Draft Weed Management Plan for the Ocotillo Sol Project

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APPENDICES

A: Potential and Observed Weeds within the Project Area

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1.0 Executive Summary

This weed management plan has been prepared for the proposed Ocotillo Sol Project (Project) in Imperial County, California (Figure 1). The preparation of this plan is in compliance with the Ocotillo Sol Draft Environmental Impact Statement (EIS) and the Best Management Practices and Guidance: Desert Renewable Energy Projects (Renewable Energy Action Team 2010).

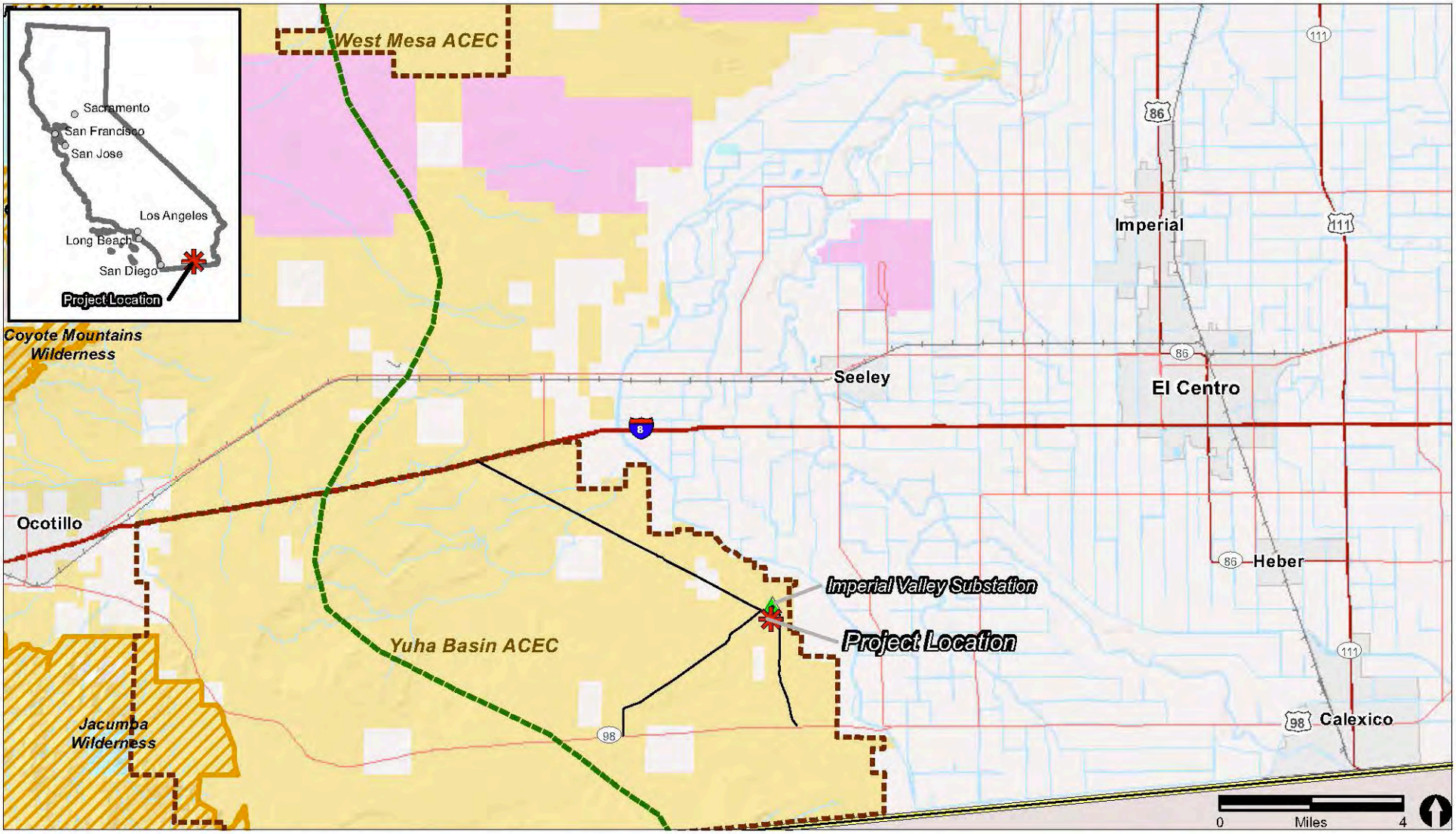
As outlined in the Project Draft EIS, this document provides a comprehensive, adaptive weed management plan for preconstruction and long-term invasive weed abatement for the Ocotillo Sol Project. This plan includes the results of the preconstruction weed inventory, an assessment of weeds on adjacent lands, outlines appropriate preconstruction weed control measures, identifies required short- and long-term monitoring and adaptive management procedures, and identifies operation and maintenance requirements related to weed control including a site-specific analysis of effects of proposed herbicide use on-site. This plan is intended to be adaptive in order not only to control weed species that are currently known to exist on-site, but also to provide a framework to control unknown weed species that may occur in the future.

For the purpose of this document, “weeds” are noxious, non-native, invasive plant species that have been specifically identified by the California Invasive Plant Council [Cal-IPC] in 2012 (Appendix A).

A total of two weed species, Saharan mustard (*Brassica tournefortii*) and Mediterranean grass (*Schismus barbatus*), were observed within the Project Area and buffer area. Two additional weed species, saltcedar (*Tamarisk ramosissimum*) and athel tamarisk (*Tamarix aphylla*) were observed in the vicinity of the Project Area (Figure 2). Saharan mustard and Mediterranean grass will be initially treated as a part of Project weed control. The two tamarisk species in the area will be treated long-term if they become established within the Project Area.

2.0 Project Description

The proposed Ocotillo Sol Project would construct, operate, maintain, and decommission a 100-acre, up to 20-megawatt solar photovoltaic (PV) generation facility on Bureau of Land Management (BLM) managed lands. In addition, the proposed Project includes a 15-acre temporary right-of-way (ROW) for use as a laydown area during construction of the solar facility. This project would also include a 12.47 kilovolt, 2,000-foot underground generation tie line from the generation facility to the adjacent Imperial Valley Substation, and interconnection facilities within the Imperial Valley Substation consisting of breakers, switches, racking systems, and cabling. Within the



Primary Limited Access or Interstate
Primary US and State Highways
Secondary State and County
Project Access Routes
Railroads
International Boundary
Rivers and Canals
Substation
Land Jurisdiction
Bureau of Land Management
Military
State
Federal Wilderness Areas
BLM ACEC
Juan Bautista De Anza Trail

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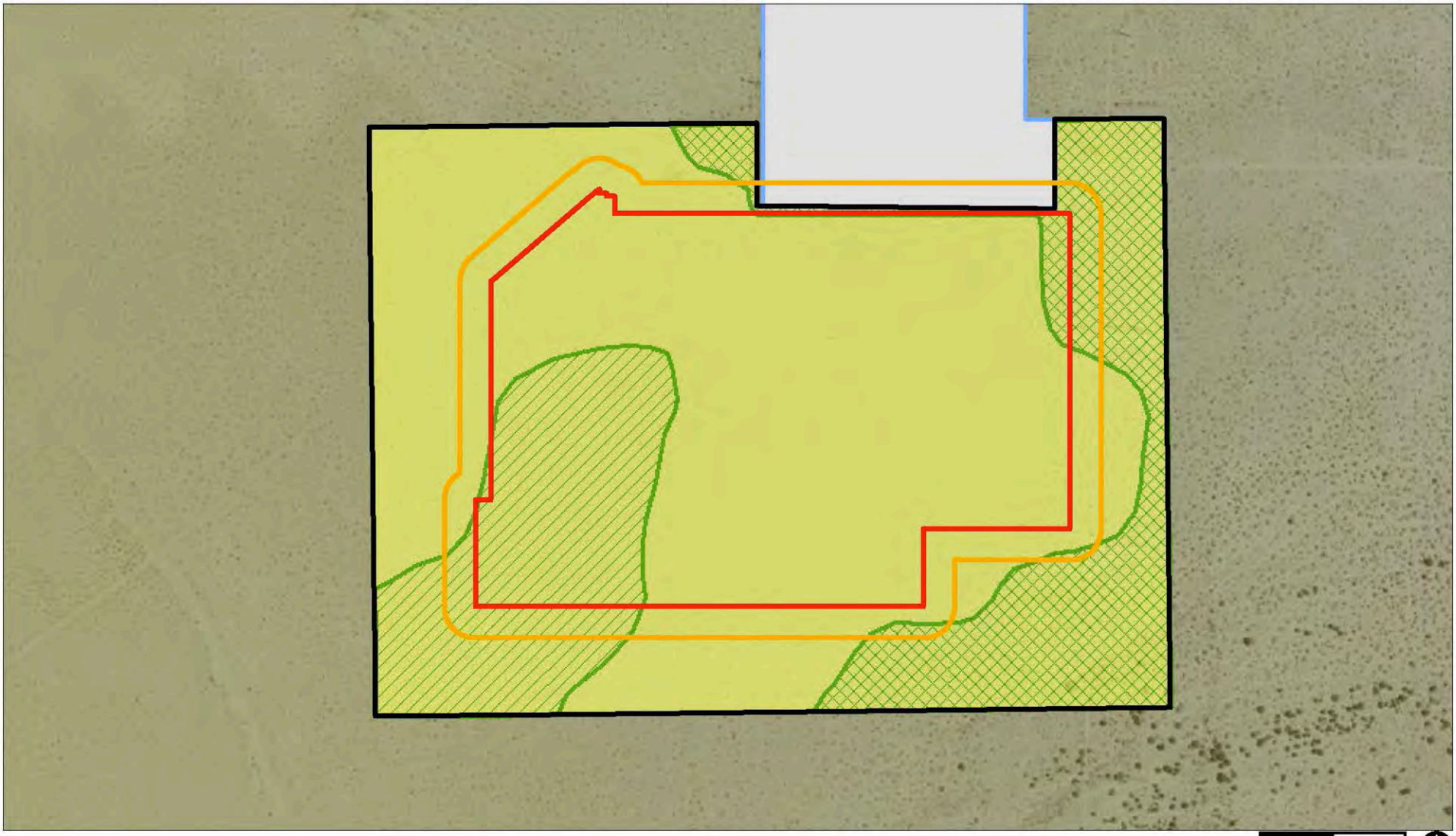
fig1_weed 3/21/2012

FIGURE 1

Project Location



Site Boundary
Project Buffer
Survey Area
Imperial Substation

Exotic Plant Species Cover

Brassica tournefortii (0-1%)
Brassica tournefortii (1-5%)
Schismus barbatus (1-5%)

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fig2_weed 3/26/2012

FIGURE 2

Exotic Plant Species Observed

proposed ROW, the solar field, operations and maintenance building, laydown area, and the switchyard would occupy the majority of the site. About 75 percent (86 acres) of the 115-acre ROW would be used for the solar panels; the remaining area (approximately 14 acres) would be used for internal access roads, power lines, switchgear, a step-up transformer, an operations and maintenance building, and the temporary laydown area (15 acres).

The 15-acre construction laydown area would be restored and released back to the BLM upon decommissioning of the solar PV facility.

3.0 Weed Management Plan Approach

The Project and ancillary facilities (the ROW and work areas, known in this document as the Project Area) occur on land administered by the BLM within Imperial County.

The 115-acre Project Area includes all proposed temporary and permanent impact areas. Permanent and temporary impacts of the Project include solar panels, transformers, underground transmission lines, maintenance buildings, perimeter roads, project fencing, staging areas, work areas, and vehicle parking areas.

Weed management approaches for the Project are designed to be concurrent with three conceptual construction timeframes: (1) pre-construction, (2) construction, and (3) post-construction. A key part of long-term management of weeds on the Project will be to perform initial weed abatement prior to construction (pre-construction), installation of best management practices (BMPs) (construction), and performing monitoring and annual weed treatments throughout the lifetime of the Project (post-construction).

3.1 Weed Management Plan Goals

As outlined in the Draft Ocotillo Sol EIS, the goals of the Project weed management plan are to:

- Identify and map of all exotic plant species, as defined by the Cal-IPC (2012), within the Project Area.
- Develop monitoring and preventative management strategies for weed control during construction activities at the Project.
- Provide a framework for control and management of noxious weeds in areas temporarily disturbed during construction. Native seeding will aid in site revegetation.

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- Develop annual weed control treatment methods for the lifetime of the Project.
- Provide a long-term strategy for noxious weed control and management during the operation of the project.

Weed control treatments will include all chemical, manual, and mechanical methods applied with the authorization of the BLM. The application of herbicides will comply with all applicable state and federal laws and regulations. Where manual and/or mechanical methods are used, disposal of the plant debris will follow the regulations set by the BLM and Imperial County Agriculture Commissioner. The timing of the weed control treatment will be implemented with the goal of controlling populations before they start producing seeds. Timing and conduct of weed treatment activities must be compliant with construction and mitigation measures for sensitive species outlined in section 4.6.4.2, Mitigation for Impacts to Wildlife Resources, in the Ocotillo Sol Project Environmental Impact Statement (EIS).

As weeds within the local region are widely and uniformly distributed and extremely difficult to isolate and eradicate within the Project Area, this plan has been drafted to control existing invasive species within the project area to a density at or below current levels and to limit the expansion of additional regional invasive species into the Project Area.

Responsible Parties

Project Proponent

The Ocotillo Sol Project Applicant (Project proponent) will be responsible for funding and implementing this weed management plan. The Project proponent will be responsible for contracting with personnel qualified in implementation, maintenance, and monitoring of noxious, non-native, invasive plant removal practices described in this plan. Upon contracting with a qualified person or organization to implement this plan, the Project proponent will designate a person or group as the Weed Control Manager (WCM).

Weed Control Manager

A Weed Control Manager shall be hired to implement this plan. The WCM can be either an individual or an organization as long as the person(s) actively managing the Project meets the qualifications outlined below to the satisfaction of the Project proponent. If the selected WCM is an organization, the project manager shall be licensed in the state of California to perform pest control activities and capable of managing large-scale weed eradication projects. The WCM will be responsible for the day-to-day implementation of this plan and will carry out the requirements and objectives described herein. All pest control activities performed shall be under the prescription of a state of California Pest Control Advisor (PCA) or California Qualified Applicator License (QAL).

The individual or project manager identified by the organization contracted to implement this plan must meet the following criteria:

- Have a B.S. or B.A. degree in ecology, botany, biology, landscape maintenance, range management, or related field.
- Have at least two years of experience in native or horticultural landscaping including weed control in southern California, preferably San Diego and Imperial Counties.
- Have a PCA or QAL license.
- Have demonstrated experience in similar projects or in projects including similar skills.

4.0 Preconstruction Survey

RECON biologist Michael Nieto conducted pre-construction weed surveys within the Project Area and an additional 150 foot buffer area on March 2, 2012. A summary of survey methodology and results follow. An overview of weed species' densities within and adjacent to the Project Area is provided in Figure 2.

4.1 Methods

The Project Area was traversed on foot by a biologist walking meandering transects. The majority of survey time was spent within impact areas (Project Area) and project buffers. Additional survey time was spent within the local area on access roads (0.5-mile radius of project) recording observations of additional weed species and noting infestation trends of adjacent lands.

All weeds present within or adjacent to the Project Area were noted. A complete list of weed species with potential to occur in the Project Area is presented in Appendix A.

The surveyor recorded the locations of all target weed species when encountered using Global Positioning System (GPS) handheld unit (Trimble GeoXT). Additional location information was recorded in surveyors' field notebooks. Survey data were downloaded from the GPS units into a geographic information system (GIS) database. Following the survey, the data in the GIS database were updated and refined with the information contained in the surveyor's field notes.

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Each weed species population located within the Project Area was categorized into one of five density classes. Density categorization was based on qualitatively derived ocular cover estimates of the population. The density categories assigned are presented in Table 1.

TABLE 1
EXOTIC SPECIES DENSITY CATEGORIES

Description	Density
Trace	Individual(s), less than 1% cover
Low	>1-5% cover
Medium	>5-25% cover
Dense	>25–50% cover
Dominant	>50–100% cover

4.2 Preconstruction Survey Results

A total of two weed species (Saharan mustard and Mediterranean grass) were observed within the impact area (Project Area) and buffer. Two additional weed species (saltcedar and Athel tamarisk) were observed in the vicinity of the Project Area. These additional species were included in the weed assessment as they have a long-term potential to colonize the Project Area.

A list of weed species identified and observed during the preconstruction survey is presented in Table 2. A map of observed noxious weeds within the Project Area is included in Figure 2. A description of the species observed and proposed control methods are presented in Section 7.2.

TABLE 2
NON-NATIVE SPECIES OBSERVED IN THE PROJECT AREA

Species	Common Name	Cal-IPC Rating	BLM Noxious Weed List
Brassica tournefortii	Saharan mustard	High	Yes
Schismus barbatus	Mediterranean grass	Limited	Yes
Tamarix aphylla	Athel tamarisk	Limited*	Yes
Tamarix ramosissima	saltcedar	High*	Yes

* These species were observed within the region (<0.5 miles), but not within proposed Project impact areas. These species were recorded as they have the long-term potential to encroach into project boundaries.

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5.0 Weed Control

Weed control and prevention procedures are required prior to initiation of construction and during active construction. These requirements are outlined below.

5.1 Preconstruction Weed Abatement

All weed species will be treated and controlled within the Project Area, including temporary staging areas and vehicle access routes. All species must be treated prior to construction or when treatments would be most effective based on the species phenology (see Section 7.2).

The impact area within the Project Area refers to the 100-acre area containing the solar fields, inverter and transformer station, auxiliary facilities and their associated construction yard, and all other areas that will be disturbed during the construction process. All project features within the project footprint will undergo preconstruction weed abatement, and weeds will be treated during and after construction at all of these impact areas, including the 15-acre temporary laydown area.

Weed control treatments shall include all chemical, manual, and mechanical methods applied in compliance with BLM and the Imperial County Agriculture Commissioner, where appropriate. The application of herbicides shall be in compliance with all state and federal laws and regulations under the prescription of a PCA and implemented by a QAL. Where manual and/or mechanical methods are used, disposal of the plant debris will follow the regulations set by BLM and the Imperial County Agriculture Commissioner. No deviation from the plan shall occur without prior written approval by SDG&E and BLM. It is the PCA's responsibility to address guidelines administered by regulatory agencies in the written recommendation.

The primary suggested means of control of these target weed species during preconstruction is through the application of herbicides. Herbicides kill or inhibit plant growth and can be very effective in controlling many weed species. Different weed species may require alternate herbicides, application rates, and time of application for effective treatment (see Section 7.2).

Using herbicides to control weeds requires careful planning and a professional staff familiar with the application areas and herbicides they are using. The use of herbicides should be under the direction of a professional pesticide applicator (QAL). Prior to application, the applicators should be aware of all safety regulations and applicable environmental regulations and familiar with target versus native plants. The WCM is

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responsible for meeting these requirements and approving any trained staff or certified pesticide applicators that will handle herbicides.

The method of application varies greatly from one species to the next and also with the degree of infestation. The application method ultimately chosen should minimize risks of harming non-target plants. The herbicide used should be appropriate for the given species, environmental condition, and regulatory environment. The environmental risks of using herbicides include drift, volatilization, persistence in the environment, and groundwater contamination.

Species descriptions and management measures are included in Section 7.2, Species-specific Weed Control Plans.

5.2 Construction Measures

As part of the environmental training program, field crews will be trained to recognize the importance of weed species control and informed of the measures designed to control the spread of weed species. Deliberate introduction of noxious, non-native, invasive plants or animals into the Project Area is prohibited. Heavy equipment will be commercially washed prior to entering the project site and, consequently, shall arrive at the works site weed free. All seeds and straw materials used during operation and maintenance activities will be weed free, as will all gravel and fill material, as commercially available.

A log will be kept for all vehicle/equipment/tool off-site washing that states the date, time, location, type of equipment washed, methods used, and staff present. The log will include the signature of a responsible party. Logs will be available to the BLM, wildlife agencies, and biological monitor for inspection at any time and will be submitted to the BLM on a monthly basis during construction.

6.0 Long-term Monitoring

The 115 acre portion of the Project Area will be surveyed for weed species annually for the life of the project to monitor previously identified and treated populations and to identify new weed populations. Based on the species observed during pre-construction surveys and the species with potential to infest the Project Area in the future, surveys should generally be conducted in late winter/early spring of each year to capture all potentially invasive species. The exact timing will be determined by the WCM based on rainfall and other environmental conditions. If evidence of late or early season weed species is noted, timing of annual surveys may be shifted to account for these species.

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Surveys should focus on (1) areas where target weed species have previously been mapped; (2) areas where target species have previously been treated; and (3) areas that are being actively disturbed by maintenance activities. Prior to each survey, the target species list should be reevaluated to include new species that may be introduced to the area over time and weed species that may be classified into elevated Cal-IPC categories.

It is anticipated that those species listed in Table 2 will be of greatest concern. All surveys must be conducted by biologists or weed control specialists knowledgeable of noxious, non-native, invasive species to identify infestations of existing or new species.

Survey areas will be traversed on foot, with biologists walking meandering transects through the solar field, work areas, and ancillary facilities. Surveyors will record the location of all weed species when encountered using handheld GPS units and field maps. Each weed species population should be categorized into one of the five density classes (based on qualitatively derived ocular cover estimates of the population) listed in Table 1.

7.0 Long-term Adaptive Weed Management Measures

Long-term maintenance measures are described to keep the Project Area within the Low category in Table 1 (Section 4.1) for species that were removed during preconstruction weed removal efforts, and to prevent or control species that are not yet established but could potentially infest the site in the future. These long-term weed control measures are intended to be adaptive, to address new threats as they occur, and to prevent future infestations. Weed treatment and control shall occur on a minimum annual basis unless otherwise approved by the BLM, Pest Control Advisor, and Project proponent.

The Project Area is part of a larger Sonoran Desert ecosystem that includes neighboring desert scrub and agricultural lands. Many weed species are dispersed by wind, water, or transport by animals (including humans). The movement of weeds from adjacent areas may pose a long-term challenge and therefore there is a need for monitoring for other noxious species including those listed in Appendix A. The strategy for the weed management plan is to be adaptive. This strategy can be broken down into several steps:

- Identify the weeds present on the site that the Project proponent is required to control. This includes adding or removing target weed species as conditions change.
- Select the appropriate weed control options.

- Monitor and assess impacts from operation and maintenance activities on weed species. Work with the Project proponent to address actions that may be detrimental to weed control where practical without interfering with required activities.

- Evaluate the effectiveness of control methods applied each year and use this information to refine control priorities, methods, and goals. These data can provide useful information for improved management practices and, in turn, may increase the overall quality of habitat surrounding the Project Area.

7.1 Management Tools

The species, location, and extent of weed species infestation will largely determine the management tools used to control populations. Consideration will also be given to the difficulty of controlling a particular weed species. Control efforts will follow an integrated pest management approach. This approach balances cost, overall effectiveness, and environmental risk in selecting the best treatment(s) to use for any given target at any location in the Project Area.

All options of control will be considered by the WCM before action is taken. These methods may include removal by hand or machine, passive management in appropriate areas (allowing native species to become established and outcompete invasive species), and/or application of herbicides. Each of these management tools has advantages and disadvantages, and often the best approach is a combination of methods (Hoshovsky and Randall 2000). In addition, optimum timing of invasive species management strategies can vary by the type of plant in question. During the lifetime of the required long-term weed control, several strategies may be implemented.

7.1.1 Prevention

The most effective, efficient, and low-cost weed species control strategies prevent weed invasions from ever occurring and quickly detect invasions that do occur so that weeds can be eradicated or contained before they spread (Hoshovsky and Randall 2000). This requires not only knowing where existing infestations occur through regular survey and mapping events, but also incorporating meaningful BMPs into construction activities that are aimed at containment of infestations. Management tools to prevent the establishment of weeds within a given area include annual monitoring (as outlined in Section 6.0) and eradicating weeds immediately upon detection. If it is not feasible to remove a particular weed species in its entirety, preventative measures may include cutting off target species flower and seeding stalks (inflorescences) and removing them from the site.

Specific BMP's used in each area will be coordinated between the contractor and WCM. The following list presents examples of BMPs that would be incorporated into construction activities to prevent the spread of weeds:

- Avoid impacts to native vegetation.
- Avoid and minimize ground disturbance. Consider impacts of different types of equipment and when possible choose equipment that will result in the least disturbance to soil and vegetation.
- Determine whether weed control efforts should be conducted before, during, and/or after maintenance activities, and incorporate into the project schedule.
- Wash vehicles, machinery, and tools off-site in a commercial facility prior to entering the work area to minimize the potential introduction of additional weed species.. Use only barren fill and gravel.

A worker education program is recommended to inform construction and maintenance workers how to implement the BMPs.

7.1.2 Manual Removal

Physical control often involves hand dethatching, pulling, cutting, or removal by mechanical means. These methods are labor intensive and may be used for smaller populations of weed infestations or around sensitive habitats. Physical methods of weed control may provide an advantage in these situations where desirable species may be left in place, while surrounding weeds may be removed. Dethatching is a useful tool that removes the dead or dying plant material from the soil surface. Dethatching also removes weed seed that may still be attached to the plant and will also increase the effectiveness of subsequent herbicide applications.

When weed material is transported away from the removal area, care must be taken to confine the material and ensure that seeds or vegetative material do not escape and infest new areas. Whenever possible and for all small infestations, seed and vegetative material will be secured in appropriate bags and double bagged. For large weed removal efforts, all material will be placed in a refuse bin (dumpster). The vegetative material placed in the bin will not exceed the top, and the bin will be appropriately covered so that plant material cannot be blown out of the bin during transport to a landfill. All invasive weeds from the project site must be disposed of within Imperial County at Imperial County Landfill Company and/or Mesquite Regional Landfill.

7.1.3 Competition and Restoration

Competition and restoration involves the seeding and care of installed native species so they may outcompete weeds. Although the creosote scrub found on and near the Project Area is generally considered a low-cover vegetation community, native plants can still offer competitive disadvantages to weeds in the form of allelopathy (creosote) and water sequestration (Mahall and Callaway 1991). Seeding will often involve a maintenance period where weeding will be necessary at least monthly during the growing season. This method of weed management should be implemented in conjunction with another form of weed control, such as dethatching or herbicide use.

7.1.4 Chemical Control

The *Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) was released to the public on June 29, 2007. The Record of Decision (ROD) for the PEIS includes standard operating procedures for applying herbicides (summarized in Appendix B, Table B-2; pages B-9 to B-14 of the ROD) and mitigation measures (summarized in Table 2; pages 2-4 to 2-6 of the ROD) that were adopted to ensure that all practicable means to avoid or minimize environmental harm are implemented in these vegetation treatment projects. The Human Health Risk Assessment (PEIS, Appendix B) and Ecological Risk Assessment (PEIS, Appendix C) include an analysis of impacts to resources and human health. The Ocotillo Sol Weed Management Plan tiers to the human health and ecological risk assessments, the resource analyses related to the standard operating procedures, and resource analyses related to the mitigation measures in the PEIS.

Only adjuvants and herbicides approved by BLM in California will be used on BLM lands. Herbicide application can only occur on BLM lands with an approved Pesticide Use Proposal with consultation with a PCA. The chemical means of controlling weeds is the application of herbicides. Herbicides kill or inhibit plant growth and can be very effective in controlling many weed species. Different weed species may require alternate herbicides, application rates, and time of application.

Using herbicides to control weeds requires careful planning and a professional staff familiar with the application areas and herbicides they are using. The use of herbicides should be under the direction of a professional pesticide applicator with either a QAL or PCA in the state of California. Before applying any herbicides, the applicators should be aware of all safety regulations and applicable environmental regulations and be familiar with target versus native plants. The WCM is responsible for meeting these requirements and approving any trained staff or certified pesticide applicators that will handle herbicides.

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The method of application varies greatly from one species to the next and also with the degree of infestation, time of year, and environmental conditions. The application method ultimately chosen should minimize risks of harming non-target plants. The environmental risks of using herbicides include drift, volatilization, persistence in the environment, groundwater contamination, edge effects on sensitive wildlife, and harmful effects on animals.

Herbicide application should always include marker dyes to make the herbicide visible. Higher visibility is desirable, because it:

- allows personnel to more effectively protect themselves against contamination;
- prevents unintended multiple application to a particular area or plant;
- ensures complete coverage of target area and plants; and
- informs personnel of overspray and wind-drift issues, which protects non-target plants.

7.1.4.1 Chemical Control Environmental Effects[1]

Care must be taken to ensure that herbicide applications used to control weed species do not impact wildlife species near the Project.

7.1.4.1.1 Glyphosate

Chemical Properties

Known Biological Effects

Sensitive species analysis

Although studies with glyphosate and harvester ants (*Pogonomyrmex* spp.) and/or flat-tailed horned lizard (*Phyrnosoma mcallii;* FTHL) have not been conducted, in general, glyphosate formulations have shown to have a low or negligible effect on terrestrial and aquatic insect life (Folmar et al. 1979; Gardner and Grue 1996; Simenstad et al. 1996; Peterson and Hulting 2004; Bohan et al. 2005). Indirect effects of glyphosate on insect populations may include the disappearance of weed seeds as a food source (Kerry et al. 2006).

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1 Section 7.1.4.1 is being edited at the time of Draft submittal. Additional analysis will be added for the final weed management plan.

7.1.4.1.2 Triclopyr

Chemical Properties

Known Biological Effects

Sensitive species analysis

Triclopyr, an herbicide used on broadleaf forbs and woody plants, has been found to be non-toxic to insects (EPA 1998). Indirect effects of triclopyr and other herbicides on insect populations may include the disappearance of weed seeds as a food source (Kerry et al. 2006).

7.2 Species-specific Weed Control Plans

Species profiles and management strategies have been developed and compiled for all weed species observed within the Project Area or buffer, and are presented below. A summary of recommended chemical treatments is presented in Table 3.

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TABLE 3
CHEMICAL TREATMENT RECOMMEDNATIONS SUMMARY

Species	Common Name	Herbicide	Dosage	Timing/ Notes
Brassica tournefortii	Saharan mustard	glyphosate	4%, low volume directed spray	Late winter/ early spring, prior to flowering
		triclopyr	2%, foliar spray	Ambient temp. >55 degrees at noon
Schismus barbatus	Mediterranean grass	glyphosate	2%	
Tamarix aphylla	Athel tamarisk	triclopyr	5% or undiluted Pathfinder II	Late fall. Cut and paint stumps with herbicide Foliar spray to resprouts
Tamarix ramosissima	saltcedar	triclopyr	5% or undiluted Pathfinder II	Late fall. Cut and paint stumps with herbicide Foliar spray to resprouts

7.2.1 Saharan Mustard (*Brassica tournefortii*)

Weed Designation(s): Cal-IPC High rating, BLM Noxious Weed

Photograph 1: Saharan mustard (*Brassica tournefortii*) rosette and inflorescence at the project site

Description: Saharan mustard is a Mediterranean species native to North Africa, the Middle East, and southern Europe. Currently, this plant is found throughout the low-elevation deserts of the southwest—southern Nevada, southern California, Arizona, New Mexico, and west Texas. It prefers sandy or gravelly soil, although it is also able to grow

Photograph 2: Saharan mustard growing on access road east of Project Area (left). Saharan mustard growing within localized depressions within Project Area (right).

on alluvial fans and rocky hillsides. Unlike many invasives, this plant does not require disturbed soil to become established.

This plant is a robust, fast-growing winter annual with a basal rosette of leaves with stinging hairs. The basal rosette of leaves grows up to 3 feet in diameter in favorable environments (University of Nevada Cooperative Extension [UNCE] 2002). Saharan mustard rosettes within the Project Area average 6-10 inches in diameter. The erect stem can be 4–40 inches in height, and it branches extensively, forming a “tumbleweed” once the plant dries up and the stem breaks. The leaves smell like cabbage when they are crushed.

Plants flower as early as December or January, immediately following the first winter rains, and may set seed as early as February. The flowers are small and dull yellow, making them inconspicuous compared to most other true mustards (Sanders and Minnich 2000). Fruits are long pods that contain between 750 and 9,000 tiny seeds each.

Saharan mustard forms dense stands that crowd out native wildflowers. It has a competitive edge with its early phenology, which allows it to usurp soil moisture from native species which develop later (Sanders and Minnich 2000). It appears that this plant may carry fire, especially when there are other low-growing invasive species (such as Mediterranean grass) present underneath.

Current Distribution in the Project Area: Sahara mustard was observed in varying densities within the Project Area. The highest densities were observed along the access road on the eastern edge of the 115-acre Project impact area (Photograph 2). Within the impact area, Sahara mustard appears to be associated with subtle drainage features and local depressions (see Photograph 2). Locally, Sahara mustard can be found in relatively high densities within the large drainage south of the Project and surrounding the Imperial Valley substation immediately north of the Project.

Control Options

All efforts to control this species within the Project Area will be conducted as outlined in this plan. The following are options that can be utilized as determined by the WCM.

Prevention: Vehicle and human transit should be limited through infested areas once this plant has gone to seed, especially following a rain event, as the mucilaginous coating on the seeds allow them to stick onto objects and travel to new places. Repeated treatments and monitoring on small areas are preferable to diffuse treatments over wide areas, which may inadvertently increase the density of this plant (Trader et al. 2006).

Physical Control: If an infestation is small, it is possible to remove the plants by digging them out of the ground or hand-hoeing. This is especially effective if the invasion is new and there is not a seed bank existing in the soil. It is important to do this prior to seed set and also to bag and remove the plants from the site. A site should be revisited weekly in order to catch later-germinating plants, especially if there have been multiple rainfall events. Weed whipping is not recommended as the plants will simply regrow (UNCE 2002).

Chemical Control: Saharan mustard is often the first winter annual to germinate in an area, making effective herbicide treatment possible while minimizing impacts to non-target species. Triclopyr, a BLM approved herbicide, has been effective at killing young rosette/early flowering plants at Lake Mead National Recreation Area (UNCE 2002). According to the National Park Service, Saharan mustard can also be controlled with BLM approved 2, 4-D, dicamba, or glyphosate (Mau–Crimmins et al. 2005). If glyphosate is selected, recent experience in the Colorado Desert has shown that treatments are most effective at a 4 percent solution in a low-volume directed spray when ambient temperatures exceed 55 degrees Fahrenheit (R.Hobbs pers comm.). Ambient temperature and lifecycle stage (younger plants are more sensitive to treatment) likely effect the uptake of glyphosate into Sahara mustard root structures, and consequently its ability to control individual plants. In addition, as the key to controlling Sahara mustard is to control the local seed bank, inflorescences and seed heads should be removed and bagged prior to herbicide application.

Treatment Schedule: Apply treatments in late winter to very early spring. All cut vegetative material should be bagged, carried off-site, and disposed of in a responsible and legal manner to prevent the spread of weeds. Care should also be taken during transport of the materials to ensure they are secure (and do not, for example, fly out of the back of a truck).

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7.2.2 Mediterranean grass (*Schismus barbatus*)

Photograph 3: Mediterranean grass was observed in low densities throughout the Project Area.

Weed Designation(s): Cal-IPC Limited, BLM Noxious Weed

Description: Mediterranean grass is a small, basal, and tufted annual grass that typically occurs in dry, open, and generally disturbed areas (Baldwin et al. 2012; Photograph 3). This grass grows up to one foot high, has linear leaves, and an inflorescence that is composed of dense, appressed spikelets (Lightner 2011). Mediterranean grass can be common and abundant in the open spaces between shrubs in the desert, often producing a dense mat of green that fades to a light straw color once dead (Bossard et al. 2000).

Mediterranean grass is native to southern Europe, northern Africa, and southwestern Asia, and spread to California in the 1930s. The plant is spread long distances by grazing, off-road vehicle use, and construction of linear corridors. The seeds disperse short distances by sheet flooding and by wind (Bossard et al. 2000).

Mediterranean grass germinates in early winter following rain events of approximately 0.4 inch. It can grow in two weeks and remain until early spring, when rainfall is reduced and temperatures are higher. In less than two weeks, the grass can go to seed from its flowering stage. It typically flowers from March through May (Bossard et al. 2000).

As the grass can create dense mats, it competes effectively for limiting nutrients with native annual plants that also occupy the spaces between shrubs. Mediterranean grass may be contributing to the increasing frequency and extent of fire in California deserts. Fire can be carried readily across the desert by the dead Mediterranean grass stems, which remain in the ground for up to two years (Bossard et al. 2000).

Current Distribution in the Project Area: Mediterranean grass was observed in low densities, relatively evenly dispersed, throughout the Project Area and adjacent lands. Densities of Mediterranean grass appeared to be slightly correlated with drainages and roadsides, but were found throughout the area.

Control Options

All efforts to control this species within the Project Area will be conducted as outlined in this plan. The following are options that can be utilized as determined by the WCM.

Physical Control: Burning is not recommended, as it can enhance the survival of the species (DiTomaso et al. 2007). As the grass is small, it is impractical to hand pull. In addition, disruption of the soil surface when plants are removed may promote further weed establishment. Plowing, disking, or scraping is not recommended, as soil disturbance and reduced shading are favorable conditions for Mediterranean grass (Bossard et al. 2000).

Chemical Control: Herbicide, including glyphosate, can control Mediterranean grass, but application should be precise as the grass has a small leaf and culm surface area (Bossard et al. 2000).

Treatment Schedule: Application of herbicide should occur late winter to very early spring. Care should be taken during application of herbicide so as not to affect non-target species.

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7.2.3 Athel tamarisk (*Tamarix aphylla*)

Weed Designation(s): Cal-IPC Limited rating, BLM Noxious Weed

Description: Athel tamarisk is an evergreen tree that can grow up to 12 meters tall (DiTomaso et al. 2007). Its bark is thick and reddish brown to gray. The twigs are long, drooping, and appear jointed. The leaves are grey, scalelike, and do not overlap (Lightner 2011).

Athel tamarisk was originally introduced as a landscape ornamental for shade, as a windbreak along roads, and as erosion control in southern California. As this species of tamarisk seldom escapes cultivation, it is considered less invasive (Tesky 1992). Athel tamarisk is native to northern Africa, the Middle East, and India (DiTomaso et al. 2007).

Athel tamarisk produces white to pale pink flowers from May to July (DiTomaso et al. 2007). This tree mainly reproduces by seed, but sometimes vegetatively from root sprouts. Germination occurs shortly after seed dispersal, and once seedling are established in favorable conditions they may grow 3-4 meters in one year (DiTomaso et al. 2007).

Athel tamarisk can live up to 100 years and dry up viable water sources, increase surface soil salinity, modify hydrology, decrease biodiversity of plants, and increase fire risk (IUCN 2010).

Current Distribution in the Project Area: Although not found within the Project impact, a population of athel tamarisk was observed 0.25 mile north of the Project intermixed with saltcedar in a swale associated with runoff from the Imperial Valley Substation. Although saltcedar individuals appeared to be undergoing treatment, athel tamarisk individuals did not. An individual athel tamarisk tree was also identified in Pinto Wash approximately 0.15 mile south of the Project Area.

Control Options

All efforts to control this species within the Project Area will be conducted as outlined in this plan. The following are options that can be utilized as determined by the WCM.

Physical Control: As this tree typically grows in sandy ground, seedlings can be easily removed by hand. Care must be taken to remove as much of the root system as possible. If the trees are fully grown, larger mechanized devices, such as a chainsaw or dozer, are required. If a large area is invaded, the area should be deep ripped to bring any root material to the surface. Since re-shooting is likely, follow-up treatments are necessary (Cooperative Research Centre 2003).

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Chemical Control: Herbicides with effectiveness against woody broadleafed plants, such as triclopyr, should be used as follow-up to initial mechanical control (Cooperative Research Centre 2003). The cut-stump method is recommended, where the main stem is cut off by chainsaw and herbicide is applied to the cut stem immediately after to ensure absorption.

Treatment Schedule: Early control before the tree becomes mature is recommended as well as integrated control methods, using both mechanical and chemical means (Cooperative Research Centre 2003). Mechanical and chemical control should occur in late winter or early spring before the tree flowers and goes to seed.

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7.2.4 Saltcedar (*Tamarix ramosissima*)

Weed Designation(s): Cal-IPC High rating, BLM Noxious Weed

Description: Saltcedar is a rhizomatous shrub that may occur as spotty to heavy infestations along drainages and shores of water bodies. The scale-like leaves have salt glands; flowers are small, white to deep pink, and are densely packed on racemes. The bark is reddish brown with smooth stems less than 1 inch in diameter. Saltcedar is native to Eurasia and Africa and was used in the 1800s as erosion control, windbreaks, and shade, and as an ornamental. It spreads by seed and vegetative growth. Saltcedar is a prolific seeder, with as many as 50,000 seeds per plant per year, produced over a long period (April to October) (Horton et al. 1960). Seeds are easily dispersed by wind or as water moves through the watercourses that they occupy. The seeds remain viable only for a few weeks, but they germinate easily in saturated soil. Horton et al. (1960) noted that receding spring and summer flows are ideal for germination and seedling establishment. Saltcedar can also reproduce vegetatively, if stems are buried in damp soil, as in a flooding situation ("layering"). Saltcedar is drought-tolerant and withstands lowered water tables as well as flooding (Carpenter 1998).

Photograph 4: Treated saltcedar north of the Project Area, immediately east of the Imperial Valley substation.

Presence of saltcedar can have devastating effects on native habitats, and it has been a pervasive problem across the American Southwest for several decades. Some of the

more profound effects include dramatic narrowing of stream channels; sediment trapping; lowering of water tables; increased soil salinity, fire frequency, and altered plant community composition; and decreased native wildlife diversity. Native riparian species such as cottonwood and willow can be replaced by saltcedar, which can invade to the point of dominance (Carpenter 1998).

Like many other invasive species, saltcedar is easily spread and difficult to eradicate. Therefore, early detection and control are critical to the successful control of this species.

Current Distribution in the Project Area: Although not found within the Project Area, a population of saltcedar was observed 0.25 mile north of the project in a swale associated with runoff from the Imperial Valley Substation (see Photograph 4). This population appears to be undergoing treatment due to the presence of cut stems, hydroseed, and herbicide dye observed throughout the area.

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Control Options

Early detection and control are critical to the successful control of this species. Post treatment monitoring is also essential, since saltcedar is capable of resprouting following treatment. Seedlings will continue to establish as long as saltcedar infestations persist upwind or upstream of the Project Area. The following are options that can be utilized as determined by the WCM.

Physical Control: Cutting alone is not an effective means of controlling saltcedar, since it tends to resprout vigorously from roots and stumps. However, cutting to the stump and then immediately applying herbicide has been effective (see below). Seedlings and small plants may be successfully uprooted by hand, if the entire root system can be removed. A weed wrench may also be used to dislodge larger individuals. All cut vegetative material should be bagged, carried off-site, and disposed of in a responsible and legal manner to prevent the spread of weeds. Care should also be taken during transport of the materials to ensure they are secure.

Chemical Control: The most frequently used and effective method in California for larger trees is to cut an individual saltcedar shrub as close to the ground as possible and immediately (in less than 30 seconds) apply a triclopyr herbicide to the perimeter of the cut stems. This method is most effective during fall months, when the plants are actively translocating materials to their roots (Carpenter 1998). Foliar treatment of any resprouts and any plants less than 2 feet tall is necessary. This method allows plants to be treated selectively, which is especially important if there are also native species present.

Treatment Extent: As the saltcedar in the local area is not within the project impact area and it is currently being treated by another project, it will not be treated as a part of the initial pre-construction treatments of the Project. That being said, saltcedar has a potential for colonizing drainage areas on the eastern (downslope) edge of the project and will likely be a part of long term monitoring and management.

Treatment Schedule:

- Winter–early spring: locate all saltcedar individuals within mapped areas.
- Spring–summer: treat seedlings and mature trees with an appropriate control method. Avoid treatment of mature trees in spring and summer months in areas where nesting birds occur, in these cases treat mature trees with an appropriate control method in the late winter. All cut vegetative material should be bagged, carried off-site, and disposed of in a responsible and legal manner to prevent the spread of weeds. Care should also be taken during transport of the materials to ensure they are secure.

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- Fall: If the cut-stump herbicide method is used, fall is the optimal time for treatment. Follow-up control should occur at least twice per year.

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7.3 Reporting

In December of each year following initiation of Project construction, an annual report will be submitted to interested agencies, including, but not limited to: BLM, U.S. Fish and Wildlife Service, California Department of Fish and Game, and Imperial County. The annual report will include a summary of the activities completed during the previous calendar year related to annual weed survey and control efforts. Specifically, the annual report will include:

- the results and maps of the annual weed surveys;
- a description of any new weed species identified;
- a description of methods and locations of weed control efforts for each species identified and treated;
- an analysis of the efficacy of weed control efforts performed to date and recommend changes to future control efforts, if necessary;
- identification of unforeseen issues and recommendations to address; and
- a work plan that will include a proposed survey and treatment schedule for the next year as well as specific weed management plans for any new species identified and updated control plans for species where current control methodologies can be improved.

8.0 Conclusion

A total of two exotic species (Saharan mustard and Mediterranean grass) were observed within the Project Area. Two additional exotic species (saltcedar and athel tamarisk) were observed in the vicinity of the Project Area. Saharan mustard and Mediterranean grass will be initially treated as a part of Project weed control. Since both species are pervasive in the Sonoran Desert the control of each may be discontinued, in consultation with BLM, based on the results of the annual treatments. The two tamarisk species in the area will be treated long-term if they colonize sites within the Project Area. All species must be treated prior to construction or when treatments would be most effective based on the species phenology. Construction weed abatement measures will be implemented during Project implementation, and long-term weed monitoring and control will be required. Long-term monitoring and adaptive control measures will be implemented to reduce the threats from future weed challenges.

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APPENDIX A

APPENDIX A
POTENTIAL AND OBSERVED WEEDS WITHIN THE PROJECT AREA AND LOCAL REGION (0.5 MILE RADIUS)

Scientific Name	Common Name	Observed	Cal-IPC Rating	Habitats of Concern and Comments
Alhagi maurorum	camelthorn	No	Moderate	Grassland, meadows, riparian and desert scrub, Sonoran thorn woodland. Very invasive in southwestern states. Limited distribution in California.
Brassica tournefortii	Saharan mustard, African mustard	Yes	High	Desert dunes, desert and coastal scrub.
Bromus diandrus	ripgut brome	No	Moderate	Dunes, scrub, grassland, woodland, forest. Very widespread, but monotypic stands uncommon.
Bromus madritensis ssp. *rubens*	foxtail chess, red brome	No	High	Scrub, grassland, desert washes, woodlands.
Cynodon dactylon	Bermuda grass	No	Moderate	Riparian scrub in southern California. Common landscape weed, but can be very invasive in desert washes.
Halogeton glomeratus	halogeton	No	Moderate	Scrub, grasslands, pinyon-juniper woodland. Larger problem in NV. Monotypic stands are rare.
Kochia scoparia	kochia	No	Moderate	Scrub, chaparral, grasslands.
Schismus barbatus	Mediterranean grass	Yes	Limited	Scrub, grassland, desert washes, desert scrub,
Sisymbrium irio	London rocket	No	Moderate	Scrub, grasslands. Widespread. Primarily in disturbed sites. Impacts vary locally.
Stipa capensis	Mediterranean steppegrass, twisted-awned speargrass	No	Moderate	Desert scrub; first recorded in California 1995. Limited distribution, but spreading rapidly in California deserts.
Tamarix aphylla	athel tamarix	Yes	Limited	Desert washes, seeps, and springs
Tamarix parviflora	smallflower tamarisk	No	High	Riparian areas, desert washes, coastal scrub.
Tamarix ramosissima	saltcedar, tamarisk	Yes	High	Desert washes, riparian areas, seeps and springs.
Washingtonia robusta	Mexican fan palm	No	Moderate	Desert washes. Limited distribution but spreading in southern California. Impacts can be higher locally.