



San Diego Goldenstar
Translocation Plan for the
Castlerock Project
City of San Diego
Project No. 10046

Prepared for

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A handwritten signature in black ink, appearing to read "Anna Bennett".

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TABLE OF CONTENTS

1.0	Introduction	1
1.1	Existing Conditions	9
1.2	Background on San Diego Goldenstar	11
1.3	Existing Populations at the Castlerock Site	14
1.4	Proposed Translocation Site	14
1.5	Responsible Parties	21
2.0	Methods	21
2.1	San Diego Goldenstar Translocation Methods	22
2.2	Habitat Enhancement Methods	25
3.0	Translocation Site Maintenance and Monitoring	27
3.1	Maintenance	27
3.2	Monitoring	29
3.3	Reporting	32
3.4	Remedial Measures	33
3.5	Contingency Measures	33

FIGURES

1:	Regional Location	2
2:	Project Location on USGS Map	3
3a:	Annexation Scenario Impact Area	5
3b:	No Annexation Scenario Impact Area	7
4a:	Annexation Scenario Potential San Diego Goldenstar Translocation Areas	17
4b:	No Annexation Scenario Potential San Diego Goldenstar Translocation Areas	19

TABLE OF CONTENTS (CONT.)

TABLES

1:	San Diego Goldenstar Translocation Schedule	22
2:	Five-Year Maintenance Schedule	27
3:	Five-Year Monitoring Schedule	30

PHOTOGRAPHS

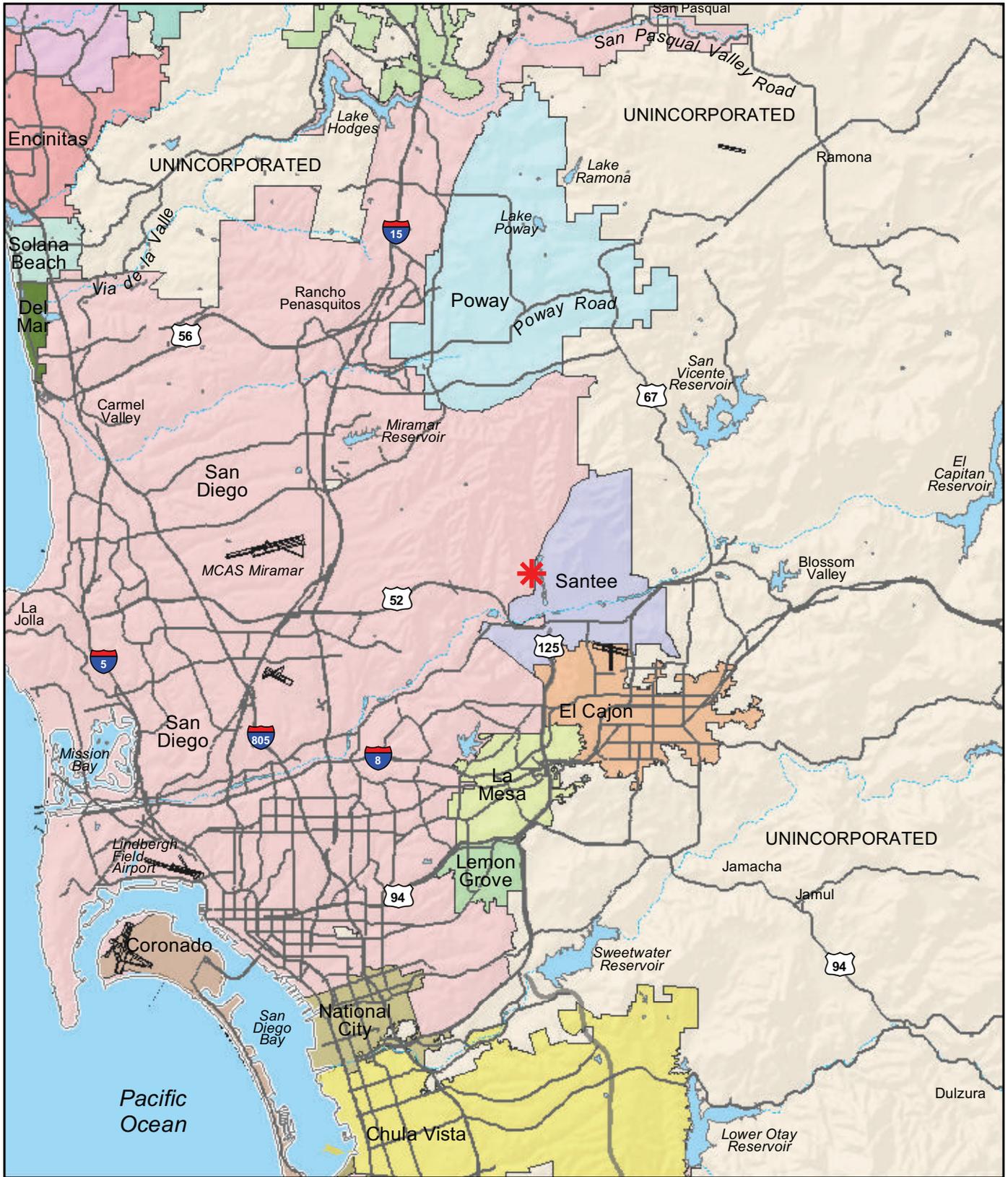
1:	Flowering San Diego Goldenstar	10
2:	San Diego Goldenstar Salvaged in 1991 Growing in Mission Trails Regional Park in February 2010	13

1.0 Introduction

Pardee Homes is proposing a residential development at the Castlerock site in the city of San Diego, California (Figures 1 and 2). This report evaluates two project development scenarios for this site. The first scenario (Annexation Scenario) assumes that the City of San Diego approves the project, but the project is subsequently annexed into the city of Santee. For the Annexation Scenario, Pardee Homes proposes to develop approximately 108.72 out of a total of 203.64 acres of the Castlerock site for residential use (Natural Resource Consultants [NRC] 2012; Figure 3a). The Annexation Scenario would result in the construction of 283 detached single-family residences, 147 single-family detached units clustered on larger lots (referred to as “green court” units), approximately 4.0 acres (gross) of public parks, 0.64 acre (gross) and 0.49 acre (usable) of pocket parks, a pedestrian trail, and public streets and private driveways on an undeveloped 203.64-acre site within the East Elliott Community Plan. The remainder of the property (94.92 acres) would remain undisturbed as open space, except for small areas needed for brush management. Access to the Annexation Scenario project would be provided from Mast Boulevard to the south.

The second scenario (No Annexation Scenario) assumes the project is not annexed into the city of Santee and remains within city of San Diego. For the No Annexation Scenario, Pardee Homes proposes to develop approximately 108.91 out of a total of 203.64 acres of the Castlerock site for residential use (NRC 2012; Figure 3b). Due to the additional infrastructure requirements, the No Annexation Scenario has one less detached single-family residence. The No Annexation Scenario would involve minor changes in the land uses with 282 detached single-family residences, 140 single-family detached small lot units (referred to as “green court” units), approximately 4.0 acres (gross) of public parks, 0.50 acre (gross) and 0.39 acre (usable) of pocket parks, a pedestrian trail, and public streets and private driveways and 94.73 acres of open space.

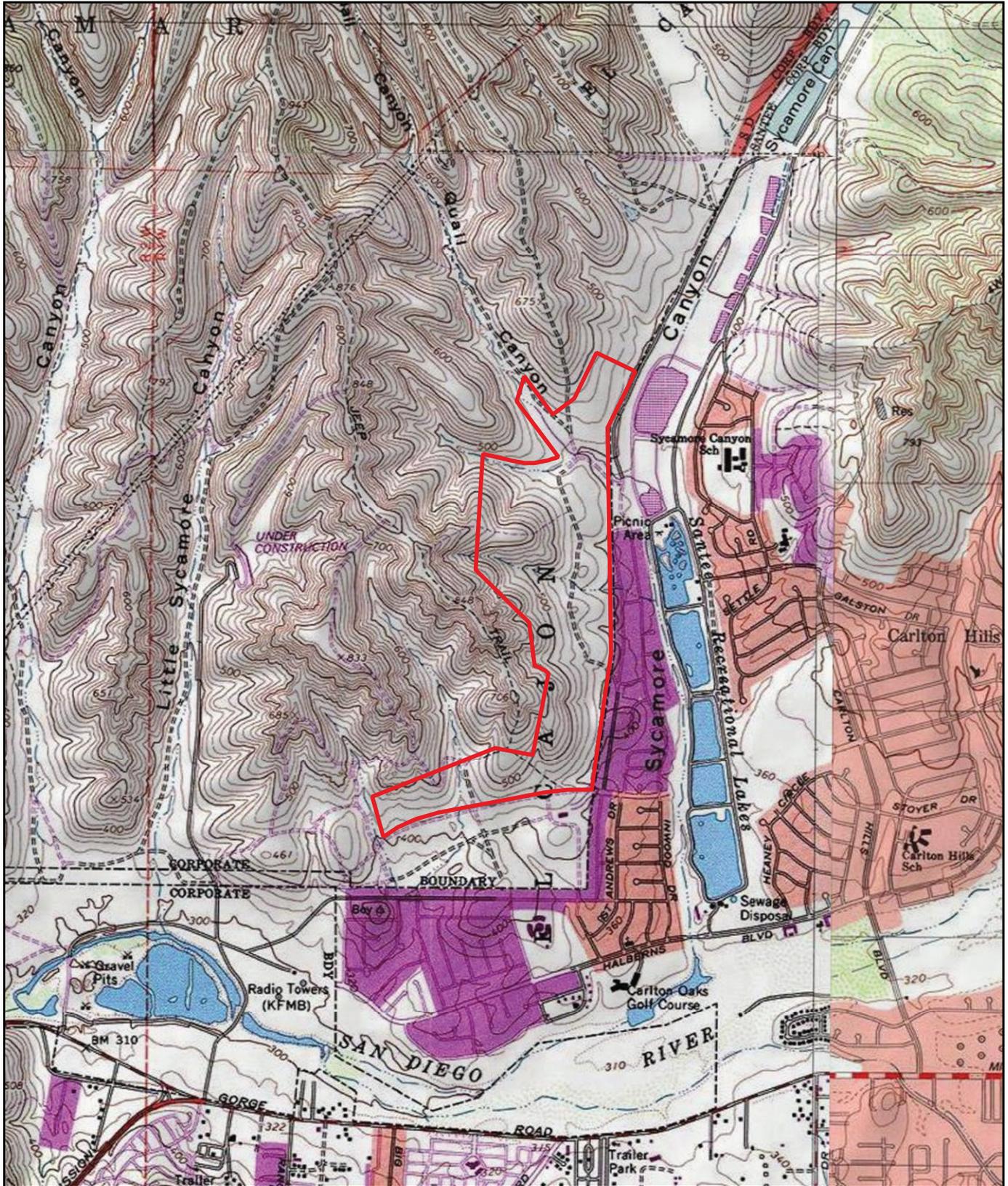
This translocation plan addresses the impacts to San Diego goldenstar (*Muilla clevelandii*) that would result from implementation of either the Annexation Scenario or No Annexation Scenario for the Castlerock development. This plan describes methods of salvaging San Diego goldenstar from the Castlerock development site, as well as propagation of additional San Diego goldenstar plants from seed, if needed. This plan also details the five-year monitoring, maintenance, and reporting program as required by the City of San Diego. The purpose of the monitoring program is to make observations and collect data on survivorship and flowering of the translocated population so that the progress of the mitigation effort can be assessed. The purpose of the maintenance program is to remove weeds in the surrounding habitat so that the translocated population may establish, and to minimize future weed invasion at the receiver site.



 Project Location

FIGURE 1

Regional Location



 Project Boundary

FIGURE 2

Project Location on USGS Map



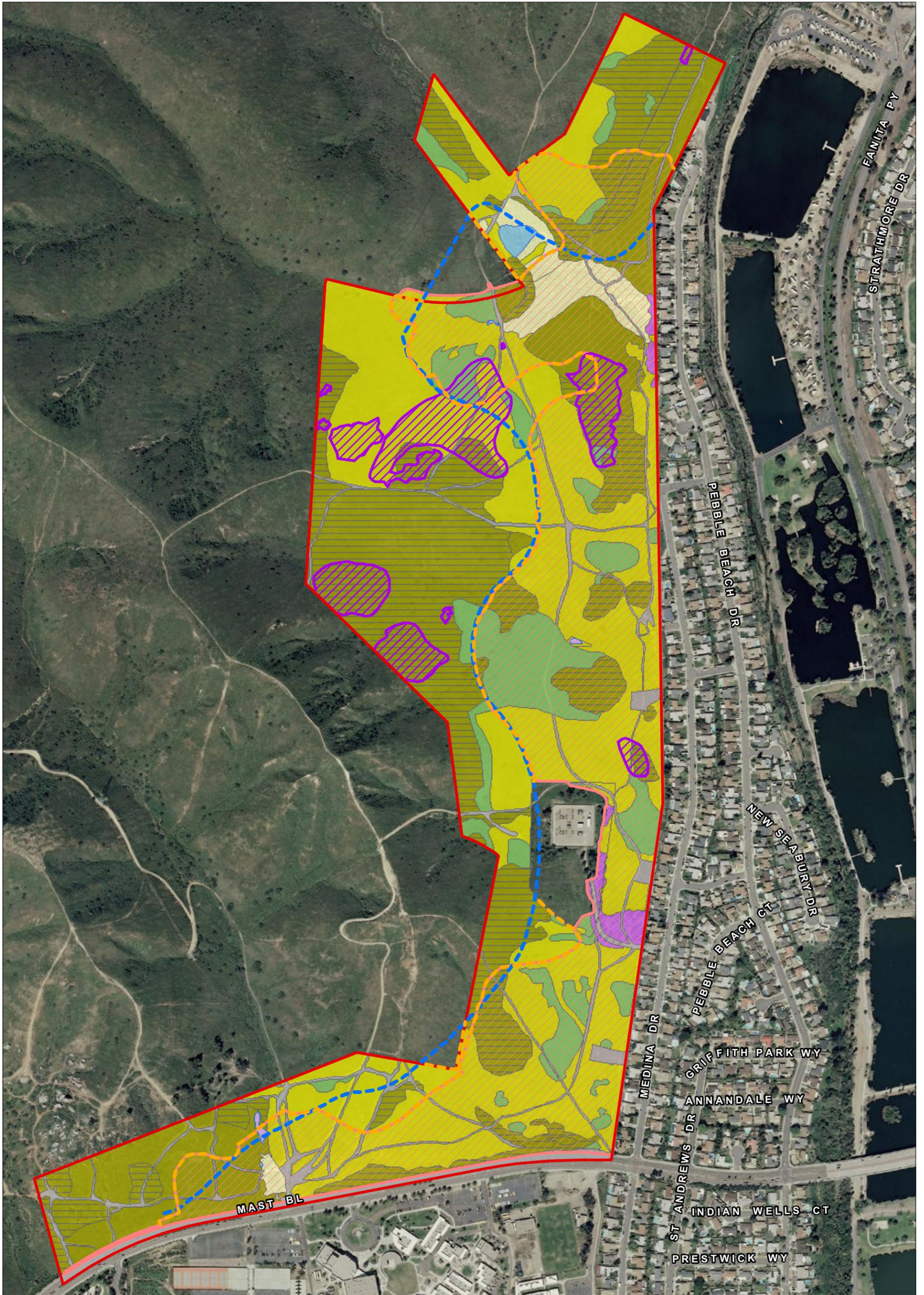


FIGURE 3a

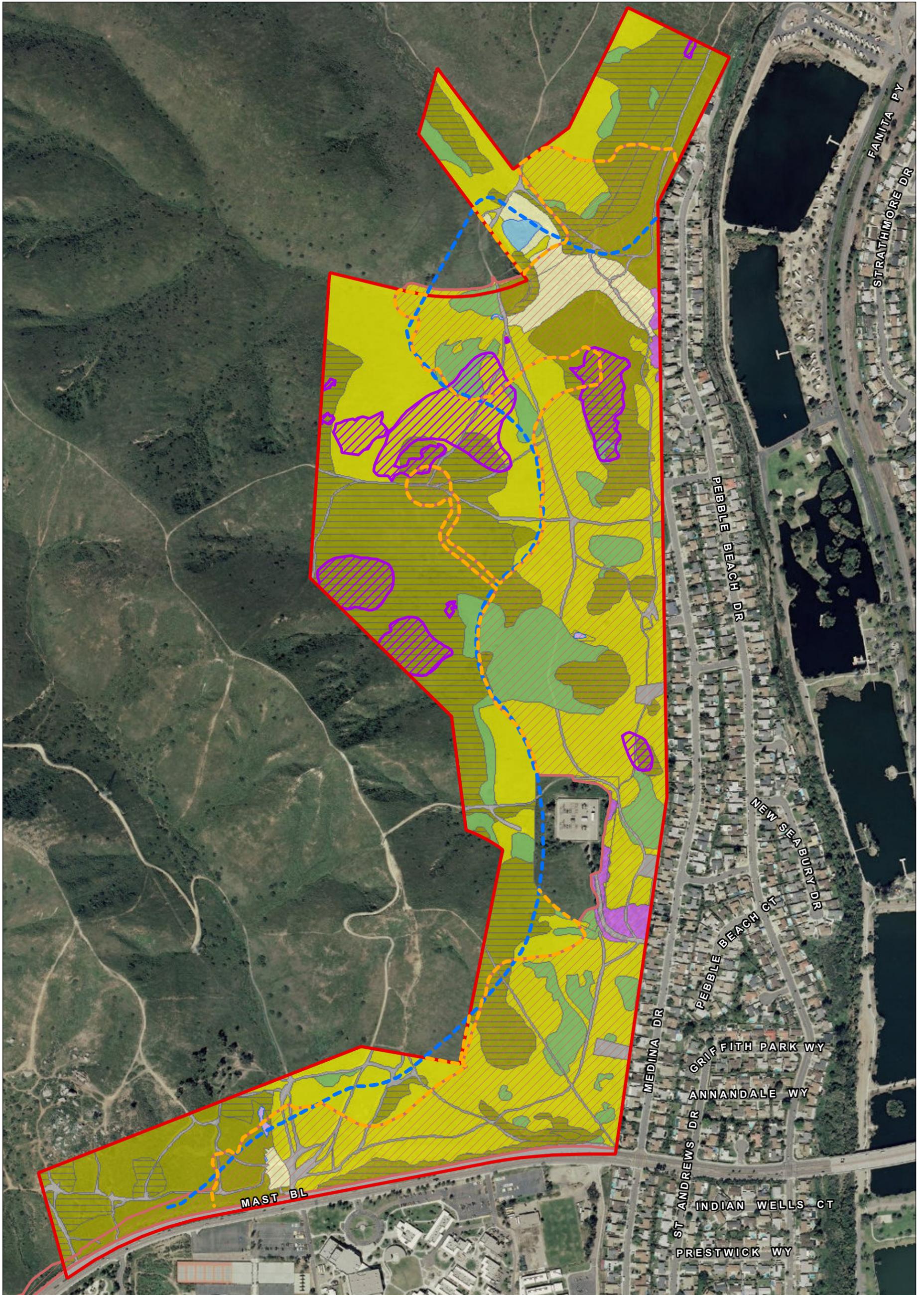


FIGURE 3b

The reporting program is designed to document the implementation of this translocation plan and report on results of annual monitoring efforts. The translocation site or sites will be located on suitable soils adjacent to preserved San Diego goldenstar populations in designated open space within the Multi-Habitat Planning Area (MHPA). The Annexation Scenario will impact 0.06 acre of San Diego goldenstar, while the No Annexation Scenario will impact 0.10 acre. The translocation area will be large enough to accommodate all of the individuals salvaged from the Annexation Scenario 0.06-acre impact area or the No Annexation Scenario 0.10-acre impact area. For both scenarios, it is anticipated that an approximately 1.0-acre area will be enhanced in and around the translocation area to ensure the long-term sustainability of the translocated San Diego goldenstar. Native grassland species will be reintroduced to the translocation site through a combination of hand seeding and use of container plants.

A potential landslide area extends from the MHPA into the north central portion of the development area (NRC 2012). San Diego goldenstar is located in this area. The area occupied by San Diego goldenstar that may be affected by remediation activities will need to be quantified after further geological testing prior to grading (NRC 2012). A landslide remediation plan has also been prepared to address the impacts from remedial grading (RECON 2012).

1.1 Existing Conditions

The 203.64-acre Castlerock site is located in the city of San Diego, in the East Elliott Community Planning Area, on the north side of Mast Boulevard between Medina Drive and West Hills Parkway (see Figure 2). It consists primarily of annual grassland on rolling terrain of slopes and ridges, rising in elevation from east to west, and also from south to north on the associated ridges. Coastal sage scrub (CSS) occupies the southwest section of the site, as well as patches in the northeastern and southern sections. Disturbed CSS occupies a significant portion of the site as well, with the majority along the western site boundary. Additional habitats present on-site include baccharis-dominated CSS, native grassland, eucalyptus woodland, coastal and valley freshwater marsh, emergent wetland, and disturbed areas (i.e. graded areas and dirt roads) (NRC 2012). Land uses adjacent to the Castlerock site include the Santee Lakes Regional Park, single-family residences, and MHPA. The maximum elevation on-site is approximately 668 feet above mean sea level (NRC 2012).

San Diego goldenstar is a covered species under the City of San Diego's Multiple Species Conservation Plan (MSCP) and is one of several species of native geophytes (a perennial plant that emerges from an underground storage structure, e.g. bulb, corm, tuber, etc.) occurring on-site (Photograph 1). This species was detected on approximately 14.62 acres within the boundaries of the Castlerock site during the 2010



PHOTOGRAPH 1
Flowering San Diego Goldenstar
(*Bloomeria clevelandii*)

vegetation mapping and special status plants survey performed by NRC (2012). The salvaged San Diego goldenstar would be translocated to other suitable habitat areas within the MHPA. There are approximately 9.94 acres of San Diego goldenstar within the existing MHPA, prior to a boundary adjustment proposed as part of this project (see Figure 3a and 3b). This plan will provide for the translocation of San Diego goldenstar from a 0.06-acre area proposed to be impacted in the existing MHPA for the Annexation Scenario or a 0.10-acre area proposed to be impacted in the existing MHPA for the No Annexation Scenario.

1.2 Background on San Diego Goldenstar

The conservation status, biology, and distribution of San Diego goldenstar are described in this section.

1.2.1 Conservation Status

San Diego goldenstar is a City of San Diego MSCP covered species (1997a). San Diego goldenstar is also on List 1B of the California Native Plant Society (CNPS) *Inventory* (CNPS 2010). CNPS List 1B.1 plant species are considered rare, threatened, or endangered in California and elsewhere. Furthermore, CNPS considers the San Diego goldenstar seriously endangered in California, indicated by a ranking of 0.1 following the List 1B status.

San Diego goldenstar is also on the California Department of Fish and Game's (CDFG) Natural Diversity Data Base Special Vascular Plants, Bryophytes and Lichens List (CDFG 2010), which meets the criteria for state listing under Section 15380 of the California Environmental Quality Act (State of California 1996).

1.2.2 Biology and Distribution

San Diego goldenstar is a perennial monocot plant species which is known from no more than 65 occurrences from San Diego County southward into Baja California, Mexico (CNPS 2010). It occurs in openings within CSS, chaparral, valley and foothill grassland, and near vernal pools, often on clay soils. It is noted that San Diego goldenstar was formerly in the genus *Muilla*, but was recently changed to *Bloomeria*.

~~The genus *Muilla* was originally included in the *Liliaceae* family, but has since been reclassified as a member of the family *Themidaceae* (Hickman 1993). The genus *Muilla* is an anagram of the genus *Allium*, the wild onions, because of the two genera's superficial resemblance to each other (Hickman 1993). Like other corm species in the region, San Diego goldenstar begins its annual growth cycle after significant fall or winter rains. The plants grow vegetatively during the winter and early spring months. The plants~~

develop a central inflorescence beginning in late winter and flowering occurs during late April and early May. Seed set generally occurs in late May into June. The fruit capsules of the San Diego goldenstar are small, approximately 4–5 millimeters in length, and contain numerous black seeds. After flowering, the plants become dormant in summer, surviving on starch reserves stored in a subterranean tuberous corm (underground stem).

The percentage of individuals in a population that flower can vary greatly from one year to the next. In dry years, few individuals flower, while in years with above normal and/or well-spaced rains, thousands of plants may flower in that same population. The total number of goldenstar in a population is difficult to determine due to the ability of the plants to propagate vegetatively from dividing corms. Based on observation of natural populations, in a near normal rainfall year it is reasonable to expect that approximately 10–20 percent of the total number of individuals in a population are large enough to flower. In a previous San Diego goldenstar salvage effort, our observations indicate that many more corms are present in the soil than actually flower in any given season. Typically numerous small corms are present in these populations and although these plants are too small to develop inflorescences, they contribute a significant proportion of individuals to the total population.

1.2.3 Summary of Previous San Diego Goldenstar Translocation Programs

One San Diego goldenstar translocation effort implemented in the early 1990s has progressed enough to evaluate the persistence of the translocated plants (Dodero 1996). As part of a Caltrans mitigation effort for State Route 52, several hundred San Diego goldenstar were salvaged prior to grading and construction of State Route 52 between the Sycamore Landfill and Mission Trails Regional Park. The salvaged plants were translocated into appropriate grassland habitat in Mission Trails Regional Park. Plants were replanted adjacent to existing San Diego goldenstar populations during 1992.

The salvaged plants were placed in holes that were excavated about four to six inches deep and approximately 8 to 12 inches across. The excavated area was then backfilled with soil to cover the corms. The goal was to mimic the distribution of natural populations that are often quite dense. For this small scale translocation effort, approximately 20-30 plants were put in each of the holes. At the time of this translocation effort, no success criteria were required for the translocated San Diego goldenstar.

The most recent check of the translocated population in the spring of 2010 by RECON biologist Mark Dodero showed that salvaged plants are still persisting over 17 years later. Approximately 150 of the salvaged goldenstar in 20 locations were relocated in 2010 (Photograph 2). It should be noted that no maintenance efforts have been



PHOTOGRAPH 2
San Diego Goldenstar Salvaged in 1991 Growing in
Mission Trails Regional Park, February 2010

performed on the translocated population since the mid-1990s, and yet the plants have persisted.

Observations of these plants indicates that the greatest threat to the long-term survival of these translocated San Diego goldenstar populations is weed invasion and the associated herbivory by pocket gophers (*Thomomys* sp.). Non-native species of particular concern are annual grasses such as wild oats (*Avena* spp.) and herbaceous weeds including storksbill (*Erodium* spp.) and smooth cat's ear (*Hypochaeris glabra*) that compete directly with San Diego goldenstar for light, water and nutrients.

In disturbed, weedy habitats, populations of pocket gophers often rise to higher levels than in undisturbed habitat. The soil tilling performed by the gophers encourages further weed growth that, if left unchecked, can lead to the complete dominance of non-native species, to the detriment of San Diego goldenstar and other natives.

1.3 Existing Populations at the Castlerock Site

San Diego goldenstar may be visually identified following fall/winter precipitation events. The existing San Diego goldenstar populations were mapped in 2001, 2003, 2005, 2007, 2008, 2009, and 2010 by NRC (2012). This species is abundant and widespread in the northern and central portions of the site and was detected within 14.62 acres during NRC's 2010 vegetation mapping and special status plants survey (NRC 2012). An estimated 10,000 San Diego goldenstar individuals are present within the site. San Diego goldenstar was found in native and annual grasslands, as well as CSS disturbed by the Cedar Fire, in 2010 (see Figures 3a and 3b). The San Diego goldenstar is typically found in open, rather than shaded, habitats, yet may be associated with scattered CSS shrub species. Typical associated plant species include purple needlegrass (*Nasella pulchra*), blue-eyed grass (*Sisyrinchium bellum*), and wavy-leaved soap plant (*Chlorogalum parviflorum*).

A portion of one population, located within the existing MHPA boundary, is anticipated to be impacted by the Annexation Scenario. Approximately 0.06 acre of San Diego goldenstar will be impacted (see Figure 3a). In the No Annexation Scenario 0.10-acre of San Diego goldenstar is anticipated to be impacted (see Figure 3b). For either project scenario, the population size of the impacted San Diego goldenstar will be estimated at the time of salvage.

1.4 Proposed Translocation Site

Selecting a translocation site is one of the most important tasks in planning for plant translocation. Environmental factors such as soil type, slope aspect, sun exposure, moisture regime, weed cover, and plant species composition can either increase or

decrease translocation success. A few reasons why translocations may fail are plant–soil incompatibility, improper slope aspect, weed invasion, and human disturbance. To help ensure translocation success, the criteria listed below are used in selecting the translocation site. The location and existing conditions of the sites selected are also described below.

1.4.1 Selection Methods

The translocation site will be chosen based on (1) proximity to the donor site, (2) designation as permanent open space within the MHPA, as described in the City of San Diego MSCP Subarea Plan (1997b), (3) adjacency to existing San Diego goldenstar populations, and (4) location in areas that do not currently support sensitive biological resources to minimize potential impacts to existing native communities.

During the translocation site selection process, the goal is to find and minimize the number of sites chosen, and if multiple sites are selected, chose locations that are in close proximity to each other to reduce edge effects and increase the efficiency of maintenance activities such as weeding and plant care.

The translocation area must have specific environmental conditions similar to the donor site to ensure establishment and persistence of the introduced San Diego goldenstar population. Four general factors are used to evaluate potential translocation sites: physical, biological, logistical, and historical (Fiedler and Laven 1996). These general factors are explained in the list below. The specific physical, biological, logistical, and historical conditions for the San Diego goldenstar at the Castlerock site are explained in bold print below each general heading. This section provides justification for the translocation site selection as it relates to the four factors.

1. **Physical.** These factors include the soil and landscape characteristics of the site.

San Diego goldenstar are typically found in openings on clay soils. The translocation site has the appropriate clay soils and is located on slopes adjacent to the natural San Diego goldenstar populations.

2. **Biological.** These factors include the presence of appropriate habitat and susceptibility to weed invasion.

In undisturbed habitat, the San Diego goldenstar typically grows in openings within native grassland and CSS habitat, with a low presence of non-native species. The translocation site will be located in previously disturbed areas within annual grassland or in openings of disturbed CSS. Non-native weed species will be controlled as part of the maintenance activities, and native species that are typical associates of San Diego goldenstar will be encouraged through planting and seeding efforts.

3. **Logistical.** The accessibility of the site for maintenance and monitoring, and site protection from unauthorized use are logistic factors. The site should be easily accessible but protected from off-road-vehicle use or heavy bicycle or foot traffic.

If necessary, the translocation site will be fenced, at strategic locations, to prevent unauthorized entry and to minimize vandalism.

4. **Historical.** This factor considers using currently occupied versus potential habitat and incorporates knowledge of the species' evolutionary history.

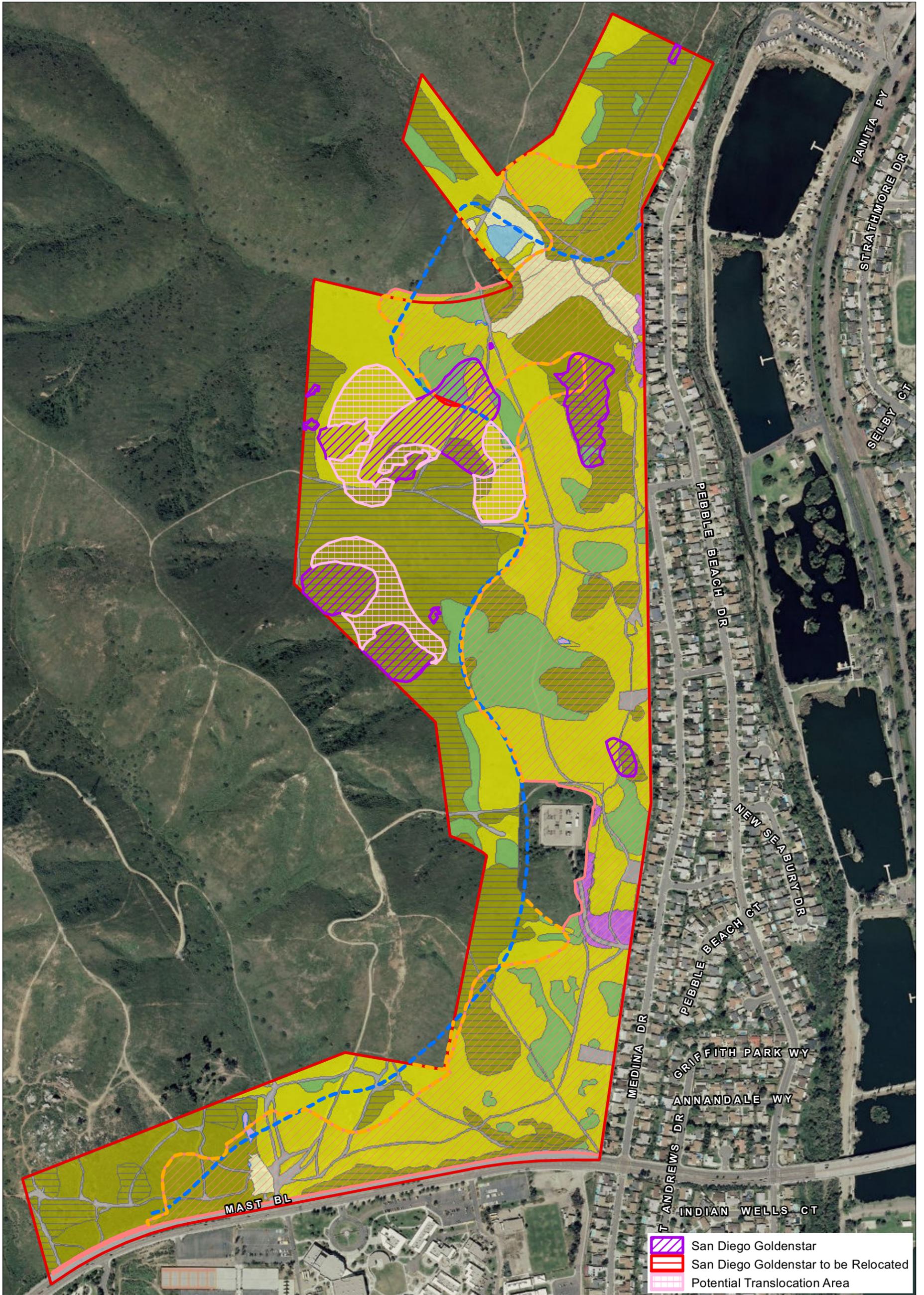
The San Diego goldenstar will be translocated near existing populations in suitable, but unoccupied, habitat within its historic range. The translocation site will be less than one mile from the donor site.

In summary, the translocation site will have all of the appropriate characteristics to serve as a receiver site. San Diego goldenstar salvaged from the impacted population will be planted in disturbed areas of the Open Space Lot 'P' within Pardee ownership, adjacent to existing populations. The disturbed habitat at the translocation site will be enhanced to ensure the long-term sustainability of the San Diego goldenstar population.

1.4.2 Site Location and Conditions

To accommodate the 0.06 acre of salvaged San Diego goldenstar for the Annexation Scenario or the 0.10 acre of salvaged San Diego goldenstar for the No Annexation Scenario, we anticipate enhancing approximately 1.0 acre of annual grassland or disturbed CSS habitat. The habitat enhancement program will include weed control, planting, and seeding with site-appropriate native grassland species. The translocation site will be restored to a native plant composition characteristic of the native grasslands on the Castlerock site. No preserved San Diego goldenstar populations or other sensitive biological resources in the MHPA will be impacted by this translocation program.

The translocation site will be located adjacent to the natural populations in suitable habitat within Open Space Lot 'P' within Pardee ownership. As noted in Section 1.4.1 above, the proposed translocation site has the appropriate soils, slope, and moisture conditions to support the San Diego goldenstar. Prior to translocation efforts, an additional habitat assessment survey (spring 2012) will be conducted within Open Space Lot 'P' to determine the most appropriate translocation area. Figures 4a and 4b depict the locations of the potential translocation site in relation to the proposed development scenarios.



- Project Boundary
- Proposed MHPA
- Existing MHPA
- Annexation Scenario Impact Area

- Vegetation Communities**
- Coastal Sage Scrub
 - Disturbed Coastal Sage Scrub
 - Baccharis-dominated CSS
 - Annual Grassland

- Native Grassland
- Coastal and Valley Freshwater Marsh
- Emergent Wetland
- Eucalyptus Woodland
- Disturbed

- San Diego Goldenstar
- San Diego Goldenstar to be Relocated
- Potential Translocation Area

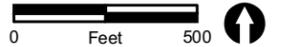
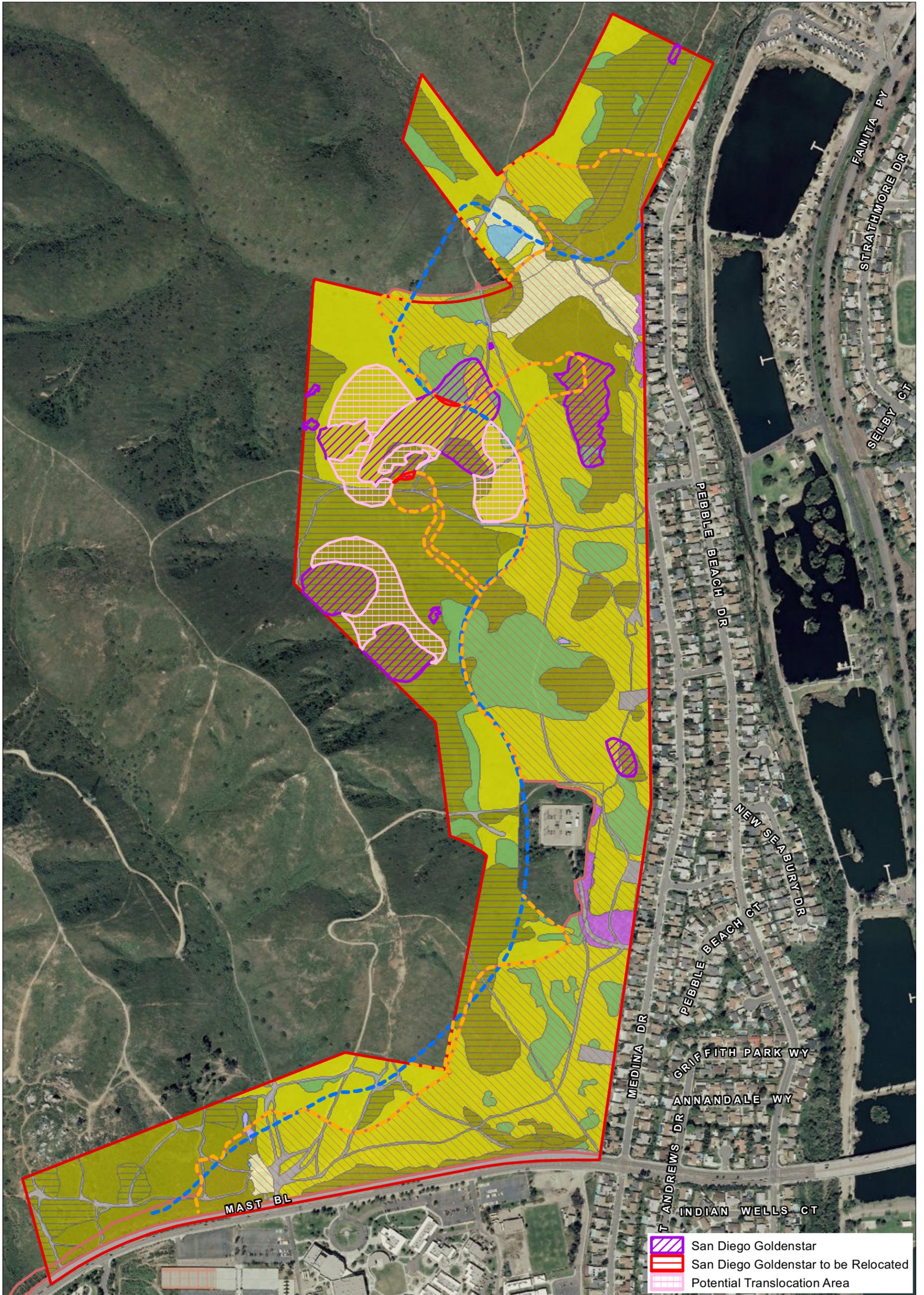


FIGURE 4a

Annexation Scenario Potential San Diego Goldenstar Translocation Areas



- Project Boundary
- Proposed MHPA
- Existing MHPA
- No Annexation Scenario Impact Area

- Vegetation Communities**
- Coastal Sage Scrub
 - Disturbed Coastal Sage Scrub
 - Baccharis-dominated CSS
 - Annual Grassland

- Native Grassland
- Coastal and Valley Freshwater Marsh
- Emergent Wetland
- Eucalyptus Woodland
- Disturbed

- San Diego Goldenstar
- San Diego Goldenstar to be Relocated
- Potential Translocation Area



FIGURE 4b

No Annexation Scenario Potential San Diego Goldenstar Translocation Areas

1.5 Responsible Parties

1.5.1 Property Owner

The party financially responsible for this translocation project is:

Pardee Homes
6025 Edgewood Bend Court
San Diego, CA 92130
Contact: Jimmy Ayala, Director, Community Development

The Owner will be responsible for contracting with personnel qualified in implementation, maintenance, and monitoring of restoration/revegetation sites and practices described in this plan. Upon contracting with a qualified person or organization to implement this plan, the Owner will designate a person or group as the Principal Restoration Specialist.

1.5.2 Principal Restoration Specialist

A Principal Restoration Specialist acceptable to the Owner shall be hired to implement this plan. The Principal Restoration Specialist can either be an individual or an organization, as long as the person(s) actively managing the program meets the qualifications outlined below to the satisfaction of the Owner and approved by the City of San Diego Development Services, Environmental Analysis Section and Mitigation Monitoring Coordinator. If the Principal Restoration Specialist is an organization, a project manager shall be designated. The Principal Restoration Specialist will be responsible for the day-to-day implementation of this plan and will carry out the requirements and objectives described herein.

1.5.2.1 Qualifications of the Principal Restoration Specialist

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

- B.S. or B.A. degree in ecology, botany, biology, landscape maintenance, range management, or related field.
- At least three years of experience in native habitat restoration in southern California, preferably San Diego County.
- Demonstrated experience in similar translocation and restoration projects.

2.0 Methods

2.1 San Diego Goldenstar Translocation Methods

Translocation methods will include plant salvage, seed collection, and plant propagation. Table 1 summarizes the proposed translocation schedule. Translocation efforts during the fall/winter of the first season (as early as 2012–2013) will be focused on weeding the translocation site to prepare the area to receive the salvaged San Diego goldenstar. Also, depending on the project grading schedule, the earliest the corms will be salvaged is during the fall/winter season of 2012–2013. While the corms can be salvaged at any time of the year, the goal is to time the salvage effort so that the corms do not have to be stored at the nursery for an extended period of time. It is preferable to move the corms to the translocation area as soon as they are salvaged, minimizing the time lag between salvage and replanting. The timing of the salvage will be coordinated with the project owner. RECON will take into account the project grading schedule and implement the salvage effort at the best possible time for plant survivorship. If necessary, the corms can be salvaged during the summer and stored until the rainy season has commenced.

The Year 1 maintenance and monitoring period for the project will begin in the spring of 2013, approximately 120 days after the San Diego goldenstar are planted at the translocation site. If the plants are not moved to the translocation site until the 2013–2014 winter season, the Year 1 maintenance and monitoring period will begin 120 days after the corms are planted.

**TABLE 1
SAN DIEGO GOLDENSTAR TRANSLOCATION SCHEDULE***

Task	Implementation Tasks	Year 1 2013	Year 2 2014	Year 3 2015
Seed collection	Spring 2012	Spring	—	—
Plant propagation from seed	Fall 2012	Fall	Fall	Fall, if necessary
Plant salvage	2012 or 2013	—	—	—
Planting	Fall/Winter 2013	Fall/Winter, if necessary	Winter seed grown plants	Winter, if necessary

*The translocation schedule is subject to change based on the timing of project grading. The schedule outlined above is approximate.

2.1.1 Seed Collection

If available, seed collection will begin in the spring of 2012 and continue into the following years as needed. All seed will be collected on-site from existing populations within the open space lots or from existing populations within two miles of the project site.. Whole dried inflorescences will be collected soon after the flowering period (April–May) when seeds are fully mature.

The seed will be placed in paper bags, which allow for the evaporation of residual moisture to prevent fungal growth. Seeds will be stored in a cool, dark location at the nursery to prevent desiccation and maintain viability. A portion of the seeds will be used to propagate additional plants for planting at the translocation site. The remainder of the seed will be stored for future direct seeding into the restored habitat.

2.1.2 Plant Propagation

To ensure success criteria are met, additional San Diego goldenstar may be propagated from locally collected seed or salvaged from impact areas outside of the MHPA. Propagation of San Diego goldenstar from seed under nursery conditions is an effective method of producing large number of plants (Dodero 1996). Studies of rare plant species have shown that growing plants to beyond seedling size, prior to transplanting, increases survivorship after planting (Guerrant 1996). Propagated plants will be grown from wild collected seed to maintain genetic integrity of the population.

Seed will be sown in greenhouse flats in the fall of 2012 (if seed is available) and again in 2013 if more plants are needed. Plants will be grown at the RECON Native Plants, Inc. nursery for a minimum of two seasons, and then will be transplanted into the open space. A portion of the seed-grown plants will be taken from the propagation flats and planted with purple needlegrass in rose pots. These mixed species container plants will be used for the restoration of the associated grassland habitat. Other appropriate grassland species will be introduced through a combination of container planting and direct seeding. Appropriate grassland species to be planted at the translocation site will be based on observations of species present within the surrounding occupied San Diego goldenstar habitat.

2.1.3 Plant Salvage

In addition to the propagation of San Diego goldenstar from seed, the plants from the donor site will be salvaged during 2012–2013 soon after the rainy season starts, but also dependent on the project grading schedule. Additionally, San Diego goldenstar may be salvaged from impact areas outside of the MHPA to increase the number of San Diego goldenstar planted within the translocation site. Salvaging will occur twice to ensure that as many San Diego goldenstar corms are salvaged as possible. If necessary, the corms

can be salvaged at any time of the year, but as mentioned above, the goal is to minimize the length of time that the corms must be stored prior to replanting.

Prior to salvage, the impact area will be surveyed to identify and mark the populations. Under the direct supervision of the project biologist, a skilled restoration crew will carefully excavate the San Diego goldenstar corms from the impact area. Corms will be excavated using hand tools and placed in rose pots along with salvaged native soil. Multiple corms will be placed in each rose pot. The rose pots will be consolidated into greenhouse flats for storage. In areas of high San Diego goldenstar density, small equipment such as a bobcat-type dozer may be used to excavate the corms. If the project grading schedule permits, other grassland species such as purple needlegrass and bulb species may also be salvaged and taken to the translocation site.

If environmental conditions are appropriate at the time of salvage, the San Diego goldenstar will be moved directly to the translocation site to avoid having to store them at the nursery. If the rainfall is below normal, the salvaged plants will be moved to the growing facility at RECON Native Plants, Inc. for care until the environmental conditions are suitable for planting.. If translocation is not suitable until fall, plants will be maintained in rose pots under a shade cloth with no supplemental irrigation to induce their natural summer dormancy cycle. As part of this process, the plants will not be irrigated so that they will emerge with the onset of natural rainfall. Supplemental irrigation will be introduced as needed once the corms become active. The rose pots will be regularly weeded by hand to reduce competition and to prevent the introduction of weeds to the translocation site. Following successful emergence, the San Diego goldenstar rose pots will be translocated to the mitigation site.

2.1.4 Translocation

If weather patterns are favorable and depending on the project grading schedule, the salvaged San Diego goldenstar will be planted during the winter of 2012–2013 (see Table 1). To ensure that success criteria for survivorship and flowering are met, additional plants may be propagated from seed as described above and/or salvaged from impact areas outside of the MHPA and planted during the third year of the translocation program, in the 2015–2016 winter season.

The project biologist will determine the exact timing of translocation based on weather conditions and the project grading schedule. In general, the San Diego goldenstar will be planted during the rainy season (December–February) when the soil is moist from recent rains and rain is predicted within a few days.

The following procedures will be followed when planting the San Diego goldenstar: (1) prior to planting, soil will be excavated from the transplant areas to accommodate the goldenstar rose pots; (2) each rose pot of San Diego goldenstar will be lowered into the

excavated areas as an entire unit to minimize disturbing the corms, which can affect survivorship; (3) each rose pot will be placed into an excavated area, flush with or slightly below the existing soil surface to prevent erosion of the corm from the soil; (4) to mimic natural populations, the San Diego goldenstar corms will be planted densely, approximately 50 to 100 plants per square meter; (5) seed-grown corms may also be planted in mixed species containers with purple needlegrass or other grassland species; and (6) openings between the rose pots will be filled with soil and lightly compacted. The newly installed plants can tolerate some deposit of soil, but not exposure of the corm from soil eroding away from the base of the plant.

To minimize herbivory, hardware cloth will be placed underneath the corms and on the soil surface to discourage gophers and other rodents from eating the corms. The ends of the hardware cloth will be wired together to form a wire mesh cage around the plants. The cages will still allow for the developing inflorescences and pollinating insects to pass through the screen.

After planting, the San Diego goldenstar will be lightly watered to settle the surrounding soil. Following translocation, each plot will be mapped with a global positioning system (GPS) unit for future monitoring purposes.

2.1.5 Irrigation

The translocation of the San Diego goldenstar will be timed to coincide with natural rainfall events. If necessary, a water truck will be used to irrigate newly planted corms until they become established or during extended dry periods during the winter growing season. Watering will be discontinued as the plants go into summer dormancy.

2.2 Habitat Enhancement Methods

Enhancing the habitat by weeding the translocation site is necessary to ensure survival and persistence of the introduced San Diego goldenstar population. A total of approximately 1.0 acre of habitat will be enhanced. The enhancement areas will coincide with the selected translocation site (see Figure 4). The habitat enhancement program includes weed control, planting, and seeding with site-appropriate native grassland species.

Disturbed areas within the translocation site will be planted and/or hand seeded with native grassland species. Species to be used for seeding will include purple needlegrass, other native grasses, herbaceous perennials, geophytes, and annual flowering species. Seed and established plants will be collected from the impact area if the project grading schedule permits. When feasible, seed and established plants may also be collected from populations within two miles of the site. Collection of seeds from

local populations ensures a locally adapted genetic integrity and variability to provide the best chance of survivorship and long-term success. A second benefit to using local populations is the attraction of appropriate pollinators and insects that are also locally adapted.

The 1.0-acre enhancement area must first be dethatched. Dethatching is a technique commonly implemented by RECON that removes the buildup of non-native grasses and herbs so that exotic species are controlled and openings within the habitat can be re-created. Dethatching will be done in late summer or early fall after native species have become dormant for the season. The schedule for the dethatching effort is timed to minimize impacts to any native vegetation. All work will be performed by crews trained to recognize native and non-native species. Weed whips will be used to cut the dried weedy material left from the previous seasons' growth. No existing native vegetation will be disturbed and no fertilizers will be used in the translocation areas.

After the thatch is cut, the material will be raked into piles, collected, and transported to the nearby landfill or composted on-site. The dethatching will be performed once at the start of the project. It is anticipated that dethatching will take place in the fall of 2012 depending on the project schedule. After winter rains commence, weed seed still present in the soil will germinate.

If deemed feasible by the project biologist, a pre-emergent herbicide may be used to control weeds. Pre-emergent herbicides generally affect newly germinating seeds. While existing plants remain unaffected. The use of pre-emergent herbicide can reduce non-native weed growth significantly. The amount of herbicide used can be adjusted to have germination preventing effects for six month or longer. Mature plants can be introduced to the sites in containers, and after two seasons, native seed can be distributed by hand once the herbicide effects subside. Control of non-native seedlings during the growing season will include hand pulling around native species, including the San Diego goldenstar.

During the plant establishment period, weed control will be performed by spraying a glyphosate based herbicide or grass specific herbicide (fusilade) to kill newly germinated weeds. The glyphosate and fusilade herbicides are approved for use in natural areas by the U.S. Fish and Wildlife Service and CDFG, and must be applied by a licensed applicator. Non-native weeds to be controlled include, but are not limited to, annual grasses such as wild oats and forb species such as storksbill.

3.0 Translocation Site Maintenance and Monitoring

Management includes qualitatively and quantitatively monitoring the translocated San Diego goldenstar population and maintaining the approximately 1.0-acre enhancement area. An adaptive management approach is necessary to ensure the survival of the translocated population of San Diego goldenstar (Pavlik 1996). Adaptive management refers to the ability to slightly field modify maintenance and monitoring techniques to reflect a better understanding of the species or to adapt to any atypical events that may occur during the five-year translocation program. Therefore, during the five-year translocation process, any new information obtained from this translocation effort that may help ensure the success of the San Diego goldenstar planting may be used at the discretion of the project biologist. The proposed monitoring, maintenance, and reporting methods for the San Diego goldenstar translocation program is described below.

3.1 Maintenance

Maintenance tasks include watering during the first planting season, exotic species control, and replacement planting, if needed. A comprehensive weeding program is especially important, as San Diego goldenstar populations are sensitive to invasion by exotic species. Only hand weeding will be allowed within 48 inches of translocated or existing San Diego goldenstar patches. San Diego goldenstar translocation plots will be temporarily covered with a non-porous material, such as a tarp, during spraying to further reduce the risk of herbicide overspray. Table 2 outlines the maintenance schedule.

**TABLE 2
FIVE-YEAR MAINTENANCE SCHEDULE**

Type/Task	Year 1 2013–2014	Year 2 2014–2015	Year 3 2015–2016	Year 4 2016–2017	Year 5 2017–2018
Watering	As needed	As needed	As needed	—	—
Weed control	Four times	Four times	Four times	Three times	Twice
Repair Fencing	—	As needed	As needed	As needed	As needed
Planting	Winter	Winter	Winter, if needed	—	—

3.1.1 Irrigation

The newly translocated San Diego goldenstar may require supplemental watering during the first season of growth. If, during the rainy season between November–March, there are more than two to three weeks of dry or unusually warm weather and the new plants

appear water stressed, the San Diego goldenstar will be watered using a water truck. Enough water will be given to saturate the top four to six inches of soil. Watering will mimic natural precipitation patterns, and, therefore, will not exceed the typical rainfall season (November–March). A water truck and hose will be used to irrigate the area. Seed propagated corms that are planted in the third season may also be watered, if needed.

3.1.2 Weeding

Weeds must be removed by well-trained and skilled maintenance workers under close supervision of the project biologist to prevent impacts to the San Diego goldenstar and other biological resources. Only hand weeding will be allowed within 36 inches of translocated or existing San Diego goldenstar patches. Outside of this area, weeds may be removed by mechanical weed cutters or sprayed with herbicide. When herbicide is used, there shall be little to no wind present, as overspray may potentially harm native plants. San Diego goldenstar translocation plots will be covered with a tarpaulin (tarp) or similar item during herbicide spraying to further reduce the risk of overspray. The tarp will never remain on the plots for more than a four-hour period to prevent stress or injury and will be removed after the herbicide application has been completed within approximately 50 feet of the plots.

Weeds shall be removed quarterly, or more often if directed by the project biologist, for the first three years to adequately control weed species and reduce the weed seed bank in the soil. Less intensive weeding efforts will be conducted in Years 4 and 5, unless otherwise required.

3.1.3 Site Protection

Protection of the translocation site from human disturbance is essential for success. One of the criteria in choosing the translocation areas is the ease in which protective measures can be applied. Of particular importance is protection of the translocation site from pedestrians and off-road vehicles. Currently, Open Space Lot 'P' is unfenced and the site is accessible. There are graded dirt roads and unauthorized bike trails that traverse the site, providing access to the Open Space Lot 'P'. This access is helpful for implementation of the translocation program, but the roads may also allow unauthorized vehicles to enter the area. If needed, the program prescribes that the translocation and enhancement parcel be fenced at strategic locations to prevent unauthorized vehicle access (see Figure 4). Any fencing and signage will be installed in consultation with the project owner and the City of San Diego. Signs identifying the area as a restoration site may also be necessary.

Fencing will continue to be inspected regularly for damage as well as impacts from pedestrians. Improvements or repairs will be made on an as-needed basis.

3.2 Monitoring

Monitoring of the translocation site requires frequent site visits and collection of qualitative and quantitative data to ensure the project is progressing toward the stated goals. The performance standards and monitoring methods are described below.

3.2.1 Performance Standards

3.2.1.1 San Diego Goldenstar Translocation

The final performance standards of the San Diego goldenstar translocation plan are:

- The establishment of a self-sustaining population of San Diego goldenstar with a minimum survivorship of 80 percent of translocated individuals. The total number of goldenstar in a population is difficult to determine due to the ability of the plants to propagate vegetatively from dividing corms. An estimate of the total number of individuals will be determined when the goldenstar are salvaged and planted. These data will be used as a baseline for assessments of survivorship in subsequent years.
- Twenty percent of the surviving individuals will be mature flowering plants in any of the five monitoring years at the translocation site (without supplemental water).
- Prior to the end of the five-year maintenance and monitoring period, the translocated individuals shall have survived without supplemental watering for at least two years.
- Individuals lost to herbivory or other causes will be replaced with seed grown plants and/or salvaged plants from the impact area outside of the MHPA such that, at the end of five years, 80 percent of the estimated number of individuals present in the impacted area (either 0.06 acre for the Annexation Scenario or 0.10 acre for the No Annexation Scenario) will be growing at the translocation site.

3.2.1.2 Habitat Enhancement

- The enhancement and restoration of approximately 1.0 total acres of the native grassland habitat at the translocation site. In addition, a 100-foot protective buffer will be maintained (i.e., weeded) around the translocation site.
- A total of 0 percent coverage by California Invasive Plant Council's ([Cal-IPC]; Cal-IPC 2006) High, Moderate, and Alert species and no more than 10 percent of the enhancement site will be covered by exotic weeds at the end of five years.

If in any year significant progress towards the performance standards is not observed, then the project biologist or the City of San Diego may recommend remedial actions. In addition, if final performance criteria are not met within five years, remedial measures

and additional years of monitoring and maintenance may be required by the City of San Diego. Appropriate remedial actions are discussed below.

3.2.2 Monitoring Methods

A monitoring program will be conducted for five years following the initial planting. Monitoring is necessary to determine the survival and performance of the transplant population and to adjust procedures as needed to ensure progress toward restoration goals. Monitoring will be conducted by a biologist with experience in the preparation, implementation, and monitoring of rare plant translocation programs.

The monitoring program will include both quantitative and qualitative assessments of the translocated population. Table 3 summarizes the monitoring schedule. Quantitative data will be collected by annually estimating all surviving and flowering individuals. Qualitative data will be collected by visually comparing the stages of development within the translocated population to the natural populations nearby. Pollinator observations at the translocation site and a preserved San Diego goldenstar population in open space (reference site) will also be conducted to make a general comparison of the pollinators of the two areas. Monitoring methods are described in detail below.

**TABLE 3
FIVE-YEAR MONITORING SCHEDULE**

Type/Task	Year 1 2013–2014	Year 2 2014–2015	Year 3 2015–2016	Year 4 2016–2017	Year 5 2017–2018
Qualitative Monitoring	Weekly/ Monthly*	Quarterly during the growing season	Quarterly during the growing season	Quarterly during the growing season	Quarterly during the growing season
Quantitative Monitoring					
Survivorship Counts	—	Winter	Winter	Winter	Winter
Flowering Counts	Spring	Spring	Spring	Spring	Spring
Exotic Cover estimate	Spring	Spring	Spring	Spring	Spring

*Qualitative monitoring will occur weekly during the 120-day Plant Establishment Period and monthly thereafter during the growing season.

3.2.2.1 Quantitative

a. Survivorship Estimates

Each translocated San Diego goldenstar patch at the translocation site will be numbered by the monitoring biologist. Permanent markers will be placed near each patch so they can be found easily each year. The translocated patches will be mapped using a Global Positioning System so the areas can be relocated if markers are lost. The number of individuals within each patch will be estimated when they are planted. These data will be used as a baseline so survivorship in subsequent years may be assessed.

A census of the translocated population will be conducted each year (beginning in year two). The first growth assessment and annual census shall be conducted in the second growing season (January–March), or as directed by the project biologist, so that the above-ground leaves may be observed. This assessment will be used to determine the total number of translocated individuals that have survived over the summer dry season. Each monitoring year, the individuals within each patch will be estimated and recorded. Percent survivorship will be calculated by dividing the number of surviving plants by the baseline number of plants. Because individuals are densely packed within each clump and the plants are small in size, these estimates will be approximate (± 10 percent). In addition, the areas immediately around the translocated clumps will be searched carefully for volunteer San Diego goldenstar plants. All volunteer plants will also be estimated and mapped.

b. Flowering Estimates

The second quantitative assessment will be conducted later in the growing season (April–May) when the production of flowers and seed may be observed. Total estimates of flowering individuals will be completed at that time. The project biologist will record the population estimate and include the results in the annual report.

c. Exotic Species Cover

Exotic species cover will be estimated annually to determine if the cover criteria for weeds are being met. Weed cover will be estimated at the translocation site as an absolute cover percentage. Permanent photo points will be established at selected locations within the translocation site. Repeat photographs will be taken each spring and these photographs will be included in the annual reports.

3.2.2.2 Qualitative Monitoring

Two types of qualitative assessments—general growth assessments and limited pollinator observations—will be conducted during the translocation effort. Evaluation of plant health and identifying and correcting problems as they arise are necessary for ensuring successful establishment. Following planting, the site will be monitored weekly during the initial 120-day plant establishment period (PEP). After the PEP, qualitative monitoring will be conducted monthly during the growing season for the remainder of the first year and quarterly for the remainder of the five-year maintenance and monitoring period.

a. Growth Assessment

The performance of San Diego goldenstar individuals at the translocation site will be visually assessed to determine the overall plant condition and whether the timing of leaf, flower, and seed production is similar to the adjacent natural populations. One reference

population will be selected within the Castlerock open space. Only a good-quality natural population that is not suffering from substantial weed invasion will be selected as a reference population. In addition, the reference site will also have a similar physical and biological setting as the translocation site. The reference site will be mapped using a Global Positioning System (GPS) unit, and this information will be included in the annual report.

b. Pollinator Observations

Pollinator observations will be conducted to determine if potential San Diego goldenstar pollinators are visiting the translocated plants. This will help evaluate the progress of the San Diego goldenstar translocation and habitat enhancement effort. If the habitat surrounding the translocation site is enhanced appropriately, it will likely be able to support a sufficiently diverse assemblage of pollinators that will ensure successful pollination and seed production of San Diego goldenstar (Buchman and Nabhan 1996). The production of viable San Diego goldenstar seed is important in ensuring reproduction and therefore the long-term persistence of the translocated population. Observations of pollinators will also help contribute to the overall understanding of the biology and reproduction of this species.

Pollinator observations will be conducted at least once each season during the San Diego goldenstar flowering period (approximately April–May). Observations will be made in conjunction with other scheduled monitoring visits. The project biologist will stand near the San Diego goldenstar plants and observe and photograph pollinators for approximately one hour. Both the translocation and at least one natural population within the open space will be observed. Pollinators that are observed will be identified to family, if possible. The types of pollinators observed visiting San Diego goldenstar at the translocation site will be used for a general comparison with that of the natural population.

3.3 Reporting

An as-built report will be submitted to the City of San Diego documenting the translocation of the San Diego goldenstar.

Two copies of the as-built report shall be submitted to the City of San Diego at the end of the 120-day PEP. This report shall include a discussion of weed control, horticulture treatments, erosion control, trash/debris removal, watering, site protection/signage, pest management, and vandalism, as applicable to this translocation project. An assessment of the progress of the San Diego goldenstar translocation effort shall be provided at the end of the 120-day PEP.

Copies of the annual monitoring reports summarizing maintenance and monitoring results of the San Diego goldenstar translocation effort will be submitted to the City of San Diego and the wildlife agencies by the project biologist no later than December 1 each year. The monitoring section will include survey methods, data summary analysis, comparison of performance standards, discussion, reporting remedial actions, recommendations, and photodocumentation. The maintenance section will include weeding procedures and plant care activities. Each annual report, from Year 2 on, will compare findings of the current year with those in previous years.

3.4 Remedial Measures

The project biologist or the City of San Diego may recommend remedial measures based on the annual quantitative monitoring results or qualitative observations made in the field so that the plantings move toward the performance standards. If the San Diego goldenstar requirement of 80 percent survivorship and 15 percent flowering is not met by Year 3, additional planting of propagated San Diego goldenstar from seed may be required. Propagation, planting, monitoring, and maintenance would follow the methods discussed in this plan. Other remedial measures may also include more intensive weeding efforts within the translocation site, which may add additional monitoring years.

3.5 Contingency Measures

The contingency measures for the potential loss of San Diego goldenstar individuals due to herbivory, drought, vandalism, and fire are as follows.

3.5.1 Herbivory/Disease

Preventative measures will be taken to minimize herbivory on the San Diego goldenstar corms, and these methods are described in Section 2.1.4 above. If herbivory is still observed, the damaged/missing plants will be replaced. The replacement plants will be planted in a different location within the translocation site to try and minimize herbivory. Any diseased or pest-infected plants of San Diego goldenstar will be removed as needed and replaced with healthy plants.

3.5.2 Vandalism

If bicycle or foot trails are observed within the translocation area, natural methods will be used to discourage trail use. These methods include piling of brush material at the entrance of the new trail and planting of shore cactus (*Opuntia littoralis*) to discourage foot and bicycle traffic.

3.5.3 Drought

During the first two seasons after translocation, if the San Diego goldenstar begin annual growth (leaf structures are observed above-ground) and a long period of dry weather follows, the translocated population *will be* watered as needed until it rains or the plants have set seed. However, the plants *will not be* watered to induce above-ground growth, as it is natural for San Diego goldenstar to remain dormant during times of extreme drought. By the third season after translocation, no supplemental water will be given to allow the plants to respond to the natural rainfall pattern, except in the event that new corms are planted as replacements.

4.0 Notification of Completion

After the fifth year success criteria are met, the final monitoring report will be submitted to the City of San Diego for review. If the project has met the performance standards outlined herein, the project biologist will contact the City of San Diego and recommend final approval of the project. A request for a final inspection shall be submitted with the final monitoring report. The City of San Diego will respond in writing after a review period or may request an on-site meeting to review the habitat enhancement site. After review, the San Diego goldenstar mitigation requirement will be deemed complete when written approval by the City of San Diego has been received. Upon confirmation of project success, the City of San Diego shall release the property owner of any additional obligations. As part of the mitigation program, the Owner shall convey the translocation site to the City of San Diego following confirmation of project success. The applicant understands that failure of any significant portion of the revegetation area may result in a requirement to replace that portion of the site and/or to extend the monitoring and establishment/maintenance period until all success criteria are met.

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