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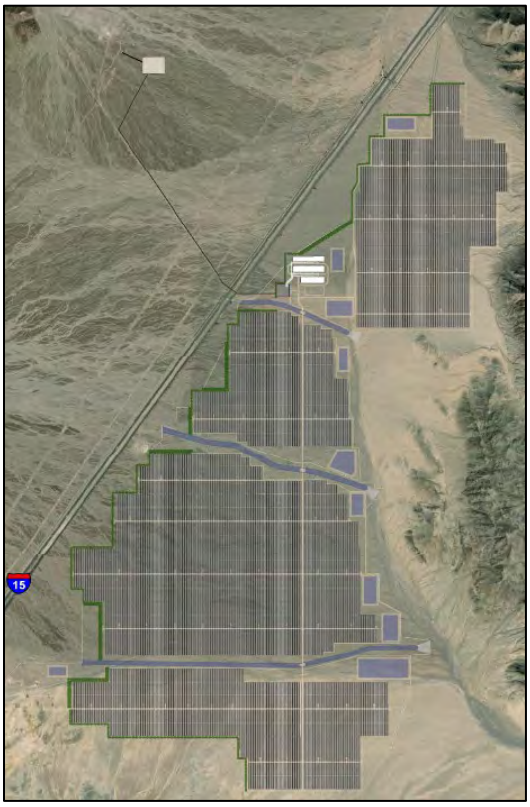
Soda Mountain Solar Project

Updated Staff Assessment

SCH #2025080161

Part 2 of 2



CALIFORNIA
ENERGY COMMISSION
Gavin Newsom, Governor

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DOCKET NUMBER 24-OPT-03

UPDATED STAFF ASSESSMENT

Soda Mountain Solar Project

(24-OPT-03)

Lead Agency

California Energy Commission

March 2026

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Part 2

Appendix A: Bracketed Comment Letters and Transcript

Appendix A

Bracketed Comment Letters and Transcript

February 27, 2026

Mr. Drew Bohan

Executive Director

California Energy Commission

715 P Street, Sacramento, CA 95814

SUBJECT: APPLICANT COMMENTS ON THE SODA MOUNTAIN SOLAR PROJECT STAFF ASSESSMENT (SCH #2025080161)

Dear Mr. Bohan,

On behalf of the Applicant team, I would like to thank the California Energy Commission for its hard work in implementing the AB 205 process. The AB 205 process is doing a tremendous job of accelerating clean energy siting, permitting, financing, transmission, and project development throughout California. Although it is not the Applicant's preferred project, the staff recommended Environmentally Superior Alternative, Big Horn Sheep Buffer and Relocated BESS Alternative #2, represents a feasible project alternative that the Applicant team can implement. This alternative retains the 2016 removal of 571 acres north of Interstate 15 to minimize impacts to desert bighorn sheep and incorporates an additional reduced construction and operational footprint to further reduce impacts to desert bighorn sheep.

The Soda Mountain Solar Project offers a model for safely locating solar and battery energy storage facilities far away from residential areas, clustered adjacent to dense infrastructure projects, and connecting to underutilized transmission lines, which prevents the need for new transmission lines to be constructed in wilderness or populated areas. The project site is prime for a renewable energy development because it is located directly adjacent to existing large-scale infrastructure projects – including the I-15, Brightline West high speed rail project and existing high-voltage transmission lines.

To ensure the project Applicant can effectively construct and operate the project, revisions to the Soda Mountain Solar Project Staff Assessment (SCH #2025080161) are required. This transmittal provides the Applicant's comments on the Soda Mountain Solar Project Staff Assessment and includes the following documents as attachments:

Attachment 1: Impact Evaluation for the Soda Mt. Solar Project
Attachment 2: Aquatic Resources Delineation and Impact Analysis
Attachment 3: Compensatory Mitigation Evaluation for Waters of the State
Attachment 4: Requested Text Clarifications for Conditions of Certification
Attachment 5: Updated Preliminary Drainage Report
Attachment 6: Bighorn Sheep Buffer Alternatives

1. PROJECT IMPACTS AND MITIGATION

Attachment 1 provides revised impact estimates and updated compensatory mitigation ratios and impact acreages specific to desert tortoise (*Gopherus agassizii*), burrowing owl (*Athene cunicularia*), and state jurisdictional waters. Attachment 2 provides the aquatic resources delineation and impact analysis. Attachment 3 provides a detailed compensatory mitigation evaluation for Waters of the State.

1.1 Revised Impacts: With implementation of the precision grading technology identified in Appendix Z (TN 261587), on-site grading and associated ground disturbance would be significantly reduced. Implementation of the precision grading technology identified in Appendix Z (TN 261587) would reduce permanent ground disturbance. The reduction in on-site grading and associated ground disturbance reduces the direct, indirect and cumulative impacts to biological and water resources, including a reduced potential for the project to result in direct, indirect or cumulative impacts to candidate and special status species. This reduction would minimize habitat loss and fragmentation for sensitive species, including desert tortoise and burrowing owl. The Staff Assessment should be updated to match the impacts identified in Attachment 1 and Attachment 3. 1-1

1.2 Water Resources Impacts: The reduction in on-site grading and associated ground disturbance would reduce the potential for the project to result in direct, indirect or cumulative impacts related to water quality standards, waste discharge requirements, surface and groundwater quality degradation and the alteration of onsite drainage patterns. Implementation of the precision grading technology identified in Appendix Z (TN 261587) and the reduction of grading earthwork efforts will allow ephemeral washes to maintain natural drainage patterns, minimize soil disruption and preserve hydrologic connectivity. The reduction in ground disturbance and grading efforts would reduce the overall use of water for dust control measures, reduce compaction of soils, and reduce erosion and sedimentation to downstream channels. Low impact grading will allow natural contour reestablishment and surface stabilization to allow for the ecological function of these features. As such, low-impact grading that avoids permanent alteration to wash morphology can warrant mitigation scaling based on actual function loss rather than raw acreage. Additional information to support this determination is included in Attachment 1 and Attachment 3. 1-2

1.3 Compensatory Mitigation Ratios: The following compensatory mitigation measures are proposed based on existing conditions, proposed mitigation measures, and anticipated post-construction conditions. Detailed information to support these requested revisions are included in Attachment 1 and Attachment 3.

1.3.1 Desert tortoise (COC BIO-16): The Applicant's Biological Resources Technical Report (TN # 261603) proposes 1:1 compensatory mitigation ratio for disturbed areas that will no longer provide viable long-term habitat for desert tortoise. This was consistent with the Bureau of Land Management's (BLM) 2016 Record of Decision and the U.S. Fish and Wildlife Service's 2016 Biological Opinion for the project, which also specified a compensatory habitat mitigation ratio of 1:1 for impacts to suitable desert tortoise habitat. The Desert Renewable Energy Conservation Plan also specifies a 1:1 mitigation ratio outside of designated critical habitat. Consistent with these documents, a 1:1 ratio is proposed to mitigate for permanent impacts. The Staff Assessment does not justify why the CEC's mitigation ratios exceed a 1:1 ratio. 1-3

In particular, the Staff Assessment's proposed 3:1 mitigation ratio for areas north of Interstate 15 is not justified. The project overlaps a portion of the Soda Mountain Expansion Area of Critical Environmental Concern (ACEC), which encompasses approximately 16,720 acres. Under the DRECP, this ACEC is subject to a 1 percent disturbance cap, and a 3:1 mitigation ratio applies only when this disturbance cap has been reached or exceeded. As documented in the Staff Assessment, the project overlap within the ACEC represents approximately 0.22 percent of the total ACEC acreage. Because the disturbance cap will not be exceeded, a 3:1 mitigation ratio is not appropriate. Moreover, given the low desert tortoise density and habitat use described in the Staff Assessment, the limited ACEC overlap does not provide a sufficient basis to justify a higher mitigation ratio for desert tortoise impacts.

1.3.2 Burrowing owl (COC BIO-21): Consistent with the Applicant's Biological Resources Technical Report (TN # 261603), a compensatory mitigation ratio of 1:1 is proposed to mitigate for disturbed areas that will no longer provide viable long-term habitat. The Staff Assessment does not justify why the CEC's mitigation ratios exceed a 1:1 ratio. 1-4

1.3.3 Waters of the State (COC BIO-26): Attachment 2 provides the aquatic resources delineation and impact analysis. Attachment 3 provides a detailed compensatory mitigation evaluation for Waters of the State.

1.3.3.1 Permanent Impacts: Based on field-verified drainage morphology and hydrologic modeling, the distributed nature of ephemeral flows, and the project's minimized grading design, the available evidence supports the conclusion that permanent project features may result in partial functional loss within direct impact footprints but will not cause a complete loss of drainage connectivity or downstream hydrologic function. Surface flows are expected to continue to route around built structures in a manner consistent with existing alluvial- fan processes. Therefore, the project would not result in complete loss of hydrologic connectivity and function, and a 3:1 mitigation ratio for impacts associated with built infrastructure should be reduced. A 1:1 ratio would be consistent with the minimum 1:1 ratio required under the State Wetland Procedures (State Water Resources Control Board 2021). Further, the Lahontan Regional Water Quality Control Board -has recently accepted 2:1 mitigation ratios for permanent impacts to waters of the State for other projects in their purview, including for the Palmdale Ditch Conversion Project, where permanent impacts to ephemeral streams were mitigated at 2:1, and for the Hackstaff Road Bridges Project, where permanent wetland and stream impacts were mitigated at 2:1. Detailed information to support these requested revisions are included in Attachment 3. 1-5

1.3.3.2 Temporary Impacts: Habitat functionality under arrays is not diminished to a degree warranting habitat replacement or justification for a 1.5:1 mitigation ratio, since the habitat will remain intact to support special-status species in the project area. Across studies and regulatory guidance documents, these underpanel zones are consistently described as modified yet still functional landscapes, retaining hydrologic and biological processes rather than representing lost habitat. As such, no compensatory mitigation is proposed under the solar arrays. Detailed information to support these requested revisions are included in Attachment 3. 1-6

1.3.4. Special Status Plants (COC BIO-12): A 1:1 mitigation ratio is commonly applied to impacts for Special Status Plants and has been accepted by lead and resource agencies for California projects (see, for example, Eldorado–Lugo–Mohave Series Capacitor Project). Additionally, the reduction in on-site grading and associated ground disturbance reduces the direct, indirect and cumulative impacts to special status plants, including a reduced potential for the project to result in direct, indirect or cumulative impacts to candidate and special status plants. Therefore, the identified ratios of 3:1 and 2:1 should be replaced with 1:1. 1-7

1.4 Water Supply: As reflected in the project description, water for project construction and operations would be supplied from up to 5 new groundwater wells installed on the project site (located in the Soda Mountain Subbasin of the Soda Lake Valley Groundwater Basin) or, alternatively or in addition, from an existing private off-site groundwater well located at 58502 Death Valley Road, Baker, California 92309 (located in the Silver Lake Valley Groundwater Basin). The Applicant prepared a Water Supply Report (Appendix J) [TN# 261605] for the off-site well option. The Water Supply Report for the off-site well included the results of both pumping tests and water quality sampling to determine existing aquifer conditions. The Water Supply Report for the off-site well concluded that the project's water usage would result in a negligible drawdown of the aquifer, sufficient groundwater resources are available to meet the project's water demand from the off-site well, and no analyte exceeded the primary or secondary Maximum Contaminant Levels. As long the project does not use more water that was estimated for the analysis in the Water Supply Report (up to 336 acre-feet during construction and decommissioning, and up to 5.6 acre-feet per year during up to 40 years of operations), the project's use of the off-site well would not 1-8

substantially decrease groundwater supplies and would not exceed the safe yield of the underlying aquifer. The Staff Assessment (specifically, Chapter 5.16, Water Resources) should be updated to incorporate analysis of the project's use of the off-site well, as reflected in the Water Supply Report. 1-8 continued

1.6 CDFW Desert Bighorn Sheep Study: The Staff Assessment refers to the California Department of Fish and Wildlife's 2024 Desert Bighorn Sheep Study for the project as (CDFW 2024), but this document is included in the References in the Staff Assessment as (RE 2024vv). A consistent reference to this document should be added to the References and included in the Record of Proceedings. 1-9

2. TEXT CLARIFICATIONS FOR CONDITIONS OF CERTIFICATION

In addition to the global changes identified in Section 2.1 below, Attachment 4 provides a document identifying the specific requested text revisions to certain of the project's COCs, which are explained below.

Attachment 4 includes highlighted placeholders for compensatory mitigation ratios and estimated impact acreages (and calculations based on those figures). The Applicant requests the CEC review the supporting documentation provided in this submittal and modify the COCs' mitigation and impact numbers globally throughout the Staff Assessment.

2.1 Global Changes

The following changes should be implemented in all COCs and in corresponding text in the environmental analysis in the Staff Assessment:

- The COCs should not require approvals by other agencies such as LADWP or BLM. These agencies may be considered reviewing agencies and consulted only on an as-needed basis. Only the CPM should be required to approve any items conditioned in the COCs. COCs that require approval of LADWP, BLM, or other agencies are problematic and have the potential to result in delays and increased compliance costs. References to USFWS consultation should be removed, as BLM is responsible for coordinating any required USFWS reviews. 1-10
- Various parts of the Staff Assessment refer to the Los Angeles Board of Water and Power Commissioners instead of Los Angeles Department of Water and Power (LADWP). LADWP determines its own internal approval processes and delegations of authority and therefore the global reference should be to LADWP not the Los Angeles Board of Water and Power Commissioners. 1-11
- In some cases, the COCs reference "prior to the start of construction" and in others, the COCs reference "prior to site mobilization and ground disturbance" or similar terminology. For clarity and consistency in compliance requirements, we request all language state "prior to the start of construction". This is consistent with the terminology identified in Section 9.2 of the Staff Assessment. 1-12

2.2 BIO-12 Special-Status Plant Avoidance and Minimization Measures

- 2. Compensatory Mitigation: CRPR 1 and 2 ranked species is listed twice. The first reference should be removed, as CRPR 1 and 2 are addressed in the second bullet.
- 6. Integrating Special-Status Plan Mitigation and Other Mitigation Lands: For consistency with COC BIO-26, we suggest using the term "state jurisdictional waters" rather than "waters of the state". 1-13
- 7.b. Title/Conveyance: We have provided clarifying text regarding the exact terms of the transaction that should be required for the CEC to review and approve.
- 7.f. Mitigation Security: Reference to "Section 7" of this condition should be added throughout to clarify that the Security is financial assurance for the compensatory mitigation requirement, not for all other measures in BIO-12.

- Verification: It is not feasible or reasonable to require the Habitat Enhancement/Restoration Plan, Formal Acquisition Proposal, Compensation Lands Management Plan, Recent Preliminary Title Report, and Property Analysis Record before the start of construction if a Security will be provided. These documents necessarily will be approved by the CPM prior to acquisition, protection, and transfer of compensation lands.

1-13 continued

2.3 BIO-15 Desert Tortoise Impact Avoidance, Minimization, and Mitigation Measures

The Staff Assessment should be globally revised to ensure that the Applicant's wildlife friendly fencing is conditioned as part of the project. Specifically, BIO-15 section 14, Permanent Security Fencing with Attached Desert Tortoise Fencing should be revised to be consistent with BIO-24 which requires the project owner install fencing between the arrays that provide passage to small mammals and desert tortoise.

As part of the construction activities wildlife friendly fencing is proposed around certain project components, with openings capable of fitting adult desert tortoises (10 inches by 7 inches). These openings are found and used by desert tortoises when they encounter fencing while traversing their habitat (Ruby et al. 1994). All wildlife friendly fencing would remain installed for the duration of the project's operation and maintenance. The presence of wildlife friendly fencing would allow for the recolonization of the site by desert tortoise and other wildlife. In other photovoltaic projects using the same process, wildlife, including desert tortoise, rattlesnake, desert kit fox, rabbits, and other species, were found to reoccupy the site after removal of exclusion fencing (Cypher et al. 2021). The proposed fencing would allow for wildlife species to reoccupy the project site during operation and maintenance.

1-14

2.4 BIO-16 Habitat Management Land Acquisition for Desert Tortoise

- The requested edits shown in Attachment 4—which include recalculating mitigation requirements based on the final project impact acreage, and allowing stacking of conservation lands for all compensatory mitigation requirements—will ensure mitigation is proportional to actual impacts. The final amount of compensatory mitigation is not yet known so a specific acreage amount and Security amount should not be required in the COC.
- 1.a. Cost Estimates: The requested text addition allows for a more accurate Security calculation in certain circumstances.
- 2. Mitigation Bank Credits: Consistent with comments above, the final amount of compensatory mitigation is not yet known so a specific acreage amount should not be required in the COC.
- 8. Transfer Long-term Endowment Funds: The endowment funds should not be required before the HM lands are acquired or transferred.
- 11.a. Security Amount: Consistent with comments above, the final amount of compensatory mitigation is not yet known, so the requested revision allows for a more accurate Security based on the actual compensatory mitigation requirement.
- 11.g. Security Release: The requested revision facilitates partial release of security (for example, release of a portion of the security for land acquisition after the land is acquired).
- Verification: It is not feasible or reasonable to provide the Draft and Final Management Plans prior to the start of construction if a Security will be provided. These documents necessarily will be approved by the CPM prior to acquisition, protection, and transfer of HM lands.

1-15

2.5 BIO-21 Habitat Management Land Acquisition for Burrowing Owl

- Many of the requested edits to COC BIO-21 are consistent with those for BIO-16, for the same reasons noted above.
- 1.d–1.g (Cost Estimates), 11.a (Security Amount). The requested edits correct what appears to be a clerical error in the reported cost estimates.

1-16

2.6 BIO-23 Habitat Management Land Acquisition for Permanent and Temporary Impacts to State Waters

- The requested edits to BIO-23 are consistent with those for BIO-12, BIO-16, and BIO-21, for the same reasons noted above.

1-17

2.7 WATER-4 Compliance with Clean Water Act Section 401

- The requested edit is a correction to avoid confusion because the project is not subject to the Clean Water Act.

1-18

2.8 WATER-5 Groundwater Production and Monitoring Well Installation

- The requested edits account for the possibility that the project will use water from an existing off-site well, in addition or as an alternative to installing up to 5 on-site wells, and the timing of installing on-site wells (if at all) is not known at this time. This is consistent with the project description.
- The requested edits specify the portions of the San Bernardino County Desert Groundwater Management Ordinance that the project is required to comply with, but also make express that the County does not exercise permitting jurisdiction under this Ordinance.
- Verification: The requested edits provide feasible timeframes for providing the Groundwater Well Installation Workplan, Groundwater Well Installation Report, and Groundwater Monitoring and Reporting Plan. As proposed in the Staff Assessment, the timeframes (especially the Groundwater Well Installation Workplan 18 months before construction) are infeasible and will cause substantial undue delays to the project.

1-19

2.9 WATER-6 Groundwater Monitoring and Reporting

- The requested edits to WATER-6 are consistent with those for WATER-5, for the same reasons noted above.

1-20

2.10 WATER-7 Water Use and Reporting

- The requested edits to WATER-7 are consistent with those for WATER-5 and WATER-6, for the same reasons noted above.

1-21

2.11 WORKER SAFETY-10

- The requested edits provide minor tweaks to WORKER SAFETY-10 which acknowledge that the active solar energy system property tax exclusion under Revenue and Taxation Code section 73 expires January 1, 2027. Construction of the project will not be completed and subject to possessory interest tax by that date, so the project will not be subject to the exclusion unless the Legislature extends it (which is unlikely). The project's payment of possessory interest tax to San Bernardino County will provide material funding for the San Bernardino County Fire Protection District (SBCFPD) during project operations. The environmental analysis in the Staff Assessment also should be revised to reflect that the active solar energy system property tax exclusion will expire after January 1, 2027, and the project will fund the SBCFPD during project operations through its payment of possessory interest tax.

1-22

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3. PRELIMINARY DRAINAGE REPORT

Attachment 5 provides an Updated Preliminary Drainage Report, providing additional information on the post-construction conditions of the project after implementation of COC WATER-9. The proposed drainage patterns from implementation of COC WATER-9 provide the most feasible and low-impact solution for the project and do not alter the existing drainage pattern in a manner which would result in erosion or siltation, significantly increase the rate or amount of surface runoff, or impede or redirect flood flows. Due to the highly pervious nature of the project site in both the existing and proposed conditions and limited disturbance areas, the surface runoff will not differ significantly in the proposed condition than in the existing. Increased runoff from the (disturbed and compacted) access roads will be dissipated and infiltrated onsite within the alluvial soils immediately downgradient of the roads, resulting in no significant increase in runoff or erosion. Where these access roads must cross shallow seasonal drainage paths, small diameter (e.g., 3-inch) rock may be used where needed to stabilize the road surface, as localized erosion/scour may otherwise occur in a major storm event. As the rock will be installed at existing grades, no disruption of grades leading to erosion/scour will occur. Elevation and grading/compaction of pads is anticipated for the BESS yards, substation and switchyard. With that disturbance and grading/compaction, some concentration and increase of runoff and erosion is anticipated, absent mitigating countermeasures. These countermeasures include small rock-lined swales and berms adjacent to the pads to capture and infiltrate increased runoff and minimizing erosion potential to a level of non-significance. The vast majority of solar panel pilings will not require any protection, but where needed, and as determined during the final design of the project, some pilings will be deeper to counter any potential localized scour that the pilings may be subject to. In no case would the pilings be subject to scour exceeding 2 feet however, and any scour would be very localized and contained. If needed, small rock may be used as a mitigating countermeasure to prevent the localized scour. 1-23

4. Project Alternatives

4.1 No Project Alternative: The 1.24-mile buffer presented in CEC Docket Item TN 262246 is functionally equivalent to the No Project Alternative evaluated in the Staff Assessment. As shown in Attachment 5, expanding the CEC-conditioned 0.25-mile buffer identified under the Big Horn Sheep Buffer and Relocated BESS Alternative #2 to a 1.24-mile buffer would render the majority of the project site undevelopable. Specifically, implementation of a 1.24-mile buffer would place approximately 2,609 acres of the 2,670-acre project site into preservation status, with no development permitted. This represents a 96 percent reduction in the developable footprint, which is effectively the same outcome as the No Project Alternative presented in the Staff Assessment and, therefore, is not a feasible project alternative. 1-24

4.2 0.64 Mile Buffer: A 0.64-mile buffer has been determined infeasible by the Applicant to implement as both a project alternative or mitigation measure. Implementing a 0.64-mile buffer as an alternative or mitigation measure would prevent the project from attaining most of the basic project objectives. Additionally, there are specific economic, legal, environmental, social, and technological factors that make implementing a 0.64-mile buffer infeasible as a project alternative or mitigation measure. The Applicant team has evaluated a 0.64 mile buffer, which is shown in Attachment 6. Implementation of a 0.64-mile buffer would place approximately 1,402 acres of the 2,670-acre project site into preservation status, with no development permitted. This represents a 53 percent reduction in the developable footprint, which would reduce the project's solar energy generation capacity and battery energy storage capacity by at least half. It is important to note that the reduction in project footprint size due to implementation of a 0.64-mile buffer may not result in a linear reduction in the project's energy generation and storage capacity. In other words, a 50% reduction in the project footprint could result in a reduction in the project's energy generation and storage capacity of much greater than 50%. This is because the project contains civil design features such as roads, fences, and basins, and moving these project components would lead to an even greater reduction to the solar field and BESS size than the 1,402-acre reduction from buffer implementation. 1-25

The primary goal of the project proposed within Opt-In Application (24-OPT-03) is to contribute to the achievement of California's renewable energy goals and create a vital new point of interconnection for renewable energy in San Bernardino County to connect to California's electric transmission infrastructure. There are 7 specific project objectives for the project. The discussion below identifies how implementation of a 0.64-mile buffer would be in direct conflict with the proposed project's objectives and would impede the project from attaining the project's objectives. 1-25 continued

Project Objective 1: Assist the State of California in achieving or exceeding its Renewables Portfolio Standard and greenhouse gas emissions reduction objectives by developing and constructing new California Renewables Portfolio Standard–qualified solar power generation facilities producing approximately 300 MW.

The Renewables Portfolio Standard (RPS) is one of California's key programs for advancing renewable energy. The program sets continuously escalating renewable energy procurement requirements for the State's load-serving entities. The RPS requires all load-serving entities in California to procure an increasing portion of their electricity sales from eligible renewable resources. Senate Bill (SB) 1078, passed in September 2002, set the RPS of 20% total renewables generation by 2020.

- SB 107, passed in September 2006, accelerated achievement of the 20% RPS to 2010.
- SB X1-2, signed in April 2011, raised the RPS goal to 33% in 2020.
- SB 350, signed in 2015, increased the RPS goal to 50% in 2030.
- SB 100, signed into law in September 2018, revised the RPS goal to 60% by 2030 and set a long-term target of 100% carbon-free energy by December 31, 2045.

Electricity generated by the project would be used to serve the needs of California customers and would facilitate compliance with California's RPS. The project would assist the State in achieving its energy objectives under SB 100 and SB 350 and greenhouse gas emissions–reduction goals under Assembly Bill 32. The project would advance the goals of the State to reduce use of fossil fuels and increase the availability of electricity from solar energy, which is eligible for compliance with the RPS.

Implementing a 0.64-mile buffer as an alternative or mitigation measure would result in a significant direct loss of renewable energy generation. Implementing a 0.64-mile buffer would result in a reduction to the total project footprint of 1,402 acres or 52%. This reduction would prevent the project from producing 300 MW of solar energy and would directly conflict with the project objective to transition the State to renewable energy and meeting RPS targets by providing 300 MW of RPS-qualified solar energy generation facilities. This loss of solar energy generation would also impact the State's ability to maintain electrical system reliability under this transition and during extreme climate change driven events. Therefore, implementation of a 0.64-mile buffer as a project alternative or mitigation measure would impede the project from attaining project objective #1. 1-26

Project Objective 2: Produce and transmit electricity at a competitive cost.

Economies of scale allow for cost advantages when building large-scale renewable energy developments. It is more cost effective to construct one large project to produce 300 MW of renewable energy, than constructing multiple smaller projects to cumulatively produce 300 MW of renewable energy. Solar panels, inverters and other components are more cost competitive when bought in large quantities, lowering the overall project cost. Fixed costs such as interconnection facilities, permitting, design, land acquisition and project management are spread across a larger number of watts generated in a large-scale project, lowering the cost per watt. Energy capture is also subject to economies of scale and cost savings for rate payers can be maximized by utilizing 1-27

an optimal land layout and panel orientation. Large utility-scale solar projects can be better integrated into the electrical grid, potentially reducing transmission losses and providing more predictable power output. The most significant fixed cost is associated with the new high-voltage interconnection facilities required by LADWP, which are currently estimated to cost over $60 million dollars. These costs remain the same even if the project size and energy generation are greatly reduced, thus making a significant reduction in project size particularly harmful to the project's ability to sell power cheaply.

Last, a reduction in footprint due to implementation of a 0.64-mile buffer from areas may not result in a linear reduction in project size, and ensuing energy generation loss could be far greater than 53% or 1,402 acres. This is because the project area being reduced by implementation of a 0.64-mile buffer contains civil design features such as roads, fences and basins, and re-arranging these project components would lead to an even greater reduction to the solar field and BESS size than the 1,402-acre reduction from buffer implementation. 1-27 continued

For the reasons above, implementing a 0.64-mile buffer would cause a significantly more expensive project and impair the Applicant's ability to sell power more cheaply on the wholesale market or to LADWP directly. Therefore, implementation of a 0.64-mile buffer as a project alternative or mitigation measure would directly impact the project's ability to save California ratepayers money and would impede the project from attaining project objective #2.

Project Objective 3: Provide a new source of energy storage that assists the State in achieving its energy storage mandates.

Within the State of California, implementation of the project supports the Energy Action Plan and Loading Order, which established a high-level, coherent approach to meeting California's electricity and natural gas needs and set forth the "loading order" to address California's future energy needs. The "loading order" established that the State, in meeting its energy needs, would invest first in energy efficiency and demand-side resources, followed by renewable resources, and only then in clean conventional electricity supply. Since that time, the California Public Utilities Commission and California Energy Commission have overseen the plans, policies, and programs for prioritizing the preferred resources, including energy efficiency and renewable energy.

Electricity from the project would be used to serve the needs of California customers and would facilitate compliance with California's RPS. The project would assist the State in achieving its energy objectives under SBs 100 and 350 and greenhouse gas emissions–reduction goals under Assembly Bill 32. The project would advance the goals of the State to reduce use of fossil fuels and increase the availability of electricity from solar energy, which is eligible for compliance with the RPS.

Implementing a 0.64-mile buffer would result in a reduction to the total project footprint of 1,402 acres or 53%. This reduction would prevent the project from producing 300 MW of solar energy and would directly conflict with the project objective of advancing the energy storage mandates. The reduction in energy generation would reduce the amount of solar energy that would flow into the BESS and would require the BESS facility to be downsized in the same proportion as the solar field. A downsized solar energy system would not generate sufficient energy to charge a BESS of 300 MW, and the implementation of a 0.64-mile buffer would result in a direct reduction in energy storage capacity. This loss of energy storage would negatively impact the State's ability to accelerate a transition to renewable energy and would negatively impact the State's ability to maintain electrical system reliability under this transition and during extreme climate change driven events. Therefore, implementation of a 0.64-mile buffer as a project alternative or mitigation measure would impede the project from attaining project objective #3. 1-28

Project Objective 4: Use the existing transmission unused capacity that provides approximately 300 MW of capacity.

The power produced by the project would be conveyed to the regional electrical grid through an interconnection with the existing Marketplace-Adelanto 500-kilovolt (kV) transmission line operated by the Los Angeles Department of Water and Power (LADWP). Transmission is critical to ensuring grid reliability and resilience, particularly as the state faces extreme weather events caused by climate change. According to the California ISO Transmission Plan, the need for new energy generation over the next 10 years has escalated rapidly, driving an accelerated pace for new transmission development. The combination of dramatically increasing the pace of renewable generation and load forecast growth are driving an increase in transmission requirements. To meet the State's renewable energy goals, an expanded, upgraded and reinforced transmission system is required.

The proposed project does not require the construction of new off-site transmission infrastructure and instead maximizes the use of existing infrastructure that is currently underutilized and directly adjacent to the project site. Implementing a 0.64-mile buffer would result in a reduction to the total project footprint of 1,402 acres, or 53% of the total project footprint. This reduction in project footprint would prevent the project from producing 300 MW of solar energy and 300 MW of energy storage, and would directly conflict with the project objective of maximizing the utilization of the existing transmission line's unused capacity of 300 MW. Therefore, implementation of a 0.64-mile buffer as a project alternative or mitigation measure would impede the project from attaining project objective #4. 1-29

Project Objective 5: Utilize existing energy infrastructure to the extent possible by locating solar power generation facilities near existing infrastructure, such as electrical transmission facilities.

The project proposes a large-scale solar and battery storage facility within an area that contains existing infrastructure, including the existing Marketplace-Adelanto 500 kV transmission line operated by the LADWP. Although reducing the project footprint would still allow for the remaining project components to connect to the existing energy infrastructure, reducing the project's energy generation capabilities would not maximize the existing energy infrastructure in the project area. The existing Marketplace-Adelanto 500 kV transmission line has the capacity to handle an additional 300 MW of energy, which would be generated by the project.

The project has an existing executed Interconnection Agreement for 300 MW of capacity with LADWP. A significant reduction in size caused by implementing a 0.64-mile buffer is prohibited under the current interconnection agreement and would trigger a "material modification process" per LADWP's Open Access Transmission Tariff, Attachment M: Large Generator Interconnection Procedures, further causing re-study and amendment of the Agreement. Such a process causes significant unknowns related to study timing, future costs and project schedule, and until resolved would impede the financial investment necessary to advance the project development and construction. Every action for this project that is not consistent with the existing LADWP Agreement requires 11 approvals from all members of the Mead-Adelanto Project leading to significant additional time beyond normal interconnection processes. Implementation of a 0.64-mile buffer would result in an anticipated freeze on the project advancement of a minimum of 18 months. This potential delay would prevent the project from being capable of being accomplished within a reasonable period of time and is therefore infeasible. 1-30

Implementing a 0.64-mile buffer would result in a reduction to the total project footprint of 1,402 acres, or 53% of the total project footprint. This reduction would prevent the project from producing 300 MW of solar energy and the reduced production of energy at this project site would have to be 1-31

made up by installing solar panels at another site. Thus, the effect of implementing a 0.64-mile buffer would be to preclude the utilization, to the extent possible, of the existing infrastructure adjacent to the project site. This consequence would directly conflict with the project objective of utilizing existing transmission infrastructure. Therefore, implementation of a 0.64-mile buffer as a project alternative or mitigation measure would impede the project from attaining project objective #5. 1-31 continued

Project Objective 6: Site solar power generation facilities in areas of San Bernardino County that have the best solar resource to maximize energy production and the efficient use of land.

The project site is located within a designated federal Section 368 Energy Corridor adjacent to I-15 (Corridor number 27-225). Additionally, an existing Southern California Edison (SCE)-owned 115 kV sub transmission line and an LADWP-operated 500 kV transmission line run parallel to and adjacent to the western perimeter of the project site. The project site is located immediately adjacent to existing roadways that provide readily available access for construction and operations. The project site was selected to maximize energy production and the most efficient use of land, considering existing infrastructure, site geology, environmental impacts, water, waste and fuel constraints and electric transmission constraints.

The proposed project is located within the DRECP area of the County of San Bernardino and was sited in this area in an effort to maximize energy production while efficiently using land. Implementing a 0.64-mile buffer would result in a reduction to the total project footprint of 1,402 acres, or 53% of the total project footprint. This reduction would prevent the project from producing 300 MW of solar energy. A reduction in the project footprint could result in a separate project being proposed elsewhere within the County to fully meet energy production goals. This would directly conflict with the project objective of siting solar power generation facilities in areas of San Bernardino County that have the best solar resource to maximize energy production while efficiently using of land. Therefore, implementation of a 0.64-mile buffer as a project alternative or mitigation measure would impede the project from attaining project objective #6. 1-32

Project Objective 7: Develop a solar power generation facility in San Bernardino County that would support the economy by investing in the local community, creating local construction jobs, and increasing tax and fee revenue to the County.

The project would provide economic benefits to the County of San Bernardino and to its residents and businesses by increasing spending in the community as a result of construction and development-related work. It would provide opportunities for local tradespeople to develop their skills and gain experience installing solar and battery storage facilities and would reduce the amount of time that many of these people spend commuting by offering a local job opportunity. It also would provide increased sales and use taxes, personal property tax, and possessory interest property tax revenues to the County over many years.

Implementing a 0.64-mile buffer would result in a reduction to the total project footprint of 1,402 acres, or 53% of the total project footprint. The reduction in project footprint would reduce construction and operational jobs, project taxes, and associated local economic benefits to the County and local businesses. Therefore, implementation of a 0.64-mile buffer as a project alternative or mitigation measure would impede the project from attaining project objective #7. 1-33

Economic and Legal Factors: Reduction of the project footprint would result in a financial burden that would significantly hinder the project's viability and the economic benefits to the community. Practical limitations, such as direct conflicts with legal agreements contained within the LADWP Interconnection Agreement and Facilities Studies, create an infeasible scenario for reducing the project footprint. The project has an existing executed Interconnection Agreement for 300 MW of 1-34

capacity with LADWP. A significant reduction in size caused by implementing a 0.64-mile buffer would be prohibited under the current agreement and would result in the triggering of a "material modification process" with LADWP, further causing re-study and amendment of the Agreement. Such a process causes significant unknowns related to study timing, future costs and project schedule, and until resolved would impede the financial investment necessary to advance the project development and construction. Every action for this project that is not consistent with the existing LADWP Interconnection Agreement requires 11 approvals from all members of the Mead-Adelanto Project leading to significant additional time beyond normal interconnection processes. Implementation of a 0.64-mile buffer would result in an anticipated freeze on the project advancement of a minimum of 18 months. This potential delay would prevent the project from being capable of being accomplished within a reasonable period of time and is therefore infeasible. 1-34 continued

Implementing a 0.64-mile buffer may also result in a breach of the LADWP Agreement that could result in a termination of this agreement, which has significant economic consequences and creates a situation that makes implementing a 0.64-mile buffer infeasible. It is also expected that implementation of a 0.64-mile buffer would result in a higher cost per watt for the project by not maximizing economies of scale. Economically, a reduction in the project footprint would also significantly reduce the living wage jobs that would be provided during project construction and operation. This would result in a direct reduction in the economic benefits of the project to the County and its residents by decreasing spending in the community as a result of construction and development-related work. The reduction in project footprint would reduce the direct and indirect economic benefits of the project, including reducing labor costs, contractor's profit and overhead, sales and use taxes, personal property tax, and possessory interest tax revenues to the State of California and County of San Bernardino. The total fiscal benefit to the County and State from implementation of the project would be substantially reduced with implementation of a 0.64-mile buffer. 1-35

Social Factors: Reducing the project footprint would also reduce the socioeconomic benefits of the project, including employment for local residences and sources of income through the direct and indirect employment opportunities identified within the project's Socioeconomic Study (Appendix P TN #259903). A reduction in the project footprint would substantially reduce the project's ability to help provide a reliable local source of renewable power that would minimize power outages and disruptions by reducing rolling blackouts during peak demand periods. 1-36

Technological Factors: The proposed project is a large-scale infrastructure project that utilizes state-of-the-art solar energy generation and battery energy storage technology. The project site was selected because it is located directly adjacent to existing large scale infrastructure projects – including the I-15, Brightline West high speed rail project and existing transmission lines. The project offers a model for safely locating solar and battery energy storage facilities far away from residential areas, clustered adjacent to dense infrastructure projects, and connecting to underutilized transmission lines, which prevents the need for new transmission lines to be constructed in wilderness or populated areas. Reducing the project footprint reduces the project's capability for maximizing technology in an effort to build environmentally friendly solar and battery storage developments. 1-37

4.3 Staff-Recommended Bighorn Sheep Buffer and Relocated BESS Alternative #2: Although it is not the Applicant's preferred project, the staff-recommended Environmentally Superior Alternative, Bighorn Sheep Buffer and Relocated BESS Alternative #2, represents a feasible project alternative that the Applicant team can implement. This alternative retains the 2016 removal of 571 acres north of Interstate 15 to minimize impacts to desert bighorn sheep and incorporates a reduced construction and operational footprint. As a result, it would generate less severe impacts than the proposed project across the following issue areas: Air Quality; Biological Resources; Climate Change and Greenhouse Gases; Cultural and Tribal 1-38

Cultural Resources; Hazards, Hazardous Materials, and Wildfire; Public Health; Solid Waste Management; and Transportation. The Bighorn Sheep Buffer and Relocated BESS Alternative #2 is the product of an exhaustive and collaborative engineering and environmental design process involving the developer, owner, environmental and biological consultants, civil design engineers, resource agencies, and the CEC. The alternative reflects a good-faith effort to maximize the developable potential of the site through highly efficient design and equipment selection while simultaneously incorporating conservation measures to meaningfully address biological resource concerns. This alternative has an extremely constrained design from a technical standpoint, such that any further reduction of the project footprint would result in a reduction of the project's energy generation capacity and a diminished ability of the Applicant to meet the project objectives.

1-38 continued

CONCLUSION

On behalf of the Applicant team, I would like to thank the California Energy Commission for its hard work in implementing the AB 205 process. The applicant team appreciates the opportunity to provide these comments and our team stands ready to execute a viable renewable energy and battery storage project, including delivering a modified project design, referred to as the staff-recommended Environmentally Superior Alternative, the Big Horn Sheep Buffer and Relocated BESS Alternative #2.

Sincerely,

Hannah Arkin

CEO, Resolution Environmental

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February 26, 2026
Project No: 25-17245

Soda Mountain Solar, LLC
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Newark, New Jersey 07102

Subject: Impacts Evaluation for the Soda Mountain Solar Project in Unincorporated San Bernadino County, California

This report has been prepared by Rincon Consultants to provide revised impact estimates and updated compensatory mitigation ratios/acreages specific to desert tortoise (*Gopherus agassizii*), burrowing owl (*Athene cunicularia*), and impacts to water. The report has two primary purposes: 1) to summarize updated evaluations of impacts to biological and water resources within the Project boundaries of the proposed Soda Mountain Solar Project (Project) based on modifications to the project's proposed construction activity and methods and the proposed revegetation and management plan; and 2) to present proposed revisions to the mitigation ratios and/or acreages based on the updated impacts evaluation.

Rincon has prepared this report based on two primary sources of existing information: 1) vegetation community and habitat mapping prepared by SWCA (2024a) and reviewed by the California Energy Commission; and 2) information on advanced construction technology and 30 percent site design provided by ZGlobal and their Design/Build contractor. This evaluation considered the currently proposed alternative technology for solar array installation in the context of previously disclosed existing conditions, proposed mitigation measures, and proposed compensatory mitigation.

Revisions to the construction activity and methodology include implementation of advanced technology as reflected in CEC Docket TN# 261587 which would require the project to utilize advanced terrain-following solar tracker systems which would significantly reduce mass grading efforts. The Project is currently evaluating two project designs. Project A (Preferred Design) and Project B (Alternative Design). Under both options, this construction methodology would reduce permanent impacts from up to 2,074.31 acres to 246.02 acres under Project A, and from 1,987.45 acres to 213.7 acres under Project B by significantly reducing the extent of site grading. Reduced levels of grading would reduce permanent impacts to ephemeral drainages to 191.01 acres under Project A and 157.70 acres under Project B. The total acreage of temporary impacts would converse increase, with temporary impacts resulting from ground disturbance associated with mowing and drive/crush of vegetation, maintain soil and seed bank and allowing for a quicker and more natural revegetation of the most of the project site. 2-1

Recommendations for levels of compensatory mitigation were revised based on ratios contained in the initial 2016 Record of Decision, in the context of reduction of permanent impacts, reduction in loss of functional habitat, and suggested agency guidelines based on established procedures.

Methodology

Rincon Consultants (Rincon) conducted desktop analysis and literature review to evaluate existing biological conditions within the Project area and to assess potential impacts and mitigation strategies. This analysis relied on a comprehensive review of previously published technical documents, environmental assessments, and biological studies relevant to the Soda Mountain Solar Project. The 30 percent site design provided by ZGlobal and their Design/Build contractor was used to estimate impact footprints and assess spatial overlap with sensitive biological resources.

The following sources were used in the impacts evaluation:

- Soda Mountain Solar Project Environmental Impact Report (EIR) prepared by the Bureau of Land Management (BLM 2015),
- Record of Decision Soda Mountain Solar Project and Amendment to the California Desert Conservation Area Plan. (BLM 2016)
- CEC Docket TN #261603 Soda Mountain Solar Project Biological Resources Technical Report (Appendix D-1) (SWCA 2024a)
- CEC Docket TN #261597 Revised EIR Section 3.4 Biological Resources February 2025 (SWCA 2025a)
- CEC Docket TN #261595 Chapter 2 Project Description February 2025 (SWCA 2025b)

These primary sources were supplemented by additional technical documents that provided species specific data, hydrological data, and mitigation implementation details:

- CEC Docket TN #257930 Water Supply Assessment for the Soda Mountain Solar Project (Appendix J) (SWCA 2025c)
- CEC Docket TN# 261587 Mitigation Measure MM BIO-3 (Appendix Z) (SWCA 2025d)

Background

Project Description

The Soda Mountain Solar Project is located approximately 7 miles southwest of Baker, CA, directly adjacent to Interstate 15. A Record of Decision (ROD) was initially issued by the Bureau of Land Management in March 2016, however, was later rejected by the San Bernardino County supervisors.

The 2016 Project included the development of a 287 megawatts (MW) photovoltaic solar facility and associated infrastructure and facilities within 2,942-acre project boundary (Project). Surface disturbance was anticipated at 2,059 acres of which 1,767 acres would be permanently impacted.

The Project is currently evaluating two project designs. Project A (Preferred Design) and Project B (Alternative Design). Both designs include the development of a 300 MW photovoltaic solar farm and includes 300 MW battery storage. Under Project A, total impacts will be contained within 2074.31 acres, while total impacts under Project B will be limited to 1987.45 acres. Permanent impacts under Project A will be limited to approximately 246.02 acres, while permanent impacts under Project B will be limited to approximately 213.7 acres. 2-2

The project site remains within the 2016 ROD location site. The site remains located adjacent to existing roadways that provide access for construction and operations. Figure 1 and Figure 2 document Limits of Disturbance and anticipated Temporary and Permanent Disturbance.

Existing Conditions

The existing conditions within the Project boundaries remain consistent with the 2016 Project design (BLM 2016). Vegetation within the Project boundaries consists primarily of Mojavean desert scrub and desert wash scrub habitats, with sandy soils and scattered gravel and cobble. Within the project boundary, five native vegetation communities were identified, including Creosote Bush– White Bursage Bush Scrub, Creosote Bush Scrub, Rigid Spine Flower – Hairy Desert Sunflower, Cheesebush–Sweetbush Scrub, and California Joint Fir–Longleaf Joint-fir Scrub (SWCA 2024). Two sensitive vegetative “associations” were present. Table 1 presents the mapped vegetation communities within the project 2-3

Study Area and the total acreages of each community. The Study Area also included disturbed (i.e., previous surface disruption or mechanical clearing) and developed areas (i.e., maintained dirt roads).

Desert tortoise and burrowing owl sign were observed during survey efforts conducted in May 2023. No desert tortoise were directly observed, however suitable burrows and scat was present within the Project boundary.

Table 1 Vegetation Communities and Land Cover Types

Vegetation Community	Global Rank*	State Rank†	Acres within Project Boundary
Creosote Bush – White Bursage Scrub Larrea tridentata – Ambrosia Dumosa Shrubland Alliance	G5	S5	2,459
Creosote Bush Scrub Larrea tridentata Shrubland Alliance	G5	S5	145
Rigid Spineflower – Hairy Desert Sunflower Chorizanthe rigida – Geraea canescens Desert Pavement Sparsely Vegetated Alliance, (Chorizanthe rigida – Geraea canescens Desert Pavement Association)	G4	S4 (Sensitive Association	32
Cheesebush – Sweetbush Scrub Ambrosia salsola – Bebbia juncea Shrubland Alliance	G4	S4	8.2
California Joint Fir – Longleaf Joint-fir Ephedra californica – Ephedra trifurca Shrubland Alliance, (Ephedra californica – Ambrosia salsola Association)	G5	S4 (Sensitive Association)	1.2
Developed/Disturbed	NA	NA	25

*Global Rank (NatureServe 2024):

- G4 = Over 100 viable occurrences worldwide/statewide and/or more than 32,000 acres
- G5 = Demonstrably secure because of its worldwide/statewide abundance

†State Rank (NatureServe 2024):

- S4 = Over 100 viable occurrences worldwide/statewide and/or more than 32,000 acres
- S5 = Demonstrably secure because of its worldwide/statewide abundance

Table 2 Special Status Species Suitable Habitat

Species	Suitable Habitat (Acres)	Suitable Habitat Description
desert tortoise (*Gopherus agassizii*)	2645.4	Variety of environments from sandy flats to rocky foothills, including alluvial fans, washes and canyons. Arid land with sparse vegetation. All native vegetation communities in project area.
burrowing owl (*Athene cunicularia*)	2645.4	Open dry annual or perennial grasslands, deserts, and scrublands characterized by low growing vegetation. All native vegetation communities in project area.

2-3 continued

Site Restoration and Fencing

The implementation of new technology will significantly reduce the need for site grading, thereby limiting permanent soil disturbance and preserving native topography. Temporarily disturbed areas will be restored to pre-project conditions through implementation of a Vegetation Resources Management Plan, which includes top-soil salvage, native seeding, and performance standards, including monitoring and

2-4

reporting (BIO-13). To maintain site permeability for wildlife, the project is proposing to design fencing to allow re-entry of desert tortoise and direct animals toward designated undercrossings to prevent obstruction of movement. Collectively, these proposed efforts would reduce the extent and severity of habitat disturbance, support habitat restoration, and ensure continued wildlife access through and around the facility. Measures associated with desert tortoise and burrowing owl are provided in Attachment 2. 2-4 continued

Restoration

Following construction activities, temporary disturbance areas will be restored in accordance with BIO-13, which requires implementation of a Vegetation Resources Management Plan. The plan will help restore temporary impacts to functional desert tortoise habitat within the project area. Desert tortoise primarily use creosote bush and white bursage for cover, which is the dominant vegetation community present in the project area, totaling 2,459 acres (Esque et al. 2021). Creosote bush is capable of resprouting following disturbance by heavy vehicles, regaining a full canopy within 5 years (Gibson et al. 2004). Reseeding shrub seedlings will also provide further mitigation to the damage caused during the minimal ground disturbance (Abella & Berry, 2016). Annuals, necessary for forage, revegetate faster, taking 1-15 years to reestablish (Abella & Berry, 2016). Previous solar projects in alluvial fans have utilized the post-construction addition of biocrust to further advance restoration of temporary disturbed areas impacted by minimal ground disturbance (Phoenix 2019). The implementation of advanced technology and BIO-13 will provide a comprehensive plan to limit the impact of ground disturbance throughout the project timeline. 2-5

Case studies by Valley Electrical Association in the Mojave Desert demonstrated minimal ground disturbance, followed by revegetation of shrubs and forage along with wildlife friendly fencing, leads to desert tortoise re-utilizing the habitat within solar farms (VEA 2022). The use of minimal ground disturbance methods, combined with updated restoration plans, should result in the long-term maintenance and viability of suitable desert tortoise and burrowing owl habitat within the solar array areas, significantly reduce long-term habitat degradation and support the recovery and continued use of the site by desert tortoise and burrowing owl. As such, a reduction in compensatory mitigation to offset loss of burrowing owl and desert tortoise habitat to align with the revised permanent impact acreage is appropriate. 2-6

Fencing

Prior to construction activities, exclusion fencing will be installed to prevent all wildlife from entering the project area. As part of the construction activities wildlife friendly fencing is proposed around certain project components, with openings capable of fitting adult desert tortoises (10 inches by 7 inches). These openings are found and used by desert tortoises when they encounter fencing while traversing their habitat (Ruby et al. 1994). All wildlife friendly fencing would remain installed for the duration of the project's operation and maintenance. The presence of wildlife friendly fencing would allow for the recolonization of the site by desert tortoise and other wildlife. In other photovoltaic projects using the same process, wildlife, including desert tortoise, rattlesnake, desert kit fox, rabbits, and other species, were found to reoccupy the site after removal of exclusion fencing (Cypher et al. 2021). The proposed fencing would allow for wildlife species to reoccupy the project site during operation and maintenance. 2-7

Installation Methods

Advanced Technology

The Project's utilization of advanced technology would substantially reduce the extent of ground disturbance, vegetation removal and direct impacts from project development as compared to previous technology that requires more extensive grading to prepare the site for panel installation. The proposed

project would use Nextracker NX Horizon-XTR-0.75 10-inch tracker system, Nevados All Terrain Tracker system, or other similar systems under development that would limit disturbance for each pile installation to 1 square foot per pile (approximately 3 acres per every 100,000 piles). These trackers can accommodate up to 15 percent or more slope compared to typical equipment.

Site Preparation and Installation

Site clearing and preparation will be required for pile installation to allow access for work on the solar array but at levels far less extensive and intrusive. Site preparation will include limited mowing and grubbing within the site, removal of large boulders, and spot grading to allow for equipment usage. In most instances equipment would be rolled over vegetation to minimize vegetation loss.

Installation of the Solar Array system will not change from what was described in CEC Docket TN #261595 Chapter 2 Project Description. Construction of the solar arrays would begin with the installation of array support posts, which would be driven into the soil using a pile/vibratory/rotary driving technique to a depth of approximately 6 to 12 feet. Once the support structures are in place, solar panels would be attached to the support frame. The assembled groups of solar panels would be wired together into strings through connectors on the back of the modules. Assembled panel sections would then be connected to combiner boxes located throughout the arrays that would deliver power to the inverter. Output wires from combiner boxes would be routed along an underground trench system approximately 3 to 6 feet deep and 1 to 6 feet wide, to the central inverter. Central inverters would be mounted on concrete pads or driven piles. Central inverters would be brought in by tractor-trailers through the Rasor Road site entrance and delivered directly to the mounting pad sites where they are placed by mobile crane (SWCA 2025). Racking systems and modules will be installed using terrain telehandlers, trucks, trailers, UTVs. Approximately 55 acres of permanent disturbance will be attributed to the installation of the solar panels associated with the use of advanced technology. Development of permanent infrastructure (inclusive of roads, facilities and solar panel posts) on the entire project site under the specifications as discussed in CEC Docket TN# 261587, would result in permanent impacts as follows:

2-8

- Project Alternative A: 246.02 acres
- Project Alternative B: 213.7 acres .

Of the 246.02 acres for Project A, approximately 78.73 acres of permanent disturbance will be associated with the installation of solar panel posts. Alternatively, of the 213.7 acres for Project B, approximately 85.99 acres of permanent disturbance will be associated with the installation of solar panel posts.

Impact Calculations

Use of alternative technology would reduce overall impacts. Calculations redefining total impacts are summarized below.

Temporary and Permanent Impacts

Without implementation of advanced technology, permanent disturbance associated with grubbing and grading required to level rough and undulating areas would result in a total of 2,074 acres under Project A and a total of 1987.45 under Project B. Grubbing and grading would be required for installation of pile foundations, preparation of soils for concrete foundations for substation equipment, inverters, energy storage systems, and operation and maintenance of building. Implementation of advanced technology will reduce permanent impacts to less than 246.02 acres under Project A and 213.7 acres under Project B. Table 3 summarized revised impacts to each components utilizing advanced technology.
The cumulative permanent impacts of the terrain-following solar tracking system infrastructure within the Project area remains consistent at approximately 55 acres.

As a result, permanent impacts to suitable habitat would be reduced. Table 4 provides revised impacts to suitable habitat for desert tortoise and burrowing owl based on the update calculation of permanent impacts.

Table 3 Revised Impacts based on Advance Technology Utilization

Project Component	Project A		Project B	
	Temporary (acres)	Permanent (acres)	Temporary (acres)	Permanent (acres)
East Array	337.02	4.65	272.15	4.58
South Array 1	201.96	3.62	213.02	4.35
South Array 2	622.01	10.03	618.55	12.21
South Array 3	321.21	5.43	367.56	9.85
Substation	0	2.06	0	2.06
Gen-Tie Corridor[1]	30.47	0	30.57	0
Remaining Project Site	370.62	165.23	326.9	125.65
Terrain-Following Solar System	-55	55	-55	55
Totals	**1,828.29**	**246.02**	**1,773.75**	**213.7**

Table 4 Revised Impacts to Suitable Wildlife Habitat

Species	Temporary (acres) Project A/Project B	Permanent (acres) Project A/Project B
burrowing owl (*Athene cunicularia*)	1,883.29/1,828.75	246.02/213.7
Desert tortoise (*Gopherus agassizii*)	1,883.29/1,828.75	246.02/213.7

2-9

Water Resources Impacts

Project impacts to waters of the state have herein been updated with results of the updated jurisdictional delineation (rincon 2026). Site development as originally designed, involving mass grading ff the entire project area would have resulted in roughly 10- to 12-times higher impacts of that estimated for site development under implementation of advanced technology (see Table 5).

2-10

Table 5 Summary of Impacts to Water Resources

	Total Temporary Impact Area	Total Permanent Impact Area	Waters of the State (RWQCB and CDFW Jurisdiction)			
			Temporary Impacts		Permanent Impacts	
	Acres	Acres	Acres	Linear Feet	Acres	Linear Feet
Project A Impacts	1,929.07	191.01	953.80	991,070.58	125.30	84,471.86
Project B Impacts	1,828.75	157.70	1,053.89	1,012,214.57	90.49	70,396.98

Notes: No Wetland or non-Wetland Waters of the U.S., under USACE jurisdiction were determined to be present in the Study Area. No Wetland Waters of the State were determined present in the Study Area.

2-10 continued

Conclusion

Revised Impacts

With implementation of advanced technology, on-site grading and associated ground disturbance would be significantly reduced. Under current anticipated design, implementation of advanced technology would reduce permanent ground disturbance to 246.02 under Project A and 213.70 acres under Project B. Installation of terrain following solar panels will convert the total permanent impacts to both desert tortoise and burrowing owl to 246.02 acres and temporary impacts to 1,828.29 acres under Project A. Impacts are further reduced under Project B to 213.7 acres of permanent impacts and 1,773.75 acres of temporary impacts.

The reduction in on-site grading and associated ground disturbance reduces the direct, indirect and cumulative impacts to biological and water resources, including a reduced potential for the project to result in direct, indirect or cumulative impacts to candidate and special status species. This reduction would minimize habitat loss and fragmentation for sensitive species, including desert tortoise and burrowing owl.

2-11

Water Resources Impacts

The reduction in on-site grading and associated ground disturbance would reduce the potential for the project to result in direct, indirect or cumulative impacts related to water quality standards, waste discharge requirements, surface and groundwater quality degradation and the alteration of onsite drainage patterns (SWCA 2025d).

Implementation of advanced technology and the reduction of grading earthwork efforts will allow ephemeral washes to maintain natural drainage patterns, minimize soil disruption and preserve hydrologic connectivity. The reduction in ground disturbance and grading efforts would reduce the overall use of water for dust control measures, reduce compaction of soils, and reduce erosion and sedimentation to downstream channels.

Low impact grading will allow natural contour reestablishment and surface stabilization to allow for the ecological function of these features. As such as low-impact grading, that avoid permanent alteration to wash morphology can warrant mitigation scaling based on actual function loss rather than raw acreage.

2-12

Compensatory Mitigation Ratio

Reporting of project progress and the status of the mitigation measures will allow for up-to-date information on the impacts of revegetation and species repopulation efforts. The following compensatory mitigation ratios are proposed based on existing conditions, proposed mitigation measures, and anticipated post-construction conditions.

Desert tortoise

Both the 2015 EIR/EIS and the 2016 USFWS Biological Opinion required a 1:1 mitigation ratio for impacts to desert tortoise. Consistent with these documents, the Desert Renewable Energy Conservation Plan also specifies a 1:1 mitigation ratio outside of designated critical habitat. Due to the reduction of permanent impacts resulting from implementation of advanced technology, no change is proposed for permanent impacts. A 1:1 ratio is proposed to mitigate for permanent impacts. 2-13

Proposed compensatory land should be of equal or greater value. A total of approximately 246.02 acres/213.7 acres is proposed dependent on Project design selected.

Burrowing owl

A compensatory mitigation ratio of 1:1 is proposed to mitigate for disturbed areas that will no longer provide viable long-tern habitat. A total of approximately 246.02 acres/213.7 acres is proposed dependent on Project design selected. 2-14

Sincerely,
Rincon Consultants, Inc.

Marlyng Gama
Supervising Biologist

David Daitch
Vice President

Attachments

Attachment 1 Figures
Attachment 2 Mitigation Measures

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Attachment 1

Figures

Figure 1 Project A (Preferred)

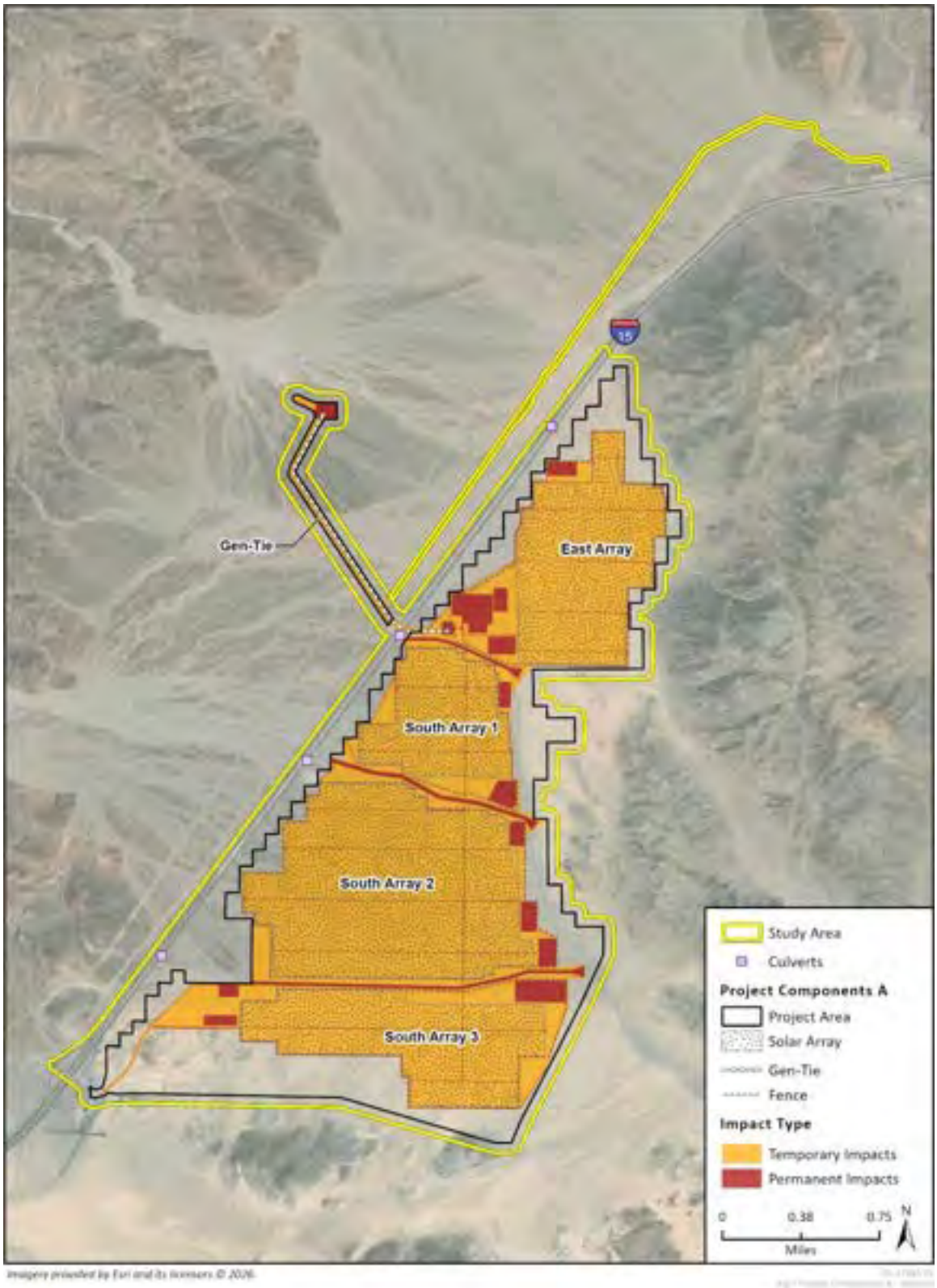
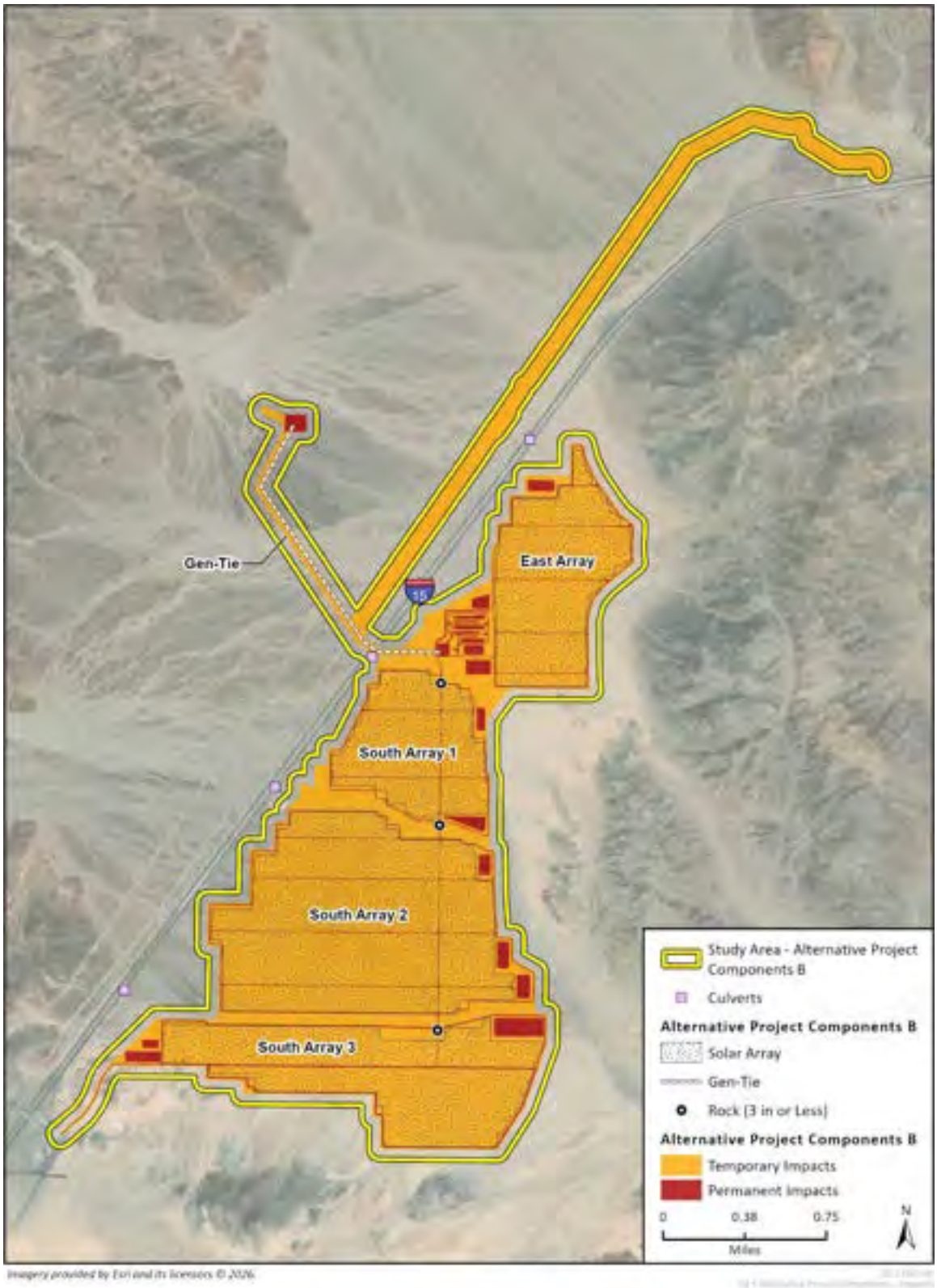


Figure 2 Project B (Alternative)



Attachment 2

Mitigation Measures

Applicable Mitigation Measures

The following measures have been pulled from the Soda Mountain Solar Project Staff Assessment (CEC 2025).

BIO-13 Vegetation Resources Management Plan

The project owner shall develop and implement a Vegetation Resources Management Plan (VRMP). The VRMP shall be prepared in consultation with the Designated Biologist and shall include an education program (see BIO-5) to describe why topsoil, biotic crusts, specific Soda Mountain Solar Project Staff Assessment BIOLOGICAL RESOURCES 5.2-208 trees such as palo verde, and succulents are salvaged and should be avoided to the greatest extent possible during construction. The VRMP shall include all propose salvage techniques and shall be submitted to the CPM and BLM for review and approval. The VRMP shall include the following:

1. Soil Baseline Characterization. The VRMP shall describe the soil characteristics of temporary disturbance areas and define what constitutes a biotic crust. The soil characterization shall include:
    a. Profile description of three representative pedons. (A pedon is the smallest three-dimensional sampling unit displaying the full range of characteristics of a particular soil and typically occupies an area ranging from about 1 to 10 square yards.)
    b. Characterization of surface application (desert pavement or biological soil crust present).
    c. Identification of biological soil crust organisms (cyanobacteria, mosses, lichens, liverworts).
    d. Documentation of soil macro-invertebrates (i.e., presence of ants, termites, and other significant macro-invertebrates).
2. Provide laboratory data for bulk density; soil fertility and organic matter content including total carbon and nitrogen content, and soil compaction levels along with references to generally accepted methods for making these determinations.
3. Topsoil Salvage. The project owner shall salvage the top 3 inches of soil from graded areas and collect upper 0.25 inch separately for biological crust. Stockpile soil dry, ≤ 4 ft deep, and manage to maintain viability. Use stockpiles to grow native plants for seed production and maintain soil biota. The vegetation in place at or immediately before topsoil collection shall be healthy native vegetation with less than 15% absolute cover of exotic weed growth. Soil occupied by vegetation of high plant diversity shall be given priority over soil occupied by low-diversity native vegetation. Soil may be collected with a front loader, bulldozer, or scraper and transported to storage areas by front loader, dump truck, or scraper. The equipment transporting the soil may not travel across the stockpile more than the minimum number of times required to build the soil to its intended depth. The depth of the stockpiles shall not exceed 4 feet in the case of sandy loam or loamy sandy soils. Topsoil stockpiles shall be kept dry and covered if no vegetation is introduced. If native vegetation is grown on the stockpiles to increase seeds and soil organisms, no cover is required. Artificial watering may be provided at the project owner's option. Stockpiled topsoil shall be used to grow native plant species for the purpose of producing native seeds and building beneficial microorganisms in the soil volume. All native plant species encountered in the vegetation surveys shall be included in the growing rotation on the stockpiles. The size of the stockpile area must be sufficient for the safe propagation of cacti.
4. Biological Soil Crust Characterization and Preservation. Biological soil crust is defined here as a mixture of organisms that occupy and protect the surface of the soil in most desert ecosystems. The organisms often include filamentous and non-filamentous cyanobacteria, mosses, lichens, liverworts, and fungi. Biological soil crust shall be preserved by collecting the upper 0.25 inch of topsoil from areas to be graded. The project owner shall collect from specific areas known to

contain biological crust organisms or collect upper soil from the entire area to be graded. Collections shall emphasize filamentous cyanobacteria, but other cyanobacteria, mosses, lichens, and liverworts are also considered valuable contributors to biological soil crust and important in protecting against erosion and reducing weed invasion, and shall be collected as a secondary priority. Soil surface crust shall be air dried and stored dry in a shaded location in containers that allow air movement, such as loose-weave fabric bags. In no case may the stored crust be subject to wetting or direct sunlight during storage. All containers shall be clearly labeled with date and location of original collection; name and contact information of persons responsible for identifying suitable material to collect; and the persons who collected, stored, and maintained collections. Biological soil crust shall be reapplied at the time of replanting by crumbling the stored material and broadcasting it on the surface of the soil. Approximately 10% of the stored material shall be broadcast on topsoil storage areas among plants being grown for seed and soil microorganisms. When the growing cycle progresses to new planting, the soil supporting biological crust shall be collected and stored by the same methods prescribed for collections from the original soil, in clearly labeled bags or other suitable containers.

5. Succulent Transplant. The project owner shall salvage succulent plants located in areas to be dragged, rolled, or spot graded, or above mowing height. These plants shall be salvaged and transplanted into a nursery area. The Succulent Transplant portion of the Vegetation Resources Management Plan shall include, at a minimum:
    a. The location of target plants on the project area;
    b. Criteria for determining which individual plants are appropriate for salvage;
    c. The proposed methods for salvage, propagation, transport, and planting;
    d. Procedures for identifying target species during preconstruction clearance surveys;
    e. Considerations for storing salvaged plants or pre-planting requirements; and
    f. Suggested transplantation sites.
6. Transplanted Cacti. Succulents to be transplanted into the nursery area shall be placed in their same compass orientation as they were in their original location. The salvaged plants also shall be kept in long-term soil stockpiles, along with natives grown on the stockpiles, to keep the soil biota fresh.

Succulent transplants done during preparation of the project area shall be fully documented and serve as trials of methods to be used during plant salvage on the project area. Records shall be maintained for each transplanted specimen including species; height; number of branches or pads as appropriate; donor location by UTM coordinates; methods used to remove, transport, and store the plant; period of temporary storage; location; facility description; planting medium used for storage; and frequency of watering during storage. Records shall be kept at the time of planting at the storage area, and quarterly thereafter during storage until such time as each plant is placed in the field or dies. Transplanted individuals shall be maintained for 3 years, including removal of invasive species and irrigation (if necessary), as well as monitored for 3 years to determine the percentage of surviving plants each year and to adjust maintenance activities using an adaptive management approach

BIO-15 Desert Tortoise Impact Avoidance, Minimization, and Mitigation Measures

The project owner shall implement the following measures to avoid, minimize and offset impacts to desert tortoise during site mobilization, construction, and operation:

1. Desert Tortoise Translocation Plan. The Designated Biologist(s) shall prepare and implement a Desert Tortoise Translocation Plan (DTTP) 30 Calendar days prior to start of Covered Activities. Covered Activities are not authorized to start until DTTP is approved in writing by the CPM in consultation with the BLM, USFWS, and CDFW. The DTTP shall follow the most current guidelines provided by USFWS and CDFW regarding desert tortoise translocation. It shall include methods of burrow excavation, nest and egg handling procedures, safe handling guidelines for capture and relocation, temperature constraints, avoiding the transmission of diseases or parasites, disease

testing, radio tagging, transportation procedures, artificial burrow construction and shelter placement along the perimeter fence line. Where guidance differs between BLM, USFWS and CDFW, the project owner shall apply the most restrictive condition and seek written direction from the CPM in coordination with the USFSW, BLM, and CDFW on how to reconcile the differences.

2. Raven Management and Reporting Plan. The Designated Biologist shall prepare and implement a Raven Management and Reporting Plan (Raven Plan) consistent with CDFW and USFWS raven management guidelines. The purpose of the Raven Plan shall be to minimize project-related predator subsidies (e.g. common ravens and coyotes) and prevent any increases in raven numbers or activity within desert tortoise habitat during construction and operation phases. The Plan shall address all project components and their potential effects on raven numbers and activity. The Raven Plan shall be reviewed and approved by CPM, in coordination with the CDFW and USFWS, prior to the start of site mobilization activities. The Raven Plan shall:

    a. Identify all potential project activities as well as structures, components, and other features that could provide predator subsidies or attractants. This includes but is not limited to: improperly managed food waste; roadkilled animals; water storage facilities; pooled water from leaks, dust control, or wastewater; debris from brush and other vegetation clearing; as well perch or nest sites on project facilities and other infrastructure. As required by BIO-7, Item 18, all trash and food waste will be disposed of in secure, self-closing bins to prevent access by wildlife.

    b. Describe specific management practices to avoid or minimize conditions that might increase raven numbers and predatory activities. This includes the following:

        i. Collect and dispose of animals killed on the site or project access roads to reduce food subsidies;

        ii. Water used for the project shall be applied to avoid puddling;

        iii. Inactive common raven nests will be removed in accordance with USFWS guidelines. If re-nesting occurs, further measures will be coordinated with the CPM, in coordination with CDFW and USFWS; and

        iv. Active nests will be reported to CPM, CDFW, and USFWS for consideration of egg-oiling or other authorized management measures.

    c. The Designated Biologist and/or Biological Monitor shall oversee implementation of the Raven Plan.

    d. The project owner shall contribute to the USFWS Regional Raven Management Program by making a one-time payment of $105 per acre of long-term or permanent project disturbance.

3. Desert Tortoise Fencing. The project owner shall install desert tortoise exclusion fencing around the project area, laydown, staging and parking areas. Exclusion fence specifications shall be approved by the CPM and be consistent with those described in the most recent *Desert Tortoise Field Manual* or more current guidance provided by BLM, CDFW and USFWS. Fencing shall not be required to conduct work at or along the generation-tie line corridor but would be required around tower work areas and the switching station site.

4. Desert Tortoise Pre-construction Clearance Surveys. After the completion of fencing installation, the Designated Biologist(s) and/or Biological Monitor(s) shall conduct 5-meter clearance sweeps of the project area prior to site mobilization. Follow-up surveys shall also be conducted within fourteen (14) days preceding additional construction after a gap in significant construction activities of 60 calendar days or more. Surveys shall include 100 percent of the area disturbed

and a surrounding buffer of 100 feet. A map of proposed survey areas shall be provided to the CPM for review and approval, and the BLM, CDFW and USFWS, for review and comment prior to initiating the surveys. Pre-construction clearance surveys shall be completed using perpendicular survey routes within the Project Area. Pre-construction clearance surveys cannot be simultaneously combined with other clearance surveys conducted for other species while using the same personnel. Covered Activities cannot start until two (2) negative results from consecutive surveys using perpendicular survey routes for desert tortoise are documented. New clearance surveys shall be conducted if the desert tortoise fence is breached (e.g., large gaps, torn fencing, or cavities that could allow desert tortoises to enter the site) for more than 24 hours. Clearance surveys shall be conducted for all linear facilities prior to any ground disturbance. In addition, surveys shall be conducted one week prior to any ground disturbance and within 24 hours of beginning work in suitable habitat. Methods for clearance surveys and exclusion fence specifications shall be consistent with those described in the most recent *Desert Tortoise Field Manual* or more current guidance provided by CDFW and/or USFWS. Any pdeserotential burrows, sign, or tortoises shall be noted, recorded using a precision GPS device, and identified on project maps submitted to the CPM. The Biological Monitor(s) and/or Authorized Biologist(s) shall record all potential desert tortoise and burrows within the pre-construction clearance survey area, using global positioning system (GPS) technology. The Authorized Biologist(s) and/or Biological Monitor(s) shall provide the results of the pre-construction clearance survey (including all information of the USFWS Protocol data sheet) to the CPM, BLM, USFWS, and CDFW within 10 Calendar days of completing the surveys. The use of specialized equipment (e.g., fiber optics) may be necessary to thoroughly inspect all burrows in preparation for collapsing them. Twenty-four hours prior to the start of any Covered Activities, except for areas already cleared within installation of desert tortoise exclusion fencing, the DT Authorized Biologist(s) and/or Biological Monitor shall conduct a final clearance survey of Project Area. The use of specialized equipment (e.g., fiber optics) may be necessary to thoroughly inspect all burrows in preparation for collapsing them.

5. <u>If Desert Tortoise Detected.</u> If adult or juvenile desert tortoises or potentially active burrows are detected during the pre-clearance surveys the Designated Biologist and/or Biological Monitor(s) shall contact the CPM, CDFW, and USFWS immediately for guidance. No work shall occur within 200-feet of any potential burrow or desert tortoise pending coordination with the CPM, CDFW, and USFWS. Handling of desert tortoise shall not be allowed pending the completion of appropriate take authorization from the CEC, in coordination with CDFW, and USFWS, per Item 4.

6. <u>Supplemental Mitigation for Desert Tortoise.</u> If a desert tortoise is detected during the surveys, construction, or operation all work within 300 feet of the desert tortoise shall immediately stop and the observation shall be immediately reported to the Authorized Biologist(s). Covered Activities shall not resume until the Authorized Biologist(s) and/or Biological Monitor(s) has verified the desert tortoise has left the project area or an Authorized Biologist(s) approved under this COC relocates the desert tortoise as described in the Desert Tortoise Translocation Plan. The Designated Biologist shall notify CPM, BLM, USFWS, and CDFW of any desert tortoise observations within the project area within 24 hours. Notification and the written report shall include the date, location, and circumstances of the observation, the name of the Designated Biologist that relocated the individual, pictures, map and shapefiles with the location (including GPS coordinates) where the individual was moved as specified in the DTTP.

7. <u>Excavation of Desert Tortoise Burrows.</u> All potential desert tortoise burrows shall be investigated by fiber optic systems, excavated, and backfilled prior to construction. Only Authorized Biologist(s) and Biological Monitor(s) approved by CPM, BLM, USFWS, and CDFW are authorized to conduct burrow excavation. Excavation of burrows shall follow the methods described the USFWS Field Manual and the DTTP.

8. Desert Tortoise Translocation. The Designated Biologist shall translocate all desert tortoise to the approved translocation areas identified in the approved DTTP. The DTTP shall follow the most current guidelines provided by USFWS and CDFW regarding desert tortoise translocation. Where guidance differs between the USFWS and CDFW, verbal and/or written direction provided by CPM in consultation with the CDFW always controls. CDFW notes that the list of items below are the most common examples of the differences between CDFW and USFWS guidelines. These shall be included in the DTTP along with the most recent USFWS translocation guidelines:
    a. Translocated tortoises are tortoises removed from the Project Area and/or have a radio transmitter attached.
    b. The Authorized Biologist shall determine when the creation of artificial burrows is needed.
    c. Ambient air temperature guidelines shall be followed as specified in this COC.
    d. Tortoises <100 millimeters (mm) midline carapace length (MCL) shall be released immediately without being held, transmitted, or blood drawn for disease testing as long as the temperature requirements are met.
    e. CDFW does not authorize the release of tortoises that test positive for disease even if it does not show outward signs of the disease. If a tortoise tests positive for disease it is the responsibility of the Permitee to locate a CDFW approved facility to place the tortoise in. Any exception to this determination will need to be approved in writing by the CDFW on a case-by-case basis.
9. Disease testing shall not be done between November 1 and May 14. If a tortoise >100 mm MCL is found between November 1 and May 14 or earlier with written approval from CDFW the tortoise shall be held in quarantine facilities and shall remain in quarantine until tested twice (once in the spring and once in the fall). If the tortoise tests negative for disease, it can be released in accordance with the approved DTTP. Blood draw samples for Mycoplasma agassizii and Mycoplasma testudineum shall determine if a tortoise is negative or positive for disease. A combination of results from blood testing and visual inspection will be used to determine the health of a tortoise. Blood draw samples will be sent to: Dr. Mary Brown, University of Florida Mycoplasma Laboratory, 2015 SW Archer Road, Room V2-234, Gainesville Florida 32608, or other facility approved by CDFW. CDFW uses enzyme-linked immune assay (ELISA) test results to determine if a tortoise is positive for disease. The ELISA tests will be used to test for exposure to herpes virus (*Mycoplasma agassizii* and *Mycoplasma testudiuneum*).
    a. If a tortoise tests positive for or is suspected of disease, then the tortoise will be tested twice for disease (once in the spring after May 15 to and once in the fall). To determine results of blood testing use the most current guidelines provided by the University of Florida Mycoplasma Laboratory Department of Infectious Diseases and Pathology. The University of Florida Mycoplasma Laboratory Department of Infectious Diseases & Pathology 2013 criteria for classifying Mycoplasma agassizii and Mycoplasma testudineum is a titer 64 is positive, and a titer of 32 is suspect (retesting in 6 weeks) or most current guidelines. All sample forms shall come from the University of Florida's guidance.
    b. The DTTP shall include a requirement that all translocated tortoises regardless of size be included in the translocation numbers and all reports.
    c. The DTTP shall propose one recipient site. Recipient sites shall have the vegetative structure to support all life stages of desert tortoises. In addition to the USFWS Field Manual guidelines the DTTP shall also include identifying the known threats or potential causes of population decline, how potential threats have been or would be addressed,

complete physical examination and health assessments with sample collection, agestructure and sex ratios, protocol level surveys, vegetation classification and quality of habitat. The DTTP shall detail which characteristics are to be used to decide if a recipient site is similar enough to a Project Area including burrow aspects, and recovery needs such as habitat restoration and/or predator control.

d. All tortoises >100 mm MCL removed off the Project Area shall be fitted with a transmitter and monitored for 5 years post translocation.

e. Recipient sites shall be a minimum of 4 miles (6.5 kilometers) away from highway/road right-of-way that does not include desert tortoise fencing.

f. All tortoise burrows within the Project Area shall be excavated following procedures outlined in the U. S. Fish and Wildlife Service Desert Tortoise Field Manual.

g. Creation of artificial burrows, as well as translocation of tortoises and eggs shall only occur on land(s) (including Bureau of Land Management), when written authorization has been obtained from the landowner prior to the start of Covered Activities. The written permission from the landowner shall be included in the DTTP and the DTTP shall not be approved by CDFW until authorization is provided in writing. If creation of artificial burrows or translocation of tortoise or eggs is proposed to take place on private lands then in addition to written approval required above, some form of protection for the land such as a conservation easement shall be in place prior to translocation occurring.

h. Cleaning and Disinfection Protocol. Trifectant and Rescue Ready to Use One Step Disinfectant Cleaner are the only products authorized under this ITP and its associated DTTP to be used as a disinfectant. These products are not authorized to be applied using a spray bottle or other spray methods.

    i. Cleaning and Disinfection Protocol shall include the following:

    ii. Remove all grossly visible debris.

    iii. Wash the area or item with water and mild detergent.

    iv. Thoroughly rinse the cleaned area to remove any detergent residue.

    v. Allow the area to dry completely.

    vi. Apply disinfectant mixture.

    vii. Allow the full disinfectant product recommended contact time.

    viii. Thoroughly rinse away any residual disinfectant and allow the area or item to air dry.

10. Ambient Air Temperatures. During all handling procedures, desert tortoise shall be treated in a manner to ensure that they do not overheat or exhibit signs of overheating (e.g., gaping, foaming at the mouth, etc.), or are placed in a situation where they cannot maintain surface and core temperatures necessary to their well-being. Tortoises shall be kept shaded at all times until it is safe to release them. For the purposes of this permit, ambient air temperature shall be measured in the shade, protected from wind, at a height of 5 centimeters above the ground surface. For all Covered Activities no desert tortoise shall be captured, moved, transported, released, or purposefully caused to leave its burrow for whatever reason when the ambient air temperature is above 95° Fahrenheit (F) (35° Celsius (C)). No desert tortoise shall be captured if the ambient air temperature is anticipated to exceed 95° F (35° C) before handling or processing can be completed. If the ambient air temperature exceeds 95° F (35° C) during handling or processing, desert tortoises shall be kept shaded in an environment that does not exceed 95° F (35° C), and

not released until ambient air temperature declines to below 95°F (35°C). Desert tortoises moved during the less active season (June 1 to August 31 and November 1 to March 31) shall be monitored by the DT Authorized Biologist(s) for at least two days after placement in the new burrows to ensure their safety. During relocation, the DT Authorized Biologist(s) may hold a captured desert tortoise overnight and move them the following morning within these temperature constraints.

11. Desert Tortoise Rehydration. If a desert tortoise voids its bladder as a result of being handled, the Authorized Biologist(s) shall rehydrate the animal(s). The Authorized Biologist(s) shall rehydrate the desert tortoise at the location where the animal(s) was or were captured, or the location where the animal(s) is or will be released. The Authorized Biologist(s) shall rehydrate the desert tortoise by placing it in a tub with a clean plastic disposable liner. The Authorized Biologist(s) shall add water to the lined tub while ensuring that the water level is not higher than the lower jaw of the animal. The Authorized Biologist(s) shall rehydrate each desert tortoise individually for a minimum of 10 to 20 minutes. The DT Authorized Biologist(s) shall place the lined tub in a quiet protected area during rehydration.
12. Desert Tortoise Handling Records. The DT Authorized Biologist(s) and/or Biological Monitor(s) shall maintain a record of all desert tortoises handled. This information shall include: (1) the locations (narrative and maps) and dates of observation, including whether the individual(s) was found above ground or in a burrow; (2) ambient temperature when handled and released; (3) general condition and health of the individual(s), including injuries, state of healing, and whether the individual(s) voided its bladders; (4) identified diagnostic markings (i.e., identification numbers or marked marginal scutes); (5) location moved from and location moved to (using GPS technology), including information on any burrow (natural or artificial) utilized; (6) whether any eggs were discovered and relocated; (7) digital photographs of any desert tortoise and eggs handled; and (8) results of ongoing monitoring. The Designated Representative(s) shall provide the CPM, BLM, USFWS, and CDFW with the information listed above submitted in the quarterly reports during construction.
13. Desert Tortoise Guards. The design of desert tortoise guards shall include exit ramps, cleanouts, and temporary shelters or guards along the fence line. Guards shall be installed along the fence line of the project and designed to prevent entrapment with the proposed perimeter berms. Guard locations and design shall be provided to the CPM for approval and the BLM, USFWS, and CDFW for review and comment prior to starting Covered Activities.
14. Permanent Security Fencing with Attached Desert Tortoise Fencing. The permanent desert tortoise exclusion fencing shall be attached to the 6-foothigh standard chain link security fencing. This fencing shall be installed around the array fields, operation and maintenance facilities, warehouses, substations, switchyard, and interconnection facilities and will remain in place during operations except it may be removed in places where wildlife-friendly fencing may be implemented over a portion of the facility site. The fence shall be constructed according to Chapter 8 of the USFWS Field Manual, but if any tortoises <100 mm MCL are translocated within 500 meters of the Project area, tortoise fencing shall be 16 gauge or heavier galvanized after welded wire with mesh opening of ½ inch horizontal by ½ inch vertical. The fence shall include the installation of shade structures along the outer fence perimeter placed at regular intervals. To prevent potential access at site access points, all gates would be installed with desert tortoise exclusion fencing affixed along the bottom portion of the gate structure. The fencing shall be constructed to allow desert kit fox access to the solar arrays while excluding desert tortoise. The fencing must be placed in a way to ensure that desert tortoises do not get trapped between the fence line and the perimeter berms.
15. Permanent Security Fence Maintenance Inspection. The DT Authorized Biologist(s) and/or Biological Monitor(s) shall inspect the tortoise fencing during the Covered Activities, at the end of

each workday during the construction period, monthly during O&M, and during major rainfall and high wind events within 24 hours to ensure desert tortoise is prohibited from entering the Project Area. If the fence is compromised, repairs shall be completed immediately, and clearance protocol level surveys shall be conducted as described in Section 4.

16. Vehicle Inspection. Workers shall inspect for desert tortoises under vehicles and equipment before the vehicles and equipment are moved. If a desert tortoise is present, the worker shall contact the DT Authorized Biologists(s) and/or Biological Monitor and wait for the tortoise to move unimpeded to a safe location or the DT Authorized Biologist(s) shall relocate the tortoise as described in the DTTP before moving vehicles and equipment.
17. Staging Area and Parking Area. The project owner shall enclose all staging and parking areas with desert tortoise exclusion fencing. All parked vehicles and equipment shall be inspected prior to being moved. If a desert tortoise is found within a staging or parking area the worker shall immediately contact the Authorized Biologist(s) and/or Biological Monitor. A designated biologist shall relocate the desert tortoise in accordance with the DTTP.
18. Raven Management and Reporting Plan. The Designated Biologist shall prepare and implement a Raven Management and Reporting Plan (Raven Plan) consistent with CDFW and USFWS raven management guidelines. The purpose of the Raven Plan shall be to minimize project-related predator subsidies (e.g. common ravens and coyotes) and prevent any increases in raven numbers or activity within desert tortoise habitat during construction and operation phases. The Plan shall address all project components and their potential effects on raven numbers and activity. The Raven Plan shall be reviewed and approved by CPM, in coordination with the CDFW and USFWS, prior to the start of site mobilization activities. The Raven Plan shall:
    a. Identify all potential project activities as well as structures, components, and other features that could provide predator subsidies or attractants. This includes but is not limited to: improperly managed food waste; roadkilled animals; water storage facilities; pooled water from leaks, dust control, or wastewater; debris from brush and other vegetation clearing; as well perch or nest sites on project facilities and other infrastructure. As required by BIO-7, Item 18, all trash and food waste will be disposed of in secure, self-closing bins to prevent access by wildlife.
    b. Describe specific management practices to avoid or minimize conditions that might increase raven numbers and predatory activities. This includes the following:
        i. Collect and dispose of animals killed on the site or project access roads to reduce food subsidies;
        ii. Water used for the project shall be applied to avoid puddling;
        iii. Inactive common raven nests will be removed in accordance with USFWS guidelines. If re-nesting occurs, further measures will be coordinated with the CPM, in coordination with CDFW and USFWS; and
        iv. Active nests will be reported to CPM, CDFW, and USFWS for consideration of egg-oiling or other authorized management measures.
    c. The Designated Biologist and/or Biological Monitor shall oversee implementation of the Raven Plan.
    d. The project owner shall contribute to the USFWS Regional Raven Management Program by making a one-time payment of $105 per acre of long-term or permanent project disturbance. Based on this calculation the Permittee shall provide a one-time payment at $105.00/acre for 1543.46 acres at $162,063.30 to the REAT account established with NFWF's Raven Management Plan fund. A minimum of 15 days prior to the start of

Covered Activities these funds shall be provided to NFWF using appropriate deposit document and proof of paying this fee shall be provided to the CPM and CDFW within 24 hours after the funds have been provided to NFWF.

19. Erosion Control Materials. To minimize the risk of ensnaring and strangling desert tortoise and other wildlife, the project owner shall not use erosion control materials containing synthetic (e.g., plastic or nylon) monofilament netting. Geotextiles, fiber rolls, and other erosion control measures shall be made of loose-weave mesh, such as jute, coconut (coir) fiber, or other products without welded weaves. The project owner shall use erosion control materials composed entirely of natural-fiber biodegradable materials. Plastic "photodegradable" erosion control materials shall not be used.
20. Full-Time Monitoring. An Authorized Biologist(s) and/or Biological Monitor(s) shall be present during all project activities that occur outside a permanent fenced area during the construction period. The Authorized Biologist(s) and/or Biological Monitor(s) shall conduct compliance inspections a minimum of three times a day (once during the onset of the day's work, once mid-day, and once at the conclusion of that day's work) during construction within the fenced area. The Authorized Biologist(s) and/or Biological Monitor(s) shall conduct compliance inspections to: minimize incidental take of the desert tortoise; prevent unlawful take of species; check for compliance with all measures of this COC; check all exclusion zones; and ensure that signs, stakes, and fencing are intact, and that project activities are only occurring in the project area. The Designated Representative or Authorized Biologist shall prepare daily written observation and inspection records summarizing oversight activities and compliance inspections, observations of desert tortoise and their sign, survey results, and monitoring activities required by this COC. During the operations and maintenance period of the project, an Authorized Biologist(s) shall be on-site to address any compliance-related issues.
21. Monitoring During Operation and Maintenance. Once all construction is complete any work being performed outside the exclusionary fencing shall have an Authorized Biologist(s) and/or Biological Monitor(s) on-site to monitor any ground-disturbing activities such as fence or berm repairs and during perimeter fence inspections for the term of this COC.
22. Desert Tortoise Injury. If a desert tortoise is injured as a result of projectrelated activities, the DT Authorized Biologist shall immediately take it to a CPM and CDFW approved wildlife rehabilitation or veterinary facility. The [project owner shall identify the facility before commencing site mobilization and shall bear any costs associated with the care or treatment of such injured desert tortoise. The project owner shall notify CPM, BLM, USFWS, and CDFW of the injury immediately by telephone and e-mail followed by a written incident report within 48 hours. The notification shall include the name of the facility where the animal was taken.
23. Reporting. A report documenting survey results, including surveyor name(s), date(s) of survey, location (with maps), weather conditions, and any observations or detections of desert tortoise or their sign will be prepared and submitted to the CPM, CDFW, and USFWS. In addition, a monitoring report that includes the location, description, and duration of the activities, any observations or detections of desert tortoise found during the surveys or project activities, and any relocation efforts will be provided during monthly and annual compliance reporting.
24. CNDDB Observations. The Authorized Biologist shall submit all observations of desert tortoises to CDFW's California Natural Diversity Database (CNDDB) within 60 calendar days of the observation and the Authorized Biologist shall include copies of the submitted forms with the next Quarterly Compliance Report.

BIO-20 Burrowing Owl Impact Avoidance, Minimization, and Mitigation Measures

The project owner shall implement the following measures to avoid, minimize and offset impacts to breeding and foraging burrowing owls during site mobilization, construction, operation, and decommissioning:

1. Burrowing Owl Mortality Reduction Plan. The project owner shall submit a Burrowing Owl Mortality Reduction Plan prepared by the Designated Biologist(s) (s) for review and approval to the CPM, and CDFW for review and comment, prior to beginning any project activities including site mobilization, surveying, fencing, or ground disturbance. Burrow exclusion, burrow excavation, artificial burrow construction, and other relocation activities shall not proceed until this plan has been approved in writing by the CPM in coordination with the CDFW. The Burrowing Owl Mortality Reduction Plan shall include, but not be limited to detailed description of survey methodology; detailed burrow exclusion and excavation methods; project activities that may be performed within burrowing owl avoidance buffers; identification of a wildlife rehabilitation center or veterinary facility capable of and willing to treat injured burrowing owl or care for at-risk burrowing owl, burrowing owl eggs, and/or burrowing owl chicks; and procedure for collection and storage of burrowing owl carcasses. Only CPM approved Designated Biologist(s)), or personnel following directions from and under the supervision of the Designated Biologist(s), are authorized to handle and transport injured burrowing owl for treatment or impacted burrowing owl eggs for salvage. All other burrowing owl handling is prohibited. Once the Burrowing Owl Mortality Reduction Plan is approved in writing by the CPM, it shall be used for the duration of the project unless updated by request of the CPM to reflect best available science, or to update mitigation and conservation strategies. If any updates are required, the CPM will contact the project owner to discuss potential updates. Any proposed changes to the Burrowing Owl Mortality Reduction Plan shall be submitted, in writing, to the CPM for review and approval and the CDFW for review and comment in writing prior to the implementation of any proposed modifications.
2. Burrowing Owl Burrow Replacement Plan. The project owner shall replace each known burrowing owl burrow (as defined below under Burrow Avoidance) that cannot be avoided within the project area with an artificial burrow to compensate for the loss of important shelter used by BUOW for protection, reproduction, and escape from predators. The project owner shall submit a Burrowing Owl Burrow Replacement Plan prepared by an approved Designated Biologist(s) to the CPM. Implementation of the Burrowing Owl Burrow Replacement Plan shall not proceed until this plan has been approved in writing by the CPM in coordination with the CDFW. The Burrowing Owl Burrow Replacement Plan shall include, but not be limited to: a discussion and map of potential artificial burrow replacement locations; description of the replacement burrow design and dimensions (e.g., depth and width of burrow, width of burrow entrance, orientation of burrow entrance, number and placement of entrances to natal burrows); artificial burrow installation methods; long-term artificial burrow protection and maintenance methods; and timing of BUOW burrow installation/construction. Once the burrowing owl Burrow Replacement Plan is approved in writing by the CPM, it shall be used for the duration of the project unless it is updated by the CPM to reflect best available science, or to update mitigation and conservation strategies in which case the CPM will contact the project owner to discuss needed updates. If any updates are required, the CPM will contact the project owner to discuss potential updates. Any proposed changes to the Burrowing Owl Mortality Reduction Plan shall be submitted, in writing, to the CPM for review and approval and the CDFW for review and concurrence in writing prior to the implementation of any proposed modifications.
3. Burrowing Owl Pre-Construction Nesting Surveys and Reporting. The Designated Biologist with support from Biological Monitor(s) shall conduct preconstruction surveys for burrowing owls to identify potential, known, and/or nesting burrowing owl burrows. A potential burrowing owl

burrow is any subterranean hole three inches or larger for which no evidence is present to conclude that the burrow is being used or any past use by a burrowing owl; a known burrowing owl burrow is a burrow that shows evidence the burrow is being used, known to have been used, or past use by a burrowing owl, or an "atypical" burrow (e.g., a pipe, culvert, buckled concrete, etc.) showing signs of occupancy (e.g. burrowing owl presence, whitewash, pellets, prey remains, etc.); and a nesting burrowing owl burrow is used for nesting (e.g. known burrowing owl burrow indications of the presence of eggs, chicks, dependent young, and/or brooding or egg incubation. The survey area shall include the project disturbance area and surrounding 300- meter survey buffer, as accessible. If surveys detect burrowing owls within 1,600 feet of proposed construction activities, based on four consecutive 24-hour periods of monitoring with infrared camera, the Designated Biologist shall provide to the CPM documentation indicating that non-disturbance buffer fencing has been installed no less than 10 days prior to the start of any project-related site disturbance activities. The documentation shall include information as specified in Items 4 and 5, or as otherwise requested by the CPM.

4. Burrow Map. The Designated Biologist(s)shall provide a Keyhole Markup Language (KMZ) map and GIS shapefiles to the CPM of all burrowing owl burrows found during the surveys conducted during the surveys required under Item 3 requirements (Burrowing Owl Pre-Construction Surveys and Reporting). The map shall show the details and locations of all burrowing owl sightings and potential, known, and nesting burrowing owl burrows as defined in the Burrowing Owl Burrow Avoidance section. The map shall include an outline of the project area, and any distinct work area(s) surveyed within the project area, title, north arrow, scale bar, and legend. If an active burrow is confirmed during the surveys the project owner shall notify the CPM and CDFW within 48 hours. In coordination with the Designated Biologist(s), CPM and CDFW, a 1,600-foot line of sight disturbance-free buffer shall be established and demarcated by fencing or flagging and placed on project maps. This buffer may be adjusted as determined by a qualified avian biologist in coordination with the CPM and CDFW. Nest locations shall be mapped using GPS technology and provided the CPM.

5. BUOW Burrow Avoidance. The Designated Biologist, shall establish nodisturbance buffer zones around potential, known and nesting burrowing owl burrows according to the following guidelines:

    a. If a potential burrowing owl burrow (any subterranean hole three inches or larger for which no evidence is present to conclude that the burrow is being used or any past use by a burrowing owl) is discovered, the Designated Biologist shall establish a minimum 50-foot no-disturbance buffer around the burrow.

    b. If a known burrowing owl burrow (a burrow that is known to have been used or shows evidence of current or past use) or an "atypical" burrow (e.g., a pipe, culvert, buckled concrete, etc.) showing signs of occupancy (e.g. burrowing owl presence, whitewash, pellets, prey remains, etc.) is discovered, the Designated Biologist(s) shall establish a minimum nodisturbance buffer of at least 100 feet around the burrow. A nodisturbance buffer of at least 1,600 feet shall be established around known burrowing owl burrows currently occupied by burrowing owl during the nesting season (typically February 1 to August 31 in this area). Nest buffer reductions are described below.

    c. If a nesting burrowing owl burrow (e.g. known burrowing owl burrow with indications of the presence of eggs, chicks, dependent young, and/or brooding or egg incubation) is discovered within or immediately adjacent to the project area, the project owner and/or Designated Biologist shall notify the CPM and CDFW immediately through email. A no-disturbance buffer of at least 1,600 feet shall be established around the nest burrow. A no-disturbance buffer of at least 1,600 feet shall be established around known burrowing owl burrows currently occupied by burrowing owl during the nesting season (February 1

to August 31). If burrowing owl burrows cannot be avoided as described above, then the project owner shall follow Item 6 (Burrowing Owl Burrow Blockage), Item 7 (Burrowing Owl Burrow Excavation), and Item 1 (Burrowing Owl Mortality Reduction Plan), as appropriate. If the approved Designated Biologist determines burrowing owl are visibly stressed by project activities or by workers in the vicinity after these no-disturbance buffers the Designated Biologist shall immediately increase the non-disturbance buffer to a distance where the visible stress is no longer observed. The increased no-disturbance buffers will be reviewed and approved by the CPM, in coordination with CDFW, based on their behavioral observations of the affected burrowing owl. The buffers prescribed above shall not be reduced or otherwise modified without prior written approval from the CPM, in coordination with the CDFW. If the approved Designated Biologist(s) determines that specific project activities are not likely to affect the burrowing owl using known or nesting burrowing owl burrows due to the nature of the specific project activities, or due to objects or topography that might reduce potential noise disturbance and obstruct view of the project activities from the nest, then the CPM approved Designated Biologist(s) may email a written request to the CPM to reduce the buffer distance with documented observational data (Buffer Reduction Request). The CPM will review each Buffer Reduction Request on a case-by-case basis and provide a determination in response to each Buffer Reduction Request in writing. The CPM may request additional and ongoing biological monitoring prior to approving a Buffer Reduction Request.

6. BUOW Burrow Blockage. If the CPM has approved the blockage of a known burrowing owl burrow, the Designated Biologist shall block rather than destroy any unoccupied known burrowing owl burrow located within the buffer distances limits prescribed in Item 5 (Burrowing Owl Burrow Avoidance), but outside the discrete work area(s) within the project area(s) where ground and vegetation disturbing project activities will be performed. Burrows (including burrows in natural substrate and in under man-made structures) may be blocked only immediately after the CPM-approved Designated Biologist(s) has conducted four consecutive 24-hour periods of monitoring with infrared camera and determined that burrowing owl is not currently present. Burrow blockage shall be done in a manner that prevents burrowing animals from digging back into the burrow. All blocked burrows shall be monitored by the approved Designated Biologist(s) and/or Biological Monitor(s) at least once every 48 hours while the blockage is in place to ensure that the exclusion material is still intact. If burrowing owl regains access to the burrow, the project owner or Designated Biologist shall contact the CPM immediately and obtain written guidance regarding how to proceed. All blocked burrows shall be unblocked within 48 hours of completion of construction activities within the prescribed buffer distance.

7. Burrowing Owl Burrow Excavation. The approved Designated Biologist(s), and/or Biological Monitor under direct supervision of the approved Designated Biologist(s), shall excavate known or potential burrows that exhibit signs of current or past burrowing owl use or characteristics suggestive of a burrowing owl burrow (including burrows in natural substrate and in/under man-made structures) that cannot be avoided per guidance in Item 5 (Burrowing Owl Burrow Avoidance), that are within the project area. Burrows to be destroyed shall be fully excavated, filled with dirt, and compacted to ensure that burrowing owl cannot reenter or use the burrow during the period that project activities occur in the project area.

    a. Excavation of known burrowing owl burrows shall only occur after the approved Designated Biologist(s) has determined that burrowing owl is not currently present after 4 consecutive 24-hour periods of monitoring with infrared cameras. If the excavation process reveals evidence of current use by burrowing owl, then burrow excavation shall cease immediately, and camera monitoring as described above shall be conducted or resumed as applicable. burrowing owl burrows shall be carefully excavated with hand

tools, or by mechanical means if a specific methodology is approved in writing by the CPM, until it is clear no individuals of burrowing owl are inside.

b. Potential burrowing owl burrows without any signs of burrowing owl use or characteristics suggesting it is a burrowing owl burrow may be excavated under the direct supervision of the approved Designated Biologist(s) without prior camera monitoring.

c. Nesting burrowing owl burrows used for nesting shall not be excavated until biological and camera monitoring confirm that the chicks have fledged and are no longer dependent on the nest and then only after written concurrence from the CPM. An established burrowing owl burrow no-disturbance buffer may be removed once the burrow is collapsed and the burrowing owl (s) is/are no longer using the burrow.

8. Burrowing Owl Injury. If a burrowing owl is injured or found dead within the vicinity of the project area, project owner shall notify the CPM of the injury or mortality to the burrowing owl immediately by email. The Designated Biologist(s) shall follow the Burrowing Owl Mortality Reduction Plan to either immediately transport injured individuals to a CPM-approved wildlife rehabilitation center or veterinary facility or follow approved collection and storage procedures for deceased animals. The project owner shall bear any cost associated with care and recovery of any injured burrowing owl adults, nestling(s) or egg(s) and hacking (controlled release of captive reared young).

9. Burrowing Owl Observations and Notification. All workers shall be trained to identify burrowing owl and shall inform the approved Designated Biologist(s) if a burrowing owl is seen within or near the project area during implementation of any project activity. All work in the vicinity of the burrowing owl which could harm the individual, shall cease until the individual moves from the project area of its own accord or the approved Designated Biologist(s) passively encourages the individual to move out of harm's way, in compliance with the timing and methods identified in the CPM-approved Burrowing Owl Mortality Reduction Plan.

10. Operation Activities Designated Biologist On-site. The approved Designated Biologist(s) shall be onsite during all ground and vegetation disturbing activities. The approved Designated Biologist(s) shall be on-site during all non-emergency ground and vegetation disturbing project activities performed at night. The approved Designated Biologist(s) shall ensure that the minimum amount of lighting is used to complete the activities and that lighting is directed away from active burrows to the maximum extent feasible.

11. Vehicle Parking (Site Mobilization, Construction and Operation). During site mobilization, construction, operation, and maintenance activities or while implementing burrowing owl take minimization measures, the project owner shall not allow vehicles to park on top of known or potential burrowing owl burrows. Vehicles left overnight shall not be located within 50 feet of known burrowing owl burrows. Workers shall inspect for burrowing owl under vehicles and equipment every time the vehicles and equipment are moved. If a burrowing owl is present, the worker shall wait for the burrowing owl to move unimpeded to a safe location. Alternatively, the approved Designated Biologist(s) shall be contacted to passively encourage the burrowing owl to move away from the vehicle or equipment, in compliance with the timing and methods identified in the Burrowing Owl Mortality Reduction Plan.

12. Pipes and Materials Inspection (Site Mobilization, Construction, Operation). The project owner shall ensure that all pipes or similar materials stockpiled or replaced in the project area are capped or otherwise enclosed at the ends to prevent entry by burrowing owl. The project owner shall ensure that any permanent pipes or similar materials or structures are left open where burrowing owl or other species may enter them and become trapped. The approved Designated Biologist(s) or Biological Monitor(s) shall thoroughly inspect all such materials for burrowing owl,

before they are moved, buried, or capped. If a burrowing owl is discovered inside such material, that section of material shall not be moved until the animal has escaped of its own accord. Alternatively, the approved Designated Biologist may passively encourage the burrowing owl. to move away from the pipes, culverts, or similar structures, in compliance with the timing and methods identified in the Burrowing Owl Mortality Reduction Plan.

13. Ground and Vegetation Disturbing (Site Mobilization, Construction, and Operation). Burrowing Owl Pre-Construction Surveys and Reporting (Item 3) shall be implemented within 30 calendar days prior to commencing ground or vegetation disturbing activities during operation in each distinct work area(s) within the project area. If the approved Designated Biologist(s) identifies any potential, known, or nesting burrowing owl burrows, the burrow(s) shall be monitored following the Burrowing Owl Burrow Blockage (Item 6) and Burrowing Owl Burrow Excavation (Item 7) as applicable, unless avoided per the Burrowing Owl Burrow Avoidance requirements (Item 5).
14. Burrowing Owl Observations (Operation). During operational activities within the project area, all workers shall inform the approved Designated Biologist if a burrowing owl is observed within or near the project area. All work in the vicinity of the burrowing owl, which could injure or kill the animal, shall cease immediately until the burrowing owl moves from the project area of its own accord or the approved Designated Biologist(s) passively encourages the individual to move out of harm's way, in compliance with the timing and methods identified in the approved Burrowing Owl Mortality Reduction Plan.
15. Burrowing Owl Injury (Operation). If a burrowing owl is injured or found dead within the vicinity of the project area, the project owner shall notify the CPM of the injury or mortality to the burrowing owl immediately. The approved Designated Biologist shall follow the approved Burrowing Owl Mortality Reduction Plan to either immediately transport injured individuals to a CDFWapproved wildlife rehabilitation center or veterinary facility or follow approved collection and storage procedures for deceased animals. The project owner shall bear any cost associated with care and recovery of any injured burrowing owl adults, nestling(s) or egg(s) and hacking (controlled release of captive reared young).

Soda Mountain Solar Project

Aquatic Resources Delineation and Impact Analysis

prepared for

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1 Introduction

Rincon Consultants, Inc. (Rincon) conducted an aquatic resources delineation for the Soda Mountain Solar Project (project), located on land managed by the Bureau of Land Management (BLM) within unincorporated San Bernardino County, California. The delineation was conducted to determine the location and extent of waters and wetlands within a defined Study Area that are potentially subject to the jurisdiction of the United States Army Corps of Engineers (USACE), Lahontan Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFW). For the purposes of this assessment, the Study Area includes a 3,463-acre area encompassing the proposed project site and alternative project site (inclusive of the proposed solar arrays, storage areas, gen-tie corridor, access roads, and temporary work areas), and a 250-foot buffer. This assessment also includes an analysis of impacts to aquatic resources within the proposed project site and alternative project site to assist with regulatory permitting, as necessary.

Any proposed project impacts in areas identified as jurisdictional waters or wetlands may be subject to the permit requirements of the USACE under Section 404 of the Clean Water Act (CWA), RWQCB under Section 401 of the CWA and/or Porter-Cologne Water Quality Act, and CDFW pursuant to Section 1600 et. seq. of the California Fish and Game Code. However, the authority of the California Energy Commission (CEC), pursuant to Government Code amendments, enacted with the passage of Assembly Bill 205 in 2022, may supersede the CDFW's authority over a proposed project. Actual jurisdictional areas are determined by the state and federal authorities at the time that jurisdictional determinations or permits are requested.

1.1 Study Area Location

The Study Area is located approximately 10 miles southwest of the unincorporated town of Baker, in San Bernardino County, California (Figure 1, Appendix D). The Study Area is located between Baker and Barstow, and can be reached by traveling on Interstate 15 and exiting Rasor Road at the Rasor Road Services Shell Oil gas station (66150 Rasor Road, Baker, California 92309), and then following the unpaved portion of Rasor Road onto the project site.

The Study Area covers approximately 3,463 acres and is positioned on BLM public lands within the San Bernardino, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2a through Figure 2d, Appendix D). The Public Land Survey System depicts the Study Area in Township 12N, Range 7E, Sections 1 and 11-14; Township 12N, Range 8E, Sections 6, 7 and 18; Township 13N, Range 8E, Sections 29-32, San Bernardino Meridian (Earth Point 2025). The Study Area is centered at approximately 35.148097˚, -116.183703˚ in the alluvial valley dividing the northern and southern portions of the Soda Mountains in the Mojave Desert and extends approximately 8.5 miles along the southeast side of Interstate 15 (Mojave Freeway).

The Study Area occurs on the following San Bernardino County Assessor's Parcel Numbers (APN): 0543-24-117-0000, 0543-24-119-0000, 0543-20-107-0000, 0543-25-101-0000, 0543-20-110-0000, 054320-109-0000, 0543-25-112-0000, and 0543-21-118-0000 (Figure 3, Appendix D).

1.2 Project Description

This assessment includes an impact analysis of jurisdictional aquatic resources within the entire Study Area, as well as within the limits of the proposed Project A and the Alternative Project B, further discussed below.

1.2.1 Project A

The proposed project includes construction, operation, maintenance, and eventual decommissioning (after 40 years) of a 300-megawatt (MW) photovoltaic (PV) solar facility. The project would operate 24 hours per day year-round and would generate electricity during daylight hours when the sun is shining. The project would generate and deliver solar-generated power to the regional electrical grid through an interconnection with the existing Mead-Adelanto 500-kV transmission line operated by the Los Angeles Department of Water and Power. The approximate disturbance areas within the Study Area include the following project components, which includes a total 2,120-acre Project Area illustrated in Figure 4, Appendix D:

1. Solar photovoltaic facility consisting of four solar arrays identified as the East Array and South Arrays 1, 2, and 3, operation and maintenance (O&M) buildings and structures, stormwater infrastructure, and related infrastructure and improvements;
2. A substation and utility switchyard for interconnection to the existing transmission system, located within the gen-tie corridor;
3. Approximately 1-mile 500-kilovolt (kV) gen-tie line connecting project substation, switchyard, and 500-kV Mead-Adelanto line; and
4. Approximately 300 MW/1,200 MW-hour of battery energy storage system (BESS).

In addition, the project incorporates an existing 3.79-mile dirt access road on the north side of Interstate 15. This road is an existing road and no new grading resulting in permanent impacts is proposed as part of the project. Temporary impacts may be necessary for road improvements throughout the life of the project; however, no road improvements are currently proposed. For the purpose of this assessment, Rincon provided a total acreage of delineated aquatic resources within the Access Road, which includes the existing road prism, and a 250-foot buffer.

Project associated Mitigation Measures will also be implemented, as necessary, throughout the life of the project. Specifically, with implementation of MM BIO-3, on-site grading and associated ground disturbance would be significantly reduced under the solar field. The reduction in on-site grading and associated ground disturbance would reduce the potential for the project to result in direct, indirect or cumulative impacts related to water quality standards, waste discharge requirements, surface and groundwater quality degradation and the alteration of onsite drainage patterns.

1.2.2 Alternative Project B

The Alternative Project B (also referred to as Alternative #1) incorporates a reduced project area to accommodate an extended buffer for desert bighorn sheep. The approximate disturbance areas within the boundaries of the Alternative Project B site includes a 1,986-acre Project Area illustrated in Figure 5, Appendix D. Under this configuration, the alternative project would include the following components:

1. Relocate the BESS facility approximately 3,090 feet from I-15; 1,360 feet from the existing Rasor Road; and 9,460 feet from the nearest sensitive receptor located adjacent to the project-adjacent gas station, and placing it within the central solar field within Solar Array #2;
2. Establish a 0.25-mile buffer from the 10-percent slope contour to increase separation from desert bighorn sheep foraging and movement habitat;
3. Use existing internal access roads for operational and emergency access;
4. Reconfigure PV arrays to avoid the buffer area while maintaining generation capacity;
5. Extend the gen-tie line approximately 8,370 feet, likely within proposed internal roadways, to reach the proposed substation/switchyard; and
6. Increase separation from public roadways, thereby reducing potential public-safety risks associated with a BESS fire or thermal event.

This alternative project will also utilize the same access road as the proposed Project A, discussed above, consisting of an existing 3.79-mile dirt access road on the north side of Interstate 15.

This alternative project will also implement MM BIO-3 to reduce on-site grading, as discussed above.

2 Methodology

A combination of a literature review, field surveys, and data processing and GIS analysis were conducted to identify, describe, and map aquatic features within the defined Study Area, further discussed below.

2.1 Literature Review

Rincon reviewed aerial imagery (Google Earth Pro 2025) of the Study Area, the *San Bernardino, California* USGS 7.5-minute topographic quadrangle (USGS 2025a), the Web Soil Survey (United States Department of Agriculture, Natural Resources Conservation Service [USDA, NRCS] 2025a), the National Hydric Soils List by State: California (USDA, NRCS 2025b), and the U.S. Climate Data for weather history (U.S. Climate Data 2025). Additionally, the National Wetlands Inventory (NWI; United States Fish and Wildlife Service [USFWS] 2025) and the National Hydrography Dataset (NHD; USGS 2025b) were reviewed. These resources were reviewed to better characterize the site and its surroundings from a hydrologic, geologic, and topographic perspective, and to determine if any soil units mapped in the Study Area are classified as hydric.

The literature review also included the review of two previously prepared reports completed for the project by SWCA: *Aquatic Resources Delineation Report for the Soda Mountain Solar Project*, dated June 2024 (ARDR; SWCA 2024) and *Soda Mountain Solar Project Biological Resources Technical Report*, dated January 2025 (BRTR; SWCA 2025).

2.2 Field Surveys

Field surveys included a combination of delineation surveys to capture detailed mapping of aquatic resources in representative locations within the Study Area, and field verification along transects of aquatic features mapped using high-resolution imagery throughout the Study Area.

Field delineation surveys were conducted within Representative Sample Plots by Artemis Environmental biologists between March 24 and March 28, 2025. The surveys were completed on-foot to evaluate the site for wetland and non-wetland jurisdictional features within the proposed locations of the solar arrays. Current federal and State policies, methods, and guidelines were used to identify and delineate potential jurisdictional features and are summarized in the Section 2.2.1 below and in detail in Appendix A. The field surveys consisted of delineating aquatic resources within 50 randomly located 100-meter by 100-meter square plots to capture representative data on aquatic resources within the proposed project impact areas. A total of 123.55 acres were surveyed in the combined 50 Representative Sample Plots. Field delineation surveys were also completed within the entire approximately 38.87-acre gen-tie corridor.

Because each of the proposed solar arrays occupies a location on the landscape with soils, slope, and hydrology that may differ from the other arrays, Representative Sample Plots were positioned using a stratified random sampling design within each array using tools in ArcGIS. Sample Plots were 100m X 100m (2.471 acre). The number of Sample Plots placed within or adjacent to each solar array was proportional to the total area of the array so that the total area of all Sample Plots was approximately 8 percent of the total area of the array. The size of each solar array and the total number of Sample Plots for each array are presented in Table 1. Note the entire proposed gen-tie

corridor was field and desktop delineated without the use of Sample Plots, and some of the Sample Plots were taken adjacent to the array in areas where defined drainages were present. The location of Sample Plots are illustrated in Figure 6 (Appendix D).

Table 1 Summary of Field Delineation Survey Methodology within the Study Area

Project Component[3]	Total Acres	Number of Sample Plots[1]	Total Sample Plot Acreage (Survey Area)	Percentage of Project Component Field Delineated
East Array	341.668	11	27.181	8%
Solar Array 1	205.583	5	17.297	8%
South Array 2	632.041	17	51.891	8%
South Array 3	326.641	7	27.181	8%
Gen-Tie Corridor	38.87	0	N/A[2]	100%

[1] Sample Plots are 100x100 square meters (2.471 acres), note that some sample plots occurred partially within the array or adjacent.

[2] No Sample Plots were taken in the gen-tie corridor, however the entire corridor (approximately 37.931 acres) were surveyed.

[3] Sample Points were taken within or adjacent to the East Array, Solar Array 1, Solar Array 2, and Solar Array 3.

During the field delineation surveys, the extent of potential jurisdictional features were collected in the field using a Trimble Global Positioning System unit with sub-meter accuracy and were subsequently transferred to Rincon's Geographic Information System (GIS) software program (i.e., ArcGIS Pro) to further analyze aquatic features in the entire Study Area and assist in producing figures provided in this document. Sample points were established within the Study Area that best represent the conditions of the jurisdictional features and not conducted in areas with an obvious prevalence of upland vegetation or in areas where the landform would not support wetland features. At each sample point, plant species were documented and the previously mapped vegetation communities identified in the SWCA BRTR (SWCA 2025) were field-checked for accuracy. Sample point locations are illustrated in the attached figures and completed datasheets are provided in Appendix C. Photographs of potential jurisdictional features and the surrounding areas were captured. Photographs are provided as Appendix B.

Additionally, following additional GIS mapping of aquatic features within the Study Area, utilizing high-resolution aerial imagery and data collected during the field delineation surveys, Rincon and Artemis delineators walked the full length of four large linear transects positioned throughout the Study Area, including one transect within the 250-foot buffer around the northern access road. The transects were walked by Rincon and Artemis delineators on August 12 and August 15, 2025 and January 2 and 3, 2026 to field verify the mapped aquatic features and document the width of each intersecting drainage and/or watercourse along the transect. Transect locations are illustrated in the attached figures. The delineators verified if the digitally mapped drainage features were present or absent. For features that were present, a GPS point was captured in the center of the feature to document the width of the feature, from top of bank for single-thread channels or the width of the complete watercourse which captures the entirety of the functionally-related features (i.e., swales, braided channels, floodplain). Drainage features that were digitally mapped and confirmed by field staff to not be defined aquatic features were noted and later removed from the digital imagery. GIS staff later used the width measurements along the transects, and the field data from the March delineation surveys, to extrapolate the drainage/watercourse widths throughout the Study Area and revise the digital imagery to produce attached figures and impact calculations.

2.2.1 Delineation Survey Methods

Wetland Waters of the U.S.

Wetland waters of the U.S., within USACE jurisdiction, were determined when all three wetland parameters (hydrophytic vegetation, hydric soils, and hydrology) were present and if there was a continuous surface connection between the potential wetland and a navigable water body or relatively permanent tributary (Environmental Protection Agency [EPA] 2023). Potential wetland features were evaluated for the presence of wetland indicators, specifically, hydrophytic vegetation, hydric soils, and wetland hydrology, according to routine delineation procedure within the *Wetlands Delineation Manual* (USACE 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008a). The USACE Arid West 2022 Regional Wetland Plant List, which was the most current USACE plant list at the time of the field delineation, was used to determine the indicator status of the examined vegetation by the following indicator status categories: Upland (UPL), Facultative Upland (FACU), Facultative (FAC), Facultative Wetland (FACW), and Obligate Wetland (OBL; Lichvar et al. 2020). At each sample point, if wetland characteristics were identified, a soil pit was to be dug approximately 12 to 18 inches below ground to further analyze soil conditions and determine if hydric soils were present and a USACE Wetland Datasheet was used to document site conditions. However, no wetland indicators were identified in the Study Area during the field surveys; therefore, no soil pits or wetland sample points were collected.

Non-Wetland Waters of the U.S.

The lateral limits of USACE jurisdiction for Non-wetland Waters of the U.S. were determined by the presence of physical characteristics indicative of the OHWM. The OHWM was identified in accordance with the applicable Code of Federal Regulations (CFR) sections (33 CFR 328.3 and 33 CFR 328.4) and Regulatory Guidance Letter 05-05 (USACE 2005), as well as in reference to various relevant technical publications, including, but not limited to, *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008b). In areas where drainage features were present, sample points were established to define an ordinary high water mark (OHWM) and Rapid OHWM Field Identification Datasheets (USACE 2025) were used to document indicators of an OHWM, if present. Completed datasheets are provided as Appendix B.

Additionally, Rincon evaluated sources of water, streamflow period, connections to Navigable Waters or Traditional Navigable Waters (TNWs), and other factors that affect whether waters qualify as non-wetland waters of the U.S. under current USACE regulations (33 CFR 328.3). The regulations were also reviewed in the determination of non-jurisdictional features (e.g., roadway ditches excavated in uplands). A more detailed regulatory definition of USACE jurisdiction is provided in Attachment A.

Wetland Waters of the State

Potential State wetland features were evaluated pursuant to the State Water Resources Control Board (SWRCB) *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*, which went into effect May 28, 2020 (SWRCB 2021). These procedures acknowledge that wetland Waters of the State should be delineated using the standard USACE wetland delineation procedures, taking into consideration that the methods shall be modified only to allow for the fact that a lack of vegetation does not preclude an area from meeting the definition of a wetland.

Non-wetland Waters of the State

The lateral limits of non-wetland Waters of the State, as defined under the Porter-Cologne Water Quality Control Act, were determined by the presence of physical characteristics indicative of the OHWM and other indicators of hydrologically active watercourses, based on current interpretation of jurisdiction by the Lahontan RWQCB and CDFW. More specifically, Waters of the State were delineated by reviewing the topography and morphology of active drainage features to determine the top of bank for stream features, including low alluvial terraces of the active floodplain where applicable in larger washes, and the outer limit of associated riparian vegetation, where present. The delineation of Waters of the State incorporated *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008b) and the *Mapping Episodic Stream Activity (MESA) Field Guide* and *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants* ("MESA Guide"; Brady and Vyverberg 2013) published by the California Energy Commission in 2014. The MESA Guide provides a current understanding of fluvial geomorphology and ecohydrology and facilitates mapping of Waters of the State.

2.3 Data Processing and GIS Analysis

Following post field GIS processing of the GPS data retained from the delineation surveys and verification transects, the Study Area was digitally mapped using GIS software tools using a combination of high resolution drone aerial imagery, digital elevation modeling, HECRAS Max Velocity modeling, ESRI aerial imagery, ESRI digital elevation modeling, topographic imagery, and extrapolated data retained from the field survey efforts.

3 Existing Site Conditions

3.1 Climate, Topography, and Land Use

The Study Area is located within the Mojave Desert, characterized by hot summer temperatures and cool winters ranging from 108˚F in the summer months to 33˚F in the winter months, with an average of 3.72 inches of annual rainfall (U.S. Climate Data 2025).

The Study Area occurs within the desert flow surrounded by the Soda Mountains. The Study Area is located within an historical alluvial fan system originating from the cleavages of the Soda Mountains, located to the northwest of the Study Area. Several alluvial fans have deposited sediment along the desert valley floor, which is primarily flat, sloping from the northwest to the southeast across the fan system. The Soda Mountains immediately northwest of the Study Area extend to approximately 3,425 feet above sea level and meet the desert valley floor at the Study Area with elevations ranging between approximately 1,275 to 1,450 feet above mean sea level. The alluvial fan system continues to support small ephemeral drainages that convey stormwater from the Soda Mountains into the valley floor.

The Study Area consists of open space managed by BLM. Rasor Road provides access into the project site, which is a BLM ground transportation feature (Road AC8828). Although the project site is not within a designated Off-Highway Vehicle (OHV) Area, vehicle tracks and disturbance are prevalent across the Study Area in multiple areas, frequently coinciding with drainage areas.

3.2 Hydrology

The Study Area is located within the Soda Lake Hydrologic Subarea (628.82) of the greater Mojave Hydrological Unit (628.00) of the South Lahontan Hydrologic Basin and spans two watersheds: (HUC 180902082502) and (HUC 180902082504) of the greater Mojave Watershed (HUC 18090208). The Mojave Hydrological Unit (HU; 628.00). Surface water and the drainage within the Study Area flow southeast, terminating at Soda Dry Lake. Soda Dry Lake is a playa in the Mojave Desert that periodically holds water after rainfall and comprises salt and alkali deposits. Soda Dry Lake is not defined as, nor drains to, waters of the United States (WOUS) or Traditional Navigable Waters (TNW). A small portion of the southwestern corner of the Study Area is part of the Cronis watershed that ultimately drains to Cronise Valley and East Cronise Lake, also a dry lakebed that does not drain to a WOUS or TNWs. Please refer Figure 7 (Appendix D) for mapped regional watershed boundaries.

The USFWS NWI identifies several Riverine (R4SBJ: Riverine, Intermittent, Streambed, Intermittently Flooded [USFWS 2025]) features distributed across the Study Area, originating from the alluvial fan system from northwest to southeast. These drainage features ultimately terminate east of the Study Area within the desert valley floor. The general locations of the features mapped by NWI appear to be correct, however, these drainage features are likely ephemeral, supporting water flow only during or immediately after rainfall, and may consist of paleo channels that no longer actively support water flows. Please refer to Figure 8 (Appendix D) for mapped NWI aquatic resources.

USGS NHD identifies the potential location and extent of watercourses and streams, drainage patterns, topographic models, and other hydrologic information, similarly mapped to NWI. Drainage features identified by NHD include additional drainage features across the Study Area from northwest to southeast, merging into a larger wash to the east of the Study Area that directs flow to

the south, out of the Study Area. These drainages are categorized by the NHD as having an ephemeral stream flow. The NHD also identifies stream flow to the northwest along Interstate 15, indicating that the Interstate is a barrier to much of the northern rainfall flows and directs water along the Interstate to the north. Refer to Figure 8 (Appendix D) for mapped NHD aquatic resources.

A series of culverts along the Interstate assist in transporting surface water flows under the Interstate and into the Study Area. As addressed in the 2024 ARDR (SWCA 2024), four large culverts were identified along Interstate 15 that provide water passage of upstream water from the north side of the highway to the south side, funneling water into a ditch feature. These culverts/ditches are summarized in Table 2 below, and illustrated in Figure 7 (Appendix D). Other highway water chutes/flumes also occur along Interstate 15 that direct water flows off the highway from the north to the south. The locations of the culverts and the chutes/flumes were used to assist in the evaluation of jurisdictional aquatic resources.

Table 2 Major Culverts along Interstate 15 (SWCA 2024)

Ditch/Culvert	Location (Latitude, Longitude)	Culvert Structure Width (feet)	Distance Between Culverts (miles)
Unnamed Ditch	35.142620°, -116.203046°	8.0	1.2
Marl Ditch	35.156067°, -116.190648°	17.5	0.7
Opah Ditch	35.164668°, -116.182698°	77.0	1.2
Turtle Ditch	35.179039°, -116.169775°	17.5	0.5

The Study Area occurs within a Federal Emergency Management Agency (FEMA) Flood Hazard Area Zone D, which represents areas with possible but undetermined flood hazards (FEMA 2024).

3.3 Soils

The USDA, NRCS Web Soil Survey depicts four soil map units within the Study Area, summarized in Table 3, and further discussed in the 2024 ARDR (SWCA 2024). In the review of the USDA, NRCS (2025), no mapped soil units were identified as hydric.

Table 3 Soil Map Units in the Study Area

Soil Unit Name	Hydric
Tecopa-Rock outcrop-Lithic Torriorthents (s1126) (well-drained; calcareous; loamy)	No
Rock outcrop (s1131) (somewhat excessively drained; calcareous; loamy)	No
Rositas-Carrizo (s1137) (somewhat excessively drained)	No
RillitoGunsight (s1140) (somewhat excessively drained; loamy)	No

3.4 Vegetation Communities and Land Cover Types

Vegetation communities in the project site (including the locations of the four proposed solar arrays and the gen-tie corridor) were previously analyzed in the 2025 BRTR (SWCA 2025). Five vegetation communities were identified within the project site as defined in *A Manual of California Vegetation Online* (CNPS 2023), and included the following: Rigid Spineflower – Hairy Desert Sunflower (*Chorizanthe rigida – Geraea canescens* Desert Pavement Sparsely Vegetated Alliance), California

Joint Fir – Longleaf Joint-fir Scrub (*Ephedra californica – Ephedra trifurca* Shrubland Alliance), Cheesebush – Sweetbush Scrub (*Ambrosia salsola – Bebbia juncea* Shrubland Alliance), Creosote Bush Scrub (*Larrea tridentata* Shrubland Alliance), and Creosote Bush – White Bursage Scrub (*Larrea tridentata – Ambrosia salsola* Shrubland Alliance) which was the most dominant over the entire Study Area. Additionally, maintained dirt roads and other disturbed sites were mapped as Developed/Disturbed landcover type.

Of these vegetation communities, two sensitive associations were identified in the project site: *Chorizanthe rigida – Geraea canescens* Desert Pavement Association and *Ephedra californica – Ambrosia salsola* Association (CDFW 2025). No Special Vegetation Features identified in the Desert Renewable Energy Conservation Plan (DRECP) occur within the Study Area. Table 4 provides a summary of vegetation communities and land cover types within the project site, which are further discussed in the 2025 BRTR (SWCA 2024).

Table 4 Summary of Vegetation Communities and Land Cover Types (SWCA 2025)

Type	Global Rank[1]	State Rank[2]
Creosote Bush – White Bursage Scrub *Larrea tridentata – Ambrosia dumosa* Shrubland Alliance	G5	S5
Creosote Bush Scrub *Larrea tridentata* Shrubland Alliance	G5	S5
Rigid Spineflower – Hairy Desert Sunflower *Chorizanthe rigida – Geraea canescens* Desert Pavement Sparsely Vegetated Alliance, (*Chorizanthe rigida – Geraea canescens* Desert Pavement Association)	G4	S4 (Sensitive Association)
Cheesebush – Sweetbush Scrub *Ambrosia salsola – Bebbia juncea* Shrubland Alliance	G4	S4
California Joint Fir – Longleaf Joint-fir *Ephedra californica – Ephedra trifurca* Shrubland Alliance, (*Ephedra californica – Ambrosia salsola* Association)	G5	S4 (Sensitive Association)
Developed/Disturbed	N/A	N/A

Notes: Data included in this table references information from SWCA 2025.

[1] Global Rank (NatureServe 2024): G4 = Over 100 viable occurrences worldwide/statewide and/or more than 32,000 acres G5 = Demonstrably secure because of its worldwide/statewide abundance

[2] State Rank (NatureServe 2024): S4 = Over 100 viable occurrences worldwide/statewide and/or more than 32,000 acres S5 = Demonstrably secure because of its worldwide/statewide abundance

[3] Project site totals approximately 2,670 acres.

4 Jurisdictional Assessment

No areas potentially meeting federal or state wetland definitions occur within the Study Area based on the literature and desktop review and field survey effort. Non-wetland water resources were determined to occur within the Study Area that meet the current state definitions of Waters of the State subject to RWQCB under the Porter-Cologne Act, and CDFW jurisdiction under Section 1600 et seq. of the CFGC. The non-wetland waters were not identified as waters of the U.S. under the most current federal definitions of waters of the U.S. Further discussion on wetland and non-wetland water resources identified in the Study Area and the potential jurisdiction of the resources is provided below.

As illustrated in Figure 8 (Appendix D), there are numerous aquatic resources mapped in the NHD/NWI that correspond with the larger drainage features and few distinct tributaries. However, the drainage features identified in the March 2025 field survey effort indicate that the Study Area consists of several additional small ephemeral drainage features, and active channels with evidence of recent episodic flow, indicative of the alluvial landform encompassing the entire Study Area. The differences between the drainage features identified in the Representative Sample Plots captured during the March 2025 field surveys compared to the NHD/NWI mapped aquatic resources are a result of the changing flow patterns from year to year, sedimentation over time, variability in widths of stream complexes, developmental impacts from Interstate 15 and dirt roads occurring in the Study Area, and due to the GPS accuracy conducted as part of this assessment compared to the remote sensing techniques used to inform the NHD/NWI maps. Therefore, the NHD/NWI mapped aquatic resources were not used in the calculations that estimated jurisdictional limits within the Study Area. Alternatively, Rincon utilized a combination of field delineation surveys in Representative Sample Plots, high-resolution GIS mapping, and field verification transects, as discussed in the Methodology Section above, to determine the jurisdictional limits of aquatic resources within the Study Area.

A total of approximately 1,326 acres of non-wetland Waters of the State were determined to be present within the Study Area, incorporating both the results of the field delineated data, extrapolated GIS data, and field verifications (Figure 6).

Please refer to Appendix A for further information on the regulatory framework and Section 2, above, discussing the survey methodologies, which were both used to evaluate wetland waters and non-wetland waters potentially subject to the purview of USACE, RWQCB, and CDFW.

4.1 Wetland Waters

4.1.1 Wetland Waters of the U.S.

No wetlands that meet the current USACE definition for wetland waters of the U.S. were determined to occur within the Study Area. No areas of inundation that supported the three defining characteristics of federal wetlands (hydric soils, hydrophytic vegetation, and wetland hydrology) were identified during previous field survey efforts in May 22–26, June 12–16, and September 6–8, 2023 as noted in SWCA Report (SWCA 2024). The literature and database review also indicates that the region in which the Study Area is situated is in a low-lying alluvial fan consisting of dry, gravelly soils with high levels of calcium carbonate (lime). These types of soils, in combination with high desert winds in the region, can create a natural cement-like material which

increases the soil's impermeability, affecting soil structure, hydrology, vegetation patterns, and other processes, thus further supporting the lack of sustained wetland aquatic resources occurring in the Study Area.

No wetland waters of the U.S., as defined by the *Revised Definition of 'Waters of the United States'; Conforming,* were determined to occur within the Study Area.

4.1.2 Wetland Waters of the State

No wetland waters that meet the current RWQCB definition for wetland Waters of the State were determined to occur within the Study Area. During the March 2025 field survey, no areas of inundation that supported continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both were observed; no anaerobic conditions in the upper substrate were observed; and no areas were dominated by hydrophytes were observed. These typical wetland characteristics were also not documented in the 2024 ARDR (SWCA 2024). Due to the arid conditions of the region and dry, gravelly alluvial soils encompassing the Study Area, the Study Area lacks sustained wetland conditions .

No wetland Waters of the State, as defined in the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (2021) , were determined to occur within the Study Area.

4.2 Non-Wetland Waters

4.2.1 Waters of the U.S.

Non-wetland water drainage features identified in the Study Area did not meet the most current definition of waters of the U.S. The drainages may have supported an OHWM, but were not determined to be TNWs, or provide permanent, standing or continuously flowing bodies of waters that drain to or from TNWs. The Study Area is located in the Mojave Watershed, which is a closed basin, and the drainage features occurring in the Study Area do not provide permanent, standing or continuously flowing bodies of waters to TNWs. The drainages provide ephemeral surface water flow temporarily before the water percolates into the groundwater, evaporates, or feeds into isolated dry lakes with no nexus to commerce; therefore, the drainage features in the Study Area are not considered TNWs or tributaries of TNWs.

Additionally, an Approved Jurisdictional Determination (AJD) reviewed by the USACE under *Rapanos Guidance* for the Soda Mountain Solar Project, File Number SPL-2010-01042-SLP, was issued on June 5, 2013, covering 411 acres of delineated features within a larger study area than the current revised project (USACE 2013). The AJD found that flows on-site extend both northeast and southeast into Soda Dry Lake. In the AJD, USACE used jurisdictional report information submitted by Panorama Environmental Inc., dated November 2009 and 2013. USACE found acreages of the drainage areas (active floodplain) were "accurately calculated using GIS data and polygons." The USACE concluded the drainages were isolated non-relatively permanent waters that are tributary to an isolated, intrastate dry lake, and not ultimately tributary to a TNW. USACE concluded all 411 acres of delineated features as non-jurisdictional.

No non-wetland waters of the U.S. subject to federal jurisdiction under CWA Section 404, under the purview of the USACE, were determined to occur within the Study Area.

4.2.2 Waters of the State

Non-wetland water drainage features identified in the Study Area did meet the most current definition of Waters of the State. The drainage features supported an OHWM, evidence of scour, cut banks, headcuts, flow lineations, sediment sorting, vegetation channel alignment, mud cracks, sand filled channels, wrack lines, and/or organic drift and were determined to be active channels that support surface water flows. The aquatic features throughout the Study Area consist of ephemeral, episodic drainages consisting of defined single channels and greater watercourses consisting of functionally related swales, first-order streams, single-thread channels, compound channels, braided channels, discontinuous and distributary channel networks, and floodplains. Several watercourses, consisting of several ephemeral drainage features, were observed to be cut-off and re-directed due to existing well-defined dirt roads occurring throughout the Study Area. Ephemeral drainages that may have once naturally extended to lower elevations were cut off by roads and channelized to larger drainages that along the road before crossing the road and mapped appropriately based on results of field verification transects. The features mapped in Figure 6 were determined be Waters of the State under the California Porter-Cologne Water Quality Control Act under the purview of the RWQCB, and California Fish and Game Code §§ 1600–1616 under the purview of the CDFW.

Please refer to Site Photographs provided as Appendix B for images of representative aquatic features identified in the 2025/2026 field survey effort as non-wetland Waters of the State and appropriately defined and mapped as Waters of the State.

4.3 Non-Jurisdictional Features

During the field survey effort, features identified within the Study Area may have illustrated evidence of ponded water, such as surface soil cracks, or characteristics of previous surface water flows, such as a eroded soils, but were not determined to be wetland or non-wetland Waters of the State because the feature lacked evidence of an OHWM, defined bed and bank, key wetland indicators (i.e., hydrophytic vegetation, hydric soils), and/or were absent of fluvial erosion and deposition (i.e., evidence of rock varnish/weathering, surface rounding on landform). These features were determined to be dormant, abandoned, or relict, as defined by Brady and Vyverberg (2013) were generally not subject to resource agency jurisdiction and were not mapped as active drainage features or were excluded from mapped watercourses. Additionally, evidence of off-road vehicular traffic was identified throughout the Study Area, concentrated within drainage features that lacked vegetation or rocky substrate, making identification of an active stream/watercourse indicators difficult to identify and properly map. Drainage features lacking identifiable jurisdictional indicators were identified as non-jurisdictional and not mapped in this report.

Please refer to Site Photographs provided as Appendix B for images of the drainage features identified in the 2025 field survey effort as non-jurisdictional features.

5 Impact Assessment

The following provides an assessment of estimated project impacts to jurisdictional aquatic resources as a result of proposed temporary and permanent project activities, based on the preliminary 30% Civil Design Plans, for the proposed Project A and the Alternative Project B, including associated gen-tie corridor and northern access road. Project components that result in temporary or permanent impacts for each project design, assessed in this impact analysis, are summarized in Table 5 and illustrated in Figure 9 and Figure 10 (Appendix D).

Table 5 Summary of Temporary and Permanent Impacts by Project Component

Project A Components		Alternative Project B Components	
Temporary Impacts	**Permanent Impacts**	**Temporary Impacts**	**Permanent Impacts**
Solar Array	Proposed Switchyard	Solar Array	Roads
Limits of Disturbance	Access Road	Limits of Disturbance	Laydown Yard
BLM Road	Laydown Yard		Stormwater Pond
	Berm		BESS Yard
	Proposed BESS Yard		Substation
	Proposed BESS Yard Boundary		Switchyard
	Proposed Box Culverts		Guard Berm Ditch
	Proposed Grading Footprint		Erosion Structure
	Proposed Sediment Basin		
	Proposed Outlet Protection Feature		
	Drainage Canal		

3-1

Proposed temporary and permanent impacts to aquatic features within the Project Areas are summarized in Table 6 and illustrated in Figure 11a through Figure 11n (Project A – Aquatic Resources Impacts) and Figure 12a through Figure 12n (Alternative Project B – Aquatic Resources Impacts), Appendix D.

Table 6 Summary of Estimated Jurisdictional Aquatic Resource Impacts within the Project Sites

			State Waters (RWQCB and CDFW Jurisdiction)			
			Temporary Impacts		Permanent Impacts	
	Total Temporary Impact Area (acres)	Total Permanent Impact Area (acres)	Acres	Linear Feet	Acres	Linear Feet
Project A Impacts	1,929.07	191.01	953.80	991,070	125.30	84,471
Alternative Project B Impacts	1,828.75	157.70	1,053.89	1,012,214	90.49	70,396

Notes: No wetland waters of the U.S. or state were determined to be present in the Study Area.

3-2

Incorporated into the project design is the following Mitigation Measure (MM) for grading and construction activities:

> **MM BIO-3: Construction Impact Minimization.** The project shall implement an advanced technology terrain-following solar tracker system (such as the Nextracker NX Horizon-XTR-0.75 10-inch tracker system, Nevados All Terrain Tracker system, or other system resulting in a similar reduction) that reduces grading under the solar field, consisting of solar power arrays identified as East Array and South Arrays 1, 2 and 3. Quarterly construction monitoring reports shall be provided to the California Energy Commission during the construction period for the project. The quarterly construction monitoring reports shall quantify and document all remaining permanent and temporary grading acreage from project construction with the terrain-following tracker system. All temporary grading impact areas shall be revegetated onsite as described in the project-specific Temporary Disturbance Revegetation Plan (APM BIO-7 and MM-BIO-21). All permanent grading impact areas shall be mitigated at the required compensatory mitigation standards of the resource agencies (APM BIO-36, MM BIO-12, MM BIO-24).

3-3

With implementation of MM BIO-3, on-site grading and associated ground disturbance would be significantly reduced under the solar arrays. The reduction in on-site grading and associated ground disturbance would reduce the potential for the project to result in direct, indirect or cumulative impacts related to water quality standards, waste discharge requirements, surface and groundwater quality degradation and the alteration of onsite drainage patterns.

6 Discussion

The results of the aquatic resources delineation conclude that non-wetland, ephemeral aquatic features, including active watercourses, occur within the Study Area that may be subject to RWQCB and CDFW jurisdiction, further summarized below. Authorization from these agencies may be required for implementation of the proposed project if it will involve alteration of or impacts to potentially jurisdictional aquatic resources identified in the Study Area.

In summary, no wetland waters of the U.S. were identified in the Study Area. Non-wetland drainage features identified in the Study Area did not meet the most current definition of waters of the U.S. The drainages may have supported an OHWM, but were not determined to be TNWs, or provide permanent, standing or continuously flowing bodies of waters that drain to or from TNWs. Additionally, an AJD reviewed by the USACE under *Rapanos Guidance* for the Soda Mountain Solar Project, File Number SPL-2010-01042-SLP, was issued on June 5, 2013, covering 411 acres of delineated features within a larger study area than the current revised project. The AJD found that flows on-site extend both northeast and southeast into Soda Dry Lake. The USACE concluded the drainages were isolated non-relatively permanent waters that are tributary to an isolated, intrastate dry lake, and not ultimately tributary to a TNW. USACE concluded all 411 acres of delineated features as non-jurisdictional. Therefore, no wetland or non-wetland waters of the U.S., under the purview of the USACE, were determined to occur within the Study Area.

No Wetland Waters of the State were identified during the field effort within the Study Area, however state waters under the purview of the RWQCB and CDFW were determined to be present. The Study Area included approximately 1,554.65 acres of RWQCB and CDFW jurisdiction. Authorization from the RWQCB and CDFW is anticipated if the aquatic resources cannot be avoided by the proposed project design. Specifically, a Waste Discharge Requirement would be required from the Lahontan RWQCB and authorization from the CDFW (via the AB 205 Opt-in-pathway), specifically a CDFW Notification of Lake or Streambed Alteration Agreement for impacts to state waters.

Rincon determined that the proposed Project A may result in an approximately 953.80 acres (991,070 linear feet) of temporary impacts and 125.30 acres (84,471 linear feet) of permanent impacts to RWQCB and CDFW jurisdiction. The Alternative Project B may result in approximately 1,053.89 acres (1,012,214 linear feet) of temporary impacts and 90.49 acres (70,396 linear feet) of permanent impacts to RWQCB and CDFW jurisdiction.

7 Limitations, Assumptions, and Use Reliance

This jurisdictional delineation has been performed in accordance with best jurisdictional investigation practices conducted at this time and in this geographic area. The jurisdictional investigation is limited by the scope of work performed. The jurisdictional survey is limited also by the environmental conditions present at the time of the survey. Our field studies were based on current industry practices, which change over time and may not be applicable in the future. No other guarantees or warranties, expressed or implied, are provided. The findings and opinions conveyed in this report are based on findings derived from site reconnaissance, jurisdictional delineation, and specified historical and literature sources. Although Rincon believes the data sources are reasonably reliable, Rincon cannot and does not guarantee the authenticity or reliability of the data sources it has used. Additionally, pursuant to our contract, the data sources reviewed included only those that are practically reviewable without the need for extraordinary research and analysis.

8 References

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Appendix A

Regulatory Framework

Regulatory Framework

The following is a brief summary of the regulatory context under which biological resources are managed at the federal, State, and local levels. A number of federal and State statutes provide a regulatory structure which guide the protection of jurisdictional features. Agencies with the responsibility for protection of jurisdictional features within the Project region include:

- United States Army Corps of Engineers (non-wetland waters and wetlands of the United States)
- Lahontan Regional Water Quality Control Board (waters of the State)
- California Department Fish and Wildlife (riparian areas, streambeds, and lakes)
- California Energy Commission

United States Army Corps of Engineers

The United States Army Corps of Engineers (USACE) is responsible for administering several federal programs related to ensuring the quality and navigability of the nation's waters.

Clean Water Act Section 404

Congress enacted the Clean Water Act (CWA) "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the law was significantly reorganized and expanded in 1972. "Clean Water Act" became the law's common name with amendments in 1972.

Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Section 404 of the CWA authorizes the Secretary of the Army, acting through the USACE, to issue permits regulating the discharge of dredged or fill materials into the "navigable waters at specified disposal sites." Section 404 requires that a permit be issued before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from regulation under Section 404 (e.g., certain farming and forestry activities).

Waters of the U.S.

The USACE and US Environmental Protection Agency (USEPA) have undertaken several efforts to modernize their regulations defining "waters of the United States" (e.g., the 2015 Clean Water Rule and 2020 Navigable Waters Protection Rule), but these efforts have been frustrated by legal challenges which have invalidated the updated regulations. As a result of the Supreme Court ruling in *Sackett v. Environmental Protection Agency*, EPA and USACE issued a final rule that amends the "Revised Definition of 'Waters of the United States'" to conform key aspects of the regulatory text to the U.S. Supreme Court's decision (88 Federal Register 61964–61969, September 8, 2023).

Under the "Revised Definition of 'Waters of the United States'; Conforming" rule, the term "waters of the United States" is defined as follows (33 CFR 328.3[a]):

(1) Waters which are:
   (i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
   (ii) The territorial seas; or
   (iii) Interstate waters;

(2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;

(3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section that are relatively permanent, standing or continuously flowing bodies of water;

(4) Wetlands adjacent to the following waters:
   (i) Waters identified in paragraph (a)(1) of this section; or
   (ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3) of this section and with a continuous surface connection to those waters;

(5) Intrastate lakes and ponds not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3) of this section.

In addition, the amended regulations include eight types of excluded waters (33 CFR 328.3[b]) which are not “waters of the United States” even where they otherwise meet the terms of paragraphs (a)(2) through (5) of this section:

(1) Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the Clean Water Act;

(2) Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area’s status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA;

(3) Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;

(4) Artificially irrigated areas that would revert to dry land if the irrigation ceased;

(5) Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;

(6) Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;

(7) Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States; and

(8) Swales and erosional features (e.g., gullies, small washes) characterized by low volume, infrequent, or short duration flow.

The lateral limits of USACE jurisdiction in non-tidal waters is defined by the "ordinary high-water mark" (OHWM) unless adjacent wetlands are present. The OHWM is a line on the shore or edge of a channel established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed upon the bank, shelving, changes in the character of soil, destruction of vegetation, or the presence of debris (33 CFR 328.3(e)). As such, waters are recognized in the field by the presence of a defined watercourse with appropriate physical and topographic features. If wetlands occur within, or adjacent to, waters of the United States, the lateral limits of USACE jurisdiction extend beyond the OHWM to the outer edge of the wetlands (33 CFR 328.4 (c)). The upstream limit of jurisdiction in the absence of adjacent wetlands is the point beyond which the OHWM is no longer perceptible (33 CFR 328.4; see also 51 FR 41217).

Wetlands

The USACE defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3). Indicators of three wetland parameters (hydric soils, hydrophytic vegetation, and wetlands hydrology), as determined by site investigation, must be present at a site for USACE to classify the site as a wetland (Environmental Laboratory 1987). The following is a discussion of each of these parameters.

Hydrophytic Vegetation

Hydrophytic vegetation dominates areas where frequency and duration of inundation or soil saturation exerts a controlling influence on the plant species present. Plant species are assigned wetland indicator status according to the probability of their occurring in wetlands. More than fifty percent of the dominant plant species must have a wetland indicator status to meet the hydrophytic vegetation criterion. The USACE published the National Wetland Plant List (USACE 2018), which separates vascular plants into the following four basic categories based on plant species frequency of occurrence in wetlands:

- **Obligate Wetland (OBL).** Almost always occur in wetlands
- **Facultative Wetland (FACW).** Usually occur in wetlands, but occasionally found in non-wetlands
- **Facultative (FAC).** Occur in wetlands or non-wetlands
- **Facultative Upland (FACU).** Usually occur in non-wetlands, but may occur in wetlands
- **Obligate Upland (UPL).** Almost never occur in wetlands

The USACE considers OBL, FACW and FAC species to be indicators of wetlands. An area is considered to have hydrophytic vegetation when greater than 50 percent of the dominant species in each vegetative stratum (tree, shrub, and herb) fall within these categories. Any species not appearing on the United States Fish and Wildlife Service’s list is assumed to be an upland species, almost never occurring in wetlands. In addition, an area needs to contain at least 5% vegetative cover to be considered as a vegetated wetland.

Hydric Soils

Hydric soils are saturated or inundated for a sufficient duration during the growing season to develop anaerobic or reducing conditions that favor the growth and regeneration of hydrophytic vegetation. Field indicators of wetland soils include observations of ponding, inundation, saturation,

dark (low chroma) soil colors, bright mottles (concentrations of oxidized minerals such as iron), gleying (indicates reducing conditions by a blue-grey color), or accumulation of organic material. Additional supporting information includes documentation of soil as hydric or reference to wet conditions in the local soils survey, both of which must be verified in the field.

Wetland Hydrology

Wetland hydrology is inundation or soil saturation with a frequency and duration long enough to cause the development of hydric soils and plant communities dominated by hydrophytic vegetation. If direct observation of wetland hydrology is not possible (as in seasonal wetlands), or records of wetland hydrology are not available (such as stream gauges), assessment of wetland hydrology is frequently supported by field indicators, such as water marks, drift lines, sediment deposits, or drainage patterns in wetlands.

Limitations on Jurisdiction based on Sackett v. USEPA Supreme Court Decision

On May 25, 2023, the Supreme Court issued its decision on the petition from the Sacketts, a family in Idaho that was subject to a compliance order from the USEPA for backfilling their lot near Priest Lake, which the USEPA claimed contained federally regulated wetlands. The wetlands in question were adjacent to a ditch that fed a creek that ultimately drained into Priest Lake, a navigable water body. The USEPA asserted that the Sacketts had violated the law by filling the wetlands on their property without a permit. The Court's decision addressed controversy over whether, and under what conditions, the CWA reaches navigable waters' tributaries or adjacent wetlands. The Supreme Court's decision in Sackett provides definitive guidance to the agencies in determining the limits of their Clean Water Act authority. Major tenets of the decision have been incorporated into the agencies' current regulations through the September 2023 Conforming Rule.

The Court decided:

- "Adjacent wetlands" are WOTUS only if there is a continuous surface connection between the wetland and a navigable or relatively permanent water body, such that it is difficult to determine the boundary between the wetland and the water body. The opinion notes that "temporary interruptions to surface connection may sometimes occur because of phenomena like low tides or dry spells." The agencies addressed this element by defining the term "adjacent" to mean "having a continuous surface connection" in the Conforming Rule.
- The Significant Nexus Standard, introduced by the Court in prior decisions, is not mentioned in the Clean Water Act and should not be used. The Court determined that the standard applies ecological factors whose use in determining jurisdiction is not supported by the statute. The Conforming Rule removed significant nexus considerations from the definition.
- Although jurisdiction over tributaries was not addressed by the Court, the decision stated that "…the [Clean Water Act's] use of "waters" encompasses only those relatively permanent, standing or continuously flowing bodies of water forming geographical features that are described in ordinary parlance as streams, oceans, rivers, and lakes." The Conforming Rule makes clear that only relatively permanent tributaries qualify as "waters of the United States."

State Water Resource Control Boards

The State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs) have jurisdiction over "waters of the State," which are defined as any surface water or groundwater, including saline waters, within the boundaries of the state (California Water Code sec. 13050(e)). These agencies also have responsibilities for administering portions of the CWA.

Clean Water Act Section 401

Section 401 of the CWA requires an applicant requesting a federal license or permit for an activity that may result in any discharge into navigable waters (such as a Section 404 Permit) to provide state certification that the proposed activity will not violate state and federal water quality standards. In California, CWA Section 401 Water Quality Certification (Section 401 Certification) is issued by the RWQCBs and by the SWRCB for multi-region projects. The process begins when an applicant submits an application to the RWQCB and informs the USACE (or the applicable agency from which a license or permit was requested) that an application has been submitted. The USACE will then determine a "reasonable period of time" for the RWQCB to act on the application; this is typically 60 days for routine projects and longer for complex projects but may not exceed one year. When the period has elapsed, if the RWQCB has not either issued or denied the application for Section 401 Certification, the USACE may determine that Certification has been waived and issue the requested permit. If a Section 401 Certification is issued it may include binding conditions, imposed either through the Certification itself or through the requested federal license or permit.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) is the principal law governing water quality regulation in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne Act applies to surface waters, wetlands, and ground water and to both point and nonpoint sources of pollution. Pursuant to the Porter-Cologne Act (California Water Code section 13000 et seq.), the policy of the State is as follows:

- The quality of all the waters of the State shall be protected
- All activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason
- The State must be prepared to exercise its full power and jurisdiction to protect the quality of water in the State from degradation

The Porter-Cologne Act established nine RWQCBs (based on watershed boundaries) and the SWRCB, which are charged with implementing its provisions and which have primary responsibility for protecting water quality in California. The SWRCB provides program guidance and oversight, allocates funds, and reviews RWQCB decisions. In addition, the SWRCB allocates rights to the use of surface water. The RWQCBs have primary responsibility for individual permitting, inspection, and enforcement actions within each of nine hydrologic regions. The SWRCB and RWQCBs have numerous nonpoint source related responsibilities, including monitoring and assessment, planning, financial assistance, and management.

Section 13260 of the Porter-Cologne Act requires any person discharging or proposing to discharge waste that could affect the quality of waters of the State to file a Report of Waste Discharge with the appropriate RWQCB. The RWQCB may then authorize the discharge, subject to conditions, by issuing Waste Discharge Requirements (WDRs). While this requirement was historically applied primarily to outfalls and similar point source discharges, the SWRCB's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*, effective May 2020, make it clear that the agency will apply the Porter-Cologne Act's requirements to discharges of dredge and fill material as well. The *Procedures* state that they are to be used in issuing CWA Section 401 Certifications and WDRs, and largely mirror the existing review requirements for CWA Section 404 Permits and Section 401 Certifications, incorporating most elements of the USEPA's *Section 404(b)(1) Guidelines*. Following issuance of the *Procedures*, the SWRCB produced a consolidated application form for dredge/fill discharges that can be used to obtain a CWA Section 401 Water Quality Certification, WDRs, or both.

Non-Wetland Waters of the State

The SWRCB and RWQCBs have not established regulations for field determinations of waters of the state except for wetlands currently. In many cases the RWQCBs interpret the limits of waters of the State to be bounded by the OHWM unless isolated conditions or ephemeral waters are present. However, in the absence of statewide guidance each RWQCB may interpret jurisdictional boundaries within their region and the SWRCB has encouraged applicants to confirm jurisdictional limits with their RWQCB before submitting applications. As determined by the RWQCB, waters of the State may include riparian areas or other locations outside the OHWM, leading to a larger jurisdictional area over a given water body compared to the USACE.

Wetland Waters of the State

Procedures for defining wetland waters of the State pursuant to the SWRCB's *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* went into effect May 28, 2020. The SWRCB defines an area as wetland if, under normal circumstances:

(i) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both;

(ii) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and

(iii) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

The SWRCB's *Implementation Guidance for the Wetland Definition and Procedures for Discharges of Dredge and Fill Material to Waters of the State* (2020), states that waters of the U.S. and waters of the State should be delineated using the standard USACE delineation procedures, taking into consideration that the methods shall be modified only to allow for the fact that a lack of vegetation does not preclude an area from meeting the definition of a wetland.

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) derives its authority from the Fish and Game Code of California and administers several State laws protecting fish and wildlife resources and the habitats upon which they depend.

Protection of Lakes and Streambeds

California Fish and Game Code section 1602 states that it is unlawful for any person to "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake" without first notifying the California Department of Fish and Wildlife (CDFW) of that activity. Thereafter, if CDFW determines and informs the entity that the activity will not substantially adversely affect any existing fish or wildlife resources, the entity may commence the activity. If, however, CDFG determines that the activity may substantially adversely affect an existing fish or wildlife resource, the entity may be required to obtain from CDFW a Streambed Alteration Agreement (SAA), which will include reasonable measures necessary to protect the affected resource(s), before the entity may conduct the activity described in the notification. Upon receiving a complete Notification of Lake/Streambed Alteration, CDFW has 60 days to present the entity with a Draft SAA. Upon review of the Draft SAA by the applicant, any problematic terms are negotiated with CDFW and a final SAA is executed.

The CDFW has not defined the term “stream” for the purposes of implementing its regulatory program under Section 1602, and the agency has not promulgated regulations directing how jurisdictional streambeds may be identified, or how their limits should be delineated. However, four relevant sources of information offer insight as to the appropriate limits of CDFW jurisdiction as discussed below.

- **The plain language of Section 1602 of CFGC** establishes the following general concepts:
  - References “river,” “stream,” and “lake”
  - References “natural flow”
  - References “bed,” “bank,” and “channel”
- **Applicable court decisions**, in particular *Rutherford v. State of California* (188 Cal App. 3d 1276 (1987), which interpreted Section 1602’s use of “stream” to be as defined in common law. The Court indicated that a “stream” is commonly understood to:
  - Have a source and a terminus
  - Have banks and a channel
  - Convey flow at least periodically, but need not flow continuously and may at times appear outwardly dry
  - Represent the depression between the banks worn by the regular and usual flow of the water
  - Include the area between the opposing banks measured from the foot of the banks from the top of the water at its ordinary stage, including intervening sand bars
  - Include the land that is covered by the water in its ordinary low stage
  - Include lands below the OHWM
- **CDFW regulations** defining “stream” for other purposes, including sport fishing (14 CCR 1.72) and streambed alterations associated with cannabis production (14 CCR 722(c)(21)), which indicate that a stream:
  - Flows at least periodically or intermittently
  - Flows through a bed or channel having banks
  - Supports fish or aquatic life

- Can be dry for a period of time
- Includes watercourses where surface or subsurface flow supports or has supported riparian vegetation

- **Guidance documents**, *including A Field Guide to Lake and Streambed Alteration Agreements* (CDFG 1994) and *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants* (Brady and Vyverberg 2013), which suggest the following:
  - A stream may flow perennially or episodically
  - A stream is defined by the course in which water currently flows, or has flowed during the historic hydrologic course regime (approximately the last 200 years)
  - Width of a stream course can reasonably be identified by physical or biological indicators
  - A stream may have one or more channels (single thread vs. compound form)
  - Features such as braided channels, low-flow channels, active channels, banks associated with secondary channels, floodplains, islands, and stream-associated vegetation, are interconnected parts of the watercourse
  - Canals, aqueducts, irrigation ditches, and other means of water conveyance can be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife
  - Biologic components of a stream may include aquatic and riparian vegetation, all aquatic wildlife including fish, amphibians, reptiles, invertebrates, and terrestrial species which derive benefits from the stream system
  - The lateral extent of a stream can be measured in different ways depending on the particular situation and the type of fish or wildlife resource at risk

The tenets listed above, among others, are applied to establish the boundaries of streambeds in various environments. Importance of each factor may be weighted based on site-specific considerations and the applicability of the indicators to the streambed at hand.

California Energy Commission

The California Energy Commission (CEC) has been authorized under Assembly Bill 205 (Chapter 61, 2022) to establish a new certification program for eligible non-fossil-fueled power plants and related facilities to optionally seek certification from the CEC, using emergency rulemaking authority provided by AB 205. Per the Notice of Approval of Emergency Regulatory Action for Opt-in Regulations Section 1877, Opt-In applications are required to include all the information specified by California Code of Regulations (CCR) Title 20 Division 2 Section 1704(a) Appendix B that is relevant to the project.

Appendix B

Site Photographs

Representative Images of Non-Wetland Waters of the State (RWQCB/CDFW Jurisdiction) Photographed in Representative Sample Plots within the Study Area between March 24 – 28, 2025

Photo Point E-4-1 (East Array). Northwestern facing representative photograph facing downstream of a small drainage exhibiting indicators of an OHWM.

Photo Point E-6-3 (East Array). Southeast facing representative photograph of an upstream portion of a drainage exhibiting indicators of an OHWM.

Photo Point E-11-3 (East Array). East facing representative photograph illustrating indicators of an OHWM, corresponding to the EK-003 Datasheet.

Photo Point E-7-3 (East Array). West facing representative photograph illustrating an OHWM and no riparian vegetation, corresponding to the ATG-004 Datasheet.

Photo Point E-9-2 (East Array). East facing representative photograph illustrating an upstream portion of a drainage exhibiting an OHWM and no riparian vegetation, corresponding to the EK-004 Datasheet.

Photo Point E-5-3 (East Array). Northeast facing representative photograph illustrating indicators of an OHWM, corresponding to the KG-003 Datasheet.

Photo Point S1-3-2 (South Array 1). East facing representative photograph illustrating an upstream portion of a drainage exhibiting an OHWM and no riparian vegetation, corresponding to the ATG-003 Datasheet.

Photo Point S1-5-2 (South Array 1). Southwest facing representative photograph illustrating indicators of an OHWM, corresponding to the KG-001 Datasheet.

Photo Point S2-14-1 (South Array 2). West facing representative photograph of an upstream drainage feature exhibiting indicators of an OHWM.

Photo Point S2-5-2 (South Array 2). East facing representative photograph of a downstream drainage feature exhibiting indicators of an OHWM, corresponding to the EK-001 Datasheet.

Photo Point S2-6-2 (South Array 2). West facing representative photograph of a drainage feature exhibiting indicators of an OHWM, corresponding to the ATG-002 Datasheet.

Photo Point S2-8-1 (South Array 2). East facing representative photograph of an downstream drainage feature exhibiting indicators of an OHWM, corresponding to the EK-001 Datasheet.

Photo Point S3-2-1 (South Array 3). Northeast facing representative photograph of drainages in the Study Area exhibiting weak indicators of a bed and bank and change in substrate.

Photo Point S3-7-1 (South Array 3). East facing representative photograph of drainages in the Study Area exhibiting weak indicators of a bed and bank and change in substrate.

Photo Point S3-8-1 (South Array 3). Northeast facing representative photograph of drainages in the Study Area exhibiting weak indicators of a bed and bank and change in substrate.

Photo Point S3-11-1 (South Array 3). West facing representative photograph of drainages in the Study Area exhibiting weak indicators of a bed and bank and change in substrate.

Photo Point T-1 (Gen-Tie Corridor). Northeast facing representative photograph illustrating a floodplain control ditch paralleling Interstate 15, facing downstream.

Photo Point T-11 (Gen-Tie Corridor). East facing representative photograph illustrating braided drainages, facing downstream.

Photo Point T12 (Gen-Tie Corridor). East facing representative photograph illustrating indicators of an OHWM in a drainage feature, corresponding to ATG-005 Datasheet.

Photo Point T-5 (Gen-Tie Corridor). West facing view of drainage where indicators have been disturbed by vehicular activities.

Representative Images of Non-Jurisdictional Features Photographed in Representative Sample Plots within the Study Area Photographed between March 24 – 28, 2025

Photo Point S2-13-2 (South Array 2). East facing view of a representative area exhibiting indicators of historic sheet flow and swales and signs of desert pavement.

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Appendix C

Completed Datasheets

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

The Public reporting burden for this collection of information, 0710-0024, is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

Project ID #: Soda Mountain Solar	Site Name: ATG001	Date and Time: 3/25/25 11:24am
Location (lat/long): 35.147816, -116.190936	Investigator(s): Antonette Gutierrez	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Undisturbed single channel with natural, gentle slopes of upland sand and small rock.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [ ] **Shelving**
  - [ ] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [X] **Secondary channels**
- [X] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [X] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [ ] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [ ] **Changes in particle-sized distribution**
  - [ ] *transition from* _____ to _____
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [ ] **Change in vegetation type from** _____ **to** _____
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [X] **Other vegetation observations**
  Unvegetated

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Larrea tridentata-Ambrosia dumosa dominate on the channel banks. Both shrubs are uniformly dispersed throughout the landscape.

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Obvious break in slope with defined bed and bank in various locations throughout the channel. Secondary channels flow into the main channel. Slight shelving on the steeper bank. Obvious change in soil from upland to the channel bottom.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
S2-8-1	Multi-thread unvegetated streambed (junction) upstream.
S2-8-2	Unvegetated streambed downstream.

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

The Public reporting burden for this collection of information, 0710-0024, is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

Project ID #: Soda Mountain Solar	Site Name: KG002	Date and Time: 3/26/25 1:30pm
Location (lat/long): 35.170851, -116.169424	Investigator(s): Kyle Gunther	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Open desert in a regional drought. Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Bajada contains Larrea tridentata -Ambrosia dumosa Shrubland with numerous small braided ephemeral drainages that flow across a paved road (Arrowhead Trail) and converge downstream of the road into a larger, more defined wash. Litter present.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [X] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [X] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [ ] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* silt/sand *to* sand/gravel
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** 0 **to** Lartri-Ambdum
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Flat, sandy-silty floodplain present (unvegetated), then transitions to an obvious bank at the OHWM that is vegetated and has sandy-gravel soils.

Additional observations or notes

Road has likely created this convergence point from the upstream braided channels on the bajada.

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
E-6-2	Downstream
E-6-3	Upstream
E-6-4	OHWM and TOB

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: KG003	Date and Time: 3/26/25 2:50pm
Location (lat/long): 35.170590, -116.172039	Investigator(s): Kyle Gunther	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Open desert in a regional drought. Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Flat sandy floodplain (unvegetated). Obvious banks (~1 foot tall) made up of sandy gravel and some cobble. Upland vegetation consists of Larrea tridentata -Ambrosia dumosa Shrubland. Litter present.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [ ] **Channel bar**
  - [ ] *shelving (berms) on bar*
  - [ ] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [X] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [X] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* sand to gravel
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** 0 **to** Lartri-Ambdum
- [X] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [X] **Sediment deposited on vegetation or structures**
- [X] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Flat, unvegetated floodplain below OHWM (sandy). Break in slope at OHWM. Transition from sloped to flat at TOB and change in sediment to gravel, and vegetated.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
E-5-1	Downstream
E-5-2	Upstream
E-5-3	OHWM and TOB

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: ATG003	Date and Time: 3/26/25 8:35am
Location (lat/long): 35.160971, -116.175045	Investigator(s): Antonette Gutierrez	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Desert bajada. Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Shallow large channels with shallow sand tributaries in flat desertscape disturbed by offroad activity.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [ ] **Shelving**
  - [ ] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [X] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [ ] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [X] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [X] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* gravel to sand
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [ ] **Change in vegetation type from** _____ **to** _____
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [X] **Other vegetation observations**
  Unvegetated system

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Larrea tridentata-Ambrosia dumosa distributed evenly throughout the descertscape.

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Slight break in slope and changes in soil character evident. Multiple channels with sandy substrate in the channel and gravel in the upland islands.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
S1-3-1	Upstream
S1-3-2	Downstream
S1-3-3	OHWM

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: ATG004	Date and Time: 3/26/25 12:45pm
Location (lat/long): 35.170713, -116.162028	Investigator(s): Antonette Gutierrez	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Undisturbed single unvegetated streambed near base of mountains. Natural headwater flows from mountains to the east.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [X] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [X] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [X] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [X] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [X] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* cobble to sand/gravel
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [ ] **Change in vegetation type from** _____ **to** _____
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [X] **Other vegetation observations**
  Unvegetated system

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Larrea tridentata-Ambrosia dumosa on top of bank.

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Obvious bed and bank, change in soil character, shelving, scour and changes in particle size distribution.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
E-7-1	Upstream
E-7-2	Downstream
E-7-3	OHWM-scour and cut in bank.

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

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Project ID #: Soda Mountain Solar	Site Name: ATG005	Date and Time: 3/27/25 9:00am
Location (lat/long): 35.170545, -116.187415	Investigator(s): Antonette Gutierrez	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Desert bajada. Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Disturbed by offroad vehicles. Major road intersects overall wash.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [X] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [X] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [X] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [X] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [X] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [X] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [X] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [X] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* cobble to sand
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [ ] **Change in vegetation type from** _____ **to** _____
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [X] **Vegetation matted down and/or bent**
- [X] **Other vegetation observations**
  Unvegetated

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Larrea tridentata, Ambrosia dumosa, and Ambrosia salsola on the banks and on the islands within the channels.

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Obvious bed and bank for the channels. Change in soil type from upland to streambed. Scouring, shelving, and pools throughout the system.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
T-10	Upstream main channels
T-11	Downstream braided channels
T-12	OHWM shelving and break in slope, change in soil, and sediment distribution.

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: EK001	Date and Time: 3/25/25 1300
Location (lat/long): 35.149214, -116.175823	Investigator(s): EK	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Alluvial fan in open desert. Conditions dry and apparently lacking significant winter rainfall this year

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Some limited OHV disturbance in the area, but not at the immediate location of this transect

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [ ] **Shelving**
  - [ ] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [X] **Channel bar**
  - [ ] *shelving (berms) on bar*
  - [ ] *unvegetated*
  - [X] *vegetation transition (go to veg. indicators)*
  - [X] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [X] **Instream bedforms and other bedload transport evidence**
  - [X] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* gravel to Sand
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** s **to** none
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [X] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

There is a clear break in slope at the OHWM and an abrupt change in particle size distribution from gravel and cobble above the OHWM to sand below the OHWM

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
S2-5-1	Upstream from sample point
S2-5-2	Downstream from sample point
S2-5-3	OHWM at sample point

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: EK002	Date and Time: 3/25/25 1530
Location (lat/long): 35.158846, -116.172770	Investigator(s): EK	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Alluvial fan in open desert. Sample point located within a moderately sized ephemeral stream. There was apparently very little rain here in the 2024/2025 winter season

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Low levels of OHV disturbance in the wash channels

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [ ] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [ ] *unvegetated*
  - [X] *vegetation transition (go to veg. indicators)*
  - [X] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [X] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [X] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* gravel to sand
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** L **to** Cheese bush
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [X] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

There is a clear and obvious break in slope and bed & banks. The bank is about 1.5 ft tall on river left and steep. On river right the slope is more gentle and about 3 ft. tall. There is a change in particle size distribution from cobble and gravel to sand at the OHWM.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
Other-8	Upstream from sample point
Other-9	Downstream from sample point
Other-10	OHWM on river left at sample point

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: EK003	Date and Time: 3/26/25 0910
Location (lat/long): 35.162635, -116.165457	Investigator(s): EK	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Alluvial fan in open desert. There was apparently very little rainfall at this site in the 2024/2025 winter season

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

This site is minimally disturbed upper alluvial fan. There are a few OHV tire tracks nearby but not at the sample point.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [ ] **Channel bar**
  - [ ] *shelving (berms) on bar*
  - [ ] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [ ] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* gravel to sand
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** S **to** Unvegetated
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

This is a small unvegetated stream channel in the upper portion of an alluvial fan. The channel is about 1 ft. wide between OHWMs at the sample point. There is a distinct break in slope at the OHWM and a clear change in particle size distribution from coarse and fine gravel to sand at the OHWM.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
E-11-2	Upstream from sample point
E-11-3	Downstream from sample point
E-11-4	OHWM at sample point

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: EK004	Date and Time: 3/26/25 1330
Location (lat/long): 35.165347, -116.168754	Investigator(s): EK	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [x] satellite imagery
- [ ] land use maps
- [x] aerial photos
- [x] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Mid slope on an alluvial fan in open desert. Apparently very little rainfall during the 2024/2025 winter season

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Minimally disturbed open desert with occasional tire tracks and trash.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [x] **Break in slope**
  - [x] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [ ] **Shelving**
  - [ ] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [ ] **Channel bar**
  - [ ] *shelving (berms) on bar*
  - [ ] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [ ] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [ ] **Changes in character of soil**
- [ ] **Mudcracks**
- [x] **Changes in particle-sized distribution**
  - [x] *transition from* gravel to sand
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [ ] **Change in vegetation type from** S **to** unvegetatedb
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Small alluvial channel in the middle of a bajada. The channel is about 1 ft wide between OHWM with a cut bank about 4" deep on one side and a gradual slope on the other. There is a distinct change in particle size distribution from gravel and cobble above the OHWM to sand at and below the OHWM

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
E-9-1	Downstream from sample point
E-9-2	Upstream from sample point
E-9-3	OHWM at sample point

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

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Project ID #: Soda Mountain Solar	Site Name: KG001	Date and Time: 3/26/25 9:51am
Location (lat/long): 35.156993, -116.185206	Investigator(s): Kyle Gunther	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Open desert in a regional drought. Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Interstate 15 has obstructed natural flow from mountains. Upstream flow is now funneled to culverts or under bridges. Litter also present in drainage. Cobble banks to sandy floodplain. Upland vegetation = Larrea tridentata -Ambrosia dumosa Shrubland. Floodplain contains sparse amounts of Ambrosia dumosa.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [X] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [X] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [ ] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* cobble to sand/gravel
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** 0 **to** Lartri-Ambdum
- [X] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [X] **Other vegetation observations**
  Old dry annuals scattered in floodplain

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Change in soil texture and particle size, presence of bed and bank, change in vegetation type and cover.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
S1-5-2	Upstream view
S1-5-3	Downstream view
S1-5-4	OHWM and TOB view

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

The Public reporting burden for this collection of information, 0710-0024, is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

Project ID #: Soda Mountain Solar	Site Name: KG002	Date and Time: 3/26/25 1:30pm
Location (lat/long): 35.170851, -116.169424	Investigator(s): Kyle Gunther	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Open desert in a regional drought. Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Bajada contains Larrea tridentata -Ambrosia dumosa Shrubland with numerous small braided ephemeral drainages that flow across a paved road (Arrowhead Trail) and converge downstream of the road into a larger, more defined wash. Litter present.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [X] **Channel bar**
  - [X] *shelving (berms) on bar*
  - [X] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [ ] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* silt/sand *to* sand/gravel
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** 0 **to** Lartri-Ambdum
- [ ] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [ ] **Sediment deposited on vegetation or structures**
- [ ] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Flat, sandy-silty floodplain present (unvegetated), then transitions to an obvious bank at the OHWM that is vegetated and has sandy-gravel soils.

Additional observations or notes

Road has likely created this convergence point from the upstream braided channels on the bajada.

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
E-6-2	Downstream
E-6-3	Upstream
E-6-4	OHWM and TOB

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-COR.

Form Approved -
OMB No. 0710-0024
Expires: 2027-09-30

The Agency Disclosure Notice (ADN)

The Public reporting burden for this collection of information, 0710-0024, is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

Project ID #: Soda Mountain Solar	Site Name: KG003	Date and Time: 3/26/25 2:50pm
Location (lat/long): 35.170590, -116.172039	Investigator(s): Kyle Gunther	

Step 1 Site overview from remote and online resources.
Check boxes for online resources used to evaluate site:

- [ ] gage data
- [ ] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [X] satellite imagery
- [ ] land use maps
- [X] aerial photos
- [X] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources.
Were there any recent extreme events (floods or drought)?
Open desert in a regional drought. Conditions dry and apparently lacking significant winter rainfall this year.

Step 2 Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or human-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls, etc.

Flat sandy floodplain (unvegetated). Obvious banks (~1 foot tall) made up of sandy gravel and some cobble. Upland vegetation consists of Larrea tridentata -Ambrosia dumosa Shrubland. Litter present.

Step 3 Mark the boxes next to the indicators used to help identify the location of the OHWM.
OHWM is at a transition point, therefore some indicators used to identify the location of the OHWM may be just below or above the OHWM. Make a slash in boxes next to indicators that are helpful in identifying the OHWM. After the initial assessment, those indicators identified at the OHWM elevation should be changed from slashes to x's. Note, it is not necessary to mark indicators that are present but do not help inform identification of the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and attach a photo log.

Geomorphic indicators

- [X] **Break in slope**
  - [X] *on the bank*
  - [ ] *undercut bank*
  - [ ] *valley bottom*
  - [ ] Other: _____
- [X] **Shelving**
  - [X] *shelf at top of bank*
  - [ ] *natural levee*
  - [ ] *human-made berms or levees*
  - [ ] *other berms:* _____
- [ ] **Secondary channels**
- [ ] **Channel bar**
  - [ ] *shelving (berms) on bar*
  - [ ] *unvegetated*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar*
- [X] **Instream bedforms and other bedload transport evidence**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., pools, riffles, steps, etc.)*
  - [ ] *Weathered clasts or bedrock*
  - [X] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

Sediment indicators

- [ ] **Soil development**
- [X] **Changes in character of soil**
- [ ] **Mudcracks**
- [X] **Changes in particle-sized distribution**
  - [X] *transition from* sand to gravel
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits*

Vegetation indicators (*Consider the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain*)

- [X] **Change in vegetation type from** 0 **to** Lartri-Ambdum
- [X] **Change in density of vegetation**
- [ ] **Exposed roots below intact soil layer**
- [ ] **Vegetation matted down and/or bent**
- [ ] **Other vegetation observations**

Other physical indicators

- [X] **Sediment deposited on vegetation or structures**
- [X] **Wracking/presence of organic litter**
- [ ] **Presence of large wood**
- [ ] **Leaf litter disturbed or washed away**
- [ ] **Water staining**

Other observed indicators? Describe:

Project ID #: Soda Mountain Solar

Step 4 Was additional information used to support identification of the OHWM? ☐ Yes ☒ No

If yes, describe and attach information to data sheet:

Step 5 Is an OHWM present at this site? ☒ Yes ☐ No

Describe rationale for location of OHWM or lack thereof by describing any observed indicators (at, above, and/or below the OHWM location).

Flat, unvegetated floodplain below OHWM (sandy). Break in slope at OHWM. Transition from sloped to flat at TOB and change in sediment to gravel, and vegetated.

Additional observations or notes

Attach an imagery log of the site.

Imagery log attached? ☒ Yes ☐ No If no, explain why not: _____

List photographs, or other imagery/sketches, and include descriptions in the table below.

Number photographs in the order that they are taken. Attach imagery and include annotations of features.

Imagery Number	Imagery description
E-5-1	Downstream
E-5-2	Upstream
E-5-3	OHWM and TOB

Appendix D

Figures

Figure 1 Regional Location

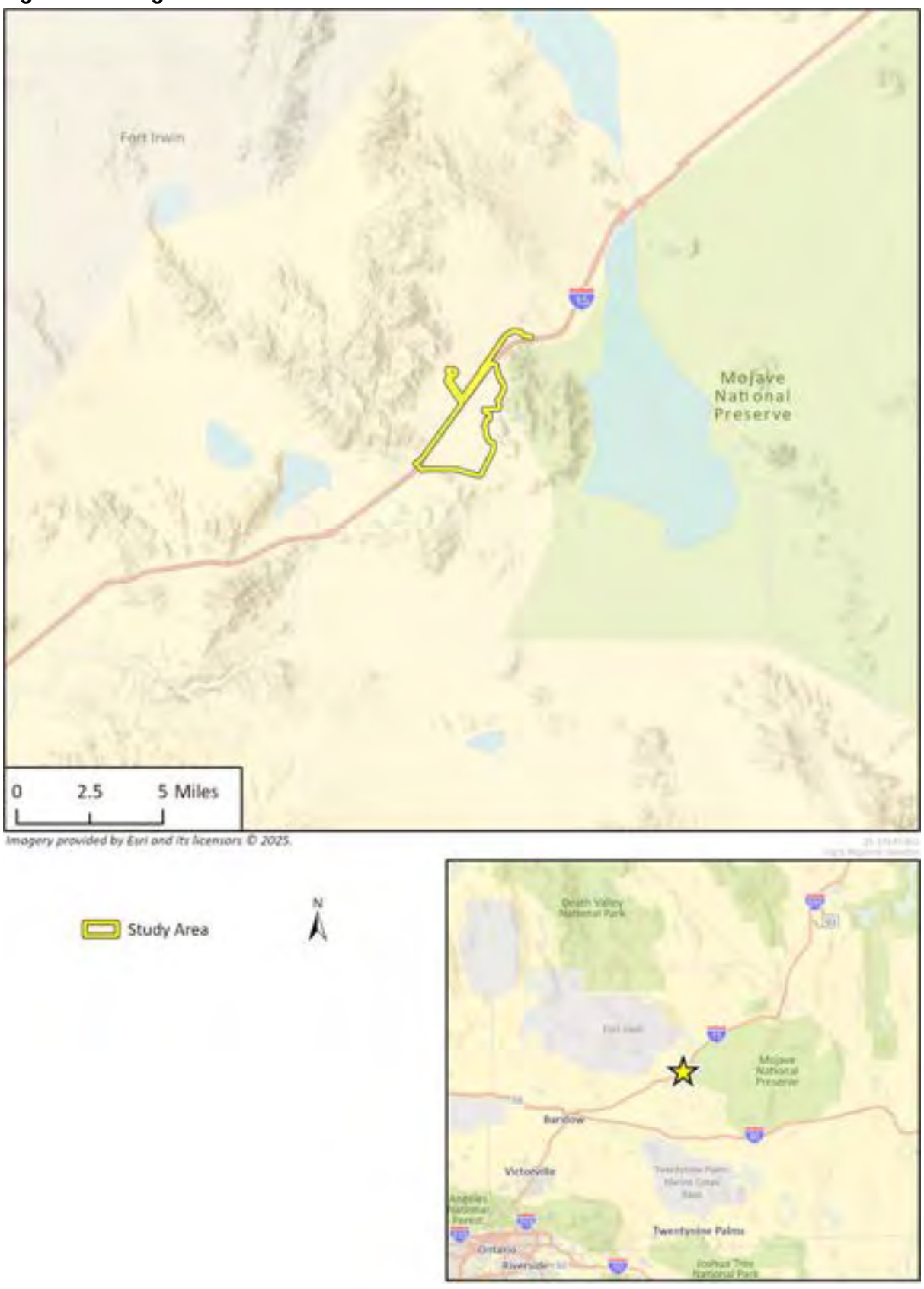
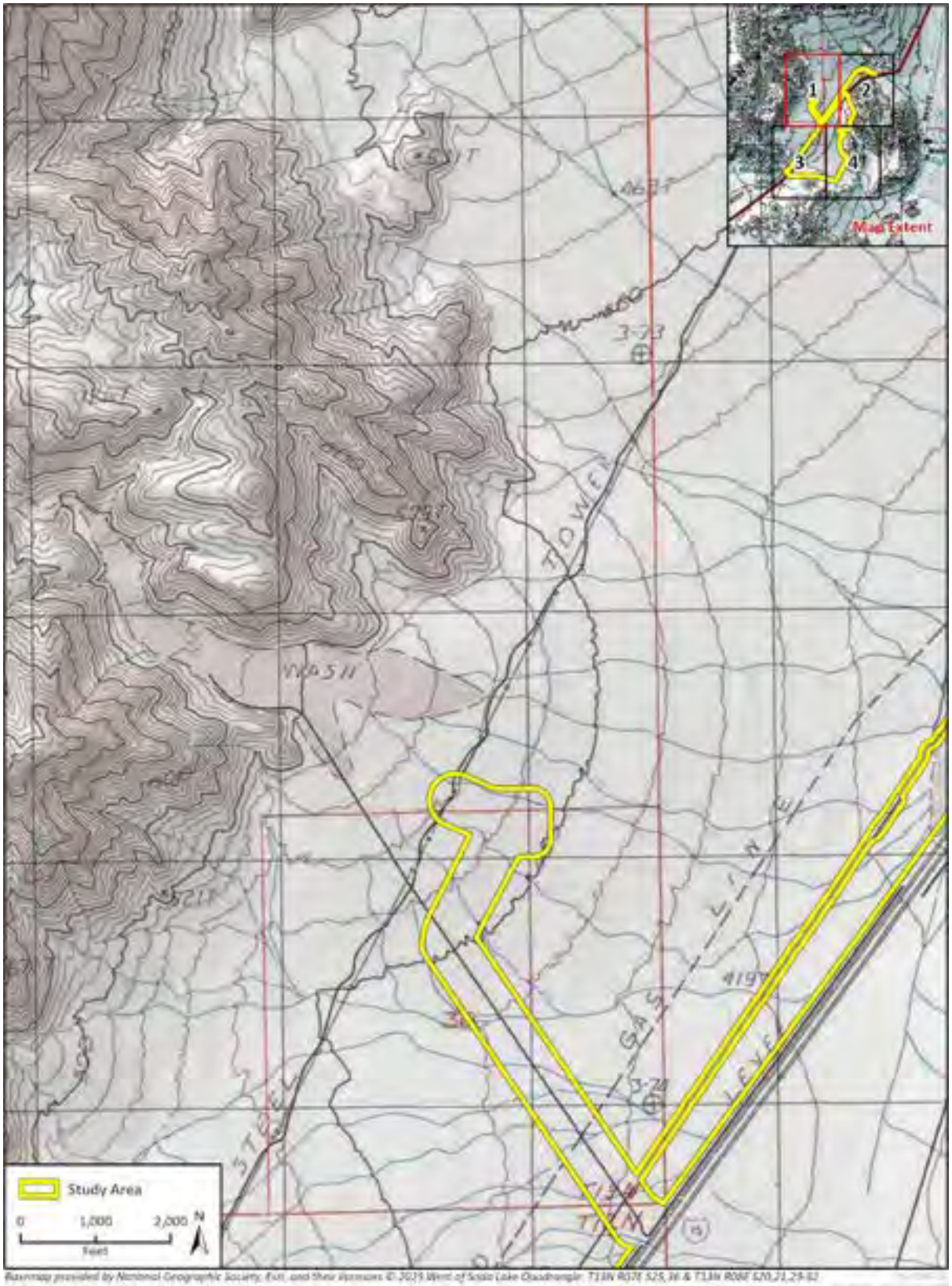
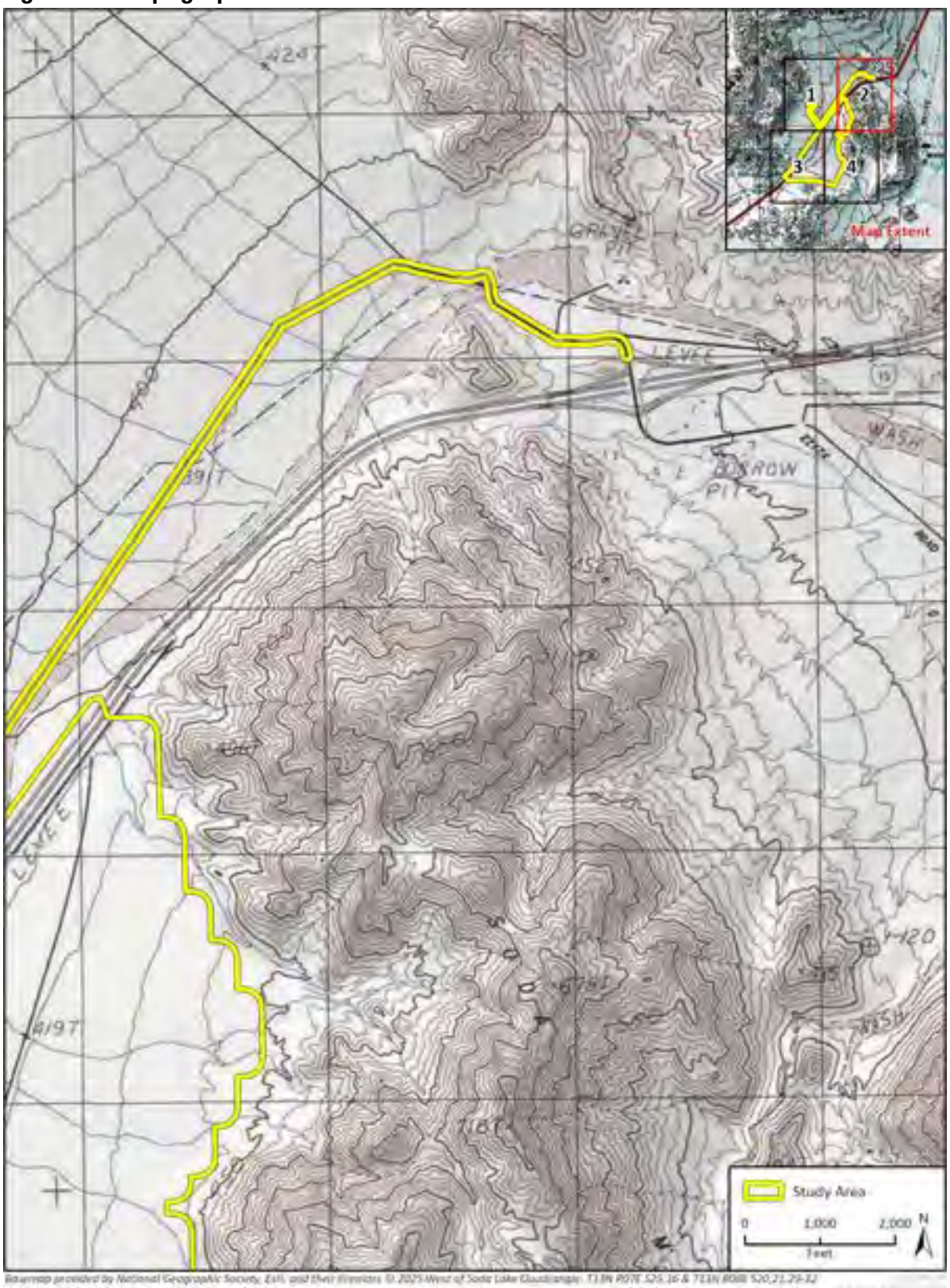


Figure 2a Topographic Location



Basemap provided by National Geographic Society, Esri, and their licensors © 2015 West of Soda Lake Quadrangle: T13N R07E S25,36 & T13N R08E S20,21,29-32 & T12N R07E S01,11-14 & T12N R08E S05-07,18. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Figure 2b Topographic Location



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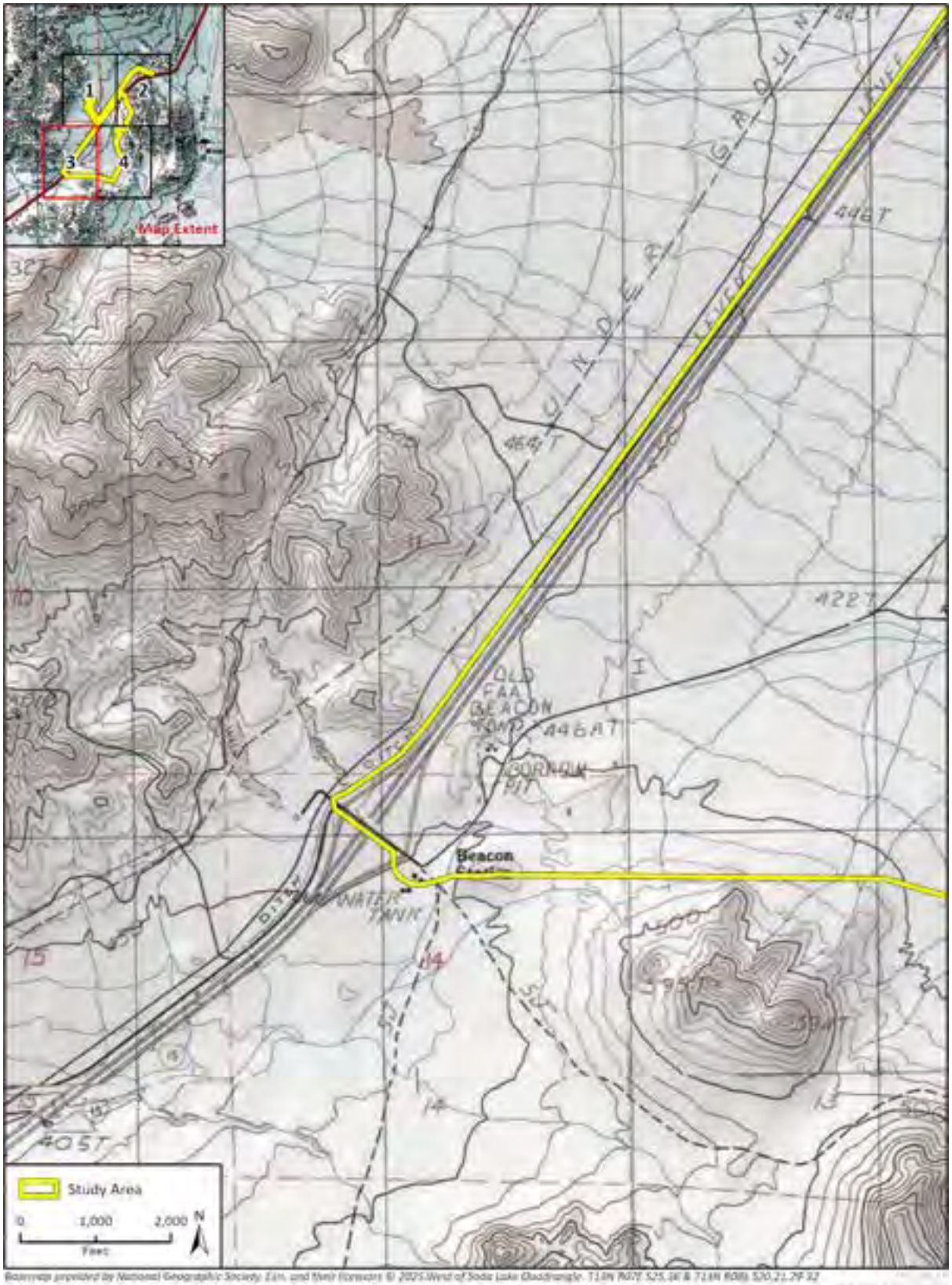
Soda Mountain Solar Project

Figure 2c Topographic Location



Basemap provided by National Geographic Society, Esri, and their licensors © 2025.West of Soda Lake Quadrangle. T13N R07E S25,36 & T14N R08E S30,31,29,32 & T13N R07E S01,11 14 & T12N R08E S05 07,18. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Figure 2d Topographic Location

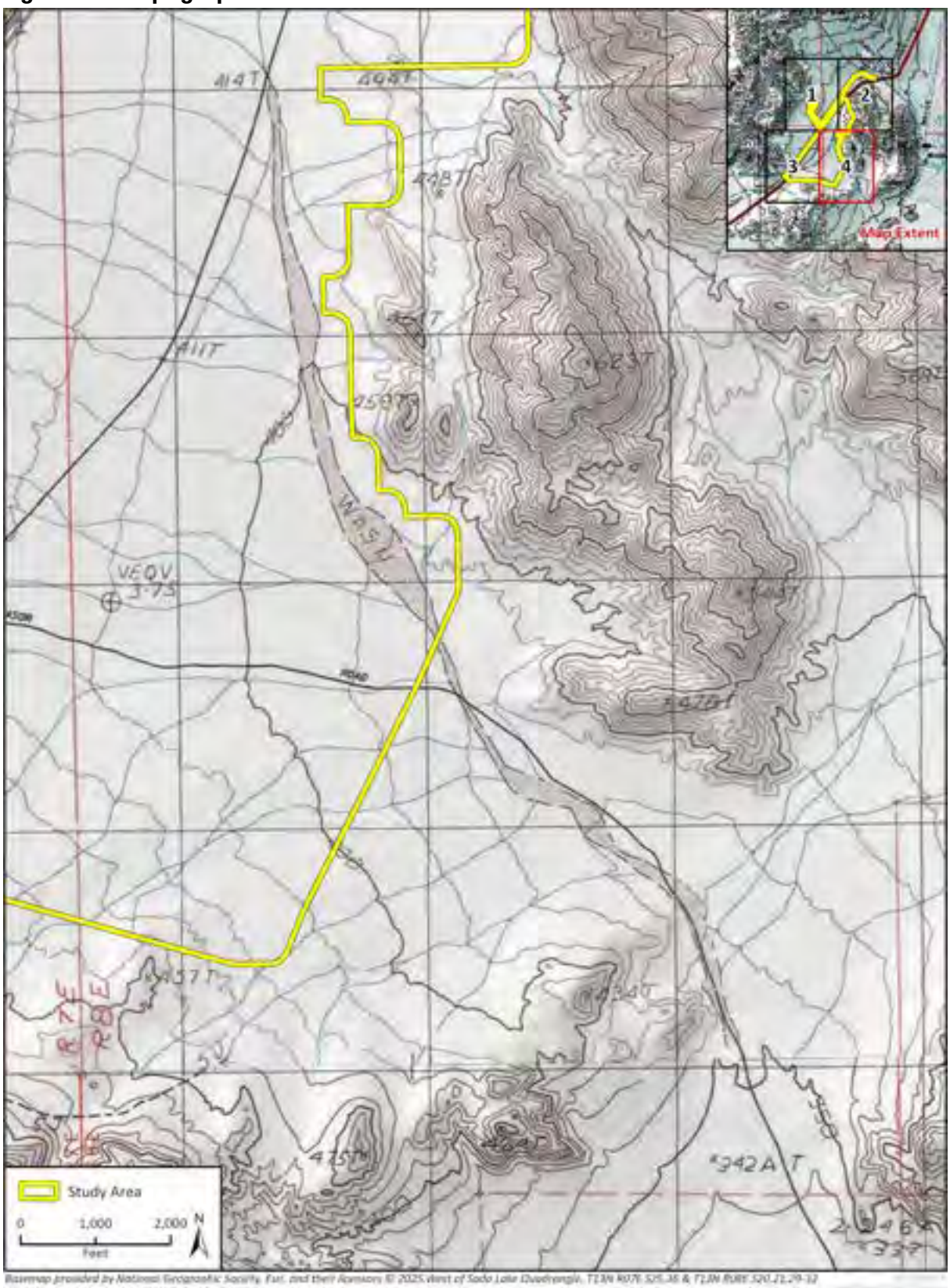


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Figure 3 Parcel Map

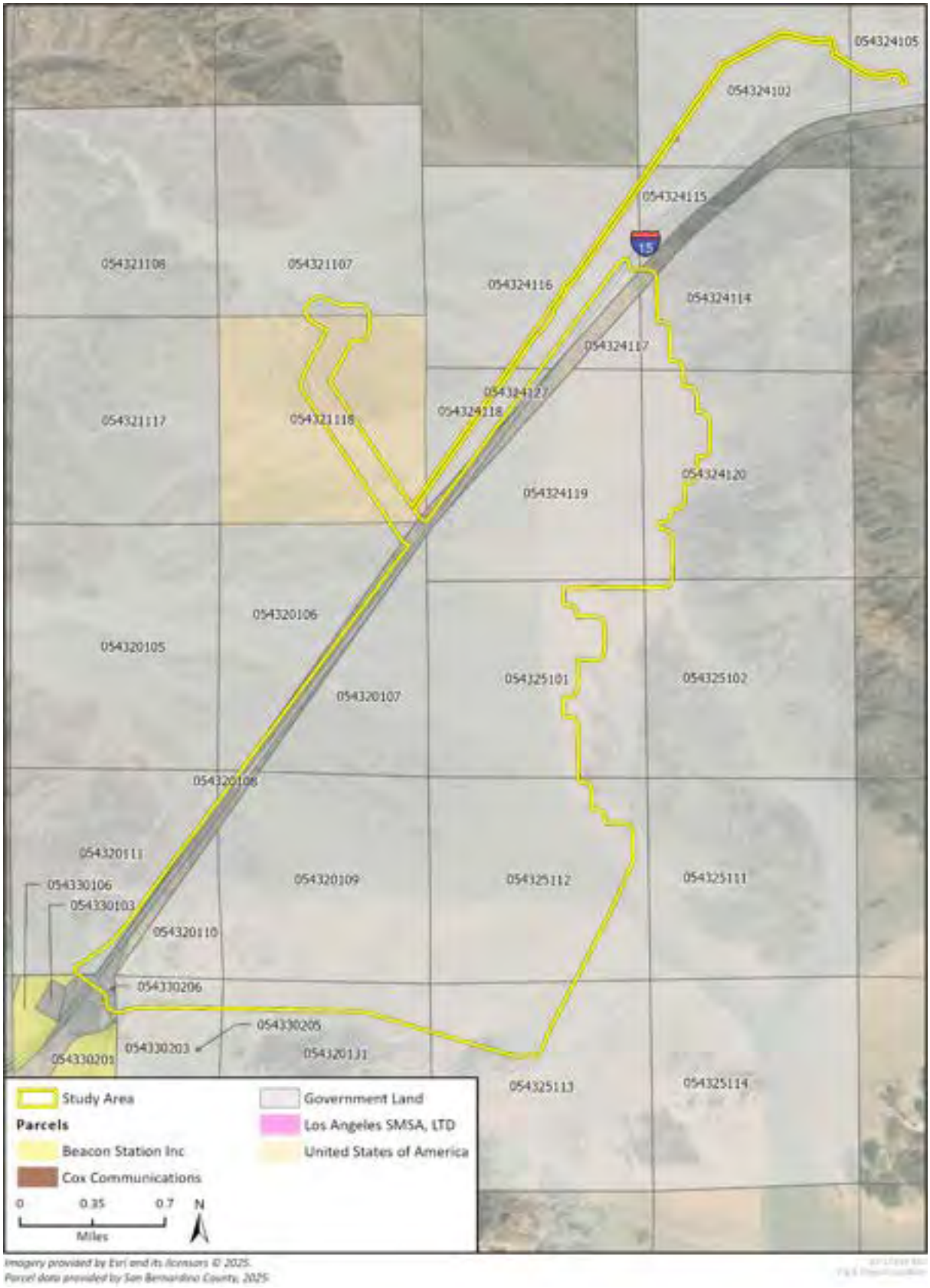


Figure 4 Project A Components

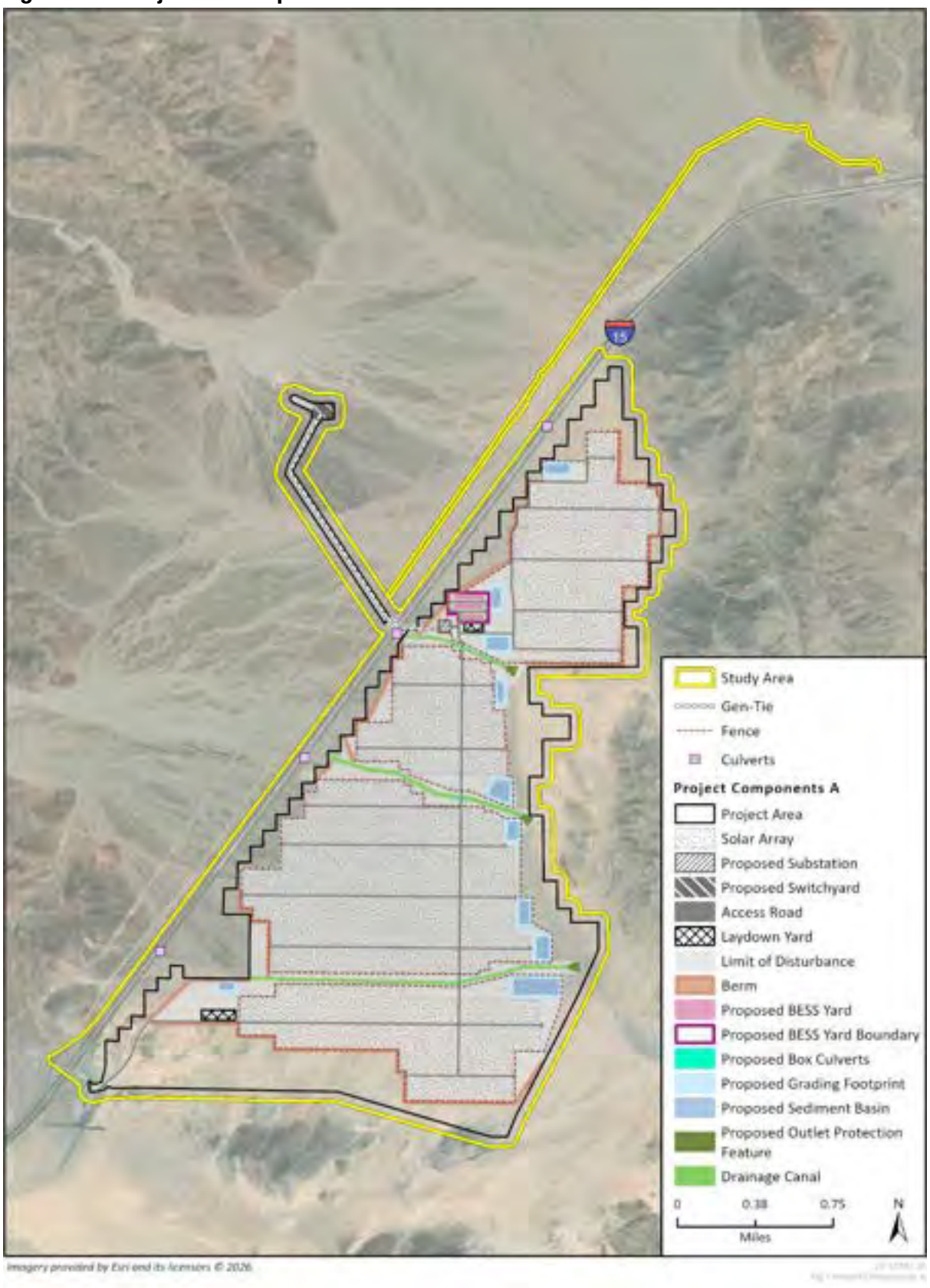


Figure 5 Alternative Project B Components

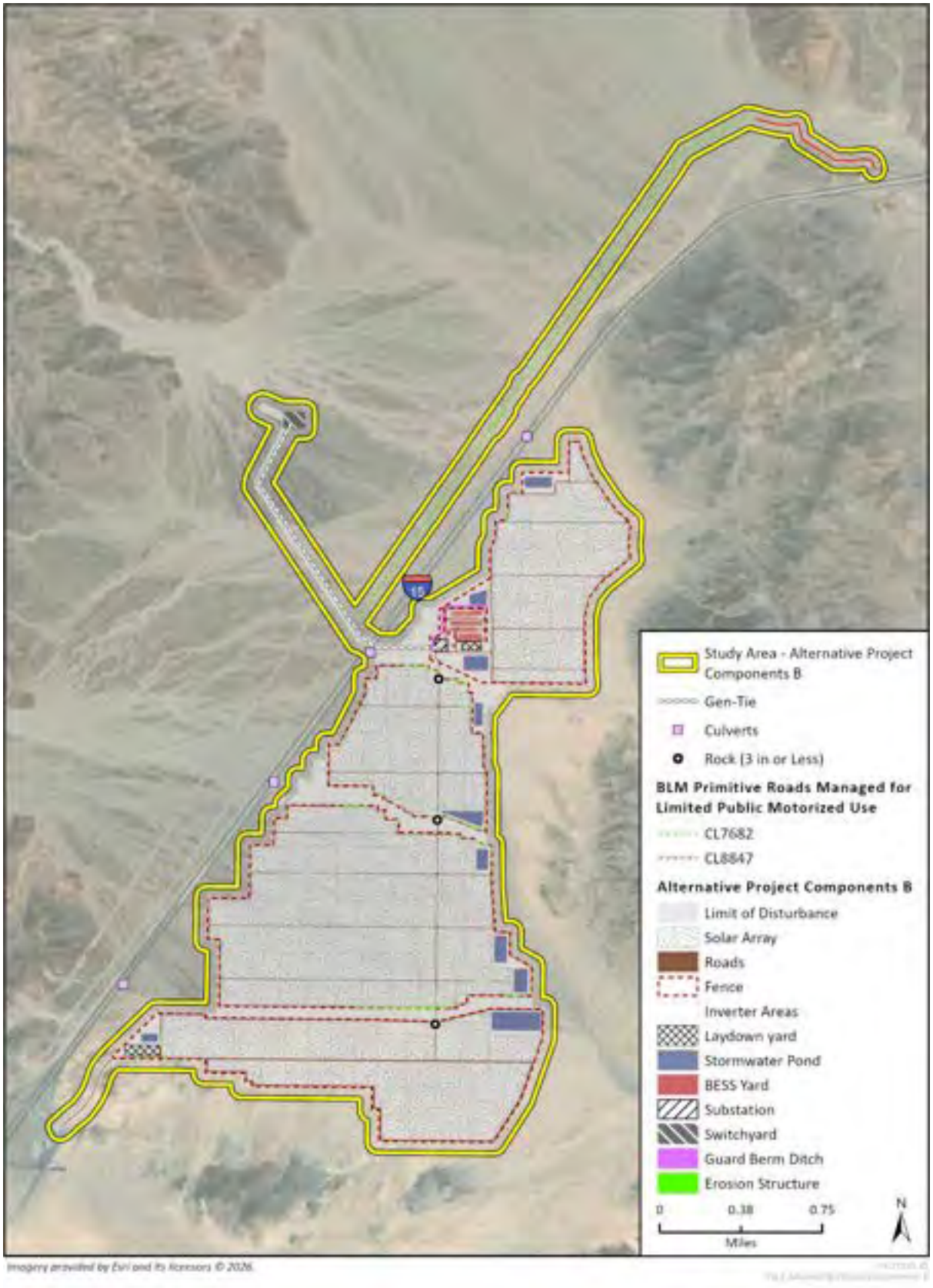


Figure 6 Aquatic Resources Delineation Map

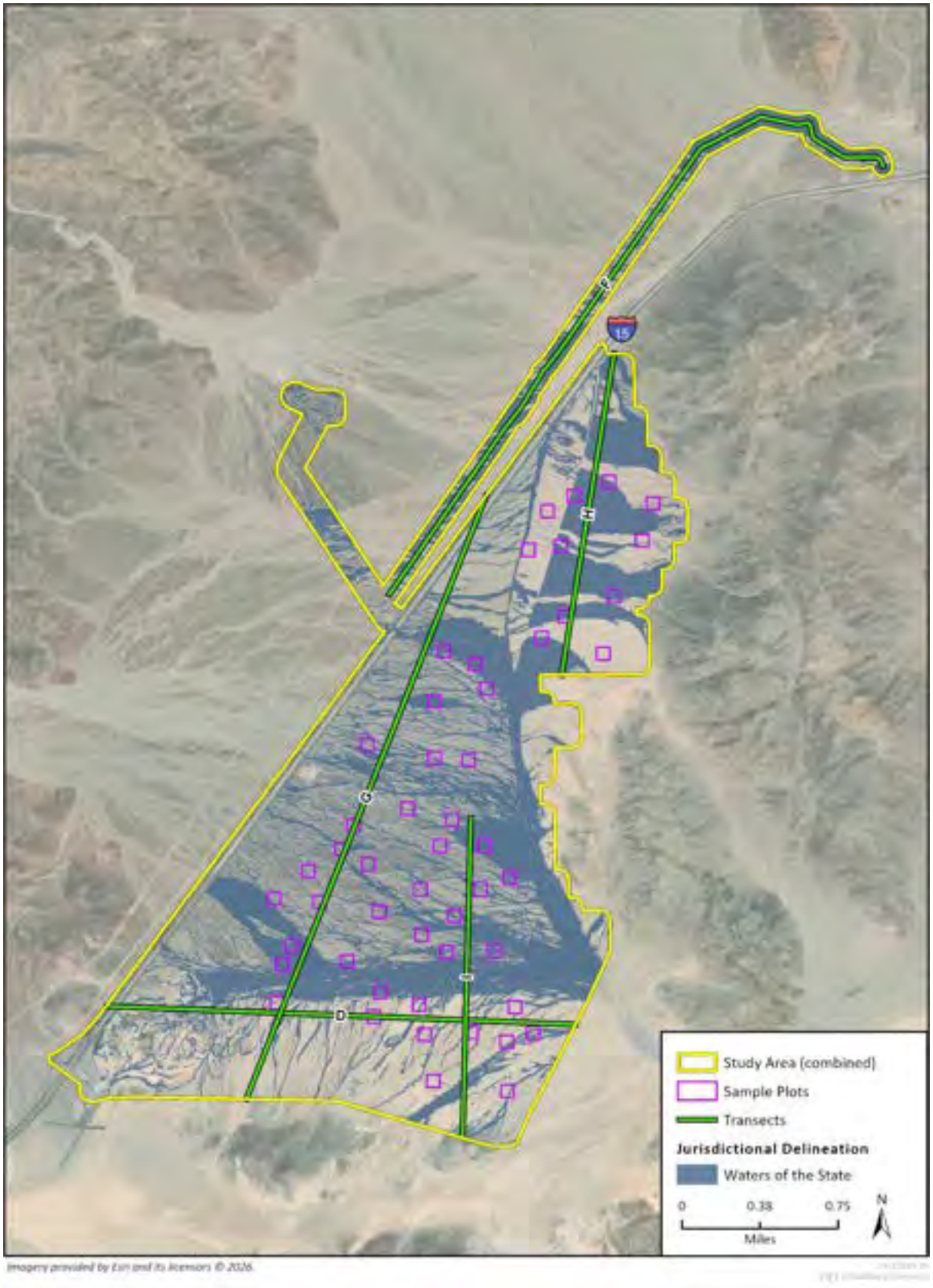


Figure 7 Watershed Map

Figure 8 NHD/NWI Documented Waters and Wetlands

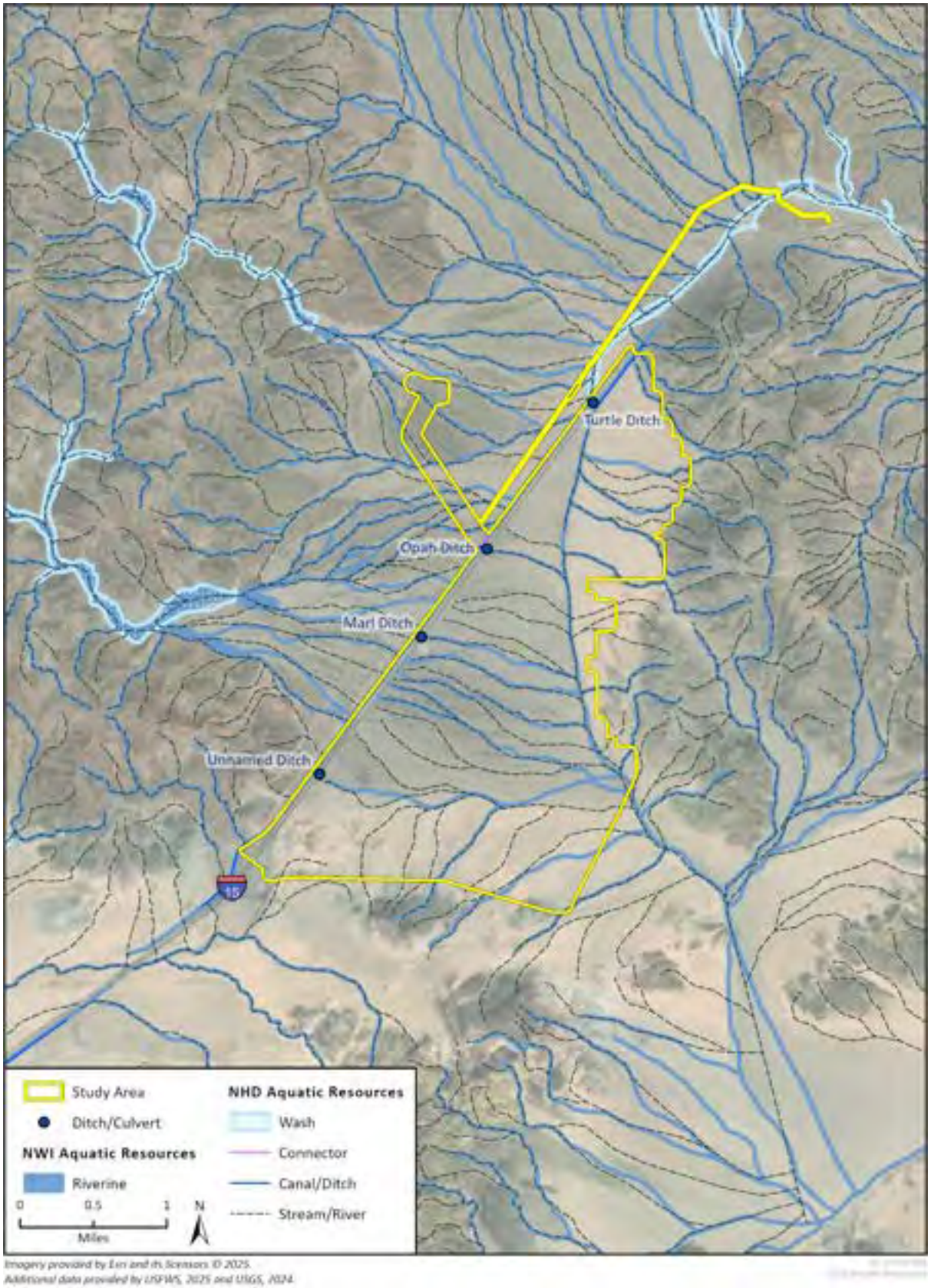


Figure 9 Project A – Temporary and Permanent Impact Areas

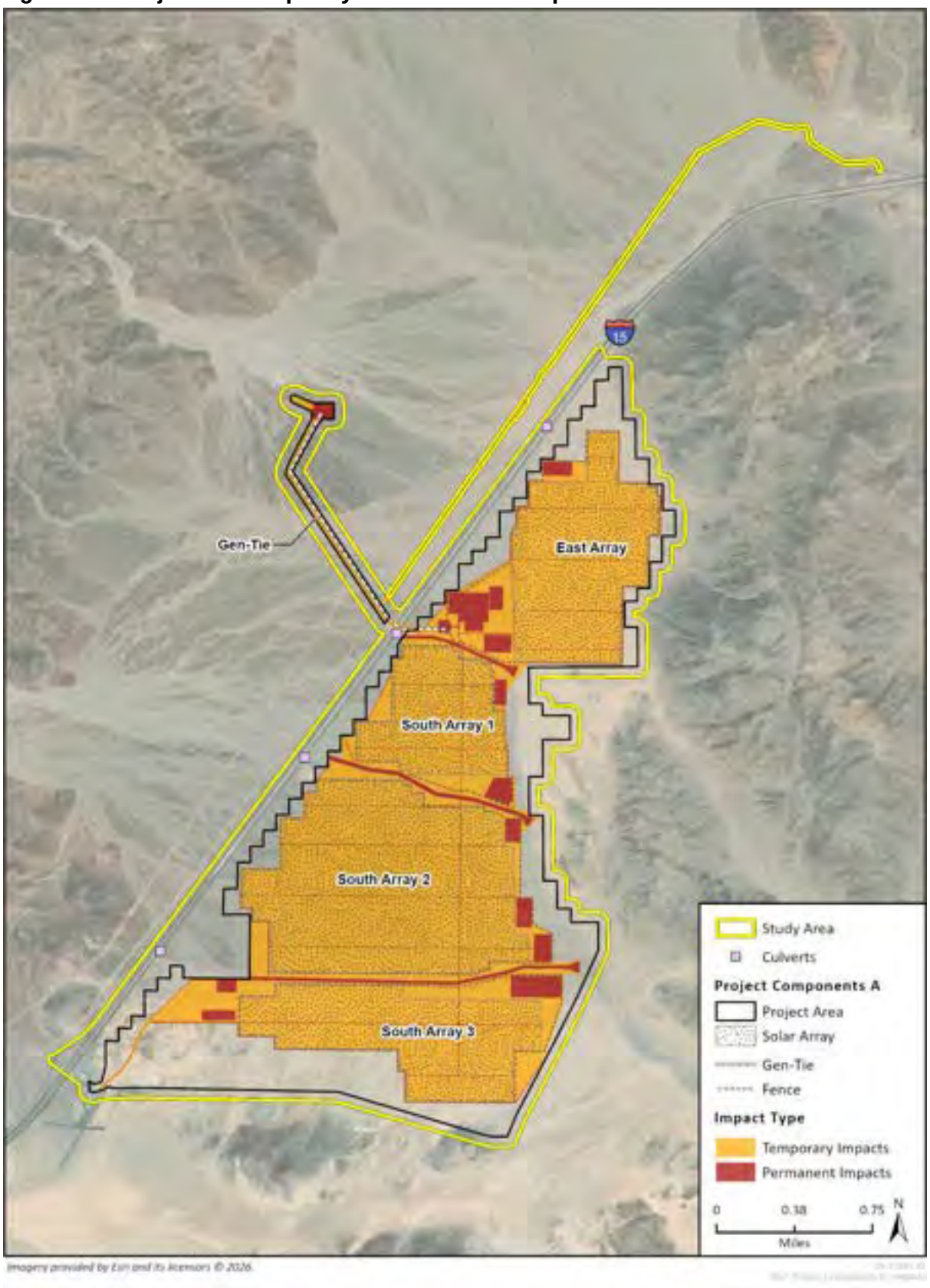


Figure 10 Alternative Project B – Temporary and Permanent Impact Areas

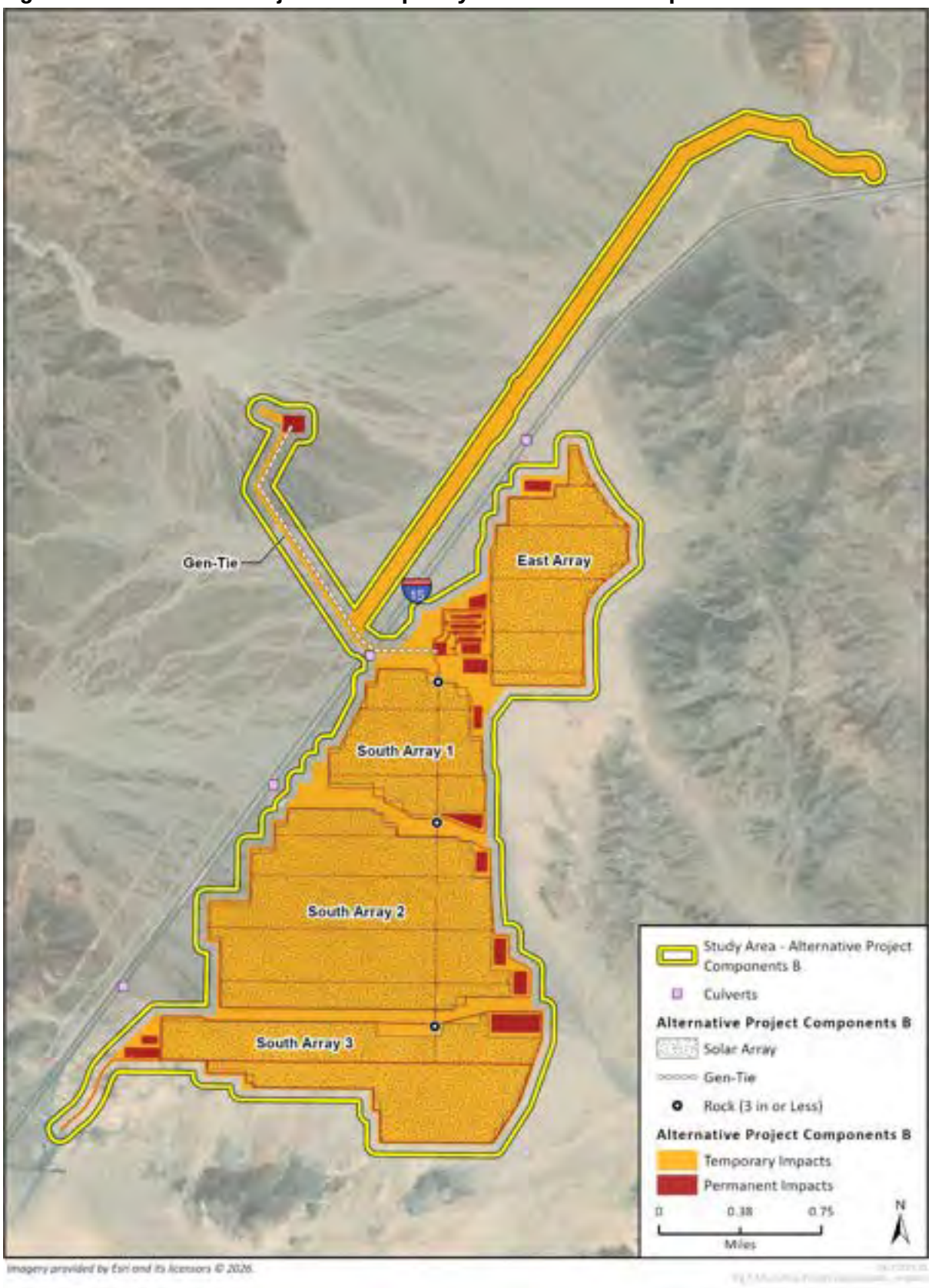


Figure 11a Project A –Aquatic Resources Impacts Overview

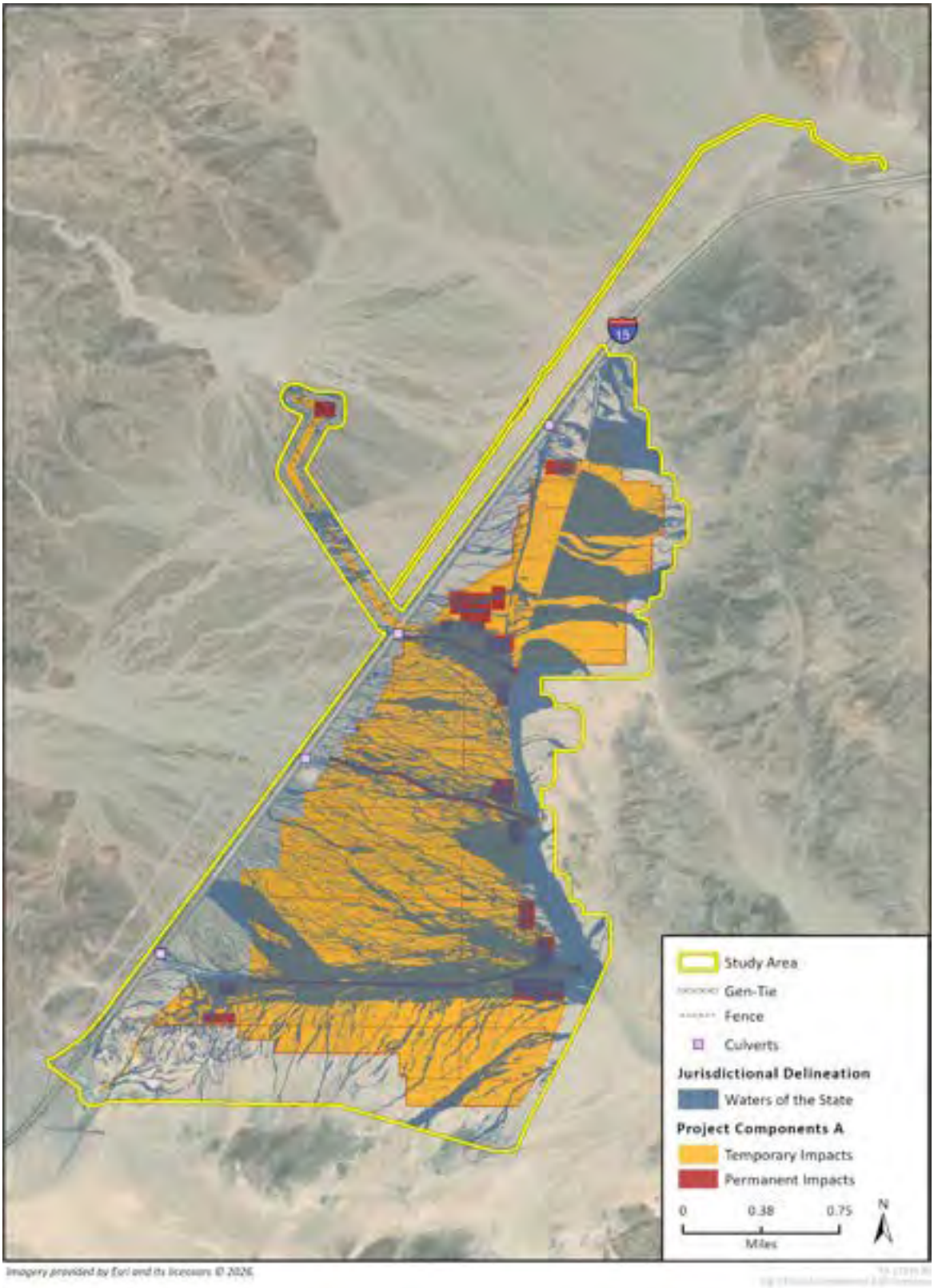


Figure 11b Project A –Aquatic Resources Impacts

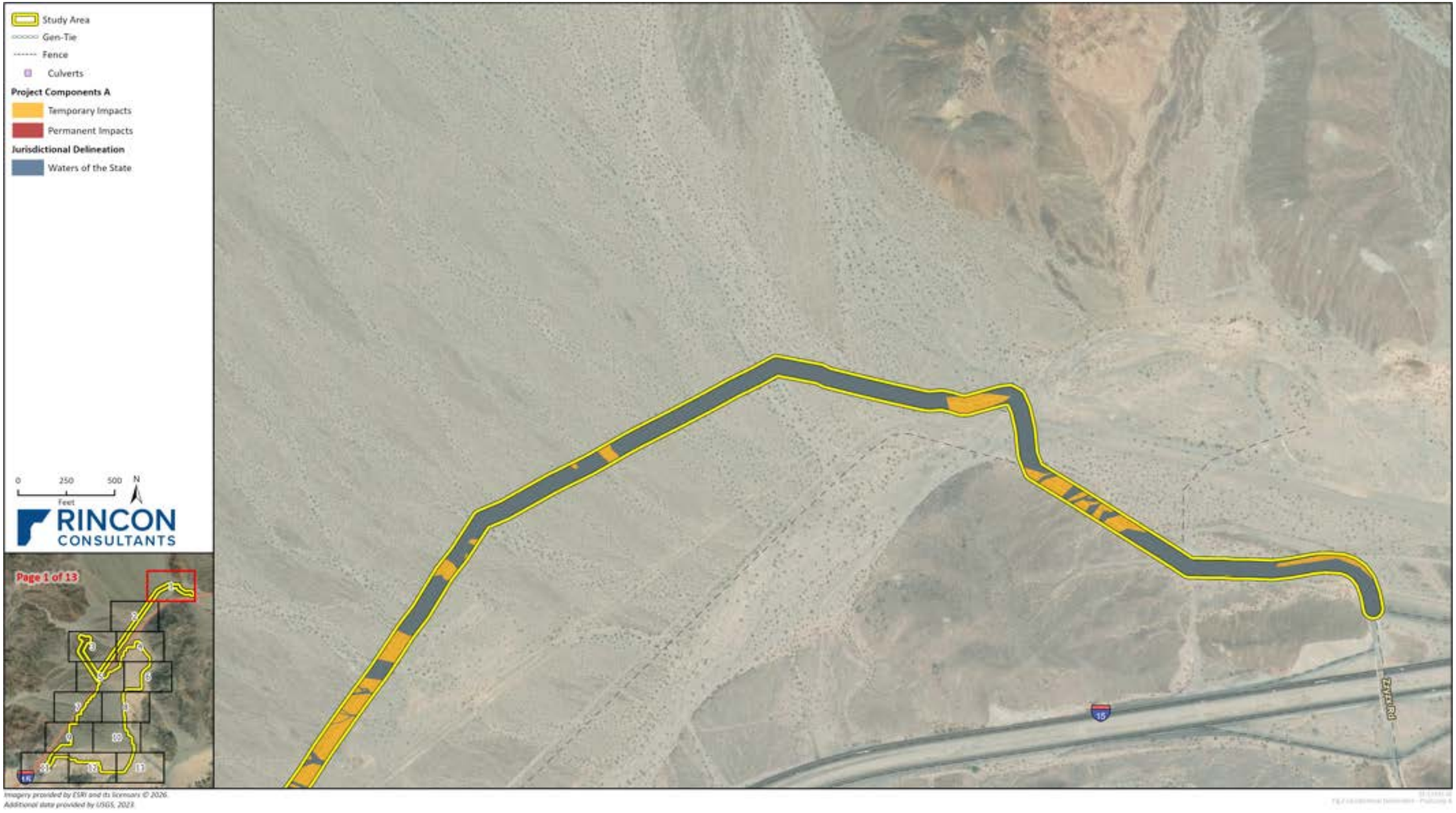


Figure 11c Project A –Aquatic Resources Impacts

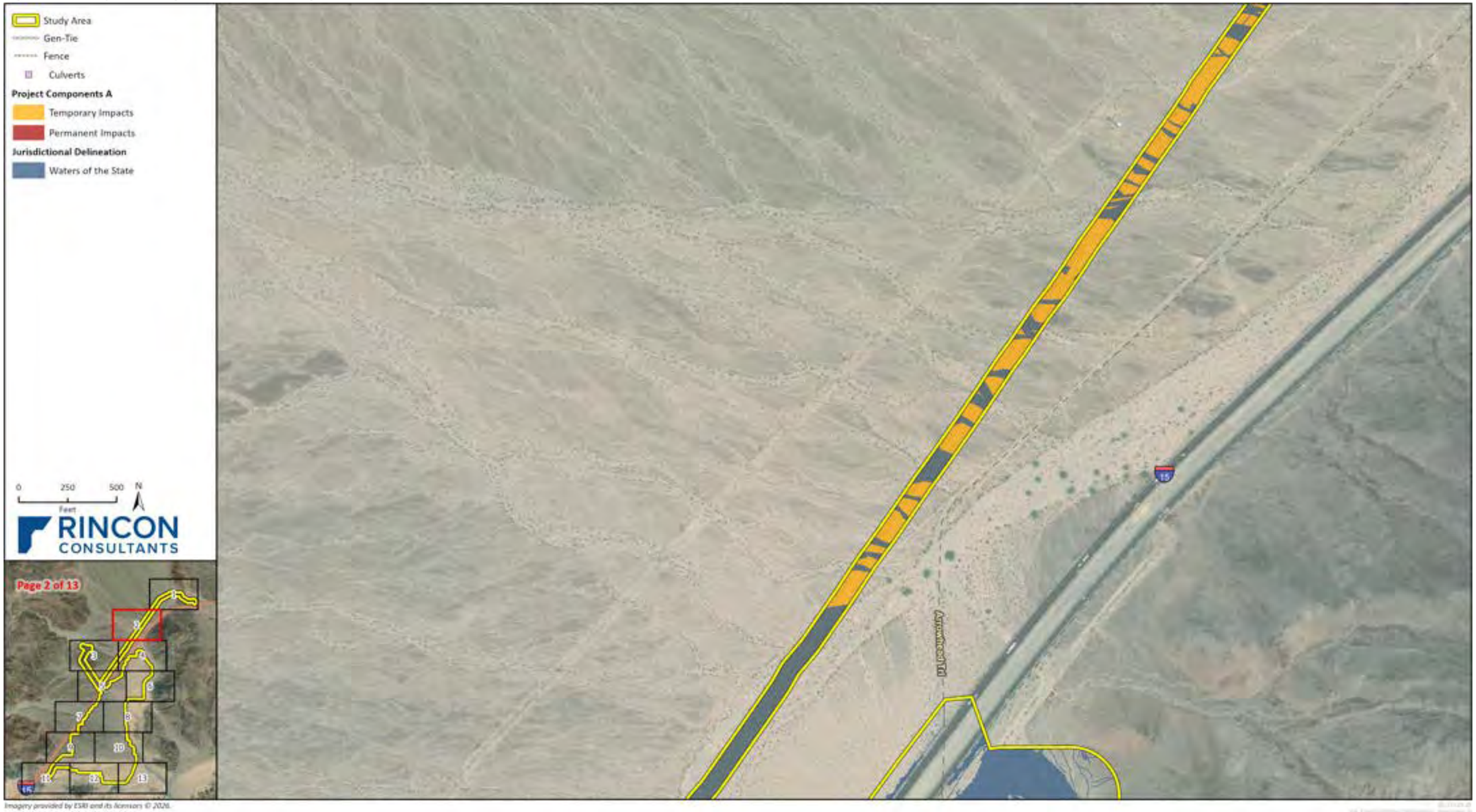


Figure 11d Project A –Aquatic Resources Impacts

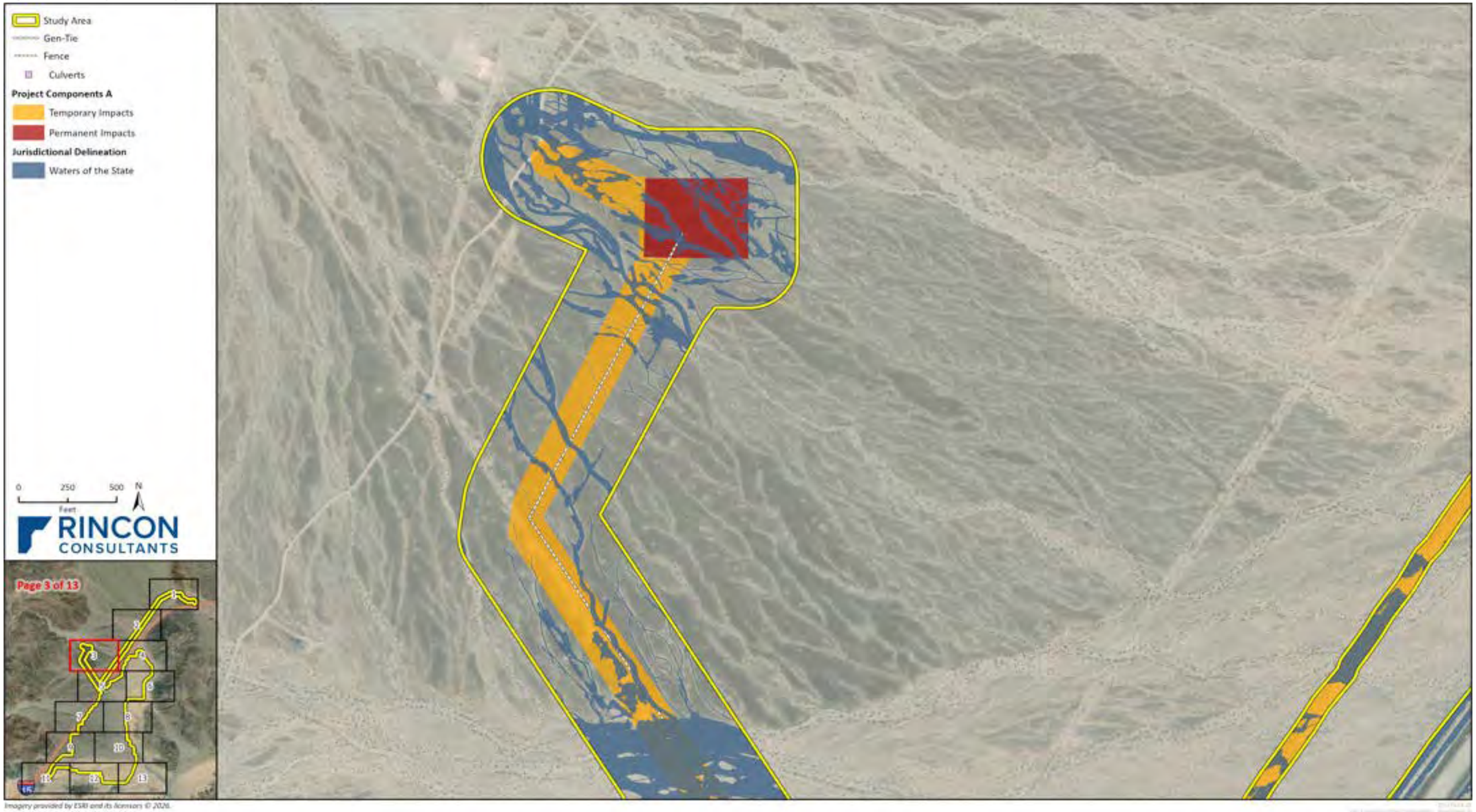


Figure 11e Project A –Aquatic Resources Impacts

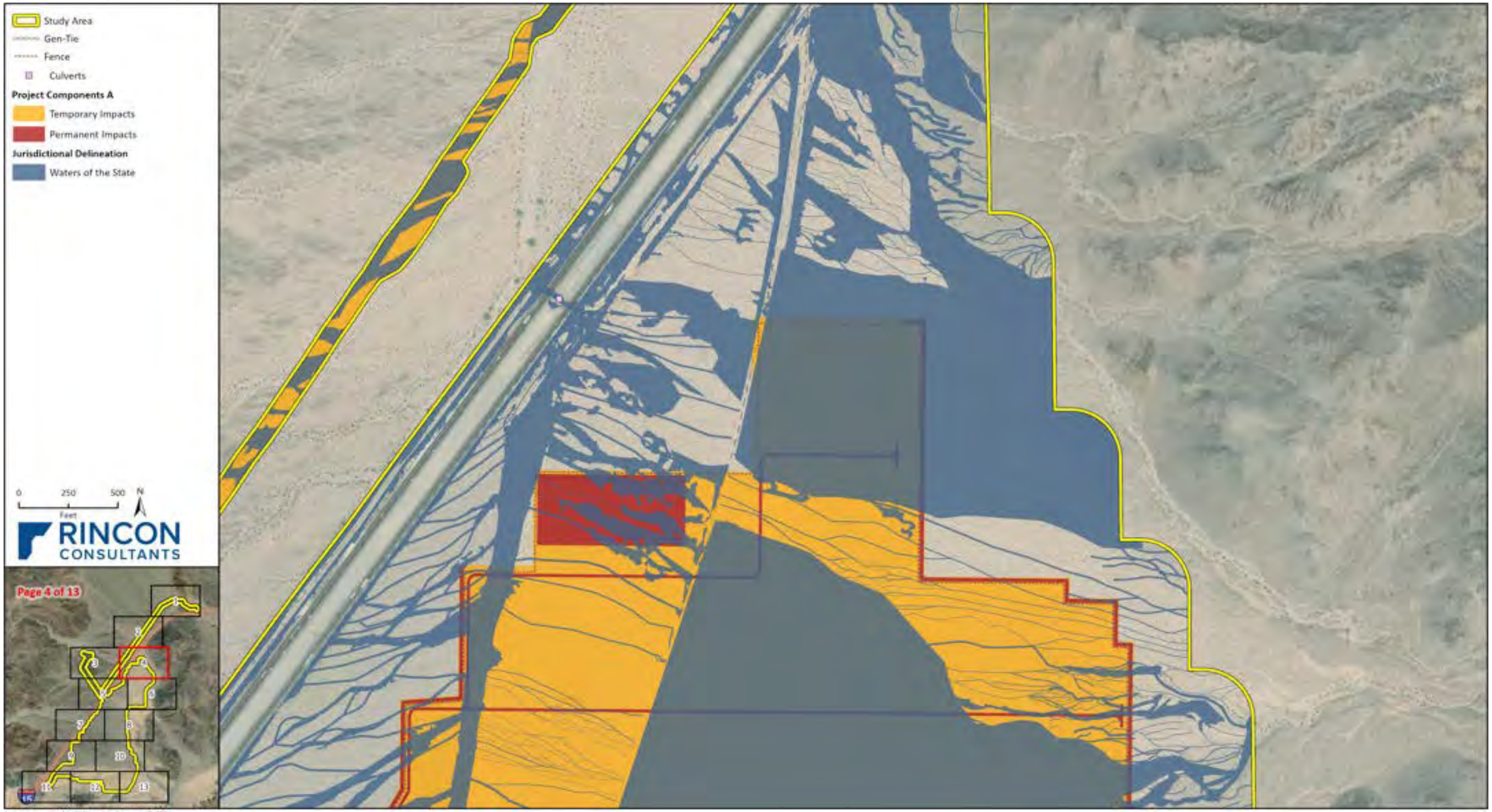
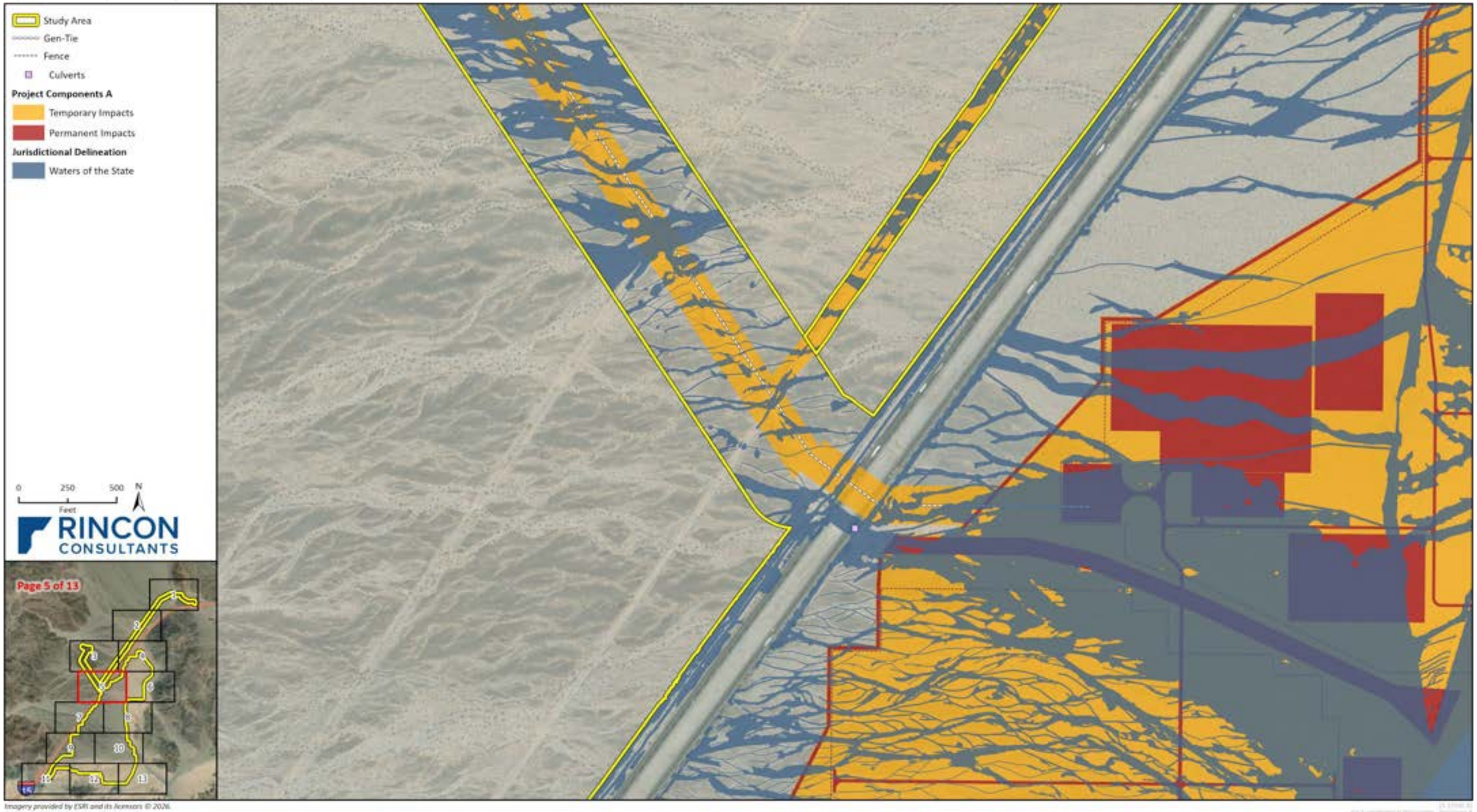


Figure 11f Project A –Aquatic Resources Impacts



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Soda Mountain Solar Project

Figure 11g Project A –Aquatic Resources Impacts

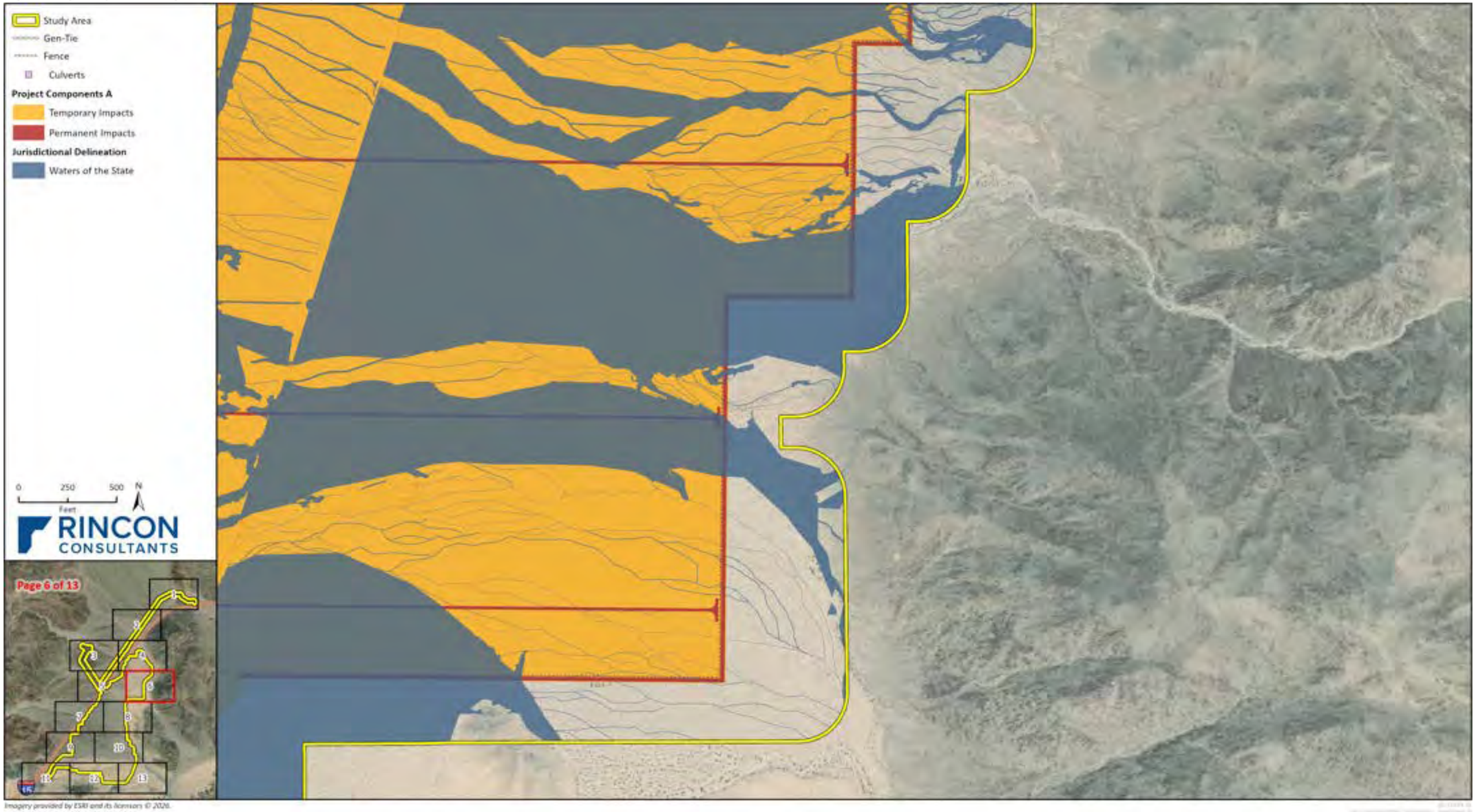


Figure 11h Project A –Aquatic Resources Impacts

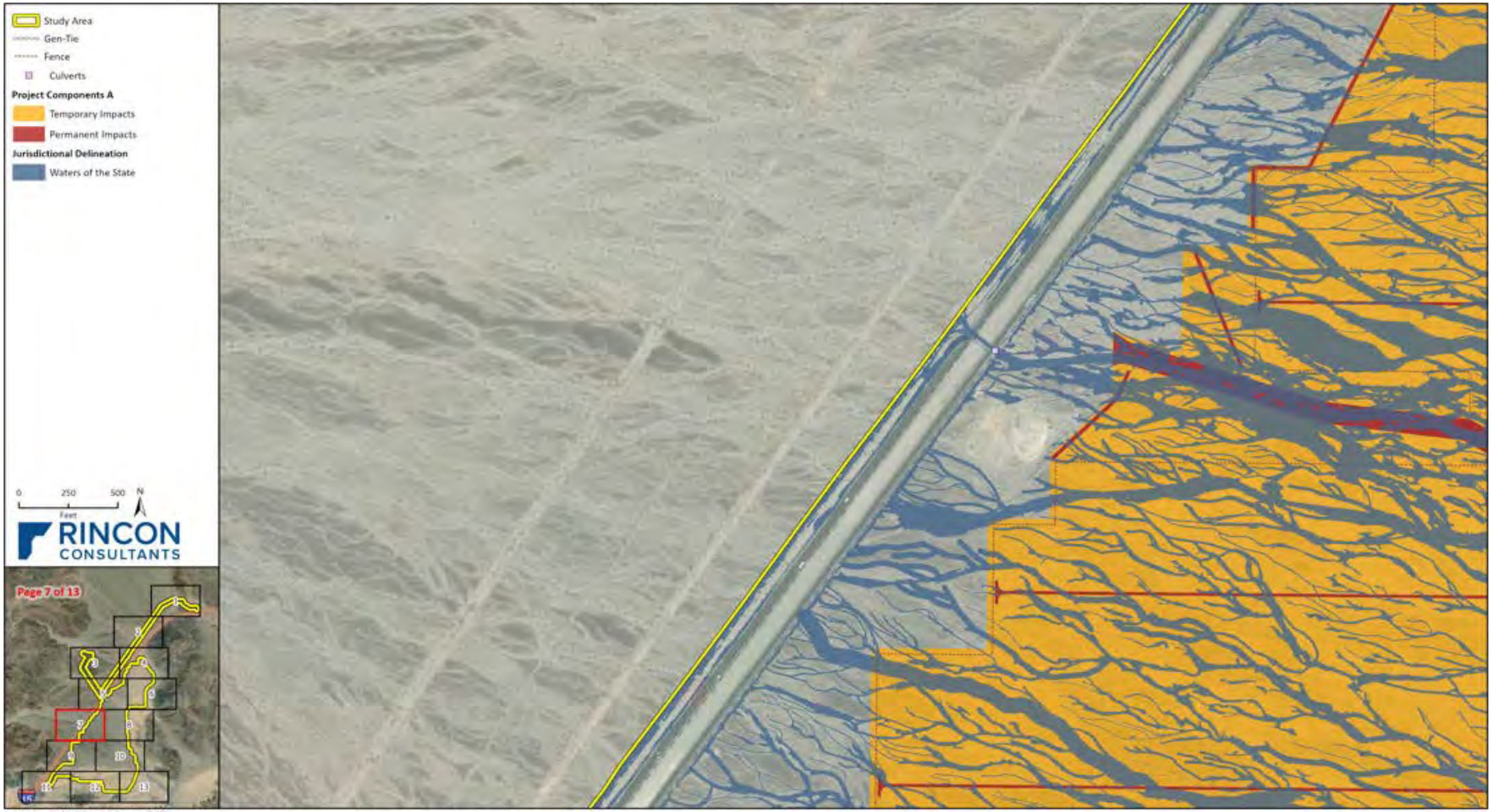


Figure 11i Project A –Aquatic Resources Impacts

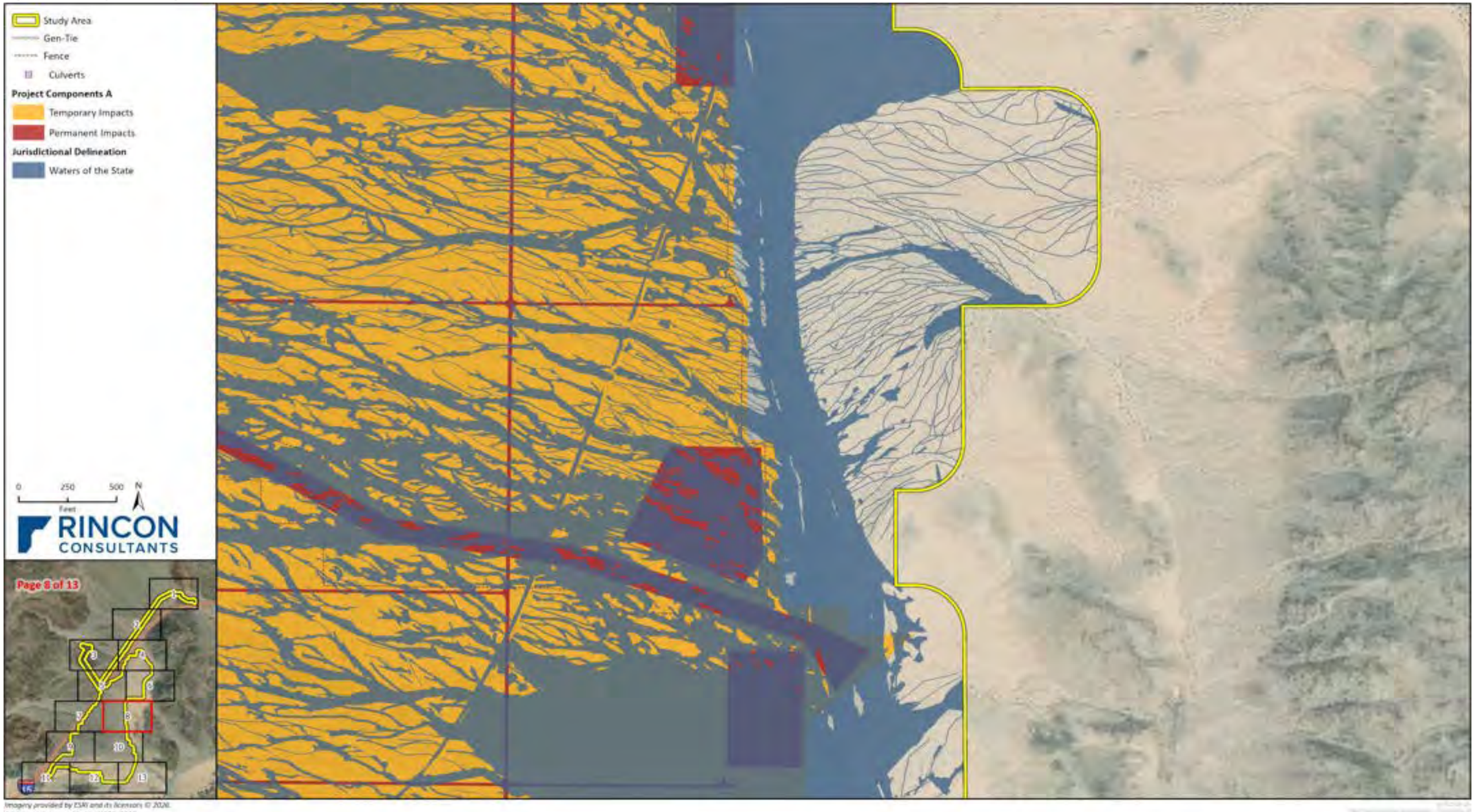


Figure 11j Project A –Aquatic Resources Impacts

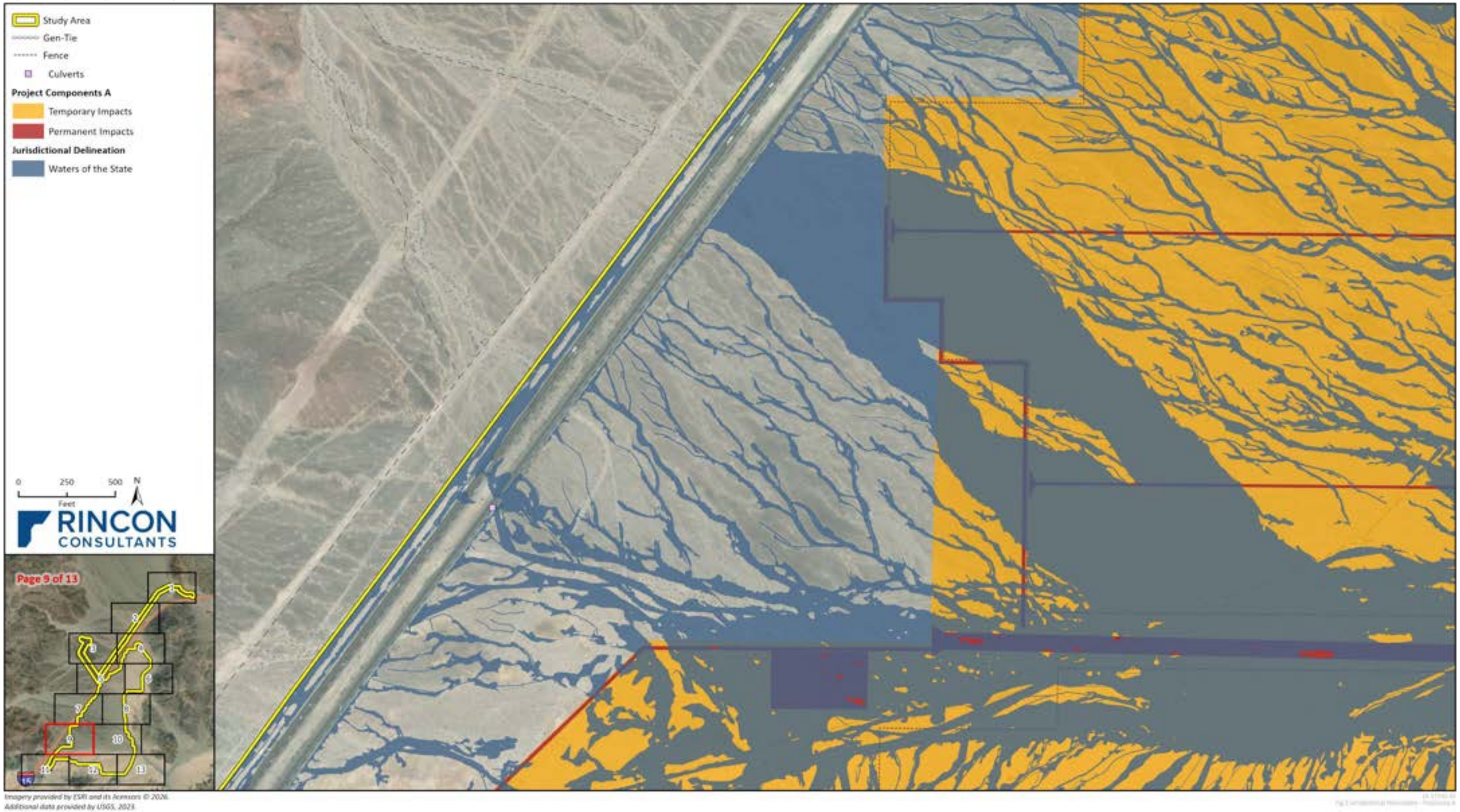
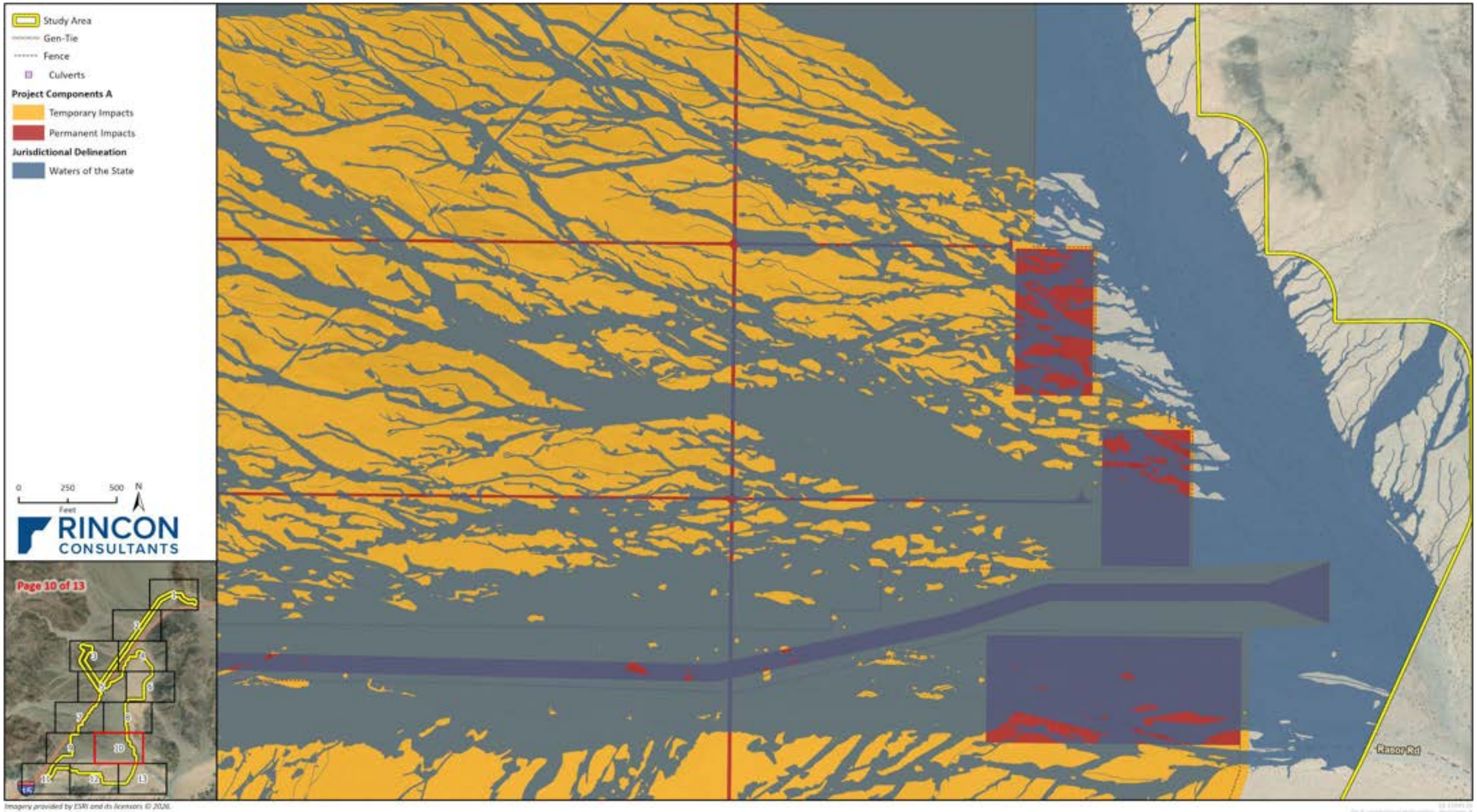


Figure 11k Project A –Aquatic Resources Impacts



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Additional data provided by USGS, 2023.

Figure 11l Project A –Aquatic Resources Impacts

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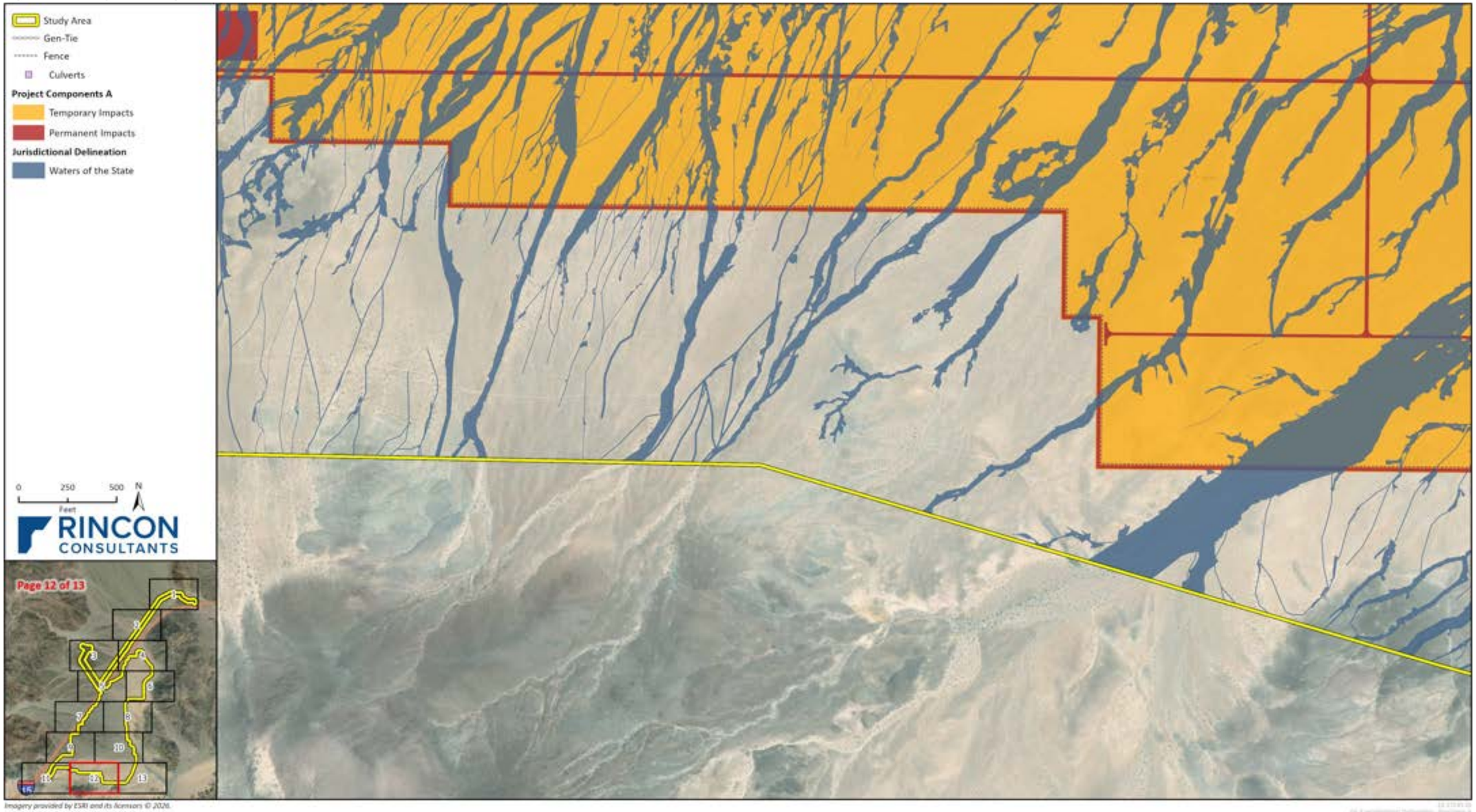
Additional data provided by USGS, 2023

Figure 11m Project A –Aquatic Resources Impacts



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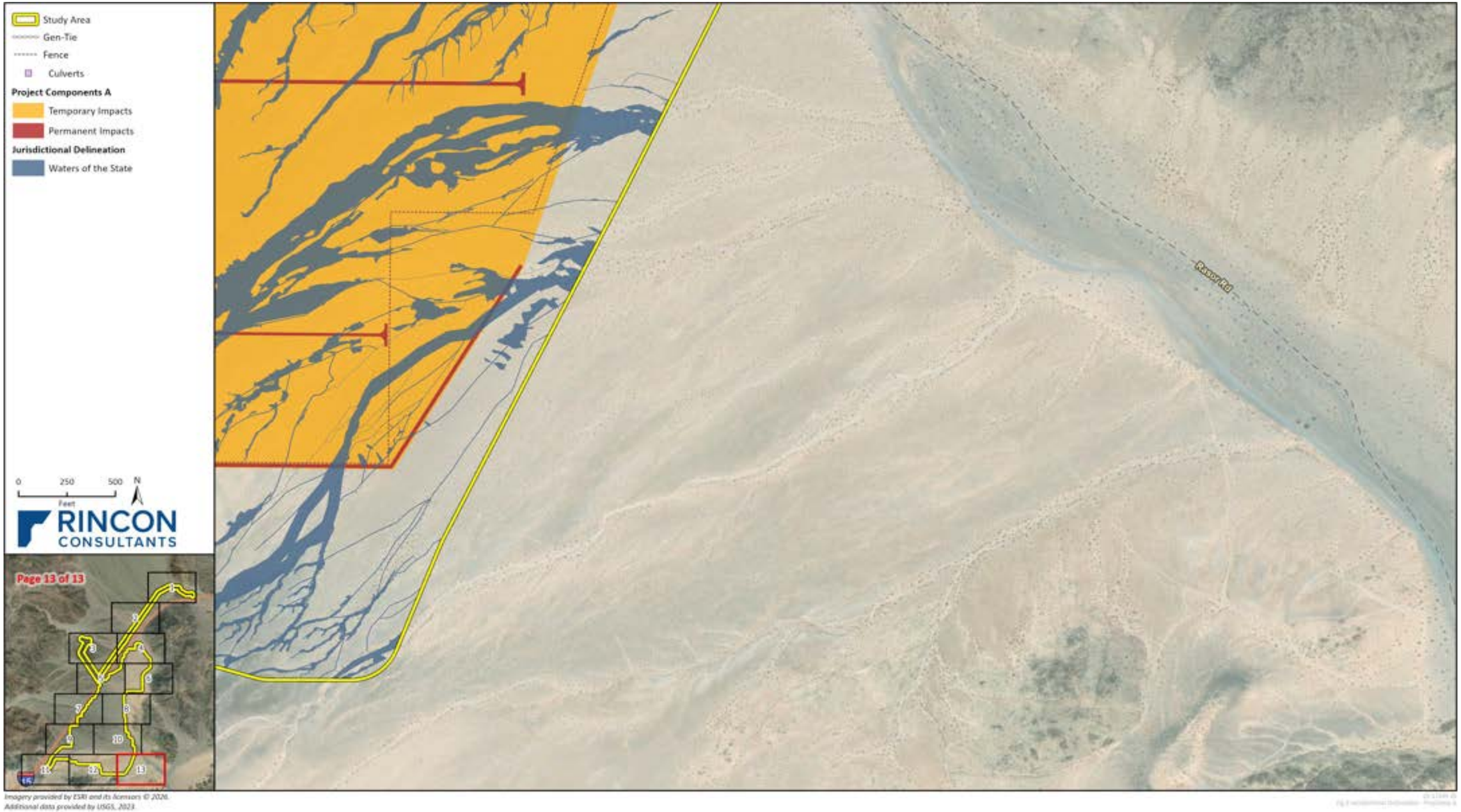

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Figure 12a Alternative Project B – Aquatic Resources Impacts Overview

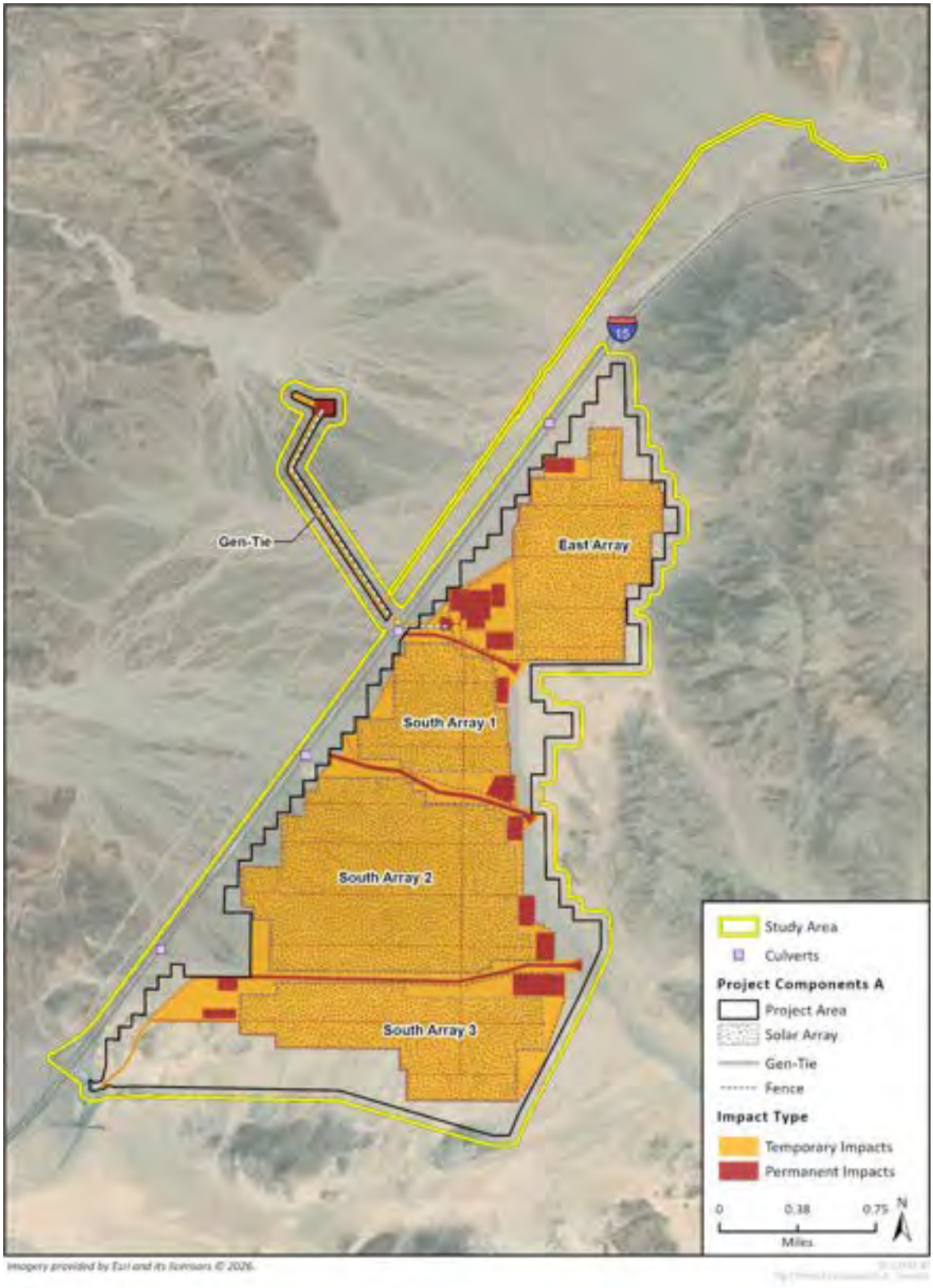

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Figure 12b Alternative Project B –Aquatic Resources Impacts

Figure 12c Alternative Project B –Aquatic Resources Impacts

Figure 12d Alternative Project B –Aquatic Resources Impacts

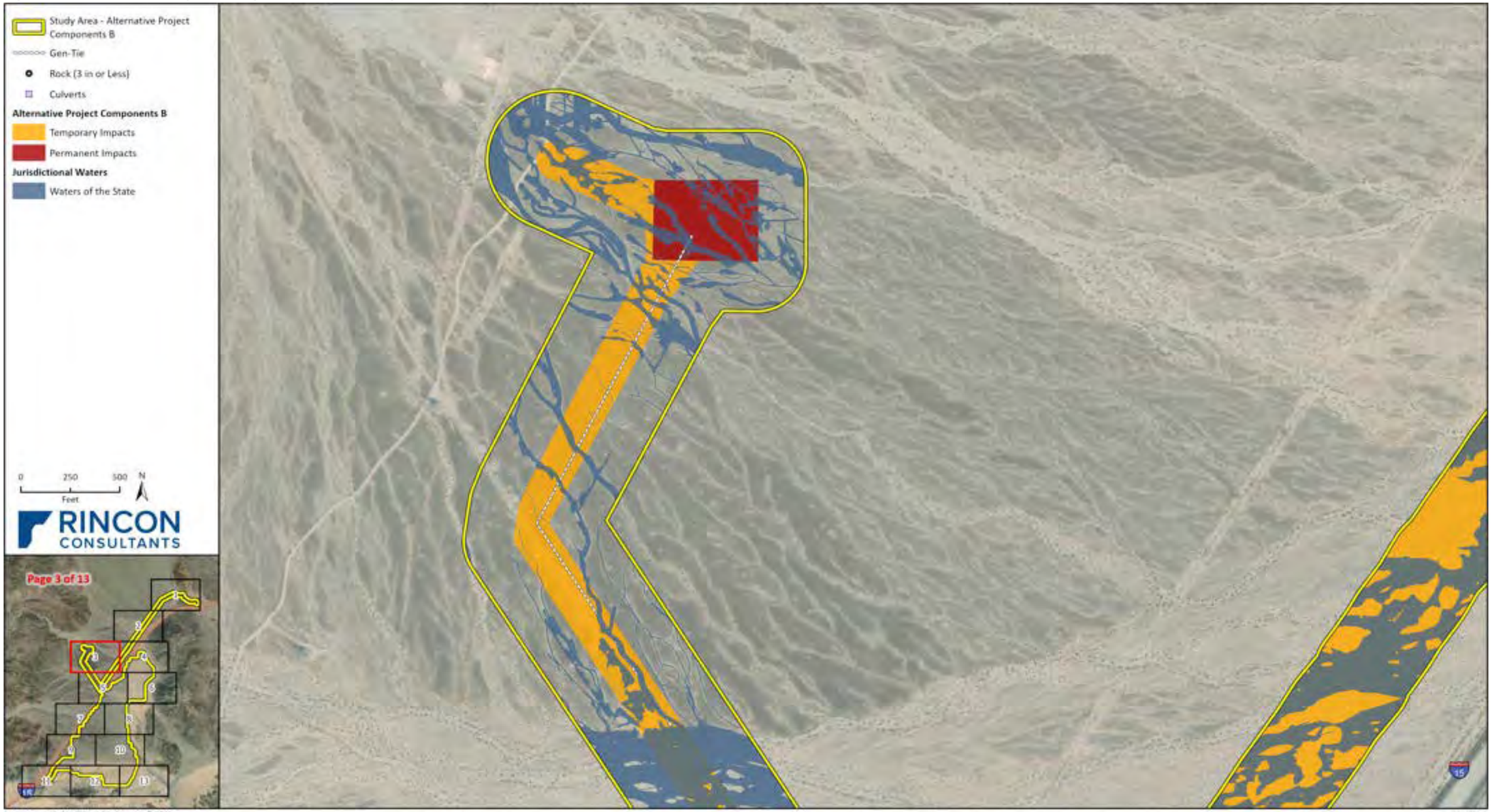


Figure 12e Alternative Project B –Aquatic Resources Impacts

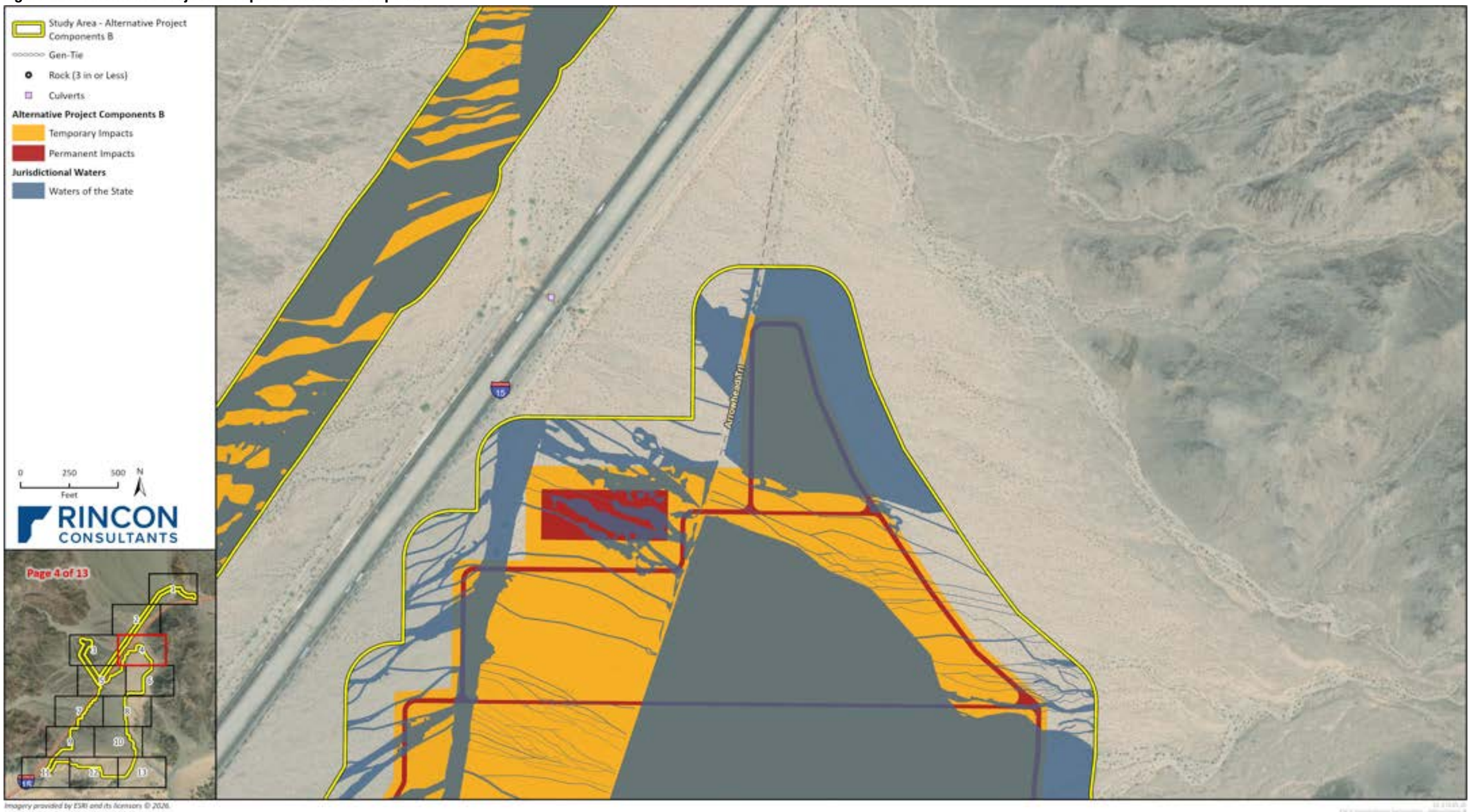


Figure 12f Alternative Project B –Aquatic Resources Impacts

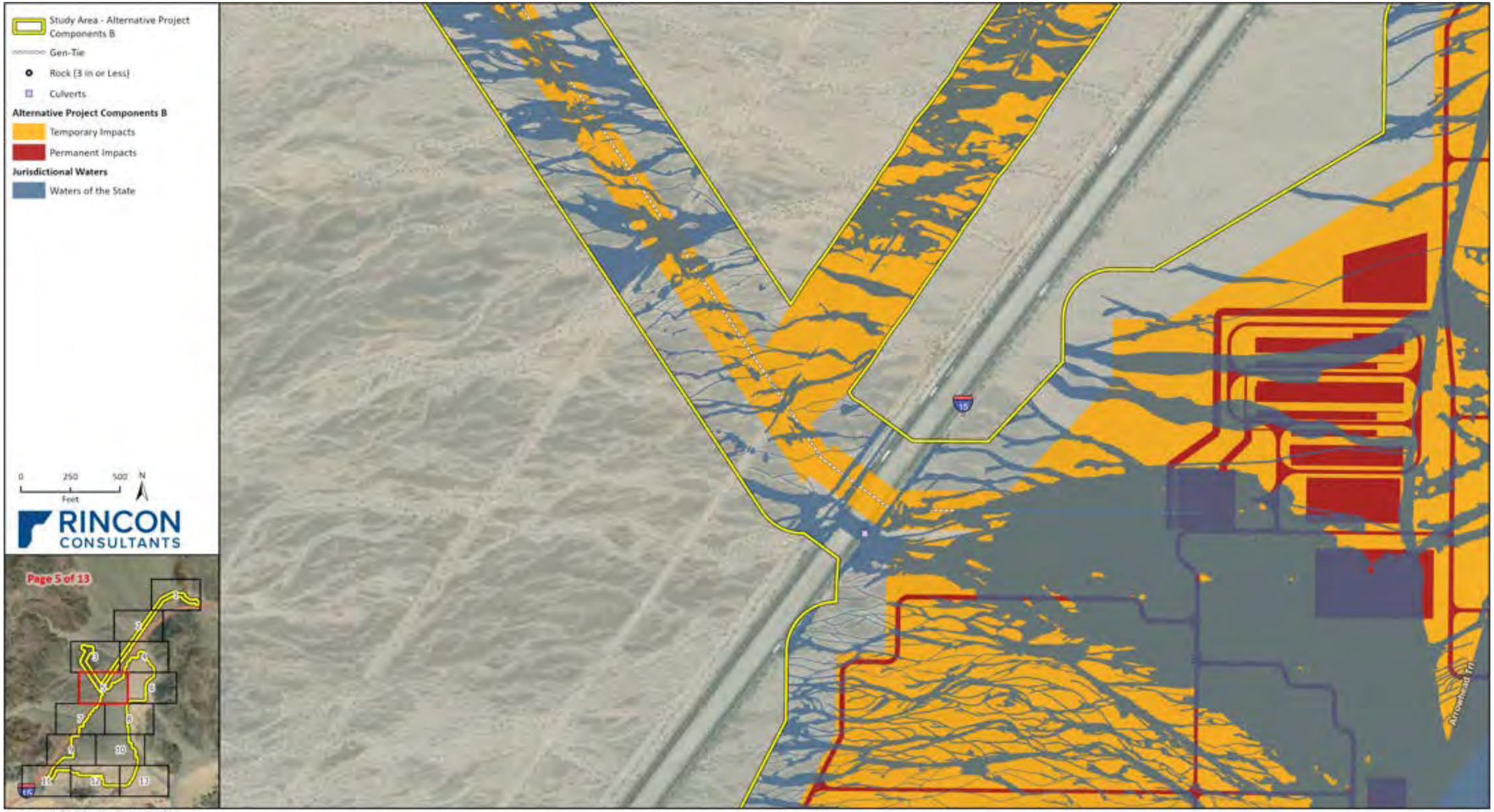


Figure 12g Alternative Project B –Aquatic Resources Impacts

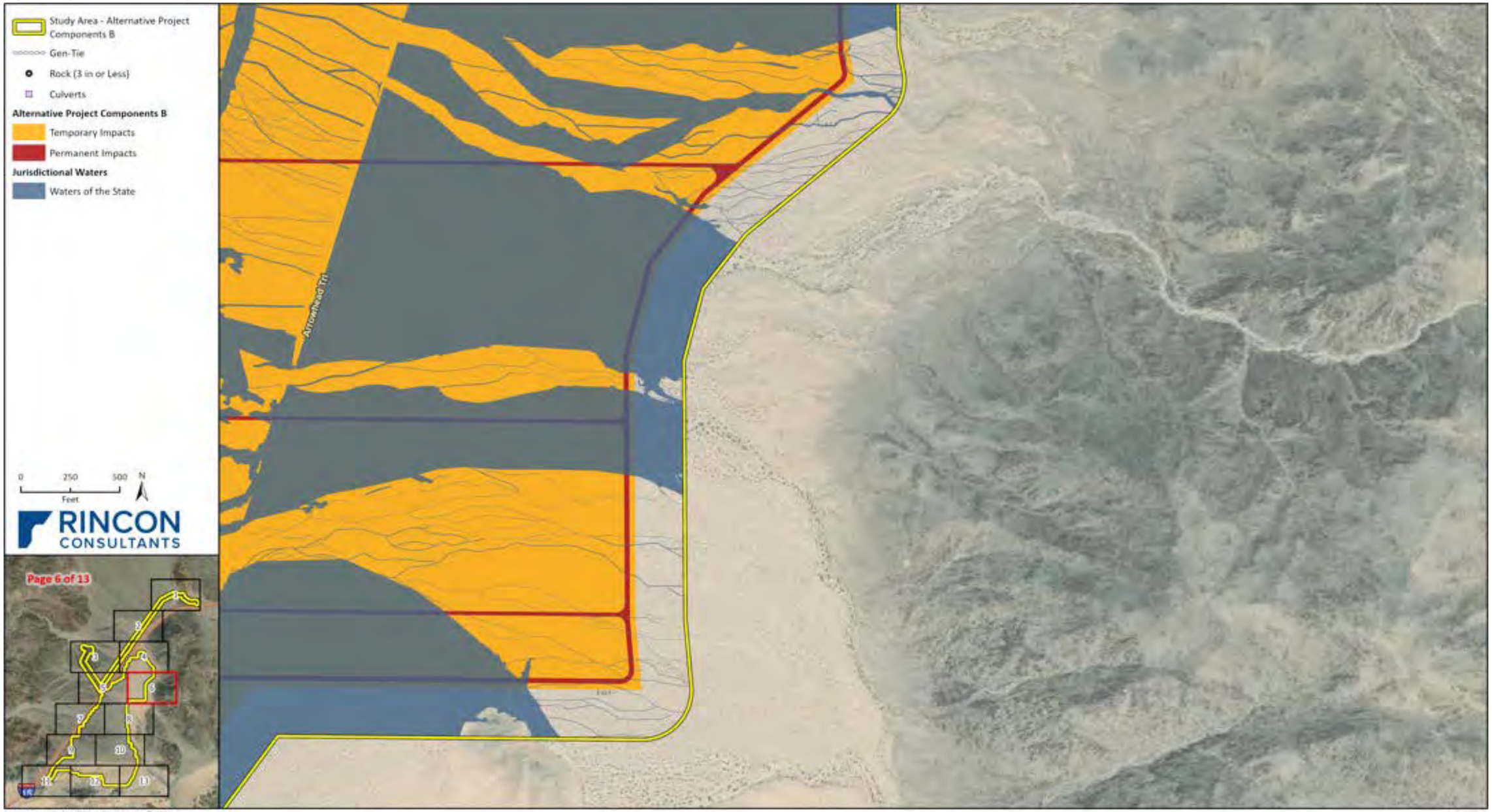


Figure 12h Alternative Project B –Aquatic Resources Impacts

Figure 12i Alternative Project B –Aquatic Resources Impacts

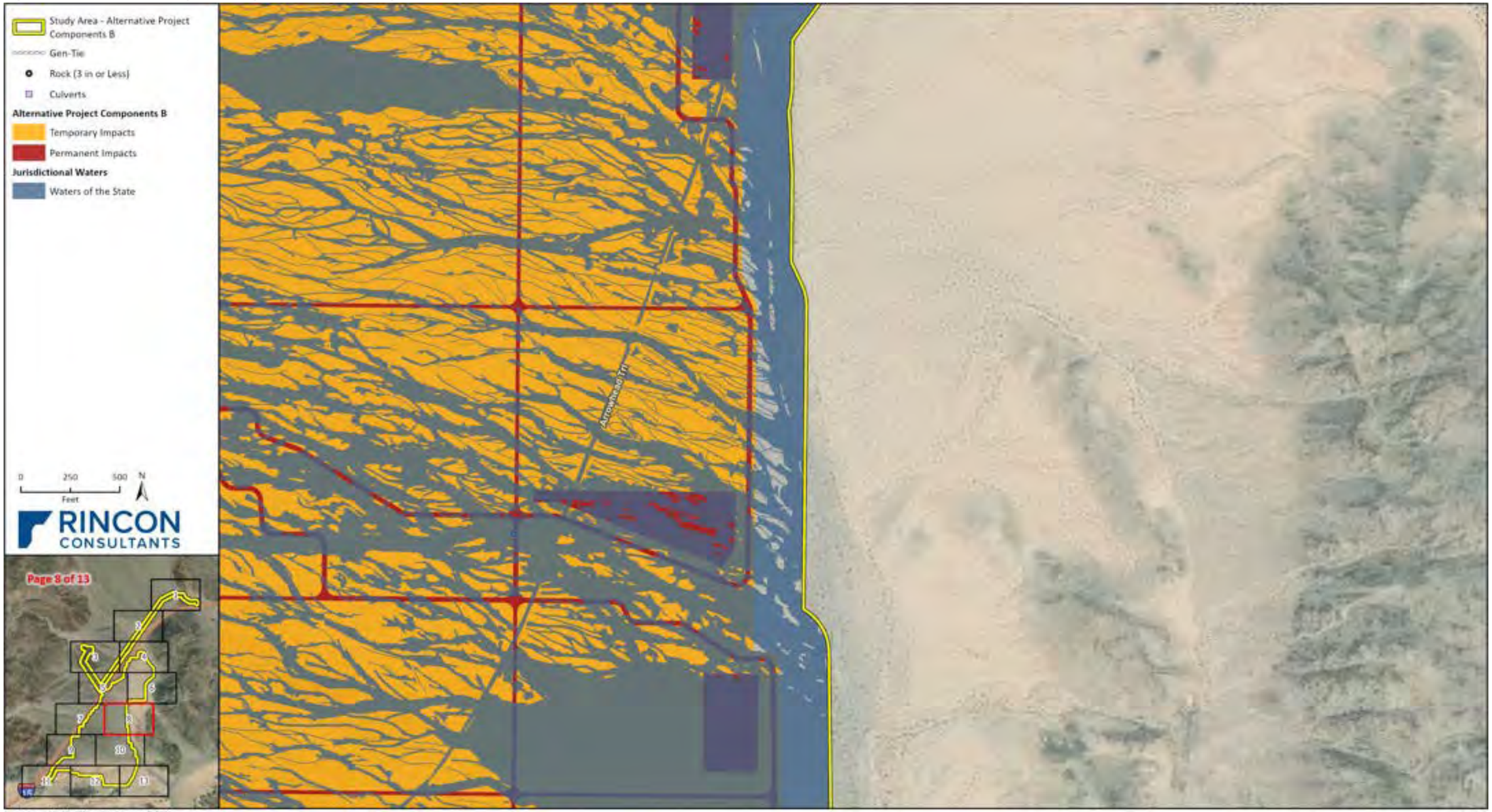


Figure 12j Alternative Project B –Aquatic Resources Impacts

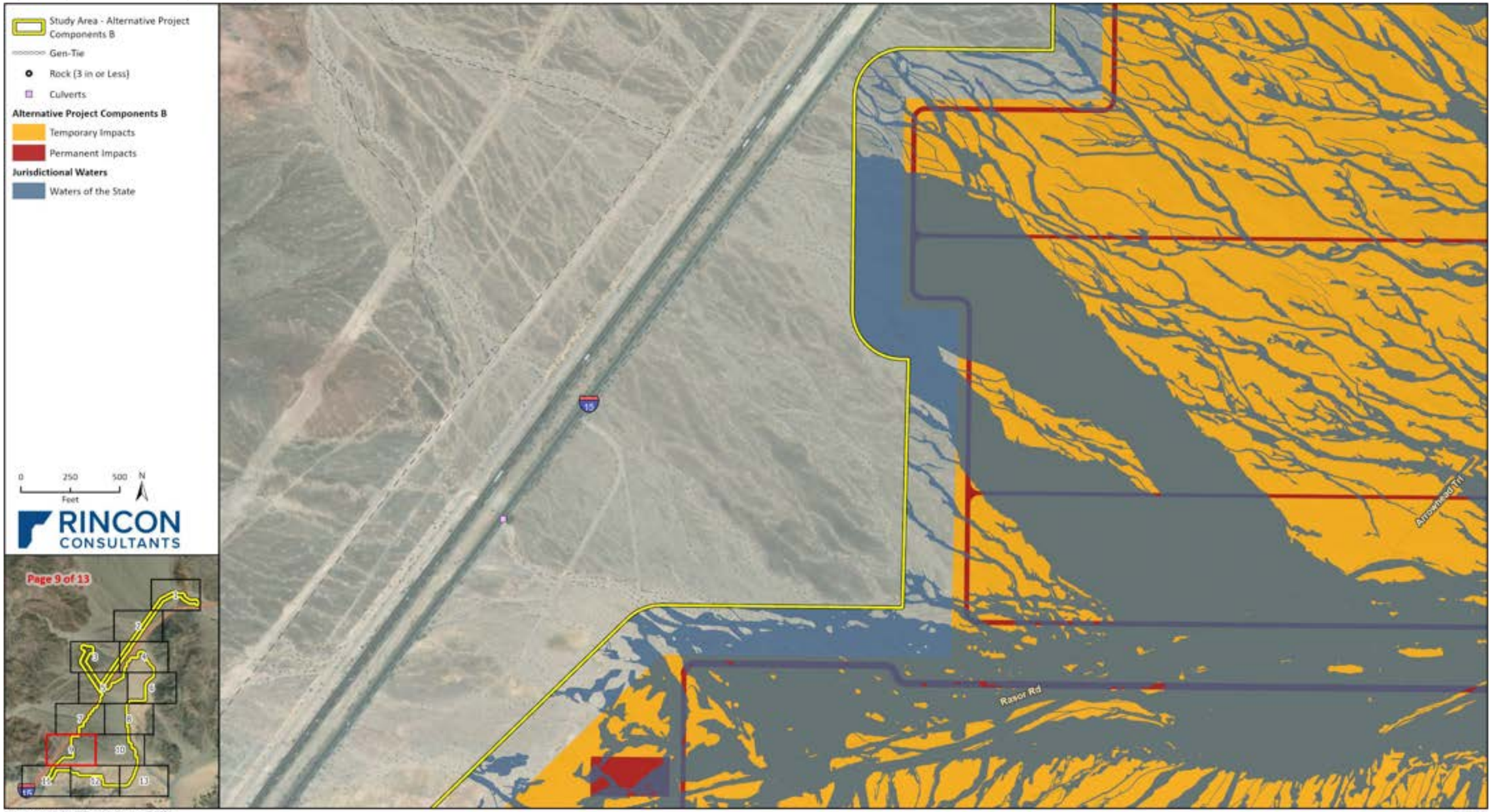


Figure 12k Alternative Project B –Aquatic Resources Impacts

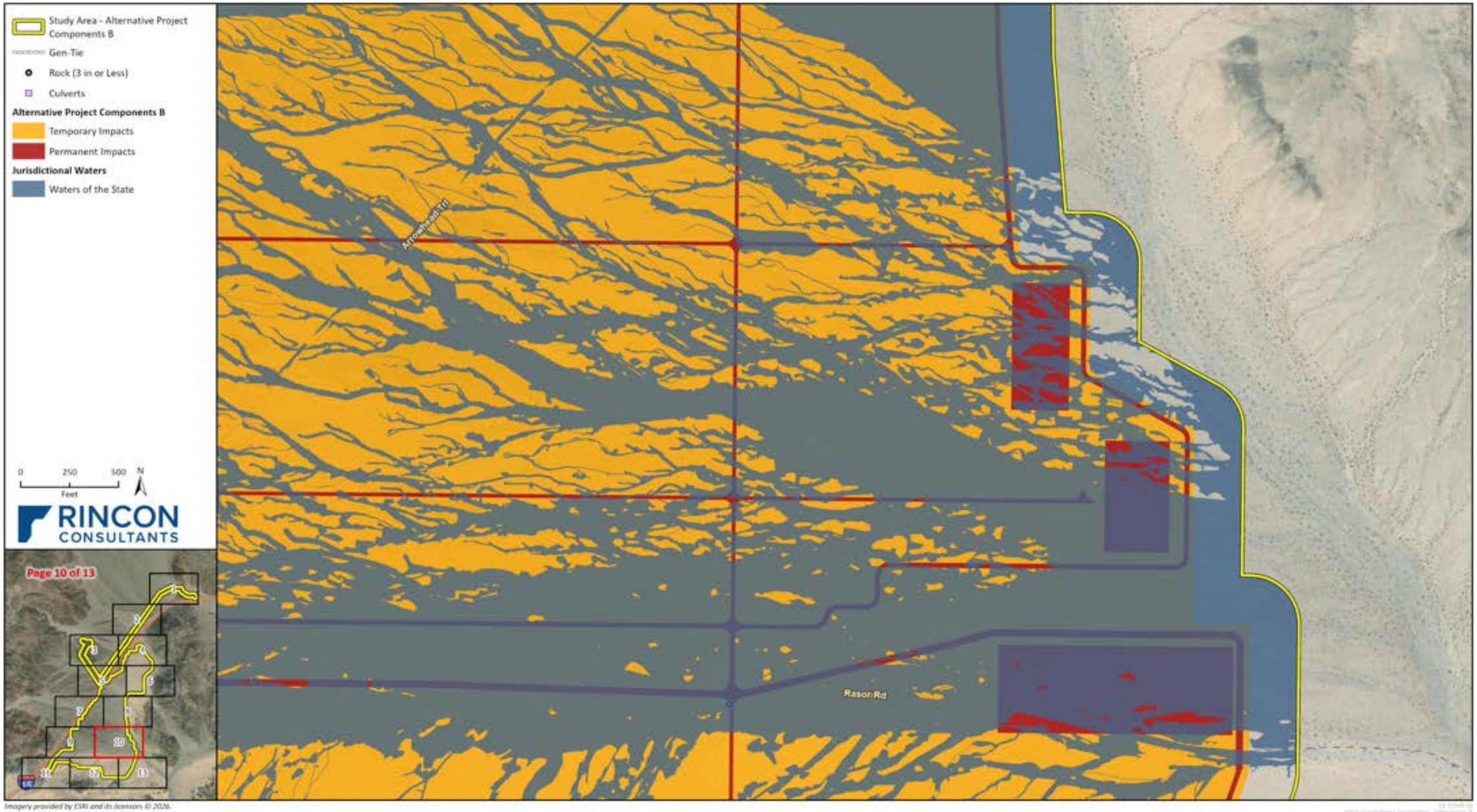


Figure 12l Alternative Project B –Aquatic Resources Impacts

Figure 12m Alternative Project B –Aquatic Resources Impacts

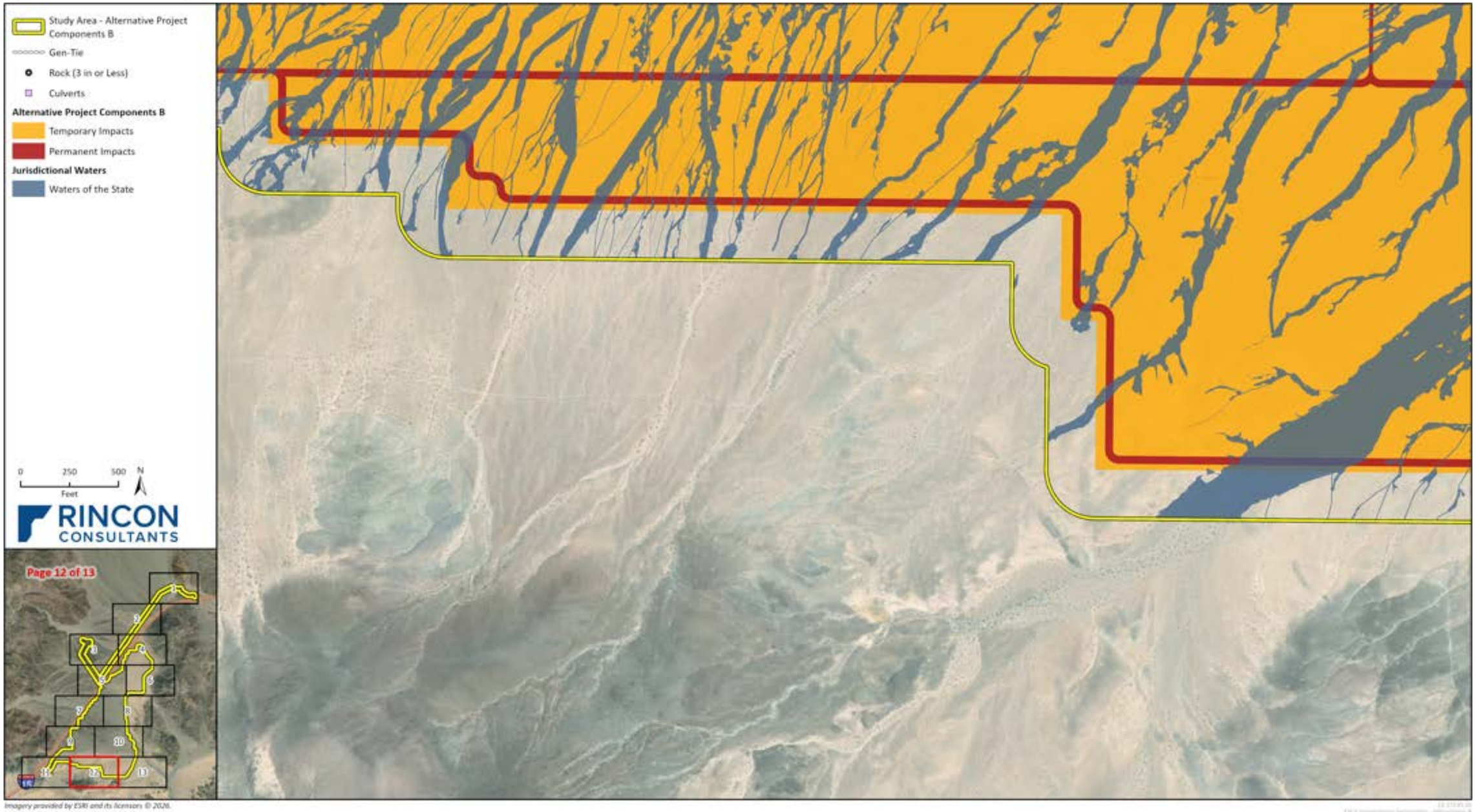
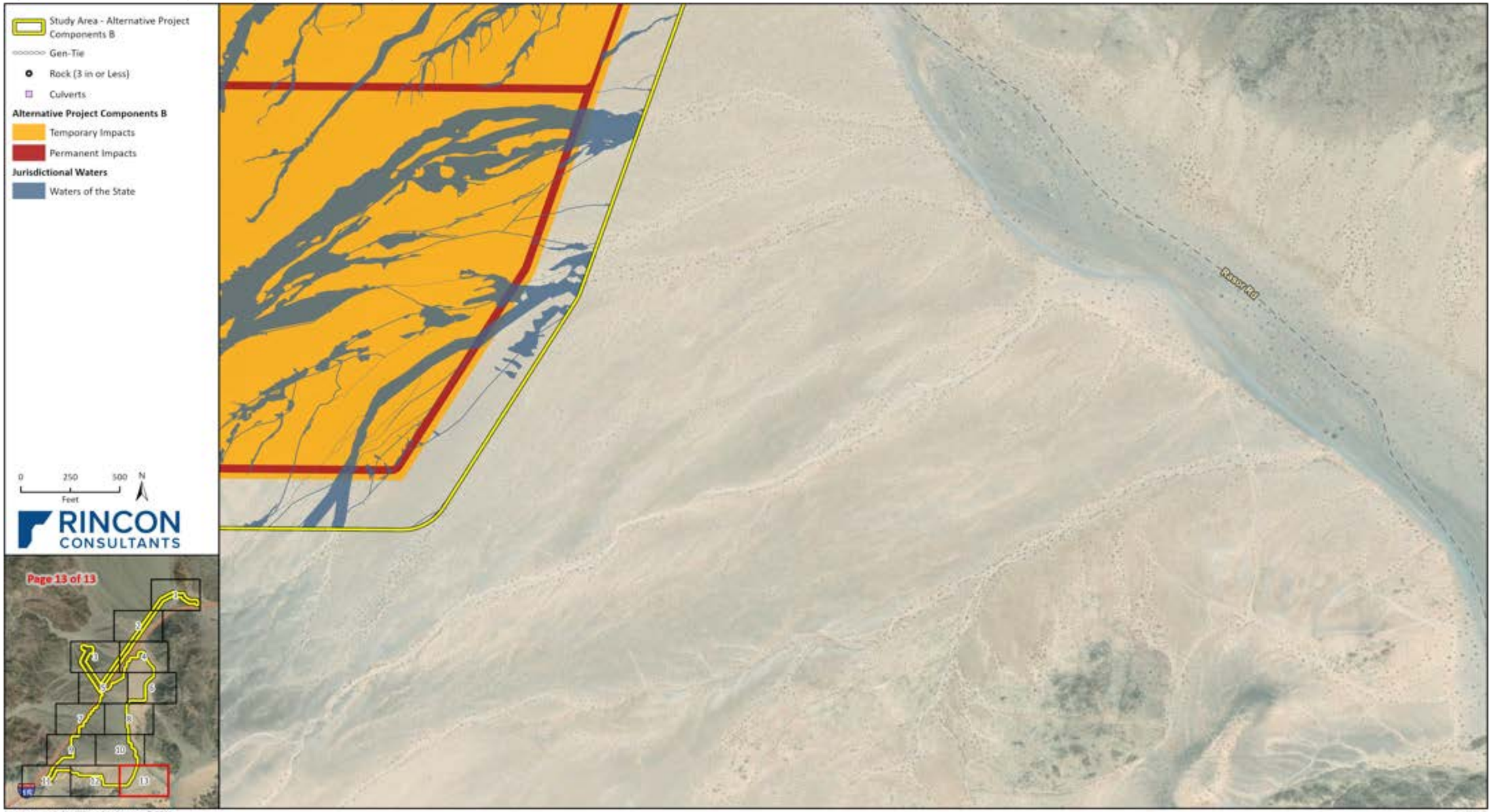


Figure 12n Alternative Project B –Aquatic Resources Impacts



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Rincon Consultants, Inc.
11801 Pierce Street, Suite 200
Riverside, California 92505
951-405-0979

February 25, 2026
Project No: 25-17245

Soda Mountain Solar, LLC
110 Edison Place, Suite 312
Newark, New Jersey 07102

Subject: Soda Mountain Solar Project, Compensatory Mitigation Evaluation for Waters of the State San Bernardino County, California

Soda Mountain Solar, LLC (SMS) has requested that Rincon Consultants, Inc. (Rincon) provide a brief evaluation of the California Energy Commission's (CEC) Soda Mountain Solar Project Staff Assessment (Staff Report) (CEC 2025), with a specific focus on the compensatory mitigation ratios applied to potential impacts on Waters of the State (WoS). To support project planning and decision making, SMS is requesting Rincon's regulatory expertise to assess the CEC's justification for the mitigation ratios outlined in the Staff Report, and offer alternative compensatory mitigation ratios such that the compensatory mitigation would be commensurate with the impacts anticipated, and consistent with the mitigation ratios required by the CEC and the Lahontan Regional Water Quality Control Board (RWQCB) for similar impacts in the region. In response to this request, Rincon has prepared the following letter outlining our initial review and our assessment of the issues raised.

Impacts to Waters of the State

The Soda Mountain Solar Project (project) would affect state-jurisdictional drainages considered to be WoS, which consist entirely of ephemeral desert washes that traverse the project area. According to the CEC Staff Report, the project site supports approximately 213.5 acres of WoS and all project impacts to WoS are considered to result in permanent or partial loss of ecological function, depending on the degree to which project infrastructure alters natural hydrology.

Permanent impacts occur where project components such as the battery energy storage system, substation and switching station pads, access roads, including the Rasor Road realignment, and fenced or vegetation-free zones would fully eliminate stream channels, remove vegetation, interrupt infiltration, and sever hydrologic connectivity. Based on the CEC Staff Report, these areas total approximately 21.75 acres of WoS subject to complete functional loss.

According to the CEC Staff Report, areas beneath the solar arrays or within temporary construction zones that retain some natural hydrology represent 205.02 acres of WoS expected to experience partial functional loss but maintain residual ecological value because infiltration and flow paths would persist beneath the panels. Of this, a smaller subset of 4.12 acres along the gen-tie alignment would be temporarily impacted, as the hydrology and stream channels would be restored after construction. Temporary effects to drainages that remain confined within the existing road prism and do not alter downstream hydrology are not considered to result in jurisdictional impacts.

CEC Applied Compensatory Mitigation Ratios

In the Staff Report, the CEC applies mitigation ratios of 3:1 for permanent loss, 1.5:1 for partial functional loss, and 1:1 for temporary disturbance. Based on these ratios, the project's total mitigation obligation is estimated at 376.9 acres, pending final delineation and design verification. The CEC concludes that, without compensatory mitigation, the project's WoS impacts would be significant because permanent disturbances would substantially and irreversibly alter the hydrologic and ecological functions of desert

wash systems. Temporary impacts along the gen-tie alignment that can be fully restored after construction warrant a lower mitigation ratio, as hydrology and ecological function within active channels would return. No mitigation is required by the CEC for temporary impacts at drainage crossings on existing access roads, provided the work remains within the existing road prism and does not alter downstream hydrology.

Justification for Reducing Mitigation Ratios

The Staff Report provides several points that support adjusting the proposed mitigation ratios to better reflect actual ecological conditions. Because the report acknowledges that its ratios are discretionary, based on preliminary acreage estimates, and subject to refinement as field data are verified, there is room to apply more appropriate and defensible values. The analysis in the Staff Report support a lower 2:1 ratio for permanent impacts that reduce, but do not eliminate, ecological function; no mitigation under the solar arrays where hydrology and vegetation largely persist; and a 1:1 ratio for temporary gen-tie impacts where conditions will be restored. Thus, there is a clear basis for refining the mitigation approach. The following sections provide additional rationale, beyond what is outlined in the Staff Report, to support adjustments to the CEC proposed mitigation ratios. 6-1

Mitigation Ratio for Permanent Impacts

The Staff Report explains that the proposed 3:1 mitigation ratio is based on the assumption that permanent project features would eliminate stream channels and vegetation entirely, resulting in a complete loss of hydrologic connectivity and function. The Staff Report acknowledges the proposed ratios are discretionary rather than regulatory requirements, and that acreage estimates and related conclusions may change as field data are further verified.

As documented in the Aquatic Resources Delineation (Rincon 2025), the site is characterized by an extensive network of ephemeral alluvial-fan drainages with distributed, braided, and shifting surface flow pathways rather than single, confined channels. The delineation verifies that drainage features frequently fan, braid, or dissipate into adjacent alluvial surfaces across wide portions of the project site. These characteristics indicate that stormwater flows naturally diverge, reconnect, and re-route across the fan depending on rainfall intensity, sediment accumulation, and local microtopography.

Because of this diffuse flow regime, the installation of project components that result in permanent disturbance (e.g., inverter pads, access road grading, water-control berms, and the substation/switchyard) is not expected to eliminate hydrologic connectivity entirely. Instead, surface flows will continue to move around and between project features via adjacent undisturbed portions of the alluvial fan. No project component fully spans or dams any drainage in a manner that would block downstream hydrology. 6-2

The delineation also confirms that the ephemeral drainages ultimately disperse across broad desert fan surfaces before terminating in playa basins (Soda Dry Lake, Cronise Valley), and that the drainage network does not include incised channels or confined stream courses that could be fully severed by fill. Instead, hydrology is driven by sheet flow, shallow braided channels, and low-relief alluvial features; these processes inherently allow for flow bypass around isolated permanent structures.

Therefore, based on field-verified drainage morphology and hydrologic modeling, the distributed nature of ephemeral flows, and the project's minimized grading design, the available evidence supports the conclusion that permanent project features may result in partial functional loss within direct impact footprints but will not cause a complete loss of drainage connectivity or downstream hydrologic function. Surface flows are expected to continue to route around built structures in a manner consistent with existing alluvial-fan processes. Therefore, the project would not result in complete loss of hydrologic connectivity and function, and a 3:1 mitigation ratio for impacts associated with built infrastructure

should be reduced. A 1:1 ratio would be consistent with the minimum 1:1 ratio required under the State Wetland Procedures (State Water Resources Control Board 2021). Further, the Lahontan RWQCB has recently accepted 2:1 mitigation ratios for permanent impacts to waters of the State for other projects in their purview, including for the Palmdale Ditch Conversion Project, where permanent impacts to ephemeral streams were mitigated at 2:1, and for the Hackstaff Road Bridges Project, where permanent wetland and stream impacts were mitigated at 2:1 (EcoAtlas 2024). 6-2 continued

Support for No Mitigation Under Arrays

The CEC is requiring a 1.5:1 mitigation ratio for the areas under the arrays. This ratio suggests replacement of habitat lost and creation/restoration of additional habitat beyond the replacement habitat. However, the Staff Report concludes that areas beneath the solar arrays are expected to retain natural hydrology, support vegetation, and maintain partial ecological function.

The report acknowledges that hydrology remains functional beneath panels, consistent with studies from Penn State Engineering and the Department of Energy showing that vegetated solar sites do not meaningfully alter natural flow paths and that soil moisture stays within normal ranges (Mulhollem 2024; Cook 2013). Similarly, the Staff Report's assertion that vegetation persists under arrays are consistent with research demonstrating that these zones remain pervious, retain infiltration capacity, and continue to support ecological activity. North Carolina Department of Environmental Quality (DEQ) guidance classifies vegetated under-panel areas as pervious, and studies show that native or disturbance-tolerant species regularly use these modified habitats (Cook 2013; NCDEQ 2018).

The Staff Report explains that ecological function for ground-dwelling species such as desert tortoise, western burrowing owl, and Crotch's bumble bee is reduced but not eliminated beneath solar panels, consistent with engineering findings that major functional losses are driven primarily by mass grading and soil disturbance, not by the presence of panels themselves. Where soils and native vegetation remain intact, as is the case with the areas under the solar arrays, ecological function, including forage availability, burrow potential, and invertebrate habitat, largely persists. The Staff Report further concludes that the project's impacts on waters of the State, including approximately 213.55 acres of non-wetland waters, would not result in any long-term reduction in ecological function because the applicant's revised fluvial-geomorphic stormwater design preserves natural drainage patterns, maintains hydrologic and sediment-transport processes, and avoids channelization or flow redirection that would otherwise impair the ecological role of ephemeral desert drainages as wildlife movement corridors and resource patches. Implementation of Conditions of Certification requiring best management practices, erosion, and stormwater controls, ensures that watershed-scale ecological functions - including hydrologic connectivity, infiltration, and ephemeral-channel stability - are fully maintained, and resulting impacts are reduced to less than significant.

Arid-land ecological function depends on intact soils, infiltration, and episodic resource pulses. Arid western systems, including areas dominated by ephemeral washes, rely on infiltration rather than continuous surface flow, and solar panels do not interrupt these core hydrologic processes. Studies showing sustained hydrologic activity and vegetation beneath arrays (Mulhollem 2024; Cook 2013; NCDEQ 2018) are supported by evidence from a Mojave Desert facility where a rare annual plant maintained normal growth and demographic performance despite microhabitat changes (Pereira et al. 2025). Because desert species are adapted to disturbance and fluctuating resources, partial modification beneath arrays does not constitute habitat loss in the way it might in more mesic environments. The best available science shows that under-array areas remain modified but functional desert landscapes, and compensatory mitigation warranting replacement of the habitat is not justified.

Taken together, both the Staff Report and literature indicate that habitat functionality under arrays is not diminished to a degree warranting habitat replacement or justification for a 1.5:1 mitigation ratio, since the habitat will remain intact to support special-status species in the project area. Across studies and 6-3

regulatory guidance documents, these under-panel zones are consistently described as modified yet still functional landscapes, retaining hydrologic and biological processes rather than representing lost habitat. As such, no compensatory mitigation is proposed under the solar arrays. 6-3 continued

Mitigation Ratio for Temporary Gen-Tie Impacts

The Staff Report's recommended 1:1 mitigation ratio for temporary gen-tie impacts aligns with how other utility-scale solar projects compensate for short-term temporary impacts. At Soda Mountain Solar, temporary construction impacts would be limited to minor surface disturbance that revegetates quickly and would be restored through a standard revegetation plan. The 1:1 ratio is appropriate and consistent with mitigation requirements for temporary disturbed areas that will be restored. 6-4

Duplicative Mitigation Requirements

The CEC's proposed mitigation ratios create a structural inconsistency in which a project proponent could be required to mitigate the same temporary ground disturbance twice, once for temporary impacts to desert tortoise habitat and again for temporary impacts to WoS. For example, the Staff Report assigns a 1.5:1 ratio for temporary disturbance between the arrays for desert tortoise habitat, even though the same footprint is simultaneously subject to a 1.5:1 ratio under the WoS framework. Because this disturbance represents a single physical impact, applying two separate ratios to the same area results in an inflated mitigation obligation rather than a resource-specific adjustment.

The Staff Report applies separate compensatory mitigation requirements to the same areas of temporary disturbance between the solar arrays, one set of ratios for desert tortoise habitat and a second set of ratios for WoS, resulting in an effective "double-counting" of mitigation obligations for the same acreage. The Biological Resources section assigns tortoise habitat compensation based on mapped temporary and permanent disturbance footprints, while the aquatic resources analysis independently requires mitigation for impacts to non-wetland waters, including ephemeral washes that occur within the same inter-array zones. Because the under-array and between-array areas are treated as both tortoise habitat and WoS features, without any indication that one mitigation requirement will offset the other, the Staff Report imposes duplicative compensatory obligations for the same physical impact. Notably, the Staff Report provides no clarification that mitigation will be consolidated, credited jointly, or otherwise adjusted to avoid redundancy, nor does it acknowledge standard interagency practice that seeks to prevent overlapping compensatory requirements for co-located resources. As written, the Staff Report therefore departs from typical CEQA/agency practice by requiring additive mitigation for two resource categories on the same acreage of temporary disturbance. In accordance with CEQA, compensatory mitigation must not be counted twice for a single physical impact.[1]

Further, the CEC's recommended 1.5:1 ratio for temporary disturbance between the arrays for desert tortoise habitat is inconsistent with the 1:1 ratio required in accordance with the project's 2015 EIS/EIR, 2016 U.S. Fish and Wildlife Service Biological Opinion, and the Desert Renewable Energy Conservation Plan (DRECP). The Staff Report provides no rationale for exceeding these regulatory benchmarks.

[1] Under CEQA and established interagency mitigation practice, compensatory mitigation may not be assessed more than once for a single physical impact. Agencies may evaluate an impact across multiple resource categories, but the disturbance footprint is counted only once for purposes of calculating compensatory obligations. (See CEQA Guidelines §§15021(a)(3), 15126.4(a)(1); see also standard agency practice in multi-resource analyses, e.g., DRECP, USFWS BOs.)

Applicant Proposed Compensatory Mitigation

The Staff Report identifies 376.90 acres of required mitigation, while the Applicant proposes 47.62 acres, reflecting an 87% decrease that results primarily from the Applicant's position that no compensatory mitigation should be required for the areas under the solar arrays. This difference arises from an intentional adjustment of mitigation proposed commensurate with the anticipated extent of project impacts, precedent established by the Lahontan RWQCB for other permitted projects in the region, and the understanding that hydrologic and ecological function will largely be maintained beneath the solar arrays. 6-5

Conclusion

In consideration of the project impacts, the CEC's proposed mitigation ratios for WoS are not fully supported by the information presented in the Staff Report. Some of the mitigation ratios proposed by CEC for WoS are inconsistent with CEQA and other regulatory requirements, and exceed what is justified from both a regulatory and hydrological/ecological perspective.

Sincerely,
Rincon Consultants, Inc.

May Lau
Principal Regulatory Specialist

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Attachment 4

Applicant's Proposed Clarifications to Draft Conditions of Certification in Staff Assessment for Soda Mountain Solar Project

The COCs below include highlighted placeholders for compensatory mitigation ratios and estimated impact acreages (and calculations based on those figures). The Applicant requests the CEC review the supporting documentation provided in the following documents and modify the COCs' mitigation ratios and impact numbers globally throughout the Staff Assessment.

Attachment 1: Impact Evaluation for the Soda Mt. Solar Project
Attachment 2: Aquatic Resources Delineation and Impact Analysis
Attachment 3: Compensatory Mitigation Evaluation for Waters of the State
Attachment 5: Updated Preliminary Drainage Report

Additionally, the redlines below include specific text clarifications for conditions of certification, as summarized in Section 2 of the Applicant Comments on the Soda Mountain Solar Project Staff Assessment letter, dated February 27, 2026.

BIO-12 Special-Status Plant Avoidance and Minimization Measures The Designated Biologist and/or Biological Monitor(s) shall conduct floristic pre-construction surveys for special-status plants. Surveys shall be conducted with the appropriate protocols approved by the CPM during the appropriate season in all suitable habitat within the project disturbance areas and access roads and within 100 feet of disturbance areas, where accessible. Surveys shall be conducted by qualified botanists or biologists approved by the CPM, pursuant to **BIO-1** and/or **BIO-3**.

The field surveys and reporting shall conform to current CDFW botanical field survey protocol (CDFW 2018) or more recent updates. With respect to areas potentially directly disturbed during the construction of the generation tie-line, protocol surveys conforming to the current CDFW botanical field survey protocol (CDFW 2018) are required for areas that have not previously been surveyed by the project owner to date. During each year of construction, and prior to ~~site mobilization and ground disturbance~~the start of construction, the project owner shall identify proposed survey areas to the CPM for review and approval prior to initiating annual botanical surveys. The survey plan shall identify proposed survey areas and the rationale for any areas not proposed for surveys. The survey plan shall include maps, at an approved scale, clearly defining each proposed survey area. 7-1

Any special-status plant species (including state and federally listed threatened or endangered species, candidates for listing, and all CRPR 1A, 1B, 2, 3, and 4 ranked species) detected shall be documented in the pre-construction survey reports. The results shall be submitted to CPM and~~,~~ CDFW and BLM~~, and USFWS~~ (should federally listed plants be discovered) for review. The reports shall describe any conditions that may have prevented target species from being located or identified, even if they are present as dormant seeds or below-ground root stock (e.g., poor rainfall, disturbance, or wildfire). In some cases, follow-up surveys may be necessary to adequately evaluate impacts. Pre-construction field survey reports shall include maps, at an approved scale, showing locations of survey areas, reference populations, and special-status plants.

The results of these surveys will inform the implementation of appropriate avoidance and minimization measures, as outlined below:

1. Avoidance. Where feasible, any special status plant shall be protected by establishment of a minimum 50-foot non-disturbance buffer. The buffer area shall be clearly staked, flagged, and signed for avoidance prior to the ~~beginning of site mobilization~~start of construction and maintained throughout the construction phase. For tree or shrub species, the buffer shall be no less than twice the drip line (i.e., two times the distance from the trunk to the canopy edge) to protect and preserve the root systems. The buffer zone shall be of sufficient size to prevent direct or indirect disturbance to the plants from site mobilization and construction activities, erosion, inundation, or dust.

   The final buffer distance shall be determined by a qualified biologist or botanist, approved under **BIO-1** and/or **BIO-3,** based upon the proposed use of the immediately adjacent areas and the plant's ecological requirements (e.g., sunlight, moisture, shade tolerance, water availability, edaphic physical and chemical characteristics).

   If a smaller buffer is necessary due to other site-specific constraints, the project owner, in coordination with the Designated Biologist or qualified botanist shall develop and implement site-specific protection measures, such as monitoring, to avoid the impacts to the species, if possible. The measure shall be subject to approval from the CPM ~~and BLM~~, in consultation with BLM and CDFW, as-needed. Such measures may include placing decking or pads above dormant species to prevent their loss and limit soil compaction.

2. Compensatory Mitigation. If avoidance of special status plants is not feasible, the project owner shall mitigate impacts to any state or federally listed plants that are subject to disturbance from project activities. Should a State listed plant be subject to disturbance the project owner would be required to implement standard categories of mitigation applicable for take coverage through CESA which includes seed salvage, propagation, and the preservation of lands occupied by the species. The measures shall be subject to approval from the CPM ~~and BLM~~, in consultation with BLM and, CDFW ~~and/ or USFWS~~, as-needed. In addition, the project owner shall provide compensatory mitigation for CRPR 1 or 2 ranked species if project activities result in the loss of more than 10 percent of a defined occurrence due to direct or indirect impacts to soils, vegetation, or water transport that could affect the species' viability.

   An occurrence, or local population, shall be defined as the number of individuals occurring on the project area or all plants within a 0.25-mile buffer.

   - For perennial species, percent avoidance shall be based on population size or number of individuals avoided.

   - For annuals, avoidance shall be based on occupied habitat, which includes habitat containing the species' micro-habitat preferences (e.g., such as "soil types and moist depressions").

   Occupied habitat shall be calculated on both the project area and compensation lands as including each special status plant occurrence and a surrounding 100-foot buffer area to account for seed bank.

   The project owner shall provide compensation lands at the following minimum ratios:

7-1 continued

- ~~3:1~~ :1 for any state or federally listed plants ~~and CRPR 1 or 2 ranked species~~
- ~~2:1~~ :1 ratio for CRPR 1 or 2 ranked species

3. Compensatory Mitigation by Acquisition. The requirements for the acquisition, initial protection and habitat improvement, and long-term maintenance and management of special-status plant compensation lands shall include the following:

   Selection Criteria for Acquisition Lands. The compensation lands selected for acquisition may include any of the following three categories:

   a. Occupied Habitat, No Habitat Threats. The compensation lands selected for acquisition shall be occupied by the target plant population and shall be characterized by site integrity and habitat quality that are required to support the target species and shall be of equal or better habitat quality than that of the affected occurrence. The occurrence of the target special-status plant on the proposed acquisition lands should be viable, stable, or increasing (in size and reproduction).

   b. Occupied Habitat, Habitat Threats. Occupied compensation lands characterized by habitat threats may also be acquired if the population could be reasonably expected to recover with habitat restoration efforts (e.g., OHV or grazing exclusion, or removal of invasive non-native plants) and is accompanied by a Habitat Enhancement/Restoration Plan.

   c. Unoccupied but Adjacent. The project owner may also acquire habitat for which occupancy by the target species has not been documented, if the proposed acquisition lands are adjacent to occupied habitat. The project owner shall provide evidence that acquisitions of such unoccupied lands would improve the defensibility and long-term sustainability of the occupied habitat by providing a protective buffer around the occurrence and by enhancing connectivity with undisturbed habitat. This acquisition may include habitat restoration efforts where appropriate, particularly when these restoration efforts will benefit adjacent habitat that is occupied by the target species.

7-1 continued

4. Review and Approval of Compensation Lands Prior to Acquisition. The project owner shall submit a formal acquisition proposal to the CPM ~~and BLM~~ describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for special-status plants in relation to the criteria listed above and must be approved by the CPM, in coordination with BLM and~~,~~ CDFW ~~and/or USFWS~~, as-needed.

5. Compensation Lands Management Plan. The project owner shall prepare a management plan for the compensation lands in consultation with the entity that will be managing the lands. The objective of the management plan shall be to support and enhance the long-term viability of the target special-status plant occurrences. The Compensation Lands Management Plan shall be submitted for review and approval to the CPM ~~and BLM~~, in coordination with the BLM and~~,~~ CDFW ~~and/or USFWS~~, as-needed.

6. Integrating Special-Status Plant Mitigation with Other Mitigation lands. If all or any portion of the acquired compensation lands for desert tortoise, burrowing owl, ~~waters of the state~~state jurisdictional waters, or other required compensation lands meets the criteria above for special-status plant compensation lands, the portion of the other species or habitat

compensation lands that meets any of the criteria above may be used to fulfill that portion of the obligation for special-status plant mitigation.

7. Compensation Lands Acquisition Requirements. The project owner shall comply with the following requirements relating to acquisition of the compensation lands after the CPM ~~and BLM,~~ has approved the proposed compensation lands:

   a. Preliminary Report. The project owner, or an approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary or requested documents for the proposed compensation land to the CPM and CDFW. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the CPM. For conveyances to the State, approval may also be required from the California Department of General Services and the Wildlife Conservation Board.

   b. Title/Conveyance. The project owner shall acquire and transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement, as required by the CPM. Any transfer of a conservation easement or fee title shall be to CDFW if accepted by CDFW, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code section 65965), or to BLM or other public agency approved by the CPM. If an approved non-profit organization holds fee title to the compensation lands, a conservation easement shall be recorded in favor of CDFW or another entity approved by the CPM. If an entity other than CDFW holds a conservation easement over the compensation lands, the CPM may require that CDFW or another entity approved by the CPM, in consultation with CDFW, be named a third-party beneficiary of the conservation easement. The project owner shall obtain approval of the CPM of the ~~terms~~ condition of title and form of any transfer of fee title or conservation easement to the compensation lands.

   7-1 continued

   c. Initial Protection and Habitat Improvement. The project owner shall fund activities that the CPM requires for the initial protection and habitat improvement of the compensation lands. These activities will vary depending on the condition and location of the land acquired, but may include trash removal, construction and repair of fences, invasive plant removal, and similar measures to protect habitat and improve habitat quality on the compensation lands.

      The habitat improvement funds may be held and expended by a qualified non-profit organization, CDFW or another public agency, provided that the entity is qualified to manage compensation lands (pursuant to California Government Code section 65965) and is authorized to participate in implementing the required activities on the compensation lands, upon approval of the CPM, in consultation with CDFW.

      If CDFW accepts fee title to the compensation lands, the project owner shall provide the habitat improvement fund directly to CDFW or its designee.

   d. Property Analysis Record. Upon identification of the compensation lands, the project owner shall conduct a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate amount of the long-term maintenance and management fund to pay the in-perpetuity management of the compensation lands. The PAR or PAR-like analysis must be approved by the CPM before it can be used to establish funding levels or management activities for the compensation lands.

e. Long-term Maintenance and Management Funding. The project owner shall deposit a capital long-term maintenance and management fee in a dedicated interest-bearing account held by governmental entity, special district, or nonprofit organization or other CPM--approved entity, in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis conducted for the compensation lands.

The CPM, in consultation with CDFW, may designate another non-profit organization to hold the non-refundable, long-term maintenance and management fee if the organization is qualified to manage the compensation lands in perpetuity.

If CDFW takes fee title to the compensation lands, CDFW shall determine whether it will hold the long-term management fee in the special deposit fund or designate another entity to manage the long-term maintenance and management fee under CDFW oversight.

In addition to the costs listed above under Items a-d, the project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to: title and document review costs incurred from other state agency reviews, overhead related to providing compensation lands to CDFW or an approved third party, escrow fees or costs, environmental contaminants clearance, and other site cleanup measures.

f. Mitigation Security. The project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by Section 7 of this condition that are not completed prior to the start of ~~site mobilization and ground-disturbing activities~~construction. 7-1 continued

Financial assurances shall be provided to the CPM, and copy to the CDFW, in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("Security") approved by the CPM. The actual costs to comply with Section 7 of this condition will vary depending on the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management as determined by a PAR report.

Prior to submitting the evidence of Security, the project owner shall obtain the CPM's approval of the form of the Security. The CPM may draw on the Security or approve of the security beneficiary to draw on the security, if the CPM determines the project owner has failed to comply with the requirements specified in Section 7 of this condition. Funds from the Security may solely be used for implementation of the requirements of Section 7 of this condition.

Use of the Security by the CPM or other approved entity does not relieve the project owner of its obligations under Section 7 of this condition if the Security is insufficient to fully cover required measures. Any unused portion of Security shall be returned to the project owner, in whole or in part, upon successful completion of the associated requirements in Section 7 of this condition.

8. Monitoring. Annual monitoring and documentation of salvaged plants shall include, but not be limited to, details of plants salvaged, stored, and transplanted (salvage and transplanting locations, species, number, size, condition, etc.); adaptive management efforts implemented (date, location, type of treatment, results, etc.); and evaluation of success of transplantation. Transplanted species may not be placed in areas subject to future land disturbance and must

be protected by a conservation easement or restricted covenant that prohibits disturbance and ensures conservation of the site in perpetuity. Conservation lands would be acquired consistent with the specifications identified above under Section 7.b., -Title /Conveyance. Annual monitoring shall occur for a minimum of three years post-relocation to ensure the plants become established and are not at risk from weeds or other impacts, unless approved by the CPM. The results of annual monitoring shall be reported in an Annual Monitoring Report specific to salvaged of propagated plants for a minimum of three years. Additional monitoring may be necessary if determined upon review of the annual reports by the CPM that the success criteria are not met. Success criteria shall include maintaining habitat occupied by the impacted species at the identified ratios and number of plants for any occupied habitat affected by the project.

9. Propagation and Relocation Strategy. If salvage and relocation is not believed to be feasible for special-status plants, then the project owner shall consult with California Botanic Garden, BLM, or another qualified entity, as-needed, to develop an appropriate propagation and relocation strategy, based on the life history of the species affected. The Special-Status Plant Propagation and Relocation Plan shall include at minimum: (a) collection and salvage measures for plant materials (e.g., cuttings), seed, or seed banks, to maximize success likelihood; (b) details regarding storage of plant, plant materials, or seed banks; (c) location of the proposed propagation facility, and proposed methods; (d) time of year that the salvage and other practices will occur; (e) success criteria; and (f) a detailed monitoring program, commensurate with the plan's goals. The draft Special-Status Plant Propagation and Relocation Plan shall be submitted to the CPM ~~and BLM~~ for review and approval and to the BLM and CDFW for review and comment, as-needed. The final plan approved by the CPM shall be submitted prior to any salvage or relocation.

7-1 continued

Verification: The project owner shall submit the proposed annual survey plan 45 days prior to commencing the surveys to the CPM for review and approval. The project owner shall submit the results of each annual survey to the CPM for review and approval no more than 45 days after the completion of the surveys.

Should compensatory mitigation be required, the project owner shall, prior to the start of construction, either provide verification that the required acquisition, protection, and transfer of all compensation lands has occurred or provide the Security required by Section 7.f of this condition. ~~submit the Habitat Enhancement/Restoration Plan, Formal Acquisition Proposal, Compensation Lands Management Plan, Recent Preliminary Title Report, and Property Analysis Record (PAR) and Security to the CPM for review and approval and the CDFW/USFWS if applicable for review and comment no later than 45 days prior to construction.~~

If plant propagation is proposed as mitigation the project owner shall submit the Special-Status Plant Propagation and Relocation Plan to the CPM for review and approval and the CDFW~~/USFWS~~ if applicable for review and comment no later than 45 days prior to the start of construction.

The project owner shall submit the Annual Monitoring Reports to the CPM for review and approval no more than 30 days after each reporting period.

BIO-15 Desert Tortoise Impact Avoidance, Minimization, and Mitigation Measures The project owner shall implement the following measures to avoid, minimize and offset impacts to desert tortoise during site mobilization, construction, and operation:

1. Desert Tortoise Translocation Plan. The Designated Biologist(s) shall prepare and implement a Desert Tortoise Translocation Plan (DTTP) 30 Calendar days prior to start of Covered Activities. Covered Activities are not authorized to start until DTTP is approved in writing by the CPM in consultation with the BLM~~, USFWS,~~ and CDFW, as-needed. The DTTP shall follow the most current guidelines provided by ~~USFWS and~~ CDFW regarding desert tortoise translocation. It shall include methods of burrow excavation, nest and egg handling procedures, safe handling guidelines for capture and relocation, temperature constraints, avoiding the transmission of diseases or parasites, disease testing, radio tagging, transportation procedures, artificial burrow construction and shelter placement along the perimeter fence line. Where guidance differs between BLM~~, USFWS~~ and CDFW, the project owner shall apply the most restrictive condition and seek written direction from the CPM in coordination with the USFSW, BLM, and CDFW, as-needed, on how to reconcile the differences.

2. Raven Management and Reporting Plan. The Designated Biologist shall prepare and implement a Raven Management and Reporting Plan (Raven Plan) consistent with CDFW ~~and USFWS~~ raven management guidelines. The purpose of the Raven Plan shall be to minimize project-related predator subsidies (e.g. common ravens and coyotes) and prevent any increases in raven numbers or activity within desert tortoise habitat during construction and operation phases. The Plan shall address all project components and their potential effects on raven numbers and activity. The Raven Plan shall be reviewed and approved by CPM, in coordination with the CDFW ~~and USFWS~~, prior to the start of site mobilization activities. The Raven Plan shall: 7-2

a. Identify all potential project activities as well as structures, components, and other features that could provide predator subsidies or attractants. This includes but is not limited to: improperly managed food waste; road killed animals; water storage facilities; pooled water from leaks, dust control, or wastewater; debris from brush and other vegetation clearing; as well perch or nest sites on project facilities and other infrastructure. As required by **BIO-7**, Item 18, all trash and food waste will be disposed of in secure, self-closing bins to prevent access by wildlife.

b. Describe specific management practices to avoid or minimize conditions that might increase raven numbers and predatory activities. This includes the following:

i. Collect and dispose of animals killed on the site or project access roads to reduce food subsidies;

ii. Water used for the project shall be applied to avoid puddling;

iii. Inactive common raven nests will be removed in accordance with ~~USFWS~~ CDFW guidelines. If re-nesting occurs, further measures will be coordinated with the CPM, in coordination with CDFW ~~and USFWS~~; and

iv. Active nests will be reported to CPM and~~,~~ CDFW~~, and USFWS~~ for consideration of egg-oiling or other authorized management measures.

c. The Designated Biologist and/or Biological Monitor shall oversee implementation of the Raven Plan.

d. The project owner shall contribute to the USFWS Regional Raven Management Program by making a one-time payment of $105 per acre of long-term or permanent project disturbance.

3. Desert Tortoise Fencing. As part of the construction activities wildlife friendly fencing shall be installed around certain project components, with openings capable of fitting adult desert tortoises (10 inches by 7 inches). These openings are found and used by desert tortoises when they encounter

fencing while traversing their habitat. All wildlife friendly fencing would remain installed for the duration of the project's operation and maintenance. The presence of wildlife friendly fencing would allow for the recolonization of the site by desert tortoise and other wildlife. In other photovoltaic projects using the same process, wildlife, including desert tortoise, rattlesnake, desert kit fox, rabbits, and other species, were found to reoccupy the site after removal of exclusion fencing. The proposed fencing would allow for wildlife species to reoccupy the project site during operation and maintenance.

~~The project owner shall install desert tortoise exclusion fencing around the project area, laydown, staging and parking areas. Exclusion fence specifications shall be approved by the CPM and be consistent with those described in the most recent Desert Tortoise Field Manual or more current guidance provided by BLM, CDFW and USFWS. Fencing shall not be required to conduct work at or along the generation tie line corridor but would be required around tower work areas and the switching station site.~~

4. Desert Tortoise Pre-construction Clearance Surveys. After the completion of fencing installation, the Designated Biologist(s) and/or Biological Monitor(s) shall conduct 5-meter clearance sweeps of the project area prior to site mobilization. Follow-up surveys shall also be conducted within fourteen (14) days preceding additional construction after a gap in significant construction activities of 60 calendar days or more. Surveys shall include 100 percent of the area disturbed and a surrounding buffer of 100 feet. A map of proposed survey areas shall be provided to the CPM for review and approval, and the BLM and, CDFW ~~and USFWS~~, for review and comment, as-needed, prior to initiating the surveys. Pre-construction clearance surveys shall be completed using perpendicular survey routes within the Project Area. Pre-construction clearance surveys cannot be simultaneously combined with other clearance surveys conducted for other species while using the same personnel. Covered Activities cannot start until two (2) negative results from consecutive surveys using perpendicular survey routes for desert tortoise are documented.

7-2 continued

New clearance surveys shall be conducted if the desert tortoise fence is breached (e.g., large gaps, torn fencing, or cavities that could allow desert tortoises to enter the site) for more than 24 hours. Clearance surveys shall be conducted for all linear facilities prior to any ground disturbance. In addition, surveys shall be conducted one week prior to any ground disturbance and within 24 hours of beginning work in suitable habitat. Methods for clearance surveys and exclusion fence specifications shall be consistent with those described in the most recent Desert Tortoise Field Manual or more current guidance provided by CDFW ~~and/or USFWS~~. Any potential burrows, sign, or tortoises shall be noted, recorded using a precision GPS device, and identified on project maps submitted to the CPM.

The Biological Monitor(s) and/or Authorized Biologist(s) shall record all potential desert tortoise and burrows within the pre-construction clearance survey area, using global positioning system (GPS) technology. The Authorized Biologist(s) and/or Biological Monitor(s) shall provide the results of the pre-construction clearance survey ~~(including all information of the USFWS Protocol data sheet)~~ to the CPM, BLM, ~~USFWS,~~ and CDFW within 10 Calendar days of completing the surveys. The use of specialized equipment (e.g., fiber optics) may be necessary to thoroughly inspect all burrows in preparation for collapsing them.

Twenty-four hours prior to the start of any Covered Activities, except for areas already cleared within installation of desert tortoise exclusion fencing, the DT Authorized Biologist(s) and/or Biological Monitor shall conduct a final clearance survey of Project Area. The use of specialized equipment (e.g., fiber optics) may be necessary to thoroughly inspect all burrows in preparation for collapsing them.

5. If Desert Tortoise Detected. If adult or juvenile desert tortoises or potentially active burrows are detected during the pre-clearance surveys the Designated Biologist and/or Biological Monitor(s) shall contact the CPM, and CDFW , and USFWS immediately for guidance. No work shall occur within 200-feet of any potential burrow or desert tortoise pending coordination with the CPM and, CDFW, and USFWS. Handling of desert tortoise shall not be allowed pending the completion of appropriate take authorization from the CEC, in coordination with CDFW, and USFWS, per Item 4.

6. Supplemental Mitigation for Desert Tortoise. If a desert tortoise is detected during the surveys, construction, or operation all work within 300 feet of the desert tortoise shall immediately stop and the observation shall be immediately reported to the Authorized Biologist(s). Covered Activities shall not resume until the Authorized Biologist(s) and/or Biological Monitor(s) has verified the desert tortoise has left the project area or an Authorized Biologist(s) approved under this COC relocates the desert tortoise as described in the Desert Tortoise Translocation Plan. The Designated Biologist shall notify CPM, BLM, USFWS, and CDFW of any desert tortoise observations within the project area within 24 hours. Notification and the written report shall include the date, location, and circumstances of the observation, the name of the Designated Biologist that relocated the individual, pictures, map and shapefiles with the location (including GPS coordinates) where the individual was moved as specified in the DTTP.

7. Excavation of Desert Tortoise Burrows. All potential desert tortoise burrows shall be investigated by fiber optic systems, excavated, and backfilled prior to construction. Only Authorized Biologist(s) and Biological Monitor(s) approved by CPM and in consultation with, BLM, USFWS, and CDFW, as-needed, are authorized to conduct burrow excavation. Excavation of burrows shall follow the methods described the USFWS Field Manual and the DTTP. 7-2 continued

8. Desert Tortoise Translocation. The Designated Biologist shall translocate all desert tortoise to the approved translocation areas identified in the approved DTTP. The DTTP shall follow the most current guidelines provided by USFWS and CDFW regarding desert tortoise translocation. Where guidance differs between the USFWS and CDFW, verbal and/or written direction provided by CPM in consultation with the CDFW always controls. CDFW notes that the list of items below are the most common examples of the differences between CDFW and USFWS guidelines. These shall be included in the DTTP along with the most recent USFWS translocation guidelines:

a. Translocated tortoises are tortoises removed from the Project Area and/or have a radio transmitter attached.
b. The Authorized Biologist shall determine when the creation of artificial burrows is needed.
c. Ambient air temperature guidelines shall be followed as specified in this COC.
d. Tortoises <100 millimeters (mm) midline carapace length (MCL) shall be released immediately without being held, transmittered, or blood drawn for disease testing as long as the temperature requirements are met.
e. CDFW does not authorize the release of tortoises that test positive for disease even if it does not show outward signs of the disease. If a tortoise tests positive for disease it is the responsibility of the Permittee to locate a CDFW approved facility to place the tortoise in. Any exception to this determination will need to be approved in writing by CDFW on a case-bycase basis.

9. Disease testing shall not be done between November 1 and May 14. If a tortoise >100 mm MCL is found between November 1 and May 14 or earlier with written approval from CDFW the tortoise shall be held in quarantine facilities and shall remain in quarantine until tested twice (once in the spring and once in the fall). If the tortoise tests negative for disease, it can be released

in accordance with the approved DTTP. Blood draw samples for Mycoplasma agassizii and Mycoplasma testudineum shall determine if a tortoise is negative or positive for disease. A combination of results from blood testing and visual inspection will be used to determine the health of a tortoise. Blood draw samples will be sent to: Dr. Mary Brown, University of Florida Mycoplasma Laboratory, 2015 SW Archer Road, Room V2-234, Gainesville Florida 32608, or other facility approved by CDFW. CDFW uses enzyme-linked immune assay (ELISA) test results to determine if a tortoise is positive for disease. The ELISA tests will be used to test for exposure to herpes virus (Mycoplasma agassizii and Mycoplasma testudiuneum).

a. If a tortoise tests positive for or is suspected of disease, then the tortoise will be tested twice for disease (once in the spring after May 15 to and once in the fall). To determine results of blood testing use the most current guidelines provided by the University of Florida Mycoplasma Laboratory Department of Infectious Diseases and Pathology. The University of Florida Mycoplasma Laboratory Department of Infectious Diseases & Pathology 2013 criteria for classifying Mycoplasma agassizii and Mycoplasma testudineum is a titer <32 is negative, a titer > 64 is positive, and a titer of 32 is suspect (retesting in 6 weeks) or most current guidelines. All sample forms shall come from the University of Florida's guidance.

b. The DTTP shall include a requirement that all translocated tortoises regardless of size be included in the translocation numbers and all reports.

c. The DTTP shall propose one recipient site. Recipient sites shall have the vegetative structure to support all life stages of desert tortoises. ~~In addition to the USFWS Field Manual guidelines t~~The DTTP shall also include identifying the known threats or potential causes of population decline, how potential threats have been or would be addressed, complete physical examination and health assessments with sample collection, age structure and sex ratios, protocol level surveys, vegetation classification and quality of habitat. The DTTP shall detail which characteristics are to be used to decide if a recipient site is similar enough to a Project Area including burrow aspects, and recovery needs such as habitat restoration and/or predator control.

7-2 continued

d. All tortoises >100 mm MCL removed off the Project Area shall be fitted with a transmitter and monitored for 5 years post translocation.

e. Recipient sites shall be a minimum of 4 miles (6.5 kilometers) away from highway/road right-of-way that does not include desert tortoise fencing.

f. All tortoise burrows within the Project Area shall be excavated following procedures outlined in the U. S. Fish and Wildlife Service Desert Tortoise Field Manual.

g. Creation of artificial burrows, as well as translocation of tortoises and eggs shall only occur on land(s) (including Bureau of Land Management), when written authorization has been obtained from the landowner prior to the start of Covered Activities. The written permission from the landowner shall be included in the DTTP and the DTTP shall not be approved by CDFW until authorization is provided in writing. If creation of artificial burrows or translocation of tortoise or eggs is proposed to take place on private lands then in addition to written approval required above, some form of protection for the land such as a conservation easement shall be in place prior to translocation occurring.

h. Cleaning and Disinfection Protocol. Trifectant and Rescue Ready to Use One Step Disinfectant Cleaner are the only products authorized under this ITP and its associated DTTP to be used as a disinfectant. These products are not authorized to be applied using a spray bottle or other spray methods.

i. Cleaning and Disinfection Protocol shall include the following:

ii. Remove all grossly visible debris.

iii. Wash the area or item with water and mild detergent.

iv. Thoroughly rinse the cleaned area to remove any detergent residue.

v. Allow the area to dry completely.

vi. Apply disinfectant mixture.

vii. Allow the full disinfectant product recommended contact time.

viii. Thoroughly rinse away any residual disinfectant and allow the area or item to air dry.

10.Ambient Air Temperatures. During all handling procedures, desert tortoise shall be treated in a manner to ensure that they do not overheat or exhibit signs of overheating (e.g., gaping, foaming at the mouth, etc.), or are placed in a situation where they cannot maintain surface and core temperatures necessary to their well-being. Tortoises shall be kept shaded at all times until it is safe to release them. For the purposes of this permit, ambient air temperature shall be measured in the shade, protected from wind, at a height of 5 centimeters above the ground surface. For all Covered Activities no desert tortoise shall be captured, moved, transported, released, or purposefully caused to leave its burrow for whatever reason when the ambient air temperature is above 95° Fahrenheit (F) (35° Celsius (C)). No desert tortoise shall be captured if the ambient air temperature is anticipated to exceed 95° F (35° C) before handling or processing can be completed. If the ambient air temperature exceeds 95° F (35° C) during handling or processing, desert tortoises shall be kept shaded in an environment that does not exceed 95° F (35° C), and not released until ambient air temperature declines to below 95°F (35°C). Desert tortoises moved during the less active season (June 1 to August 31 and November 1 to March 31) shall be monitored by the DT Authorized Biologist(s) for at least two days after placement in the new burrows to ensure their safety. During relocation, the DT Authorized Biologist(s) may hold a captured desert tortoise overnight and move them the following morning within these temperature constraints.

7-2 continued

11.Desert Tortoise Rehydration. If a desert tortoise voids its bladder as a result of being handled, the Authorized Biologist(s) shall rehydrate the animal(s). The Authorized Biologist(s) shall rehydrate the desert tortoise at the location where the animal(s) was or were captured, or the location where the animal(s) is or will be released. The Authorized Biologist(s) shall rehydrate the desert tortoise by placing it in a tub with a clean plastic disposable liner. The Authorized Biologist(s) shall add water to the lined tub while ensuring that the water level is not higher than the lower jaw of the animal. The Authorized Biologist(s) shall rehydrate each desert tortoise individually for a minimum of 10 to 20 minutes. The DT Authorized Biologist(s) shall place the lined tub in a quiet protected area during rehydration.

12.Desert Tortoise Handling Records. The DT Authorized Biologist(s) and/or Biological Monitor(s) shall maintain a record of all desert tortoises handled. This information shall include: (1) the locations (narrative and maps) and dates of observation, including whether the individual(s) was found above ground or in a burrow; (2) ambient temperature when handled and released; (3) general condition and health of the individual(s), including injuries, state of healing, and whether the individual(s) voided its bladders; (4) identified diagnostic markings (i.e., identification numbers or marked marginal scutes); (5) location moved from and location moved to (using GPS technology), including information on any burrow (natural or artificial) utilized; (6) whether any eggs were discovered and relocated; (7) digital photographs of any desert tortoise and eggs handled; and (8) results of ongoing monitoring. The Designated Representative(s) shall provide the CPM~~, BLM, USFWS, and CDFW~~ with the information listed above submitted in the quarterly reports during construction.

13.Desert Tortoise Guards. The design of desert tortoise guards shall include exit ramps, cleanouts, and temporary shelters or guards along the fence line. Guards shall be installed along

the fence line of the project and designed to prevent entrapment with the proposed perimeter berms. Guard locations and design shall be provided to the CPM for approval and in consultation with the BLM~~, USFWS,~~ and CDFW, as-needed, ~~for review and comment~~ prior to starting Covered Activities.

14.Permanent Security Fencing with Attached Desert Tortoise Fencing. The project owner shall install fencing to exclude desert bighorn sheep from entering the facility and to prevent access to the manufactured drainages that occur between the arrays. The fencing between the arrays shall provide passage to small mammals and desert tortoise. ~~The permanent desert tortoise exclusion fencing shall be attached to the 6-foothigh standard chain link security fencing. This fencing shall be installed around the array fields, operation and maintenance facilities, warehouses, substations, switchyard, and interconnection facilities and will remain in place during operations except it may be removed in places where wildlife-friendly fencing may be implemented over a portion of the facility site. The fence shall be constructed according to Chapter 8 of the USFWS Field Manual, but if any tortoises <100mm MCL are translocated within 500 meters of the Project area, tortoise fencing shall be 16 gauge or heavier galvanized after welded wire with mesh opening of ½ inch horizontal by ½ inch vertical. The fence shall include the installation of shade structures along the outer fence perimeter placed at regular intervals. To prevent potential access at site access points, all gates would be installed with desert tortoise exclusion fencing affixed along the bottom portion of the gate structure. The fencing shall be constructed to allow desert kit fox access to the solar arrays while excluding desert tortoise. The fencing must be placed in a way to ensure that Soda Mountain Solar Project desert tortoises do not get trapped between the fence line and the perimeter berms.~~

7-2 continued

15.Permanent Security Fence Maintenance Inspection. The DT Authorized Biologist(s) and/or Biological Monitor(s) shall inspect the tortoise fencing during the Covered Activities, at the end of each workday during the construction period, monthly during O&M, and during major rainfall and high wind events within 24 hours to ensure desert tortoise is prohibited from entering the Project Area. If the fence is compromised, repairs shall be completed immediately, and clearance protocol level surveys shall be conducted as described in Section 4.

16.Vehicle Inspection. Workers shall inspect for desert tortoises under vehicles and equipment before the vehicles and equipment are moved. If a desert tortoise is present, the worker shall contact the DT Authorized Biologists(s) and/or Biological Monitor and wait for the tortoise to move unimpeded to a safe location or the DT Authorized Biologist(s) shall relocate the tortoise as described in the DTTP before moving vehicles and equipment.

17.Staging Area and Parking Area. The project owner shall enclose all staging and parking areas with desert tortoise exclusion fencing. All parked vehicles and equipment shall be inspected prior to being moved. If a desert tortoise is found within a staging or parking area the worker shall immediately contact the Authorized Biologist(s) and/or Biological Monitor. A designated biologist shall relocate the desert tortoise in accordance with the DTTP.

18.Raven Management and Reporting Plan. The Designated Biologist shall prepare and implement a Raven Management and Reporting Plan (Raven Plan) consistent with CDFW ~~and USFWS~~ raven management guidelines. The purpose of the Raven Plan shall be to minimize project-related predator subsidies (e.g. common ravens and coyotes) and prevent any increases in raven numbers or activity within desert tortoise habitat during construction and operation phases. The Plan shall address all project components and their potential effects on raven numbers and activity. The Raven Plan shall be reviewed and approved by CPM, in coordination with the CDFW ~~and USFWS~~, prior to the start of site mobilization activities. The Raven Plan shall:

a. Identify all potential project activities as well as structures, components, and other features that could provide predator subsidies or attractants. This includes but is not limited to: improperly managed food waste; roadkilled animals; water storage facilities; pooled water from leaks, dust control, or wastewater; debris from brush and other vegetation clearing; as well perch or nest sites on project facilities and other infrastructure. As required by **BIO-7**, Item 18, all trash and food waste will be disposed of in secure, self-closing bins to prevent access by wildlife. Soda Mountain Solar Project

b. Describe specific management practices to avoid or minimize conditions that might increase raven numbers and predatory activities. This includes the following:

i. Collect and dispose of animals killed on the site or project access roads to reduce food subsidies;

ii. Water used for the project shall be applied to avoid puddling;

iii. Inactive common raven nests will be removed in accordance with USFWS guidelines. If re-nesting occurs, further measures will be coordinated with the CPM, in coordination with CDFW ~~and USFWS~~; and

iv. Active nests will be reported to CPM, and CDFW~~, and USFWS~~ for consideration of egg-oiling or other authorized management measures.

7-2 continued

c. The Designated Biologist and/or Biological Monitor shall oversee implementation of the Raven Plan.

d. The project owner shall contribute to the USFWS Regional Raven Management Program by making a one-time payment of $105 per acre of long-term or permanent project disturbance. Based on this calculation the Permittee shall provide a one-time payment at $105.00/acre for ~~1543.46~~ acres at ~~$162,063.30~~$ to the REAT account established with NFWF's Raven Management Plan fund. A minimum of 15 days prior to the start of Covered Activities these funds shall be provided to NFWF using appropriate deposit document and proof of paying this fee shall be provided to the CPM and CDFW within 24 hours after the funds have been provided to NFWF.

19. Erosion Control Materials. To minimize the risk of ensnaring and strangling desert tortoise and other wildlife, the project owner shall not use erosion control materials containing synthetic (e.g., plastic or nylon) monofilament netting. Geotextiles, fiber rolls, and other erosion control measures shall be made of loose-weave mesh, such as jute, coconut (coir) fiber, or other products without welded weaves. The project owner shall use erosion control materials composed entirely of natural-fiber biodegradable materials. Plastic "photodegradable" erosion control materials shall not be used.

20.Full-Time Monitoring. An Authorized Biologist(s) and/or Biological Monitor(s) shall be present during all project activities that occur outside a permanent fenced area during the construction period. The Authorized Biologist(s) and/or Biological Monitor(s) shall conduct compliance inspections a minimum of three times a day (once during the onset of the day's work, once mid-day, and once at the conclusion of that day's work) during construction within the fenced area. The Authorized Biologist(s) and/or Biological Monitor(s) shall conduct compliance inspections to: minimize incidental take of the desert tortoise; prevent unlawful take of species; check for compliance with all measures of this COC; check all exclusion zones; and ensure that signs, stakes, and fencing are intact, and that project activities are only occurring in Soda Mountain Solar Project the project area. The Designated Representative or Authorized Biologist shall prepare daily written observation and inspection records summarizing oversight activities

and compliance inspections, observations of desert tortoise and their sign, survey results, and monitoring activities required by this COC. During the operations and maintenance period of the project, an Authorized Biologist(s) shall be on-site to address any compliance-related issues.

21.Monitoring During Operation and Maintenance. Once all construction is complete any work being performed outside the exclusionary fencing shall have an Authorized Biologist(s) and/or Biological Monitor(s) on-site to monitor any ground-disturbing activities such as fence or berm repairs and during perimeter fence inspections for the term of this COC.

22.Desert Tortoise Injury. If a desert tortoise is injured as a result of project related activities, the DT Authorized Biologist shall immediately take it to a CPM and CDFW approved wildlife rehabilitation or veterinary facility. The [project owner shall identify the facility before commencing site mobilization and shall bear any costs associated with the care or treatment of such injured desert tortoise. The project owner shall notify CPM, who may consult BLM, ~~USFWS,~~ and CDFW, as-needed, of the injury immediately by telephone and e-mail followed by a written incident report within 48 hours. The notification shall include the name of the facility where the animal was taken.

7-2 continued

23.Reporting. A report documenting survey results, including surveyor name(s), date(s) of survey, location (with maps), weather conditions, and any observations or detections of desert tortoise or their sign will be prepared and submitted to the CPM and, CDFW~~, and USFWS~~. In addition, a monitoring report that includes the location, description, and duration of the activities, any observations or detections of desert tortoise found during the surveys or project activities, and any relocation efforts will be provided during monthly and annual compliance reporting.

24.CNDDB Observations. The Authorized Biologist shall submit all observations of desert tortoises to CDFW's California Natural Diversity Database (CNDDB) within 60 calendar days of the observation and the Authorized Biologist shall include copies of the submitted forms with the next Quarterly Compliance Report.

Verification: The project owner shall submit a Desert Tortoise Translocation Plan (DTTP) 30 days prior to start of Covered Activities to the CPM for review and approval in consultation with the BLM, ~~USFWS,~~ and CDFW, as-needed. The project owner shall submit the proposed annual survey plan 45 days prior to commencing the surveys to the CPM for review and approval and to the CDFW ~~and USFWS~~ for review and comment. The project owner shall submit the pre-construction survey reports to the CPM and, CDFW~~, and USFWS~~ no more than 45 days after each survey effort has been completed. The project owner shall submit the receipt of payment to the USFWS Regional Raven Management Program and the CPM 14 days prior to site mobilization. A report documenting survey results shall be prepared and submitted to the CPM and, CDFW~~, and USFWS~~ within 14 days of completing the surveys.

BIO-16 Habitat Management Land Acquisition for Desert Tortoise To mitigate for impacts to desert tortoise the project owner shall fulfill the following requirements:

The project owner shall purchase ~~4,316.5 acres of~~ desert tortoise mitigation or conservation bank credits, at a location within the Mojave Desert approved in advance by the CPM, in coordination with the BLM~~, USFWS,~~ and CDFW, as-needed, or shall provide for both the permanent protection and management of ~~4,316.5 acres of~~ Habitat Management (HM) lands pursuant to Item 3 (Habitat Management Lands Acquisition and Protection) and the calculation and deposit of the management funds pursuant to Item 5 (Endowment Fund). The amount of mitigation required

7-3

shall be calculated based on the project's final direct permanent and temporary loss of desert tortoise habitat, as approved by the CPM, in consultation with the ~~USFWS,~~ BLM, and CDFW, at a ___:1 ratio for all permanent impacts to desert tortoise habitat.

The project owner shall provide detailed maps of all proposed work areas that have the potential to result in temporary or permanent impacts to desert tortoise habitat. This includes providing maps of work areas around each of the generation tie-line poles, access roads, retention basins, berms, staging areas, pull and tensioning sites, or other work areas. Maps, at an approved scale of all proposed temporary and permanent work areas shall be provided to the CPM and CDFW prior to ~~any site mobilization~~the start of construction. At the conclusion of construction, the project owner shall provide a true-up of any habitat that were subject to temporary or permanent impacts. Any areas subject to grading would be considered permanent.

If all or any portion of the mitigation or conservation bank credits or acquired compensation lands for special-status plants, burrowing owl, state jurisdictional waters, or other required compensatory mitigation meets the criteria for desert tortoise compensation lands, the portion of the other species or habitat compensation lands that meets the criteria for desert tortoise compensation lands may be used to fulfill that portion of the obligation for desert tortoise mitigation.

The purchase of mitigation or conservation bank credits or permanent protection and funding for perpetual management of HM lands must be complete before ~~starting project activities~~the start of construction, or within 18 months of the start of construction ~~date of the site mobilization,~~ if Security is provided pursuant to the Security (Item 11) below for all uncompleted obligations.

1. Cost Estimates. For the purposes of determining the Security amount, it is estimated the cost for the CPM or its contractors to complete acquisition, protection, and perpetual management of the HM lands is as follows:

   a. Land acquisition costs for HM lands identified in the Item 3 (Habitat Management Lands Acquisition and Protection) below, estimated at $4,000/acre for ~~4,316.5~~ _____ acres: ~~$17,266,000.00~~ _____. Land acquisition costs are estimated using local fair market current value per acre for lands with habitat values meeting mitigation requirements. The CPM will instead use the actual land acquisition cost for determining the Security amount if it can be determined with reasonable certainty; for example, if the project owner has an option or is under contract to purchase approved HM lands but the purchase transaction has not yet closed.

   b. All other costs ~~are~~ necessary to review and acquire the land in fee title and record a conservation easement as described below in Item 3b. (Conservation Easement) below: $17,440.00.

   c. Start-up costs for HM lands, including initial site protection and enhancement costs as described in the Item 3f (Start-up Activities) below, estimated at $2,000/acre for ~~4,316.5~~ _____ acres: ~~$8,633,000.00~~ _____.

   d. Interim management period funding as described in the Item 4 (Interim Management) (Initial and Capital)) below, estimated at $600.00/acre for ~~4,316.5~~ _____ acres: ~~$2,589,900.00~~ _____.

7-3 continued

e. Long-term management funding as described in the Item 5 (Endowment Fund) below, estimated at $3,100.00/acre for ~~4,316.5~~ acres: $~~13,381,150.00~~. Long-term management funding is estimated initially for the purpose of providing Security to ensure implementation of HM lands management.

f. Related transaction fees including but not limited to account set-up fees, administrative fees, title and documentation review and related title transactions, expenses incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW as described in the Item 10 (Reimburse CDFW), estimated at $6,000.00.

g. All costs associated with the CPM engaging an outside contractor to complete the mitigation tasks, including but not limited to acquisition, protection, and perpetual funding and management of the HM lands and restoration of temporarily disturbed habitat. These costs include but are not limited to the cost of issuing a request for proposals, transaction costs, contract administration costs, and costs associated with monitoring the contractor's work. $75,000.00.

2. Mitigation Bank Credits. If the project owner elects to purchase credits to complete desert tortoise compensatory mitigation obligations, then project owner shall purchase ~~4,316.5 acres of Covered Species~~desert tortoise credits from a mitigation or conservation bank approved in advance by the CPM prior to ~~initiating project activities~~the start of construction, or no later than 18 months from the start of ~~site mobilization,~~construction if Security is provided pursuant to Item 11 (Security) below. Prior to the purchase of credits, the project owner shall obtain CPM approval to ensure the mitigation or conservation bank is appropriate to compensate for the impacts of the project. The project owner shall submit to the CPM a copy of the Bill of Sale(s) and Payment Receipt prior to ~~initiating site mobilization~~the start of construction or within 18 months from start of construction ~~site mobilization,~~ if Security is provided. 7-3 continued

3. Habitat Management Lands Acquisition and Protection. If the project owner elects to provide for the acquisition, permanent protection, and perpetual management of HM lands to complete compensatory mitigation obligations, then the project owner shall:

a. Fee Title. Transfer fee title of the HM lands to CDFW pursuant to terms approved in writing by CDFW. Alternatively, the CPM, in consultation with CDFW, may authorize a governmental entity, special district, non-profit organization, for-profit entity, person, or another entity to hold title to and manage the property provided that the district, organization, entity, or person meets the requirements of Government Code sections 65965-65968, as amended.

b. Conservation Easement. If CDFW does not hold fee title to the HM lands, CDFW shall act as grantee for a conservation easement over the HM lands or shall, in its sole discretion, approve a non-profit entity, public agency, or Native American tribe to act as grantee for a conservation easement over the HM lands provided that the entity, agency, or tribe meets the requirements of Civil Code section 815.3. If CDFW elects not to be named as the grantee for the conservation easement, CDFW shall be expressly named in the conservation easement as a third-party beneficiary. The project owner shall obtain written approval from the CPM, in coordination with CDFW, of any conservation easement before its execution or recordation. No conservation easement shall be approved by the CPM unless it complies with Civil Code sections 815-816, as amended, and Government Code sections 65965-65968, as amended and includes provisions

expressly addressing Government Code sections 65966(j) and 65967(e). Because the "doctrine of merger" could invalidate the conservation interest, under no circumstances can the fee title owner of the HM lands serve as grantee for the conservation easement.

c. HM Lands Approval. The project owner shall obtain CPM written approval of the HM lands, in coordination with CDFW, before acquisition and/or transfer of the land by submitting, at least 90 days before acquisition and/or transfer of the HM lands, documentation identifying the land to be purchased or property interest conveyed to an approved entity as mitigation for the project's impacts on desert tortoise.

d. HM Lands Documentation. The project owner shall provide a recent preliminary title report, Phase I Environmental Site Assessment, and other necessary documents (please contact CPM for document list). All documents conveying HM lands and all conditions of title are subject to approval from the CPM; and if applicable, the Wildlife Conservation Board, and the Department of General Services.

e. Land Manager. Designate both an interim and long-term land manager, approved by the CPM, in consultation with the BLM, ~~USFWS,~~ and CDFW, as-needed. The interim and long-term land managers may, but need not, be the same. The interim and/or long-term land managers may be the landowner or another party. The land manager shall prepare a draft management plan for CPM review and approval, in consultation with CDFW, and written approval as part of the HM lands acquisition process. The project owner shall notify the CPM of any subsequent changes in the land manager within 30 days of the change. If CDFW will hold fee title to the mitigation land, CDFW will also act as both the interim and long-term land manager unless otherwise specified. The grantee for the conservation easement cannot serve as the interim or long-term manager without the express written authorization of the CPM, in consultation with BLM, ~~USFWS,~~ and CDFW, as-needed. 7-3 continued

f. Start-up Activities. Provide for the implementation of start-up activities, including the initial site protection and enhancement of HM lands, once the HM lands have been approved by the CPM. Start-up activities include, at a minimum: (1) conducting a baseline biological assessment and land survey report within four months of recording or transfer; (2) developing and transferring Geographic Information Systems (GIS) data if applicable; (3) establishing initial fencing; (4) conducting litter removal; (5) conducting initial habitat restoration or enhancement, if applicable; and (6) installing signage.

4. Interim Management (Initial and Capital). Provide for the interim management of the HM lands. The project owner shall ensure that the interim land manager implements the interim management of the HM lands as described in the final management plan and conservation easement approved by the CPM, in consultation with CDFW. The interim management period shall be a minimum of three years from the date of HM land acquisition and protection and full funding of the Endowment and includes expected management following start-up activities. Interim management period activities described in the final management plan shall include fence repair, continuing trash removal, site monitoring, and vegetation and invasive species management.

The project owner shall either (1) provide Security to the CPM for the minimum of three years of interim management that the land owner, the project owner, or land manager agrees to manage and pay for at their own expense, (2) establish an escrow account with written instructions approved in advance in writing by the CPM to pay the land manager annually in

advance, or (3) establish a short-term enhancement account with a CPM-approved entity for payment to the land manager.

5. Endowment Fund. If the project owner elects to provide for the acquisition, permanent protection, and perpetual management of HM lands to complete compensatory mitigation obligations, then the project owner shall ensure that the HM lands are perpetually managed, maintained, and monitored by the long-term land manager as described in this condition of certification, the conservation easement, and the final management plan approved by the CPM. After obtaining CPM approval, in consultation with CDFW, of the HM lands, the project owner shall provide long-term management funding for the perpetual management of the HM lands by establishing a long-term management fund (Endowment). The Endowment is a sum of money, held in a CPM-approved (in consultation with CDFW) fund that is permanently restricted to paying the costs of long-term management and stewardship of the mitigation property for which the funds were set aside, which costs include the perpetual management, maintenance, monitoring, and other activities on the HM lands consistent with the condition of certification, the conservation easement, and the management plan required by Item 3e (Land Manager). Endowment as used in this condition of certification ~~the Certification~~ shall refer to the endowment deposit and all interest, dividends, other earnings, additions and appreciation thereon. The Endowment shall be governed by this ~~license~~condition of certification, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended. After the interim management period, the project owner shall ensure that the designated long-term land manager implements the management and monitoring of the HM lands according to the final management plan. The long-term land manager shall be obligated to manage and monitor the HM lands in perpetuity to preserve their conservation values in accordance with this ~~license~~condition of certification, the conservation easement, and the final management plan. Such activities shall be funded through the Endowment. 7-3 continued

6. Identify an Endowment Manager. The Endowment shall be held by the Endowment Manager, which shall be either the CEC and/or CDFW or another entity qualified pursuant to Government Code sections 65965-65968, as amended.

   a. The project owner shall submit to the CPM for review and approval, a written proposal that includes: (i) the name of the proposed Endowment Manager; (ii) whether the proposed Endowment Manager is a governmental entity, special district, nonprofit organization, community foundation, or congressionally chartered foundation; (iii) whether the proposed Endowment Manager holds the property or an interest in the property for conservation purposes as required by Government Code section 65968(b)(1) or, in the alternative, the basis for finding that the Project qualifies for an exception pursuant to Government Code section 65968(b)(2); and (iv) a copy of the proposed Endowment Manager's certification pursuant to Government Code section 65968(e).

7. Calculate the Endowment Funds Deposit. After obtaining CPM written approval, in consultation with CDFW, of the HM lands, long-term management plan, and Endowment Manager, the project owner shall prepare an endowment assessment (equivalent to a Property Analysis Record (PAR)) to calculate the amount of funding necessary to ensure the long-term management of the HM lands (Endowment Deposit Amount). Note that the endowment for the easement holder should not be included in this calculation. The project owner shall submit to the CPM, in consultation with CDFW, for review and approval the results of the endowment assessment before transferring funds to the Endowment Manager.

a. Capitalization Rate and Fees. The project owner shall obtain the capitalization rate from the selected Endowment Manager for use in calculating the endowment assessment and adjust for any additional administrative, periodic, or annual fees.

b. Endowment Buffers/Assumptions. The project owner shall include in the endowment assessment assumptions the following buffers for endowment establishment and use that will substantially ensure long-term viability and security of the Endowment:

ie. 10 Percent Contingency. A 10 percent contingency shall be added to each endowment calculation to hedge against underestimation of the fund, unanticipated expenditures, inflation, or catastrophic events.

iid. Three Years Delayed Spending. The endowment shall be established assuming spending will not occur for the first three years after full funding.

iiie. Non-annualized Expenses. For all large capital expenses to occur periodically but not annually such as fence replacement or well replacement, payments shall be withheld from the annual disbursement until the year of anticipated need or upon request to Endowment Manager and the CPM, in consultation with CDFW.

8. Transfer Long-term Endowment Funds. The project owner shall transfer the long-term endowment funds to the Endowment Manager ~~upon~~ after the CPM's approval of the Endowment Deposit Amount identified above and contemporaneously with the acquisition or transfer of the HM lands. 7-3 continued

9. Management of the Endowment. The approved Endowment Manager may pool the Endowment with other endowments for the operation, management, and protection of HM lands for local populations of desert tortoise but shall maintain separate accounting for each Endowment. The Endowment Manager shall, at all times, hold and manage the Endowment in compliance with this Certification, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended.

   Notwithstanding Probate Code sections 18501-18510, the Endowment Manager shall not make any disbursement from the Endowment that will result in expenditure of any portion of the principal of the endowment without the prior written approval of the CPM in its sole discretion. The project owner shall ensure that this requirement is included in any agreement of any kind governing the holding, investment, management, and/or disbursement of the Endowment funds.

   Notwithstanding Probate Code sections 18501-18510, if the CPM, in consultation with CDFW, determines in its sole discretion that an expenditure needs to be made from the Endowment to preserve the conservation values of the HM lands, the Endowment Manager shall process that expenditure in accordance with directions from the CPM. The Endowment Manager shall not be liable for any shortfall in the Endowment resulting from the CPM's decision to make such an expenditure.

10. Reimburse CDFW. The project owner shall reimburse CDFW for all reasonable costs incurred by CDFW related to transfer of the HM lands to CDFW, if applicable, including, but not limited to transaction fees, account set-up fees, administrative fees, title and documentation review and related title transactions, costs incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW.

11. Security: The project owner may ~~proceed with project activities~~start construction only after the project owner has ensured the funding (Security) to complete any activity required by the Item 3 (Habitat Management Land Acquisition and Protection) that has not been completed before ~~project activities begin~~the start of construction. Permittee shall provide Security as follows:

    a. Security Amount. The Security shall be in the amount of $~~41,968,490.00~~ _____ or in the amount identified in the Item 1 (Cost Estimates) specific to the obligation that has not been completed. This amount ~~is~~ will be determined by the CPM and ~~is~~ will be based on an updated calculation of the final mitigation requirement and on cost estimates which are sufficient for the CEC or its contractors to complete land acquisition, property enhancement, startup costs, initial management, long-term management, and monitoring.

    b. Security Form. The Security shall be in the form of an irrevocable letter of credit or another form of Security approved in advance in writing by the CPM, in consultation with CDFW.

    c. Security Timeline. The Security shall be provided to the CPM before ~~starting site mobilization~~the start of construction.

    d. Security Holder. The Security shall be held by the CPM or in a manner approved in advance in writing by the CPM.

    e. Security Transmittal. The project owner shall transmit security to the CPM by way of an approved instrument such as an escrow agreement, irrevocable letter of credit, or other.

    f. Security Drawing. The Security shall allow the CPM to draw on the principal sum if the CPM, in its sole discretion, determines that the project owner has failed to comply with this Condition of Certification.

    g. Security Release. The Security (or any portion of the Security then remaining) shall be released to the project owner after the CPM has conducted an on-site inspection and received confirmation that ~~all~~ secured requirements have been satisfied, as may be evidenced by either:

        i. Copy of Bill of Sale(s) and Payment Receipt(s) or Credit Transfer Agreement for the purchase of ~~Crotch's bumble bee and/or western burrowing owl~~mitigation or conservation bank credits. ~~OR~~

        ii. Written documentation of the acquisition of the HM lands.

        iii. Copies of all executed and recorded conservation easements.

        iv. Written confirmation from the approved Endowment Manager of its receipt of the full Endowment.

12. Additional Funding. The CPM, in consultation with BLM, ~~USFWS,~~ and CDFW, as-needed, may require the project owner to provide additional HM lands and additional funding to ensure the impacts of the taking are minimized and fully mitigated, as required by law, if the project owner does not complete these requirements within the specified timeframe.

7-3 continued

Verification: The project owner shall provide verification that the required acquisition, protection and transfer of all HM lands has occurred and record any required conservation easements no later than 18 months from the ~~date of start of site mobilization~~start of construction, even if a S~~s~~ecurity is provided. ~~The project owner shall provide the Draft Management Plan to the CPM for review and approval and to CDFW for review and comment no later than 60 days prior to construction. The project owner shall submit the Final Management Plan to the CPM and CDFW no later than 7 days prior to construction.~~

7-3 continued

BIO-21 Habitat Management Land Acquisition for Burrowing Owl To mitigate for impacts to burrowing owl the project owner shall fulfill the following requirements:

The project owner shall purchase ~~3,724.34 acres of~~ burrowing owl mitigation or conservation bank credits, at a location within the Mojave Desert approved in advance by the CPM, in coordination with the BLM, ~~USFWS,~~ and CDFW, as-needed, or shall provide for both the permanent protection and management of ~~3,724.34 acres of~~ Habitat Management (HM) lands pursuant to Item 3 (Habitat Management Lands Acquisition and Protection) and the calculation and deposit of the management funds pursuant to Item 5 (Endowment Fund). The amount of mitigation required shall be calculated based on the project's final direct permanent and temporary loss of ~~desert tortoise~~burrowing owl habitat, as approved by the CPM, in consultation with ~~USFWS,~~ BLM, and CDFW, at a ___:1 ratio for all permanent impacts to burrowing owl habitat.

If all or any portion of the mitigation or conservation bank credits or acquired compensation lands for special-status plants, desert tortoise, state jurisdictional waters, or other required compensatory mitigation meets the criteria for burrowing owl compensation lands, the portion of the other species or habitat compensation lands that meets the criteria for burrowing owl compensation lands may be used to fulfill that portion of the obligation for burrowing owl mitigation.

The purchase of mitigation or conservation bank credits or permanent protection and funding for perpetual management of HM lands must be complete before ~~starting project activities~~the start of construction, or within 18 months of the ~~date of the site mobilization,~~start of construction if Security is provided pursuant to the Security (Item 11) below for all uncompleted obligations. 7-4

1. Cost Estimates. For the purposes of determining the Security amount, it is estimated the cost for the CPM or its contractors to complete acquisition, protection, and perpetual management of the HM lands is as follows:

   a. Land acquisition costs for HM lands identified in the Item 3 (Habitat Management Lands Acquisition and Protection) below, estimated at $4,000.00/acre for _____~~3,724.34~~ acres: $~~14,897,360.00~~ _____. Land acquisition costs are estimated using local fair market current value per acre for lands with habitat values meeting mitigation requirements. The CPM will instead use the actual land acquisition cost for determining the Security amount if it can be determined with reasonable certainty; for example, if the project owner has an option or is under contract to purchase approved HM lands but the purchase transaction has not yet closed.

   b. All other costs ~~are~~ necessary to review and acquire the land in fee title and record a conservation easement as described below in Item 3b. (Conservation Easement) below: $17,440.00.

   c. Start-up costs for HM lands, including initial site protection and enhancement costs as described in the Item 3f (Start-up Activities) below, estimated at $2,000/acre for ~~3,724.34~~ _____ acres: $~~7,488,680.00~~ _____.

   d. Interim management period funding as described in the Item 4 (Interim Management) (Initial and Capital)) below, estimated at $~~2,000~~600/acre for ~~3,798.36~~_____ acres: $~~7,488,680.00~~_____.

e. Long-term management funding as described in the Item 5 (Endowment Fund) below, estimated at $~~600.00~~3,100/acre for ~~3,724.34~~ acres: $~~2,234,604.00~~. Long-term management funding is estimated initially for the purpose of providing Security to ensure implementation of HM lands management.

f. Related transaction fees including but not limited to account set-up fees, administrative fees, title and documentation review and related title transactions, expenses incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW as described in the Item 10 (Reimburse CDFW), estimated at ~~$3,100.00/acre for 3,724.34 acres: $11,545,454.00~~$6,000.

g. All costs associated with the CPM engaging an outside contractor to complete the mitigation tasks, including but not limited to acquisition, protection, and perpetual funding and management of the HM lands and restoration of temporarily disturbed habitat. These costs include but are not limited to the cost of issuing a request for proposals, transaction costs, contract administration costs, and costs associated with monitoring the contractor's work. $~~6,000.00~~75,000.00.

2. Mitigation Bank Credits. If the project owner elects to purchase credits as approved by the approved mitigation bank to complete burrowing owl compensatory mitigation obligations, then project owner shall purchase ~~3,724.34 acres of~~ burrowing owl credits from a mitigation or conservation bank approved in advance by the CPM prior to ~~initiating project activities~~the start of construction, or no later than 18 months from the start of construction~~site mobilization,~~ if Security is provided pursuant to Item 11 (Security) below. Prior to the purchase of credits, the project owner shall obtain CPM approval to ensure the mitigation or conservation bank is appropriate to compensate for the impacts of the project. The project owner shall submit to the CPM a copy of the Bill of Sale(s) and Payment Receipt prior to ~~initiating site mobilization~~the start of construction or within 18 months from ~~start of site mobilization,~~the start of construction if Security is provided. 7-4 continued

3. Habitat Management Lands Acquisition and Protection. If the project owner elects to provide for the acquisition, permanent protection, and perpetual management of HM lands to complete compensatory mitigation obligations, then the project owner shall:

a. Fee Title. Transfer fee title of the HM lands to CDFW pursuant to terms approved in writing by CDFW. Alternatively, the CPM, in consultation with CDFW, may authorize a governmental entity, special district, non-profit organization, for-profit entity, person, or another entity to hold title to and manage the property provided that the district, organization, entity, or person meets the requirements of Government Code sections 65965-65968, as amended.

b. Conservation Easement. If CDFW does not hold fee title to the HM lands, CDFW shall act as grantee for a conservation easement over the HM lands or shall, in its sole discretion, approve a non-profit entity, public agency, or Native American tribe to act as grantee for a conservation easement over the HM lands provided that the entity, agency, or tribe meets the requirements of Civil Code section 815.3. If CDFW elects not to be named as the grantee for the conservation easement, CDFW shall be expressly named in the conservation easement as a third-party beneficiary. The project owner shall obtain written approval from the CPM, in coordination with CDFW, of any conservation easement before its execution or recordation. No conservation easement shall be approved by the CPM unless it complies with Civil Code sections 815-816, as amended,

and Government Code sections 65965-65968, as amended and includes provisions expressly addressing Government Code sections 65966(j) and 65967(e). Because the "doctrine of merger" could invalidate the conservation interest, under no circumstances can the fee title owner of the HM lands serve as grantee for the conservation easement.

c. HM Lands Approval. The project owner shall obtain CPM written approval of the HM lands, in coordination with CDFW, before acquisition and/or transfer of the land by submitting, at least 90 days before acquisition and/or transfer of the HM lands, documentation identifying the land to be purchased or property interest conveyed to an approved entity as mitigation for the project's impacts on burrowing owl.

d. HM Lands Documentation. The project owner shall provide a recent preliminary title report, Phase I Environmental Site Assessment, and other necessary documents (please contact CPM for document list). All documents conveying HM lands and all conditions of title are subject to approval from the CPM; and if applicable, the Wildlife Conservation Board, and the Department of General Services.

e. Land Manager. Designate both an interim and long-term land manager, approved by the CPM, in consultation with the BLM, ~~USFWS,~~ and CDFW, as-needed. The interim and long-term land managers may, but need not, be the same. The interim and/or long-term land managers may be the landowner or another party. The land manager shall prepare a draft management plan for CPM review and approval, in consultation with CDFW, and written approval as part of the HM lands acquisition process. The project owner shall notify the CPM of any subsequent changes in the land manager within 30 days of the change. If CDFW will hold fee title to the mitigation land, CDFW will also act as both the interim and long-term land manager unless otherwise specified. The grantee for the conservation easement cannot serve as the interim or long-term manager without the express written authorization of the CPM, in consultation with BLM, ~~USFWS,~~ and CDFW, as-needed.

7-4 continued

f. Start-up Activities. Provide for the implementation of start-up activities, including the initial site protection and enhancement of HM lands, once the HM lands have been approved by the CPM. Start-up activities include, at a minimum: (1) conducting a baseline biological assessment and land survey report within four months of recording or transfer; (2) developing and transferring Geographic Information Systems (GIS) data if applicable; (3) establishing initial fencing; (4) conducting litter removal; (5) conducting initial habitat restoration or enhancement, if applicable; and (6) installing signage.

4. Interim Management (Initial and Capital). Provide for the interim management of the HM lands. The project owner shall ensure that the interim land manager implements the interim management of the HM lands as described in the final management plan and conservation easement approved by the CPM, in consultation with CDFW. The interim management period shall be a minimum of three years from the date of HM land acquisition and protection and full funding of the Endowment and includes expected management following start-up activities. Interim management period activities described in the final management plan shall include fence repair, continuing trash removal, site monitoring, and vegetation and invasive species management.

The project owner shall either (1) provide Security to the CPM for the minimum of three years of interim management that the land owner, the project owner, or land manager agrees to manage and pay for at their own expense, (2) establish an escrow account with written

instructions approved in advance in writing by the CPM to pay the land manager annually in advance, or (3) establish a short-term enhancement account with a CPM-approved entity for payment to the land manager.

5. Endowment Fund. If the project owner elects to provide for the acquisition, permanent protection, and perpetual management of HM lands to complete compensatory mitigation obligations, then the project owner shall ensure that the HM lands are perpetually managed, maintained, and monitored by the long-term land manager as described in this condition of certification, the conservation easement, and the final management plan approved by the CPM. After obtaining CPM approval, in consultation with CDFW, of the HM lands, the project owner shall provide long-term management funding for the perpetual management of the HM lands by establishing a long-term management fund (Endowment). The Endowment is a sum of money, held in a CPM-approved (in consultation with CDFW) fund that is permanently restricted to paying the costs of long-term management and stewardship of the mitigation property for which the funds were set aside, which costs include the perpetual management, maintenance, monitoring, and other activities on the HM lands consistent with the condition of certification, the conservation easement, and the management plan required by Item 3e (Land Manager). Endowment as used in ~~the Certification~~this condition of certification shall refer to the endowment deposit and all interest, dividends, other earnings, additions and appreciation thereon. The Endowment shall be governed by this ~~license~~condition of certification, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended. After the interim management period, the project owner shall ensure that the designated long-term land manager implements the management and monitoring of the HM lands according to the final management plan. The long-term land manager shall be obligated to manage and monitor the HM lands in perpetuity to preserve their conservation values in accordance with this ~~license~~condition of certification, the conservation easement, and the final management plan. Such activities shall be funded through the Endowment. 7-4 continued

6. Identify an Endowment Manager. The Endowment shall be held by the Endowment Manager, which shall be either the CEC and/or CDFW or another entity qualified pursuant to Government Code sections 65965-65968, as amended.

   a. The project owner shall submit to the CPM for review and approval, a written proposal that includes: (i) the name of the proposed Endowment Manager; (ii) whether the proposed Endowment Manager is a governmental entity, special district, nonprofit organization, community foundation, or congressionally chartered foundation; (iii) whether the proposed Endowment Manager holds the property or an interest in the property for conservation purposes as required by Government Code section 65968(b)(1) or, in the alternative, the basis for finding that the Project qualifies for an exception pursuant to Government Code section 65968(b)(2); and (iv) a copy of the proposed Endowment Manager's certification pursuant to Government Code section 65968(e).

7. Calculate the Endowment Funds Deposit. After obtaining CPM written approval, in consultation with CDFW, of the HM lands, long-term management plan, and Endowment Manager, the project owner shall prepare an endowment assessment (equivalent to a Property Analysis Record (PAR)) to calculate the amount of funding necessary to ensure the long-term management of the HM lands (Endowment Deposit Amount). Note that the endowment for the easement holder should not be included in this calculation. The project owner shall submit to the CPM, in consultation with CDFW, for review and approval the results of the endowment assessment before transferring funds to the Endowment Manager.

a. Capitalization Rate and Fees. The project owner shall obtain the capitalization rate from the selected Endowment Manager for use in calculating the endowment assessment and adjust for any additional administrative, periodic, or annual fees.

b. Endowment Buffers/Assumptions. The project owner shall include in the endowment assessment assumptions the following buffers for endowment establishment and use that will substantially ensure long-term viability and security of the Endowment:

ie. 10 Percent Contingency. A 10 percent contingency shall be added to each endowment calculation to hedge against underestimation of the fund, unanticipated expenditures, inflation, or catastrophic events.

iid. Three Years Delayed Spending. The endowment shall be established assuming spending will not occur for the first three years after full funding.

iiie. Non-annualized Expenses. For all large capital expenses to occur periodically but not annually such as fence replacement or well replacement, payments shall be withheld from the annual disbursement until the year of anticipated need or upon request to Endowment Manager and the CPM, in consultation with CDFW.

8. Transfer Long-term Endowment Funds. The project owner shall transfer the long-term endowment funds to the Endowment Manager ~~upon~~ after the CPM's approval of the Endowment Deposit Amount identified above and contemporaneously with the acquisition or transfer of the HM lands. 7-4 continued

9. Management of the Endowment. The approved Endowment Manager may pool the Endowment with other endowments for the operation, management, and protection of HM lands for local populations of ~~desert tortoise~~burrowing owl but shall maintain separate accounting for each Endowment. The Endowment Manager shall, at all times, hold and manage the Endowment in compliance with this Certification, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended.

   Notwithstanding Probate Code sections 18501-18510, the Endowment Manager shall not make any disbursement from the Endowment that will result in expenditure of any portion of the principal of the endowment without the prior written approval of the CPM in its sole discretion. The project owner shall ensure that this requirement is included in any agreement of any kind governing the holding, investment, management, and/or disbursement of the Endowment funds.

   Notwithstanding Probate Code sections 18501-18510, if the CPM, in consultation with CDFW, determines in its sole discretion that an expenditure needs to be made from the Endowment to preserve the conservation values of the HM lands, the Endowment Manager shall process that expenditure in accordance with directions from the CPM. The Endowment Manager shall not be liable for any shortfall in the Endowment resulting from the CPM's decision to make such an expenditure.

10. Reimburse CDFW. The project owner shall reimburse CDFW for all reasonable costs incurred by CDFW related to transfer of the HM lands to CDFW, if applicable, including, but not limited to transaction fees, account set-up fees, administrative fees, title and documentation review and related title transactions, costs incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW.

11. Security: The project owner may ~~proceed with project activities~~start construction only after the project owner has ensured the funding (Security) to complete any activity required by the Item 3 (Habitat Management Land Acquisition and Protection) that has not been completed before ~~project activities begin~~the start of construction. Permittee shall provide Security as follows:

    a. Security Amount. The Security shall be in the amount of $~~43,678,218.00~~ or in the amount identified in the Item 1 (Cost Estimates) specific to the obligation that has not been completed. This amount ~~is~~ will be determined by the CPM and ~~is~~ will be based on an updated calculation of the final mitigation requirement and on cost estimates which are sufficient for the CEC or its contractors to complete land acquisition, property enhancement, startup costs, initial management, long-term management, and monitoring.

    b. Security Form. The Security shall be in the form of an irrevocable letter of credit or another form of Security approved in advance in writing by the CPM, in consultation with CDFW.

    c. Security Timeline. The Security shall be provided to the CPM before ~~starting site mobilization~~the start of construction.

    d. Security Holder. The Security shall be held by the CPM or in a manner approved in advance in writing by the CPM.

    e. Security Transmittal. The project owner shall transmit security to the CPM by way of an approved instrument such as an escrow agreement, irrevocable letter of credit, or other.

    f. Security Drawing. The Security shall allow the CPM to draw on the principal sum if the CPM, in its sole discretion, determines that the project owner has failed to comply with this Condition of Certification.

    g. Security Release. The Security (or any portion of the Security then remaining) shall be released to the project owner after the CPM has conducted an on-site inspection and received confirmation that ~~all~~ secured requirements have been satisfied, as may be evidenced by either:

        i. Copy of Bill of Sale(s) and Payment Receipt(s) or Credit Transfer Agreement for the purchase of ~~Crotch's bumble bee and/or western burrowing owl~~mitigation or conservation bank credits. ~~OR~~

        ii. Written documentation of the acquisition of the HM lands.

        iii. Copies of all executed and recorded conservation easements.

        iv. Written confirmation from the approved Endowment Manager of its receipt of the full Endowment.

12. Additional Funding. The CPM, in consultation with BLM, ~~USFWS,~~ and CDFW, as-needed, may require the project owner to provide additional HM lands and additional funding to ensure the impacts of the taking are minimized and fully mitigated, as required by law, if the project owner does not complete these requirements within the specified timeframe.

7-4 continued

Verification: The project owner shall provide verification that the required acquisition, protection and transfer of all HM lands has occurred and record any required conservation easements no later than 18 months from the ~~date of start of site mobilization~~start of construction, even if a ~~s~~Security is provided. ~~The project owner shall provide the Draft Management Plan to the CPM for review and approval and to CDFW for review and comment no later than 60 days prior to construction. The project owner shall submit the Final Management Plan to the CPM and CDFW no later than 7 days prior to construction.~~

7-4 continued

BIO-26 Habitat Management Land Acquisition for Permanent and Temporary Impacts to State Waters To mitigate for impacts to state jurisdictional waters the project owner shall fulfill the following requirements:

The project owner shall purchase ~~376.9 acres of~~ state jurisdictional waters mitigation or conservation bank credits, at a location within the Mojave Desert approved in advance by the CPM, in coordination with the CDFW and LRWQCB, or shall provide for both the permanent protection and management of ~~376.9 acres of~~ Habitat Management (HM) lands pursuant to Item 3 (Habitat Management Lands Acquisition and Protection) and the calculation and deposit of the management funds pursuant to Item 5 (Endowment Fund). The amount of mitigation required shall be calculated based on the project's final direct permanent and temporary ~~loss of~~impacts to state and CDFW jurisdictional waters, as approved by the CPM, in consultation with ~~USFWS,~~ BLM, and CDFW, at a ___:1 ratio for permanent impacts to state jurisdictional waters.

~~Temporary impacts are defined as any physical disturbance to the stream.~~

If all or any portion of the mitigation or conservation bank credits or acquired compensation lands for special-status plants, desert tortoise, burrowing owl, or other required compensatory mitigation meets the criteria for state jurisdictional waters compensation lands, the portion of the other species or habitat compensation lands that meets the criteria for state jurisdictional waters lands may be used to fulfill that portion of the obligation for state jurisdictional waters lands.

The purchase of mitigation or conservation bank credits or permanent protection and funding for perpetual management of HM lands must be complete within 18 months of the ~~date of the site mobilization~~start of construction, if Security is provided pursuant to the Security (Item 11) below for all uncompleted obligations. 7-5

1. Cost Estimates. For the purposes of determining the Security amount, it is estimated the cost for the CPM or its contractors to complete acquisition, protection, and perpetual management of the HM lands is as follows:

   a. Land acquisition costs for HM lands identified in the Item 3 (Habitat Management Lands Acquisition and Protection) below, estimated at $4,000/acre for ~~376.9~~ _____ acres: ~~$1,507,600.00~~ _____. Land acquisition costs are estimated using local fair market current value per acre for lands with habitat values meeting mitigation requirements. The CPM will instead use the actual land acquisition cost for determining the Security amount if it can be determined with reasonable certainty; for example, if the project owner has an option or is under contract to purchase approved HM lands but the purchase transaction has not yet closed.

   b. All other costs ~~are~~ necessary to review and acquire the land in fee title and record a conservation easement as described below in Item 3b. (Conservation Easement) below: $17,440.00.

   c. Start-up costs for HM lands, including initial site protection and enhancement costs as described in the Item 3f (Start-up Activities) below, estimated at $2,000/acre for ~~376.9~~ _____ acres: ~~$753,800.00~~ _____.

   d. Interim management period funding as described in the Item 4 (Interim Management) (Initial and Capital) below, estimated at $600.00/acre for ~~376.9~~ _____ acres: ~~$226,140.00~~ _____.

e. Long-term management funding as described in the Item 5 (Endowment Fund) below, estimated at $3,100.00/acre for ~~376.9~~ _____ acres: ~~$1,168,390.00~~ _____. Long-term management funding is estimated initially for the purpose of providing Security to ensure implementation of HM lands management.

f. Related transaction fees including but not limited to account set-up fees, administrative fees, title and documentation review and related title transactions, expenses incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW as described in the Item 10 (Reimburse CDFW), estimated at $6,000.00.

g. All costs associated with the CPM engaging an outside contractor to complete the mitigation tasks, including but not limited to acquisition, protection, and perpetual funding and management of the HM lands and restoration of temporarily disturbed habitat. These costs include but are not limited to the cost of issuing a request for proposals, transaction costs, contract administration costs, and costs associated with monitoring the contractor's work. $75,000.00.

2. Mitigation Bank Credits. If the project owner elects to purchase credits to complete state jurisdictional waters compensatory mitigation obligations, then project owner shall purchase ~~XXX acres of~~ jurisdictional waters credits from a mitigation or conservation bank approved in advance by the CPM prior to ~~initiating project activities~~the start of construction, or no later than 18 months from the start of ~~site mobilization,~~construction if Security is provided pursuant to Item 11 (Security) below. Prior to the purchase of credits, the project owner shall obtain CPM approval to ensure the mitigation or conservation bank is appropriate to compensate for the impacts of the project. The project owner shall submit to the CPM a copy of the Bill of Sale(s) and Payment Receipt prior to ~~initiating site mobilization~~the start of construction or within 18 months from ~~start of site mobilization,~~the start of construction if Security is provided. 7-5 continued

3. Habitat Management Lands Acquisition and Protection. If the project owner elects to provide for the acquisition, permanent protection, and perpetual management of HM lands to complete compensatory mitigation obligations, then the project owner shall:

a. Fee Title. Transfer fee title of the HM lands to CDFW pursuant to terms approved in writing by CDFW. Alternatively, the CPM, in consultation with CDFW, may authorize a governmental entity, special district, non-profit organization, for-profit entity, person, or another entity to hold title to and manage the property provided that the district, organization, entity, or person meets the requirements of Government Code sections 65965-65968, as amended.

b. Conservation Easement. If CDFW does not hold fee title to the HM lands, CDFW shall act as grantee for a conservation easement over the HM lands or shall, in its sole discretion, approve a non-profit entity, public agency, or Native American tribe to act as grantee for a conservation easement over the HM lands provided that the entity, agency, or tribe meets the requirements of Civil Code section 815.3. If CDFW elects not to be named as the grantee for the conservation easement, CDFW shall be expressly named in the conservation easement as a third-party beneficiary. The project owner shall obtain written approval from the CPM, in coordination with CDFW, of any conservation easement before its execution or recordation. No conservation easement shall be approved by the CPM unless it complies with Civil Code sections 815-816, as amended, and Government Code sections 65965-65968, as amended and includes provisions

expressly addressing Government Code sections 65966(j) and 65967(e). Because the "doctrine of merger" could invalidate the conservation interest, under no circumstances can the fee title owner of the HM lands serve as grantee for the conservation easement.

c. HM Lands Approval. The project owner shall obtain CPM written approval of the HM lands, in coordination with CDFW, before acquisition and/or transfer of the land by submitting, at least 90 days before acquisition and/or transfer of the HM lands, documentation identifying the land to be purchased or property interest conveyed to an approved entity as mitigation for the project's impacts on ~~burrowing owl~~state jurisdictional waters.

d. HM Lands Documentation. The project owner shall provide a recent preliminary title report, Phase I Environmental Site Assessment, and other necessary documents (please contact CPM for document list). All documents conveying HM lands and all conditions of title are subject to approval from the CPM; and if applicable, the Wildlife Conservation Board, and the Department of General Services.

e. Land Manager. Designate both an interim and long-term land manager with demonstrated aquatic resource management experience, approved by the CPM, in consultation with BLM, ~~USFWS,~~ LRWQCB, and CDFW, as-needed. The interim and long-term land managers may, but need not, be the same. The interim and/or long-term land managers may be the landowner or another party. The land manager shall prepare a draft management plan for CPM review and approval, in consultation with CDFW, and written approval as part of the HM lands acquisition process. The project owner shall notify the CPM of any subsequent changes in the land manager within 30 days of the change. If CDFW will hold fee title to the mitigation land, CDFW will also act as both the interim and long-term land manager unless otherwise specified. The grantee for the conservation easement cannot serve as the interim or long-term manager without the express written authorization of the CPM, in consultation with BLM, ~~USFWS,~~ and CDFW, as-needed.

7-5 continued

f. Start-up Activities. Provide for the implementation of start-up activities, including the initial site protection and enhancement of HM lands, once the HM lands have been approved by the CPM. Start-up activities include, at a minimum: (1) conducting a baseline biological assessment and land survey report within four months of recording or transfer; (2) developing and transferring Geographic Information Systems (GIS) data if applicable; (3) establishing initial fencing; (4) conducting litter removal; (5) conducting initial habitat restoration or enhancement, if applicable; and (6) installing signage.

4. Interim Management (Initial and Capital). Provide for the interim management of the HM lands. The project owner shall ensure that the interim land manager implements the interim management of the HM lands as described in the final management plan and conservation easement approved by the CPM, in consultation with CDFW. The interim management period shall be a minimum of three years from the date of HM land acquisition and protection and full funding of the Endowment and includes expected management following start-up activities. Interim management period activities described in the final management plan shall include fence repair, continuing trash removal, site monitoring, and vegetation and invasive species management.

The project owner shall either (1) provide Security to the CPM for the minimum of three years of interim management that the land owner, the project owner, or land manager agrees

to manage and pay for at their own expense, (2) establish an escrow account with written instructions approved in advance in writing by the CPM to pay the land manager annually in advance, or (3) establish a short-term enhancement account with a CPM-approved entity for payment to the land manager.

5. Endowment Fund. If the project owner elects to provide for the acquisition, permanent protection, and perpetual management of HM lands to complete compensatory mitigation obligations, then the project owner shall ensure that the HM lands are perpetually managed, maintained, and monitored by the long-term land manager as described in this condition of certification, the conservation easement, and the final management plan approved by the CPM. After obtaining CPM approval, in consultation with CDFW, of the HM lands, the project owner shall provide long-term management funding for the perpetual management of the HM lands by establishing a long-term management fund (Endowment). The Endowment is a sum of money, held in a CPM-approved (in consultation with CDFW) fund that is permanently restricted to paying the costs of long-term management and stewardship of the mitigation property for which the funds were set aside, which costs include the perpetual management, maintenance, monitoring, and other activities on the HM lands consistent with the condition of certification, the conservation easement, and the management plan required by Item 3e (Land Manager). Endowment as used in the ~~Certification~~ condition of certification shall refer to the endowment deposit and all interest, dividends, other earnings, additions and appreciation thereon. The Endowment shall be governed by this ~~license~~condition of certification, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended. After the interim management period, the project owner shall ensure that the designated long-term land manager implements the management and monitoring of the HM lands according to the final management plan. The long-term land manager shall be obligated to manage and monitor the HM lands in perpetuity to preserve their conservation values in accordance with this ~~license~~condition of certification, the conservation easement, and the final management plan. Such activities shall be funded through the Endowment.

7-5 continued

6. Identify an Endowment Manager. The Endowment shall be held by the Endowment Manager, which shall be either the CEC and/or CDFW or another entity qualified pursuant to Government Code sections 65965-65968, as amended.

   a. The project owner shall submit to the CPM for review and approval, a written proposal that includes: (i) the name of the proposed Endowment Manager; (ii) whether the proposed Endowment Manager is a governmental entity, special district, nonprofit organization, community foundation, or congressionally chartered foundation; (iii) whether the proposed Endowment Manager holds the property or an interest in the property for conservation purposes as required by Government Code section 65968(b)(1) or, in the alternative, the basis for finding that the Project qualifies for an exception pursuant to Government Code section 65968(b)(2); and (iv) a copy of the proposed Endowment Manager's certification pursuant to Government Code section 65968(e).

7. Calculate the Endowment Funds Deposit. After obtaining CPM written approval, in consultation with CDFW, of the HM lands, long-term management plan, and Endowment Manager, the project owner shall prepare an endowment assessment (equivalent to a Property Analysis Record (PAR)) to calculate the amount of funding necessary to ensure the long-term management of the HM lands (Endowment Deposit Amount). Note that the endowment for the easement holder should not be included in this calculation. The project owner shall

submit to the CPM, in consultation with CDFW, for review and approval the results of the endowment assessment before transferring funds to the Endowment Manager.

a. Capitalization Rate and Fees. The project owner shall obtain the capitalization rate from the selected Endowment Manager for use in calculating the endowment assessment and adjust for any additional administrative, periodic, or annual fees.

b. Endowment Buffers/Assumptions. The project owner shall include in the endowment assessment assumptions the following buffers for endowment establishment and use that will substantially ensure long-term viability and security of the Endowment:

~~i~~e. 10 Percent Contingency. A 10 percent contingency shall be added to each endowment calculation to hedge against underestimation of the fund, unanticipated expenditures, inflation, or catastrophic events.

ii~~d~~. Three Years Delayed Spending. The endowment shall be established assuming spending will not occur for the first three years after full funding.

iii~~e~~. Non-annualized Expenses. For all large capital expenses to occur periodically but not annually such as fence replacement or well replacement, payments shall be withheld from the annual disbursement until the year of anticipated need or upon request to Endowment Manager and the CPM, in consultation with CDFW.

8. Transfer Long-term Endowment Funds. The project owner shall transfer the long-term endowment funds to the Endowment Manager ~~upon~~ after the CPM's approval of the Endowment Deposit Amount identified above and contemporaneously with the acquisition or transfer of the HM lands.

7-5 continued

9. Management of the Endowment. The approved Endowment Manager may pool the Endowment with other endowments for the operation, management, and protection of HM lands for ~~local populations of desert tortoise~~state jurisdictional waters but shall maintain separate accounting for each Endowment. The Endowment Manager shall, at all times, hold and manage the Endowment in compliance with this Certification, Government Code sections 65965-65968, as amended, and Probate Code sections 18501-18510, as amended.

   Notwithstanding Probate Code sections 18501-18510, the Endowment Manager shall not make any disbursement from the Endowment that will result in expenditure of any portion of the principal of the endowment without the prior written approval of the CPM in its sole discretion. The project owner shall ensure that this requirement is included in any agreement of any kind governing the holding, investment, management, and/or disbursement of the Endowment funds.

   Notwithstanding Probate Code sections 18501-18510, if the CPM, in consultation with CDFW, determines in its sole discretion that an expenditure needs to be made from the Endowment to preserve the conservation values of the HM lands, the Endowment Manager shall process that expenditure in accordance with directions from the CPM. The Endowment Manager shall not be liable for any shortfall in the Endowment resulting from the CPM's decision to make such an expenditure.

10. Reimburse CDFW. The project owner shall reimburse CDFW for all reasonable costs incurred by CDFW related to transfer of the HM lands to CDFW, if applicable, including, but

not limited to transaction fees, account set-up fees, administrative fees, title and documentation review and related title transactions, costs incurred from other state agency reviews, and overhead related to transfer of HM lands to CDFW.

11. Security: The project owner may ~~proceed with project activities~~start construction only after the project owner has ensured the funding (Security) to complete any activity required by the Item 3 (Habitat Management Land Acquisition and Protection) that has not been completed before ~~project activities begin~~the start of construction. Permittee shall provide Security as follows:

    a. Security Amount. The Security shall be in the amount of $~~3,754,370.00~~ or in the amount identified in the Item 1 (Cost Estimates) specific to the obligation that has not been completed. This amount ~~is~~ will be determined by the CPM and ~~is~~ will be based on an updated calculation of the final mitigation requirement and on cost estimates which are sufficient for the CEC or its contractors to complete land acquisition, property enhancement, startup costs, initial management, long-term management, and monitoring.

    b. Security Form. The Security shall be in the form of an irrevocable letter of credit or another form of Security approved in advance in writing by the CPM, in consultation with CDFW.

    c. Security Timeline. The Security shall be provided to the CPM before ~~starting site mobilization~~the start of construction.

    d. Security Holder. The Security shall be held by the CPM or in a manner approved in advance in writing by the CPM.

    e. Security Transmittal. The project owner shall transmit security to the CPM by way of an approved instrument such as an escrow agreement, irrevocable letter of credit, or other.

    f. Security Drawing. The Security shall allow the CPM to draw on the principal sum if the CPM, in its sole discretion, determines that the project owner has failed to comply with this Condition of Certification.

    g. Security Release. The Security (or any portion of the Security then remaining) shall be released to the project owner after the CPM has conducted an on-site inspection and received confirmation that ~~all~~ secured requirements have been satisfied, as may be evidenced by either:

        i. Copy of Bill of Sale(s) and Payment Receipt(s) or Credit Transfer Agreement for the purchase of ~~Crotch's bumble bee and/or western burrowing owl~~ mitigation or conservation bank credits. ~~OR~~

        ii. Written documentation of the acquisition of the HM lands.

        iii. Copies of all executed and recorded conservation easements.

        iv. Written confirmation from the approved Endowment Manager of its receipt of the full Endowment.

7-5 continued

12. Additional Funding. The CPM, in consultation with BLM, ~~USFWS,~~ and CDFW, as-needed, may require the project owner to provide additional HM lands and additional funding to ensure the impacts of the taking are minimized and fully mitigated, as required by law, if the project owner does not complete these requirements within the specified timeframe.

7-5 continued

Verification: The project owner shall provide verification that the required acquisition, protection and transfer of all HM lands has occurred, and record any required conservation easements no later than 18 months from the ~~date of start of site mobilization~~start of construction, even if a ~~s~~Security is provided. ~~The project owner shall provide the Draft Management Plan to the CPM for review and approval and to CDFW for review and comment no later than 60 days prior to construction. The project owner shall submit the Final Management Plan to the CPM and CDFW no later than 7 days prior to construction.~~

WORKER SAFETY-10 The project owner shall:

a. Reach one or more agreements with the SBCFPD, either directly between the parties or using a mediator, regarding one-time initial funding and ongoing annual funding to provide mitigation for SBCFPD's emergency response services related to direct and cumulative project-related impacts, subject to sub-paragraph (e) below; or

b. If no agreement can be reached under (a), then the project owner and SBCFPD shall enter into final and binding arbitration. The arbitration shall be held in accordance with California law and the terms of **WORKER SAFETY-10**, and any challenge related to arbitration or the enforceability of arbitration will not suspend, delay, or excuse payment obligations by the project owner. The project owner shall pay the cost of arbitration. The arbitrator shall be selected by mutual agreement of the parties and submitted to the CPM for review and approval. If the parties are unable to mutually agree to an arbitrator, the CPM shall select one. The arbitrator shall also consider the following in reaching a decision:

   1. Weigh the needs of SBCFPD's emergency response to the project related to fire, rescue, EMS, and hazardous materials spills and the related costs on the fire department resources caused by direct impacts of the project;

   2. Weigh the cumulative impact of the project on the fire department resources including but not limited to the drawdown of SBCFPD resources on existing communities and the impacts on those communities;

   3. Determine the amount of one-time initial funding for any capital improvements and the amount of annual funding with an increase for inflation.

7-6

c. Develop a schedule, in coordination with the SBCFPD, that provides a timeline for reaching agreement or completing arbitration prior to the anticipated date of site mobilization, subject to sub-paragraph (e) below. The schedule must include a timeframe for: (i) negotiating one or more agreements on funding directly between the parties or using a mediator, or (ii) commencing and finalizing arbitration. In all dealings regarding this condition, the CEC expects the project owner and the SBCFPD to work in good faith and provide timely, substantive responses to all communications from the other party, mediator, or arbiter. In no event may the agreement or arbitration delay the project's site mobilization, construction, or operation.

d. The agreement(s) or arbiter's decisions may separately address funding to SBCFPD related to services for direct and cumulative impacts caused during construction and caused during operation, but any agreement or arbiter's decision regarding funding during construction shall be completed no later than 45 days prior to site mobilization, any agreement or arbiter's decision regarding funding during operation shall be completed no later than 45 days prior to operation, and there must be continual funding until the solar property tax exclusion sunsets and there is no "active solar energy system" property tax exclusion under California Revenue and Taxation Code section 73 applicable to the project.

~~d.~~e. This COC shall apply during project operations only if the project is subject to the active solar energy system property tax exclusion under California Revenue and Taxation Code section 73.

Verification:

a. No more than 30 days after certification, the project owner shall provide to the CPM for review and approval the schedule for reaching agreement on funding prior to site mobilization.

b. At least 30 days prior to the start of site mobilization, or as soon as practicable thereafter, the project owner shall provide to the CPM for review and approval either:

   1. A copy of the agreement with the SBCFPD or

   2. A copy of the arbiter's decision.

c. If the agreement or arbiter's decision submitted 30 days prior to site mobilization is limited to funding during construction, then, provided the active solar energy system property tax exclusion still applies, the project owner must provide to the CPM for review and approval an agreement or arbiter's decision to cover the remaining period of the project (for as long as the project is subject to the active solar energy system property tax exclusion) at least 30 days prior to the completion of construction.

d. Upon approval of the agreement or arbiter's decision by the CPM, the project owner shall commence payment of the initial funding and annual funding. If the agreement or arbiter's decision is provided later than 30 days prior to the start of site mobilization, funding will be made retroactive to cover from the start date of site mobilization.

7-6 continued

COMPLIANCE WITH ~~CLEAN WATER ACT SECTION 401~~PORTER-COLOGNE WATER QUALITY CONTROL ACT

WATER-4 The project shall require construction of (3) engineered channels, (13) low grade road crossings, and (3) culvert road crossings associated with ephemeral streambeds that have been determined to be Water of the State in the updated jurisdictional delineation report prepared for the application (RE 2025aaaa). The United States Army Corp of Engineers (USACE) previously determined that no ephemeral streambeds on the project were Water of the United States. Therefore, the applicant shall apply for dredge and fill waste discharge requirements (WDRs) with the LRWQCB, following the *State Policy for Water Quality Control: State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* in accordance with the applicable requirements of division 7 of the Water Code and California Code of Regulations, title 23, Section 3855. 7-7

Verification: At least sixty (60) days prior to construction, the project owner shall apply to the LRWQCB for coverage under dredge and fill WDRs, include all necessary information and applicable fees, submitting copies of all application submittals to the CPM. Within ten (10) days of its mailing or receipt, the project owner shall submit to the CPM any correspondence with the SWRCB or the LRWQCB about the SWRCB Order for discharge of stormwater associated with this activity. The project owner shall notify the CPM in writing of any violations and include these in the annual compliance report. Any monitoring documentation associated with the SWRCB Order shall be included in the annual compliance report.

GROUNDWATER PRODUCTION & MONITORING WELL INSTALLATION

WATER-5 Water used for project construction and operation shall be groundwater produced from up to ~~(~~5~~)~~ well(s) to be installed along the eastern edge of the project site or, alternatively or in addition, from an existing private off-site groundwater well located at 58502 Death Valley Road, Baker, California 92309 (RE 2025ii; RE 2025eeee). ~~In addition~~If any groundwater production wells are installed on the project site, up to ~~(~~9~~)~~ additional wells shall be installed to monitor groundwater levels and quality to assess any possible negative impacts to the local groundwater resource. Groundwater monitoring well locations shall be selected per consultation between the CPM, project owner, LRWQCB and the San Bernardino County Department of Environmental Health Services (SBCEHS).

If any groundwater production wells are installed on the project site, a~~A~~ Groundwater Well Installation Workplan (GWIW) shall be submitted to the CPM~~, LRWQCB, and SBCEHS,~~ for review and approval, and to the LRWQCB and SBCEHS for review. The GWIW shall include the following:

1. A scaled map showing the site and vicinity, and production and monitoring wells proposed for construction;

2. Description of proposed drilling and well installation methods;

3. Proposed monitoring well design; and,

4. schedule for completion of the work.

Groundwater production and monitoring wells shall be installed and constructed per applicable California Water Code section~~s~~:~~,~~ California well standards (DWR bulletins 74-81 and 74-90, 2020 Statewide Advisory: Dealing Materials for Water Wells, Monitoring Wells, Cathodic Protection Wells, and Geothermal Heat Exchange Wells)~~,~~; and, if applicable pursuant to San Bernardino County Code section 33.06552(c), the substantive standards of the San Bernardino County Desert Groundwater Management Ordinance ~~(§ 33.06551)~~ at San Bernardino County Code section 33.06554(d), (f), (h) (however no permit from SBCEHS shall be required).

7-8

Verification: At a frequency determined by the CPM, the project owner shall keep the CPM apprised of all aspects of production and monitoring well installation. ~~At least (18) month prior to construction,~~If any groundwater production wells are installed on the project site, the project owner shall submit the Groundwater Well Installation Workplan (GWIW) to the CPM~~, LRWQCB, and SBCEHS~~ for review and approval, and to the LRWQCB and SBCEHS for review, prior to installation of the wells. ~~At least (15) months prior to construction, the project owner shall initiate groundwater well installation. At least (3) months p~~Prior to ~~construction~~using water from on-site wells for the project, the project owner shall submit a Groundwater Well Installation Report (GWIR), along with the Groundwater Monitoring and Reporting Plan as required by COC **WATER-6**.

GROUNDWATER MONITORING AND REPORTING

WATER-6 If any groundwater production wells are installed on the project site, ~~T~~the Project owner shall submit a Groundwater Monitoring and Reporting Plan (GMRP) to the CPM ~~and the LRWQCB~~ for review and approval. The Project owner shall also provide a copy of the GMRP to the LRWQCB and SBCEHS for review ~~to ensure compliance with the DGMO~~.

In concert with the goals of the LRWQCB Basin Plan and the San Bernardino County DGMO, the groundwater monitoring program shall accomplish the following objectives:

- Establish ambient ~~pre-construction Project related~~ groundwater elevation and quality conditions prior to using water from one or more groundwater wells that may be installed on the project site for the project.

- Monitor groundwater elevation and quality data trends and identify any potential changes that could be attributed to Project pumping.

- Identify if Project groundwater pumping is causing an overdraft condition or adversely affecting the Soda Mountain groundwater subbasin aquifer.

- Identify if Project groundwater pumping is adversely affecting groundwater migration to the adjacent Soda Lake Groundwater Basin (6-033) from the east and southeast outlet of the Soda Mountain subbasin. 7-9

- Avoid, minimize, or mitigate significant impacts to sensitive receptors (springs and possible groundwater-dependent vegetation).

Prior to ~~project construction~~using water from groundwater wells that may be installed on the project site for the project, monitoring shall commence to establish pre-production~~construction~~ groundwater conditions ~~in the well proposed for the program~~. Monitoring shall continue during the remainder of project construction and project operation, as applicable. Water quality sampling shall be implemented during groundwater level monitoring events using the monitoring well network established as a result of COC **WATER-5**. The GMRP shall include the Groundwater Well Installation Report (GWIR) as a requirement of COC **WATER-5** if applicable.

Also prior to ~~project construction~~using water from groundwater wells that may be installed on the project site for the project, a well reconnaissance shall be conducted to investigate and document the condition of any existing water supply wells located within 2 miles of the project site. This may include a search of online resources, such as the California Department of Water Resources (DWR) Well Completion Report map interface, followed up by physical verification. If applicable, the reconnaissance shall include sending notices by registered mail to property owners.

The GMRP shall provide a description of the methodology for monitoring background and site groundwater levels and quality and shall consist of the following:

1. Scaled map showing the site and vicinity, newly installed production and monitoring well locations, relevant natural and man-made features (existing and proposed as part of this project).

2. Well reconnaissance results;

3. Drilling methods employed, well construction as-builts, borehole lithology for each of the newly installed production and monitoring wells, and results of well development;

4. Description of the methodology for monitoring background and site groundwater elevation and quality; and,

5. Description of analytes and analytical methods proposed to analyze groundwater samples such as TDS, major cations and anions, metals, oxygen-18 and deuterium isotopes, and any other constituents the CPM deem necessary to monitor water quality trends.

Prior to ~~project construction~~using water from groundwater wells that may be installed on the project site for the project, all network production and monitoring wells shall be sampled, and all groundwater quality and groundwater level monitoring data shall be reported to the CPM in a Groundwater Monitoring Report (GMR) that shall include the following:

1. An assessment of pre-~~project~~ production groundwater levels, and a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station).

2. A~~s~~n assessment of pre-~~project~~ production groundwater quality based on groundwater sample analytical results.

3. The data shall be tabulated, summarized, and submitted to the CPM. The data summary shall include the estimated range (minimum and maximum values), average, and median for each constituent analyzed. If a sufficient number of data points are available, the data shall also be analyzed using the Mann-Kendall test for trend at 90 percent confidence to assess whether pre-~~project~~ production water quality trends, if any, are statistically significant.

7-9 continued

Verification: The Project owner shall complete the following:

~~At least six (6) weeks p~~Prior to ~~the start of construction activities~~using water from groundwater wells that may be installed on the project site for the project, the ~~GRMP~~ GMRP shall be submitted to the CPM~~, LRWQCB and SBCEHS~~ for review and approval and to the LRWQCB and SBCEHS for review.

~~At least four (4) weeks p~~Prior to use of any groundwater from on-site wells for ~~construction~~the project, all groundwater quality and groundwater level monitoring data shall be reported to the CPM.

During ~~project construction and during the first two years of project operations~~the first five years that water is being produced from on-site wells for the project, the Project owner shall monitor groundwater elevation and quality on a quarterly basis~~. Between two and years of project operation~~, and shall report groundwater elevation and quality ~~shall be reported~~ semi-annually. All groundwater quality and elevation and data shall be submitted to the CPM.

After the first five~~-~~-year ~~operational and~~ monitoring period, the Project owner shall submit a 5-year monitoring report to the CPM that submits all monitoring data collected and provides a summary of the findings. The CPM, with consultation with the LRWQCB and SBCEHS shall determine if groundwater sampling frequencies should be revised or any analy~~s~~zes eliminated.

Any testing results or correspondence exchanged between the project owner and the LRWQCB or the SBCEHS during operations shall be provided to the CPM in the annual compliance report. All results and diagrams associated with groundwater production/monitoring well installation shall be included in the annual compliance report.

7-9 continued

WATER USE AND REPORTING

WATER-7 Water supply for project construction and operation shall be groundwater extracted from the project site ~~via~~ from up to ~~(~~5~~)~~ production wells to be installed on the project site or, alternatively or in addition, from an existing private off-site groundwater well located at 58502 Death Valley Road, Baker, California 92309. Since the project site is~~n~~ within an unincorporated and unadjudicated desert region of San Bernardino County, groundwater extraction from wells installed on the project site for the project shall, if applicable pursuant to San Bernardino County Code section 33.06552(c), comply with the substantive standards of the DGMO at San Bernardino County Code section 33.06554(d), (f), (h) (however no permit from SBCEHS shall be required). Water use during construction shall not exceed 325 AF and operational water use shall be limited to a maximum of 6 AFY. During project construction, the Project Owner shall file an annual notice with the SWRCB ~~per the requirement of~~ if and as required under Water Code Sections ~~§~~4999–5009 for reporting of groundwater production in excess of 25- acre-feet per year. The project owner shall record daily water use for the project construction and operation. 7-10

Verification: The Project owner shall file an annual "Notice of Extraction and Diversion of Water" with the SWRCB ~~in accordance with~~ if and as required under Water Code Sections ~~§~~4999–5009. The Project Owner shall include a copy of the filling in the annual compliance report. During project construction, the monthly compliance report shall include a summary of monthly water use. The project's annual compliance report shall include a monthly and annual summary of water use identifying construction or operations and water source.

TORY R. WALKER ENGINEERING

PRELIMINARY DRAINAGE REPORT

for

Soda Mountain Solar Project

San Bernadino County, California

Prepared for:

Apex Energy Solutions, LLC

Attn: Ziad Alaywan

604 Sutter Street, Suite 250

Folsom, CA 95630

February 2026

Prepared by:

_____

Tory R. Walker, PE

WATERSHED, FLOODPLAIN & STORMWATER MANAGEMENT | RIVER RESTORATION | FLOOD FACILITIES DESIGN | SEDIMENT & EROSION

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ATTACHMENT 1 Soils Map
ATTACHMENT 2 Rational Method Calculations
ATTACHMENT 3 SWCA Drainage Report

1. INTRODUCTION

The purpose of this report is to summarize the CEQA level (preliminary) hydrologic and hydraulic analyses of the proposed Soda Mountain Solar project. This report analyzes the following:

1. Pre and post-project drainage conditions for a 100-year design storm

2. PROJECT DESCRIPTION

Soda Mountain Solar, LLC, is proposing a solar power production facility in the Soda Mountain area of San Bernardino County, California. Tory R. Walker Engineering (TRWE) conducted a stormwater drainage analysis to evaluate potential significant hydrologic or hydraulic impacts onsite or offsite.

The Soda Mountain Solar project proposes to construct solar arrays on the property, with battery energy storage systems (BESS), a substation, laydown yards, and roadways to support the operations. Proposed hydraulic components, where necessary, include swales, berms, and rock lining along roadways.

The project site is approximately 2,670 acres and is 6 miles southwest of Baker, California, along Interstate 15. The study area contains numerous alluvial fans that drain toward the proposed site. See Location Map in **Figure 1** below.

Figure 1 | Location Map

2.1. Pre-Project Conditions

The project site is currently 100% pervious, consisting primarily of barren land and open brush. The entire site is underlain by Hydrologic Soil Group A. See Soils Map in **Attachment 1**. Stormwater runoff on the project site flows overland toward the east, with the majority of the project draining south and a portion of the site draining north. Offsite run-on enters the site from the west through three culverts along I-15.

The surrounding terrain is characterized by numerous alluvial fans that drain toward the proposed development area in the valley floor. These individual alluvial fans have coalesced, or overlapped, along the base of the mountain fronts surrounding the project site, creating a broad, gently sloping depositional surface, known as a bajada.

Terrain plays a major role in how runoff behaves because it influences the speed, volume, and direction of water flow during precipitation events. Steeper slopes accelerate water movement,

reducing infiltration and increasing runoff volume and velocity. Gentler slopes allow more time for water to infiltrate into the soil, reducing surface runoff. The terrain on the project site, being characterized by gentle slopes formed by deposition of alluvium, has created natural braided drainage patterns where water spreads out and slows down, promoting infiltration.

Additionally, precipitation in the Soda Mountain area is sparse, with a monthly mean precipitation of less than 1 inch per month in the wettest months (typically December through February). Storm events that generate runoff tend to be short and intense, rather than prolonged; this typical episodic pattern occasionally produces flash flooding in the steeper terrain east and west of the project site during infrequent heavy storms, but this runoff then mostly dissipates and infiltrates in the flatter alluvium of the valley floor, where the project site is located.

2.2. Post-Project Conditions

The project proposes installation of NEXTracker Solar Arrays and construction of supporting infrastructure including a BESS, a substation, laydown yards, and roadways. The proposed NEXTracker solar technology has a very limited disturbance area; the panels track the sun and are mounted on footings, eliminating the need for grading.

Given the nature of the terrain, soils, vegetation, and precipitation patterns characterizing this project site, and the nature of the proposed project, it is best to design the drainage for the project focusing on conservation of the many existing natural braided drainage rills and shallow channels as they play a crucial role in the infiltration of stormwater runoff. As the proposed development area is at the intersection of the bajadas from the east and west (i.e., the valley floor), it is gently sloping, with drainage patterns being formed by the alluvial fans over millennia.

Hydraulic components to mitigate potential onsite impacts consist of berms and swales around the BESS and substation, and rock lining along susceptible features. Existing runoff upstream of the proposed substation and BESS on the north portion of the site will be collected in a swale and directed around the proposed project components. The swale will discharge at existing grade north of the BESS, where flow will spread out and infiltrate the existing soils.

3. HYDROLOGIC ANALYSIS

A prior drainage report for the project site was prepared by SWCA and reviewed by TRWE. We determined that, at the preliminary level, the SWCA analysis sufficiently characterizes the pre-

project drainage patterns for the entire site. Natural drainage rills and shallow channels were studied in the SWCA report for 2-year, 10-year, and 100-year design storm events; flow depths and velocities have been mapped for these design storms, and the results reflect the topography and historic aerial imagery, which have not changed in recent times. See **Attachment 3**.

To ensure adequate protection of the proposed facilities against the 100-year storm, TRWE computed the post-project 100-year peak flow in the area of the proposed BESS and substation using Advanced Engineering Software (AES). AES calculates runoff using the Rational Method and is based upon the criteria set forth in the San Bernadino County Hydrology Manual.

The remainder of the proposed site was analyzed and determined by TRWE to create no significant increase in runoff leaving the site due to the characteristic drainage patterns described above, including the high infiltration rate as a result of the flat slopes, shallow rills, short and sparse precipitation patterns, and Type A soils. Although there are components of the Soda Mountain Solar Project that have the potential to increase runoff (e.g., compacted roads and pads for some of the infrastructure, solar panels), almost all the precipitation running off of these features will infiltrate the soil layer beneath and surrounding them. This design approach of minimizing plant and soil disturbance, combined with the restoration and revegetation plan for temporarily disturbed areas, means no significant increase in runoff is expected to result from the proposed project components.

3.1. Peak Design Storm Calculations

For post-project conditions, the peak flow rate was calculated using the San Bernadino County Hydrology Manual Rational Method for a 100-year design storm. See results in **Attachment 2**.

Peak flow is equal to: Q = CIA

Where: Q = peak discharge (cfs)

C = runoff coefficient

I = average rainfall intensity, taken at the time of concentration (in/hr)

A = drainage area (ac)

3.2. Peak Flow Summary

The post-project 100-year peak flow rate draining to the swale on the north portion of the site is shown in **Table 1** below.

Table 1 | 100-Year Peak Flow Rate

Drainage Basin	Area (acres)	100-Year Peak Flow (cfs)
1	33.6	75.7

This is graphically illustrated in the Hydrologic Work Map in **Attachment 2**.

4. HYDRAULIC ANALYSIS

The proposed swale at the north portion of the site is sized to ensure the 100-year peak flow of 76 cfs is contained with at least one (1) foot of freeboard from the top of the berm. The three (3) inch rock lining the swale and berm is appropriately sized to protect against the resulting velocities along the swale and berm. A typical section of the swale and berm is shown below.

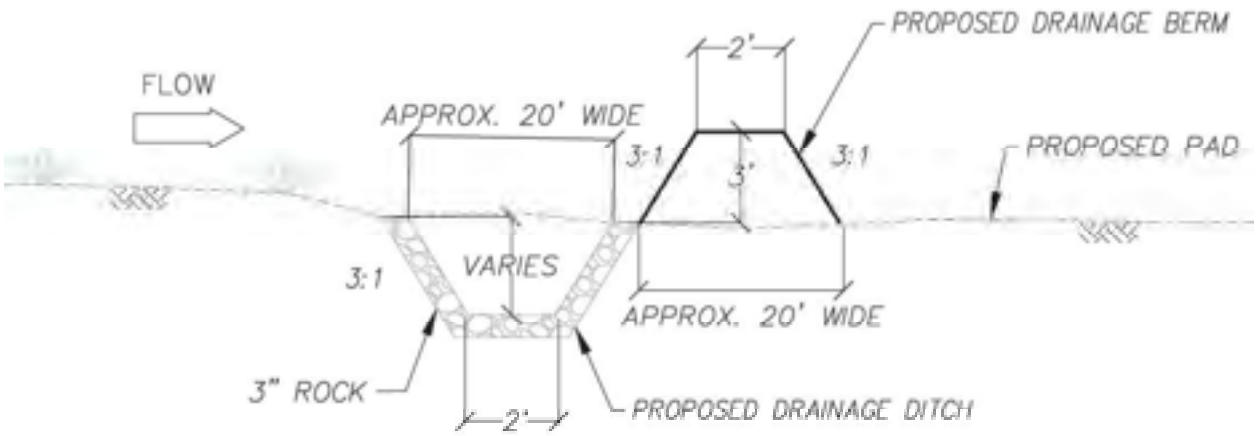


Figure 2 | Typical Berm and Swale Section

5. RESULTS AND CONCLUSIONS

Our preliminary analysis demonstrates the feasibility of concept for the onsite hydraulics within the proposed project. Analysis of the relevant impacts, including those outlined by CEQA, illustrates that the proposed drainage patterns provide the most feasible and low-impact solution for the project and do not alter the existing drainage pattern in a manner which would result in erosion or siltation, significantly increase the rate or amount of surface runoff, or impede or redirect flood flows.

Due to the highly pervious nature of the project site in both the existing and proposed conditions and limited disturbance areas, the surface runoff will not differ significantly in the proposed condition than in the existing. Increased runoff from the (disturbed and compacted) access roads will be dissipated and infiltrated onsite within the alluvial soils immediately downgradient of the roads, resulting in no significant increase in runoff or erosion. Where these access roads must cross shallow seasonal drainage paths, small diameter (e.g., 3-inch) rock may be used where needed to stabilize the road surface, as localized erosion/scour may otherwise occur in a major storm event. As the rock will be installed at existing grades, no disruption of grades leading to erosion/scour will occur.

Elevation and grading/compaction of pads is anticipated for the BESS yards, substation and switchyard. With that disturbance and grading/compaction, some concentration and increase of runoff and erosion is anticipated, absent mitigating countermeasures. These countermeasures include small rock-lined swales and berms adjacent to the pads to capture and infiltrate increased runoff and minimizing erosion potential to a level of non-significance.

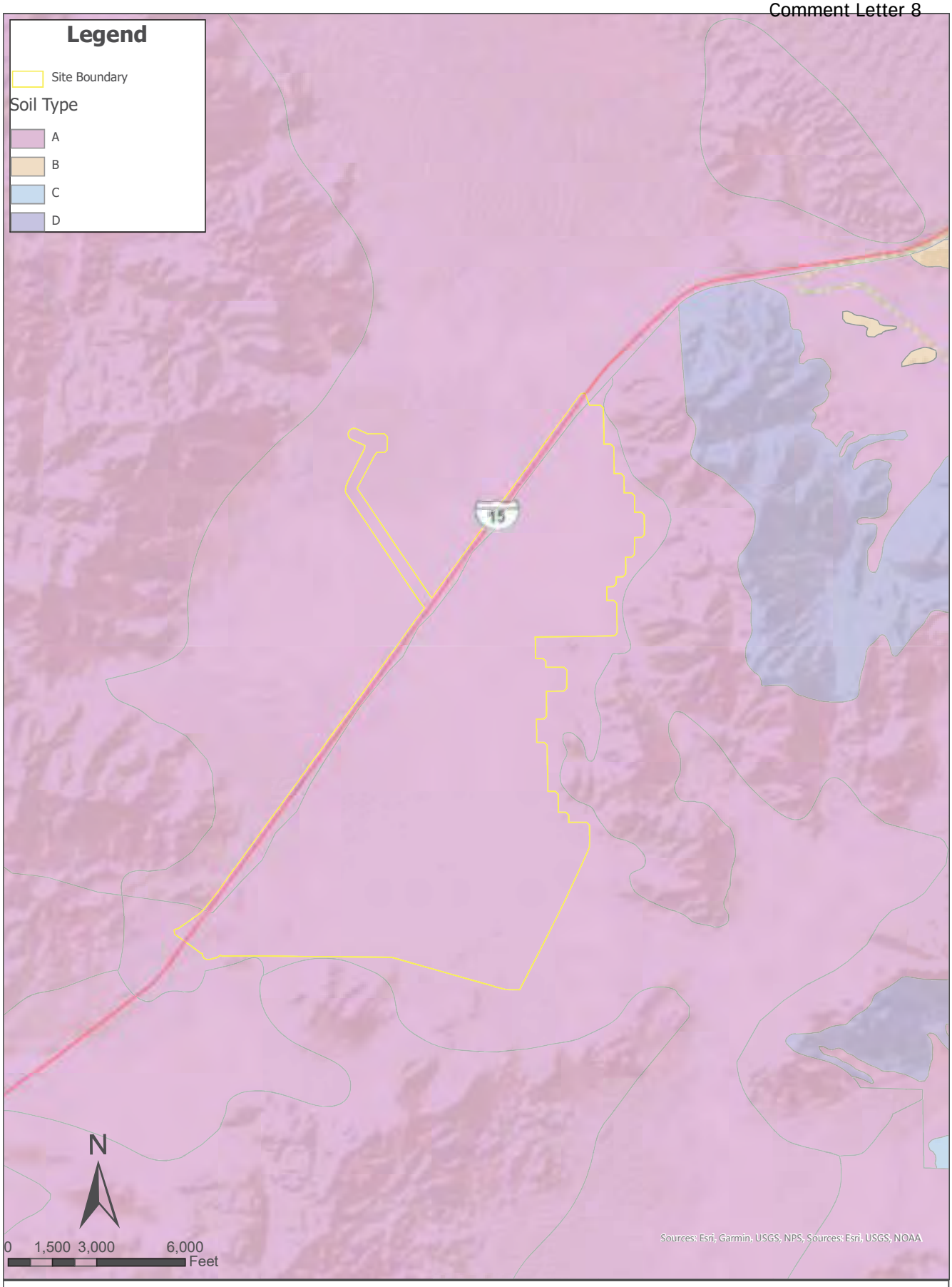
The vast majority of solar panel pilings will not require any protection, but where needed, and as determined during the final design of the project, some pilings will be deeper to counter any potential localized scour that the pilings may be subject to. In no case would the pilings be subject to scour exceeding 2 feet however, and any scour would be very localized and contained. If needed, small rock may be used as a mitigating countermeasure to prevent the localized scour.

6. REFERENCES

1. San Bernadino County, 1986 Hydrology Manual

ATTACHMENT 1

Soils Map



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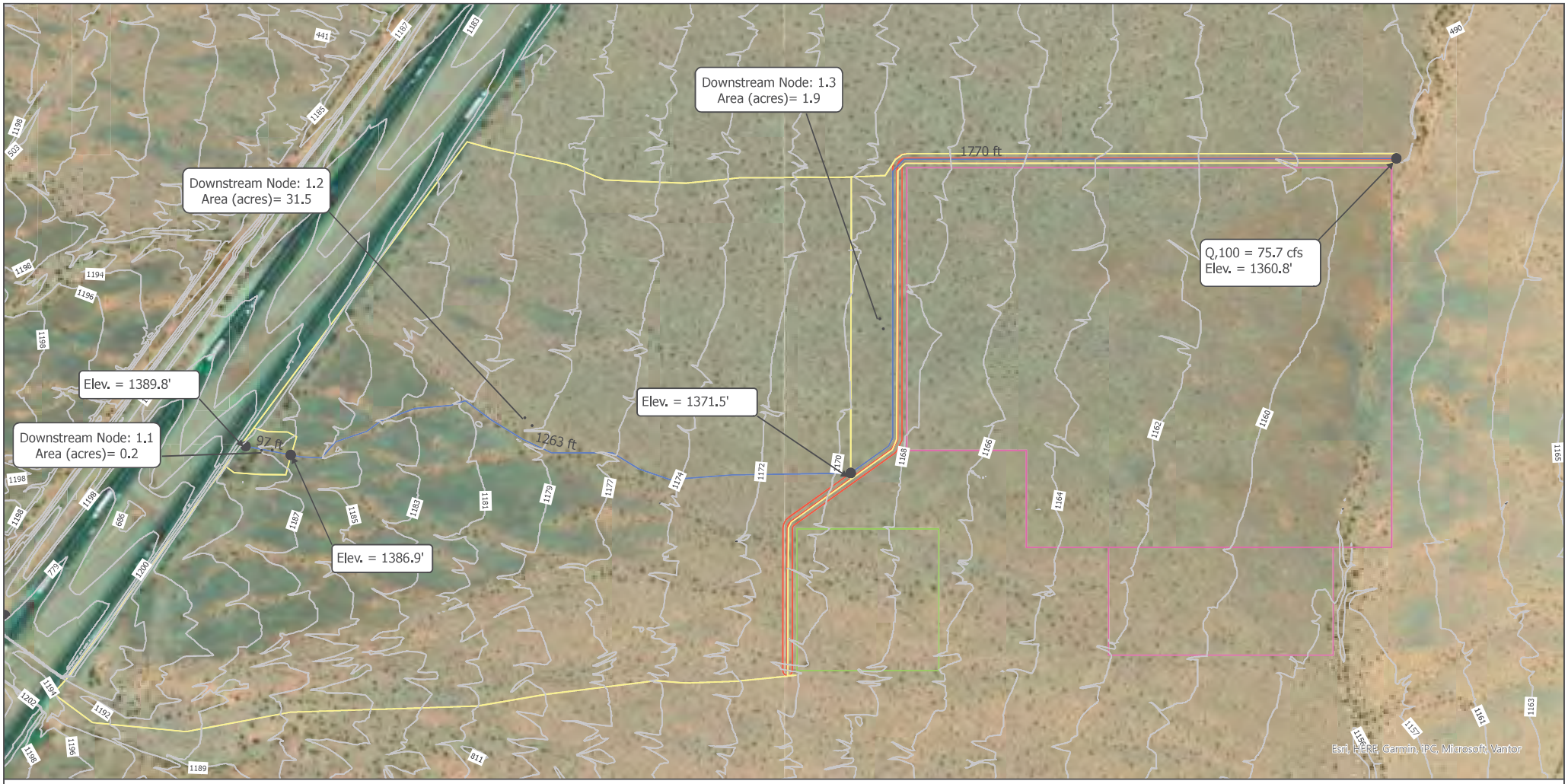
Soda Mountain Solar Project
Soil Map
February 2026

ATTACHMENT 2

Rational Method Calculations

Hydrologic Work Map



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Legend

- Flow Path
- Proposed Berm
- Proposed BESS
- Proposed Substation
- Drainage Boundary

N

0 100 200 400 Feet

Soda Mountain Solar Project
Hydrologic Work Map
February 2026

Post-Project AES Output

```
 **************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
       (c) Copyright 1983-2016 Advanced Engineering Software (aes)
          Ver. 23.0  Release Date: 07/01/2016  License ID 1532

                    Analysis prepared by: TRW Engineering

----------------------------------------------------------------------------
  FILE NAME: SODA.DAT
  TIME/DATE OF STUDY: 15:47 02/19/2026
 ============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ============================================================================
               --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.00;  4.600
   2)  10.00;  3.290
   3)  15.00;  2.660
   4)  30.00;  1.830
   5)  60.00;  1.270
   6) 120.00;  0.744
   7) 360.00;  0.304
```

```
 8)  720.00;  0.182
 9) 1200.00;  0.090
*ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
   HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
   WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)    (FT)   SIDE / SIDE/ WAY    (FT)   (FT)  (FT)  (FT)    (n)
=== ===== ========= ================= ======  ===== ====== ===== =======
 1  30.0    20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
  1. Relative Flow-Depth =  0.00 FEET
    as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
  2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
*PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
 UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
 FLOW PROCESS FROM NODE     1.00 TO NODE     1.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   97.00
 ELEVATION DATA: UPSTREAM(FEET) =  1389.80  DOWNSTREAM(FEET) =  1386.88

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.117
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.307
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/     SCS SOIL   AREA     Fp       Ap    SCS   Tc
     LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 ".4 DWELLING/ACRE"       A       0.24     0.74    0.900    52    6.12
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =      0.79
 TOTAL AREA(ACRES) =      0.24   PEAK FLOW RATE(CFS) =      0.79

****************************************************************************
 FLOW PROCESS FROM NODE     1.10 TO NODE     1.20 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1386.88  DOWNSTREAM(FEET) =   1371.47
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1263.00   CHANNEL SLOPE =  0.0122
 CHANNEL BASE(FEET) =    3.50   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.319
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/     SCS SOIL   AREA     Fp       Ap    SCS
     LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 ".4 DWELLING/ACRE"       A      31.50     0.74    0.900    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
```

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.900

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 39.34

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.58

AVERAGE FLOW DEPTH(FEET) = 0.89 TRAVEL TIME(MIN.) = 3.77

Tc(MIN.) = 9.89

SUBAREA AREA(ACRES) = 31.50 SUBAREA RUNOFF(CFS) = 75.16

EFFECTIVE AREA(ACRES) = 31.74 AREA-AVERAGED Fm(INCH/HR) = 0.67

AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.90

TOTAL AREA(ACRES) = 31.7 PEAK FLOW RATE(CFS) = 75.74

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.20 FLOW VELOCITY(FEET/SEC.) = 6.62

LONGEST FLOWPATH FROM NODE 1.00 TO NODE 1.20 = 1360.00 FEET.

****

FLOW PROCESS FROM NODE 1.20 TO NODE 1.30 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

==========

ELEVATION DATA: UPSTREAM(FEET) = 1371.50 DOWNSTREAM(FEET) = 1360.80

CHANNEL LENGTH THRU SUBAREA(FEET) = 1770.00 CHANNEL SLOPE = 0.0060

CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 3.000

MANNING'S FACTOR = 0.020 MAXIMUM DEPTH(FEET) = 3.00

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.661

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					

```
 ".4 DWELLING/ACRE"       A      1.90     0.74    0.900   52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     77.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.78
 AVERAGE FLOW DEPTH(FEET) =   1.81   TRAVEL TIME(MIN.) =   5.10
 Tc(MIN.) =   14.99
 SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =    3.41
 EFFECTIVE AREA(ACRES) =     33.64    AREA-AVERAGED Fm(INCH/HR) =   0.67
 AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.90
 TOTAL AREA(ACRES) =      33.6       PEAK FLOW RATE(CFS) =     75.74
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.79   FLOW VELOCITY(FEET/SEC.) =   5.74
 LONGEST FLOWPATH FROM NODE     1.00 TO NODE     1.30 =    3130.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      33.6  TC(MIN.) =    14.99
 EFFECTIVE AREA(ACRES) =     33.64  AREA-AVERAGED Fm(INCH/HR)=  0.67
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.900
 PEAK FLOW RATE(CFS)   =     75.74
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

ATTACHMENT 3

SWCA Drainage Report

DOCKETED	
Docket Number:	24-OPT-03
Project Title:	Soda Mountain Solar
TN #:	257946
Document Title:	Appendix K Stormwater Drainage Report
Description:	In this Appendix, hydrologic conditions were analyzed to understand the existing and future flood hazards for the proposed Project site; determine inundation areas and spatial distribution of stormwater depths and velocities for the 2-year, 10-year, and 100-year 24-hour storm events; and identify any flood hazard areas within the site.
Filer:	Hannah Gbeh
Organization:	Resolution Environmental
Submitter Role:	Applicant Consultant
Submission Date:	7/22/2024 5:19:38 PM
Docketed Date:	7/23/2024

Soda Mountain Solar Project
Stormwater Drainage Report
San Bernardino County, California

JUNE 2024

PREPARED FOR

Soda Mountain Solar, LLC

PREPARED BY

SWCA Environmental Consultants

SODA MOUNTAIN SOLAR PROJECT
STORMWATER DRAINAGE REPORT
SAN BERNARDINO, CALIFORNIA

Prepared for

Soda Mountain Solar, LLC
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SWCA Project No. 68347

June 2024

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1 BACKGROUND AND OBJECTIVES

Soda Mountain Solar, LLC, is proposing a solar power production facility in the Soda Mountain area of San Bernardino County, California, and is currently seeking an Incidental Take Permit and Streambed Alteration Agreement from the California Department of Fish and Wildlife, along with a Title 27 Discharge Permit and Clean Water Act Section 401 Permit from the Lahontan Regional Water Quality Control Board. In support of those permit applications, SWCA Environmental Consultants (SWCA) conducted a stormwater drainage analysis.

Hydrologic conditions were analyzed to understand the existing and future flood hazards for the proposed Soda Mountain Solar Project (project) site; determine inundation areas and spatial distribution of stormwater depths and velocities for the 2-year, 10-year, and 100-year 24-hour storm events; and identify any flood hazard areas within the site. The project site is located on federal land managed by Bureau of Land Management. It is approximately 2,670 acres and is located 3.83 miles northwest of Zzyzx, California, and 6 miles southwest of Baker, California, along Interstate 15. The study area contains numerous alluvial fans that drain toward the proposed site. The site is located in Federal Emergency Management Agency (FEMA) Zone D, meaning that the area has not been studied using detailed methods and existing flood risk is unknown (Appendix A).

2 CALCULATION METHODOLOGIES

A 2-dimensional (2-D) rain-on-grid hydrodynamic model was prepared for this study area using HEC-RAS v. 6.3.1, developed by the U.S. Army Corps of Engineers, Hydrologic Engineering Center. The program is capable of modeling rainfall-runoff and surface water hydraulics. For this study, the area of interest (AOI) modeled in HEC-RAS included the site of proposed solar facility and the contributing drainage area. Existing and proposed conditions were modeled to understand the effect of the proposed solar development on stormwater drainage. The proposed conditions were based on 30% civil design plans dated August 8, 2023, and provided by QCells and Kleinfelder, Inc. The 30% civil design plans that are incorporated into the proposed conditions are the berm outlines, drainage channels, catchment basins, and solar panels. The proposed land cover layer within the model was adjusted to delineate the proposed design features and represent the impervious conditions of the solar array coverage. However, the proposed condition in the model did not include the 12 box culverts and eight low-water crossings due to the assumptions that the culverts will be designed to allow the channels to withstand the flow capacity. The following section describes the available data used and assumptions made by SWCA to develop the model.

2.1 Topographic Data

Existing terrain conditions were based on a digital elevation model (DEM) with 1-meter resolution from the U.S. Geological Survey (USGS) merged with the detailed topographic survey data of the site provided by Michael Baker, Inc. The DEM was reprojected to North American Datum of 1983 (NAD 83) California Zone 5, converted to units of U.S. survey feet, and imported to the HEC-RAS to build the topographic surface for the existing condition model. A rectilinear mesh was created for the AOI using 100-foot grid cells. The mesh was refined by adding additional computation points within the known areas of concentrated flow, creating a mesh of 50-foot grid cells within these areas. The proposed terrain was created by modifying the existing conditions DEM to represent conditions shown in the 30% civil design, which included multiple berms, channels, and sediment basins.

2.2 Rainfall Data

A hyetograph was developed based on the Soil Conservation Service (SCS) dimensionless curve and Type II rainfall data derived from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation data for the 2-year, 10-year, and 100-year 24-hour storm events over the Soda Mountain location coordinates 35.1575 degrees North, 116.1821 degrees West, near Baker, California. The hyetograph illustrates the intensity of rainfall over time; the horizontal axis of the hyetograph represents time, while the vertical axis represents rainfall depth. Each storm event was run as an individual unsteady flow model with a precipitation value added to the meteorological data encompassing the entire AOI and normal depth downstream conditions with friction slopes measured from the topographic data in HEC-RAS. The hyetographs are provided in Appendix B.

Meantime, a monthly mean precipitation summary was obtained from the National Weather Service (NWS) past weather record (NWS, 2024). Precipitation at NWS Baker Station from 1996 – 2013 was used for analysis the pattern of the monthly precipitation because Baker Station is close to the project site. The monthly mean precipitation is shown in Figure 1 below. Precipitation information from California Irrigation Management Information System (CIMIS) was used for comparison. The three closest CIMIS stations 117-Victorville, 221-Cadiz Valley, and 257-Ridgecrest shows similar precipitation patterns as the NWS Baker Station precipitation data. The CIMIS stations are further away compared to the NWS Baker Station so the CIMIS stations information are not included in this report. The construction and operation of project is not anticipated to alter the monthly precipitation patterns.

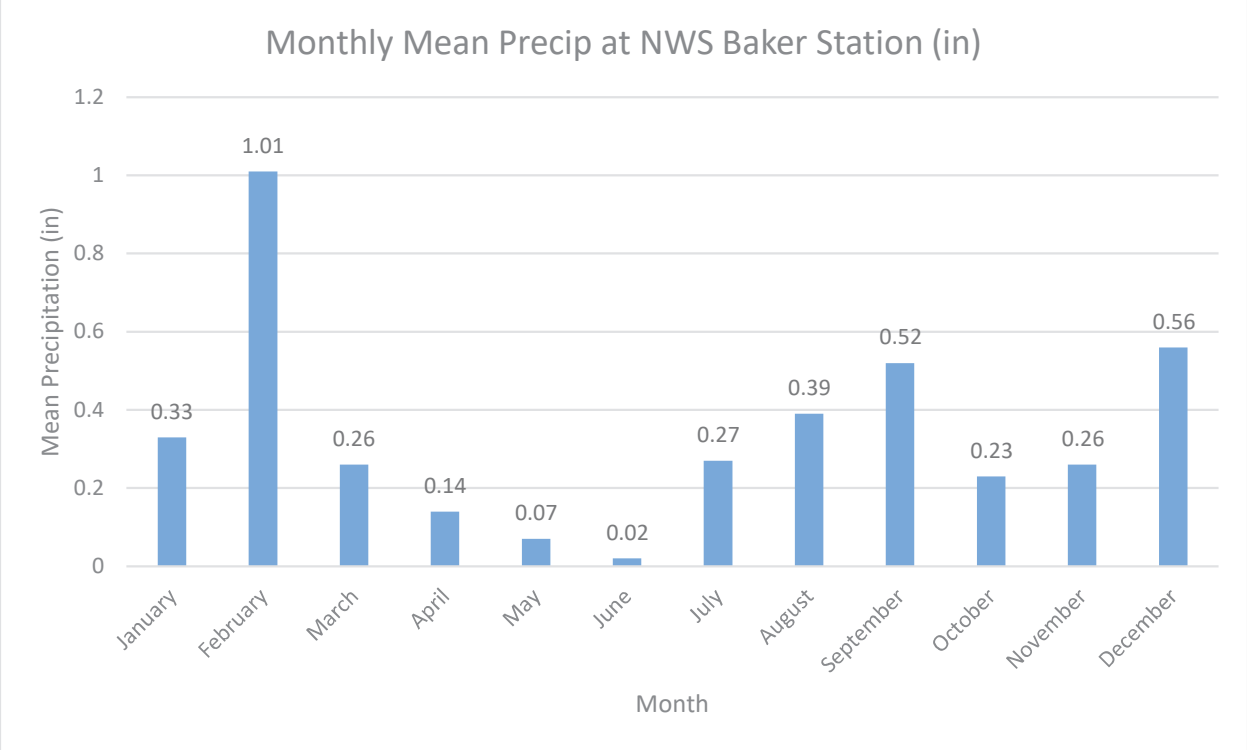

Figure 1: Monthly Mean Precipitation at NWS Baker Station

2.3 Soils and Land Cover Data

The study area soil types consist of gravel with silt and sand. Therefore, the hydrologic soil groups (HSGs) were determined to be A, B, and C for this site based on information from the soil watershed study and the Jurisdictional Determination Report by the URS Land Management Consulting Group (2009) and the Natural Resource Conservation Service (NRCS). See Appendix C and Table 1 below for descriptions of individual HSGs. Group D soils were not present based on the NRCS soil survey information.

Table 1. Hydrologic Soil Groups

HSG	Description
Group A	Sand, loamy sand or sandy loam types of soils. These soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well-drained to excessively drained sands or gravels and have a high rate of water transmission.
Group B	Silt loam or loam. Soils in this HSG have a moderate infiltration rate when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well-drained to well-drained soils with moderately fine to moderately coarse textures.
Group C	Sandy clay loam. These soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure.
Group D	Clay loam, silty clay loam, sandy clay, silty clay or clay. This HSG has the highest runoff potential. These soils have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high-water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material.

A 30-meter land cover raster was retrieved from the National Land Cover Database (Multi-Resolution Land Characteristics Consortium 2019).

The land cover and soils data were reprojected to NAD 83 California Zone 5, converted to units of U.S. survey feet, and imported to HEC-RAS to build the existing condition model. The infiltration dataset was created in HEC-RAS using a parametrization of the soils and land cover layers. Manning's n roughness values were assigned based on land cover conditions. The existing land cover condition at the site is predominantly classified "Shrub-Scrub". Areas of proposed solar areas were assumed to be converted to "Developed, Medium Intensity," with increased SCS curve numbers and impervious areas to account for site development. See Appendix C for further information.

2.4 Floodplain Data

According to the FEMA, the area in which the project site is located is classified as Zone D, which indicates possible but undetermined flood hazards. The flood insurance study and map for the Soda Mountain San Bernardino County, California, incorporated areas by FEMA were used to determine the extent of the zone and the regulations within the zone (FEMA 2023). The coordinate points used to generate the Soda Mountain flood insurance rate map project site were 35.1575 degrees North, 116.1821 degrees West. Based on Best Available Map (BAM) provided by California Department of Water Resources indicated the location of the project site is not within the floodplain (BAM 2024). SWCA obtained a second FEMA study map that had a larger coverage area of the Soda Mountain region and the town of Baker, California (FEMA 2023). Between Baker and east of Soda Mountain lies a floodplain Zone A, which indicates areas with a 1% annual chance of flooding. The FEMA maps are provided in Appendix A.

3 MODEL RESULTS

Hydrographs were generated for each simulation at two locations where flow leaves the site, as shown in Figure 2. Figure 3 and Figure 4 show the change in stormwater runoff to the south and north of the site, respectively, for the 2-year storm event. No grading of the proposed condition was conducted by the site development engineer for the 30% design milestone. Proposed berms and channels were added directly into the hydraulic model terrain by SWCA based on the alignments and section geometries provided in the 30% design. Future refinement of the site design to include grading of the proposed solar array areas to drain into the detention basins will be required to mitigate these increases in stormwater runoff. Peak flows for a 10-year events of the proposed condition are expected to be the same to the existing condition (Figure 5Figure 6. A decrease in peak flow for the proposed condition is predicted in the 100-year hydrographs at south side of the site, due to the capacity of the retention ponds, while no significant change at the north side (Figure 7 and Figure 8).

Exhibits were prepared illustrating the predicted spatial distributions of depth and velocity for existing and proposed conditions under the 2-year, 10-year, and 100-year storm events (Appendix D). These maps clearly indicate areas where hazardous flow depths and velocities are expected to be present in the site and surrounding area during these events.

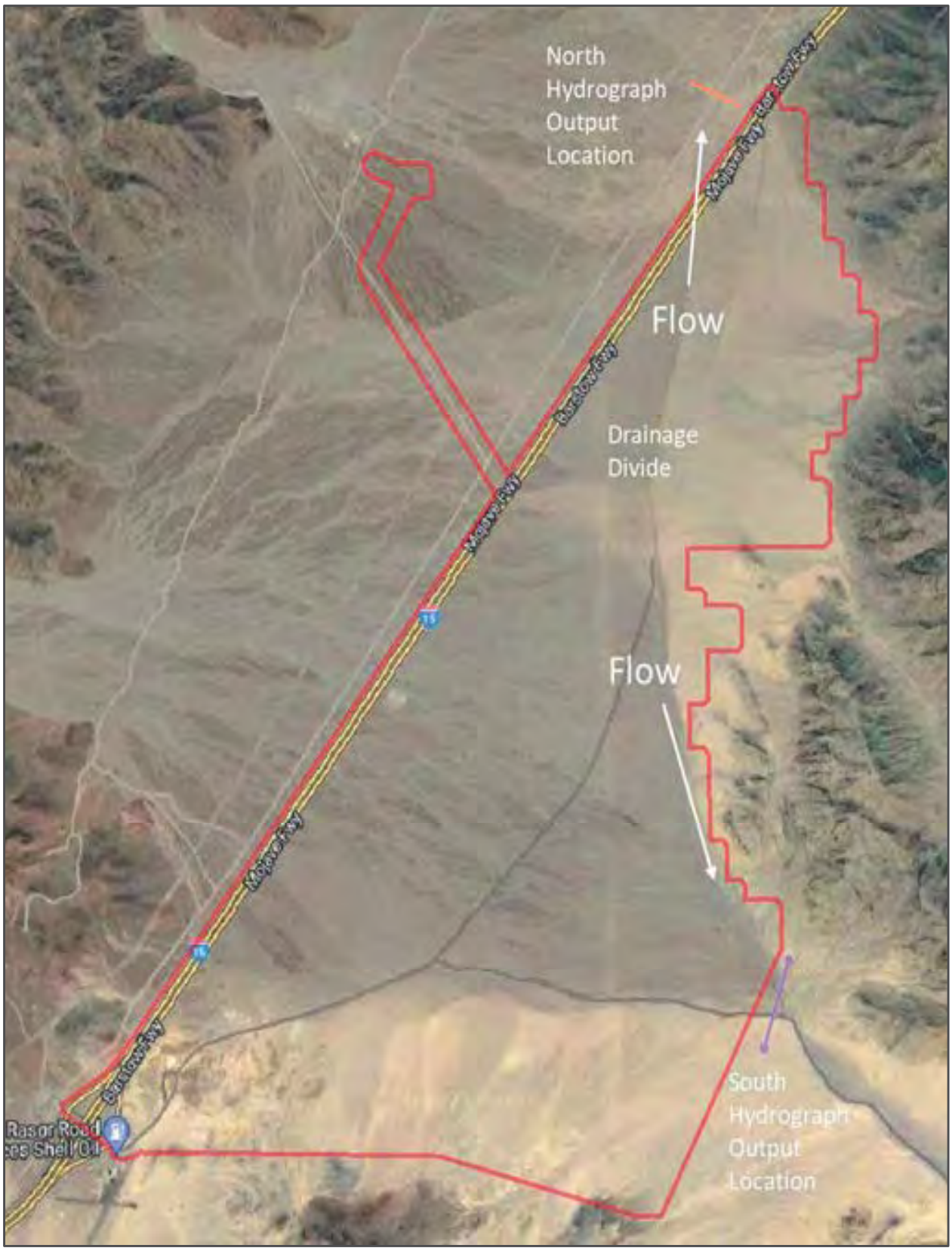

Figure 2. Overview of project site showing locations of hydrograph output locations and drainage divide.

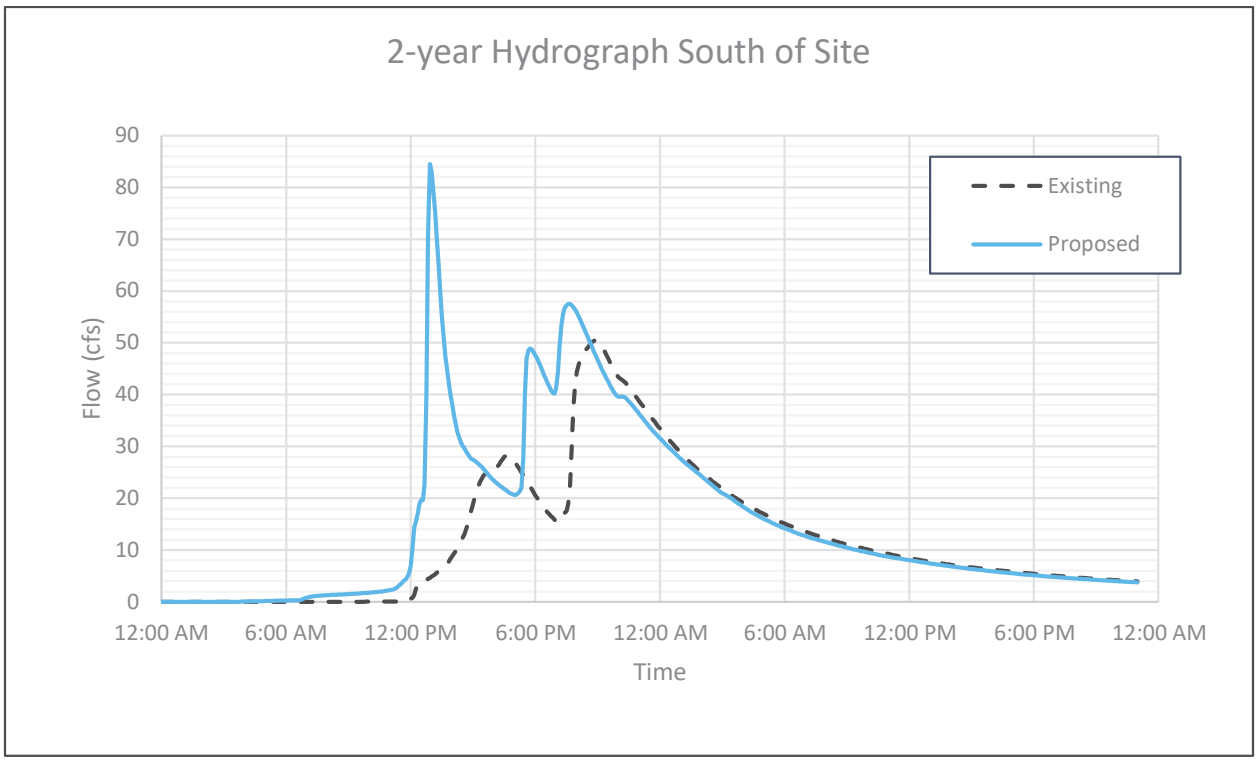

Figure 3. 2-year hydrograph of flow exiting the site to the south, proposed condition showing a significant increase and change in timing in stormwater runoff compared to existing condition.

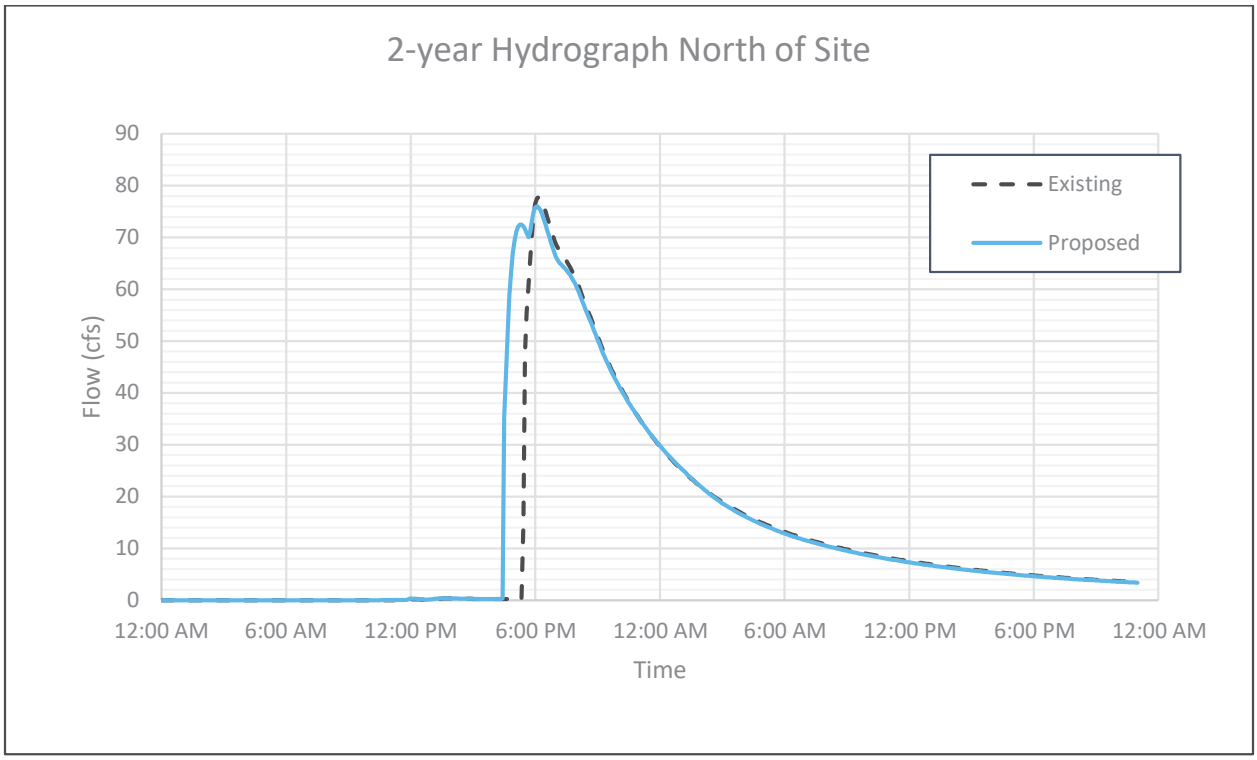

Figure 4. 2-year hydrograph of flow existing to the north of the site, proposed condition showing a small decrease in peak flow.

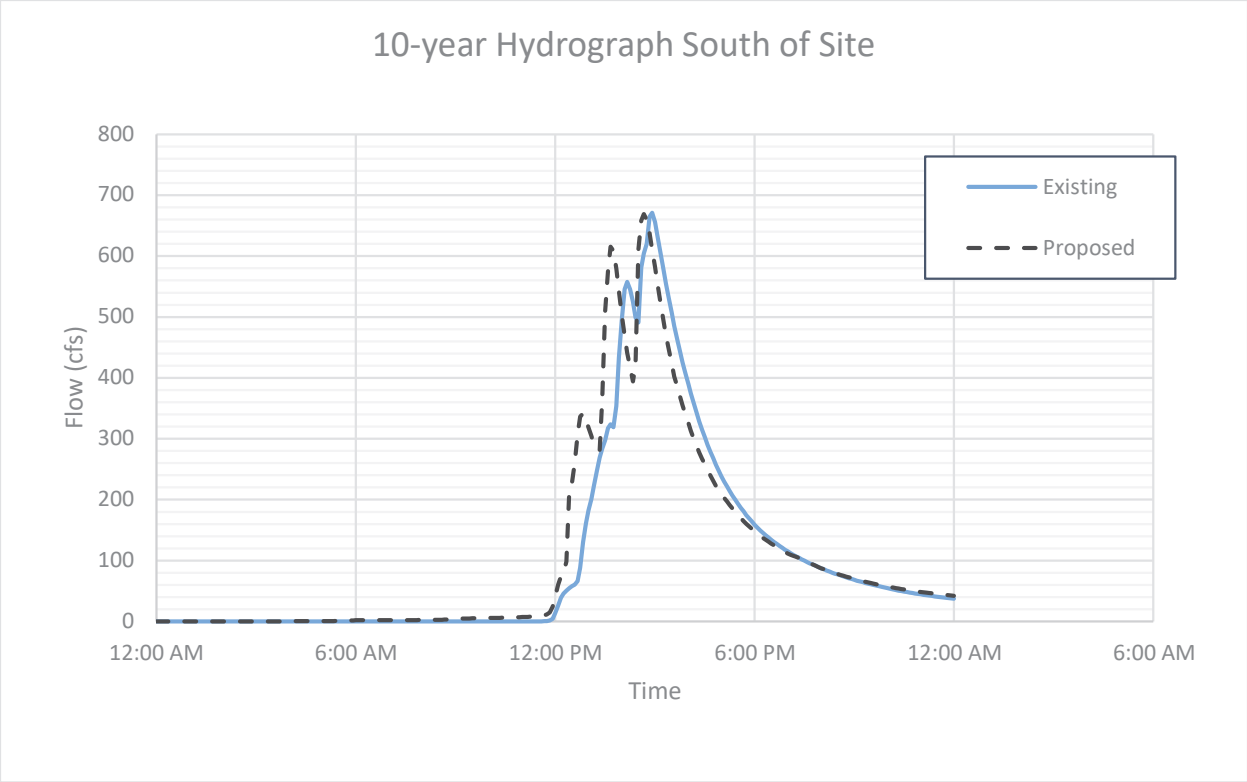

Figure 5. 10-year hydrograph of flow exiting the site to the south, showing no change in peak stormwater runoff among existing and proposed conditions.

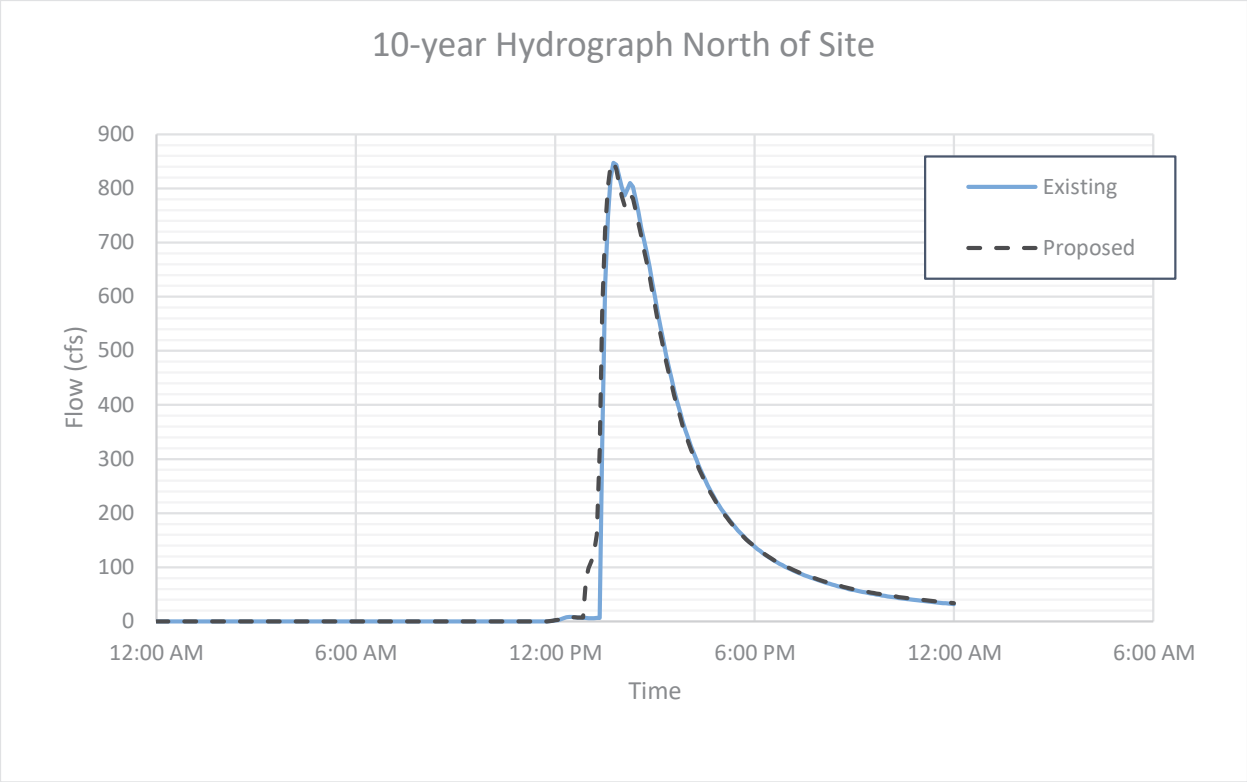

Figure 6. 10-year hydrograph of flow exiting the site to the north, showing no change in peak stormwater runoff among existing and proposed conditions.

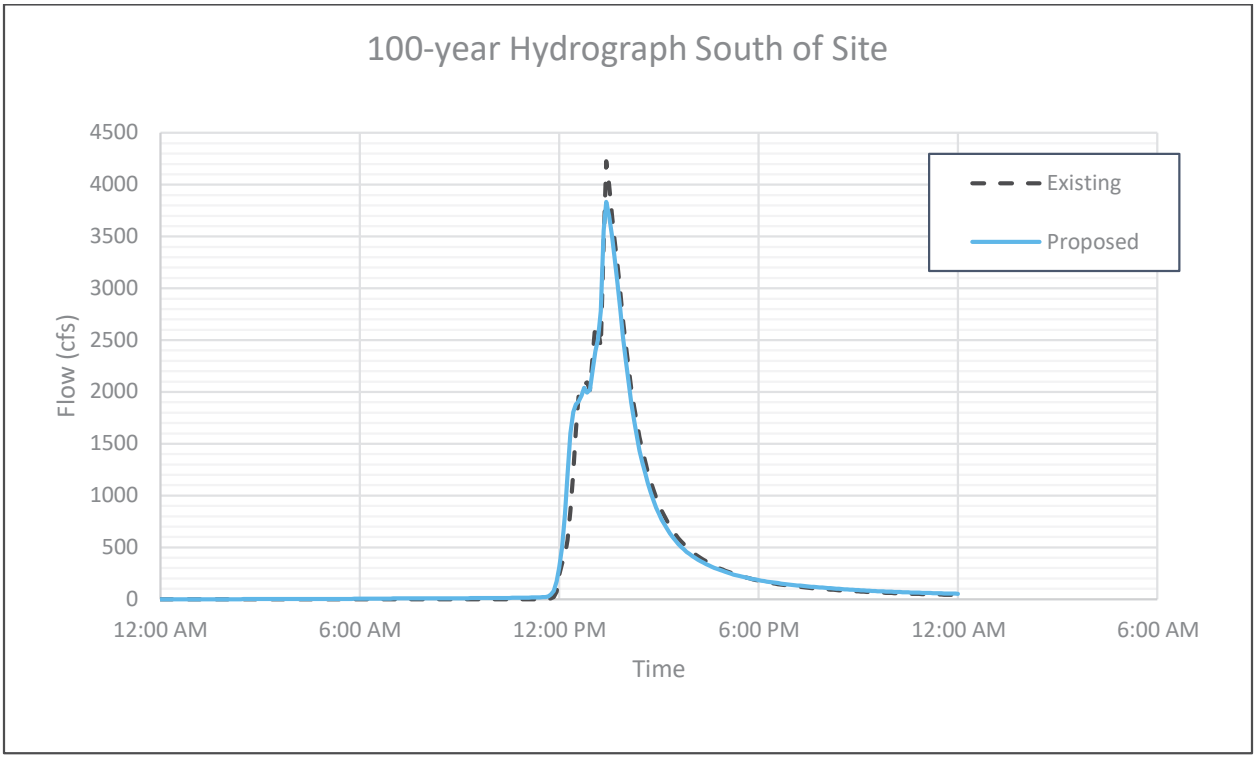

Figure 7. 100-year hydrograph of flow exiting the site to the south, proposed condition showing decrease in peak stormwater runoff compared to existing condition.

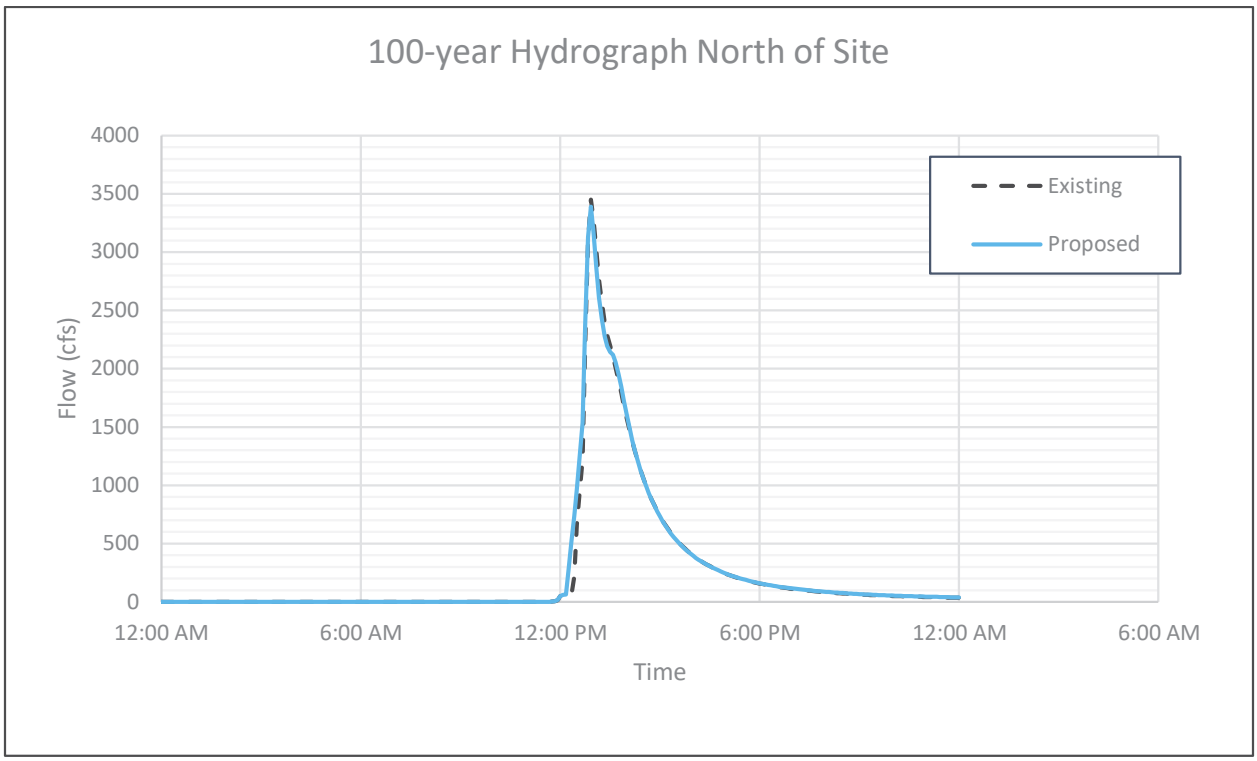

Figure 8. 100-year hydrograph of flow exiting the site to the north, showing no significant change in stormwater runoff.

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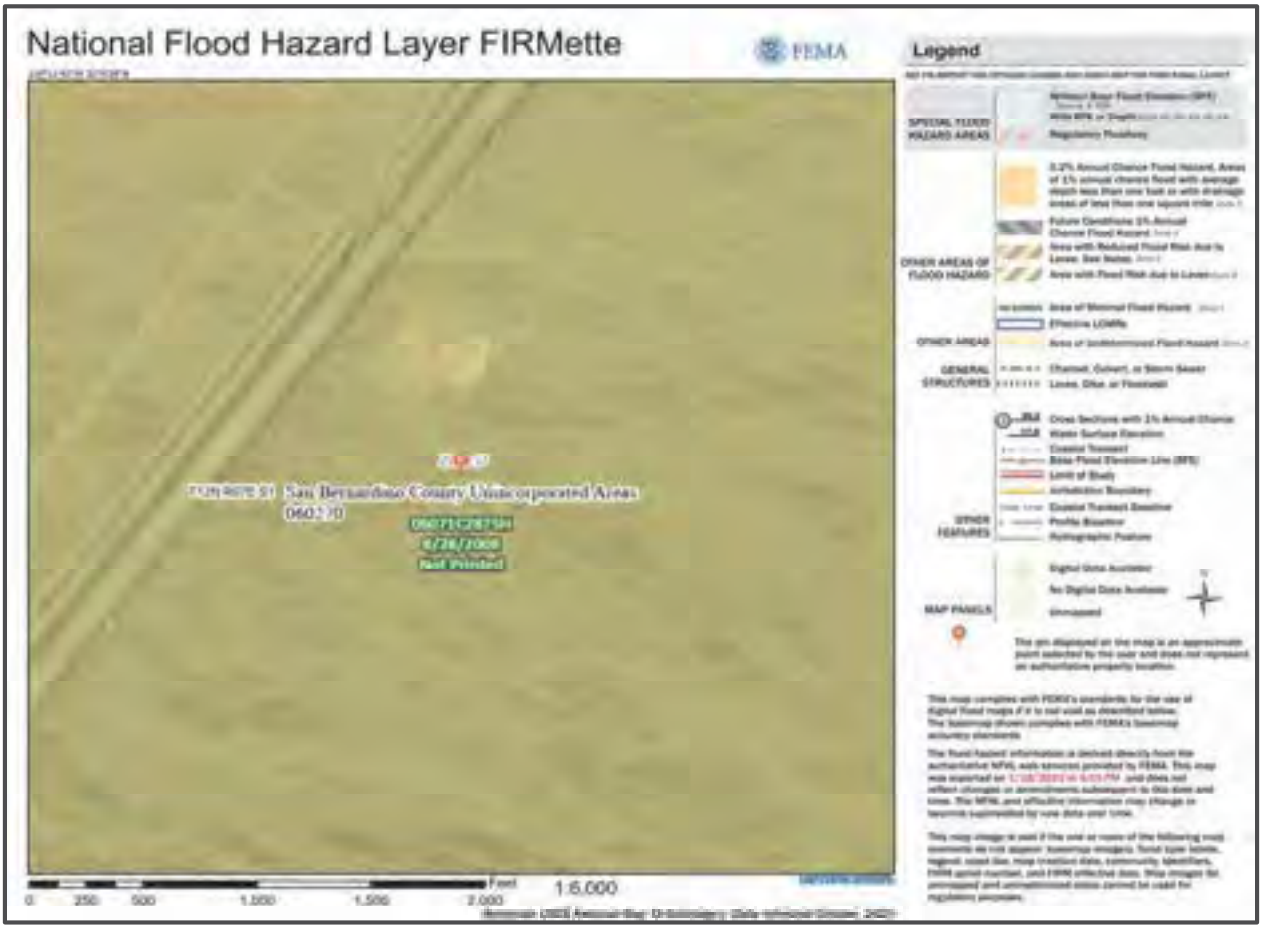
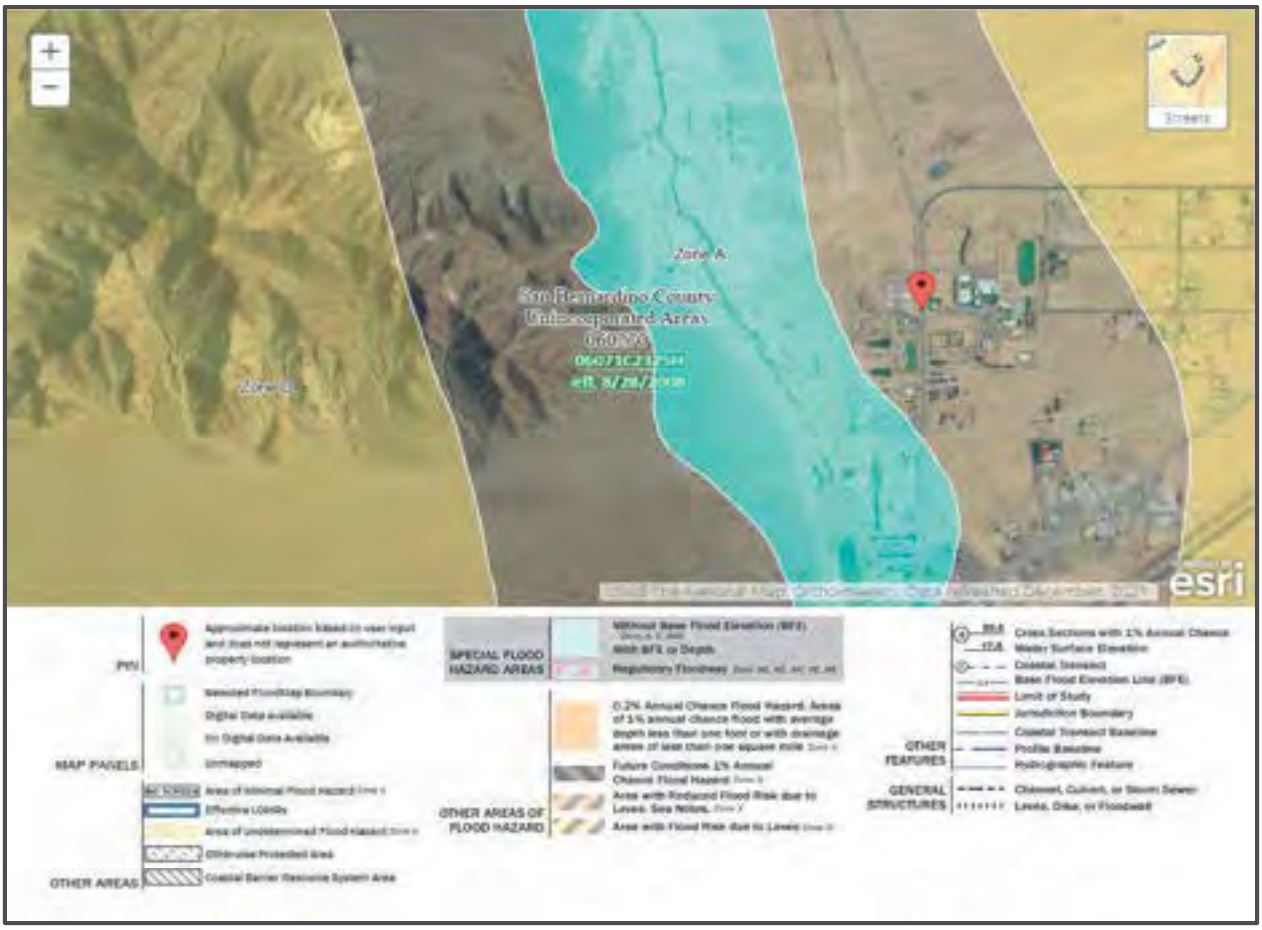
APPENDIX A

Miscellaneous Site Data

FEMA Flood Hazard



Source: FEMA (2023)



Source: FEMA (2023)

APPENDIX B

Rainfall Data

Point Precipitation Frequency Estimates by NOAA

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

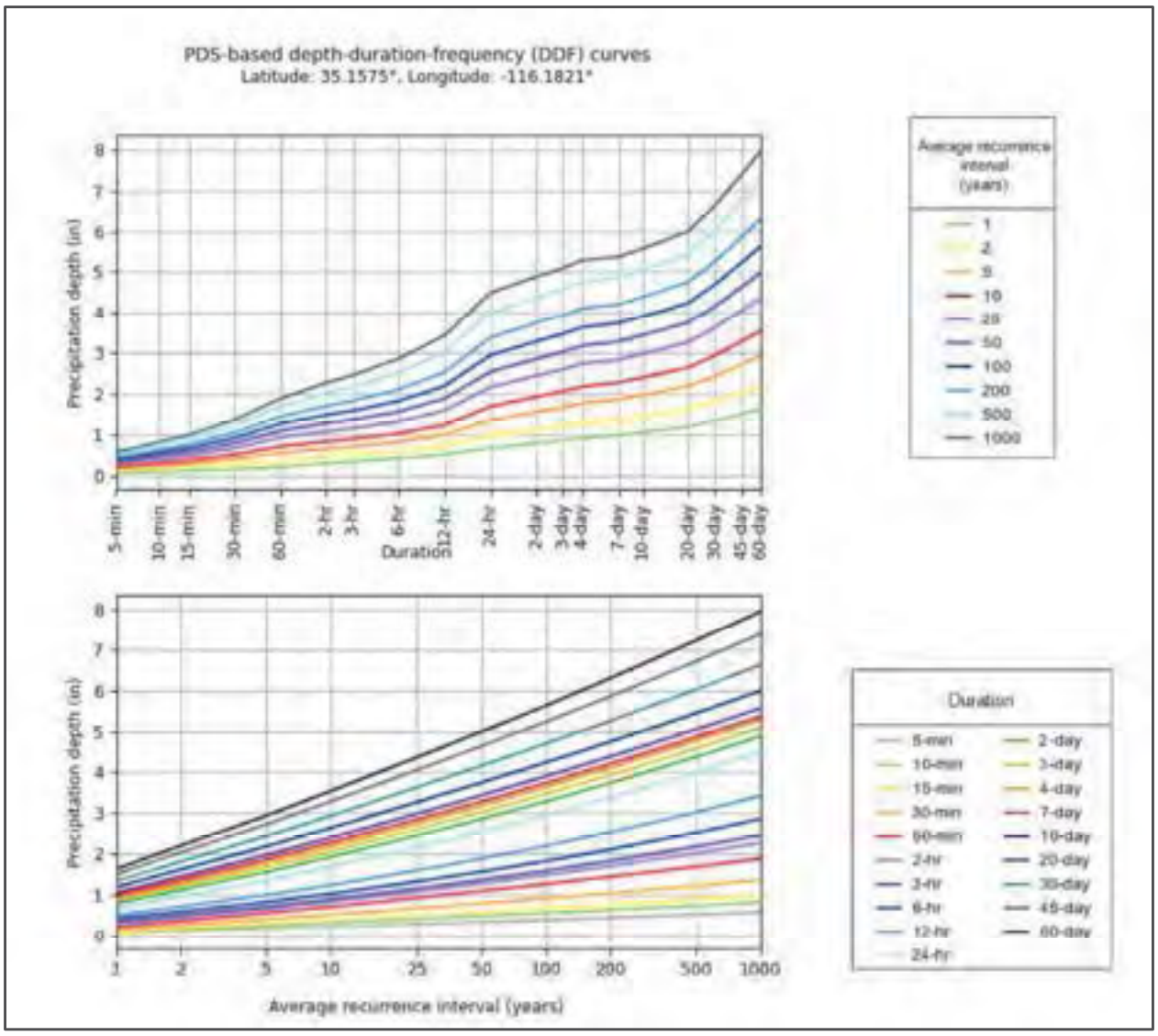
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.063 (0.052-0.078)	0.108 (0.088-0.133)	0.166 (0.135-0.205)	0.214 (0.173-0.267)	0.279 (0.219-0.360)	0.330 (0.254-0.434)	0.382 (0.287-0.514)	0.436 (0.319-0.603)	0.511 (0.359-0.734)	0.569 (0.387-0.846)
10-min	0.091 (0.074-0.112)	0.154 (0.126-0.191)	0.238 (0.194-0.294)	0.306 (0.248-0.382)	0.400 (0.314-0.516)	0.473 (0.364-0.622)	0.548 (0.411-0.737)	0.625 (0.457-0.864)	0.732 (0.514-1.05)	0.816 (0.555-1.21)
15-min	0.110 (0.090-0.136)	0.186 (0.152-0.230)	0.287 (0.234-0.356)	0.370 (0.300-0.462)	0.484 (0.379-0.624)	0.572 (0.440-0.752)	0.662 (0.497-0.891)	0.756 (0.553-1.04)	0.885 (0.622-1.27)	0.987 (0.671-1.47)
30-min	0.151 (0.124-0.187)	0.257 (0.210-0.317)	0.396 (0.323-0.490)	0.510 (0.413-0.637)	0.666 (0.522-0.859)	0.788 (0.605-1.04)	0.912 (0.685-1.23)	1.04 (0.761-1.44)	1.22 (0.857-1.75)	1.36 (0.924-2.02)
60-min	0.209 (0.171-0.258)	0.355 (0.290-0.439)	0.548 (0.447-0.678)	0.705 (0.571-0.881)	0.922 (0.723-1.19)	1.09 (0.837-1.43)	1.26 (0.947-1.70)	1.44 (1.05-1.99)	1.69 (1.18-2.42)	1.88 (1.28-2.79)
2-hr	0.294 (0.241-0.363)	0.447 (0.365-0.552)	0.654 (0.533-0.810)	0.829 (0.671-1.04)	1.08 (0.844-1.39)	1.27 (0.979-1.67)	1.48 (1.11-1.99)	1.70 (1.24-2.35)	2.01 (1.42-2.90)	2.27 (1.54-3.37)
3-hr	0.337 (0.276-0.416)	0.492 (0.402-0.608)	0.706 (0.576-0.875)	0.889 (0.719-1.11)	1.15 (0.902-1.48)	1.36 (1.05-1.79)	1.59 (1.19-2.13)	1.83 (1.34-2.53)	2.17 (1.53-3.12)	2.46 (1.67-3.65)
6-hr	0.417 (0.341-0.514)	0.585 (0.478-0.723)	0.820 (0.669-1.02)	1.02 (0.828-1.28)	1.32 (1.03-1.70)	1.56 (1.20-2.05)	1.82 (1.37-2.45)	2.11 (1.54-2.91)	2.52 (1.77-3.62)	2.86 (1.94-4.25)
12-hr	0.503 (0.412-0.621)	0.707 (0.578-0.873)	0.991 (0.808-1.23)	1.24 (1.00-1.54)	1.59 (1.25-2.05)	1.88 (1.44-2.47)	2.19 (1.64-2.95)	2.53 (1.85-3.50)	3.02 (2.12-4.34)	3.43 (2.33-5.09)
24-hr	0.673 (0.564-0.776)	0.959 (0.846-1.11)	1.35 (1.19-1.57)	1.66 (1.47-1.97)	2.16 (1.83-2.60)	2.54 (2.11-3.12)	2.94 (2.39-3.69)	3.38 (2.66-4.34)	3.99 (3.05-5.33)	4.49 (3.32-6.19)
2-day	0.786 (0.694-0.909)	1.11 (0.982-1.29)	1.55 (1.37-1.80)	1.92 (1.68-2.25)	2.44 (2.07-2.94)	2.85 (2.37-3.50)	3.28 (2.67-4.12)	3.74 (2.96-4.81)	4.37 (3.34-5.84)	4.88 (3.61-6.73)
3-day	0.854 (0.753-0.987)	1.20 (1.06-1.39)	1.67 (1.47-1.94)	2.06 (1.80-2.40)	2.60 (2.20-3.13)	3.02 (2.51-3.71)	3.47 (2.82-4.35)	3.93 (3.12-5.06)	4.58 (3.49-6.12)	5.09 (3.77-7.02)
4-day	0.912 (0.805-1.06)	1.28 (1.13-1.48)	1.77 (1.56-2.05)	2.17 (1.90-2.54)	2.73 (2.32-3.29)	3.17 (2.64-3.90)	3.63 (2.95-4.55)	4.10 (3.25-5.28)	4.76 (3.64-6.36)	5.28 (3.91-7.29)
7-day	0.982 (0.867-1.14)	1.36 (1.20-1.58)	1.86 (1.64-2.16)	2.27 (1.98-2.66)	2.84 (2.40-3.42)	3.28 (2.73-4.02)	3.73 (3.04-4.68)	4.21 (3.34-5.41)	4.86 (3.71-6.49)	5.37 (3.98-7.41)
10-day	1.05 (0.927-1.22)	1.45 (1.28-1.68)	1.97 (1.73-2.28)	2.40 (2.09-2.80)	2.98 (2.53-3.59)	3.44 (2.86-4.22)	3.90 (3.17-4.89)	4.38 (3.48-5.64)	5.05 (3.85-6.74)	5.57 (4.12-7.68)
20-day	1.18 (1.05-1.37)	1.62 (1.42-1.87)	2.18 (1.92-2.53)	2.64 (2.30-3.08)	3.26 (2.76-3.93)	3.74 (3.11-4.60)	4.24 (3.44-5.32)	4.75 (3.76-6.11)	5.44 (4.16-7.28)	5.99 (4.43-8.26)
30-day	1.33 (1.18-1.54)	1.81 (1.60-2.09)	2.43 (2.14-2.82)	2.94 (2.56-3.43)	3.62 (3.07-4.37)	4.16 (3.46-5.10)	4.70 (3.82-5.89)	5.26 (4.17-6.77)	6.03 (4.60-8.05)	6.63 (4.91-9.15)
45-day	1.50 (1.32-1.74)	2.03 (1.79-2.35)	2.72 (2.40-3.16)	3.29 (2.87-3.84)	4.05 (3.43-4.88)	4.64 (3.85-5.69)	5.24 (4.26-6.57)	5.86 (4.64-7.54)	6.71 (5.13-8.97)	7.39 (5.47-10.2)
60-day	1.63 (1.44-1.88)	2.20 (1.94-2.54)	2.94 (2.58-3.41)	3.54 (3.09-4.14)	4.36 (3.69-5.25)	4.99 (4.15-6.12)	5.63 (4.58-7.06)	6.30 (5.00-8.11)	7.22 (5.52-9.66)	7.96 (5.89-11.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

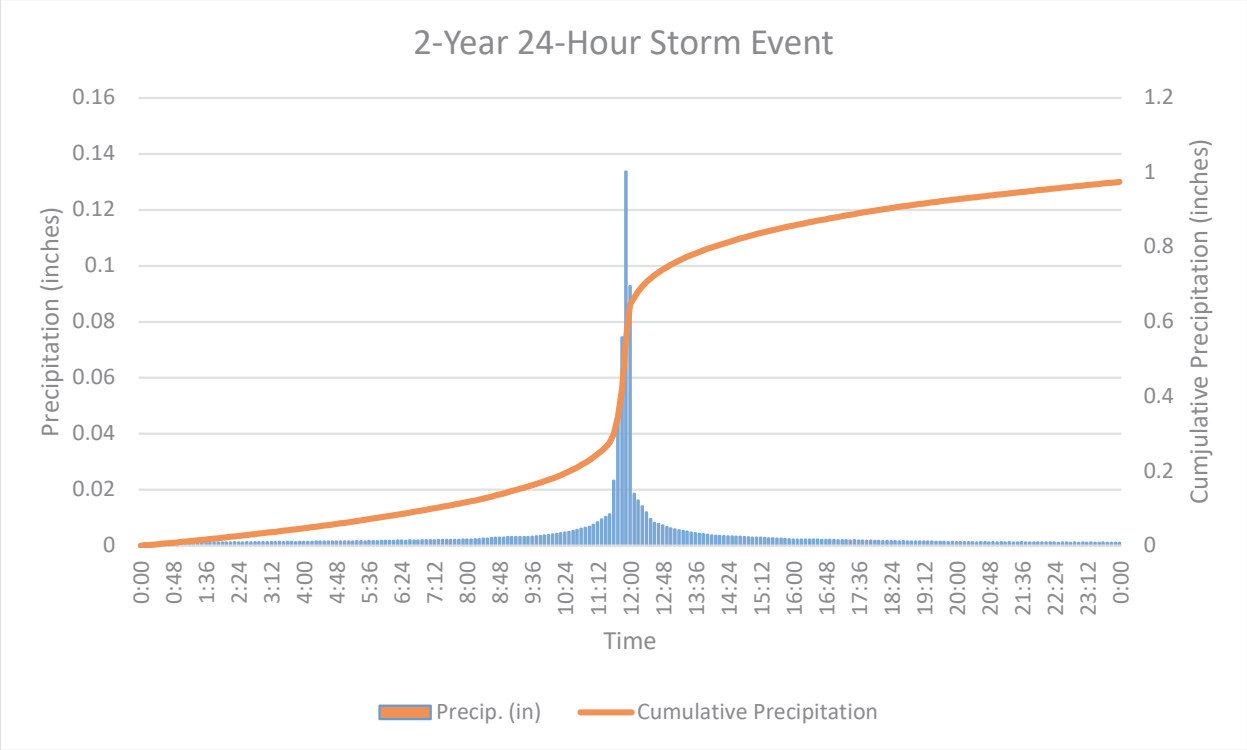
Please refer to NOAA Atlas 14 document for more information.

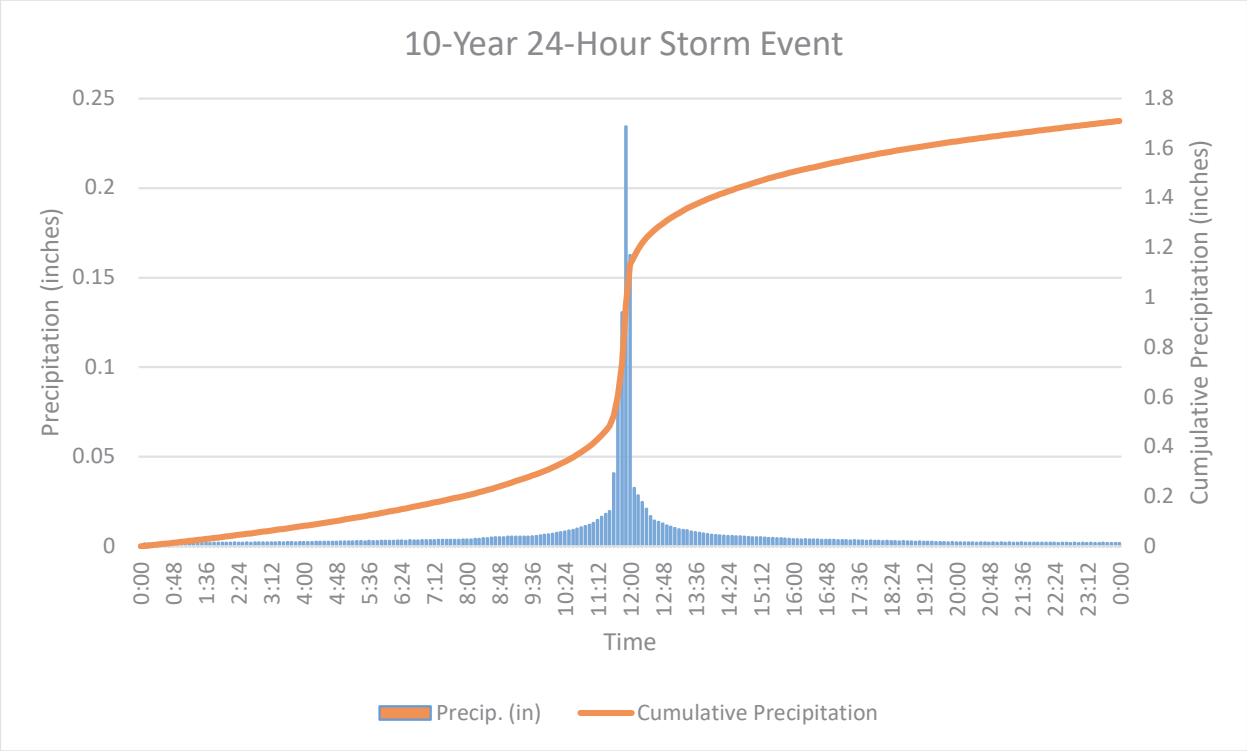
Source: NOAA (2023)

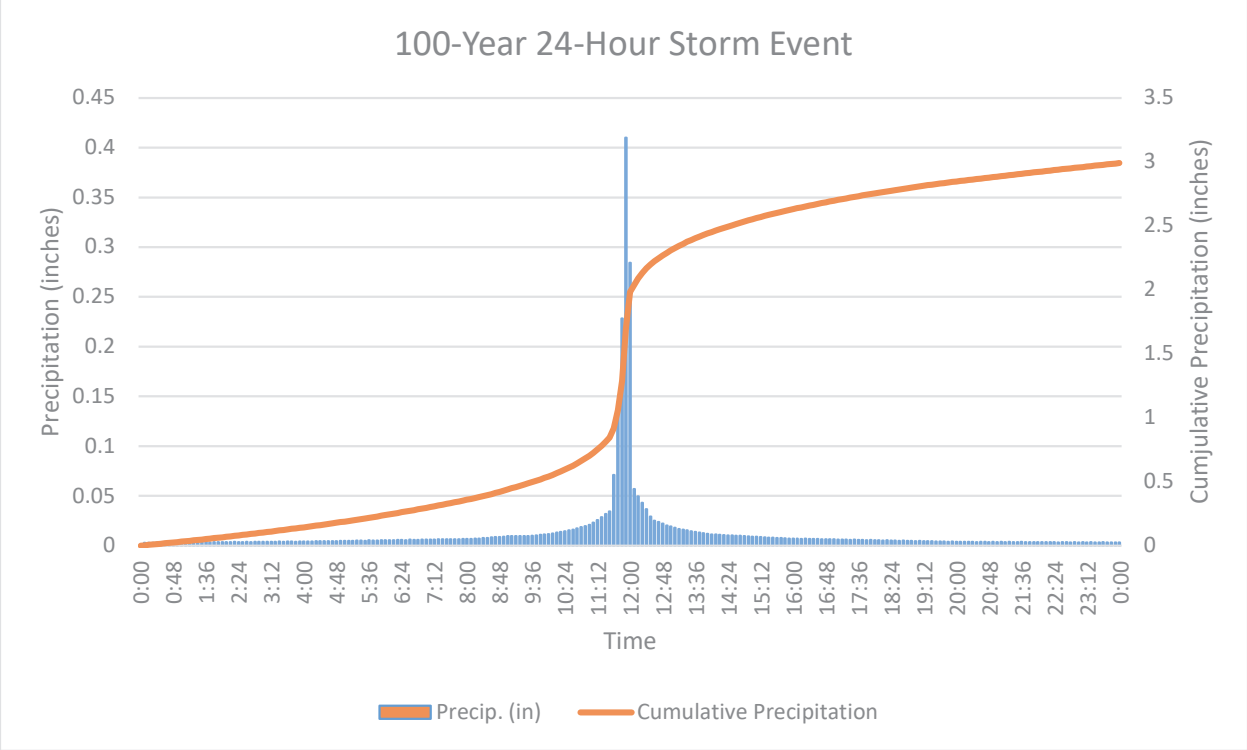


Source: NOAA (2023)

Precipitation Hyetograph




10-Year 24-Hour Storm Event
Precipitation (inches)
Cumjulative Precipitation (inches)
0.25
0.2
0.15
0.1
0.05
0
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0:00
0:48
1:36
2:24
3:12
4:00
4:48
5:36
6:24
7:12
8:00
8:48
9:36
10:24
11:12
12:00
12:48
13:36
14:24
15:12
16:00
16:48
17:36
18:24
19:12
20:00
20:48
21:36
22:24
23:12
0:00
Time
Precip. (in)
Cumulative Precipitation

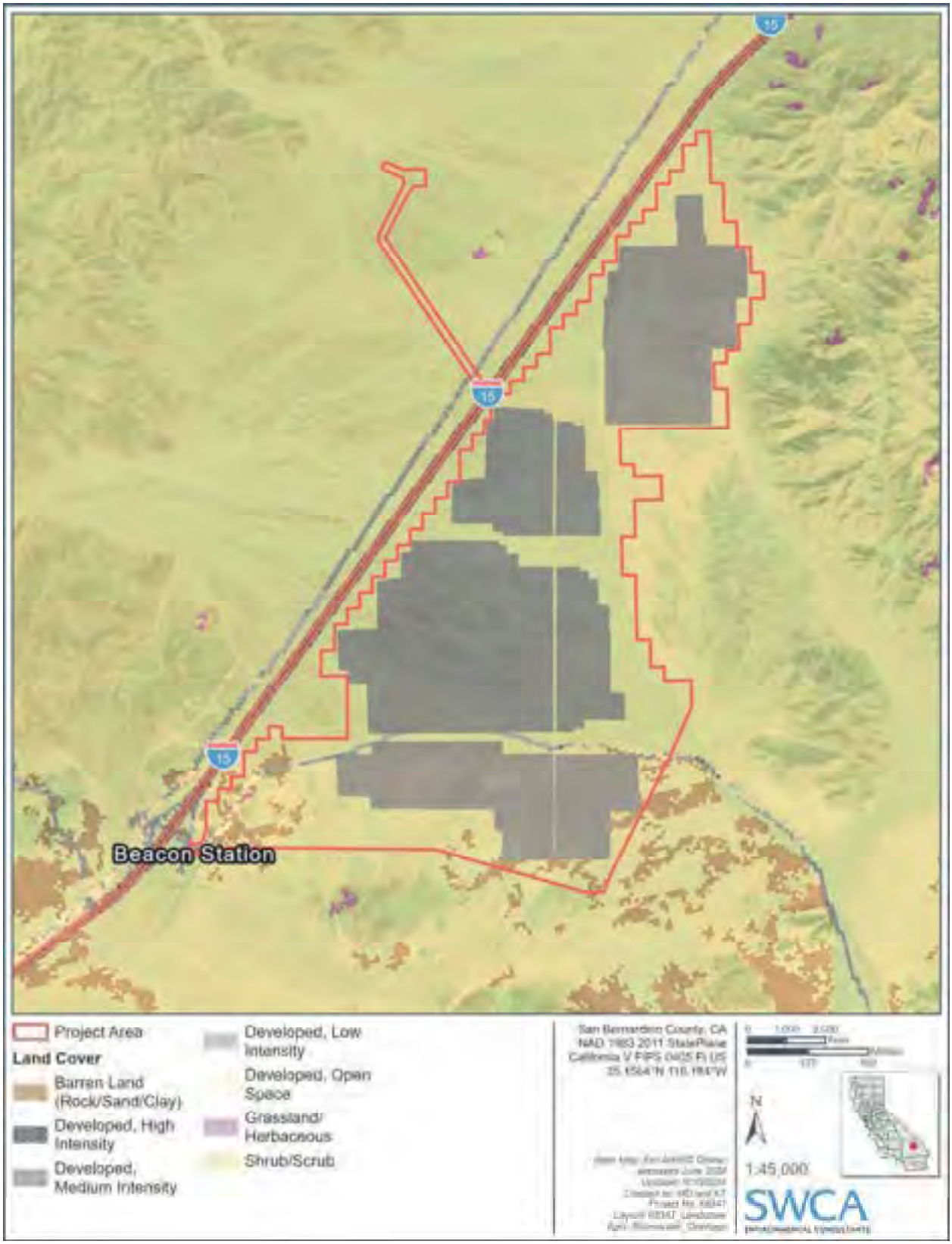

100-Year 24-Hour Storm Event
Precipitation (inches)
Cumjulative Precipitation (inches)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
3.5
3
2.5
2
1.5
1
0.5
0
0:00
0:48
1:36
2:24
3:12
4:00
4:48
5:36
6:24
7:12
8:00
8:48
9:36
10:24
11:12
12:00
12:48
13:36
14:24
15:12
16:00
16:48
17:36
18:24
19:12
20:00
20:48
21:36
22:24
23:12
0:00
Time
Precip. (in)
Cumulative Precipitation

APPENDIX C

Soils and Land Cover Data

Pre-Development Land Cover Exhibit

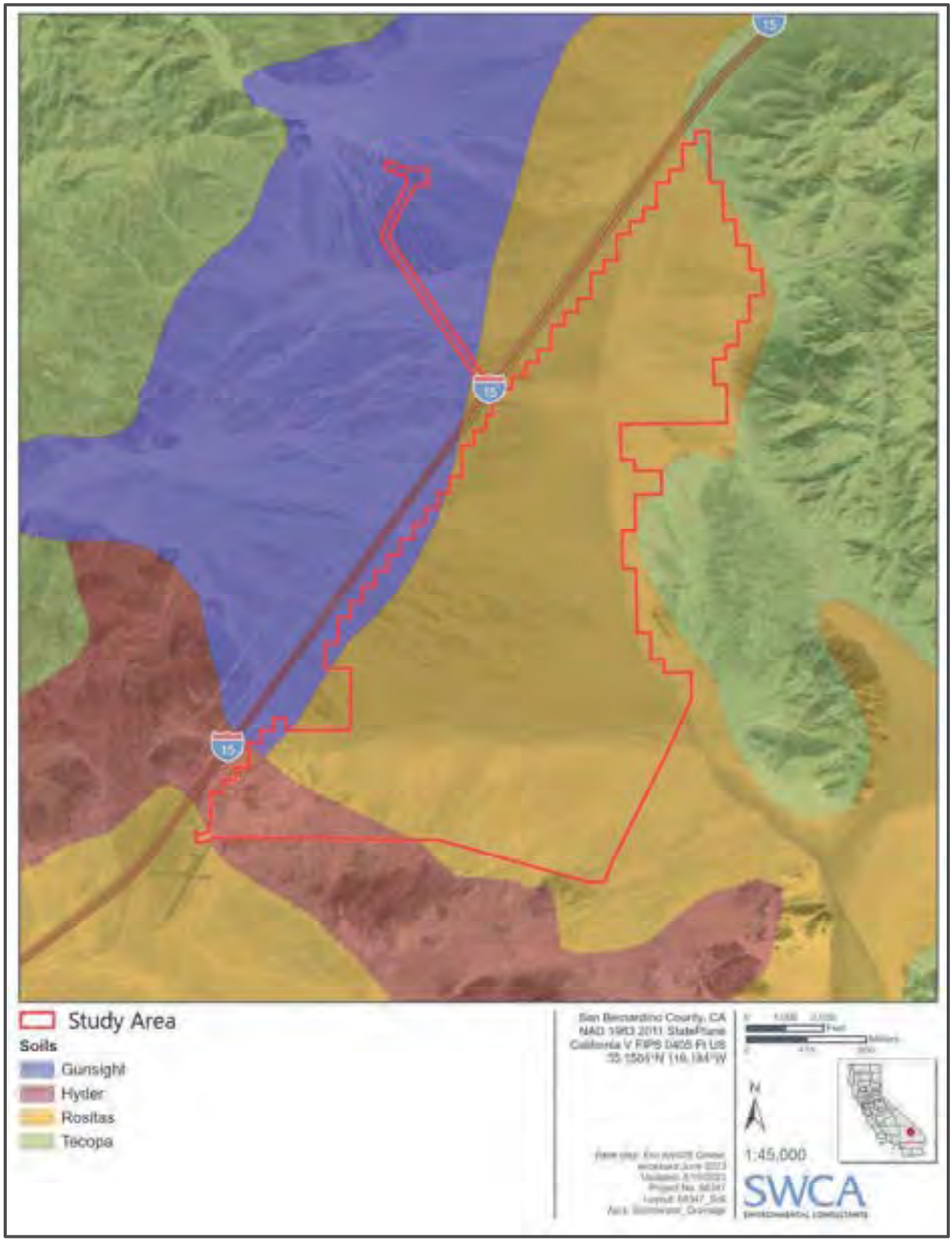
Post-Development Land Cover Exhibit

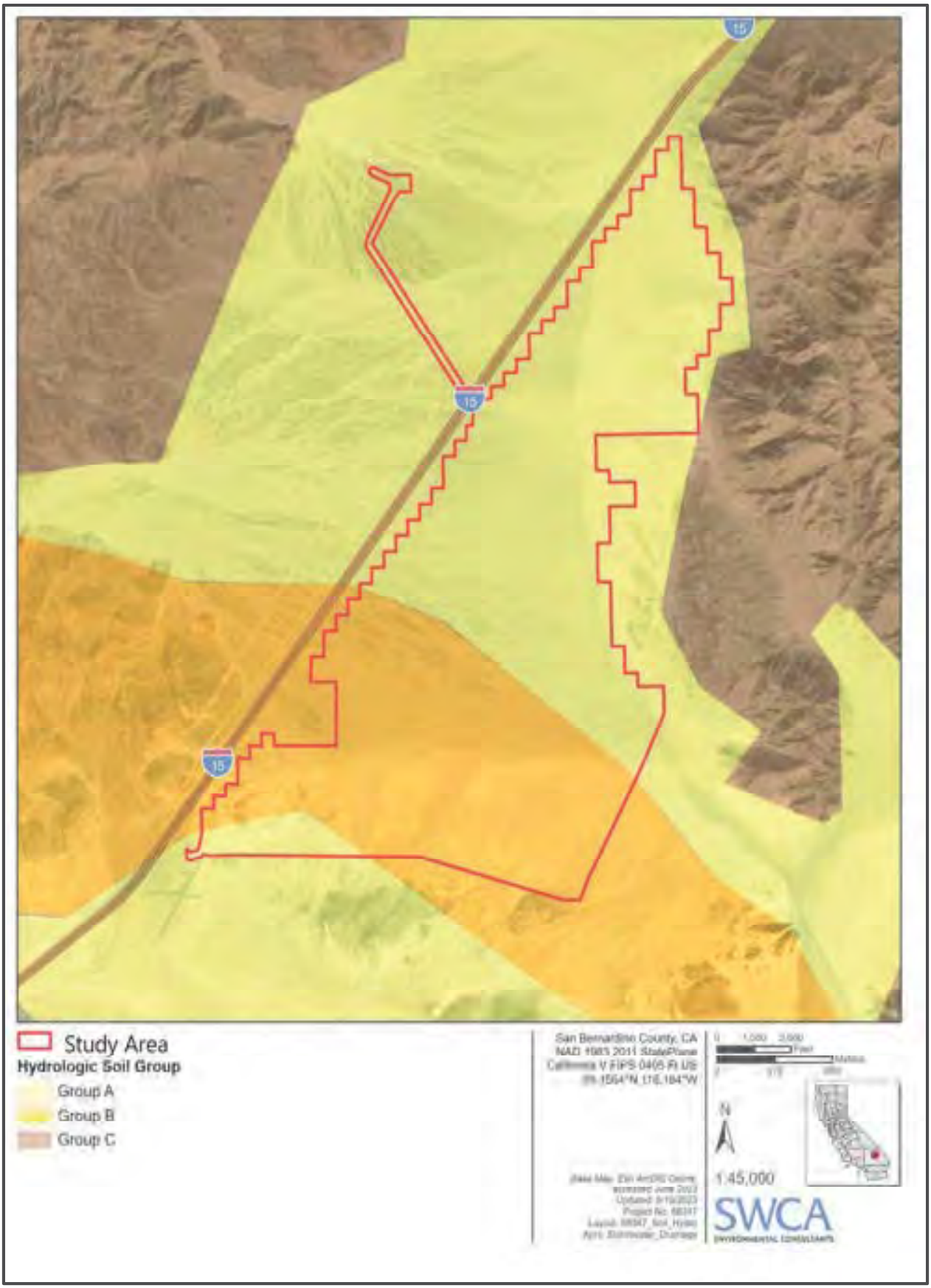


Pre-Development and Post-Development Land Cover Roughness and Percent Impervious Area

ID	Name	ManningsN	Percent Impervious
0	NoData	0.066	0
52	Shrub-Scrub	0.06	0
31	Barren Land Rock-Sand-Clay	0.025	0
22	Developed, Low Intensity	0.09	20
21	Developed, Open Space	0.03	10
71	Grassland-Herbaceous	0.04	0
23	Developed, Medium Intensity	0.1	40
24	Developed, High Intensity	0.15	80
90	Woody Wetlands	0.09	0
11	Open Water	0.035	100
42	Evergreen Forest	0.15	0
43	Mixed Forest	0.1	0
95	Emergent Herbaceous Wetlan...	0.075	0
81	Pasture-Hay	0.035	0
82	Cultivated Crops	0.035	0
41	Deciduous Forest	0.15	0

Natural Resources Conservation Service Soils Information




15
15
15
Study Area
Hydrologic Soil Group
Group A
Group B
Group C
San Bernardino County, CA
NAD 1983 2011 StatePlane
California V FIPS 0405 Ft US
(N 1564°N, 176,184°W
N
1:45,000
SWCA

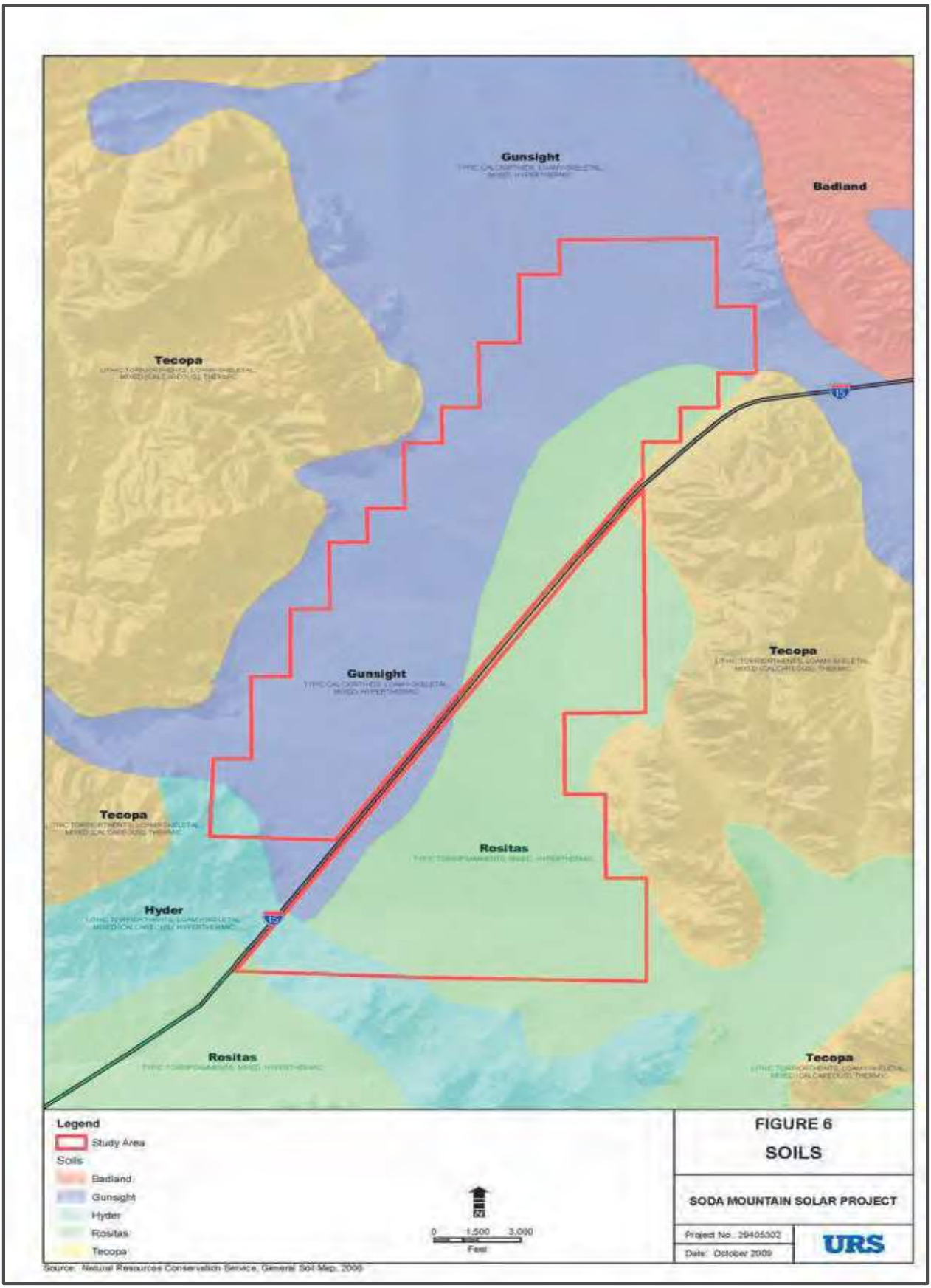

Gunsight
Badland
Tecopa
Gunsight
Tecopa
Tecopa
Rositas
Hyder
Rositas
Tecopa
Legend
Study Area
Soils
Badland
Gunsight
Hyder
Rositas
Tecopa
0 1,500 3,000
Feet
FIGURE 6
SOILS
SODA MOUNTAIN SOLAR PROJECT
Project No. 29405302
Date: October 2009
URS
Source: Natural Resources Conservation Service, General Soil Map, 2009

Table 2. Permissible Shear and Velocity for Selected Lining Materials[1]

Boundary Category	Boundary Type	Permissible Shear Stress (lb/sq ft)	Permissible Velocity (ft/sec)	Citation(s)
Soils	Fine colloidal sand	0.02 - 0.03	1.5	A
	Sandy loam (noncolloidal)	0.03 - 0.04	1.75	A
	Alluvial silt (noncolloidal)	0.045 - 0.05	2	A
	Silty loam (noncolloidal)	0.045 - 0.05	1.75 – 2.25	A
	Firm loam	0.075	2.5	A
	Fine gravels	0.075	2.5	A
	Stiff clay	0.26	3 – 4.5	A, F
	Alluvial silt (colloidal)	0.26	3.75	A
	Graded loam to cobbles	0.38	3.75	A
	Graded silts to cobbles	0.43	4	A
	Shales and hardpan	0.67	6	A
Gravel/Cobble	1-in.	0.33	2.5 – 5	A
	2-in.	0.67	3 – 6	A
	6-in.	2.0	4 – 7.5	A
	12-in.	4.0	5.5 – 12	A
Vegetation	Class A turf	3.7	6 – 8	E, N
	Class B turf	2.1	4 - 7	E, N
	Class C turf	1.0	3.5	E, N
	Long native grasses	1.2 – 1.7	4 – 6	G, H, L, N
	Short native and bunch grass	0.7 - 0.95	3 – 4	G, H, L, N
	Reed plantings	0.1-0.6	N/A	E, N
	Hardwood tree plantings	0.41-2.5	N/A	E, N
Temporary Degradable RECPs	Jute net	0.45	1 – 2.5	E, H, M
	Straw with net	1.5 – 1.65	1 – 3	E, H, M
	Coconut fiber with net	2.25	3 – 4	E, M
	Fiberglass roving	2.00	2.5 – 7	E, H, M
Non-Degradable RECPs	Unvegetated	3.00	5 – 7	E, G, M
	Partially established	4.0-6.0	7.5 – 15	E, G, M
	Fully vegetated	8.00	8 – 21	F, L, M
Riprap	6 – in. d_{50}	2.5	5 – 10	H
	9 – in. d_{50}	3.8	7 – 11	H
	12 – in. d_{50}	5.1	10 – 13	H
	18 – in. d_{50}	7.6	12 – 16	H
	24 – in. d_{50}	10.1	14 – 18	E
Soil Bioengineering	Wattles	0.2 – 1.0	3	C, I, J, N
	Reed fascine	0.6-1.25	5	E
	Coir roll	3 - 5	8	E, M, N
	Vegetated coir mat	4 - 8	9.5	E, M, N
	Live brush mattress (initial)	0.4 – 4.1	4	B, E, I
	Live brush mattress (grown)	3.90-8.2	12	B, C, E, I, N
	Brush layering (initial/grown)	0.4 - 6.25	12	E, I, N
	Live fascine	1.25-3.10	6 - 8	C, E, I, J
	Live willow stakes	2.10-3.10	3 – 10	E, N, O
Hard Surfacing	Gabions	10	14 – 19	D
	Concrete	12.5	>18	H

[1] Ranges of values generally reflect multiple sources of data or different testing conditions.

A. Chang, H.H. (1988).
B. Florineth, (1982)
C. Gerstgraser, C. (1998).
D. Goff, K. (1999).
E. Gray, D.H., and Sotir, R.B. (1996).
F. Julien, P.Y. (1995).
G. Kouwen, N.; Li, R. M.; and Simons, D.B., (1980).
H. Norman, J. N. (1975).
I. Schiechtl, H. M. and R. Stern. (1996).
J. Schoklitsch, A. (1937).
K. Sprague, C.J. (1999).
L. Temple, D.M. (1980).
M. TXDOT (1999)
N. Data from Author (2001)
O. USACE (1997).

SCS Curve Numbers and Infiltration Rates

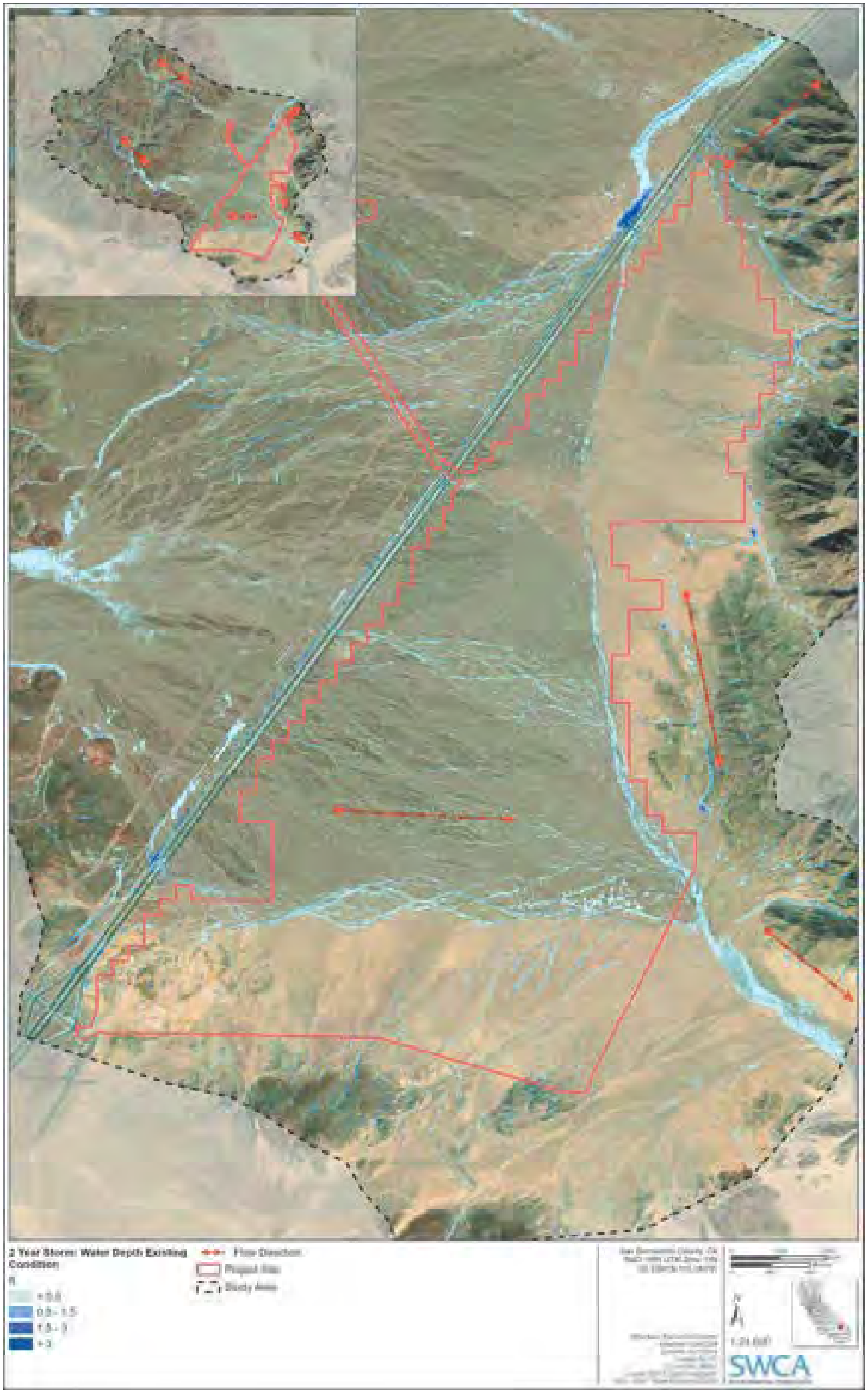
ID	Name	Curve Number	Abstraction Ratio	Minimum Infiltration Rate (in/hr)
0	NoData	90	0.2	0.14
1	NoData : C	80	0.2	0.18
2	NoData : A	60	0.2	0.41
3	NoData : B	70	0.2	0.27
4	Shrub-Scrub : NoData	92	0.2	0.14
5	Shrub-Scrub : C	92	0.2	0.18
6	Shrub-Scrub : A	83	0.2	0.41
7	Shrub-Scrub : B	89	0.2	0.27
8	Barren Land Rock-Sand-Clay : NoData	92	0.2	0.14
9	Barren Land Rock-Sand-Clay : C	92	0.2	0.18
10	Barren Land Rock-Sand-Clay : A	83	0.2	0.41
11	Barren Land Rock-Sand-Clay : B	89	0.2	0.27
12	Developed, Low Intensity : NoData	90	0.2	0.37
13	Developed, Low Intensity : C	80	0.2	0.45
14	Developed, Low Intensity : A	50	0.2	0.6
15	Developed, Low Intensity : B	65	0.2	0.78
16	Developed, Open Space : NoData	70	0.2	0.8
17	Developed, Open Space : C	70	0.2	0.8
18	Developed, Open Space : A	50	0.2	0.8
19	Developed, Open Space : B	60	0.2	0.8
20	Grassland-Herbaceous : NoData	80	0.2	0.31
21	Grassland-Herbaceous : C	80	0.2	0.4

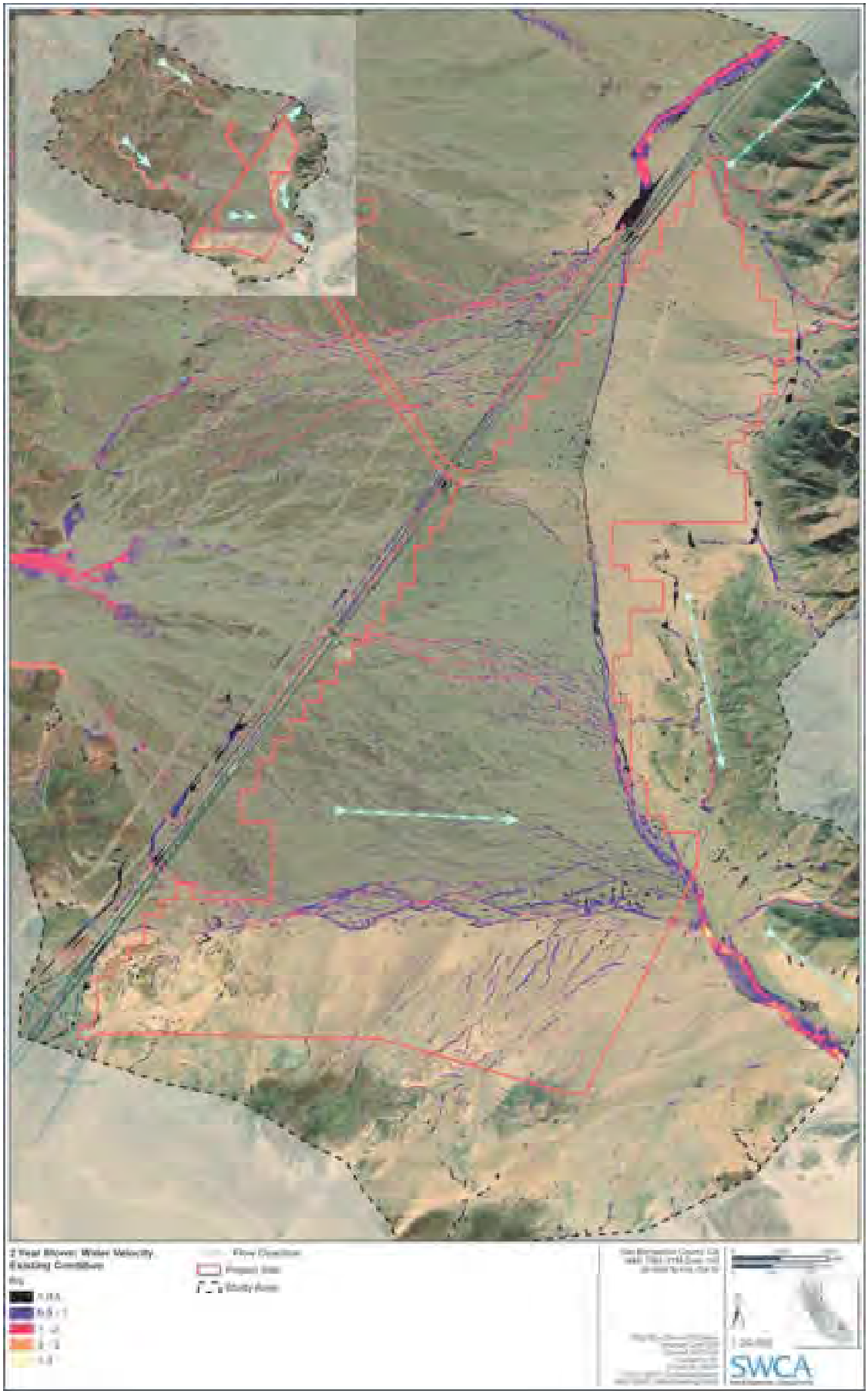
22	Grassland-Herbaceous : A	70	0.2	0.82
23	Grassland-Herbaceous : B	60	0.2	0.56
24	Developed, Medium Intensity : NoData	85	0.2	0.29
25	Developed, Medium Intensity : C	85	0.2	0.34
26	Developed, Medium Intensity : A	60	0.2	0.58
27	Developed, Medium Intensity : B	77	0.2	0.45
28	Developed, High Intensity : NoData	95	0.2	0.18
29	Developed, High Intensity : C	95	0.2	0.22
30	Developed, High Intensity : A	65	0.2	0.39
31	Developed, High Intensity : B	80	0.2	0.3
32	Woody Wetlands : NoData	75	0.2	0.4
33	Woody Wetlands : C	75	0.2	0.5
34	Woody Wetlands : A	60	0.2	0.95
35	Woody Wetlands : B	45	0.2	0.69
36	Open Water : NoData	98	0.2	0.01
37	Open Water : C	98	0.2	0.01
38	Open Water : A	98	0.2	0.01
39	Open Water : B	98	0.2	0.01
40	Evergreen Forest : NoData	70	0.2	0.4
41	Evergreen Forest : C	70	0.2	0.5
42	Evergreen Forest : A	40	0.2	0.95

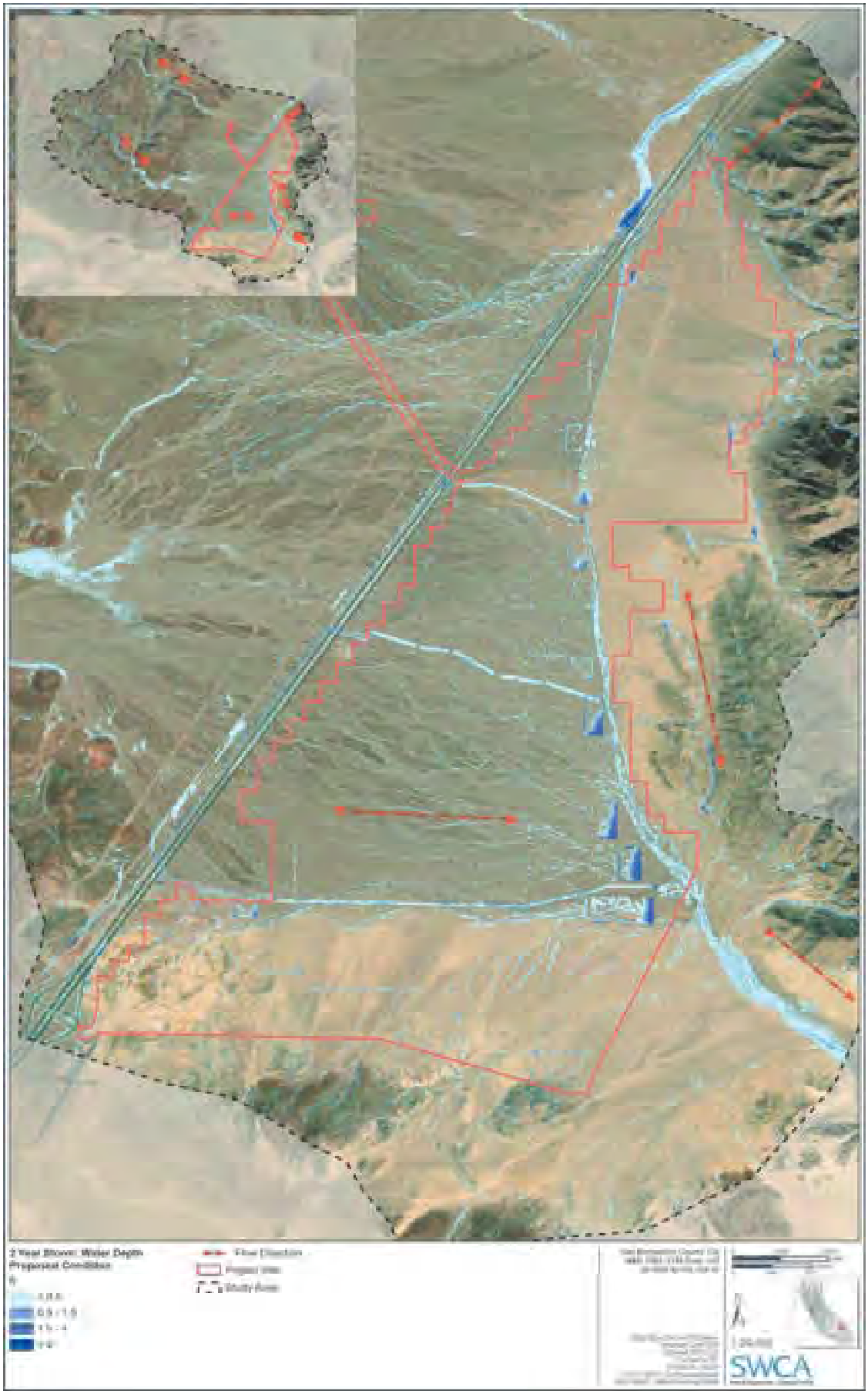
43	Evergreen Forest : B	55	0.2	0.69
44	Mixed Forest : NoData	75	0.2	0.4
45	Mixed Forest : C	75	0.2	0.5
46	Mixed Forest : A	60	0.2	0.95
47	Mixed Forest : B	68	0.2	0.69
48	Emergent Herbaceous Wetlands : NoD...	80	0.2	0.4
49	Emergent Herbaceous Wetlands : C	80	0.2	0.5
50	Emergent Herbaceous Wetlands : A	60	0.2	0.95
51	Emergent Herbaceous Wetlands : B	70	0.2	0.69
52	Pasture-Hay : NoData	80	0.2	0.22
53	Pasture-Hay : C	80	0.2	0.29
54	Pasture-Hay : A	60	0.2	0.59
55	Pasture-Hay : B	70	0.2	0.41
56	Cultivated Crops : NoData	80	0.2	0.22
57	Cultivated Crops : C	80	0.2	0.29
58	Cultivated Crops : A	60	0.2	0.59
59	Cultivated Crops : B	70	0.2	0.41
60	Deciduous Forest : NoData	75	0.2	0.4
61	Deciduous Forest : C	75	0.2	0.5
62	Deciduous Forest : A	60	0.2	0.95
63	Deciduous Forest : B	68	0.2	0.69

APPENDIX D

HEC-RAS Model Results


2 Year Storm Water Depth Existing Condition
ft
+ 0.5
0.5 - 1.5
1.5 - 3
+ 3
Flow Direction
Project Site
Study Area
1:24,000
SWCA


SWCA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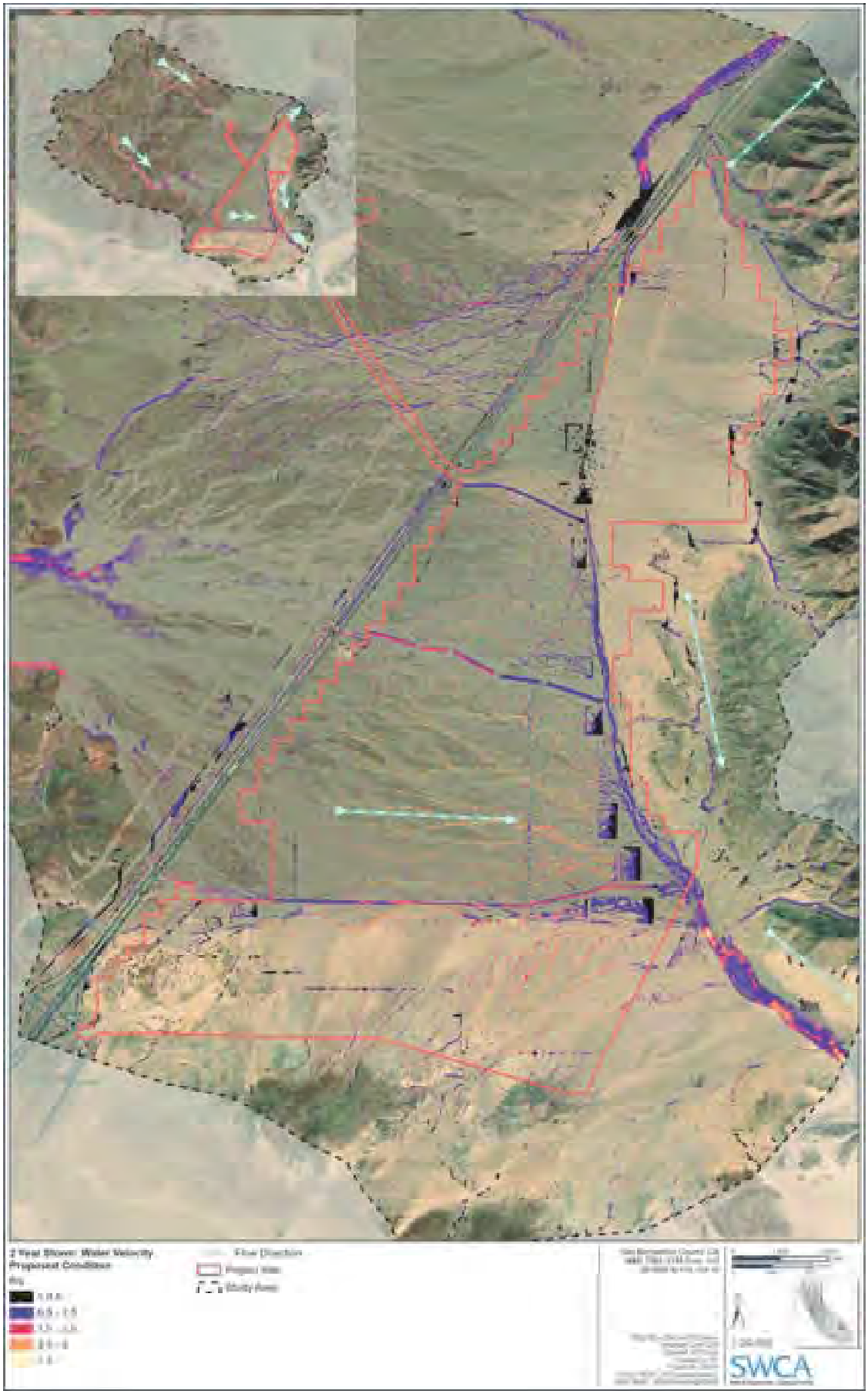
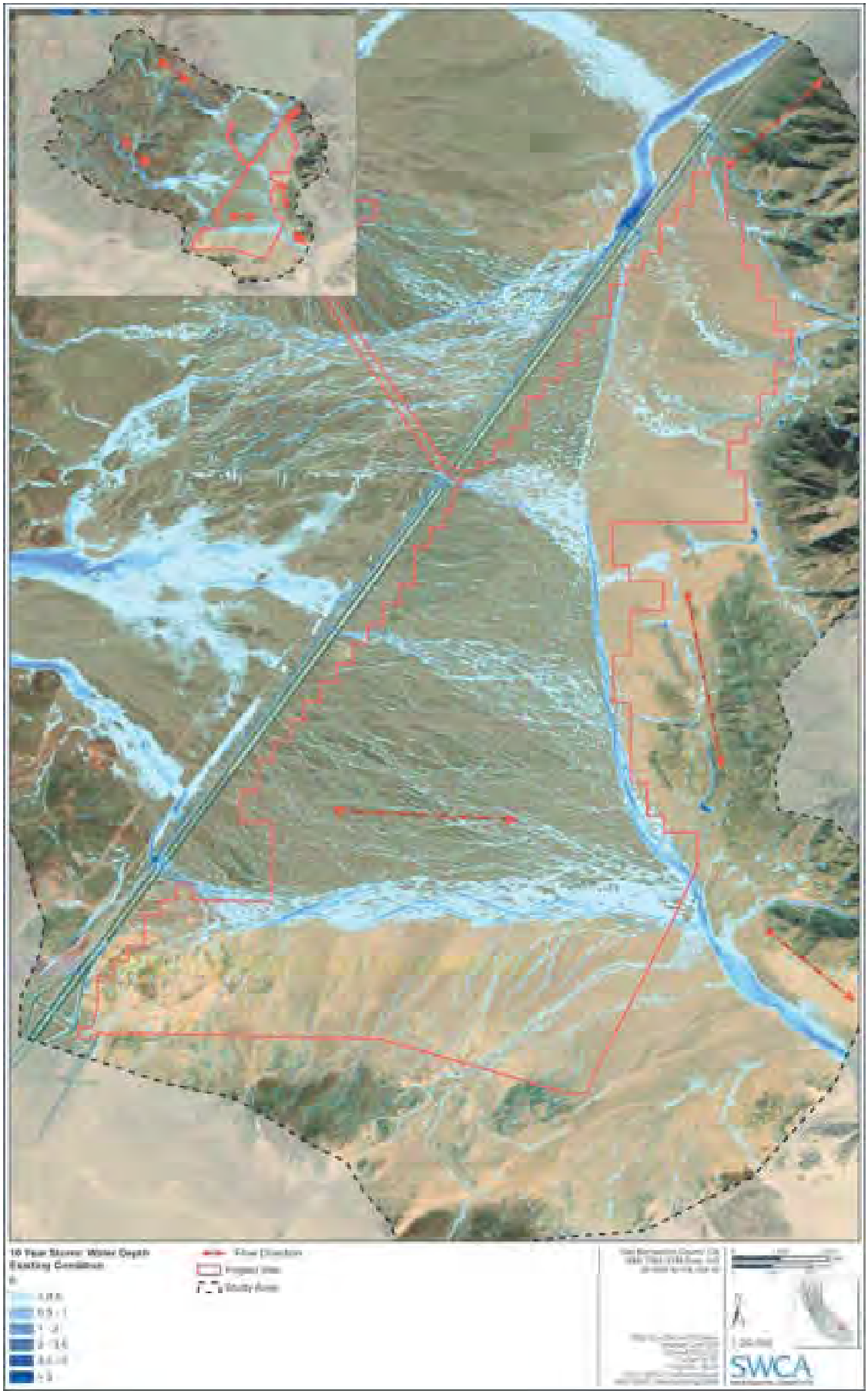
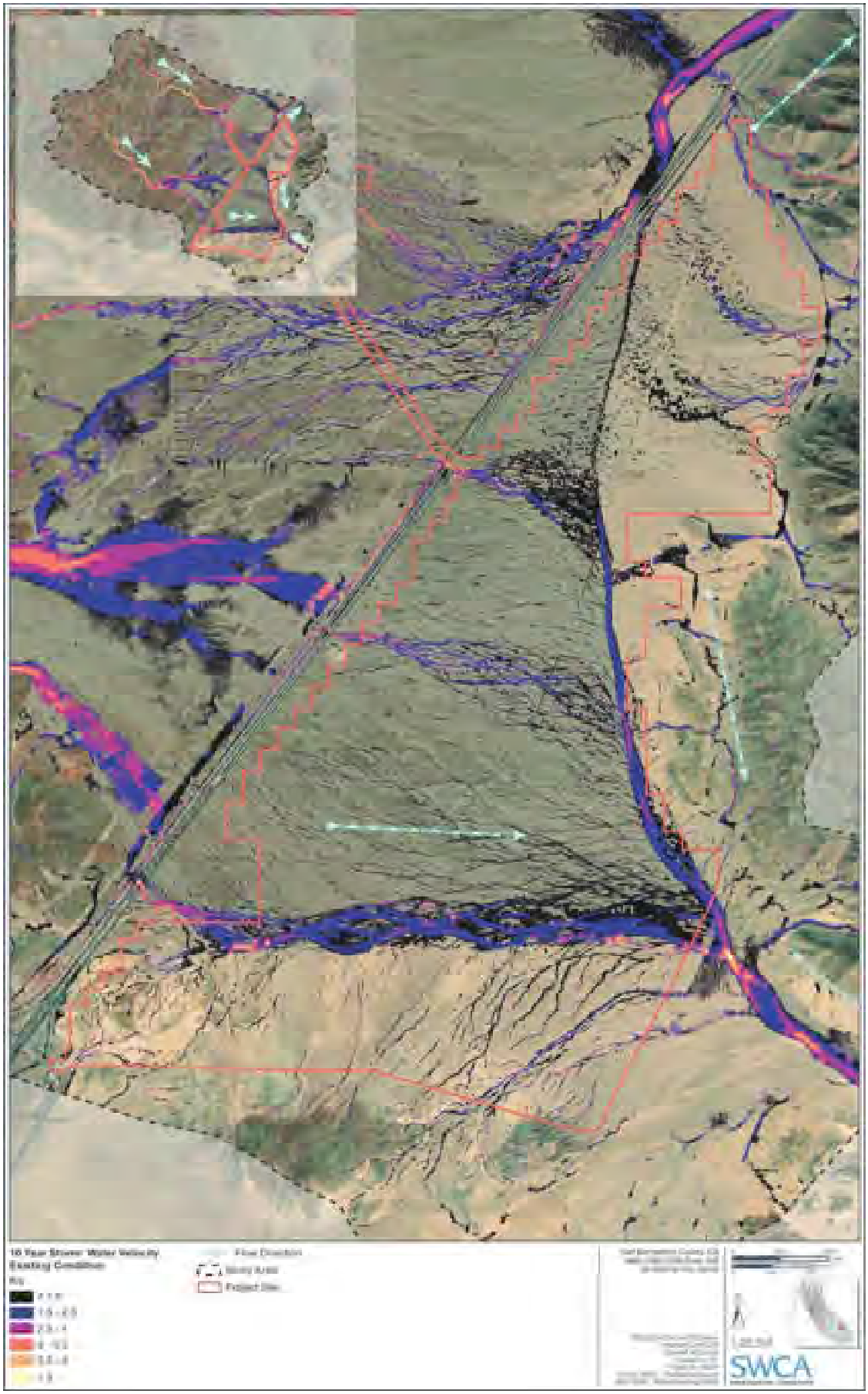
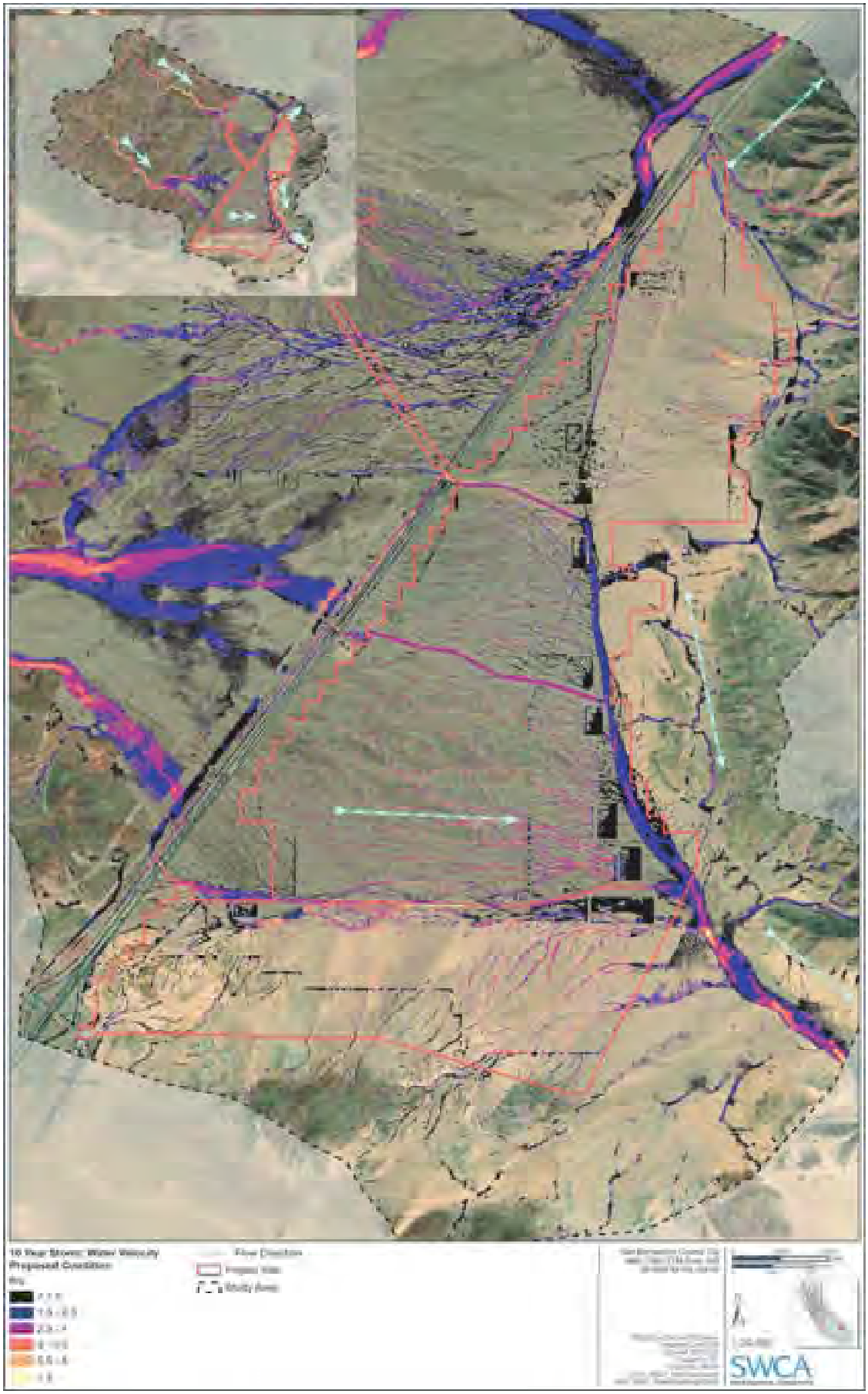
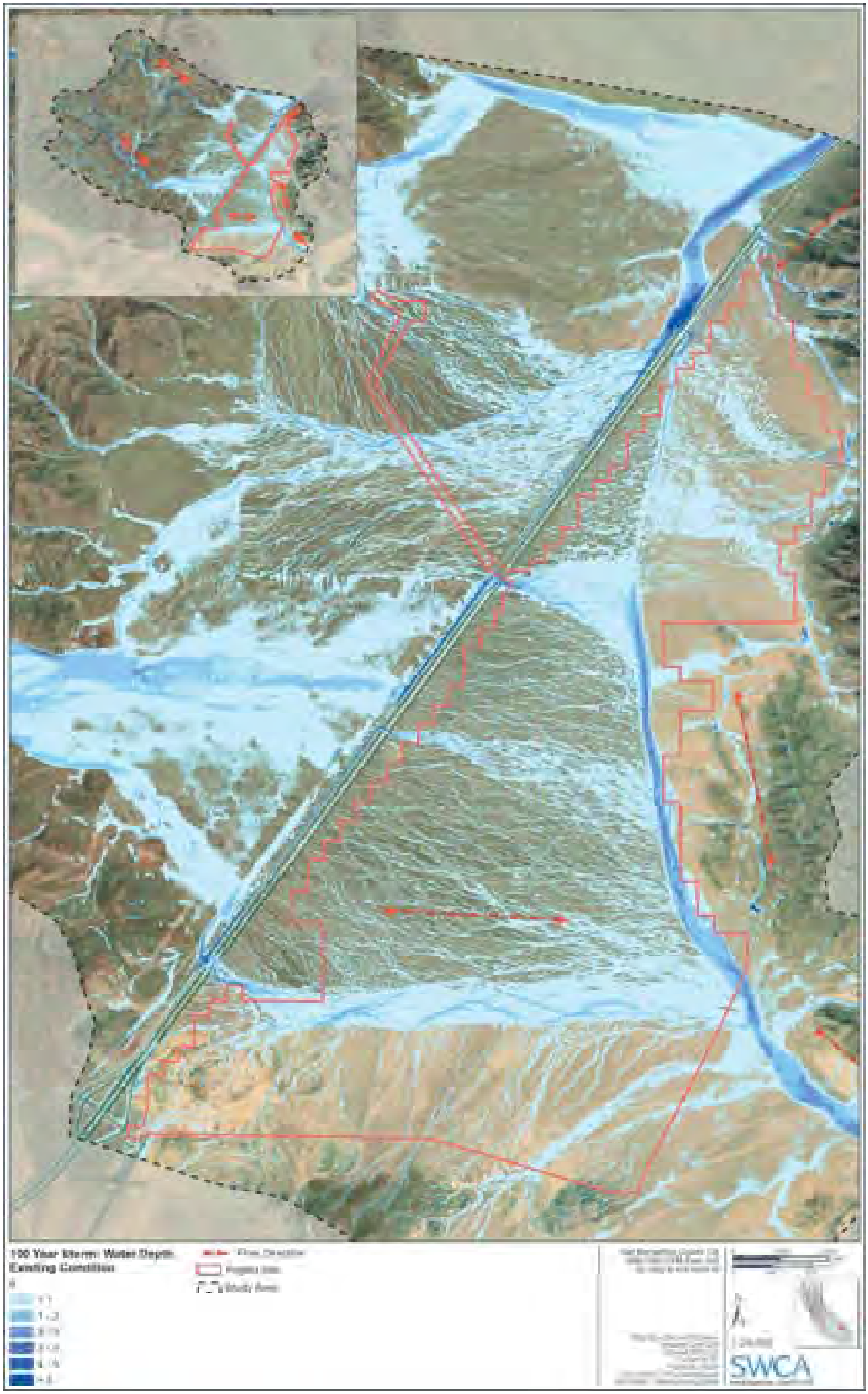

2 Year Storm Water Velocity
Proposed Condition
Flow Direction
Project Site
Study Area
SWCA

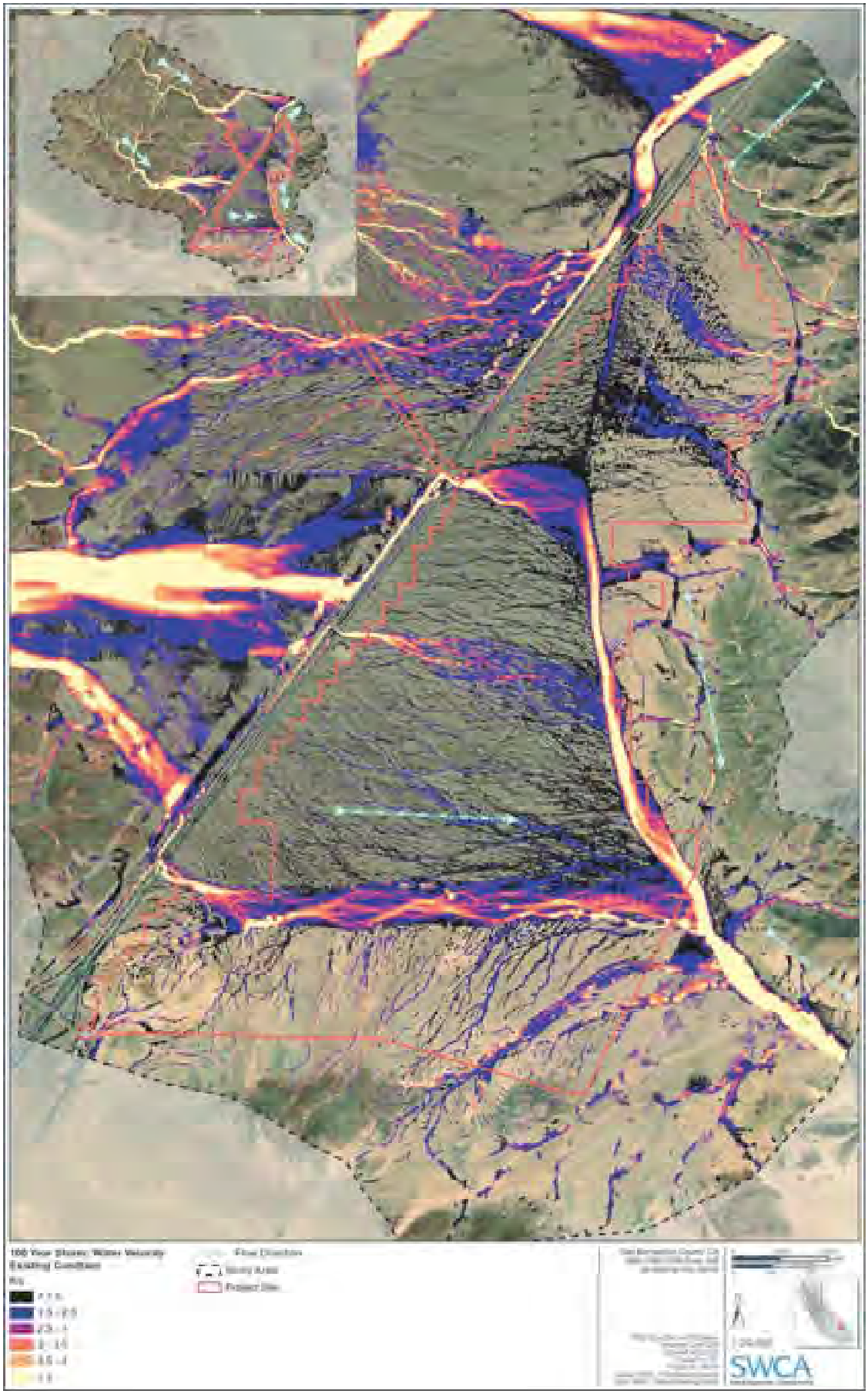

10 Year Storm Water Depth
Existing Condition
Flow Direction
Project Site
Study Area
SWCA

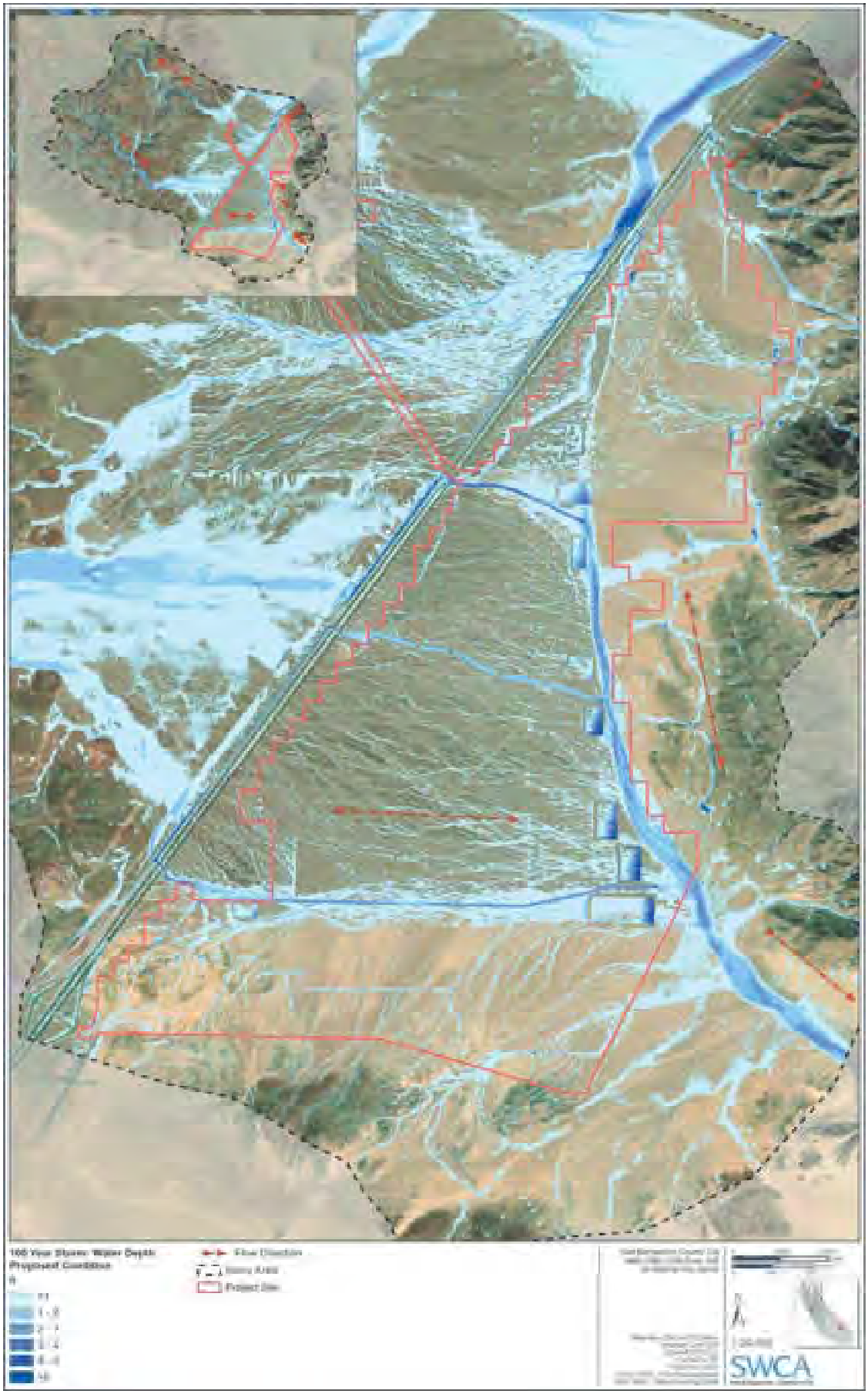

SWCA

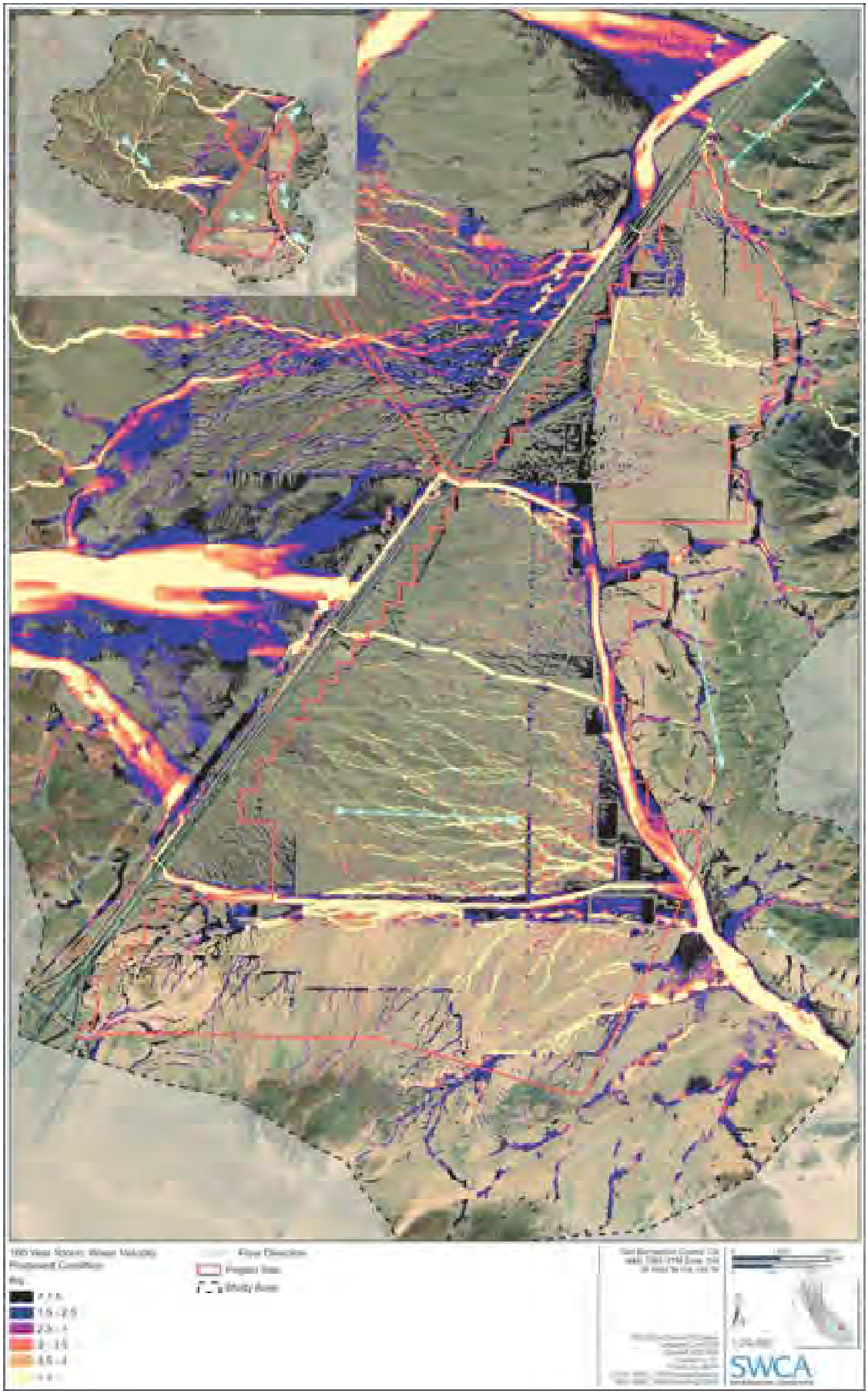
10 Year Storm: Water Depth
Proposed Condition
ft
0.5 - 1
Flow Direction
Project Site
Study Area
SWCA

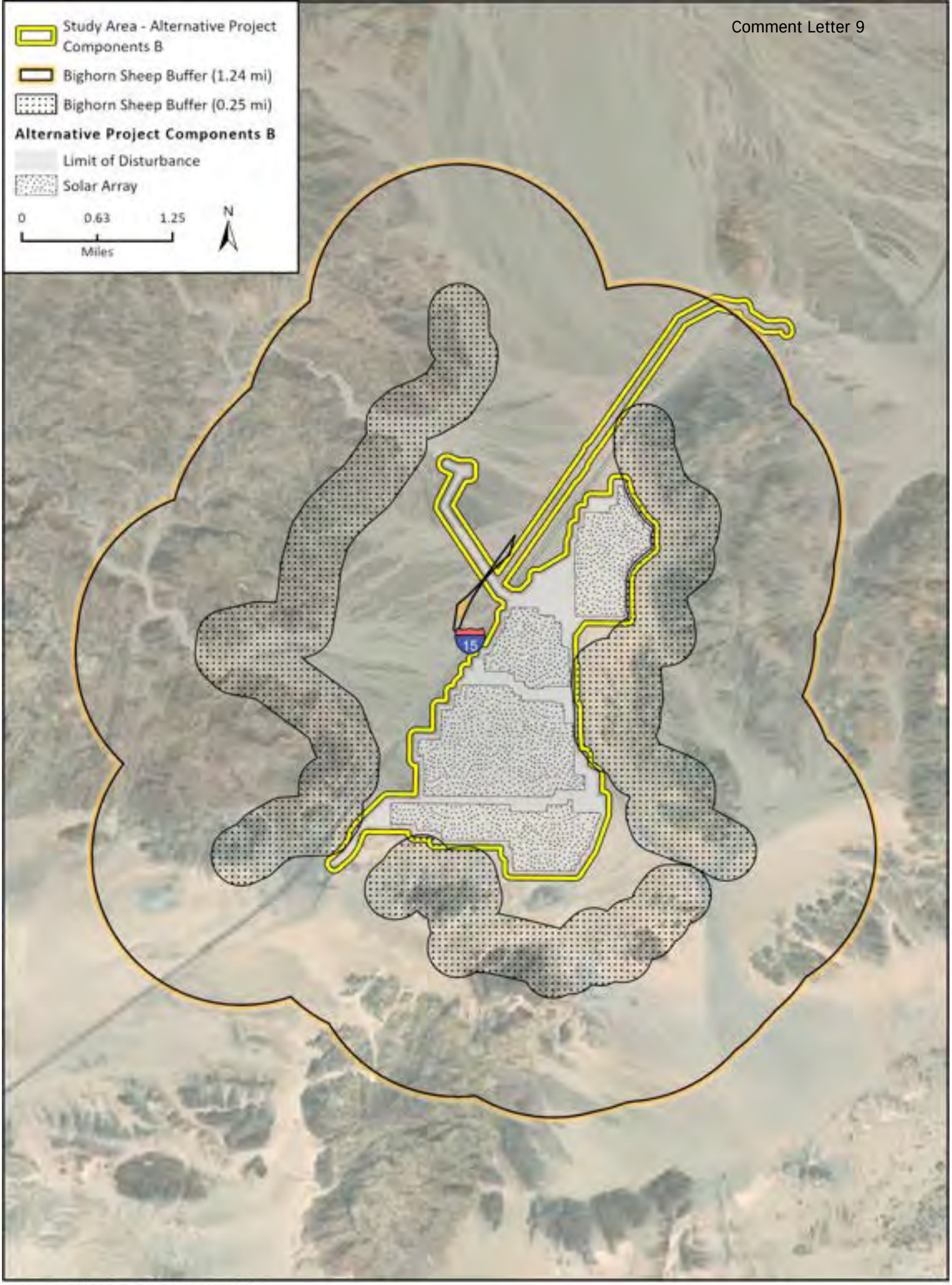

10 Year Storm: Water Velocity
Proposed Condition
Flow Direction
Project Site
Study Area
SWCA


100 Year Storm: Water Depth
Existing Condition
Flow Direction
Project Site
Study Area
SWCA

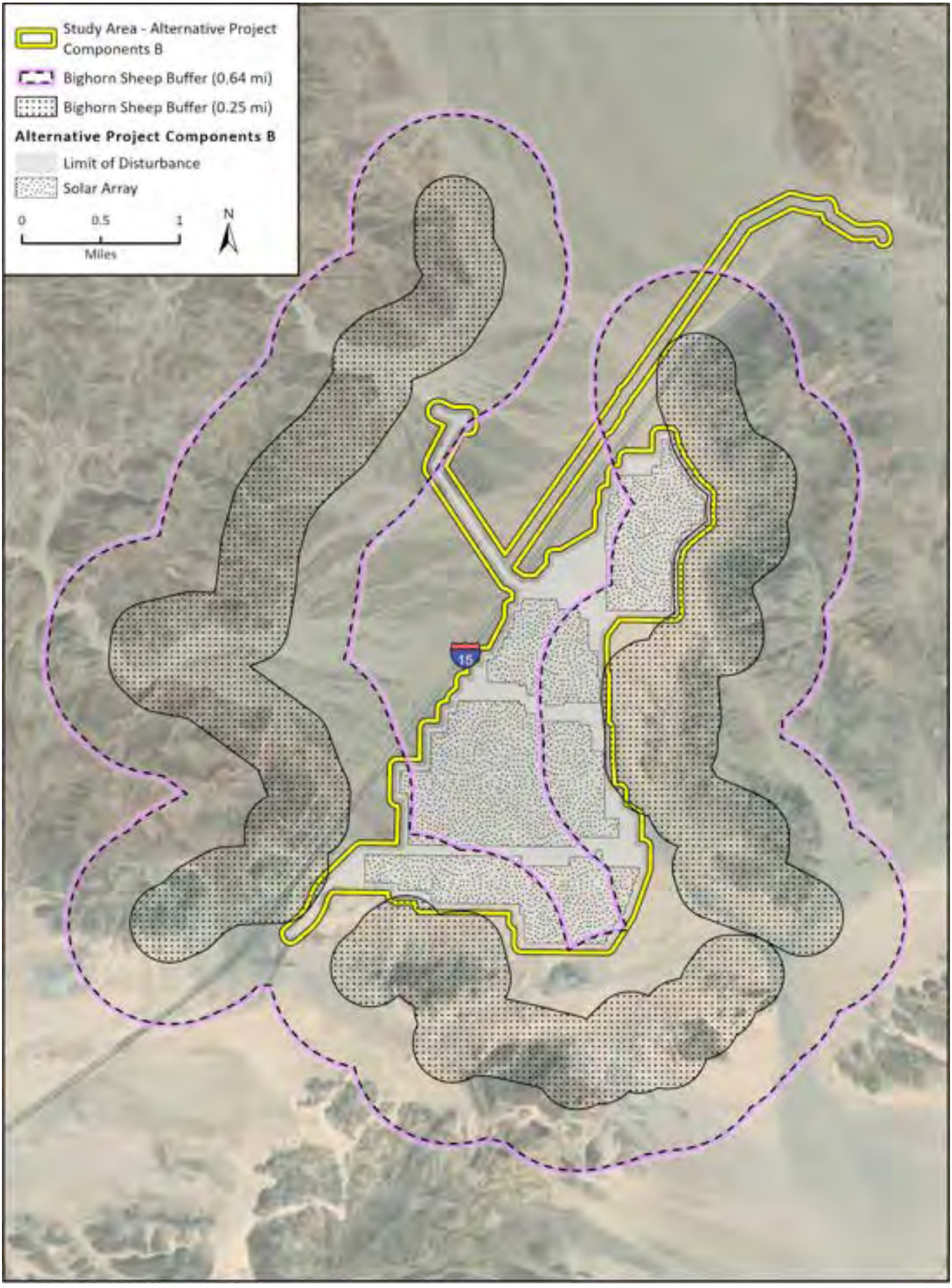

100 Year 24-hour Water Velocity
Existing Condition
SWCA


100 Year Storm Water Depth
Proposed Condition
Flow Direction
Project Site
SWCA


Flow Direction
Project Site
Study Area
SWCA



Imagery provided by Esri and its licensors © 2026.


Study Area - Alternative Project Components B
Bighorn Sheep Buffer (0.64 mi)
Bighorn Sheep Buffer (0.25 mi)
Alternative Project Components B
Limit of Disturbance
Solar Array
0
0.5
1
Miles
N
15

Comment Received From: Baker Community Services District Kenia Rodriguez
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

BCSD opposition to proposed Soda Mt Solar Porject

February 19, 2026

California Energy Commission
715 P Street
Sacramento, CA 95814

BAKER COMMUNITY SERVICES DISTRICT OPPOSITION TO PROPOSED SODA MOUNTAIN SOLAR PROJECT

Dear California Energy Commission,

On behalf of the Baker Community Services District (Baker CSD), I am writing to express our adamant opposition to the Soda Mountain Solar Project that is seeking authorization from your agency.

The Baker CSD is home to over 700 residents and has been authorized by the Local Agency Formation Commission (LAFCO) to provide the following functions: water, sewer, street lighting, fire protection, TV translator, solid waste, and park and recreation. The Baker CSDâ€™s service area includes 4.5 square miles located along the Interstate 15 corridor, has numerous tourism related businesses and is a unique desert community that is an attraction for visitors traveling to and from the Las Vegas area and is also considered a gateway to the Mojave National Preserve. We are the closest town to this proposed project.

Alongside hundreds of county residents, local organizations, businesses, scientists, recreation groups, gateway communities, the California Department of Fish and Wildlife and the National Park Service, we spoke out against the Soda Mountain Solar Project in the past and collectively warned of the threats of this project to wildlife such as the desert bighorn sheep, recreation, the Mojave National Preserve, water resources, and our tourism economy. 10-1

Thankfully, the San Bernardino County Board of Supervisors rejected certifying the project under the California Environmental Quality Act (CEQA) in 2016. Rather than learn its lesson and avoid developing this region, the new project developers are proposing to develop in the same South Soda Mountains area and seeking to fast track under new state regulation.

The Soda Mountain Solar Project undermines our countyâ€™s interests, harms communities, jeopardizes a national park unit and contradicts our countyâ€™s renewable energy ordinance. The proposed water source for the project is located just

February 19, 2026

California Energy Commission
715 P Street
Sacramento, CA 95814

BAKER COMMUNITY SERVICES DISTRICT OPPOSITION TO PROPOSED SODA MOUNTAIN SOLAR PROJECT

Dear California Energy Commission,

On behalf of the Baker Community Services District (Baker CSD), I am writing to express our adamant opposition to the Soda Mountain Solar Project that is seeking authorization from your agency.

The Baker CSD is home to over 700 residents and has been authorized by the Local Agency Formation Commission (LAFCO) to provide the following functions: water, sewer, street lighting, fire protection, TV translator, solid waste, and park and recreation. The Baker CSD's service area includes 4.5 square miles located along the Interstate 15 corridor, has numerous tourism related businesses and is a unique desert community that is an attraction for visitors traveling to and from the Las Vegas area and is also considered a gateway to the Mojave National Preserve. We are the closest town to this proposed project.

Alongside hundreds of county residents, local organizations, businesses, scientists, recreation groups, gateway communities, the California Department of Fish and Wildlife and the National Park Service, we spoke out against the Soda Mountain Solar Project in the past and collectively warned of the threats of this project to wildlife such as the desert bighorn sheep, recreation, the Mojave National Preserve, water resources, and our tourism economy.

Thankfully, the San Bernardino County Board of Supervisors rejected certifying the project under the California Environmental Quality Act (CEQA) in 2016. Rather than learn its lesson and avoid developing this region, the new project developers are proposing to develop in the same South Soda Mountains area and seeking to fast track under new state regulation.

The Soda Mountain Solar Project undermines our county's interests, harms communities, jeopardizes a national park unit and contradicts our county's renewable energy ordinance. The proposed water source for the project is located just outside our CSD boundary, but it is from same water table of the CSD, and it therefore has this additional, direct impact to the interests of the CSD. 10-2

We write this letter to yet again express our strong opposition to the Soda Mountain Solar Project.

Sincerely,

Greg Bowman
General Manager
Baker Community Services District

Comment Received From: Yuhaaviatam of San Manuel Nation
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Yuhaaviatam of San Manuel Nation Comment Letter

Additional submitted attachment is included below.

Yuhaaviatam of San Manuel Nation

February 25, 2026

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: Soda Mountain Solar Project – Docket Number 24-OPT-03 – OPPOSE

Dear Chair Hochschild and Members of the California Energy Commission:

On behalf of Yuhaaviatam of San Manuel Nation (Nation), a federally recognized Indian Tribe, I respectfully write in opposition to the proposed opt-in procedure for the Environmental Impact Report (EIR) for the Soda Mountain Solar Project.

While we recognize that the Commission is charged with advancing the state's energy policy, including the development of renewable energy resources, we value the diligence you bring to evaluating the potential impacts of projects that come before you, particularly where sensitive and fragile landscapes are concerned.

The proposed Soda Mountain Solar Project, located adjacent to the Mojave National Preserve within a sensitive and largely undisturbed desert ecosystem, as proposed, would adversely affect bighorn sheep—an animal of profound cultural and environmental significance to the Nation—as well as the broader surrounding environment.

As currently designed, the project site lies within a proposed wildlife corridor connecting the Soda and Cady Mountains to the Mojave National Preserve and is likely to significantly impede use of the Soda Mountain Wildlife Crossing by desert bighorn sheep. A failure to facilitate successful passage across this corridor would exacerbate the adverse effects of habitat fragmentation caused by Interstate 15. These impacts include reduced genetic diversity, increased inbreeding potential, and a heightened risk of vehicle-related mortality. 11-1

As stewards of our 7.4-million-acre ancestral territory spanning Los Angeles, Riverside, Kern, and San Bernardino Counties, we carry a sacred responsibility to protect and preserve our cultural resources, the environment, and the landscapes entrusted to us. Accordingly, we respectfully submit the following recommendations:

Establishment of Enhanced Buffer Zones

- Implementing a robust setback between the solar facility and critical habitat should be incorporated into any project design. This buffer should, at a minimum, meet the California Department of Fish and Wildlife's recommendation of 0.25 miles; however, we advocate extending the buffer up to 1.25 miles. 11-2

Project Deferment

- Delaying the 2,670-acre solar development until the wildlife crossing is completed, which is currently scheduled for late 2027, will allow for essential environmental studies to verify the crossing's efficacy for bighorn sheep prior to further development. 11-3

We support efforts to ensure effective wildlife movement and habitat connectivity, recognizing that these actions reflect a shared commitment to environmental sustainability and the preservation of natural resources. Such measures align with our values of protecting native wildlife and honoring our longstanding traditions of environmental stewardship.

For these reasons, we respectfully request that the California Energy Commission reject the opt-in procedure for the EIR and deny further approval of the Soda Mountain Solar Project as currently proposed.

The Nation welcomes the opportunity to work collaboratively with the California Energy Commission and remains committed to strengthening and maintaining a meaningful government-to-government relationship. Should you have any questions regarding the Nation's position, please contact Clifford Batten, Director of Environmental Management, at Clifford.Batten@sanmanuel-nsn.gov

Thank you for your consideration,

Lynn R. Valbuena

Lynn R. Valbuena
Chairwoman
Yuhaaviatam of San Manuel Nation

Comment Received From: Eastern Kern County Resource Conservation District
Submitted On: 2/12/2026
Docket Number: 24-OPT-03

Opposition to the Opt-in EIR of the Soda Mountain Solar Project

Additional submitted attachment is included below.

Eastern Kern County Resource Conservation District
300 S. Ridgecrest Rd.
Ridgecrest, CA 93555

February 9, 2026

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: Opposition to the Opt-in EIR of the Soda Mountain Solar Project near Baker, CA, Docket Number 24-OPT-03

Dear Chair Hochschild and Members of the California Energy Commission:

The Eastern Kern County Resource Conservation District (EKCRCD) respectfully submits this letter in opposition to the proposed opt-in procedure to the Environmental Impact Report (EIR) for the Soda Mountain Solar Project near Baker, California.

EKCRCD supports the development of renewable energy in California; however, such development must be responsibly sited to avoid irreversible harm to sensitive ecosystems, protected wildlife, and public trust lands. The Soda Mountain Solar Project is a poorly located, large-scale industrial facility proposed for an ecologically critical and largely undisturbed area adjacent to the Mojave National Preserve.

This 300-megawatt project would occupy approximately 2,670 acres of Bureau of Land Management land and has existed in various forms for nearly 20 years. It was rejected by the San Bernardino County Board of Supervisors in 2016 due to unacceptable environmental impacts and limited local benefit. The use of a state opt-in process to override local land-use decisions disregards that prior determination and undermines meaningful local and regional review.

12-1

The project site lies within a vital wildlife corridor connecting the Soda and Cady Mountains to the Mojave National Preserve. These corridors are essential for desert bighorn sheep movement, genetic diversity, and long-term population viability. The project's own EIR concludes that construction and operation would result in significant and unavoidable impacts to desert bighorn sheep, a Fully Protected species under California Fish and Game Code Section 4700, and would conflict with laws prohibiting take of such species.

Of particular concern is the project's proximity to a planned wildlife crossing over Interstate 15, designed to restore bighorn sheep connectivity disrupted by the freeway. Industrial-scale solar development in this location threatens to compromise the effectiveness of this crossing, undermining years of planning, public investment, and conservation science.

12-2

The project would also contribute to cumulative impacts on other sensitive desert species, including Mojave fringe-toed lizards, desert tortoises, burrowing owls, and native vegetation, while posing risks to scarce desert water resources through groundwater extraction and altered surface hydrology. These impacts outweigh the project's benefits, particularly given the availability of less damaging alternatives.

12-3

California can and must meet its renewable energy goals by prioritizing solar development on rooftops, parking lots, canals, and already-disturbed lands. Advances in technology make these options increasingly feasible without sacrificing intact desert ecosystems or threatening national parks and preserves.

For these reasons, EKCRCD urges the California Energy Commission to reject the opt-in procedure to the EIR and deny further approval of the Soda Mountain Solar Project.

Thank you for your consideration.

Sincerely,

Judith A. Decker
President, Board of Directors
Eastern Kern County Resource Conservation District

Comment Received From: Edward Lee LaRue, Jr.
Submitted On: 2/25/2026
Docket Number: 24-OPT-03

Formal comments of the SA-EIR

See attached comments

Additional submitted attachment is included below.

DESERT TORTOISE COUNCIL
3807 Sierra Highway #6-4514
Acton, CA 93510
www.deserttortoise.org
eac@deserttortoise.org

DESERT TORTOISE PRESERVE COMMITTEE, INC.
P.O. Box 940
Ridgecrest, CA 93556
www.Tortoise-Tracks.org
roger.dale@tortoise-tracks.org

Via email only

February 25, 2026

To: Lisa Worrall
California Energy Commission
715 P Street
Sacramento, CA 95814
STEPsiting@energy.ca.gov

Re: Draft Environmental Impact Report (Included Within Staff Assessment) for the Proposed Soda Mountain Solar Project (24-OPT-03)

Dear Ms. Worrall,

The Desert Tortoise Council (DTC) is a non-profit organization comprising 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 Mexico, the DTC routinely provides information and other forms of assistance to individuals, organizations, and regulatory agencies on matters potentially affecting desert tortoises within their geographic ranges.

The Desert Tortoise Preserve Committee (DTPC) is a non-profit organization formed in 1974 to promote the welfare of the desert tortoise in its native wild state. DTPC members share a deep concern for the continued preservation of the tortoise and its habitat in the southwestern deserts and are dedicated to the recovery and conservation of the desert tortoise and other rare and endangered species inhabiting the Mojave and western Sonoran deserts. The DTPC has a long track record of protecting desert tortoises and their habitat through land acquisition, preserve management, mitigation land banking, and educational outreach.

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."

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 and DTPC to petition the California Fish and Game Commission (Commission) in March 2020 to elevate the listing of the Mojave desert tortoise from Threatened to Endangered under the California Endangered Species Act (CESA) (Defenders of Wildlife et al. 2020). Importantly, following California Department of Fish and Wildlife's (CDFW) (2024a) status review, in their April 2024 meeting the Commission voted unanimously to accept the CDFW's petition evaluation and recommendation to uplist the tortoise from threatened to endangered under the CESA based on the scientific data provided on the species' status, declining trend, numerous threats, and lack of effective recovery implementation and land management (CDFW 2024b). On July 15, 2025, the tortoise was officially uplisted to endangered status under the CESA (Commission 2025).

Thank you for contacting the DTC o 12/29/2025 with the opportunity to comment on this proposed project. This enabled us to attend the webinar on February 5, 2026 where the ratio of opposition to support for the project was 10:1. Our opposition to the project is based on specific concerns that we have expressed in numerous comment letters since 2012. In fact, the DTC contends that most of the concerns expressed in the following comment letters remain valid [see green highlighted items in DTC (2025)], many of them are not addressed in the Staff Assessment Environmental Impact Report (SA-EIR), are herein incorporated by reference, and we expect will be addressed in the Final Environmental Impact Report (FEIR): 13-1

Desert Tortoise Council (2012): https://www.dropbox.com/scl/fi/ingb7rp1h8itqq44oatkr/Soda-Mountain-Desert-Tortoise-Council-Scoping-Comments.12-13-2012.pdf?rlkey=uj6xar4ri0pw97hiomlm2eb6d&dl=0

Desert Tortoise Council (2014): https://www.dropbox.com/scl/fi/dyuhk8vrbc8cjxak4uupx/Soda-Mountain-Comment-Letter.3-1-2014.pdf?rlkey=2iw350060qplbtq2zhmjcn1rx&dl=0

Desert Tortoise Council (2016): https://www.dropbox.com/scl/fi/415ngw90fczcvqos6fmya/Soda-Mountain-Comments.8-12-2016.pdf?rlkey=nwj44jqebbjhd3us83sodpwfu&dl=0

Desert Tortoise Council (2023): https://www.dropbox.com/scl/fi/0n30cj81lvua4gl138v3q/Soda-Mountan-Solar.2-16-2023.pdf?rlkey=4qs53z0gxv0xre8hksnj8nrdm&dl=0

Desert Tortoise Council (2025): https://www.dropbox.com/scl/fi/8jzzwys4o4tugu919xvp1/Soda-Mtn.-Solar-Project-Scoping-Comments-to-CEC.9-3-2025.pdf?rlkey=rlurds33ca5a4tzyxpym1u1ec&dl=0

Our review of the SA-EIR is that the project has not substantially changed from its most recent iteration, which was denied for a number of environmentally significant reasons. Unless otherwise noted, page numbers cited herein are from the SA-EIR dated December 2025.

(1) The proposed project still does not involve a valid alternative as this latest proponent continues to attempt to situate the proposed solar site in near-pristine habitats outside Development Focus Areas (DFAs) and outside Variance lands as designated by the Desert Renewable Energy Conservation Plan (DRECP, BLM 2016), place the gen-tie line in an Area of Critical Environmental Concern (ACEC), impact a key linkage point in desert-wide connectivity (page 5.2-12 quoting SC Wildlands 2012), and affect habitats where 182 “features were identified as potential tortoise burrows … that had been originally excavated by desert tortoise” were located during the most recent 2023 surveys (page 5.2-33), etc.

Collectively, the SA-EIR clearly documents the poor site selection that continues to be associated with this project. During the webinar, the proponent claimed that it was obligated to situate this solar facility along the Meade-Adelanto Transmission Line as if that were the only available transmission corridor available and that other alternatives were not being pursued because they didn’t occur along this corridor. These and other factors have resulted in oppositional comments and controversary relative to desert bighorn sheep, desert tortoise, burrowing owl, Mojave fringe-toed lizard, and their habitats, air quality, visual resources, greenhouse gas emissions, battery energy storage system (BESS) fires, and impacts to hydrological resources (page 1-13), which may have been avoided had a less environmentally sensitive site been identified.

13-2

(2) It is not clear in the SA-EIR to where the energy that would be produced would be transmitted, even though we specifically asked for that information in our scoping comments of September 3, 2025. Surely, there are impaired habitats closer to the targeted communities consuming this energy that are better suited to this development than at the proposed location. But these alternative sites (as well as rooftop solar) are not analyzed in the SA-EIR, in part because they do not occur along the Meade-Adelanto Transmission Line and because they do not satisfy the proponent’s financial expectations for the project (i.e., the proponent would not benefit financially from implementing the rooftop solar alternative).

13-3

(3) Whereas we appreciate that the 2012-proposed arrays that would have occurred on the north and west side of I-15 were eliminated, there have always been relatively more tortoises on the east and southern sides of the interstate where this most recent proponent continues to propose development. When we walked the site in 2012, we found that the cobble substrates precluded most of the off-highway vehicle (OHV) traffic that would have otherwise emanated from the adjacent Rasor OHV Open Area, and that the site was in near-pristine condition. According to the SA-EIR (page 5.2-102), the project would result in "…2,074 acres of permanent and temporary impacts of desert tortoise habitat," which would be avoided if a less environmentally-damaging alternative were selected on brown fields or otherwise degraded habitats devoid of tortoises. We suspect that locating the solar site adjacent to the Rasor OHV Open Area will contribute to more dust on the mirrors and result in the use of more water than would be needed in more urban settings. 13-4

(4) Despite focal surveys and studies for bighorn sheep that continue to show the importance of this area to the conservation of this species, here is yet another proponent willing to ignore those studies and results and continue to propose this development at a location that has significant impacts that cannot be mitigated as per Table 1-1 on page 1-4 of the SA-EIR. The SA-EIR on page 5.2-170 concludes that "This short-term fragmentation, combined with noise and human presence, would contribute to a cumulative impact that is considered *significant and unavoidable* [*emphasis* added] for desert bighorn sheep during construction." Of course impacts are avoidable; just do not construct solar fields at this location. 13-5

Please note, on page 5.2-101, the error in the following statement, "…the desert tortoise is federal- and *state-listed* [*emphasis* added] as threatened under the ESA and California Endangered Species Act (CESA), respectively." Since July 2025, Mojave desert tortoise is now listed as Endangered by the Commission, which the DTC and DTPC believe warrants heightened protection than if the species were listed as Threatened. This error should be corrected in the Final EIR and may warrant additional analysis given the upgraded nature of the listing from Threatened to Endangered. 13-6

There is no indication in the literature cited section for biological resources (pages 5.2-271 to 5.2-280) that a CDFW 2081 incidental take permit (ITP) has been solicited, but we note on page 5.2-102 that "The ITP application provided by the applicant indicated that five protocol-level surveys for desert tortoise were performed in the proposed project area between 2009 and 2023 (261593 ITP App). A detailed description of each of the surveys can be found in the ITP application (261593 ITP App) and supporting application materials (RE 2024c)." We interpret this information to mean that an ITP application was submitted in 2024, but there is no indication if the ITP application was submitted to the CDFW or USFWS, or if an ITP was ever issued. 13-7

The SA-EIR (page 5.2-70) states that the California Energy Commission (CEC) is opting to pursue "in-lieu permitting" under the Warren-Alquist Act, but provides no more than this statement as to the analysis associated with this alternative permitting process. As such, the DTC and DTPC are unable to understand how exactly CEC is proposing to permit this project, how this alternate approach compares to the proactive protection we have come to expect from CDFW's permitting process, or if there will be future opportunities for affected interests to review and comment on this future permitting procedure. This missing information should be explained in the Final EIR, ensuring that the tortoise is analyzed as a State-listed Endangered species rather than a Threatened species and that CEC's alternative permitting approach will be as stringent and effective as that of the CDFW. 13-8

We note on page 5.2-103 that a 2016 federal biological opinion is referenced for this project. Given the substantial declines in tortoises (Allison and McLuckie 2018), 2023 surveys that document far more tortoise burrows than earlier surveys (page 5.2-102), and recent uplisting of the tortoise from Threatened to Endangered (California Fish and Game Commission 2025), we expect that the Bureau of Land Management (BLM) will need to reinitiate formal consultation with the USFWS, because the project is located on BLM-administered lands and would need their authorization. The SA-EIR (page 5.2-105) estimates that "that a maximum of 10 adult or subadult (>180 mm) and 68 juvenile or hatchling (<180 mm) desert tortoises could occur in the area," which constitutes a California Environmental Quality Act (CEQA)-significant impact even if proposed mitigation is implemented. 13-9

Although the following explanation is given on page 5.2-68, "Take of federally listed species as defined in the ESA [endangered species act] is prohibited without incidental take authorization, which may be obtained through Section 7 consultation (between federal agencies) or a Section 10 Habitat Conservation Plan," the SA-EIR does not clearly describe which federal permitting process would be pursued. We remind the CEC, BLM, and USFWS that there is new information on the status, trend, and threats to the tortoise including threats from utility-scale solar energy development since the issuance of the USFWS's biological opinion on the DRECP. Please see Appendix A: Some Recent Findings on Impacts to the Mojave Desert Ecosystem and Mojave Desert Tortoises from Utility-scale Solar Projects (attached). 13-10

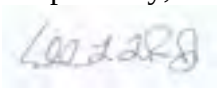
The reinitiation requirements in 50 Code of Federal Regulations (CFR) §402.16 explain that reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. We contend that the second requirements has been triggered, and that the USFWS needs to reconsider its10-year-old biological opinion because its analysis of the impacts of the taking are likely not appropriate given new information available since 2016. 13-11

The SA-EIR is not clear on how the BLM may still be involved (or not) in the proposed project or if reinitiation of formal Section 7 consultation is being sought. Alternatively, will the CEC require that a Section 10(a)(1)(B) ITP be issued by the USFWS? Please describe in detail the specific federal permitting process being pursued in the Final EIR. 13-12

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 DTC and DTPC want to be identified as Affected Interests for this and all other projects funded, authorized, or carried out by the CEC 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 request that you notify the DTC (eac@deserttortoise.org) and DTPC (roger.dale@tortoise-tracks.org) of any future proposed projects that CEC may authorize, fund, or carry out in the range of the desert tortoise in California.

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,



Edward L. LaRue, Jr., M.S.
Desert Tortoise Council, Ecosystems Advisory Committee, Chairperson

Roger Dale
Desert Tortoise Preserve Committee, Vice President

Attachment: Appendix A: Some Recent Finding on Impacts to the Mojave Desert Ecosystem and Mojave Desert Tortoises from Utility-scale Solar Projects

cc. Brian Croft, Assistant Field Supervisor, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Office, brian_croft@fws.gov
Steven Recinos, Environmental Scientist, Region 6, Inland Deserts Region, California Department of Fish and Wildlife, steven.recinos@wildlife.ca.gov
Joseph Stout, State Director, Bureau of Land Management, Sacramento, CA, castatedirector@blm.gov
Brandon Anderson, Acting District Manager California Desert District, Bureau of Land Management, BLM_CA_Web_CD@blm.gov
Lisa Belinky, Center for Biological Diversity, Oakland, CA, lbelenky@biologicaldiversity.org
Ileene Anderson, Center for Biological Diversity, Los Angeles, CA, IAnderson@biologicaldiversity.org

Literature Cited

Allison L.J. and A.M. McLuckie. 2018. Population trends in Mojave desert tortoises (*Gopherus agassizii*). Herpetological Conservation and Biology. 2018 Aug 1;13(2):433-52. http://www.herpconbio.org/Volume_13/Issue_2/Allison_McLuckie_2018.pdf

Berry, K.H., L.J. Allison, A.M. McLuckie, M. Vaughn, and R.W. Murphy. 2021. *Gopherus agassizii*. The IUCN Red List of Threatened Species 2021: e.T97246272A3150871. https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T97246272A3150871.en

[CDFW] California Department of Fish and Wildlife. 2024a. Status Review for Mojave Desert Tortoise (*Gopherus agassizii*) Report to the Fish and Game Commission, February 2024. https://nrm.dfg.ca.gov/documents/ContextDocs.aspx?cat=CESA-Listing

[CDFW] California Department of Fish and Wildlife. 2024b. 2022-2024 News Releases. California Fish and Game Commission Holds Hybrid Meeting, April 23, 2024. https://wildlife.ca.gov/News/Archive/california-fish-and-game-commission-holds-hybrid-meeting11

[Commission] California Fish and Game Commission. 2025. CESA, Petitions to List Species Under the California Endangered Species Act, Finalized Petitions. https://fgc.ca.gov/CESA#1089124-mojave-aka-agassizs-desert-tortoise-2025 https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=232827&inline

Defenders of Wildlife, Desert Tortoise Preserve Committee, and Desert Tortoise Council. 2020. A Petition to the State of California Fish And Game Commission to move the Mojave desert tortoise from listed as threatened to endangered. Formal petition submitted 11 March 2020. https://defenders.org/sites/default/files/2020-03/Desert%20Tortoise%20Petition%203_20_2020%20Final_0.pdf

[DTC] Desert Tortoise Council. 2012. Public scoping comments on the proposed Soda Mountain Solar project (CACA 49584). Comment letter submitted to Mr. Jeffrey Childers of the BLM on 12/13/2012. Ridgecrest, CA. Pages A-1 through A-6.

[DTC] Desert Tortoise Council. 2014. Formal comments on the Draft Environmental Impact Statement for Soda Mountain Solar project (CACA 49584). Comment letter submitted to Mr. Jeffrey Childers of the BLM on 3/1/2014. Ridgecrest, CA. Pages A-7 through A-13.

[DTC] Desert Tortoise Council. 2016. RE: Issuance of a well permit to proponents for Soda Mountain Solar Project. Comment letter submitted to Supervisors James Ramos and Robert Lovingood, San Bernardino, CA.

[DTC] Desert Tortoise Council. 2023. Soda Mountain Solar Project, San Bernardino County, California – Notice of Preparation (NOP) of a Draft Environmental Impact Report. Comment letter submitted to Dr. Shankar Sharma of the CDFW on 2/16/2023. Acton, CA. Pages A-15 to A-68.

Dear CEC,

It is apparent from reading the SA-EIR that the writers were not familiar with the information included in this appendix. As such, we believe that the Final EIR needs to be amended. Otherwise, CEC has not relied on the latest, best available science to complete its environmental review.

Ed LaRue

Appendix A: Some Recent Findings on Impacts to the Mojave Desert Ecosystem and Mojave Desert Tortoises from Utility-scale Solar Projects

Surface Hydrology and Impacts to Soil Moisture and Vegetation:
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.

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 EIR with respect to impacts on vegetation, wildlife and special status species including the tortoise.

Heat Island Effects to 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 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 degrees C (3.5 degrees 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 m (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 revised DEIS 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 degrees 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 degrees C warmer at the 1-meter height.

Similarly, Broadbent et al. (2019) found increased temperatures during the day, with an average 1.3 degrees 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 degrees 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 degrees 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.

Heat Island Effects to 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. Beside 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 degrees 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 increases or decreases in soil temperatures could affect persistence of vegetation and habitat suitability for burrowing wildlife forcing some species to avoid solar facilities.

The heat island effects should be analyzed with respect to impacts to other special status species, such as desert bighorn sheep, and their habitats needed for life requisites including cover from predators, forage, and connectivity habitat.

Translocation of 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 aldrak. 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.), Translocations 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).

Aa 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

We contend the results of these studies and the inability of government agencies 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, the CEC should approve projects located outside of occupied tortoise habitat, critical habitat, and wildlife habitat needed for connectivity/movement in response to climate change.

If translocation for the tortoise is implemented, we strongly recommends that the Desert Tortoise Recovery Office (DTRO) have final review and approval of the translocation plan. The DTRO contains the 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 to contribute to recovery. 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. Consequently, we recommend that the DTRO review and approve this Translocation Plan for the tortoise and how it is implemented.

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Comment Received From: Mojave Desert Resource Conservation District
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Soda Mountain Solar Comment letter 2026

Additional submitted attachment is included below.

Mojave Desert Resource Conservation District
15415 W. Sand St., #103 - Victorville, CA 92392
Phone: (760) 843-6882

DIRECTORS

CHUCK BELL
President

PAUL JOHNSON
Vice President

NEVILLE SLADE
Treasurer

EARL GRAHAM
Director

February 26, 2026

Re: Docket number 24-OPT-03 - Soda Mountain Solar Project

To: docket@energy.ca.gov. STEPsiting@energy.ca.gov.

The Mojave Desert Resource Conservation District strongly supports East Kern County RCD's letter in opposition to this project. This site has multiple, significant environmental issues - plus adjacent to the East Mojave Preserve. 14-1

There are plenty of locations in California for industrial scale solar plants with minimal impacts – disturbed/fallowed ground - close to transmission lines, etc. 14-2

The site is within our jurisdiction and we have no record of either BLM nor CEC directly notifying us of it or the project EIR. Thus a possible notification defect. 14-3

Sincerely,

Chuck Bell
Vice President
Mojave Desert Resource
Conservation District

Comment Received From: Laura Cunningham
Submitted On: 2/25/2026
Docket Number: 24-OPT-03

Soda Mountain Solar Project Staff AssessmentDraft EIR Comments 24-OPT-03

Additional submitted attachment is included below.

Soda Mountain Solar Project
California Energy Commission
715 P Street, MS 40
Sacramento, CA 95814

Via email to docket@eneregy.ca.gov and efiling.

February 25, 2026

Re: Soda Mountain Solar Project Staff Assessment/Draft EIR Comments 24-OPT-03

Dear Commissioners,

Please accept our scoping comments by Western Watersheds Project and Basin and Range Watch on the proposed Soda Mountain Solar Project Staff Assessment and Draft Environmental Impact Report (EIR). Soda Mountain Solar Project is a utility-scale 300 megawatt (MW) photovoltaic solar plus battery storage that is proposed on 2,670 acres of high-value public land in San Bernardino County, California between Barstow and Baker, and next to Mojave National Preserve.

We support solar energy in the built environment, and urge utility-scale solar developers to site their projects on already degraded lands, brownfields, and as a last resort on living ecosystems and wildlife habitat. During the February 5, 2026, public meeting held by the California Energy Commission (CEC), the applicant seeking to build Soda Mountain Solar Project stated that they chose this project and its site because it is "prime for solar" next to an existing high-voltage powerline. This applicant showed no apparent concern for the high-value bighorn sheep habitat and connectivity corridor, state and federal Threatened and Endangered species in the area, relatively intact Mojave Desert ecosystems on public lands, nearness to a popular National Park unit, or local community concerns over Lithium battery fires.

We are repeating and re-emphasizing many of our older comments because the California Energy Commission persists in streamlining hearings, reviews, and signaling early on that any significant impacts will be over-ridden. This streamlining appears to be politically-motivated and not based on the best available science.

Western Watersheds Project is a non-profit organization with more than 50,000 members and supporters. Our mission is to protect and restore western watersheds and wildlife through education, public policy initiatives, and legal advocacy.

Basin and Range Watch is a 501(c)(3) non-profit working to conserve the deserts of Nevada and California and to educate the public about the diversity of life, culture, and history of the ecosystems and wild lands of the desert.

Overriding Considerations Seem to be Locked In

During the February 5, 2026, California Energy Commission (CEC) meeting on the Soda Mountain Solar Project, Staff recommended that the Commission issue a Statement of Overriding Considerations—a rubber stamp that ignores significant and unmitigable impacts. Over the years we have watched CEC issue these overriding considerations numerous times, and the entire commenting process begins to seem like a waste of time for the public. Local experts, local governments, and communities are ignored, the science is bypassed, and developers apparently hold sway of the state agencies. When will the CEC ever say No to such a bad project as this? 15-1

Opt-In Certification is Illegal Under CEQA

Soda Mountain Solar Project is an Opt-In project according to the CEC, allowing that agency to bypass local laws to streamline renewable energy permitting. The CEC website explains the Op-In process as follows:

> Prior to the June 30, 2022, signing of Assembly Bill (AB) 205, the CEC's powerplant licensing jurisdiction was limited to thermal powerplants 50 megawatts (MW) or larger. To accelerate the state's transition to renewable energy and to maintain electrical system reliability under this transition and during extreme climate-change-driven events, AB 205, as modified by AB 209 expands the types of facilities that can be certified by the CEC. This "Opt-in" certification process is available to solar photovoltaic and terrestrial wind energy powerplants of 50 MW or more, energy storage facilities of 200 megawatt-hours (MWh) or more, the electric transmission lines from these facilities to the first point of interconnection, and facilities that manufacture or assemble clean energy or storage technologies or their components with a capital investment of at least $250 million. In addition, thermal powerplants of 50 MW or more that do not use fossil or nuclear fuels may choose the Opt-in process rather than the CEC's Application for Certification process. AB 205 authorizes the CEC to accept applications for these facilities and provides a new, streamlined process for their review and a decision by the CEC. The CEC is the "lead agency" under the California Environmental Quality Act and is required to prepare an environmental impact report for any facility that elects to opt-in to the CEC's jurisdiction. With exceptions, the issuance of a certificate by the CEC for an eligible facility is in lieu of any permit, certificate, or similar document required by any state, local, or regional agency, or federal agency to the extent permitted by federal law, and supersedes any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law. The

> CEC's authority under the opt-in certification program does not supersede the authority of the California State Lands Commission to require leases and receive lease revenues, if applicable, or the authority of the California Coastal Commission, the San Francisco Bay Conservation and Development Commission, the State Water Resources Control Board or applicable regional water quality control board, or, in the case of manufacturing facilities, the applicable local air quality management district or the Department of Toxic Substances Control.[1] (*Emphasis ours*.)

This hoarding of power by the state should never have been allowed to pass the Assembly, as it raises questions of legality under the California Environmental Quality Act (CEQA) by sweeping away public input and participation. When the state illegally supersedes local and regional ordinances voted on by communities, significant impacts identified by local experts and citizens will go un-analyzed, un-avoided, and un-mitigated because despite any Staff Assessments the CEC is given a free pass by this new law to certify any project, no matter how impactful. 15-2

This represents a case study in yet one more roll-back of this landmark state law which has served to safeguard the environment, imperiled species and biodiversity, and local communities from corporate expansion.

Not Consistent with DRECP

Staff admits that the project is inconsistent with local plans for aesthetics and is not consistent with the Desert Renewable Energy Conservation Plan (DRECP) of 2016 in violating Visual Resource class management allowances. Visual Resources would be degraded with no possible mitigation. In addition, the solar application is not located in a Development Focus Area as delineated in the DRECP. 15-3

Not Consistent with the Western Solar Plan

The solar application is also not located within a designated Solar Energy Zone, as mapped in the Western Solar Plan. 15-4

Does not Conform with San Bernardino County Plan

The California Energy Commission was supposed to consider local community concerns over large power plants, but in the last several years we have seen solar projects streamlined and local concerns bypassed. In 2016, the San Bernardina County Board of Supervisors rejected the Soda Mountain Solar Project[2] over impacts to the Mojave National Preserve, water use, recreational access, wildlife impacts, and visual impacts. A petition against the project with 2,500 signatures also convinced the county to reject the project. The CEC has apparently ignored this popular local outrage towards such a badly-sited industrial energy project. 15-5

[1] https://www.energy.ca.gov/powerplant/solar-photovoltaic-pv-battery-energy-storage/soda-mountain-solar-project

[2] newssodamtn.pdf

Questions Surrounding Grid Connection

The CEC docket[3] says the project would generate and deliver solar power to the regional electrical grid through an interconnection with the existing Marketplace-Adelanto 500-kilovolt (kV) transmission line operated by the Los Angeles Department of Water and Power.

15-6

Yet in 2015, Los Angeles Department of Water and Power refused to enter into a power purchase agreement with Soda Mountain Solar proponents over the impacts it would have had on the public lands and sensitive resources in the California Desert Conservation Area.[4]

Desert Bighorn Sheep

As numerous commenters, nonprofits, hunting organizations, scientists, and agency personnel have stated over many years, this is one of the worst places to site a large-scale solar energy project because it would block and degrade crucial connectivity for bighorn sheep.

The Soda Mountain Solar Project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn.

The Soda Mountain Wildlife Crossing over I-15 has been in the works for years, and that project has become a necessity with the future Brightline West high-speed rail project in the planning stages to parallel the interstate highway, further blocking any remaining bighorn connectivity.

15-7

CalTrans on its website described the importance of the Soda Mountain Wildlife Crossing project well, a project supported by millions of dollars of California taxpayer's funds:

> The need for the proposed project is based on desert bighorn sheep genetic and tracking data that demonstrates I-15 is a movement barrier for sheep that have historically traveled between the northern mountain ranges and southern mountain ranges. While there are several under-crossings (washes and large box culverts) present throughout the I-15, data shows desert bighorn sheep are less likely to move through these structures, unlike other medium and large mammals such as bobcats and mountain lions. Like other large mammals, desert bighorn sheep need large, connected habitats to breed and thrive. I-15 divides the previously connected ranges into isolated habitat fragments. This decreases desert bighorn sheep genetic diversity, increases inbreeding, and increases territorial disputes

[3] https://www.energy.ca.gov/powerplant/solar-photovoltaic-pv-battery-energy-storage/soda-mountain-solar-project

[4] https://renewablesnow.com/news/la-city-not-to-buy-power-from-358-mw-bechtel-pv-park-in-mojave-480337/

amongst males. The fragmentation of habitat currently forces desert bighorn sheep to cross over I-15, increasing risk of vehicular crashes and desert bighorn sheep fatalities. From 2007 to 2020, at least 59 desert bighorn sheep were killed by vehicles in California. Dedicated wildlife crossings are needed to restore wildlife connectivity.[5]

CalTrans goes on to describe the project (one of three wildlife crossings along I-15) as a bridge with three-span cast-in-place/prestressed concrete box girder structures with openings for the existing northbound and southbound I-15 lanes and the future Brightline West rail in the median. The bridges are proposed to be 100 feet wide and 240 feet to 400 feet long. Railing and fencing will be installed at the edges of the bridges and chain link directional fencing will also be installed at various lengths along the access control line to direct wildlife to the crossings. The surface of the bridges will be composed of native materials to match the characteristics of the surrounding areas. The dedicated wildlife crossings will provide safe and sustainable passages for bighorn sheep and other wildlife across I-15 that restores bighorn sheep wildlife connectivity and allow for the safe movement of animals, and the exchange of genetic material. The project will assist in restoring and enhancing wildlife connectivity among meta-population fragments of bighorn sheep and facilitate crossing of the I-15 of other species. 15-7 continued

Brightline on its website says that it has worked with Caltrans and California Department of Fish and Wildlife (CDFW) to develop a coordinated plan to fund, design, construct and maintain these wildlife overcrossings.[6]

CEC Staff admits that construction of the Soda Mountain Solar Project cannot be mitigated to have less than significant impacts to bighorn sheep here. The large-scale solar project would disrupt bighorn movement and use of important habitat, and has the potential to jeopardize the entire Soda Mountain desert bighorn herd. 15-8

Staff admits that construction and operation of this solar project would have significant and unavoidable impacts that cannot be fully mitigated. Staff recommended to the Commission an alternative that reduces impacts to bighorn by using a 0.25 mile buffer of the solar field from the connectivity corridor, and by relocating the Lithium Battery Energy Storage System away from this corridor (Alternative 2). 15-9

California Department of Fish and Wildlife has commented that they were the original lead agency under the California Environmental Policy Act (CEQA), and they found significant and unmitigable impacts to bighorn sheep in this area from the proposed solar project. The solar applicant then took advantage of the AB 205 Opt-In process where they could ditch CDFW as the lead agency under CEQA and switch to the California Energy Commission which was named under that state law to be able to streamline and circumvent laws and push projects forward. 15-10

CDFW found substantial impacts to streambed alteration and incidental take of species listed under the California Endangered Species Act. Mojave desert tortoise and 15-11

[5] https://dot.ca.gov/caltrans-near-me/district-8/district-8-current-projects/i-15-wildlife-crossings
[6] https://www.gobrightline.com/press-room/2023/brightline-west-wildlife-overcrossings

Western burrowing owl have impacts that need the best possible mitigation. Bighorn sheep are a fully protected species that may have impacts from the solar project that are not mitigable. The applicant chose to withdraw from the CEQA review where CDFW was the lead agency, and transfer to CEC as the lead agency, knowing that the recent change in state law would afford them an easier path for streamlined environmental review under the CEC. This apparently is resulting in the circumvention of bighorn sheep impacts.

15-11 continued

Desert bighorn sheep need flatlands in addition to mountains as foraging areas and stepping-stones in providing connectivity. Bighorn will use areas of less than 10% slope in order to cross basins between mountain ranges. These flatlands are important bighorn habitat, just as much as steep mountain terrain is.

15-12

The Soda Mountain-Cady Mountain area bighorn sheep are one of the most important populations in the Mojave Desert, connecting Joshua Tree National Park populations with bighorn in Death Valley National Park.

15-13

Staff is not recommending the best science in their recommendations.

We photographed this herd of desert bighorn sheep at springs and rush (Juncus) meadows next to Zzzyx, at the base of the Soda Mountains. This is very close to the proposed giant solar project, which is proposed just around the ridge to the west of this scene.

15-14

Nelson desert bighorn herd at springs and marsh edge at Zzyzx. Photo: Laura Cunningham.

We agree with bighorn sheep biologist Clinton Epps from Oregon State University who gave public comments about his research into this bighorn population

15-15

numerous times in front of the agencies, including during the February 5, 2026, public meeting held by the CEC. He has been studying this system since 1999. Populations of desert bighorn are small, with probably not more than about 5,000 in California. Each mountain range in the desert has dozens to a few hundred bighorn at most. 15-15 continued

Survival in this harsh environment depends on the ability to move either seasonally or permanently between mountain ranges: to seek forage and water sources or to disperse. Genetic diversity is maintained between populations north of I-15 and those to the south. Soda Mountain was colonized from the Cady Mountains, and a new wildlife overpass crossing is planned over I-15 in order to mitigate the planned high speed train track which will block all connectivity along the freeway. I-15 has certain wash undercrossings that sheep sometimes may use, but a train track would completely block these. 15-16

Epps is concerned that sheep would not have time to familiarize themselves with any new wildlife overcrossing if a vast solar project were constructed before the train corridor was built. Bighorn also occasionally use the desert flatlands to forage, where the solar project is proposed. This is all habitat. 15-17

Epps has serious concerns with the latest iteration of this solar project in a key connectivity link that is critical for genetic diversity. The proposed 0.25-mile buffer is inadequate and based on vert old recommendations. Since 2013, GPS-collared bighorn show that locations below 10% slope are still important to sheep populations as they use these areas for forage. A buffer needs to be at least 0.6 to 1.2 miles. 15-18

Epps recommended that the solar project be delayed until the wildlife crossing is built. 15-19

We support the public comment by wildlife biologist Christine Aiello, coauthor of the Wildlands Network connectivity study with the National Park Service pointing out that the Soda Mountain Wildlife Crossing is of the highest priority. A quarter-mile buffer is not large enough to reduce impacts of the solar project to bighorn to less than significant. The bighorn sheep need a stable, safe natural environment as part of their connectivity movements. Bighorn make behavioral decisions based on what they see at a distance. 15-20

We believe that the solar project would easily be visible from the wildlife crossing, and could scare off bighorn from using the overcrossing. 15-21

The CEC needs to follow the science and not dismiss the huge and very significant impacts of this large solar project next to a planned wildlife overcrossing. Approving the solar project could negate the wildlife crossing structure. 15-22

Mojave Desert Tortoise

Federally threatened Mojave desert tortoises (*Gopherus agassizii*) also inhabit these alluvial fans. Already in severe decline, habitat for this federally threatened species is being chopped up little by little each year.

In 2024 the California Fish and Game Commission determined that the California population of the Mojave desert tortoise was warranted for uplisting from state threatened to state endangered under the California Endangered Species Act a decision which should require complete avoidance of its habitat here7. Mojave desert tortoise is state endangered due to present or threatened modification or destruction of its habitat, according to the Fish and Game Commission.

Take under the California Endangered Species Act (CESA) is requested by the solar developer for Mojave desert tortoise, and staff recommends avoidance and mitigation measures.

The CEC is requiring compensatory mitigation, but already during the February 5, 2026, public meeting the solar applicant was stating that they were concerned that the mitigation ratios and acreages represented the "worst-case scenario", and that they needed to do less because they were planning on using a "superior terrain-tracking solar system." This would lessen grading, and permanent impacts would be reduced from 100 acres to 79 acres. The applicant told Staff that they would supply their "true" mitigated impacts for consideration. We have seen discussions of the shortage of private lands available for tortoise habitat compensatory mitigation, and this needs to be discussed transparently. 15-23

This all needs to be analyzed publicly in a Supplemental Staff Assessment so that everyone can better understand what the applicant is suggesting.

This is not a large reduction in impacts, as machinery and vehicles will still need to drive over the desert habitat for tortoises in order to construct the solar field. [use BLM Nevada classification system] CEC should maintain full mitigation ratios for such a sensitive landscape. 15-24

The applicant also stated that it would construct security fencing around its proposed energy project that would allow desert tortoise to re-enter the project. Has the CEC analyzed this? How much native desert vegetation will be left in the solar field after construction? Will disturbance of desert surfaces impact the quality of tortoise habitat over time? There are many unanswered questions to this snap proposal that need analysis. 15-25

Mojave Fringe-toed Lizards

Mojave fringe-toed lizard (*Uma scoparia*) populations have been significantly impacted by large-scale solar developments in Chuckwalla Valley, Riverside County, CA, and the cumulative impacts of the Soda Mountain Solar Project need to be analyzed. There may be cryptic species embedded in the populations across the Mojave and Colorado Deserts of California, and until further genetic sampling is undertaken these populations of potentially new taxa could be drastically impacted before they are even known to science. 15-26

Mojave Tui Chub

[7] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=232682&inline

A population of federally endangered and state endangered Mojave tui chub (Siphaletes bicolor mohavensis)8 inhabits a nearby artificial spring-fed lake at Zzyzx,9 which serves as a refuge population as the species' original habitat in the Mojave River has suffered degradation. Groundwater pumping at proposed on-site wells for dust suppression, or trucked local water could impact these springs. 15-27

Rare Plants and Plant Communities

Many rare and sensitive plant species may have been missed because these plants do not bloom every year. Rare plant communities could be degraded both directly by driving and construction, and indirectly through the spread of invasive weeds, dust impacting pollen production, and ethe heat island effect of large solar facilities on surrounding desert habitats. This needs more analysis. 15-28

Visual Resources

The Sodas Mountain Solar Project violates local plans for aesthetics and has significant and unavoidable visual impacts under the DRECP. Staff determined that the large-scale industrial energy project cannot be camouflaged, screened, colored, and no set-backs can be employed to reduce the impacts to less than significant.

The Soda Mountain Project is a VRM Class IV project but the designation has been updated to include the standards of the Desert Renewable Energy Conservation Plan. This review could be paused until a plan amendment could be made to upgrade the VRM Class to VRM Class II. The objective of VRM Class II is to: *"To retain the existing character of the landscape. Allowed Level of Change: The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer."*[10] 15-29

The CEC could create an alternative that protects the Visual Landscape of the area by requesting that the Bureau of Land Management amend the Desert Renewable Energy Conservation Plan and upgrade the VRM Class of the area to VRM Class III.

The CEC should take night lighting impacts more seriously and require an alternative that has no lighting period. Many of the solar projects in Southern Nevada have done this. 15-30

The gen-tie line will fragment the visual landscape and add a 3-dimensional impact to the visual landscape. 15-31

Staff recommend Glint and Glare mitigation, but this is untested with the project next to the busy I-15 in an otherwise natural, remote desert landscape. 15-32

[8] https://www.fws.gov/project/creating-refuge-mohave-tui-chub#:~:text=The%20Mohave%20tui%20chub%20%28Siphateles,native%20to%20the%20Mojave%20River.
[9] https://www.nps.gov/moja/learn/nature/chubresearch.htm
[10] Microsoft Word - VRM Process.doc

Project construction will produce extreme 3-dimensional dust plumes and due to the massive disturbance of the landscape, will continue to be an issue throughout most of the project life span. Construction will take about 2 years, that is two years of dust/visual impacts. 15-33

This alone should require the CEC to not certify this project in this location. The DRECP needs to be amended to downgrade the area from Class III to Class IV.

Lithium Battery Fire

300 MW of Battery Energy Storage System (BESS) Lithium battery storage is proposed with the solar project. The City of Baker fire and emergency response services is concerned during public comments over the lack of equipment to fight Lithium battery fires, which have been shown to burn hot for long times (days) with special measures needed to mediate these fires—simply dumping water on them will not work, or many tank-loads of water are needed over several hours. Eastern San Bernardino County is the largest county in the nation, and emergency services have hundreds of square miles to service, taking a long time to reach remote areas such as the Soda Mountain site. The project applicant seems to be pushing the bulk of responsibility on fires onto local communities instead of taking responsibility for proper and detailed response planning for dangerous technology which has a poor track record in hot deserts such as this low Mojave Desert basin. 15-34

Lithium thermal runaway is an extremely dangerous situation and there are limited resources in the local area to control these fires. Lithium fires create toxic smoke which will require closing Interstate Highway 15 and local communities like Baker and Barstow will bear the burden and expense of controlling the fires. The fires cannot be controlled and often burn for days, even weeks. The batteries could easily malfunction and pollute the watershed. Malfunctioning lithium batteries can release cobalt, copper and nickel into local watersheds. 15-35

BESS runaway fires are nor rare nor are they compartmentalized. These runaway fires have recently impacted major US highways, large numbers of travelers, impacted economies, and places people in life-threatening situations as local emergency services struggle to deal with these events. 15-36

We remember very well when the I-15 was closed for two days in 2024 due to a truck tipping over and causing a BESS Lithium fire which burned for 24 hours and apparently caused toxic fumes to be emitted.[11] We remember when there were problems with drivers trapped on a remote desert stretch of highway in the middle of summer suffering from heat exposure and thirst, and lack of gasoline. We are thankful that no one died. It is unacceptable to continue plans for transporting Lithium battery units on these busy freeways without deep planning—not rubber-stamping. 15-37

Lithium battery fires on highways are not uncommon now, as we also recall a September 2024 Lithium battery fire when two trucks crashed at night on US 95 in 15-38

[11] https://pv-magazine-usa.com/2024/08/01/battery-fire-shuts-down-california-highway/

Amargosa Valley north of Las Vegas, Nevada. The highway was closed to traffic in both directions while fire crews and hazardous materials crews put out the fire. 15-38 continued

Remains of crashed and burned tractor trailer that was hauling Lithium-ion batteries on US 95 in Amargosa Valley, Nevada. Days later the fire was still smoking. Photo: Laura Cunningham.

Congresswoman Dina Titus released the following statement after the crash:

> Today's accident and fire on U.S. 95 involving a truck carrying lithium-ion batteries underscores the urgency for Congress to act on the 'Thermal Runaway Reduction Act', legislation I introduced last week in response to a similar accident on Interstate 15 in July. Without better regulation of the transport of these batteries, it is only a matter of time before these accidents and resulting fires take human lives. Furthermore, the resulting road closures and the amount of water needed to extinguish these fires have significant impacts on resources in our region. Congress needs to act quickly to enact live-saving regulations.[12]

If Lithium-Iron-Phosphate batteries are used, how will these newer types of batteries react to onsite fires? 15-39

The CEC should review a No Lithium Battery Storage On-Site Alternative in a Supplemental Staff Assessment. 15-40

Groundwater and Surface Hydrology

[12] https://www.8newsnow.com/news/local-news/fiery-semi-truck-crash-involving-lithum-batteries-closes-us-95-northwest-of-las-vegas/

The project will be using a very large amount of groundwater for dust mitigation during construction and additional water for panel cleaning during the project lifespan. The hydrology in the region is poorly understood. A solar project of this size traditionally uses 1,000 to 2,000 acre-feet of water during construction. One of the past solar developers for Soda Mountain, Bechtel, claimed they would use about 600 acre-feet, which is a large amount for such an arid region. The aquifer is poorly understood and the lack of higher mountains in the area indicate that there is little recharge from precipitation runoff or snowmelt. Desert aquifers are delicate and irreplaceable. This water supplies the Soda Springs complex and if it is removed, the Mojave tui chub which is endangered could decline in numbers.

The applicant at the February 5, 2026, CEC public meeting stated that they will consider reducing the grading and construction of stormwater control earthworks and features that are normally used to move flash flood runoff around solar fields. This project design modification needs to be analyzed in a Supplemental Staff Assessment so that the public can review and participate in commenting on these large changes. 15-41

Plus, we have observed that large flash flood events have damaged large-scale solar projects in operation in California and Nevada deserts, with damage to security fences, modification to surface hydrology, and other impacts that may allow tortoises to accidentally enter areas where they should be prohibited. This needs much better analysis and not streamlining. 15-42

Alternatives Will Not Alleviate These Problems

Staff described their "Environmentally Superior Alternative" that would reduce the project footprint and provide for a buffer between the solar project and the bighorn connectivity corridor. The BESS would be relocated away from this sensitive habitat in case of thermal runaway fires to reduce these impacts. But this would result in a longer gen-tie line to the onsite substation (which would further degrade Visual Resources). 15-43

But bighorn still use lands with less than 10% slope, so the buffer will not actually help bighorn habitat use.

Staff admitted that even this Alternative 2 would mot avoid significant impacts, only lessen the impacts, and therefore Staff recommended that the Commission use a Statement of Overriding Considerations to force a certification for the project. This is unacceptable. 15-44

Old Spanish National Historic Trail

The National Trails System (NTS) was created in law, by Congress, in 1968 (National Trails System Act, Pub. L. No. 90-543). In 1978, Congress amended this law and the National Trails System to include congressionally established National Historic Trails (NHTs). 15-45

The congressionally designated alignment of the Armijo Route of the Old Spanish National Historic Trail (OSNHT) is present just outside of the visual analysis area to the

east and south of the project. The visual analysis determines the project will not be seen from the trail, yet the trail is only 3.4 miles from the project site.

15-45 continued

The Interior Department (Bureau of Land Management/National Park Service) has for a long time failed to implement a required Old Spanish National Historic Trail Comprehensive Management Plan. The Interior Department never established a required National Trails System Act Right of Way for the Old Spanish National Historic Trail.

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail.

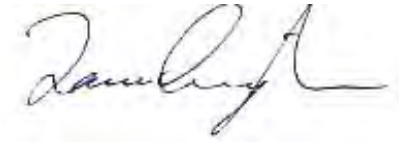
Conclusion

We strongly oppose this solar project, which has been reviewed with science and popular demand over and over again across many years and different companies, each time reaching the same conclusion: that this is the wrong site for such a large-scale industrial energy project.

We will be attending the California Energy Commission April 27, 2026, Business Meeting where the Commission will decide whether this project should receive certification.

Please keep us informed of all further substantive stages in this and related CEQA processes and documents.

Sincerely,



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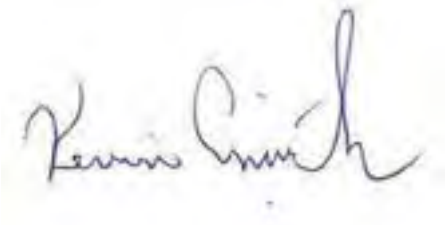

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Comment Received From: Melanie Branson
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Opposition to Opt-in Procedure to EIR in Support of the Soda Mountain Solar Project near Baker, CA, Docket Number 24-OPT-03

Additional submitted attachment is included below.

Kerncrest Audubon Society
P.O. Box 984
Ridgecrest, California

February 9, 2026

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: Opposition to Opt-in Procedure to EIR in Support of the Soda Mountain Solar Project near Baker, CA, Docket Number 24-OPT-03

Dear Chair Hochschild and Members of the California Energy Commission:

The Kerncrest Audubon Society submits this letter in formal opposition to the proposed opt-in procedure to the Environmental Impact Report (EIR) for the Soda Mountain Solar Project near Baker, California.

As an organization dedicated to the conservation of birds and their habitats, we are deeply concerned about the project's location adjacent to the Mojave National Preserve and the Zzyzx area, one of the most ecologically significant bird concentration sites in the eastern Mojave Desert. This region supports both resident desert birds and a remarkable diversity of migratory species that rely on scarce water, vegetation, and intact habitat during critical stages of their life cycles.

16-1

Zzyzx is widely recognized by ornithologists and birders as a "migrant trap," where exhausted birds concentrate during spring and fall migration due to the presence of water and mature vegetation in an otherwise arid landscape. Numerous bird species rare in California have been documented in this area, including Ovenbird, Cape May Warbler, Golden-winged Warbler, Wood Thrush, and Rufous-backed Robin. These occurrences underscore the site's exceptional importance as stopover habitat within regional and continental migratory networks.

In addition to migratory species, the area supports a diverse assemblage of desert and regional resident birds, including Lucy's Warbler, Brewer's Sparrow, Black-tailed Gnatcatcher, Rock Wren, Horned Lark, Greater Roadrunner, and Phainopepla. These species depend on intact desert landscapes with minimal industrial disturbance for breeding, foraging, and shelter.

16-2

The proposed 2,670-acre industrial solar facility would introduce extensive habitat loss, vegetation removal, fencing, lighting, noise, and increased human activity into this sensitive landscape. Such disturbance threatens to degrade the ecological conditions that make this area viable for both migratory and resident bird populations. Large-scale solar development is also associated with increased collision risk, habitat fragmentation, and disruption of avian movement patterns, particularly in areas that function as ecological refugia.

16-3

We are also concerned about cumulative impacts. The Mojave Desert has already experienced extensive habitat conversion from energy, transportation, and infrastructure projects. Incremental loss of intact desert habitat disproportionately affects birds, which rely on a limited number of reliable stopover sites. Once these sites are degraded or lost, they cannot be easily replaced.

16-4

Kerncrest Audubon Society supports renewable energy development that is responsibly sited on rooftops, parking structures, canals, and previously disturbed lands. Advances in solar technology make it unnecessary to sacrifice intact desert ecosystems and critical wildlife habitats to meet California's clean energy goals.

For these reasons, we respectfully urge the California Energy Commission to reject the opt-in procedure to the EIR and deny further approval of the Soda Mountain Solar Project.

Thank you for the opportunity to provide these comments.

Sincerely,

Robert E. Parker
President, Kerncrest Audubon Society

Comment Received From: Pat Flanagan
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

MBCA Soda Mtn Solar comments

Additional submitted attachment is included below.

MBCA
morongo basin conservation association
Post Office Box 24, Joshua Tree CA 92252 http://mbconservation.org
MBCA is a 501 (c)3 non-profit, community based, all volunteer organization

California Energy Commission
715 P Street
Sacramento, California 95814

Subject: Docket Unit, MS-4
Docket No. 24-OPT-03 Email: docket@energy.ca.gov

As requested, this letter explains the importance of the individual Pdfs I submitted to CEC staff during the Soda Mountain Solar Project public meeting on February 5, 2026. The Pdfs speak to

- dust generation in the Mojave Desert when soils are disturbed during the construction, operation, and following shutdown of utility solar projects; 17-1
- the ability of the desert to sequester carbon underground for millennia when left undisturbed. 17-2

I felt an obligation to provide this science based information because I live directly downwind 7.5 miles from the original solar project constructed outside the town of Joshua Tree in 2014. My property is surrounded by intact desert and until the solar project construction my air was clean no matter the wind. Then one day with a strong wind coming from the west a cloud of dust enveloped my house and closed me in until the cloud passed. Such dust clouds continue to this day. Because of the changing climate our communities were originally excited by local solar development until we learned the perils to air quality (PM10 and PM2.5), our health, and the desert environment when the intact desert is destroyed. Below are photos showing what we have experienced and what you can expect will cloud the I-15 and surrounding desert and mountains when the wind blows should Soda Mountain Solar be constructed.

Figure 1: Dust rising off the 150-acre Cascade Solar in Joshua Tree on 03/28/**2016**. The facility went on line 04**/2014**. Photo courtesy of Tom O'Keye.

Figure 2: Dust rising off Cascade Solar 01**/2025**. Photo courtesy of Laraine Turk.

For an introduction to the interconnection between carbon sequestration and dust generation in the desert read
(1) *The Desert Under Our Feet* by Robin Kobaly published in the March 2019 Desert Report, and the
(2) *Science Brief: Climate Mitigation in California: The importance of conserving carbon in deserts* by Defenders of Wildlife.

(3) The *AB 1757 Desert Sector Letter* is a brief introduction to the report *Nature Based Solutions: Desert Sector.* This report was later upgraded to richly referenced chapters in
(4) *The California Desert's Role in 30X30: Carbon Sequestration and Biodiversity.* Below is the Report Overview with the list of chapters.

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Joan Taylor, Governing board of the Coachella Valley Mountains Conservancy, and boards of Friends of the Desert Mountains and The Wildlands Conservancy. Chairperson, California Conservation Committee and California/Nevada Desert Committee of Sierra Club

This report was developed to support the State's Pathway's to 30X30 project with more accurate data for the Sparsely Vegetated Land (includes the desert) category – Chapter VIII Biodiversity in our deserts.

(5) USGS Poster (2012?) *Assessing the geology and geography of large footprint energy installations in the Mojave Desert, California and Nevada*. David R. Bedford and David M. Miller. U.S. Geological Survey.

Area of analysis in the three-state Mojave Desert region. BLM-designated PEIS sites are also shown

Figure 3: Overview Map from the poster showing the area analyzed which includes Soda Mountain Solar on the I-15 east of Barstow.
From the Abstract: "About 48%of the entire area is less than 5% slope, and 8.3% is less than 1% slope, the favored slope category. For this lowest-slope category, deposits underlying about 98% of the area are either mixed eolian-alluvial origin or are fine-grained alluvial deposits, and thus susceptible to eolian dust and sand transport, especially after disturbance. In addition, in this low-slope category, 89% of the area is susceptible to flooding, based on the age and geomorphology of alluvial deposits." (emphasis added)

(6) USGS *Soil Surface Susceptibility to Wind Erosion*. Jayne Belnap, Sue Phillips, David M. Miller etc.
This study analyzes the Threshold Friction Velocity (TFV), the wind speed at which particles move and the amount of soil blown off the soil surface at high spring wind speed. The Mojave National Preserve was selected to physically assess the vulnerability to wind erosion including the soil surface characteristics and climate and the percent time per month that a TFV is exceeded.

The town of Baker and the Soda Mountain Solar Project are within the boundary of the area analyzed.

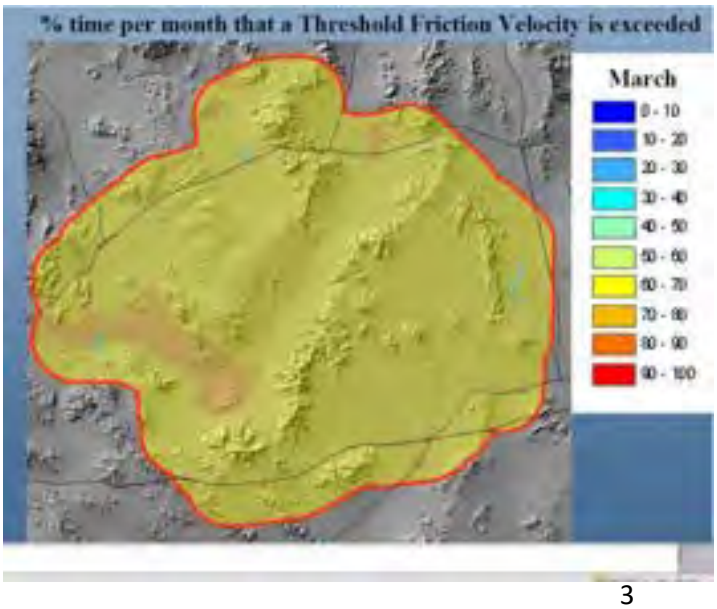

Figure 4: Soil Surface Susceptibility to Wind Erosion showing the percent time per month that a TFV is exceeded in the Mojave National Preserve. From March through October the TFV can exceed more than 60% of the time. (emphasis added)

(7) *Vulnerability of desert biological crusts to wind erosion: the influences of crust development, soil texture, and disturbances. Jayne* Belnap and Dale A. Gillette. Journal of Arid environments (1998) **39**: 133-142 Article No. ac980388. This article was not in the original Pdfs provided but is important to completely understand wind erosion in the desert.

From the Abstract: "Biological soil crusts, consisting of cyanobacteria, green algae, lichens, and mosses, are important in stabilizing soils in semi-arid and arid lands. Integrity of these crusts is compromised by compressioned disturbance such as foot, vehicle, or livestock traffic. Using a portable wind tunnel, we found threshold friction velocities (TFVs) of undisturbed crusts well above wind forces experienced at these sites; consequently, these soils are not vulnerable to wind erosion. However, recently disturbed soils or soils with less well-developed crusts frequently experience wind speeds that exceed the stability thresholds of the crusts." (emphasis added)

(8) *Sand Transport Paths in the Mojave Desert, Southwestern United States*. James B. Zimbelman, Steven H. Williams, and Vatche P. Tchakerian, Desert Aeolian Processes Edited by Vatche P. Tchakerian. Published in 1995 by Chapman & Hall. London.

Remote sensing and field evidence are used to describe sand deposits found in associated pathways of emplacement in the eastern Mojave Desert.

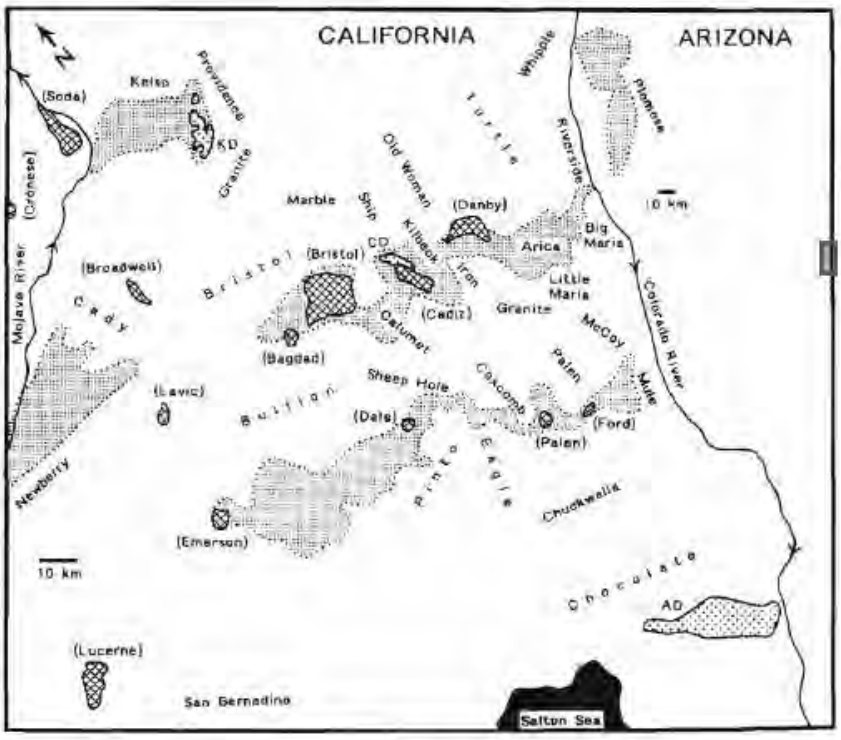

Figure 1. (b) Simplified sketch map of the area shown in Figure 1a. Selected playas (gridded pattern, names in parentheses), mountains (names listed at appropriate location), and rivers (arrows show direction of flow) are labeled for reference. Sand deposits are shown in dotted patterns: the open pattern represents active (relatively unvegetated) dunes (KD = Kelso Dunes, CD = Cadiz Dunes, AD = Algodones Dunes) and the dense pattern represents inactive (stabilized by vegetation) deposits. Note that foreshortening due to the oblique viewing geometry causes horizontal scale variations across the area.

Figure 5**:** Sketch map of the analyzed Sand Transport Paths. Note locations along the Mojave River.

Figure 6:
Screen shot of Daggett Solar in Newberry Springs 12/21/2021. Courtesy of Ted Stimpfel.

Figure 6 shows what happens when development occurs in the sand transport path. The picture, taken December 21, 2021, shows dust blowing over the "protective" fence surrounding Daggett Solar Power Project in Daggett-Newberry Springs, in the Mojave River Valley.

These materials should be incorporated into the library of reports and scientific papers used by the CEC staff for analysis of utility solar power projects in the desert. As noted in the *California Desert's Role in 30x30,* the two key takeaway messages are that in order to maintain desert biodiversity, carbon sequestration, and air quality the following are necessary:

1. The desert's carbon storage process differs significantly from more widely understood sectors such as forests, grasslands, chaparral, and wetlands.
2. Because of the distinct carbon storage process found in the desert ecosystem, there is one recommended strategy to maximize the desert sector's contribution to carbon emission reduction: intact desert lands need to be left undisturbed.

The proposed Soda Mountain Solar Project does not support the goals of the 30x30. The DEIR does not accurately reflect the soil conditions or the impact of the development on dust and air quality. Further the DEIR does not recognize the important role intact desert systems play in the sequestration of carbon thus the analysis in the DEIR is not complete and must be reanalyzed.

Further, if the proposed project goes forward, it will have detrimental impacts on the state's 30x30 goals. The purpose of AB205 surely did not include development of projects that are counter to the state's interest. The County of San Bernardino did not approve this project for good reasons which still apply especially related to water used to manage dust. The amount of water that is estimated to be necessary to control dust is a vast underestimate of actual water use by other projects. This is predicated on the erroneous assumption that dust can be controlled using water, see figures 1, 2, and 6. This dust will also obscure visibility on Interstate 15 and pose a significant risk for drivers.

The no-action alternative is the only sustainable alternative and should be the one adopted by the CEC for the project.

Sincerely,

Pat Flanagan,
Board member MBCA

Pdfs attached to email:

1. The Desert Under Our Feet, Robin Kobaly
2. Science Brief: Climate Mitigation in California: the Importance of conserving carbon in deserts. Defenders of Wildlife, Defenders of Wildlife
3. AB1757 Desert Sector Letter
4. The California Desert's Role in 30X30: Carbon Sequestration and Biodiversity
5. USGS Poster: Assessing the geology and geography of large footprint energy installations in the Mojave Desert, California and Nevada, David R. Bedford and David M. Miller
6. USGS Soil Surface susceptibility to Wind Erosion, Jayne Belnap, Sue Phillips, David M. Miller
7. Vulnerability of desert biological crusts to wind erosion: the influence of crust development, soil texture, and disturbances. Jayne Belnap
8. Sand Transport Paths in the Mojave Desert, Southwestern United States. James Zimbelman et.al.

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FACTS

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DESERT
LAND
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MBCA
morongo basin conservation association

CactusToCloud
Institute

September 14, 2023

Email to: naturebasedsolutions@resources.ca.gov

RE: Desert Sector Targets for AB 1757

Dear CNRA, CARB, and CDFA:

Thank you for the opportunity to provide input to the California Natural Resources Agency [CNRA], California Air Resources Board [CARB], and California Department of Food and Agriculture [CDFA] on the importance of desert carbon sequestration as part of AB 1757's commitment to reaching our state's broad climate change goals. We are writing to you as a science-focused subgroup of the 30 X 30 Inland Deserts Working Group, affiliated with the statewide 30 by 30 Power in Nature coalition, to urge CNRA's, CARB's, and CDFA's affiliated staff to read the attached comprehensive report, *Nature Based Solutions: Desert Sector.* Our detailed biographies are in the report.

The California desert region has been largely overlooked as a significant carbon sink for several reasons. First, the scarce aboveground vegetation is visually misleading if one assumes a singular correlation between aboveground biomass and carbon sequestration capacity. This misperception is tied to a second reason for overlooking the desert sector: the desert ecosystem primarily sequesters carbon underground. Finally, as an underfunded research ecosystem, the desert sector remains woefully behind its companion ecosystems such as forests, grasslands, chaparral, and wetlands in terms of quantifying, measuring, and modeling carbon sequestration capacity. But

there is more than sufficient research to make this salient point: the desert lands of California are a significant carbon sink and must be included in regional and global carbon accounting.
Our analysis offers three key takeaway messages:

- The desert's carbon storage process differs significantly from more widely understood sectors such as forests, grasslands, chaparral, and wetlands.
- Due to the distinct carbon storage process found in the desert ecosystem, there is one recommended strategy to maximize the desert sector's contribution to carbon emission reduction: it needs to be left undisturbed.
- Large-scale disturbance of deserts, particularly within critical ecosystems such as creosote bajadas and microphyll woodlands, will not only result in the reduction of California's biodiversity, but also in the removal of a long-term carbon sequestration source, releasing calcite carbon that has been stored for millennia.

Specifically, our recommended target for the desert sector is conservation of 100% of undisturbed non-military public lands annually based on current levels, starting in 2024, and that regions displaying higher densities of microphyll woodlands and creosote bajadas be especially prioritized due to their higher capacity for carbon sequestration.

The discrepancy between our group's recommendation and CARB 's (which is to cut land conversion of deserts and sparsely vegetated landscapes by at least 50 percent annually from current levels, starting in 2025) is based on fundamental characteristics of the unique and fragile desert ecosystem. Whereas a forest ecosystem can be disturbed (harvested) with a relatively brief recovery time, and even managed to restore carbon sequestration over the long term, the desert region has no options for recovery of lost carbon within the time-scale of this planning effort. And once the carbon is stored underground in caliche soil layers, it remains there for upwards of thousands of years if left undisturbed. So it is critical to understand that CARB's recommendation would result in *permanent loss of carbon storage for all desert land that has been disturbed*. Here is further reasoning behind our recommendation:

(1) How the desert captures and stores carbon is unique in process and timescale.
While desert plants do capture and store carbon aboveground in foliage and woody tissue, they store much of their captured carbon deep underground in a massive network of connected roots and fungal root-partners, unlike forests which store most of their carbon aboveground or near the soil surface. Some of this carbon is stored in the tiny but numerous filaments of root-partnering fungi, and because there can be so many miles of fungal hyphae in each cubic foot of desert soil, it is attributed with storing one-third of the world's soil organic carbon. Also, much of the carbon that desert plants capture aboveground from the air eventually turns into inorganic carbon underground in mineralized deposits called calcite or caliche. These calcite/caliche deposits can store captured carbon in this inorganic form for millennia.

(2) Quantification of net ecosystem exchange (NEE).

Our recommendation is based on scientific analysis of photosynthesis data from the desert ecosystem [Appendix A]. In plants and soils, atmospheric CO_2 is absorbed during photosynthesis and released during respiration which can be quantified as "net ecosystem exchange", or NEE. In individual years, it can be highly positive or negative depending on the environmental conditions and the variability is extremely high in deserts.

NEE values are critical in assessing carbon sequestration capacity. In many cases, these are short term datasets. We are desperately in need of long-term background data for good decisions. *Based on surface area in vegetation maps, the extrapolated NEE value amounts to 1.5 to 1.88 million tons of carbon annually pulled out of the atmosphere by desert vegetation.*

Based on scientific analysis of photosynthesis data from the desert ecosystem, highest priority should be given to conservation of microphyll woodlands and creosote bajadas. The transfer of atmospheric carbon to desert biomass in microphyll woodlands and creosote shrubland is relatively insensitive to local precipitation. These vegetation types have access to alternate sources of water, including moisture from large rain events even miles away that saturate the soil, and access to groundwater by deep roots. These factors allow plants in microphyll woodlands and creosote bajadas to photosynthesize and sequester carbon through the seasons even without local precipitation. For this reason, it is inaccurate to assume that the arid desert climate equates with poor NEE values that form the basis for carbon sequestration.

(3) The undisturbed desert is a long-term carbon sink.

Carbon storage capacity is a function of both quantity and timescale. The desert ecosystem, long regarded as an insignificant carbon sink, outperforms other ecosystems in carbon storage by holding on to that carbon for longer periods of time if left undisturbed. For instance, while a temperate forest may have an average organic turnover time of 25 years, the desert's turnover time is 38 years. That difference is of a higher magnitude for soil/sediment of each ecosystem: the temperate forest average turnover time is 55 years, but the desert's is much more extended at 200 years. **See Appendix B** for a comparison of average organic carbon turnover in years across a spectrum of ecosystems. Unlike the large storage of organic C in most ecosystems, much of the desert total carbon is stored as calcites, generated from soil respiration. If buried and undisturbed, this carbon can remain sequestered for millennia (Schlesinger 1985). *There could be more than 262 million tons of C stored in California deserts as calcites.*

(4) Modeling.

Our group acknowledges the critical role that modeling will play in projecting, measuring and quantifying carbon sequestration within the desert sector. We recommend an additional carbon sequestration modeling framework to reconcile the desert carbon budgets using an ecohydrology approach. Deep water use (rather than precipitation) of microphyll woodlands and creosote

bajadas is a more accurate representation of moisture dynamics for these vegetation types. By incorporating deeper water use and using the normalized difference vegetative index {NDVI} as a driver of CO_2 fixation (Rohde et al. 2021), we produce more accurate modeling projections by linking the NEE to deep carbon sequestration [please see attached *Nature Based Solutions: Desert Sector* report for additional supporting data and studies].

(5) Tools, frameworks, collaborations and investments to deliver recommended targets. There are planning tools currently available that allow decision makers the opportunity to simultaneously develop solar installations on desert lands, while protecting conservation values including carbon sequestration all at once. This is the kind of pioneering work that establishes California as an environmental leader. It is laudable that through your work the California Natural Resources Agency (CNRA) and the CARB will have a better understanding about how Natural and Working Lands can contribute to CARB's total carbon stock percent change of -4% by 2045, but we strongly recommend that *the state energy agencies, California Public Utilities Commission and California Energy Commission, also be closely engaged to ensure on-the-ground consistency* with this unprecedented effort.

One planning tool is the Carnegie Energy and Environmental Compatibility [CEEC] model, a multiple criteria model that quantifies each solar installation based on environmental and technical compatibility. *Techno-ecological synergies [TES] is a second tool* for decision-makers seeking to integrate the advancement of utility-scale solar with conservation of our desert lands. This is a framework proposed by a group of researchers led by Dr. Rebecca R. Hernandez of UC Davis which engineers the mutually beneficial relationships between technological and ecological systems to bolster the sustainability of solar energy across a suite of environments including land, water, and built-up systems. Details for both of these planning tools are available in our report.

There are alternative options to disturbance of intact desert lands. We recognize that there is an urgent need to transition to clean energy. Although perhaps well-intended, development of large-scale utility projects across previously undisturbed desert lands is counterproductive. Disruption of desert soils and vegetation releases significant carbon back into the atmosphere, defeating the purpose of natural and working lands utilized as a natural carbon sink. Further, such development on intact lands is not necessary because there are numerous feasible options for developing utility scale solar in California that can deliver the state-estimated need for 70,000 MW of new utility scale solar (CEC 2021) which, if entirely ground-mounted with current technology, would require approximately 350,000 acres of land. Some of these options include:

- Water-deprived ag lands in the Central Valley estimated to be a minimum of 500,000 acres (Hanak et al, 2019) or as much as 900,000 acres (Escriva-Bou et al, 2023)
- 250,000+ acres of selenium- contaminated land in the Westlands Water District
- 200,000+ acres of parking lots in California (USGS 2019)
- 11,500 megawatts on commercial/industrial rooftops near substations (RETI 2009), with far greater rooftop potential today
- 4,000 miles of canals and 16,000 miles of highway right of ways
- Agrivoltaics (ie, slightly elevated or spaced photovoltaic panels) on a portion of the 25+ million acres of farm and ranch lands throughout the state

Investments needed to deliver on targets. Our group has assessed a long-standing need to invest in scientific, peer-reviewed research relevant to identifying, mapping, quantifying, and modeling carbon sequestration in arid desert lands. The desert ecosystem is far behind other ecosystems in obtaining measurable data critical for 30X30 work. There is adequate data to confirm the existence of carbon sequestered underground in the desert, but substantial gaps exist for more granular analysis.

Additionally, we strongly recommend investment in expansion of already existing tools, and consultation with experts in integrating conservation strategies in the desert with technology. For example, the work of Dr. Rebecca Hernandez from UC Davis and her team would provide a mechanism for achieving the dual goals of desert conservation while utilizing technology schemes to maximize carbon sequestration in the desert and protecting biodiversity.

Additional benefits of desert land conservation. Conserving intact desert lands offers additional benefits that are essential to 30 X 30 goals. Conservation of undisturbed desert lands provides protection for one of the most biodiverse ecosystems on the planet. So-called desert "wastelands" are not only richer from a biodiversity standpoint, but they also appear to be incubators of speciation, with many species occurring nowhere else on earth. A recently published study, Pillay et al. (2022, *Frontiers in Ecology and the Environment*, vol. 20, issue 1) looked at patterns of vertebrate animal species richness across our planet. As expected, they found that the tropics ranked number one. However, deserts were the next most species-rich biome when it came to mammals, birds, and reptiles, higher than temperate forests, shrublands, and grasslands. Critical health benefits are conferred by conservation of undisturbed desert lands which include preventing mobilization of dangerous desert dust particulates that contribute to a suite of respiratory illnesses (particularly among disadvantaged communities), and sustaining economic stability provided by tourism and recreation to the desert region's intact landscapes.

Conclusion.

Our recommendation that the best strategy for employing natural and working lands in the desert region is ***conservation of 100% of undisturbed non-military public lands annually based on***

current levels, starting in 2024 is based on a foundation of scientific literature. The carbon sequestration process in California's deserts occurs primarily underground, and avoidance of disturbance to desert soils is the means to maximize carbon sequestration within the desert sector.

Thank you for the opportunity to contribute comments. We stand by for further discussion and to provide additional guidance.

Sincerely,

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Appendix A

Comparison of desert regions with other ecosystems of published net ecosystem exchange [NEE].

Mesquite stands [Desert]	200 kg.ha^{-1}y^{-1} [[Huxman et al. 2004]
Creosote bajada [Desert]	1,000 kg ha^{-1}y^{-1} [Jasoni et al. 2005]
Baja California [wet year]	520 kg ha^{-1}y^{-1} [Hastings et al. 2005]
Sky Island coniferous forest above SoCal de	300 kg ha^{-1}y^{-1} [Allen et al. 2014)
Chaparral [100 y/o, wet year]	520 kg ha^{-1}y^{-1}
Sky Island coniferous forest above SoCal deserts	300 kg ha^{-1}y^{-1} [Allen et al. 2014]
Chaparral [100 y/o, drought year	180 kg ha^{-1}y^{-1}
La Selva tropical rainforest	3,000 kg ha^{-1}y^{-1}
Boreal forest	780 kg ha^{-1}y^{-1}

Appendix B

Deserts undertake the conversion of CO2 (from soil respiration) into calcites. Deserts effectively store both calcites and organic carbon. The table below illustrates average turnover time (years) of organic carbon in both ecosystem types and soil/sediments.
Desert organic carbon once fixed stays in the system longer than in other ecosystems, releasing back to the atmosphere slowly. This storage benefit is most notably pronounced in desert soil and sediment. Calcites, layered into caliche, form from autotrophic respiration from deep roots and symbiotic microbes, and from heterotrophic respiration from the transferred organic matter. Disturbance to desert lands undermines the carbon storage process. Importantly, buried calcites are dissolved upon exposure to air and water. Upon exposure, the CO_2 in calcium carbonates can be released from disturbed soils up to 2.4g $C \cdot m^{-2} \cdot day^{-1}$, or 24 $kgC \cdot ha^{-1} \cdot day^{-1}$ following a precipitation event (Swanson 2017).

Ecosystem Type	**Ecosystem Organic C Turnover Time**	**Soil/Sediment Organic C Turnover Time**
Desert	38 years	200 years
Temperate forest	25 years	55
Cropland	22 years	40
Perennial grassland	36 years	100

Reichie 2020

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NEWS OF THE DESERT FROM SIERRA CLUB CALIFORNIA & NEVADA DESERT COMMITTEE MARCH 2019

DESERT REPORT

BY ROBIN KOBALY

THE DESERT UNDER OUR FEET

An extraordinary biological web that serves us in countless ways

WE ARE WITNESS TO ASSAULTS ON OUR DESERT LANDSCAPE EVERY day, but we usually recognize only what we see above ground. In fact, these surface alterations result in critical changes below ground that have far-reaching implications that are mostly unnoticed or unappreciated. If we could see the intricate systems that hum along invisibly underground, we would likely fight even harder to protect our desert landscapes from unnecessary disturbance.

Research around the world is showing that the biggest contributors to soil stability in deserts are the smallest of microorganisms. Tiny microbes hold our desert landscape together. The valuable role of hidden microorganisms in keeping our air cleaner, preventing dust storms, controlling erosion, and helping us reduce carbon dioxide levels in our atmosphere is enormous, but that role is mostly overlooked when we make land-use decisions in our desert.

Biological Soil Crusts: Stabilizing Soil and Influencing Water Runoff

Across arid soils, a thin crust often forms within the top few centimeters of the soil surface. Surprisingly, these crusts are not exclusively formed from excess minerals, as is often thought, but are created by microscopic and somewhat larger macroscopic organisms that live together in a tiny but profound world.

Whenever it rains, a cast of soil creatures (including cyanobacteria, formerly called blue-green algae, plus bacteria, fungi, and other microbes) that have been patiently sleeping wakes up like a scene in Sleeping Beauty's castle. Released from the spell of drought, these microscopic creatures start making food and creating miniature subway tunnels as they move through the soil, reproducing as long as the soil is moist. Tunnels of sticky mucilage around algae filaments allow the algae to move into new frontiers while moisture paves their way.

As the soil dries out after rain, a slumber again falls over the entire

→ PAGE 14

Deep roots, evening primrose.
2018 © Robin Kobaly

THE DESERT UNDER OUR FEET

→ PAGE 1

community, and the soft, gluey tunnels start to dry out – but not before tightly binding all the soil grains they have touched. The value of this thin, living "skin" across our desert soil is not only expressed during its wet "waking hours," but also during its dry dormant time when it performs the critical role of gluing soil particles together against wind and water erosion.

During the following months or years of drought, these sticky tunnels continue to bind soil grains together. The result of this microscopic community is a protective seal across the soil surface called a biological soil crust that keeps dust, particulate matter (PM10s and PM2.5s), and harmful fungal spores like valley fever from being blown up into the air wherever soil has not been disturbed. These living soil crusts take hundreds of years to develop into effective soil sealants, but when they are allowed to remain intact, they not only hold back wind and water erosion, but also supply nutrients to neighboring higher plants, improve water infiltration, prevent choking dust storms, and help keep our air clean and healthy. Plus, they do all this for us while they are sleeping.

Mycorrhizae: A Strategic Partnership Between Plants and Fungi

Working both above and below this marvelous crust, plants are breathing in massive amounts of carbon dioxide from the air, reassembling the carbon into sugar, then transporting it underground to grow roots. Byproducts from this growth (photosynthesis) become locked in hidden carbon storage vaults underground, both living and non-living, for many hundreds of years. Small shrubs like Blackbrush can live at least 400 years, while Mormon Tea can live over 250 years. Our Mojave Yuccas are youngsters at 500 years old, and may live to several thousand years old. And even more impressive are Nolinas, Desert Ironwood trees, and California junipers that may live to over 1000 years.

Roots from these carbon-eating plants reach far underground, some as much as 150 feet deep (roots of succulents like cacti and yuccas are not as deep; they have other survival tricks). Roots this deep are essential to reach soils still moist from rains that may have fallen many years ago, and these deep, living "straws" create an upside-down forest of craggy wood, resulting in a greater mass of living tissue below ground than what we see above ground.

All these deep roots are not separate and alone in their quest to gather water and nutrients to survive. Eons ago, they struck upon a partnership with fungus that helps them absorb moisture and nutrients from an arid soil that is almost devoid of either. Over 90% of plants on earth belong to this "root partners' club," a lifelong membership that grants participating plants special privileges.

Moisture and valuable resources like phosphorus and nitrogen are all gathered and delivered to the plant partner through thin threads of widely dispersed fungal hyphae called mycelium. In exchange, the plant host supplies sugars to their "mycorrhizal" fungal root partners, which, for all their near-magical powers, cannot make their own food. A good trade indeed. This partnership has been called a "subterranean swap meet."

But the fungal partner offers more to this relationship; it offers immune-boosting compounds and antibiotics and bitter-tasting chemicals that deter animals and insects from eating its host's leaves. Even more mind-boggling, fungal threads from neighboring plants can merge with adjacent fungal threads to connect plant to plant in a massive community network that "exchanges information" between plants for the good of the whole community.

Without seeing anything above ground, the mycelia below ground transmit information about dangers like insect attacks and initiate the production of pest-repelling compounds in the leaves of the plants connected to this "root partner's club." No single plant has to fight an intruder on its own. This information-sharing network of fungi has been dubbed "nature's internet" or the "Wood Wide Web."

Mycorrhizal Mushrooms. 2018 © Robin Kobeis

The benefits of this hidden relationship extend beyond the exchange of resources between plants and fungi. Both the root and the fungus are breathing out carbon dioxide in the dark (plants breathe *in* carbon in the light, and breathe *out* carbon in the dark). Right at the point where a tiny fungal thread connects to the plant root, some of the carbon dioxide exhaled by roots and fungi reacts with calcium in the soil to form crystals of calcium carbonate, or what is called caliche. Carbon in these crystals becomes locked into the soil.

Over time, large chunks or even vast layers of caliche are built up underground, capturing carbon from our atmosphere in an underground lock-box and reducing its potential escape into the atmosphere. This transfer of carbon from air to leaf to root to fungal partner and into caliche deposits is one of nature's ways to sequester carbon and hold it in natural storage underground.

All that we need to do to keep the carbon safely stored in the underground caliche is to allow the desert plants to keep living and sequestering carbon. It is thought that some of the vast caliche beds in our southwest desert soils may have been formed over thousands of years. Some of our longest-lived desert plants may have germinated right after the last ice age receded 10,000 years ago and are still growing today, capturing carbon underground over millennia (King Clone, a cloning creosote in Johnson Valley, estimated to be almost 11,000 years old, is one example).

Glomalin: Hiding Place for a Third of the World's Carbon

There is still more to this incredible story. Every hyphae (the thread-like "root" of a fungus) of the most common kind of root-partnering fungus in our desert (arbuscular mycorrhizal fungi) is coated with a waterproof sealant called "glomalin." This coating of sticky protein around each fungal thread prevents leakage when water and nutrients move through the hyphae. Glomalin is made directly from carbon gathered by its plant partner, so again atmospheric carbon is being moved from air into soil for long-term storage.

Remarkably, each hyphae's coating *of glomalin* persists in the soil after the fungal thread dies (when the growing root section matures and barks over). For another 30 to 100 years, the sloughed off glomalin glues soil grains together in packets containing carbon, nitrogen, phosphorus, and other valuable nutrients. This waxy coating of glomalin helps to form tiny soil clumps called "aggregates," and prevents nutrients vital to plant growth from being leached out of the soil. Glomalin will continue to hold carbon underground long after death of the hyphae that produced it – helping us in our quest to reduce greenhouse gases in our atmosphere.

This entire kingdom of incredible creatures works twenty-four hours a day, year after year, without any input from humans, unseen by us and mostly unappreciated by us. These life-forms in mutual partnership will continue to glue our soils together and capture our excess carbon in perpetuity . . . *unless we remove the plants and disturb the soil that makes all this magic work.*

We are now faced with decisions about whether to allow thousands of acres of functioning desert systems to be sacrificed for solar energy developments – on the premise of reducing carbon dioxide levels in the atmosphere. Scientists estimate that after the removal of desert vegetation and disturbance of the top soil, the pre-existing plant community requires about fifty to three hundred years before it returns to pre-disturbance cover and biomass, but requires about three thousand years before the disturbed area returns to the function it had before disturbance. The ancient nature of both the plants and the living soil crust organisms make this a credible prediction.

We once thought that carbon was held in meaningful amounts only in ocean creatures and forest trees and humus. Now we know that soils, including desert soils, are a significant storage facility for carbon. Without these biological partnerships, significant amounts of carbon would be released from the soil back into the atmosphere, and no additional carbon would be sequestered. Not only are desert soils holding carbon in caliche deposits, they also store vast amounts of organic carbon in soil organisms, including root-partnering fungi with their coating of glomalin. The importance of glomalin's carbon storage capacity is stated by a USDA scientist this way:

"As carbon gets assigned a dollar value in a carbon commodity market, it may give literal meaning to the expression that good soil is black gold. And glomalin could be viewed as its 'golden seal.'"
– Don Comis, USDA Agricultural Research Service, (2002) in *"Hiding Place for a Third of the World's Stored Soil Carbon"*

Wherever possible, we need to steer developments, especially large-scale projects like utility-scale solar facilities, to pre-disturbed, severely impacted soils or pre-developed sites such as parking lots and roofs. Then, we get the best of all options: progress with preservation.

Leave these microscopic soil magicians alone to do their work. The desert's underground life-support systems can only function if the aboveground systems (desert plants and living soil crusts) are kept alive and intact. We must be their voice and their champion in protecting them – so they can silently continue to protect our potential for carbon sequestration, our air quality, our health, our economy, our landscape, our ecotourism, our property values, and our quality of life. To ensure our own sustainable future, we need to keep our desert soils intact and alive . . . it benefits everyone. The choice is ours.

With a Master's Degree in Biology, Robin Kobaly had a twenty-year career as a botanist with the BLM, and continues to work in botany, wildlife biology, and natural history interpretation. She is currently executive director of the SummerTree Institute, a 501(c)3 nonprofit corporation dedicated to providing responsible viewpoints toward our environment, our place in it, and our responsibility to it.

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5 SAND TRANSPORT PATHS IN THE MOJAVE DESERT, SOUTHWESTERN UNITED STATES

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ABSTRACT

Remote sensing and field evidence are used to describe sand deposits found in associated pathways of emplacement in the eastern Mojave Desert. Two separate pathways are identified here: one extending eastward from the Bristol Playa through the Cadiz and Danby Playas and Rice Valley to the Colorado River, and a second parallel path extending eastward from Dale Playa through the Palen and Ford Playas to the Mule Mountains near the Colorado River. The preferential location of sand ramps on the west slopes of mountains along each path suggests that the eastward moving, wind-driven sand was not confined by topographic divides between separate drainage basins around the individual playas and valleys. Sediment analysis of selected samples shows that there are discreet associations of sand characteristics along the sand pathways, with an inferred similarity between the stabilized (vegetated) sands in Rice Valley, west of the Colorado River, and stabilized sand dunes on Cactus Plain and La Posa Plain in Arizona, east of the Colorado River. Sand transport along the paths appears to have been episodic, based on multiple paleosols present in several dissected sand ramps. Future testing of the sand transport path hypothesis will require additional sediment analyses, spectral studies of remote sensing data, and obtaining dates for selected soil horizons along the sand paths.

INTRODUCTION

Wind has long been recognized as a powerful agent for sediment transport in arid environments. Sand transport in the hyper-arid Sahara Desert in northern Africa can be traced for thousands of kilometers, providing physical evidence of the wind patterns prevalent throughout the region (Wilson 1971, El-Baz et al. 1979, El-Baz and Maxwell 1982). However, significant aeolian transport is not restricted to hyper-arid deserts. Semi-arid regions also can preserve evidence of substantial deposits of aeolian sand, but many of these deposits may be stabilized at present by a variety of desert flora adapted to the intermittent rainfall.

The advent of airborne and satellite-based remote sensing data allow both the surface materials and their associated flora to be examined in a regional context. In particular, spacecraft images have been used to identify aeolian deposits throughout the Earth (Breed and Grow 1979), as well as on Mars (Sagan et al. 1972, Greeley and Iversen 1985) and Venus (Greeley et al. 1992).

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Conclusions derived from remote sensing data must be corroborated by "ground truth" investigations at key localities. The present study combines preliminary field observations with satellite remote sensing data to document aeolian deposits along hypothesized sand transport pathways in the eastern Mojave Desert of California. While a considerable amount of field work remains to be carried out, our intent here is to describe the primary features which suggest that an association exists between various sand deposits. Integrated pathways of sand transport would imply that aeolian processes have regional significance well beyond the confines of individual drainage basins. The time scale of this aeolian activity is not well constrained at present, but exposures described here suggest that the dissected sand ramps in the eastern Mojave Desert contain climatic information which predates the Holocene activity evidenced by the present isolated accumulations of active dunes.

BACKGROUND

The Mojave Desert is located in southern California at the southern end of the Basin and Range physiographic province. It is an important field geology study area because it contains numerous, accessible, well-exposed examples of a variety of geologic features (Dohrenwend 1987). The Garlock and San Andreas faults define sharp boundaries to the western margin of the Mojave Desert, while the eastern boundary with the arid region surrounding the Colorado River is more gradational. The sand transport paths described in this study lie in the eastern part of the Mojave Desert, possibly including sand deposits east of the Colorado River (Figure 1). A synopsis of the geology of the study region can be found in Jahns (1954) and in Bassett and Kupfer (1964).

Aeolian activity has formed sand sheets at several locations in the Mojave Desert. Sand ramps over 100 m thick occur in places where topography has impeded local sand migration (H.T.U. Smith 1967, R.S.U. Smith 1982). These sand ramp deposits include soil layers and other features that contain paleoclimatic information (Tchakerian 1991). The deposition of each layer presumably followed the desiccation of pluvial lakes lying upwind, with soil formation occurring between pulses of aeolian activity (Smith 1982, McFadden et al. 1987, Wells et al. 1987, Chadwick and Davis 1990, Tchakerian 1991). Some sand ramps are so large that they surmount the windward side of the topographic obstacle responsible for their formation. This study presents a hypothesis of regional aeolian transport that provides a unifying framework in which to interpret the results obtained from widely distributed sand ramps in the Mojave region.

A synoptic view of the Mojave Desert is best obtained from remote sensing data. Several recent remote sensing and field studies have focused on aeolian processes in the Mojave region (e.g., Blount et al. 1990, Paisley et al. 1991, Lancaster et al. 1992, Laity 1987, 1992, Zimbelman and Williams, in preparation). These efforts revealed that active sand can be distinguished from sand

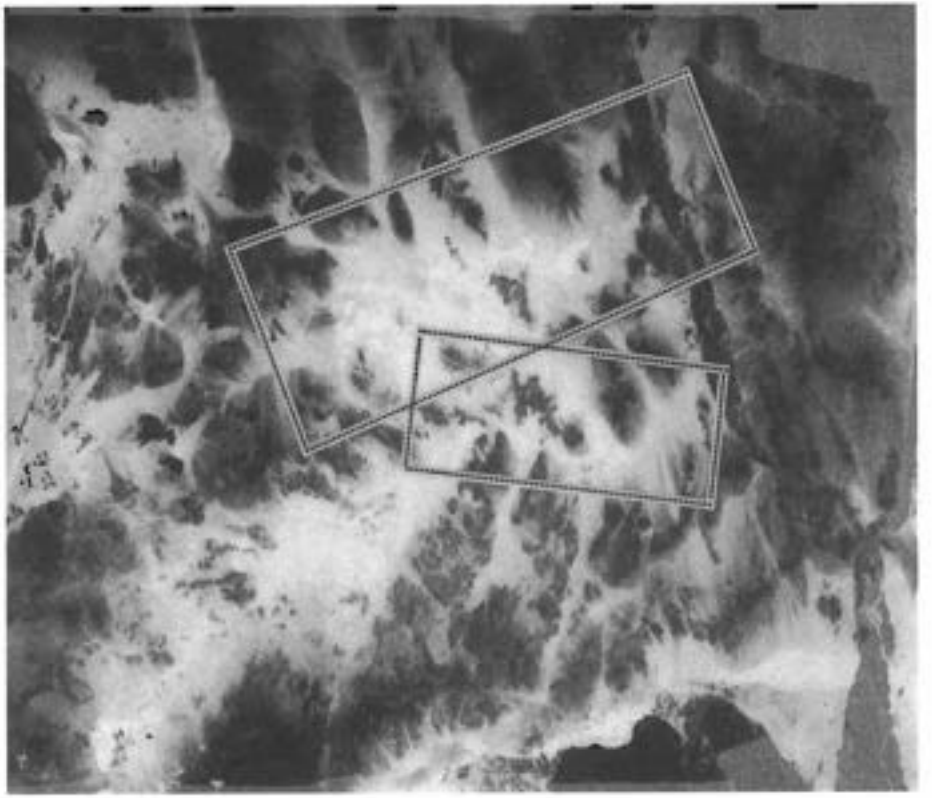

Figure 1. (a) Oblique view of the eastern Mojave Desert, taken with the Linhof camera on board the Space Shuttle. This view shows the Mojave Desert area from the outwash plains of the Mojave River (near Barstow, California) at left, to the agricultural fields along the Colorado River at right. The line of sight is nearly coincident with the paths of sand transport described in the text. Dotted lines show the locations of Figures 2 (top) and 7 (bottom). See Figure 1b for selected feature names near the pathways. Portion of frame 51B-146-111, obtained during Shuttle flight STS 51B, between April 26 and May 6, 1985.

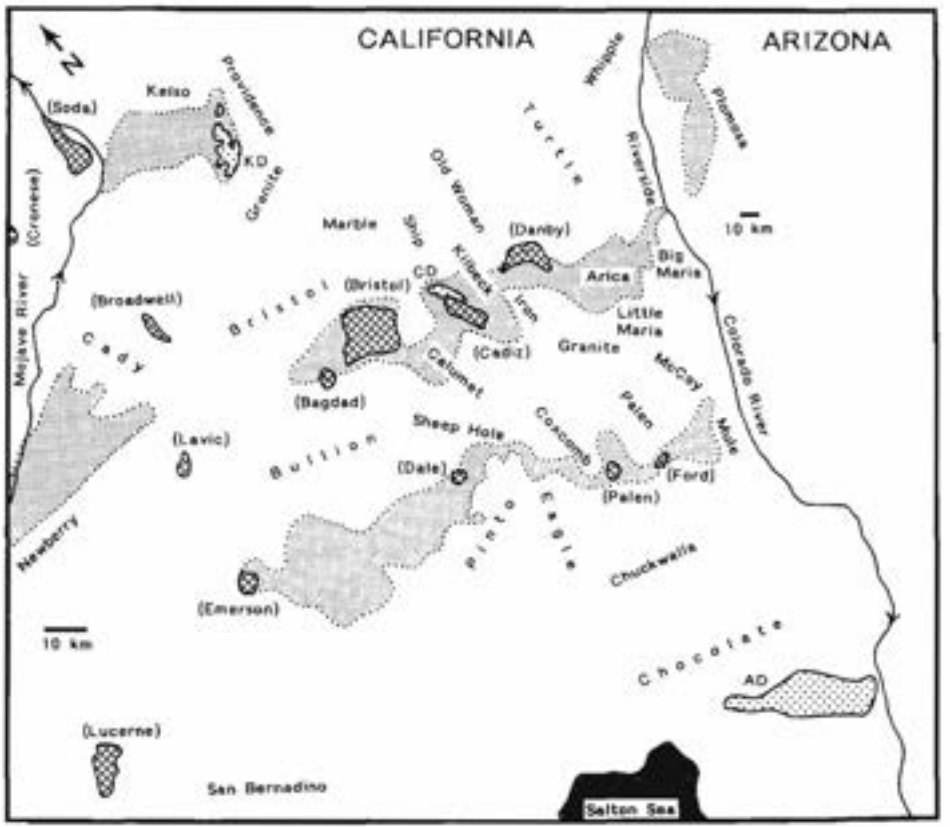

Figure 1. (b) Simplified sketch map of the area shown in Figure 1a. Selected playas (gridded pattern, names in parentheses), mountains (names listed at appropriate location), and rivers (arrows show direction of flow) are labeled for reference. Sand deposits are shown in dotted patterns; the open pattern represents active (relatively unvegetated) dunes (KD = Kelso Dunes, CD = Cadiz Dunes, AD = Algodones Dunes) and the dense pattern represents inactive (stabilized by vegetation) deposits. Note that foreshortening due to the oblique viewing geometry causes horizontal scale variations across the area.

stabilized by vegetation through subtle but consistent differences in reflectance properties between the Landsat Thematic Mapper spectral bands. Similar spectral differences exist in the Landsat data used in the present study, although the differing plant populations appear to play a significant role in the reflectance properties of aeolian deposits in the Mojave region (Zimbelman and Williams, in preparation). Consequently, seasonal variations may prove to be critical to the spectral response of certain Mojave sand deposits. These relationships are still under active investigation, so the results presented here will be based primarily on morphology as observed in a single spectral band.

SAND TRANSPORT PATHS

Three principal locations of aeolian deposits in the eastern Mojave Desert are described here: the Bristol Trough (which includes the Bristol, Cadiz, and Danby playas), Clark's Pass (which includes the Dale, Palen, and Ford playas), and the Cactus and La Posa Plains in Arizona (Figure 1). Both the active and stabilized (vegetated to the point of nonmobility) sand deposits observed at these locations are hypothesized here to be part of regional sand transportation paths which cross the Mojave Desert southeast to the Colorado River, and possibly beyond the river. These locations are all south and east of the Kelso Dunes (Figure 1), the most prominent and intensively studied dune field in the Mojave Desert (Sharp 1966, 1978, Paisley et al. 1991, Lancaster et al. 1992, Lancaster 1993). The sand in the Kelso Dunes originated in broad outwash plains associated with the Mojave River, was transported to the southeast by the prevailing winds, and collected at the base of the >1800-m Providence and Granite Mountains, which formed an insurmountable barrier to the windblown sediments (Sharp 1978). The sands associated with the Bristol Trough and Clark's Pass also are oriented along the prevailing northwest-to-southeast wind direction (Greeley and Iversen 1985), but these sand deposits have traversed several distinct drainage basins on their way to the Colorado River. Sand from the Bristol Trough may have even contributed to a third major sand deposit, a field of stabilized dunes on the Cactus Plain and La Posa Plain east of the Colorado River. Each of the three sand localities is described in greater detail in the following sections.

Bristol Trough

The most prominent association of sand deposits begins at the Bristol Playa near the head of a broad topographic low called the Bristol Trough (Thompson 1929). Sand occurs continuously over a distance of almost 150 km, eventually terminating at the Colorado River (Figure 2). The sand deposits concentrate around three large playas (Bristol, Cadiz, and Danby), and consist of both active dunes and vegetation-stabilized sand sheets and linear dunes (Figure 2). The relation of the sand deposits to the mountains they traverse indicates that the sand movement was toward the east-southeast, with prominent sand ramps present on the west side of several mountain ranges along the pathway.

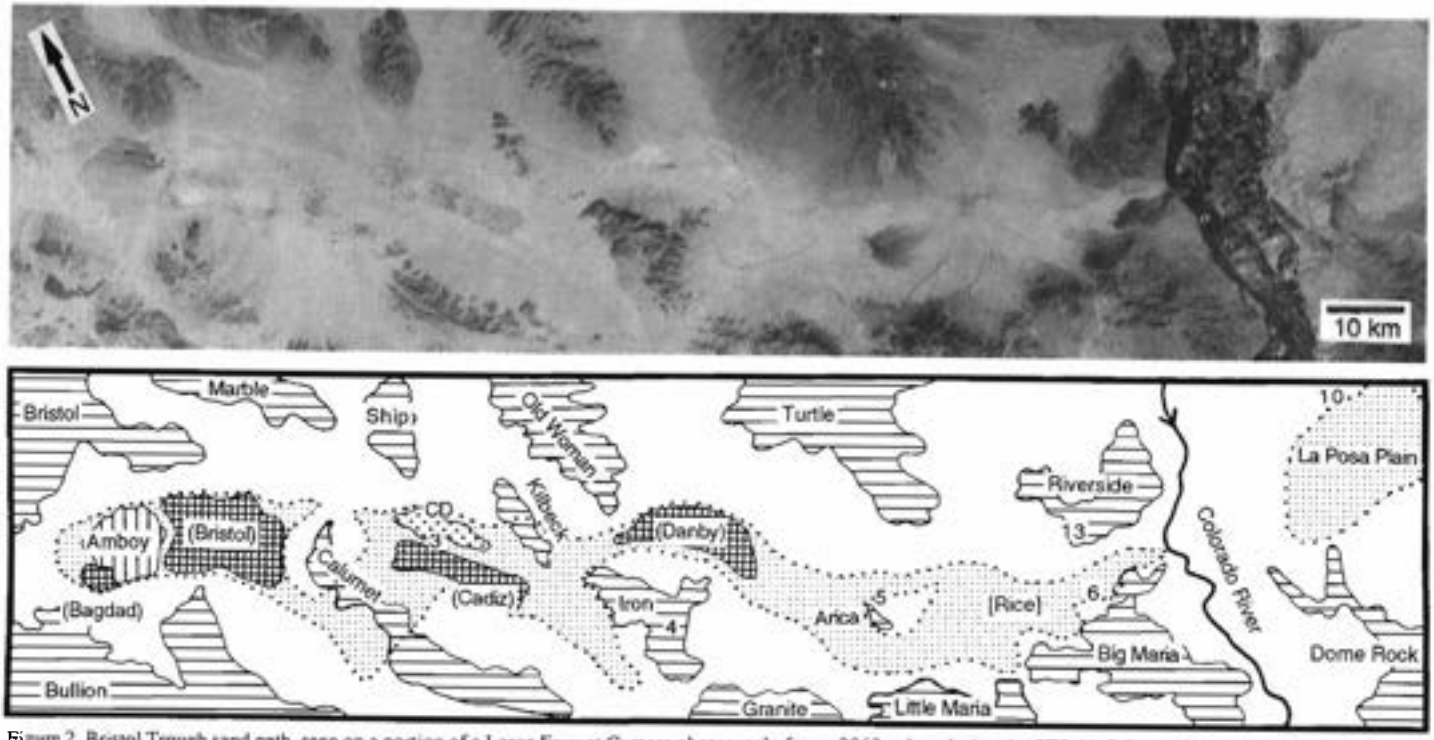

Figure 2. Bristol Trough sand path, seen on a portion of a Large Format Camera photograph, frame 2063, taken during the STS 41-G Space Shuttle flight between October 5 and 13, 1984. The sketch map below the photograph labels mountains (horizontal lined pattern), playas (gridded pattern), and sand deposits (dotted pattern). The active Cadiz Dunes (CD) are shown in a large dotted pattern. Rice Valley is identified by the name within square brackets. The Amboy lava flow (vertical lined pattern) is a Holocene basaltic eruption that covered the western portion of Bristol Playa. Numbers indicate the approximate centers of the orbital views shown in the corresponding figures.

Sand accumulations first become discernible west of the Bristol Playa, in the broad valley between the Bristol and Bullion Mountains (Figure 2). The Holocene basalt flow associated with the Amboy cinder cone covered the western portion of the Bristol Playa, leaving the small Bagdad Playa west of the Amboy flow as a remnant of the ancestral Bristol Playa (Bassett and Kupfer 1964). Sand derived from Bristol Mountains alluvium traverses the Amboy lava flow from WNW to ESE (Greeley and Iversen 1985), consistent with the annual wind flow in the region during the Holocene (Laity 1992). A prominent low-albedo wind streak is present downwind from the Amboy cinder cone (Figure 2). Sand transport across the flow is obstructed by the cinder cone, and enhanced turbulent wind scour in the lee of the cone aids in inhibiting sand migration into the wind streak (Greeley and Iversen 1978, 1985). There is no evidence, either in remote sensing data or on the ground, that sand from the Mojave River has traversed the Cady Mountains to enter the Bristol Playa basin from the west (Figure 1); the Bristol area is interpreted here to represent the beginning of the aeolian sand deposits that extend east to the Colorado River (Figure 2).

Sand is abundant southeast of the Bristol Playa, where it has built large ramps against the western slopes of the Calumet Mountains (Figure 2). The sand ramps provide shallow slopes for saltating sand to climb the western flanks of the mountains, as well as shallow slopes along which the sand moves

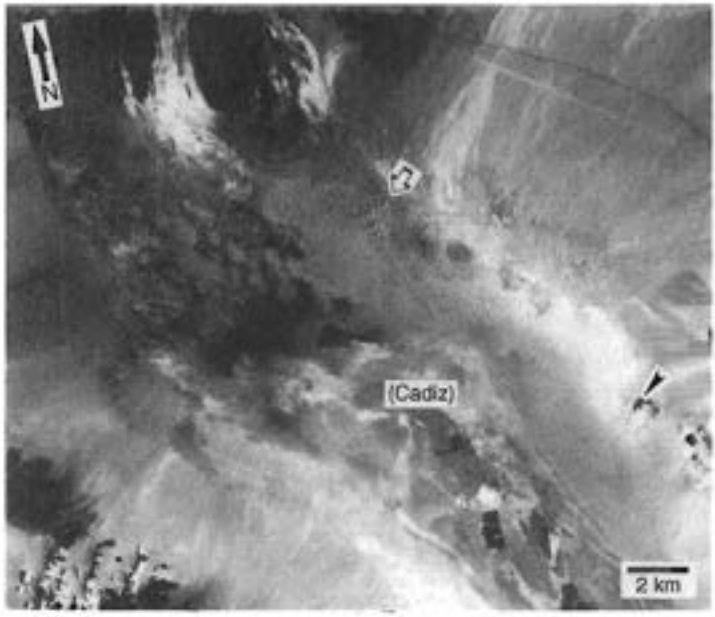

Figure 3. (a) Portion of a Landsat Thematic Mapper image showing the northern end of Cadiz Playa and the Cadiz Dunes north of the playa. The largest dunes (open arrow) have 30 m of relief. Transverse dunes are present along the northern margin of the playa; the dark arrow shows the location and orientation of Figure 3b. Landsat TM band 5, obtained on September 26, 1986.

Table 1
Mean values of grain size, sorting, and percent silt and clay for selected samples from the Mojave Desert, California

Aeolian unit	Mean (ϕ)	Standard deviation	Skewness	Kurtosis	% silt and clay
Dale Lake					
Unit 1	2.24	0.83	0.10	1.17	2.90
Unit 2	1.91	0.91	0.14	1.15	3.10
Unit 3	2.15	0.85	0.08	1.10	3.25
Unit 4	1.70	1.21	0.05	1.05	1.25
Unit 5	2.23	0.78	-.07	0.93	2.40
Calumet Mtns	2.91	0.97	0.22	1.29	4.83
Cadiz Dunes	2.35	0.29	-.03	0.89	
Iron Mtns	2.45	0.88	0.15	1.10	7.20
Rice Valley	2.95	0.75	0.20	1.25	6.25
Cactus Plain	2.87	0.87	0.25	1.35	5.98

down the eastern flanks of the mountains. Neither climbing nor falling dunes are observed on the Calumets, but Landsat spectral data indicates that stabilized sand dominates a 10-km-long reach of the central portion of the mountains, where sand ramps were evident on the ground. Alluvial fan deposits around the northern end of the Calumets lack any prominent sand accumulations, leading to the interpretation that most sand from the Bristol area crossed the central Calumets instead of going around the northern alluvial fans.

East of the Calumet Mountains, sand deposits are concentrated around the Cadiz Playa, which is in the broad valley between the Calumet Mountains and the Kilbeck Hills (Figure 2). The sand deposits attain a considerable thickness on the northern margin of the Cadiz Playa; individual dunes display 30 m of relief and are clearly resolved in Landsat Thematic Mapper data (Figure 3a). Ground investigation showed that the dunes north of Cadiz Playa are the only substantive area of active dunes observed along the Bristol Trough path. The active sand gradually thins to the east, where transverse dunes with 1-2 m of relief become the dominant aeolian landform (Figure 3b).

Stabilized sand sheets extend eastward from the Cadiz Valley across the southern end of the Kilbeck Hills into the Danby Valley (Figure 2). Extensive sand ramps are present around the southern Kilbeck Hills, and are particularly well developed on the western slopes of the Iron Mountains (Figure 4a). Where ephemeral streams dissect the Iron Mountain sand ramps, tens of meters of sand are exposed within the channels, both in the western sand ramps (some of which have active dunes on the channel crest, Figure 4b), and in stabilized sand ramps on the northern flanks (Figure 4c).

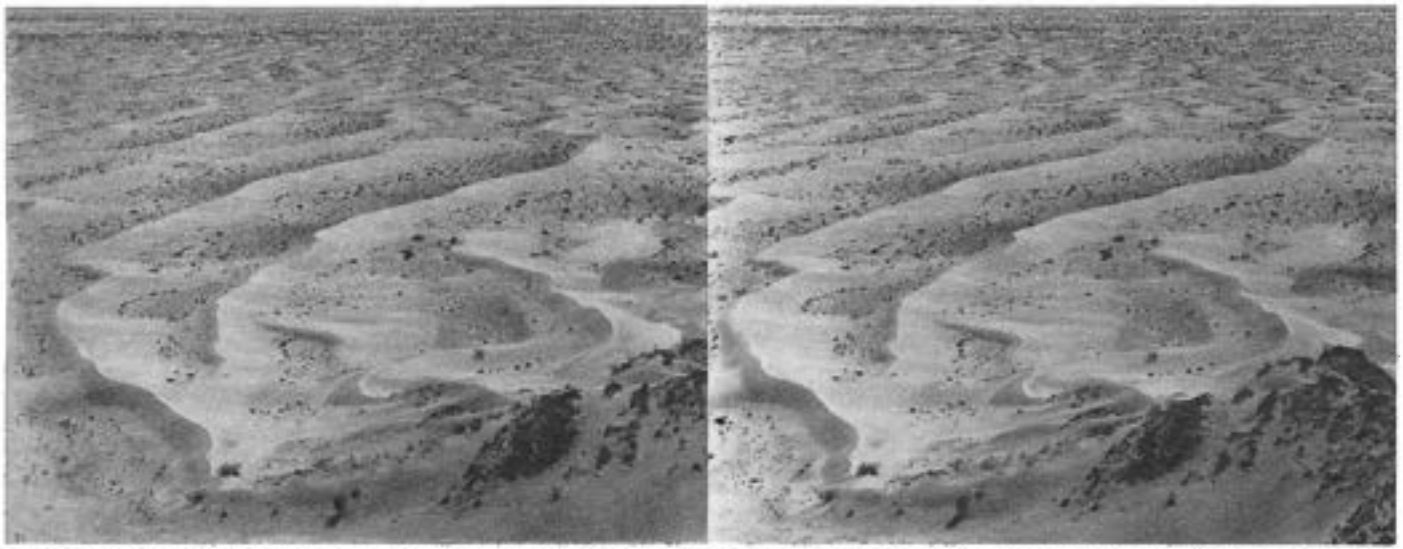

Figure 3. (b) Oblique stereo pair of transverse dunes north of the Cadiz Playa, looking southwest. Stereo view shows exaggerated topography; the dunes have 1 to 2 m of vertical relief and an average spacing of 40 m. Photographs taken on September 26, 1986, from the top of a small hill north of the playa.

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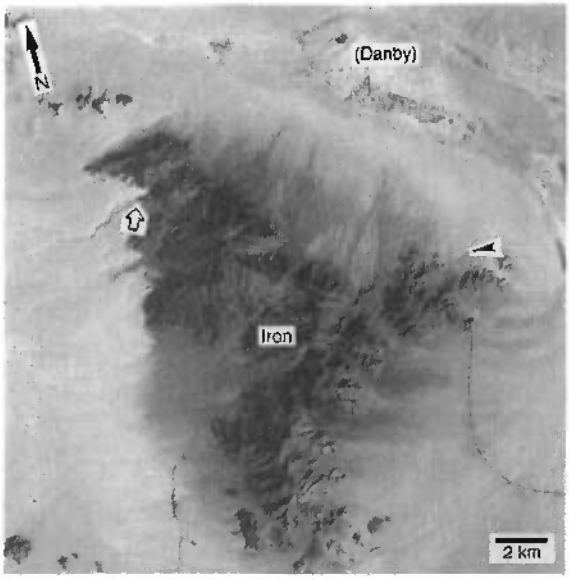

Figure 4. (a) Portion of a Landsat Thematic Mapper image showing the Iron Mountains south of Danby Playa. Prominent sand ramps are present on the western slope of the mountains; open arrow shows the location and orientation of the photograph in Figure 4b. Less active (more vegetated) sand ramp on the northern slope was sampled in 1991; the dark arrow shows location and orientation of the photograph in Figure 4c. Landsat TM band 5, obtained on September 26, 1986.

Figure 4. (b) View of entrenched sand ramp on the western slope of the Iron Mountains, taken from the channel floor. The 25-m-high channel wall has considerable vegetation cover at this locality, but the channel crests consist of active dune patches. Photograph was taken on October 9, 1993.

Figure 4. (c) Entrenched sand ramp on the northern slope of the Iron Mountains, with a paleosol complex (open arrow) capping the deposit. Note the outstretched arms of a 1.6 m field assistant (dark arrow) in the ephemeral wash, which exposes the sediments of the sand ramp. The top of the sand ramp is mantled with taluvium (talus and alluvium). Photograph was taken in 1992.

South of Danby Playa, the sand deposits spread to cover much of the Rice Valley with linear dunes and sand sheets, both of which are stabilized by desert vegetation (Figure 2). Sand surrounds the 500-m-high Arica Mountains (Figure 5a); a prominent sand ramp on the western slope almost reaches the top of the highest peaks, while the eastern slope is essentially sand-free (Figure 5b). Fields of stabilized linear dunes cover the southern side of the Rice Valley (Figure 6a). Sand ramps terminate at stream margins within the Big Maria Mountains, exposing up to 10 m of accumulated sand (Figure 6b). A narrow strip of sand exits the eastern end of Rice Valley, extending east to the Colorado River. Basic sedimentological characteristics of four sand deposits sampled along the pathway are listed in Table 1.

Clark's Pass

A second association of sand deposits roughly parallels the Bristol Trough path, but along a more southerly route (Figures 1 and 7). Sand ramps east of the Dale Playa at the eastern end of the Twentynine Palms Valley allowed sand to exit the valley through Clark's Pass, a narrow gap between the Sheep Hole and Pinto Mountains (Figure 8a).

The orientation of the Sheep Hole and Pinto Mountains acted like a funnel to concentrate migrating sand rather than trapping it completely, as at the Kelso Dunes. The sand ramps developed between the mountains allow wind-blown sand to climb more than 250 m from the level of Dale Playa to Clark's Pass.

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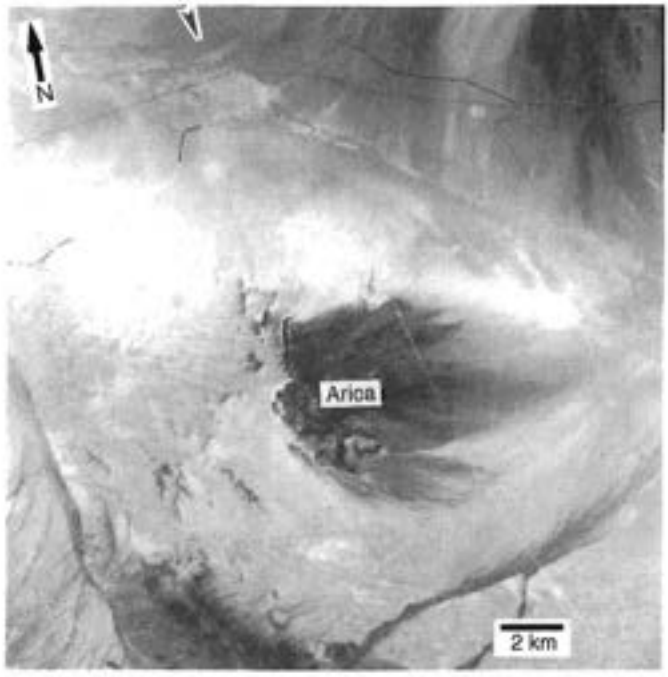

Figure 5. (a) Portion of a Landsat Thematic Mapper image showing the Arica Mountains at the west end of Rice Valley. The dark arrow at the top shows the orientation of the photograph in Figure 5b, taken from a position just off the northern edge of the image. Landsat TM band 5, obtained on September 26, 1986.

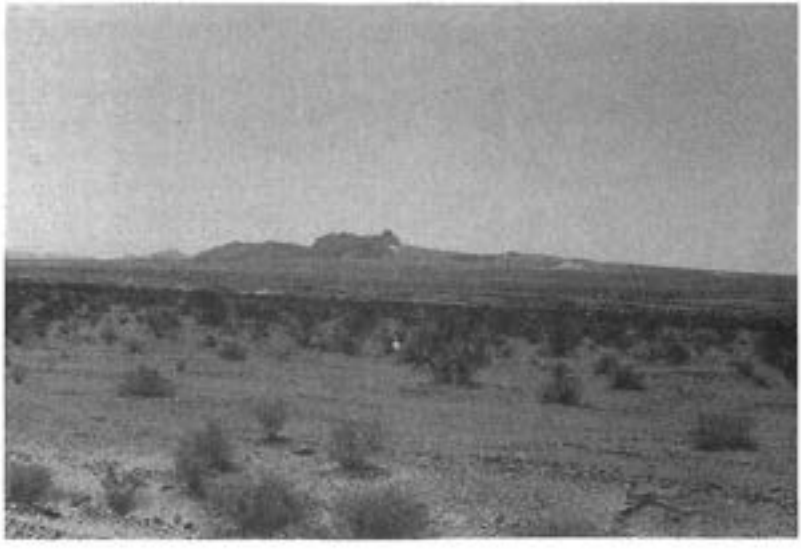

Figure 5. (b) Profile view of the Arica Mountains, looking south from a road that follows the railroad tracks north of Danby Playa. A prominent sand ramp is present on the west slope (right) while the east slope (left) is relatively sand-free, in the lee of the 500-m-high mountains. Photograph was taken in May 1991.

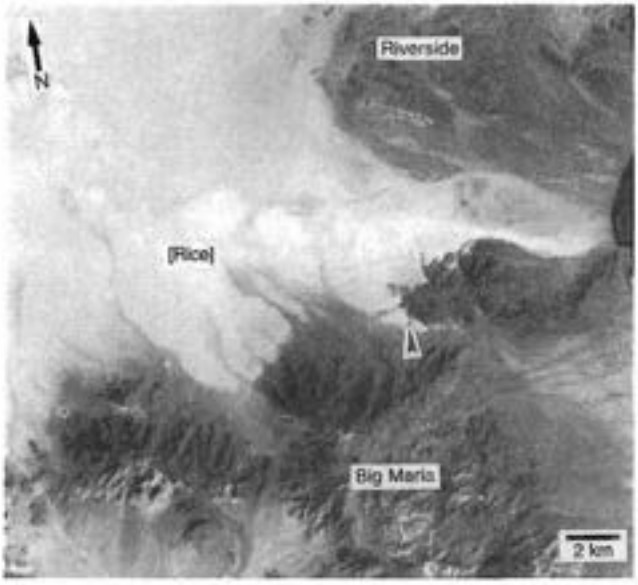

Figure 6. (a) Portion of a Landsat Thematic Mapper image showing stabilized dunes in Rice Valley. The sand deposits occur against the northern slopes of the Big Maria Mountains, and are cut by emphemeral channels from those mountains. The dark arrow shows the location and orientation of Figure 6b. Landsat TM band 5, obtained on September 26, 1986.

Figure 6. (b) Upper portion of the sand ramp on the northern slope of the Big Maria Mountians. The top of the section exposed by an ephemeral stream is stabilized by vegetation and taluvium, and capped by a prominent paleosol. Photograph was taken in 1991.

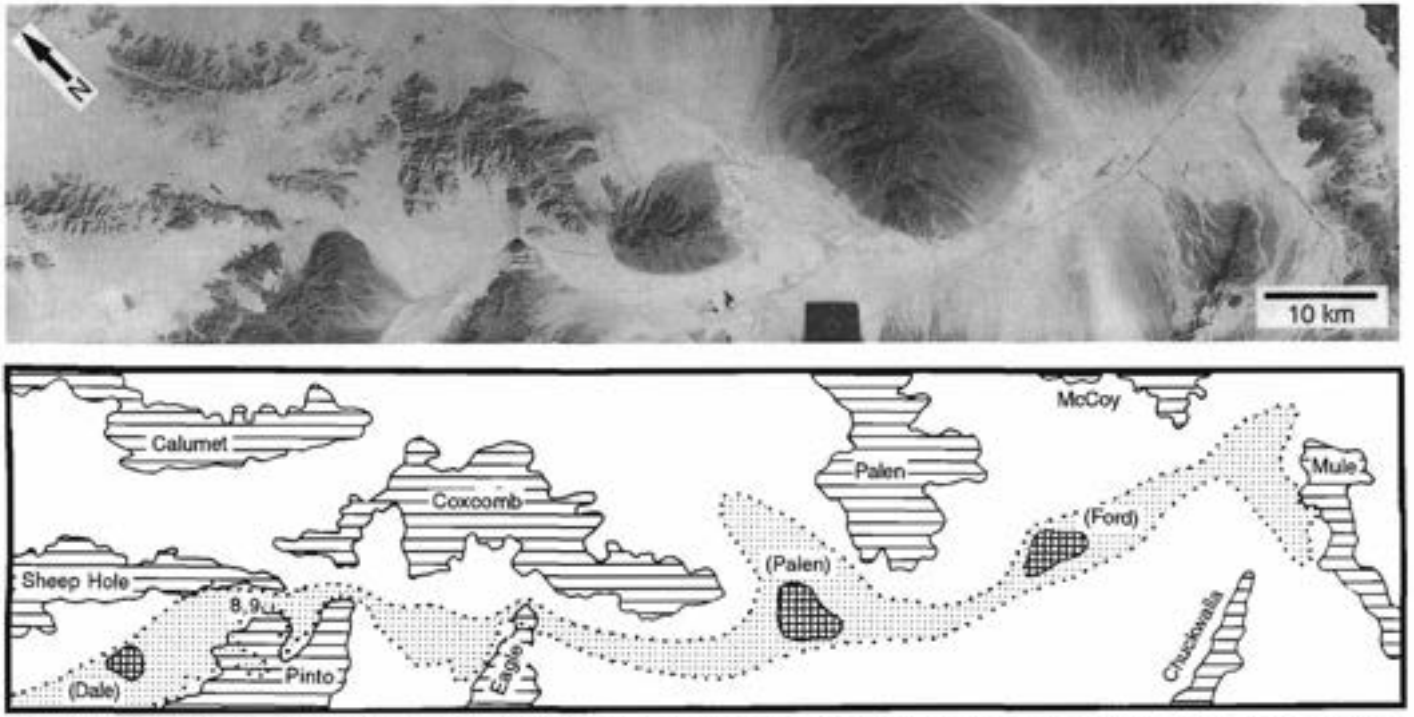

Figure 7. Clark's Pass sand path, seen on a portion of a Large Format Camera photograph, frame 2063, taken during the STS 41-G Space Shuttle flight between October 5 and 13, 1984. The sketch map below the photograph labels mountains (lined pattern), playas (gridded pattern), and sand deposits (dotted pattern).

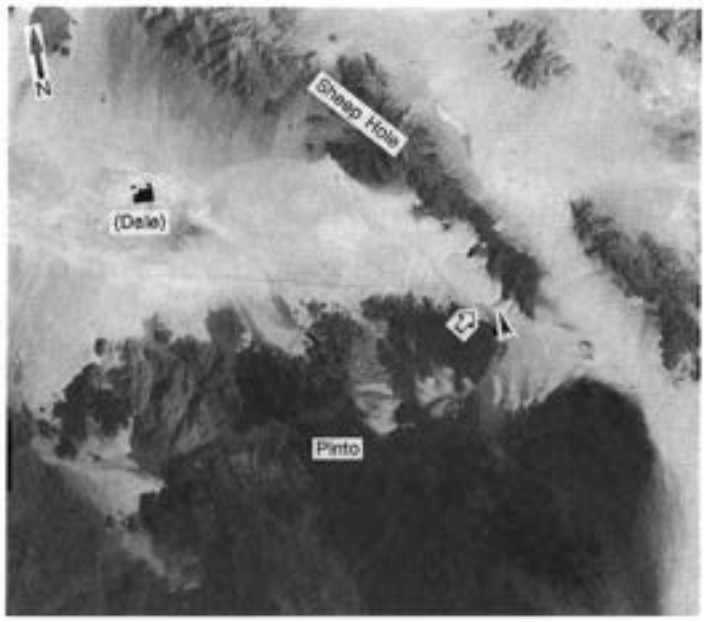

Figure 8. (a) Portion of a Landsat Thematic Mapper image showing the Clark's Pass area. Sand is ramped against the Sheep Hole (top) and Pinto (bottom) Mountains, providing an exit from the Twentynine Palms Valley, past Dale Playa, through Clark's Pass. The dark arrow shows the location and orientation of Figure 8b, and the open arrow shows the location and orientation of Figure 9a. Landsat TM band 5, obtained on September 26, 1986.

Some sand has been trapped in small valleys along the northern margin of the Pinto Mountains (Figure 8a), but the volume of sand deposits within the mountains appears to be much smaller than that of the sand ramps leading up to Clark's Pass. Ephemeral streams from the Sheep Hole Mountains cut into the sand ramps at several locations (Figure 8b), providing a cross-section through tens of meters of sand and exposing several soil horizons.

Several major stratigraphic units are identified within the Dale sand ramp (Tchakerian 1991) by the combination of geomorphic and soil-stratigraphic relations (Figure 9, Table 1). The units are predominantly aeolian in origin, with some intermixed fluvial deposits. Unit 1 contains fine to medium (Mz = 2.24 ϕ) moderately sorted (σ = 0.83) aeolian sands with grus and a silt/clay content of 2.9%. It is capped by a reddish yellow (5YR/6/6) paleosol with discontinuous carbonate nodules. Unit 2 comprises fine to medium (Mz = 1.91ϕ) poorly sorted (σ = 0.91) aeolian sands and has a silt and clay content of 3.1%. It contains numerous fluvial cut and fill lenses. The unit is capped by a prominent reddish yellow (7.5YR/6/6) paleosol with calcrete disseminated throughout the matrix, and carbonate enriched root pseudomorphs. Unit 3 consists of mostly yellowish red (5YR/5/8) medium to coarse (Mz = 2.15ϕ) moderately sorted (σ = 0.85) aeolian sands with large percentages of grus. It is capped by a poorly developed discontinuous paleosol with some calcareous

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Figure 8. (b) Sand ramp on the western side of the Sheep Hole Mountains near Clark's Pass, at the east end of the Twentynine Palms Valley (Shelton et al. 1978, figure 9-21). Note the active dune along the crest of the channel. Oblique aireal photograph taken by R. Greeley.

rhizoliths. Unit 4 contains primarily fluvially redistributed dune sands, cut-and-fill structures, and coarse gravel alluvial channels. The sediments are mostly coarse sands (Mz = 1.70ϕ), and are poorly sorted (σ = 1.21).

The section is topped by weakly consolidated sand that forms the surface of the sand ramp. Unit 5 contains brownish yellow (10YR6/6) fine to medium (Mz = 2.23ϕ), moderately well sorted (σ = 0.78) aeolian sands, with a silt/clay content of 2.4%. The uppermost section of Unit 5 is obscured by loose aeolian sands. However, about 500 m to the west of this section, further aeolian depositional units have been identified which are stratigraphically equivalent to or younger than Unit 5. They consist of brownish yellow, fine to medium, moderately well sorted aeolian sands similar in composition to Unit 5. Additional units in the area are similar, with respect to grain size, sorting, percent silt/clay, and quartz grain surface micromorphologies (SEM analysis), to Unit 5, suggesting emplacement by a single aeolian episode with multiple depositional pulses (Tchakerian 1991).

After exiting through Clark's Pass, the sand traversed the northern end of

the Eagle Mountains and passed the Palen and Ford Playas (Figure 7). The sand deposits around the Palen and Ford Playas are primarily in the form of broad sand sheets, with very limited development of isolated, stabilized dunes. There is no evidence at present that sand reached the Colorado River after passing the Mule Mountains (which have prominent sand ramps on their western slopes), but the lack of visible sand likely results from the extensive agricultural activity along the Colorado River in the vicinity of Blythe, California.

Cactus Plain–La Posa Plain

A third accumulation of sand deposits possibly may be related to the proposed sand transport pathways through the Mojave Desert. Large fields of stabilized linear dunes are present on the eastern bank of the Colorado River near the town of Parker, Arizona (Figure 10). These dunes are directly opposite the termination point of the Bristol Trough path at the Colorado River (Figure 1). There is no obvious source for the stabilized dunes on the Cactus Plain and the La Posa Plain (Figure 10); the adjacent mountains display typical alluvial fan development with no apparent accumulation of sand-sized materials to supply the sand to the extensive dune fields. The Colorado River could be a source for the sand, except that the Cactus Plain–La Posa Plain area is the only sand accumulation next to the river but not next to a large lake or playa (such as the Algodones Dunes near the Salton Sea; Figure 1).

The Arizona linear dunes generally have from 2 to 4 m of relief and are oriented approximately transverse to the prevailing wind direction evident within the Bristol Trough (Greeley and Iversen 1985, Laity 1992). No prominent sand ramps are evident around the dunes; the sand accumulation progressively thins leading up to the adjacent mountains. However, the silt/clay content of the Cactus Plain dunes is nearly twice as large as that of the Dale units exposed within the Clark's Pass path, but is similar to the silt/clay content of the Iron Mountain and Rice Valley sands from the eastern portion of the Bristol Trough path (Table 1). The increased silt/clay content does not appear to be pedogenic in origin; the loose sand covers the dunes but they are no longer mobile because of the desert vegetative cover. The adjacent locations and the overall similarities between the Rice Valley and Cactus Plain sands raise the possibility that the Arizona sands may be genetically related to the "apparent" termination of the Bristol Trough path at the Colorado River; this intriguing possibility is discussed in the following section.

DISCUSSION

The alignment of the Mojave sand paths is because of a combination of topography and prevailing winds. Our observations led to the hypothesis that the paths represent the aeolian part of a combined aeolian/alluvial/fluvial drainage system, as discussed below. Also described are the possibility of net sand migration across the Colorado River, and some paleoclimatic implications of the sand transport path hypothesis.

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Figure 9. (a) The upper part of the Dale Lake sand ramp, with an ephemeral fluvial wash in the foreground (see also Figure 8). The Sheep Hole Mountains are in the background. The dark arrow points to the paleosols shown in Figures 9b and 9c, exposed by the streamcut in the sand ramp. Photograph taken in 1987.

Figure 9. (b) A close up view of the middle section of the sand column exposed in the wash of the ephemeral stream described in Figure 9a. The section exposed here is about 10 m thick. Photograph taken in 1987.

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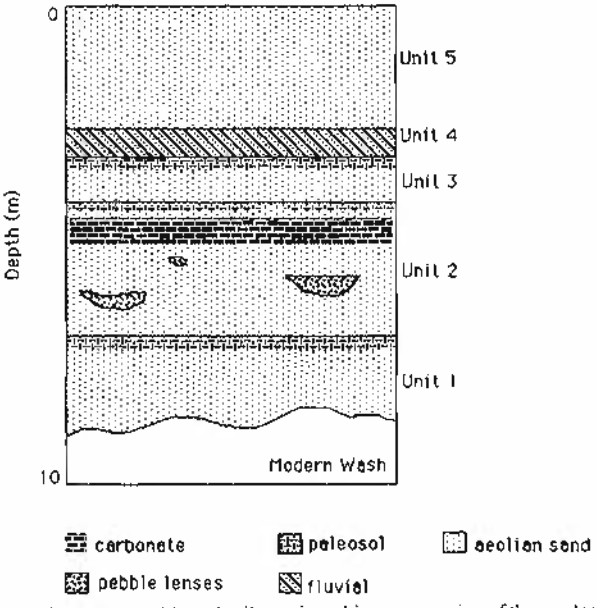

Figure 9. (c) A detailed geomorphic and soil-stratigraphic cross-section of the sand ramp exposure shown in Figure 9b.

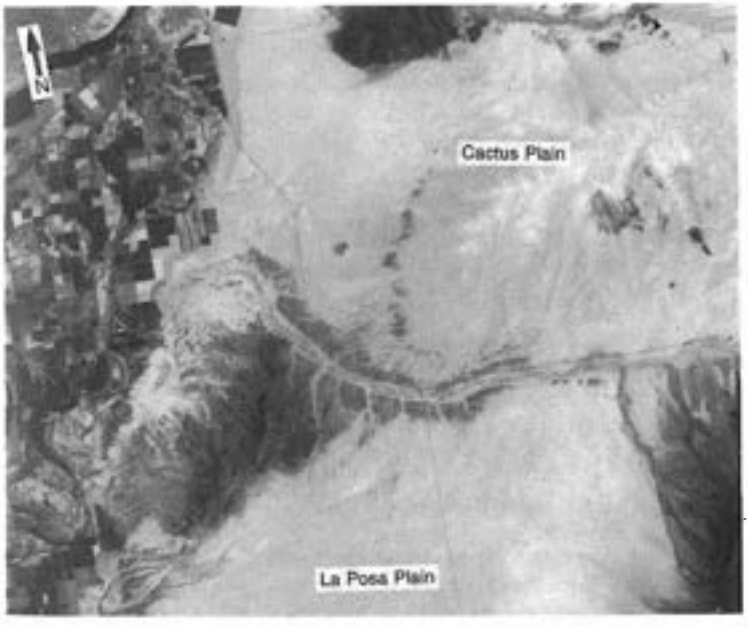

Figure 10. Portion of a Landsat Thematic Mapper image showing the stabilized dunes near Parker, Arizona. Agricultural use of the Colorado River floodplain is evident at left. The dunes are concentrated on the Cactus Plain (top) and the La Posa Plain (bottom), with no apparent source area evident in the sourrounding mountains. Landsat TM band 5, obtained on June 9, 1984.

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Sand Transport Pathways As "Rivers Of Sand"

The pathways followed by the sand in transport toward the Colorado River can be compared to the path followed by a tributary stream on its way toward a higher order primary river. Both systems show sensitivity to local topography, but windblown sand is not forced always to flow down the local topographic gradient. The longitudinal profile of a river generally is concave upward, in accord with a steady downstream decrease in slope (e.g., Leopold et al. 1964, p. 248-255). In contrast to fluvial systems, aeolian sand can surmount or bypass significant topographic obstacles under favorable conditions of wind orientation and sand supply. Sand deposition on the windward side of the mountain ranges built sand ramps that facilitate continued access by saltating sand up the gentle windward slope of the ramp. Sand along the Bristol Trough path surmounts relief of up to 100 m on portions of the Calumet and Iron Mountains (Figure 11a), while the Clark's Pass path traverses 250 m of relief to provide an outlet for the sand from the Dale Playa (Figure 11b). Sufficient sand was available from the Dale Basin to build the large sand ramps that characterize the Clark's Pass path. In contrast, smaller ramps were sufficient to surmount the topography along the Bristol Trough path.

The Mojave and Colorado River systems may have been connected in earlier epochs (Blackwelder 1933, 1954, Miller 1946). Blackwelder (1954) postulated a Mojave/Colorado connection via the Bristol Trough that coincides exactly with the observed sand path (Figure 12). The hypothesized drainage connection was then disrupted by a combination of climate change, tectonic processes, and the eruption of the Pisgah volcanics. The association of the Mojave Desert sand deposits with (sometimes large) playas contributed to an assumption that the sand was locally derived, solely from the nearest paleolake. Our preliminary remote sensing analysis and field observations suggest that the present-day playas may be intermediate concentration points (at local topographic lows) for a more through-going movement of windblown sand. The tectonic trough enclosing the Bristol, Cadiz, and Danby Playas provides a preexisting trend along which the wind-blown sediments now encounter only minimum topographic obstacles, which were surmounted or bypassed through prolonged aeolian activity. In this sense, the sand transport paths might be considered "rivers of sand" that have reclaimed and actually shortened a possible drainage path from an earlier epoch. Considerable field work remains to be done to test the validity of this hypothesis, as well as much more extensive sediment analyses.

Possible Trans-Colorado River Sand Transport

Two intriguing questions are raised by the possibility of sand transport paths in the Mojave region: what is the ultimate fate of sand in transit along each path, and what is the source of the sands on the Cactus and La Posa Plains? Much of the sand entering the Colorado River is transported downstream, with much of it perhaps contributing to the Gran Desierto dune field in Mexico (Merriam 1969, Lancaster et al. 1987, Blount and Lancaster 1990). However, we

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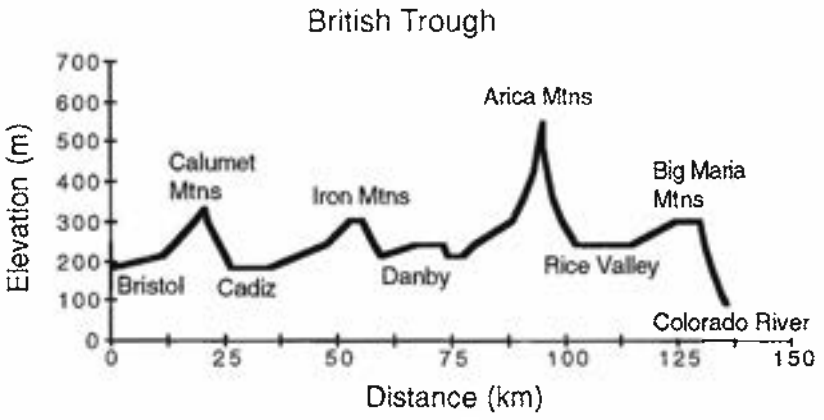

Figure 11. (a) Topographic profile along the Bristol Trough path. Vertical exaggeration is approximately 87X. The profile follows the approximate centerline of the sand path, including both active and inactive sand deposits. Mountain ranges encountered along the path are labeled above the profile; these topographic obstacles are crossed by the sand through emplacement of thick sand ramps. Playa names and Rice Valley are labeled below the profile, which ends at the Colorado River near Quien Sabe Point. Topographic data are from 1:250,000 Needles (USGS 1969a) and Salton Sea (USGS 1969b) map sheets.

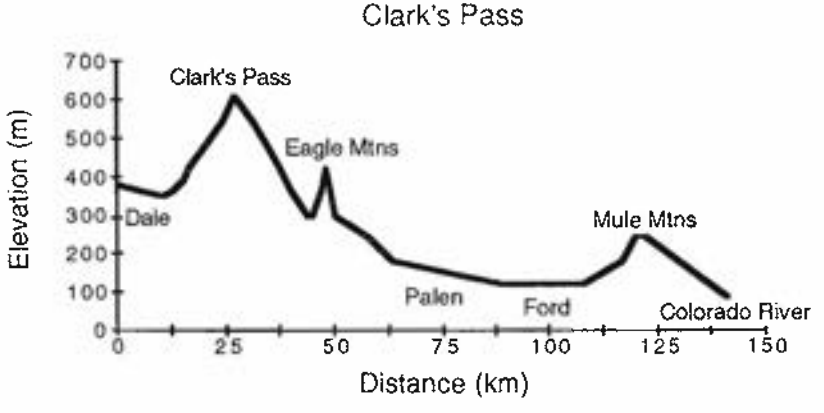

Figure 11. (b) Topographic profile along the Clark's Pass path. Vertical exaggeration is approximately 87X. The profile follows the approximate centerline of the sand path, including both active and inactive sand deposits. Mountain ranges encountered along the path are labeled above the profile; these topographic obstacles are crossed by the sand through emplacement of thick sand ramps. Playa names are labeled below the profile, which ends at the Colorado River near Blythe, California. Topographic data are from 1:250,000 Needles (USGS 1969a) and Salton Sea (USGS 1969b) map sheets.

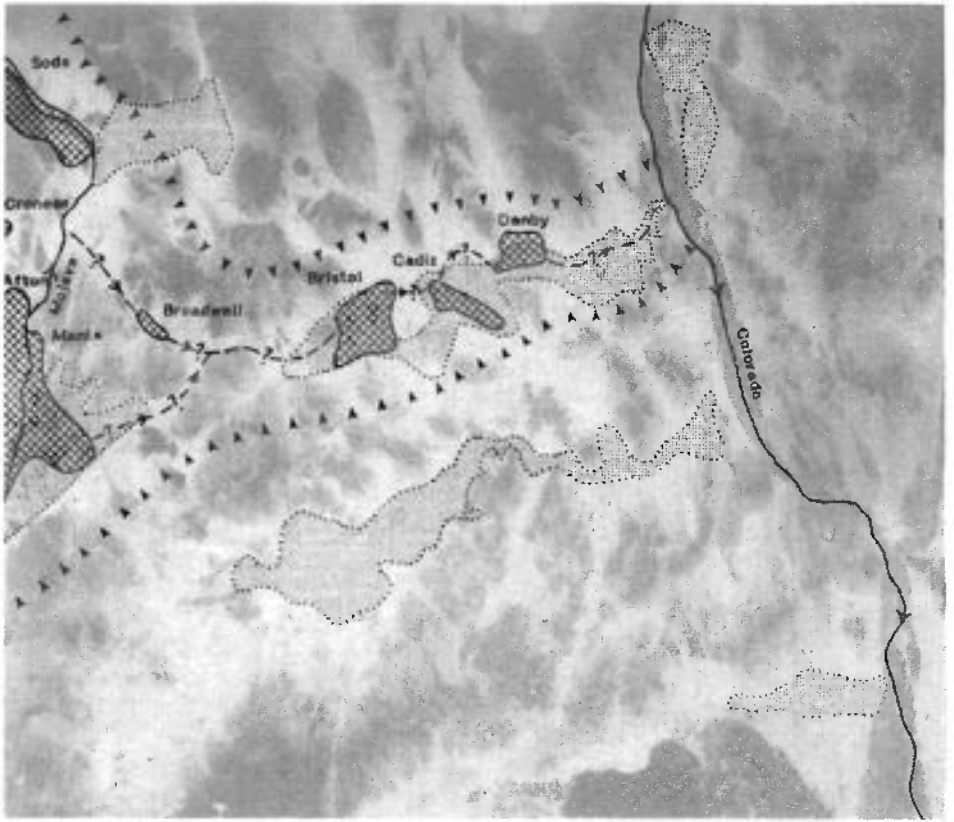

Figure 12. The paleodrainage reconstruction of Blackwelder (1954) is superposed on the oblique photograph in Figure 1a. Arrows outline the dramage into the paleolakes (gridded pattern). Dotted patterns show sand deposit locations from Figure 1b. Note the close match of the Bristol Trough sand path and the inferred drainage from the Mojave River to the Colorado River.

speculate that some of the sand transported down the pathways may have crossed the Colorado River and ended up on the Cactus and La Posa Plains (Williams et al. 1991, Tchakerian et al. 1992). The lack of other sand accumulations east of the Colorado River argues against the river itself as the primary sand source and argues for a mechanism which could bring mobile sand to this particular location. Batches of aeolian sand appear to enter the river floodplain at the western end of the sand transport paths (Figure 13). Eventually, the river may have opened a new meander channel west of aeolian sand deposits on the floodplain, which were then remobilized by the wind and exported onto the Cactus and La Posa dunefields. It is difficult to assess how effective such a process may have been prior to regulation of flow along the Colorado River. However, this mechanism could account for the presence of a large quantity of sand on the plains east of the Colorado River and is coincident with the termination of sand transport paths through the Mojave Desert.

Paleoclimatic Implications

The presence of well-developed paleosols and multiple aeolian depositional units within the sand ramps along the sand transport paths indicates that aeolian activity in the Mojave Desert has been widespread and episodic. A description of the units exposed in the Dale sand ramp was given earlier, and additional exposures of multiple soil-horizons were observed during a recent reconnaissance survey of the more remote portions of the Bristol Trough sand pathway. Such exposures within the sand pathways may be related to more extensively studied paleosols in the western Mojave Desert.

In the Silver Lake basin (part of Pleistocene Lake Mojave), an aeolian depositional period (Qe2) that took place between 12 and 8.7 ka, has been recognized by Wells et al. (1987) and Brown (1989). An older aeolian depositional episode prior to 22 ka has also been identified by Brown (1989) in sediment cores from the Silver Lake basin. The sedimentary record from Lake Mojave indicates that lake levels were low to intermediate between 13.5 and 9 ka, with final dessication around 8.7 ka (Brown 1989). It seems likely that the sand ramps observed along the sand transport pathways also witnessed increased levels of aeolian sediment input during low stands of the desert paleolakes, as sediments became available for transport from dried lake basins and their surrounding piedmont areas.

Sediment supply from desert lake basins was drastically curtailed after 9 ka, as a result of the changing environmental conditions which caused most lakes either to dry up or to reach very low water levels (Benson et al. 1990). The sand ramps probably underwent a period of stabilization through vegetation development and soil formation because of the reduction in sediment supply. They were subsequently mantled by rock debris from the adjoining mountains and later entrenched by ephemeral streams. In the middle Holocene, from about 7 to 5 ka, the Mojave Desert experienced a drier than present climatic regime, a period referred to as the climatic optimum or the Altithermal, first recognized

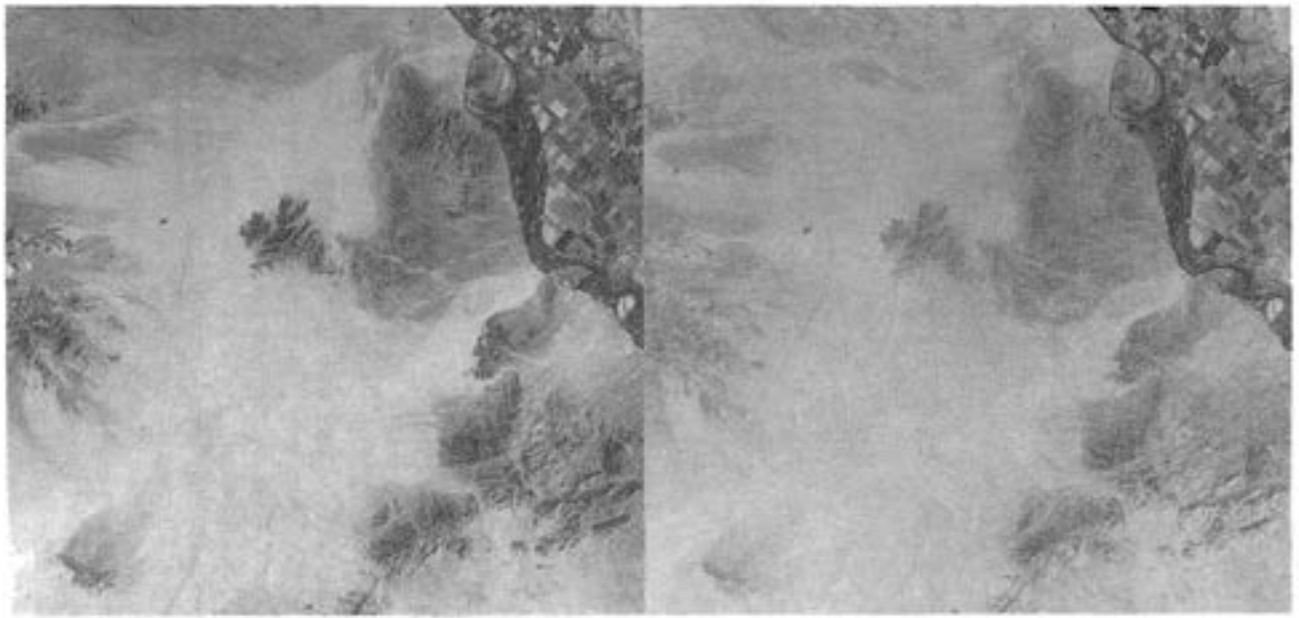

Figure 13. Stereo view of Rice Valley and the Quien Sabe Point area, from portions of Large Format Camera photographs, frames 2062 (left) and 2064 (right), taken during the STS 41-G Space Shuttle flight between October 5 and 13, 1984. The vertical relief is highly exaggerated in this stereo pair, but this view emphasizes the relation between the sand deposits, the mountains, and the Colorado River.

by Antevs (1962). According to Spaulding (1991), Middle Holocene macrofossil (packrat middens) records from the southern Mojave Desert indicate a more arid period than the present between 6800 and 5060 yr B.P. It is thus highly probable that the Middle Holocene period witnessed little aeolian activity as desert lakes were already dessicated by the time of the Altithermal, and most sand ramps fully stabilized.

Accelerator Mass Spectroscopy (AMS) ^{14}C and cation-ratio dating of varnished ventifacts on stabilized debris mantling sand ramps in the Cronese Basin in the Mojave Desert (see left margin of Figure 1b) indicate that aeolian activity ceased or was at a minimum, and that debris deposits were already stabilized, between 5.5 and 5 ka (Dorn et al. 1989). Hence (given the absence of numerical ages directly from dune deposits), most of the sand ramps were probably stable with rock talus and vegetation before the onset of more xeric conditions during the Altithermal, and aeolian activity was at a minimum or mostly restricted to those few desert basin areas that had active sediment input, such as the Mojave River Wash supplying sediments for the Kelso Dunes. Using luminescence dating measures, Lancaster et al. (1991) report a lack of ages older than 5000 yr B.P. from the main Kelso Dune fields, and suggest that the majority of the sediments have been extensively reworked prior to the mid-Holocene.

The entrenched sand ramps within the Bristol Trough and Clark's Pass sand pathways represent a valuable resource for studying paleoclimatic information preserved within the paleosols. The Dale sand ramp is presently the only locality within the sand pathways that has been thoroughly studied for sedimentological characteristics, but our field studies have identified other localities within the Bristol Trough path where entrenched sand ramps expose paleosol sequences. Comparison of the paleosol sequences, both along a given pathway and between adjacent pathways, should provide a test for the emplacement scenarios proposed here. Luminescence dating of key paleosol horizons is perhaps the most critical information required to quantify the climatic information recorded within the sand ramps.

FUTURE WORK

We have presented here the preliminary descriptions and interpretations of the sand deposits present in the eastern Mojave Desert. A considerable amount of field work remains to be carried out, particularly in terms of describing and documenting the sediment characteristics and internal stratigraphy within the thick sand ramps evident at several locations. The sand transport pathway hypothesis can be tested through additional analyses of samples already collected, particularly looking for mineralogical information which could indicate whether or not the sand at the proposed "upstream" end of the pathways could have supplied the sands observed at the termination of the pathways. Additional sedimentological studies may also help to test whether or not the sands along the pathways are consistent with transport away from the inferred

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source of each pathway. Obtaining samples specifically collected for luminescence dating measurements (Lancaster et al. 1991) from geographically separated soil horizons is essential to the development of a regional stratigraphic history of the eastern Mojave Desert.

The remote sensing data have been used in the present work for basic geomorphic and geographic descriptions, but spectral variations between different bands of Thematic Mapper data should be useful in refining the distribution of active and stabilized sand deposits (Blount et al. 1990). We also hope that the spectral information will be useful for estimating sand thickness throughout the region based on vegetation that is sensitive to particular sand thicknesses (Zimbelman and Williams, in preparation).

CONCLUDING REMARKS

We have presented both remote sensing and field evidence for the emplacement of aeolian sand pathways in the eastern Mojave Desert. Two pathways are described in detail: one extending eastward from the Bristol Playa past the Cadiz and Danby Playas through Rice Valley to the Colorado River, and a second path extending eastward from Clark's Pass past Palen and Ford Playas to the Mule Mountains by the Colorado River. The preferential development of sand ramps on the west slopes of mountains along each path indicates that the eastward-moving, wind-driven sand was not restricted by topographic divides between separate drainage basins around the individual playas and valleys. Preliminary sediment analysis of selected samples shows that there are discrete associations of sand characteristics along the sand pathways, with an inferred possible relationship between the stabilized sands in Rice Valley (within the Bristol Trough path) west of the Colorado River and stabilized linear dunes on the Cactus Plain and La Posa Plain east of the Colorado River. Sand transport along the paths appears to have been episodic, based on multiple soil horizons present in several dissected sand ramps.

ACKNOWLDGEMENTS

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Science Brief

Climate Mitigation in California:

The importance of conserving carbon in deserts

As climate change continues to accelerate, it is essential to protect natural habitats that act as carbon sinks. When these areas are developed and disturbed, additional carbon is released into the air and the plants and soils in those ecosystems are impacted, reducing their ability to absorb and store carbon. Studies around the world have shown that desert ecosystems can act as important carbon sinks. With desert ecoregions comprising 27% of California, protecting this biome can contribute to securing carbon stores in the state. By limiting development, excessive OHV use, livestock grazing and other activities that disturb desert soils, the state can help ensure these carbon reserves stay in the ground and out of the atmosphere.

Quick take

- Desert ecosystems provide important carbon storage functions now and in the future given climate change.
- Conserving California deserts can help ensure that the stored CO^2 stays in the ground.
- Key results include:
  - Inland deserts account for 10% of the state's total stored carbon.
  - 7% of carbon-rich areas in California deserts may already be impacted by human activities.
  - Ensuring sufficient desert representation in conserved areas will protect unique species assemblages and ecosystem services.

Carbon Capture in Deserts

There are several ways in which deserts store carbon. To start, desert plants store carbon in their biomass just as other plants do; through photosynthesis, plants take in CO_2 from the air and convert that into tissue. Many desert plants also have important relationships with underground fungi: roots bond with these fungi in a mutually beneficial relationship. As part of this relationship, the plants transfer carbon to the mycorrhizae, which also store carbon. The majority of stored and sequestered carbon, however, is in soils. Plant or animal excretion and decomposition releases some carbon, which reacts with calcium in the desert soil to create calcium carbonate crystals. Since some desert plants' roots grow to over a hundred feet, these crystals, called caliches, can be deep underground. Caliches build into larger chunks over time and create carbon sinks. Additionally, when the root fungi die, they leave behind their waxy coating, which aggregates and helps keep carbon in the soil. For their storage and sequestration potential, arid-semiarid soils are considered the third largest global pool of carbon (Emmerich 2003).

Read more about the desert carbon storage process here: http://www.desertreport.org/?p=2270

California Carbon Sinks

The most conclusive evidence of California desert carbon storage potential comes from a 10-year study in the Mojave Desert at the Nevada Desert Free-Air CO_2 Enrichment Facility (NDFF). This study compared plots of desert with current CO_2 levels to plots with projected 2050 CO_2 levels. To do this, they piped extra CO_2 over the plots. At the completion of the study, the researchers compared the carbon between the plots with current CO_2 levels and those with projected CO_2 levels. They found that the plots that received extra carbon were able to store significantly more carbon than those that received current carbon levels. This indicates that as atmospheric CO_2 levels rise, deserts will have increased capacity to sequester in response to projected elevated atmospheric CO_2. Deserts store 9.7% of California carbon and based on the NDFF experiment, and this amount may increase with climate change. A report by the National Parks Service shows that Death Valley and Joshua Tree National Parks and the Mojave National Preserve were within the top 10 park units with the highest annual net ecosystem carbon balance.

Read the full scientific article for this experiment here: https://doi.org/10.1038/nclimate2184

Results

The data indicate that 27% of lands within the state of California fall within desert ecoregions (Inland Desert and Sierra Nevada-East). These lands alone account for nearly 10% of the total carbon stored in the state. Importantly, the top carbon-rich locations in deserts are less impacted by human activity compared to other ecoregions: 7% overlap with areas of higher human footprint compared to nearly one quarter of carbon-rich areas in the San Joaquin Valley. Currently, 42% of carbon-rich areas in desert regions fall into areas managed for conservation. An additional 35% fall on public lands managed for multiple uses (including extractive activities). Based on these results, California deserts sequester and store a significant amount of the state's carbon. Though desert environments have relatively low sequestration on a per area basis, they represent a large proportion of the state's area and are relatively undisturbed by human activity.

Carbon can be stored in a number of different reservoirs. Here we analyzed total ecoregion carbon in above- and belowground biomass and in soil (Soto-Navarro et al. 2020). We compared the top carbon-rich areas for each ecoregion with human footprint metrics and the protected areas database of the U.S.

Map highlighting carbon-rich areas (top 20%) within each ecoregion and current coincidence with higher human disturbance. Sierra Nevada – East was combined with the Inland Desert ecoregion to represent California's deserts as a singular unit.

Recommended Actions

Given their carbon storage capabilities, conservation of large, intact desert areas could have a high return on investment for climate mitigation. Decision-makers will need to account for desert ecosystems in short- and long-term conservation planning efforts to ensure the persistence of these ecosystem services under future climate change scenarios. Great opportunity exists for desert protections on public lands, but some carbon-rich areas could benefit from private lands conservation, especially around the Salton Sea. Particular care should be taken in recognizing Death Valley (Sierra Nevada – East sub ecoregion) as a desert ecosystem that is unique and separate from others in the Sierra Nevada ecoregion. Failing to do so results in underestimation of Death Valley's carbon storage potential, which has been noted in other works. Finally, local stakeholders, Tribes and desert communities should be part of the decision-making process to ensure that those groups disproportionately impacted by conservation (or other) efforts in this ecoregion are well represented.

Questions?
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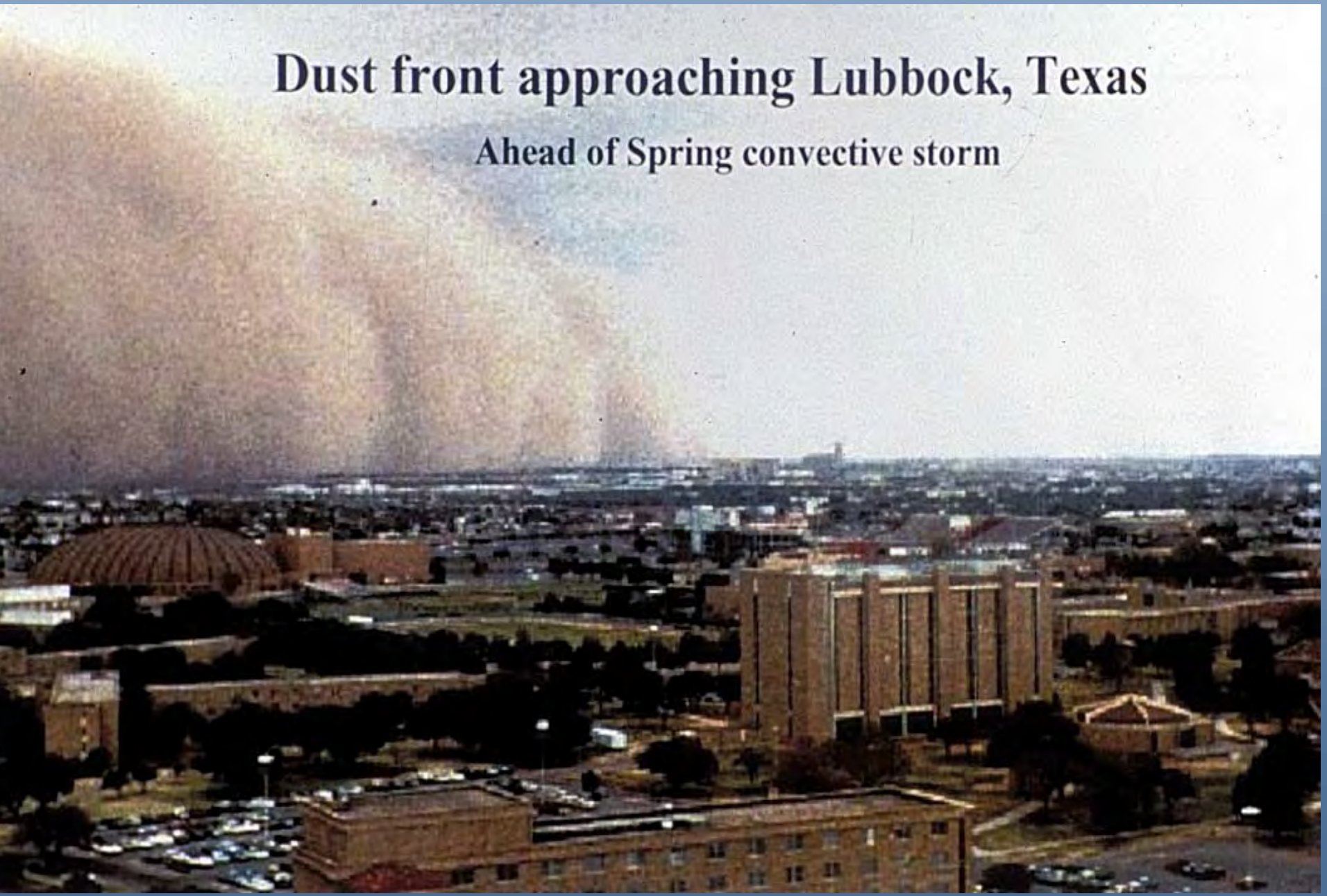
Soil Surface Susceptibility to Wind Erosion

Jayne Belnap, Sue Phillips, David M. Miller, David Bedford, Geoffrey Phelps Alan Flint, Lorraine Flint, Joseph Hevesi, Susan Benjamin

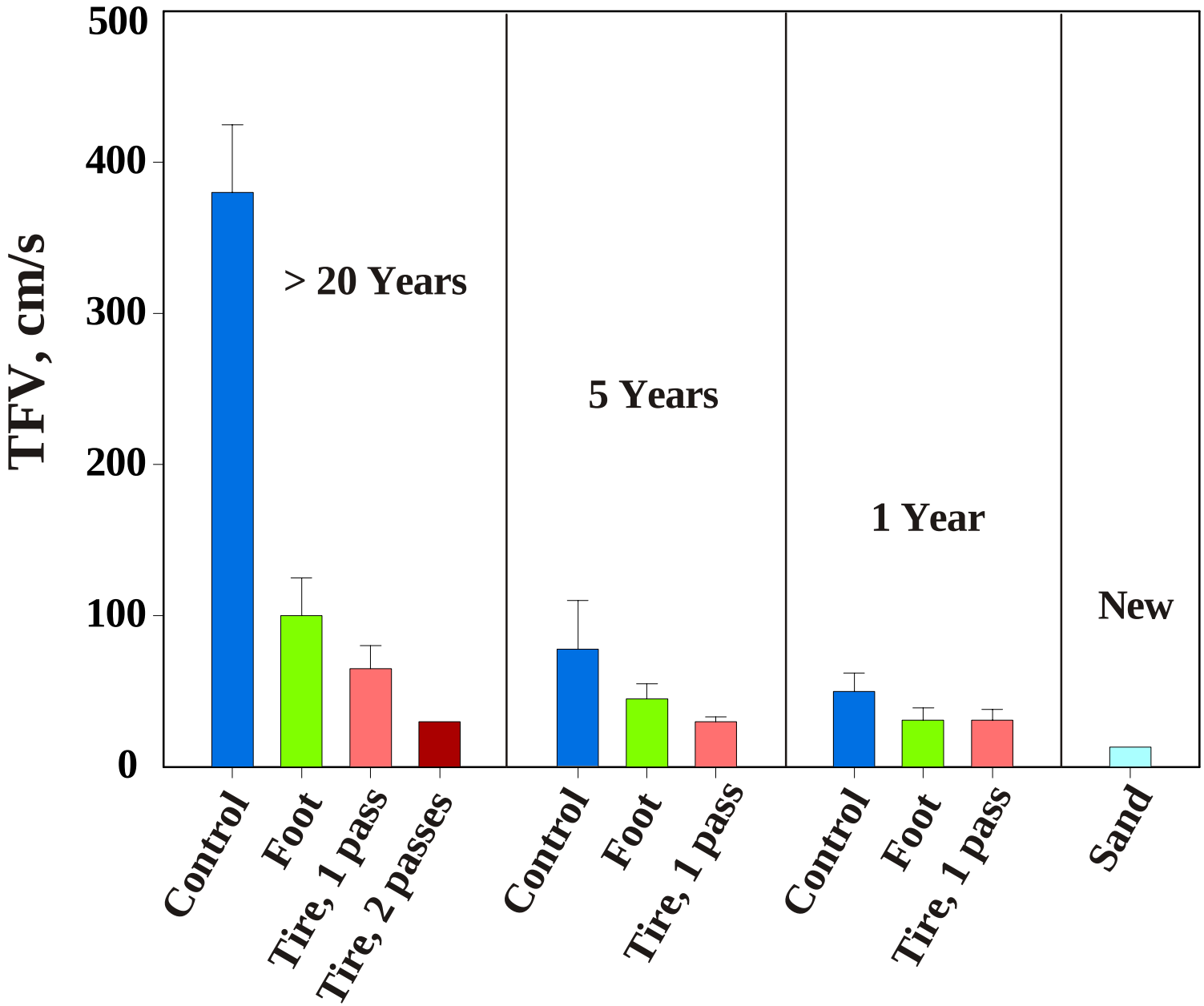

Dust front approaching Lubbock, Texas
Ahead of Spring convective storm

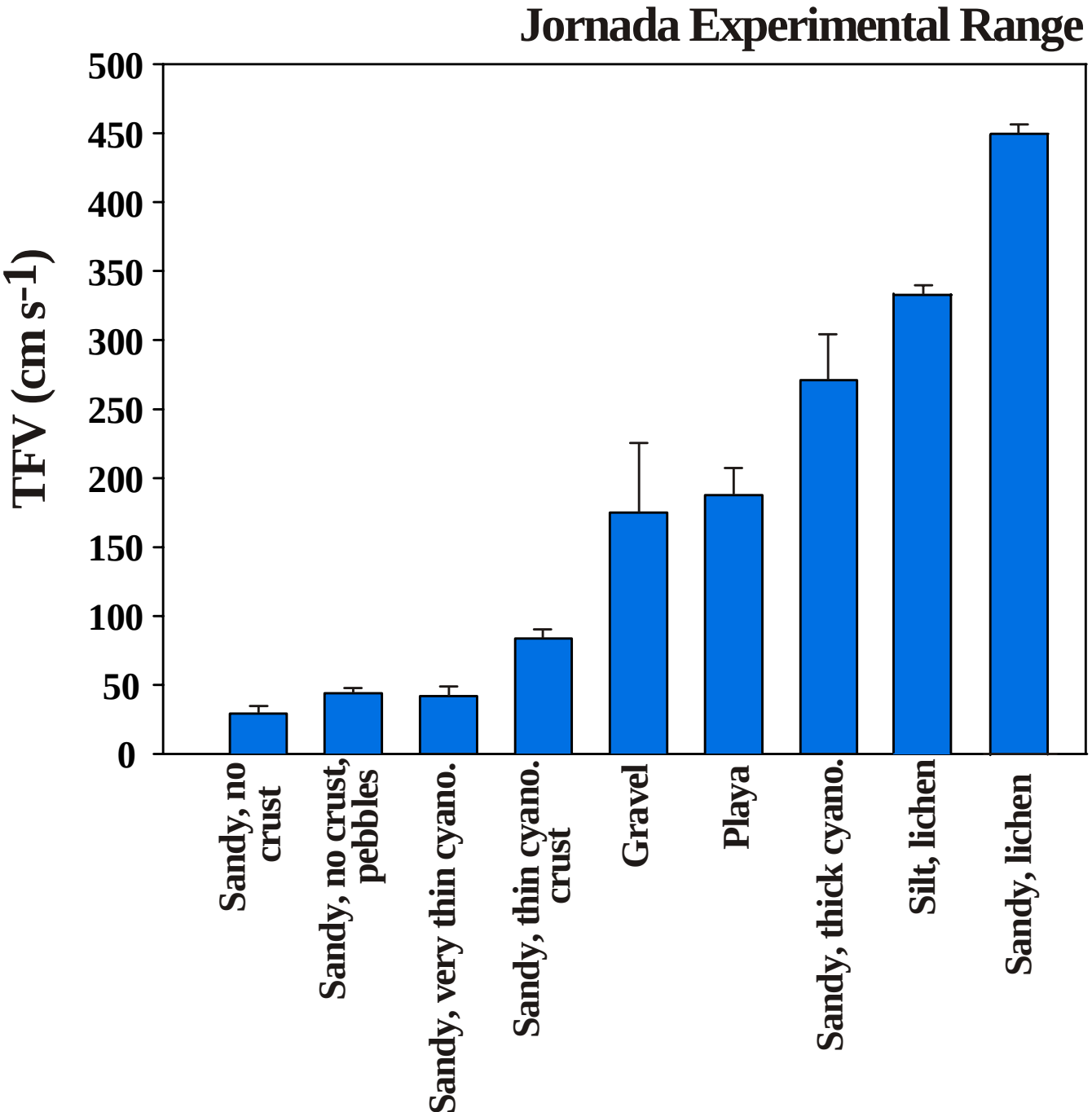
TFV= Threshold Friction Velocity

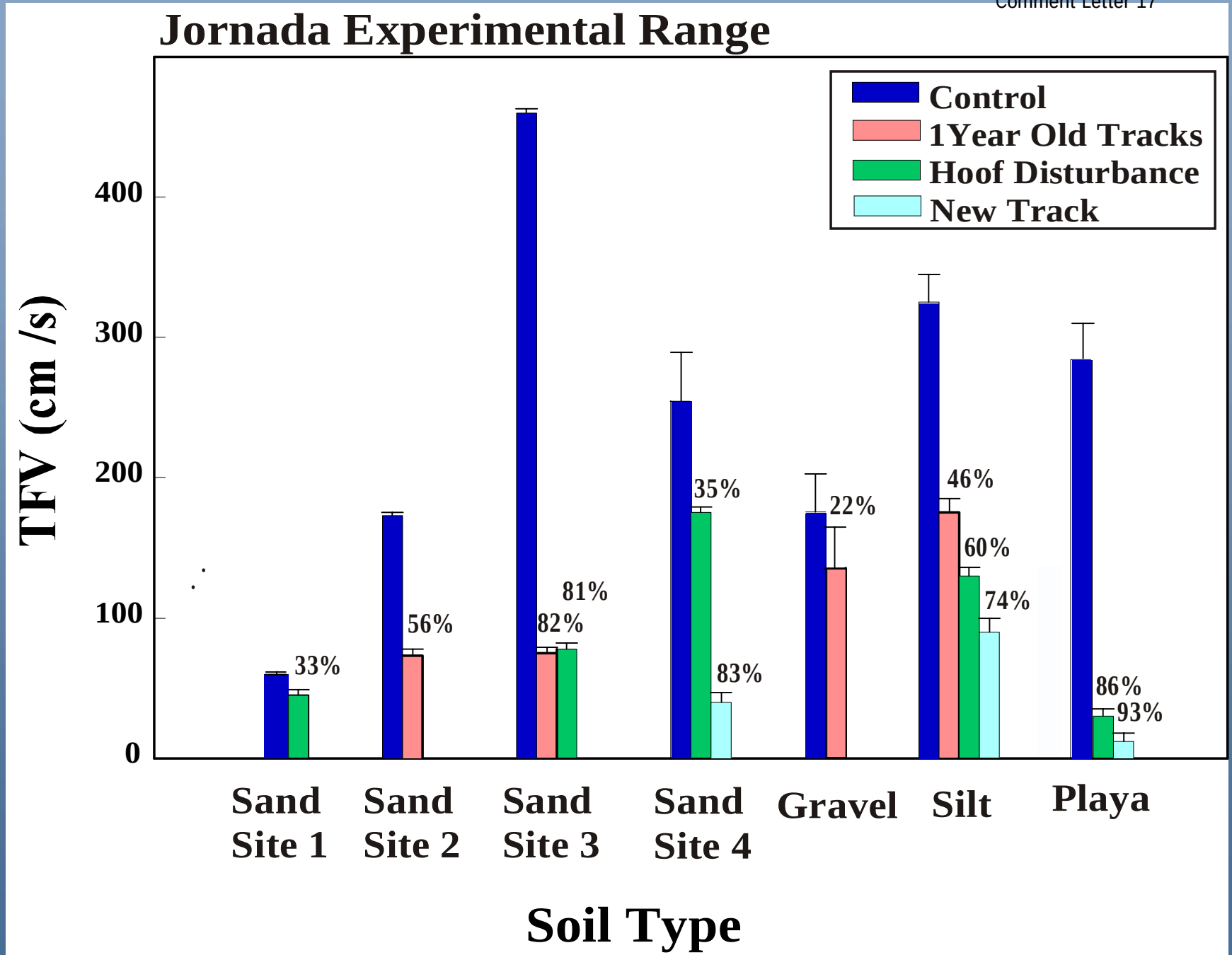
The wind speed at which particles move

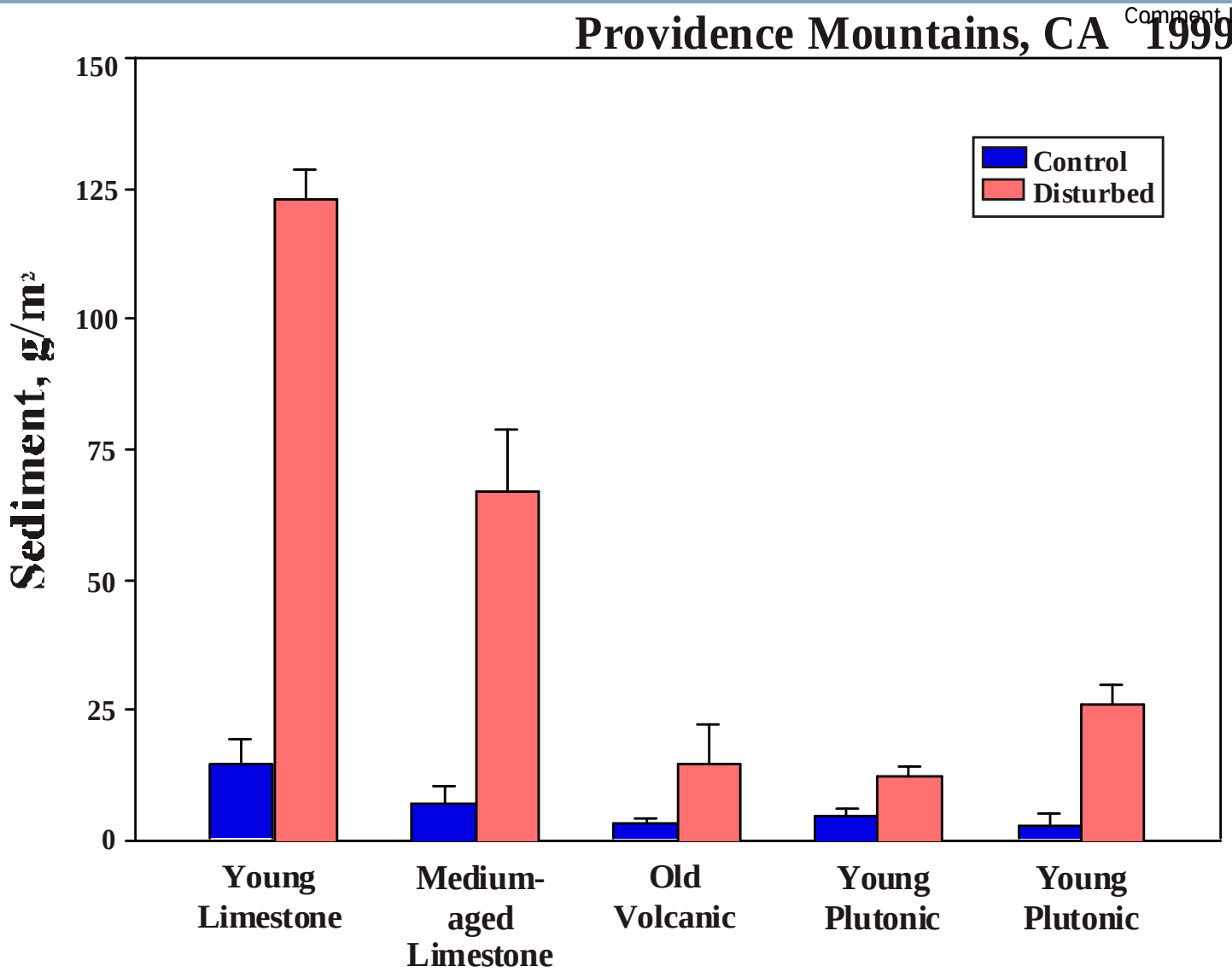
Sediment = amount of soil blown off the soil surface at high spring wind speed

Moab, Utah


TFV, cm/s
500
400
300
200
100
0
> 20 Years
5 Years
1 Year
New
Control
Foot
Tire, 1 pass
Tire, 2 passes
Control
Foot
Tire, 1 pass
Control
Foot
Tire, 1 pass
Sand


Jornada Experimental Range
TFV (cm s-1)
500
450
400
350
300
250
200
150
100
50
0
Sandy, no crust
Sandy, no crust, pebbles
Sandy, very thin cyano.
Sandy, thin cyano. crust
Gravel
Playa
Sandy, thick cyano.
Silt, lichen
Sandy, lichen

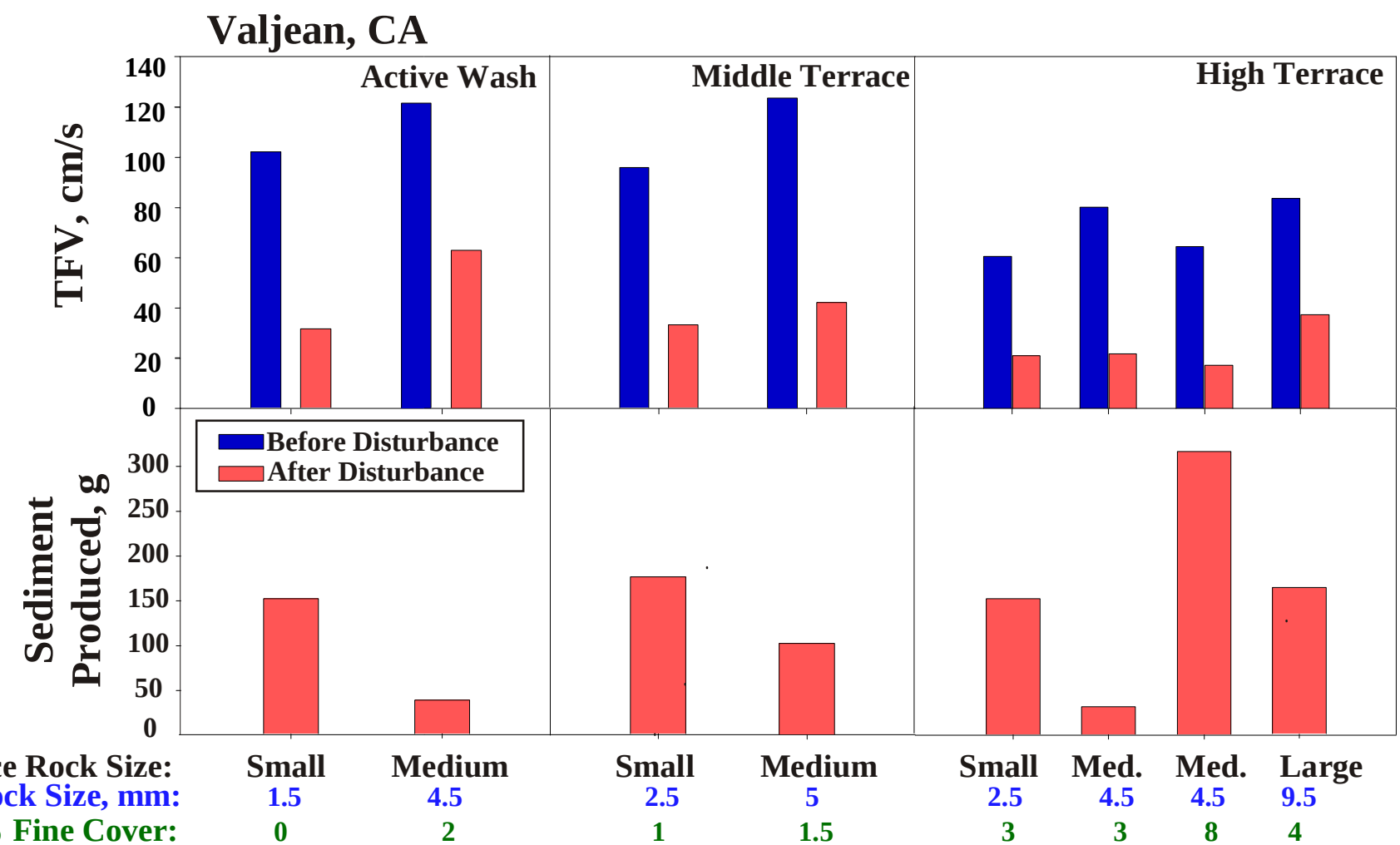

Jornada Experimental Range
Control
1Year Old Tracks
Hoof Disturbance
New Track
TFV (cm /s)
0
100
200
300
400
33%
56%
82%
81%
35%
83%
22%
46%
60%
74%
86%
93%
Sand Site 1
Sand Site 2
Sand Site 3
Sand Site 4
Gravel
Silt
Playa
Soil Type

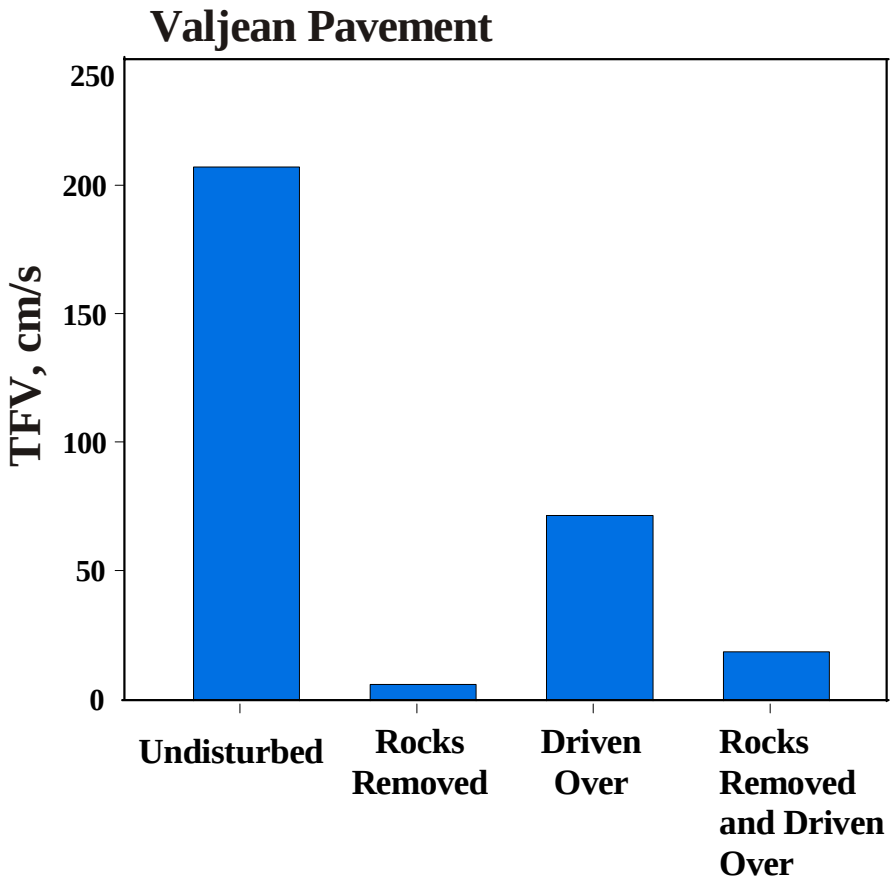


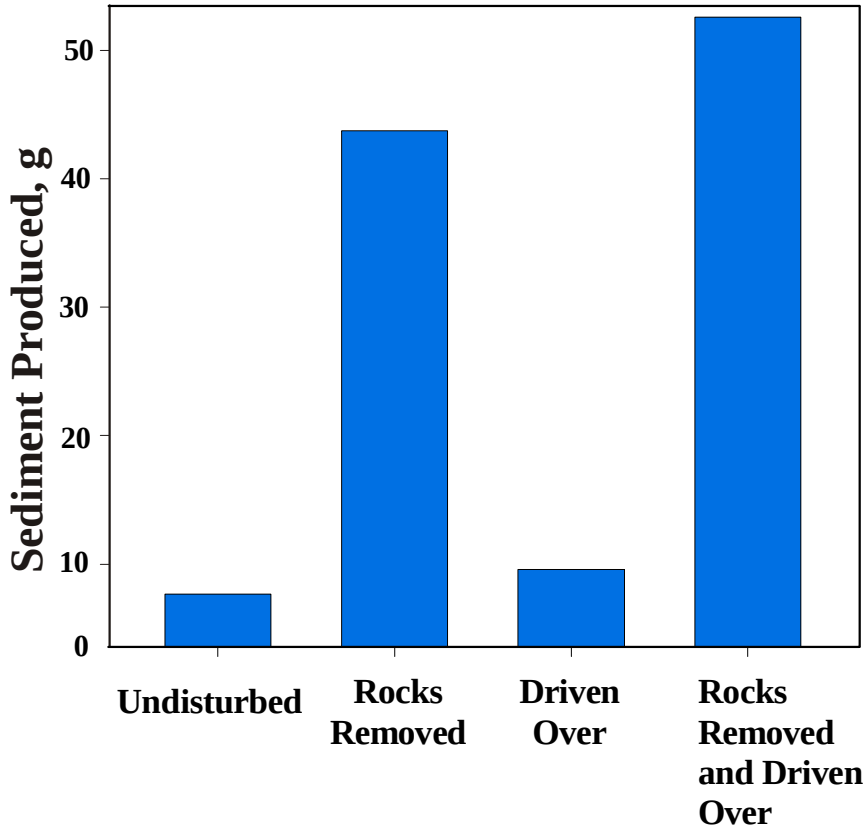
Sites of Different Substrate: Distal Alluvial Fan

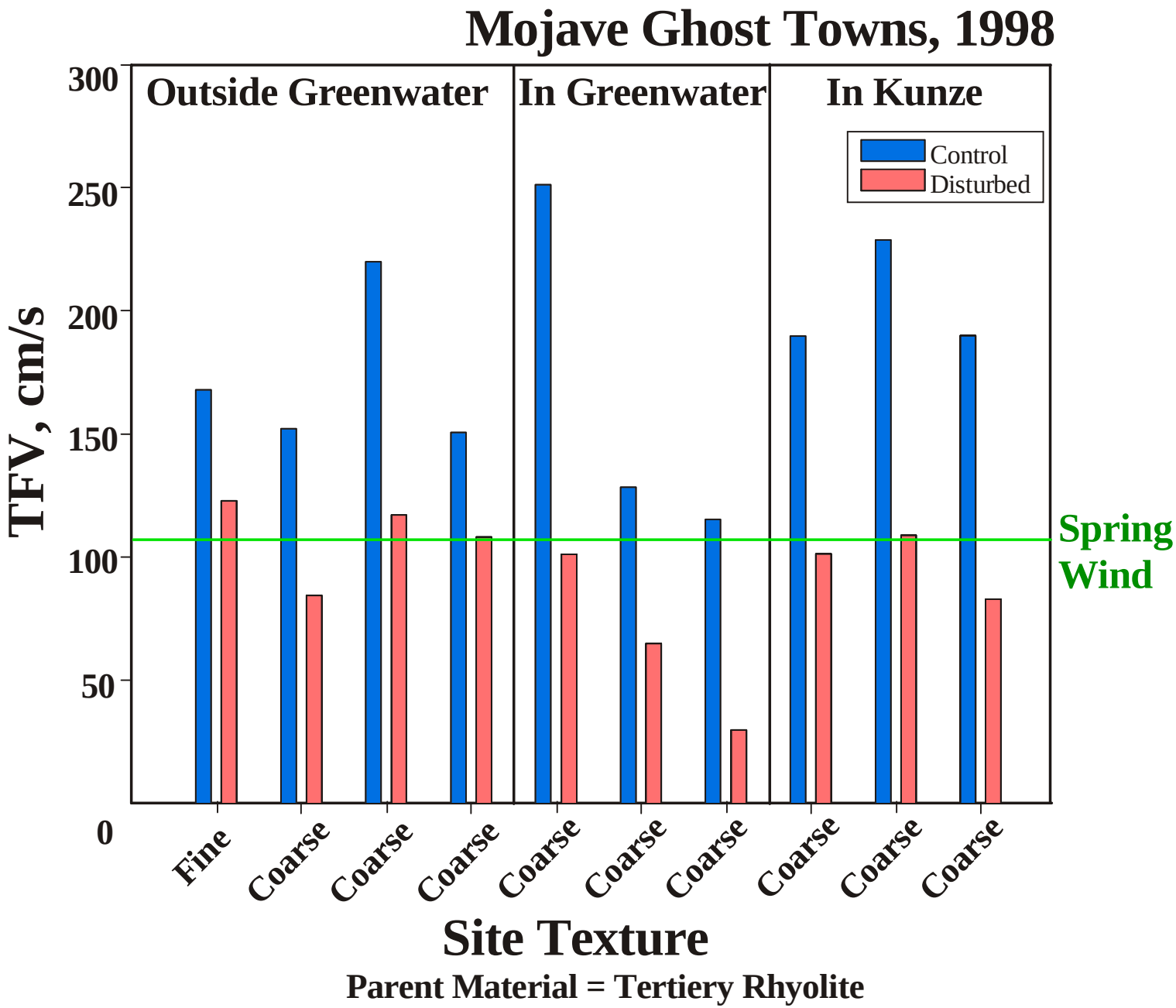
Rock Cover: Control r^2=0.86

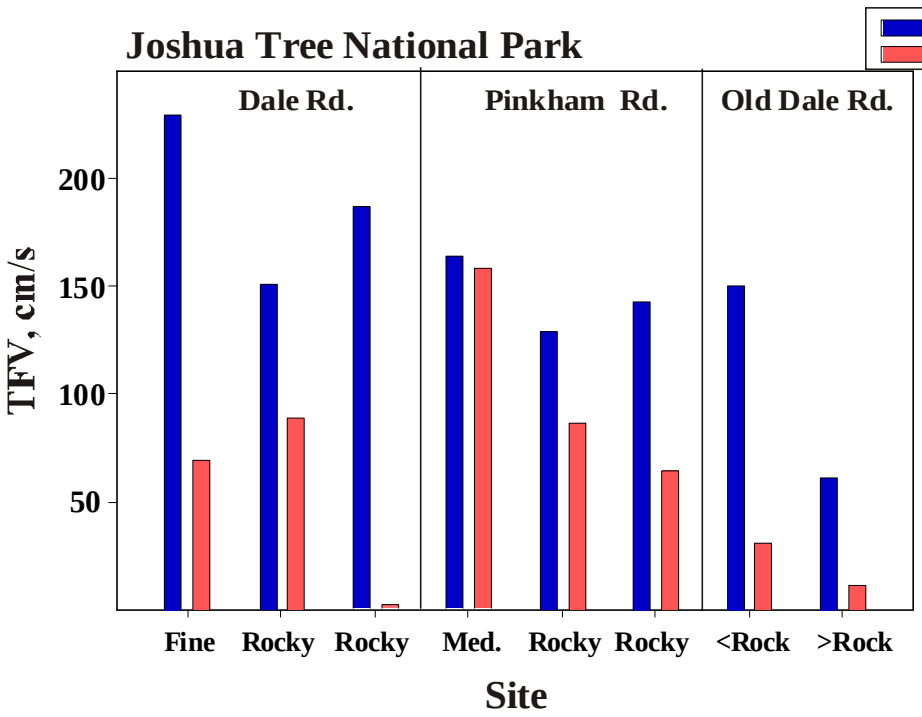
Disturbed r^2=0.97

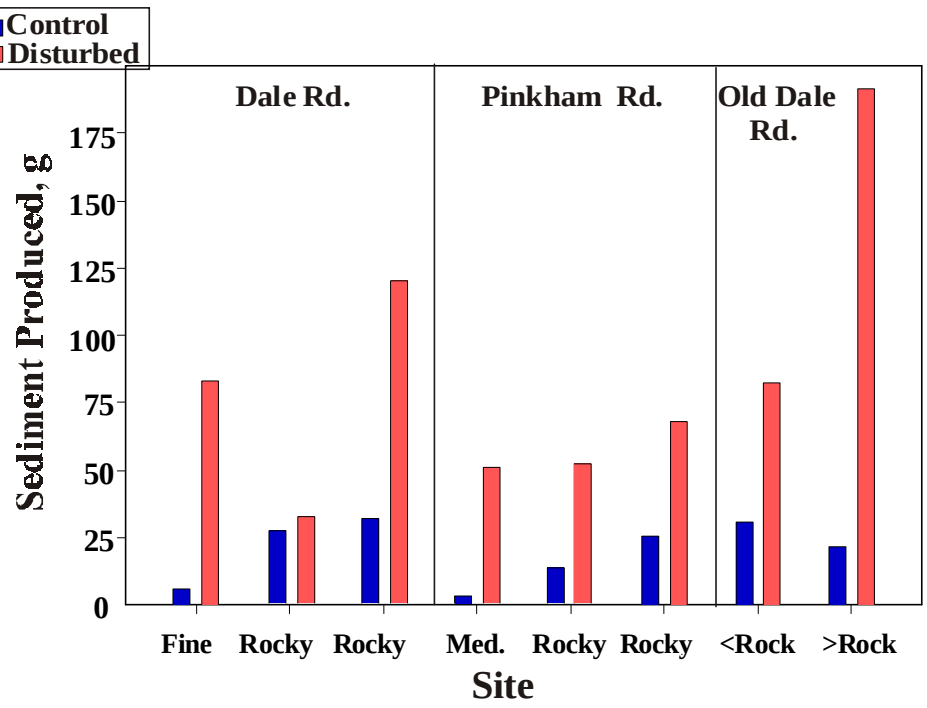

Valjean, CA
Active Wash
Middle Terrace
High Terrace
TFV, cm/s
140
120
100
80
60
40
20
0
Before Disturbance
After Disturbance
Sediment Produced, g
300
250
200
150
100
50
0
Surface Rock Size: Small Medium Small Medium Small Med. Med. Large
Ave. Rock Size, mm: 1.5 4.5 2.5 5 2.5 4.5 4.5 9.5
% Fine Cover: 0 2 1 1.5 3 3 8 4

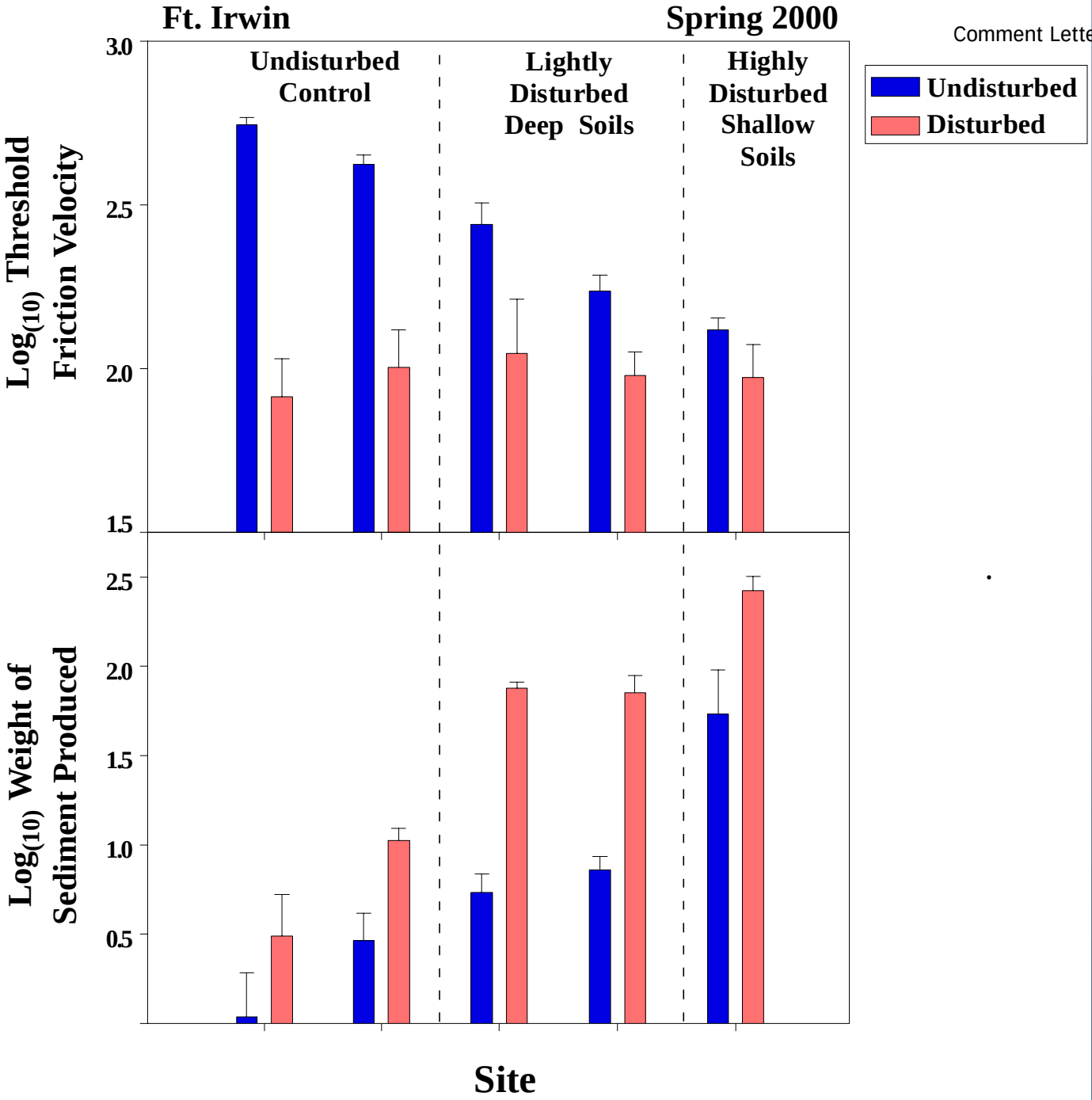

Valjean Pavement
TFV, cm/s
250
200
150
100
50
0
Undisturbed
Rocks Removed
Driven Over
Rocks Removed and Driven Over


Sediment Produced, g
50
40
30
20
10
0
Undisturbed
Rocks Removed
Driven Over
Rocks Removed and Driven Over


Mojave Ghost Towns, 1998
Outside Greenwater
In Greenwater
In Kunze
Control
Disturbed
TFV, cm/s
300
250
200
150
100
50
0
Spring Wind
Fine
Coarse
Coarse
Coarse
Coarse
Coarse
Coarse
Coarse
Coarse
Coarse
Site Texture
Parent Material = Tertiery Rhyolite


Joshua Tree National Park
Control
Disturbed
Dale Rd.
Pinkham Rd.
Old Dale Rd.
TFV, cm/s
200
150
100
50
Fine
Rocky
Rocky
Med.
Rocky
Rocky
<Rock
>Rock
Site


Dale Rd.
Pinkham Rd.
Old Dale Rd.
Sediment Produced, g
175
150
125
100
75
50
25
0
Fine
Rocky
Rocky
Med.
Rocky
Rocky
<Rock
>Rock
Site


Ft. Irwin
Spring 2000
Undisturbed Control
Lightly Disturbed Deep Soils
Highly Disturbed Shallow Soils
Undisturbed
Disturbed
Log(10) Threshold Friction Velocity
3.0
2.5
2.0
1.5
Log(10) Weight of Sediment Produced
2.5
2.0
1.5
1.0
0.5
Site

Wind Erosion Vulnerability

- Location
- Altitude
- Slope
- Aspect
- Quarternary Unit
- Parent Material
- Chemical Weathering Rate
- Pavement Formation
- Aeolian Sand Inputs
- Rockiness Index
- Roughness
- % Disturbance
- Rock Cover (3 Rock Size Classes)
- Litter Cover (2 Litter Classes)
- Lichen & Moss Cover (by Species)
- Lichen &Moss Species Richness
- Cyanobacterial Cover
- Cyanobacterial Biomass
- Shrub Cover
- Annual Grass Cover
- Perennial Grass Cover
- Soil Surface & Subsurface Chemistry (P, K, Zn, Fe, Mn, Cu, Ca, Mg, Na, N, $CaCO_3$)
- Soil Texture
- Sand Size Fractions
- Average Annual Precipitation
- Average Annual ET

Vulnerability to wind erosion

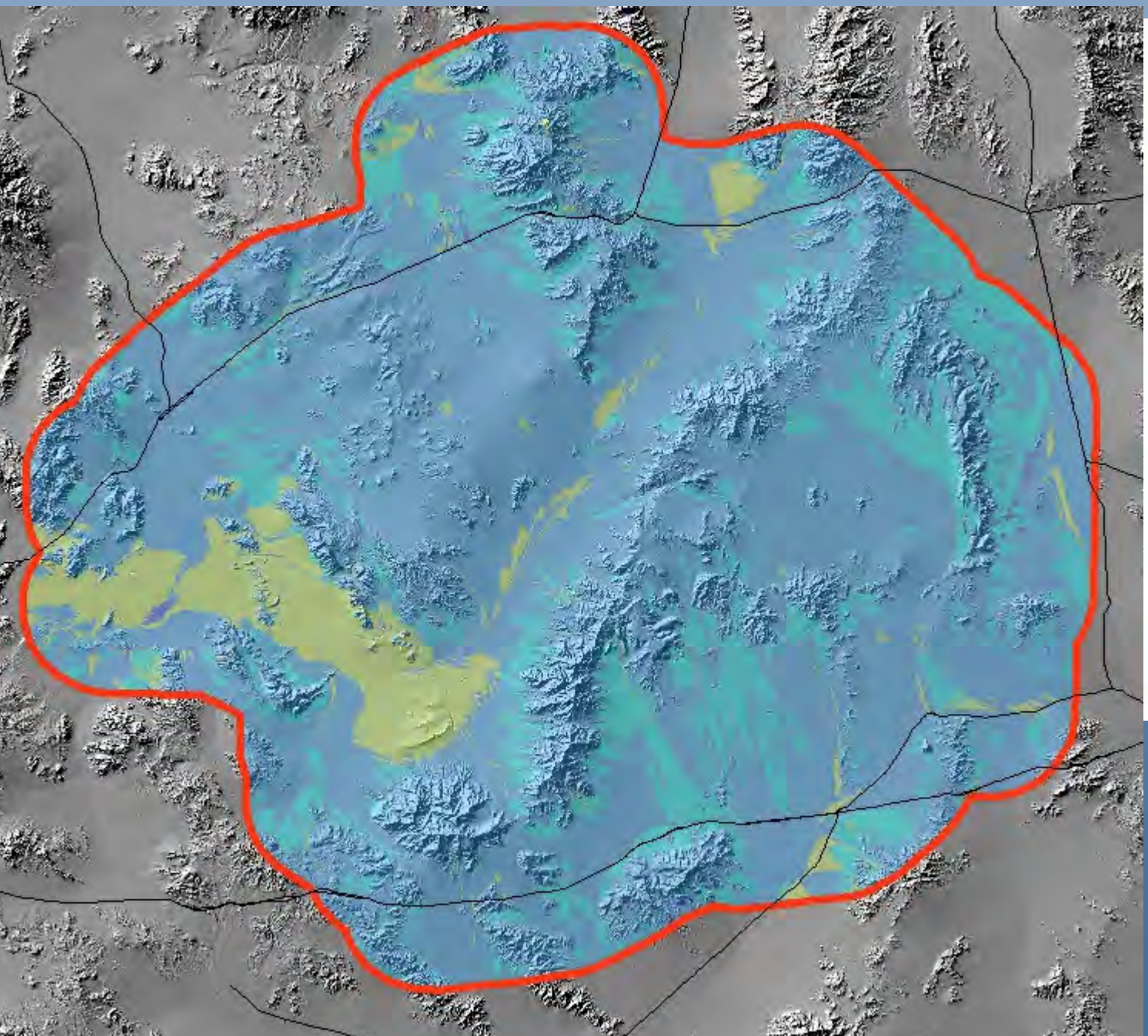
Soil Surface Characteristics

- Disturbance
- Particle size distributions (med.+fine/silt)
- Surface rockiness
- Salt
- Biological and physical crusts

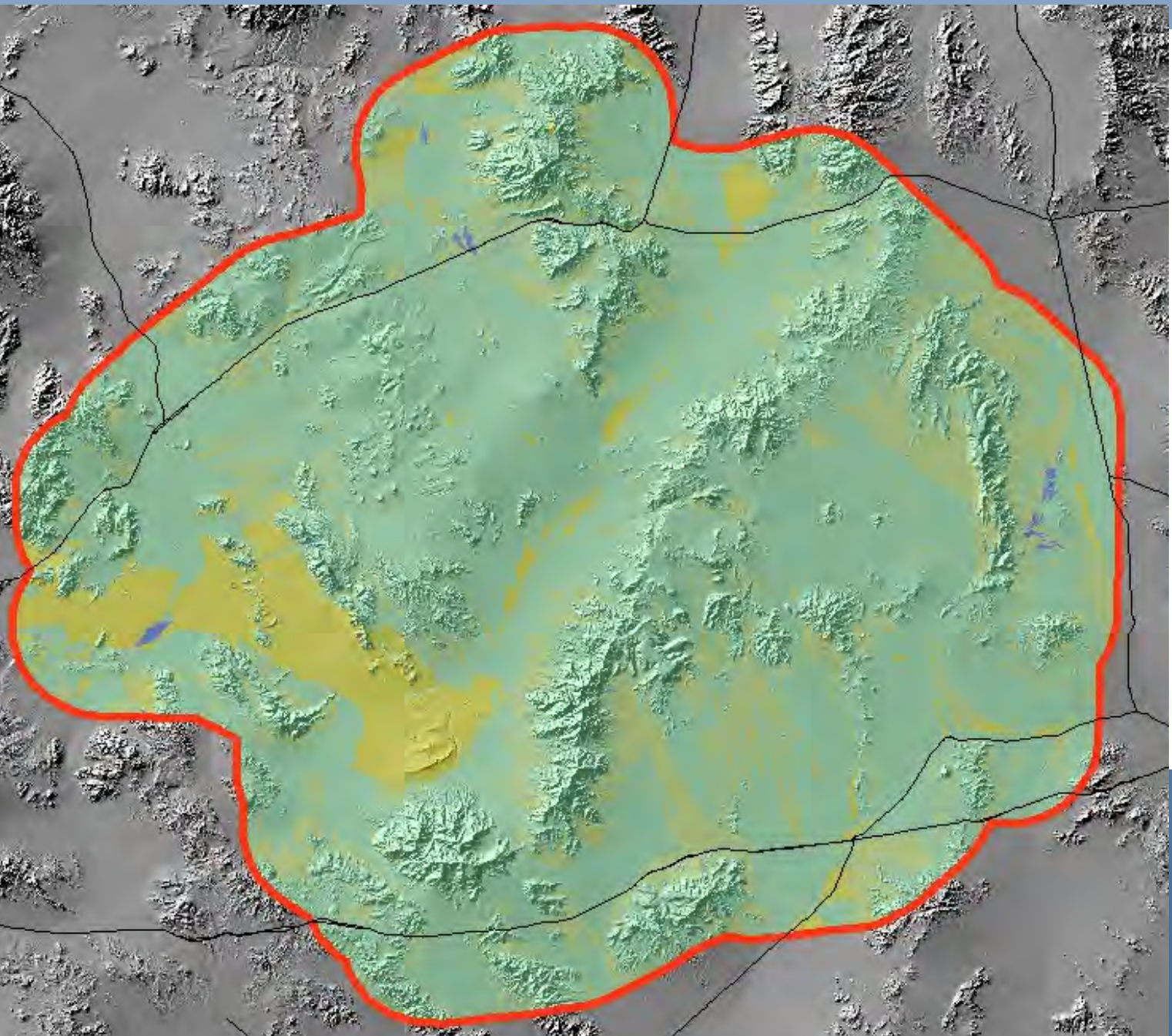
Climate

- Hours when soils are dry and winds exceed TFV

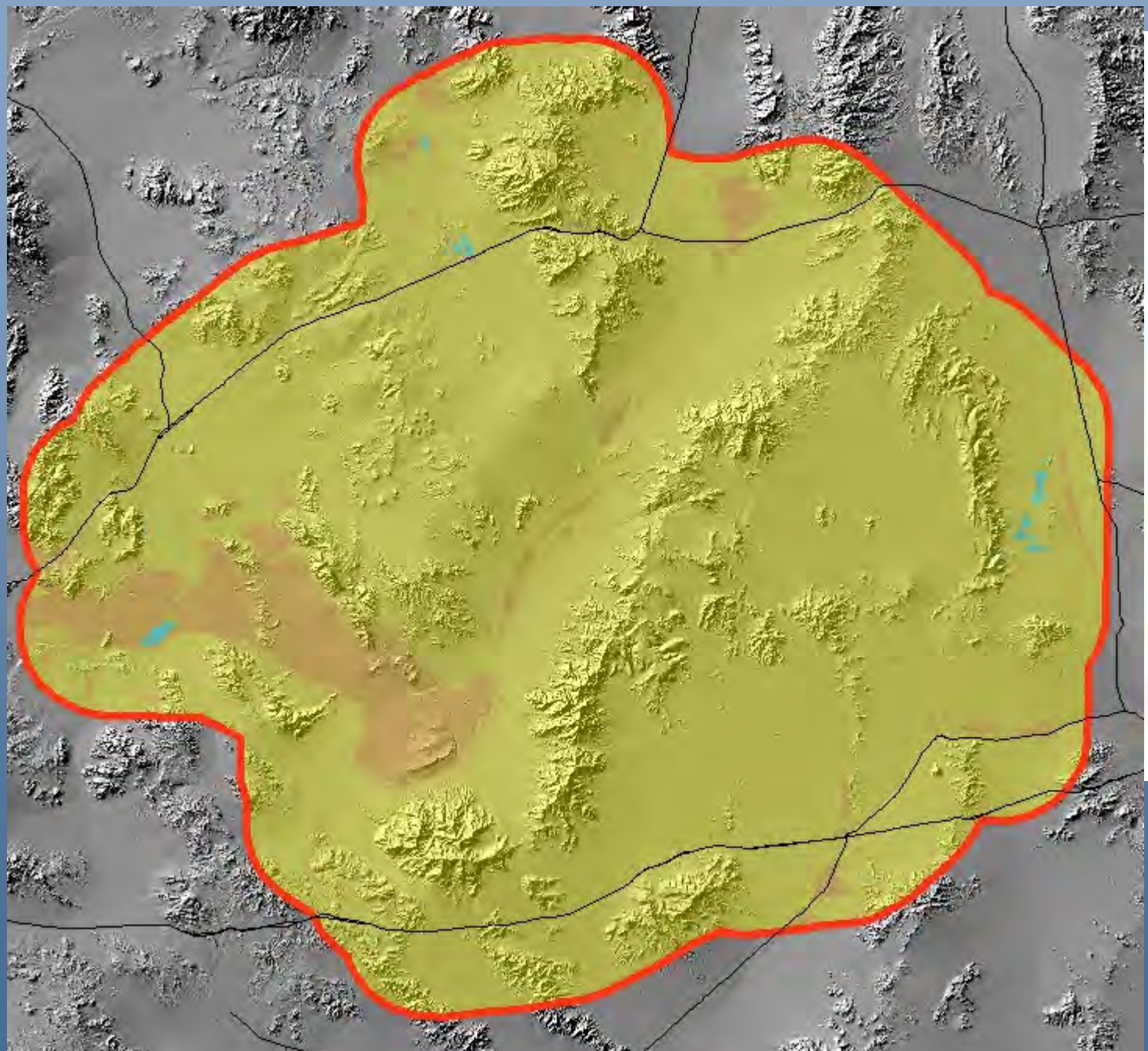
% time per month that a Threshold Friction Velocity is exceeded



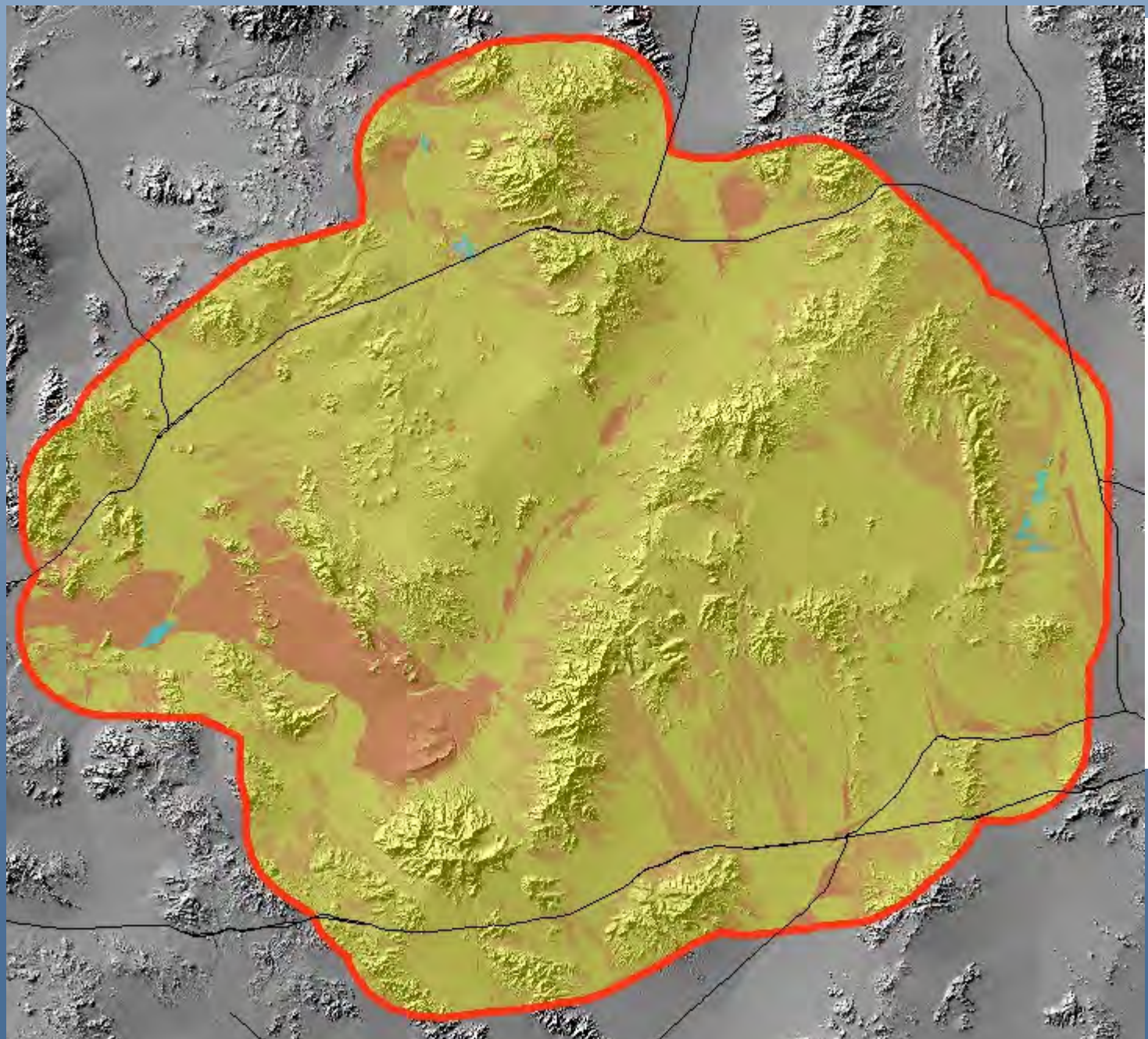
% time per month that a Threshold Friction Velocity is exceeded



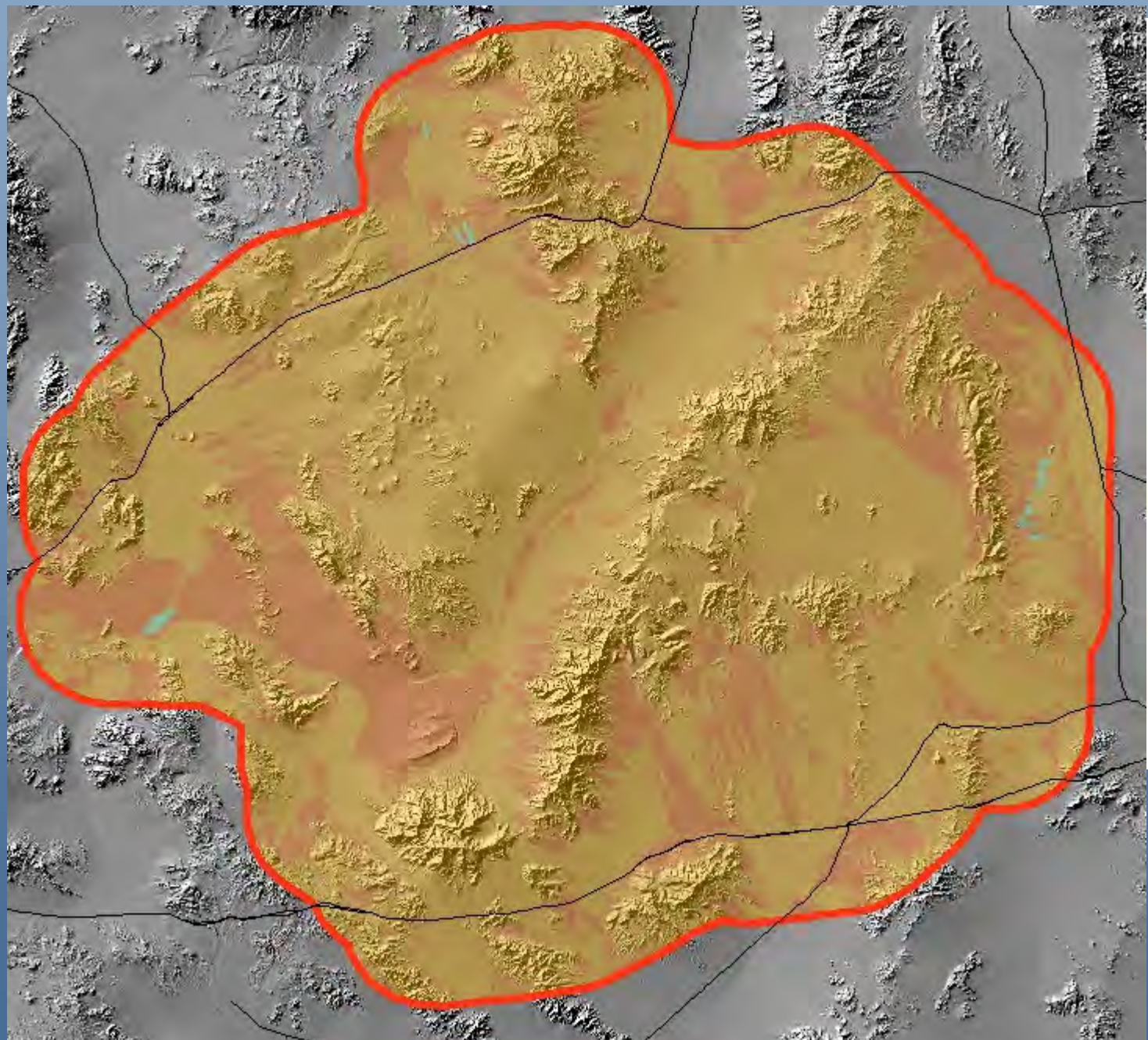
% time per month that a Threshold Friction Velocity is exceeded



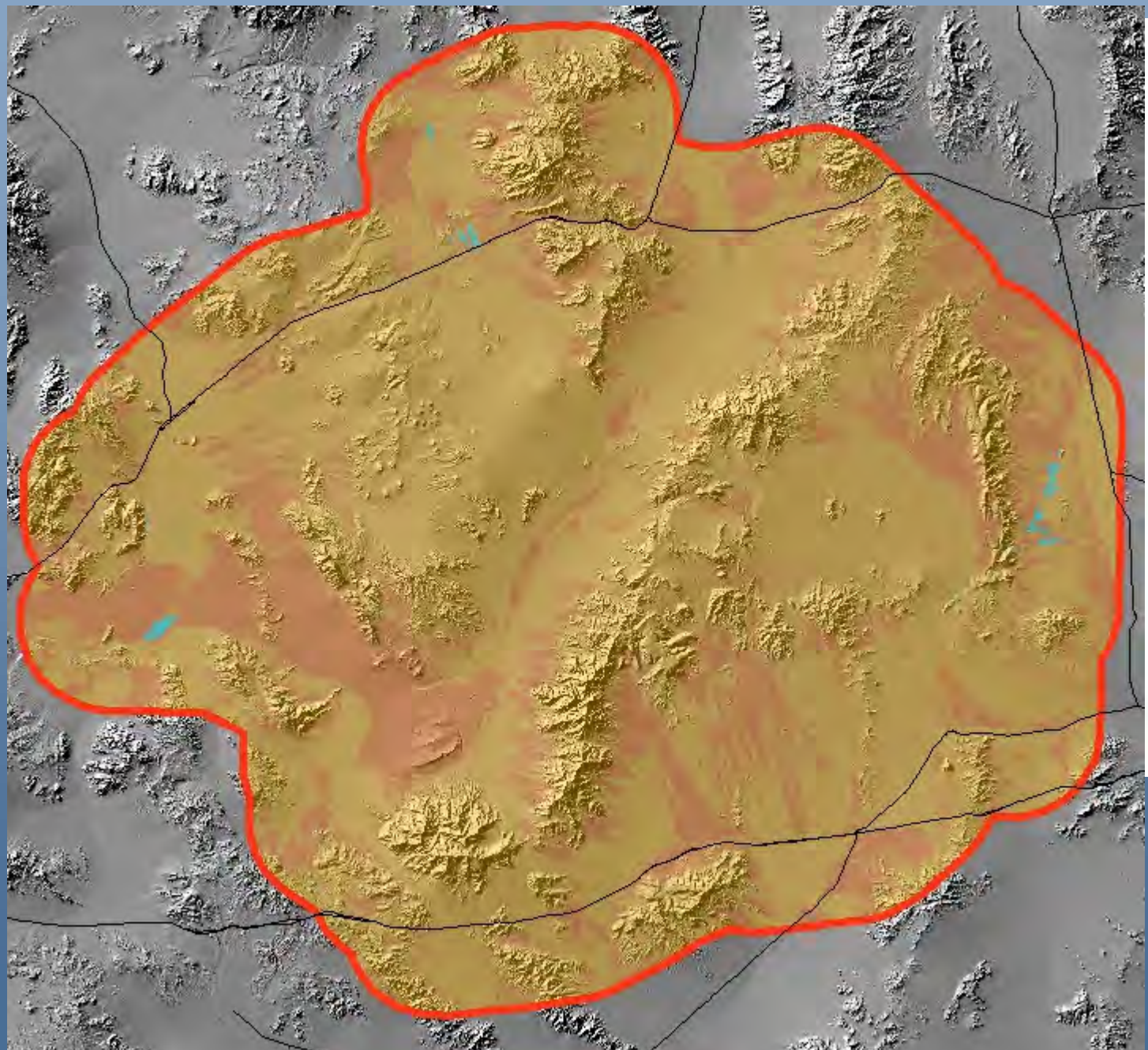
% time per month that a Threshold Friction Velocity is exceeded



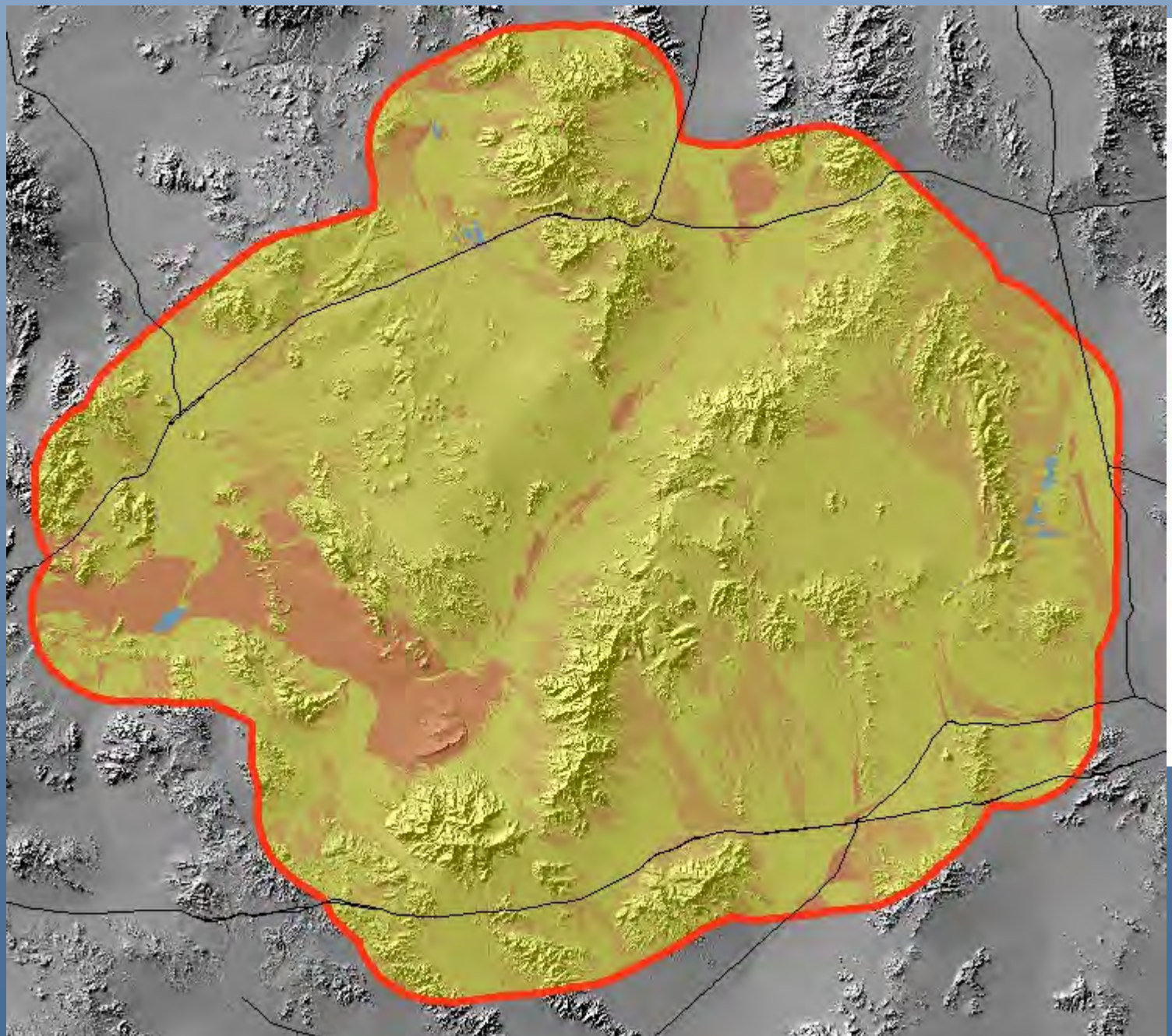
% time per month that a Threshold Friction Velocity is exceeded



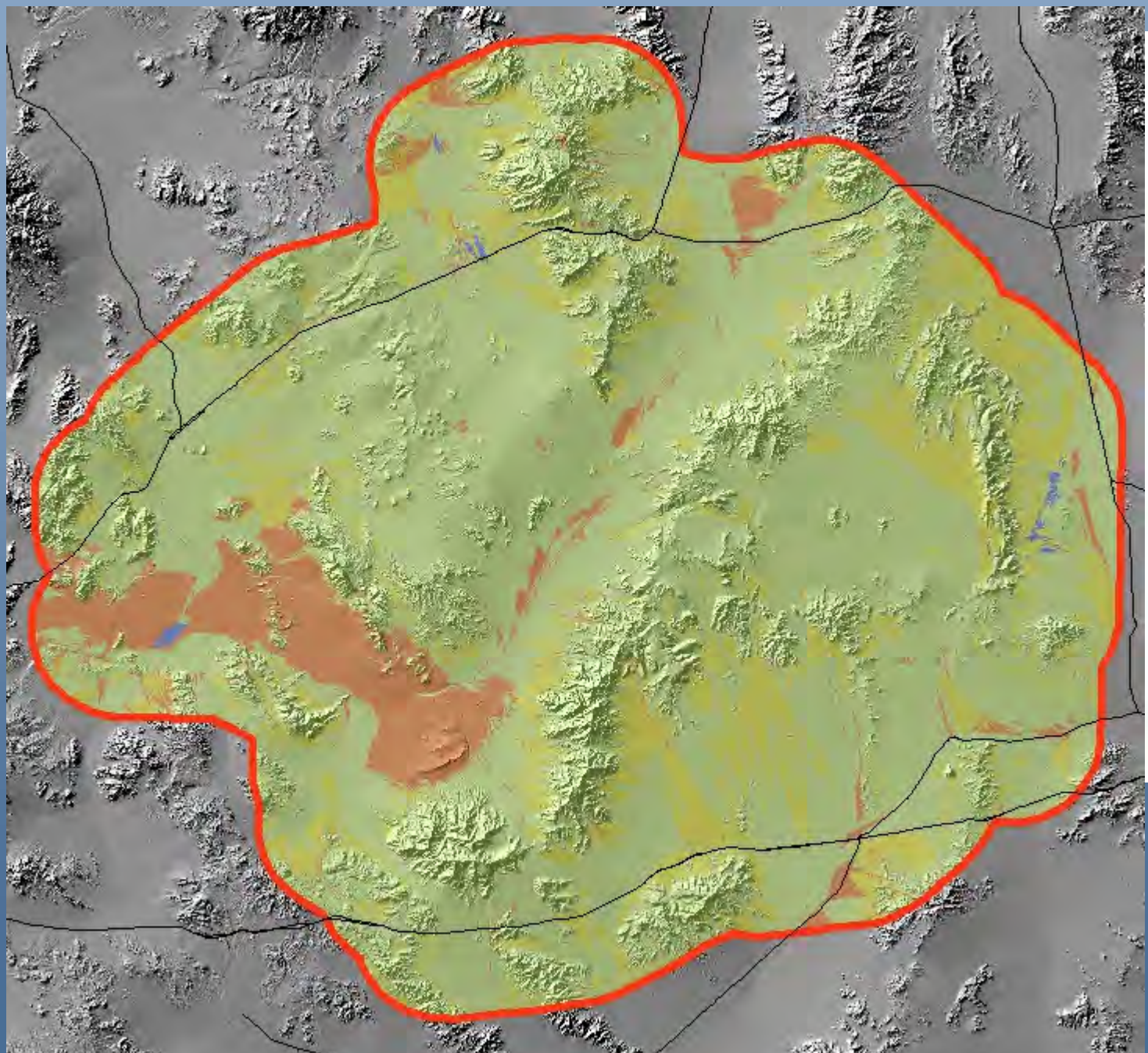
% time per month that a Threshold Friction Velocity is exceeded



% time per month that a Threshold Friction Velocity is exceeded



% time per month that a Threshold Friction Velocity is exceeded



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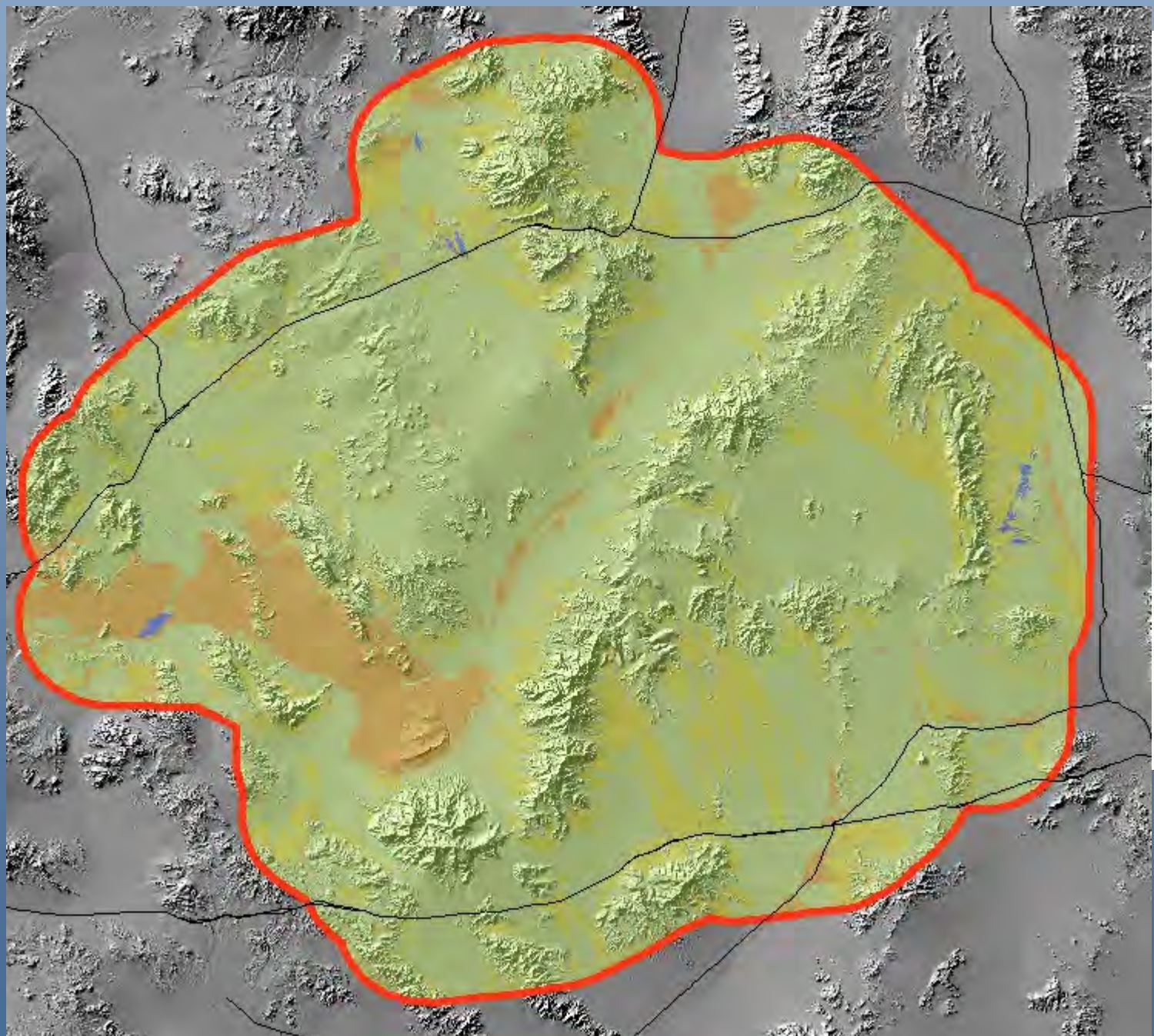

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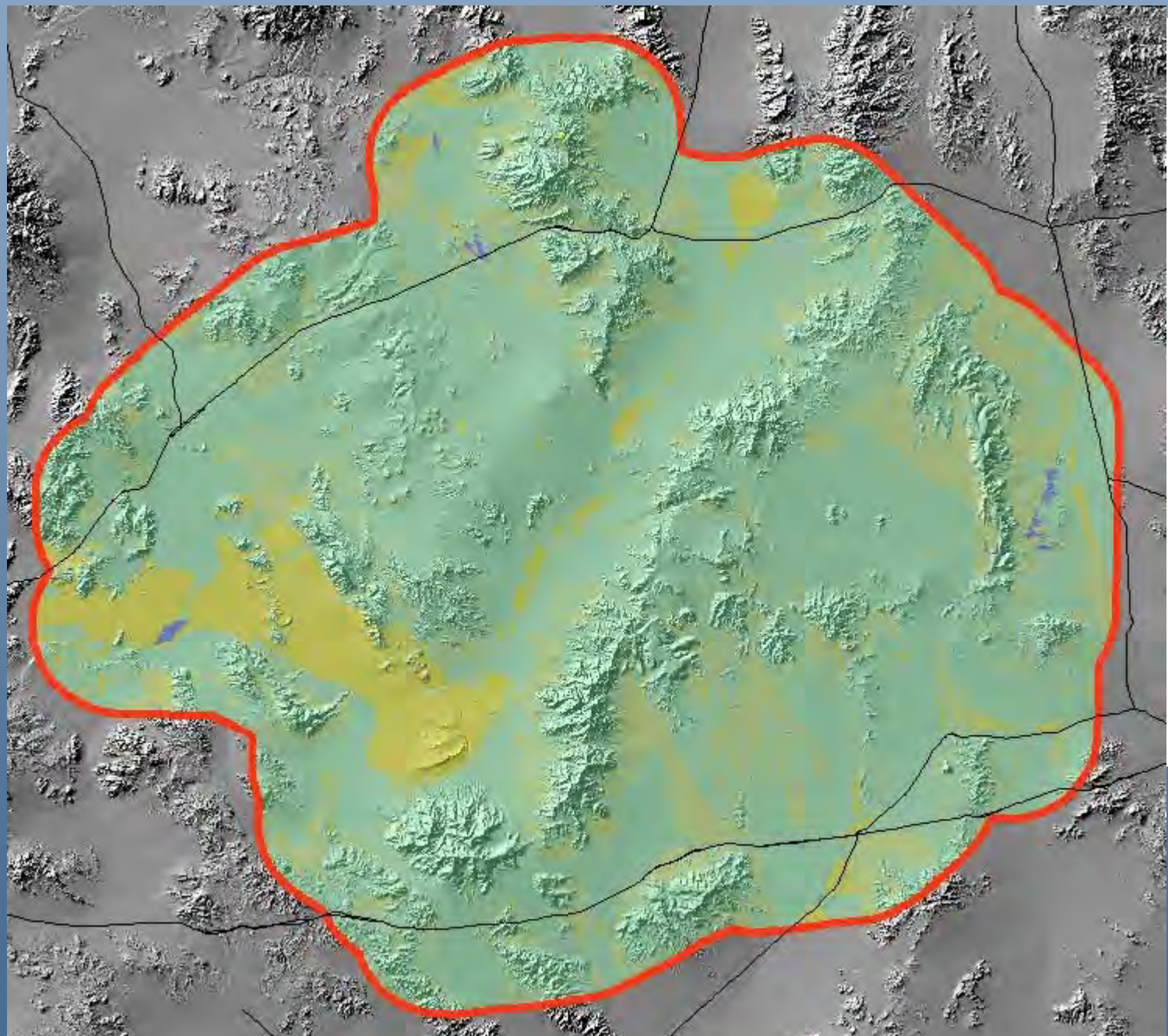

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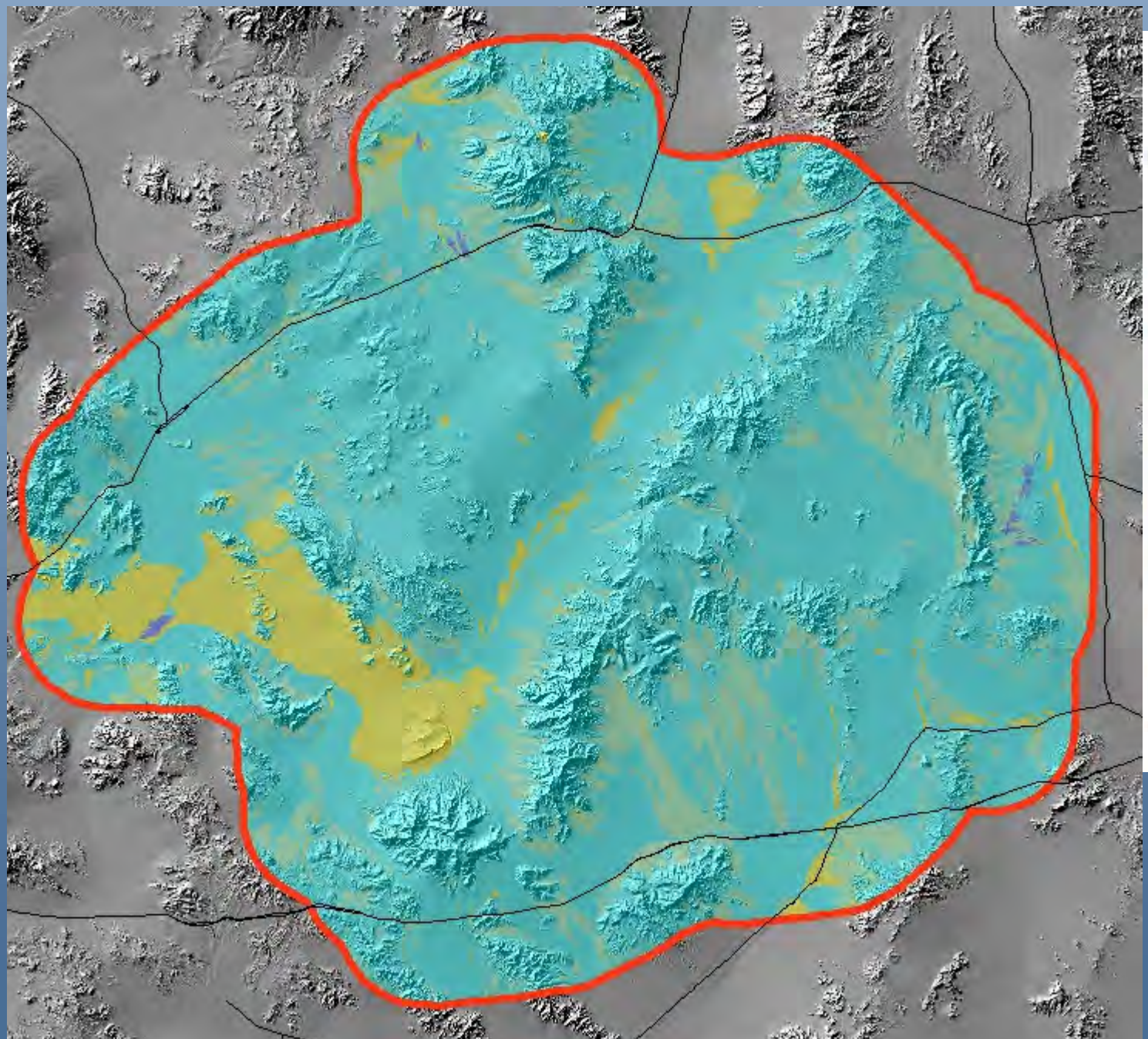

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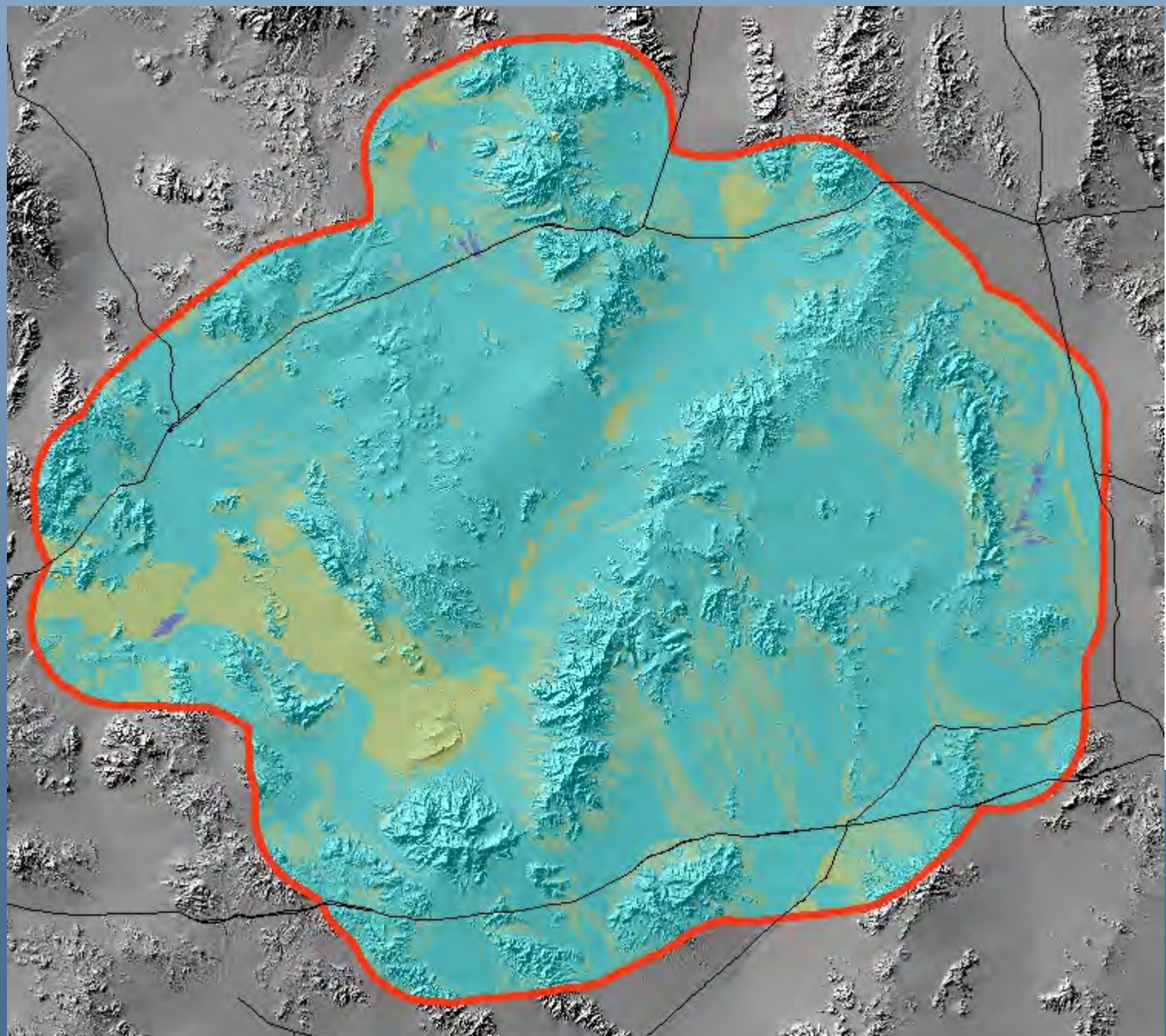
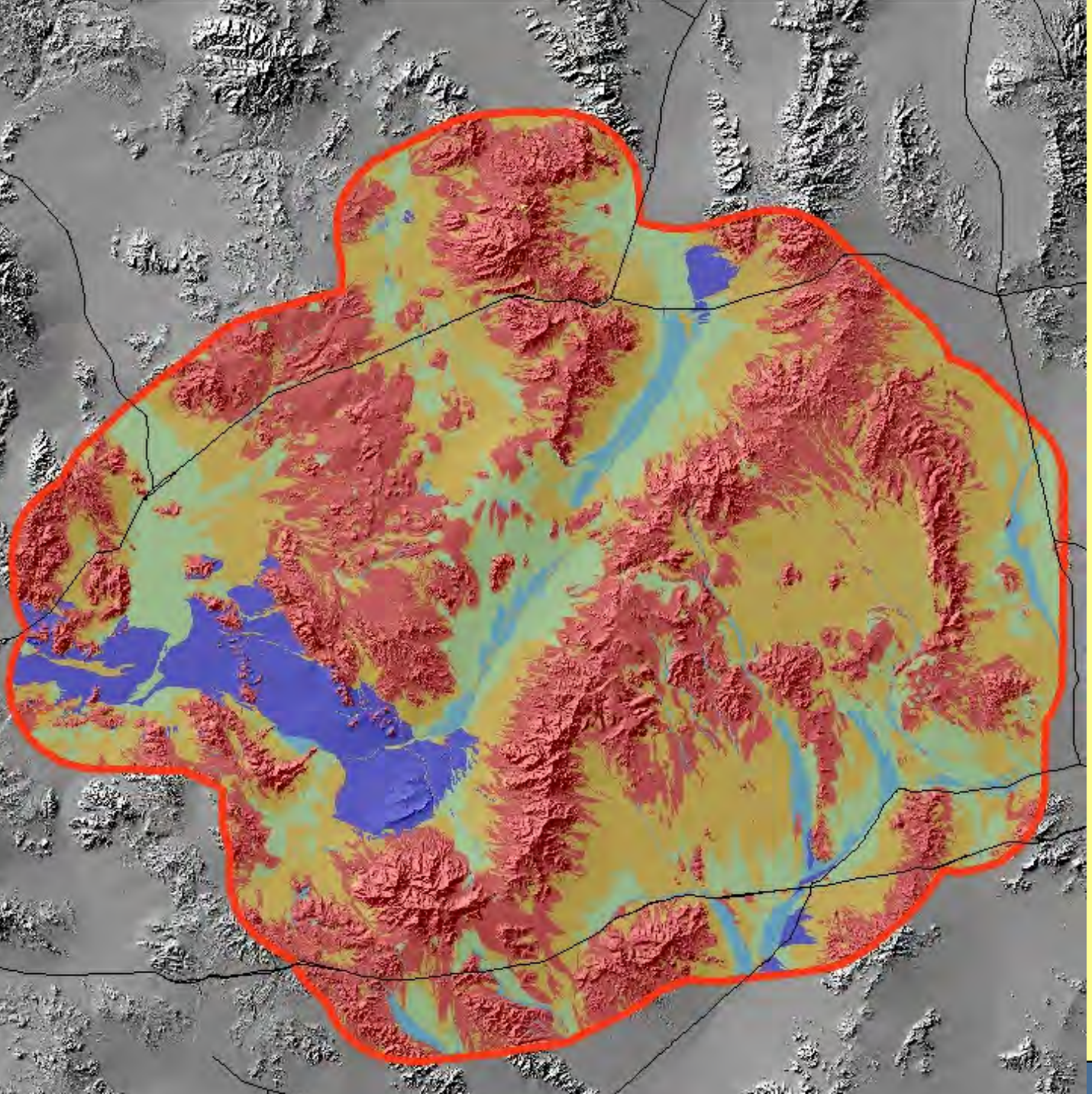


Comment Letter 17

Preliminary Wind Sediment Production Map for Disturbed Soils in the Mojave Nat'l Preserve



Legend

Main Road

MOJA border, buffer

Sediment g/m^2

Low

Medium

High

Where from here for Mojave Wind Vulnerability?

- Anemometers
- Repeated disturbances

CONCLUSIONS

- Potential crust distribution can be predicted and mapped. We need to understand processes behind distribution for greater predictive power.
- Recovery appears to follow a general model, but we need many more dated disturbances
- Explore ways to hasten recovery
- Vulnerability to wind erosion can be predicted and mapped. We need to include repeated disturbance.
- Vulnerability to water erosion has not been tested.

The California Desert's Role in 30X30: Carbon Sequestration and Biodiversity

February 6, 2024

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Colin Barrows, Co-founder, Cactus to Cloud Institute

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Arch McCulloch, M.S. Computer Science. Azusa Pacific University. B.S Geology / Computer Science. California State University, Dominguez Hills

Joan Taylor, Governing board of the Coachella Valley Mountains Conservancy, and boards of Friends of the Desert Mountains and The Wildlands Conservancy. Chairperson, California Conservation Committee and California/Nevada Desert Committee of Sierra Club

Author Biography

Dr. Michael Allen. Dr. Michael Allen has a Bachelor of Science in Biology from Southwestern College in Kansas, a Master of Science in Botany from the University of Wyoming, and a Ph.D. in Botany from the University of Wyoming, and is currently a Distinguished Professor Emeritus in Microbiology and Plant Pathology at the University of California, Riverside. He has worked on carbon flux and mycorrhizae since his dissertation, served as a program officer at the National Science Foundation where he managed Long-Term Projects, Ecosystems, and Conservation and Restoration Biology. During his tenure, he led discussions for the initiation of the National Ecological Observatory Network (NEON), served as an original member of various NEON boards, led the Biodiversity workshop, led the California bioregion discussions, and designed the soil sensor network that was adopted by NEON to measure soil carbon flux.

Dr. Cameron Barrows. Dr. Cameron Barrows worked for The Nature Conservancy (TNC) with his wife Kate, managing the last remaining old growth redwood forest in Mendocino County, CA, and conducting research on Spotted Owls (1980-1986). Dr. Barrows continued working for TNC and other NGO conservation organizations to implement the first-in-the-nation Habitat Conservation Plan in the Coachella Valley and expanding that plan to encompass the full breadth of biodiversity within that valley (1986-2005). Research focused on the Coachella Valley fringe-toed lizard and flat-tailed horned lizard. He worked with the Research Faculty at the University of California Riverside's (UCR) Center for Conservation Biology (2005-2022). Research focused on the response and resilience of desert species to modern climate change. Emeritus Research Faculty at UCR (2022-Retired). Still doing research and still married to Kate (44 years and counting). Their son Colin is carrying the desert conservation torch into the coming decades.

Colin Barrows. Colin is a Coachella Valley naturalist and desert advocate who works to promote conservation of natural open spaces and native species. He works with local agencies to advance habitat conservation, recreational trails planning, and education about desert ecosystems. He also serves on the board of the Mt. San Jacinto Natural History Association. Colin currently serves as co-founder of the Cactus to Cloud Institute.

Susy Boyd. Susy Boyd completed her MNR [Master of Natural Resources] degree at Oregon State University with an emphasis in Forests and Climate Change. Her research project developed climate change predictions and impacts on Seasonally Dry Tropical Forests in Mexico's Yucatan region. Prior to her studies with OSU, she received a Master of Arts degree in Rhetoric and Communication at UC Davis where she also served as lecturer. She currently works with Mojave Desert Land Trust as Public Policy Coordinator.

Pat Flanagan. Pat Flanagan is a naturalist - educator with a BA degree in biology from CSU Long Beach. She was the director of education at the Tijuana River National Estuarine Research Reserve for 10 years. She developed the first bilingual coastal wetland curriculum for bi-national distribution and training. This curriculum was later adapted to the Colorado Desert for the Desert Protective Council. She was a founding member of the Mojave Desert Land Trust where she held various positions. She is on the board of the Morongo Basin Conservation Association (20 years) for whom she has studied and commented extensively on Utility Scale Solar projects in the Mojave Desert. She is an advisor to the Mojave Desert Resource Conservation District and the naturalist at the historic 29 Palms Inn Oasis of Mara.

Robin Kobaly. Robin Kobaly holds both BS and MS degrees in Biology and Plant Ecology from the University of California, Riverside. She served as a botanist for the U.S. Bureau of Land Management for 21 years, working on regional conservation plans, habitat management plans, management plans for Areas of Critical Environmental Concern (ACEC), and environmental impact statements. Kobaly served on the Independent Science Panel providing science-based input to the planning process for the Desert Renewable Energy Conservation Plan (DRECP). She currently serves as Executive Director of The SummerTree Institute, an environmental education non-profit.

Arch McCulloch. Arch McCulloch has Bachelor of Science degrees in Computer Science and in Geology from California State University at Dominguez Hills, and a Master of Science degree in Computer Science from Azusa Pacific University. He spent 35 years as a software and information assurance engineer in the defense industry. He is currently on the boards of Morongo Basin Conservation Association (MBCA) and the Mojave Desert Chapter of California Native Plant Society (CNPS).

Joan Taylor. Joan Taylor has been conserving the California desert for over five decades, including eight years as an appointed stakeholder to DRECP, where she co-authored the joint environmental NGO comments on the CEC energy-acreage calculator. Joan has received numerous awards and acknowledgements for her life-long leadership

in desert conservation. Currently, she serves on the governing board of the Coachella Valley Mountains Conservancy, The Wildlands Conservancy, and Friends of the Desert Mountains. Joan also chairs the Sierra Club's California Conservation Committee and its California/Nevada Desert Committee.

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The California Desert Conservation Area

Executive Summary

Our state's southeast desert region is unlike any other locale of the state. California's desert ecosystem comprises a staggering 25% of state land (approx.26 million acres) and is locally accessible to approximately half of our state's population. The unique beauty of the desert ecosystem has driven visitation to the region, with Joshua Tree National Park recognized as the 8th most visited national park in the country in 2022.

In spite of its rapidly rising popularity, the California desert as an ecosystem remains poorly understood, underfunded, and misperceived. One of the most persistent mischaracterizations is that the California desert is a barren wasteland with low biodiversity and limited capacity for carbon storage. Scientific data refutes these inaccuracies, and this report will demonstrate that the California desert has extremely high biodiversity and is a significant carbon sink with tremendous opportunity to sequester carbon and help our state meet its atmospheric carbon reduction goals.

There are 2 key takeaway messages from this report:

1. **The desert's carbon storage process differs significantly from more widely understood sectors such as forests, grasslands, chaparral, and wetlands.**

2. **Because of the distinct carbon storage process found in the desert ecosystem, there is one recommended strategy to maximize the desert sector's contribution to carbon emission reduction: intact desert lands need to be left undisturbed.**

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I. Introduction. California's goal of carbon neutrality seeks to balance the net flux of greenhouse gas emissions (GHG) from all sources and sinks.

> California's non-forest habitats play an unappreciated but critical role [in carbon sequestration] …. As with forests, non-forest habitats can store carbon by keeping it from being released and sequester it by removing it from the atmosphere. Habitats in arid and semi-arid regions — including shrublands, grasslands, and deserts — have been found to store significant amounts of carbon while being resilient to drought and increased atmospheric carbon (Yap et al., 2023).

As reported by Yap et al., globally, scientists estimate that deserts store 999 – 1,899 petagrams [Pg] of carbon. In the United States, southwest deserts sequester 50 teragrams [Tg] of carbon annually (equal to 0.05 Pg). And in California's northern Mojave Desert, field experiments demonstrated that CO_2 exchange plays a larger role in global carbon cycling than what scientists and policy makers have long assumed. The desert ecosystem, unlike other sectors, is largely unmanaged with the exception of some restoration projects. Additionally, the desert's recovery from alterations of any kind takes place on a time scale at a much slower rate relative to other ecosystem types, up to thousands of years.

The desert's function as a significant global carbon sink is an emerging and exciting scientific territory that merits a central place in any endeavor to meet climate change goals.

Center for Biological Diversity, Yap, T., Prabhala, A., & Anderson, I. (2023). *Hidden in Plain Sight: California's Native Habitats are Valuable Carbon Sinks* (W. Leung, Ed.).

II. Maximizing Carbon Sequestration and Biodiversity Protections

Maximizing carbon sequestration and concurrent protection of high biodiversity in the California desert ecosystem is achieved by conserving 100% of <u>undisturbed</u> public lands.

Arch McCulloch, MS
Board Member, Morongo Basin Conservation Association / Mojave Desert Chapter of CNPS

It is axiomatic that disturbances in the desert take a long time to heal. Scars in terrain altered by General Patton's World War II training exercises remain visible today, and areas grazed by cattle still, over 60 years later, support vegetation assemblages that indicate a history of grazing and associated fires (Sawyer et al. 2009). Deliberate disturbances, such as the desert intaglios near Blythe, can last for many centuries.

Many desert perennials are long-lived: Joshua trees (*Yucca brevifolia*) can live over 100 years and Mojave yuccas (*Yucca schidigera*) can live over 1,000 years; desert ironwood (*Olneya tesota*) may live a thousand or more (Rymer 2023). Creosote bush (*Larrea tridentata*) clonal rings over 10,000 years old are still living in parts of the Mojave Desert (Porter 2012). Blackbrush (*Coleogyne ramosissima*) may take over 60 years to re-establish on sites where it has been removed (Anderson 2001). Obviously, restoration of disturbed sites is complicated by these time scales.

In desert soils, restoration is even more complicated due to very deep and expansive root systems and to the complex soil biota that has co-evolved with plants on particular sites over millennia. After removal of perennial plants, the re-establishment of this deep soil biota, even more than the extremely slow growth rates of desert perennials, means there is no practical way to restore lands where this relationship has been disrupted.

Photovoltaic solar (PV) is rightly seen as a core energy resource to reduce our carbon footprint. The issue is where to place it to best attain this goal. There is great risk of unintended consequences when Southern California deserts are narrowly assumed to be the primary locale for utility scale solar, as we discuss in the following sections. Photovoltaic efficiency is highest on cool, sunny days, which maximizes the electric potential of the solar cell. Since cloud cover and high ambient temperatures both reduce PV efficiency, cooler areas with higher cloud covers will have PV efficiency comparable to hot areas with lower cloud cover. Locating solar panels as close as practicable to load will reduce resistance losses. The success of PV generation in Germany shows that acceptable efficiency is achievable with these strategies.

Given the ability of undisturbed desert land to bind and hold carbon on a scale of millennia, and the difficulty of restoring disturbed desert lands to anything approaching this capability, we believe that any solar project proposed for the desert should be sited on the vast areas that have already been disturbed by urban, agricultural, and industrial installations (and by the ruins, both physical and biological, of former installations).

In sum, any calculation of equivalent carbon savings by a desert solar installation must, if it is honest, subtract carbon no longer sequestered by the destroyed vegetation, as well as carbon being released to the atmosphere by soil now exposed to weathering. It must also account for replacing an ecosystem service (that, if undisturbed, would continue to operate independently and indefinitely), with an industrial service requiring near-constant maintenance and complete equipment replacement every few decades.

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Characterizing Disturbed Lands

Susy Boyd, MNR. Master of Natural Resources, Forests and Climate Change, Oregon State University
Public Policy Coordinator, Mojave Desert Land Trust

Disturbed lands are those areas where infrastructure development has been or may be encouraged. The state of California as a whole has much to offer in terms of disturbed lands suitable for utility infrastructure as we transition to clean energy and meet our state's impressive climate change mitigation goals.

Landscape-scale disturbance falls across a continuum. A pristine desert ecosystem characterizes one end of the spectrum, and worst-case scenario characterized by loss of ecosystem function represents the other end of the spectrum (C. Barrows Ph.D., personal communication, September 14, 2023). A functioning desert ecosystem provides ecosystem services beyond carbon sequestration including habitat for desert organisms. So long as perennial woody vegetation remains intact, the landscape can be considered a functioning ecosystem, even with presence of non-native grasses and mustard that have

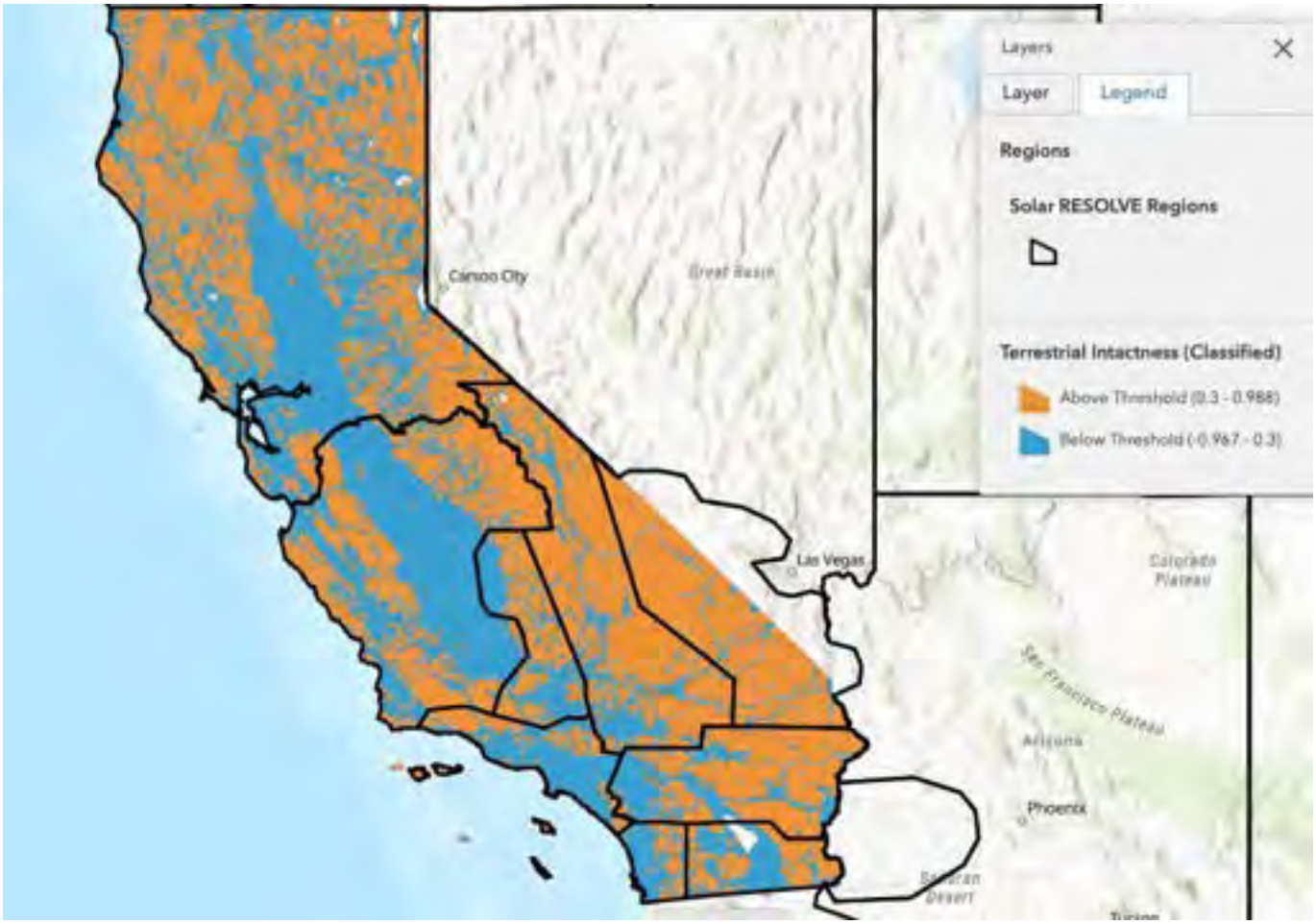
ephemeral impacts based on water availability. Other examples of undisturbed lands subject to minor impacts include areas with light or well-managed grazing, lands affected by wildfire (with root zone left undisturbed), and lands impacted by flooding with no expected continuing disturbance.

Examples of landscapes that have lost most of their functionality would be abandoned building sites, fallow agricultural lands, and large-scale mining operations; degraded OHV playgrounds; parking lots; and rights-of-way for transmission lines and canals. Residential and commercial developments are also regions where ecosystem function has been reduced to nonfunctional status.

In 2023, the California Energy Commission [CEC] released a staff report entitled, “Land-Use Screens for Electric System Planning.” Land use screens are high level land use evaluation tools that identify favorable sitings for renewable energy after considering technical and economic criteria; legal restrictions; and planning considerations for biodiversity, crop production, climate resilience, and landscape intactness. The 2023 report provides descriptors for landscape intactness:

> Terrestrial landscape intactness: ***A measure of landscape condition based on the extent to which human impacts such as agriculture, urban development, natural resource extraction, and invasive species have disrupted the landscape across California.*** The Conservation Biology Institute (CBI) has created a multicriteria evaluation model using more than 30 data layers, or variables…. The CEC staff partitions this dataset at the mean to create two categories: areas that are already disturbed and have degraded ecosystem function and areas where development would impair the landscape and cause new disturbance. In this analysis, areas of low landscape intactness are most suited for exploration of renewable resource potential, whereas areas of high intactness are better suited for conservation. Therefore, the higher category of landscape intactness values is used to remove technical resource potential from the state.

Lands with degraded ecosystem function are shown in blue (below the mean) in the following map and areas with high intactness value (above the mean) are displayed in orange. Areas with high landscape intactness (orange) indicate areas with low priority for infrastructure development in order to preserve ecosystem function, biodiversity, and carbon sequestration capacity. Intact landscape characterizes much of the California desert region, though large tracts of disturbed land across the state remain highly viable options for renewable energy development. More thorough analysis of disturbed desert lands is needed for planning purposes. Future industrial scale solar projects should be sited on disturbed lands that already exhibit low intactness.



Source: Hossainzadeh, S. et al. 2023.

Landscape Intactness as calculated by CBI is partitioned into high and low categories based on the mean.
Orange = High intactness [Undisturbed]
Blue = Low intactness [Disturbed]

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Hossainzadeh, Saffia, Erica Brand, Travis David, and Gabriel Blossom. 2023. Land-Use Screens for Electric System Planning: Using Geographic Information Systems to Model Opportunities and Constraints for Renewable Resource Technical Potential in California. California Energy Commission. Publication Number: CEC-700-2022-006-F.

Why desert restoration is not an effective means to achieve atmospheric carbon reduction goals

Robin Kobaly, M.S. Biology and Plant Ecology, University of California, Riverside
Executive Director, The Summertree Institute

The rate and success of restoration efforts or recovery of disturbed ecosystems is largely dependent upon water availability. When an impacted ecosystem has ample water available for seed germination, root establishment, and growth of new foliage, recovery can be fairly rapid, ushering back the community of insects, reptiles, birds, mammals, and microbes that depend upon plants in the ecosystem. However, if a disturbed ecosystem has limited rainfall and low soil nutrient content, recovery either naturally or through restoration efforts takes much longer and may not always succeed. Recovery from disturbance by temperate ecosystems is much faster than in arid ecosystems, with both infrequent, unpredictable precipitation and low soil nutrients contributing to the slower recovery of arid ecosystems such as those in the California deserts.

Recovery and restoration in forest ecosystems requires about 40 years, but recovery and restoration in desert ecosystems can take centuries longer. Research suggests that removal of desert vegetation and disturbance of the topsoil requires about 30 years before the pre-existing plant community begins to grow back, over two centuries before even partial recovery of species composition occurs, 50 – 300 years for recovery of plants to pre-disturbance cover and biomass, and up to 3,000 years before the disturbed area returns to the ecosystem function it had before disturbance. Disturbance is defined here as a physical force (e.g., road building, plowing for agriculture, construction of industrial-scale solar fields, etc.) that removes most or all the plant biomass.

Research indicates that the older the plant community, the longer the recovery time. Desert ecosystems are known for the longevity of their perennial plant community, with many shrubs living hundreds (blackbrush, Mormon tea, galleta grass, pinyon, etc.) to thousands of years (creosote, Mojave yucca, California juniper, nolina, desert ironwood, etc.). Data show that protecting deserts from disturbance is critical for sustaining old communities, valuable for their generational contributions to ecosystem stability. The desert's ancient plants sustain their community through centuries of drought episodes, excessive heat waves, frosts that kill younger plants, and attacks by diseases and pests that compromise younger plants struggling to become established.

Some scientists have hypothesized that if disturbed, the oldest communities may not actually recover, even with restoration efforts, and they could be replaced by an alternative community. The reasoning is that climate and other conditions (e.g., invasion by exotic species, climate extremes, anthropogenic nitrogen deposition) have changed so much since the communities developed hundreds to thousands of years ago, restoration attempts may not be successful in recreating the original ecosystem, and a different community may become established instead of the original community.

Active revegetation in southwestern deserts has generally been confined to small areas because of its expense, the unpredictable weather that makes restoration effectiveness uncertain, and logistical challenges associated with implementing treatments across large desert areas.

Since disturbances can leave scars in the desert visible for multiple human generations and because restoration is so difficult, costly, and not guaranteed, great care should be exercised before disturbing the desert, not simply for ecosystem health, but also to preserve visual aesthetics, air quality, human health, ecotourism viability, biodiversity, and carbon sequestration capacity. For these reasons, conservation of intact desert lands should be prioritized over restoration of land not already scheduled for disturbance by infrastructure projects.

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III. The Critical Relationship Between Undisturbed California Desert Lands and Carbon Sequestration

Michael F. Allen, Ph.D.
Distinguished Professor Emeritus, Department of Microbiology and Plant Pathology, University of California, Riverside.

A microphyll woodland that was later denuded for a utility-scale solar energy facility. While individual trees and shrubs are small aboveground, belowground their roots expand horizontally and vertically, filling the interspaces and reaching to depths of tens of meters. These deep-rooted plants are also very long-lived, sequestering carbon for hundreds to thousands of years. One clonal creosote shrub was measured as 22 by 8 meters across, and was over 11 thousand years old.

- Carbon fixation and allocation in microphyll woodlands and creosote shrubland is relatively insensitive to local precipitation due to the access that these vegetation types have to two alternate sources of water: moisture from large rain events even miles away that saturate the soil,

and access to groundwater by deep roots. These factors allow plants in microphyll woodlands and creosote bajadas to photosynthesize and sequester carbon throughout the seasons even without local precipitation. Although highly variable annually, measurements of net ecosystem exchange [NEE] in mesquite stands through a growing season can exceed 200 kilograms of carbon per hectare per year (kgC/ha/y) and net ecosystem exchange of creosote bajada scrub can exceed 1,000 kgC/ha/y. Our back-of-the-envelope conservative estimates suggest that these two vegetation types could sequester an average of 1.5 million tons of C per year. [By comparison, NEE during a wet year in Baja California was 520 kgC/ha/y with a sky island coniferous forest above southern California desert at 300 kgC/ha/y, a 100-year-old chaparral during a wet year of 520 kgC/ha/y, and drought year of 180 kgC/ha/y, the La Selva tropical rainforest of 1,000 kgC/ha/y (dry year)/3,000 kgC/ha/y (average)/5,000 kgC/ha/y (wet year), and a boreal forest 780 kgC/ha/y]. In deserts, the organic carbon of the ecosystem turns over on an average of 38 years, with soil and sediments turning over on a 200-year average. This contrasts with a temperate forest of 25 and 55 years, respectively; a cropland turnover of 22 and 40 years, respectively; and a perennial grassland turnover of 36 and 100 years, respectively. Desert organic carbon once fixed stays in the system longer than in other ecosystems, releasing back to the atmosphere slowly.

However, unlike the large storage of organic C in most ecosystems, much of the desert total carbon is stored as calcites, generated by respiration.

- Calcites, layered into caliche, form from autotrophic respiration from deep roots and symbiotic microbes, and from heterotrophic respiration of the transferred organic matter. If buried and undisturbed, this carbon can remain sequestered for millennia. We estimate that more than 262 million tons of C could be stored in California deserts as calcites.
- Importantly, buried calcites are dissolved upon exposure to air and water. Upon exposure, the CO_2 in calcium carbonates can be released from disturbed soils up to 2.4 gC/m^2/day, or 24 kgC/ha/day following a precipitation event.
- We suggest a new C sequestration modeling approach to validate and close the desert carbon budgets using an ecohydrology approach, incorporating deeper water use and using normalized difference vegetative index {NDVI} rather than precipitation as a driver of CO_2 fixation, and linking the NEE to deep C sequestration.

Conclusion

- Large-scale disturbance of deserts, particularly within critical ecosystems such as creosote bajadas and microphyll woodlands, has the potential to reduce not only California's biodiversity, but also a source of long-term carbon sequestration, releasing calcite carbon stored for millennia.

IV. Overview of Carbon Sequestration Process in Desert Ecosystems

Robin Kobaly, M.S. Biology and Plant Ecology, University of California, Riverside
Executive Director, The Summertree Institute

What drives carbon capture and storage in deserts?

The combination of a hot, dry climate, and dynamic plant adaptations to that extreme climate has created a unique pathway for the capture and storage of carbon (carbon sequestration) in deserts. Sparse rainfall has resulted in desert soils that are abundant in minerals such as calcium, but low in nutrients like nitrogen necessary for plant growth. That sparse rainfall, combined with hot, dry surface soils, has enticed many desert plants to grow exceptionally long roots to reach deep soils that still hold moisture from rain

events from years past and possibly from miles away, or even deep enough to reach down to groundwater.

Root partners like fungi and bacteria living on or within those deep-rooted desert plants absorb and share resources with their plant host, helping their plant partners overcome the minimal presence of water and nutrients. These pressures, adaptations, and partnerships all work together to create an unexpected mechanism for extremely long-term carbon storage – and carbon capture that can continue even when we least expect it: when rainfall is just a memory across the desert.

How does the desert capture and store carbon?

While desert plants do capture and store carbon aboveground in foliage and woody tissue, they store much of their captured carbon deep underground in a massive network of connected roots and fungal root-partners, unlike forests which store most of their carbon aboveground or near the soil surface. Some of this carbon is stored in the tiny but numerous filaments of root-partnering fungi, called mycorrhizal fungi, that live in partnership with plant roots. The filaments, or mycelia, of one large group of these mycorrhizal fungi are coated with a “sealant” called glomalin made from carbon that was captured aboveground by the plant host. Because there can be so many miles of fungal hyphae (covered with glomalin) in each cubic foot of desert soil, glomalin is attributed with storing one-third of the world’s soil organic carbon.

Much of the carbon these plants capture aboveground from the air and convert into sugar is eventually turned into inorganic carbon underground. When the long roots breathe out (respire) carbon dioxide deep into dark moist soil, this carbon dioxide combines with the abundant calcium in our arid soils to create mineralized deposits called calcite (calcium carbonate), or “caliche” when it forms into layers. These deposits start as tiny crystals but eventually grow to large crystals, then chunks, and into layers of caliche that can start at the soil surface or form at various depths underground. These calcite/caliche deposits can store captured carbon in this inorganic form for hundreds, to thousands, to even hundreds of thousands of years…if not disturbed.

Where does carbon sequestration occur in deserts?

Historically, much of the desert’s “soil organic carbon” has been missed by soil scientists, because many soil studies conclude at “plow-line depth,” or between 6 and 12 inches. These studies aren’t of much relevance in the desert because most of the carbon that desert plants capture is stored extremely deep in the soil. Roots of most (non-succulent) desert plants grow incredibly deep, up to ten times longer than the plant is tall in their critical quest to find soil moisture, and the subterranean biomass of this network of deep roots is filled with organic carbon. A veritable inverted “forest” of root mass holds carbon deep underground in desert soils. These deep roots and their connected fungal root partners continuously breathe out carbon dioxide from just below the soil surface down to as much as 150 feet (over 40 meters), or down to groundwater. That exhaled carbon, in contact with calcium and moisture, is eventually converted underground into calcium carbonate (calcite) crystals which can form into layers of caliche, capable of storing that carbon for millennia.

When does carbon sequestration happen in deserts?

Carbon is captured wherever desert plants grow, but the level and timing of that capture varies with the types and distribution of those plants across the landscape. Desert grasslands and areas with *shallow*-rooted shrubs and cacti capture carbon in response to rain events; in these habitats, carbon accumulation after precipitation can be as high as in wetter ecosystems. Habitats with *deep*-rooted plants, such as

microphyll woodlands (dry washes with small-leaved trees like palo verde, mesquite, and ironwood), as well as creosote bajada scrub (broad alluvial slopes with creosote bushes) can continue to photosynthesize and capture carbon long after rain events. Because of their long roots that reach to deep, percolated water from previous rain events (possibly occurring miles away), or even reaching down to groundwater, these stands of desert plants can extend their carbon fixation long into drought cycles. These factors allow plants in microphyll woodlands and creosote bajadas to photosynthesize and sequester carbon throughout the seasons even without local precipitation.

How much carbon is captured and stored in the desert?

Scientists are currently working on ways to measure deeply buried carbon across vast landscapes like the California Desert that are highly diverse in topography, soils, climate, and vegetation. Carbon-storing calcite/caliche deposits are distributed in patches in some places and in vast layers in others. Also, these deposits are distributed at varying soil levels depending upon rainfall and the depth of desert plant roots that can deposit carbon all the way down to groundwater. Arriving at a total value for stored underground carbon in a diverse desert is much more challenging than for other more homogeneous landscape types. However, we do have data that measures how much carbon is accumulated by plants in some specific desert habitats, and can compare capture rates to other ecosystems around the planet.

The primary gauge of an ecosystem's carbon sink potential is the net exchange of carbon between the ecosystem and the atmosphere, i.e., the carbon balance of the land, or how much carbon comes in versus how much carbon goes out. This measurement is called "net ecosystem exchange," or NEE. By comparing the carbon balance of diverse ecosystems, we can get an idea of the relative strength of each ecosystem's carbon sink capacity. Dr. Michael Allen has summarized NEE measured within various ecosystems worldwide. He compared them to those measured across two vegetation types thought to sequester significant amounts of carbon in the California desert (microphyll woodlands, which can contain mesquite, and creosote bajada scrub). As shown in the table below, the carbon sink capacity of creosote bajada scrub rivals that of a tropical rainforest or boreal forest. Even microphyll woodlands are in the range of coniferous forests in southern California. **The combined two desert vegetation types, microphyll woodland and creosote bajada scrub (just two of many vegetation types in the California desert), could sequester an average of 1.5 million tons of carbon per year.**

Net Ecosystem Exchange Rate	kilograms Carbon per hectare per year
Sky island coniferous forest in southern California desert	300
100-year-old chaparral during a wet year	520
100-year-old chaparral during a drought year	180
La Selva tropical rainforest (wet year)	5000
La Selva tropical rainforest (dry year)	1000
Boreal forest	780
Mesquite stands (microphyll woodland) in California desert	200+
Creosote bajada scrub in California desert	1000+

What happens to stored carbon if we disturb desert soils?

Despite its long-term storage capacity, caliche releases its sequestered carbon when vegetation is removed and soils are disturbed and exposed to erosion. As caliche degrades in disturbed soils, its calcium and carbon molecules are uncoupled, releasing the carbon to reenter the atmosphere as carbon dioxide.

Why care?

We risk losing massive accumulations of carbon stored underground as calcite/caliche if the desert soil surface is disturbed. This carbon capture and storage system is functioning now and will continue to capture and store carbon if soils are not disturbed. Most of the caliche in our desert soils was actually formed during the Pleistocene when the climate supported more dense and productive vegetation**. In fact, Dr. Michael Allen at the UCR Center for Conservation Biology commented on the desert's capacity to store large amounts of carbon dioxide as caliche, noting that, "The amount of carbon in caliche, when accounted globally, may be equal to the entire amount of carbon as carbon dioxide in the atmosphere."**

Removal of carbon from our atmosphere is now being considered an important component of fighting climate change. The synthetic conversion of excess atmospheric carbon dioxide to calcite and storing it underground is gaining much attention and funding (although with major technical difficulties). Our deserts are performing this conversion every day, automatically, without any input from humans, and it will continue that unaided sequestration and long-term storage if simply left undisturbed.

V. Quantification of Carbon Sequestration in the Desert

Carbon and California Deserts: June 2023.

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Arid lands worldwide have sequestered carbon (C) for millennia. Human–caused perturbations of deserts alter this balance and risk releasing significant amounts of CO_2 to the atmosphere, exacerbating global warming. **Although the net primary production in California Desert Ecosystems is generally low, there remains a net positive carbon sequestration in wildland ecosystems, particularly across desert bajadas and microphyll woodlands.**

There *remains a view* that, because of low precipitation, high temperatures, and sparse vegetation, hot deserts of southern California are of limited value to carbon sequestration. However, our deserts contain a very large carbon sink. Laid down over thousands of years, desert C is more dynamic and sensitive to disturbance than is often acknowledged. As Martin and colleagues (Martin et al. 2021) noted:

> "Although equilibrium is often assumed between soil carbon dioxide and groundwater, disequilibrium may result from heterogeneous distributions of recharge, flow paths, and respiration often seen in the carbonate critical zone. Understanding the controls of this disequilibrium, which drives carbon dioxide dissolution or evasion and alters pH, weathering reactions, and carbonate mineral dissolution or precipitation, is critical in linking the carbonate critical zone to the global climate system."

Below, I outline the basis for our concerns with the loss in natural wildland deserts because of its importance in the global atmospheric carbon budget as well as the associated loss of biodiversity (Hernandez et al. 2015).

CO_2 fixation. Due to the low leaf area, one assumption made by large-scale ecosystem models is that deserts fix carbon at relatively low rates. But when water is available, leaves of desert plants photosynthesize at the same rates as in other ecosystems, and leaves can grow rapidly with soil moisture. Broadly, and especially during drought, rates of flux, net ecosystem exchange (NEE), across scales measured by techniques such as eddy flux, are often low but highly variable. At Deep Canyon during a series of dry years, our NEE was slightly positive. Alternatively, from the desert free air CO_2 enrichment (FACE) research project, under ambient CO_2 conditions, NEE was estimated up to 1.27 metric tons of carbon per hectare per year (MTC/ha/y) (Jasoni et al. 2005). The standing crop mass was 11 kg of carbon per hectare (kgC/ha), 80% of which was soil organic carbon (SOC) and sensitive to atmospheric CO_2 levels, largely deposited as soil C (Evans et al. 2014). For the Sonoran desert ecosystem, NEE was estimated as ranging from 120 kg·of carbon per hectare during a dry season to 360 kg·of carbon per hectare during a wet season (Huxman et al. 2004). [By comparison, NEE for a wet year in a desert in Baja California was up to 520 kgC/ha/y, a sky island above southern California desert at 200 to 300 kgC/ha/y, a 100 year old Chaparral of 520 kgC/ha/y, and drought year of 180 kgC/ha/y, the La Selva tropical rainforest of 1,000 kgC/ha/y (dry year)/3,000 kgC/ha/y (average)/5,000 kgC/ha/y (wet year), and a boreal forest 780 kgC/ha/y].

From these desert NEE measurements, where is the additional carbon in deserts? Likely deep in the profile (see discussion in C sequestration). Desert grasslands and areas with shallow-rooted shrubs and cacti are coupled to precipitation and carbon accumulation depending on local precipitation. However, large pulses in precipitation provide groundwater that extends the length of active photosynthesis of deeply-rooted shrubs (greater than 50m) such as creosote and mesquite (*Prosopis)* (Huxman et al. 2004) and utilization of deep groundwater from storms generated far upstream can extend the carbon fixation of stands into drought cycles in deserts (Scott et al. 2006) and in the uplands such as the montane sky islands (Kitajima et al. 2013). Plants with shallow roots in deeper pools and in groundwater can access many sources of water in which to undertake photosynthesis and carbon accumulation (Querejeta et al. 2007, Querejeta et al. 2009). Reynolds and colleagues (Reynolds et al. 2004) challenged the simple "pulse-reserve" complex showing that in deserts, sequences of pulses are more important than individual events, and Weiss and colleagues (Weiss et al. 2004) found that Normalized Difference Vegetation Index (NDVI), using satellite imagery that visualizes greenness, showed that water from distant sources (groundwater) can extend photosynthetic activity (Bisigato et al. 2013, Rohde et al. 2021).

What is clear is that simple precipitation models are inadequate for assessing carbon sequestration in arid lands, riparian corridors, or any areas that have underground sources of water. Understanding and modeling Carbon requires a complex approach that integrates ecohydrology and plant morphologies (Gutiérrez-Jurado et al. 2006).

Where does the fixed CO_2 go? Groundwater originates at higher elevations in complex terrain, traveling in subsurface flows to lower bajadas, providing moisture to creosote and microphyll woodlands. At these lower elevations, plants have very deep rooting systems from several meters down at least to 53m [174'] in the case of honey mesquite, *Prosopis juliflora*, (Canadell et al. 1996) and down into the caliche layer in the case of creosote, *Larrea tridentata* (Barbour 1969), sometimes growing through cracks and extending below the caliche layers and affecting water fluxes and soil development (Gutiérrez-Jurado et al. 2006). Because they can utilize the deep groundwater, shrub photosynthesis extends beyond the local precipitation season (Ávila-Lovera et al. 2017). Isotopic signature data from my group at Deep Canyon showed that the deep-rooted shrubs acquired between 69% and 87% of their water for photosynthesis from groundwater (M. Allen unpublished data). Others (Ogle et al. 2004) have shown that the water through the stem could well be used to model water uptake profiles, and thereby provide estimates of stored soil water use, and thereby assess the SOC buried deep in the profile.

This deeper C is the reason for some of the slow turnover of SOC and for the formation of calcites (discussed below).

C sequestration. In terrestrial ecosystems, there are three forms of sequestered C to be considered. The first is easier to estimate and model, and that is aboveground herbaceous and woody tissue, with some estimates providing belowground tissue C as well. At the global scale, current aboveground biomass is 349 Pg, belowground 92 Pg, totaling 441 Pg C (Walker et al. 2022). The second is the soil organic carbon (SOC), globally equaling 3,037 Pg C, or more than 8 times the estimated aboveground carbon, and nearly 7 times the total standing crop biomass.

If we use a NEE figure of 200 kgC/h/y (see CO_2 fixation section) for creosote and for microphyll woodlands, we can begin to estimate at least the C accumulation for desert ecosystems. There are 2.47 acres per ha. Using the CA 4th Climate Change Assessment for the Inland Desert Area, there are 489,423 acres of microphyll woodland and 17,466,886 of creosote. Using this estimate, that would amount to an average of 1.5 million tons of carbon accumulated by these two vegetation types annually. Using the EPA Level III Ecoregions map, that would amount to 1.88 million tons of carbon. These estimates are in the range for coniferous forests or oak woodlands in southern California.

There are large gaps, such as between the NEE of Jasoni and Huxman. If 80% of the carbon (C) is allocated belowground to a meter in depth (Evans et al. 2014), and a large fraction is transported deep, then the overall carbon accumulation will be underestimated. In isotopic studies, soil calcite values show evidence of C recycling in soil (Schlesinger 1985, Allen et al. 2013) above the caliche layers, suggesting extensive C recycling. C is transferred downward via roots deep into the profile (sometimes more than 50m). Respiration of roots and symbiotic microbes (autotrophic respiration) and decomposers (heterotrophic respiration) produces CO_2. Add water (ground water or surface precipitation) and calcium (Ca)-derived upslope from basalts, limestone, marble or dolomite -- and some of that CO_2 is bound into calcites, the most stable of which is $CaCO_3$. Because the process is a dynamic equilibrium, add water again, and exposed calcite can be re-solubilized. Some of the CO_2 is volatilized back to the atmosphere and the Ca moves downward with the water. That Ca rebinds with newly respired CO_2 in the deeper layer, again forming calcite. The deeper the process occurs, the higher the CO_2 concentration. The process continually repeats itself to the maximum depth that water travels (forming a caliche layer), or to groundwater. Surface measurements, such as from eddy covariance techniques, are highly variable as the environmental conditions are fickle even within the footprint of the sensors, and for sensitivity to assumptions regarding fetch and topography. Most comprehensive soil carbon measurements (from soil cores) to date are constrained to the top meter of the soil.

Further, to understand sequestration, we must also incorporate carbon turnover. For example, despite enormous production, tropical rainforests have fast rates of decomposition resulting in a rapid turnover, thereby returning the fixed carbon back to the atmosphere. In wet tropics, the average turnover for vegetation is 15 years, and soil organic carbon (SOC) 27 years. Temperate forests vegetation turns over on average every 25 years, and the SOC in 55 years (Reichle 2020). Desert vegetation turns over every 38 years, but the SOC turns over on a 200-year span. Moreover, carbonates, when buried, can remain for millennia, but upon exposure, will volatilize releasing CO_2 to the atmosphere.

The soil carbon component is complex, but there are indicators that deserts may sequester SOC in many complex forms. As an initial example, in the Mojave Desert under Creosote (*Larrea tridentata)* canopy, the arbuscular mycorrhizal fungal standing crop was 423 kgC/ha (and 635 kgC/ha under elevated CO_2). It is very challenging to determine the hyphal lifespan, critical to estimating C sequestration, as literature values range from 5 days (Staddon et al. 2003) to 145 days (Treseder et al. 2010). Currently other efforts to estimate turnover are being undertaken by Allen from image data already collected. Much of the variation is probably due to responsiveness of fungal hyphae to individual precipitation events at daily to seasonal scales (Hernandez and Allen 2013). An example is glomalin, a glycoprotein complex produced largely by arbuscular mycorrhizal fungi, that has a long retention span (Rillig et al. 1999, Allen 2022). Glomalin is known to accumulate due to a slow turnover, (measured using immunoreactive soil protein

(IRSP), and can be as much as 40 µg/g soil (Clark et al. 2009). Using a 2m rooting depth, this means that there may be 2 metric tons of glomalin protein per ha across the extensive creosote shrubland soils, representing a significant pool of SOC.

Calcites/Caliche Carbon. Carbonates may be relatively unimportant to the global C cycle over a time scale of millions of years, as precipitation and dissolution is continuous. However, at time scales of decades to centuries, the inorganic carbon (C_i), is often in disequilibrium and can dramatically impact the carbon cycle (Martin 2017). At a global scale, as much as 940 Pg C_i is sequestered as soil calcium carbonate (or calcite) with as much as 1404 Pg C as bicarbonate in groundwater, more than all the soil organic C (1530 Pg C), and well more than the 594 Pg C of standing plant biomass (Monger et al. 2015). Chuckwalla, Gunsight and Cherioni soils contain extensive layering of calcites, and even Carsitas soils have carbonate coatings on the surface of rocks. In the Chuckwalla Valley, for example, estimates ranged from 36 metric tons of carbon/hectare to 82 metric tons of carbon/hectare. Using the smaller figure, and assuming that calcites underlie much of the creosote and microphyll woodlands (14.6 tons of carbon/acre), then a conservative estimate is that there could be as much as 262 million tons of carbon stored deep in desert soils.

Moreover, produced at approximately 4 kgC/ha/y, the buried calcite-C becomes relatively stable. Schlesinger (1985) estimated that the $CaCO_3$ in the Chuckwalla Valley was formed during the Pleistocene, between 15,000 and 20,000 years ago, and an 85,000-year residence time appears to be relatively accurate. However, upon disturbance, loss rate appears to be significant over annual to decadal time scales, as much as 10 kgC/ha/wet day (Swanson 2017).

The conversion of CO_2 to calcite is considered important enough that considerable effort is being undertaken to synthetically convert atmospheric CO_2 to calcite (Pogge von Strandmann et al. 2019), the process that desert plants undertake every day.

*The **Mechanism** in deserts*. Both roots and microorganisms respire CO_2: then CO_2 and H_2O (water) combine to form HCO_3^- and an H^+ ion, acidifying the soil. Upon encountering Ca^{2+} dissolved in soil water, HCO_3^- binds to the Ca to form $CaCO_3$, a large fraction of which precipitates to form calcite (limestone, $CaCO_3$), or upon layering, caliche.

Accessing groundwater acquired by deep roots of specialized desert plants. Roots can go down tens of meters to acquire water (Canadell et al. 1996, Jackson et al. 1999). At the interface of the water table, microbial activity may dramatically increase. Just above the water table, arbuscular mycorrhizae search for phosphorus and other nutrients, in part to sustain dinitrogen fixation (with high respiration rates) occurring in the groundwater (anaerobic) by associated bacteria that provides the nitrogen for these ecosystems (Virginia et al. 1986). Mycorrhizae increase respiration of CO_2 (Knight et al. 1989) as well as sequestering organic C (Rillig et al. 1999).

Groundwater in western deserts is notorious for being hard, that is, having high concentrations of $CaCO_3$. As it is pumped up for use, $CaCO_3$ dissociates, releasing CO_2 (Wood and Hyndman 2017). They estimated that groundwater depletion could account for a measurable fraction of annual CO_2 emission. As caliche is exposed to the atmosphere, caliche degrades releasing CO_2 (Hirmas and Allen 2007). One assumption is that because Ca^{2+} remains in the soil, re-association with HCO_3^- will occur (Mills et al. 2020). This certainly will be the case in a closed system (such as a laboratory beaker). But in an open ecosystem, equilibrium remains an open question and is in need of further examination (Leij et al. 1999, Martin 2017, Gallagher and Breecker 2020, Martin et al. 2021). On the surface, $CaCO_3$ equilibrates with CO_2 at ~400 ppm, the current atmospheric CO_2 level (Hirmas et al. 2010), but soil CO_2 where most exchange occurs can range up to 3,000 ppm (Allen et al. 2013), likely accounting for deposition of caliche beds (Schlesinger 1985). Rhizosphere CO_2 levels (in the soil rooting zone) can exceed 3,000 ppm in undisturbed soil, but drop in devegetated lands, only increasing CO_2 loss from $CaCO_3$ dissolution (Allen et al. 2013). Deep in groundwater, CO_2 bound as $CaCO_3$ can exceed 190 mg/L (DeSimone et al. 2009), degassing as it is pumped out (Wood and Hyndman 2017). Surface isotopic values of caliche show that

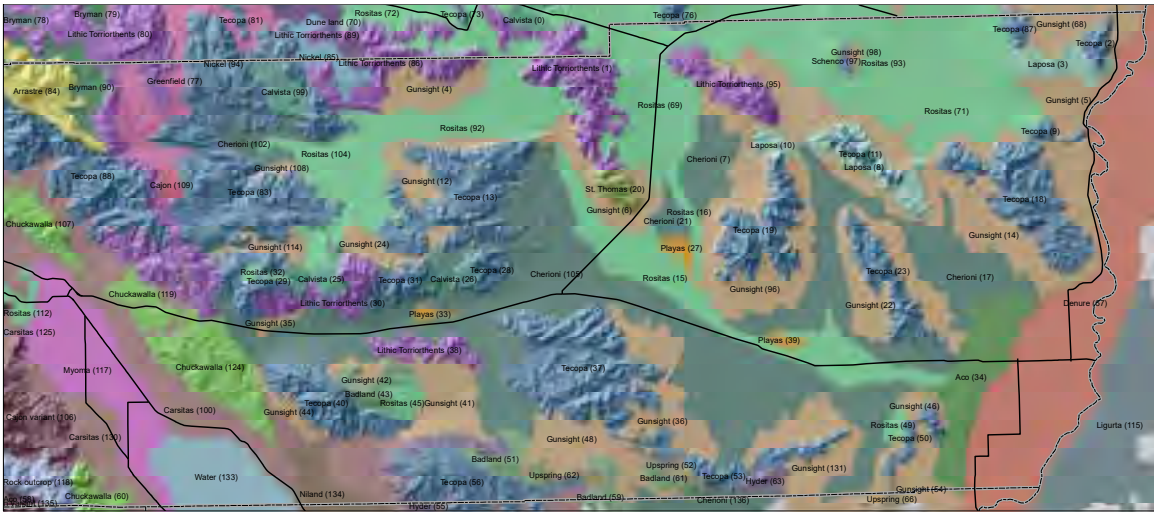
there is a fractionation in the caliche C, indicating that exchange (losses or gains in caliche C) is occurring (Allen et al. 2013, Mills et al. 2020). The conversion of land to agriculture and tree production is resulting in a shallowing of rooting depths nationwide along with a loss of deep root functioning (Billings et al. 2018).

Summary: Concerns.

Adding the dynamics of calcites to the slow SOC turnover demonstrates why the overall C cycling becomes extremely challenging to quantify, especially across long time scales and an area as diverse and large as the California desert. Loss of NEE from California deserts would amount to a significant loss of carbon in addition to loss in California's biodiversity.

But our largest concern is the risk of losing massive accumulations of carbon, stored underground as calcite-C. This C capture and storage system is functioning now and will continue to capture and store C for long time periods if soils are not disturbed. In the Chuckwalla Valley of the California deserts, C as $CaCO_3$ was 8 kgC/m^2, within the top 1.35 m of soil (Schlesinger 1985) in one profile and 3.5 kgC/m^2 in a second. $CaCO_3$ can be found across the valley. Assuming an average of 6 kgC/m^2, there could be 60 metric tons of C per ha of microphyll woodland/creosote bush in the surface soils. A large fraction of the Chuckwalla Valley creosote bush and microphyll woodland has already been stripped of vegetation for a single solar development.

It is always challenging to extrapolate beyond the actual locations of measurements. However, existing datasets support this concern. Schlesinger (1985) raised the issue that disturbance of desert caliche C was of concern to C budgets. When we examine soils maps, the bajadas and microphyll woodlands have high concentrations of soil $CaCO_3$, across Chuckwalla, Gunsight and Cherioni soils. These soils are alluvial soils, often with a calcic horizon ranging from 25 cm to more than a meter deep, and often with creosote scrub vegetation fingering into microphyll woodlands. These soils extend from almost every mountain range in the California deserts. So, this is our best estimate.



US Soil Map for East Riverside County

compname	id#	caco3_l	caco3_r	caco3_h
Rositas	15	-	-	-
Cherioni	17	0	3	5
Gunsight	36	4	6	8
Gunsight	96	4	6	8
Cherioni	105	0	3	5

Quantity of Carbonate (CO3) in the soil expressed as CaCO3.
Weight percentage of the less than 2 mm size fraction

Other maps, such as the SSURGO Soil data for Coachella Valley show high calcite concentrations in the bajadas and in the desert washes north of the Salton Sea, but south of the Salton Sea, where agriculture predominates, that calcite is largely gone, except for some upper edges.

Our final concern is that with increasing disturbance of desert soils by utility-scale solar energy [USSE] there will be a loss of the high biodiversity of California's deserts. We are especially concerned with a direct loss in microphyll woodlands and desert bajadas, and in a potential for the decrease in the linkages between these vegetation types and the uplands where Ca and water inputs occur. Both biodiversity and regulation of carbon cycling will be impacted, to date with unpredictable consequences. The more we learn and apply understanding of the soil carbonate dynamics (Martin et al. 2021) to managing for biodiversity and carbon cycling, the better we will be able to manage desert lands to reduce greenhouse gas production and sustain our biodiversity (Allen and Mishler 2022).

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VI. Modeling Carbon Sequestration in Our Deserts

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Many modeling efforts purporting to describe C sequestration in deserts are problematic. They underestimate C accumulation, as they use precipitation drivers at the location of production. However, desert plants use water over longer terms from single large events, and uplift groundwater precipitated in mountains well away from the locations of primary production. We agree with others who have critiqued the California Air Resources Board [CARB] modeling as dramatically underestimating the C sequestration potential by ignoring large parts of the C cycle (CarbonCycleInstitute 2022). Currently, destruction of large wildland deserts for agriculture, mining, or for Utility-Scale Solar Energy (USSE) development is on-going or proposed for California deserts.

We know that traditional precipitation-based modeling for C sequestration is inadequate. However, is there a more useful approach? We argue that there is a more promising direction based on existing modeling approaches.

First, Normalized Difference Vegetation Index (NDVI) should be used to identify the land areas with photosynthetic activity and the duration of that activity (Rohde et al. 2021), not local precipitation. From the greenness activity, it should be feasible to estimate C fixation, replacing the precipitation driver for wet periods in models such as DAYCENT (Parton et al. 1998).

Second, an ECOHYDROLOGY model (Gutiérrez-Jurado et al. 2006) allows for estimating water transport and coupling soil properties (including calcite horizons) building on HYDRUS (Šimůnek et al. 2005). HYDRUS can also be used with the equations described by Kitajima and colleagues (Kitajima et al. 2013) to quantify the additional timeframes for C gain using intermediate depth- and ground-water sources.

Third, the SLIC model (Hirmas et al. 2010) evaluates the transitions between $Ca + CO_2 + H_2O <> CaCO_3$.

Fourth, once the water sources and time frames are identified, NEE measurements coupled with soil respiration measurements could provide spot-checks on modeled values.

This modeling approach can provide a comprehensive overview to help close the carbon cycle in the deserts. It is important that the confirmation measurements are based on a long-term dataset, and that, given CO_2 and global temperature changes, two or more longer-term C cycling instrument facilities be deployed. The model as developed by the National Ecological Observatory Network (NEON), could serve as a model, and could be installed at field stations such as the NRS stations at the Granite Mountains and Boyd Deep Canyon, or the CSU Zzyzx station.

References: Please see previous section V.

VII. Mapping and Identifying Prioritized Areas of our Desert to Achieve Carbon Reduction Goals

Microphyll woodlands/Creosote

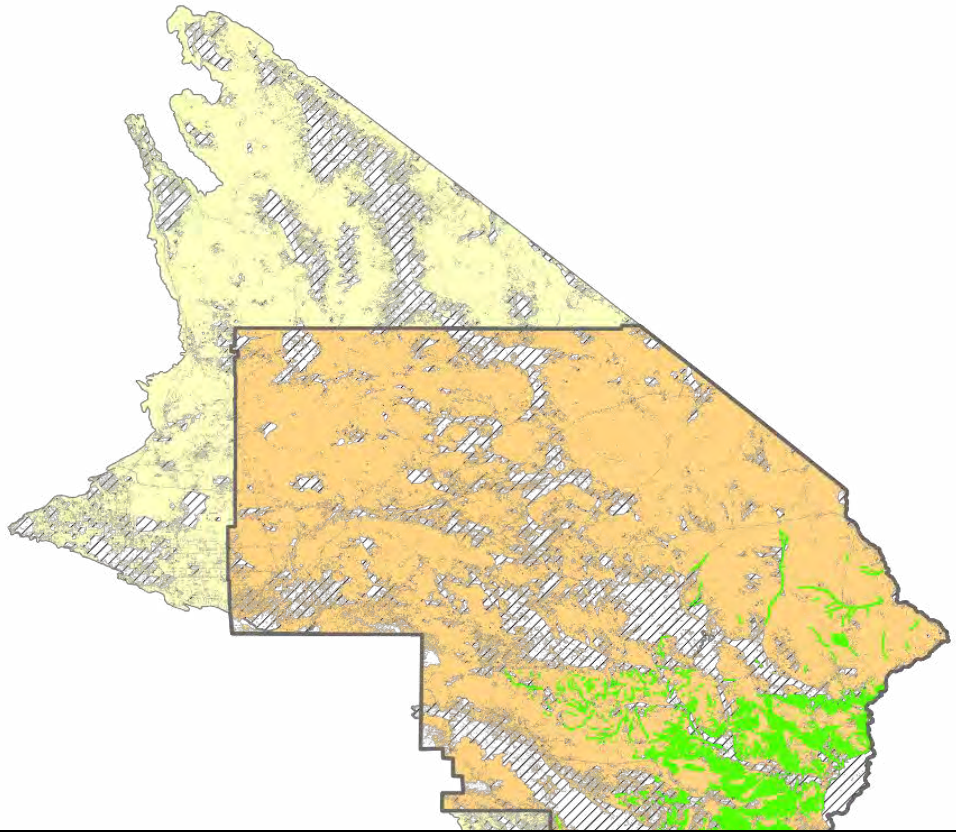
Colin Barrows. Co-founder, Cactus to Cloud Institute

In sections IV, V and VI above, Kobaly and Allen indicated the importance of two specific desert vegetation types in the desert region's impressive capacity to store carbon. Kobaly notes the combined

carbon sequestration capacity of **microphyll woodland** and **creosote bajada scrub** could sequester an average of 1.5 million tons of carbon per year. Allen reports that these two vegetation types create a net positive carbon sequestration value within California's desert ecosystem.

Section VI discussion around the relationship between groundwater and underground caliche formation (carbon sequestration) plays out across these two vegetation types. With the groundwater originating at higher elevations, it traverses in subsurface flows to lower elevations such as those where the creosote bajadas and microphyll woodlands are found. The vegetation types here have rooting systems that can run over 53m [174'] deep. Root systems of creosote can grow into the caliche layer and beyond to reach groundwater sources.

The dynamics of these two vegetation types are of particular interest in demonstrating high capacity for carbon sequestration, though they are not the only vegetation types nor the only means by which carbon may be sequestered within the desert ecosystem. But microphyll woodlands and creosote are of high interest in discussion of carbon sequestration in the desert, and this section identifies and quantifies which desert regions warrant high prioritization for conservation.



EPAIII CA Deserts boundary (DRECP) [Exterior Boundary]

CA Climate Assessment inland desert boundary (30x30) [Interior Boundary]

Shrub/Scrub land cover for both areas in **orange (30x30)** and **yellow (DRECP)**

Microphyll woodland in **green.**

Small areas of lighter green outside the 30x30 area.

SUMMARY

Boundary Area	Desert Vegetation Type	Acres
CA 4th Climate Change Assessment Inland Desert Area [30X30] Boundary	Shrub Scrub Land Cover	**13,300,107**
EPA Level III Ecoregions, Mojave and Colorado CA Desert Area	Shrub Scrub Land Cover	**18,715,754**

Recommended acreage of conserved desert land for vegetation cover types microphyll woodlands and creosote bajadas.

It should be noted that these identified lands represent those areas recognized to be highest conservation priority for carbon sequestration function. These acreages represent only a partial opportunity to maximize carbon sequestration and protect biodiversity.

VIII. Additional benefits

Biodiversity in California's deserts

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California is by far the most biologically diverse of the United States' contiguous 48 states, with deserts comprising roughly one third of California's land surface. And yet California's deserts, as well as deserts worldwide, tend to be overlooked in discussions of biodiversity. The dictionary definition of "desert" reflects the prevailing bias: "a large area of land that has very little water and very few plants growing on it". Other descriptors include "wasteland," "barren," and "lifeless." *Desert* is often used as a euphemism for a place where little or no life, food, or culture exists. Other than being arid, none of these perceptions is accurate.

One can test the hypothesis that California deserts are biologically depauperate. Covering one third of California, if species were randomly distributed, then we would expect about 33% of California's plant and animal species to live in deserts. Values significantly less than 33% would support a belief that our deserts are, compared to elsewhere in California, lacking living things. On the other hand, if values are greater than 33%, then the assumption of our deserts being a barren wasteland would be categorically false.

While exact numbers will vary with shifting taxonomic classifications,

> **California is the home of almost 2300 native annual herbaceous plants, over 3600 native perennial herbaceous (not woody) plants, over 1300 species of native shrubs, and just under 240 native tree species** (using Calflora's Consortium of Herbaria database).

Combining California's three main deserts—the Great Basin, the Mojave, and the Colorado— along with the "sky island" mountains that are within or border those deserts, it was found:

> **55% of those native California annual herbaceous plants, 53% of perennial herbaceous plants, 60% species of shrubs, and 53% of those native tree species live in the California deserts**.

Of the three deserts,

> **The Mojave has the highest plant species richness, with 49% of those native annual herbaceous plants, 44% of perennial herbaceous plants, 52% of shrub species, and 45% of those native California tree species.**

Since this species richness is well above 33% in each of those plant categories, we can reject the hypothesis that California deserts have low biodiversity.

> **In the categories of annual herbaceous plants and shrubs, California deserts have more species than any other ecological region in California.**

Our desert "wastelands" are not only richer from a vegetation standpoint, but they also appear to be incubators of speciation, with many species occurring nowhere else on earth. A recently published study, Pillay et al. (2022, *Frontiers in Ecology and the Environment*, vol. 20, issue 1) looked at patterns of vertebrate animal species richness across our planet. As expected,

> **They found that the tropics ranked number one. However, deserts were the next most species-rich biome when it came to mammals, birds, and reptiles, higher than temperate forests, shrublands, and grasslands.**

In California, reptile species richness is especially high in our deserts.

> **California has 40 species of native lizards that call our state home. Ninety percent of those can be found in our deserts, again**, well above the expected 33% of lizards that were randomly distributed across California. **At least six of those lizards are found nowhere else.**

Some areas are especially species rich. Along with colleagues from the U.S. and Mexico, we looked at lizard species richness across North America and found nowhere else that compared to deserts in the number of species that occur together.

> **The top spot was the Coachella Valley at the edge of the Colorado and Mojave Deserts which has 33 lizard species within a 50 km [31.07 miles] radius circle. Of the 34 species of snakes found in California, 76% are found within desert habitats.**

We do not have similar data sets for insects. However:

> **Native bee pollinators in the Joshua Tree National Park area are estimated to include more than 600 species representing 40 genera in 6 families.**

And some insect families, such as darkling beetles (Tenebrionidae), specialize in living in arid habitats. Darkling beetles are the clean-up crews in deserts. Technically detritivores, they eat dead matter, replacing the job fungi and bacteria do in moist environments. Several years ago,

> **[Dr. C. Barrows] conducted a survey of darkling beetles living on the remaining sand dunes of the Coachella Valley. Across those dune fragments [Dr. C. Barrows] found 34 different darkling beetle species. Try to put that into perspective: Imagine finding a lake with 34 resident species of ducks, or a forest with 34 species of warblers, or a mountain range with 34 species of deer.**

Beyond biodiversity, people also put value on superlatives such as the antiquity of individual plants or animals. In the Pacific Northwest, redwood trees can reach the advanced age of 3200 years. In the central Sierra Nevada range, giant sequoias can reach 2700 years of age, and in the White Mountains,

bristlecone pines can be up to 4800 years old. That's impressive. But even more impressive is the oldest creosote bush, the most widely distributed desert shrub:

> **The King Clone creosote is 11,700 years old, an extreme superlative. There are also desert tortoises who can approach nearly 100 years of age.**

Courtesy of James M. Andre. Sweeney Granite Mountains Desert Research Center. gmdrc@ucr.edu

Economic benefits

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Public Policy Coordinator, Mojave Desert Land Trust

Land that is set aside for conservation holds potentially high economic value as a driver of tourism and recreation. The good news is that recreational use of public lands allows the land to remain largely undisturbed *and* continue to sequester carbon, thus fulfilling a dual mission while generating local business and tax revenue.

A 2014 report [ECONorthwest] noted economic contributions of Quiet Recreation Visits within 50 miles of recreation sites on BLM-managed lands within California. Total Direct Spending was $243,938,853. In inflation-adjusted dollars for 2023, that amount today would be $314,392,148.

Visit California's Economic Impact of Travel report for 2021 indicated Local Tax Revenue of $293,000 for the state's Desert Region, supporting community benefits such as safety, fire, recreation, and library services.

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Biocrusts in the desert

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Executive Director, The Summertree Institute

Overview:

~ Microscopic organisms living at and near the surface of arid soils produce glue-like substances that hold undisturbed desert soils together and prevent soil erosion

~ These living soils, called biocrusts, create and store valuable fertilizing nutrients for the surrounding plant community

~ Biocrusts, when kept intact, hold otherwise dangerous PM10 and PM2.5 particles and spores, such as Valley Fever, in the soil and out of the air, protecting people from breathing in these health-impacting pollutants

A thin surface crust forms across arid soils on or within the top few centimeters of the soil surface. Surprisingly, these crusts are not made up simply of encrusted, excess soil minerals as often thought, but are created by microscopic and somewhat larger macroscopic organisms that live together in an unseen but profound world.

The microbes that make up this living "biocrust" live only near the top few centimeters of the soil because they need sunlight to make their own food. As some of these organisms travel through the soil, their network of mucilaginous, hollow tunnels between soil grains records a history of their movements and leaves a legacy of soil cohesion.

These and other tiny microbes living between desert soil grains create and store scarce, valuable, fertilizing nutrients like phosphorus and nitrogen at and below the surface, and they share these building blocks for life with all the plants in the surrounding community. If not disturbed by vehicle wheels or bulldozer blades, this soil cement and the community that produced it can persist for many thousands of years—or more.

Biological soil crusts keep soils intact and prevent dust storms…unless soils are disturbed. The dried, glue-like threads of microbes in biocrusts form a resistant seal across the soil surface, keeping dust, particulate matter, and harmful fungal spores like valley fever from being blown up into the air wherever the soil has not been disturbed.

These living soil crusts take hundreds of years to develop into effective soil "sealants." When they are allowed to remain intact, they will hold back wind and water erosion, supply nutrients to neighboring plants, improve water infiltration, prevent particulate matter from entering the air, and help keep our air clean and healthy. When living soil crusts are disturbed, choking dust storms occur. Dust storms blow harmful particulate matter into the air – and we breathe it in. The smaller particulate matter (smaller than 10 microns, or PM 10 particles) when inhaled into our lungs cause health impacts ranging from coughing and wheezing to asthma attacks and bronchitis, as well as high blood pressure, heart attacks, strokes, and premature death in people with heart and lung disease.

Keeping desert biocrusts intact protects the health of people living near the soil disturbance as well as people living many hundreds of miles from the point of disturbance.

Health benefits

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Maximizing the desert region's carbon sequestration potential by conserving undisturbed non-military land provides the additional benefit of bolstering public health. Dust, particularly [Particulate Matter] PM_{10}, is an important outcome of disturbance in desert wildlands (Pointing and Belnap, 2014; Frie et al., 2019). Desert dust erosion resulting from disturbance of desert soils is a source of significant health issues (Lwin et al., 2023) ranging from respiratory particles to local sources of heavy metals including Aluminum, Arsenic, Selenium, Cadmium, Lead, Uranium and Thorium (Frie et al., 2019). Numerous studies have noted evidence of associations between desert and sandstorm dust, and morbidity/mortality rates. Particle size is believed to be one of the key factors implicated in health risk. Large-sized particles can cause damage to external organs causing skin, eye, and ear irritation. But small size particles are capable of entering the respiratory tract and causing disorders within that system. The smaller size particles may penetrate the respiratory tract and damage cardiovascular, cerebral, cerebrovascular, blood and immune systems.

The high incidence of childhood asthma surrounding the Salton Sea (at a rate over 20%) is among the highest in California. In on-going studies, mice models found that the dust collected from these disturbed desert areas triggered a significant neutrophil inflammatory response that is distinct from the known immune allergic response, causing "asthma-like symptoms" (Biddle et al., 2023). This tells us that there are unknown new diseases emerging from the increasing disturbances in California's desert.

Desert dust may also cause infectious disease by carrying pathogens. An example is Valley Fever, caused by spores of fungi of species of *Coccidiodes*, which is present in desert soils and triggered upon inhaling dust when surface soils are disturbed (https://www.cdc.gov/fungal/diseases/coccidioidomycosis/index.html). Valley fever is endemic in California desert soils and increasing dust with disturbance and global warming is of concern (Cat et al., 2019; Gorris et al., 2019). In new studies from California deserts, local dust emissions are increasing and releasing novel microbial pathogens (Freund et al., 2022) that we are only now beginning to identify.

At the global scale, it is estimated that 1.7% of lung-cancer and cardio-pulmonary disease deaths can be attributed to chronic exposure to desert dust. In latitudes with extensive deserts such as Africa, the middle East and Asia, the percentage jumps to 15 – 50%. Short-term exposure to dust was documented to be the source of respiratory illness among 70% of Afghan and gulf war veterans deployed between 2003-2004.

Clearly, scientific research demonstrates a concerning link between desert dust and severe public health risk. Disturbance to desert soil is a contributor to desert dust, presenting an additional benefit for leaving desert lands undisturbed.

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IX. Transition to Clean Energy: Meeting our Clean Energy Goals and Minimizing Disturbance to our Desert Ecosystem

Introduction

There is a growing understanding that a tension exists between the need to conserve desert land, which itself functions as a significant nature-based solution to store carbon emissions – and expansive renewable energy projects that disturb desert lands and in doing so, release carbon back into the atmosphere.

This is a solvable problem that requires coordination between renewable energy developers, conservationists, policy makers, and the handful of experts who have carefully analyzed and evaluated desert lands and crafted detailed maps that consider solar industry needs, cost, and conservation all at once. This is the key work that needs to be done if desert lands are to continue their critical function as grand carbon sinks. Experts agree that the means to successfully navigate the nexus of industrial solar and conservation of carbon-storing natural desert lands lies with thoughtful, advanced planning, and integration of a suite of renewable energy options. If desert lands are perceived as a sacrificial ecosystem in the name of renewable energy, we run the risk of undermining the long-term carbon storage function they have performed for thousands of years and backpedaling on meeting carbon sequestration targets. And unlike other ecosystems, once disturbed, recovery in the desert is so long-term it should be considered as a non-option.

Utility Scale Solar and Avoidance of Desert Disturbance

Joan Taylor. Chairperson, California Conservation Committee and California/Nevada Desert Committee of Sierra Club.

CA Senate Bill 100 established a landmark policy requiring renewable energy and zero-carbon resources to supply 100 percent of electric retail sales to end-use customers by 2045. To meet this goal, the California Energy Commission, California Public Utilities Commission, California Air Resources Board SB 100 Joint Agency Report estimated a need for an additional 70,000 megawatts (MW) of utility-scale solar to come online by 2045 in its Core Scenario (CEC 2021). Notably, the Core Scenario assumed high electrification demand but did not factor in any advances in renewable technology or in tools to manage peak load, so this estimate can properly be considered conservative.

Based on the most recently approved large utility-scale solar project in California, 5.02 acres are required to develop one megawatt of ground-mount single-axis tracking utility-scale solar with four hours of battery storage, including generation ties and other infrastructure (California Water Boards 2021). This equates to approximately 350,000 acres of land or other surface on which to mount PV panels. Even were one to use the now-outdated number of 7.1 acres per megawatt that was assumed nearly a decade ago by CEC (CEC 2014), the total acreage requirement for utility-scale solar would be less than 500,000 acres. For context, there are over 105 *million* acres in California.

There are numerous feasible options for developing utility-scale solar in California that can deliver the estimated need for new utility-scale solar and provide increased local jobs and other benefits, without disturbing intact desert. Some of these include:

- Water-deprived agricultural lands in the Central Valley estimated to be a minimum of 500,000 acres (Hanak et al, 2019) or as much as 900,000 acres (Escriva-Bou et al, 2023)
- 250,000+ acres of selenium- contaminated land in the Westlands Water District
- 200,000+ acres of parking lots in California (USGS 2019)
- 11,500 MW of capacity on large commercial/industrial rooftops near substations (RETI 2009)
- 4,000 miles of canals and 16,000 miles of highway right of ways
- Agrivoltaics (ie, slightly elevated or spaced photovoltaic panels) on a portion of the 40+ million acres of farm and ranch lands throughout the state (CDFA)

Examples of appropriate utility-scale solar sites and potential additional renewable capacity

Preferred Sites	Acres	Total potential generation
Water-deprived Ag Lands Central Valley	**500,000 – 900,000**	**100,000 MW – 250,000 MW**
Selenium contaminated land, Westlands Water District	**250,000**	**50,000 MW**
Parking Lots in CA	**200,000**	**40,000 MW**
Large commercial/industrial rooftops near substations	**n/a**	**11,500 MW, min (this 2009 estimate is outdated)**
20,000 miles highway & canal right of ways (est 100' wide)	**240,000+**	**47,000 MW, min**
TOTAL	**1,190,000 – 1,590,000**	**248,000 – 398,00 MW**
Agrivoltaics on 40+ million acres farm & ranch lands	**40,000,000+**	**Millions of MW**

While utility-scale solar that is sited remote from load is dependent on high voltage transmission, utility-scale solar that is generated "In Front of the Meter" on large rooftops and parking lots at load centers is not dependent on the larger grid. Urban and peri-urban solar eliminates the capital costs, delay, average 7%-line energy losses, steep monthly ratepayer charges for new transmission capacity and inherent lack of reliability of electric power that relies on long-distance transmission. Moreover, transmission costs are rising faster than the cost of the energy wheeled, while PV prices are falling (CPUC 2021), making solar sited at load more attractive for ratepayers, not to mention the benefits of local jobs and energy reliability. But if the full estimated need for utility-scale solar cannot be met on the distribution grid, the alternative of siting solar on water-deprived or contaminated lands and/or utilizing agrivoltaics on a small fraction of the state's 40 million acres of farm and ranch lands can easily absorb the balance in a win-win for landowners as well as the environment (DOE 2023).

The potential solar capacity of the above options far exceeds the energy agencies' projected need for an additional 70,000 MW of new utility scale solar to meet the state's 2045 decarbonization goal. Clearly, the above options are the preferred resources to avoid land-use impacts and societal costs of developing transmission-dependent solar on intact desert lands in the California desert.

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X. Policy Strategies and Tools to Maximize Carbon Sequestration and Conservation Values

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The state of California has long been recognized for its leadership in transitioning towards new, clean energy sources to reduce CO_2 atmospheric emissions. There are, however, two aspects to emissions reductions work.

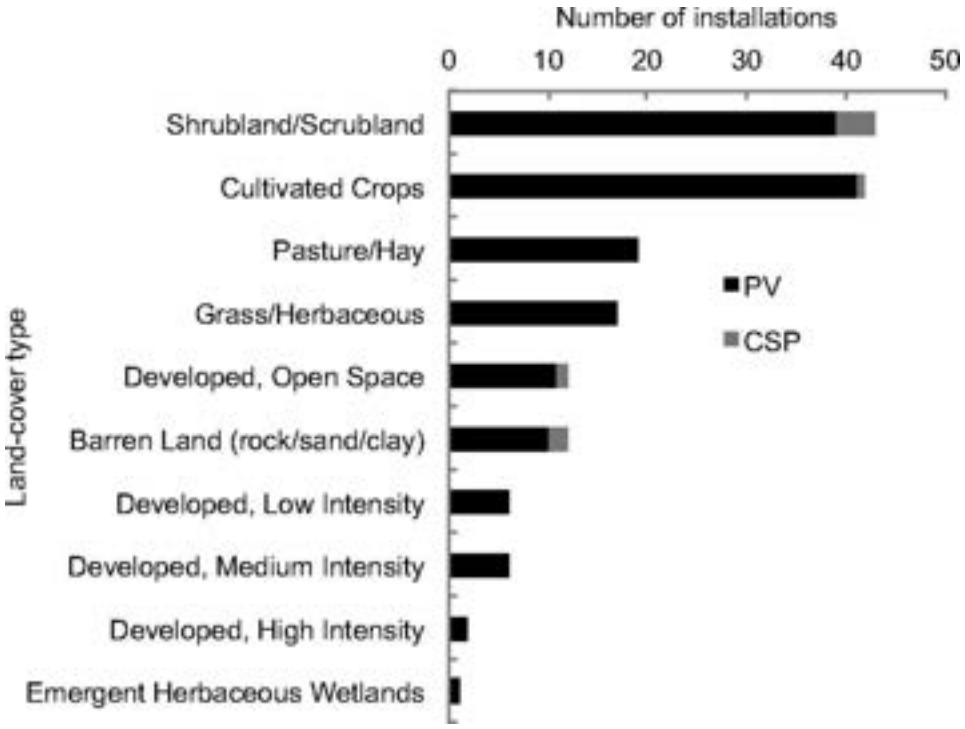
The first is "what". This piece is on track. The state has diligently passed legislation and dedicated millions of dollars towards reducing carbon emissions through technological innovation and utilizing our natural and working lands to reach net zero.

The second aspect of carbon emissions work is "how." While the state has rolled out dozens of utility scale solar energy projects (USSE's) at an accelerating pace across desert lands, this has taken place at the expense of disturbance of intact desert lands, which counterproductively serve as significant carbon sinks. The irony is that we are releasing carbon into the atmosphere by disturbing desert lands and their long-term sequestered carbon while building infrastructure intended to reduce atmospheric carbon. On this front, California has not yet realized fully its leadership potential. How these transitions are carried out

is based on siting decisions made in advance. For instance, China has directed their energy transition efforts towards utility-scale, ground-mounted PV [photovoltaic] panels, whereas Germany has achieved about 90% of its transition development within a built environment.

Several studies have revealed that regulations and policies in California have deemphasized solar growth and development within the built environment close to final destinations to meet demand, and instead favored development within shrublands and scrublands. Hernandez et al. (2015) note that carbon sequestration, among other ecosystem services including groundwater depletion and movement corridors for wildlife, may be adversely impacted globally by land cover conversion of shrubland and scrubland ecosystems.

Shrublands and scrublands have borne the brunt of land use conversion in our state's efforts to pursue USSE's on a massive scale, while developed regions remain largely underutilized.



Hernandez et. al. 2015.

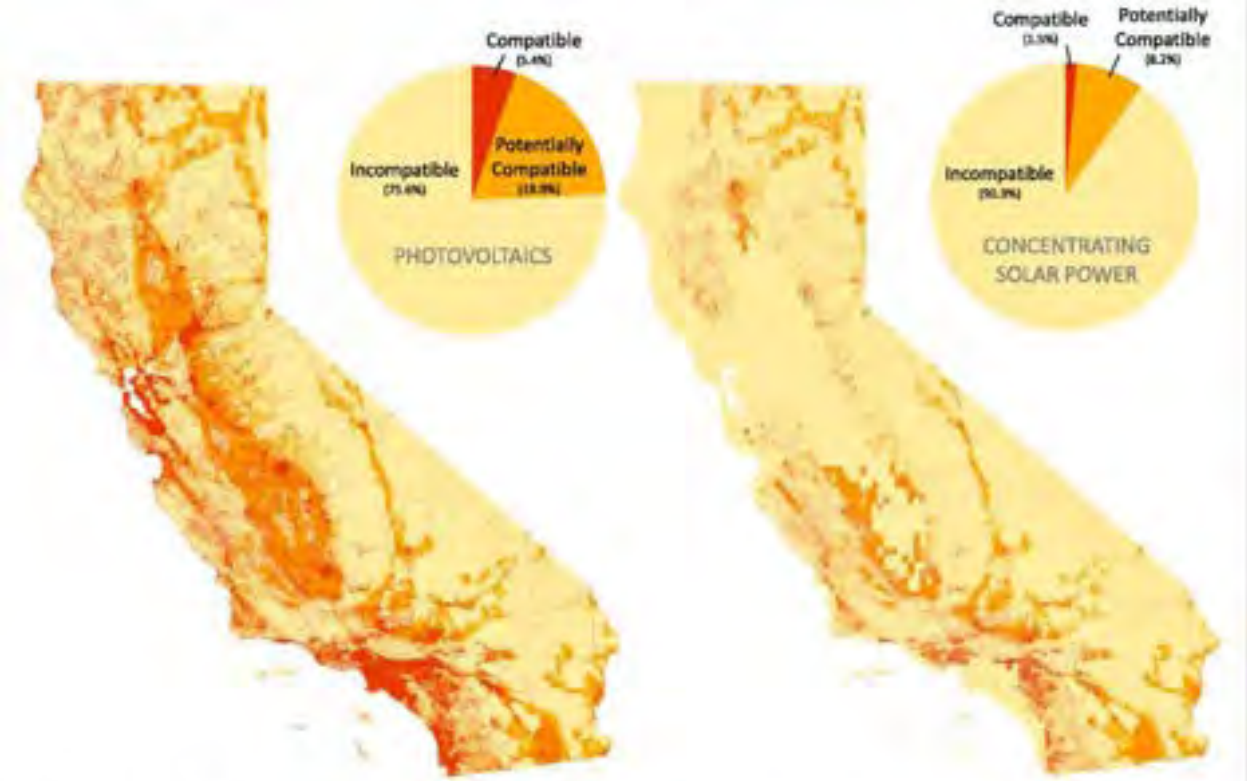
Number of photovoltaic (PV) and concentrating solar power (CSP) installations (planned, under construction, operating) by land cover type in California; represented in order of most installations to least for both technologies.

How do we, as policy and decision-makers, carry out the task of addressing the "how" aspect of transition to clean energy so that the desert's carbon sinks remain undisturbed and intact?

There are **planning tools** currently available that allow decision makers the opportunity to simultaneously develop solar installations on desert lands, while protecting conservation values including carbon sequestration all at once. This is the kind of pioneering work that establishes California as an environmental leader.

One such tool is the **Carnegie Energy and Environmental Compatibility [CEEC] model,** a multiple criteria model that quantifies each solar installation based on environmental and technical compatibility. The CEEC model is a decision support tool that develops a spatial environment and technical

compatibility index that outputs 3 tiers: Compatible, Potentially Compatible, and Incompatible. The model was designed for use in California and can identify environmentally low-conflict areas based on resource constraints and opportunities.



The state of California classified according to the CEEC Compatibility Index (Compatible, Potentially Compatible, Incompatible) and area (percentage) within each class for photovoltaic (PV) and concentrating solar power (CSP) technologies.

Hernandez et.al., 2015

A second tool of interest for decision-makers seeking to integrate the advancement of USSE's with conservation of our desert lands is a framework proposed by a group of researchers led by Dr. Rebecca R. Hernandez of UC Davis. **Techno-ecological synergies [TES]** engineers the mutually beneficial relationships between technological and ecological systems to bolster the sustainability of solar energy across a suite of environments including land, water, and built-up systems. The intent of applying the TES framework to solar energy technologies is an effort for "sustainable engineering" to minimize unintended consequences on nature as we rapidly advance USSE's on our natural and working lands.

The authors propose expansion of solar energy engineering principles to include both economic and ecological systems based on a synergistic relationship between technology and the environment. The outcome of TES produces products relevant to the technology end of development (PV module efficiency and grid reliability) *as well as* support for ecosystem services such as carbon sequestration and storage, water-use efficiency, and wildlife habitat. The research team offers 20 potential TES outcomes and discusses metrics and assessment methods to measure TES flows.

One example of a TES opportunity is optimizing land resources. The most degraded lands sites, for example EPA Superfund sites, could produce about 38% of total US energy consumption (based on 2015 assessment). At the same time, degraded lands function as substitutes, sparing undisturbed land with greater capacity for carbon sequestration. Moreover, the negative effects of land cover change and

disturbance such as release of GHG emissions, dust release, and soil-borne pathogens are reduced or eliminated.

Further examples of optimizing land resources include co-location of other renewable energy formats (such as wind turbines) adjacent to solar utility, with benefits compounded when this takes place on already degraded land. The number of potential beneficial outcomes for individual TES's ranges from 6-13; that is, there are substantial benefits to be gained by the synergistic framework proposed by this system.

While the commitments to transition to clean energy are moving rapidly, it may be necessary to make good use of policies to embed solar energy TESs into the economics of planning.

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Parker, S., Cohen, B. D., & Moore, J. E. (2018). Impact of solar and wind development on conservation values in the Mojave Desert. *PLOS ONE*, *13*(12), e0207678. https://doi.org/10.1371/journal.pone.0207678

XI. Conclusion

To fully realize the value of desert lands as part of our state's efforts to sequester atmospheric carbon, the desert must be recognized as a significant carbon sink -- *and it needs to be left undisturbed*. Unlike other ecosystems, it has a unique time scale that would require hundreds to thousands of years to recover from disturbance. The highest capacity regions for desert carbon storage, including microphyll woodlands and desert bajadas, should be identified as the top priority regions for conservation. And the state must also place high importance on the "how" part of transitioning to clean energy by careful pre-planning and siting of renewables on already disturbed desert lands and developments. We only get to do this once, so it needs to be done right.

USGS
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Assessing the geology and geography of large-footprint energy installations in the Mojave Desert, California and Nevada

David R Bedford and David M Miller
U.S. Geological Survey, 345 Middlefield Road, MS-973, Menlo Park, CA 94025

Abstract

Large-footprint energy installations such as solar and wind farms are proposed for wide areas of drylands that are publicly owned. Some installations impact areas of 400 to 2000 km² each, requiring land use assessments that are novel compared to past decisions for relatively small installations such as mine sites and roadways. Solar installations require low-gradient smooth topography, areas for which we have general data sets that can help with evaluations.

We use topography (30 m DEMs) and surficial geology (1:100,000 scale) for an area of 40,440 km2 stretching from Lancaster and Mojave on the west to Jean, NV, and Goffs, CA, on the east to evaluate potential lands for solar energy installations. The geology was mapped using uniform methods across the northern Mojave Desert so that a consistent database is available for analytical purposes. We use slope categories, surficial geology attributes, and land ownership to describe this area in a series of maps.

About 48% of the entire area is less than 1% slope, and 8.3% is less than 1% slope, the lowest slope category. For this lowest-slope category, deposits underlying about 98% of the area are either: mixed eolian-alluvial origin or are fine-grained alluvial deposits, and thus are susceptible to eolian dust and sand transport, especially after disturbance. In addition, in this low-slope category, 89% of the area is susceptible to flooding, based on the age and geomorphology of alluvial deposits. These maps are examples of several we present for decision making with respect to hazards and ecological attributes in the face of climate change.

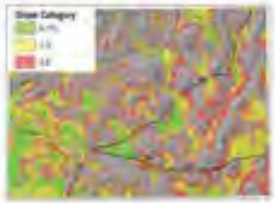
Overview

Area of analysis in the Mojave–Great Mojave Desert region. BLM-designated DETA sites are also shown.

Geologic Mapping

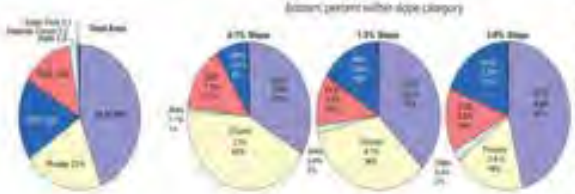
Surficial Geologic Map of the Study Area

Slope Analysis

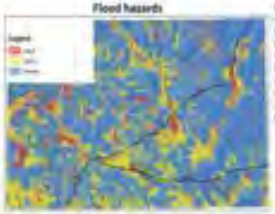


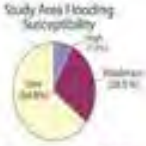
Land Ownership

Ownership by slope category
Top number: percent of total area
Bottom: percent within slope category



Geologic Influence on Energy Installations





Integration of Geologic Analyses

Implications for Climate Change

Conclusions

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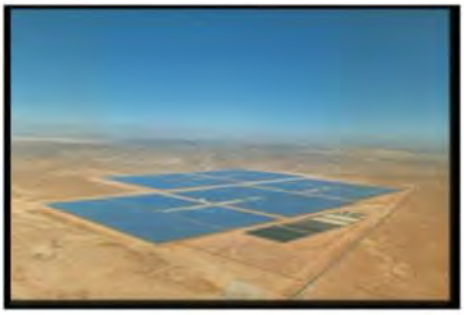
We use topography (30 m DEMs) and surficial geology (1:100,000 scale) for an area of 40,400 km2 stretching from Lancaster and Mojave on the west to Jean, NV, and Goffs, CA, on the east to evaluate potential lands for solar energy installations. The geology was mapped using uniform methods across the northern Mojave Desert so that a consistent database is available for analytical purposes. We use slope categories, surficial geology attributes, and land ownership to describe this area in a series of maps.

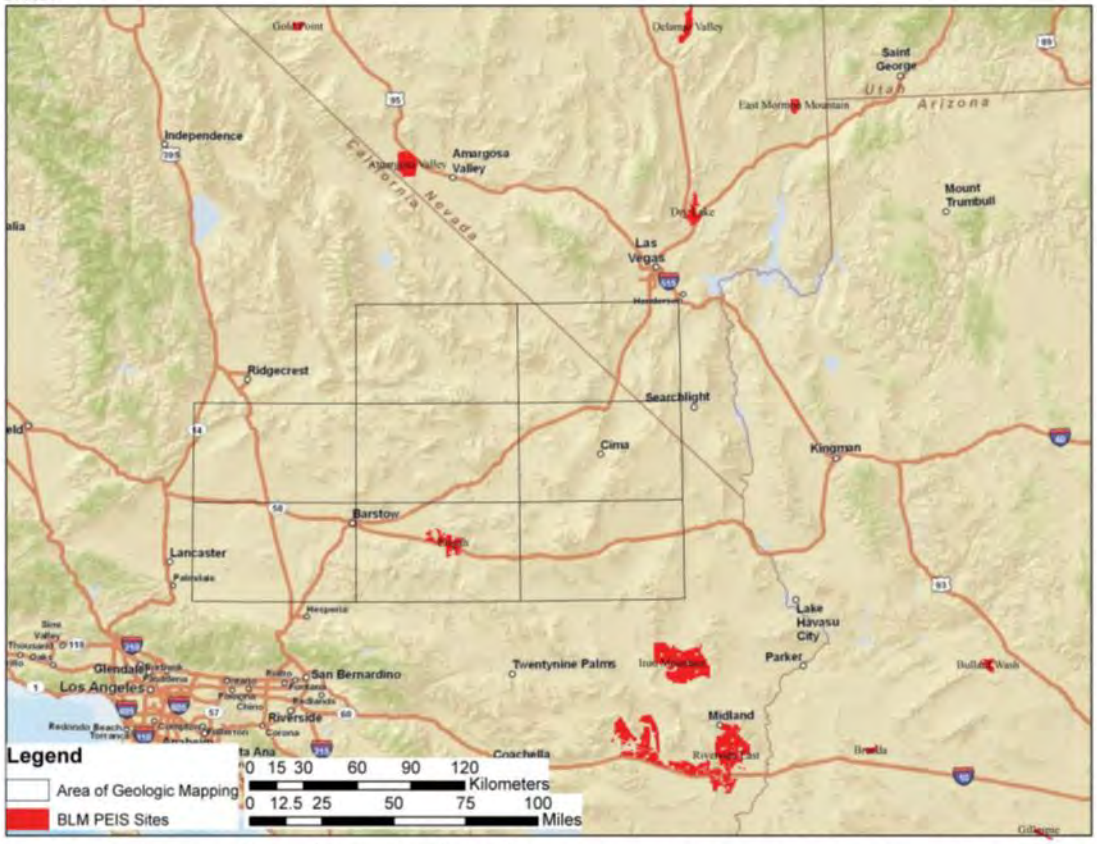
About 48% of the entire area is less than 5% slope, and 8.3% is less than 1% slope, the favored slope category. For this lowest-slope category, deposits underlying about 98% of the area are either mixed eolian-alluvial origin or are fine-grained alluvial deposits, and thus are susceptible to eolian dust and sand transport, especially after disturbance. In addition, in this low-slope category, 89% of the area is susceptible to flooding, based on the age and geomorphology of alluvial deposits. These maps are examples of several we present for decision-making with respect to hazards and ecological attributes in the face of climate change.

Overview

The Mojave Desert have been identified as an area with ample space and many of the resources needed for alternative energy development. Responding to recent interests in alternative energy, the BLM has received thousands of applications for large, utility-scale alternative energy developments. To assess the impacts of alternative (predominately solar and wind power) energy, the BLM has established Programmatic Environmental Impact Statement (PEIS) study sites. These sites will be used to develop management plans for the currently identified areas as well as other areas that may be potentially permitted for large energy developments.



These facilities typically require flat to very gently sloping topography and have a large footprint of disturbance. The goal of this poster is to identify how surficial geologic information can help guide site placement and anticipate mitigation requirements.

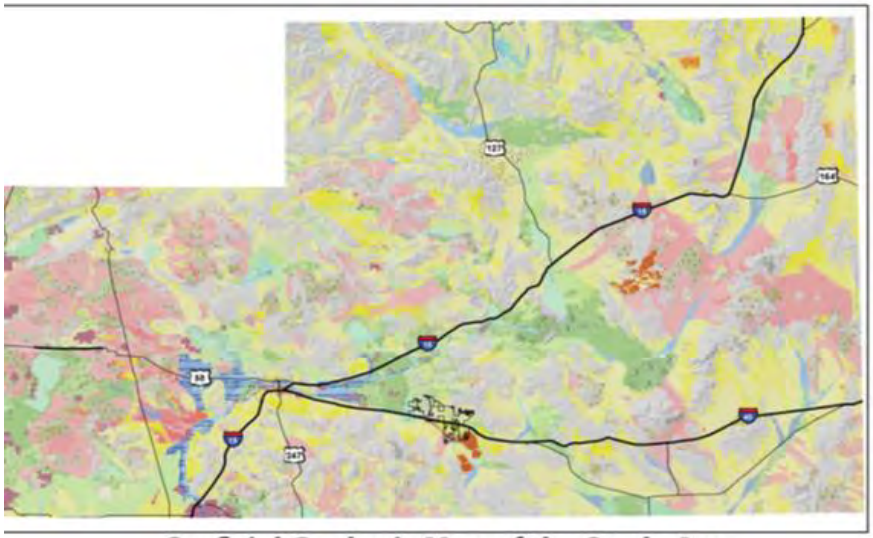


Area of analysis in the three-state Mojave Desert region. BLM-designated PEIS sites are also shown

Geologic Mapping

USGS collected and organized surficial geology data for the 8-quadrangle area we analyzed. The database was collected at scales more detailed than 1:100,000, and generalized to that scale. This scale roughly corresponds to the 30-m DEM and Landsat resolution. The effort was organized so that resulting 8 databases are uniform and robust, resulting in a geospatial database covering a broad tract of the Mojave Desert Ecoregion. An example of a published data base is Bedford et al. (2010). Surficial geology attributes include parent material, thickness, grain size, soil development, age, and geomorphic process of deposition (or erosion). These attributes allow the database to be used for many applications such as soil hydrology, susceptibility to erosion, estimations of plant cover and plant species composition, and susceptibility to flooding (Miller et al., 2009). The database also includes point measurements of a number of soil and geomorphic properties that were not used in this study.

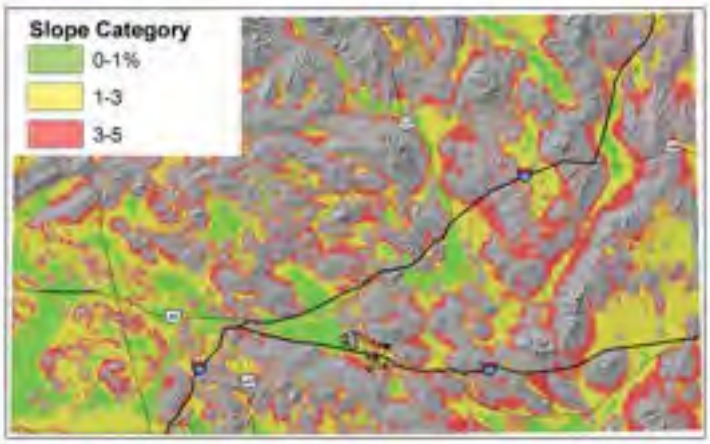
This database contains information similar to the detailed NRCS soil maps, but in addition carries geomorphic process information. The process information is powerful for applying the database to several uses. For instance, the knowledge that a polygon is typified by active alluvial fan channels carries information about recency and frequency of flooding and when combined with topography, defines "downstream" directions that will be modified if the channels are disturbed by construction.

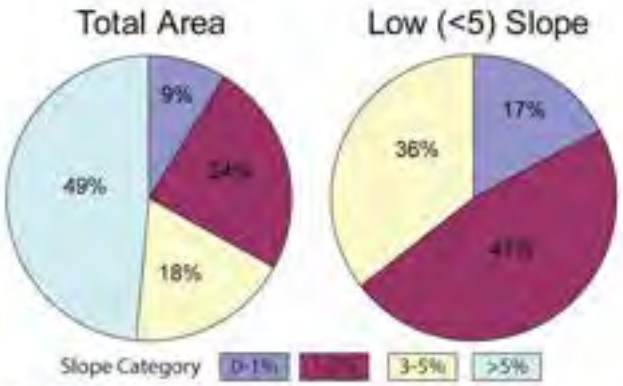


Surficial Geologic Map of the Study Area

Slope Analysis

We analyzed a 30-meter Digital Elevation Model (DEM) for areas of suitable slope. Solar energy facilities need to be sited on less than 5% slopes. To capture broad areas of similar slope, we smoothed the slope map calculated from the DEM using a 9x9 moving window. We then broke the slope map into 3 categories where facilities could be sited (0-1%, 1-3%, 3-5%) and a single category for unsuitable slopes larger than 5%.





Findings:

- About half the area is <5% slope, but only 9% is <1% slope, the favored category for installations.
- Of the <5% low-slope fraction, about half is 1-3% slope and one-third is 3-5%.
- The 0-1% slope area mainly occurs in and near playas and in the Mojave River plain.
- The 3-5% slope category tends to occur in upper piedmonts near their junctions with mountains; these areas are broader in the east than the west.

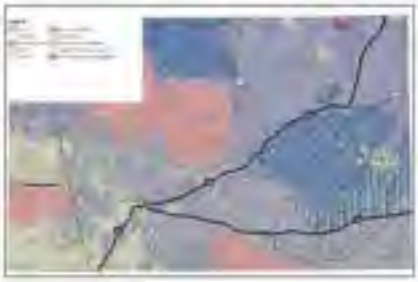
Land Ownership

We then wanted to know who owned the land across the study area. It is well known that much of the land is "off limits" for energy development (e.g. National Parks). We intersected an ownership map with the slope categories.

Assuming that only BLM and Privately held lands may be developed we can determine how much of the desert could be developed. Most of the area studied is managed or owned by the BLM and private landowners, respectively. Within the most suitable areas, determined by slope, this relation holds.

Example conclusion: The most suitable areas determined by slope (0-1%) make up only 9 percent of the study area. Within that area, 76% of the area could potentially be developed based on ownership.

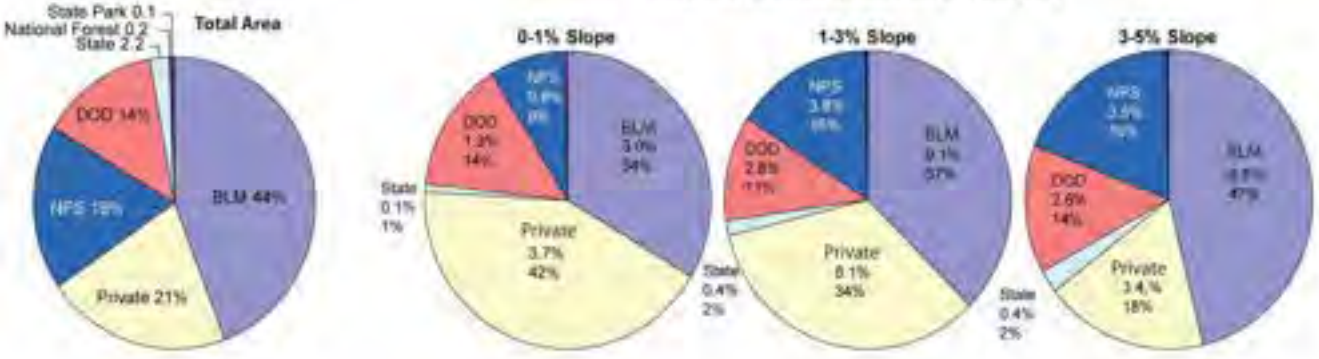
Owner	Percent of area
BLM	44.3
Private	21.0
National Park	18.3
DOD	13.8
State	2.2
National Forest	0.20
State Park	0.12
State Wildlife Reserve	0.05
County or Local	0.01
Native Am. Res.	0.00



Ownership by slope category

Top number: percent of total area

Bottom: percent within slope category



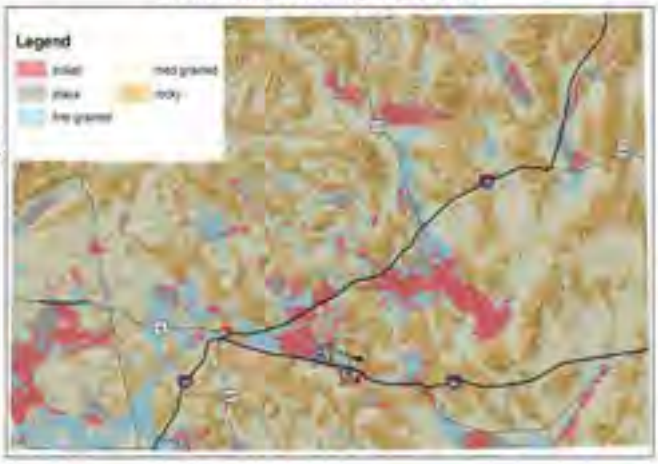
Geologic Influence on Energy Installations

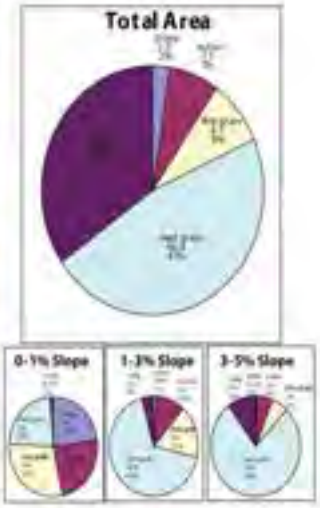
We reclassified our geologic map into a few broad categories that are likely to be important to assess the impacts and functioning of alternative energy facilities.

Wind-blown sand and dust

Wind-blown (eolian) sand and dust is a major hazard in arid regions and interferes with solar energy production and can greatly increase water (for cleaning) needs. Disturbance of surface biocrusts and plants, as well as pebble regs and pavements, exacerbate dust and sand emissions during storms; siting installations where eolian emissions are minimized should be preferred.

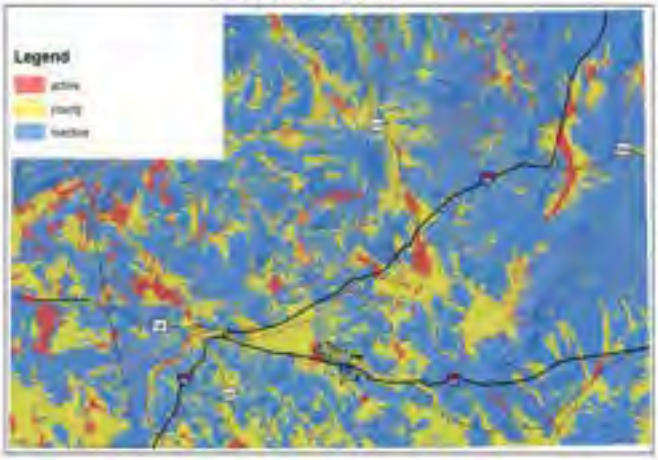
Our "eolian" category represents areas with modern or past eolian sand in the deposit; its disturbance can rapidly destabilize the soils. Playas are very fine grained and intermittently flooded, resulting in chemical crusts that are easily disrupted. Fine-grained deposits have potential for emissions of dust and sand when disturbed; lesser potential is probable for medium and rocky categories.





Susceptibility for **High** Eolian hazard: 75% | 28% | 12%

Flood hazards



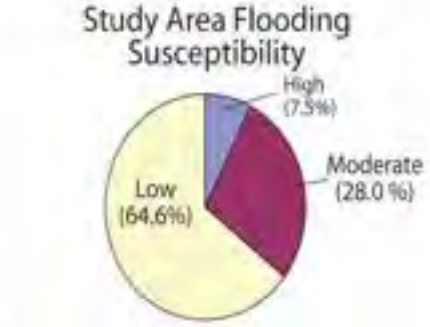
Flood hazards on alluvial fans can be estimated with a knowledge of age of deposit, channel characteristics, and topography (House, 2005; Robins et al., 2008). Areas with active channels and deposits are intermittently active, whereas those with young deposits flood less frequently, during only the most extreme precipitation events or if channel hydrology is disturbed.

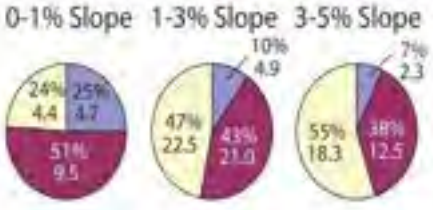
Results:

- Surficial geology with high flooding potential makes up only 6% of the total area with <5% slopes
- High flooding potential characterizes 25% of the area with 0-1% slope.
- High flooding potential characterizes 10% of the area with 1-3% slope.

Results:

- Much of the area we identified as having favorable ownership and slopes have rocky to medium grained soils, which have low susceptibility to eolian hazard.
- A large proportion of the 0-1% slope category is composed of active and former eolian deposits, playa deposits, and fine-grained deposits. These three substrate types are the most susceptible to eolian emissions that affect the installations and downwind locations.
- The 1-3% slope category has much lower susceptibility to eolian hazards than the lowest slope category.





Integration of Geologic Analyses

We investigated the geology of the areas with highest susceptibility for hazards. Spatial correspondence of flood hazard and eolian hazards in the lowest slope categories is striking result. These areas correspond with two main landforms: 1) valley bottoms, and 2) big-river flood plains. Valley bottoms are sites of playas, playa-fringe deposits of mixed origins, eolian sand deposits, and distal alluvial fan deposits. These deposits have in common a fine grain size and lack of rocky cover; as a result they are among the most unstable landforms in arid regions. Big-river flood plains are broad, generally fine-grained flats that may be rocky in a few places. Floodplains typically are valued for a wide variety of commercial and residential uses.

High hazard values (both eolian and flooding) are evident for large proportions of the lowest slope category. In contrast, the high hazard values for the 1-3% slope category applies to much less of the area: 28% is high eolian hazard and 10% high flood hazard. Similar decreases in the proportion of the steepest slope category that is susceptible to hazards are evident.

Implications for Climate Change

Increased mean temperature, extreme temperatures, and climate variability are forecast for this region. Uncertainty for forecasts of summer (monsoon) precipitation and total precipitation remain. Higher temperatures will reduce soil moisture and increase aridity, which along with increased extreme conditions, will increase emissions during extreme wind events. As vegetation responds to climate shifts there also is a likelihood for more sediment to become destabilized and made available to wind and water transport. If monsoon conditions increase in frequency and intensity due to warmer Gulf of California, increased flooding may result (Miller et al., 2010). These scenarios indicate that current assessments of the vulnerability to erosion from wind and water may need to be re-evaluated and that more of the Mojave Desert may be susceptible to these impacts. Species adapted to playa-margin environments may be especially vulnerable to climate change.

Conclusions

Although very low slope (0-1%) areas, the favored sites for solar installations, constitute less than 10% of the Mojave Desert region, they represent a disproportionately large percentage of substrate that is susceptible to flooding and to eolian sand and dust emissions. Private ownership of these low-slope lands exceeds BLM ownership; with greater road access and other features of private ownership, these lands may warrant more consideration for development. Steeper slopes (1-3%) characterize more of the desert (24%); these lands have less susceptibility to flood and eolian hazards. These steeper lands deserve greater consideration in efforts to tradeoff less suitable building land with decreased susceptibility for hazards. Future studies will add plants and animals to this study of geology and topography. Such a study could strengthen conclusions and permit forecasts in the face of climate change. Geomorphology and surficial geology allow some aspects of energy installation to be described and used for decision-making.

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Article No. ae980388

Vulnerability of desert biological soil crusts to wind erosion: the influences of crust development, soil texture, and disturbance

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(*Received 16 June 1997, accepted 12 December 1997*)

Biological soil crusts, consisting of cyanobacteria, green algae, lichens, and mosses, are important in stabilizing soils in semi-arid and arid lands. Integrity of these crusts is compromised by compressional disturbances such as foot, vehicle, or livestock traffic. Using a portable wind tunnel, we found threshold friction velocities (TFVs) of undisturbed crusts well above wind forces experienced at these sites; consequently, these soils are not vulnerable to wind erosion. However, recently disturbed soils or soils with less well-developed crusts frequently experience wind speeds that exceed the stability thresholds of the crusts. Crustal biomass is concentrated in the top 3 mm of soils. Sandblasting by wind can quickly remove this material, thereby reducing N and C inputs from these organisms. This loss can result in reduced site productivity, as well as exposure of unprotected subsurface sediments to wind and water erosion. Actions to reduce impacts to these crusts can include adjustments in type, intensity, and timing of use.

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Keywords: cryptogamic; microbiotic; microphytic; cyanobacteria; lichens; soil loss; wind erosion; land degradation

Introduction

Wind is an important erosive force in deserts, where there is little soil surface protection by organic matter or vegetative cover. Dust deposition by wind often exceeds that of fluvial deposition in these drier regions (Goudie, 1978; Williams *et al.*, 1995). Sediment is produced from soil surfaces when wind forces exceed soil threshold friction velocities (the force needed to detach particles from soil surfaces). Since wind erosion is of major concern both in the western United States and worldwide (Dregne, 1983*a*), it is important to understand how soil surface disturbance affects these threshold velocities.

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In hot and cold arid regions of the world where vascular plant cover is absent or restricted, biological soil crusts (also referred to as cryptogamic, cryptobiotic, microbiotic, or microphytic crusts) often dominate the soil surface (Cameron, 1966; Friedmann & Galun, 1974; Friedmann & Ocampo-Paus, 1976; Harper & Marble, 1988; West, 1990). Depending on soil characteristics and disturbance regimes, soil crust components generally include cyanobacteria, green algae, lichens, mosses, and/or microfungi. In arid soils that are more alkaline, cyanobacteria generally dominate (Friedmann *et al.*, 1967; Belnap & Gardner, 1993; Johansen, 1993; Belnap, 1995).

Sheath material extruded by cyanobacteria entrap and bind soil particles together, acting to reduce both wind and water erosion (Belnap, 1993; Williams *et al.*, 1995; McKenna-Neuman *et al.*, 1996; Belnap & Gillette, 1997). Cyanobacteria appear better able than green algae to protect soil surfaces from wind erosion in the laboratory (McKenna-Neuman *et al.*, 1996). Field studies in Utah cold deserts show that well-developed crusts, containing both lichens and mosses, offer more protection than cyanobacteria alone (Belnap & Gillette, 1997). These studies also showed that any vehicle or foot traffic over well-developed or previously disturbed crusts drastically decreased soil surface resistance to wind erosion in the sandy loam soils tested.

Garcia-Pichel & Belnap (1996) showed that biomass and activity in biological soil crusts were concentrated within 3 mm of the soil surface. This distribution has important implications for studies on soil surface vulnerability to wind erosion, as very little soil loss can result in the removal of most soil surface organisms. Cyanobacteria and cyanobacterial-containing soil lichens are an important source of both fixed carbon and nitrogen for many desert ecosystems (Beymer & Klopatek, 1991; Evans & Ehleringer, 1993; Belnap, 1995), and can increase macronutrient concentrations in vascular plant tissue (Belnap & Harper, 1995). Removal of these organisms therefore reduces site productivity and exposes unprotected subsurface soils to both wind and water erosion. In addition, loss of fine soil particles to which nutrients are bound also reduces site productivity. Reduced fertility of systems is one of the most definitive and problematic aspects of desertification (Dregne, 1983*b*).

This study further expands field tests of arid land soil vulnerability to wind erosion. Here we examined the surface resistance of four warm desert soils in southern New Mexico with different levels of biological soil crust development. We then examined soils for the effects of hoof and vehicle disturbance and compared results to those obtained with similar experiments from the cold deserts of southern Utah.

Materials and methods

Study sites

This study was conducted at the USDA-ARS Jornada Experimental Range (JER) at the north end of the Chihuahuan Desert in south-central New Mexico, where annual precipitation averages 247 mm. Daily average temperature maxima range from 13°C in December to 36°C in June. The elevation of the study sites ranged from 1150 to 1175 m. Wind speeds in this area were estimated using a Geomet station that recorded 6-min wind speed averages at 6·1 m above the soil surface during the previous calendar year.

Sites were located on four soil types within JER: sandy, alluvial silt, gravel, and playa soils. Sandy and playa soils were replicated at four sites, alluvial silt soils at three sites, and gravel soils at two sites. At each site, two runs were performed for TFVs.

Wind tunnel measurements and soil samples were collected in open interspaces between perennial vegetation. Biological crust development was visually assessed by the presence/absence of cyanobacteria, mosses, and lichens. Well-developed crusts were defined as those with lichen and/or moss cover. Poorly developed crusts — those

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containing only cyanobacteria — varied from sites with very low cyanobacterial biomass to sites with very high cyanobacterial biomass. Cyanobacterial biomass was qualitatively determined by counting the number of filaments that could be seen when soil surfaces were broken.

The sandy site was dominated by mesquite (*Prosopis glandulosa*) and very low cyanobacterial biomass. The gravel sites were dominated by creosotebush (*Larrea tridentata*), 40% rock cover, and low cyanobacterial biomass (on soils between the rocks). The alluvial silty soils were dominated by tarbush (*Flourensia cernua*), high cyanobacterial biomass, and a well-developed lichen soil crust dominated by the soil lichens *Catepyrenium* sp. and *Collema tenax*. The playa soils lacked perennial vegetation and biological soil crust.

Threshold friction velocities (TFV, the force required to detach soil particles from the surface) were determined for each soil type at each of the replicated sites. TFV for surface integrity (SI) was the friction velocity at which large, intact chunks of the surface were detached and blown away. Because wind stress equals the square of friction velocity times the density of air, relative resistances of the different crustal classes to wind erosion are defined as the square of the ratio of threshold friction velocities between the classes being compared. Results are also reported as the per cent decrease in soil resistance to wind erosion.

Once TFVs were determined for the undisturbed soils, disturbance was applied in the form of a cow hoof (applied by hand) or two passes with a four-wheel drive vehicle. TFV for soil within the disturbance was then determined. In addition, TFVs were obtained from experimental vehicle tracks established 1 year previously and fenced to prevent further disturbance. The three crustal classes were compared using a two-way ANOVA and multiple range test. A *t*-test was used to distinguish between disturbance treatments and controls.

Wind tunnel

Detailed methods can be found in Belnap & Gillette (1997). A portable, open-bottomed wind tunnel, 0·15 m × 0·15 m cross-section by 2·4 m length, was used so that many wind speeds could be created over the desert surface.

TFVs were determined by gradually increasing wind speed in the tunnel until consistent forward soil particle movement was observable across the soil surface. Airflow velocities were then recorded at the soil surface midway across the end of the working section at 3·2, 6·4, 12·7, 25·4, 38·1, 50·8, 63·5, 76·2, 88·9, and 101·6 mm above the soil surface, yielding wind profiles for the controls (undisturbed soils). For areas receiving hoof or vehicle treatments, TFVs were determined for the undisturbed surface, after which treatments were applied. TFVs are reported in $cm\,s^{-1}$; the conversion factor for wind speeds in $m\,s^{-1}$ is 100.

Results

Soil texture and crust development

Sandy soils had a significantly greater per cent of sand than did the playa or silt soils (72%, 33%, and 30% respectively; Table 1). Per cent sand in the playa and silt soils did not differ significantly. Per cent clay was greatest in the silt soils but did not significantly differ between the playa and sandy soils (29%, 18%, and 13% respectively). Per cent silt was greatest in the playa and silt soils (49% and 41%,

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respectively), and this percentage differed significantly from that of sandy soils (14%). Gravel and sandy soils had similar textures, with the gravel site having a 40% rock cover.

Biological soil crusts were found at all silty alluvial, sand, and gravel sites. Development of these crusts varied widely. Silty alluvial and sandy sites 2–4 had high cyanobacterial biomass and well-developed lichen soil crusts. No cyanobacteria to medium cyanobacterial biomass was found on the sandy soils at site 1, and very low cyanobacterial biomass was found at the gravel sites. Playa soils had mineral crusts, but no biological crust development was seen.

Threshold friction velocities

TFVs for the different sites are shown in Figs 1–3. Figure 1 shows the SI values for all sites tested. These values ranged widely from 30 to 471 cm s^{-1}. TFVs of the soil surface were related to biological crust development and rock cover. Lowest SI values were seen in sandy soils with no crusts (30 cm s^{-1}). Soils with very thin and thin cyanobacterial crusts had higher TFVs (40 and 82 cm s^{-1}, respectively). Sandy soils with thicker cyanobacterial crusts averaged 260 cm s^{-1}, while well-developed lichen crusts on silt and sand showed very high TFVs (323 and 471 cm s^{-1}, respectively).

Rock cover and soil mineral crusting also conferred some resistance to wind erosion. Soils with no crusts but 20% rock cover showed an increase of TFVs when compared to similar soils with no crust (30 *vs.* 42 cm s^{-1}). Gravel sites, with 40% rock and thin cyanobacterial cover, showed intermediate TFV values (173 cm s^{-1}). Playa sites with mineral crusts showed intermediate TFVs as well (185 cm s^{-1}).

Applied disturbance decreased the resistance of all soil types to wind erosion at all sites (Figs 2 and 3). In sandy soils, hoof disturbance resulted in a 20–83% decline in TFVs, with the slightly thicker crust showing the greatest per cent decline and the very thin crusts showing the least decline. In silty soils, hoof impacts reduced TFVs by 60%. On playa soils this decline was 86%. Gravel showed the least impact with a 22% decline in TFV.

New disturbance by vehicles in sandy soils resulted in an 83% decline in TFVs. Sites affected by vehicles 1 year previously showed no recovery, with TFVs still reduced by 31–82%. In silty soils new tracks had an impact similar to those in sandy soils, with a decline of 74%. However, 1-year-old tracks showed declines of only 46%. New vehicle tracks in playa soils resulted in a TFV decline of 93%.

Table 1. *Soil texture of Jornada Experimental Range sites*

	% sand		% silt		% clay	
	Average	SE	Average	SE	Average	SE
Playa	33·10	5·36	49·32	3·36	17·58	3·20
Sand	72·38	5·92	14·27	2·20	13·35	3·99
Silt	30·11	0·67	40·61	1·76	29·28	1·15
Gravel	68·72	*	11·64	*	19·64	*

*Indicates no standard error because only one sample was taken.

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Discussion

Resistance to wind erosion paralleled biological crust development. Both silt and sandy soils with the greatest TFVs were those with the most well-developed crusts, while less wind resistance was seen at sites with less crustal development. Because cyanobacteria and lichens secrete substances and produce filaments that entangle soil grains (Belnap & Gardner, 1993; McKenna-Neuman *et al.*, 1996), this result was expected. Rocks and mineral crusts were also seen to confer some resistance to erosion.

Soil surface disturbances resulted in greatly decreased soil resistance to wind erosion for all soil types, regardless of the disturbance regime. Resistance to wind erosion is the square of measured TFVs. Consequently, disturbance reduced the resistance of the tested soil surfaces from 69% to more than 5200% (Table 2). Hoof print disturbances increased wind erosion susceptibility by 69–5247%, depending on substrate type, while disturbance with a vehicle increased susceptibility by 1372–3399%. Even after a year of recovery, sandy surfaces still showed a 114–2950% increase in susceptibility. As cyanobacteria and lichens are very brittle when dry and crush easily, surface stability conferred by these organisms would be severely compromised after compressional disturbances (Webb & Wilshire, 1983; Belnap & Gardner, 1993; Johansen, 1993; Belnap *et al.*, 1994; Belnap, 1996).

Although silty alluvial and sandy soils showed a similar response to new vehicle disturbance (83% *vs.* 74% TFV decline), silty soils showed a faster recovery rate than sandy soils. The partial recovery seen in the silty soils was probably a result of clay particle suspension after rainfall. When rainfall is heavy enough to pool on the soil surface, clay particles can float to the water surface, and upon drying, form a thin mineral crust. Thus thin crust resists wind erosion when dry but does not protect soil

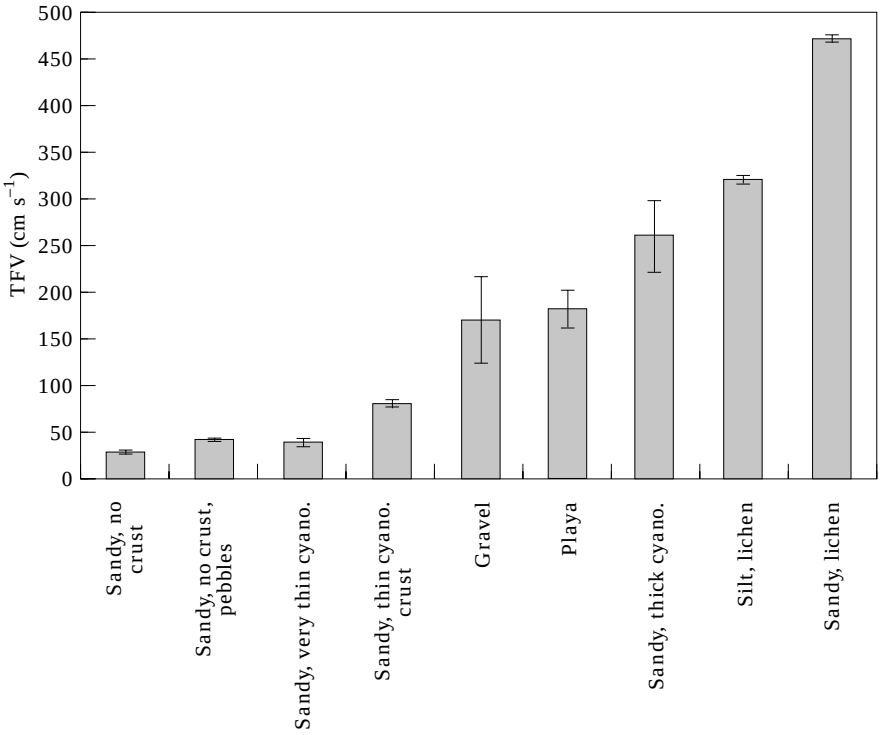

Figure 1. Threshold friction velocities (TFV) for all undisturbed sites.

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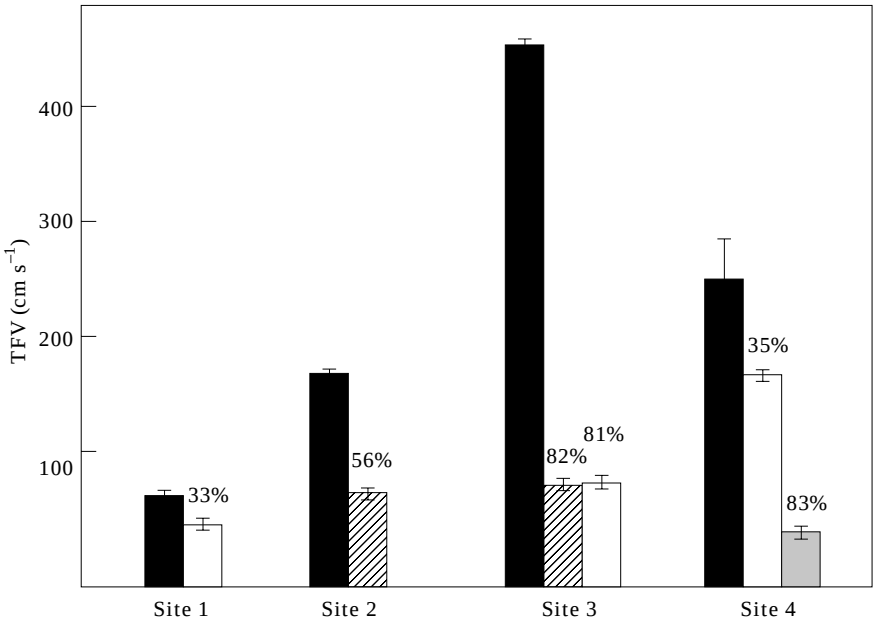

Figure 2. Decline in TFV resulting from applied disturbances at four sites in sandy soils. Hoof disturbances were applied by hand; tracks are from two passes of a four-wheel drive vehicle. All disturbances significantly differed from controls and each other ($p < 0{\cdot}01$) except sandy site 3, where the control and treatments significantly differed from each other but the treatments did not significantly differ from each other. (■) = control; (▨) = 1-year-old track; (□) = hoof disturbance; (▩) = new track.

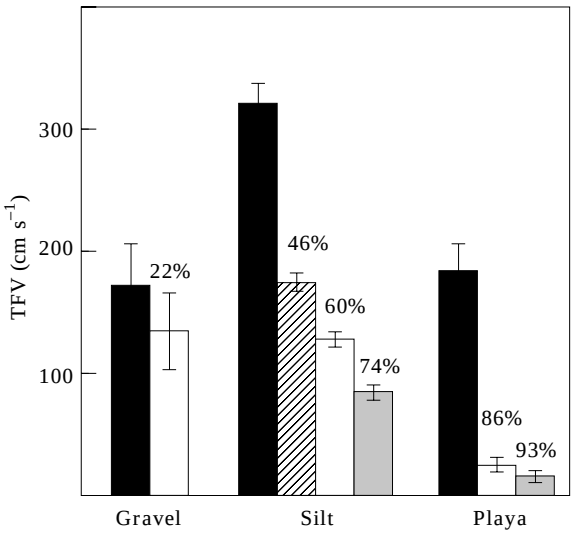

Figure 3. TFVs from gravel, silt, and playa sites. All disturbances significantly differed from controls and from each other ($p < 0{\cdot}01$). (■) = control; (▨) = 1-year-old track; (□) = hoof disturbance; (▩) = new track.

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surfaces from water erosion when wet. This same phenomenon may occur in the sandy soils but to a lesser degree.

Playa soils showed the greatest impact with disturbance. Silty and sandy soils showed an intermediate response, with gravel soils being the least compromised. Since the playa soils had no biological crust or rocks to increase resistance to wind erosion, crushing of the thin mineral crust left the surface with virtually no protection from wind erosion. In almost all cases, vehicle tracks resulted in greater damage than hoof prints, regardless of soil type. The reason for this is not known.

Wind speeds on the Jornada were continuously recorded by a Geomet station during 1995, the year before this study (Fig. 4), at a height of 6·1 m. The mode was seen at 1·5 m s^{-1} and the maximum at 20 m s^{-1}. These measurements were taken well above the surrounding vegetation. For playa sites, which lack vegetation, these wind speeds are a good approximation of ground speed. For vegetated areas, ground wind speeds would be expected to be much less. SI values obtained for sites covered by a well-

Table 2. *Per cent reduction of soil resistance to wind erosion. Resistance is calculated by squaring TFV values*

Site	IS (cm s^{-1})	Hoof (%)	New track (%)	1-year track (%)
Sandy 1	54	69	114	–
Sandy 2	180	–	517	–
Sandy 3	471	–	2950	–
Sandy 4	264	236	–	3399
Gravel	173	163	–	–
Silt	323	618	337	1327
Playa	185	5247	–	–

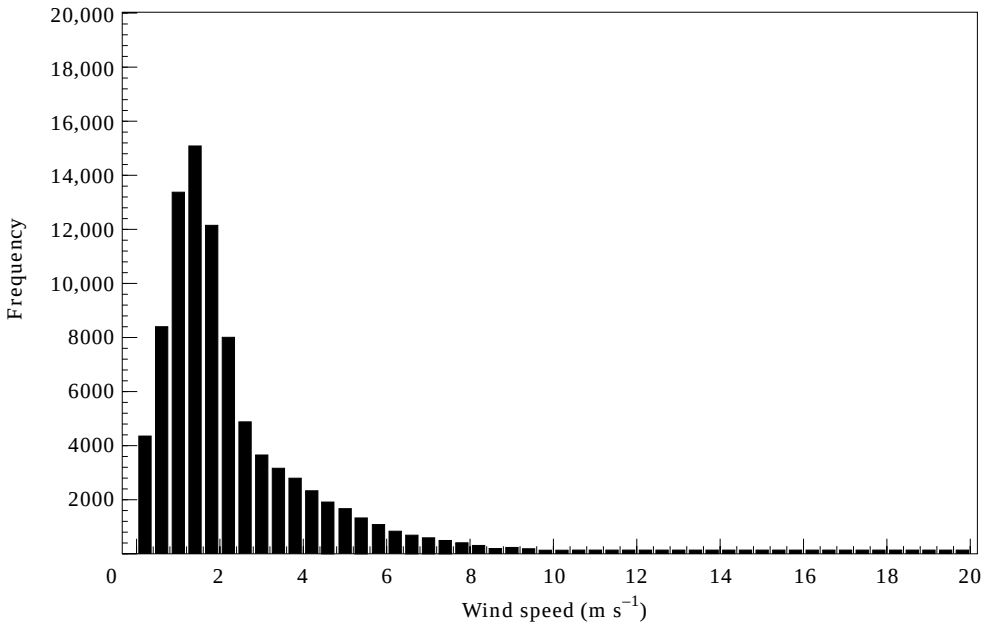

Figure 4. Wind speeds at a Geomet station at the Jornada Experimental Range, Las Cruces, NM. Numbers represent 6-min averages throughout 1 year (1995). Measurements were taken 6·1 m above the soil surface.

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developed biological soil crust (29–32 m s^{-1}) indicate that well-developed crusts can protect soil surfaces from erosion by winds in this region. However, sites with very low or no cyanobacterial biomass and limited or no perennial vegetation would be susceptible to frequent wind erosion events. Both hoof and vehicle disturbance lowered soil resistance significantly on all soil types. Surfaces previously not susceptible to wind erosion (silt and sand) were vulnerable after disturbance.

The results obtained in this study were similar to those seen for previous field studies of wind erosion on biologically crusted surfaces. Belnap & Gillette (1997) found that although sandy soils with well-developed lichen crusts had TFVs well above wind speeds of the region, disturbance by foot or vehicle traffic resulted in TFVs well below commonly occurring wind events. This was true for both new disturbances and those more than 5-years-old. Williams *et al.* (1995) reported TFVs of 200 cm s^{-1} for alluvial soils with fairly high silt-clay contents that had been fenced off from grazing disturbance for 3 years. Gillette (1988) reported a TFV of 290 cm s^{-1} in rain-crusted soils in the Mojave Desert and 20–60 cm s^{-1} for loose sandy soils (Gillette *et al.*, 1980). Gillette *et al.* (1980) also showed increasing fine texture in soils results in increased TFVs.

Decreasing TFVs have been shown to be directly associated with increased sediment movement (Leys, 1990; Williams *et al.*, 1995). Soils are slow to weather from parent material in arid and semi-arid regions. This process has been estimated to take 5000 to 10,000 years (Wilshire, 1983); therefore, soil loss can have long-term consequences. In addition, nearby biological soil crusts can be buried by this sediment, resulting in the death of the photosynthetic organisms (Belnap, 1995, 1996). Garcia-Pichel & Belnap (1996) have shown that in biological soil crusts more than 75% of the photosynthetic biomass, and almost all photosynthetic productivity, is from organisms in the top 3 mm of these soils. Therefore, very small soil losses can dramatically reduce site fertility and further reduce soil surface stability. In addition, many plants have relatively inflexible rooting depths and often cannot adapt to rapidly changing soil depths.

Conclusions

This study demonstrated that soils with well-developed soil crusts can be highly resistant to wind erosion. However, all types of disturbance on the soil types tested left soil surfaces much more susceptible to wind erosion from commonly occurring wind speeds. Recovery rates varied depending on soil type.

Soil erosion in arid lands is a major threat worldwide. Beasley *et al.* (1984) estimated that 3·6 million ha of western United States rangelands experience some degree of accelerated wind erosion. Relatively undisturbed biological soil crusts can contribute a great deal of stability to these otherwise highly erodible soils. Biological soil crusts are present year round. Unlike vascular plants, their cover is not reduced in drought years. Unlike rain crusts, they do not dissolve when wet. Consequently, over time and in adverse conditions they offer stability that is often lacking in other soil surface protectors.

Ever-increasing recreational and commercial use of semi-arid and arid areas globally threaten the integrity of these crusts and may lead to significant increases in regional and global wind erosion rates. For these reasons, managers of arid and semi-arid regions need to consider the important role these crusts play in soil surface stability and reduce disturbance to these biological crusts whenever possible. Specific actions may include reduction in types and intensites of use as well as adjustments in timing of use.

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Comment Received From: Morongo Basin Conservation Association (MBCA)
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Comment letter - Morongo Basin Conservation Association

Additional submitted attachment is included below.

MBCA

morongo basin conservation association

Post Office Box 24
Joshua Tree CA 92252
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February 26, 2026

California Energy Commission
715 P Street
Sacramento, California 95814

Subject: Docket Unit, MS-4
Docket No. 24-OPT-03 Email: docket@energy.ca.gov

Dear Readers,

The Morongo Basin Conservation Association (MBCA) appreciates this opportunity to address various issues associated with the Soda Mountain Solar Project.

We believe that this project should not be approved (more correctly that the "No-Action" alternative should be chosen), as the project is poorly sited and detrimental to the maintenance of desert vistas and healthy communities. These qualities are what attract people to the desert, both as residents and as visitors, and are the economic drivers of our communities and way of life.

1. Wildlife Crossing:

   The agreement that allowed the Brightline West high-speed rail line was contingent on construction of wildlife overpasses allowing animals to safely cross both the rail track and the I-15 freeway. Consultations between environmental organizations, wildlife biologists, California Department of Fish and Wildlife (CDFW) and California Department of Transportation (CalTrans) resulted in three locations being chosen for the overpasses. (These were based primarily on bighorn sheep migration patterns.) One of these overpasses is to be constructed at Soda Mountain. Bighorn sheep are notoriously shy of human activities, so construction of a solar field at this location will be contrary to the very qualities the overpass is attempting to mitigate. 18-1

2. Wildlife
   a. Bighorn Sheep
      - Bighorn sheep populations in the California deserts are fragmented, primarily by highways that the sheep are unwilling to cross. This leads to genetic isolation of populations, with inbreeding causing loss of viability and the gradual weakening and extirpation of the isolated population(s). Interstate 15 18-2

splits populations in the Death Valley region from those in the Mojave Preserve, to the detriment of both. The Soda Mountain wildlife crossing is designed to alleviate this issue, but construction of a solar project will interfere with this effort. (Wildlife crossings are also planned in other parts of the California Desert.) 18-2 continued

b. Desert Tortoise
   - There is a small population of desert tortoises within the project site. Previous efforts to relocate tortoises have had poor reproductive success. We would like to see what detailed plans the project and the State have for this population, as well as determinations of likelihood of long-term success with the transplanted population. 18-3

c. American Badger 18-4

d. Burrowing Owl 18-5

e. Mojave Fringe-toed Lizard
   - These species were also observed on the project site, and we would like to see detailed analyses of relocation plans and expected success rates. 18-6

f. The area has not been adequately surveyed for rare plant species (or for any plants, for that matter). 18-7
   - Given high rates of endemism in the desert, it is likely that new species (by definition rare) will be discovered during any systematic survey of the area.
   - Plant surveys of the project site should be conducted by plant taxonomists over at least a full year to account for seasonal variations of annual species.

3. Dust

This concern is the subject of a comprehensive letter submitted by Pat Flanagan, a board director of MBCA. The comments within that letter are adopted within this letter.

In short, disturbances to desert soils will almost always result in the long-term production of dust. With certain types of soils (see Pat's letter) the problem is exacerbated. Frequent and high winds (as at the Soda Mountain site) amplify it even more. Decision makers should examine the situation at Aratina Solar near Boron, or at the smaller solar projects in Lucerne Valley for examples of the potential impacts of blowing dust. Soda Mountain is close (and often upwind) of the town of Baker, and perhaps most significantly, is adjacent to the busy Interstate 15 freeway that is the main link between Los Angeles and Las Vegas. During a high wind event (very common in these parts) the dust could be as much a visual impediment as a tule fog in the Central Valley. 18-8

- Please examine dust videos from Aratina and other desert solar sites. (A link to one such video is HERE). We would be glad to provide additional videos.

In the Barstow public meeting, the project applicant remarked that they had managed to reduce grading impacts from 1500 acres to just 75 acres. This sounds impressive on a project site of over 2500 acres. In fact, it sounds a little too good. We suspect the applicant may be counting disturbance only for the bases of the solar panels and other related equipment, and we would expect clarification on that point before any project is approved. It seems apparent that most of the site will be scraped, at least to the point of removing existing vegetation. In addition, the solar panel locations must be connected by vehicle access roads as well as by electrical connections. Anywhere vegetation is removed in the desert must be considered as "disturbance" from the perspective of dust generation. Any stratification of surface soil is compromised, and any fungal mycelial networks that hold surface particles together are destroyed. The question then becomes: How are you going to mitigate the dust problem you have just created? 18-9

4. Water

   A traditional way to control dust is by spreading water over it. Given abundant sunlight, low humidity, and wind, the water must be applied in large amounts and often. (Aratina reportedly applies water multiple times per day, and the dust still blows.) 18-10

   - This project was denied water by San Bernardino County.
   - The applicant is currently getting water by truck from an offsite private well.
     1. Will this amount be adequate for construction, as well as for daily maintenance/dust control during operation?
     2. Has the impact of projected water withdrawal on the local aquifer (from the private well) been assessed? 18-11
     3. The expenditure of carbon and Green House Gas emissions due to trucking the water must be considered within the environmental analysis. 18-12

5. Opposition from government entities
   a. San Bernardino County Board of Supervisors voted against approving a solar plant on this site. (No water available) 18-13
   b. The US National Park Service has expressed opposition. (Adjacent to Mojave National Preserve)
   c. The project is contrary to plans by CalTrans and CDFW. (The wildlife crossing, as discussed above.)

In short, a solar project is a monumentally bad choice for this site. Either the wildlife crossing or the dust issue, by itself, is adequate reason to select the "No-Action" alternative for this project, and we urge you to do so.

Thank you for the opportunity to comment.

Arch McCulloch, Director
Morongo Basin Conservation Association

Comment Received From: Christina Aiello
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

Aiello & Epps Comments on Soda Mountain Solar Draft EIR

Additional submitted attachment is included below.

Christina M. Aiello, Ph.D.
California Wildlife Biologist
Wildlands Network
Joshua Tree, CA

February 27, 2026

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: Soda Mountain Solar Project Staff Assessment SCH #2025080161

We would like to first thank the California Energy Commission (CEC) for seeking information on this project's potential impacts to one of the region's largest and most iconic species, desert bighorn sheep, and for taking the time to meet to discuss these issues in person. We disagree with the Staff Assessment that concludes the "Big Horn Sheep Buffer and Relocated BESS Alternative #2 would reduce the impacts to desert bighorn sheep to less than significant." Analyses we have conducted, including within a report commissioned by the National Park Service for this solar project that was submitted to the CEC in this process, and their conclusions demonstrate that the project, as proposed in Alternative #2, does not reduce environmental impacts to this species to less than significant. 19-1

We appreciate that CEC summarized several of the concerns and recommendations we provided in a submitted assessment of the project (Aiello & Epps 2025 Report and Supplement[1]), but were surprised and are concerned that the CEC Staff Assessment (heretofore, the Assessment)[2] did not include an Alternative with the following mitigations package to address the significant impacts our research has identified: 19-2

1) First, establish a 0.62 – 1.24-mile buffer as part of project design.
2) Second, delay construction until the completion of the already planned wildlife crossing structure and study is completed on how wildlife are using it.
3) Third, adjust project mitigations as necessary to reflect relevant new information based on use of wildlife crossing structure.

The Assessment didn't include any of the recommendations in any alternative. The Assessment provides no data and analysis to dismiss the analyses and associated conclusions and recommendations we have submitted to the CEC since the start of this process. The Assessment indicates the CEC recommends permitting the project if a 0.25-mile buffer from 10% sloped habitat is included, and consistently refers to habitat at and above 10% slope as important habitat 19-3

[1] Aiello & Epps 2025 Report (https://efiling.energy.ca.gov/GetDocument.aspx?tn=261255&DocumentContentId=97622) and Supplement (https://efiling.energy.ca.gov/GetDocument.aspx?tn=262621&DocumentContentId=99217)
[2] Soda Mountain Solar Project Staff Assessment https://efiling.energy.ca.gov/GetDocument.aspx?tn=268057&DocumentContentId=105070

(pages 341 and 343) – stating that this threshold was defined by CDFW. In the public scoping meeting held on February 5, 2026, CDFW representative Brandy Wood corrected CEC's reference to these recommendations as tied to a CDFW-published document— stating that the CDFW-led CEQA process was terminated before its completion and the in-progress environmental documents were not finalized nor published by CDFW for public review. Those documents include the Dudek Report, which itself acknowledges their reference to a 0.25mi buffer from the 10% slope is simply a restatement of a carryover CDFW statement originating in 2013, rather than based on any current research and analysis. There is nothing in the record from CDFW or the CEC that states the information we have provided does not represent the best available science, and there is nothing in the record to refute the expert analysis underpinning our 3-part mitigation package, which includes the 0.62 – 1.24-mile buffer. We also note that the CDFW stated that it has not determined what is the appropriate buffer to reduce the impacts to bighorn sheep to less than significant for the purposes of CEQA compliance, because that is CEC's sole responsibility as a result of the applicant's decision to opt-in to the AB 205 process. This also lends further weight and consideration on the importance of adopting the mitigation package we have submitted.

19-3 continued

We understand and are sensitive to the fact that the CEC and Opt-In permitting process has a role to promote renewable energy as a means to reduce energy needs from sources that contribute to climate change. However, we strongly believe this goal should not compromise state wildlife and conservation goals. The Mojave National Preserve is a critical ecological anchor for the California Desert, connecting prized national park and Bureau of Land Management landscapes that stretch from Joshua Tree to Death Valley. Maintaining landscape level connectivity is the best defense against a rapidly changing climate and should be a top priority. Indeed, California has recently adopted The Room to Roam Act (A.B. 1889), which will soon require cities and counties in the state to adopt land-use plans that avoid impacts to wildlife connectivity.

19-4

The project is proposed adjacent to the South Soda Mountains and lies within direct proximity to a planned wildlife overpass across Interstate 15, a $35 million effort to preserve and improve bighorn sheep movement between the Mojave National Preserve and northern populations. This overpass is the result of years of planning and state legislation (SB 145) supported by state agencies and a broad coalition.

The Aiello & Epps 2025 Report and Supplement represents the most up-to-date science with predictions tailored to local habitat preferences and considerations of visibility-driven influences on behavior. The research referenced in this report, along with the newly published study by Sawyer *et al.* (2025)[3], indicates that disturbance from industrial-scale development near occupied habitat—especially within a 0.62 – 1.24-mile range—can risk long-term avoidance, potentially

19-5

[3] Sawyer, H., Smith, K.T., Robb, B.S. and Merkle, J.A., 2025. Ungulate use before and after utility-scale solar development. *Ecological Solutions and Evidence*, *6*(3), p.e70071. https://doi.org/10.1002/2688-8319.70071

rendering the overpass ineffective at its goal of improving region-wide genetic and demographic connectivity.

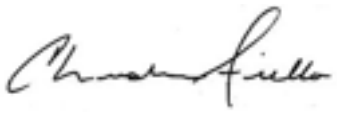
The South Soda Mountains population is already vulnerable due to its isolation, small size, and habitat constraints. Disruption of movement between the Soda and Cady ranges would reduce resilience and increase extinction risk—not only locally, but across the broader bighorn metapopulation. 19-5 continued

In addition to a larger buffer mitigation, the construction of any project in the area should be delayed until the local population of bighorn sheep have habituated to using the new overcrossings and it is ensured that any development will not interfere with wildlife movements. Following habituation to the new wildlife crossings and assessment of the environmental setting, additional mitigations should be considered as needed. 19-6

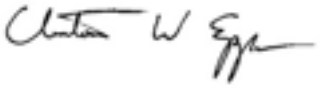
Desert bighorn sheep are not only iconic to the Mojave, but their conservation influences the health of the wider desert ecosystem. With few large-bodied mammals in the region, their role is unique and valuable to the ecological community – including diverse human communities that live and recreate in California's deserts.

The package of three mitigations described within the Aiello & Epps 2025 Report reflects the best available science and is our recommended approach to reduce adverse impacts to less than significant – we respectfully urge you to adopt it. 19-7

Sincerely,



Christina Aiello, PhD
Wildlife Biologist
Wildlands Network



Clinton W. Epps, Ph.D.
Professor, Department of Fisheries, Wildlife, and Conservation Sciences
Oregon State University

Comment Received From: Stacy Goss
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

Opposition to Soda Mountain Solar Project

Additional submitted attachment is included below.

Desert Survivors

2648 International Blvd., Suite 301 • Oakland, CA 94601 • desert-survivors.org

California Energy Commission
715 P Street
Sacramento, CA 95814

February 27, 2026

Re: Comments on Soda Mountain Solar Staff Assessment / Draft EIR

Dear Chair Hochschild, and Members of the California Energy Commission:

Desert Survivors is a non-profit organization of people who love the desert and are committed to preserving its unique beauty and value. Founded in 1981, the organization promotes a mission of experiencing, sharing and protecting the desert as wilderness. Desert Survivors has approximately 300 members, who mostly live in California and Nevada.

We write to express our opposition to siting a solar facility in the Soda Mountain region.

In addition to the project not being consistent with the DRECP and the Western Solar Plan, Desert Survivors is most concerned about the significant impacts to both biological and visual resources of the Mojave Desert.

Biological Resources

We sponsor hiking and camping trips in these areas of the California desert, in part, to view and study wildlife such as bighorn sheep, desert tortoise, a variety of migrating and desert-adapted birds, and unique vegetation including cacti and wildflowers. These creatures will be put at tremendous risk by this project, and the likelihood of experiencing these animals around the area will be significantly impacted.

The California Energy Commission staff acknowledge that this project would lead to significant and unavoidable impacts to desert bighorn sheep. It is not unusual to see bighorn sheep in the Soda and Cady Mountains, and they are often seen by visitors driving down Zzyzx road, as the sheep make their way to Soda Lake in the morning. These animals are Fully Protected by the California Department of Fish and Wildlife. 20-1

Our likelihood of seeing desert tortoise has already been significantly impacted by the catastrophic decline of the species to the west of the proposed project area due to OHV impacts. This project is yet another nail in their extinction coffin.

Visual Resources

The iconic, open, sweeping landscapes of the Mojave Desert is what draws many people to this area. Looking on a map, this project seems to have been shoe-horned into the small area of unprotected land in the center of multiple Wilderness Areas—Soda Mountains to the north/northwest, Cady Mountains to the south/southwest, Kelso Dunes Wilderness to the south, and the Mojave Wilderness and the Mojave National Preserve to the west. Desert Survivors has sponsored numerous camping and hiking trips to all of these areas, for participants to experience the desert as wilderness. The proposed 2,670 acre, solar photovoltaic generating and storage facility would not only devastate its 20-2

parcel of desert, but would blight the vistas of the greater region. It would be difficult to find a more inappropriate area than Soda Mountain for an industrial-scale solar project. 20-2 continued

There is a reason that this project has failed to move forward several times over the past 19 years; the location. Again, Desert Survivors is strongly opposed to the siting of this proposed project in Soda Mountain.

Sincerely,

Stacy Goss,
President, Desert Survivors

Comment Received From: Conservation Organizations
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

Comments from Conservation Organizations

Comments on behalf of: Amargosa Conservancy, Basin and Range Watch, California Desert Coalition, California Native Plant Society, CalWild, Center for Biological Diversity, Conservation Lands Foundation, Defenders of Wildlife, Desert Advocacy Media Network, Friends of the Amargosa Basin, Friends of the Inyo, Mojave Desert Land Trust, National Parks Conservation Association, Sierra Club, and Western Watersheds Project

Additional submitted attachment is included below.

February 27, 2026

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: Comments on Soda Mountain Solar Staff Assessment / Draft EIR

Commissioner Gallardo and Commissioners,

On behalf of the Amargosa Conservancy, Basin and Range Watch, California Desert Coalition, California Native Plant Society, CalWild, Center for Biological Diversity, Conservation Lands Foundation, Defenders of Wildlife, Desert Advocacy Media Network, Friends of the Amargosa Basin, Friends of the Inyo, Mojave Desert Land Trust, National Parks Conservation Association, Sierra Club, and Western Watersheds Project, we write to (1) express our ongoing opposition to siting a solar facility in this Soda Mountain region and (2) respond to the Staff Assessment / Draft Environmental Impact Report (SA/EIR).

We support renewable energy development, which is why we collaborated with the private and public sector, elected officials and community leaders to create the California Desert Renewable Energy Conservation Plan (DRECP).

The facts of this matter make painfully clear that Soda Mountain Solar represents the worst type of solar development and the opposite of “smart from the start” renewable energy planning:

- The project site is not designated in the DRECP as a Development Focus Area for solar energy project siting . 21-1
- This is a “zombie” application, originally filed to hold the site for industrial solar development in 2007, nearly 20 years ago and nearly 10 years prior to the finalization of the DRECP.
- The application has failed to advance under 3 different owners, and recently flipped to its 4th owner, New Jersey-based VC Renewables. 21-2
- The National Park Service, which manages the immediately adjacent Mojave National Preserve, has opposed this project for over a decade. 21-3
- The project was rejected by the San Bernardino County Board of Supervisors in 2016, who referenced the California Department of Fish and Wildlife (CDFW) and National Park Service’s concerns about the project’s impacts to the “Fully Protected” desert bighorn sheep. 21-4
- The National Park Service commissioned a report from the nation’s leading bighorn sheep scientists that represents the most current, best-available science and which concluded the significant, disproportionate impacts from developing this site, including risk of local extinction of the sheep population. 21-5
- Should the proposed Soda Mountain Solar Project be built, a legislatively required, ~$35 million taxpayer funded wildlife crossing at this site stands to be subverted and rendered useless according to the bighorn sheep scientists. 21-6

WHY LOCATE PROJECTS IN DRECP-APPROVED ZONES?

At its core, the DRECP is about doing renewable energy right. If renewables are proposed on public lands, they should be sited on lower conflict lands.

For developers, it means access to a huge swath of desert land (388,000 acres) for solar development, that brings certainty and efficiency to each project. For communities and conservation groups it means progress that doesn't sacrifice the very landscapes we're trying to protect.

The DRECP provides clear guidance on *where* renewable energy development is most appropriate, lands designated as Development Focus Areas. That upfront clarity reduces permitting risk, shortens timelines, and lowers the chance of costly delays, lawsuits, or project redesigns.

By steering development away from sensitive habitats and cultural sites, developers avoid mitigation surprises, legal challenges, and reputational risk. Predictability saves money.

COMMENTS ON SA/DEIR

<u>Desert Bighorn Sheep</u>

- The California Energy Commission (CEC) was provided the most up-to-date scientific information on desert bighorn sheep through multiple submittals by Dr. Christina Aiello, including a report commissioned by the National Park Service. That information describes a package of three mitigations needed to reduce the severity of adverse impacts to bighorn sheep to less than significant. However, the CEC did not include a single one of the mitigations in the package in either of the alternatives. The CEC disregarded this despite not pointing to a single piece of information to dismiss the package of mitigations. 21-7

- The CEC implies the CDFW has reviewed all the information submitted to the CEC, including the Aiello report, and that CDFW has dismissed the analysis from Aiello. This is false – the CDFW has never stated or implied that position. Based on this error, the CEC then implies that the CDFW has stated its analysis – older than Aiello's analysis – is superior, more reliable, and should be adopted. This too is false. The CDFW has not only never said that, but it has stated that the Aiello analysis represents the most current, best available science on the topic of bighorn sheep. CDFW has also stated that the analysis it commissioned by Dudek was never subject to any public review or formal process. CDFW has further stated that the CEC, not CDFW, must consider the best available science before it to independently assess and determine what measures are needed to reduce the level of adverse impacts to below significant. 21-8

- We incorporate by reference the February 27, 2026 comments submitted by Dr. Aiello in response to the SA/DEIR.

Project Objective

The basic objective of the Project, as stated in the Staff Assessment, is to "Assist the State of California in achieving or exceeding its Renewables Portfolio Standard and greenhouse gas emissions reduction objectives by developing and constructing new California Renewables Portfolio Standard–qualified solar power generation facilities producing approximately 300 MW."

- The 300 MW generation capacity is an objective of the Project Applicant and is not based on any statutory or regulatory requirement. A project proponent cannot artificially confine the range of available alternatives considered and analyzed by CEC staff by relying upon an overly narrow statement of project objectives. To allow the project's objectives to be unreasonably narrowed renders the California Environmental Quality Act (CEQA) mandate to consider a reasonable range of potentially feasible alternatives meaningless. This issue can be resolved if the Staff Assessment is revised according to additional recommendations included in this letter. 21-9

Alternatives to the Proposed Project

Alternatives to the proposed Project that were analyzed in the Staff Assessment include the No Project Alternative, the Bighorn Sheep (BHS) Buffer and Relocated Battery Energy Storage System (BESS) Alternative #1, and the BHS Buffer and Relocated BESS Alternative #2, identified as the Environmentally Superior Alternative under CEQA.

- We request that the Alternative site locations that were reportedly considered but dismissed be identified in a supplement to the Staff Assessment. This is a reasonable request given that there are numerous Development Focus Areas within the Desert Renewable Energy Conservation Plan area that are managed by the US Bureau of Land Management (BLM) and specifically designated for solar energy project development due to lower conflicts with biological and other resources. An additional site that is along this same corridor that the state and federal administrations have discussed repurposing is the already developed, but soon to be decommissioned, Ivanpah Solar Generating Station site. 21-10

- We request that the CEC staff analyze at least one additional alternative in a supplement to the Staff Assessment that incorporates the package of three mitigations, as found in the Dr. Aiello report commissioned by the National Park Service, that is necessary to reduce the level of impacts to bighorn sheep to below significant: (1) a buffer of 0.62 miles-1.24 miles from the 10% slope, (2) delay construction of the solar project until after movement of desert bighorn sheep has been established over the new wildlife crossing that is currently under development, and (3) reassess any mitigations based on 21-11

conditions following adoption of the crossing by wildlife. This alternative should be identified as the Environmentally Superior Alternative under CEQA. 21-11 continued

- We believe this is a reasonable recommendation because it would provide greater assurance that impacts to desert bighorn sheep would meet the standard for full mitigation of direct and indirect impacts under CEQA. 21-12

Project Location and Land Status

The Project, located on public land managed by the BLM, is within an area designated as General Public Lands under the DRECP.

- We appreciate that the CEC staff confirmed in the Staff Assessment that the Project is located within an area designated as General Public Lands because the Project Applicant incorrectly identified the Project as located within a Development Focus Area in a letter to the CEC dated 2/9/2025. 21-13

CONCLUSION

We hope our comments on the Staff Assessment are helpful to CEC staff in preparing for public hearings on the Project conducted by the Commissioners. The biological, social and economic values of desert bighorn sheep in the Project area to the residents of California, conservation organizations and the CDFW far outweigh the value of the electricity that the Project would provide to commercial markets in California. It is with those values in mind that we submit this letter with our comments and recommendations.

Please contact us via email if you would like to discuss our comments or obtain additional supporting information.

Sincerely,

Mason Voehl
Executive Director
Amargosa Conservancy

Kevin Emmerich
Co-Founder
Basin and Range Watch

Frazier Haney
Co-President
California Desert Coalition

Brendan Wilce
Conservation Program Coordinator
California Native Plant Society

Linda Castro
Assistant Policy Director
CalWild

Lisa Belenky
Senior Counsel
Center for Biological Diversity

Jora Fogg
California Associate Program Director
Conservation Lands Foundation

Jeff Aardahl
Senior California Representative
Defenders of Wildlife

Chris Clarke
Executive Director
Desert Advocacy Media Network

Cameron Mayer
Executive Director
Friends of the Amargosa Basin

Kayla Browne
Desert and Renewable Energy Policy Director
Friends of the Inyo

Krystian Lahage
Public Policy Officer
Mojave Desert Land Trust

Neal Desai
Pacific Senior Regional Director
National Parks Conservation Association

Joan Taylor
California/Nevada Desert Committee Chair
Sierra Club

Laura Cunningham
California Director
Western Watersheds Project

Comment Received From: National Parks Conservation Association
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

National Parks Conservation Association comments on DEIR Staff Assessment

Additional submitted attachment is included below.

February 27, 2026

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: Comments on Soda Mountain Solar Staff Assessment / Draft EIR

Commissioner Gallardo and Commissioners,

On behalf of the National Parks Conservation Association, we write to express our continued opposition to the Soda Mountain Solar project. The California Energy Commission (CEC) Staff Assessment / Draft Environmental Impact Report (SA/EIR) relies on a patchwork of unsubstantiated evidence of the impacts to desert bighorn sheep, and visual impacts to the adjacent Mojave National Preserve (MOJA). 22-1

0.25 Mile Bighorn Sheep Buffer Relies on Insubstantial Evidence

The California Environmental Quality Act (CEQA) is clear in its guidelines in defining whether a project may or may not have a significant effect on the environment. When these guidelines are applied to the impacts to desert bighorn sheep in the Soda Mountain region it's clear the CEC has chosen to apply impact standards for what fits best for the applicant. The SA reveals this choice—the CEC acknowledges that desert bighorn sheep are impacted by 1) population fragmentation from development 2) movement restriction and habitat loss from development footprint and fencing 3) substantial collar and movement evidence of sheep using adject areas.

Dr. Christina Aiello, bighorn sheep biologist and author of leading studies on the Soda Mountain region population including a report commissioned by the National Park Service that was submitted to the CEC in this process, repeatedly outlines the importance of the Soda Mountain I-15 corridor to maintaining long term habitat connectivity. Aiello even goes so far as to say that "movement between the Soda and Cady Mountains ranked among the top five existing movement corridors with the largest contributions to region-wide connectivity."[1] Aiello proposes three specific mitigations to lower the level of impacts to the desert bighorn sheep populations to less than significant, including, (1) a minimum of a 0.62 mile buffer—a recommendation in direct contrast with the SA's chosen 0.25 mile buffer, (2) delay construction of the solar project until after movement of desert bighorn sheep has been established over the new wildlife crossing that is currently under development, and (3) reassess any mitigations based on conditions following adoption of the crossing by wildlife. 22-2

[1] Aiello 2025 – Christian Aiello (TN 261255). Christian Aiello comments – Impacts to desert bighorn sheep, dated January 23, 2025. Accessed online at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=261255&DocumentContentI d=9762

CEC relies on an outdated 2013 recommendation from the California Department of Fish and Wildlife (CDFW) for their 0.25-mile buffer. The acceptance of a 0.25 mile buffer ignores the empirical and biological evidence from the Aiello study, a study that uses GPS-collar data and peer-reviewed literature. Importantly, CDFW has informed the CEC numerous times, including at the CEC SA/DEIR public meeting in February, that (1) there is caution in relying upon the Dudek Report, as CEC is doing to justify a 0.25mi buffer, because that report was developed as part of a public process that never started and the report wasn't put forward in any public process, (2) that CDFW has not determined if that 0.25mi buffer represents the most up-to-date, best-available science on this matter in light of its understanding of the Aiello Report commissioned by the National Park Service, (3) that CDFW's 0.25mi buffer stems from a recommendation from 2013 and Dudek Report's incorporation of that simply reflects what was stated previously and carried over, not that the buffer represents what's required to reduce level of impact to less than significant, and (4) that it is the CEC's responsibility to assess the Aiello Report to determine how it influences the CEC's determination of impact significance and related, how it influences CEC's incorporation of mitigation measures. Said differently, CDFW has stated that CEC cannot use an objectively outdated CDFW report and CDFW's name as justification to throw the nation's leading bighorn sheep scientists, and their research, under the bus.

22-2 con.

While the CEC SA widely acknowledges the adjacent future Brightline West project and its accompanying wildlife crossing, its 0.25 mile buffer does not consider cumulative impacts from these multiple projects, and the importance of the Soda Mountains to greater Mojave desert bighorn sheep populations.

Despite CEC's SA recognizing the Brightline West project and its wildlife crossings, the significant and unavoidable impacts to desert bighorn sheep, and the leading bighorn sheep biologists clear recommendations, a 0.25 mile buffer is still chosen. CEQA requires a lead agency to consider a reasonable range of potentially feasible alternatives, not simply alternatives that are in the applicants best interest.

The SA should have, and CEC must now, analyze alternatives with the mitigations provided in the Aiello Report. While the applicant has proposed a 300 megawatts (MW) PV / 300 MW, 1,200 MW-hours storage facility, CEC's Opt-In process explicitly authorizes it to approve "Solar photovoltaic or terrestrial wind electrical generating power plants generating 50 megawatts (MW) or greater" and "Energy storage systems capable of storing 200 megawatt-hours (MWh) [50 megawatts] or more," highlighting that the CEC itself understands smaller-scale projects are both appropriate and feasible.

22-3

Smaller scale solar, battery, and solar + battery projects are not only appropriate and feasible under CEC's Opt-In process, but they are also being deployed in California, the American Southwest, and across the nation. For example, according to the Solar Energy Industries Association website, the Sienna 2 Solar (55MW) and Storage (55MW) project, the Desert Harvest 2 Solar (70MW) + Storage (35 MW) project, the Hudson High Solar (100MW) and Storage (50MW storage) project, the Colgreen North Shore Solar (75MW) project, the Silver State North Solar (50MW) project, and Sunray 3 Solar (13MW) project.

Visual Impacts to Mojave National Preserve

The proposed Soda Mountains Solar project lies within one mile of the Soda Mountains Wilderness Study Area and immediately adjacent to the Mojave National Preserve (MOJA). The applicant prepared visual resources technical report (VRTR) recognizes the importance of scenic viewsheds of National Park Service (NPS) managed units, and projects that are adjacent to them. Unfortunately, the VRTR, and the CEC SA fall woefully short of analyzing the significance of visual impacts to MOJA, despite an abundance of evidence pointing to NPS's concerns of this project in the past, and the foundational importance of scenic vistas to MOJA's landscape. 22-4

The CEC concludes that from the 11 key observation points (KOPs) there is a.significant.and. unavoidable.impact, an impact that fails to incorporate the importance of scenic vistas of a national park unit. They do however define a scenic vista, and conveniently use landscapes managed by NPS in their description,

> "An example of a scenic vista in a rural landscape would be the view through and along the Yosemite Valley as seen from the Wawona Tunnel overlook in Yosemite National Park, California. In an urban landscape, two examples include the view through and along the National Mall from the Washington Monument in Washington, D.C. and the view through and along Capitol Mall from the Tower Bridge to the California State Capitol building in Sacramento, California. Once a scenic vista is identified, an adverse effect is presumed when a sizable component(s) of the proposed project physically changes (e.g., obstructs) the scenic vista."

In analyzing the visual impacts both the VRTR and the CEC SA recognize the General Management Plan (GMP) and the NPS Night Sky Program, but then conclude, "No area of the preserve would experience full views of the project. For these reasons, combined with the project being located outside of the boundary of the Preserve and outside the jurisdiction of NPS land use management, the project would comply with the goals and policies of the General Management Plan for the Mojave National Preserve during the construction stage and O&M."[2] Since 2014, NPS has made it clear on the impacts of the Soda Mountain Solar project, as comment letter during the BLM EIS / San Bernardino County EIR process, "We are, therefore, concerned about the project's long-term degradation of the unique visual resources that define the Mojave Desert and contribute to scenic values of the area…NPS has identified the desert scenery as a fundamental resource for Mojave National Preserve." The importance of scenic vistas to National Parks is codified in the Organic Act stating, "which purpose is to conserve the scenery and the natural and historic objects and the wild life therein."[3] These values are reinforced in the General Management Plan and the Foundation Document for MOJA, where it is clearly stated that "desert scenery"[4] is fundamental to the values for the Preserve. For the VRTR to ignore the clear significance of a solar project next to a National Park unit is to undermine the fundamental value and resource of the Mojave National Preserve.

Conclusion

Substituting applicant convenience for substantial scientific evidence is not an acceptable method of CEQA analysis and permitting. Throughout multiple iterations of the Soda Mountain Solar project there has been evidence backed science focused on the impacts of this project to the regional 22-5

[2]Appendix B Visual Resources Technical Report
https://efiling.energy.ca.gov/GetDocument.aspx?tn=264864&DocumentContentId=101637
[3] (16 USC §1)
[4] NPS, 2013. Foundation Document, Mojave National Preserve, California. June.
[http://home.nps.gov/moja/parkmgmt/upload/MOJA_FoundationDoc_Final_June_2013_W EB.pdf]

desert bighorn sheep populations. The underlying conclusion of this project has remained the same: there are significant and unavoidable impacts to this fully protected (under CESA) species. CEC has chosen to cherry-pick mitigation tactics in the name of project feasibility that suits an applicants desires.

22-5 con.

The visual impacts from a utility scale solar project, especially one that sits adjacent to a wilderness area and a National Park unit, must consider the park-specific values of preserving scenic viewsheds, and utilize not just the applicant's contractor for visual impacts, but the agency that stands to be most impacted, the National Park Service.

Sincerely,

Mason Osgood
California Desert Program Manager
National Parks Conservation Association

Comment Received From: California Native Plant Society
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

CNPS Comment - Soda Mountain Solar Project SA-DEIR

February 27, 2026

California Energy Commission
Attn: Lisa Worrall, Project Manager
715 P Street
Sacramento, CA 95814

Submitted via email to: STEPsiting@energy.ca.gov, Chair.Hochschild@energy.ca.gov, CommissionerGallardo@energy.ca.gov

Submitted via the web to: https://efiling.energy.ca.gov/

Re: California Native Plant Society Comments on Soda Mountain Solar Project Staff Assesment/Draft Environmental Impact Report

Dear Ms. Worrall, Chair Hochschild, and Commissioner Gallardo:

Thank you for the opportunity to comment on the Soda Mountain Solar Project Staff Assessment (SA)/Draft Environmental Impact Report (DEIR). The following comments are submitted on behalf of the California Native Plant Society (CNPS), a non-profit environmental organization with over 13,000 members in 35 Chapters across California and Baja California, Mexico. CNPSâ€™s mission is to protect Californiaâ€™s native plants and their natural habitats, today and into the future, through science, education, stewardship, gardening, and advocacy. We work closely with decision-makers, scientists, and local planners to advocate for well-informed policies, regulations, and land management practices. 23-1

Opposition to Project Siting

While our organization is in strong support of the development of renewable energy, where we place renewable energy projects and how we meet our energy needs are critical to the conservation of remaining intact habitats, preservation of biodiversity, and achieving Californiaâ€™s 30x30 goals. The proposed Soda Mountain Solar Project is not compatible with these goals.

This project is not sited within a designated development focus area as designated by the Desert Renewable Energy Conservation Plan (DRECP), a plan that has provided access to huge swaths of lower conflict lands for solar development. Both the National Park Service and the California Department of Fish and Wildlife (CDFW) have cited concerns with the impacts to desert bighorn sheep, a CDFW fully protected species, 23-2

CALIFORNIA
NATIVE PLANT SOCIETY
2707 K Street, Suite 1, Sacramento, CA 95816-5130 (916) 447-2677 www.cnps.org
Protecting California's native flora since 1965

February 27, 2026

California Energy Commission
Attn: Lisa Worrall, Project Manager
715 P Street
Sacramento, CA 95814

Submitted via email to: STEPsiting@energy.ca.gov, Chair.Hochschild@energy.ca.gov, CommissionerGallardo@energy.ca.gov
Submitted via the web to: https://efiling.energy.ca.gov/

Re: California Native Plant Society Comments on Soda Mountain Solar Project Staff Assesment/Draft Environmental Impact Report

Dear Ms. Worrall, Chair Hochschild, and Commissioner Gallardo:

Thank you for the opportunity to comment on the Soda Mountain Solar Project Staff Assessment (SA)/Draft Environmental Impact Report (DEIR). The following comments are submitted on behalf of the California Native Plant Society (CNPS), a non-profit environmental organization with over 13,000 members in 35 Chapters across California and Baja California, Mexico. CNPS's mission is to protect California's native plants and their natural habitats, today and into the future, through science, education, stewardship, gardening, and advocacy. We work closely with decision-makers, scientists, and local planners to advocate for well-informed policies, regulations, and land management practices. 23-1

Opposition to Project Siting

While our organization is in strong support of the development of renewable energy, where we place renewable energy projects and how we meet our energy needs are critical to the conservation of remaining intact habitats, preservation of biodiversity, and achieving California's 30x30 goals. The proposed Soda Mountain Solar Project is not compatible with these goals.

This project is not sited within a designated development focus area as designated by the Desert Renewable Energy Conservation Plan (DRECP), a plan that has provided access to huge swaths of lower conflict lands for solar development. Both the National Park Service and the California Department of Fish and Wildlife (CDFW) have cited concerns with the impacts to desert bighorn sheep, a CDFW fully protected species, that would result from this development. The project would block access to the legislatively required, and taxpayer funded, wildlife crossing planned to improve habitat connectivity for desert bighorn sheep. This project is now being brought forward by its fourth owner after failing to advance under previous lead agencies. 23-2

SA/DEIR Comments

Project Alternatives

We would strongly encourage the CEC to disclose the alternative sites that were stated to be considered but dismissed, as is reported in the SA/DEIR. There are many areas within DRECP Development Focus Area that would be more suitable for large scale solar development than this site. An analysis of an alternative to repurpose the Ivanpah Solar Generation Site should also be considered. This information and additional alternatives analysis should be circulated for public review in a supplemental SA/DEIR prior to the development of the FSA/FEIR. 23-3

MM BIO-6

The development of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) should not be deferred until after project approval. There is sufficient information in the PSA/DEIR to guide the development of the BRMIMP as required by § 15126.4 (a)(1)(B) of CEQA which states that "mitigation measures shall not be deferred until some future time," unless "it is impractical or infeasible to include those details during the project's environmental review." Additionally, the BRMIMP must be fully enforceable through permit conditions, agreements, or other legally binding instruments as required by §15126.4(a)(2) of CEQA and must include explicit performance standards and monitoring requirements to define and evaluate when these standards are being met. Provisions to require adaptive management and additional monitoring in the event that standards are not being met should be incorporated into the BRMIMP. A supplemental SA/DEIR including the BRMIMP should be circulated for full public review and comment prior to the development of the FSA/FEIR. 23-4

MM BIO-7

This mitigation measure should indicate that avoidance of botanical resources should be prioritized over any form of compensatory mitigation. 23-5

MM BIO-8

The development of the Vegetation Management Plan (VMP) should not be deferred until after project approval. There is sufficient information in the SA/DEIR to guide the development of the VMP as required by § 15126.4 (a)(1)(B) of CEQA which states that "mitigation measures shall not be deferred until some future time," unless "it is impractical or infeasible to include those details during the project's environmental review." Additionally, the VMP must be fully enforceable through permit conditions, agreements, or other legally binding instruments as required by §15126.4(a)(2) of CEQA and must include explicit performance standards and monitoring requirements to define and evaluate when these standards are being met. Provisions to require adaptive management and additional monitoring in the event that standards are not being met should be incorporated into the VMP. The VMP should explicitly require the use of locally sourced and genetically appropriate seed or cuttings, preferably sourced from material within the project site. All mentions of the allowance for the Compliance Project Manager (CPM) to approve the use of material from other sources should be removed from this mitigation measure. MM BIO-8 should include language indicating that collecting seed or cutting material 23-6

to be bulked by the California Botanic Garden, or by another native plant nursery in coordination with the California Botanic Garden, may be needed to ensure the required quantities of suitable propagules or transplants. Salvaged topsoil should be stored in a manner to prevent contamination with non-native species and to be kept dry to prevent the germination of the seedbank contained prior to redistribution. A supplemental SA/DEIR including the VMP should be circulated for full public review and comment prior to the development of the FSA/FEIR. 23-6 con.

MM BIO-9

The development of the Integrated Weed Management Plan (IWMP) should not be deferred until after project approval given the significant information regarding invasive species present on the project site and the potential for project activities to introduce invasive species and to facilitate the proliferation of invasive species, as required by § 15126.4 (a)(1)(B) of CEQA which states that "mitigation measures shall not be deferred until some future time," unless "it is impractical or infeasible to include those details during the project's environmental review." Additionally, the IWMP must be fully enforceable through permit conditions, agreements, or other legally binding instruments as required by §15126.4(a)(2) of CEQA and must include explicit performance standards and monitoring requirements to define and evaluate when these standards are being met. Provisions to require adaptive management and additional monitoring in the event that standards are not being met should be incorporated into the IWMP. A supplemental SA/DEIR including the IWMP should be circulated for full public review and comment prior to the development of the FSA/FEIR. 23-7

MM BIO-12

This mitigation measure should clearly define "feasible" regarding avoidance of special status plant species. The minor modification or reduction of the project footprint or placement of project facilities that would allow for the majority of project objectives to be achieved, or minor changes to the alignment of access routes, should be considered as feasible when considering the avoidance of sensitive resources. Avoidance of botanical resources should be prioritized over any form of compensatory mitigation. BIO-12 states that CRPR 1 or 2 ranked species would receive a 3:1 mitigation ratio and in the next line state that these species would receive a 2:1 mitigation ratio, this should be amended to clarify that the 3:1 mitigation ratio would apply to "any state or federally listed plants and CRPR 1 or 2 ranked species" and that a mitigation ratio of 2:1 would be applied to "CRPR 3 or 4 ranked species." The development of a relocation plan for special status plants should not be deferred until a point at which "salvage and relocation is not believed to be feasible for special status plants." This relocation plan should be developed in coordination with California Botanic Garden, BLM, or another qualified entity at the point that it is determined that the relocation of a special status species is deemed necessary and this plan should help to guide decisions whether the relocation of the species in question is feasible, or if the development of a propagation and reintroduction plan is necessary. The performance standards and term of mitigation are not clearly defined in this mitigation measure to a level to achieve enforceability as required by § 15126.4 (a)(2) of CEQA. This mitigation measures must include explicit performance standards, as well as a mechanism to ensure that these standards are achieved, and contingencies for additional mitigation and adaptive management. 23-8

MM BIO-13

The Vegetation Resources Management Plan (VRMP) should be developed and circulated in a revised Staff Assessment (DEIR) for public review prior to project approval. The VRMP is essential to the success of mitigation measures BIO-13. Given that there is sufficient information regarding the anticipated impacts of the project to develop the VRMP the deferral of developing this plan is in violation of section 15126.4 (a)(1)(b) of CEQA which only allows for specific details to "be developed after project approval when it is impractical or infeasible to include those details during the project's environmental review." This mitigation measure should prioritize the avoidance of botanical resources over any form of compensatory mitigation, These measures also lack the required enforceability required in section 15126 (a)(2) of CEQA. This mitigation measures must include a fully developed VRMP as well as explicit performance standards and a full description of mechanisms to ensure that these standards are achieved, contingencies for additional mitigation and adaptive management, and a guarantee for the funding of mitigation, monitoring, and enforcement. A supplemental SA/DEIR including the VRMP should be circulated for full public review and comment prior to the development of the FSA/FEIR. 23-9

Maintenance and Monitoring

We strongly recommend the following requirements regarding the development of mitigation measures, the term of mitigation, and the ongoing monitoring of performance standards throughout the life of the project be incorporated into MM BIO-6, MM BIO-8, MM BIO-9, MM BIO-12 and BIO-13:

- Avoidance of impacts to special status species and sensitive vegetation communities should be prioritized over any form of restoration or compensatory mitigation.
- Species-specific restoration plans should be developed for all special status plants with the potential to be impacted, including detailed criteria for determining the success of restoration or compensatory mitigation.
- Restoration plans should be developed for all sensitive plant communities with the potential to be impacted, including detailed criteria for determining the success of restoration or compensatory mitigation. 23-10
- Areas identified as potential recipient sites must be surveyed following CDFW Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities (Protocols) to ensure that compensatory mitigation sites would be suitable for target species or vegetation communities and that mitigation efforts would not cause harmful impacts to existing botanical resources. Low conflict areas that have been degraded by previous land uses should be prioritized for restoration, leaving intact natural habitat undisturbed by restoration efforts.
- While onsite mitigation is preferred, if contiguous acreage to achieve mitigation needs is not present on the project site restoration activities may be implemented offsite.
- Maintenance and monitoring of compensatory mitigation and restoration sites should occur each year for the first five years of the mitigation term. After five years of maintenance, yearly monitoring of the site should demonstrate a self-sustaining area of occupation and population numbers with no management actions for years 6-8.
- If monitoring shows stable populations after three years (following the initial 5-year period of annual monitoring) with no maintenance, the populations should be monitored

every two years throughout the life of the project.

- If the populations do not demonstrate stability/adherence to species specific success criteria after the initial five year maintenance and monitoring period, after three years without maintenance, or if subsequent monitoring shows loss or decline of populations, as determined by the required mitigation ratio and/or performance standards for compensatory mitigation and/or restoration, then yearly maintenance and monitoring shall be resumed for a five year period, again requiring that yearly monitoring show self-sustaining populations for three years post maintenance before returning to a two year monitoring cycle.

23-10 con.

In conclusion, please develop a supplemental SA/DEIR to address the siting issues outlined above and to incorporate the listed recommendations to improve the mitigation measures for botanical resources. Thank you for the opportunity to comment on this project and please contact me if you have any questions.

Sincerely,

Brendan Wilce
Conservation Program Coordinator
California Native Plant Society
bwilce@cnps.org

Comment Received From: Benjamin Zuckerman
Submitted On: 1/6/2026
Docket Number: 24-OPT-03

Soda Mountain Solar Project

I am a supporter of solar power and have had solar panels on the roof of my house since 2002. But putting industrial scale solar in biologically sensitive areas and running power lines over endless miles of additional sensitive areas is the wrong way to do solar. Our species is responsible for the demise of numerous wild species -- the desert bighorn and tortoise deserve more from us than destructive infringement of their home ranges.
I would like to quote County Supervisor Robert Lovingood: "It is hard to justify damaging sensitive desert lands when we have disturbed lands near transmission corridors that are ideally suited". 24-1

Comment Received From: Elizabeth Epstein
Submitted On: 2/11/2026
Docket Number: 24-OPT-03

Negative impacts of Soda Mountain Solar Project

The Soda Mountain Solar Project as proposed will negatively affect the bighorn herds in addition to other biological resources in the area. There are vital wildlife crossings in the area proposed. There are places that are currently disturbed that can be used instead. 25-1

Comment Received From: Elisabeth Robson
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

I oppose the Soda Mountain Solar Project

Please select a No Project Alternative for the Soda Mountain Solar Project. 26-1

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 26-2

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 26-3

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard. 26-4

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls.

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 26-5

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 26-6

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 26-7

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 26-8

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 26-9

For these reasons, CEC must select a No Project Alternative! 26-10

Thank you
Elisabeth Robson

Comment Received From: Cody Dolnick
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

Please select a No Project Alternative for the Soda Mountain Solar Project.

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 27-1

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 27-2

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard. 27-3

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls.

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 27-4

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on 27-5

Interstate 15. An alternative eliminating lithium battery storage was not considered. 27-5 con.

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 27-6

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 27-7

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 27-8

For these reasons, CEC must select a No Project Alternative! 27-9

Thank you

Comment Received From: Stephen Denham
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

Soda Mountain Solar Project

Please select the No Project Alternative for the Soda Mountain Solar Project. 28-1

The California Energy Commission (CEC) has determined that the project would result in significant and unavoidable impacts to desert bighorn sheep. The site is adjacent to a critical herd in the Cady Mountains that relies extensively on the southern Soda Mountains. The required 8-foot chain-link security fencing would exclude large wildlife and partially block an established movement corridor, preventing passage by bighorn sheep. 28-2

The CEC has also determined that the project would have significant and unavoidable impacts on visual resources. The project site is adjacent to the Mojave National Preserve and would conflict with visual resource standards established by the Desert Renewable Energy Conservation Plan. 28-3

The project would impede habitat connectivity for the federally threatened and California state-endangered Mojave desert tortoise.

Aeolian sand transport would be disrupted, and habitat would be removed for the Mojave fringe-toed lizard.

Habitat loss would also affect rare plant species, kit fox, American badger, and burrowing owl populations. 28-4

Groundwater extraction from five on-site wells would contribute to cumulative groundwater decline affecting the springs at Zzyzx and the federally endangered Mojave tui chub. An alternative relying on off-site wells was not selected. 28-5

Proposed lithium battery energy storage systems (BESS) present a risk of thermal runaway events that could release toxic smoke and hazardous chemicals, potentially affecting the local environment and motorists on Interstate 15. An alternative excluding lithium battery storage was not evaluated. 28-6

Project review should be suspended pending development of a Comprehensive Management Plan for the Old Spanish National Historic Trail. 28-7

The project location was not designated for solar development under the Desert Renewable Energy Conservation Plan and is not within a Development Focus Area. 28-8

Caltrans is constructing a wildlife crossing over Interstate 15 to maintain habitat connectivity for desert bighorn sheep; the proposed project would undermine the 28-9

effectiveness of this measure.

For these reasons, the CEC should select the No Project Alternative.

28-10

Thank you for your consideration.

Comment Received From: Leor Kaminski
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

I oppose this Solar project

I commend California for taking steps to reduce our carbon footprint and use Solar energy. However, I am saddened to think that we should fix our climate problem by exacerbating our biodiversity crisis. I am proud to be an American and a Californian, and am especially proud of our plant and animal diversity and our wild landscapes and public lands. I am especially proud to be Californian when I read about the times that our grid is nearly 100% renewable, however, I do not think that we should build a solar farm on some of our last wild landscapes that still exist. There must be a better way. Therefore, I do not support the Sods Mountain Solar Project

29-1

Comment Received From: Teresa Skye
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

Soda Mountain solar

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 30-1

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 30-2

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard.

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls. 30-3

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 30-4

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 30-5

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 30-6

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 30-7

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 30-8

We are on our way tomorrow to spend a week in Mojave NP. The thought of that 30-9

landscape being dismantled is sickening.

30-9 con.

For these reasons, CEC must select a No Project Alternative!

Thank you"
Teresa Skye

Comment Received From: Lorraine Markoff
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

Please select a No Project Alternative for the Soda Mountain Solar Project

Please select a No Project Alternative for the Soda Mountain Solar Project! 31-1

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 31-2

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 31-3

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard.

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls. 31-3

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 31-4

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 31-5

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 31-5

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 31-6

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert 31-7

bighorn sheep, but the Soda Mountain project would block it. 31-7 con.

There are so many things wrong with this project, that, please, CEC must select a No Project Alternative! 31-8

Thank you very much!

Comment Received From: Brian G. Hammer Sr
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

Bad for California

This proposed site is a nightmare for California: Human, Animals, and wildlands alike.
We are awash in Solar Energy and often CALISO must sell electricity to Arizona to take the energy ! Why then are we still building industrial solar sites? Tax benefits to the owners and builders. This is a factor in why electricity is so expensive in California.
Did anyone mention that the wildlife crossing is adjacent to the proposed site?
Desert plants sequester carbon in a big way. Disturb the soil and it starts releasing it again. 32-1
Hey, I thought the reason for solar is to sequester carbon?
Once disturbed desert soils will generate dust for decades. This will close the Interstate regularly. No amount of water will stop this dust. Is the State willing to do an Owens lake solution to this site.
Use the "No Project Alternative", the only way Californians benefit.
For your consideration.

Comment Received From: FRANK HARRIS
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

Build solar near cities and towns

Build solar in urban areas
Industrial roof tops, public buildings, airports

33-1

Comment Received From: Julia Cichon
Submitted On: 2/23/2026
Docket Number: 24-OPT-03

Soda Mt Dolar Project

I oppose this project because it is detrimental to the wildlife environmrnt 34-1

Comment Received From: Mary K. Moore
Submitted On: 2/24/2026
Docket Number: 24-OPT-03

No Project Alternative

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 35-1

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 35-2

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard. 35-3

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls.

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 35-4

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 35-5

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 35-6

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 35-7

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 35-8

For these reasons, CEC must select a No Project Alternative! 35-9

Thank you,
Mary K. Moore

Comment Received From: George Silliman
Submitted On: 2/24/2026
Docket Number: 24-OPT-03

Soda Moutain Solar Project

Please select the No Project Alternative for the Soda Mountain Solar Project. I worked for years for that alternative to project big horn sheep, to secure a passage over I15, and to secure water resources. Thank you. 36-1

George Sidney Silliman, Ph.D.

Comment Received From: Pamela Nelson
Submitted On: 2/24/2026
Docket Number: 24-OPT-03

no on soda mountain project

Dear Commissioners,
Please select a No Project Alternative for the Soda Mountain Solar Project
There has been discussion about this site for decades. It's very unsuitable for a solar project. CA is becoming so fragmented, I'm worried we won't have any of our iconic wildlife left for our present and future generations to learn about and enjoy. When we drive in this area, it's so refreshing to think there is still a chance for our species as we look across the beautiful expanse. 37-1

The Bighorn sheep, tortoises (that have really taken a beating already), lizards, foxes, badgers and the list goes on will be permanently detrimentally and most likely fatally effected. Water resources will dwindle; there's not enough!
The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 37-2

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 37-3

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.
Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard.
Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls. 37-4

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 37-5

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 37-6

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 37-7

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 37-8

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 37-9

CEC must select a No Project Alternative!

37-10

Comment Received From: carol gerratana
Submitted On: 2/25/2026
Docket Number: 24-OPT-03

No Project Alternative

This project would harm desert wildlife. This project would harm the desert itself, the very ground and desert life forms. This project would lead to pollution and death.

For all the money being invested why not put solar on every roof, homes and business. The groundwater decline alone is more than enough reason to put an end to any desert solar construction!

38-1

Comment Received From: Carole Childs
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Soda Mountain Solar Project

Please select a No Project Alternative for the Soda Mountain Solar Project. 39-1

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 39-2

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 39-3

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard.

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls. 39-4

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 39-5

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 39-6

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 39-7

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 39-8

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 39-9

For these reasons, CEC must select a No Project Alternative! 39-10

Thank you.

Comment Received From: Claire Vaye Watkins
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Opposed to Soda Mtn Solar

The Soda Mountain solar project is a terrible idea and will have catastrophic impacts on all living things in that area, including endangered bighorn sheep. Please deny this project. 40-1

Comment Received From: Judy Branfman
Submitted On: 2/25/2026
Docket Number: 24-OPT-03

select a No Project Alternative for the Soda Mountain Solar Project

Hello California Energy Commission,

The Soda Mountain Solar Project is wrong for so many reasons: creating a visual disturbance in the natural landscape, cutting off travel routes and habitat for numerous species, taking precious water resources from limited groundwater, and more. San Bernardino County rejected the project, stating â€œIt is hard to justify damaging sensitive desert lands when we have disturbed lands near transmission corridors that are ideally suited". And incredibly even the Los Angeles Department of Water and Power cancelled their power purchase agreement with the project in 2015 over the impacts it would have on the California desert. 41-1

This unwanted and un-needed project would create a terrible precedent for other bad projects across our precious California deserts and I urge you to choose a No Project Alternative.

Comment Received From: Mathieu Federspiel
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

I value wild mountains

Please select a No Project Alternative for the Soda Mountain Solar Project.

I live close to desert areas of Oregon and enjoy visiting desert areas of California. I know how biologically rich these areas are, especial with mountains like the Soda. These areas are valueable to me and to the many people who enjoy recreation in these areas. Alternative solar options, like rooftop solar, are better than converting wild area to industrial solar farms. 42-1

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 42-2

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 42-3

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard.

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls. 42-4

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 42-5

Lithium battery banks or BESS storage could cause a thermal runaway fire which would 42-6

emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 42-6 con.

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 42-7

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 42-8

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 42-9

For these reasons, CEC must select a No Project Alternative! 42-10

Thank you!

Comment Received From: Jeff Griffin
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Please select a No Project Alternative for the Soda Mountain Solar Project

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 43-1

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 43-2

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard. 43-3

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls.

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 43-4

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 43-5

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 43-6

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 43-7

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 43-8

43-9

For these reasons, CEC must select a No Project Alternative!

Thank you,
Jeff Griffin

Comment Received From: Mark Carrington
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

Please Select a No Project Alternative â€“ Soda Mountain Solar Project

Please Select a No Project Alternative â€“ Soda Mountain Solar Project

To the California Energy Commission,

I respectfully urge the Commission to select the No Project Alternative for the Soda Mountain Solar Project. 44-1

This proposal would industrialize 2,670 acres of intact desert landscape directly adjacent to the Mojave National Preserve. The Commissionâ€™s own analysis acknowledges significant and unavoidable impacts, particularly to desert bighorn sheep and visual resources. Issuing a Statement of Overriding Considerations in the face of such impacts undermines public confidence in the review process and the intent of environmental protections.

The project site lies within a critical movement corridor for desert bighorn sheep associated with the Cady Mountains herd. Eight-foot security fencing surrounding the facility would block wildlife movement entirely, fragmenting habitat at a time when the State is investing millions of dollars in wildlife crossings to maintain connectivity across Interstate 15. Approving this project would directly contradict those conservation investments. 44-2

Federally threatened Mojave desert tortoise habitat would be further fragmented. Mojave fringe-toed lizard populations, already impacted elsewhere by large-scale solar development, would lose additional habitat and experience cumulative impacts to sand transport systems essential to their survival. Kit foxes, American badgers, burrowing owls, and rare plant communities would lose 4 square miles of functioning desert ecosystem.

The project proposes extraction of groundwater from up to five new onsite wells within the Soda Lake Valley Basin. In an arid region where springs and hydrologic systems are interconnected, even â€œless than significantâ€• determinations deserve precaution. Groundwater ultimately supports sensitive desert ecosystems, including springs near Zzyzx and habitat for the federally endangered Mojave tui-chub. Water for construction should be trucked in rather than drawn from fragile desert aquifers. 44-3

The 300 MW battery storage component introduces additional risk. Lithium battery thermal runaway events have demonstrated the capacity to burn for extended periods, release toxic smoke, and disrupt transportation corridors. Emergency response capabilities in remote desert communities remain limited. 44-4

Visual impacts have been determined significant and unavoidable. Industrial-scale solar arrays adjacent to a national preserve contradict the landscape protection goals of the Desert Renewable Energy Conservation Plan. The project site was not designated as a Development Focus Area under that plan. 44-5

The presence of the congressionally designated Old Spanish National Historic Trail within proximity of the project area further warrants caution. Analysis should be paused until a Comprehensive Management Plan for the Trail is completed, including consideration of appropriate protective buffers. 44-6

Renewable energy development is necessary â€” but it must be responsibly sited. As San Bernardino County previously recognized, disturbed lands near transmission corridors are more appropriate than intact desert landscapes adjacent to national preserves. 44-7

For these reasons, I respectfully request that the Commission select the No Project Alternative for the Soda Mountain Solar Project.

Thank you for your consideration.

Mark Carrington
Active Communities of Desert Center
Lake Tamarisk, California

Comment Received From: Eric Smith
Submitted On: 2/26/2026
Docket Number: 24-OPT-03

No Alternative for the Soda Mountain Solar Project

I am writing regarding the Soda Mountain Solar Project.

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. Caltrans is currently building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 45-1

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 45-2

In addition:

- The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

- Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard. 45-3

- Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls.

- The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 45-4

- Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 45-5

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 45-6

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan, and the Soda 45-7

Mountain area is not a Development Focus Area. 45-7 con.

For these reasons, CEC must select a No Project Alternative! 45-8

Comment Received From: Kevin Kingma
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

Soda Mountain Solar Comment letter

Dear Commissioners:

California governance seems to be caught up in a recent, temporary urge to skirt previous environmental law and regulations. It is doing this with energy projects and housing approvals, and seems to be motivated mostly by the desire to show that the predominant political party in California can get things done â€“ in other words, for political reasons.

I urge the CEC to instead consider that environmental guard rails came into being for a reason, and to reject projects that do not meet rational standards.

The Soda Mountain Solar project is an example of an energy project that does not meet rational standards. It has a long history of being rejected by local towns, the county of San Bernardino, East Kern County, the Mojave Desert Resource Conservation District, Los Angeles Department of Water and Power, and local Native American Nations. It was rejected by the Desert Renewable Energy Conservation Plan (DRECP). It has been rejected by environmentalists who fully understand climate change but comprehend that the benefit of this project does not justify the costs, and that there are much better alternatives, like solar energy from rooftop solar and solar projects on disturbed urban lands.

46-1

The Soda Mountain Solar project has a long list of environmental harms:
1) It will harm Desert Bighorn Sheep, the federally threatened Mojave Desert Tortoise, the Mojave fringe-toed lizard, Kit Foxes, American Badgers and Burrowing Owls.
2) It will use up scarce ground water in a desert environment.
3) There is the potential risk of fire from lithium batteries in a location that has limited fire control resources.
4) It will likely impact the Old Spanish National Historic Trail. There is pending BLM/NPS planning for a 5 mile buffer that the project would fall within.
5) Visual impacts would be significant and should not be ignored with a simple statement that this is unavoidable and unmitigatable.
6) Dust from disturbed desert has a significant potential for harm to public health.

46-2

For all of theses reasons, I urge you to look for better alternatives to site solar energy projects, to set an example for wise use of our public lands, and to choose a NO PROJECT alternative for the Soda Mountain solar project.

Comment Received From: William Helmer
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

Comment on Soda Mountain Solar Project

I recommend No Project for the Soda Mountain Solar Project. This old project has should still be rejected, and it was a mistake to resurrect this project again. This is a waste of time and money. Also, the NEPA review by BLM with an updated Environmental Impact Statement should occur at the same time as the CEQA review by the California Energy Commission (CEC). 47-1

There was virtually no analysis of the Project's impacts to the Old Spanish National Historic Trail (OSNHT) by the BLM. The Project lies within the ten mile wide OSNHT Corridor, and cultural landscape impacts must be analyzed within this corridor. Visual impacts are are only a part of the analysis, and impacts to the Trail should not be reduced to the geographic centerline of the OSNHT Corridor. A full Section 106 analysis according to regulations of the National Historic Preservation Act must be conducted, with consultation interviews with individuals and organizations familiar with the history and cultural resources of this part of the Mojave Desert. 47-2

The Project is too close to Mojave National Preserve, and will impact this very scenic area of the Mojave Desert. 47-3

In conclusion, the recommendation by CEC for a Finding of Overriding Consideration should be rejected for a project with significant impacts that canâ€™t be mitigated. 47-4

Comment Received From: Judith Baker
Submitted On: 2/27/2026
Docket Number: 24-OPT-03

Select a No Project Alternative for the Soda Mountain Solar Project

I am a public health professional who lives in and recreates in the desert, contributing to local economies. I urge you to select a No Project Alternative for the Soda Mountain Solar Project. It will significantly and permanently harm the environment, harming people, plants and animals, outlined below. 48-1

The California Energy Commission (CEC) determined this project will significantly and unavoidably harm desert bighorn sheep. The project is adjacent to an essential bighorn herd in Cady Mountains that uses the south Soda Mountains extensively. The solar project will block a sheep movement corridor, due to its 8-foot-tall chain-link security fences. 48-2

The CEC concluded the project will significantly and unavoidably harm visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan. 48-3

The project will block connectivity for federally threatened and California State Endangered Mojave Desert Tortoise.

The project will block sand transport, and remove habitats for Mojave fringe-toed lizard, for rare plants, kit foxes, American badgers and burrowing owls. 48-4

The project would extract water from 5 onsite wells exacerbating a cumulative groundwater decline for the springs at Zzyzx and for federally endangered Mojave tui-chub. An alternative using offsite wells must be selected. 48-5

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. It should be. 48-6

The analysis of this project should be immediately paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 48-7

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 48-8

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 48-9

48-10

For all these reasons, CEC must select a No Project Alternative!

Thank you

Comment Received From: Jared Fuller
Submitted On: 3/1/2026
Docket Number: 24-OPT-03

Soda Mountain Solar No Project Alternative

Please select a No Project Alternative for the Soda Mountain Solar Project.

The California Energy Commission (CEC) has concluded that this project will have significant and unavoidable impacts to desert bighorn sheep. The project is adjacent to an essential bighorn herd in the Cady Mountains that uses the south Soda Mountains extensively. A movement corridor would be partly blocked by the solar project, which needs 8-foot-tall chain-link security fences surrounding the project and which excludes large wildlife, completely blocking any movement by bighorn. 49-1

The CEC has concluded that the project will have significant and unavoidable impacts to visual resources. The project would be adjacent to the Mojave National Preserve and violated the visual standards implemented by the Desert Renewable Energy Conservation Plan.

The project will block connectivity for the federally threatened and California State Endangered Mojave Desert Tortoise.

Sand transport would be blocked and habitat would be removed for Mojave fringe-toed lizard. 49-2

Habitat would be removed for rare plants, kit foxes, American badgers and burrowing owls.

The project would extract water from 5 onsite wells adding to a cumulative groundwater decline for the springs at Zzyzx and for the federally endangered Mojave tui-chub. An alternative using offsite wells was not selected. 49-3

Lithium battery banks or BESS storage could cause a thermal runaway fire which would emit toxic smoke and chemicals to the local environment and endanger motorists on Interstate 15. An alternative eliminating lithium battery storage was not considered. 49-4

The analysis of this project should be paused until a Comprehensive Management Plan can be established for the Old Spanish National Historic Trail. 49-5

The location of the Soda Mountain Solar Project was not designated for solar energy development under the Desert Renewable Energy Conservation Plan. The Soda Mountain area is not a Development Focus Area. 49-6

Caltrans is building a wildlife crossing over Interstate 15 to maintain linkage for desert bighorn sheep, but the Soda Mountain project would block it. 49-7

For these reasons, CEC must select a No Project Alternative.

Thank you

CALIFORNIA ENERGY COMMISSION

In the matter of:

Soda Mountain Solar Project	)	Docket No. 24-OPT-03

SODA MOUNTAIN SOLAR PROJECT

CEC STAFF ASSESSMENT PUBLIC MEETING

IN-PERSON AT:

HOLIDAY INN EXPRESS - CONFERENCE ROOM

2700 LENWOOD ROAD

BARSTOW, CA 92311

REMOTE ACCESS VIA ZOOM

THURSDAY, FEBRUARY 5, 2026

1:00 P.M.

Reported by:

Elise Hicks

APPEARANCES

COMMISSIONERS

Noemi Gallardo, Lead Commissioner

David Hochschild, Chair

STAFF

Kaycee Chang, California Environmental Quality Act (CEQA) Project Management Unit Supervisor

Lisa Worrall, Project Manager

Eric Knight, Siting and Environmental Branch Manager

Mariah Ponce, Chief Counsel's Office

Crystal Cabrera, Chief Counsel's Office

Hilarie Anderson

PUBLIC ADVISOR'S OFFICE

Ryan Young, Deputy Public Advisor

APPLICANT

Hannah Arkin, Resolution Environmental

PRESENTER

Chris Huntley, Director of Biological Resources, Aspen Environmental Group

PUBLIC COMMENT

Dan Munsey, San Bernardino County Fire Protection District

APPEARANCES

PUBLIC COMMENT (cont'd)

Brandy Wood, California Department of Fish and Wildlife

Randy Banis, President of Friends of El Mirage

Scott Gibson, California Chapter of the Wild Sheep Foundation

Debra Hughson

Neal Desai, Senior Pacific Regional Director, National Parks Conservation Association

Mason Osgood

Chance Wilcox, National Parks Conservation Association

Pat Flanagan, Morongo Basin Conservation Association

Erin Gatlin

Arch McCulloch, Morongo Basin Conservation Association

Kevin Emmerich, Basin and Range Watch

Scott Miller, Western Power Trading Forum

Clinton Epps

Edward LaRue, Desert Tortoise Council

Ben Pratt, IBEW Local 477

Jason Becker, Operating Engineers Local 12

Christina Aiello, Wildlands Network

Scott Murtishaw, California Energy Storage Alliance

Donald Priest, California Chapter of the Wild Sheep Foundation

APPEARANCES

PUBLIC COMMENT (cont'd)

Joan Taylor, California/Nevada Desert Committee of Sierra Club

Laura Cunningham, on behalf of Moises Cisneros

Rhay Flores

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P R O C E E D I N G S

1:01 p.m.

THURSDAY, FEBRUARY 5, 2026

MS. CHANG: Thank you all for being here. We're going to get started. I am Kaycee Chang with the Siting, Transmission, and Environmental Protection Division, or as we like to say, STEP, and I supervise the STEP Division CEQA Project Managers. Thank you for attending today's CEC-hosted meeting on our Staff Assessment of the Soda Mountain Solar Project.

Commissioner Gallardo will now lead us in the Pledge of Allegiance.

Next slide, please.

COMMISSIONER GALLARDO: Please rise.

(The Pledge of Allegiance is recited in unison.)

COMMISSIONER GALLARDO: Thank you.

MS. CHANG: Thank you. We would like to go over a few meeting logistics.

This meeting is hybrid with attendees in-person at the Holiday Inn Express, and virtual attendees on Zoom. We also thank our Spanish interpreters and court reporter for this assistance here today.

For those attending virtually, Zoom closed captioning has been enabled. Attendees can use the service by clicking on the Live Transcript icon and then choosing

either Show Subtitle or View Full Transcript. The closed captioning service can be stopped by exiting out of the Live Transcript or selecting the Hide Subtitle icon.

We also have enabled Spanish interpretation on Zoom. And for those participating in-person, please be mindful of speaking slowly and clearly into the microphone for those participating online to hear, for our Spanish interpreters, and the court reporter.

Finally, this meeting is being recorded. The meeting recording will be available on the California Energy Commission's website.

Next slide, please.

This slide provides an overview of today's agenda. We will be sharing information with the public and presenting on our project findings, which are detailed in the Staff Assessment. There will be plenty of opportunities for comments from California Native American tribes, government agencies, elected officials, and interested parties and members of the public. We also have agendas with the Public Advisors table to the right.

Next slide, please.

We are fortunate to have with us today our Siting Lead Commissioner, Noemi Gallardo, who you will hear from shortly. At the tables, we have our CEC Staff Attorneys, Mariah Ponce and Crystal Cabrera. We are also fortunate to

have CEC's Acting Public Advisor, Ryan Young.

Now, I would like to hand the microphone over to our CEC Executive Director, Drew Bohan.

MR. BOHAN: Apologies. I just want to say thank you everybody for coming out and for your participation. I want to give particular thanks to Neal Desai and a few others who brought us out for a tour of the site. We also got a tour from the developer. And I want to thank staff. You write a thousand-page report, you don't make everybody happy all the time, but I thought they did a terrific job on pulling this together. And every project we have has issues and we try to work through those the best we can, and I felt like we did that here. So I just want to say thank you. I'm looking forward to public comment.

COMMISSIONER GALLARDO: All right. Thank you, Drew.

Buenas tardes. Good afternoon everyone and Happy New Year as well. My name is Noemi Gallardo and I'm one of the five Commissioners at the California Energy Commission. I'm also the Lead Commissioner for the Commission's permitting work, including the Opt-In Certification Program, which is what we're in today.

It is great to be back here in Barstow to discuss the Soda Mountain Solar Project application. We had a public meeting back in August of last year where we heard

from many of you. And that meeting was very constructive and helped inform the Staff Assessment being presented today. So we did learn about your concerns regarding the potential impacts on the landscape, the potential impacts on several animal species, including the desert tortoise, the Desert bighorn sheep. And today you're going to hear directly from staff about how they evaluated those issues and others.

And we, as Drew mentioned, we realized that there will be mixed reactions to the Staff's Assessment and their recommendation. And we're here today to inform you more about that and also to continue listening to all of you. We want to know any further insight, questions, concerns, general comments that you may have. And our staff meticulously conducts an independent review and analysis of each application. As you may have noticed, for those of you that took a look at it, it's over 1,000 pages. And it took many hours to get there, so I wanted to thank the staff for their diligence and the rigor that they applied to all of these proceedings, including this one on Soda Mountain.

I also want to thank the support offices for their collaboration throughout this process. The Chief Counsel's Office that provide legal expertise, our Public Advisor and his team that provide support to the public,

our Media Team, and also our Executive Director Drew.

I also want to emphasize to all of you that the Chair and I have said on previous occasions, and we're repeating it today, that we will not vote to approve any project that we would not feel comfortable having in our neighborhoods or in our communities. And so that's why we're here, the Chair is joining via Zoom, I'm here in-person, to continue listening again to your insights, comments, questions, et cetera. That all is very important to us.

And before I pass the mic to the Chair, I'd also like to express some gratitude to our applicant, VC Renewables and their team, for the professionalism that they have shown and the diligence also in providing the staff the various information that they need to be able to do their evaluation.

I, too, want to thank Neal Desai for coordinating that site visit for the Energy Commission to help us better understand the impact of decisions made here on the bighorn sheep in particular.

We also appreciate Scott Gibson, Dr. Aiello, Jacob Overton [sic] and Chancellor Cox (phonetic) for joining us on that visit, so appreciate that.

Finally, on behalf of the Energy Commission, I want to thank the community of Barstow and San Bernardino

County in general for welcoming us and also for participating in this proceeding, whether that's in the room or via Zoom. On that note, I want to let you all know that we have about 55 people on Zoom as well. So we have folks in the room and folks on Zoom.

So, Chair Hochschild, I'll pass the mic on to you. And after him will be our Public Advisor Ryan Young.

Gracias. Thank you.

CHAIR HOCHSCHILD: Thank you so much, Commissioner.

Hey, good afternoon, everyone. I just wanted to give my thanks to all the stakeholders for joining. Very much looking forward to hearing all the comments and to working with all of you. And especially want to give my gratitude to the Energy Commission staff for all the diligence and to the applicant.

And with that, back to you, Commissioner.

MS. CHANG: Thank you, Chair, for joining us. We'll pass it on to our Public Advisor, Ryan Young.

MR. YOUNG: Good afternoon. Thank you for joining us today. I'm Ryan Briscoe Young, the acting Public Advisor with the Energy Commission's Office of the Public Advisor, Energy Equity, and Tribal Affairs.

Today, we're going to have some presentations, hear from government representatives, and then have our

main public comment period. I just wanted to mention at the beginning of our time together a couple of instructions for later in the day, which I'll also repeat then as well.

The first is, is that we ask everyone who would like to make a comment to please turn in a blue card as soon as possible to the Public Advisor's desk over there on your right. If you represent a local government entity, state entity, or California Native American tribe, please indicate that on your blue card as well.

I'll now pass the mic to Lisa Worrall.

MS. WORRALL: Thanks so much, Ryan. Sorry. Can you hear me out there? Okay. Excellent. Thank you, Ryan.

My name is Lisa Worrall. I'm the Project Manager for the CEC for the Soda Mountain Solar Project. The application -- oh, sorry. The goal of today's CEC's meeting is to present Staff’s Assessment, which includes a draft environmental impact report of the Soda Mountain Solar Project, to encourage public participation, hear comments from you, and, too, feedback to our updated environmental document, the Updated Staff Assessment.

The comment period closes on February 27th at 5:00 p.m., so any comments you have regarding the environmental document, please submit those to the docket or today verbally. I'll touch more on that about how to participate on the docket later in today's meeting.

Next slide, please.

The application for Soda Mountain Solar Project was submitted to the CEC under the Opt-In Certification Program. The project proposes a solar photovoltaic, or PV, facility with a battery energy storage system, or BESS, B-E-S-S, on approximately 2,670 acres of land administered by the United States Department of the Interior Bureau of Land Management, also known as BLM.

The project site is located approximately 7 miles southwest of the community of Baker in unincorporated San Bernardino County. The project site is bounded directly to the east by the Mojave National Preserve and BLM lands, including the Rasor Off-Highway Vehicle Recreation Area at the southeast corner. Interstate 15, or I-15, and the former Arrowhead Trail Highway run along the western boundary of the project site. The Rasor Road Shell -- Rasor Road Services Shell Oil Gas Station is located off I-15 southwest of the project site along the access road, which is Rasor Road. This is where the primary access to the project site would be obtained through.

The project would disturb approximately 2,059 acres overall and include a 300 megawatt solar PV facility, a 300 megawatt, or 1,200 megawatt BESS -- megawatt hour BESS, 140,000 square foot high voltage project substation, 500 kilovolt generation intertie line, or gen-tie, a

234,300 square foot utility switch yard, and a 500 kilovolt transmission loop-in lines.

The power produced by the project would be conveyed to the regional electrical grid through an interconnection with the existing 500 kilovolt Marketplace-Adelanto transmission segment of the Greater Mead-Adelanto 500 kV transmission line. This line is owned and operated by the Los Angeles Department of Water Power, also known as LADWP. LADWP would also need to make protection-setting upgrades at the Marketplace Substation in Boulder City in Nevada and Adelanto Substation in Adelanto, California, to accommodate the power generated by the Soda Mountain Solar Project.

Next slide, please.

The CEC received the project application on August 1st, 2024. The CEC reviewed the data submitted and completed a series of data requests for information before deeming the project complete -- or the application complete in July of 2025. CEC staff then held a public informational and environmental scoping meeting in Barstow in August 2025 in this very room. The CEC Staff Assessment was filed December 29th, 2025, opening the 60-day public comment period, which as I said before, closes February 27, 2026.

Today, we'll be sharing you our Staff Assessment

conclusions and hearing comments from agencies, governments, California Native American tribes and interested members of the public. No decisions will be made at this meeting.

The CEC will publish an Updated Staff Assessment which will include final recommendations on the proposed project, and this will be published no later than March 27th, 2026. This project and the CEC staff recommendation will be presented at a business meeting to be held on April 27th, 2026, for a formal decision by the CEC. And this business meeting will be formally noticed.

Next slide, please.

To date, the CEC has received comments from 17 people and interested members of the public on the proposed project. Thank you for those comments. Many comments have raised concerns related to impacts to biological species, particularly Desert bighorn sheep, desert tortoise, burrowing owl, Mojave fringe-toed lizard, and their habitats.

Also of concern is the proximity of the project to the future overpass and the Mojave National Preserve. Other concerns raised include concerns regarding air quality, fugitive dust, greenhouse gas emissions, visual resources, BESS fire safety and impacts on hydrological resources. Greenhouse gas emissions are also of concern.

We continue to consider public comments during this process and will reply to all comments raising significant environmental issues and make edits to the analysis, if necessary, in the Updated Staff Assessment which will include the final environmental impact report.

Next slide, please. Thank you.

The Staff Assessment has been prepared by a team of CEC technical experts including biologists, mechanical engineers, air resource engineers, archaeologists, geologists and more. Staff evaluated the potential environmental effects of the construction and operation of the project in compliance with the California Environmental Quality Act, also known as CEQA, CEQA guidelines, the Warren-Alquist Act, and the California Code of Regulations Title 20.

The topic areas shown on this slide are not those that are considered in a typical EIR. These engineering topics are required to be analyzed per requirements of the Warren-Alquist Act and in implementing regulations in California Code of Regulations Title 20. We evaluated engineering aspects of the project and concluded that the construction and operation of the project would be consistent with all applicable local, state and federal plans, policies and regulations. Should the project be certified it can be reliably operated.

For further specific details we encourage you to download the Staff Assessment from the project's docket. Part of our presentation here describes how to find project documents on the CEC website, and that will be later on this afternoon.

Next slide, please.

This table summarizes staff's CEQA impact conclusions for the environmental topic areas and the project's consistency with plans, policies and regulations in these areas.

The CEC staff has identified significant and unavoidable impacts in the areas of biological resources and visual resources. These are the rows bolded in the table. Red means the project is not consistent with plans, policies and regulations, and that there are significant and unavoidable impacts.

Next slide, please.

I will now begin our staff presentations on the environmental areas of concern. I'll pass the mic over to Chris Huntley our biologist.

Thank you.

MR. HUNTLEY: Good afternoon. My name is Chris Huntley. I'm the Director of Biological Resources and a senior wildlife biologist at Aspen Environmental Group, and we are a consultant to the CEC on this project.

Today, I'll provide a brief overview of the baseline conditions that occur on the project site and the environmental considerations taken into account during our analysis of the impacts to special status plants, wildlife, aquatic resources, our proposed mitigation measures, which are also known as conditions of certification, and how the project aligns with permitting requirements.

Please note that in the biological resources Staff Assessment, the figures were inadvertently omitted from the published document. These figures have been filed to the docket in an errata to the Staff Assessment and are available online.

Next slide, please.

The proposed project is located on public lands managed by the BLM. The habitat is largely characterized as creosote bush scrub which is a common plant community found across most of the Mojave Desert. In addition, there are small areas that support more unique vegetation dominated by rigid spineflower and joint fir which are considered rare plant communities.

The southern portion of the project site is crossed by Rasor Road, a well known off-highway vehicle trail. Another dirt road bisects the area and runs north from Rasor Road. These roads support periodic camping and vehicle travel that we saw when we were on the project

site.

The project site also supports an extensive network of ephemeral drainages that carry storm flows from the Soda Mountains across the site. Some of these drainages carry flow under Interstate 15 through a series of ditches and culverts.

There is no designated critical habitat identified by the United States Fish and Wildlife Service in the project area. However, the project gen-tie line would connect to the existing LADWP transmission line right-of-way which is located in a BLM designated area of critical environmental concern. These are also known as ACECs.

The project is located immediately adjacent to the south Soda Mountains. This area supports the Soda Mountain herd of Desert bighorn sheep and the area has been deemed essential to the long-term recovery of this herd. The project is also located just south of a proposed wildlife crossing that would span Interstate 15 and provide sheep and other desert wildlife access to historic habitat on the other side of the interstate. This crossing is being constructed as part of the High-Speed Rail project to enhance wildlife movement in this area.

Next slide, please.

This slide shows the projects -- or the proposed

project footprint, which is outlined in black. The colored areas represent seasonal bighorn sheep movement. The data comes from collared bighorn sheep that have been tagged in the project area.

It is evident when you look at this figure the amount of sheep usage -- the sheep use the south Soda Mountains extensively. And under CEQA, potential impacts on wildlife movement corridors, which are areas used by animals to move from one area to another, must be evaluated as part of the impact assessment for biological resources. And the project site is located in and adjacent to an important movement corridor for this species. And this herd of Desert bighorn sheep relies on the south Soda Mountains to support breeding, foraging, and as escape habitat.

Next slide, please.

To date, no federal -- no state or federally listed plants have been detected during multiple years of surveys and are not expected to occur. However, the area is expected to support a variety of native animals, including at least one watch list species that, while it is not typically afforded protection under CEQA, it has been evaluated in the Staff Assessment.

The project site does support a low-density population of desert tortoise, which is a state endangered

and federally-threatened species. And the project owner would be required to capture and translocate these animals to adjacent habitat. It would also be required to provide compensatory mitigation in the form of land preservation to reduce impacts to this and other species should the project be approved.

Other sensitive species that are known to occur either on or adjacent to the project site include western burrowing owl, a state candidate for listing, Desert bighorn sheep, which are considered a state fully protected species, desert kit fox, which is an animal protected from harm by various state regulations, and Mojave fringe-toed lizards and American badgers, which are considered state species of special concern.

There are also a number of common and sensitive birds known from the region that have been either observed or have the potential to occur on the project site. Some of these include loggerhead shrike, Bendire's, Le Conte's, and crissal thrashers, a number of raptors, golden eagle, and various species of migratory waterfowl that fly over the site.

Next slide, please.

As presented in the previous slides, our biological resource evaluation included reviewing the applicant's information, conducting independent research

and literature reviews to assess the occurrence of sensitive species, collaborating with other regulatory agencies including the BLM, the U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife. And we also participated in three one-day site visits to ground truth the existing data and to meet with concerned parties to the proceedings.

The result is the development and recommendation of 26 mitigation measures, including 11 species-specific measures, which again are also referred to as conditions of certification. These measures include, but are not limited to, pre-construction surveys, construction monitoring, the implementation of non-disturbance buffers, the translocation of desert tortoise, and post-construction monitoring. These measures will be implemented by the project owner, the CEC staff oversight throughout the life of the project should the proposed project be approved by the CEC.

Pursuant to state law, if the CEC issues a license for this project, the conditions of certification include incidental take authorization for desert tortoise and western burrowing owl under the California Endangered Species Act, also known as CESA. Under CESA, take means to hunt, pursue, capture, kill, or harm a protected species or attempt to do so, even if it occurs unintentionally during

construction or operation.

Take authorization in this case, under CEC's in-lieu permitting authority, would allow impacts to occur to state-listed species during lawful project activities and would require a variety of avoidance measures and other mitigation requirements to ensure impacts are fully mitigated. And staff collaborated with representatives of the California Department of Fish and Wildlife in the development of these measures.

Our analysis presented two distinct types of impacts, first during construction, and then during the operations of the facility over the life of the project. Except for Desert bighorn sheep, we concluded that impacts to sensitive plants and wildlife from the construction of the proposed project could be reduced to less than significant levels with the implementation of staff's proposed conditions of certification. It would also comply with state and federal Endangered Species Acts and other plans, policies, and regulations.

However, staff concluded there would be significant and unavoidable impacts to Desert bighorn sheep and their migratory movement from the construction and operation of the proposed project, as the project footprint would intrude onto important habitat that has been deemed essential to the viability of the Soda Mountain herd. The

project also would not be consistent with the California Fish and Game Code standard requirement to fully mitigate impacts to a fully protected species.

Next slide, please.

The Staff Assessment identifies the full list of plans, policies, and regulations impacted by the proposed project. As discussed in the Staff Assessment, during construction, the proposed project would be consistent with applicable plans, policies, and regulations for biological resources, except those protecting Desert bighorn sheep. During operation of the project, the project would not be consistent with the California Fish and Game Code standard requirement to fully mitigate impacts as it relates to Desert bighorn sheep. Detailed information and analysis can be found in the Staff Assessment on this topic.

However, staff determined that impacts to Desert bighorn sheep could be reduced to less than significant levels with the adoption of the bighorn sheep buffer and BESS relocation Alternatives 1 and 2. These alternatives include a 0.25 mile buffer from the 10 percent slope line, and this buffer was developed in coordination with staff from the California Department of Fish and Wildlife. The figure to the left shows the bighorn sheep buffer and the BESS Relocation for Alternative 2, which, as you will hear later today, is staff's environmentally superior

alternative. And this figure shows the 0.25 mile buffer applied to the proposed project.

And this concludes the presentation on biological resources, and I will pass the mic over to Eric Knight.

Thank you.

MR. KNIGHT: Thank you, Chris.

Good afternoon, everybody. My name is Eric Knight. I manage the Siting and Environmental Branch of the CEC's Siting Division, STEP Division as we've been referring to it. I supervised the preparation of the visual resources section of the Staff Assessment.

As discussed and explained in the Staff Assessment, the proposed project would have significant environmental effects under two visual resources questions in CEQA Guidelines Appendix G and would be inconsistent with identified federal and local plans, policies, and regulations pertaining to aesthetics and visual resources.

Next slide, please.

There are four questions under aesthetics, otherwise known as visual resources, in the CEQA Guidelines Appendix G. This is known as the environmental checklist. For the first two questions, would the project have a substantial adverse effect on a scenic vista, and would the project damage scenic resources, staff concluded that impacts would be less than significant and no impact,

respectively.

The project is not within a formally designated scenic vista. While informal scenic vistas could be available for the Soda Mountain Wilderness and Mojave National Preserve, much of the views of the project from these locations would be substantially screened by intervening terrain.

An alignment of the Old Spanish National Historic Trail is located to the east and south of the project. However, there are no high-value sites or segments identified along this portion of the trail. At its closest point, the Old Spanish Trail is approximately 3.4 miles from the project, and no visibility along the trail was identified in the viewshed analysis.

The project is not within the view corridor of any officially designated state scenic highway. Although I-15 is identified by Caltrans as an eligible state scenic highway, it must first be nominated for designation by San Bernardino County, which the county has not done. The nearest state scenic highway to the project is Interstate 40, approximately 25 miles to the south. Staff's review of the San Bernardino County's plans and ordinances did not identify any designated or protected scenic resources on the site or in the vicinity.

Next slide, please.

The third question under aesthetics asks, would the project in non-urbanized areas substantially degrade the existing visual character or quality of public views of the site and its surroundings? For the Soda Mountain project, staff used an adapted descriptive inventory model, formal aesthetic -- or methodology, excuse me, formal aesthetic model to evaluate the physical change the project would have on the existing visual character or quality of the site and the surrounding area. The evaluation focused on project prominence and visual absorption capability. Project prominence measures the degree of visual contrast with the existing landscape and visual absorption capability measures the ability of the landscape to absorb the visual contrast without an alteration to its visual character.

The physical change to visual character quality was evaluated from 11 key observation points, or KOPs. A KOP is a point in a publicly-accessible location where the public -- where a public view of the project is analyzed and evaluated in the landscape. For each KOP, the applicant provided photographs showing the existing view and photorealistic simulations of how the proposed project components would appear from each KOP. On the next slide I'll show before and after images from one of these KOPs.

A KOP evaluation is conducted for all 11 KOPs

determined given the existing physical environment, that the color, form, texture, and scale of the project components cannot be camouflaged, disguised, screened, or exterior surface coated, colored, or finished, nor can setbacks be employed that would mitigate the degradation of the existing visual character quality of public views of the site and its surroundings to less than significant levels.

Generally speaking, the undeveloped valley floor would be substantially modified as the project would introduce forms, lines, colors, and textures associated with the PV arrays and associated infrastructure that are uncommon and not currently found in the existing landscape. The existing rural open space would be replaced with an inherent semi-industrial utilitarian landscape character. After mitigation, the visual impacts remain significant and unavoidable.

Next slide, please.

This slide shows images from Figures 5.15-5a and 5.15-5b in a Staff Assessment. The image on the left is how the project site currently looks to travelers on northbound Interstate 15 looking east towards the site. The image on the right is the proposed project simulated in that same view. The nearest project facilities to KOP 2 would be approximately 0.1 mile, or approximately 528 feet

to the east.

Next slide, please.

The fourth and final aesthetics question in CEQA guidelines asks, would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area? The approximately 2,670 acre project site consists of a broadly enclosed, undeveloped desert valley. Generally, the project site is visually and ecologically characteristic of the conditions common in the region. With existing nighttime lighting conditions -- while existing nighttime lighting conditions vary throughout the area, no light sources currently exist on this project site and there is no emission of artificial light at night and no reflectance during daylight.

The World Atlas Night Sky Brightness Interactive Map shows the location of the project site in a minimal brightness area. The map delineates physical radiance, or brightness, homogeneously over an area from an approximate site location by color. The next slide will show this map of the project site.

Given the current absence of night lighting and structures on the proposed project site, implementation of the project has the potential to cause the emission of artificial light into the nighttime environment from outdoor lighting for site and building access and security

purposes, and glare and reflectance during daytime from the surface of PV panels and other structures.

However, staff concludes that levels of new light and glare and reflectance emitted by the project and from construction laydown areas would have a less than significant effect on the environment with effective implementation of staff's proposed conditions of certification that would include VIS-2 for design and structural surface treatments, VIS- 4, landscape screening, VIS-5, night lighting management, and VIS-6, glint and glare mitigation and monitoring for PV panels. Mitigation measures VIS-1, design and structural surface treatments, and VIS-3, night lighting management for the LADWP owned and operated switchyard.

Next slide, please.

This is the slide from the World Atlas night sky brightness map. It shows the brightness at night emitted from the general project area along Interstate 15 corridor and eastern San Bernardino County, California. Night sky brightness for the site and surrounding area is rated C2, typically truly dark site, and C3, rural sky.

Next slide, please.

The BLM's Land Use Plan amendment for the Desert Renewable Energy Conservation Plan, or DRECP, established visual resources management classifications for lands under

BLM's management that allow authorized activities or land uses to contrast with the visual environment to varying degrees. The project site and surrounding areas is categorized as visual resource management Class III, which requires that activities and uses partially retain the existing character of the landscape. Under this classification, activities or uses may attract attention but should not dominate the view of the casual observer. The proposed project would not be consistent with the DRECP and that would create strong degrees of visual contrast when viewed from all 11 of the representative KOPs.

The DRECP also requires regional mitigation for mitigation -- or for visual impacts in general public lands. Although project visual impacts will remain significant following implementation of staff's proposed conditions of certification and mitigation measures, no additional mitigation or compensation has been identified to offset these significant and unavoidable impacts. Therefore, the project would not be consistent with this DRECP policy.

The Staff Assessment also identified that the project's residual significant visual impacts pertaining to the degradation of existing visual character or quality of public views would be inconsistent with several policies and requirements in the San Bernardino County Countywide

Plan, including the Land Use, Natural Resources, and Renewable Energy Conservation Elements, and the San Bernardino County Development Code.

Let's see. This concludes the presentation on the visual resources and I will now pass the presentation back to Project Manager Lisa Worrall.

MS. WORRALL: Thanks so much, Eric, for that.

I will now provide an overview of the alternatives analysis that was conducted pursuant to CEQA.

Next slide, please.

The alternatives analysis is a core component of CEQA and is intended to inform decision makers by the CEC and provide transparency for the project -- or for the public. CEQA requires inclusion of a no-project alternative which serves as a baseline for comparing environmental effects and identification of the environmentally superior alternative among the action alternatives considered.

CEQA requires lead agencies to evaluate a range of reasonable alternatives to a proposed project that could feasibly obtain most of the basic project objectives while avoiding or substantially reducing significant environmental impacts. For this project, the basic project objectives, as described in the Staff Assessment, also include renewable energy generation, grid reliability, and

energy storage.

Consistent with CEQA's rule of reason to evaluate alternatives necessary to permit a reasoned choice, alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project.

In determining whether an alternative is reasonable, CEQA considers whether it is technically feasible, economically viable, consistent with applicable regulatory requirements, supported by available infrastructure, and whether the project proponent could reasonably acquire or control the site. This screening process ensures the alternatives analysis remains focused on realistic implementable options that meaningfully inform the CEC's decision. As required by CEQA, staff have identified an environmentally superior alternative.

Next slide, please.

As described in the Staff Assessment, the proposed project would result in significant and avoidable impacts, including impacts to Desert bighorn sheep habitat and their movement, and visual resources, as well as public safety concerns related to the proximity of the BESS to I-15. Additional impacts were identified in other resource areas, including air quality and water resources. These impacts were central considerations in shaping the

alternatives analysis and directly guided by the development of the two bighorn sheep buffer and relocated BESS alternatives.

The proposed alternatives were specifically designed to address these issues by reducing the project footprint, increasing separation from sensitive biological resources and I-15, and improving public safety concerns while continuing to meet the project's renewable energy generation and energy storage objectives.

Next slide, please.

The alternatives analysis summarizes the alternatives that were considered but eliminated from further study because they would not meet most of the basic project objectives or were determined to be infeasible. Alternative site locations were reviewed but dismissed due to the absence of suitable land near necessary electrical infrastructure, challenging terrain, and a lack of sufficiently large contiguous parcels along the Adelanto-Mead transmission corridor.

Three alternatives were considered for full analysis, specifically the no-project alternative, the BHS buffer, or bighorn sheep buffer, and relocated BESS Alternative 1, and bighorn sheep buffer and relocated BESS Alternative 2.

Under the no-project alternative, the proposed

project would not be constructed. All project-related environmental impacts would be avoided, and as a result, the site would remain in existing undeveloped conditions.

The BHS buffer and relocated BESS Alternatives 1 and 2 were developed by staff to directly address impacts to desert bighorn sheep and concerns about public safety while maintaining the project's renewable energy generation and energy storage objectives. These alternatives would reduce impacts to biological resources and, specifically, desert bighorn sheep. However, impacts to visual resources would remain significant and unavoidable.

Due to added ground disturbance and the additional gen-tie length required to connect the BESS facility to the proposed on-site substation as required for the BHS buffer Alternative 1, the BHS buffer and Alternative 2 was identified as the environmentally superior alternative.

Next slide.

The BHS buffer and relocated BESS Alternative 2 establishes a quarter-mile buffer downslope from the 10 percent slope contour that defines the lower extent of important BHS foraging and escape habitat along the site's northern, southern, eastern -- sorry, southern, and eastern boundary, as recommended by California Department of Fish and Wildlife.

This figure shows the site plan for this alternative. The purple crosshatch area shows the quarter-mile BHS buffer, and the three green rectangular area shows the proposed location of the BESS facility. This topographic line marks where the land transitions from flat alluvial fan to the steeper foothill slopes that serve as foraging escape terrain for the bighorn sheep. Maintaining a setback from this 10 percent slope threshold would reduce potential disturbance, lighting, and noise effects in areas used by sheep between the valley floor and the adjacent mountainous terrain.

These design modifications reduce the potential disturbance by reducing the project's footprint and limiting the intrusion into the sensitive wildlife areas essential to the Soda Mountain bighorn sheep herd while increasing separation from a major transportation corridor.

Next slide, please.

This alternative relocates the BESS to an interior portion of the solar field, avoiding the area immediately adjacent to I-15 and increasing the distance between the BESS and I-15 to approximately 970 feet. This resulting setback reduces the likelihood that drivers would be exposed to smoke, reduced visibility, or chemical inhalation hazards in the unlikely event that a BESS thermal runaway incident occurs. This additional spacing

also reduces the potential for visual distraction for motorists and contributes to improve public safety.

The BESS is shifted directly east which would require a short extension of the gen-tie line to the point of interconnection at the substation because the substation will actually be relocated adjacent to the BESS facility, so it would need a longer connection. However, it will be shorter than under the Alternative 1.

Some reorganization of the PV panel placement would be required to avoid encroaching into this quarter mile buffer, the bighorn sheep buffer. Approximately 50 acres of the PV arrays that are located too close to the slope threshold would be shifted to the interior areas of the site that fall outside of the buffer. And to maintain the project's generating capacity, the applicant may redistribute relocated panels within the southern or central portions of the project site, adjust row spacing or employ higher efficiency modules at the time of construction. These adjustments would occur within the approved project footprint and would not require expansion of the site boundary.

Operational access would continue to rely on the project's internal access roads and no new off-site roads would be required. Emergency access would likewise remain consistent with the project's overall fire protection

strategy.

Overall, the alternative is generally feasible because it reduces electrical infrastructure needs and maintains a more compact layout, but would still require careful engineering, refinement, biological review and internal site planning to ensure compatibility with project objectives and resource constraints. Although noting that this alternative is extremely constrained, the applicant considers it a feasible alternative.

Given the scale of the overall facility and associated visual characteristics for this alternative, there would still be no change to the visual resources related impacts compared to the proposed project and this impact would remain significant and unavoidable.

Next slide, please.

Oh, I shall pass -- this concludes the alternatives analysis and pass the mic over to Kaycee Chang for Opt-In requirements and next steps.

MS. CHANG: Thank you, Lisa.

Next slide, please.

As part of the Opt-In program, there are mandatory requirements that the projects must meet. Today, we are highlighting three of particular interest. For labor, we conclude that the construction of the project is not a covered project subject to public works. The

applicant has submitted -- the applicant has committed to provisions of the Labor Code to paying prevailing wages, and to using a skilled and trained workforce.

Next slide.

Under Public Resources Code section 25545.9(b), there is a rebuttable presumption that the construction or operation of the facility will have an overall net positive economic benefit to San Bernardino County.

Next slide.

For the requirement that the applicant must enter into one or more legally binding and enforceable agreements with or that benefit a community-based organization, the applicant submitted an executed agreement with the Friends of El Mirage. According to the mission of the Friends of El Mirage, the organization is a varied group of outdoor recreationalists using the El Mirage OHV Open Area and promoting the preservation, multiple use, and restoration of the area.

The charitable donation is to support the following projects: one, improve, protect, and maintain existing trails and dry lake beds; and promote understanding, education, and cooperation between all open space users.

Next slide.

The bighorn sheep buffer and relocated vest

Alternative 2 would reduce the impacts to desert bighorn sheep to less than significant. Since staff recommends the CEC certify the environmentally superior alternative, a statement of overriding considerations is not evaluated for impacts to biological resources. However, impacts to visual resources would remain significant and unavoidable. Specifically, staff concludes, given the existing physical landscape, the project would substantially degrade the existing visual character or quality of public views of the site and its surroundings from the 11 applicant-submitted key observation points.

While staff concludes there is a significant and unavoidable impact to visual resources, the project provides regional economic benefits, construction and engineering jobs, grid reliability benefits, support for California's renewable energy and greenhouse gas emission reduction goals, and displacement of fossil fuel generation and corresponding air pollution.

Thus, staff concludes there is substantial and compelling evidence in the record to support a CEC decision to approve the project by issuing a statement of overriding considerations.

Next slide, please.

Today, we will be taking oral comments on the Staff Assessment. Written comments on the Staff Assessment

can be submitted to the project docket until 5:00 p.m. on February 27th, 2026. We will respond to all comments raising significant environmental issues and make edits to the analysis, if necessary, in the Updated Staff Assessment which will be filed on March 27th, 2026, along with the Executive Director's recommendation. The CEC is planning to consider the Soda Mountain Solar Project's Opt-In application at the April 27th, 2026 business meeting.

I would like to invite the applicant to the podium to make remarks. After applicant remarks, we will take a break and then follow with a brief presentation from the Office of the Public Advisor, Energy Equity, and Tribal Affairs on public participation and tribal consultation overview before opening this meeting up for public comment.

Thank you.

MS. ARKIN: Good afternoon. My name is Hannah Arkin, and I am the CEO of Resolution Environmental, serving today as the applicant's representative for the Soda Mountain Solar Project. Can you hear me now? Okay.

On behalf of the applicant team, I'd first like to thank the California Energy Commission for its hard work implementing the AB 205 process. 1-1

The AB 205 process is doing a tremendous job accelerating clean energy siting, permitting, financing, transmission, and project development throughout

California. It is imperative that renewable energy developers can capture expiring federal tax credits while supporting reliability, affordability, and decarbonization. And we appreciate the state's effort to meet us at the moment so that we can work together to achieve this goal. 1-1 continued

The Soda Mountain Solar Project is a large-scale infrastructure project that utilizes state-of-the-art solar energy generation and battery energy storage technology. The project will include a 300-megawatt solar facility paired with 300 megawatts of battery storage, enough to power more than 140,000 homes. This energy generation equates to roughly one-fifth of all households in the county of San Bernardino, and a project of this scale will help stabilize rolling blackouts.

The project site is prime for renewable energy development because it's located directly adjacent to existing large-scale infrastructure projects, including the I-15, the Brightline West high-speed rail project, and existing high-voltage transmission lines. 1-2

The project also offers a model for safely locating solar and battery energy storage facilities far away from residential areas, clustered adjacent to dense infrastructure projects, and connecting to underutilized transmission lines, which prevents the need for new transmission lines to be constructed in wilderness or

populated areas.

In 2007, the project applicant submitted a project on the same site that covered 4,179 acres of BLM land and had a development footprint of approximately 2,222 acres. In March 2016, the BLM, Bureau of Land Management, issued a Record of Decision and approved a project configuration that removed 571 acres from the proposed development specifically to reduce impacts to visual resources and account for the future efforts to restore connectivity for desert bighorn sheep. The project proposed today maintains the removal of those 571 acres to minimize impacts to desert bighorn sheep, in addition to implementing additional biological and hydrological mitigation that significantly minimizes other environmental impacts.

Additionally, the staff recommended environmentally superior alternative, the bighorn sheep buffer, and relocated BESS Alternative 2 provides a biological buffer for the bighorn sheep and moves the BESS facility 500 feet east of the highway, which further reduces the environmental impacts of the project.

This alternative is the result of an exhaustive and creative engineering process between the developer, the owner, environmental and biological consultants, civil design engineers, resource agencies, and the CEC, and it

1-2 continued

1-3

1-4

identifies a project where we are truly maximizing the available site with highly efficient design and equipment, while also implementing conservation measures to address biological resource concerns.

Although it is not the applicant's preferred project, the staff-recommended environmentally-superior alternative, the bighorn sheep buffer and relocated BESS Alternative 2 is a feasible project that the applicant can develop. 1-4 continued

The applicant team, we have reviewed the Staff Assessment and would like to note a few points for clarification. Our team will also be following up with the detailed written comments prior to the close of the public comment period.

The applicant team is concerned that the mitigation ratios and acreage requirements identified in the Staff Assessment identify the worst-case scenario project and the identified mitigation ratios and acreages do not account for the significant5 reduction of habitat impacts that would occur from implementations of the applicant's voluntary use of advanced technology terrain following solar tracker system. This system is described in detail within Docket item TN261587, or Appendix Z. 1-5

For example, implementation of the advanced technology terrain following solar tracker system 1-6

identified in Appendix Z significantly reduces the amount of grading on site under the solar field. Implementation of this grading technology reduces the project's permanent impacts on biological resources by nearly 90 percent. Using the grading technology would result in the project's permanent impacts to habitats being reduced from 1,506 acres to 79 acres. The applicant team will be providing clarifying information prior to the close of the public review period to help the CEC clarify the project's true post construction impacts and mitigation requirements. 1-7

We're also concerned that the identified mitigation ratios and acreages do not account for implementation of Condition of Certification Water 9. Condition of Certification Water 9 requires the project implement a fluvial geomorphic stormwater design that significantly reduces the amount of stormwater infrastructure constructed by the project. Implementation of Condition of Certification Water 9 reduces the project's grading in earthwork by nearly 95 percent. After implementation of Condition of Certification Water 9, net grading of the project site would be approximately 20,000 cubic yards rather than 489,000 cubic yards. 1-8

We believe the Staff Assessment reflects a worst-case project scenario that identifies up to three times more impacts to water resources than would occur 1-9

after implementation of the grading technology identified in Appendix Z and implementation of Condition of Certification Water 9.

1-9 continued

Beyond these two specific mitigation measures, the project is also implementing other mitigation to offset the environmental impacts of the project including compensatory biological resources mitigation, wildlife fencing that will be designed to allow reentry of desert tortoise, and to direct animals towards designated under crossings to prevent the obstruction of movement. Given the project's design and the extensive efforts to preserve biological resources, a reduction in the compensatory mitigation to offset the loss of any species of concern is appropriate.

1-10

Permitting development within the State of California is an extremely challenging process and we are so grateful to the CEC's Opt-In process for helping provide a CEQA Plus environmental review process that offers a comprehensive stakeholder engagement under an expedited timeline. The applicant team has done our best to show a very good faith effort to present a project and project alternative that significantly reduces the impacts, environmental impacts of concern that the public and the resource agency have identified. Our team stands ready to execute a state-of-the-art renewable energy and battery

storage project, including delivering a modified project design referred to as the staff-recommended environmentally-superior alternative, the bighorn sheep buffer and relocated BESS Alternative 2.

The applicant team, we appreciate the opportunity to provide these comments today. And that concludes the applicant's remarks.

MS. CHANG: Thank you, Hannah. And thank you all for sitting through our presentations.

We will now take a 15-minute break, returning around 2:20 p.m., and then we will proceed with the Public Advisor's presentation and public comment. Thank you.

(Off the record at 2:04 p.m.)

(On the record at 2:23 p.m.)

MS. CHANG: Hi everyone. We're going to get back started.

Can we get the next slide, please?

All right, I would like to invite Acting Public Advisor Ryan Young for the presentation.

MR. YOUNG: Good afternoon. Again, I'm Ryan Briscoe Young, the Acting Public Advisor for the California Energy Commission. Today, I'll be presenting on how members of the public, California Native American tribes, and others can participate in this proceeding.

Next slide, please.

As mentioned previously, I'm with the Office of Public Advisor, Energy Equity, and Tribal Affairs. Part of our mission is to facilitate public and tribal engagement in CEC programs and policies. We are a free resource available to anyone who wants to participate in CEC proceedings, including this Soda Mountain proceeding. I'll be sharing our contact information on a later slide.

Next slide, please.

Now I'll talk about different ways to participate in the CEC Soda Mountain proceeding. There are multiple ways you can participate. The first is to follow the proceeding. Another is to comment on the proceeding. And the third option available to California Native American tribes is tribal consultation.

Next slide.

I'll now go into more detail on how to follow this proceeding.

The microphone is on.

MS. ANDERSON: Sorry, something happened with the slide. Give me just one second. I'm sorry, Ryan. It went back to the beginning. I don't know what happened. What slide am I supposed to be in, multiple ways to participate; is that correct, Ryan?

MR. YOUNG: Follow via web, email, and events.

MS. ANDERSON: Okay. Thank you.

MR. YOUNG: Okay, I will now go into more detail on how to follow this proceeding.

One of the most popular ways to participate in our programs and policies is to simply follow them. You can follow our proceedings by reviewing materials we post on our website, signing up for email updates, and by attending events like the one here today. Our events are almost always hybrid or fully virtual via Zoom, so the public can attend our events from anywhere with a phone or internet connection.

On this slide, you'll see a snapshot of the CEC webpage for the proposed Soda Mountain project. It has information on the proposed project and project status. It also has a place where you can subscribe for free email updates on the project under the subscribe section. There's also a link to submit written comments directly to a project docket and a link to the entire project docket.

So, what is a docket?

The CEC has publicly available online dockets for its proceedings. This is basically a place where application materials, public comments, notices, agendas, and other documents are filed and available online.

On this slide, the image to the right is of the docket for the proposed Soda Mountain project. With few exceptions, all materials in the docket are linked and

available for anyone to download and view for free.

Next slide, please.

Another way to participate is to comment. As in all CEC programs and policies, any person can comment verbally at a CEC event or in writing. Please note that comments will become part of the public record with access available via any search engine on the internet. To comment verbally, just attend the event and wait for the instructions during the public comment period to make your comment. For our hybrid events, you can comment in-person, via Zoom, or by phone. Coming up on our agenda is just such a public comment period.

The CEC also welcomes written comments. As I stated before, on the CEC website, we have what is called a docket for each project proceeding. Written comments can be submitted to the docket for the proceeding at any time, but the most effective time to do so is during announced comment periods. On our website, you can submit a comment electronically by typing it into our e-comment page or uploading a document, such as a letter. We also have email and paper options to submit a comment that are detailed in the notice for today's event.

If you need assistance, you can always contact the Office of the Public Advisor, Energy Equity, and Tribal Affairs. I'll have our contact information on the last

slide.

Next slide, please.

The CEC has invited tribal consultation in this and other Opt-In proceedings. William Larson from the CEC Siting Division is available for inquiries and other communications from California Native American tribes.

Next slide, please.

Thank you for attending this meeting and your interest in this proceeding. We're here to serve the state of California, and your participation is a big part of the process.

Here's the contact information for the Office of the Public Advisor. My office is available to assist you in participating in our programs and policies.

And just a reminder to turn in your blue card to the Public Advisor's table should you wish to make a comment shortly.

Okay, the Energy Commission now welcomes public comment at this time. And before we move to general public comment, we're going to begin with comments from government entities, including local, state, and federal agencies, as well as California Native American tribes. If you represent a government entity, including a California Native American tribe, and you're in the room, please approach the podium. If you're on Zoom, please click the

raised hand feature on the screen, and it looks like an open palm. If you're joining us by phone, you're going to press star nine to raise your hand.

We're going to start with commenters here in-person, and then we'll transition to online and phone attendees. And again, if you're a member of the public, we please ask that you wait until you've heard from the government entities here today. And we'll continue with general public comments immediately thereafter.

All right, if you're with a government entity, and you haven't yet raised your hand, please do so now. It doesn't look like -- oh, welcome. Please approach the podium. State and spell your name for the record, and we welcome your public comment.

MR. MUNSEY: Good afternoon. Dan Munsey, San Bernardino County Fire Protection District. I want to thank the Commission for including our comments we've made in writing about this geographical area.

We protect a county of 22,000 square miles, 20,000 within our jurisdiction. This particular project areas of concern is identified in your documents because of the lack of resources in this particular area. We have one fire engine in the community of Baker. The engine is staffed with four people, but its response is 3,000 square miles. So at any given time, they may be two hours from

2-1

this particular project.

The second concern is environmental factors. And while there's been a risk analysis done through the State of California, you must remember that this particular area is very close to Death Valley with temperatures that often increase to 118 to 120 degrees. It can also be very freezing and cold in the winter with snowfall. These and other complications make it very difficult to protect this.

I acknowledge that in Section 4.4, there's Safety 10 that states that the applicant must meet with the fire department to come to an agreement. My concern is in reviewing the documents, I can't find out what kind of agreement that would be, the timeline, so it would be -- and if that agreement would be forced.

Because of these needs, I respectfully ask the Commission to address those issues.

Thank you.

MR. YOUNG: Thank you.

If there are any other representatives of local government entities in the room, please approach the podium and provide your comment.

Seeing none, I'm going to transition to Zoom. First, we have Brandy Wood, followed by Moises Cisneros.

Brandy Wood, I'm going to unmute you. Please unmute on your end, state and spell your name for the

2-1 continued

2-2

2-3

record, and we welcome your public comment. Hi, Brandy, you're going to want to unmute on your end.

MS. WOOD: Thank you. Can you hear me?

MR. YOUNG: We can. Thank you.

MS. WOOD: My name is Brandy Wood. I'm an Environmental Program Manager at CDFW in Region 6.

CDFW appreciates this opportunity to provide comments and recommendations regarding the proposed project activities that may affect California's fish and wildlife resources. CDFW is California's trustee agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the state.

Normally, the proposed project would require one or more discretionary approvals by CDFW because it may result in substantial adverse impacts to fish and wildlife resources, such as lake and streambed alteration and incidental take of species protected under the California Endangered Species Act, and CDFW would have submitted comments as a responsible agency under the California Environmental Quality Act.

However, because the project proponent opted into the Assembly Bill 205 certification process, the CEC has exclusive jurisdiction over the proposed project and is responsible for ensuring any certification of proposed project, including all conditions necessary to ensure

compliance with Fish and Game Code and its implementing regulations.

CDFW does not have a direct permitting role in the process that would trigger a responsible agency role. CDFW instead submits these comments as a trustee agency under CEQA.

Pursuant to AB 205, the CEC and CDFW developed a coordination plan through a memorandum of understanding to ensure that all potential impacts to fish, wildlife, and plant resources and the habitats upon which they depend, including but not limited to the incidental take of species protected under the California Endangered Species Act, are consistent with Fish and Game Code and its implementing regulations found in Title 14.

The project has applied for incidental take of desert tortoise and western burrowing owl, and CDFW has provided guidance and recommendations to the CEC to avoid, minimize, and mitigate impacts to those species, meeting the requirements for full mitigation.

Additionally, we have collaborated on the impact analysis of stream delineations and other fish and wildlife resources within the project footprint.

Desert bighorn sheep are a protected species under Fish and Game Code. CDFW has shared with CEC a document from June 2024 that was produced when CDFW was

proposed to be the CEQA lead agency for the project. The report entitled Desert Bighorn Sheep Study: Soda Mountain Solar Project, evaluated potential impacts for the desert bighorn sheep from the project, and included a suite of recommendations -- sorry, of recommended mitigation measures for those impacts.

Ultimately, the project proponent decided to withdraw from the CDFW-led process and apply for the streamlined AB 205 process led by the CEC. CDFW did not publish for public review any of the environmental documents produced during that time.

To avoid significant negative impacts to the population, desert bighorn sheep must maintain the ability to forage on the flats beyond the toe of the slopes and maintain the stepping-stone connectivity function of those intermediate hills south of the proposed development. Conserving these key habitats and maintaining a sufficient buffer zone from project impacts is essential for preventing significant impacts to this desert bighorn sheep population. 3-1

CDFW appreciates the opportunity to have engaged with CEC staff and the project proponent in numerous meetings for the project.

Thank you.

MR. YOUNG: Thank you.

I'd next like to welcome Kevin Emmerich. And just another reminder that we're currently hearing from local government entities first. Kevin, I'm going to unmute your line. Please unmute on your end, state and spell your name for the record and begin your public comment. Kevin, you might want to unmute on your end and you can begin your comment. Doesn't sound like we can hear you. We'll try and come back to you in just a moment.

I'm next going to recognize Randy Banis. Randy, I'm going to unmute your line. Please state and spell your name for the record, and we welcome your public comment.

MR. BANIS: Thank you. Am I coming in loud and clear?

MR. YOUNG: We can hear you. Thank you.

MR. BANIS: My name is Randy Banis, spelled R-A-N-D-Y B-A-N-I-S. I'm President of Friends of El Mirage. The --

MR. YOUNG: Sir, I apologize. This is for local government entities first. We'll come back to members of the general public in just a minute.

MR. BANIS: Thank you.

MR. YOUNG: Thank you. We'll keep your place in queue.

Okay, I'm now going to transition to the public comment period. Comments are going to be three minutes or

less. Again, please state and spell your name for the record.

I'd first like to welcome Scott Gibson. Welcome, Scott. Please approach the podium and give your public comment.

MR. GIBSON: Hello, and thank you for having me. My name is Scott Gibson. I represent the California Chapter of the Wild Sheep Foundation. I'm also a volunteer with the Society for the Conservation of Bighorn Sheep. These organizations together have been involved in habitat conservation related to bighorn sheep since the 1960s.

I am a conservationist, a hunter, and a volunteer for public land restoration efforts. I live, work, recreate, and love our public lands in the Mojave Desert.

I am opposed to this project. It will have a detrimental effect on the recovery and connectivity of desert bighorn sheep. The science submitted by the nation's leading bighorn sheep experts makes it clear this project would cause irreversible ecological damage. This project could also harm or negate decades of conservation work by my organizations and the many volunteers who have given their time and treasure to help our desert bighorn sheep. 15-1

The Soda Mountain sheep population is one of the most important in the state. This is due to its location 15-2

and its ability to support wildlife connectivity from Death Valley all the way through to Joshua Tree National Park. 15-2 continued

Desert bighorn sheep and other wildlife are integral to the cultural economic fabric of our desert communities. Wildlife viewing and sportsman's activities have long been pillars of our rural traditions. Any harm to sheep and the other wildlife populations undermine these activities. 15-3

In addition, any reduction of sheep movement between the Soda and Cady Mountains with neighboring herds and mountain rangers south of the I-15 would certainly decrease these opportunities and would reduce or eliminate California citizens' hunting and viewing opportunities. 15-4

There are alternatives to the proposed Soda Mountain plan submitted by leading bighorn sheep biologists and connectivity experts. These alternatives are not going to be implemented according to the current plan. 15-5

The overall Soda Mountain Solar Project isn't good for our desert bighorn sheep and other wildlife. It's problematic. The project has been rejected previously by the county and is opposed by the National Park Service. The State of California should be protecting our bighorn sheep and other sensitive wildlife.

This project will negatively affect the proposed $35 million in taxpayer funded wildlife overcrossing over 15-6

the I-15 freeway as part of the high-speed rail system. This project will likely negate the many decades of bighorn sheep water development projects volunteers from my organizations have built in the area. I urge you to reject this project. 15-7

Thank you.

MR. YOUNG: Thank you for your comments.

I'd next like to welcome Debra Hughson. Debra, please state and spell your name for the record and we welcome your public comment. Comments will be three minutes or less. And after Debra we'll hear from Neal Desai.

MS. HUGHSON: Hello. Okay. Debra Hughson, D-E-B-R-A H-U-G-H-S-O-N. I would like to just follow up on the comments that Scott has made.

I heard earlier in the discussion from biology about the Soda Mountain herd. I think you need to take a step back from that. The Soda Mountain herd would not exist without its connection to Camp Cady. And in fact, if you look at this in a bigger picture in terms of the metapopulation dynamics, the Soda Mountain connection is the single most important connectivity for the entire metapopulation of Mojave Desert bighorn sheep. It's the only place that connects demographic connectivity between the east and the west half and, thus, is important. It's 16-1

essential for the maintaining of the entire metapopulation of Mojave Desert bighorn sheep. It's very exceedingly important. 16-1 continued

And then I think you need to step back and take another look at the bigger picture here. What we're talking about here on a global scale is transitioning from a carbon-based economy to a renewable-based economy. And I think we all understand the importance of that. But look at this in terms of a bigger picture. Here you have a very small project in terms of footprint compared to other projects that are going on, yet it has enormous overarching negative impacts. And so your trade-off here is really poor. You're accepting tremendous impacts to an iconic desert species for what? For a negligible improvement in our carbon footprint. 16-2

And so I agree with Scott that this project should not be constructed.

Thank you.

MR. YOUNG: Thank you for your comments.

Neal, please approach the podium, state and spell your name for the record, and we welcome your public comment.

MR. DESAI: Good. Am I on? Yeah. Hi. Neal Desai. N-E-A-L D-E-S-A-I. Good afternoon. Thank you, Commissioner, Executive Director, and Chris here for

joining us and others. So it was a few months ago out in the field. I represent the National Parks Conservation Association. We've been advocating for the protection of our national parks.

Debra, I want to thank you for your public service for the National Park Service over decades. You're retired now, but thank you for everything that you've done for the Mojave Desert.

We continue to be very strongly opposed to this project.

And I also want to preface by saying we were very much involved in the establishment of the DRECP. That created red light zones, yellow light, green light to help renewable energy developers have certainty. This project, this dumpster fire of an application, has been around since 2007. We're in this fourth application -- or fourth owner. Everyone has tried to move it forward, and it keeps on getting stopped by the county, and thank you, San Bernardino County, by the National Park Service, thank you very much for all of your work in opposing this since over a decade ago, and this is not a place designated for smart-from-the-start solar planning. 4-1

So what are we doing? Like what's going on here? And it's tough to -- it’s tough to not think that things are a little cooked here, okay, and I just want to share a

few things.

So the nation's leading bighorn sheep experts have submitted information. It was commissioned by the National Park Service. It's submitted to you all. It's from 2025. Nothing in the staff report dismisses any of those conclusions. The staff report doesn't even respond to those recommendations. There's not even an alternative. There's not even an alternative that gives the public and everyone else an opportunity to look at what has been recommended.

I think I just heard CFW say that the science that they put together wasn't even intended to be a published document. And that document says that this is just a recommendation from their quarter-mile buffer or something from 2013, an informal recommendation from 2014. So we have the nation's leading bighorn sheep biologists telling the CEC, this could lead to late local extinction of a population.

You have all of us telling you that we are risking California is risking $35 million in taxpayer funded wildlife crossing, risking it. Why? This is not an issue of first impression either. We've dealt with this. We've dealt with this for over 10 years. It's been rejected by the county here.

And so it's tough, it's just tough to think that

4-1 continued

4-2

4-3

4-4

things are not a little bit cooked here; right? The pressure that you're under, it almost seems very comparable to the BLM when the Park Service was opposing it, and they were told, hey, you got to approve this anyways.

We ask you to oppose this. We ask you to listen to the scientists. We ask you to put forward an alternative, put it back up to the public.

Thank you.

MR. YOUNG: Please conclude your remarks. Thank you. Thank you for your comments.

We're next going to go to Mason Osgood, and then Chance Wilcox. Mason, please approach the podium, state and spell your name for the record. Comments will be three minutes or less. And we appreciate your public comments.

MR. OSGOOD: Thank you. My name is Mason Osgood, M-A-S-O-N O-S-G-O-O-D. I'm a resident of Joshua Tree. I'm here to read a statement by Jacob Overson. That's J-A-C-O-B O-V-E-R-S-O-N, who is unfortunately unable to attend.

"Commissioners, my name is Jacob Overson. I am born and raised in Baker, the nearest town to the project site. Our family ranched in this region for generations. I'm also a board member for the Baker Community Services District, and the district is strongly opposed to this project.

4-4 continued

17-1

"Our community has supported efforts to help bring wildlife back to this region. The bighorn sheep and the Mojave National Preserve are very important to our community. We are already in a fragile balance here with wildlife, and this solar project will disrupt this balance. 17-1 continued

"The desert is not a wasteland. The people who live out here love it and love their wildlife. We do not want to see this project.

"We worked with the county to stop this project, but now the company and you are bringing it back. That is not respectful to our community. There is a place for solar, and this is not the place."

Thank you.

MR. YOUNG: Thank you.

Chance Wilcox, we welcome your public comment. Comments will be three minutes or less.

MR. WILCOX: Thank you. My name is Chance Wilcox, C-H-A-N-C-E W-I-L-C-O-X. I direct the California Desert Program for the National Parks Conservation Association, and I'm a resident of the Mojave Desert. 18-1

We're all Californians. We love renewable energy, or many of us in this room love renewable energy, and the desert provides perfect opportunities for solar development. However, not all sites are perfect for solar

development. And it has been proven time and time again that the Soda Mountains are not the place for development.

I urge you not to accept a renewable energy project that isn't right just to continue California's incredible opportunities and reputation for celebrating renewable energy development. This project isn't right.

The site is not zoned for solar development by the DRECP and is immediately next to Mojave National Preserve, established by federal legislation for its biological, scenic, recreational, and cultural importance. 18-1 continued

Scientists have continuously demonstrated that the project, even with a quarter of a mile buffer, would not only have immense negative impacts on Mojave Desert bighorn sheep populations and genetic diversity, but would also jeopardize the effectiveness of a future wildlife crossing over I-15 that Caltrans has already approved millions of taxpayer dollars to construct. 18-2

I have stood at the future site of that overcrossing, where you can see the proposed site for the Soda Mountain Solar Project, and I have looked up at a bighorn ram curiously looking down at me.

The National Park Service has opposed the project. The county has previously rejected the project. Scientists have told you this project isn't right. You said yourself that you would not want to permit or approve 18-3

a project that you wouldn't want in your own backyard or neighborhood, but community members have told you, who live here in the Mojave Desert, that this project is not right for these communities or for their backyard, where they recreate, where they appreciate the beauty, and they appreciate the wildlife that are representative of these communities and this desert.

And with that in mind, I ask you to oppose this project and accept a no-project alternative. 18-3 continued continued

Thank you.

MR. YOUNG: Thank you.

Pat Flanagan, we'd like to welcome you to the podium. And after that, we'll hear from Erin Gatlin.

Pat, please state and spell your name for the record. Comments will be three minutes or less, and we welcome your comments.

MS. FLANAGAN: Okay. Thank you. Do we hear me? Okay. My name is Pat Flanagan, P-A-T F-L-A-N-A-G-A-N. I'm with the Morongo Basin Conservation Association. I am also a resident of the Mojave Desert, and I have been suffering from dust from the very first solar projects that were built in Joshua Tree back in 2013, which brought me to talk to you today because there's going to be a dust problem where this project is proposed. 5-1

I brought a number of documents which I will pass

on to you.

The first one is from the USGS, United States Geological Survey, assessing the geology and geography of large footprint energy installations in the Mojave Desert, California, and Nevada. And from their abstract, I get about 48 percent of the entire area is less than a 5 percent slope, and 8.3 is less than 1 percent slope, the favored slope category. That's what we're getting. For this lowest slope category, deposits underlying about 98 percent of the area are either mixed aeolian alluvial origin or fine-grained alluvial deposits, and you found those, and thus are susceptible to aeolian dust and sand transport, especially after disturbance. So that gives us a feeling for it's not unusual that there should be this dust problem.

5-1 continued

I've also given you an article here, *Sand Transport Paths in the Mojave Desert, Southwestern United States*, by James Zimbelman, in which you will look at the sand transport paths, which are from the end of the ice ages, and we get sand transport out of the dry lake beds.

5-2

Also very interesting is soil surface susceptibility to wind erosion, another USGS project, and they did their study in the Mojave Preserve. And I want you to see their maps, which do the percent time per month that a friction velocity is exceeded. And this is the

5-3

boundary, and the project is within the boundary. So you can look at these and go, oh, they're going to get a lot of wind a lot of the time. 5-3 continued

To do dust controls, I found the best ones that Lisa and I have found that are not going to destroy the area, so it can -- well, it takes thousands of years to recover, but it comes from the Owens Dry Lakebed, which says you need four inches of crushed gravel on top of fabric, and that will keep the dust down, and try that one. 5-4

We also need to know that the deserts of California, in an undisturbed way, actually are sequestering 10 percent of the state's carbon, and so it's not that it's easy to go out and say, okay, that one out there is 10 percent. 5-5

MR. YOUNG: Thank you. Please conclude your comments.

MS. FLANAGAN: Okay. Done.

MR. YOUNG: Thank you.

MS. FLANAGAN: There you go.

MS. PONCE: This Mariah Ponce from the CEC.

Mrs. Flanagan, if you would like the CEC to consider your documents, if you can please upload those to the docket? Thank you.

MR. YOUNG: The Public Advisor is available to assist with that.

Erin Gatlin, please approach the podium. State and spell your name for the record. We welcome to public comment. And then we'll hear from Arch McCulloch.

MS. GATLIN: Can you hear me? Okay. My name is Erin Gatlin. That's E-R-I-N G-A-T-L-I-N.

I would just really like to reinforce all the comments that have already been offered today related to the project and its impacts, which are recognized as being not mitigatable as proposed in the preferred alternative. It doesn't meet the recommendations by the recognized biologists. 19-1

The community doesn't want it. The county has already rejected it. It's not consistent with agreements that were established in the DRECP or any other agreements, including the agreement that established the need for wildlife corridors and identified this location as an appropriate one. Let's stop putting bad projects in the Mojave Desert and focus on ways to instead make solar energy more efficient in the state of California. 19-2

Thank you.

MR. YOUNG: Thank you.

And for our last in-room public comment, we'd like to hear from Arch McCulloch. Arch, please approach the podium. State and spell your name for the record, and we welcome your public comment.

MR. MCCULLOCH: Hi. Can you hear me? Great. I'm Arch McCulloch, A-R-C-H M-C-C-U-L-L-O-C-H. I'm with Morongo Basin Conservation Association. I want to thank you for the opportunity to speak here.

I'll start out by saying that this is sort of a project that is reluctant to just die. MBCA has opposed it on, I think, about four different iterations. I have two of those letters that we've written in opposition of it at various times over the years. Most of those points we brought up still hold. 6-1

Certainly. Okay, I'm sorry.

A lot of people have talked about a lot of things. I'm going to try and pick up some of the things in the noise.

For tortoises, you guys, in your report, have this, which I think you guys will recognize, and I don't know if anybody else can see it, but it shows desert tortoise burrows and scat within the project area. I assume that your mitigation for that is going to be move the tortoises. And I want to tell you that's been tried before and it has been uniformly unsuccessful, even when they tried to move them to keep the neighboring tortoises together, that it results in an overall 90 percent decrease in the tortoise population after being moved. That's highly skewed, even so, towards the male tortoises, which 6-2

means that after a single tortoise generation, you're looking at something awfully close to 100 percent mortality. And this was tried at the Marine base, and it's been tried other places too. 6-2 continued

Let's see. With other species that were shown on the site, badger, kit fox, and the burrowing owls, I suspect that the same kind of thing is true. I don't know if you're planning on relocating them or letting them relocate themselves, but either way, I think you're going to look at very high mortality among the things there. 6-3

This project was rejected by San Bernardino County, by the National Park Service, and is contrary to another state agency, Caltrans, which was trying to put in the overpass. I would say that the -- yeah, I've lost it. 6-4

The other thing I have, I'm skeptical of the 75-acre claim for grading that was brought up. And Mr. Knight, I have a slight correction for you. Highway 247 was declared a scenic highway in September of this year, and I think that's closer than 25 miles. 6-5

Thank you very much.

MR. YOUNG: Thank you for your comments.

That concludes our in-room portion of public comment. I'm now going to transition to Zoom and online. If you are joining us by Zoom or by phone, please let us know you'd like to make a comment. If you're joining us by

Zoom, please use the raised-hand feature. If you're online and you're on the telephone and you want to join us, please press star nine to raise your hand.

Before Scott Miller, I'm going to turn to Kevin Emmerich. Kevin, I'm going to unmute your line. Please state and spell your name for the record and we welcome your public comment. Comments will be three minutes or less.

MR. EMMERICH: Can you hear me now?

MR. YOUNG: Yes, we can. Thank you.

MR. EMMERICH: Thank you. My name is Kevin Emmerich. K-E-V-I-N E-M-M-E-R-I-C-H.

First off, I want to say I'm with Basin and Range Watch. We've followed and opposed this project since 2009. We wish we didn't have to do it again. When the county said no in 2016, we thought that was going to be final and we were happy about that. 7-1

But your environmentally-superior alternative removes about four square miles of bighorn sheep habitat, that flat habitat that's very important to them. And there's really not going to be any type of override that's going to be able to mitigate this. It is one of the most significant herds of desert bighorn in California. I really urge you not to override that.

You can't mitigate a lithium battery fire by 7-2

moving a project around. So we do an alternative that eliminates battery storage. And the Bonanza Peak Solar Project, Charleston View, just eliminated their battery storage. It can be done. 7-2 continued

I'm skeptical that the water use, 500 acre-feet for construction and 5 acre-feet a year, will not hurt the Soda Springs complex. I'm urging you to review an alternative that does not allow on-site wells. 7-3

The Old Spanish Trail is only a comprehensive management strategy at this point. They were required to make a management plan about 20-some years ago and still have not. This needs to be held up until that plan can be implemented. 7-4

The visual resource class is Class III, and under federal standards and the DRECP, you need to do a plan amendment to actually approve that. You have to downgrade it to Class IV. You said it's not compatible. An alternative that takes the gen-tie out of the ACEC would be a good alternative and an alternative that eliminates all grading would actually be a good alternative.

Again, please don't override this. If you do, that does compromise your credibility as a regulating agency. 7-5

Thank you.

MR. YOUNG: Thank you.

We're next going to hear from Scott Miller, and then Clinton Epps.

Scott, I'm going to unmute your line. Please unmute on your end and we welcome your public comment. Comments will be three minutes or less.

MR. MILLER: Hi. This is Scott Miller. Can you hear me?

MR. YOUNG: Yes, we can. Thank you.

MR. MILLER: Okay, great. I'm Scott Miller. I'm the Executive Director of the Western Power Trading Forum. I'm here to express support for the Soda Mountain Solar and Battery Storage Project.

WPTF has over 135 members which are participating in achieving reliability and economic efficiency through competitive markets. And this, we believe, has always benefited customers and the needs of the western region. Our members develop, own, and operate resources across all 11 states in the Western Interconnection. 8-1

The proposed facility has already been modified significantly to try to accommodate the environmental needs of the system. While they've done that, they've done something very important. They've added 1,200 megawatts of battery storage which provides a tremendous amount of reliability and flexibility to the system, not only to benefit California's reliability but also in California's

help of the rest of the Western region in terms of the reliability which all the states share in.

The project has a critical role, certainly for California and the grid, in reducing energy price volatility, and also help in mitigating the possibility for rolling blackouts as has been discussed.

The siting adjacent to the Interstate 15 and the planned Southern California to Las Vegas rail corridor minimizes the environmental and visual effects. And I will say that after seeing developments that have occurred in all 11 states in the Western region, this has been a significant effort on the of the company to try to minimize environmental effects while providing the region and California itself with clean, reliable power that will benefit economically and from a reliability standpoint.

So as a consequence, I would -- for all of these reasons, I respectfully urge the California Energy Commission to approve the Soda Mountain Solar Project, and I thank you for your consideration.

8-2 continued

MR. YOUNG: Thank you.

After Clinton Epps, we're going to hear from GMM. Clinton, please unmute on your end. I'm going to unmute you. State and spell your name for the record, and we welcome your comments.

MR. EPPS: Okay. Can you all hear me?

MR. YOUNG: Yes, we can. Thank you.

MR. EPPS: Thank you. So, my name is Clint Epps, C-L-I-N-T E-P-P-S. I'm a professor of wildlife science at Oregon State University and I'm speaking on my own behalf, not on behalf of my university. I thank you all for the opportunity to provide comment today. 20-1

I've been studying desert bighorn sheep in this system since 1999, so this will be my 27th year of working in this system. And I and members of my research group have reviewed the potential impacts of this project and its previous iterations and continue to have serious concerns about it.

As other people have mentioned, this is a key connectivity link. One thing that I have learned in these decades of work on these animals is their ability to move back and forth between these mountain ranges is critical for recolonizing habitat when there's local extinctions, for maintaining genetic diversity, which helps with resilience to disease and other environmental issues.

I want to specifically mention that the 0.25-mile offset that has been mentioned, we have submitted information previously that show that that is inadequate. That is a very old recommendation based on just sort of general bighorn habitat use, but it comes from a time when we did not have the precise spatial information provided by 20-2

GPS collars, which has been available in this system now since 2013. And with those data, we see that in this mountain range, more than 11 percent of the locations are at slopes below 10 percent. 20-2 continued

And those flats provide critical food resources at times of the year when there's, you know, areas of greenup, and this is a very nutritionally stressed population. And so the ability of these animals to move back and forth between the Sodas and the Cadys, most critically, I think, in some ways in the long term, is this potential to facilitate and restore movement across Interstate 15, opens up new habitat, opens up gene flow and connectivity. 20-3

And with the high-speed rail line that's been proposed to come in, any kind of significant disruption, which this solar facility absolutely will be, especially if it's only a 0.25-mile setback, could really deplete the ability of that crossing structure and all the work that's gone into that to mitigate those problems. 20-4

So I urge strong consideration of the larger buffer that we have recommended, which is somewhere between 0.6 and 1.2 miles, and most critically, delaying construction until that wildlife crossing goes in. If it is going to be built, wait until that crossing goes in and animals can establish use. That's really critical. But 20-5

they really do need to be able to move back and forth locally across the freeway and to be able to access those habitats and vegetation on the flats. 20-5 continued

So thanks again for the opportunity to speak. And we really strongly urge you to consider all this scientific information that we have been providing.

MR. YOUNG: Thank you.

GMM, I'm going to unmute your line. Please unmute on your end. State and spell your name for the record. And we welcome your comments. Comments will be three minutes or less. GMM, you're going to want to unmute on your end.

MR. LARUE: Yes. Sorry, I didn't realize it was LGMM. My name is Ed LaRue. And I am a tortoise biologist with the Desert Tortoise Council.

MR. YOUNG: Would you state your name for the record, please?

MR. LARUE: Sure. Edward, E-D-W-A-R-D, LaRue, L-A capital -R-U-E.

And I appreciate that in the presentation with visual resources that the DRECP was recognized. I'm disappointed that our biologists didn't also talk about the connection relative to the DRECP. My concern or understanding is that this is not within a development focus area as identified by the Bureau of Land Management 21-1

and its DRECP in 2016. Also, that it's not a Solar Energy Zone as identified in the programmatic solar document that came out from the BLM in 2012. 21-1 continued

So I've walked the site in early iterations of this, and the site is pristine. Despite it being proximate to the open area, there's very little cross-country vehicle travel out there. There aren't a lot of tortoises there, but the scientists throughout the years, and also in the DRECP, are encouraging this kind of development to go on in degraded habitats, brownfields, and that sort of thing. 21-2

The thing that I find really kind of disingenuous is, is that you've shackled all your alternatives to a single corridor. There's been no discussion about where this energy is being transported. And my guess is if it's being transported to the south, that there are going to be degraded habitats closer to the targeted source for this energy than to develop something in the middle of the desert and transport it hundreds of miles into places that are already biologically impaired.

The other thing I'm not hearing discussed, and I was really concerned when I was at the public meeting last year, that the proponent seems to have shackled itself to the off-highway vehicle group and was talking about putting infrastructure in the Rasor Open Area, which is on BLM lands, as a goodwill gesture to off-highway vehicle users. 21-3

My concern is, is that the proximity of the solar site to an open area will result in increased dust generation, and that that dust will actually impair the efficacy of the solar shields and so forth, but will also require that you have to use more water in order to wash the dust off of that site. 21-3 continued

So the Tortoise Council has been opposed to this from the very beginning. I believe that every issue we've ever raised in this is still valid, so we will resubmit all of our comments so that a different lead agency, in this case the CEC, can hopefully consider our concerns and reject this project.

So thank you much.

MR. YOUNG: Thank you.

Moises Cisneros, I'm going to unmute your line. Please unmute on your end, state and spell your name for the record, and we welcome your public comment.

Okay, Ben, I'm going to unmute your line. Please state and spell your name for the record, and we welcome your public comment.

MR. PRATT: Good afternoon, my name is Ben Pratt, B-E-N P-R-A-T-T. I currently serve as Vice President of IBEW Local 477. We represent approximately 1,400 electricians in San Bernardino, Inyo, and Mono County, many of whom are residents of the I-15 corridor. Our residents 22-1

that live up in the high desert region are constantly forced to travel down the Cajon Pass for work, and this provides a great opportunity for them to work where they live. This locally sourced workforce that we offer definitely meets the skilled and trained requirement for this project. Local 477 has been operating in the solar and BESS space since its inception. 33-2 continued

I would like to add that BESS technology has come a long way since it began. These fires tend to be compartmentalized and very rare, especially if installed by skilled and trained personnel.

Also, I would like to add that the IBEW is committed to outreach and partnership with the communities. Currently, we're working with Barstow Community College to provide opportunities for apprenticeship for recently-separated veterans and those active duty members that are approaching their end of active service.

Additionally, there is a massive deficit in the grid that needs to be met. Grid expansion equals affordability for ratepayers and is definitely beneficial to the mitigation of blackouts. 33-3

For all those reasons, IBEW 477 supports this project. Thank you for your time.

MR. YOUNG: Thank you.

Jason Becker, I'm going to unmute your line.

Please stay and spell your name for the record and welcome your public comment. Comments will be three minutes or less. Thank you.

MR. BECKER: Yes, my name is Jason Becker, J-A-S-O-N B-E-C-K-E-R, and I'm a business representative for the Operating Engineers Local 12 here in Southern California.

Many of our members, like my brother from IBEW just mentioned, are local residents right here in the high desert that are going to be working on this project. These aren't just jobs. These are good-paying careers to residents of the Mojave Desert. 23-1

What a lot of the opposition isn't recognizing is the advancements we've had in construction technology. These sites no longer require the mass grading that once happened when this project was first proposed 20 years ago. There's very little impact compared to previous, not only the dust control, we're stewards of the environment. We take pride in making sure we leave our sites cleaner than when we got there. Vegetation is replaced. Native species are planted. Less native species are removed in the construction process. It's different than it was 20 years ago. There's less material excavated out of these sites.

The solar panels produce more energy, so out of that footprint you have more benefit to the grid than you

did previously.

And let's not forget that, when everyone mentions it, it's that San Bernardino County had denied this in the past. You know, at one point there was a history of denying all solar projects in San Bernardino County. San Bernardino was not very friendly and always the same argument, it was always about the native plants, the desert tortoise, the kit fox, and that argument hasn't changed. But we haven't shown how the construction industry ignores the effects and doesn't go far beyond to make sure there isn't a negative impact.

23-1 continued

All of our sites are always staffed with biologists, cultural representatives, tribal representatives. And if anything gets in the way of construction, construction is immediately stopped to take care of that, that issue, whether it be an artifact, an animal, an endangered plant, to mitigate the damages that occur to the environment.

Thank you.

MR. YOUNG: Thank you.

We're next going to hear from Christina Aiello, and then Scott Murtishaw.

Christina, please unmute on your end. I'm going to, excuse me, I'm going to unmute you. Please state and spell your name for the record and comments will be three

minutes or less.

MS. AIELLO: Thank you. My name is Christina Aiello, that's A-I-E-L-L-O. I'm a wildlife biologist for Wildlands Network, and I've studied the ecology of wildlife in Southern California for 15 years, the last 8 of which have been focused on desert bighorn sheep specifically. I was one of the authors of the report commissioned by the Park Service that specifically focused on the impacts of this project on bighorn sheep, which is one of the key wildlife resources within the Mojave National Preserve, but also on the surrounding BLM lands and other national parks in the area. 9-1

And I'm not here today to argue against the solar development necessarily, but I'm here to argue to protect a restoration effort at this site that's really been decades in the making. I'm referring to the Wildlife Crossing Project that's about to be built in this area. This is a project that's an investment in the future of bighorn populations, not just at Soda Mountain but throughout the entire Mojave Desert. And this is not a cheap investment. The Transportation Commission approved $76 million to go towards these three overpasses to be built, but the crossing here at Soda Mountain is the highest priority of these crossings.

And the quarter-mile buffer from the sloped areas

that's been proposed is not, in my scientific opinion, sufficient to reduce the impacts to less than significant, given the unique situation of this particular project's location and its risk to this in-progress efforts to restore connectivity in this region.

So the justifications for the proposed buffer are fairly weak and stem from a very limited interpretation of bighorn movement and their habitat needs. So we have submitted the report that calls for three mitigation measures: first, a larger buffer that's more appropriate for their ecology and needs; second, delaying the project's construction until the wildlife crossings are adopted; and then third, re-evaluating their habitat needs at that point because things are going to change and the situation is going to be different.

9-1 continued

So the Staff Assessment had provided no data or analysis to dismiss what we had recommended, and they provided our conclusions and recommendations that we had submitted, but they did not adopt them as an alternative. So I would urge you to say that simply looking at GPS locations on a map and deciding mitigation buffers off of these loose interpretations ignores the dynamic behaviors of bighorn sheep and the decades of knowledge that's been gained on them.

9-2

These animals are constantly navigating risk and

rewards on the landscape, and they're going to have to overcome their fears in order to make this crossing successful. So filling in these low-lying areas with large solar construction project is the opposite of creating a stable and comfortable situation for these bighorn for this project, this restoration project, to be successful. So we need to preserve that project, but also the connectivity that already exists between the Soda and Cady Mountains. The solar project overlaps with the habitat that the bighorn are using to move between these mountain ranges, and the project will be highly visible from the areas they use the most. And bighorn make decisions based on things they can see from a distance.

9-2 continued

So the risks of this development are disproportionately high, and we recommend you all to look at our recommendations and adopt them.

Thank you very much.

MR. YOUNG: Thank you.

Scott Murtishaw, I'm going to unmute your line. Please unmute on your end. State and spell your name for the record. Your comments will be three minutes or less. We welcome to public comment, Scott.

MR. MURTISHAW: All right, thank you. Yeah, my name is Scott Murtershaw, S-C-O-T-T M-U-R-T-I-S-H-A-W, and I am the Executive Director of the California Energy

10-1

Storage Alliance. We're a trade association representing approximately 80 energy storage developers, manufacturers, and storage safety experts.

And I'm speaking today, as you might guess, to express our strong support for the proposed Soda Mountain Solar and Storage Project. It will provide safe, reliable, and clean power to approximately 300,000 homes, and will do so when energy is most needed. 10-1 continued

And energy storage has already proven that it's indispensable during the California summers, during record-breaking heat waves. In 2020, we experienced two blackouts and multiple Flex Alerts that called for customers to conserve energy until the nighttime. And in 2024, with a similar peak load and the hottest summer in California's history, we had no blackouts and no Flex Alerts. And the difference was entirely due to the addition of several thousand megawatts of storage.

The project site is also located adjacent to existing transmission corridors and major load centers, so it will enable interconnection without requiring costly or time-consuming upgrades. It's a strategic location to be brought on quickly and cost-effectively. And I'm sure as you all are aware, the governor's office estimates that we'll need over 50,000 megawatts of energy storage by 2035 to achieve our greenhouse gas production targets. And we

only have about 16,000 megawatts currently available. So projects like this are absolutely necessary to capture renewable energy when it's abundant and then store it for delivery during peak hours, reduce our reliance on polluting fossil plants, cut greenhouse gases, and do all of that while keeping lights on.

10-1 continued

I'm sure many of you are also aware that, as a previous speaker acknowledged, energy storage technologies and safety regulations have evolved tremendously in just the past five years. So the transition to lithium iron phosphate chemistry has substantially reduced the risk of fires. And accompanying that, the shift to outdoor containerized projects. like this one. from the building-based storage projects that were used in places like Moss Landing dramatically limits the scale of potential fires, usually to one or at most two containers. And to give you a sense of how that compares, that would be about one percent the size of the Moss Landing fire.

10-2

So for all of these reasons, we just effectively urge you to (indiscernible).

MR. YOUNG: Thank you.

Phone number ending in 644, I'm going to unmute your line. Please unmute on your end by pressing star nine -- excuse me, star six on your end. We welcome your public comment. Please state and spell your name for the record.

Phone number ending in 644, press star six to unmute on your end.

MR. PRIEST: Can you hear me?

MR. YOUNG: Yes, we can. Thank you.

MR. PRIEST: Yeah. Yeah, my name is Donald Priest, D-O-N-A-L-D, Priest, P-R-I-E-S-T. I'd like to thank the Commissioners for allowing me and my organization to state our opposition to this project at the proposed location. I'm a Board Member of the California Chapter of the Wild Sheep Foundation. For decades, our mission has been to promote, enhance, and increase California's native bighorn sheep in our California deserts. 11-1

Again, we are strongly opposed to the Soda Mountain Solar Project proposal. And this opposition included a large coalition of wildlife conservation organizations that have also written to the Commission. This project would be disastrous to our varied and iconic California desert wildlife species. And the Commission has this information from the leading desert bighorn sheep biologists that have made this clear. And I believe that they've already spoken.

We're disappointed the Commission did not put forward an alternative that includes the recommended buffers and other mitigation measures that the desert bighorn sheep biologists experts had submitted, which is

within the report commissioned by the National Park Service. Unfortunately, the Commission is ignoring the science on this matter and has not responded to the information submitted to it. 11-1 continued

The proposed project location is within and adjacent to sensitive desert bighorn sheep habitat, as well as the $35 million taxpayer-funded Wildlife Crossing there at Soda Mountain. Over 40 conservation organizations work to attain that over-crossing as mitigation to the Brightline high-speed rail line that is being built within the median of Interstate 15. This crossing is imperative to the survival of desert bighorn sheep, as it allows for sheep to move in search of resources, and most importantly, for genetic diversity. 11-2

This region of the California desert that includes the Mojave National Preserve is not merely just public land, but a living legacy, a place where generations of Californians have recreated, observed wildlife, and participated in its (indiscernible) activities. This project would be disruptive to those activities by Californians and our responsible land stewardship heritage. 11-3

Californians expect renewable energy development to be responsibly cited in locations that minimize the impact on native wildlife, local communities, and California's ecosystem. In this case, responsible means

that the Commission should reject this project as proposed and require its relocation to a less sensitive area. 11-3 continued

MR. YOUNG: Thank you.

Joan Taylor, I'm going to unmute your line. Please unmute on your end. State and spell your name for the record. And comments will be three minutes or less.

MS. TAYLOR: Thank you. Good afternoon. My name is Joan Taylor. I'm a Chair of the California/Nevada Desert Committee of Sierra Club. Moises Cisneros, Sierra Club staff with Beyond Coal has been trying to get in by phone, but the idea isn't working. I will read his statement to you, and it represents Sierra Club's input at this point. 12-1

"My name is Moises Cisneros. I'm a resident of San Bernardino County, and I'm here representing the Sierra Club and its members who are impacted by your decisions on the Soda Mountain Project.

"We support renewable energy development, which is why we collaborated with the private and public sector, elected officials, and community leaders for just about 10 years to create the California Desert Renewable Energy Plan, also known as DRECP. At its core, DRECP is about doing energy right. If renewables are proposed on public lands, they should be sited on lower conflict lands.

"For developers, it means access to a huge swath of desert land for solar development to bring certainty and efficiency to each project.

"For communities and conservation groups, it means progress that doesn't totally sacrifice the very landscapes we're trying to protect.

"The proposed Soda Mountain Project is not within one of DRECP's solar zones and would bring significant negative impacts to Big Horn Sheep, Mojave Preserve, and the $35 million Wildlife Crossing that California taxpayers have already funded.

"The DRECP provides clear guidance on where renewable energy is most appropriate. That upfront clarity reduces permitting risk, shortens timelines, and lowers the chance of costly delays, lawsuits, or project redesigns. By steering development away from sensitive habitats and cultural sites, developers avoid mitigation surprises, legal challenges, and reputational risk. Predictability saves money, especially at the scale we are discussing today.

"The Soda Mountain Project would be better served where it is welcomed and within the auspices of the DRECP."

Thank you very much.

MR. YOUNG: Thank you.

12-1 continued

Laura Cunningham, I'm opening your line. Please unmute on your end and spell your name for the record. Your comments will be three minutes or less.

MS. CUNNINGHAM: Hello. Can you hear me?

MR. YOUNG: Yes, we can. Thank you. Yes, we can.

MS. CUNNINGHAM: Yeah, Laura Cunningham, C-U-N-N-I-N-G-H-A-M. And I think today I'm going to speak as a landowner in the Cima, California area and in holding in the Mojave National Preserve.

I really value that we have these public lands that are for recreation and visual beauty and biodiversity. And I'm very concerned that utility-scale solar projects such as Soda Mountain are just right there, so close to the boundary of this National Park Unit, instead of on a brownfield or, better yet, distributed solar on rooftops, over parking lots in cities and in the load centers. 13-1

So I'm just going to keep this quick. I strongly oppose this project for all the excellent comments that have been stated, and I will be sending in detailed written comments.

Thank you.

MR. YOUNG: Thank you.

I'm not seeing any further raised hands on Zoom. I would like to make one more call for folks in the room.

If anyone didn't have a chance to give their public comment, please approach the podium.

All right, seeing none, back to you, Kaycee. That concludes public comment.

It looks like we have one more raised hand that popped up on Zoom. Rhay, I'm going to unmute your line. Please unmute on your end, state and spell your name for the record, and we welcome your comments.

MS. FLORES: Hi, I'm Ray Flores. That's R-H-A-Y, Flores, F-L-O-R-E-S. I am a steward and resident of the CSU Desert Studies Center in Zzyzx, actually just south of Baker and very close to the proposed solar development, although I'm speaking on behalf of myself as a private citizen and not representing my employer. 24-1

But I would like to voice my strong opposition to this project for all of the reasons that the many scientists you have heard from today have already discussed. And I would like to reiterate that I think many of the scientists that have spoken in opposition would probably also not be in opposition to solar development in general. You know, renewable energy is sort of one of those -- it is an alternative to the fossil fuel and climate crisis, but you cannot solve the climate crisis by exacerbating the biodiversity crisis.

I'm informally a botanist, and I would like to

state that there's also a really large professional conference happening for California botanists, which might explain why there are very few botanists represented as public commenters. 24-1 continued

But reading the Staff Assessment that the CEC has shared recently, it showed that they had surveys for their, you know, plants from April to May, but many of the rare plant species that actually occur adjacent and within the proposed study area begin to flower in June and July. And the nature of these plants being annuals, and especially in desert environments, is that they can be really difficult to find. They may not come up this year, they may not have come up the year that they were doing those surveys, but maybe the next year or the year after that. So it's really hard to know if they are present or absent. And these are all species that, you know, exist in the desert and rely on this habitat and would be irreversibly damaged given the nature of this development. 24-2

And that's not to say that solar development doesn't have a place in our state. It's that this is not the place, as all of the scientists have been strongly urging you.

So I would like to just keep it short. I am in strong opposition to this project.

MR. YOUNG: Randy Banis, I understand you've been

trying to make public comment. I'm going to unmute your line. Please state and spell your name for the record, and we welcome your comment. Randy Banas?

MR. BANIS: Thank you for calling on me again. My name is Randy Banis, B, as in boy, -A-N-I-S. I am the President of Friends of El Mirage.

The OHV, or off-highway vehicle, community has long held an interest in the Soda Mountain Solar Project, primarily due to its immediate proximity to the Rasor OHV Recreation Area. Long ago, a project footprint was proposed that would have included OHV Area land. 14-1

Since that time, DRECP excluded renewable energy development from the OHV Area, and shortly thereafter, Congress, through the Dingell Act, granted even stronger protections to Rasor. This project respects those exclusions and has made every effort to be a good neighbor to the OHV enthusiasts. I'd like to thank the project for working with Friends of El Mirage.

Thank you, Commission, for the opportunity to speak today.

MR. YOUNG: Thank you.

Kaycee, that concludes public comment. Back to you.

MS. CHANG: Thank you, Ryan, and thank you all for your comments today on the Staff Assessment.

Written comments can be submitted to the project docket until 5:00 p.m. on February 27th, 2026. We will respond to all comments raising significant environmental issues and make edits to analysis, if necessary, in the Updated Staff Assessment, which will be filed by March 27th, 2026, along with the Executive Director's recommendation. The CEC is planning to consider the Soda Mountain Solar Project's Opt-In application at the April 27th, 2026, business meeting, and that will be formally noticed.

I would now like to invite Commissioner Gallardo to make closing comments.

COMMISSIONER GALLARDO: Hello, everyone. Just in general, I want to express gratitude for everybody who participated in the candid comments that were made, whether that was folks in the room or folks who are on Zoom. We encourage you to join us at that business meeting. And in the meantime, too, if there are any other comments, information, data, et cetera, that you would like for us to consider, then please make sure to file those to our docket.

And I wanted to say that our Public Advisor's Office is here. They do want to speak to anyone who wants to submit comments, especially the comments that we got in writing today. If you could wait a little bit and make

sure to connect with them, that would be really helpful.

We also really appreciate a San Bernardino County Fire representative being here. I also would like to connect to make sure we have the correct contact information to ensure that you have all the details you need.

So I don't think there's anything else. Thank you to the staff again for being here. Most of us spent a whole day getting here and being here, but again, it's a beautiful area. We always receive a warm welcome. We appreciate that.

And finally, I wanted to thank our interpreters in the back for providing their services to help ensure our Spanish-speaking community can also participate, and to the staff at our venue here who are so helpful and set up really well so that we could have a smooth event today, so I thank you so much.

And with that, we'll adjourn.

(The meeting adjourned at 3:35 p.m.)

CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 24th day of February, 2026.

ELISE HICKS, IAPRT CERT**2176

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

MARTHA L. NELSON, CERT**367

February 24, 2026