

Mr. Mark Gim  
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900 South Fremont Avenue, 9th Floor  
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**Re: *Devil's Gate Reservoir Restoration Project – Phase 2 Restoration Plant Establishment Period Monitoring Conducted on June 17, 2021***

## **1.0 INTRODUCTION**

The purpose of this letter report is to document the results of Plant Establishment Period (PEP) monitoring conducted for the Devil's Gate Reservoir Restoration Project (Project), located in the City of Pasadena, Los Angeles County, California. The PEP monitoring was conducted in the planted and or seeded portions of the Phase 2 mitigation areas including DG-W-1 (Johnson Field), DG-2, DG-2 New Channels, DG-2 WOUS, DG-W-2 (Mining Pit), DG-W-2 Outlet, DG-4 Sheet Flow (northern), and DG-SF-1. Other areas included in Phase 2 include DG-4 Sheet Flow (southern), DG-4 WOUS, DG-4 Drainage, and DG-SF-2; however, due to the dynamic nature of these areas and/or uncertainty of hydrologic conditions prior to the completion of sediment removal for the Project, these areas were not planted or seeded during Phase 2. It is anticipated that most, if not all, of these areas will be planted with willow (*Salix* sp.) and mulefat (*Baccharis salicifolia*) stakes during the fall and winter of 2021. The monitoring is being conducted in accordance with the Final Habitat Restoration Plan for the Project (HRP). Active sediment removal is still occurring within the sediment removal areas for the Project and habitat restoration is being conducted onsite around the perimeter of the sediment removal areas.

ECORP is responsible for conducting qualitative monitoring and compliance review of restoration efforts in each of the mitigation areas. ECORP is also responsible for preparing monitoring reports, which typically include the following information:

- Overall health of container plants
- Observations and recommendations related to container plant establishment
- Germination of native plant species from seed application and natural recruitment
- Level of germination of nonnative plant species
- Soil condition

- Other observations and recommendations as appropriate

PEP monitoring was conducted by Carley Lancaster and Joshua Harris on June 17, 2021. Field data collected during the monitoring event is provided as Attachment A. This report documents the second PEP monitoring visit for the Phase 2 mitigation areas.

## 2.0 PEP MONITORING IN THE PHASE 2 MITIGATION AREAS

### 2.1 Brief Summary of Plant Installation

During the Phase 2 Installation effort, which was completed on May 5, 2021, a total of 11,440 one-gallon container plants were installed in the DG-W-1 (Johnson Field), DG-W-2 (Mining Pit), DG-W-2 Outlet, DG-2, DG-2 New Channels, DG-2 WOUS mitigation areas, DG-4 Sheet Flow (northern), and DG-SF-1. Container plants were not installed in the DG-4 Sheet Flow (southern), DG-4 WOUS, DG-4 Drainage, or DG-SF-2 mitigation areas; however, these areas were included in the weed removal effort and will be planted with willow and mulefat stakes in the fall and winter of 2021. Table 1 lists container plant species and the numbers installed in each of the Phase 2 mitigation areas.

Scientific Name	Common Name	DG-					TOTAL
		DG-W-1 (Johnson Field)	DG-2/ DG-2 New Channels/ DG-2 WOUS	DG-W-2 (Mining Pit)	DG-W-2 Outlet	DG-4 Sheet Flow/ DG-SF-1	
<i>Artemisia douglasiana</i>	Mugwort	349	448	187	50	31	1,065
<i>Baccharis pilularis</i>	Coyote brush	349	375	187	50	31	992
<i>Baccharis salicifolia</i>	mulefat	673	827	228	61	37	1,826
<i>Populus fremontii</i>	Fremont's cottonwood	349	375	187	50	31	992
<i>Rosa californica</i>	California rose	349	375	187	50	31	992
<i>Rubus ursinus</i>	California blackberry	349	375	141	38	23	926
<i>Salix gooddingii</i>	Black willow	698	896	373	101	61	2,129
<i>Salix laevigata</i>	Red willow	349	375	187	50	31	992
<i>Salix lasiolepis</i>	Arroyo willow	349	375	187	50	31	992
<i>Sambucus mexicana</i>	Mexican elderberry	175	225	94	25	15	534
<b>Total</b>		<b>3989</b>	<b>4646</b>	<b>1958</b>	<b>525</b>	<b>322</b>	<b>11,440</b>

All plants were installed according to the methods described in Section 4.11 of the HRP. Planting holes for all container plants were dug to a width twice the size of the root ball and to a depth slightly deeper than the depth of the root ball so that the root crown was one inch below grade following installation. Prior to installation, all plants were thoroughly watered in their containers and the soil in planting holes was wetted with at least one gallon of water. Planting holes were backfilled with native soil and irrigation basins, approximately two feet in width, were formed around the base of each plant. Rocks greater than

two inches in diameter were removed to the extent possible from the backfill soil. All container plants were irrigated with at least one gallon of water immediately following installation and basin creation.

## 2.2 PEP Monitoring Methods

PEP monitoring occurs monthly for the first four months following plant installation. Following the 120-day PEP, qualitative monitoring will occur monthly for the remainder of Year 1 (8 months). Following Year 1, qualitative monitoring will occur quarterly during Years 2 and 3 and twice per year during Years 4 through 10. The purpose of the PEP and qualitative monitoring is to assess container plant health and vigor and monitor the success of the mitigation areas.

During the June 17, 2021 visit, all Phase 2 mitigation areas were walked, the health and vigor of container plants were documented, germination from seeding and natural recruitment was noted, and the irrigation lines were inspected for functionality. In addition, the level of nonnative and invasive weed cover was estimated for each of the Phase 2 mitigation areas.

## 2.3 Qualitative Monitoring Results

### 2.3.1 DG-W-1 (Johnson Field)

The overall health of the container plants in DG-W-1 was noted as being good. Approximately five to ten percent of the container plants in DG-W-1 were noted as showing varied levels of stress and a negligible number were noted as being dead or missing. Stress may be occurring as a result of 1) transplant shock 2) herbivory by rabbits or other wildlife, 3) competition from nonnative and invasive weeds, 4) misplaced emitters, or 5) recreational traffic through the mitigation areas. Formal mortality counts will be taken for DG-W-1 during the 2021 quantitative monitoring and will be included in the 2021 annual reporting. The willow species (*Salix sp.*) and Fremont's cottonwoods (*Populus fremontii*) in the mitigation areas were no longer showing signs of seasonal dieback. Some of the container plants were noted as lacking well defined basins and should have their basins properly constructed and/or repaired. The installation of plants in the DG-W-1 mitigation area appears to have been completed successfully. The current issues identified during the monitoring visit are not expected to have an effect on the continued growth of the plants in the mitigation area. Photos 1 through 3 in Attachment B document the mitigation area during the monitoring visit.

Minimal native plant growth was noted throughout the DG-W-1 mitigation area, but what was present is likely from both natural recruitment and from seeding. Native plants such as annual bursage (*Ambrosia acanthicarpa*), common yarrow (*Achillea millefolium*), Canada horseweed (*Erigeron canadensis*), cardinal monkey flower (*Erythranthe cardinalis*), California poppy (*Eschscholzia californica*), caterpillar phacelia (*Phacelia cicutaria*), and Parry's phacelia (*Phacelia parryi*) were observed sprouting in the DG-W-1 mitigation area. In addition, dodder (*Cuscuta sp.*) was observed growing on some of the young container plants and should be removed during maintenance activities.

Nonnative weed cover in DG-W-1 was estimated at less than five percent and weeding had recently occurred in the mitigation area. Nonnative species observed in DG-W-1 included black mustard (*Brassica nigra*), tocalote (*Centaurea melitensis*), lamb's quarters (*Chenopodium album*), poison hemlock (*Conium*

*maculatum*), red-stemmed filaree (*Erodium cicutaria*) scarlet pimpernel (*Lysimachia arvensis*), German chamomile (*Matricaria chamomilla*), tree tobacco (*Nicotiana glauca*), and curly dock (*Rumex crispus*). Most of the nonnative weeds observed in this mitigation area are still vegetative with very few going to flower or seed.

### **2.3.2 DG-2/DG-2 New Channels/DG-2 WOUS**

The overall health of the container plants in DG-2, DG-2 New Channels, and DG-2 WOUS was noted as being good. Approximately five to ten percent of the container plants were noted as showing varied levels of stress and a negligible number were noted as being dead or missing. Stress may be occurring due to similar reasons described for DG-W-1. Formal mortality counts will be taken for DG-2, DG-2 New Channels, and DG-2 WOUS during the 2021 quantitative monitoring and will be included in the 2021 annual reporting. Some of the container plants were noted as lacking well defined basins and should have their basins properly constructed and/or repaired. The installation of plants in the DG-2, DG-2 New Channels, and DG-2 WOUS mitigation areas appears to have been completed successfully. The current issues identified during the monitoring visit are not expected to have an effect on the continued growth of the plants in the mitigation area. Photos 4 through 8 in Attachment B document the mitigation areas during the monitoring visit.

Minimal native plant growth was noted throughout the DG-2, DG-2 New Channels, and DG-2 WOUS mitigation areas, but was noted is likely from both natural recruitment and from seeding. Native plants such as annual bursage, prickly poppy (*Argemone munita*), Canada horseweed, California poppy, California primrose (*Eulobus californicus*), caterpillar phacelia, common phacelia (*Phacelia distans*), giant flowered phacelia (*Phacelia grandiflora*), California bluebells (*Phacelia minor*), and Parry's phacelia were observed sprouting in the mitigation areas.

Nonnative weed cover in DG-2, DG-2 New Channels, and DG-2 WOUS mitigation areas was estimated at approximately 25 percent with patches of dense new growth. Nonnative species observed included black mustard, poison hemlock, perennial pepperweed (*Lepidium latifolium*), and black nightshade (*Solanum nigrum*). Most of the nonnative weeds observed in this mitigation area were vegetative with only some starting to flower and go to seed.

### **2.3.3 DG-W-2 (Mining Pit)**

The overall health of the container plants in mitigation area DG-W-2 was noted as being fair; however, nonnative growth in this mitigation area is smothering the young container plants. Due to the high level of nonnative growth, it was difficult to determine the level of stress and the number of container plants that are dead or missing; however, it was estimated that approximately 10 to 15 percent of container plants were showing varied levels of stress. Stress may be occurring due to similar reasons described for DG-W-1; however nonnative weed growth is likely the most significant contributor to container plant stress for this mitigation area. Formal mortality counts will be taken for DG-W-2 during the 2021 quantitative monitoring and will be included in the 2021 annual reporting. Some of the container plants were noted as lacking well defined basins and should have their basins properly constructed and/or repaired. In addition, minor herbivory of young plants was observed within the DG-W-2 mitigation area and should continue to be monitored. The installation of plants in the DG-W-2 mitigation area appears to

have been completed successfully and the issues noted during the monitoring are not expected to have an impact on the continued growth of the plants. Photos 9 through 12 in Attachment B document the mitigation area during the monitoring visit.

Minimal native plant growth was noted throughout the DG-W-2 mitigation area, and what was present is likely from both natural recruitment and from seeding. Native plants such as Jimson weed (*Datura wrightii*), Parry's phacelia, and rough cocklebur (*Xanthium strumarium*) were observed sprouting in the DG-W-2 mitigation area.

Nonnative weed cover in DG-W-2 was estimated at approximately 60 percent. Nonnative species observed in DG-W-2 included black mustard, poison hemlock, perennial pepperweed, horehound (*Marrubium vulgare*), tree tobacco, and black nightshade. Most of the nonnative weeds in this area were starting to flower and will soon go to seed. This area should be weeded as soon as possible.

### **2.3.4 DG-W-2 Outlet**

The overall health of the container plants in mitigation area DG-W-2 Outlet was noted as being good. Approximately 10 percent of the container plants were noted as showing varied levels of stress and a negligible number were noted as being dead or missing. Stress may be occurring due to similar reasons described for DG-W-1. Formal mortality counts will be taken for DG-W-2 Outlet during the 2021 quantitative monitoring and will be included in the 2021 annual reporting. Some of the container plants were noted as lacking well defined basins and should have their basins properly constructed and/or repaired. In addition, minor herbivory of young plants was observed within the DG-W-2 Outlet mitigation area and should continue to be monitored. The installation of plants in the DG-W-2 Outlet mitigation area appears to have been completed successfully and the issues noted during the monitoring are not expected to have an impact on the continued growth of the plants. Photos 13 through 15 in Attachment B document the mitigation area during the monitoring visit.

Minimal native plant growth was noted throughout the DG-W-2 Outlet mitigation area, and what was present is likely from both natural recruitment and from seeding. Native plants such as annual bursage, common cryptantha (*Cryptantha intermedia*), tall flatsedge (*Cyperus eragrostis*), caterpillar phacelia, giant flowered phacelia, Parry's phacelia, chaparral nightshade (*Solanum xanti*), and rough cocklebur were observed sprouting in the DG-W-2 Outlet mitigation area.

Weed abatement was observed to be actively occurring in portions of the DG-W-2 Outlet mitigation area during the PEP monitoring. Nonnative weed cover in DG-W-2 Outlet was estimated at approximately less than two percent for areas that had been recently weeded and as high as 60 percent in areas that had not yet been weeded. Nonnative species observed in DG-W-2 included pigweed amaranthus (*Amaranthus albus*), black mustard, poison hemlock, perennial pepperweed, German chamomile, tree tobacco, black nightshade, prickly sow thistle (*Sochus asper*), and tamarisk (*Tamarix ramosissima*). Most of the nonnative weeds in this mitigation area were starting to flower and will soon go to seed (excluding areas that were recently weeded). In addition, tamarisk has not been observed in the mitigation areas until now. Any occurrences of this species should be eradicated immediately to prevent the spread of this invasive species.

### **2.3.5 DG-4 Sheet Flow/DG-SF-1**

The overall health of the container plants in mitigation areas DG-4 Sheet Flow (northern) and DG-SF-1 was noted as being fair; however, nonnative growth in this mitigation area is smothering the young container plants. Due to the high level of nonnative growth, it was difficult to determine the level of stress and the number of container plants that are dead or missing; however, it was estimated that approximately 15 to 20 percent of container plants were showing varied levels of stress. Stress may be occurring due to similar reasons described for DG-W-1; however nonnative weed growth is likely the most significant contributor to container plant stress for this mitigation area. Formal mortality counts will be taken during the 2021 quantitative monitoring and will be included in the 2021 annual reporting. Some of the container plants were noted as lacking well defined basins and should have their basins properly constructed and/or repaired. In addition, minor herbivory of young plants was observed within the DG-4 Sheet Flow and DG-SF-1 areas and should continue to be monitored. The installation of plants in the DG-4 Sheet Flow and DG-SF-1 mitigation areas appears to have been completed successfully and the issues noted during the monitoring are not expected to have an impact on the continued growth of the plants. Photo 16 in Attachment B documents the mitigation area during the monitoring visit.

Minimal native plant growth was noted throughout the DG-4 Sheet Flow and DG-SF-1 mitigation area, and what was present is likely from both natural recruitment and from seeding. Native plants such as Canada horseweed were observed sprouting in the DG-4 Sheet Flow and DG-SF-1 mitigation areas.

Nonnative weed cover in DG-4 Sheet Flow and DG-SF-1 was estimated at approximately 85 percent. Nonnative species observed in DG-4 Sheet Flow and DG-SF-1 included black mustard, poison hemlock, and perennial pepperweed. Most of the nonnative weeds in this area were starting to flower and will soon go to seed. This area should be weeded as soon as possible.

## **3.0 RECOMMENDATIONS**

### **3.1 Nonnative Plant Control**

Nonnative weed cover ranged from approximately less than two percent to 85 percent in the various mitigation areas. During the monitoring visit, weed abatement was actively occurring within the DG-W-2 Outlet mitigation area. Many of the weeds were observed to be flowering or going to seed and should be removed as soon as possible. Regular maintenance and removal of nonnative weeds is of the highest priority for all of the mitigation areas to reduce competition between native and nonnative plants. In addition, eucalyptus stumps that are starting to re-sprout should be trimmed back frequently. A focus should be placed on removing the weeds and nonnatives from the basins of each of the container plants and cuttings; however, nonnative weeds just outside of the planting areas can migrate into the planting areas via seed dispersal. Outside of the nesting bird season, a focus should also be made to remove nonnative weeds in areas where least Bell's vireos are likely to nest during the breeding season (i.e. in the vicinity of the least Bell's vireo nest that was active in 2020). Nonnative plants and weeds that have gone to seed should be bagged and removed from the mitigation area. Without the use of herbicides, control of the nonnatives will be extremely difficult so the frequency and level of effort will need to be increased to provide control until the native plants and seedlings have a chance to grow and outcompete the

nonnatives. In particular, it is important to maintain long-term perennial pepperweed management to reduce competition and allow for native plants to germinate. In addition, dodder should be removed from container plants in the mitigation areas. 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.

### **3.2 Irrigation**

The irrigation system was inspected for functionality and appeared to be properly installed. Irrigation was actively occurring during the monitoring visit and the soil for most container plants was found to be moist at and below the surface. Some of the emitters were observed to be outside of the container plant basins, likely due to erosion, water flow, and/or public interference. Twice weekly watering events should be conducted for the container plants unless adequate rainfall occurs. After watering, the container plant basins should have at least 0.5 inch of saturation depth. Continual maintenance of the irrigation system should be conducted to ensure all plants are evenly watered and the tube emitters are placed at the base of the container plants. Watering of the seeded only areas is not recommended.

### **3.3 Herbivory**

Rabbit herbivory of container plants was observed in the Phase 2 mitigation areas. California rose appeared to be the most affected by herbivory. Minor herbivory generally will not kill the plants, but continued monitoring should be conducted during future visits to determine the level of the herbivory isn't such that plants are dying. As the plants become more established, they will be less susceptible to the effects of herbivory. It should be noted that cages were installed by Nature's Image around container plants that appeared to be most susceptible to herbivory following container plant installation; however, if browsing by rabbits or other animals begins to worsen, additional caging around affected and/or favored container plants may be warranted.

### **3.4 Erosion**

Erosion issues were generally not observed within the Phase 2 mitigation areas. However, until more native perennial plants become established in these areas, there is the potential that intense rainfall may create erosion problems. During future monitoring events, erosion should continue to be monitored in all planted areas and if warranted, erosion Best Management Practices (BMPs) should be installed in appropriate areas. This may only require the installation of straw wattles at select sites to prevent existing rills from becoming larger.

If you have any questions about the information presented in this letter, please contact me at [CLancaster@ecorpconsulting.com](mailto:CLancaster@ecorpconsulting.com) or (714) 648-0630.

Sincerely,



Carley Lancaster  
Staff Biologist

## **ATTACHMENT A**

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Field Notes



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**ATTACHMENT B**

Photo Documentation