

Attachment 1b
Rerouted Wash Mitigation Plan

**State Rerouted Wash Mitigation
Beacon Solar Energy Project
Kern County California**

The Beacon Solar Energy Project (BSEP or Project) would cause direct impacts to 16.0 acres of jurisdictional waters of the state in the form of the dry desert washes all within the Plant Site boundary. The permanent Project impacts would be the result of the proposed removal of the washes and construction of the rerouted dry washes. Of these 16.0 acres, 2.4 acres (15 percent) are vegetated with an alluvial fan scrub habitat association dominated by the native shrub, scale-broom (generally at a height of 3 to 5 feet), and 13.6 acres are unvegetated waters of the state (i.e., riverine unconsolidated bottom – ephemeral wash).

Beacon Solar, LLC (Beacon) has proposed to mitigate for impacts to state jurisdictional waters as summarized in the Streambed Alteration Agreement application and subsequent documents docketed with the California Energy Commission, including the Beacon Solar Energy Project Mitigation Plan for Impacts to Jurisdictional Waters of the State of California, Kern County, California (Mitigation Plan; EDAW 2008). That Mitigation Plan proposes a 1:1 replacement ratio for permanent Project impacts to unvegetated waters of the state and a 2:1 replacement ratio for permanent Project impacts to an ephemeral wash vegetated with southern alluvial fan scrub (i.e., scale-broom association). This document is intended to:

1. Address modifications to the Mitigation Plan as a result of refinements that are being proposed to the design of the rerouted wash; and
2. Better articulate how the proposed mitigation addresses hydrological functions as part of overall biological mitigation.

The proposed mitigation involves creating appropriate physical conditions and promoting natural processes and native revegetation in the rerouted wash. Based on the proposed mitigation ratios presented for each of these jurisdictional habitat conditions, a total of 18.4 acres of mitigation would be required for these permanent impacts (Table 1).

**Table 1
Review of Maximum CDFG Jurisdictional Impacts
and Proposed Mitigation Requirements**

CDFG Wetlands and Waters	Permanent Impacts		
	CDFG Permanent Impacts (acres)	Mitigation Ratios	Mitigation (acres) ¹
Vegetated Wetlands			
Southern Alluvial Fan Scrub	2.4	2:1	4.8
Unvegetated State Waters			
Unconsolidated bottom (Ephemeral Wash – Streambed)	13.6	1:1	13.6

Total Impacts	16.0		18.4
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¹ 13.6 acres of unvegetated state waters will be mitigated (at 1:1 ratio) and 2.4 acres of vegetated state waters will be mitigated (at a ratio of 2:1 to create 4.8 vegetated acres) within the proposed rerouted wash.

Rerouted Wash Design Features

Impacts to the wash will be mitigated onsite, to the extent feasible, within the rerouted wash system. Although the overall approach to mitigation has not changed from the original proposal in the Mitigation Plan, design changes were initiated for the rerouted wash to address flood flow control and storm water management (see Memorandum for Hydrologic and Hydraulic Analysis of Rerouted Channel for Beacon Solar Energy - Mojave, CA, AECOM 2009). The changes to the design of the rerouted wash also included modifications to facilitate the development of a wash system that would replace the existing functions and values of the Pine Tree Creek Wash. The three key design changes intended to facilitate desert wash function and value from both hydrological and biological perspectives are summarized below.

1. Side Slopes. Side slopes of the channel were reduced from 3:1 to 4:1 horizontal to vertical (H:V). This reduction in slope is necessary to meet Kern County requirements regarding public safety.
2. Drop Structures. Incorporation of 10-foot high drop structures are proposed to maintain reasonable velocities through the channel while maximizing the habitat potential between drop structures by maintaining maximum distance between drop structures. To further enhance the habitat potential between drop structures each one will incorporate low flow offset notches to facilitate braiding of the stream bed during low flow events. The drop structures will have a 3:1 (H:V) slope face and be constructed of a soil cement material and riprap backfilled with soil to allow desert tortoises to navigate longitudinally within the channel (AECOM 2009).
3. Longitudinal Slope. The incorporation of drop structures allows for the reduction in the longitudinal slope of the channel, which reduces the rate of flow within the channel. This slope reduction is anticipated to facilitate the braiding and microtopographic variation that is characteristic of wash systems and would also facilitate vertical movement of water into the groundwater basin during low-flow storm events to maintain similar groundwater recharge benefits to the existing wash.

The proposed design feature changes to the wash are critical to the successful hydrologic and hydraulic function of the wash to avoid and minimize potential downgradient impacts; however, they also offer opportunity to facilitate development of the biological functions and values. The development of both hydrological and biological functions and values will be measured by success criteria previously established to evaluate the success of the restoration effort. These success criteria are presented below.

Success Standards

The primary success standards for the mitigation area within the rerouted wash are focused on maintaining hydrological characteristics of a natural desert wash, maintaining native vegetation cover, and maintaining problematic nonnative species below certain thresholds. An additional

goal of the Project mitigation is to create physical conditions that promote natural hydrologic functions of a desert wash, natural successional processes and native plant recruitment onsite and ultimately attain a minimum of 26 percent cover (4.8 acres of vegetative cover as required for 2:1 mitigation of impacted vegetation) at the end of five years. The existing Pine Tree Creek Wash prior to filling will serve as a photo-documented reference for determining the success of the rerouted wash and will be supplemented by the upstream reach at the Plant Site boundary. The Project restoration ecologist will compare the condition of the rerouted wash with the existing wash in order to verify the biological and hydrological functions of the rerouted wash are equal to or greater than the existing onsite wash.

Hydrological Success Standards

The principle hydrologic goal of this mitigation plan is to create a drainage system with physical characteristics of a natural desert wash (interfluves, shelving, scour areas and sediment deposition areas) and retain the existing hydrology that will support dynamic channel formation processes and resulting functions. Hydrological success criteria must account for the highly changeable nature of a desert wash over time base on the unpredictability of precipitation events in a desert environment. Hydrological success of is difficult to gauge on a short time-line and therefore, the rerouted wash will be monitored for hydrological success for the life of the Project. Successful implementation will be measured by the following criteria:

- Maintain flood flow, volume, and extent equivalent to or better than the existing wash. Objective: Minimal or no structures or diversions, and maintain natural water sources and flood flow, volume, and extent.
- Maintain hydrologic connections equivalent to or better than exiting wash. Objective: Maintain natural water sources and confirm the on-site wash segment remains properly connected with the upstream and downstream channel segments.
- Sediment transport is equivalent to or better than existing wash. Objective: Maintain natural levels of sediment transport by maintaining natural flood-prone area width, and prevent development of significant erosion areas. This is evidenced by creation of interfluves, shelving, and sediment deposition that results in a braided system.

The redesign of the wash has incorporated features as summarized above for hydrologic and hydraulic processes that will facilitate achievement of the above criteria. Routine inspections of the wash during the life of the project for maintenance and repair will identify issues associated with excessive sediment scour (erosion) and deposition that may compromise success of the restoration effort.

Biological Success Standards

The principle biological goal of this mitigation plan is to create a drainage system with biological functions and values (including botanical and wildlife) equal to or greater than the existing desert wash. Successful implementation will be measured by the following criteria:

- Achieve vegetation cover equivalent to or better than existing wash. Objective: Restore and maintain native vegetation to support functional wildlife habitat by obtaining 26 percent vegetation cover within the wash area consistent with the Mitigation Plan presented in the Project’s Streambed Alteration Agreement application package.
- Achieve plant species richness, evenness, and structure equivalent to reference site. Objective: Achieve plant species richness, evenness, and structure at least equivalent to the existing Pine Tree Creek Wash in the Plant Site.

Creation of the functions and values of a desert wash system in the rerouted wash, and hence successful mitigation for impacts, would be measured by achievement of the success criteria listed in Table 4.

**Table 3
Success Standards for Rerouted Wash 18.4-Acre Mitigation Area**

Milestone	Success Standards^{1,2}	Remedial Measures
Year One	Maintain cover of problematic nonnative species <10 percent; Attain 2 percent average native plant cover	Adjust methods, timing, and level of effort as necessary to reduce nonnative cover below threshold.
Year Two	Maintain cover of problematic nonnative species <5 percent; Attain 8 percent average native plant cover	Same as above
Year Three	Maintain cover of problematic nonnative species <5 percent; Attain 14 percent average native plant cover	Same as above
Year Four	Maintain cover of problematic nonnative species <2 percent; Attain 20 percent average native plant cover	Same as above
Year Five	Maintain cover of problematic nonnative species <2 percent; Attain 26 percent average native plant cover	Same as above

¹ Problematic nonnative species for this plan are defined as nonnative species that pose a “moderate” or “high” threat to California wildlands as defined by CAL-IPC (2006).

² Extended maintenance and monitoring may be warranted beyond five years if success standards are not achieved on schedule.

Remedial Measures

The success of restoration is based on achievement of the success criteria defined above. Beacon has also identified corrective actions if success criteria are not met within the 5-year monitoring period. Corrective actions include the following:

- If vegetation cover does not represent 26 percent (26 percent cover is equivalent to 4.8 acres of 18.4 total mitigation acres per the Conceptual Mitigation Plan) average cover within the restoration area after 5 years of monitoring, and the restoration ecologist determines that the mitigation effort is not progressing at a productive rate, the monitoring period will be extended until criteria is met or for a period agreed to by Beacon, CDFG and CEC.
- If appropriate, additional seeding may also occur within the mitigation area if sufficient vegetation has not established.

- If vegetation establishment does not achieve the 26 percent average cover of native species and the monitoring period is extended, invasive weed control will continue for the extended monitoring period as agreed to by Beacon, CDFG and CEC.
- If typical physical characteristics (interfluves/braiding, shelving, scour and deposition) are not found to be forming, Beacon will employ a restoration ecologist to identify locations and mechanisms to facilitate the development of these features such as additional minor grading and contouring or the addition of organic debris (e.g., shrub branches) and/or rocks and other abiotic features to promote microtopographic complexity.

Summary

The design features, mitigation measures, monitoring program, success criteria, and remedial measures presented to date in the Mitigation Plan and summarized above are expected to adequately mitigate for impacts to state jurisdictional waters by facilitating development of a wash system that meets or exceeds the existing hydrological and biological functions and values of Pine Tree Creek Wash. The Mitigation Plan will be updated based on the revised rerouted wash design prior to construction and following concurrence from the CEC on the proposed design modifications.

References

- AECOM 2009. Memorandum for Hydrologic and Hydraulic Analysis of Rerouted Channel for Beacon Solar Energy - Mojave, CA. June 19.
- EDAW. 2008. Beacon Solar Energy Project Mitigation Plan for Impacts to Jurisdictional Waters of the State of California, Kern County, California. August 15, 2008.