

**Year 3 Annual Monitoring Report  
for the  
Devil's Gate Reservoir Restoration Project  
(Phase 1) Onsite Habitat Mitigation**

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**Pasadena, Los Angeles County, California**

**Prepared for:**

Los Angeles County Public Works

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## **TABLE OF CONTENTS**

1.0	INTRODUCTION .....	1
1.1	Project Location .....	2
2.0	ONSITE HABITAT MITIGATION OVERVIEW .....	2
2.1	General Location of Mitigation Areas .....	2
2.2	Mitigation Requirements .....	2
2.3	Ownership Status .....	6
2.4	Mitigation for Impacts to Protected Trees.....	6
3.0	SUMMARY OF ONSITE HABITAT MITIGATION ACTIVITIES.....	7
3.1	Site Preparation .....	7
3.2	Irrigation Strategy .....	8
3.3	Seeding .....	8
3.4	Container Plant Installation.....	8
3.5	Site Protection .....	9
4.0	SUMMARY OF YEAR 3 MAINTENANCE ACTIVITIES .....	11
4.1	Maintenance of Onsite Habitat Mitigation Areas .....	11
4.1.1	Nonnative Weed Abatement.....	11
4.1.2	Supplemental Planting.....	12
4.1.3	Irrigation Maintenance.....	12
4.1.4	Pest Control .....	12
4.1.5	Erosion Control.....	12
4.1.6	Vandalism.....	12
5.0	SUMMARY OF YEAR 3 MONITORING ACTIVITIES.....	12
5.1	Monitoring of Onsite Habitat Mitigation areas .....	12
5.2	Horticultural Monitoring Summary.....	13
5.2.1	Soil Moisture and Irrigation Functionality .....	13
5.2.2	Native Plant Germination.....	13
5.2.3	Container Plant Health .....	14
5.2.4	Nonnative and Invasive Plant Species.....	14
5.2.5	Herbivory, Plant Pests, and Plant Disease.....	14
5.2.6	Erosion Issues.....	14
5.2.7	Photo Documentation .....	15
5.3	Botanical Monitoring Summary .....	15
5.3.1	Botanical Monitoring Methods.....	15
5.3.2	Botanical Monitoring Results.....	25



6.0	ACHIEVEMENT OF PERFORMANCE STANDARDS.....	35
6.1	Container Plant Survivorship .....	36
6.2	Native Plant Cover .....	36
6.3	Nonnative Plant Cover .....	36
6.4	Native Plant Species Richness.....	36
7.0	DISCUSSION .....	36
8.0	REFERENCES.....	38

### **LIST OF FIGURES**

Figure 1.	Project Vicinity .....	3
Figure 2.	Project Location.....	4
Figure 3.	Onsite Habitat Mitigation Areas .....	5
Figure 4.	Proposed Trails & Site Protection .....	10
Figure 5.	Transect Locations Onsite Habitat Mitigation Areas .....	16
Figure 6.	Transect Locations Reference Sites .....	24

### **LIST OF TABLES**

Table 1.	Onsite Habitat Mitigation Site Monitoring Events.....	13
Table 2.	Container Plant Survivorship .....	26
Table 3.	Percent Native/Nonnative Cover Mitigation Areas .....	27
Table 4.	Percent Native/Nonnative Cover Reference Sites.....	31
Table 5.	Native Species Richness Mitigation Areas.....	32
Table 6.	Native Species Richness Reference Sites .....	33
Table 7.	City of Pasadena Groundwater Monitoring Results .....	34
Table 8.	JPL Groundwater Monitoring Results.....	34
Table 10.	Performance Standards for Onsite Mitigation Areas.....	35

### **APPENDICES**

- Appendix A - Streambed Alteration Agreement Notification No. 1600-2015-0263-R5
- Appendix B - Year 3 Plant Species Compendium
- Appendix C - Year 3 Photo Documentation

## **LIST OF ACRONYMS AND ABBREVIATIONS**

<b>Term</b>	<b>Description</b>
CDFW	California Department of Fish and Wildlife
City	City of Pasadena
CSS	Coastal sage scrub
GPS	Global Positioning System
HRP	Habitat Restoration Plan
Cal-IPC	California Invasive Plant Council
JPL	Jet Propulsion Laboratory
LACPW	Los Angeles County Public Works
LBVI	Least Bell's vireo
LSAA	Lake or Streambed Alteration Agreement
msl	Mean Sea Level
PMA	Permanent Maintenance Area
Project	Devil's Gate Reservoir Habitat Restoration Project
RAFSS	Riversidean Alluvial Fan Sage Scrub
Reservoir	Devil's Gate Reservoir

## 1.0 INTRODUCTION

Los Angeles County Public Works (LACPW) completed Phase 1 of habitat restoration implementation for the Devil's Gate Reservoir Habitat Restoration Project (Project) on February 13, 2020. Habitat restoration is being implemented to comply with the compensatory mitigation requirements in Conditions 3.1, 3.2, and 3.5 of the Lake or Streambed Alteration Agreement (LSAA) (Notification No. 1600-2015-0263-R5 dated March 21, 2017) executed between the California Department of Fish and Wildlife (CDFW) and the Los Angeles County Flood Control District. Two amendments to the LSAA were issued by the CDFW in response to modifications to the boundaries of the Project (dated July 17, 2018) and to address the proposed offsite mitigation component (dated July 16, 2018). The LSAA and the LSAA amendment for the onsite mitigation are included in Appendix A. Implementation of habitat mitigation for Phase 1 was conducted in mitigation areas DG-1, DG-1 WOUS, DG-2A, DG-2B, DG-3A, DG-4, DG-4B, DG-4C, and DG-5. A small portion of Phase 1 mitigation areas DG-1, DG-3A, and DG-4 were included in the temporary impacts around the perimeter of the Project and are actively being restored following the completion of the side slopes configuration. A small, unrestored portion of DG-3A is currently being used for staging of construction equipment and for maintenance access and will either be restored following the completion of the Project or will become a permanent access route for maintenance activities. In addition, the portion of DG-3A that surrounds Altadena Drain suffered major erosion during Year 3 and LACPW is working on design plans to redirect high intensity flows to the reservoir and repair the erosion. DG-3B is an additional mitigation area added as a result of the legal settlement and restoration of this area will be included in Phase 4 of restoration implementation. Implementation of habitat mitigation was conducted according to the Final Habitat Restoration Plan (HRP) for the Project (dated November 2018), which addresses the impact areas associated with the Project and the onsite compensatory mitigation areas at the Project site (ECORP 2018a). According to the HRP, onsite compensatory mitigation will include the creation, restoration, and enhancement of native habitats with the purpose of providing quality habitat for an abundance of wildlife, including the least Bell's vireo (*Vireo bellii pusillus*), which is listed as endangered under the federal and California Endangered Species Acts and (CDFW 2018).

The Project, which included an initial removal of 1.3 million cubic yards of sediment to establish a Permanent Maintenance Area (PMA), has restored flood capacity and established a reservoir management system to maintain the flood control capacity of the reservoir. Subsequently, annual maintenance and episodic maintenance are being conducted and will continue to be conducted in the established PMA to remove accumulated sediment and to ensure continued flood control capacity. Removal of sediment will not occur outside of the boundaries of the PMA.

This Year 3 Annual Monitoring Report has been prepared to address the onsite habitat mitigation requirements pursuant to the LSAA for the Project. This report documents the progress of onsite mitigation that the LACPW is responsible for implementing and maintaining for a period of five years for riparian habitats and ten years for upland habitat. Annual reports will be provided until established success criteria have been met and CDFW has deemed the mitigation successful.

## 1.1 Project Location

The Project is located in the City of Pasadena (City) in Los Angeles County on the Pasadena United States Geological Survey California 7.5' topographic quadrangle (Figure 1). More specifically, the Project is located within the upper portion of the Arroyo Seco Watershed within the City's Hahamongna Watershed Park (Figure 2).

The Project site is located along an approximately 4,754-foot linear section of the Arroyo Seco drainage and alluvial fan, which is an area subject to change and disturbance due to erosion and sediment movement resulting from runoff that flows south from the Angeles National Forest. The elevation of the Project site ranges from approximately 985-feet above Mean Sea Level (msl) behind the dam, to approximately 1,100-feet above msl at the northern end.

## 2.0 ONSITE HABITAT MITIGATION OVERVIEW

### 2.1 General Location of Mitigation Areas

The Phase 1 onsite habitat mitigation areas (hereafter referred to as mitigation areas) are located to the east and west of the Devil's Gate Reservoir (Reservoir) just outside of the PMA for the Project (Figure 3). Mitigation areas DG-1, DG-1 WOUS, DG-2A, DG-2B, and DG-3A are located on the east side of the Reservoir and mitigation areas DG-4, DG-4B, DG-4C, and DG-5 are located on the west side of the Reservoir. The mitigation areas are encompassed by the Hahamongna Watershed Park, which is heavily used for recreational activities, such as hiking, bird watching, horseback riding, and disc golf.

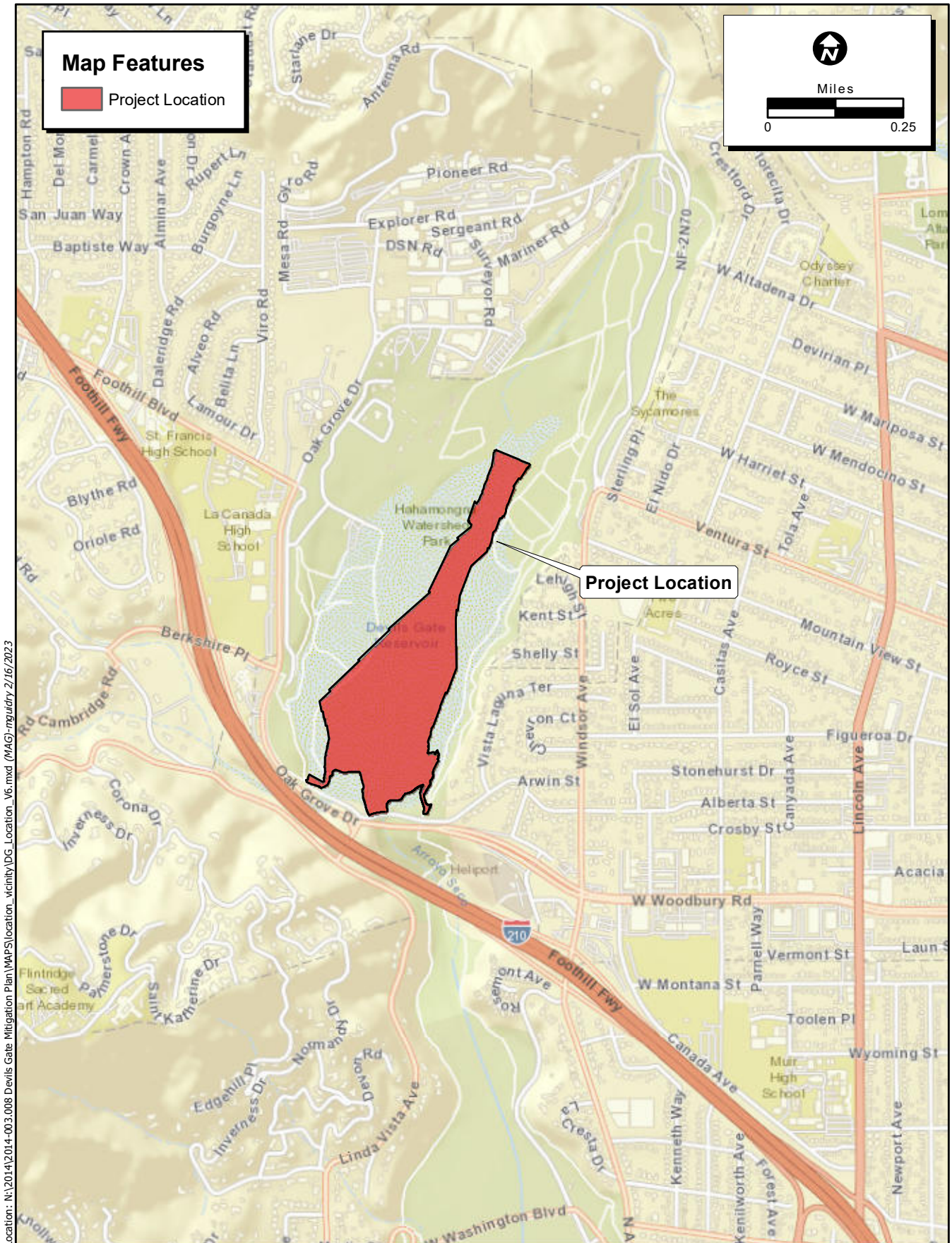
### 2.2 Mitigation Requirements

The LSAA issued by the CDFW for the Project on March 21, 2017 provided a breakdown of the required onsite and offsite compensatory mitigation for permanent impacts (Condition 3.1) as well as the mitigation required for the temporary impacts of the Project (Condition 3.2). The LSAA amendment issued on July 17, 2018 addressed a revision to the Project boundary that changed the overall impacts of the Project. In addition, the LSAA amendment included a revision to Condition 3.1, which addressed the changes in the required onsite mitigation. LACPW is currently in the process of preparing an LSAA amendment application that will account for changes to the permitted Project boundary resulting from clearing that occurred outside of the permitted Project boundary and to comply with the conditions of the finalized legal settlement. The conditions of the legal settlement resulted in minor changes to the Project boundary and a conversion of some permanent impact areas to temporary impacts. The HRP, which will be revised following the issuance of the amended LSAA, will incorporate all changes related to the legal settlement. Future annual reports will be based on the revised HRP requirements.

The original design of the onsite mitigation for the Project, which is what this annual report is based upon, included the creation, restoration, and enhancement of 69.94 acres subject to CDFW jurisdiction located outside of the PMA. The 69.94 acres of mitigation is required to compensate for permanent impacts to 41.98 acres of CDFW jurisdiction.







**Figure 2. Project Location**



Location: N:\2014\2014-003.008 Devils Gate Mitigation Plan\VA\PS\restoration\analysis\2020-09-15 Restoration\_Grading\DG\_MitigationAreas\_Restoration\_Phasing\_2021.0723.mxd (VAG) ngulduhy 8/24/2021

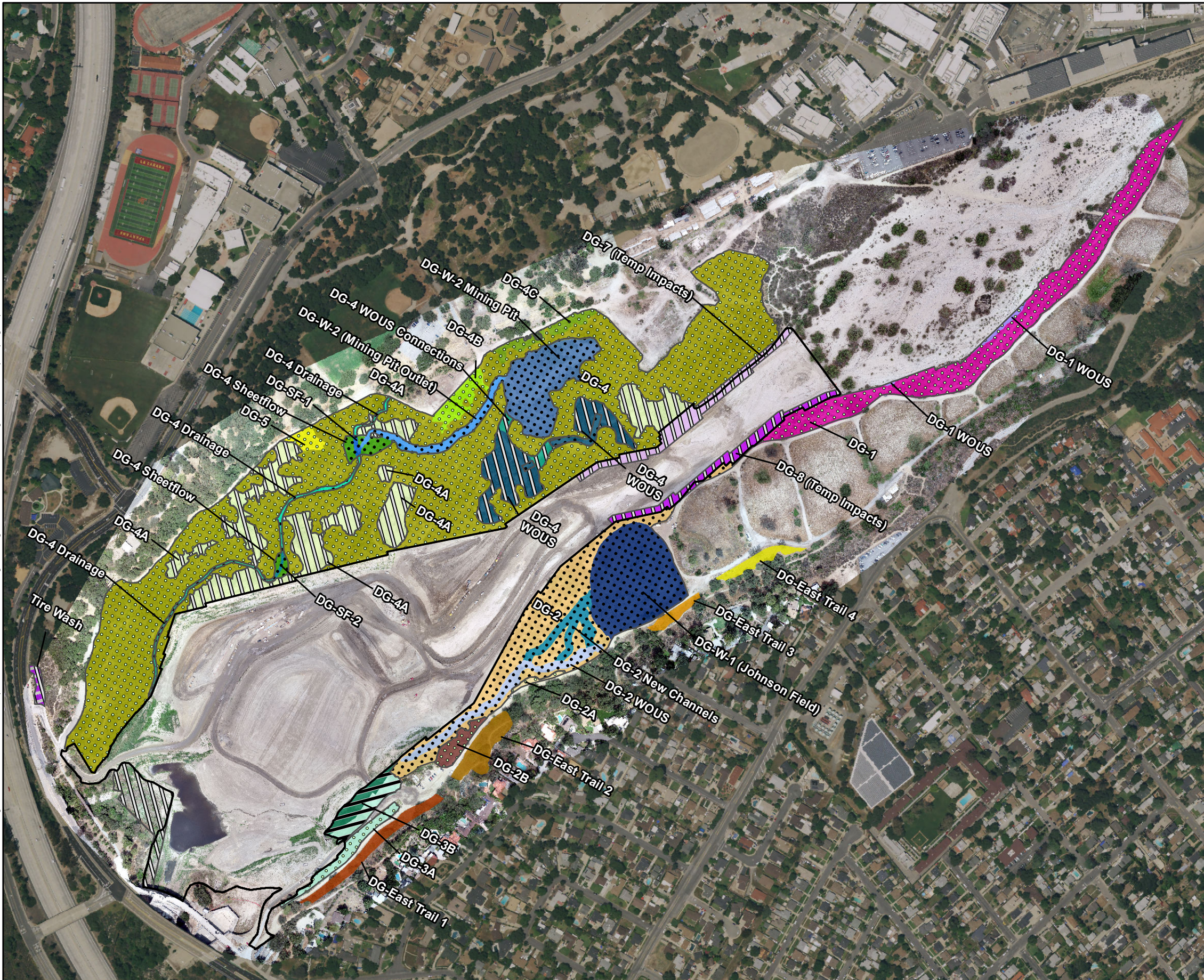
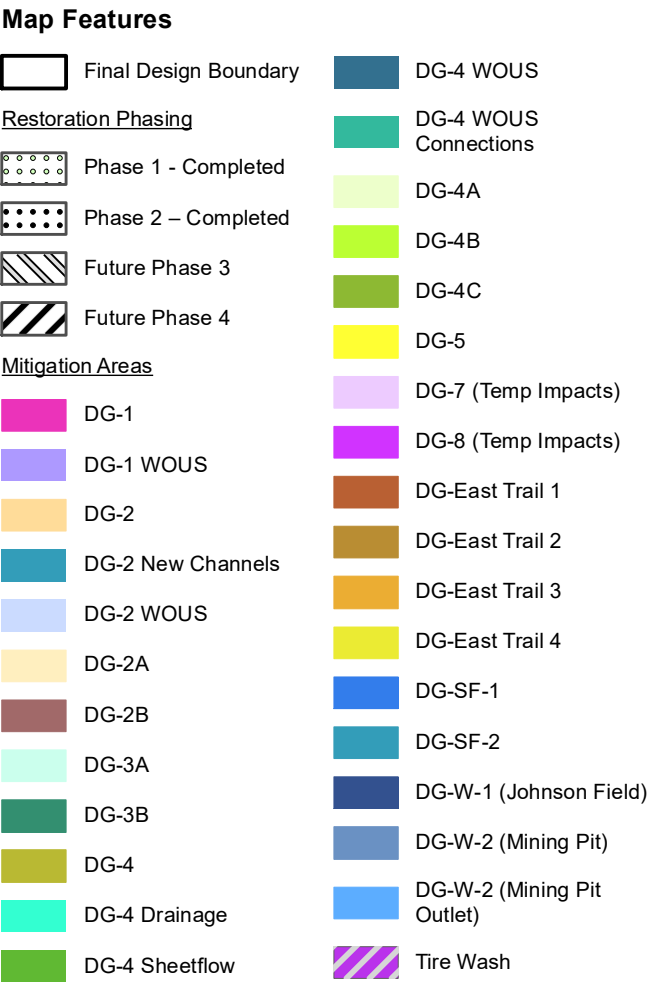
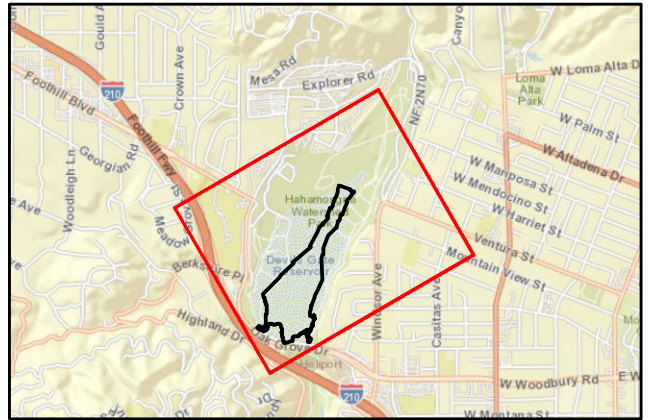


Figure 3.  
Onsite Habitat Mitigation Areas



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





The LSAA also requires mitigation for temporary impacts to 16.17 acres by delaying the impacts to these areas until the third year of sediment removal and replanting them within 24 months of the impacts. In addition, the Episodic Maintenance Area, or side slopes of the PMA, which encompasses 7.34 acres according to the original design, will be replanted with native vegetation, including shrub and annual species associated with riparian scrub and alluvial scrub vegetation communities. Allowing the side slopes of the Annual Maintenance Area to support native vegetation will provide additional compensatory mitigation by creating a riparian scrub buffer habitat between the areas that are actively managed in the annual maintenance area and the compensatory mitigation areas. The side slopes may be periodically affected by re-contouring if large sediment deposits bury portions of the side slopes. In this case, the sediment will be removed, and the side slopes will be re-contoured and allowed to naturally revegetate.

Onsite compensatory mitigation will include invasive and nonnative weed abatement, planting with native container stock, planting pole cuttings for specific species, seeding with native seed material, and maintaining and monitoring each mitigation area for a period of five years for riparian areas and ten years for upland areas, or until all success criteria have been met.

## **2.3 Ownership Status**

The mitigation areas are located on land owned by the City of Pasadena.

## **2.4 Mitigation for Impacts to Protected Trees**

During the course of construction for the Project, unavoidable impacts to trees protected under the City of Pasadena City Trees and Tree Protection Ordinance and/or the County of Los Angeles Oak Tree Ordinance occurred. A total of 0.606 acre of direct and indirect impacts to native tree canopy protected under the City of Pasadena City Trees and Tree Protection Ordinance, including 0.025 acre of impacts to western sycamore (*Platanus racemosa*), 0.159 acre of impacts to Fremont's cottonwood (*Populus fremontii*), and 0.421 acre of impacts to coast live oak (*Quercus agrifolia*), occurred as a result of the clearing in the Initial Sediment Removal Area and access road construction. In addition, impacts to coast live oak canopy that occurred during construction activities are also protected under the County of Los Angeles Oak Tree Ordinance. Per Condition 2.11 of the LSAA and Mitigation Measure BIO-7 (MM-BIO-7) of the Revised Final Environmental Impact Report (ECORP 2017), protected trees impacted during construction activities will be replaced at a 1:1 ratio by canopy acreage. In addition, per Condition 2.11 (B) of the LSAA, all oak trees that had their root protection zone encroached upon during construction activities shall be monitored annually for five years and also during Years 7 and 10. During Phase 1 of restoration activities, a total of 686 Fremont's cottonwoods (1-gal containers) and 474 coast live oaks (300 acorns and 174 1-gallon containers) were planted. Due to concerns with the polyphagous shot hole borer beetle (*Euwallacea* sp.) infestations in populations of western sycamore, this species was not planted during Phase 1 of restoration activities. If conditions allow, this species will be planted during future phases of restoration.



### 3.0 SUMMARY OF ONSITE HABITAT MITIGATION ACTIVITIES

Habitat restoration implementation was conducted by Natures Image and Gothic Landscape (Gothic), with oversight by Carley Lancaster (Restoration Ecologist, ECORP Consulting, Inc.), Josh Corona-Bennett (Senior Restoration Ecologist, ECORP), Mari Quillman (Biological Resources Program Manager, ECORP), Margie Pfeffer (Biologist, Stillwater Sciences), Wendy Katagi (Senior Manager, Watershed & Ecosystem Restoration Services, Stillwater), Dick Rol (Principal Landscape Architect, ICF International), and Anthony DeJulio (Vice President, ICF). ECORP and ICF are contractors to LACPW and Stillwater, Natures Image, and Gothic are subcontractors to ICF. Implementation of habitat restoration for Phase 1 was conducted in mitigation areas DG-1 WOUS, DG-1, DG-2A, DG-2B, DG-3A, DG-4, DG-4B, DG-4C, and DG-5. A total of six vegetation communities were included in the Phase 1 habitat restoration effort including Mulefat Thickets (*Baccharis salicifolia* Shrubland Alliance), Black Willow Thickets (*Salix gooddingii* Woodland Alliance), Coast Live Oak Woodland (*Quercus agrifolia* Woodland Alliance), California Buckwheat Scrub (*Eriogonum fasciculatum* Shrubland Alliance), Scale Broom Scrub (*Lepidospartum squamatum* Shrubland Alliance), and California Sagebrush – California Buckwheat Scrub (*Artemisia californica*-*Eriogonum fasciculatum* Shrubland Alliance). Habitat restoration implementation commenced on November 19, 2018 with nonnative and invasive plant removal and follow-up weed abatement efforts. Following the weed abatement efforts, soil ripping was conducted for mitigation area DG-5 to decompact the soil and to prepare the area for container plant installation and seed application. Following initial weed abatement efforts and soil ripping, container plant installation and seed application commenced in all Phase 1 mitigation areas. Implementation for Phase 1 was completed on February 13, 2020. A brief description of the habitat restoration implementation is provided in the following sections.

#### 3.1 Site Preparation

Site preparation activities primarily consisted of nonnative weed removal. Initial nonnative weed abatement activities commenced on November 19, 2018 and were completed on February 20, 2019. Follow-up weed abatement efforts commenced immediately following the completion of the initial weed abatement effort and have been ongoing for the Phase 1 mitigation areas. Pre-planting nonnative and invasive plant removal was conducted using a combination of hand-pulling, weed whips, and hula hoes. During the pre-planting weed removal efforts, all nonnative and invasive plant species that had gone to flower or seed were removed by hand or by using hand tools, placed on tarps, and disposed of in an onsite dumpster. Onsite dumpsters were picked up regularly and the nonnative and invasive plant materials were disposed of at an appropriate facility located outside of the Project site.

Species targeted during the initial nonnative and invasive plant removal included wild oat (*Avena fatua*), black mustard (*Brassica nigra*), red brome (*Bromus madritensis* ssp. *rubens*), poison hemlock (*Conium maculatum*), red-stemmed filaree (*Erodium cicutarium*), eucalyptus (*Eucalyptus* sp.), foxtail barely (*Hordeum murinum*), perennial pepperweed (*Lepidium latifolium*), and horehound (*Marrubium vulgare*). Even though these plant species were targeted for removal, all species of nonnative or invasive plants listed in the HRP were removed if they were encountered.

In addition to nonnative weed removal, jute netting was installed on the slopes of DG-3A in preparation for planting. The jute netting was installed to help stabilize the soil and prevent erosion in this mitigation area.

### **3.2 Irrigation Strategy**

A temporary aboveground poly-tube irrigation system with drip emitters was installed for mitigation areas DG-2A, DG-2B, DG-3A, DG-4, DG-4B, DB-4C, and DG-5. Because container plants and pole cuttings were not installed in mitigation areas DG-1 or DG-1 WOUS, an irrigation system was not installed for these areas. The irrigation system was installed and inspected prior to the planting of container plants and pole cuttings. The irrigation system is currently connected to a municipal water source and was fitted with a meter, pressure regulator, and back-flow preventer. Emitters were positioned within the planting basins of each container plant and pole cutting and according to the HRP, supplemental irrigation will continue to be applied for a period of no more than three years. However, if the mitigation areas need to be irrigated for a longer period of time to meet the success standards, then irrigation will continue. Irrigation and irrigation maintenance have been occurring at the rate specified in Table 8 of the HRP.

### **3.3 Seeding**

Upon completion of the initial weed abatement effort, the seeding process, which consisted of broadcast seeding, commenced on April 4, 2019. Seed used for the Project was procured from S&S Seeds Inc. and only seed materials collected within the acceptable geographic regions described in Section 4.9 of the HRP was used. Broadcast seeding was completed using hand-crank spreaders or it was simply spread by-hand. Seed was applied evenly throughout each mitigation area and incorporated into the soil to a depth of approximately 0.5 inch using bow rakes. To the extent possible, seed was applied during the fall, winter, or other periods when sufficient rainfall was expected to occur. In addition to the seed procured from S&S seeds, a total of 300 coast live oak acorns were installed by ECORP in mitigation area DG-3A. The coast live oak acorns were procured from Psomas and were collected within the Lower Arroyo Seco (between State Route-134 and South Pasadena) and public rights-of-way (i.e., streets/swales) in the cities of Arcadia, Monrovia, Pasadena, and Sierra Madre.

### **3.4 Container Plant Installation**

The container plant installation process commenced on August 8, 2019, after completion of the initial weed abatement effort. Container plants used for the Project were procured from Tree of Life Nursery and Rancho Santa Ana Botanic Garden and only container plants grown from seed collected within the acceptable geographic regions described in Section 4.9 of the HRP were used. Prior to installation, all plant material was inspected by the Restoration Ecologist (RE) to ensure that container stock was healthy and did not show signs of having pests or disease. Container stock determined to be in poor condition was rejected by the RE.

Container plant installation followed the methods described in Section 4.11 of the HRP. Container plants were planted using standard horticultural practices. Planting holes for all container plants, except oak trees, were dug to a width twice the size of the root ball and to a depth slightly deeper than the depth of

root ball so that the root crown was one inch below grade following installation. Oak trees were planted in a manner that the root crown was 0.5 to one inch above grade following installation (after soil settled following watering). Prior to installation, all plants were thoroughly watered in their containers and the soil in each of the planting holes was wetted with a minimum of one gallon of water. Planting holes were backfilled with native soil and irrigation basins were formed around the base of each planting. Basins were constructed to be a minimum of two feet wide and with a ridge no less than four inches. Rocks greater than two inches in diameter were removed to the extent possible from the backfill soil. Fertilizer was not added to backfill. Soil was tamped-in by hand to collapse air pockets in the backfill. All container plants were irrigated with a minimum of one gallon of water immediately following installation and basin creation. Container plants were planted in ecologically appropriate locations throughout the site and as directed by the RE.

In addition to container plants being installed in the Phase 1 areas, willow and mulefat stakes were also collected and installed in DG-3A and DG-4. Willow and mulefat stakes were collected from suitable donor sites in the Arroyo Seco north of the Project site. Additional willow and mulefat stakes were collected from the mitigation areas where existing vegetation was dense enough to withstand stake collection. Willow and mulefat stake collection followed the methods described in Section 4.10 of the HRP. To ensure establishment success, cuttings were harvested from live, dormant plants (i.e., willows) in late fall and early winter before the buds started to break. Willow and mulefat stakes were approximately three to four feet long and from one to two-inch diameter at their base. A diagonal cut was made at the base of each stake and the top was cut horizontally to differentiate the rooting end from the above ground end to aid in installation. Lateral branches were also removed during harvesting. The willow stakes were stored (no longer than 2 weeks) in buckets filled with water and in a cool shaded location until they were ready for planting. Immediately prior to installation, the stakes were dipped in a rooting hormone and then installed in pre-watered holes approximately two feet deep or with more than half of the cutting underground. The holes were backfilled and the soil around the stake tamped-in to ensure good soil to stem contact and no air pockets. The willow stakes were watered immediately following installation. All cuttings were provided with a drip emitter from the irrigation system

### **3.5 Site Protection**

To delineate the site and deter trespassers from entering the mitigation areas, Environmentally Sensitive Area signs were installed and in 2021, wooden post fencing connected with cables was installed along the boundaries of the mitigation areas (Figure 4). In addition, public outreach to recreational users of the area was conducted to educate the public on the restoration efforts. Lastly, stinging and thorny vegetation, including California blackberry (*Rubus ursinus*), California wild rose (*Rosa californica*), and stinging nettle (*Urtica dioica*), were planted in the mitigation areas to further deter entry.





Figure 4. Proposed Trails & Site Protection Map

**Map Features**

- Final Design Boundary
- Routine Annual Maintenance Area
- Arroyo Seco Trail
- Seasonal Trail
- Bike Trail
- Other Trail
- Proposed Park Access Sign Location
- Proposed ESA Sign Location
- Quick Release Maintenance Vehicle Access
- Proposed Site Protection Fencing (5,030 ft.)

**Mitigation Areas**

DG-1	DG-4A
DG-1 WOUS	DG-4B
DG-2	DG-4C
DG-2 New Channels	DG-5
DG-2 WOUS	DG-7 (Temp Impacts)
DG-2A	DG-8 (Temp Impacts)
DG-2B	DG-East Trail 1
DG-3A	DG-East Trail 2
DG-3B	DG-East Trail 3
DG-4	DG-East Trail 4
DG-4 Drainage	DG-SF-1
DG-4 Sheetflow	DG-SF-2
DG-4 WOUS	DG-W-1 (Johnson Field)
DG-4 WOUS Connections	DG-W-2 (Mining Pit)
	DG-W-2 (Mining Pit Outlet)





## **4.0 SUMMARY OF YEAR 3 MAINTENANCE ACTIVITIES**

### **4.1 Maintenance of Onsite Habitat Mitigation Areas**

Maintenance for the onsite habitat mitigation areas was conducted by Natures Image and Gothic, with oversight by Carley Lancaster (Restoration Ecologist, ECORP), Josh Corona-Bennett (Senior Restoration Ecologist, ECORP), Mari Quillman (Biological Resources Program Manager, ECORP), Margie Pfeffer (Biologist, Stillwater Sciences), Wendy Katagi (Senior Manager, Watershed & Ecosystem Restoration Services, Stillwater), Dick Rol (Principal Landscape Architect, ICF International), and Anthony DeJulio (Vice President, ICF). Maintenance activities during Year 3 focused mainly on nonnative weed abatement, native plant survival, and irrigation system maintenance. In addition, maintenance was performed for minor pest control, erosion control, and vandalism during Year 3.

#### **4.1.1 Nonnative Weed Abatement**

Prior to the commencement of restoration activities, many of the mitigation areas showed high levels of nonnative weed infestation (e.g., DG-4). Maintenance in the form of nonnative weed abatement commenced immediately following the initial weed abatement effort and has been ongoing for all of Years 1, 2 and 3. Nonnative plant species controlled during Year 3 included wild oat, black mustard, red brome, poison hemlock, red-stemmed filaree, foxtail barely, perennial pepperweed, horehound, curly dock (*Rumex crispus*), and tamarisk (*Tamarix ramosissima*).

During Year 1, herbicide application was employed for a brief period from February 22, 2019 to March 18, 2019; however, herbicide application was suspended due to public concerns and the Los Angeles County Board of Supervisors subsequently placed a moratorium on use of glyphosate at all County facilities until further notice. During the brief period of herbicide application, only herbicide registered for aquatic use and approved for use in wetland habitat restoration by the regulatory agencies (i.e. Roundup Custom™) was used. A blue marking dye was added to allow for the identification of areas sprayed. In addition, following the suspension of herbicide use, a hot water vapor machine was used to treat nonnative weeds in areas where native growth was minimal.

In addition, the stumps of the eucalyptus trees that were felled during the initial nonnative weed abatement effort and treated with copper nails during Year 1 were cut back on a regular basis when observed to be re-sprouting. Nonnative weed cover, especially perennial pepperweed, is a significant problem in portions of the mitigation areas. Because perennial pepperweed can produce dense colonies through seed germination and underground rhizomes (rhizomatous roots), removal of this species without the use of systemic herbicide is very difficult. A full list of nonnative plant species that have been detected within the mitigation areas is included in Appendix B.

During the Year 3 maintenance period, nonnative plant species were removed from mitigation areas with hand tools. If weeds had formed flowers or seeds prior to removal, the maintenance crew carefully contained the removed material to reduce the spread of seeds.

#### **4.1.2 Supplemental Planting**

Supplemental planting for the mitigation areas did not occur during Year 3 of restoration activities. Formal mortality counts were taken during the Year 1 botanical monitoring event and any required supplemental planting will occur during Phase 3 of restoration.

#### **4.1.3 Irrigation Maintenance**

During Year 3, the irrigation system was inspected for functionality on a regular basis by Natures Image and Gothic during routine maintenance activities to ensure the system was operating efficiently and that container plants were receiving adequate water. During the irrigation system inspections, the soil around the container plants was inspected to ensure proper saturation was occurring and emitters were inspected to maintain proper placement within the planting basins. Wildlife damage to irrigation lines was repaired on an as-needed basis.

#### **4.1.4 Pest Control**

Only minor herbivory of container plants was observed in the mitigation areas during Year 3. Most of the metal cages that were installed around the container plants during previous years were removed because the container plants are now well established and are unlikely to be significantly impacted by minor herbivory.

#### **4.1.5 Erosion Control**

Only minor erosion control for the mitigation areas was implemented during Year 3. Maintenance of the jute netting installed in DG-3A during site preparation was conducted on an as-needed basis. In addition, erosion of plant basins was addressed during regular maintenance activities. It should be noted that severe erosion occurred in December 2021 in the DG-3A mitigation area surrounding Altadena Drain. LACPW is working on design plans to redirect high intensity flows to the reservoir and repair the erosion; however, this work is still in the planning stage and was not implemented during Year 3.

#### **4.1.6 Vandalism**

Vandalism to the mitigation areas and the irrigation system was generally not observed in the Phase 1 mitigation areas during Year 3. Only minor damage to container plants, including broken branches and trampled basins, was observed. This appeared to generally be the result of pedestrian traffic through the mitigation areas.

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### **5.0 SUMMARY OF YEAR 3 MONITORING ACTIVITIES**

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#### **5.1 Monitoring of Onsite Habitat Mitigation areas**

Monitoring activities during Year 3 included both horticultural monitoring and botanical monitoring. Horticultural monitoring was performed quarterly during Year 3. Horticultural monitoring included monitoring soil moisture, irrigation system function, native plant germination, container plant health, nonnative plant species presence, invasive plant species presence, herbivory/pests/disease, erosion issues,

and site damage. Photo documentation of the mitigation areas occurred as necessary. In addition to horticultural monitoring, botanical monitoring was conducted in the summer of Year 3. Monitoring events that occurred during Year 3 and the remainder of Year 2 (following the Year 2 botanical monitoring event) are listed in Table 1 below.

<b>Table 1. Onsite Habitat Mitigation Site Monitoring Events</b>	
<b>Date</b>	<b>Monitoring Type</b>
11/19/22	Horticultural Monitoring
02/23/22	Horticultural Monitoring
05/19/22	Horticultural Monitoring
07/01/22	Botanical Monitoring
07/12/22	Botanical Monitoring
07/13/22	Botanical Monitoring
07/14/22	Botanical Monitoring
08/11/22	Botanical Monitoring
08/17/22	Botanical Monitoring/Quarterly Horticultural Monitoring
8/26/22	Horticultural Monitoring

## 5.2 Horticultural Monitoring Summary

### 5.2.1 Soil Moisture and Irrigation Functionality

Soil moisture levels were assessed throughout the mitigation areas during the horticultural monitoring visits. Soil moisture depth was typically determined using a handheld garden trowel to dig below the surface. In addition to assessing soil moisture, irrigation lines were inspected for functionality. Minor issues with the irrigation system, including misplaced emitters, animal damage to the irrigation line, and vandalism were observed during Year 3. These issues were immediately brought to the attention of Natures Image and were resolved in a timely manner. Soil moisture depth varied throughout the year and provided insight into the water-holding capacity of the soil. Soils at the mitigation areas were draining sufficiently, but some areas drained more slowly than others.

### 5.2.2 Native Plant Germination

Multiple native plant species were observed to be germinating in the mitigation areas during Year 3. Native plant germination appeared to be from both the seed mix and natural recruitment. Native plant species observed germinating in the mitigation areas during the Year 3 monitoring included annual bursage (*Ambrosia acanthicarpa*), California sagebrush (*Artemisia californica*), miniature suncup (*Camissoniopsis micrantha*), common sandaster (*Corethrogyne filaginifolia*), chaparral yucca (*Hesperoyucca whipplei*), ladies' tobacco (*Pseudognaphalium californicum*), scale broom (*Lepidospartum squamatum*), mugwort (*Artemisia douglasiana*), deerweed (*Acmispon glaber*), California poppy (*Eschscholzia californica*), telegraph weed (*Heterotheca grandiflora*), salt heliotrope (*Heliotropium curassavicum*), tarragon (*Artemisia dracunculus*), wild cucumber (*Mara macrocarpa*), common phacelia (*Phacelia distans*), chia (*Salvia columbariae*), mulefat (*Baccharis salicifolia*), Douglas' nightshade (*Solanum douglasii*), California rose (*Rosa*

*californica*), cobweb thistle (*Cirsium occidentale*), Parry's phacelia (*Phacelia parryi*), western ragweed (*Ambrosia psilostachya*), evening primrose (*Oenothera elata*), Jimson weed (*Datura wrightii*), beardless wildrye (*Elymus triticoides*), Canada horseweed (*Erigeron canadensis*), California buckwheat (*Eriogonum fasciculatum*) and caterpillar phacelia (*Phacelia cicutaria*).

### **5.2.3 Container Plant Health**

Container plant health varied throughout the year, with spring showing the most prolific growth. Seasonal dieback of the willow species (*Salix* sp.) and Fremont's cottonwoods was observed during both the horticultural monitoring visits during the fall and winter months. Overall, the container plants are healthy and are becoming well established.

### **5.2.4 Nonnative and Invasive Plant Species**

Nonnative plant species presence within the mitigation areas varied during Year 3 and was most abundant during the spring. Perennial pepperweed is very dense and established in some of the mitigation areas, especially portions of DG-4. Because perennial pepperweed can produce dense colonies through seed germination and underground rhizomes (rhizomatous roots), removal of this species without the use of systemic herbicide is very difficult. Nonnative plant species encountered within the mitigation areas during Year 3 were removed using hand tools, including hula hoes and weed whips. All planting basins were hand-weeded to avoid damage from mechanical tool.

### **5.2.5 Herbivory, Plant Pests, and Plant Disease**

Minor herbivory of container plants was observed within the mitigation areas during Year 3. The species most targeted by herbivory included California rose, California buckwheat, and basket rush (*Juncus textilis*). In addition, some of the Phase 2 mitigation areas had confirmed presence of the polyphagous shot hole borer beetle and LACPW is working with the Los Angeles Agricultural Commissioner Weights and Measures to control the infestation. None of the Phase 1 areas showed signs of moderate or severe infestation.

In addition to herbivory, dodder (*Cuscuta* sp.) was observed to be an issue in several of the mitigation areas. Species most affected by dodder included willows and blue elderberry (*Sambucus nigra* ssp. *caerulea*). Although many species of dodder are native, this parasitic plant can be harmful to younger shrubs and trees that are not yet established and can even cause mortality. Following observations of dodder within the mitigation areas, removal of this species from affected plants was implemented during weed abatement efforts.

### **5.2.6 Erosion Issues**

Erosion issues were observed within the Phase 1 mitigation areas during Year 3, including severe erosion to the DG-3A mitigation area surrounding Altadena Drain. The steeper slopes in DG-3A were also observed to be affected by erosion. Erosion in these areas occurred during the rainy season, especially in December of 2021. Rainfall during this period has carved a channel that flows to the south of Altadena



Drain before connecting to the reservoir where severe berm erosion continues to occur. Repairs to jute netting, irrigation lines, and plant basins were conducted during Year 3 on an as-needed basis.

### **5.2.7 Photo Documentation**

Photo documentation occurred throughout Year 3 during the horticultural monitoring and botanical monitoring. Permanent photo points were established during the Year 1 botanical monitoring and will be used during subsequent monitoring years to document the progress of the mitigation areas. Photo documentation completed during botanical monitoring is included as Appendix C.

## **5.3 Botanical Monitoring Summary**

### **5.3.1 Botanical Monitoring Methods**

Botanical monitoring for Year 3 was conducted during the spring and summer. Container plant survival was determined by counting all container plants that were dead, missing, or in a condition unlikely to survive. If a volunteer or recruit of the same species originally planted was determined to be growing within the planting basin (or within 1 meter of that basin) of a dead container plant, then that plant was counted toward the survival total. Native and nonnative plant cover was determined using a modified point-line intercept method along established transect lines (Elzinga et al. 2001). During Year 1, a total of 25 transect lines were established randomly throughout the mitigation areas (Figure 5). In addition, a total of 7 transect lines were established in undisturbed reference sites with similar vegetation communities as the mitigation areas (Figure 6). The start and end of each transect line was marked with steel rebar and a plastic orange cap and Global Positioning System (GPS) coordinates were recorded using an iPad equipped with ArcGIS software to document the start and end locations of each transect. The number of transects and the length of transects established in each mitigation area followed the guidance provided in Section 7.1.2 of the HRP.

In addition, per Condition 2.11 (B) of the LSAA, all oak trees that had their root protection zone encroached upon during construction activities were assessed visually for their health and vigor during the botanical monitoring visit. Coast live oak was the only species of oak impacted during construction activities and the monitoring was conducted for tree tag numbers 3, 32 through 38, 52, and 72 from Tables 1 and 2 in the Oak Tree Inventory Report for the Devil's Gate Reservoir dated November 2018 (ECORP 2018b). In addition, one coast live oak that did not have its root protection zone impacted during construction activities, tree tag number 39, was also assessed during the monitoring.

Reference sites were established during Year 1 for Riversidean Alluvial Fan Sage Scrub (RAFSS), Coastal Sage Scrub (CSS), oak woodland, riparian scrub, riparian woodland, and least Bell's vireo (LBVI) habitats. Reference sites were relatively undisturbed and had vegetation composition similar to the goal vegetation communities for the mitigation areas. The reference site for the LBVI habitat was selected in undisturbed riparian habitat with mature riparian trees and a well-established understory. In addition, the reference site for LBVI habitat was selected in occupied habitat where the species has been known to be present for the past several years. Data for the reference sites was not collected during Year 3 and the data from Year 1 will be used for comparison.



Location: N:\2014\2014-003\_008 Devils Gate Mitigation Plan\MAPS\restoration\analysis\2020-11-10 Restoration\_DC\_Restoration\_Monitoring\_DC\_Restoration\_Monitoring\_20201118.mxd (MAG-mguldry 12/8/2020)



**Figure 5. Transect Locations  
Onsite Mitigation Areas**  
Page 1 of 8

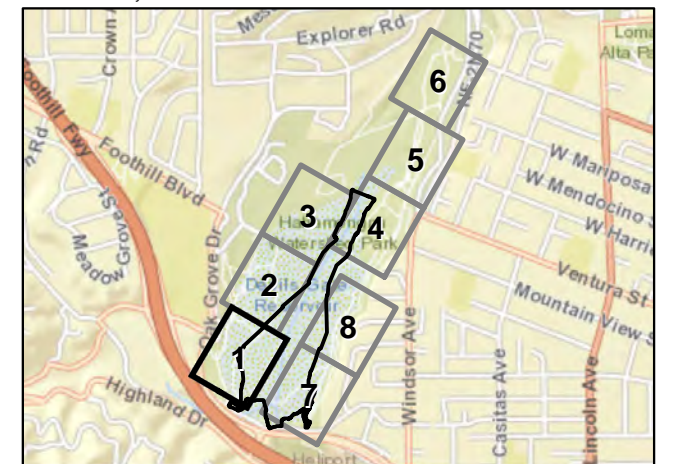
**Map Features**

- Final Design Boundary
- Photo Location and Direction
- Transect Start
- Transect End
- Restoration Transect

**Mitigation Areas**

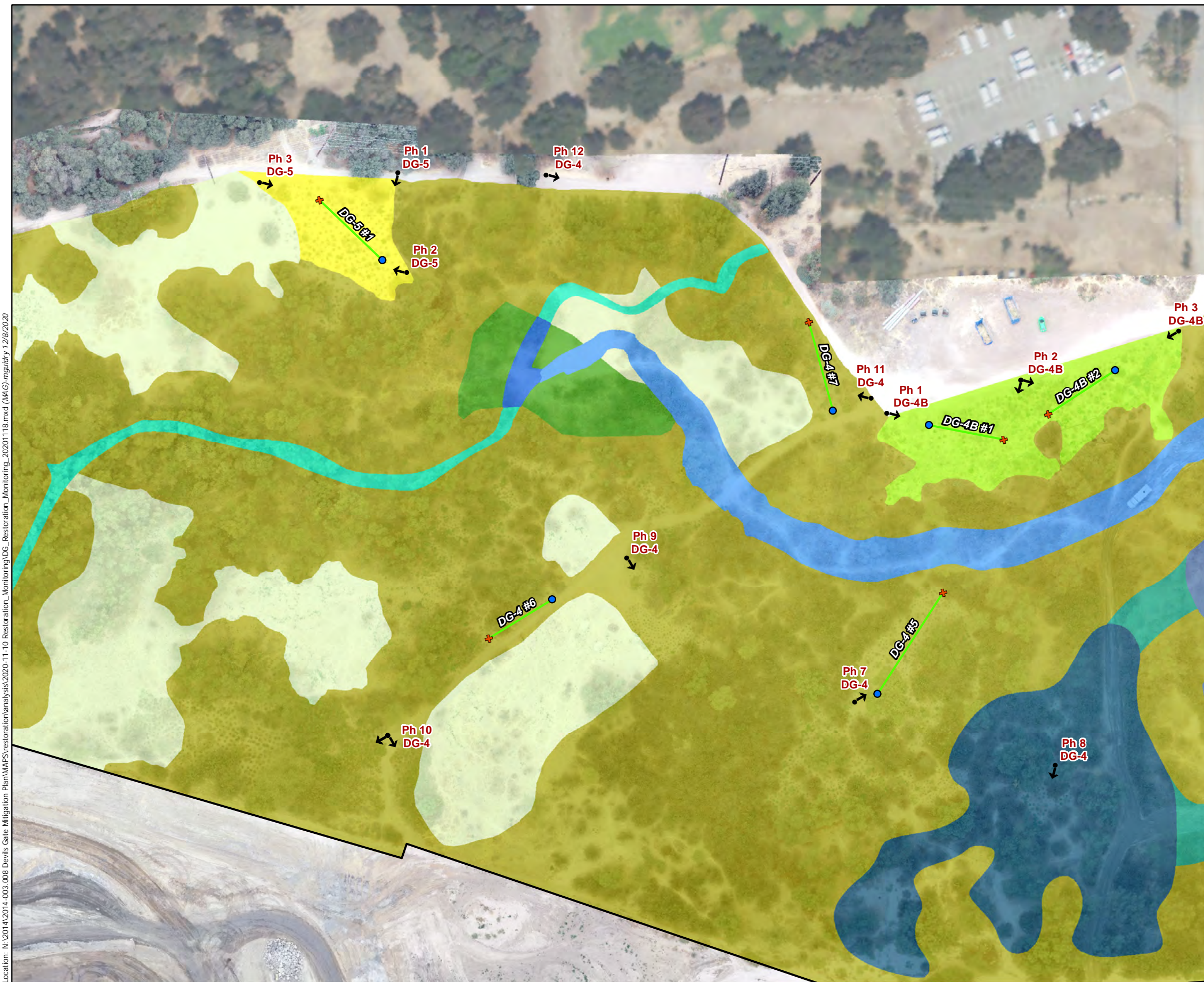
- DG-4
- DG-4 Drainage
- DG-4 Sheetflow
- DG-4A
- DG-SF-2

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





Location: N:\2014\2014-003\_008 Devils Gate Mitigation Plan\MAPS\restoration\analysis\2020-11-10 Restoration\_Monitoring\DC\_Restoration\_Monitoring\_20201118.mxd (MAG:mgludry 12/8/2020)



**Figure 5. Transect Locations  
Onsite Mitigation Areas**  
Page 2 of 8

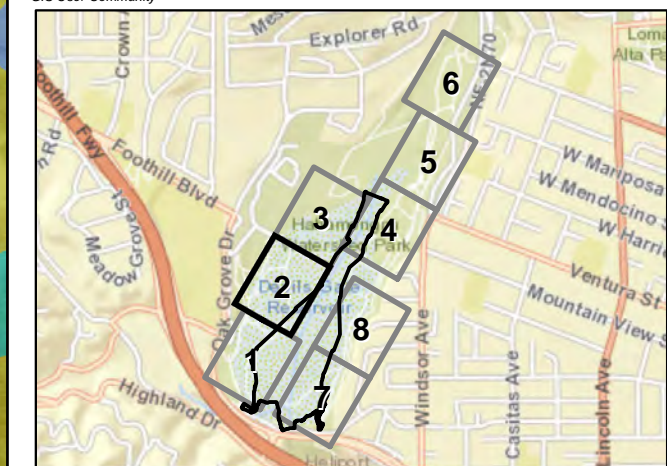
**Map Features**

- Final Design Boundary
- Photo Location and Direction
- Transect Start
- Transect End
- Restoration Transect

**Mitigation Areas**

- DG-4
- DG-4 Drainage
- DG-4 Sheetflow
- DG-4 WOUS
- DG-4 WOUS Connections
- DG-4A
- DG-4B
- DG-5
- DG-SF-1
- DG-W-2 (Mining Pit)
- DG-W-2 (Mining Pit Outlet)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





Location: N:\2014\2014-003\_008 Devils Gate Mitigation Plan\WAPs\restoration\analysis\2020-11-10 Restoration\_Monitoring\DC\_Restoration\_20201118.mxd (MAG-mguldry 12/8/2020)



**Figure 5. Transect Locations  
Onsite Mitigation Areas**  
Page 3 of 8

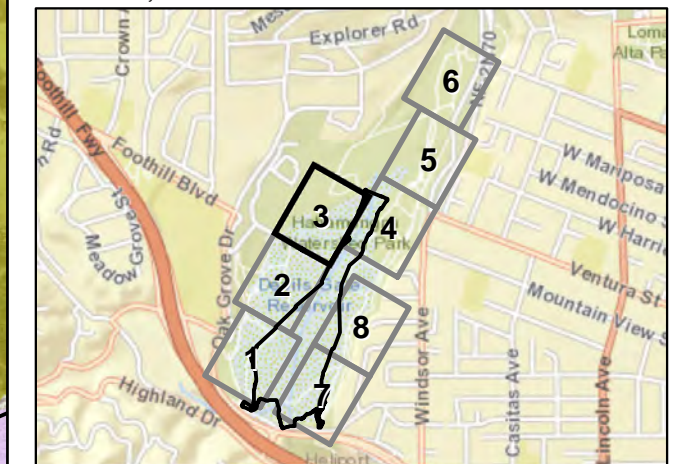
**Map Features**

- Final Design Boundary
- Photo Location and Direction
- Transect Start
- Transect End
- Restoration Transect

**Mitigation Areas**

- DG-4
- DG-4 WOUS
- DG-4 WOUS Connections
- DG-4A
- DG-4C
- DG-7 (Temp Impacts)
- DG-W-2 (Mining Pit)
- DG-W-2 (Mining Pit Outlet)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





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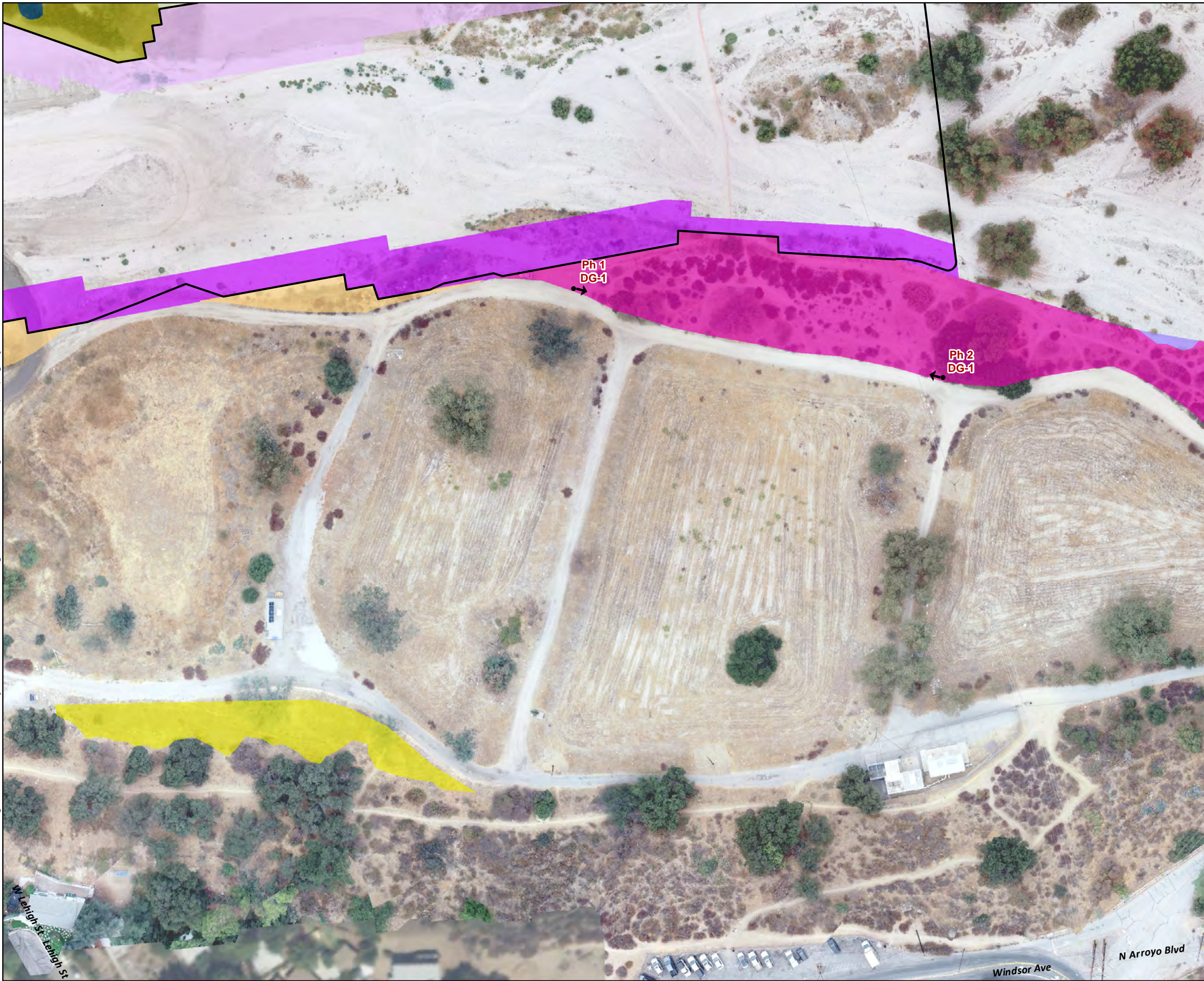


Figure 5. Transect Locations  
Onsite Mitigation Areas  
Page 4 of 8

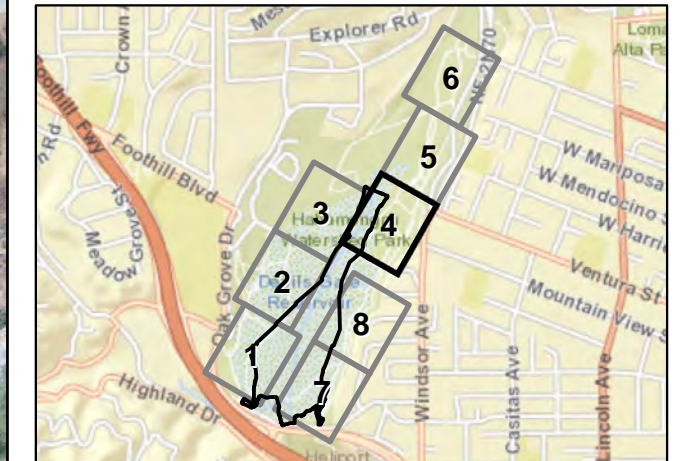
Map Features

- Final Design Boundary
- Photo Location and Direction

Mitigation Areas

- DG-1
- DG-1 WOUS
- DG-2
- DG-4
- DG-4 WOUS
- DG-4A
- DG-7 (Temp Impacts)
- DG-8 (Temp Impacts)
- DG-East Trail 4

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





Location: N:\2014\2014-003\_008 Devils Gate Mitigation Plan\MAPS\restoration\analysis\2020-11-10 Restoration\_Monitoring\DC\_Restoration\_Monitoring\_20201118.mxd (MAG-mguldry 12/8/2020)



Figure 5. Transect Locations  
Onsite Mitigation Areas  
Page 5 of 8

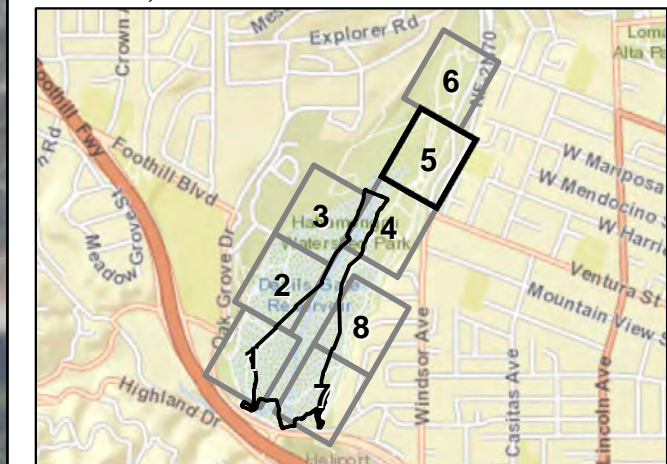
Map Features

- ↑ Photo Location and Direction
- Transect Start
- ✚ Transect End
- Restoration Transect

Mitigation Areas

- DG-1
- DG-1 WOUS

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





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Figure 5. Transect Locations  
Onsite Mitigation Areas  
Page 6 of 8

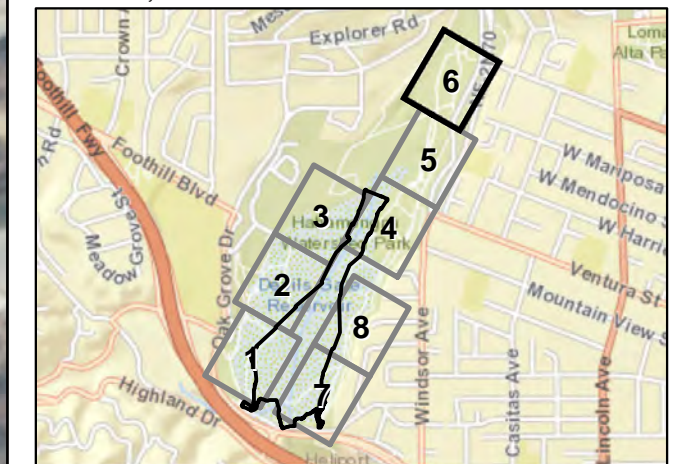
Map Features

- ↑ Photo Location and Direction
- Transect Start
- ✚ Transect End
- Restoration Transect

Mitigation Areas

- DG-1

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





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**Figure 5. Transect Locations  
Onsite Mitigation Areas**  
Page 7 of 8

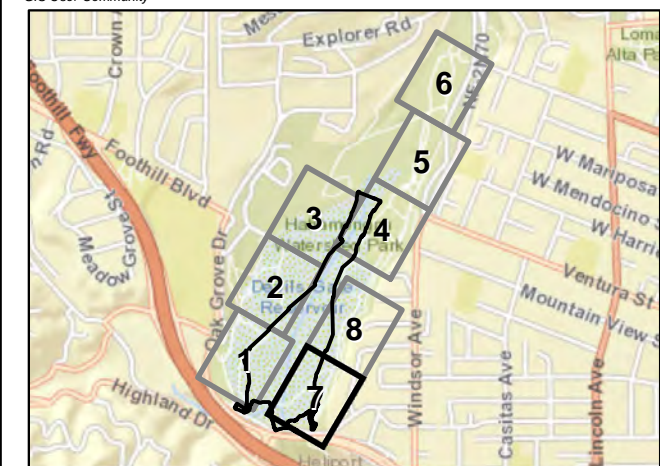
**Map Features**

- Final Design Boundary
- Photo Location and Direction
- Transect Start
- Transect End
- Restoration Transect

**Mitigation Areas**

- DG-2
- DG-2 WOUS
- DG-3A
- DG-3B
- DG-East Trail 1

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





Location: N:\2014\2014-003\_008 Devils Gate Mitigation Plan\WAPS\restorationanalysis\2020-11-10 Restoration\_Monitoring\DC\_Restoration\_Monitoring\_20201118.mxd (MAG)mguidry 12/8/2020



Figure 5. Transect Locations  
Onsite Mitigation Areas

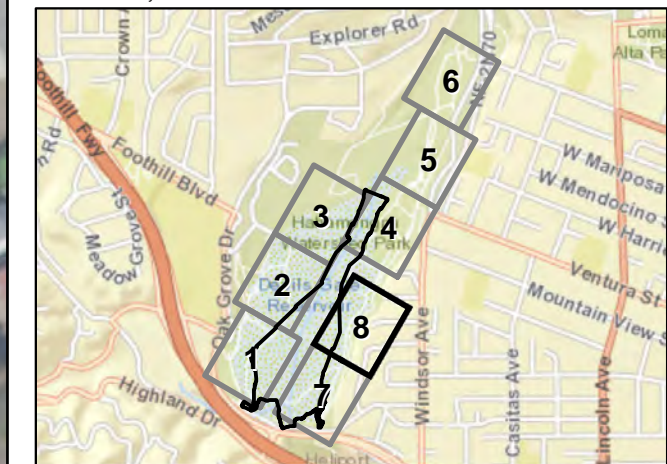
Map Features

- Final Design Boundary
- Photo Location and Direction
- Transect Start
- Transect End
- Restoration Transect

Mitigation Areas

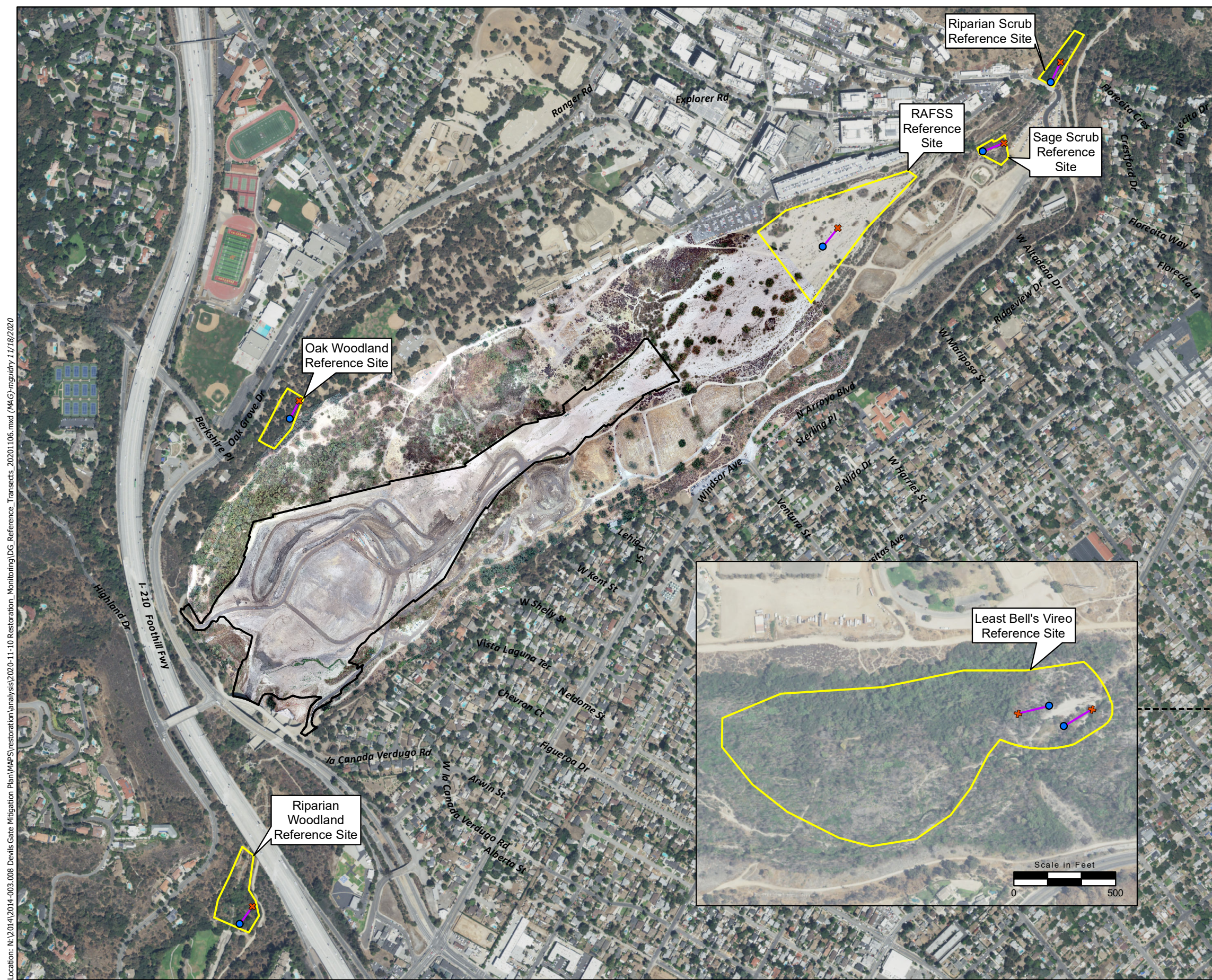
- DG-2
- DG-2 New Channels
- DG-2 WOUS
- DG-2A
- DG-2B
- DG-East Trail 1
- DG-East Trail 2
- DG-East Trail 3
- DG-W-1 (Johnson Field)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





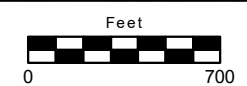
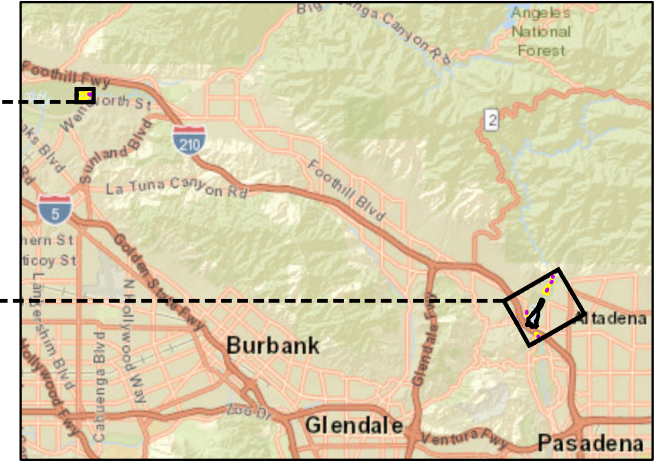
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**Figure 6.**  
**Transect Locations Reference Sites**

- Map Features**
- Final Design Boundary <sup>1</sup>
  - Reference Site
  - Reference Transect
  - Transect Start
  - Transect End

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community





Data was collected along each transect at every 0.5 m (sampling location), starting at 0.5 m. Each plant species that intersected the transect tape at each sampling location was recorded. A sampling dowel was used to assist in determining which plant species intersected the transect tape at each sampling location. In situations where the canopy of a plant intersected the transect tape at a sampling location, that species was also recorded; this included tree species with an overhead canopy. If only one plant species intersected the transect tape at any sampling location, that species received one tally mark. In situations where multiple plant species intersected the transect tape at a sampling location, those plant species received a fraction of a tally mark dependent on the number of species that intersected the transect tape at that sampling location.

Bare ground, rock, and litter were also recorded along each transect in areas that had no plant overlap. Species occurrence along each transect line was totaled and divided by the number of sampling points and multiplied by 100 to derive the percent cover (total cover) along each transect. Species richness was determined for each mitigation area and reference site by documenting the native species that occurred within a belt transect. The belt transects extended one meter to the left and right of each of the 25 transects within the mitigation areas and the 7 transects within the reference sites.

Per the requirements of Section 7.1.4 in the HRP, groundwater data collected by the City of Pasadena and the Jet Propulsion Laboratory (JPL) was provided to ECORP for the 2022 monitoring year. Data provided by the City of Pasadena was collected at three wells on the east side of the Devil's Gate Reservoir towards the northern portion of the Project area. This data was collected on October 17, 2022 (Year 2) and includes the depth in feet from the reference elevation to the static water surface (i.e., static water level). Data provided by JPL was collected at 26 wells to the north, east, and west of the Devil's Gate Reservoir. This data was collected on January 28, 2022 and April 22, 2022 (Year 2) and includes water level data in feet above msl.

## **5.3.2 Botanical Monitoring Results**

The botanical monitoring included determining results for survivorship of the container plantings, percent native and nonnative cover, and species richness of the vegetation communities in the mitigation areas, the vegetation communities in the LBVI areas, and at the reference sites. In addition, groundwater data was obtained from the City of Pasadena. The results are included in the following sections.

### ***5.3.2.1 Container Plant Survivorship***

Year 3 survival counts were conducted during the annual botanical monitoring. Overall, plant mortality for Year 3 was found to be low with survivorship ranging from 72.6 to 96.1 percent in the mitigation areas. The overall survivorship percentage for container plants in the Phase 1 restoration areas was 93.1 percent. The container plant survival data is listed in Table 2.

<b>Table 2. Container Plant Survivorship</b>						
<b>Mitigation Area</b>	<b>Container Plants</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4<sup>3</sup></b>	<b>Year 5<sup>3</sup></b>
DG-2A	Number Planted	120	120 <sup>2</sup>	120 <sup>2</sup>		
	Number of Mortalities	8	0	0		
	Survivorship (%) <sup>1</sup>	93.3	93.3	93.3		
DG-2B	Number Planted	456	456 <sup>2</sup>	456 <sup>2</sup>		
	Number of Mortalities	24	0	0		
	Survivorship (%) <sup>1</sup>	94.7	94.7	94.7		
DG-3A	Number Planted	687	687 <sup>2</sup>	687 <sup>2</sup>		
	Number of Mortalities	172	12	4		
	Survivorship (%) <sup>1</sup>	74.9	73.2	72.6		
DG-4	Number Planted	10,581	10,581 <sup>2</sup>	10,581 <sup>2</sup>		
	Number of Mortalities	514	51	6		
	Survivorship (%) <sup>1</sup>	95.1	94.7	94.6		
DG-4B	Number Planted	648	648 <sup>2</sup>	648 <sup>2</sup>		
	Number of Mortalities	22	0	3		
	Survivorship (%) <sup>1</sup>	96.6	96.6	96.1		
DG-4C	Number Planted	542	542 <sup>2</sup>	542 <sup>2</sup>		
	Number of Mortalities	44	10	3		
	Survivorship (%) <sup>1</sup>	91.9	90.0	89.5		
DG-5	Number Planted	312	312 <sup>2</sup>	312 <sup>2</sup>		
	Number of Mortalities	46	0	0		
	Survivorship (%) <sup>1</sup>	85.3	85.3	85.3		
Overall	Number Planted	13,346	13,346 <sup>2</sup>	13,346 <sup>2</sup>		
	Number of Mortalities	830	73	16		
	Survivorship (%) <sup>1</sup>	93.7	93.2	93.1		

<sup>1</sup>If a volunteer or recruit of the same species originally planted was determined to be growing within the planting basin (or within one meter of that basin) of a dead container plant, then that plant was counted toward the survival total.

<sup>2</sup>Cumulative number of plants installed.

<sup>3</sup>To be determined.

### 5.3.2.2 Percent Native and Nonnative Cover – Mitigation Areas

Native cover for the Phase 1 mitigation areas continued to show improvements during Year 3. Overall native cover (perennial plus annual) increased during Year 3 for the CSS, oak woodland, riparian, and LBVI mitigation areas. The overall native cover for the RAFSS mitigation area decreased from the Year 2 results, which was likely the result of scouring in the channel caused by heavy storm flows during the rainy season. Nonnative cover during Year 3 tended to be low from mid-summer to late winter and invasive cover for the mitigation areas ranged from zero percent to one percent during the annual monitoring. As native cover increases and nonnative seed banks are depleted from continual weed abatement, it is expected that nonnative weed cover will continue to decrease during future monitoring years. It should be noted, that due to inaccessibility at Altadena Drain, Transect 4 for DG-3A could not be assessed during the Year 3 monitoring event.

Table 3 presents a summary of Year 3 native (perennial/annual) and nonnative cover data for the mitigation areas. The average overall native perennial cover in the RAFSS mitigation areas was 25.0

percent with zero percent cover of native annuals, nonnatives, and invasive plants. For the CSS mitigation areas, the average overall native perennial cover was 59.1 percent, the native annual cover was 6.6 percent, and the percent cover of nonnative/invasive plants species was 0.4 and 0.0 percent, respectively. For the oak woodland mitigation areas, the average overall native perennial cover was 56.8 percent, the native annual cover was 15.5 percent, and the percent cover of nonnative/invasive plants species was 0.0 percent, respectively. For the riparian mitigation areas, the average overall native perennial cover was 51.3 percent, the native annual cover was 18.4 percent, and the percent cover of nonnative/invasive plant species was 1.3 and 1.0 percent, respectively. Finally, in the LBVI mitigation areas, the average overall native perennial cover of 65.8 percent, the native annual cover was 11.3 percent, and the percent cover of nonnative/invasive plants was 1.2 and 0.7 percent, respectively.

<b>Table 3. Percent Native/Nonnative Cover Mitigation Areas</b>						
<b>Transect and Transect Length</b>	<b>Vegetation Type</b>	<b>Year 1 (%)</b>	<b>Year 2 (%)</b>	<b>Year 3 (%)</b>	<b>Year 4<sup>1</sup></b>	<b>Year 5<sup>1</sup></b>
<b>Riversidean Alluvial Fan Sage Scrub (RAFSS)</b>						
DG-1 WOUS Transect 1 (35 m)	Perennial	45.0	46.4	25.0		
	Annual	0.0	0.7	0.0		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	0.0	1.4	0.0		
<b>RAFSS Overall<sup>3</sup></b>	<b>Perennial</b>	<b>45.0</b>	<b>46.4</b>	<b>25.0</b>		
	<b>Annual</b>	<b>0.0</b>	<b>0.7</b>	<b>0.0</b>		
	<b>Nonnative</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>		
	<b>Invasive<sup>2</sup></b>	<b>0.0</b>	<b>1.4</b>	<b>0.0</b>		
<b>Coastal Sage Scrub (CSS)</b>						
DG-1 Transect 1 (45 m)	Perennial	55.6	54.4	49.4		
	Annual	0.0	0.0	5.0		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	3.3	2.2	0.0		
DG-1 Transect 2 (50 m)	Perennial	35.5	57.0	44.7		
	Annual	14.1	2.5	11.3		
	Nonnative	1.8	0.0	0.0		
	Invasive <sup>2</sup>	7.7	3.5	0.0		
DG-1 Transect 3 (50 m)	Perennial	64.1	55.5	59.5		
	Annual	0.0	3.0	6.5		
	Nonnative	1.0	0.5	0.0		
	Invasive <sup>2</sup>	7.9	1.4	0.0		
DG-4 Transect 1 (50 m)	Perennial	39.0	61.8	88.2		
	Annual	5.0	16.8	8.8		
	Nonnative	1.5	0.0	2.0		
	Invasive <sup>2</sup>	5.5	4.3	0.0		

<b>Table 3. Percent Native/Nonnative Cover Mitigation Areas</b>						
<b>Transect and Transect Length</b>	<b>Vegetation Type</b>	<b>Year 1 (%)</b>	<b>Year 2 (%)</b>	<b>Year 3 (%)</b>	<b>Year 4<sup>1</sup></b>	<b>Year 5<sup>1</sup></b>
DG-4 Transect 2 (40 m)	Perennial	10.0	44.4	53.8		
	Annual	0.0	0.0	1.3		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	5.0	1.9	0.0		
<b>CSS Overall<sup>3</sup></b>	<b>Perennial</b>	<b>40.8</b>	<b>54.6</b>	<b>59.1</b>		
	<b>Annual</b>	<b>3.8</b>	<b>4.5</b>	<b>6.6</b>		
	<b>Nonnative</b>	<b>0.9</b>	<b>0.1</b>	<b>0.4</b>		
	<b>Invasive<sup>2</sup></b>	<b>5.9</b>	<b>3.0</b>	<b>0.0</b>		
<b>Coast Live Oak Woodland</b>						
DG-3A Transect 1 (20 m)	Perennial	26.7	48.3	61.3		
	Annual	26.3	13.0	11.3		
	Nonnative	11.0	2.7	0.0		
	Invasive <sup>2</sup>	0.0	2.0	0.0		
DG-3A Transect 2 (25 m)	Perennial	18.3	51.3	52.3		
	Annual	24.7	16.7	19.7		
	Nonnative	17.0	1.0	0.0		
	Invasive <sup>2</sup>	0.0	1.0	0.0		
<b>Coast Live Oak Woodland Overall<sup>3</sup></b>	<b>Perennial</b>	<b>22.5</b>	<b>49.8</b>	<b>56.8</b>		
	<b>Annual</b>	<b>25.5</b>	<b>14.8</b>	<b>15.5</b>		
	<b>Nonnative</b>	<b>14.0</b>	<b>1.8</b>	<b>0.0</b>		
	<b>Invasive<sup>2</sup></b>	<b>0.0</b>	<b>1.5</b>	<b>0.0</b>		
<b>Riparian</b>						
DG-3A Transect 3 (20 m)	Perennial	15.0	25.0	31.3		
	Annual	15.0	27.5	16.3		
	Nonnative	10.0	2.5	0.0		
	Invasive <sup>2</sup>	0.0	0.0	0.0		
DG-3A Transect 4 <sup>4</sup> (10 m)	Perennial	57.5	90.9	NA		
	Annual	7.5	0.0	NA		
	Nonnative	5.0	0.0	NA		
	Invasive <sup>2</sup>	0.0	9.2	NA		
DG-4 Transect 4 (30 m)	Perennial	33.3	70.8	76.4		
	Annual	19.2	4.2	20.3		
	Nonnative	0.0	0.0	2.5		
	Invasive <sup>2</sup>	4.2	3.3	2.5		
DG-4 Transect 8 (30 m)	Perennial	21.9	35.0	46.4		
	Annual	5.8	0.0	18.6		
	Nonnative	10.6	1.7	1.4		
	Invasive <sup>2</sup>	0.0	0.0	0.56		
<b>Riparian Overall<sup>3</sup></b>	<b>Perennial</b>	<b>31.9</b>	<b>55.4</b>	<b>51.3</b>		
	<b>Annual</b>	<b>11.9</b>	<b>7.9</b>	<b>18.4</b>		

<b>Table 3. Percent Native/Nonnative Cover Mitigation Areas</b>						
<b>Transect and Transect Length</b>	<b>Vegetation Type</b>	<b>Year 1 (%)</b>	<b>Year 2 (%)</b>	<b>Year 3 (%)</b>	<b>Year 4<sup>1</sup></b>	<b>Year 5<sup>1</sup></b>
	<b>Nonnative</b>	<b>6.4</b>	<b>1.0</b>	<b>1.3</b>		
	<b>Invasive<sup>2</sup></b>	<b>1.1</b>	<b>3.1</b>	<b>1.0</b>		
<b>Least Bell's Vireo (LBVI)</b>						
DG-2A Transect 1 (20 m)	Perennial	32.5	35.0	65.0		
	Annual	35.0	20.0	7.5		
	Nonnative	0.0	1.25	1.3		
	Invasive <sup>2</sup>	5.0	6.25	1.3		
DG-2A Transect 2 (20 m)	Perennial	7.5	22.5	50.0		
	Annual	42.5	27.5	2.5		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	7.5	2.5	0.0		
DG-2B Transect 1 (20 m)	Perennial	9.2	46.3	86.3		
	Annual	60	18.8	1.3		
	Nonnative	0.8	0.0	0.0		
	Invasive <sup>2</sup>	5.0	0.0	0.0		
DG-2B Transect 2 (20 m)	Perennial	15.7	31.7	54.6		
	Annual	55.0	42.1	35.4		
	Nonnative	0.7	0.0	0.0		
	Invasive <sup>2</sup>	6.7	3.8	0.0		
DG-4 Transect 3 (25 m)	Perennial	33.0	52.0	69.4		
	Annual	0.0	0.0	4.6		
	Nonnative	0.0	0.0	3.7		
	Invasive <sup>2</sup>	13.0	8.0	3.7		
DG-4 Transect 5 (40 m)	Perennial	25.6	30.0	53.8		
	Annual	8.8	0.0	0.0		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	4.4	1.3	0.0		
DG-4 Transect 6 (25 m)	Perennial	49.0	64.0	87.0		
	Annual	3.0	1.0	5.0		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	2.0	5.0	0.0		
DG-4 Transect 7 (30 m)	Perennial	22.8	48.9	77.8		
	Annual	13.9	11.1	7.2		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	0.0	0.0	0.0		
DG-4B Transect 1 (25 m)	Perennial	34.0	55.7	72.0		
	Annual	6.0	9.3	4.0		
	Nonnative	0.0	1.0	0.0		
	Invasive <sup>2</sup>	2.0	4.0	0.0		
DG-4B Transect 2 (25 m)	Perennial	39.0	54.3	69.3		
	Annual	5.0	13.7	10.7		

<b>Table 3. Percent Native/Nonnative Cover Mitigation Areas</b>						
<b>Transect and Transect Length</b>	<b>Vegetation Type</b>	<b>Year 1 (%)</b>	<b>Year 2 (%)</b>	<b>Year 3 (%)</b>	<b>Year 4<sup>1</sup></b>	<b>Year 5<sup>1</sup></b>
	Nonnative	0.0	1.0	0.0		
	Invasive <sup>2</sup>	4.0	1.0	0.0		
DG-4C Transect 1 (25 m)	Perennial	12.0	15.0	27.3		
	Annual	39.0	51.0	54.7		
	Nonnative	13.0	0.0	3.0		
	Invasive <sup>2</sup>	2.0	0.0	3.0		
DG-4C Transect 2 (25 m)	Perennial	29.0	30.0	54.0		
	Annual	21.0	10.0	12.0		
	Nonnative	0.0	0.0	5.0		
	Invasive <sup>2</sup>	0.0	0.0	0.0		
DG-5 Transect 1 (25 m)	Perennial	27.0	47.8	88.3		
	Annual	5.0	45.6	1.7		
	Nonnative	0.0	0.0	0.0		
	Invasive <sup>2</sup>	0.0	0.0	0.0		
<b>LBVI Overall<sup>3</sup></b>	<b>Perennial</b>	<b>25.9</b>	<b>41.0</b>	<b>65.8</b>		
	<b>Annual</b>	<b>22.6</b>	<b>19.2</b>	<b>11.3</b>		
	<b>Nonnative</b>	<b>1.1</b>	<b>0.3</b>	<b>1.2</b>		
	<b>Invasive<sup>2</sup></b>	<b>4.0</b>	<b>2.4</b>	<b>0.7</b>		

<sup>1</sup>To be determined.

<sup>2</sup>Invasive designation refers to nonnative plant species that have a California Invasive Plant Council (Cal-IPC) invasive plant rating of Moderate or High threat to wildlands.

<sup>3</sup>Average of all transects. Some minor discrepancies due to rounding error.

<sup>4</sup>Could not be assessed due to inaccessibility around Altadena Drain

### 5.3.2.3 Percent Native and Nonnative Cover – Reference Sites

Table 4 presents a summary of the native and nonnative cover data for the reference sites. It should be noted that this data was collected during Year 1 for the Phase 1 mitigation areas. The average overall perennial cover in the RAFSS reference site was 24.0 percent with zero percent cover of native annuals and 2.0 percent cover of nonnative/invasive annual plants. For the CSS reference sites, the average overall native perennial cover was 70.3 percent, the native annual cover was zero percent, and the percent cover of nonnative/invasive plants species was 14.7. For the oak woodland reference site, the average overall native perennial cover was 99.0 percent with zero percent cover of native annuals and nonnative/invasive plants. For the riparian reference sites, the average overall native perennial cover was 75.4 percent, the native annual cover was 1.5 percent, and the percent cover of nonnative/invasive plants was 19.0. Finally, for the LBVI reference sites, the average overall native perennial cover of 93.9 percent, the native annual cover was 1.9 percent, and the percent cover of nonnative/invasive plants was 1.3 percent.



Table 4. Percent Native/Nonnative Cover Reference Sites						
Transect	Vegetation Type	Year 1 (%)	Year 2 <sup>2</sup>	Year 3 <sup>2</sup>	Year 4 <sup>2</sup>	Year 5 <sup>2</sup>
<b>Riversidean Alluvial Fan Sage Scrub (RAFSS)</b>						
<b>RAFSS Reference</b>	Perennial	24.0	NA	NA		
	Annual	0.0	NA	NA		
	Nonnative	2.0	NA	NA		
<b>RAFSS Overall<sup>1</sup></b>	<b>Perennial</b>	<b>24.0</b>	NA	NA		
	<b>Annual</b>	<b>0.0</b>	NA	NA		
	<b>Nonnative</b>	<b>2.0</b>	NA	NA		
<b>Coastal Sage Scrub (CSS)</b>						
<b>CSS Reference</b>	Perennial	70.3	NA	NA		
	Annual	0.0	NA	NA		
	Nonnative	14.7	NA	NA		
<b>CSS Overall<sup>1</sup></b>	<b>Perennial</b>	<b>70.3</b>	NA	NA		
	<b>Annual</b>	<b>0.0</b>	NA	NA		
	<b>Nonnative</b>	<b>14.7</b>	NA	NA		
<b>Coast Live Oak Woodland</b>						
<b>Coast Live Oak Woodland Reference</b>	Perennial	99.0	NA	NA		
	Annual	0.0	NA	NA		
	Nonnative	0.0	NA	NA		
<b>Coast Live Oak Woodland Overall<sup>1</sup></b>	<b>Perennial</b>	<b>99.0</b>	NA	NA		
	<b>Annual</b>	<b>0.0</b>	NA	NA		
	<b>Nonnative</b>	<b>0.0</b>	NA	NA		
<b>Riparian</b>						
<b>Riparian Scrub Reference</b>	Perennial	92.0	NA	NA		
	Annual	2.5	NA	NA		
	Nonnative	3.5	NA	NA		
<b>Riparian Woodland Reference</b>	Perennial	58.8	NA	NA		
	Annual	0.5	NA	NA		
	Nonnative	34.4	NA	NA		
<b>Riparian Overall<sup>1</sup></b>	<b>Perennial</b>	<b>75.4</b>	NA	NA		
	<b>Annual</b>	<b>1.5</b>	NA	NA		
	<b>Nonnative</b>	<b>19.0</b>	NA	NA		
<b>Least Bell's Vireo (LBVI)</b>						
<b>LBVI Reference 1</b>	Perennial	96.5	NA	NA		
	Annual	1.5	NA	NA		
	Nonnative	1.0	NA	NA		
<b>LBVI Reference 2</b>	Perennial	91.3	NA	NA		
	Annual	2.3	NA	NA		
	Nonnative	1.5	NA	NA		
<b>LBVI Overall<sup>1</sup></b>	<b>Perennial</b>	<b>93.9</b>	NA	NA		
	<b>Annual</b>	<b>1.9</b>	NA	NA		
	<b>Nonnative</b>	<b>1.3</b>	NA	NA		

<sup>1</sup>Average of all transects.

<sup>2</sup>To be determined.

### 5.3.2.4 Native Species Richness – Mitigation Areas

Native species richness was determined for each mitigation area during the Year 3 botanical monitoring event and included all germinating native plants and natural recruits. Native species richness was relatively high for the mitigation areas during Year 3 due to a high diversity of germination and natural recruitment. Table 5 shows the native species richness for the mitigation areas. Native species richness was found to be 6 for the RAFSS mitigations areas, 38 for the CSS mitigation areas, 17 for the oak woodland mitigation areas, 29 for the riparian mitigation areas, and 36 for the LBVI mitigation areas.

<b>Table 5. Native Species Richness Mitigation Areas</b>					
<b>Mitigation Area</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4<sup>2</sup></b>	<b>Year 5<sup>2</sup></b>
<b>Riversidean Alluvial Fan Sage Scrub (RAFSS)</b>					
DG-1 WOUS (RAFSS)	5	9	6		
<b>RAFSS Overall<sup>1</sup></b>	<b>5</b>	<b>9</b>	<b>6</b>		
<b>Coastal Sage Scrub (CSS)</b>					
DG-1 (CSS)	16	17	30		
DG-4 (CSS)	14	22	18		
<b>CSS Overall<sup>1</sup></b>	<b>25</b>	<b>34</b>	<b>38</b>		
<b>Coast Live Oak Woodland</b>					
DG-3A (Coast Live Oak Woodland)	17	22	17		
<b>Coast Live Oak Woodland Overall<sup>1</sup></b>	<b>17</b>	<b>22</b>	<b>17</b>		
<b>Riparian</b>					
DG-3A (Riparian)	13	19	16		
DG-4 (Riparian)	15	23	27		
<b>Riparian Overall<sup>1</sup></b>	<b>22</b>	<b>33</b>	<b>29</b>		
<b>Least Bell's Vireo (LBVI)</b>					
DG-2A (LBVI)	17	26	21		
DG-2B (LBVI)	18	18	20		
DG-4 (LBVI)	19	26	25		
DG-4B (LBVI)	19	18	18		
DG-4C (LBVI)	16	19	19		
DG-5 (LBVI)	13	17	15		
<b>LBVI Overall<sup>1</sup></b>	<b>31</b>	<b>39</b>	<b>36</b>		

<sup>1</sup>Total native species observed across all mitigation areas.

<sup>2</sup>To be determined.

### 5.3.2.5 Native Species Richness – Reference Sites

Reference site data was not obtained during Year 3 due to the extreme drought conditions. For the purposes of this report, the Year 1 data for the reference sites will be used. The established reference sites will be assessed again during Year 4, or when conditions permit. Table 6 shows the native species richness for the reference sites. Native species richness was found to be 10 for the RAFSS reference site, 5 for the CSS reference site, 3 for the oak woodland reference site, 20 for the riparian reference site, and 22 in the LBVI reference sites.

<b>Table 6. Native Species Richness Reference Sites</b>					
<b>Reference Site</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4<sup>1</sup></b>	<b>Year 5<sup>1</sup></b>
Riversidean Alluvial Fan Sage Scrub (RAFSS)	10	NA	NA		
Coastal Sage Scrub (CSS)	5	NA	NA		
Coast Live Oak Woodland	3	NA	NA		
Riparian	20	NA	NA		
Least Bell's Vireo (LBVI)	22	NA	NA		

<sup>1</sup>To be determined

### 5.3.2.6 Oak Tree Monitoring

A total of 11 coast live oak trees were assessed for their health and vigor during the Year 3 botanical monitoring including 10 trees that had their root protection zone encroached upon during construction activities (tree tag numbers 3, 32 through 38, 52, and 72) and one tree that did not (tree tag 39). All of the coast live oak trees that had their root protection zone encroached upon during construction activities were found to be in similar health as they were prior to construction. Most of these trees were found to be in fair health (tree tag numbers 32 through 38, 52, and 72) and one was found to be in good health (tree tag number 3). The one coast live oak that was assessed even though it did not have its root project zone encroached upon during construction activities (tree tag number 39) was found to be in poor health and was experiencing severe branch failure and dieback. The cause of the branch failure and dieback is unclear; however, it does not appear to be the result of the Project.

### 5.3.2.7 Groundwater Data

Groundwater data collected by the City of Pasadena on October 17, 2022 (Year 2) is presented in Table 7 below. Groundwater data collected by JPL on January 28, 2022 and April 22, 2022 (Year 2) is presented in Table 8.

**Table 7. City of Pasadena Groundwater Monitoring Results**

Well Name	Reference Elevation (ft)	Static Water Level (feet) by Year				
		1	2	3	4 <sup>1</sup>	5 <sup>1</sup>
Arroyo	1,092.71	169	182	187		
52	1,076.76	152	165	171		
Ventura	1,069.82	143	163	165		

<sup>1</sup>Years 3 through 5 to be determined.

**Table 8. JPL Groundwater Monitoring Results**

Well Name	Datum (ft above msl)	Year 3 <sup>1</sup>	
		January 2022	April 2022
MW-1	1116.70	1089.33	1087.40
MW-3	1100.34	943.57	945.94
MW-4	1082.84	950.51	948.11
MW-5	1071.60	DRY	941.47
MW-6	1188.52	DRY	DRY
MW-7	1212.88	DRY	DRY
MW-8	1139.53	DRY	944.42
MW-9	1106.02	1085.55	1086.92
MW-10	1087.71	DRY	936.98
MW-11	1139.30	997.57	1010.97
MW-12	1102.14	971.85	NA
MW-13	1183.47	DRY	DRY
MW-14	1173.47	942.15	945.19
MW-15	1120.66	1088.28	1089.86
MW-16	1236.27	DRY	DRY
MW-17	1191.21	920.32	951.57
MW-18	1225.41	917.70	928.08
MW-19	1142.94	926.18	925.58
MW-20	1165.05	908.86	906.83
MW-21	1059.10	942.12	942.63
MW-22	1176.98	933.87	940.12
MW-23	1108.84	933.49	938.37
MW-24	1200.94	930.82	943.23
MW-25	934.52	691.06	690.23
MW-26	1059.08	918.39	919.03

<sup>1</sup>Years 4 and 5 to be determined.

NA=Not Applicable



## 6.0 ACHIEVEMENT OF PERFORMANCE STANDARDS

The performance standards for the Phase 1 mitigation areas, as listed in the approved HRP, are provided in Table 10 for reference. Based on the results of the botanical monitoring, the Year 3 performance standards for survivorship and nonnative plant cover have been met for all mitigation areas. The performance standard for native cover was met for the CSS, coast live oak woodland, riparian, and LBVI habitats; however, this standard was not achieved for the RAFSS habitat. There is no Year 3 performance standard for native plant species richness; however, all communities except the RAFSS have met the Year 5 performance standard. The performance standards for structural patch richness, sediment/topographic stability, and wildlife use monitoring were not required to be assessed during Year 3.

<b>Table 10. Performance Standards for Onsite Mitigation Areas</b>			
<b>Category</b>	<b>Performance Standard</b>	<b>Description (Year 2)</b>	<b>Achieved</b>
Flora-1	Survivorship	Tree, shrub, and herb strata container plants will have the following survival requirements: <ul style="list-style-type: none"> <li>Year 3: 80% Survival</li> </ul>	YES <sup>1</sup>
Flora-2	Native Plant Cover	Combined tree, shrub, and herb strata container plants will have the following native plant cover requirements: <u>Least Bell's Vireo (LBVI) Habitat</u> <ul style="list-style-type: none"> <li>Year 3: 40%</li> </ul> <u>Other Riparian Habitat</u> <ul style="list-style-type: none"> <li>Year 3: 40%</li> </ul> <u>RAFSS &amp; CSS Habitat:</u> <ul style="list-style-type: none"> <li>Year 3: 40%</li> </ul> <u>Coast Live Oak Woodland Habitat:</u> <ul style="list-style-type: none"> <li>Year 3: 30%</li> </ul>	<u>LBVI Habitat:</u> YES <u>Other Riparian Habitat:</u> YES <u>RAFSS Habitat:</u> NO <u>CSS Habitat:</u> YES <u>Coast Live Oak Woodland:</u> YES
Flora-3	Nonnative Plant Cover	Combined tree, shrub, and herb strata container plants will have the following native plant cover requirements: <u>LBVI Habitat:</u> <ul style="list-style-type: none"> <li>Year 3: Not more than 5%</li> </ul> <u>All Other Habitat Mitigation Areas:</u> <ul style="list-style-type: none"> <li>Year 3 Not more than 10% annual herbaceous species/grasses; 5% woody species/perennial herbs; 2% Cal-IPC moderate or high threat invasive species.</li> </ul>	<u>LBVI Habitat:</u> YES <u>Other Riparian Habitat:</u> YES <u>RAFSS:</u> YES <u>CSS:</u> YES <u>Coast Live Oak Woodland:</u> YES
Flora-4	Native Plant Species Richness	By Year 5 mitigation areas must have 100% of the species richness present in the respective reference sites.	<u>LBVI Habitat:</u> YES <u>Other Riparian Habitat:</u> YES <u>RAFSS:</u> NO <u>CSS:</u> YES <u>Coast Live Oak Woodland:</u> YES

<sup>1</sup> If including volunteer or recruits of the same species growing within the dead plant's basin (or within one meter of that basin), this criterion has been achieved.

## **6.1 Container Plant Survivorship**

Container plant survival is required to be a minimum of 80 percent at the end of Year 3. Out of the 13,346 container plants installed during Phase 1 of restoration activities, approximately 12,427 container plants were noted as still being alive during Year 3. This is a 93.1 percent survivorship, which is approximately 8.1 percent higher than the performance standard. In addition, a portion of the container plants lost during Years 1, 2 and 3 will be replaced during Phase 3 of restoration activities.

## **6.2 Native Plant Cover**

At the end of Year 3, native plant cover is required to be at least 40 percent for LBVI, riparian, RAFSS, and CSS habitats, and 30 percent for coast live oak woodland habitat. The Year 3 performance standard for native plant cover was achieved for all habitat types except the RAFSS with 65.6 percent native cover for LBVI habitat, 51.3 percent native cover for riparian habitat, 25.0 percent native cover for RAFSS habitat, 59.1 percent native cover for CSS, and 59.7 percent for coast live oak woodland.

## **6.3 Nonnative Plant Cover**

Nonnative plant cover during Year 3 is required to be less than 5 percent in LBVI habitat. In all other habitat types, nonnative plant cover has the following Year 3 performance standards: no more than 10 percent annual herbaceous species/grasses, no more than 5 percent woody species/perennial herbs, and no more than 2 percent Cal-IPC Moderate or High threat invasive species. The Year 3 performance standard for nonnative plant cover was achieved for all mitigation areas with nonnative cover ranging from zero to 1.3 percent and invasive cover ranging from zero to one percent.

## **6.4 Native Plant Species Richness**

Native plant species richness is required to be 100 percent of the species richness present in the respective reference sites by the end of Year 5. While there is no Year 3 performance standard, this criterion is required to be assessed every year to ensure the mitigation areas are trending towards meeting the Year 5 performance standard. The Year 5 performance standard for native plant species richness has already been met for the LBVI, riparian, CSS, and coast live oak woodland habitats. The RAFSS habitat was trending towards meeting this standard during Year 2; however, heavy storm flows during Year 3 scoured this mitigation area likely contributing to the drop in species diversity

## **7.0 DISCUSSION**

The habitat mitigation areas have performed well during Year 3. Minor issues with the irrigation system, vandalism, pests, and herbivory were observed during the Year 3 monitoring efforts; however, these issues were minor and should not impede the success of the mitigation areas. Erosion in most of the Phase 1 mitigation areas was minor; however, severe erosion in the DG-3A mitigation area surrounding Altadena Drain occurred during the stormy season and LACPW is working on design plans to redirect high intensity flows to the reservoir and repair the erosion. Maintenance activities including weed abatement, irrigation repair, basin repair, and erosion control were conducted on a regular basis during Year 3. Supplemental planting of container plants in the Phase 1 mitigation areas will occur during the Phase 3 planting effort

(fall/winter 2022/2023) and will help to increase the level of native cover in the mitigation areas. In addition, continued weed abatement efforts will continue to reduce competition from nonnative and invasive weeds.

The Phase 1 mitigation areas have met the success criteria for container plant survivorship and nonnative plant cover. In addition, the Year 3 performance standard for native cover was met for the LBVI, riparian, CSS, and coast live oak woodland habitats; however, this standard was not achieved for the RAFSS community. There is no Year 3 performance standard for native plant species richness; however, all communities except the RAFSS have already met the Year 5 performance standard. The performance standards for structural patch richness, sediment/topographic stability, and wildlife use monitoring were not required to be assessed during Year 3 and these standards will be assessed during future monitoring events.



## 8.0 REFERENCES

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## **LIST OF APPENDICES**

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Appendix A - Streambed Alteration Agreement Notification No. 1600-2015-0263-R5

Appendix B - Year 1 Plant Species Compendium

Appendix C - Year 1 Photo Documentation

Streambed Alteration Agreement Notification No. 1600-2015-0263-R5





MARK PESTRELLA, Director

# COUNTY OF LOS ANGELES

## DEPARTMENT OF PUBLIC WORKS

*"To Enrich Lives Through Effective and Caring Service"*

900 SOUTH FREMONT AVENUE  
ALHAMBRA, CALIFORNIA 91803-1331  
Telephone: (626) 458-5100  
<http://dpw.lacounty.gov>

ADDRESS ALL CORRESPONDENCE TO:  
P.O. BOX 1460  
ALHAMBRA, CALIFORNIA 91802-1460

July 17, 2018

IN REPLY PLEASE  
REFER TO FILE: **SWE-5**

Mr. Ed Pert, Regional Manager  
Streambed Alteration Program  
California Department of Fish and Wildlife, Region 5  
4665 Lampson Avenue, Suite C  
Los Alamitos, CA 90720

Attention Ms. Erinn Wilson

Dear Mr. Pert:

**DEVIL'S GATE RESERVOIR SEDIMENT REMOVAL AND MANAGEMENT PROJECT  
AMENDMENT OF STREAMBED ALTERATION AGREEMENT  
NOTIFICATION NO. 1600-2015-0263-R5**

Enclosed are two original signed copies of the Amendment of Lake or Streambed Alteration Agreement. We appreciate your collaboration on this important project and look forward to continued work with you.

If you have any questions, please contact Mr. George De La O at (626) 458-7155 or [gdelao@dpw.lacounty.gov](mailto:gdelao@dpw.lacounty.gov).

Very truly yours,

MARK PESTRELLA  
Director of Public Works

CHRISTOPHER STONE  
Assistant Deputy Director  
Stormwater Engineering Division

VM:vt

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Enc.



State of California – Natural Resources Agency  
DEPARTMENT OF FISH AND WILDLIFE  
South Coast Region  
3883 Ruffin Road  
San Diego, CA 92123  
(858) 636-3160  
[www.wildlife.ca.gov](http://www.wildlife.ca.gov)

**EDMUND G. BROWN, Jr., Governor**  
**CHARLTON H. BONHAM, Director**



July 17, 2018

Christopher Stone  
Los Angeles County Flood Control District  
900 S. Fremont Ave.  
Alhambra, CA 91803  
[CSTONE@dpw.lacounty.gov](mailto:CSTONE@dpw.lacounty.gov)

Dear Mr. Stone:

**Amendment of Lake or Streambed Alteration, Notification No. 1600-2015-0263-R5,  
Devil's Gate Dam Sediment Removal and Management Project**

On March 21, 2017 the California Department of Fish and Wildlife (CDFW) executed the Final Streambed Alteration Agreement 1600-2015-0263-R5 (Agreement) for the Devil's Gate Sediment Removal and Management Project (Project). On May 17, 2017 a Peremptory Writ of Mandate was issued by the California Superior Court (Los Angeles County) regarding the environmental impact report relied upon by the Los Angeles County Flood Control District (Lead Agency) under California Environmental Quality Act (CEQA, SCH 2011091084) and a Recirculated Final Environmental Impact Report (RFEIR) was required by the court. CDFW, as a CEQA responsible agency, relied on the Lead Agency's environmental impact report to issue the Agreement. The Recirculated portions of the RFEIR was circulated for public and agency review and comment from July 24, 2017 to September 18, 2017 and recertified by Lead Agency on November 7, 2017. The CDFW received notice on December 6, 2017 of the Order Discharging Peremptory Writ of Mandate (Discharged Writ) for the matters before the Los Angeles County Superior Court related to the RFEIR.

The Discharged Writ was issued because the Court found that the RFEIR disclosure, analysis, and revision of mitigation measures complied with the Peremptory Writ of Mandate that the Final EIR for the Project, for Alternative 3, Configuration D (Approved Project), and for Alternative 5 (Haul Route Alternative) related to: 1) the 1:1 mitigation ratios in Mitigation Measures BIO-6, -7, and -8; 2) the imposition of Mitigation Measures BIO-1 through 8 on the proposed Devil's Gate Water Conservation Project, should such a project go forward, to reduce potential cumulative impacts for this Project; and 3) the requirement, in Mitigation Measure AQ-1, that sediment removal dump trucks meet Environmental Protection Agency's emission standards for Model Year 2010 or later.

The CDFW under its sole discretion has decided to amend the Agreement (see page 39 "Amendment") to reflect changes to the environmental impact report that appear in the RFEIR. CDFW hereby amends the Agreement with addition and revision of the

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following conditions (insertions in **bold underline**, deletions in ~~red-strikeout~~ type face). All other conditions in the Agreement remain in effect unless otherwise noted herein

**Page 3 of 49**

**Initial Sediment Removal Area.** The ~~68.63~~ **65.56** acre area where the initial excavation of sediment and debris will occur.

**Permanent Maintenance Area.** The ~~51.78~~ **49.39** acre area to be maintained for flood capacity. This includes the Routine Annual Maintenance Area and the Episodic Maintenance Area.

**Routine Annual Maintenance Area.** The ~~40.80~~ **42.05** acre area where annual maintenance of the facility will occur (see Exhibit B).

**Episodic Maintenance Area.** The ~~10.98~~ **7.34** acre area side slope proposed at 3:1 (V:H) grade (see Exhibit B). where occasional maintenance will occur. This area is within the Permanent Maintenance Area, abuts Routine Annual Maintenance Area and forms transitional habitat with Habitat Restoration Area.

**Habitat Restoration Area.** The 77.01 acre area in the reservoir subject to minor land alteration, vegetation management, and planting of native plants. This area is outside the Permanent Maintenance Area (See Exhibit E).

**Sediment Removal Program**

This phase of project is limited to the restoration of a public facility, through excavation within the ~~68.63~~ **65.56**-acre Initial Sediment Removal Area (see Exhibit B, Work Plan Map) and transition to long term Permanent Maintenance Area, composed of a total of ~~51.78~~ **49.39** acres that consists of ~~40.8~~ **42.05** acres for Routine Annual Maintenance, and ~~10.98~~ **7.34** acres for Episodic Maintenance Areas for the term of this Agreement. Sediment removal will not involve expansion of use beyond that of the designed facility. The proposed initial excavation is to mechanically remove ~~2.41~~ **7** Million Cubic Yards (MCY) of post-fire debris from the Initial Sediment Removal Area within Devil's Gate Reservoir. The location of the Initial Sediment Removal Area was selected to maximize the efficient removal of post-fire debris while at the same time, avoid and minimize sensitive habitats and sensitive species impacts. Sediment levels behind Devil's Gate Dam will be brought down to 986 feet above mean sea level (msl) to eliminate the threat to the dam outlet works and comply with standards as set by the State Water Resources Division of Safety of Dams (DSOD). The Initial Sediment Removal Area will then slope upwards to ~~995~~ **1,000** feet above msl where the basin will constrict and increase in elevation to 1,040 feet above msl, and widen again to meet final elevation of 1,060 feet above msl approximately ~~4,700~~ **4,788** linear feet upstream from the dam. Devil's Gate Reservoir is routinely drained after every storm; therefore, it will not be



necessary to drain the facility for non-routine activities.

**Page 4 of 49, 4<sup>th</sup> paragraph**

The ~~2-4~~ 1.7 MCY of sediment and debris in the ~~68-63~~ 65.56-acres Initial Sediment Removal Area includes established native and non-native vegetation that will be removed. Vegetation and organic debris will be separated from the sediment and hauled to Scholl Canyon Landfill in the City of Glendale. Project Start is estimated to take place in the Fall of ~~2017~~ 2018. In subsequent years of sediment removal, vegetation and organic debris will be hauled to Scholl Canyon Landfill.

**Page 4 of 49, 6<sup>th</sup> paragraph**

**Permanent Maintenance Program**

Once excavation is complete for this project, annual maintenance of the facility will occur within the ~~40-80~~ 42.05 acre Routine Annual Maintenance Area (see Exhibit B). Vegetation management and sediment removal within the ~~40-80~~ 42.05 acre Routine Annual Maintenance Area will occur for the life of this Agreement. Excavation over the lifetime of the project within the ~~40-80~~ 42.05 acre Routine Annual Maintenance Area will be hauled to disposal sites previously authorized by Permittee (see Figures 2.5-2,-3-4 from Final Environmental Impact Report). Trucks hauling sediment will access the reservoir from an existing maintenance road east of Devil's Gate Dam and exit via a proposed upgraded access road on the western edge of Devil's Gate Dam that will exit on to Oak Grove Drive (see Exhibit A). Vegetation within the Routine Annual Maintenance Area will be mowed or grubbed annually over a 2 to 12 week period in late summer or early fall.

**Page 5 of 49, 2<sup>nd</sup> paragraph**

Episodic Maintenance within the ~~10-98~~ 7.34 acre (horizontal projection) Episodic Maintenance Area will initially include planting with appropriate native plants and thereafter annual undesirable plant control (using herbicides, hand tools, and mechanically operated hand tools (i.e., chainsaws and motor powered winches). In the event of a large debris flow or hyper concentrated flood<sup>3</sup> Episodic Maintenance would involve the need for sediment excavation/trucking off site. The types of equipment involved in excavation may include those similar to the initial sediment removal phase including, but not limited to, front loaders with four-yard buckets, bulldozers, excavator, grader, water truck, and tender trucks. Vehicles expected to be used for sediment

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<sup>3</sup> **Debris flow:** A mix of water and debris, which may include particles ranging in size from clay to boulders and may contain woody debris and other materials, that flows down a stream channel or steep slope, sometimes at great velocity, and contains more than 60 percent debris (less than 40 percent water) by volume. **Hyper-concentrated flood:** A moving mixture of sediment and water containing between 20 and 60 percent sediment by volume.

hauling include double dump trucks with an 18 cubic yard (CY) capacity or equivalent.

**Page 5 of 49, 3<sup>rd</sup> paragraph**

After Episodic Maintenance the side slopes would be returned to the proposed 3:1 (V:H) grade, and the ~~10-98~~ **7 34** acre area will be subject to the continuing annual undesirable plant control. Because this area is restricted from a general right of public access, and will be subject to undesirable plant control, it is anticipated to be revegetated naturally after periodic large debris flow or hyper concentrated floods.

**Page 6 of 49, 6<sup>th</sup> paragraph**

**Native Plants:** Nevin's barberry (*Berberis nevinii*), Plummer's mariposa lily (*Calochortus plummerae*), Greata's aster (*Symphyotrichum gretae*), Parry's spineflower (*Chorizanthe parryi* var. *parryi*), slenderhorned spineflower (*Dodecahema leptoceras*), mesa horkelia (*Horkelia cuneata* ssp. *puberula*), white rabbit-tobacco (*Pseudognaphalium leucocephalum*), Parish's gooseberry (*Ribes divaricatum* var. *parishii*), black willow thickets, mulefat thickets, riparian herbaceous, coast live oak woodland, scale broom scrub, and all other aquatic and wildlife resources in the area, including the riparian vegetation which provides habitat for such species in the area. These resources are further detailed and more particularly described in the document(s): "Devil's Gate Reservoir Sediment Removal and Management Project Final Environmental Impact Report " dated October 2014, prepared for Los Angeles County of Department of Public Works by Chambers Group; **Biological Technical Report (November 2010), Final Sediment Transport Capacity Analysis (January 2013), and the Noise and Traffic Reports (September & October 2013, respectively), Recirculated EIR for the Project and response to comments (July and October 2017, respectively), Revised Board Motion (November 7, 2017), Notice of Determination for Recirculated Final Environmental Impact Report, Order Discharging Peremptory Writ of Mandate (December 5, 2017),** " Lake and Streambed Alteration Notification Package - Devil's Gate Dam and Reservoir Sediment Removal Project" dated December 11, 2015, prepared for CDFW by Permittee complete with all attachments and exhibits, Revised vegetation mapping and impact analysis for Devil's Gate Dam and Sediment Removal Project dated May 19, 2016 by ECORP Consulting, Inc., revised assessment of temporary impact areas and incorporation of Episodic Maintenance area dated May 5, 2016.

**Page 7 of 49, 1<sup>st</sup> paragraph**

**Project Impacts**

The adverse effects the project could have on the fish or wildlife resources identified above include a total of ~~68-63~~ **65.56** acres subject to Department jurisdiction to implement the Initial Sediment Removal After Initial Sediment Removal ~~51-78~~ **49.39** acres will be maintained for flood capacity through Routine Annual Maintenance and Episodic Maintenance (see above). Additionally, in order to implement compensatory

mitigation for the project, 77.01 acres subject to the Department's jurisdiction outside the Permanent Maintenance Area, will be subject to minor surface alteration of the land, vegetation management, and application of herbicides. The following impacts would occur to vegetation communities within the ~~68.63~~ **65.56** acres necessary for Initial Sediment Removal.

**Page 7 of 49, 2<sup>nd</sup> paragraph**

**Total Permanent Project Impacts**

Permanent impacts to ~~40.80~~ **42.05** acres of vegetation communities and land cover classifications from initial sediment removal include the removal of ~~16.27~~ **15.64** acres of *Salix gooddingii* Alliance (black willow thickets), ~~1.82~~ **1.97** acres *Lepidospartum squamatum* Alliance (Scalebroom scrub), ~~8.03~~ **7.1** acres *Baccharis salicifolia* shrubland Alliance (mulefat thickets), ~~9.88~~ **10.24** acre *Lepidium latifolium*-*Conium maculatum* herbaceous semi-natural stand, ~~2.45~~ **2.61** acre *Conium maculatum* herbaceous semi-natural stand, ~~2.33~~ **1.80** acres non-native or disturbed (including ~~1.00~~ **0.67** acre *Xanthium strumarium* herbaceous stand, ~~1.33~~ **1.13** acres disturbed (trails/barren/IMP Area)), ~~0.02~~ **0.01** acre *Artemisia californica*-*Eriogonum fasciculatum* California sagebrush-California buckwheat scrub. Additionally, there are expected permanent impacts to individual California live oak trees (*Quercus agrifolia*) in an area of approximately 0.06 acre. The impacts ~~that~~ vary from direct impacts, resulting in complete removal to a limited number of individual trees, and indirect impacts to individual **trees that are located in close proximity to areas where direct impacts will occur.** The indirect impacts are undetermined at this time because the area's hilly topography may not result in any significant effect or project disturbances may be avoided all together based on project design modifications. ~~made from incorporating Measures to avoidance impacts to~~ **of oak trees will be identified following the completion of the in-tree monitoring-report survey that is** required prior to **the start of the** Project ~~start~~

**Page 7 of 49, 3<sup>rd</sup> paragraph**

**Total Temporary Project Impacts**

Temporary impacts to ~~27.83~~ **23.52** acres subject to Department jurisdiction consisting of vegetation communities and land cover classifications will occur from Initial Sediment Removal, worksite access, and installation of side-slopes in Episodic Maintenance Area. These areas contain ~~12.70~~ **13.16** acres *Lepidospartum squamatum* Alliance (Scalebroom scrub), ~~5.89~~ **4.65** acres of *Salix gooddingii* Alliance (black willow thickets), ~~3.41~~ **2.11** acres *Baccharis salicifolia* shrubland Alliance (mulefat thickets), ~~1.97~~ **0.06** acres disturbed (trails/barren/IMP Area), ~~1.24~~ **0.72** acre *Lepidium latifolium*-*Conium maculatum* herbaceous semi-natural stand, ~~1.70~~ **1.19** acres *Conium maculatum* herbaceous semi-natural stand, ~~0.50~~ **0.7** acre *Xanthium strumarium* herbaceous stand, ~~0.20~~ **0.7** acre *Quercus agrifolia* coast live oak (trees), ~~0.07 acre Eucalyptus (globulus, camaldulensis)~~ **Semi-natural stand**, ~~0.08~~ **0.12** acre *Artemisia californica*-*Eriogonum fasciculatum* California sagebrush-California buckwheat scrub.



The following Conditions have been added or amended:

**1.11 The Permittee shall fully implement all mitigation measures identified in the Final Environmental Impact Report (FEIR) and as revised by Recirculated FEIR (RFEIR). All Conditions, Studies, and mitigation measures relating to biological resources identified in the FEIR and RFEIR shall be enforceable by CDFW as terms of this Agreement.**

- 2.1 Work Period. Initial Vegetation Removal work within the Initial Sediment Removal Area shall be confined to the period starting September 15 to February 1, in the year(s) of ~~2017~~**2018** to ~~2019~~ **2020**, unless otherwise requested by Permittee and approved by CDFW in writing. Excavation shall be confined to April 15 to December 31 Monday through Friday from 0700 to 1800 hours Standard Time (1900 hours during Daylight Savings Time), and on Saturday between 0800 to 1700 hours during Standard and Daylight Savings Time. Routine Annual Maintenance or Episodic Maintenance work involving vegetation management and/or excavation is specifically addressed in Conditions 2.40 to 2.72 below.
- 2.41 Permittee shall implement Routine Annual and Episodic Maintenance in conformance with the Project Description and the following Conditions in this Agreement. The Permittee shall remove all human generated debris, such as cuttings, garbage and trash. The Permittee shall remove washed out culverts, and other construction materials, that the Permittee places within, or where they may enter the stream. Routine Annual Maintenance activities shall be limited to the inspection, routine maintenance (e.g., fence repair, minor maintenance of access roads, graffiti removal, trash removal, weed abatement, etc.) sediment removal, and vegetation management (annually) within the approved Routine Annual Maintenance Area (~~40.80~~ **42.05** acres) footprint. Vegetation may be mowed annually and when necessary for capacity reasons the root zone may be grubbed. Sediment removal may be implemented by: 1) sediment excavation and hauling off site; and 2) Flow-Assisted Sediment Transport (FAST). Episodic Maintenance within the ~~10.98~~ **7.34** acre (horizontal projection) side slope area may include annual undesirable plant control (including herbicides, hand tools, and mechanically operated hand tools (e.g., chainsaws and motor powered winches), and in the event of a large debris flow or hyper concentrated flood sediment excavation/trucking off site. If additional major maintenance/repair work is required a separate Agreement is required for said repairs.
- 2.42 Work Period. Vegetation Management work shall be confined to September 15 to February 1 starting approximately in ~~2023~~**2024** until ~~2037~~ **2038**. The general days and hours of the week that Permittee should conduct Routine Annual Maintenance is Monday through Friday from 0700 to 1800 hours Standard Time (1900 hours during Daylight Savings Time), and on Saturday between 0800 to 1700 hours during Standard and Daylight Savings Time.

Table 3.0 Compensatory Mitigation [Permanent] Requirements for Creation and Restoration

IMPACTS TO VEGETATION COMMUNITIES	COMPENSATORY MITIGATION REQUIREMENT			
	PERMANENT IMPACTS	Creation	Restoration	Total
<i>Salix gooddingii</i> Woodland Alliance	<del>16.27</del> 15.64	<del>16.27</del> 15.64	<del>22.34</del> 21.44	<del>38.58</del> 37.08
<i>Baccharis saltifolia</i> Shrubland Alliance	<del>8.03</del> 9.71	<del>8.03</del> 9.71	<del>4.83</del> 5.84	<del>12.86</del> 15.55
<i>Lepidospartum squamatum</i> Shrubland Alliance	<del>1.82</del> 1.97	<del>1.82</del> 1.97	<del>7.28</del> 7.88	<del>9.19</del> 8.5
<i>Artemisia californica</i> - <i>Eriogonum fasciculatum</i> Shrubland Alliance	<del>0.02</del> 0.01	<del>0.02</del> 0.01	<del>0.04</del> 0.02	<del>0.06</del> 0.03
<i>Conium maculatum</i> Herbaceous Semi-Natural Alliance*	<del>2.45</del> 2.61	0.00	<del>1.23</del> 1.31	<del>1.23</del> 1.31
<i>Lepidium latifolium</i> - <i>Conium maculatum</i> Herbaceous Semi-Natural Alliance*	<del>9.88</del> 10.24	0.00	<del>4.94</del> 5.12	<del>4.94</del> 5.12
<i>Xanthium strumarium</i> Herbaceous Alliance (Unofficial Alliance)	<del>1.00</del> 0.67	0.00	<del>1.50</del> 1.00	<del>1.50</del> 1.00
Disturbed/Developed	<del>1.33</del> 1.13	0.00	0.00	0.00
TOTAL COMPENSATORY MITIGATION REQUIRED		<del>26.14</del> 27.33	<del>42.13</del> 42.61	<del>68.27</del> 69.94
TOTAL PERMANENT IMPACTS		<del>40.80</del> 41.98		

3.2 Mitigation for Temporary Impacts. The total of ~~27.83~~ **23.52** acres of temporary impacts, described in detail in the Project Description, shall be established and maintained pursuant to the following requirements:

a. The Permittee shall mitigate the temporary impacts to ~~16.85~~ **17** acres of vegetation and habitat communities located in restoration areas designated (DG3B, DG 7, DG 8, DG 9, See Exhibit E) by delaying impacts to temporary impact areas until 3<sup>rd</sup> year of sediment removal project and implement restoration pursuant to Habitat Restoration Plan (see Condition 3.9, below) with 24 months of impacts (see Condition 3.5), and maintained pursuant to Habitat Management Plan (see Condition 3.10).

b. The ~~10.98~~ **7.34** acre (horizontal projection, see Exhibit B) Episodic Maintenance Area will include initially planting with appropriate native plants and thereafter annual undesirable plant control (including herbicides, hand tools, and mechanically operated hand tools (i.e., chainsaws and motor powered winches), and in the event of a large debris flow or hyper concentrated flood Episodic Maintenance would involve the need for sediment excavation/trucking offsite. After Episodic Maintenance the side slopes would be returned to proposed 3:1 (V:H) grade, and the ~~10.98~~ **7.34** acre area will be subject to the continuing annual undesirable plant control.

3.4 Establish Permanent Cross-Section. Permittee shall establish single cross section, established by monument, at upstream limit of Permanent Maintenance Area to document condition and be comparable overtime. The annual monitoring of cross section should be conducted immediately following the high flow season

and include the physical measurements of the site, photos from a fixed photographic station, and if applicable results from interviews with local persons, Permittee, or Permittee's assignees that had important observations. The cross-section and photographic station shall be monitored and reported to CDFW according to the following sub-measures.

- a. Initial Monitoring. Permittee shall monitor cross section annually for the first 5 years following Initial Sediment Removal, estimated at ~~2.4~~ **1.7** mcy plus any additional annual deposits, and as soon as feasible after the first major high flow event. If major high flow event occurs in the first 5 years of monitoring then frequency of future monitoring will be adjusted by CDFW based on consultation with Permittee. Monitoring frequency adjustments shall be based on results of annual monitoring and high flow observations.
- b. Long-term Monitoring. Permittee shall monitor cross section every once every 5 years and immediately after a major high flow event for the duration of this Agreement.

**Page 36 of 49**

**TERM**

This Agreement shall expire on ~~March 31, 2037~~ **June 31, 2038**, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

Please sign and return two copies of this letter to acknowledge the amendment. The amendment becomes valid once the letter is signed by CDFW. Copies of the Agreement and this amendment must be readily available at project worksites and must be presented when requested by a CDFW representative or agency with inspection authority.

If you have any questions regarding this letter, please contact Steve Gibson, Senior Environmental Scientist (Specialist) at (562) 342-2106 or by email at [steve.gibson@wildlife.ca.gov](mailto:steve.gibson@wildlife.ca.gov).



Mr. Christopher Stone  
July 17, 2018  
Page 9 of 9

Sincerely,

Erinn Wilson, Environmental Program Manager

ec: Veronica Mardis, LACFCD [vmardis@dpw.lacounty.gov](mailto:vmardis@dpw.lacounty.gov)

**ACKNOWLEDGEMENT**

I hereby agree to the above-referenced amendment.

Print Name: Christopher Stone

Date: July 17, 2018

Signature: Christopher Stone



**Devil's Gate Reservoir  
Restoration Project**

**LACPW/ECORP**

**Phase 1 2022 PLANT SPECIES COMPENDIUM**

Scientific Name	Common Name	Mitigation Areas	Reference Sites <sup>1</sup>
<b>VASCULAR PLANTS</b>			
<b>PTERIDOPHYTES</b>			
<b>EQUISETACEAE</b>	<b>HORSETAIL FAMILY</b>		
<i>Equisetum ssp.</i>	horsetail		X
<b>ANGIOSPERMS (EUDICOTS)</b>			
<b>ADOXACEAE</b>	<b>MUSKROOT FAMILY</b>		
<i>Sambucus nigra ssp. caerulea</i>	blue elderberry	X	X
<b>AMARANTHACEAE</b>	<b>AMARANTH FAMILY</b>		
<i>Amaranthus albus</i> *	Pigweed amaranth	X	
<b>ANACARDIACEA</b>	<b>CASHEW AND SUMAC FAMILY</b>		
<i>Malosma laurina</i>	laurel sumac	X	
<i>Toxicodendron diversilobum</i>	poison oak	X	X
<b>APIACEAE</b>	<b>CARROT FAMILY</b>		
<i>Conium maculatum</i> *	poison hemlock	X	
<b>ASTERACEAE</b>	<b>SUNFLOWER FAMILY</b>		
<i>Achillea millefolium</i>	common yarrow	X	
<i>Ambrosia acanthicarpa</i>	annual bursage	X	
<i>Artemisia californica</i>	California sagebrush	X	X
<i>Artemisia douglasiana</i>	mugwort	X	X
<i>Artemisia dracunculus</i>	taragon	X	
<i>Baccharis pilularis</i>	coyote brush	X	
<i>Baccharis salicifolia</i>	mulefat	X	X
<i>Carduus pycnocephalus</i> *	Italian thistle		X
<i>Centaurea melitensis</i> *	totalote	X	X
<i>Cirsium occidentale var. californicum</i>	California thistle	X	
<i>Corethrogyne filaginifolia</i>	common sand aster	X	X
<i>Encelia californica</i>	California brittlebush	X	
<i>Erigeron canadensis</i>	Canada horseweed	X	X
<i>Eriophyllum confertiflorum</i>	golden yarrow		X
<i>Heterotheca grandiflora</i>	telegraph weed	X	X
<i>Isocoma menziesii</i>	Menzies' goldenbush	X	X
<i>Lactuca serriola</i> *	prickly lettuce	X	X
<i>Lepidospartum squamatum</i>	scalebroom	X	X
<i>Pseudognaphalium californicum</i>	ladie's tobacco	X	X
<i>Senecio</i> sp.	Ragwort	X	
<i>Sonchus asper</i> *	prickly sow-thistle		X
<i>Xanthium strumarium</i>	rough cocklebur	X	
<b>BETULACEAE</b>	<b>BIRCH FAMILY</b>		
<i>Alnus rhombifolia</i>	white alder		X



Scientific Name	Common Name	Mitigation Areas	Reference Sites <sup>1</sup>
<b>BORAGINACEAE</b>	<b>BORAGE FAMILY</b>		
<i>Eriodictyon crassifolium</i>	thick leaved yerba santa	X	X
<i>Heliotropium curassavicum</i>	salt heliotrope	X	
<i>Phacelia cicutaria</i>	caterpillar phacelia		X
<b>BRASSICACEAE</b>	<b>MUSTARD FAMILY</b>		
<i>Brassica nigra</i> *	black mustard	X	X
<i>Hirschfeldia incana</i> *	Short podded mustard	X	
<i>Lepidium latifolium</i> *	perennial pepperweed	X	
<i>Raphanus sativus</i> *	wild radish	X	
<i>Rorippa curvisiliqua</i>	Curvepod yellow cress	X	
<b>CACTACEAE</b>	<b>CACTUS FAMILY</b>		
<i>Opuntia littoralis</i>	coastal prickly pear	X	
<b>CAPRIFOLIACEAE</b>	<b>SOUTHERN HONEYSUCKLE</b>		
<i>Lonicera subspicata</i>	Southern honeysuckle		
<b>CHENOPODIACEAE</b>	<b>GOOSEFOOT FAMILY</b>		
<b>CONVOLVULACEAE</b>	<b>MORNING GLORY FAMILY</b>		
<i>Cuscuta californica</i>	dodder	X	
<b>CUCURBITACEAE</b>	<b>GOURD FAMILY</b>		
<i>Marah macrocarpa</i>	wild cucumber	X	
<b>EUPHORBIACEAE</b>	<b>SPURGE FAMILY</b>		
<i>Ricinus communis</i> *	castor bean		X
<b>FABACEAE</b>	<b>LEGUME FAMILY</b>		
<i>Acmispon glaber</i>	deerweed	X	X
<i>Spartium junceum</i> *	Spanish broom		X
<b>FAGACEAE</b>	<b>OAK FAMILY</b>		
<i>Quercus agrifolia</i>	coast live oak	X	X
<b>GERANIACEAE</b>	<b>GERANIUM FAMILY</b>		
<i>Geranium molle</i> *	crane's bill geranium		X
<b>GROSSULARIACEAE</b>	<b>GOOSEBERRY FAMILY</b>		
<i>Ribes aureum</i>	golden currant	X	
<i>Ribes californicum</i>	California gooseberry	X	
<b>HYDROPHYLLACEAE</b>	<b>WATERLEAF FAMILY</b>		
<i>Phacelia distans</i>	Common phacelia	X	
<b>LAMIACEAE</b>	<b>MINT FAMILY</b>		
<i>Marrubium vulgare</i> *	white horehound	X	X
<i>Salvia columbariae</i>	chia	X	
<i>Salvia mellifera</i>	black sage	X	X
<b>MORACEAE</b>	<b>FIG FAMILY</b>		
<i>Ficus carica</i> *	common fig		X
<b>MYRSINACEAE</b>	<b>SCARLET PIMPERNEL</b>		
<i>Lysimachia arvensis</i> *	Scarlet pimpernel	X	
<b>MYRTACEAE</b>	<b>MYRTLE FAMILY</b>		
<i>Eucalyptus camaldulensis</i> *	Red gum	X	
<b>OLEACEAE</b>	<b>OLIVE FAMILY</b>		
<i>Fraxinus uhdei</i> *	Shamel ash	X	X

Scientific Name	Common Name	Mitigation Areas	Reference Sites <sup>1</sup>
<b>ORNAGRACEAE</b>	<b>EVENING PRIMROSE FAMILY</b>		
<i>Camissoniopsis micrantha</i>	Spencer primrose	X	
<i>Epilobium</i> ssp.	willow herb	X	
<i>Oenothera elata</i>	evening primrose	X	X
<b>PAPAVERACEAE</b>	<b>POPPY FAMILY</b>		
<i>Eschscholzia californica</i>	California poppy	X	
<b>PLANTAGINACEAE</b>	<b>PLANTAIN FAMILY</b>		
<i>Plantago arenaria</i> *	Indian plantain	X	
<b>PLATANACEAE</b>	<b>PLANE-TREE FAMILY</b>		
<i>Platanus racemosa</i>	western sycamore	X	X
<b>POLYGONACEAE</b>	<b>BUCKWHEAT FAMILY</b>		
<i>Eriogonum fasciculatum</i>	California buckwheat	X	X
<i>Eriogonum gracile</i>	slender buckwheat	X	
<i>Rumex crispus</i> *	curly dock	X	
<b>RHAMNACEA</b>	<b>BUCKTHORN FAMILY</b>		
<i>Rhamnus crocea</i>	redberry buckthorn		X
<b>ROSACEAE</b>	<b>ROSE FAMILY</b>		
<i>Prunus ilicifolia</i>	hollyleaf cherry		X
<i>Rosa californica</i>	California rose	X	
<i>Rubus americanus</i> *	Himalayan blackberry		X
<i>Rubus ursinus</i>	California blackberry	X	X
<b>RUBIACEAE</b>	<b>BEDSTRAW FAMILY</b>		
<i>Galium aparine</i>	common bedstraw		X
<b>SALICACEAE</b>	<b>WILLOW FAMILY</b>		
<i>Populus fremontii</i>	Fremont's cottonwood	X	X
<i>Salix exigua</i>	narrow leaved willow		X
<i>Salix gooddingii</i>	black willow	X	X
<i>Salix laevigata</i>	red willow	X	X
<i>Salix lasiolepis</i>	arroyo willow	X	X
<b>SAPINDACEAE</b>	<b>SOAPBERRY FAMILY</b>		
<i>Acer negundo</i>	boxelder		X
<b>SOLANACEAE</b>	<b>NIGHTSHADE FAMILY</b>		
<i>Datura wrightii</i>	jimson weed	X	X
<i>Solanum americanum</i>	Small flowered nightshade	X	
<i>Solanum douglasii</i>	Douglas' nightshade	X	
<b>ULMACEAE</b>	<b>ELM FAMILY</b>		
<i>Elm</i> ssp.*	elm		X
<b>URTICACEAE</b>	<b>NETTLE FAMILY</b>		
<i>Urtica dioica</i>	stinging nettle	X	
<b>VITACEAE</b>	<b>GRAPE FAMILY</b>		
<i>Vitis californica</i>	California grape		X
<b>ANGIOSPERMS (MONOCOTS)</b>			
<b>AGAVACEAE</b>	<b>CENTURY PLANT FAMILY</b>		
<i>Hesperoyucca whipplei</i>	chaparral yucca	X	X
<b>BIGNONIACEAE</b>	<b>TRUMPET-CREEPER FAMILY</b>		
<i>Catalpa</i> sp.	catalpa	X	
<b>CYPERACEAE</b>	<b>SEDGE FAMILY</b>		
<i>Cyperus eragrostis</i>	tall flatsedge	X	

Scientific Name	Common Name	Mitigation Areas	Reference Sites <sup>1</sup>
<b>JUNCACEAE</b>	<b>RUSH FAMILY</b>		
<i>Juncus textilis</i>	basket rush	X	
<b>POACEAE</b>	<b>GRASS FAMILY</b>		
<i>Arundo donax</i> *	giant reed		X
<i>Avena fatua</i> *	wild oat		X
<i>Bromus</i> sp.	Brome	X	
<i>Bromus carinatus</i>	California brome	X	
<i>Bromus madritensis ssp. rubens</i> *	red brome	X	X
<i>Schismus barbatus</i> *	Mediterranean grass		X
<b>TYPHACEAE</b>	<b>CATTAIL FAMILY</b>		
<i>Typha</i> ssp.	cattail		X
* Nonnative species.			
<sup>1</sup> Reference site data is from 2020.			
<b>CNPS Rare Plant Listing Status:</b>			
List 1B.1 Rare, threatened, or endangered in California and elsewhere. Seriously threatened in California.			
List 1B.2 Rare, threatened, or endangered in California and elsewhere. Moderately endangered in California			
List 2B.2 Rare, threatened or endangered in California, but more common elsewhere. Moderately threatened in California.			
List 4.2 Limited distribution (Watch List). Moderately endangered in California.			







**Photo 1: Mitigation Area DG-1 Transect #1 Start**



**Photo 2: Mitigation Area DG-1 Transect #1 End**





**Photo 3: Mitigation Area DG-1 Transect #2 Start**



**Photo 4: Mitigation Area DG-1 Transect #2 End**





**Photo 5: Mitigation Area DG-1 Transect #3 Start**



**Photo 6: Mitigation Area DG-1 Transect #3 End**





**Photo 7: Mitigation Area DG-2A Transect #1 Start**



**Photo 8: Mitigation Area DG-2A Transect #1 End**





**Photo 9: Mitigation Area DG-2A Transect #2 Start**



**Photo 10: Mitigation Area DG-2A Transect #2 End**





**Photo 11: Mitigation Area DG-2B Transect #1 Start**



**Photo 12: Mitigation Area DG-2B Transect #1 End**





**Photo 13: Mitigation Area DG-2B Transect #2 Start**



**Photo 14: Mitigation Area DG-2B Transect #2 End**





**Photo 15: Mitigation Area DG-3A Transect #1 Start**



**Photo 16: Mitigation Area DG-3A Transect #1 End**





**Photo 17: Mitigation Area DG-3A Transect #2 Start**



**Photo 18: Mitigation Area DG-3A Transect #2 End**





**Photo 19: Mitigation Area DG-3A Transect #3 Start**



**Photo 20: Mitigation Area DG-3A Transect #3 End**





**Photo 21: Mitigation Area DG-4 Transect #1 Start**



**Photo 22: Mitigation Area DG-4 Transect #1 End**





**Photo 23: Mitigation Area DG-4 Transect #2 Start**



**Photo 24: Mitigation Area DG-4 Transect #2 End**





**Photo 25: Mitigation Area DG-4 Transect #3 Start**



**Photo 26: Mitigation Area DG-4 Transect #3 End**





**Photo 27: Mitigation Area DG-4 Transect #4 Start**



**Photo 28: Mitigation Area DG-4 Transect #4 End**





**Photo 29: Mitigation Area DG-4 Transect #5 Start**



**Photo 30: Mitigation Area DG-4 Transect #5 End**





**Photo 31: Mitigation Area DG-4 Transect #6 Start**



**Photo 32: Mitigation Area DG-4 Transect #6 End**





**Photo 33: Mitigation Area DG-4 Transect #7 Start**



**Photo 34: Mitigation Area DG-4 Transect #7 End**





**Photo 35: Mitigation Area DG-4 Transect #8 Start**



**Photo 36: Mitigation Area DG-4 Transect #8 End**





**Photo 37: Mitigation Area DG-4B Transect #1 Start**



**Photo 38: Mitigation Area DG-4B Transect #1 End**





**Photo 39: Mitigation Area DG-4B Transect #2 Start**



**Photo 40: Mitigation Area DG-4B Transect #2 End**





**Photo 41: Mitigation Area DG-4C Transect #1 Start**



**Photo 42: Mitigation Area DG-4C Transect #1 End**





**Photo 43: Mitigation Area DG-4C Transect #2 Start**



**Photo 44: Mitigation Area DG-4C Transect #2 End**





**Photo 45: Mitigation Area DG-5 Transect #1 Start**



**Photo 46: Mitigation Area DG-5 Transect #1 End**





**Photo 47: Mitigation Area DG-1 Photo Point #1, Facing NE**



**Photo 48: Mitigation Area DG-1 Photo Point #2, Facing SW**





**Photo 49: Mitigation Area DG-1 Photo Point #3, Facing NE**



**Photo 50: Mitigation Area DG-1 Photo Point #3, Facing SW**





**Photo 51: Mitigation Area DG-1 Photo Point #4, Facing SW**



**Photo 52: Mitigation Area DG-1 Photo Point #5, Facing NE**





**Photo 53: Mitigation Area DG-1 Photo Point #5, Facing SE**



**Photo 54: Mitigation Area DG-1 Photo Point #6, Facing SW**





**Photo 55: Mitigation Area DG-2A Photo Point #1, Facing SW**



**Photo 56: Mitigation Area DG-2A Photo Point #2, Facing NW**





**Photo 57: Mitigation Area DG-2A Photo Point #3, Facing SW**



**Photo 58: Mitigation Area DG-2A Photo Point #4, Facing NW**





**Photo 59: Mitigation Area DG-2B Photo Point #1, Facing NE**



**Photo 60: Mitigation Area DG-2B Photo Point #1, Facing SE**





**Photo 61: Mitigation Area DG-2B Photo Point #2, Facing NE**



**Photo 62: Mitigation Area DG-2B Photo Point #2, Facing SE**





**Photo 63: Mitigation Area DG-2B Photo Point #3, Facing NW**



**Photo 64: Mitigation Area DG-2B Photo Point #3, Facing SW**





**Photo 65: Mitigation Area DG-2B Photo Point #4, Facing NW**



**Photo 66: Mitigation Area DG-2B Photo Point #4, Facing W**





**Photo 67: Mitigation Area DG-2B Photo Point #4, Facing SW**



**Photo 68: Mitigation Area DG-3A Photo Point #1, Facing SE**





**Photo 69: Mitigation Area DG-3A Photo Point #2, Facing SE**



**Photo 70: Mitigation Area DG-3A Photo Point #3, Facing S**





**Photo 71: Mitigation Area DG-3A Photo Point #4, Facing N**



**Photo 72: Mitigation Area DG-3A Photo Point #4, Facing SW**





**Photo 73: Mitigation Area DG-3A Photo Point #5, Facing NW**



**Photo 74: Mitigation Area DG-3A Photo Point #5, Facing W**





**Photo 75: Mitigation Area DG-3A Photo Point #5, Facing SW**



**Photo 76: Mitigation Area DG-3A Photo Point #6, Facing NW**





**Photo 77: Mitigation Area DG-3A Photo Point #7, Facing NW**



**Photo 78: Mitigation Area DG-3A Photo Point #7, Facing SW**





**Photo 79: Mitigation Area DG-4 Photo Point #1, Facing SE**



**Photo 80: Mitigation Area DG-4 Photo Point #2, Facing S**





**Photo 81: Mitigation Area DG-4 Photo Point #2, Facing W**



**Photo 82: Mitigation Area DG-4 Photo Point #3, Facing SW**





**Photo 83: Mitigation Area DG-4 Photo Point #4, Facing NE**



**Photo 84: Mitigation Area DG-4 Photo Point #5, Facing NE**





**Photo 85: Mitigation Area DG-4 Photo Point #5, Facing S**



**Photo 86: Mitigation Area DG-4 Photo Point #6, Facing NE**





**Photo 87: Mitigation Area DG-4 Photo Point #7, Facing NW**



**Photo 88: Mitigation Area DG-4 Point #8, Facing SE**





**Photo 89: Mitigation Area DG-4 Photo Point #9, Facing E**



**Photo 90: Mitigation Area DG-4 Photo Point #10, Facing E**





**Photo 91: Mitigation Area DG-4 Photo Point #10, Facing S**



**Photo 92: Mitigation Area DG-4 Photo Point #11, Facing SW**





**Photo 93: Mitigation Area DG-4 Photo Point #12, Facing N**



**Photo 94: Mitigation Area DG-4 Photo Point #13, Facing NE**





**Photo 95: Mitigation Area DG-4 Photo Point #14, Facing S**



**Photo 96: Mitigation Area DG-4 Photo Point #15, Facing NE**





**Photo 97: Mitigation Area DG-4B Photo Point #1, Facing NE**



**Photo 98: Mitigation Area DG-4B Photo Point #2, Facing NE**





**Photo 99: Mitigation Area DG-4B Photo Point #2, Facing SE**



**Photo 100: Mitigation Area DG-4B Photo Point #3, Facing S**





**Photo 101: Mitigation Area DG-4C Photo Point #1, Facing NE**



**Photo 102: Mitigation Area DG-4C Photo Point #2, Facing S**





**Photo 103: Mitigation Area DG-4C Photo Point #3, Facing NE**



**Photo 104: Mitigation Area DG-4C Photo Point #4, Facing S**





**Photo 105: Mitigation Area DG-5 Photo Point #1, Facing S**



**Photo 106: Mitigation Area DG-5 Photo Point #2, Facing SW**





**Photo 107: Mitigation Area DG-5 Photo Point #3, Facing NE**





Photo 108: RAFSS Reference Transect Start



Photo 109: RAFSS Reference Transect End





Photo 110: CSS Reference Transect Start



Photo 111: CSS Reference Transect End





Photo 112: Coast Live Oak Woodland Reference Transect Start



Photo 113: Coast Live Oak Woodland Reference Transect End





Photo 114: Riparian Scrub Reference Transect Start



Photo 115: Riparian Scrub Reference Transect End





Photo 116: Riparian Woodland Reference Transect Start



Photo 117: Riparian Woodland Reference Transect End





Photo 118: LBVI Reference Transect #1 Start



Photo 119: LBVI Reference Transect #1 End





Photo 120: LBVI Reference Transect #2 Start



Photo 121: LBVI Reference Transect #2 End





Photo 122: Overview LBVI Reference Site



Photo 123: Overview LBVI Reference Site





Photo 124: Overview LBVI Reference Site



Photo 125: Overview LBVI Reference Site





Photo 126: Overview LBVI Reference Site



Photo 127: Overview LBVI Reference Site