Environmental Evaluation for Installation of a Solar Array at the San José/ Santa Clara Water Pollution Control Plant

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DATE: August 10, 2009

Purpose

The purpose of this technical memorandum (TM) is to review the options to develop a potential solar array development (Project) within or adjacent to western burrowing owl (*Athene cunicularia*) habitat in the buffer lands that surround the San José/Santa Clara Water Pollution Control Plant (WPCP) and to determine if there is a ground-mounted solar photovoltaic (PV) configuration that would enable a workable co-existence between the burrowing owl habitat and the PV arrays.

At the request of City of San José (City) staff, this TM will also review the potential impacts of solar array developments at the WPCP to other potential existing biological resources, such as the Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*), wetlands, and riparian zones, and propose conceptual mitigation measures as required under the California Environmental Quality Act (CEQA).[1]

While this memorandum describes the conceptual project layout and initial biological assessment, please consider that all environmental resources listed in the CEQA Environmental Checklist will need to be addressed within an Initial Study (IS) to support the findings that the Project would not result in significant unavoidable impacts to all existing environmental resources. Based on the initial assessment however, a Mitigated Negative Declaration (MND) appears to be the most appropriate level of documentation for meeting the CEQA requirements for the Project as shown in the flow chart included in Attachment A.[2]

[1] Public Resources Code, Section 210000, et. seq and Title 14, California Code of Regulations Section 15000, et seq.
[2] CEQA Process Flow Chart. California Resource Agency.

Introduction

As part of the Solar America Showcase, the U.S. Department of Energy (DoE) Tiger Team provided an assessment for the potential use and cost-benefits for placing solar technologies at five potential sites south of the WPCP (Figure 1). The WPCP has most of the major components of a suitable solar site for electricity generation and technology demonstrations including undeveloped plots of land, a relatively constant and high electrical demand, a willing technology demonstration partner in the City of San José, and reasonable options for interconnectivity to the local electric utility grid. The complete assessment is entitled *U.S. Department of Energy 2007 Solar America Showcase, City of San José, California, San José/Santa Clara Water Pollution Control Plant Solar Site Evaluation* (DoE Evaluation).[3]

FIGURE 1: Five potential solar sites south of the San José/Santa Clara Water Pollution Control Plant

Project Location

The WPCP is located at Zanker and Los Esteros Road, about 8.5 miles north of downtown San José, in the northern portion of the City of San José, California, north of State Route 237, east of the town of Alviso, south of the salt ponds of the south San Francisco Bay, and west of the City of Milpitas. The WPCP is within the Milpitas USGS 7.5-minute quadrangle (37° 25′ 37.37″ N; 121° 56′ 37.64″ W) at an elevation of approximately 5 ft above sea level.

[3] CH2M HILL, National Renewable Energy laboratory, New Mexico State University, Sandia National Laboratories, July 2008.

Site Visit

An initial site visit was conducted on June 11, 2009 by CH2M HILL Project Engineer Jim Sandoval, CH2M HILL Associate Scientist Danielle Tannourji, City of San José Solar Program Coordinator Jessie Denver, and City of San José Biologist Eric Dunlavey. The site visit consisted of photo-documenting each of the five potential solar sites identified in Figure 1 and discussing past wildlife survey results for the western burrowing owl.

Existing Biological Resources at the Santa Clara/San José Water Pollution Control Plant

Vegetation

Located on the southern extent of the San Francisco Bay in northern San José, the five potential solar sites are characterized by vacant lands dominated by annual non-native grassland or ruderal habitat which has undergone past land uses such as agriculture and grazing. To keep in compliance with the City Fire Code Standards, the WPCP has maintained these areas through annual disking and mowing strategies. However, this year the WPCP has introduced animal grazing as a new strategy to decrease fire danger.

Riparian/Wetland Habitats

None of the potential sites appear to support riparian or wetland habitats. However, Potential Solar Areas #1, #2, and #5 may have these sensitive habitats adjacent to their boundaries. The northwestern portion of Potential Solar Area #1 appears to be adjacent to a patch of freshwater marsh wetland as seen on Figure 1. In addition, the southeastern portion of Potential Solar Area #2 abuts an isolated swale that appears to support marginal riparian habitat. Lastly, the northeastern portion of Potential Solar Area #5 borders another potentially isolated channel with wetland vegetation.

Special-Status Species

Figure 2 summarizes the known California Native Diversity Database (CNDDB) locations of special-status species within a five mile radius of the WPCP. With the close proximity to the San Francisco Bay, many of these special-status species require freshwater or salt water marsh habitat which does not occur within any of the five potential solar sites. However, all sites do support habitat suitable for the following special-status species:

- Western burrowing owl.
- Congdon's tarplant.

FIGURE 2
California Native Diversity Database Map

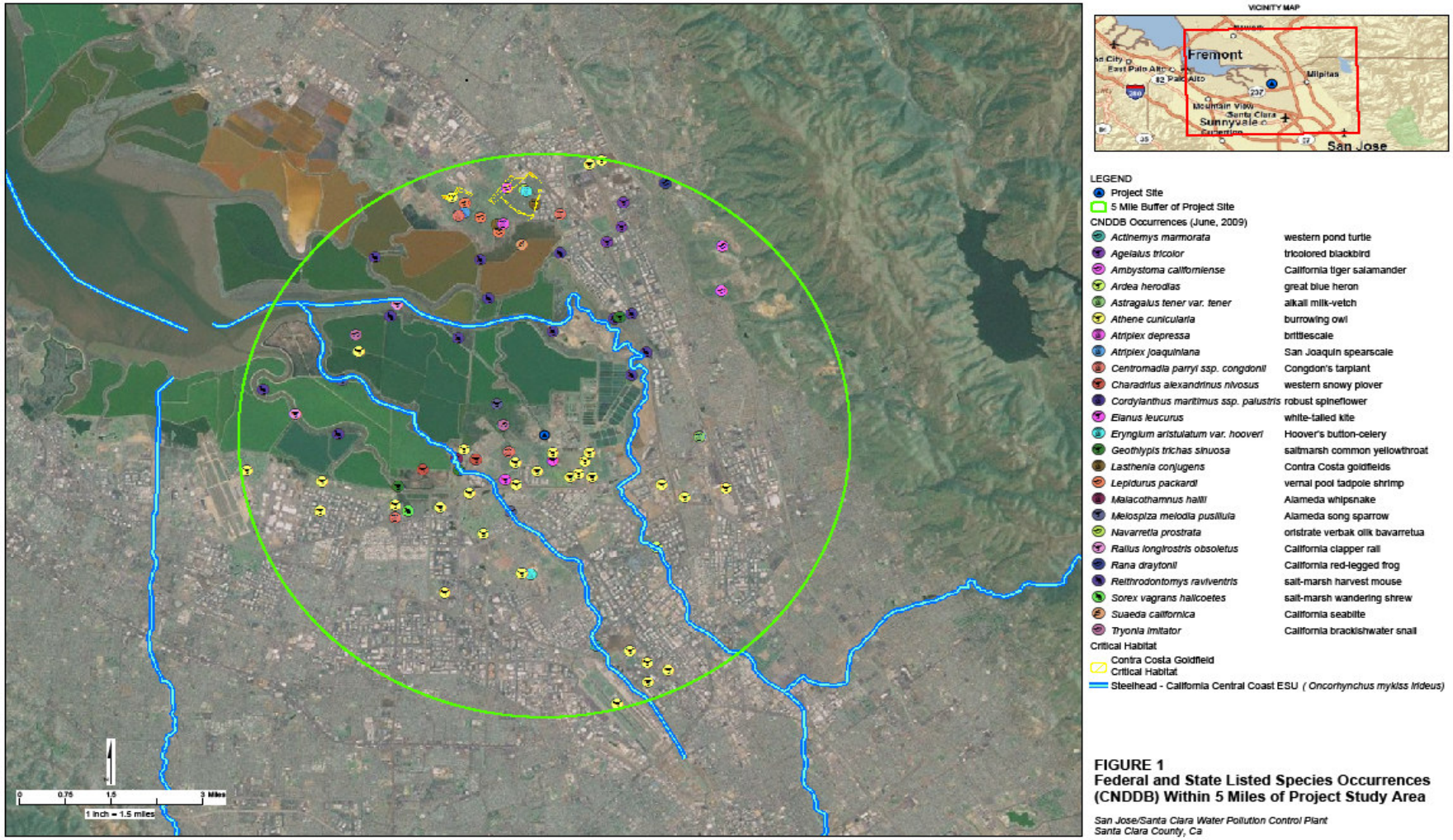

FIGURE 1
Federal and State Listed Species Occurrences (CNDDB) Within 5 Miles of Project Study Area

San Jose/Santa Clara Water Pollution Control Plant
Santa Clara County, Ca

Western Burrowing Owl (State Species Special Concern)

The burrowing owl is a small, brown and white barred owl that stands 8-10 inches tall. Burrowing owls may be present in any areas with ground squirrel burrows or artificial burrows on flat ground, hillsides, or low embankments.[4]

FIGURE 3
Western Burrowing Owl

Photo credit: Rick Scott,
2005 (http://members.cox.net/rmscott/misc/burrowingowl.html)

Burrowing owls live in grasslands and areas with low growing vegetation, dwelling underground in the burrows of ground squirrels. If natural burrows are not available, burrowing owls will use concrete or PVC pipes, culverts, holes under sidewalks, roads, asphalt or concrete piles for nest sites and cover from predators. They may also spend quite a bit of time above ground near their burrow[5].

Burrowing owls may be present on a site during the breeding season (February 1st – August 31st), but they may also occur on a site as winter residents or migrants. The best time of the day to observe burrowing owls is during early morning and early evening hours when they actively hunt for prey by running, pouncing and hovering.[6]

Burrowing owls forage mostly for insects, including crickets, beetles and earwigs, but will also hunt mice, small rodents, lizards, crayfish, and even small birds. Their territory typically consists of 6.5 acres of open land per pair or resident individual. An active owl burrow can be identified by whitewash (droppings), feathers, pellets (castings) or prey remains[7].

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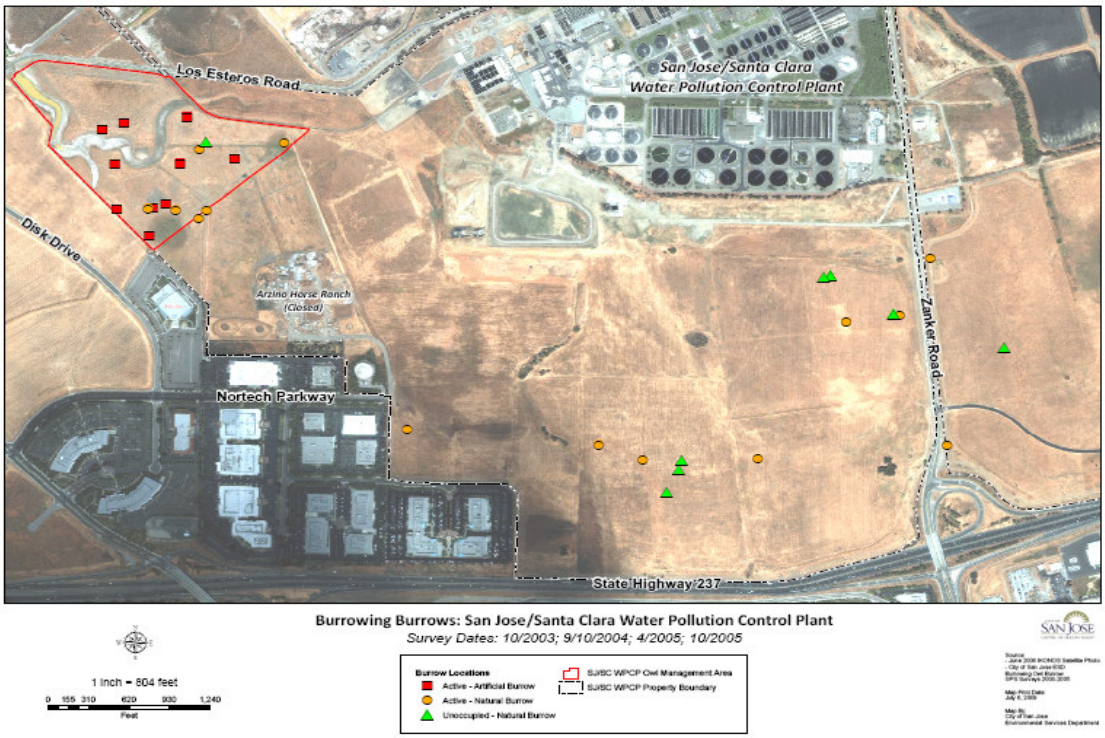
[4] City of Mountain View, CA 2009. Shoreline Regional Wildlife Area. Protecting the Western Burrowing Owl.
[5] Ibid.
[6] Ibid.
[7] Ibid.

During the nesting season, male owls decorate their mates' nest burrows with animal dung, paper, dry grass and other debris. Females may lie between 6 and 11 white eggs which they incubate underground for about 28 days. The young are fed by both parents until they are able to fly and forage independently. Young and family groups may disperse from the nest site beginning in July. Burrowing owls show strong site fidelity and may return to the same burrow every spring over a period of several years.[8]

The burrowing owl is a state "Species of Special Concern" and is protected under the following laws:

- The federal Migratory Bird Treaty Act, which prohibits the "taking of active nests, eggs, young or adults." "Take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to pursue or collect" a bird.
- Fish and Game Code, Sections 3503, 3503.5, 3513, and 3800. These regulations prohibit the taking, possession, or destruction of any bird of prey or migratory nongame bird or its nest or eggs.
- Nests, eggs, and young are protected during the breeding season (February 1 through August 31)[9].

FIGURE 4
Aerial Photo of Burrowing Owl Surveys



[8] Ibid.
[9] Ibid.

Past studies by the City's Biologist have documented the presence of burrowing owls in or adjacent to all Potential Solar Areas (Figure 4). In addition, the CNDDB has reported approximately 10 past occurrences within these areas (Figure 2). However, the discontinuance of disking over the past two years enabled grass root zones to establish and discouraged burrowing by squirrels; thus fewer burrowing owls have been identified during recent field surveys in 2008 and 2009. Continued surveying of these sites would be ideal, as the California Department of Fish and Game (CDFG) considers a site occupied by burrowing owl if at least one observation has been made within a three year timeframe. Continued monitoring in the winter and breeding season of 2010 is highly recommended as it would help conclude which sites are no longer adjacent to occupied burrowing owl habitat and in turn reduce mitigation requirements for the Project.

Congdon's Tarplant (California Native Plant Society [CNPS] List 1B on State Special Plant List)

Congdon's tarplant is an annual flowering herb of the Asteraceae family that grows in alkaline and/or sandy soils in foothill and valley grasslands, typically in mesic areas where water collects, from sea level to 750 feet above sea level. Generally the species blooms from May to October, but can be found flowering as late as mid November. It is typically found growing with mustards (*Brassica* spp), rattlesnake grass (*Briza minor*), star thistle (*Centaurea* sp.), horseweed (*Conyza canadensis*), bristly ox tongue (*Picris echioides*), dock (*Rumex maritimus*), senecio (*Senecio californicus*), and rattail fescue (*Vulpia myuros*) in disturbed habitats and annual grasslands within the San José Region.

FIGURE 5 - Congdon's Tarplant

Laws and Regulations

The Congdon's tarplant is a "California Native Plant Society (CNPS) List 1B Species" and is protected under the following laws:

- Native Plant Protection Act: Fish and Game Code, Sections 1900-1913. These regulations prohibit the taking, possession, or destruction of any special-status native plant species.

Congdon's tarplant is also on the CDFG Special Plant List which designates it as a rare California endemic species. The CNDDB has reported two past occurrences of Congdon's tarplant within the project vicinity (Figure 2). Therefore, the annual grassland and ruderal habitat presently dominating all Potential Solar Areas may be suitable for Congdon's tarplant.

Solar Technology and Design Options

Since regulations have not been implemented at this time for metering the net aggregate power generated from the solar array at the WPCP site to other City facilities, the maximum size of a solar array to fulfill the current grid power consumption of the WPCP would be 1 to 1.2 MW, which would require an equivalent land space of approximate four acres for an high efficiency PV system[1]. As shown in Figure 1, the site can support up to 111 acres of solar arrays, which would supply up to approximately 33 MW of power when utilizing a high efficiency PV system. A development of this scale could accommodate the net needs of the WPCP and supply a larger utility scale development with approximately 32 MW.

The DoE Evaluation researched a number of solar technologies for the WPCP site and concluded that three types would be relatively cost effective and suitable for the WPCP site. These technologies include thin-film solar PV panels installed at a fixed-tilt, crystalline solar PV panels with single-axis tracking, and a micro-concentrating solar power (micro-CSP) system that are briefly explained here. For more details, see the DoE Evaluation.[10]

Thin-Film Solar PV Panels

FIGURE 6
Nanosolar Utility Panel™Thin-Film Solar PV Panel at a Fixed-Tilt

Thin-film solar PV cells are made from materials that have high light absorbency, such as cadmium telluride or amorphous silicon, which allow for the fabrication of a thin layered flexible solar cell. Thin-film solar cells are generally half as efficient as crystalline silicon solar cells and therefore require about twice as much area to supply a given amount of power as solar systems based on crystalline silicon solar modules. Because there is significant available land area at the WPCP, lower-cost, lower-efficiency thin-film PV modules may be suitable.[11]

Crystalline Solar PV Panels with Single-Axis Tracking

Crystalline solar PV panels are the traditional panels fabricated from thin silicon-based wafers. Single axis tracking systems allow panels to rotate and follow the sun to maximize direct exposure to it. One example of a crystalline solar panel with a single-axis tracking system is the model T20 Tracker™ system manufactured by SunPower Corporation. As seen in Figure 7, this type of panel allows for open space between each PV array.

[10] CH2M HILL, National Renewable Energy Laboratory, New Mexico State University, Sandia National Laboratories; July 2008. U.S. Department of Energy 2007 Solar America Showcase, City of San José, California. *San José/Santa Clara Water Pollution Control Plant Solar Site Evaluation*.
[11] Ibid.

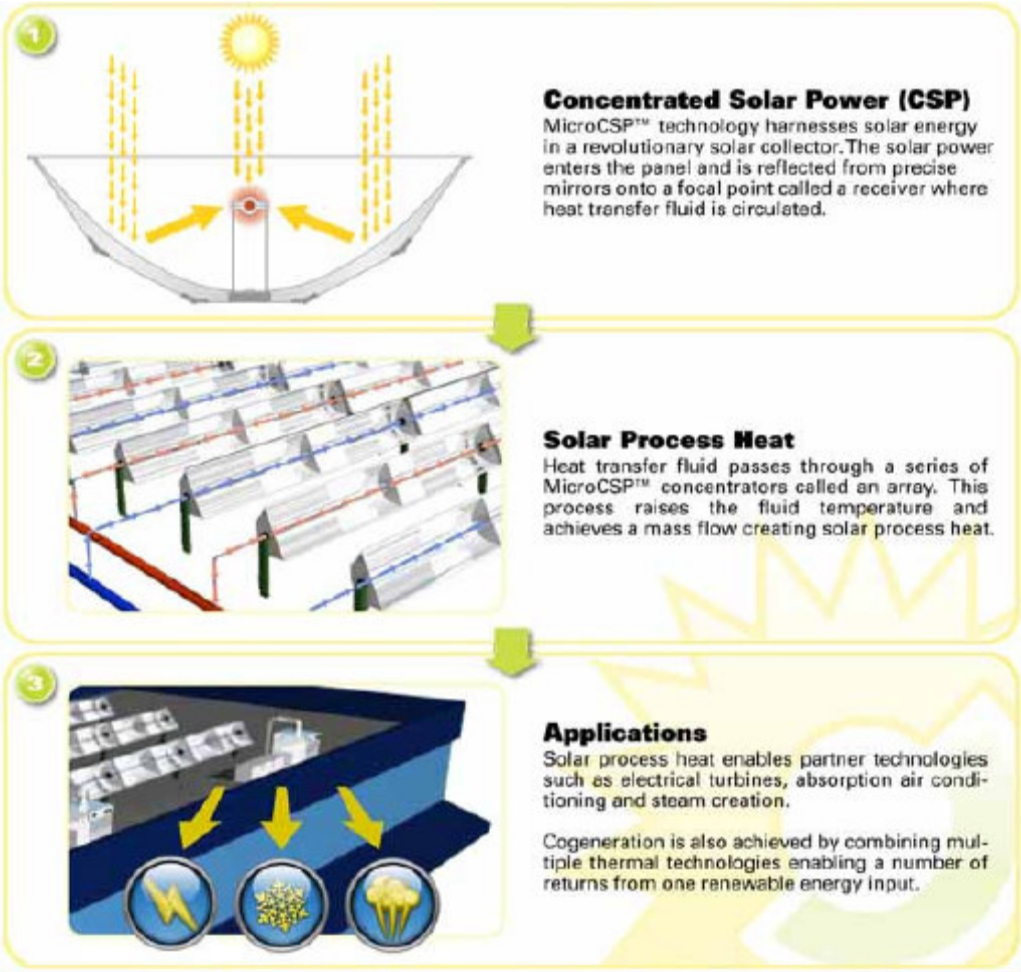
FIGURE 7
SunPower Corp. T20 Tracker™ Crystalline Solar PV Panels

Micro-Concentrating Solar Power Systems

Concentrating solar power (CSP) systems utilize parabolic troughs or heliostats to focus sunlight onto receivers to heat a working fluid. The thermal energy from the working fluid is then converted into electrical energy through a conventional steam turbine power block. Micro-CSP systems are a category of CSP systems in the 200 kW_e to 20 MW_e range. Micro-CSP systems can be used with a smaller power block using an organic working fluid with a low temperature boiling point rather than steam.[12] One example reviewed in the DoE Evaluation is the Sopogy Micro-CSP™ system shown in Figure 8.

[12] CH2M HILL, National Renewable Energy laboratory, New Mexico State University, Sandia National Laboratories, July 2008.

FIGURE 8
Sopogy Micro CSPTM System - How it works.



The DoE Evaluation recommended that CSP and micro-CSP systems only be considered at the WPCP at a demonstration scale owing to current limitations in the technology to efficiently deliver power in the San José Direct Normal Insolation (DNI) solar zone.

Co-Existence of Burrowing Owls and Solar Arrays

Designing solar arrays to accommodate or encourage burrowing owl habitat in the vicinity of an array is not recommended owing to the costly mitigation and permitting requirements of CDFG that would take effect. Furthermore, the co-location of burrowing owls and solar arrays may result in visual and physical issues that impact the owls' livelihood. Further details about this are discussed in the impacts and mitigation sections below.

Visual Impacts

FIGURE 9
A micro-CSP installation in Abu Dhabi, UAE, depicts the impact that a solar array may have on a burrowing owl's line of site.

As indicated above, burrowing owls require a good line of sight to see their prey and predators. Accordingly, developing a solar array to co-exist among owl habitations would be challenging to owls because their lines of sight would be blocked by the footings, columns and other hardware of solar cells. However, of the three technologies discussed above, the single-axis tracking solar array appears to have flexibility to enable more open space between PV arrays and allow for improved visibility by wildlife.

Additionally, the reflective properties of the solar panels may cause the owls and other birds to collide with the panels and result in physical harm or death, which happens sometimes when birds collide with building windows. Accordingly, non-reflective flat plate panels are preferred over reflective technologies, such as CSP, for sites with burrowing owls. It is recommended that the impact of solar panel reflective properties be part of the procurement selection criteria to minimize impact to avian wildlife.

In a 14 month *Wildlife Interaction* study at the Solar One CSP power plant in the Mojave Desert, 27 deaths were known to have occurred from collisions with the power plant structures, especially the CSP's heliostat mirrors, between April 1982 and May 1983.[13] Given the relatively high population of avian wildlife at the WPCP, micro-CSP is not recommended for the site given its high reflective properties relative to PV.

Physical Impacts

Electricity generating solar arrays are required to have "Touch Potential" design, whereby the frames are solidly grounded through a grounding network under the array that is

[13] McCrary, Michael D., Robert L. McKernan, Patricia A. Flanagan, and William D. Wagner, January 1984. Wildlife Interactions At Solar One: Final Report. For Southern California Edison.

contiguous to the power grid or consuming entity. Thus, electrocutions of burrowing owls by the electricity generating solar array systems are not anticipated.

As explained in Figure 8, CSP and micro-CSP units generate high temperature heat from the reflection of the sun that is transferred to the fluid tubing at the focal point. This heat has been known to incinerate insects and birds. In the Solar One CSP Power Plant Wildlife Interaction study, six known bird incinerations occurred between April 1982 and May 1983.[14] Given the relatively high amount of avian life, it is recommended that PV panels be installed at the WPCP instead of micro-CSP because PV solar panels are significantly cooler.

Should a burrowing owl find suitable habitat within a pre-existing solar array area, then proper measures shall be taken in accordance with the impacts and mitigation discussions below to minimize disturbance of the owl by operations or maintenance activities.

Constructability and Operations & Maintenance Issues in the Potential Solar Areas

Potential Impacts at Solar Areas #1 and #2

Burrowing Owl

Recent biological surveys have not identified burrowing owl occupied habitat within Potential Solar Areas #1 and #2. However due to their close proximity to a burrowing owl mitigation area just to the west and known occupied breeding/foraging habitat in the grasslands just to the east, habitat assessment surveys will be required prior to construction to conclude presence or absence of burrows suitable for burrowing owls. If burrows are present, then a protocol-level survey will be required during the winter season (December 1- January 31) and breeding season (February 1- August 31) prior to construction as described in the flowchart provided by CDFG in Attachment B[15].

Pending these survey findings, potential impacts to occupied burrowing owl habitat may or may not occur during construction. Potential impacts may come in the form of the following:

- Disturbance or harassment within 160 feet of occupied burrows
- Destruction of burrows and burrow entrances. Burrows include structures such as culverts, concrete slabs, and debris piles that provide shelter to burrowing owls.
- Degradation of foraging habitat adjacent to occupied burrows.

Congdon's Tarplant

Congdon's tarplant is not known from Potential Solar Areas #1 and #2 however suitable habitat exists on both sites. Therefore surveys during its blooming period (May-October) would be required to conclude the presence/absence of this species onsite. Pending these survey findings, potential impacts in the form of "take" (*i.e.*, harassment, removal, and

[14] McCrary, op. cit.

[15] California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines.

re-location) will be assessed if indeed the Congdon's tarplant is found within or adjacent to the proposed project footprint.

Wetlands and Riparian Habitat

Wetland and riparian habitats do not occur within these two Potential Solar Areas; therefore impacts to these sensitive habitats are not anticipated. The nearest wetland and riparian habitat is approximately 15 feet and the highest tide level of the San Francisco Bay is approximately 3,000 feet from Area #1--the closer of the two areas to the bay. To protect the potentially jurisdictional wetland and riparian habitat adjacent to these sites, a Stormwater Pollution Prevention Plan (SWPPP) may be necessary to avoid impacts to the water quality found at the adjacent wetland/riparian locations.

In the event that wetlands or waters of the U.S. are identified onsite and potential impacts are anticipated, the proposed Project will require permits from the following agencies:

- *United States Army Corps of Engineers (Corps)* – Section 404 Permit will be required to address impacts to waters of the U.S (including wetlands).
- *San Francisco Bay Regional Water Quality Control Board (RWQCB)* – Section 401 Water Quality Certification will be necessary to address impacts to waters of the U.S.
- *San Francisco Bay Conservation and Development Commission (BCDC)* – Permit will be required to address impacts in San Francisco Bay waters up to the highest tide levels.

If the Project were to impact riparian habitat associated with the isolated swale to the southwest of Solar Area #2, the proposed Project will require permits from the following agencies:

- *California Department of Fish and Game* – Section 1602 Streambed Alteration Agreement will be required to address impacts to riparian habitat associated with a streambed, creek, or swale.

Potential Impacts at Solar Area # 3, #4, and #5

Burrowing Owl

Historically, burrowing owl occupied habitat is known for Potential Solar Areas #3 and #5 (Figure 4). Therefore, future protocol-level surveys will be required during the winter season (December 1-January 31) and breeding season (February 1- August 31) prior to construction to conclude presence or absence. Pending these survey findings, potential impacts to occupied burrowing owl habitat may occur during construction. Potential Solar Area#4 has not supported burrowing owls for the past five years; thus impacts to burrowing owl habitat are not anticipated to occur at this site. However, future protocol-level surveys should continue at Potential Solar Area #4 to monitor the site's existing resources and document any new occurrences including but not limited to burrowing owls.

Congdon's Tarplant

Congdon's tarplant is not known from Potential Solar Areas #3, #4, and #5. However suitable habitat exists on all three sites. Therefore surveys during its blooming period (May-October) would be required to conclude that potential impacts are not anticipated.

Pending these survey findings, mitigation may or may not be required for impacts to Congdon's tarplant.

Wetlands and Riparian Habitat

Wetland and riparian habitats do not occur within these three Potential Solar Areas; therefore impacts to these sensitive habitats are not anticipated. To protect the potentially jurisdictional wetland habitat adjacent to Solar Area #5, a SWPPP may be necessary to avoid impacts to the water quality found at the adjacent wetland/riparian locations.

Mitigation Measures for Solar Areas #1- 5

Burrowing Owl

If the project can avoid impacts, the approved avoidance measures for Occupied Burrows are as follows:

- Construction and future operations and maintenance activities during the breeding season (February 1-August 31) shall avoid all occupied burrows unless a qualified biologist approved by CDFG verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) the juveniles from the occupied burrows are foraging independently and are capable of independent survival.
- No disturbance should occur within 160 feet of occupied burrows during the non-breeding season (September 1-January 31) or within 250 feet during the breeding season (February 1- August 31). Avoidance also requires that a minimum of 6.5 acres of foraging habitat be permanently preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls or single unpaired resident birds, as approved by CDFG and shown in Attachment C[16].

If the project cannot avoid impacts, mitigation measures for the loss of occupied burrowing owl habitat are as follows and shown in Attachment C:

- To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat (calculated on a 250 feet foraging radius around the burrow) per pair or unpaired resident bird, should be acquired and permanently protected. The protected lands should be adjacent to occupied burrowing owl habitat and at a location acceptable to CDFG. Protection of additional habitat acreage per pair or unpaired resident bird may be applicable in some instances.
- When destruction of occupied burrows is unavoidable, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created (by installing artificial burrows) at a ratio of 2:1 on the protected lands site. One example of an artificial burrow design is included in Attachment D[17].

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[16] California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines.

[17] Olenick, B. 1987. Reproductive Success of Burrowing Owls using Artificial Nest Burrows in Southeastern Idaho. Eyas 10(1): 38. and Alexander, A. K., M.R. Sackschewsky, C.A. Duberstein. 2005. *Use of Artificial Burrows by Burrowing Owls (Athene cunicularia) at the Hammer Facility on the U.S. Department of Energy Hanford Site*. Pacific Northwest National Laboratory, WA.

- If owls must be moved away from the disturbance area, passive relocation methods (as described below) should be used rather than trapping. At least one or more weeks will be necessary to accomplish this and allow the owls to acclimate to alternate burrows.
- The project sponsor should provide funding for long-term management and monitoring of the protected lands. The monitoring plan should include success criteria, remedial measures, and an annual report to CDFG.
- If possible, an easily accessible viewing platform with ecological information explaining burrowing owl life history and City mitigation efforts made to coexist with this special-status species could be placed adjacent to the mitigation area to serve as a public outreach measure.

Mitigation measures should be carried out from September 1 to January 31 which is prior to the breeding season. Preconstruction surveys of suitable habitat at the project site and buffer zones should be conducted within 30 days prior to construction to ensure no additional burrowing owls have established territories since the initial surveys. If ground disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed.

Passive Relocation – With One-Way Doors

Owls should be excluded from burrows in the immediate impact zone and in a 160-foot buffer zone by installing one-way doors in burrow entrances. One-way doors (e.g., modified dryer vents) should be left in place for 48 hours to ensure owls have left the burrow before excavation. Two natural or artificial burrows should be provided for each existing burrow in the project area that will be rendered biologically unsuitable. The project area should be monitored daily for one week to confirm owl use of burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be carefully inserted into the tunnels during excavation to maintain escape routes for any animals inside the burrow.

Best Management Practices

During construction or operations and maintenance activities a number of best management practices shall be implemented to protect the owls and other habitat, including the following measures.

Construction and operations and maintenance workers shall observe a 15 mph speed limit when driving on the WPCP site to prevent these low-flying birds from being hit and to minimize dust that may disturb their environment. The following precautions shall be taken to prevent accidental destruction of a nest site or active owl burrow at the WPCP.

Prior to installing electrical cables, pipes, concrete vaults, sidewalks, telephone poles or lines, or engaging in ground disturbing activity, the site shall be secured to find out if any occupied owl burrows are in the area where the work will occur. Pipe ends, other than culverts, shall be sealed to prevent owls from being trapped inside them.

The CDFG Mitigation Guidelines[18] recommend that a 250-foot buffer zone be maintained around a nest burrow during construction or disturbance activities. The Department also recommends that a 160-foot buffer zone be maintained around any other active owl burrow that may be affected by construction. A temporary fence is often placed 160-250 feet from the nest burrow to prevent construction equipment or vehicles from entering the buffer zone. The buffer zone is established by a qualified owl biologist and the CDFG. [19]

Congdon's Tarplant

If project impacts such as vegetation removal occur, mitigation measures for loss of Congdon's tarplant generally require the following:

- If avoidance is not feasible, a minimum 1:1 mitigation ratio would be required. Seed collection of the impacted population should take place prior to construction so mitigation plantings will preserve the same genetic diversity as the population slated for removal. Mitigation would need to take place near the project site within suitable habitat. The project sponsor may need to provide funding for long-term management and monitoring of the mitigation area depending on the level of impact and mitigation required by CDFG. The monitoring plan may include success criteria, remedial measures, and an annual report to CDFG.

Wetlands and Riparian Habitat

If project impacts such as vegetation removal or fill activities occur, mitigation measures for loss of wetland or riparian habitats generally require the following:

- If avoidance is not feasible, a minimum 1:1 mitigation ratio for the loss of wetland or riparian habitat would be required. Mitigation would need to be in-kind, meaning restoration or creation of wetlands in the same system adjacent to the project development. Please note that a 2:1 or 3:1 mitigation ratio may be required depending on the value of the wetland/riparian habitat being impacted.

In the future the Climate Action Reserve may develop a carbon offset protocol for tidal wetland restorations because wetlands have the natural ability to sequester or store carbon[20]. For example, an acre of cordgrass growing in a salt marsh produces at least twice as much organic material as the best cultivated agricultural land and many times the organic matter as natural inland grasslands and forests.[21]

If a wetland restoration mitigation measure is required, the City may gain the value-added benefit of developing carbon offset credits. This possibility needs to be confirmed once the protocol is released for public review.

CEQA Requirements for Biological Resources

This TM provides the basis for the requirement of an Initial Study (IS) and Mitigated Negative Declaration (MND) to fulfill the City's lead agency responsibilities under the

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[18] California Department of Fish and Game. 1995. Staff Report on Burrowing Owl Mitigation.

[19] Op cit. Protecting the Western Burrowing Owl.

[20] Philip Williams & Associates, Ltd. *and* Science Applications International Corporation. February 4, 2009. *Greenhouse Gas Mitigation Typology Issues Paper Tidal Wetlands Restoration.*

[21] City of Mountain View, CA 2009. Shoreline Regional Wildlife Area, Wildlife Habitats.

California Environmental Quality Act (CEQA)[1](see Attachment A). The information herein was established based on the findings of past field studies, which included the presence of western burrowing owl, review of background materials and proposed conceptual design plans, and a preliminary consideration of the CEQA Environmental Checklist.

Based on preliminary review of the proposed Project presented above, CH2M HILL believes that the proposed Project requires an IS/MND under CEQA Guidelines §15060.
CEQA Guidelines §15070(a) states:

> *A public agency shall prepare or have prepared a proposed negative declaration or mitigated negative declaration for a project subject to CEQA when:*
>
> *The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or*
>
> *The initial Study identifies potentially significant effects, but:*
>
> *Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur, and*
>
> *There would be no substantial evidence, in light of the whole record before the agency, that the project as revised may have significant effect on the environment.*

Despite which solar area is chosen for development, a biological reconnaissance survey will be required for the IS/MND to document the status of sensitive biological resources including wetland resources, special-status species, and their associated habitat. The results of the survey will need to be documented within a biological technical report that outlines the existing conditions, species identified, and potential occurrence for special-status species within the region. The IS/MND will then summarize the existing conditions of the affected environment, analyze the potential impacts, and propose mitigation measures to compensate for project impacts.

With appropriate avoidance and mitigation measures, the proposed Project should not have any significant effects on the environment including biological resources. With regard to the resources covered in this TM including the western burrowing owl, Congdon's tarplant, and wetlands, the information under the Constructability and Operations & Maintenance Issues in the Potential Solar Areas section above summarizes the potential impacts to these biological resources at each of the five Potential Solar Areas and the mitigation measures required to reduce all potential impacts to a level less than significant under CEQA.

Additional biological resources that may be affected by the proposed Project, which have not been addressed in this TM and will require further analyses under the IS/MND, are nesting birds covered under the Migratory Bird Treaty Act and the Fish and Game Code, Sections 3503, 3503.5, 3513, and 3800. Therefore, if any bird species is found nesting on the proposed Project site, avoidance measures must be employed. Such measures include pre-construction nesting surveys, buffer zone establishment, and construction monitoring. The IS/MND must include a section addressing the potential for nesting birds and the

associated avoidance measures proposed to reduce all impacts to a level less than significant.

Conclusions

Developing a WPCP Solar Array within or adjacent to Western Burrowing Owl Habitat

Any of the three ground-mounted solar configurations can be used at the five potential solar area locations adjacent to the WPCP—i.e., thin-film PV solar panels, crystalline solar PV panels with single-axis tracking, and micro-CSP. However, the CSP configurations need further study owing to concerns about heat generated at the focal point of the reflective panels and their reflectivity properties that may encourage collisions with avian wildlife. The thin-filmed and crystalline solar PV panels appear to be the most non-invasive design for the surrounding environment and its associated wildlife. Additionally these non-reflective flat plate solar PV panels are preferred over reflective technologies, such as CSP, for sites with burrowing owls and other sensitive avian species that may collide into a reflective panel.

It is recommended that a solar array developed at the WPCP be sited outside of the mitigation zone of burrowing owl habitat to avoid the mitigation and permitting process required by CDFG. Therefore, Potential Solar Area #4 appears to be the most suitable site for the proposed Project due to the following observations:

- No owls have been observed within the proposed area over the last three survey years; thus, no mitigation would be required as long as future survey years yield negative survey results.
- No wetlands or sensitive plants are known within the proposed area, thus, no mitigation would be required for these biological resources.
- Potential Solar Area #4 is adjacent to the WPCP, so access will be easy and cause fewer disturbances to adjacent open lands that may be occupied by burrowing owl or other sensitive biological resources that require mitigation.
- Less infrastructure is necessary to support the solar array due to its close proximity to the WPCP, so disturbances to buffer land would be minimized and project costs would be significantly less.

The next preferred site in terms of least environmental impact would be Potential Solar Site #2 as it has not supported burrowing owls in the past three years and Potential Solar Site #1 buffers it from the burrowing owl mitigation area to the northwest (see Figure 1). In addition, it does not appear to support wetlands or sensitive plant populations. However, impacts to surrounding occupied burrowing owl habitat may occur from accessing the site during construction and future maintenance activities. Avoidance and mitigation measures will be required if impacts occur during construction or future maintenance activities.

The third preferred site in terms of least environmental impact would be Potential Solar Site #1 as it has not supported burrowing owls in the past three years. However, it is adjacent to

the burrowing owl mitigation area which increases the likelihood that burrowing owls could occupy the site in the future. In addition, this site may support wetlands and associated special-status species that may be affected during construction and future maintenance activities. Avoidance and mitigation measures will be required if impacts occur during construction or future maintenance activities.

The least preferred sites in terms of environmental impacts are Potential Solar Sites #3 and #5 as Figure 4 demonstrates that they appear to have supported burrowing owls in the past three years. These areas do not appear to support wetlands or sensitive plant populations; however impacts to occupied burrowing owl habitat would likely occur during construction and future maintenance activities and therefore would require costly mitigation efforts.

Designing solar arrays to accommodate or encourage burrowing owl habitat within the Project boundaries is not recommended due to a number of related factors including the limited size of the proposed Project area, associated potential visual and physical impacts to the owls, the costly mitigation, and the lengthy permitting process required by CDFG. As required by CDFG, all impacts to habitats occupied by burrowing owls must be mitigated for by preserving suitable adjacent lands. Therefore, planning a solar array with artificial burrows and future monitoring would not be enough to meet the required mitigation measures for Project impacts.

Approximately 6.5 acres of foraging habitat is necessary to sustain only one breeding pair or one residential individual. Thus the size of the proposed four acre solar array would be too small to sustain more than one pair during the breeding season unless additional acreage contiguous with the development was preserved as habitat. In addition, the co-habitation of burrowing owls and solar arrays may result in visual and physical effects that may impact the owls' livelihood.

Maintenance limitations would also be of concern during the operation of the array. Every time workers would need to enter the array for maintenance, the site would have to be monitored ahead of time and the zone occupying the owl would likely have to be avoided.

Although there are no records of burrowing owls living within solar arrays at the present time, potential for this occurring may be slight but not impossible. A future option (though it is a high risk option in terms of cost) may be to start a dialogue with CDFG about the possibility and opportunity of experimenting with this co-habitat concept for a larger San José Showcase Project. This would include planning a solar array with artificial burrows, native grassland ground cover, annual maintenance and monitoring for up to 5-10 years, and annual monitoring reports and dialogue with CDFG. Cost estimates for this type of planning and implementation may range from $2-3 million dollars depending on the level of effort during the planning stages, project implementation, and duration of continued monitoring and maintenance.

One of the challenges in developing a solar array to co-exist among owl habitations would be the blocking of their lines of sight by the footings, columns and other hardware of solar cells. However, of the three technologies discussed above, the single-axis tracking solar array appears to have flexibility to enable more open space between PV arrays and allow for improved visibility by wildlife.

Other Environmental Issues

Congdon's Tarplant

If project impacts such as vegetation removal occur, mitigation measures for loss of Congdon's tarplant generally require a minimum 1:1 mitigation ratio. The project sponsor may need to provide funding for long-term management and monitoring of the mitigation area depending on the level of impact and mitigation required by CDFG. The monitoring plan may include success criteria, remedial measures, and an annual report to CDFG.

Wetlands and Riparian Habitat

If project impacts such as vegetation removal or fill activities occur, mitigation measures for loss of wetland or riparian habitats generally require a minimum 1:1 mitigation ratio. Mitigation would need to be in-kind, meaning restoration or creation of wetlands in the same system adjacent to the project development. A 2:1 or 3:1 mitigation ratio may be required depending on the value of the wetland/riparian habitat being impacted.

CEQA

Based on preliminary review of the proposed Project presented above, CH2M HILL believes that the proposed Project requires an IS/MND under CEQA Guidelines §15060. With appropriate avoidance and mitigation measures, the proposed Project should not have any significant effects on the environment including biological resources.

Additional biological resources that may be affected by the proposed Project, which have not been addressed in this TM and will require further analyses under the IS/MND, are nesting birds covered under the Migratory Bird Treaty Act and the Fish and Game Code, Sections 3503, 3503.5, 3513, and 3800. Therefore, if any bird species is found nesting on the proposed Project site, avoidance measures must be employed. The IS/MND must include a section addressing the potential for nesting birds and the associated avoidance measures proposed to reduce all impacts to a level less than significant.

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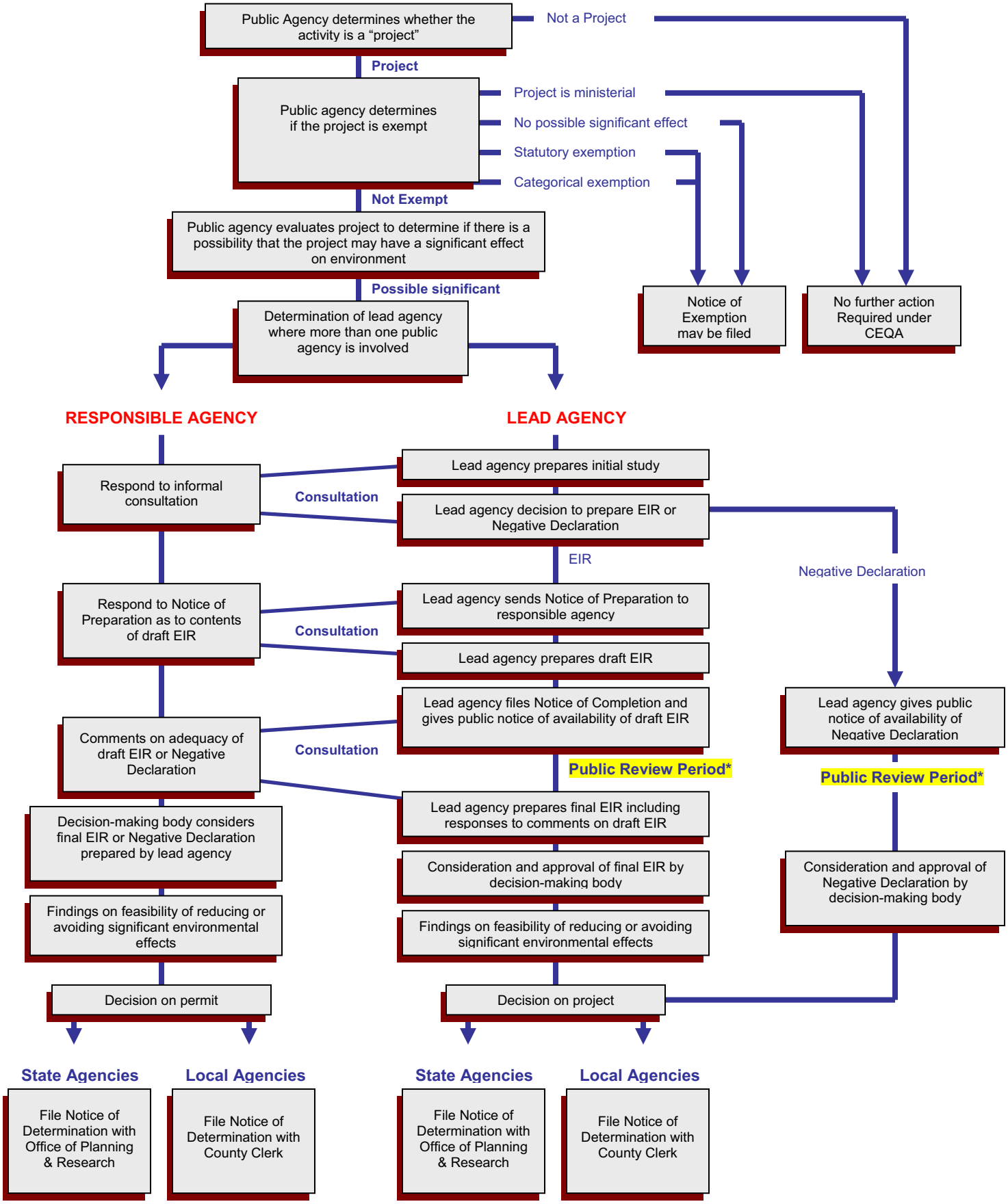
Attachments

Attachment A – CEQA Flow Chart

CEQA Process Flow Chart



Source: California Environmental Resources Evaluation System, http://ceres.ca.gov/topic/env_law/ceqa/flowchart/index.html
*** The public review and comment period shall not be less than 30 days and nor should it be longer than 60 days, per the CEQA Guidelines at http://ceres.ca.gov/topic/env_law/ceqa/guidelines/**

Attachment B – Burrowing Owl Survey Protocol

Burrowing: Owl Survey Protocol

April 1993

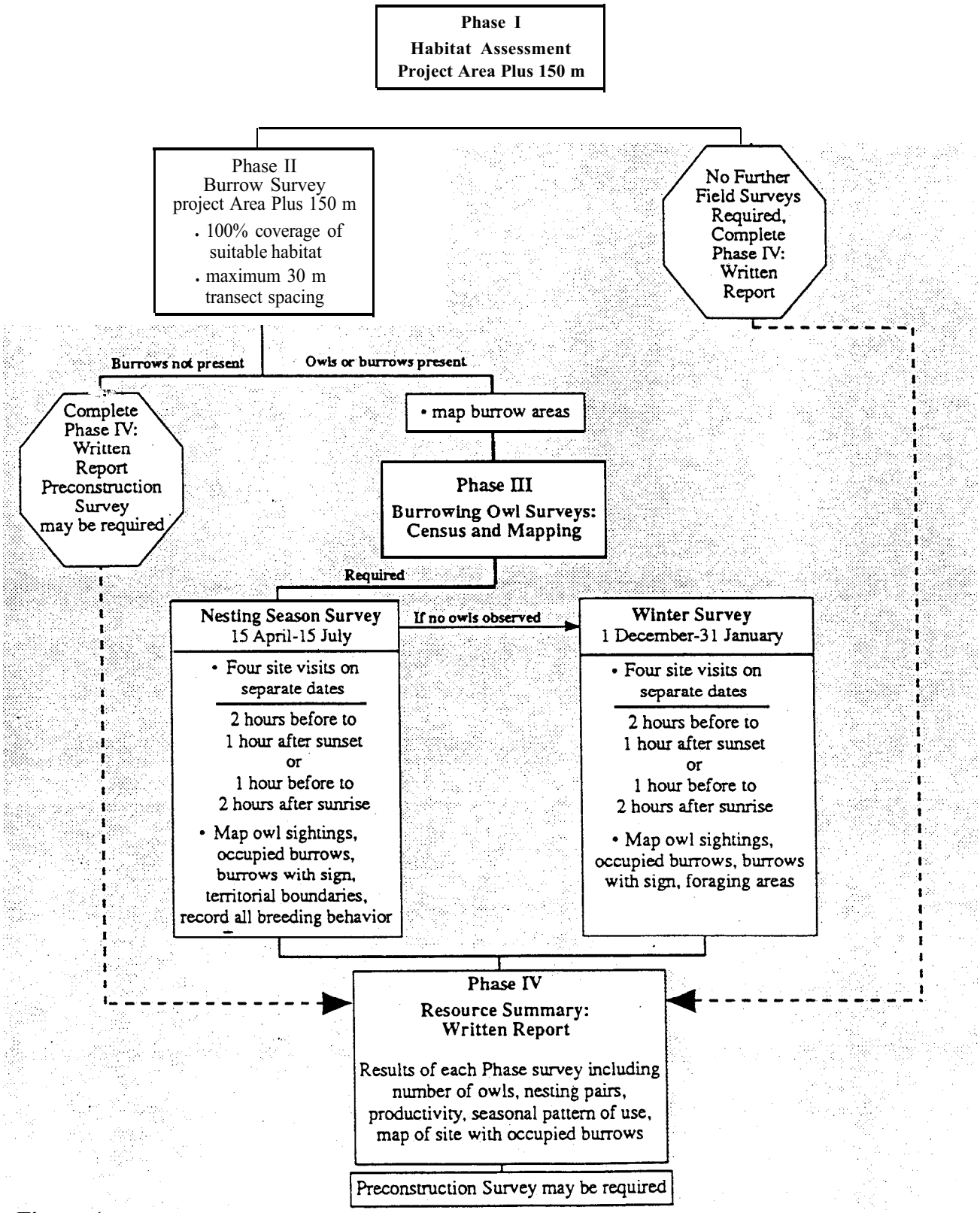


Figure 1.

Attachment C – Burrowing Owl Avoidance and Mitigation Charts

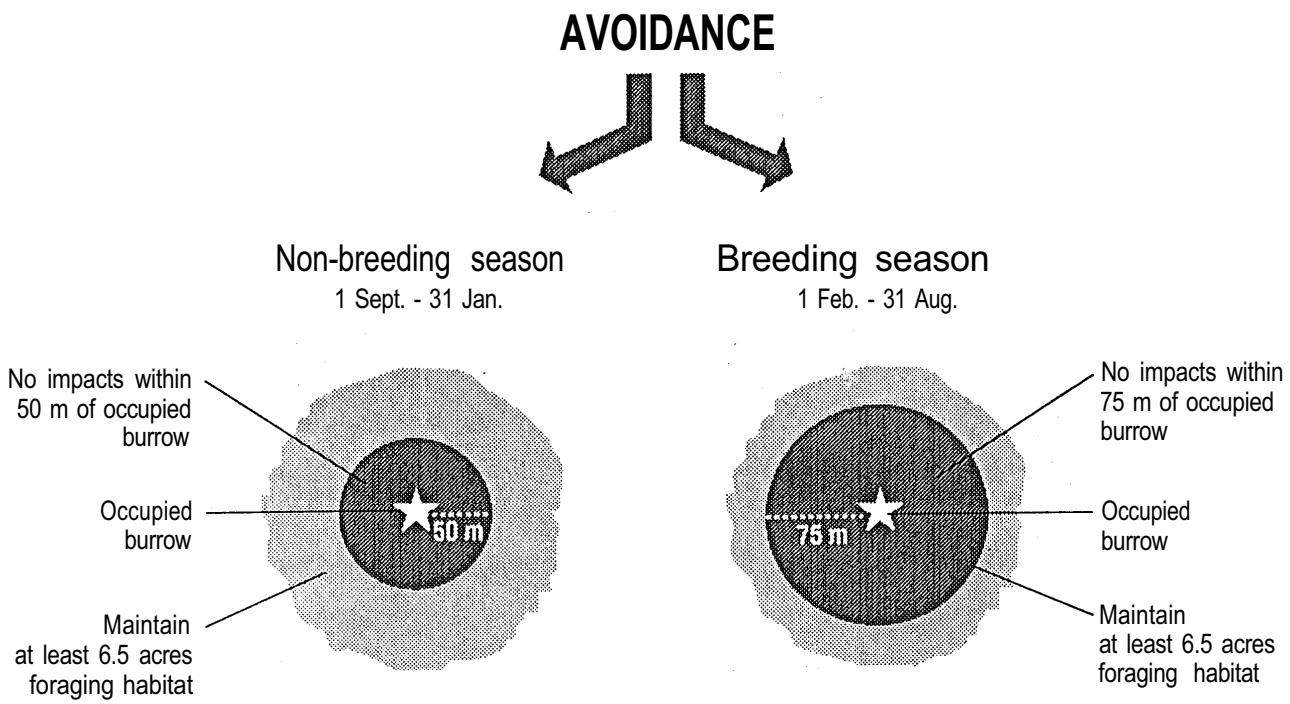


Figure 2. Burrowing owl mitigation guidelines.

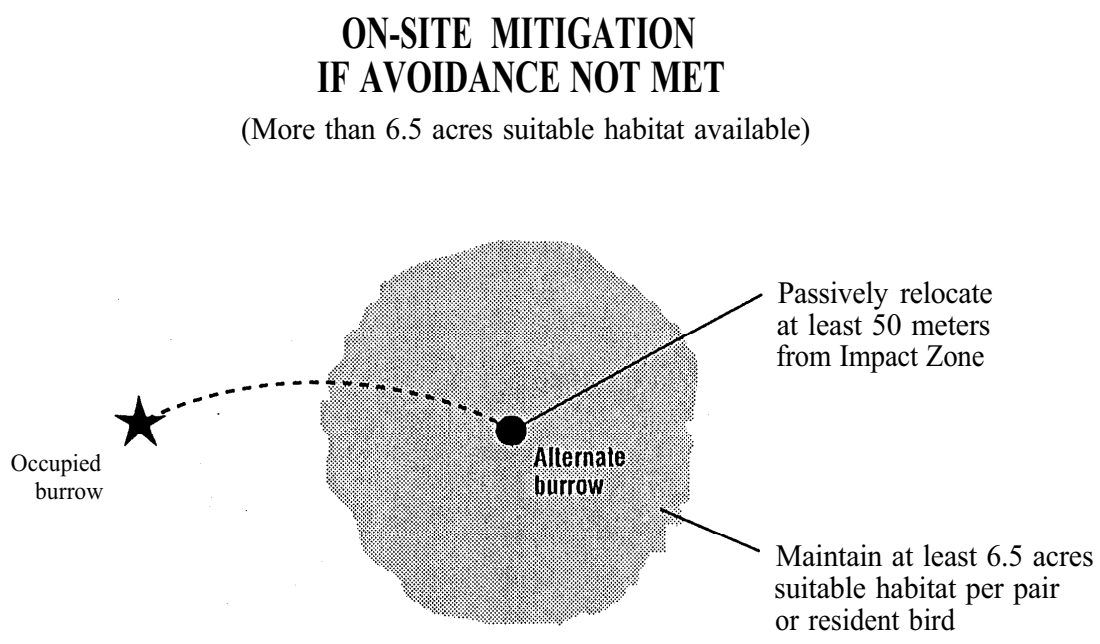


Figure 3. Burrowing owl mitigation guidelines.

Attachment D – Artificial Burrow Examples

Reproductive Success of Burrowing Owls Using Artificial Nest Burrows in Southeastern Idaho

by Bruce Olenick

Artificial nest burrows were implanted in southeastern Idaho f'or burrowing owls in the spring of 1986. These artificial burrows consisted of a 12" x 12" x 8" wood nesting chamber with rernovable top and a 6 foot corrugated and perforated plastic drainage pipe 6 inches in diameter (Fig. 1). Earlier investigators claimed that artificial burrows must provide a natural dirt floor to allow burrowing owls to modify the nesting tunnel and chamber. Contrary to this, the artificial burrow introduced here does not allow owls to modify the entrance or tunnel. The inability to change the physical dimensions of the burrow tunnel does not seem to reflect the owls' breeding success or deter them from using this burrow design.

In 1936, 22 artificial burrows were inhabited. Thirteen nesting attempts yielded an average clutch size of 8.3 eggs per breeding pair. Eight nests successfully hatched at least 1 nestling. In these nests, *67 of 75* eggs hatched (59.3%) and an estimated 61 nestlings (91.0%) fledged. An analysis of the egg laying and incubation periods showed that incubation commenced well after egg laying bega. Average clutch size at the start of incubation was 5.6 eggs. Most eggs tended to hatch synchronously in all successful nests.

Although the initial cost of constructing this burrow design may be slightly higher than a burrow consisting entirely of wood, the plastic pipe burrow offers the following advantages: (1) it lasts several field seasons without rotting or collapsing; (2) it may prevent or retard predation; (3) construction time is minimal; (4) it is easy to transport, especially over long distances; and (5) the flexible tunnel simplifies installation. The use of this artificial nest burrow design was highly successful and may prove to be a great resource technique for future management of this species.

For additional information on constructing this artificial nest burrow, contact Bruce Olenick, Department of Biology, Idaho State University, Pocatello, ID 83209.

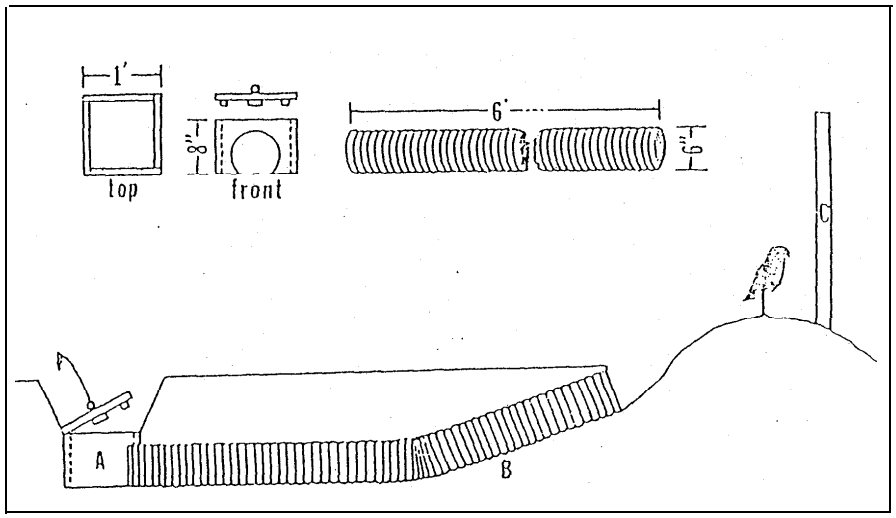


fig. 1 Artificial nest burrow design for burrowing owls Entire unit (including nest chamber) is buried 12" -- 18" below ground for maintaining thermal stability of the nest chamber. A= nest chamber, B = plastic pipe. C = perch.

ATTACHMENT A

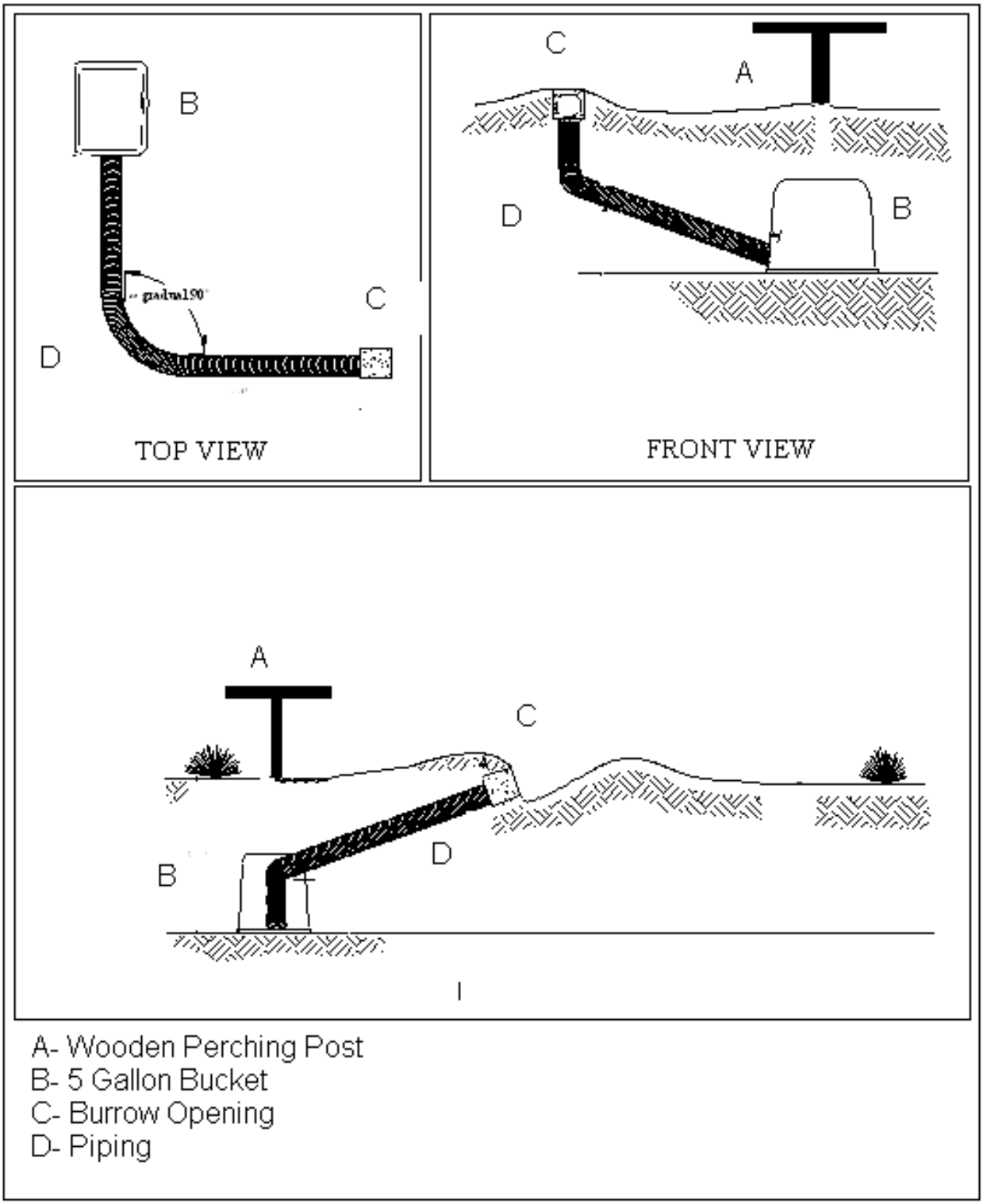


Figure 2. Recommended Layout for an Artificial Burrow