



**Protecting Burrowing Owl Habitat on City Facilities:
Burrowing Owl Habitat Suitability and Opportunities
Report**

Project # 3619-01



Prepared for:

City of Sunnyvale
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3 February 2015

Executive Summary

At the direction of the City Council, this study was conducted to determine the extent of suitable burrowing owl habitat on City-owned or managed lands in Sunnyvale, including a review of City-owned property at the Landfill and City-managed lands at Baylands Park (i.e., the active use portion of Baylands Park and the Baylands Preserve). It evaluates the efficacy of the City's existing wildlife and habitat management plan and provides recommendations for providing additional burrowing owl habitat protection and enhancement beyond the City's current programs. This study was initially proposed by City Vice Mayor David Whittum and was presented to the City Council as study issue DPW 13-15.

The City of Sunnyvale has long recognized the importance of having and protecting burrowing owls (*Athene cunicularia*), a California species of special concern, on City-owned/managed properties and has historically monitored their activity and implemented measures to protect burrowing owl habitats. These activities have taken place at the Landfill since its closure in 1994 and at Sunnyvale Baylands Park (Baylands Park) since it opened in 1994. Current measures include employing a consulting biologist with burrowing owl expertise to conduct monthly monitoring of burrowing owls on the Sunnyvale Landfill (Landfill) and quarterly monitoring at Baylands Park, including the Sunnyvale Baylands Wetlands Preserve (Baylands Preserve). However, sightings of burrowing owls at these sites have exhibited a generally downward trend for the last 10 years, consistent with general trends in the South Bay as a whole, and burrowing owls were last documented to breed on City-owned/managed property in 2004.

Due to the highly urbanized and fragmented landscape within the City's boundaries, few locations in Sunnyvale currently provide suitably large expanses of grasslands to support burrowing owls. The Landfill and Baylands Park represent some of the last suitable burrowing owl habitat in the City, and the only City-owned or managed property currently occupied by burrowing owls on a regular basis. Burrowing owls currently overwinter on the Landfill and were formerly known to breed in the grasslands on the site. Although they have not successfully bred on the Landfill since 1999, they could potentially breed on the Landfill under existing conditions. Burrowing owls were also formerly known to nest in the grasslands at Baylands Park, but they have not been recorded breeding on the site in recent years, although they continue to over-winter on the Baylands Preserve portion of the Park.

Existing burrowing owl habitat management at the Landfill and Baylands Park is guided by the general recommendations provided in the California Department of Fish and Wildlife (CDFW) *Staff Report on Burrowing Owl Mitigation* (CDFW 2012) for avoiding impacts on, and conserving habitat for, burrowing owls, as well as more site-specific recommendations provided by Debra Chromczak, the City's consulting biologist. Existing management activities are sufficient to provide suitable foraging habitat for owls, such as in California annual grassland, at these locations. However, it is our opinion that burrowing owls are unlikely to breed at either site unless additional habitat management measures are implemented.

Due to the high levels of human disturbance, grasslands in the active use portion of Baylands Park and the Landfill's West Hill do not represent high-quality habitat for the burrowing owl, and owls may not be able to breed successfully on these sites. Therefore, we do not recommend implementing any additional habitat management or enhancement measures for owls at these locations. The Landfill's East Hill and Recycle Hill, as well as the Baylands Preserve, are much more likely to support successfully breeding owls if appropriate habitat management measures are implemented.

Recommendations for measures that should be continued or newly implemented at the Landfill to increase the number of owls using the site, the numbers of owls using the site for breeding, and the breeding success of owls on the site are based on those measures proposed by Chromczak (2014) and are presented below.

- **Biologist** – Continue to employ a biologist with owl expertise.
- **Mowing/Grazing** – Continue to manage vegetation height to ≤ 6 inches at occupied owl burrows and leave islands of taller, denser vegetation to support prey populations. In addition, begin managing vegetation height at historically occupied burrows and artificial burrows. Vegetation height should be controlled year round, but especially during the breeding season (1 February through 31 August).
- **Pre-mowing/grazing Survey** – Continue to remove vegetation within 10 ft of active burrows manually using weed trimmers to avoid collapsing the burrows. Within two days of scheduled mowing or the initiation of grazing, a qualified biologist should conduct a survey of the site to determine which, if any, burrows are actively occupied by burrowing owls.
- **Improve Prey Base** – Improve the burrowing owl prey base by planting native perennials in uplands and by constructing rock/brush piles.
- **Artificial Burrow Mounds** – Install additional mounds with artificial burrows.
- **Predator Control** – Implement measures to control non-native predators within the Landfill. Measures to minimize the number of potential burrowing owl predators on the site include:
 - Provide trash containers that are designed in such a way that animals such as common ravens (*Corvus corax*), raccoons (*Procyon lotor*), and feral cats (*Felis catus*) cannot remove the trash within.
 - Do not plant trees (which could provide hunting perches for raptors) near nesting habitat.
 - Continue to enforce dog leash laws.
 - Install antipredator perches on lampposts near owl nesting habitat.
 - Minimize human disturbance. We recommend siting any Landfill park enhancements (e.g., benches, shade structures) 250 feet (ft) or more from burrowing owl enhancement areas to the maximum extent feasible to minimize disturbance of active owl burrows.
 - Consider feasibility of constructing fences around Recycle Hill and East Hill to further deter human disturbance of burrowing owls in the enhancement areas.
- **Prevent Habitat Fragmentation** – In order to avoid fragmentation of nesting and foraging habitat, the following measures should be implemented:

- Revegetate informal trails created by recreationists before they become fully established.
- Use plants to deter off-road foot traffic at intersections and along access roads.

Recommendations for measures that should be continued or newly implemented in the Baylands Preserve portion of Baylands Park to increase the number of owls using the site, the numbers of owls using the site for breeding, and the breeding success of owls on the site are similar to those measures proposed for the Landfill above. It is important to note that because the City does not own the Baylands Preserve, any enhancement activities on the site would need to be approved by the County of Santa Clara prior to implementation.

- **Biologist** – Continue to employ a biologist with owl expertise.
- **Mowing/Grazing** - Continue to manage vegetation height to ≤ 6 inches at occupied owl burrows. In addition, begin managing vegetation height at historically occupied burrows and artificial burrows. Manage vegetation height as described for the Landfill above.
- **Pre-mowing/Pre-grazing Survey** – Conduct pre-mowing surveys as recommended for the Landfill above.
- **Artificial Burrow Mounds** – Install additional artificial burrow mounds as described for the Landfill above. To reduce potential disturbance of burrowing owls by users of the recreational trails along the Preserve boundaries, we recommend implementing these measures in areas at least 250 ft from areas accessible to the public.
- **Predator Control** – Implement measures to control non-native predators within the Baylands Preserve. Measures to minimize the number of potential burrowing owl predators on the site include:
 - Do not plant trees (which could provide hunting perches for raptors) near nesting habitat.
 - Continue to enforce dog leash laws.
- **Restrict Remote Control Aircraft Use** – To reduce potential disturbance of burrowing owls by remote control aircraft launched from the active use portion of Baylands Park, we recommend potentially adding a regulation to prohibit the flying of remote control aircraft over the Baylands Preserve portion of the Park. We further recommend that signs alerting Park users of this regulation be posted throughout the Park.

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Section 1.0 Introduction

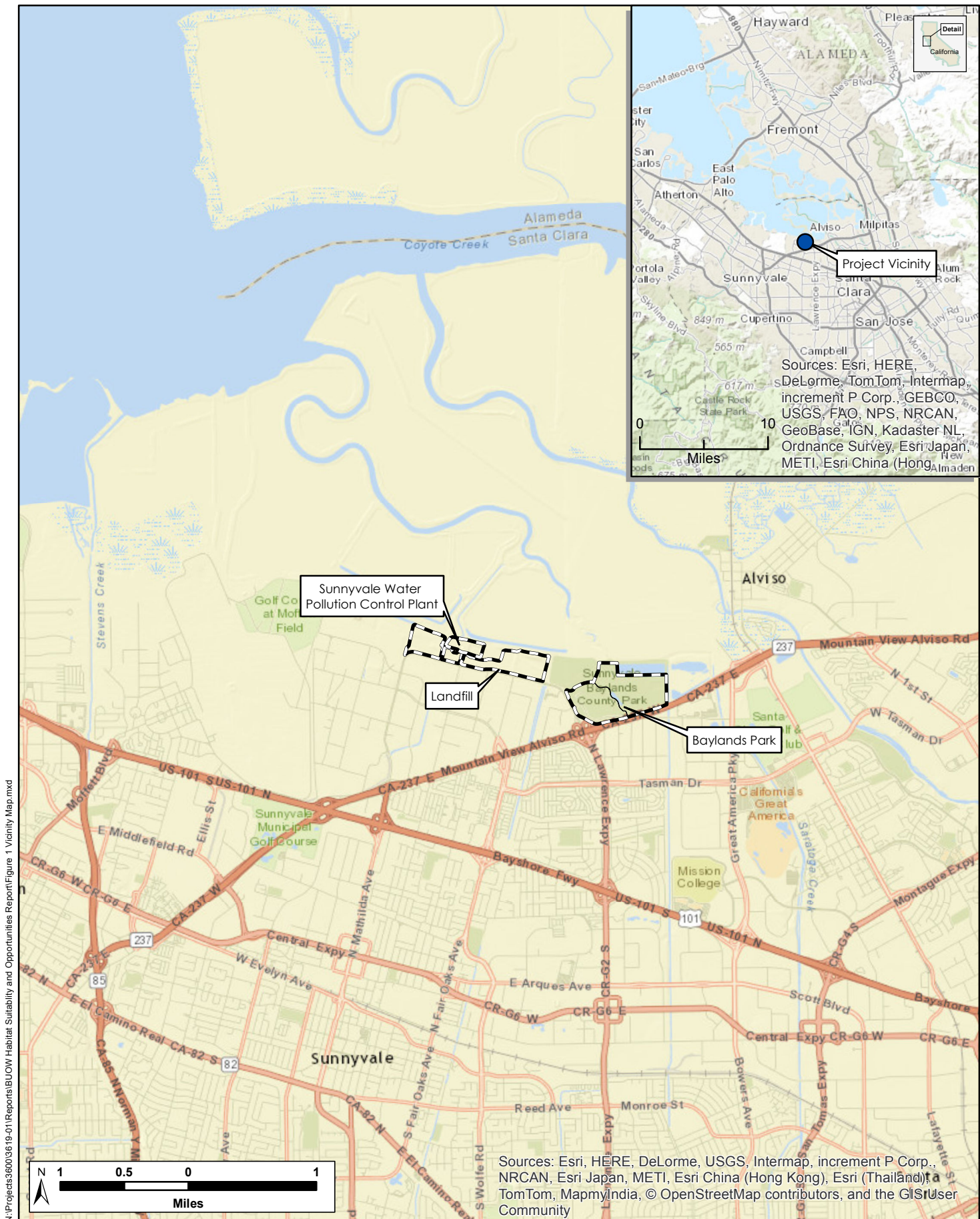
1.1 History

Historically, habitat for the burrowing owl (*Athene cunicularia*), a California species of special concern, in the City of Sunnyvale has been generally located at the north end of the City in two general areas: (1) on the Sunnyvale Water Pollution Control Plant (WPCP) and the Sunnyvale Landfill (Landfill) and adjacent levees, and (2) at Sunnyvale Baylands Park (Baylands Park), including the Sunnyvale Baylands Wetland Preserve (Baylands Preserve) (Figure 1). The WPCP and Landfill are owned by the City. Baylands Park is owned by the County of Santa Clara but operated and maintained by the City through a joint-use agreement.

The City makes consistent efforts to make the closed Landfill and Baylands Park hospitable to burrowing owls, and the Departments of Public Works and Environmental Services work to implement the measures outlined in the California Department of Fish and Wildlife's (CDFW's) *2012 Staff Report on Burrowing Owl Mitigation* to maintain habitat and avoid negative impacts on burrowing owls. Further, the City, with the help of a biologist (Debra Chromczak) under City contract, monitors and records the number and location of burrowing owls at the Landfill, WPCP and Baylands Park. However, the last successful documented nesting pair of burrowing owls was recorded in 2004. Furthermore, sightings of burrowing owls at these sites have exhibited a generally downward trend for the last 10 years, consistent with general declines throughout the South Bay, reaching a low of a single sighting in 2008 (Chromczak 2014, California Natural Diversity Database [CNDDB] 2014).

1.2 Purpose

The purpose of this study was to determine the extent of suitable burrowing owl habitat on City-owned or managed lands in Sunnyvale, including a review of City-owned property at the Landfill and WPCP, and City-managed lands at Baylands Park. It evaluates the efficacy of the City's existing wildlife and habitat management plan and provides recommendations for protecting and maintaining the existing habitat and related costs. This study was initially proposed by City Vice Mayor David Whittum and was presented to the City Council as study issue DPW 13-15 (Appendix A) on 17 December 2013.



N:\Projects\360013619-01\Reports\BUOW Habitat Suitability and Opportunities Report\Figure 1 Vicinity Map.mxd



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Figure 1: Vicinity Map
Sunnyvale Burrowing Owl Habitat Suitability
and Opportunities Report (3619-01)
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Section 2.0 Methodology

2.1 Background Review

In order to identify existing information regarding the historical and current distribution of burrowing owls within the City, as well as to become familiar with the City's current efforts to manage burrowing owl habitat, H. T. Harvey & Associates ecologists reviewed all relevant information regarding current and historical occurrences of the burrowing owl in the City. Sources of information included data possessed by the City, including the *Burrowing Owl Habitat Monitoring and Census 2013 Annual Report*¹ (Chromczak 2014; Appendix B); CDFW's California Natural Diversity Database (CNDDB); reports by birders available from eBird and the South-Bay-Birds electronic mailing list; the Santa Clara County Breeding Bird Atlas (Bousman 2007); and prior studies conducted for projects in Sunnyvale, including the *Draft Baylands Park Master Plan & EIR* (City of Sunnyvale 1988), *Sunnyvale Water Pollution Control Plant Master Plan and Primary Treatment Facility Design Biological Resources Constraints and Opportunities Report* (H. T. Harvey & Associates 2014), *Draft Summary of the 2007-2008 Burrowing Owl Studies for the Santa Clara Valley Water District* (EDAW, Inc. 2008), and the *Draft Santa Clara Valley Water District Sunnyvale East and West Channels Flood Protection Project Environmental Impact Report* (Horizon Water and Environment 2013).

2.2 Reconnaissance-level Surveys

On 16 September 2014, H. T. Harvey & Associates wildlife ecologist Ginger Bolen, Ph.D., conducted a reconnaissance-level survey of Baylands Park and the Landfill. In addition, on 25 and 26 September 2014, H. T. Harvey & Associates wildlife ecologist Robin Carle, M.S., conducted reconnaissance-level surveys of Fairwood Park, Sunnyvale Golf Course, and Sunken Gardens Golf Course. These site visits were intended primarily to put into context the information generated during the background review, to determine existing conditions on the sites, and to determine each site's potential to support burrowing owls.

2.3 Informal Consultation with California Department of Fish and Wildlife

On 10 November 2014, representatives from the City and H. T. Harvey & Associates visited the Landfill, WPCP, and Baylands Park with CDFW biologist David Johnston to discuss potential burrowing owl habitat maintenance and enhancement opportunities at these sites.

¹ The 2014 Annual Summary was issued after this report was completed. It is included in Appendix B.

Section 3.0 Regulatory Context

3.1 Federal Migratory Bird Treaty Act

The burrowing owl is a migratory species protected under the federal Migratory Bird Treaty Act (MBTA; 16 U.S.C., §703, Supp. I, 1989), which prohibits killing, possessing, or trading of migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. The MBTA protects active nests from destruction and all nests of species protected by the MBTA, whether active or not, cannot be possessed. An active nest under the MBTA, as described by the Department of the Interior in its 16 April 2003 Migratory Bird Permit Memorandum, is one having eggs or young. Nest starts (i.e., prior to egg laying) are not protected from destruction. The trustee agency that addresses issues related to the MBTA is the U.S. Fish and Wildlife Service (USFWS).

3.2 California Fish and Game Code

Burrowing owls and their nests are protected by Sections 3503 and 3800 of the California Fish and Game Code, which protect most native birds, including their nests and eggs, from all forms of “take”. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered take by the CDFW. Raptors (i.e., eagles, falcons, hawks, and owls) and their nests are specifically protected under California Fish and Game Code Section 3503.5. Section 3503.5 states that it is “unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.”

In addition, the burrowing owl is on the CDFW’s list of species of special concern. Species on this list are of limited distribution, or the extent of their habitats has been reduced substantially, such that threat to their populations may be imminent. Species of special concern may receive special attention during environmental review as potential rare species under the California Environmental Quality Act (CEQA) but do not have specific statutory protection due solely to their inclusion on this list.

3.3 City of Sunnyvale General Plan

The City of Sunnyvale General Plan Policy LT-8.2. (City of Sunnyvale 2011) requires the City to adopt management, maintenance, and development practices that minimize negative impacts on the natural environment.

Section 4.0 Habitat Suitability and Opportunities Findings

4.1 Overview

4.1.1 Life History and Habitat Requirements

Burrowing owls occur year-round in the Santa Clara Valley, using open, agricultural or grassland areas with active small mammal burrows, which they use for nesting and roosting. Typical burrowing owl habitat is treeless (because tall trees provide perches for raptors that can easily prey on burrowing owls), with minimal shrub cover and woody plant encroachment, and low density and foliage height diversity, which allows the owls to observe approaches to their nest or roost burrows. In the San Francisco Bay Area, burrowing owls are chiefly associated with burrows of California ground squirrels (*Spermophilus beecheyi*), which, in addition to providing nesting, roosting, and escape burrows, improve habitat for burrowing owls in other ways. For example, burrowing owls are known to favor areas with short, sparse vegetation (Coulombe 1971, Haug and Oliphant 1990, Plumpton and Lutz 1993a), which is the condition typically found in active ground squirrel colonies.



Burrowing owls are diet generalists. Insects, small mammals, birds, and occasionally amphibians and reptiles may be eaten (Errington and Bennett 1935, Thomsen 1971, Green et al. 1993, Plumpton and Lutz 1993b). Prey size and availability may be more important than prey species. Numerically, insect prey are most often represented, while small mammal prey (e.g., mice and voles) comprise the majority of biomass intake.

The burrowing owl nesting season as recognized by the CDFW runs from 1 February through 31 August. In Santa Clara County, burrowing owl families with non-flying young have been found as early as 30 March, suggesting egg-laying dates in mid to late February, and fledged young still dependent on adults have been found into late August (Trulio 2007). After nesting is completed, adult owls may remain in their nesting burrows or in nearby burrows, or they may migrate and over-winter elsewhere (Gorman et al. 2003). Young birds disperse across the landscape from 0.1 mile (mi) to 35 mi from their natal burrows (Rosier et al. 2006). Philopatry (the tendency for individuals to breed at or near their place of birth), site tenacity (the tendency for individuals to breed at or near their prior nest location), and nest burrow reuse have been well documented for burrowing owls (Martin 1973, Gleason 1978, Rich 1984, Plumpton and Lutz 1993a), and burrowing owls may return to a nesting site and attempt to nest even after the site has been developed. Further, past reproductive success may influence future site reoccupancy. Female burrowing owls with large broods tend to return to previously occupied nest sites, while females that fail to breed, or which produce small broods, may change nest territories in subsequent years (Lutz and Plumpton 1999).

4.1.2 Historical Occurrence in Sunnyvale

References indicate that burrowing owls were considered a fairly common resident in the drier, unsettled, interior parts of the San Francisco Bay Area in the early part of the 20th century, and Santa Clara County was considered to have one of the highest populations of burrowing owls in the region (Grinnell and Wythe 1927). According to the *2008 Nesting Burrowing Owl Survey Santa Clara Valley Habitat Conservation Plan/Natural Communities Conservation Plan* (Albion Environmental 2008), Brian Walton of the University of California Santa Cruz Predatory Bird Research Group indicated that there were hundreds of burrowing owls in dozens of places on the northern portion of the Santa Clara Valley floor in the 1970s. However, the population is believed to have declined significantly between the 1980s and early 1990s (DeSante et al. 2007) due to development, with Santa Clara County experiencing extirpation of local populations during this period (Townsend and Lenihan 2003). By the early 1990s, the burrowing owl population in the San Francisco Bay Area was estimated at 165 breeding pairs (DeSante 1997).

An analysis of available records indicates that habitat for burrowing owls in the City of Sunnyvale has been generally located at the north end of the City, primarily on City or County-owned lands (i.e., Baylands Park, WPCP, and Landfill). The only records of burrowing owls from the southern portion of the City are from a site located between the former Patrick Henry Junior High School on Dunford Way and the former Peterson High School on Rosalia Avenue (CNDDDB 2014). From 1981 to 1983, a burrowing owl pair was observed at this location each year, with one young fledging from a nest in 1981, another young fledging in 1982, and none in 1983 (CNDDDB 2014).

A detailed discussion of the history of burrowing owls on City-owned or managed lands is provided below.

Baylands Park

Baylands Park, which is composed of an active use area (72 ac) and the Baylands Preserve (105 ac), is located north of State Route 237 (SR 237), west of Calabazas Creek, east of Caribbean Drive, and south of Guadalupe Slough. It is owned by the County of Santa Clara but operated and maintained by the City.

Records from 1973 (Montoya 1973 as cited in H. T. Harvey & Associates 1995) indicate that a colony of burrowing owls nested on Baylands Park historically, when a 35-ac portion of the site was a horse pasture. In May 1973, eight pairs of owls plus three young (19 total birds) were recorded in this area. In 1984, Ms. Ginny Becchine of Save Our South Bay Wetlands recorded eight active burrows supporting 12 adults and 20 young (City of Sunnyvale 1988). Owls continued to be observed in the vicinity until August 1994 (J. Oliver pers. comm. as cited in H. T. Harvey & Associates 1995). Work on Baylands Park began in 1992.

In 1993 and 1994, three artificial burrow mounds (each approximately 15 feet [ft] in diameter x 2.5 ft tall) were installed on the Baylands Preserve (Figure 2) by Dr. Lynn Trulio of the Burrowing Owl Alliance under agreement with the County of Santa Clara. Buried within each mound was an artificial burrowing owl nesting area consisting of two 4-ft-long terra cotta pipe sections joined by an elbow attached to a 12 x 12 x 18-inch



N:\Projects\360013619-01\Reports\BUOW Habitat Suitability and Opportunities Report\Figure 2 Artificial BUOW Mounds at the Preserve.mxd



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Figure 2: Artificial Burrow Mounds at the Baylands Preserve

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plastic valvebox open at the bottom. Although the Preserve was designated as a jurisdictional wetland, the park supervisor at the time reported that the upland area where the artificial burrows were located did not flood during the rainy season (J. Oliver pers. comm. as cited in H. T. Harvey & Associates 1995). Three additional burrow mounds were constructed adjacent to Baylands Park at the Twin Creeks Sports Complex, which is operated and maintained by a private corporation on County land.

In 1995, one pair of burrowing owls and one adult female owl were relocated to the artificial mounds at the Baylands Preserve and another pair of owls was relocated to the artificial mounds at Twin Creeks Sports Complex as part of a mitigation agreement between Cisco Systems and the California Department of Fish and Game. None of the artificial mounds had been used by burrowing owls since 1993 (H. T. Harvey & Associates 1998). Thus, they were available for use by the relocated owls. Per the requirements of the California Department of Fish and Game, the relocation sites were monitored for burrowing owl for three years.

As summarized in *Cisco Systems Tasman B Project Burrowing Owl Active Relocation Final Report* (H. T. Harvey & Associates 1999), the owl pair relocated to the Baylands Preserve remained at the site, bred, and produced three fledglings in 1995. One pair of owls bred at the Baylands Preserve relocation site in 1996 and produced at least one young. Two pairs of owls also bred at this site in 1997 and produced one young each. In 1998, two pairs of owls bred successfully at the Baylands Preserve relocation site. One pair fledged one young and the second pair fledged two young. The adult female and the pair of owls at Twin Creeks Sports Complex left their respective relocation sites within a few days of their release. No owls used the artificial burrows or bred at the Twin Creeks Sports Complex relocation site, and as of 10 June 1998, all three artificial burrow mounds at this site had been destroyed. Between 1998 and 2002, 10 burrows with evidence of owl use were observed on the Baylands Park (CNDDDB 2014). There are no CNDDDB records of burrowing owl observations on any portion of the Park (i.e., active use area or Baylands Preserve) or the Twin Creek Sports Complex from 2003 through 2012 (CNDDDB 2014). However, Chromczak (2013) recorded one burrowing owl at Baylands Preserve in February, August, and December 2013, and a single owl was reported on the site in February 2014 (Cornell Lab of Ornithology 2014, South Bay Birds List-Serve 2014).

Sunnyvale Landfill and WPCP

The Landfill is an approximately 93-ac site located in the northern part of the City and consists of four refuse hills referred to as the West Hill, Recycle Hill, South Hill, and East Hill (Figure 3). Waste disposal activities reportedly began at the site in the 1920s, and the site was permitted for operation as a sanitary landfill in 1978 (Regional Water Quality Control Board 1989). It has been designated as a Class III Landfill and was used for disposal of non-hazardous residential, commercial, and industrial Municipal Solid Waste and construction debris until 1993. The WPCP, originally constructed in 1956, is located adjacent to the Landfill and includes the 16.6-ac “Main Plant,” as well as two oxidation ponds (Pond 1 and Pond 2) and associated channels. The City of Sunnyvale is the property owner and operator of the Landfill and WPCP. Prior to landfill operations, the site was composed of a relatively flat, bayward sloping plain at or near sea level (Regional Water Quality Control Board 1989).



N:\Projects\3600\3619-01\Reports\BUOW Habitat Suitability and Opportunities Report\Figure 3 Sunnyvale Landfill and WPCP.mxd



Since 2000, monthly surveys for burrowing owls have been conducted at the Landfill and WPCP by burrowing owl specialist Debra Chromczak, contracted with the City's Environmental Services Department Solid Waste and Water Pollution Control Plant Divisions, and commencing in February 2013 with the City's Department of Public Works Parks, Golf, and Street Trees Division. Services have included conducting one site survey per month to identify active burrow locations and record owl abundance. The results of these surveys were summarized in the *Burrowing Owl Habitat Monitoring and Census City of Sunnyvale 2013 Annual Report* (Chromczak 2014) and are provided in Table 1 below. As reported in the 2013 Annual Summary Report, Sunnyvale's last successful nesting attempts occurred on the Landfill in 1999 and inside the WPCP in 2004. Owls unsuccessfully attempted to nest on the Landfill's West Hill through 2003. Since March 2007, no owls or active burrows have been observed inside the WPCP, and no owls have observed on the Landfill or inside the WPCP during the peak of the breeding season (April – July).

Table 1. History of Burrowing Owl Sightings (adults/chicks) at Sunnyvale's Landfill and WPCP (Chromczak 2014).

Year	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
2000									4	4	3	4	17
2001	*	5	5	8	7	4	2/2	1	2	4	4	6	50
2002	4	4	4	5	4/6	4/4	4/6	*	4/3	*	9	5	66
2003	6	5	6	5	5/4	4/3	3/4	2/2	2	*	4	4	56
2004	5	5	3	3	4/3	2	2	2	2	6	3	3	43
2005	3	4	2	1	2	2	2	2	1	3	4	6	32
2006	4	4	1	1		2	2	2	2	2	3	3	26
2007	3	1	1								1		6
2008										1			1
2009		1								1	2	2	6
2010	2	1										2	6
2011	2									1	1	1	5
2012	2	2	2					1	2	1	4	2	16
2013	1									1	2	1	5

* data not available

Fairwood School/Park

In 1994, the City constructed improvements of the open space at Fairwood School through an agreement with the Sunnyvale School District. During construction, a burrowing owl was detected on the site, though it was unknown whether the owl was nesting or was just a non-breeding bird. As a habitat enhancement

measure, the City built an artificial burrowing owl nest mound at Fairwood Park. No owls have been recorded at the Fairwood School/Park since this time (City of Sunnyvale 2013; CNDDDB 2014).

4.2 Current Distribution

Following is a summary of current habitat conditions in the Baylands Park and Landfill areas, which have recently been used by burrowing owls at least as non-breeding habitat, as well as in areas of the City that have not been known to support burrowing owls in recent years but that are at least ostensibly suitable for use.

4.2.1 Occupied Habitat

Due to the highly urbanized and fragmented landscape within the City's boundaries, few locations in Sunnyvale currently provide suitably large expanses of grasslands to support burrowing owls. The Landfill and Baylands Park represent some of the last suitable burrowing owl habitat in the City, and the only City-owned or managed property currently occupied by burrowing owls on a regular basis. Numbers of owls appear to have declined in these areas (as in the rest of the South Bay) in recent years, and burrowing owls do not breed regularly on the Landfill or Baylands Park. Following is a summary of current habitat conditions in the Baylands Park and Landfill areas.



Photo 1. Baylands Park

Baylands Park

Currently, portions of the active use area of Baylands Park (Photo 1) are composed of California annual grasslands that are occupied by California ground squirrels and that provide ostensibly suitable nesting, roosting, and foraging habitat for burrowing owls. However, there are no CNDDDB records of burrowing owl observations on the active use portion of Baylands Park from 2003 through 2012 (CNDDDB 2014), and surveys of the area conducted monthly from February through December 2013 detected no burrowing owls (Chromczak 2014). Further, due to the high levels of human disturbance,



Photo 2. Sunnyvale Baylands Wetland Preserve

grasslands in the active use portion of Baylands Park do not represent high-quality habitat for the burrowing owl, and owls may not breed successfully on the site due to high levels of human use. However, the Baylands Preserve portion of the Park, where human access is restricted, is much more likely to support successfully breeding owls.

Baylands Preserve (Photo 2) is composed of seasonal wetlands and ruderal grasslands, portions of which are occupied by California ground squirrels and other fossorial small mammals, which provide suitable nesting,

roosting, and foraging habitat for burrowing owls (BioSystems Analysis Inc. 1991, WRA 2013). Although there are no CNDDB records of burrowing owl observations on the Baylands Preserve from 2003 through 2012 (CNDDB 2014), no surveys of the site were conducted during this period. Surveys conducted monthly from February through December 2013 detected a single burrowing owl on three occasions (Chromczak 2014), evidence that owls continue to be attracted to the Baylands Preserve. In addition, a single owl was reported on the site in February 2014 (Cornell Lab of Ornithology 2014, South Bay Birds List-Serve 2014). Owls detected on the site include one that was banded as a juvenile in May 2013 at Moffett Field. During fall/winter dispersal, this owl traveled approximately 2.8 mi from its 2013 natal burrow location to reside briefly at the Preserve (Chromczak 2014).

Sunnyvale Landfill

The Landfill (Photo 3) is currently designated as a public facility but is maintained mostly as a closed landfill that provides open space for public recreation (e.g. hiking, jogging, bicycling, and birding). The majority of recreational activities currently take place on West Hill. The majority of the site is composed of California annual grasslands that are occupied by California ground squirrels and other small mammals and that provide suitable nesting, roosting, and foraging habitat for burrowing owls.



Photo 3. Sunnyvale landfill

As described above, burrowing owls were formerly known to breed on the Landfill, and although they have not successfully bred on the site since 1999, they continue to over winter there (Chromczak 2014). In 2013, burrowing owls did not breed or attempt to breed, on the Landfill. However, monthly surveys detected four active burrow locations during the non-breeding season, a decrease from the 11 active burrow locations recorded on the Landfill in 2012 (Chromczak 2014). A maximum of two owls was observed on the Landfill during any single monthly site survey, with two owls observed on East Hill on 15 November 2013. One banded owl was sighted

on the Landfill during the 2013 monthly surveys (Chromczak 2014). On 10 January 2013, a banded juvenile was observed on the upper south slope of East Hill. The individual was originally banded by Ms. Chromczak as a juvenile in June 2012 at Moffett Field. During fall/winter dispersal, the owl traveled approximately 1.9 mi from her 2012 natal burrow location to winter briefly on East Hill. This female returned to Moffett Field to nest during the 2013 breeding season and produced at least five offspring (Chromczak 2014).

4.2.2 Potential Habitat

Sunnyvale Golf Course

The Sunnyvale Golf Course (Photo 4) is located on the south side of Highway 101 and is bisected by SR 237. Moffett Federal Airfield, where burrowing owls are known to occur year-round (ICF International 2012), is located across Highway 101 to the north of the golf course.

No burrows of California ground squirrels are present on the portion of the golf course south of SR 237, due at least in part to active small mammal control activities conducted by the golf course staff. However, high densities of non-native fox squirrels (*Sciurus niger*) and Eastern gray squirrels (*Sciurus carolinensis*) occur on this portion of the site due to the presence of a remnant walnut orchard as well as numerous other mature trees that produce nuts, cones, or acorns. The large number of squirrels, as well as the presence of many large, mature trees surrounding and within this portion of the golf course, attracts raptors that prey upon burrowing owls as well as small mammals. Therefore, burrowing owls are unlikely to occur on the site south of SR 237 due to a lack of refugia (i.e., burrows), the presence of mature trees and raptors, and high levels of human disturbance.



Photo 4. Sunnyvale Golf Course

North of SR 237, the golf course is more open and mature trees are spaced farther apart. In addition, California ground squirrel burrows are present in three locations: (1) at the western edge of the golf course in an area surrounded by large trees; (2) in the center of the golf course beneath large trees; and (3) near the eastern end of the golf course in an open area adjacent to SR 237. Inspection of these burrows during the 25 September 2014 survey indicated that few were active (e.g., burrows were partially collapsed or the entrances were clogged with debris or cobwebs), and evidence of only small numbers of ground squirrels was observed on the site (likely due to active small mammal control measures). The intact burrows on the site provide ostensibly suitable roosting and nesting habitat for burrowing owls, but due to (1) the proximity of the burrows to large trees, which provide perches for raptors, (2) regular disturbance by golfers, and (3) small mammal control efforts, which reduce the prey population for the burrowing owl, the golf course provides poor quality habitat for the burrowing owl, and there is a low probability that burrowing owls nest or roost in these burrows. Further, although our reconnaissance-level survey was not designed to determine presence or absence of burrowing owls, no owls or signs of their presence were noted during the site visit. Although the potential occurrence of burrowing owls on the golf course cannot be ruled out given the site's proximity to Moffett Federal Airfield, which is known to support the species, they are not expected to occur frequently or in large numbers, or to breed successfully on the site. Therefore, we do not recommend any efforts to manage this environment to provide habitat for the burrowing owl.



Photo 5. Sunken Gardens Golf Course

Sunken Gardens Golf Course

Sunken Gardens Golf Course (Photo 5) is a 9-hole golf course and driving range located on South Wolfe Road. The course is surrounded by extensive residential development that isolates the site from other potentially suitable burrowing owl habitat. The nearest extant occurrence of burrowing owls is at Mission College in Santa Clara, California, approximately 2.5 mi to the northeast.

Small mammal control activities are conducted at Sunken Gardens Golf Course and as a result, no burrows of California ground squirrels were observed at the site during the reconnaissance-level survey conducted on 25 September 2014. In addition, mature trees that provide perches for raptors are abundant on the site. Therefore, although the open grasslands at the site provide ostensibly suitable burrowing owl foraging habitat, due to a lack of refugia (i.e., burrows), the presence of mature trees and raptors, high levels of human disturbance, and isolation from suitable burrowing owl habitat in the region, burrowing owls are not expected to occur on the Sunken Garden Golf Course, even as occasional foragers.

Fairwood School/Park

Fairwood Park (Photo 6) is an approximately 2-ac park located on Sandia Avenue adjacent to Fairwood School. The park includes a children's play area, sand volleyball court, parcourse (i.e., fitness trail), bike path, greenway, and restrooms. Open grassland areas at the park are relatively narrow and are immediately adjacent to picnic areas, a play area, and/or paved or gravel walkways with high volumes of foot traffic from walkers, joggers, and park users. The greenway is maintained by mowing and regular watering. The adjacent school property includes basketball courts, horseshoe pits, a multi-use field, and a lighted tennis court in addition to the school building.



Photo 6. Fairwood Park

Fairwood School/Park is located approximately 0.4 mi northwest of a documented burrowing owl use area at Mission College, a site where burrowing owls are known to occur year-round, and 1.0 mi from the Preserve where owls are known to overwinter. However, no burrows of California ground squirrels are present at Fairwood School/Park to provide suitable nesting or roosting habitat for burrowing owls. Further, as described above, an artificial burrow mound was constructed on the park in 1994; however, no evidence of the mound was observed during a reconnaissance survey conducted on 26 September 2014. Thus, although burrowing

owls could potentially forage in the athletic fields and the greenbelt, due to the high levels of human disturbance and lack of refugia (i.e., suitable artificial burrows or burrows of ground squirrels) on the site, as well as the site's location amid dense urban development, burrowing owls are not expected to occur at Fairwood School or Fairwood Park.

4.3 Efficacy of Existing Management Plans

The City of Sunnyvale has long recognized the importance of having and protecting burrowing owls on City-owned/managed properties and has historically monitored their activity and implemented measures to protect burrowing owl habitats. These activities have taken place at the Landfill since its closure in 1994 and at Sunnyvale Baylands Park (Baylands Park) since it opened in 1994. Currently, the City's management of burrowing owl habitat is guided by the general recommendations provided in the CDFW's Staff Report on Burrowing Owl Mitigation (CDFW 2012) for avoiding impacts on, and conserving habitat for, burrowing owls, as well as more site-specific recommendations provided by Debra Chromczak, the City's consulting biologist.

Habitat management at the Landfill is conducted by the Environmental Services Department and includes management of grasslands to enhance their value as habitat for the owls (for example, vegetation on the site is managed by bringing in a herd of hundreds of goats and sheep once or twice a year to graze in order to enhance visibility of burrowing owl prey and predators). In addition, Landfill maintenance activities are scheduled to avoid active burrows and potential high-quality nesting sites in the breeding season. Further, the City requires dogs to be on-leash within the Landfill as the presence of loose dogs discourages use of the Landfill as owl habitat. Signage marks areas of the Landfill that are off limits to public access to protect burrowing owls, and the City has attempted in some areas to discourage off-trail activities (e.g., by blocking unofficial trails). At Baylands Park, the Department of Public Works/Parks Division conducts similar activities for burrowing owl habitat management (i.e., mowing of vegetation around the artificial burrow mounds), public access is restricted for the Baylands Preserve portion of the park and dogs are not allowed anywhere in the park. Further, no pesticides, including rodenticides, are used in the Baylands Preserve portion of the Park. Although pesticides are used in the active use portion of Baylands Park, they are used selectively and only where ground squirrel holes and tunnels would reasonably pose a hazard to people such as near established pathways, lawns, and picnic areas.

Although implementation of these measures have helped avoid direct impacts (i.e., injury or mortality) on burrowing owls during implementation of Landfill and Baylands Park maintenance activities, burrowing owls have not successfully nested on the Landfill since 1999, and sightings of owls on the Landfill reached a low of one individual in 2008. Similarly, burrowing owls have not been recorded nesting at the Baylands Park since 2004 (Chromczak 2014).

The fact that owls continue to occur on the Landfill and in the Preserve portion of the Baylands Park during the fall and winter months is an encouraging sign that owls are still attracted to these areas. However, as stated above, burrowing owls exhibit high levels of philopatry, site tenacity, and nest burrow reuse and burrowing owls may return to a nesting site and attempt to nest even after the site has been developed. Thus, the continued presence of individual burrowing owls on the Landfill and Baylands Preserve during the nonbreeding season is not sufficient evidence to conclude that the sites provide habitat capable of supporting burrowing owls long-term, especially given the proximity of a known breeding colony at Moffett Federal

Airfield, less than 1 mi west of the Landfill. In other words, given the highly developed nature of the region, individuals dispersing east from this colony are likely to pass through the Landfill and/or Baylands Preserve. Due to the lack of successful breeding on the Landfill and Baylands Preserve and the generally downward trend in the number of observations of burrowing owls on the sites since 2000 (Table 1), it is our opinion that implementation of additional habitat management measures are necessary to provide for the long-term occupation of City-owned/managed lands by the burrowing owl.

4.4 Opportunities and Recommendations

Due to the high levels of human disturbance, grasslands at the Sunnyvale Golf Course, Sunken Gardens Golf Course, Fairwood Park, and active use portion of Baylands Park do not represent high-quality habitat for the burrowing owl, and owls are unlikely to breed successfully on these sites. Therefore, we do not recommend implementing any additional burrowing owl habitat management or enhancement measures at these locations.

However, it is our opinion that with the implementation of appropriate habitat management measures, the Landfill and Baylands Preserve portion of the Park could provide long-term foraging habitat for burrowing owls and appropriate breeding habitat.

4.4.1 Landfill

Recommendations for measures that should be continued or newly implemented at the Landfill to increase the number of owls using the site, the numbers of owls using the site for breeding, and the breeding success of owls on the site are based on those measures proposed by Chromczak (2014) and are presented below. Estimated costs for each measure are presented in Appendix C.

Vegetation Management

- **Mowing/Grazing** – Continue to manage vegetation height to ≤ 6 inches at occupied owl burrows and leave islands of taller, denser vegetation to support prey populations. In addition, begin managing vegetation height at historically occupied burrows and artificial burrows. Vegetation height should be controlled year round, but especially during the breeding season (1 February through 31 August). Vegetation height should be controlled through mowing, if feasible; it has been our experience on two other sites in the South Bay that abundance of California ground squirrels and burrowing owls has declined following the replacement of mowing with use of sheep and goats, likely due at least in part to the soil compaction. However, because mowing has resulted in damage to landfill infrastructure in the past, we understand that mowing may be infeasible in some areas, necessitating the use of grazing animals.
- **Pre-mowing/grazing Survey** – We recommend that vegetation within 10 ft of active burrows be removed manually using weed trimmers (rather than using a heavy mower or left to be grazed) to avoid collapsing the burrows and to avoid having sheep or goats congregate near active burrows. Therefore, within two days of scheduled mowing or the initiation of grazing, a qualified biologist

should conduct a survey of the site to determine which, if any, burrows are actively occupied by burrowing owls. The biologist should look for owls or evidence of recent owl occupation at burrows, including the presence of feathers, whitewash, or pellets. Occupied burrows should be marked in the field by placing flagging 10-ft to the east, north, south, and west of the active burrow. Flagging should be removed immediately following the completion of mowing (or, if grazing is used, following hand-trimming around the burrow).

Habitat Enhancement

The following habitat enhancement efforts could be implemented to improve the quality of nesting and foraging habitat on the Landfill. We recommend implementing these measures in areas with a high density of well-established ground squirrel burrow complexes that are not easily accessible to pedestrian and dog traffic. Debra Chromczak (2014) designated four preferred enhancement areas on the Landfill, one each on West Hill and Recycle Hill, and two on East Hill. However, given the relatively high level of recreational use that occurs on the West Hill, and per the recommendation of David Johnson of the CDFW, we recommend that burrowing owl habitat enhancement efforts be concentrated on Recycle Hill and East Hill (Figure 3).

- **Artificial Burrow Mounds** – Install artificial burrow mounds. A variety of artificial burrow designs have been developed for the burrowing owl. We recommend the following design, which was recently implemented successfully at the San Jose-Santa Clara Regional Wastewater Facility. Nest boxes should be constructed using an 8-inch corrugated tube connected to a standard irrigation box. A 3-inch strip should be cut out of the bottom of each corrugated tube to allow the owls contact with the ground and to improve drainage. The nest box should be located at least 1 ft above the ground to prevent it from being flooded. Following construction of three nest boxes, a 5-ft dirt mound should then be carefully constructed on top of the nest boxes (i.e., there are three nest boxes per mound). The tubes should be configured appropriately during mound construction so that they provide access to the irrigation boxes from the mound surface; these tubes should be bent to prevent light from reaching the nest chamber. The new burrows should be used in conjunction with plain dirt mounds (without artificial burrows) to provide opportunities for ground squirrels to expand their range/population on site while minimizing the potential for the ground squirrels to breach the landfill cap. Initially, we recommend adding two pairs of mounds (i.e. two with artificial burrows and two without) in each of the recommended habitat enhancement areas in Figure 4.
- **Improve Prey Base** – The lack of sufficient amounts of small mammals in the diet of burrowing owls, especially during the breeding season, may result in poor reproductive success (York et al. 2002). Thus, we recommend improving the owl's prey base by planting native perennials and grasses in strips or islands and creating rock and brush piles to increase food and shelter for prey species, such as gophers and voles. The City already maintains some areas of taller vegetation on Recycle Hill and East Hill for this purpose. We recommend continuing such management and expanding the areas in which taller, denser vegetation is maintained, as well as seeding with native perennials and grasses that will form a thicker base of thatch (dead plant material) to provide cover for small mammals.



H.T. HARVEY & ASSOCIATES

Ecological Consultants

**Figure 4: Recommended Park Enhancement
Burrowing Owl Avoidance Areas**

Sunnyvale Burrowing Owl Habitat Suitability
and Opportunities Report (3619-01)
January 2015

- **Prevent Habitat Fragmentation** – In order to avoid fragmentation of nesting and foraging habitat, the following measures should be implemented:
 - Revegetate informal trails created by recreationists before they become fully established.
 - Use plants to deter off-road foot traffic at intersections and along access roads.
- **Predator Control** – Implement measures to control non-native predators within the Landfill. Measures to minimize the number of potential burrowing owl predators on the site include:
 - Provide trash containers that are designed in such a way that animals such as common ravens (*Corvus corax*), raccoons (*Procyon lotor*), and feral cats (*Felis catus*) cannot remove the trash within.
 - Do not plant trees (which could provide hunting perches for raptors) near nesting habitat.
 - Continue to enforce dog leash laws.
 - Install antipredator perches on lampposts near owl nesting habitat.
 - Minimize human disturbance. The CDFW typically recommends maintaining a 250-ft non-disturbance buffer around active burrowing owl nests to prevent their disturbance. Therefore, we recommend siting any Landfill park enhancements (e.g., benches, shade structures) 250 ft or more from burrowing owl enhancement areas to the maximum extent feasible to minimize disturbance of active owl burrows; areas within 250 ft of recommended enhancement locations are shown on Figure 4. Park enhancements made more than 250 ft from enhancement areas are not expected to have a substantial impact on the presence of burrowing owls in the enhancement areas.
 - Consider feasibility of constructing fences around Recycle Hill and East Hill to further deter human disturbance of burrowing owls in the enhancement areas.

4.4.2 Baylands Park

Our recommendations for measures that should be continued or newly implemented in the Baylands Preserve portion of Baylands Park to increase the number of owls using the site, the numbers of owls using the site for breeding, and the breeding success of owls on the site are similar to those measures proposed for the Landfill above. It is important to note that because the City does not own the Baylands Preserve, any enhancement activities on the site would need to be approved by the County of Santa Clara prior to implementation.

Vegetation Management

- **Mowing/Grazing** - Continue to manage vegetation height to ≤ 6 inches at occupied owl burrows. In addition, begin managing vegetation height at historically occupied burrows and artificial burrows. Manage vegetation height as described for the Landfill above.
- **Pre-mowing/Pre-grazing Survey** – Conduct pre-mowing surveys as recommended for the Landfill above.

Habitat Enhancement

The following habitat enhancement efforts could be implemented to improve the quality of nesting and foraging habitat on the Preserve.

- **Artificial Burrow Mounds** – Install additional artificial burrow mounds as described for the Landfill above. To reduce potential disturbance of burrowing owls by users of the recreational trails along the Preserve boundaries, we recommend implementing these measures in areas at least 250 ft from areas accessible to the public.
- **Predator Control** – Implement measures to control non-native predators within the Baylands Preserve. Measures to minimize the number of potential burrowing owl predators on the site include:
 - Do not plant trees (which could provide hunting perches for raptors) near nesting habitat.
 - Continue to enforce dog leash laws.
- **Restrict Remote Control Aircraft Use** – To reduce potential disturbance of burrowing owls by remote control aircraft launched from the active use portion of Baylands Park, we recommend implementing a regulation to prohibit the flying of remote control aircraft over the Baylands Preserve portion of the Park. We further recommend that signs alerting Park users of this regulation be posted throughout the Park.

Contrary to the recommendations of Debra Chromczak (2014), because the Baylands Preserve is already well vegetated, we do not recommend planting native perennials and grasses in strips or islands or creating rock and brush piles to increase food and shelter for prey species at that location. Further, we do not recommend replacing the perimeter fence between the active use portion of Baylands Park and Baylands Preserve as we consider it unlikely that a new fence would substantially decrease trespassing on the Baylands Preserve.

4.4.3 Long-term Monitoring and Adaptive Management

To address the uncertainty that is an inherent component of managing natural systems, we recommend that the City incorporate long-term monitoring and the principals of adaptive management into its burrowing owl habitat management strategy. Incorporating adaptive management principals into management would allow the recommended measures described above to be adjusted over time based on the results of monitoring. The ability to make such adjustments better ensures that the biological goals and objectives will be achieved. Successful adaptive management in habitat conservation planning requires (1) success criteria based specifically on the biological goals and objectives for each species, (2) an explicit link between monitoring and the success criteria, and (3) a mechanism to refine or redirect management activities if success criteria are unmet.

For adaptive management to be used, the City must first set goals for specific burrowing owl management sites (e.g., Landfill and Preserve). For example, performance criteria for a site where the goal is to maintain a certain number of overwintering owls may differ from those for a site where the goal is to attract breeding

owls. Therefore, we recommend that the City determine specific goals related to burrowing owl use (e.g., creation/maintenance of foraging habitat versus breeding habitat, number of owls/owl pairs, etc.) by site.

The success of the burrowing owl management strategy should continue to be measured by evaluating the monitoring results in light of the success criteria. If monitoring results indicate that the success criteria are not met and the quality of the habitat is declining, adaptive management should be employed to change the current management techniques so that they can achieve the success criteria to the maximum extent practicable.

The flexibility of an adaptive management approach would allow adjustments to be made over time in order to ensure that the goals and objectives of the plan for burrowing owls are achieved. Adaptive management for this plan should have the following four general components:

- Forming preservation, maintenance, and management measures based on the existing site conditions as a baseline and current knowledge of the burrowing owls' life history and ecology
- Monitoring to detect and assess burrowing owl populations at and use (e.g., for breeding) of the Landfill and Preserve
- Monitoring to detect both negative and positive impacts of vegetation management and habitat enhancement activities on habitat quality for the burrowing owl
- Periodically reassessing preservation, maintenance, and management measures (e.g., frequency of mowing) based on the results of monitoring and any new information that becomes available regarding burrowing owl biology or management.

4.5 Burrowing Owl Habitat Enhancement Funding Opportunities

4.5.1 Santa Clara Valley Habitat Conservation Plan/Natural Community Conservation Plan

The Santa Clara Valley Habitat Conservation Plan/Natural Community Conservation Plan (Habitat Plan) includes goals for the protection of burrowing owls and their habitat. Specifically, the Habitat Plan calls for the Santa Clara Valley Habitat Agency to protect via fee title or easement 600 acres of occupied nesting habitat and 4700 acres of potential habitat for the burrowing owl. Although the Baylands Park and Landfill are not included within the boundaries of the primary Habitat Plan area, because conservation opportunities for the burrowing owl within the Habitat Plan area are very limited, the Habitat Plan includes an expanded study area for burrowing owl conservation. The expanded study area encompasses portions of Sunnyvale, including both the Baylands Park and Landfill. Further, the Habitat Plan specifically allows agencies and organizations who are not Permittees under the Habitat Plan, such as the City, to acquire land or conservation easements on land that will help meet the goals and objectives of the Habitat Plan. Therefore, there may be opportunities for the City to receive funding to manage and enhance burrowing owl habitat on the Landfill and Baylands Preserve by collaborating with the Habitat Agency to help them meet their requirements for protection of burrowing owl habitat under the Habitat Plan. Because Santa Clara County is

one of the primary Habitat Plan Partners and owns the Baylands Park, coordinating with the County would be the first step in identifying Habitat Plan funding that can further the City's objectives.

4.5.2 Volunteer Assistance

The Santa Clara Valley Audubon Society (SCVAS) continues to be a leader in burrowing owl conservation and preservation in the County, and it has a large group of volunteers who are eager to assist in the preservation of burrowing owls and their habitat. SCVAS volunteers are a potential resource for helping the City with a range of burrowing owl habitat enhancement and monitoring activities, including:

- Educating park users
- Collecting data on numbers of owls, breeding pairs, and chicks
- Building artificial burrow mounds
- Planting native species in foraging habitat
- Cutting grass around nest mounds
- Monitoring for predators

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Appendix A. 2013 Council Study Issue DPW 13-15

2013 Council Study Issue

DPW 13-15 Protecting Burrowing Owl Habitat on City Facilities

Lead Department Public Works

History **1 year ago** None **2 years ago** None

1. What are the key elements of the issue? What precipitated it?

This Study was proposed by Vice Mayor Whittum and would examine the general need, feasibility and any costs associated with protecting the burrowing owl habitat on City facilities.

Historically, the habitat for burrowing owls in Sunnyvale has been generally located at the north end of the city on both city and Santa Clara County property. The areas on city-owned land include the Water Pollution Control Plant (WPCP), Landfill and adjacent levees. County owned property includes the Twin Creeks Softball Complex and Baylands Park that is operated and maintained by Sunnyvale. Baylands Park opened in 1994 and contains 105 acres of seasonal wetlands that are not accessible to the public and contain mitigated areas dedicated to the protection of several species of animals including the salt marsh harvest mouse and burrowing owls. In conjunction with the Army Corps of Engineers, 3 permanent owl nesting mounds were built in 1995 in a mitigated area and populated with pairs of owls that the California Department of Fish and Game relocated from a local site that was being developed by Cisco Corporation. Also in 1994, Sunnyvale constructed improvements of the open space at Fairwood School by agreement with the Sunnyvale School District. During construction a burrowing owl was sighted at the park and the State of California required a burrowing owl nesting mound be built as a habitat protection measure. Unfortunately no owls have been sighted at this location since 1995.

The City makes special efforts to make the closed Sunnyvale Landfill hospitable to burrowing owls. The Environmental Services Department, along with assistance from a biologist under City contract, monitors the number and location of owls at the landfill and WPCP. The biologist makes recommendations to staff on how, when and where to carry out various activities so as to provide an attractive habitat for the owls.

Since 1998 there have been 22 nest burrows documented by city staff and an environmental consultant working for the City. They were distributed in the following amounts; 5 at the Landfill (West Hill), 5 at the WPCP, 3 at Twin Creeks and 9 at Baylands Park. Although some of the burrows remain intact, including the artificial mounds in the mitigated area at Baylands Park, the last successful documented nesting pairs of owls were at Baylands Park in 2001 and the WPCP in 2004. Sightings of burrowing owls in these areas reached a low point of a single sighting in 2008 and have steadily increased since that time with 16 sightings recorded in 2012.

The Department of Public Works/Parks Division has a wildlife and habitat management plan for all areas maintained by the City including Baylands Park, that provides for the protection of wildlife habitats including those used by burrowing owls. This plan is implemented in conjunction with the Department of Environmental Services and provides guidance for maintaining the existing natural and man-made (nesting mounds) habitats and best management and maintenance practices to accomplish that goal. The plan is also utilized at Fairwood School currently and any other sites that burrowing owls may be sighted at in the future. In addition there is a wildlife and habitat management plan for the city's two golf courses (although no burrowing owl sightings have ever been reported by staff at either course) that has been certified by Audobon International as part of their Wildlife International Cooperative Sanctuary Program.

This study would determine the extent of the burrowing owl habitat in Sunnyvale including a review of City-owned property at the landfill and wastewater treatment plant. It would evaluate the efficacy of the existing wildlife and habitat management plans and provide guidance for any additional efforts, and their related costs, that may be desired to provide additional burrowing owl habitat protection beyond the City's current programs.

2. How does this relate to the General Plan or existing City Policy?

General Plan Policy LT-8.2. Adopt management, maintenance and development practices that minimize negative impacts to the natural environment, such as supporting and enforcing the integrated pest management system; and landscaping in ways which minimize the need for water.

3. Origin of issue

Council Member(s) Whittum, Martin-Milius

4. Staff effort required to conduct study Moderate

Briefly explain the level of staff effort required

Staff from the departments of Public Works and Environmental Services would need to collaborate with California State Fish and Game and a consultant specializing in burrowing owl habitats to determine what additional efforts could be made for habitat protection and estimate related costs.

5. Multiple Year Project? Yes **Planned Completion Year**

6. Expected participation involved in the study issue process?

Does Council need to approve a work plan?	No
Does this issue require review by a Board/Commission?	Yes
If so, which?	Parks and Recreation Commission
Is a Council Study Session anticipated?	Yes

7. Briefly explain if a budget modification will be required to study this issue

Amount of budget modification required 0

Explanation

The cost for the study is estimated at \$25,000 and would be contingent on grant funding. Cost is for a consultant to inspect and monitor habitat, evaluate current wildlife and habitat management plans and provide guidance on needed plan and habitat improvements and their related costs. However, staff does not expect such a study to find a need for significant change to the current habitat management policies and practices.

8. Briefly explain potential costs of implementing study results, note estimated capital and operating costs, as well as estimated revenue/savings, include dollar amounts

Are there costs of implementation? Yes

Explanation

Capital costs to construct or protect habitats are undetermined and could vary widely depending upon their number, size and complexity. Operating costs may increase depending upon the improvements.

9. Staff Recommendation

Staff Recommendation Support**If 'Support', 'Drop' or 'Defer', explain**

Staff recommends "support", contingent on grant funding.

Sunnyvale currently has wildlife and habitat management plans in place to ensure that burrowing owl habitats are adequately protected and maintained while all applicable laws are followed. The Parks Division has an inclusive policy for volunteers and would welcome any assistance from the Santa Clara Valley Audobon Society and its members or any other persons interested in helping to implement Sunnyvale's wildlife management program, including habitat protection. All potential activities proposed by the study issue request are consistent with current policies and operating practices. Staff supports considering enhancements to the current program if grant funding can be secured.

Reviewed by**Department Director**

1-15-13

Date**Approved by****City Manager**

1-15-13

Date

Appendix B. Burrowing Owl Habitat Monitoring and Census City of Sunnyvale 2013 Annual Summary Report

BURROWING OWL HABITAT MONITORING AND CENSUS

City of Sunnyvale
2013 Annual Summary Report



prepared by

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submitted to

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William Theyskens, Environmental Engineering Coordinator
Silviana Ruiz, Landfill Technician

Water Pollution Control Plant Division
Dan Hammons, Maintenance & Facility Manager

City of Sunnyvale – Department of Public Works
Parks, Golf, and Street Trees Division
Scott Morton, Superintendent of Parks & Golf

date submitted
January 25, 2014

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Introduction

The Western Burrowing Owl (*Athene cunicularia*) is a Species of Special Concern in California that is declining throughout Northern California and most of its range in the western United States. The City of Sunnyvale (City) recognizes the importance of this sensitive species and is working to protect the burrowing owl (owl) and enhance suitable habitat at the Sunnyvale Landfill Site (landfill), Water Pollution Control Plant (WPCP), and Baylands Park (park). This annual report summarizes professional services provided during 2013 by Debra Chromczak, Burrowing Owl Specialist, contracted with the City of Sunnyvale's Environmental Services Department: Solid Waste and Water Pollution Control Plant Divisions, and commencing in February 2013 for the Department of Public Works: Parks, Golf, and Street Trees Division.

Survey Methods

Services included conducting one site survey per month to identify active burrow locations, record owl abundance, submit a monthly update report, perform project evaluations, and consult on owl management issues on an as-needed basis. Surveys were performed using binoculars and a spotting scope to inspect all historic locations, artificial mounds, levees, and suitable grassland habitat for evidence of owl activity: presence of owls, feathers, pellets, whitewash, bedding material, prey remains, and/or nest decoration.

Windshield surveys were conducted from a vehicle driven along landfill access roads. Walk-through surveys were conducted on foot inside the park, from levees surrounding the park's adjacent seasonal wetlands, inside the WPCP, and to investigate suspected burrow activity on the landfill. Survey results were documented on maps depicting the number of owls observed at active burrow locations. A monthly update report including an owl location map, observations, and recommendations to improve habitat conditions was submitted to City employees.

Monthly Survey Results

A Burrowing Owl Location Map of the landfill and WPCP identifies four active burrow locations observed during twelve monthly surveys throughout 2013 (Figure 1). A Burrowing Owl Location Map of the park and adjacent seasonal wetlands identifies three active burrow locations observed during eleven monthly surveys beginning in February 2013 (Figure 2). Table 1 provides survey dates, the number of owls observed, and the number of active locations identified during each site survey. The number of active burrow locations decreased by 36% from eleven locations on the landfill in 2012 to seven locations on the landfill and park wetlands combined during 2013. The fact that surveys were not conducted in the park and wetlands during 2012 should be taken into account.

The maximum number of owls observed during a monthly site survey was two owls during the fall and winter months. On November 15, two owls were observed on East Hill. On December 17, two owls were observed: one owl on East Hill and one owl in the upland wetlands adjacent to the park. This behavior is indicative of the strong site fidelity that burrowing owls exhibit – annually returning to historic wintering and/or nesting locations.

Bands on two banded owls were resighted during 2013.

- On January 10, 2013, a banded juvenile was observed at location #18 on the upper south slope of East Hill. Ms. Chromczak banded red-over-black "02" as a juvenile in June 2012 at Moffett Field. During fall/winter dispersal, "02" traveled approximately 1.9 miles from her 2012 natal burrow location to winter briefly at location #18 on East Hill. This female returned to Moffett Field to nest during the 2013 breeding season and produced at least five offspring.

- On August 22, 2013, a banded owl was observed at location #2 on the south levee around the pump house in the seasonal wetlands east of the park. Ms. Chromczak banded red-over-black “2D” as a juvenile in May 2013 at Moffett Field. During fall/winter dispersal, “2D” traveled approximately 2.8 miles from its 2013 natal burrow location to reside briefly at location #2 in the seasonal wetlands adjacent to the park.

One new burrow location was identified in 2013. On October 11, an owl was observed at a new burrow location – #38 on the lower east slope of East Hill.

Burrowing Owl History

Table 2 displays a history of monthly surveys conducted on the landfill and the WPCP since 2000 plus 2013 survey results for the park. Results from over thirteen years of monitoring demonstrate: seasonal and annual habitat use, reproductive success, variation in owl abundance, and local population decline over time. Sunnyvale’s last successful nesting attempts occurred on the West Hill in 1999 and inside the WPCP in 2004. Owls unsuccessfully attempted to nest on the West Hill through 2003. Since March 2007, no owls or active burrows have been observed inside the WPCP.

For five consecutive years, 2007 to 2011, burrowing owls were not observed on the landfill or inside the WPCP during the breeding season. During 2012, owls were observed on the landfill at the beginning and end of the 2012 breeding season. This may signify a tendency for the owls to consider the landfill as suitable nesting habitat in the future. Tree removal along Caribbean Drive improved habitat conditions on the landfill by eliminating raptor perches allowing for a more expansive visual effect.

Owls continue to over winter on the landfill and in the park’s adjacent seasonal wetlands during the fall and winter months. This is an encouraging sign that owls are still attracted to this area as surrounding suitable grassland habitat becomes developed or degraded due to urban expansion.

Burrowing Owl Presentation to City Staff

The City requested that Ms. Chromczak meet with City staff to present an overview of burrowing owl ecology, history of owls in the Sunnyvale baylands region, recommendations for enhancing habitat conditions, and describe the services she provides to the City.

On March 29, 2013, Ms. Chromczak presented this information in a meeting at City Hall in which six City employees were in attendance: Bill Theyskens, Silviana Ruiz, Scott Morton, Dan Hammons, Patricia Lord, and Mark Bowers.

Habitat Recommendations

The following recommendations were provided to the City for consideration to enhance owl nesting and foraging habitat conditions and to provide sufficient burrowing owl protection measures during ongoing maintenance activities and construction projects.

Vegetation Management Practices

- Vegetation maintenance is a critical factor in burrowing owl management practices. Control vegetation height year round especially during the breeding season (February 1-August 31).
- Maintain vegetation height to ≤ 6 inches at occupied owl locations, historic locations, and in preferred enhancement areas to provide suitable nesting habitat to attract and retain owls.

- Establish and implement a mowing or grazing schedule to maintain this preferred vegetation height. Over grazing can compromise burrow availability. Increased vegetation height can cause nest abandonment or owl mortality.
- Leave strips and islands of vegetation undisturbed throughout the landfill to attract prey species.
- Following a mowing or grazing event, unblock burrow tunnels and remove any remaining ruderal vegetation around burrow entrances by hand.
- Between mowing or grazing events, utilize volunteers to manually mow current and preferred historic burrow locations.
- Research the advantages and disadvantages of grazing versus mowing to improve nesting habitat conditions.
 - Most effective time to mow or graze during the growing season.
 - Elimination of invasive plant species.
 - Proper grazing techniques to minimize burrow destruction.

Habitat Enhancement Efforts

- Enhance areas with a high density of well-established ground squirrel burrow complexes and areas not easily accessible to pedestrian and dog traffic to improve nesting habitat conditions. Figure 3 designates preferred enhancement areas on the landfill.
- Improve the owl's prey base by planting native perennials in strips or islands and create rock and brush piles to increase food and shelter for prey species.
- Prevent fragmentation of nesting and foraging habitat.
 - Deter off-road foot traffic.
 - Restore old and new footpaths before they are established.
 - Use plants to deter off-road foot traffic at intersections and along access roads.
- Install artificial burrows using 6-in diameter corrugated perforated drainage pipe with the bottom cut away and attached to a nest chamber made from an irrigation valve box.
 - Install perching posts on mounds outside burrow entrances.
 - Solarize mounds with black plastic to kill ruderal vegetation and seed bank.
 - Trap ground squirrels and relocate them to artificial burrows.

Additional Management Practices to Improve Habitat Conditions

- Eliminate these management practices in occupied owl locations, historic burrow locations, and preferred enhancement areas.
 - Discing of fields.
 - Ground squirrel abatement.
 - Use of rodenticides, insecticides, herbicides, chemicals.
 - Restrict pedestrian access and dog walking.
- Replace the perimeter fence between the park and the adjacent seasonal wetlands with permanent secure fencing. Keep gates to restricted seasonal wetlands locked at all times.

- Enforce the NO DOG rule inside the park and leash law on the landfill.
- Implement non-native predator abatement measures.
- When owls are present during the breeding season, install fencing or close sections of the landfill to eliminate nesting disturbance from trail users and dogs.
- Implement project evaluations prior to projects resulting in ground disturbance.
 - Consult with a qualified biologist to conduct a burrowing owl preconstruction survey.
 - Install a protective buffer around all active burrow locations.

Project Evaluations on the Landfill

Burrowing owl preconstruction surveys were conducted for the following four landfill repair projects. No burrowing owls were observed during the preconstruction surveys. Projects proceeded without significant impact to owl habitat on the landfill.

- Construction Timeline: April 9-11, 2013
Project: Well EW-27W Jumper at southeast corner of West Hill on Landfill Site
- Construction Timeline: June 3-5, 2013
Project: Condensate trap at southwest corner of West Hill on Landfill Site
- Construction Timeline: September 17-20, 2013
Project: West Hill – Repair Landfill Gas System along Lower West Access Road
- Construction Timeline: September 2013
Project: East Hill – Stevens Creek Quarry to Repair Main Haul Road

Table 1. Number of owls and number of active burrow locations observed during 2013 monthly surveys.

Location #	Burrow Location Description	JAN 10	FEB 5/22	MAR 12/13	APR 10	MAY 8	JUN 12	JUL 10	AUG 22	SEP 16	OCT 11	NOV 15	DEC 17	Owl Identity/Age
LANDFILL: EAST HILL														
15	Upper South Slope											1		unknown adult
18	Upper South Slope	1											1*	banded juvenile red-over-black "02" *unknown adult
29	Lower North Slope											1	@	unknown adult
38	Lower East Slope										1			unknown adult
BAYLANDS PARK & SEASONAL WETLANDS (February-December)														
1	Upland Wetlands-mid		1											unknown adult
2	Pump House-S Levee								1					banded juvenile red-over-black "2D"
3	Upland Wetlands-NW												1	unknown adult
# Owls Observed at # Active Burrow Locations		1/1	1/1	0	0	0	0	0	1/1	0	1/1	2/2	2/3	

@ evidence of owl activity at active burrow (no owl observed)

Table 2. History of burrowing owl sightings (#adults/#chicks) at Sunnyvale's Landfill Site and WPCP. Baylands Park and seasonal wetlands survey results from February-December 2013 included.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2000									4	4	3	4
2001	*	5	5	8	7	4	2/2	1	2	4	4	6
2002	4	4	4	5	4/6	4/4	4/6	*	4/3	*	9	5
2003	6	5	6	5	5/4	4/3	3/4	2/2	2	*	4	4
2004	5	5	3	3	4/3	2	2	2	2	6	3	3
2005	3	4	2	1	2	2	2	2	1	3	4	6
2006	4	4	1	1		2	2	2	2	2	3	3
2007	3	1	1								1	
2008										1		
2009		1								1	2	2
2010	2	1										2
2011	2									1	1	1
2012	2	2	2					1	2	1	4	2
2013	1									1	2	1
2013^	*	1						1				1

* data not available

^ park & wetlands data

CITY OF SUNNYVALE
Environmental Services Department
Landfill Site & Water Pollution Control Plant

1998-2013 BURROWING OWL HISTORIC LOCATION MAP
January 1, 2013 through December 31, 2013
— Four Active Burrow Locations —

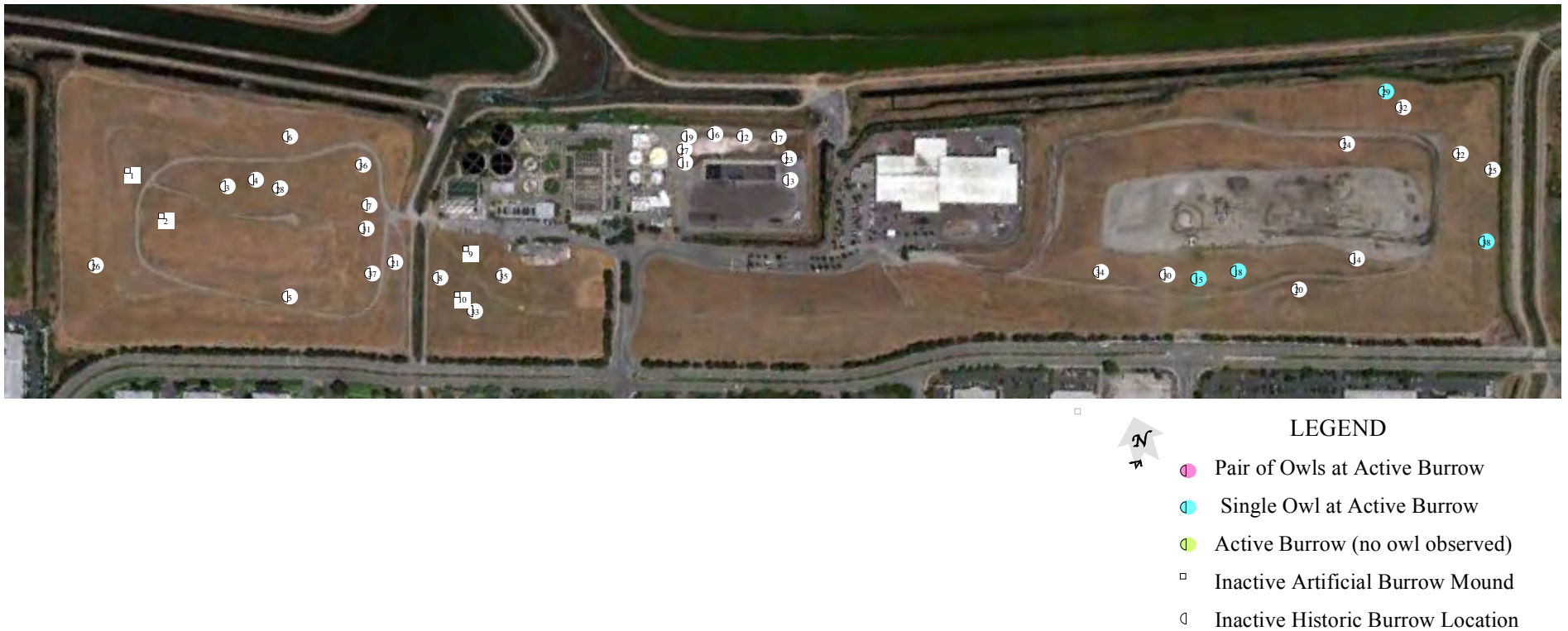


Figure 1. Four active burrowing owl locations observed during monthly site surveys throughout 2013.

CITY OF SUNNYVALE
Department of Public Works
Sunnyvale Baylands Park & Seasonal Wetlands

1998-2004 BURROWING OWL HISTORIC LOCATION MAP
January 1, 2013 through December 31, 2013
— Three Active Burrow Locations —



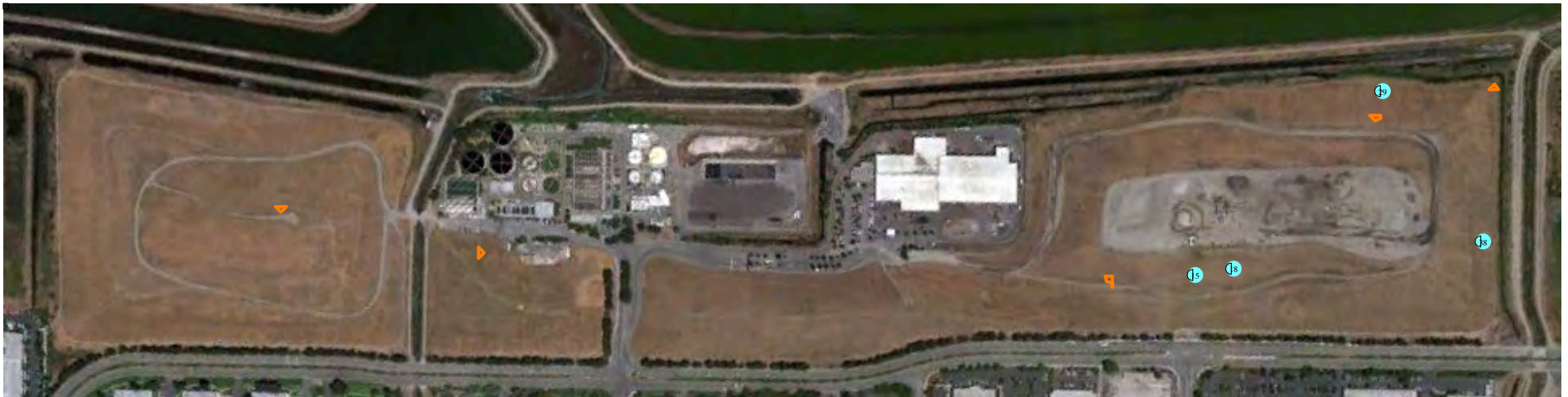
LEGEND

- 11 Single Burrowing Owl at Active Burrow Location (2013)
- 1 Historic Burrowing Owl NEST Location (1998-2004)
- 1 Historic Burrowing Owl Satellite Location (1998-2004)
- Habitat with High Density of Ground Squirrel Activity
- Upland Seasonal Wetlands
- Man-made Mounds with Artificial Burrows

Figure 2. Three active burrowing owl locations observed during monthly site surveys beginning in February 2013.

CITY OF SUNNYVALE
Environmental Services Department
Landfill Site & Water Pollution Control Plant

BURROWING OWL HABITAT ENHANCEMENT MAP



LEGEND

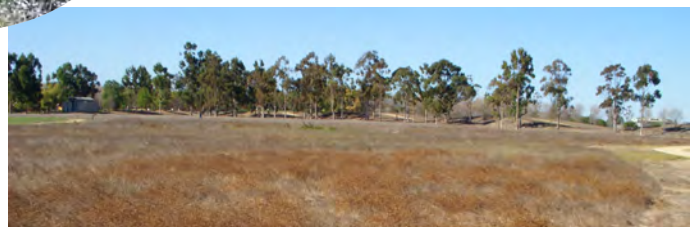
- Preferred Areas for Owl Habitat Enhancement with High Tolerance for Ground Squirrel Activity
- 2013 Active Burrowing Owl Locations - Single Owl Observed



Figure 3. Historic and preferred burrowing owl areas recommended for nesting habitat enhancement.

BURROWING OWL HABITAT MONITORING AND CENSUS

City of Sunnyvale
2014 Annual Summary Report



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January 31, 2015

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Introduction

The Western Burrowing Owl (*Athene cunicularia*) is a Species of Special Concern in California that is declining throughout Northern California and most of its range in the western United States. The City of Sunnyvale (City) recognizes the importance of this sensitive short grassland species and is working to protect the burrowing owl (owl) and enhance suitable habitat in the Sunnyvale Baylands region at three sites: Landfill Site (Landfill), Water Pollution Control Plant (WPCP), and Baylands Park (Park).

This annual report summarizes services provided from January 1, 2014 through December 31, 2014 by Debra Chromczak, Burrowing Owl Specialist, contracted with the City of Sunnyvale's Environmental Services Department: Solid Waste Division and Water Pollution Control Plant Division and the Department of Public Works: Parks, Golf, and Street Trees Division.

Survey Methods

Services included conducting site surveys to identify active burrow locations, record owl abundance, submit an update report, perform project evaluations, and consult on owl management issues on an as-needed basis. Surveys were performed using binoculars and a spotting scope to inspect all historic locations, artificial mounds, levees, and suitable grassland habitat for evidence of owl activity: presence of owls, feathers, pellets, whitewash, bedding material, prey remains, and/or nest decoration.

Windshield surveys were conducted from a vehicle driven along Landfill access roads. Walk-through surveys were conducted on foot inside the Park, from levees surrounding the Park's adjacent seasonal wetlands, inside the WPCP, and to investigate suspected burrow activity on the Landfill. Survey results were documented on maps depicting the number of owls and active burrow locations observed. An update report including survey results, an owl location map, observations, and recommendations to improve habitat conditions was submitted to City employees.

Monthly surveys were conducted on the Landfill. Quarterly surveys were conducted inside the WPCP, the Park, and from atop the surrounding levees of the adjacent wetlands in conjunction with the January, April, July, and October monthly surveys conducted on the Landfill. Quarterly surveys produced a seasonal estimation of owl abundance.

Survey Results

A Burrowing Owl Location Map of the Landfill and WPCP identifies six active burrow locations on the Landfill observed during surveys in 2014 (Figure 1). No active burrow locations were observed inside the WPCP. A Burrowing Owl Location Map of the Park and adjacent seasonal wetlands depicts no active burrow locations observed during 2014 (Figure 2). No new burrow locations were identified in 2014.

Table 1 provides survey dates, the number of owls observed, and the number of active locations identified during each site survey. In 2013, there were a total of seven active locations on the Landfill (four) and in the Park's wetlands (three). During 2014, six active locations were observed on the Landfill, only. The fact that the frequency of surveys in the Park and wetlands was reduced from monthly to quarterly surveys during 2014 should be taken into account.

The maximum number of owls observed during a site survey was two owls on the Landfill. On October 17, two owls were observed using three historic burrow locations: one unbanded owl at location #18 on the upper south slope of the East Hill and one unbanded owl moving between locations #3 and #4 on the upper north slope on the West Hill. This behavior is indicative of the strong site fidelity that burrowing owls exhibit – annually returning to historic wintering and/or nesting locations.

On March 7 during routine landfill inspection, two City employees observed a pair of owls at historic location #38 on the lower east slope of the East Hill. By March 12, the pair had abandoned location #38.

Burrowing Owl History

Table 2 displays a history of monthly surveys conducted on the Landfill and inside the WPCP beginning in September 2000, plus monthly survey results for the Park and adjacent seasonal wetlands commencing in February 2013. At the request of the City, only quarterly surveys were conducted inside the WPCP and the Park and adjacent wetlands during January, April, July, and October 2014.

Survey results from over fourteen years of owl monitoring demonstrate: seasonal and annual habitat use, reproductive success, variation in owl abundance, and local population decline over time. Table 3 provides a summary of the “last known” successful nesting attempts, breeding season observations, and when owls were last observed at each Baylands site. Because there was almost a 9-year gap (July 2004 to February 2013) in owl surveys of the Park and adjacent wetlands, owls likely occupied locations at this site during that time period.

Since 2007, burrowing owls had not been observed during the breeding season (February 1-August 31). During 2012, owls were observed on the Landfill at the beginning and end of the 2012 breeding season. In August 2013, a banded owl was observed in the Park’s wetlands and identified as a dispersing juvenile from Moffett Field. This may signify a tendency for the owls to consider the Landfill and the Park’s seasonal wetlands as suitable nesting habitat in the future. In 2013, tree removal along Caribbean Drive enhanced habitat conditions on the Landfill by allowing for a more expansive visual landscape and eliminating raptor perches.

During 2014, owls continue to occupy winter historic burrow locations on the Landfill during the fall and winter months. This is an encouraging sign that owls are still attracted to this area as surrounding suitable grassland habitat becomes developed or degraded due to urban expansion.

During a quarterly survey of the Park in January 2015, an owl was observed at an active historic location at the northeast end of the wave walk. These data will be included in the 2015 Annual Summary Report.

Trapping and Banding Efforts

During the December 9 monthly survey of the Landfill, an unbanded owl was observed moving between two active historic locations #7 and #37 on the upper east slope of the West Hill. In conjunction with our Wintering Burrowing Owl Banding Project funded by a Natural Community Conservation Planning Local Assistance Grant from the California Department of Fish and Wildlife, Philip Higgins and I successfully trapped this owl at location #7 and banded it with two aluminum bands: United States Geological Survey band (854-13874) and a color-coded Acraft study band (black-over-green 1E).

Habitat Recommendations

The following recommendations were provided to the City for consideration to enhance owl nesting and foraging habitat conditions and to provide sufficient burrowing owl protection measures during ongoing maintenance activities and construction projects.

Vegetation Management Practices

- Vegetation maintenance is a critical factor in burrowing owl management practices. Control vegetation height throughout the year, especially during the breeding season.
- Maintain vegetation height to ≤ 6 inches at occupied owl locations, historic locations, and in preferred enhancement areas to provide suitable habitat to attract and retain owls.
- Develop and implement a mowing or grazing schedule to maintain preferred vegetation height.
 - Overgrazing can compromise burrow integrity and reduce burrow availability.

- Increased vegetation height can cause nest abandonment or owl mortality.
- Between and after mowing or grazing events, enlist volunteers to maintain vegetation height.
 - Manually mow vegetation at occupied and preferred historic locations using hand held gas-powered mowing equipment.
 - Unblock burrow tunnels and remove any remaining ruderal vegetation from around burrow entrances by hand.
- Research the advantages and disadvantages of grazing versus mowing to improve habitat conditions.
 - Most effective time to mow or graze during the growing season.
 - Appropriate timing to target invasive plant species.
 - Proper grazing techniques to minimize burrow destruction.
 - Burrowing owl nesting preferences in mowed versus grazed landscape.

Habitat Enhancement Efforts

- Enhance areas with a high density of well-established ground squirrel burrow complexes in areas not easily accessible to pedestrian and dog traffic to improve nesting habitat conditions.
 - Figure 2 defines areas inside the Park with a high density of squirrel activity and the Park's adjacent upland seasonal wetlands as a potential enhancement area.
 - Figure 3 designates preferred enhancement areas and locations for rock or brush piles on the Landfill.
- Enhance foraging habitat conditions for the owl's prey base.
 - Leave strips and islands of tall vegetation undisturbed on the Landfill to attract prey species.
 - Create eight strips per Landfill hill (two strips of tall vegetation per hillside) to establish a more heterogeneous landscape.
 - Plant native perennial forbs and shrubs in the strips and islands.
 - Install brush piles of downed branches.
 - Install rock and/or concrete debris piles.
- Prevent fragmentation of nesting and foraging habitat.
 - Deter off-road foot and bicycle traffic.
 - Restore vegetation on new and existing paths to suitable habitat conditions.
 - Use plants and fencing to deter off-road foot traffic at intersections and along access roads.
 - Restrict access to fields adjacent to the wave walk to create contiguous habitat in the Park.
- Install artificial burrows using 6-inch diameter corrugated perforated drainage pipe with the bottom cut away and attached to a nest chamber made from an irrigation valve box.
 - Install perching posts on mounds outside burrow entrances.
 - Solarize mounds with black plastic to kill ruderal vegetation and seed bank.
 - Maintain vegetation height to ≤ 6 inches on artificial mounds, throughout the year.
 - Trap ground squirrels and relocate them to artificial burrows.
- When owls are present during the breeding season, install a protective buffer with temporary fencing or close sections of the Park or Landfill to minimize nesting disturbance from trail users and/or dogs.

Additional Management Practices to Improve Habitat Conditions

- Eliminate these management practices in occupied owl locations, historic burrow locations, and

preferred enhancement areas.

- Discing of fields.
- Use of rodenticides, insecticides, herbicides, chemicals, etc.
- Ground squirrel abatement.
 - If warranted, delay abatement until after the owl's breeding season.
 - Instead of abatement, trap and relocate squirrels to artificial burrows and preferred enhancement areas to increase burrow availability.
- Reduce destruction of animal (ground squirrel) burrows on the Landfill.
 - Consult with a qualified biologist to conduct an owl survey prior to burrow destruction.
 - Backfill burrows during the non-breeding season (September 1-January 31).
 - Limit the amount of burrows to be destroyed. Target only burrows that compromise the integrity and effectiveness of the landfill cap through gaseous leakage into the atmosphere, extrusion of landfill debris, and landfill gas regulations that exceed LEA standards.
 - Preserve burrows in occupied and historic locations and preferred habitat enhancement areas.
 - Mitigate burrow destruction by enhancing preferred areas and historic owl habitat.
- Prohibit access to restricted areas by improving fencing, securing gates, and enforcing signage.
 - Replace the perimeter fence between the Park and adjacent seasonal wetlands with permanent chain-link fencing.
 - Install a chain-link fence at the toe of the slough levee on the west slope of Recycle Hill to connect the perimeter fence at Caribbean Drive to Carl Road.
 - Keep gates locked at all times to prevent public access to preferred and historic owl habitat.
 - Enforce the "*Seasonal Wetlands – Please Do Not Enter*" signage to preserve existing wetlands in the Park's adjacent wetlands.
 - Enforce the "*Notice Sensitive Wildlife Area – Please Stay on Roads and Pathways*" signage to preserve remaining grasslands on the Landfill.
 - Enforce the NO DOG rule inside the Park and "off-leash" law on the Landfill.
- Restrict and enforce after hours access to the Landfill, especially on the West Hill to deter vandalism.
- Implement non-native predator abatement measures.
- Implement project evaluations prior to construction projects resulting in ground disturbance.
 - Consult with a qualified biologist to conduct a burrowing owl preconstruction survey.
 - Install a protective buffer around all active burrow locations.

Project Evaluations on the Landfill Site

Project evaluations were performed and recommendations provided for two landfill repair projects.

- *Construction Timeline:* August 7-8, 2014
Project: Light construction activities to repair landfill gas system throughout Landfill.
Preconstruction Survey Results: No burrowing owls or active burrows observed.
No significant impact to owl nesting or foraging habitat. Project approved to proceed.
- *Construction Timeline:* On-going maintenance until Landfill is covered within a one-year period.
Project: Backfilling animal burrows throughout the Landfill.
Biological opinion and recommendations were provided with further consultation advised.

Table 1. Number of burrowing owls and active burrow locations (#owls/#locations) observed during 2014.

Location #	Burrow Location Description	JAN 9	FEB 5	MAR 7^	MAR 12	APR 14	MAY 12	JUN 9	JUL 9	AUG 5	SEP 2	OCT 17	NOV 11	DEC 9	Owl Identity/Age
	LANDFILL: WEST HILL (monthly surveys)														
3	Upper North Slope Ridge											1*	@		#4 satellite
4	Upper North Slope Berm											1	@		unbanded adult
7	Upper East Slope Berm													1	banded adult black-over-green "1E"
37	Upper East Slope													1*	#7 satellite
	LANDFILL: EAST HILL (monthly surveys)														
18	Upper South Slope	@										1			unbanded adult
38	Lower East Slope	1	1	2^	@										unknown adult
	WPCP & BAYLANDS PARK plus SEASONAL WETLANDS (quarterly surveys conducted during JAN, APR, JUL & OCT) — No Burrowing Owls or Active Burrow Locations Observed —														
# Owls Observed at # Active Burrow Locations		1/2	1/1	2/1^	0/1	0	0	0	0	0	0	2/3	0/2	1/2	

▣ quarterly surveys conducted at WPCP and Baylands Park/Seasonal Wetlands

^ owl observation by City employees (Silviana Ruiz and Bill Theyskens)

@ evidence of owl activity at active burrow (no owl observed)

* same owl at satellite burrow location

Table 2. History of burrowing owl observations (#adults/#chicks) at Landfill Site, WPCP, Baylands Park and adjacent Seasonal Wetlands. Park/Wetland surveys commenced in February 2013.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2000									4	4	3	4
2001	*	5	5	8	7	4	2/2	1	2	4	4	6
2002	4	4	4	5	4/6	4/4	4/6	*	4/3	*	9	5
2003	6	5	6	5	5/4	4/3	3/4	2/2	2	*	4	4
2004	5	5	3	3	4/3	2	2	2	2	6	3	3
2005	3	4	2	1	2	2	2	2	1	3	4	6
2006	4	4	1	1		2	2	2	2	2	3	3
2007	3	1	1								1	
2008										1		
2009		1								1	2	2
2010	2	1										2
2011	2									1	1	1
2012	2	2	2					1	2	1	4	2
2013	1	1						1		1	2	2
2014	1	1	2							2		1

* data not available

Table 3. Summary of last known Sunnyvale Baylands burrowing owl observations since 1998.

Sunnyvale Baylands Observations Breeding Season (February 1-August 31)	Landfill Site	WPCP	Baylands Park	Seasonal Wetlands
Last Successful Nesting Attempt	1999	2004	1999	2001
Last Breeding Season Observation	AUG 2012	2006	2000	AUG 2013
Last Burrowing Owl Observation	DEC 2014	MAR 2007	JUL 2000	DEC 2013
<i>2015 Burrowing Owl Observations</i>	<i>JAN 2015</i>		<i>JAN 2015</i>	

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Landfill Site & Water Pollution Control Plant

1998-2014 BURROWING OWL HISTORIC LOCATION MAP
January 1, 2014 through December 31, 2014
— Four Burrowing Owls and Six Active Burrow Locations —

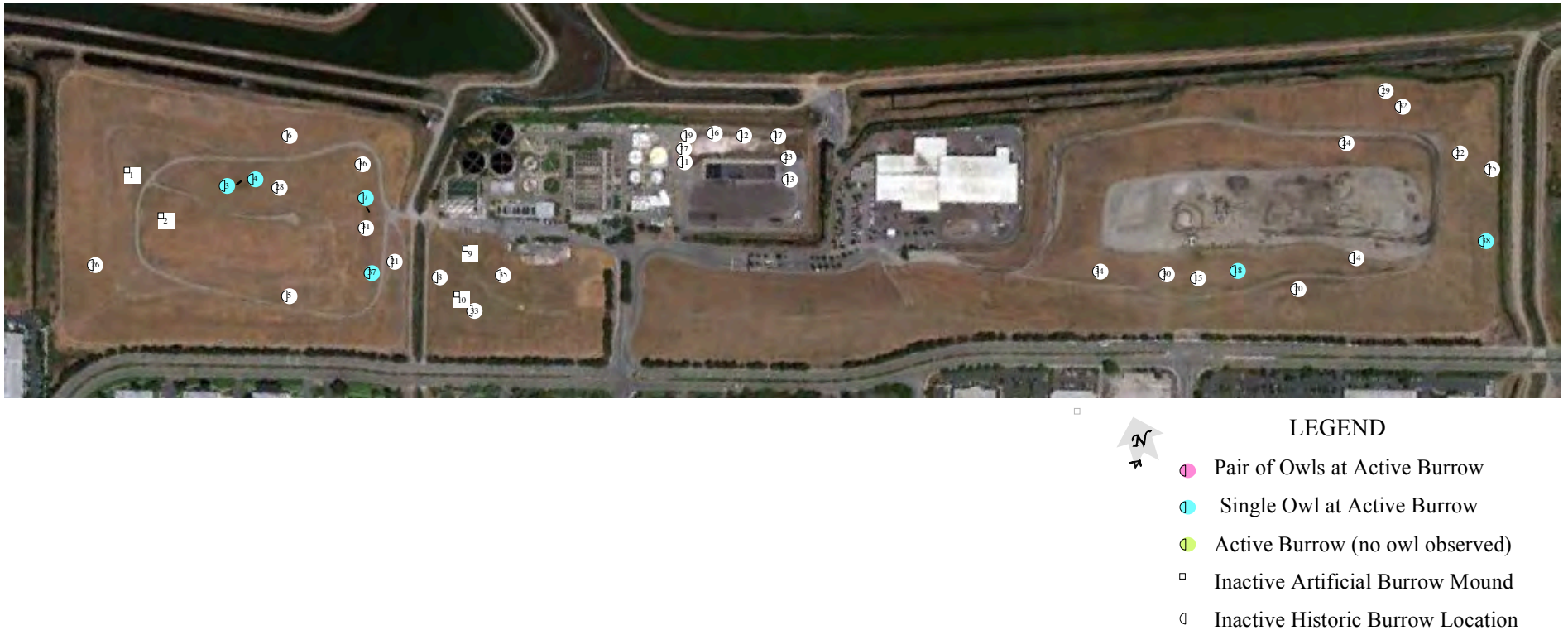


Figure 1. Four burrowing owls were observed at six active historic burrow locations on the Landfill Site during monthly site surveys throughout 2014.
No burrowing owls or active burrow locations were observed in the WPCP during quarterly site surveys in January, April, July, and October 2014.

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Sunnyvale Baylands Park & Seasonal Wetlands

BURROWING OWL HISTORIC LOCATION MAP

January 1, 2014 through December 31, 2014

— No Burrowing Owls or Active Burrow Locations —



LEGEND

- Historic Burrowing Owl Burrow Location (2013)
- Historic Burrowing Owl Burrow Location (1998-2004)
- Habitat with High Density of Ground Squirrel Activity
- Upland Seasonal Wetlands (Potential Enhancement Area)
- Man-made Mounds with Artificial Burrows

Figure 2. No burrowing owls or active burrow locations were observed during quarterly site surveys conducted in January, April, July, and October 2014.

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Landfill Site & Water Pollution Control Plant

BURROWING OWL HABITAT ENHANCEMENT MAP



LEGEND

- Preferred Area for Owl Habitat Enhancement with High Tolerance for Ground Squirrel Activity
- Recommended Location for Installation of Rock and/or Brush Piles to Create Habitat for Prey Species
- 2014 Active Historic Burrowing Owl Location - Single Owl Observed

Figure 3. Historic and preferred areas recommended for burrowing owl nesting habitat enhancement.

Appendix C. Estimated Cost of Recommended Vegetation Management and Habitat Enhancement Measures

Landfill

For the sake of estimating the costs of the recommended burrowing owl habitat enhancements, the following assumptions have been made:

- A maximum of 90 ac will be surveyed for burrowing owls during a single pre-mowing or pre-grazing survey
- For artificial burrowing owl mound construction, mechanized equipment will be used to create multiple mounds on the same day and a maximum of three mounds will be constructed.
- For artificial burrowing owl mound construction, we have assumed enough soil will be required to create mounds that are 6 feet deep and 12 feet long by 12 feet wide.
- Maximum of 4 trash cans required.
- Antipredator spikes required on a maximum of 15 lamp posts (2 ft of spikes per post).
- Planting of perennial vegetation would occur on a maximum of 3 acres.

Item	Unit	Quantity	Unit Cost	Cost
Mowing				
Labor – with mechanized equipment	LS	1	\$15,000	\$15,000
<i>Total</i>				
Pre-Mowing/Pre-Grazing Survey				
Labor	Hour	12	\$116	\$1392
Management/Mobilization	Hour	3	\$163	\$489
<i>Total</i>				\$1881
Artificial Burrowing Owl Mounds (3 Mounds with 3 Nests per Mound)				
Irrigation box	Each	9	\$48	\$432
Corrugated tube	Foot	72	\$2	\$144
Seed	LS	1	\$15	\$15
Bobcat rental and operator	Day	1	\$1000	\$1000
Soil	Yard	96	\$39	\$3744
Biologists/Labor	Hour	24	\$116	\$2784
Management/Mobilization	Hour	16	\$163	\$2608
<i>Total</i>				\$10,727
Improve Prey Base				
^a Option 1 = Planting perennial vegetation by hand	Acre	3	\$24,000	\$72,000

Item	Unit	Quantity	Unit Cost	Cost
^b Option 2 = Hydroseeding perennial vegetation	Acre	3	\$5000	\$15,000
Management/Mobilization	Hour	24	\$131	\$3144
<i>Total Option 1</i>				\$75,144
<i>Total Option 2</i>				\$18,144
Predator Control				
Trash can – animal resistant	Each	6	\$1200	\$7200
Antipredator spike installation				
Antipredator spikes for lamp posts	Foot	30	\$35	\$1050
Hydraulic lift and operator	Day	3	\$600	\$1800
Labor	Hour	24	\$116	\$2784
Management/Mobilization	Hour	4	\$163	\$652
<i>Total</i>				\$13,486
Adaptive Management Program Development				
Biologists	Hour	60	\$163	\$9780

^a Assumes no watering required

^b Hydroseeding is expected to have a very low probability of success versus planting by hand as non-native grasses will outcompete the hydroseeded perennials in the absence of fairly intensive management.