2024 Annual Monitoring Report (Year 5)

Devil's Gate Off-Site Mitigation Project

Los Angeles County, California
USACE File No. SPL-2014-00591
CDFW Tracking No. 1600-2015-0263-R5
RWQCB File No. 15-053

Prepared for:

Los Angeles County Flood Control District
P.O. Box 1460
Alhambra, CA 91802-1460
Attn: Allen Xie

AXie@dpw.lacounty.gov

(626) 570-2839

Prepared By:

WRA, Inc.
2169 G East Francisco Boulevard
San Rafael, CA 94901
Attn: Darcy Hardwick

darcy.hardwick@wra-ca.com

(415) 524-7238

October 2024

WRA#21065-7

Distribution Page

Allen Xie
Los Angeles County Department of Public Works
900 S. Fremont Avenue
Alhambra, CA 91803

Vanessa Navarro
U.S. Army Corps of Engineers
Los Angeles District, Regulatory Division
60 South California Street, Suite 201
Ventura, CA 93001

David Lin
California Department of Fish and Wildlife
4665 Lampson Avenue, Suite C
Los Alamitos, CA 90720

Valerie Carrillo Zara
California Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Contents

1 PROJECT OVERVIEW 5
1.1 Permit File Numbers 5
1.2 Project Description 5
1.3 Monitoring and Reporting Tasks 9
1.4 Status Summary 9
2 MITIGATION SITE EXISTING CONDITIONS 10
2.1 Location 10
2.2 Existing Habitat 10
3 MITIGATION ACTIVITIES 11
3.1 Cattle Exclusion Fencing 11
3.2 Invasive Species Management and Considerations 11
3.3 Planting Areas 11
3.4 Preservation Areas 11
4 MONITORING AND PERFORMANCE STANDARDS 13
4.1 Planting Area Performance Standards 13
4.2 Performance Monitoring Methods 15
4.2.1 Transect Monitoring 15
4.2.2 Drone Monitoring 15
4.3 Inspections for Mitigation Maintenance 15
5 RESULTS 18
5.1 Performance Monitoring 18
5.1.1 Mulefat and Willow Cover 18
5.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover 18
5.2 Mitigation Maintenance Inspections 22
5.2.1 Erosion 22
5.2.2 Target Non-Native Invasive Plant Species Mapping 22
5.2.3 Cattle Exclusion Fencing 23
5.2.4 Hydrologic Conditions 23
6 SUMMARY AND MANAGEMENT RECOMMENDATIONS 25
6.1 Performance Monitoring Summary 25
6.1.1 Mulefat and Willows Cover and Survivorship 25
6.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover 26
6.2 Management Recommendations 26
6.2.1 Biological Resources 26
6.2.2 Infrastructure and Facilities 27
7 REFERENCES 28

List of Tables

Table 1. Performance Standards for Planting Areas 14

Table 2. Maintenance Inspection Types and Actions 16

Table 3. Year 5 Performance Monitoring Results – Absolute Cover of Mulefat & Willow and Absolute Cover of Non-Native Invasive Broad-Leaved Plant Species within the Mitigation Site 19

Table 4. Year 5 UAV Multispectral Analysis Results – Vegetation Absolute Cover of Mulefat & Willow 20

List of Figures

Figure 1: Petersen Ranch Mitigation Bank Location Map 7

Figure 2: Mitigation Site Location Map 8

Figure 3: Devil's Gate Offsite Mitigation As-built Plan 12

Figure 4: Mitigation Site Monitoring Locations 17

Figure 5: Year 4 UAV Multispectral Analysis Results – Vegetation Absolute Cover 21

Figure 6: Target Non-Native Invasive Plants within Mitigation Site Planting Areas 24

List of Appendices

Appendix A. Annual Monitoring Data

Appendix B. Mitigation Site Observed Species List

Appendix C. Photo Monitoring And Transect Photo

List of Preparers

Nate Bello	Senior Review
Darcy Hardwick	Conservation Project Manager
Matt Schliebe	Biologist
Jake Alcaraz	Plant Biologist
Sundaran Gillespie	GIS Analyst

List of Acronyms

BEI	Bank Enabling Instrument
Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
CIR	Colour-infrared
GIS	Geographic Information System
GPS	Global Positioning System
HMMP	Habitat Mitigation and Monitoring
LACFCD	Los Angeles County Flood Control District
NNIP	Non-Native Invasive Plant
NDVI	Normalized Difference Vegetation Index
RWQCB	Regional Water Quality Control Board
UAV	Unmanned Aerial Vehicle
USACE	United States Army Corps of Engineers
WOUS	Waters of the United States
WRA	WRA, Inc.

THIS PAGE INTENTIONALLY LEFT BLANK.

1 PROJECT OVERVIEW

This is the fifth annual report for the Devil's Gate Off-Site Mitigation Project as required under the terms of the approved Devil's Gate Off-Site Mitigation Project Habitat Mitigation and Monitoring Plan (HMMP; WRA 2018). The United States Army Corps of Engineers (USACE) permit authorizing the HMMP requires the annual reports be submitted to the USACE, the California Department of Fish and Wildlife (CDFW), and the Regional Water Quality Control Board (RWQCB) (Permitting Agencies) by October 1st throughout the five-year maintenance and monitoring period.

Restoration activities at the Devil's Gate Off-Site Mitigation Project Site (Mitigation Site) were completed as outlined in the as-built memo submitted to the Permitting Agencies and dated April 23, 2019 (WRA 2019). This report includes information on the site conditions, continued restoration activities, performance monitoring, and management recommendations.

The primary goal of the Project is to create mitigation areas that could provide suitable habitat for federally and state-listed species, including least Bell's vireo (*Vireo bellii pusillus*; WRA 2018). The total riparian cover across the entire planting area is 63% based on the UAV multispectral analysis, which is greater than the mean riparian vegetation required for least Bell's vireo habitat as determined by the habitat suitability model developed by the United States Geological Survey Wildlife Program (Preston et al. 2021). In addition, the mitigation site exhibits 70-97% cumulative native wetland and riparian cover based on the UAV (Unmanned Aerial Vehicle) Multispectral Analysis and transect monitoring, respectively. The prevalence of native wetland species and the presence of a mixture of open canopy and closed canopy habitat types is consistent with the objective seeking to improve the riparian habitat structure and increase the riparian habitat diversity (Section 1.2, WRA 2018). However, as further discussed in this report, the Mitigation Site is not meeting the Year 5 Performance Standard of 68% or greater willow (*Salix* sp.) and mulefat (*Baccharis salicifolia*) cover. Due to the prevalence of robust native wetland and riparian cover, structural diversity and inherently meeting overarching project goals, it is requested that the Mitigation Site be considered for sign-off despite not meeting the Year 5 willow/mulefat performance standard.

1.1 Permit File Numbers

- U.S. Army Corps of Engineers Section 404 (File No. SPL-2014-00591)
- California Department of Fish and Wildlife Section 1602 Streambed Alteration Agreement (Notification No. 1600-2015-0263-R5)
- Los Angeles Regional Water Quality Control Board Section 401 Water Quality Certification (File No. 15-053

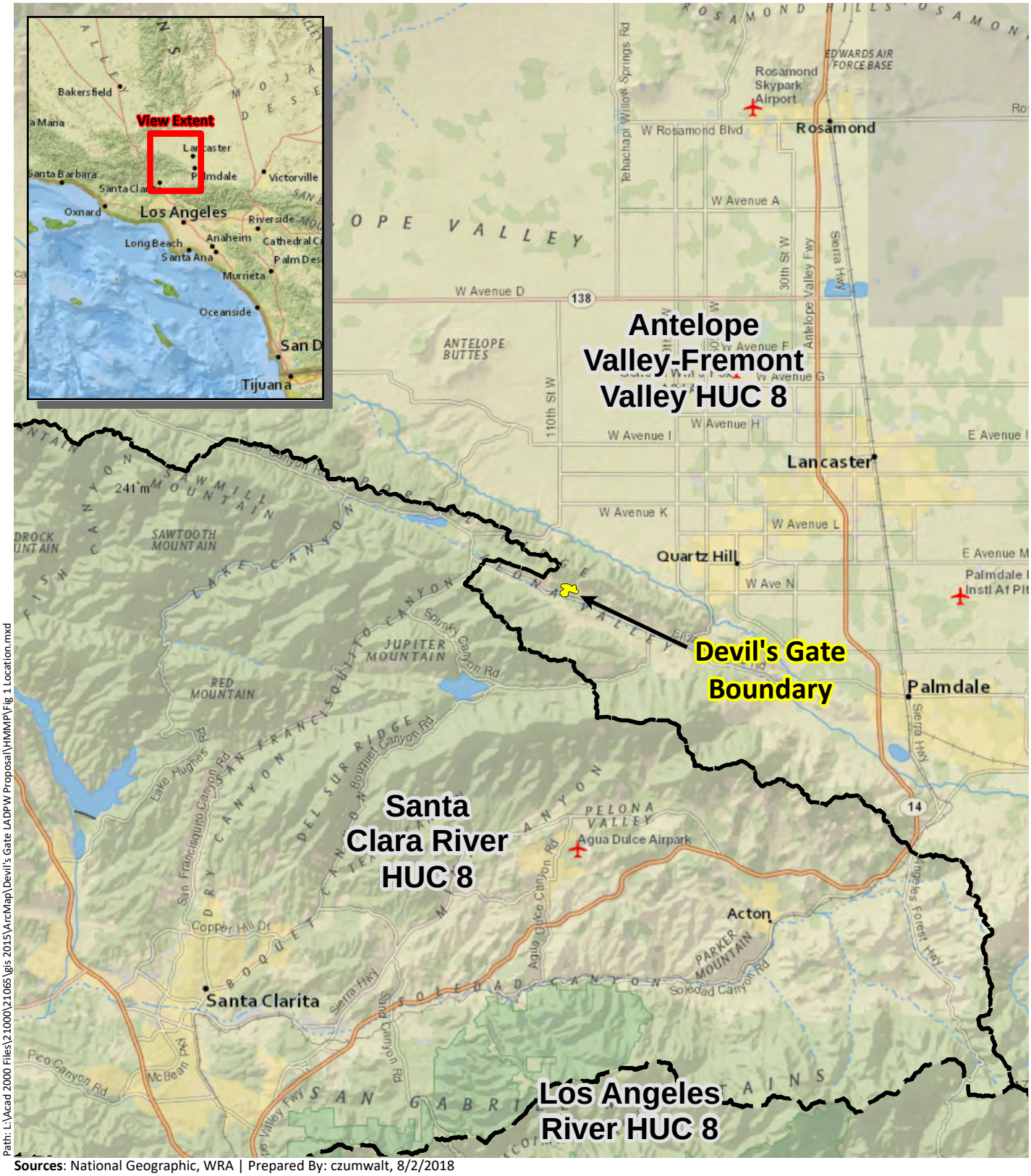
This annual report is prepared pursuant to the above permits, as set forth by the HMMP prepared by WRA, Inc. (WRA), dated October 17, 2018.

1.2 Project Description

The Devil's Gate Off-Site Mitigation Project (Project) serves as an off-site mitigation project for the Los Angeles County Flood Control District (LACFCD) Devil's Gate Sediment Removal and Maintenance Project, which was proposed to remove vegetation and 1.7 million cubic yards (cy) of sediment from a 65.56-acre area within the reservoir above the Devil's Gate Dam (Impact Site). The Sediment Removal Project will directly impact 1.52 acres of USACE jurisdictional wetlands and 32.54 acres of USACE non-wetland Waters of the United States (WOUS). LACFCD

proposed to compensate for these temporary and permanent impacts through a combination of on-site and off-site mitigation projects, as required by the USACE Section 404 Permit (SPL-2014-00591), the CDFW Lake or Streambed Alteration Agreement (1600-2015-0263-R5), and the RWQCB Section 401 Certification (15-053). On-site mitigation objectives are described in the Devil's Gate Sediment Removal and Management Project Habitat Mitigation and Monitoring Plan (ECORP 2018).

LACFCD satisfied the off-site mitigation requirement by engaging Land Veritas Corp (Bank Sponsor) to implement the Project in a 31.55–acre portion of the Petersen Ranch Mitigation Bank (Bank). The Bank is in northern Los Angeles County near Leona Valley, California (Figure 1). The Project took place at and surrounding a large sag pond (Pond D) on the east end of the Bank (Figure 2). Mitigation actions focused on enhancing existing seasonal wetlands that support mulefat and willow populations, creating new mulefat/willow dominated habitats, and preserving alluvial scrub areas around Pond D. The created, restored, and preserved communities are of a similar type and provide similar or greater functions to those affected at the Impact Site.



Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\Devil's Gate LADPW Proposal\HMMP\Fig 1 Location.mxd

Sources: National Geographic, WRA | Prepared By: czumwalt, 8/2/2018

Figure 1. Petersen Ranch Mitigation Bank Location Map

Petersen Ranch Mitigation Bank
Los Angeles County, California

Petersen Bank Boundary

Devil's Gate Mitigation Site

Devil's Gate Mitigation Site

Leona Valley

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\Devil's Gate IADPW Proposal\MMP\Fig 2 Bank Property.mxd

Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: czumwalt, 8/2/2018

Figure 2. Mitigation Site Location Map

Petersen Ranch Mitigation Bank
Los Angeles County, California

0 0.25 0.5 Miles

N

wra ENVIRONMENTAL CONSULTANTS

1.3 Monitoring and Reporting Tasks

This report addresses the Year 5 monitoring and reporting requirements of the Mitigation Site outlined in the HMMP, including the management and maintenance tasks completed this year, a description of the overall condition of the Mitigation Site, status of maintenance activities, performance monitoring activities and results, and management and maintenance activities proposed for the upcoming year in the event sign-off is not achieved.

1.4 Status Summary

Habitat restoration and enhancement activities were completed in April 2019, as described in the as-built report letter dated April 23, 2019. This includes planting of over 10,000 willow and mulefat live stakes and installation of cattle exclusion fencing. The mitigation site is now in Year 5 of the management and monitoring period and is proposed for final year sign-off.

As presented in this report, the Mitigation Site is meeting the Year 5 Performance Standard of less than 10% absolute cover percent cover of Cal-IPC rated high broad-leaved invasive plant species. The Mitigation site is not meeting the Year 5 Performance Standard of 68% or more absolute cover of mulefat or willow within the planting areas, however, transect data show there is still an average of 97% absolute cover of native wetland and riparian plant cover at the monitoring locations.

UAV multispectral analysis was conducted and determined an average absolute cover of native wetland and riparian habitat above 68% (at approximately 70%). The UAV multispectral data for this year was lower than the previous year likely due to the timing of the data collection in conjunction with yearly rainfall. It was noted that the mulefat was no longer leafing out which is hypothesized to have contributed to the reduction in observed mulefat aerial signature.

Based on the transect and UAV multispectral analysis, the total absolute cover of native wetland and riparian habitat likely falls somewhere between 70% and 97%. The prevalence of native wetland species and the presence of a mixture of open canopy and closed canopy habitat types is consistent with the objective seeking to improve the riparian habitat structure and increase the riparian habitat diversity. Therefore, it is proposed that the project site be considered for sign-off despite not meeting the willow/mulefat Year 5 performance standard.

2 MITIGATION SITE EXISTING CONDITIONS

2.1 Location

The Mitigation Site is located approximately 32 miles north of the Impact Site within the agency approved Petersen Ranch Mitigation Bank. The 31.55-acre Mitigation Site is located within the eastern portion of the Bank (Figure 2). The Mitigation Site lies within Phase D of the Bank Property, which is part of the larger, 4,103-acre Bank. Within Phase D, a large sag pond (Devil's Gate Pond) and associated wetland complex had been identified as having opportunities for improvement of existing habitat. Opportunities included establishment and enhancement of wetlands, non-wetland WOUS, and associated buffer habitats. The buffer habitats were restored and enhanced to not only provide protection for the on-site aquatic resources but also to improve the overall function of the watershed. Additional details describing the mitigation bank can be found in the Bank Enabling Instrument (BEI; Land Veritas Corp. 2016) and in the Biological Resource Inventory (BRI; BEI Exhibit H).

2.2 Existing Habitat

A BRI was conducted by WRA at the Bank Property in January and February of 2013 (WRA 2013). In total, 11 biological communities were identified within the Mitigation Site: two wetlands and waters communities, four riparian communities, two sensitive terrestrial communities, and three non-sensitive terrestrial communities. Descriptions of the two communities targeted for restoration at the Mitigation Site are included below. In addition, Appendix A presents a list of observed plant species at the Mitigation Site.

Mulefat thickets (*Baccharis salicifolia* Shrubland Alliance, G5 S4, 1602 and Porter Cologne jurisdictional habitat). Mulefat thickets are widespread in canyon bottoms, floodplains, irrigation ditches, lake margins, and stream channels (Sawyer *et al*., 2009). This alliance covered 6.21 acres of the Mitigation Site. Mulefat thickets integrate with Fremont cottonwood (*Populus fremontii*) forest, arroyo willow (*Salix lasiolepis*) thickets, stretchberry (*Forestiera pubescens*) thickets, and Mexican rush (*Juncus mexicanus*) marshes. Mulefat comprised greater than 50 percent relative cover in the shrub layer. Typically, mulefat was the only species in the shrub layer. In rare instances, other shrub species included arroyo willow, elderberry (*Sambucus mexicana*), and stretchberry. Herbaceous groundcover was composed of Mexican rush, clustered field sedge (*Carex praegracilis*), stinging nettle (*Urtica dioica*), ripgut brome (*Bromus diandrus*), and ruderal weeds.

Red willow thickets (*Salix laevigata* Woodland Alliance, G3 S3, 1602 and Porter Cologne jurisdictional habitat). Red willow thickets are widespread and occur in ditches, floodplains, lake edges, and low gradient depositions along streams (Sawyer *et al*., 2009). This alliance covered 0.65 acres of the Mitigation Site. Red willow comprised greater than 50 percent relative cover in the tree canopy, or greater than 30 percent relative cover in the tree canopy if arroyo willow was in the subcanopy. The understory shrub layer often contained mulefat. Herbaceous groundcover was composed of Mexican rush, clustered field sedge, stinging nettle, water smartweed (*Persicaria amphibia*), ripgut brome, and ruderal weeds.

3 MITIGATION ACTIVITIES

The Project involved installing cattle exclusion fencing, removing and managing invasive plant species, planting mulefat and willow, and supplementing hydrology when necessary to sustain the restored habitat, as well as guaranteeing the long-term legal protection of the Mitigation Site with a conservation easement.

Figure 3 presents the locations of the cattle exclusion fencing, planting areas, and preservation areas.

3.1 Cattle Exclusion Fencing

A wildlife-friendly cattle exclusion fence was installed around the designated planting areas to prevent livestock from grazing on riparian plants. Alignment of the cattle exclusion fencing was adjusted during installation to avoid sensitive habitat while providing full constructability.

3.2 Invasive Species Management and Considerations

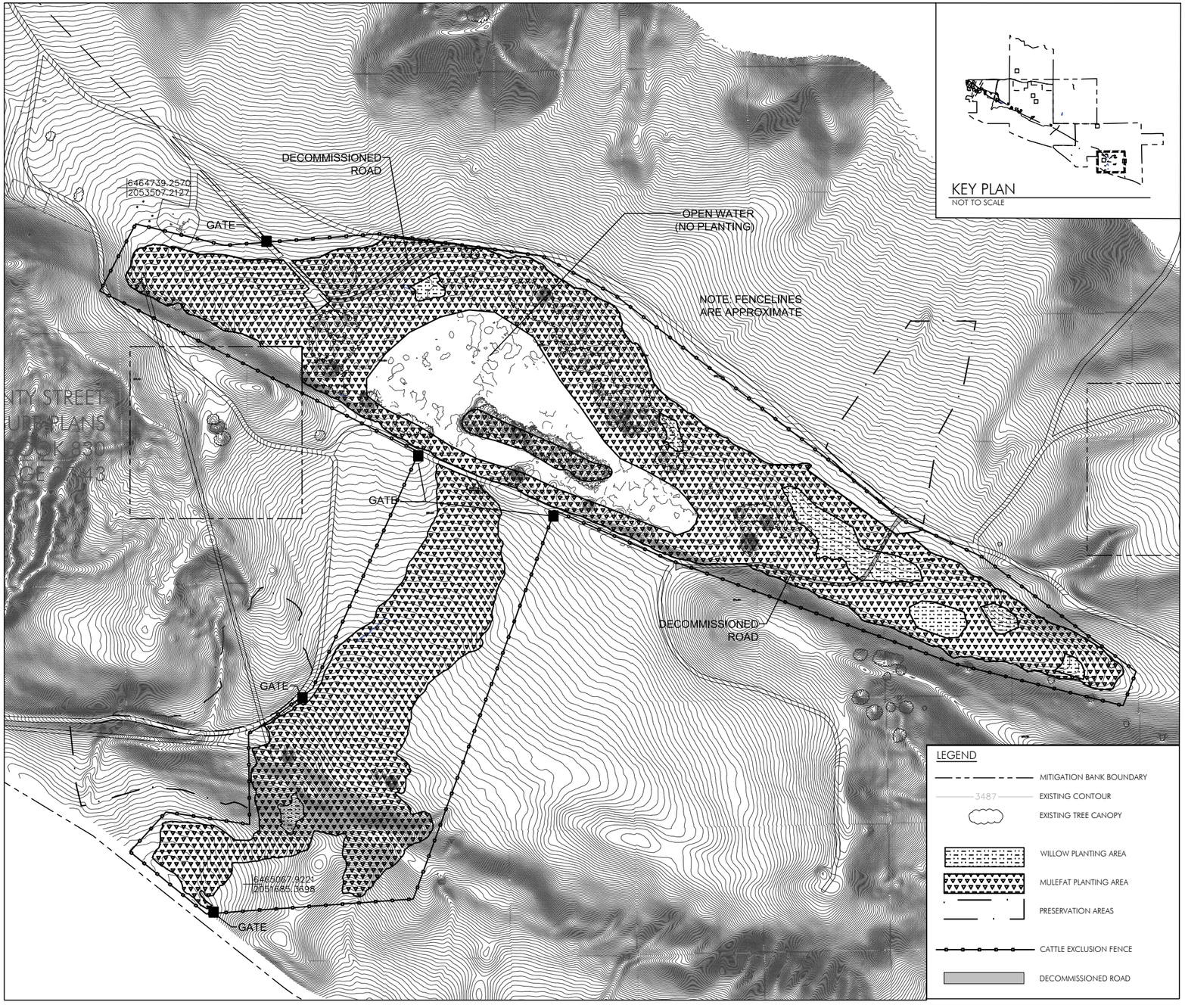
Initial weed eradication efforts included targeted grow kill cycles, and control of any non-grass invasive species present within the designated planting areas (including CAL-IPC moderate and limited species).

3.3 Planting Areas

Planting areas are within and immediately surrounding areas that previously supported sparse or scattered stands of mulefat, willow, and other riparian species. These areas were planted with 9,338 mulefat live stakes and 1,106 mixed red and arroyo willow live stake plantings to achieve an average density of 500-stems per acre, similar to existing high density mulefat and willow stands within the Mitigation Site. All plantings were live pole cuttings harvested from plants within the Bank to preserve local genetics. Willow plantings were focused only in the wettest portion of the Mitigation Site, primarily around Pond D, as well as a few other locations where groundwater seeps were sufficient to support the species; mulefat plantings are therefore more widespread throughout the Mitigation Site. In total, 27.67 acres were planted.

3.4 Preservation Areas

Two distinct preservation areas are located in the northeast and southwest of the Mitigation Site. They are dominated by California buckwheat (*Eriogonum fasciculatum*) in the northeast, and Parish's sagebrush (*Artemisia tridentata* ssp. *parishii*), thick leafed yerba santa (*Eriodictyon crassifolium*), and California buckwheat in the southwest. In total, 6.60 acres were preserved. These areas are located on alluvial fans and ephemeral drainages that receive periodic sediment and surface flows and support high quality habitat for xeric riparian communities.



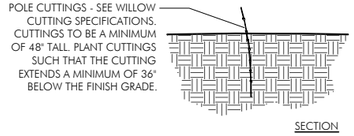
PLANTING AND FENCING PLAN

MULEFAT AREA PLANT SCHEDULE

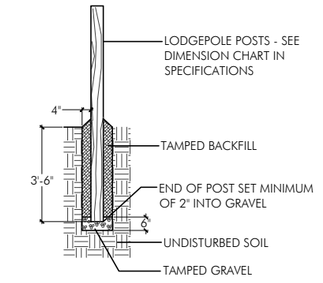
BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	QUANTITY
BACCHARIS SALICIFOLIA	MULEFAT	4' LIVE STAKE	9,338

WILLOW AREA PLANT SCHEDULE

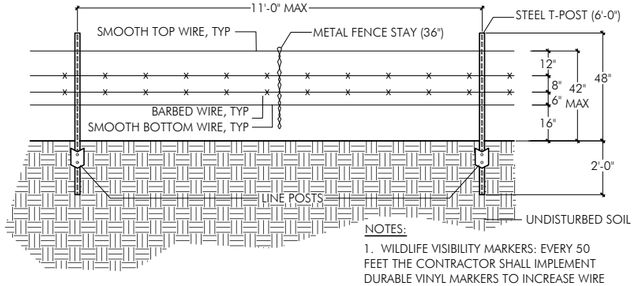
BOTANICAL NAME	COMMON NAME	CONTAINER SIZE	QUANTITY
SALIX LAEVIGATA	RED WILLOW	4' LIVE STAKE	885
SALIX LASIOLEPIS	ARROYO WILLOW	4' LIVE STAKE	221



1 POLE CUTTING DETAIL
NOT TO SCALE



3 BRACE POST INSTALLATION
NOT TO SCALE



NOTES:
1. WILDLIFE VISIBILITY MARKERS: EVERY 50 FEET THE CONTRACTOR SHALL IMPLEMENT DURABLE VINYL MARKERS TO INCREASE WIRE VISIBILITY.

2 FENCE LINE SECTION
NOT TO SCALE

wra
ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

WRA JOB #21065					
DATE: 04/20/2019					
DESIGNED BY: RBB/RFP					
DRAWN BY: RFP					
CHECKED BY: RBB	NO.	DATE	BY	REVISIONS	

PETERSEN RANCH
MITIGATION BANK
LEONA VALLEY, LOS ANGLES COUNTY CA

FIGURE 3: DEVIL'S GATE OFFSITE MITIGATION AS-BUILT PLAN

Sheet 1
Of 1
Scale: as shown

4 MONITORING AND PERFORMANCE STANDARDS

This section details annual performance standards and monitoring methods. Monitoring is conducted annually throughout the monitoring and maintenance period to demonstrate success of the mitigation activities. Monitoring is conducted in spring or early summer and is timed to follow the blooming periods of target weed species, so that any necessary control measures are implemented prior to the invasive species setting seed. Percent cover of mulefat and willow species within the Mitigation Site is assessed using plots spaced along four permanent 50-meter transects. Target invasive plant species are mapped annually and treated on an as-needed basis. Success is evaluated based on achieving the target standards presented below.

Restoration and enhancement activities were completed at the Mitigation Site in April 2019, so this report summarizes the fifth year of annual monitoring.

4.1 Planting Area Performance Standards

Performance standards for mulefat and willow installed in the planting areas are based on absolute cover assessed by visual estimation during the five-year monitoring period. Absolute cover of mulefat and willow is assessed in planting areas using the methods outlined in Section 4.2. Additionally, absolute cover of California Invasive Plant Council (Cal-IPC) rated High broad-leaved plant species is assessed in conjunction with mulefat and willow cover. The performance standards that are used to assess the success of the Mitigation Site are shown in Table 1.

Table 1. Performance Standards for Planting Areas

PERFORMANCE STANDARD	MONITORING YEAR					MONITORING FREQUENCY
	1	2	3	4	5	
By year 2, the planting areas must contain 10% or more absolute cover of mulefat or willow, or demonstrate 80% survivorship.		X				Annually
By year 3, the planting areas must contain 25% or more absolute cover of mulefat or willow, or demonstrate 80% survivorship.			X			Annually
By year 4, planting areas must contain 40% or more absolute cover of mulefat or willow.				X		Annually
By year 5, planting areas must contain 68% or more absolute cover of mulefat or willow.					X	Annually
Percent cover of Cal-IPC rated high broad-leaved invasive plant species must cover no more than 10% absolute cover of the Mitigation Site.		X	X	X	X	Annually

4.2 Performance Monitoring Methods

The Mitigation Site planting areas were monitored for cover of willow and mulefat, and cover of Cal-IPC High-rated broad-leaved invasive species ("invasive weeds"). Absolute cover of willow, mulefat, and invasive weeds was monitored in planting areas using four permanent transects. In addition to transect monitoring, a drone was used to assess site-wide cover of mulefat and willow plantings.

4.2.1 Transect Monitoring

Permanent 50-meter transects were established within planting areas (Figure 4). Transects were permanently marked in the field using T-posts. Global Positioning System (GPS) points were recorded to repeat transect monitoring in future years, and photos were taken at the start and end of each transect. Each 50-meter transect was surveyed by walking a 2.5-meter-wide belt transect and recording species and species cover class[1] every 5 meters, resulting in 10 sampling plots per transect. Species and species cover class were recorded within each plot to assess the performance standards outlined in Table 1. A photograph was taken at the beginning and end of each transect (Appendix C). The cover of mulefat and willow was then calculated by averaging the sums of the cover of mulefat and willow for each transect.

4.2.2 Drone Monitoring

A WRA licensed pilot flew the entire Mitigation Site with a Mavic3 M Multispectral UAV collecting data from 5 wavelength bands: Red, Green, Blue, Red-Edge, and Near Infrared. The data was then stitched together using Pix4D photogrammetry software. The output datasets included an RGB and Color-Infrared (CIR) photomosaics. Using Geographic Information Systems (GIS) software, a Normalized Difference Vegetation Index (NDVI) analysis was performed on the CIR imagery using the individual bands collected by the UAV. Utilizing the NDVI, data vegetation types were classified in GIS and exported into vector format. The vector format data was then used to calculate site-wide absolute vegetation cover. A follow up field visit was performed to adjust absolute vegetation cover with on the ground assessment. Incorporating the field collected data, a final absolute vegetation cover was classified.

4.3 Inspections for Mitigation Maintenance

Maintenance inspections and activities during the five-year plant establishment period in the created and enhanced riparian areas are required to facilitate the restoration (Table 2). Conditions are evaluated multiple times per year and if deficiencies are noted, they are assessed, documented, and remedied as quickly as necessary to prevent further damage, per the corresponding maintenance action described in Table 2.

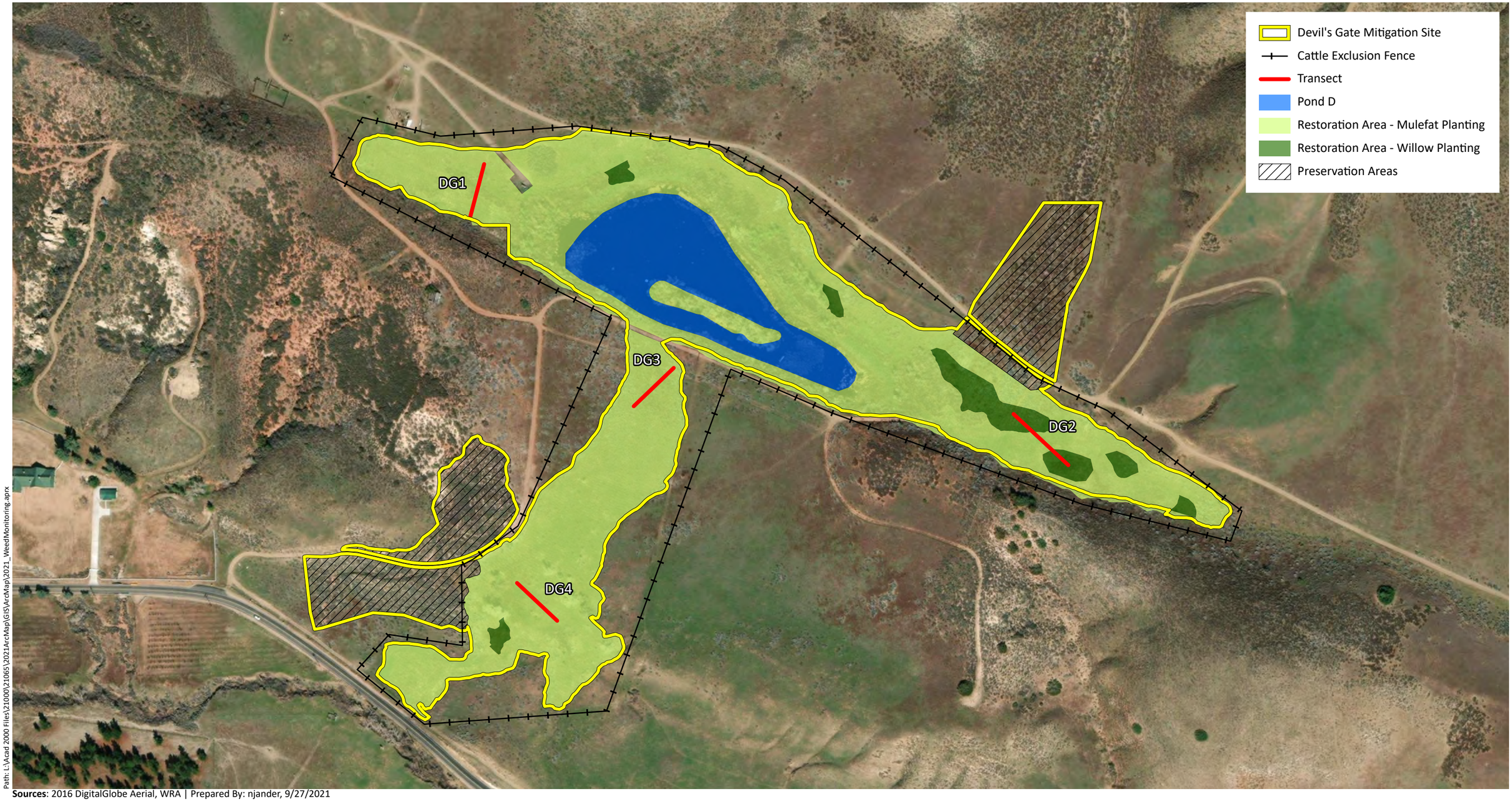
[1] *Cover classes are as follows: 0=<1%, 1=1-5%, 2=5-25%, 3=25-50%, 4=50-75%, 5=75-95%, 6=95-100%*

Table 2. Maintenance Inspection Types and Actions

INSPECTION TYPE	CORRESPONDING MAINTENANCE ACTION
Signs of erosion	Repair of slopes and installation of erosion protections
Non-native invasive plants (NNIPs) mapping	Plant removal or management to control establishment and spread
Condition of cattle exclusion fencing	Fence repair
Proper hydrologic conditions	Adjust water augmentation

Mapping of non-native, invasive plant (NNIP) species targeted for management was conducted regularly throughout the year. WRA biologists traversed the planting area on foot, focusing on locations where target NNIPs had been observed in past years, and mapped each target NNIP species occurrence that was encountered. The targets of the surveys were NNIP species rated Cal-IPC High, and species rated Cal-IPC Moderate, or Limited that are specifically known to be nuisance species either regionally or locally. Mapping was not conducted within preservation areas.

Other species that are not of regional or local concern were not mapped, but their presence was recorded in the Mitigation Site Species List (Appendix A).



Path: L:\Acad 2000 Files\21000\21065\2021ArcMap\GIS\ArcMap\2021_WeedMonitoring.aprx

Sources: 2016 DigitalGlobe Aerial, WRA | Prepared By: njander, 9/27/2021

Figure 4. Mitigation Site Monitoring Locations

Petersen Ranch Mitigation Bank
Los Angeles County, California

wra Environmental Consultants

5 RESULTS

5.1 Performance Monitoring

Year 5 monitoring activities were completed at the Mitigation Site in July 2024. Currently, the Mitigation Site is meeting the Year 5 Performance Standard of less than 10% absolute cover percent cover of Cal-IPC rated high broad-leaved invasive plant species. The Mitigation site is not meeting the Year 5 Performance Standard of 68% or more absolute cover of mulefat or willow within the planting areas, however, there is still an average of 97% absolute cover of native wetland and riparian plant cover per the transect monitoring (Table 3), and 70% per the UAV multispectral analysis (Table 4 and Figure 5). The complete annual monitoring data for the four monitoring transects is included in Appendix A. Appendix B presents all species observed within the Mitigation Site during both transect and site-wide surveys. Photo monitoring photos and transect photos are included in Appendix C.

5.1.1 Mulefat and Willow Cover

Cover of mulefat and willow was variable at the four monitoring transects (Devil's Gate [DG] 1, DG 2, DG 3 and DG 4), averaging 59% absolute cover (Table 3). Mulefat was more abundant than willow within the monitoring transects and was the dominant woody riparian species. Other native species with notable absolute cover within transects included Mexican rush (12%), field sedge (11%), rubber rabbitbrush (*Ericameria nauseosa*; 8%), tarragon (*Artemisia dracunculus*; 7%), and beardless wild rye (*Elymus triticoides*; 6%),

The UAV multispectral analysis indicated that there was a total foliar cover (exposed leaf area) of 11.89 acres of mulefat and 0.65 acres of willow across the 23.26-acre planting area, which equates to a combined mulefat and willow cover of 54%. The focus of this analysis was mulefat and willow cover. When possible, other vegetation cover was mapped; however, it was beyond the scope of this analysis to assess all the vegetation cover throughout the planting area. In addition, some portions of the planting area could not be determined using UAV. As a result, 6.84 acres of the planting area was not assigned a cover species. Based on site knowledge and transect data, we know that this 6.84 acres of cover was comprised of a variety of vegetation including native, non-native, wetland, and upland species.

5.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover

Percent cover of Cal-IPC rated high broad-leaved invasive plant species averaged 1.25% across all transects (Table 3). Only one Cal-IPC High-rated broad-leaved invasive species, perennial pepperweed (*Lepidium latifolium),* was observed in the Mitigation Site (see Section 5.2.2 and Figure 6).

Table 3. Year 5 Performance Monitoring Results – Absolute Cover of Mulefat & Willow and Absolute Cover of Non-Native Invasive Broad-Leaved Plant Species within the Mitigation Site

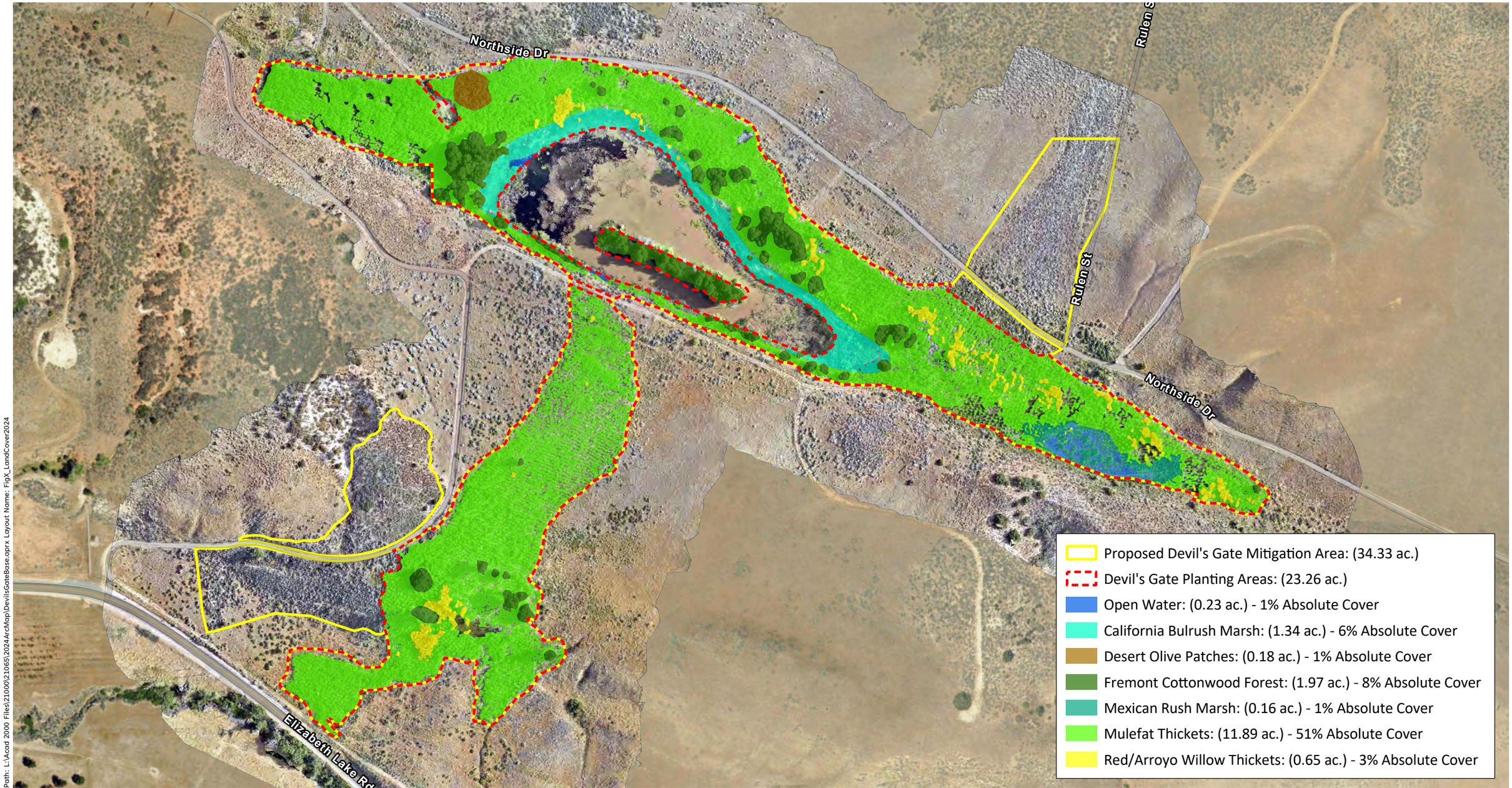
PERFORMANCE METRIC	DG1	DG2	DG3	DG4	AVERAGE	YEAR 5 PERFORMANCE STANDARD	YEAR 5 PERFORMANCE STANDARD MET?
Native Plant Cover							
Native Wetland and Riparian Cover	150%	78%	71%	88%	97%	N/A	N/A
Native Wetland Cover	59%	46%	17%	31%	38%	N/A	N/A
Native Riparian Cover	92%	32%	55%	57%	59%	>68%	**No***
Mulefat	92%	16%	55%	57%	55%	N/A	N/A
Willow	0%	16%	0%	0%	4%	N/A	N/A
Invasive Plant Cover							
Cal-IPC High Cover**	0%	1.65%	3%	0.35%	1.25%	<10%	**Yes**

**While mulefat and willow cover are not meeting the 68% threshold, there is still an average of 97% absolute cover of native wetland and riparian plant cover per the transect monitoring. Therefore, it is proposed that the project site still be considered for sign-off*
***Broad-leaved plant species rated High per Cal-IPC (grasses excluded).*

Table 4. Year 5 UAV Multispectral Analysis Results – Vegetation Absolute Cover of Mulefat & Willow

Cover Type	Acres of Vegetation Absolute Cover		Percent Absolute Cover	
	Year 4	Year 5	Year 4	Year 5
Native Wetland and Riparian Vegetation and Waters	**19.93***	**16.42**	**86%**	**71%**
Native Wetland Vegetation	**1.85**	**1.50**	**8%**	**7%**
California bullrush (*Schoenoplectus californicus*)	1.39	1.34	6%	6%
Mexican Rush (*Juncus mexicanus*)	0.46	0.16	2%	1%
Native Riparian Vegetation	**17.85**	**14.69**	**77%**	**63%**
Desert olive (*Forestiera pubescens*)	0.18	0.18	1%	1%
Fremont cottonwood (*Populus fremontii*)	1.97	1.97	8%	8%
Mulefat (*Baccharis salicifolia*)	14.91	11.89	64%	51%
Willow (*Salix* spp.)	0.79	0.65	3%	3%
Waters	**0.23**	**0.23**	**1%**	**1%**
Open Water	0.23	0.23	1%	1%
Other	**3.33**	**6.84**	**14%**	**29%**

**Corrected from Year 4 report to include 0.23 acres of waters.*



Path: L:\Acad 2000 Files\21000\21065\2024ArcMap\DevilsGateBase.aprx Layout Name: FigX_LandCover2024

Sources: WRA UAV Imagery 7/25/2023, USDA NAIP Imagery 2020, WRA | Prepared By: gillespie, 9/11/2024

Figure 5. Year 5 UAV Multispectral Analysis Results – Vegetation Absolute Cover

Devil's Gate Planting Areas
Petersen Ranch
Los Angeles County, CA

0 250 500 Feet

N

wra Environmental Consultants

5.2 Mitigation Maintenance Inspections

5.2.1 Erosion

There were no indications of erosion observed at the Mitigation Site this year. Therefore, no maintenance activities were implemented to address erosion issues.

5.2.2 Target Non-Native Invasive Plant Species Mapping

Several NNIP species of concern were observed within the Mitigation Site and were targeted for management. Management actions were rapidly deployed to control the spread of these species and are detailed below.

Three Cal-IPC High grasses are present: red brome, cheatgrass, and medusahead (*Elymus caput-medusae*). Red brome and cheatgrass were the most abundant of the Cal-IPC High species present at the Mitigation Site, and both are locally abundant in the region and within the Bank property. These species are managed within the Mitigation Site to promote the establishment of native species. In previous years, only one medusahead skeleton occurrence was observed within the Mitigation Site. This small population was monitored several times throughout the year to ensure that treatment was properly timed and that any surviving individuals were treated during follow-up treatments. In addition to the previously documented population, a new population was observed at the southern end of the Mitigation Site, next to Elizabeth Lake Road. This medusahead population flowered and set seed between maintenance inspection visits. Additional maintenance inspections targeting medusahead will be implemented in early 2025.

Perennial pepperweed, a broad-leaved plant species ranked High by Cal-IPC, was observed for the first time at the Mitigation Site in 2021 and continues to be treated in the areas it is observed. The small population identified along the DG4 monitoring transect last year was treated and was not documented along the transect this year (Figure 4). Two notable populations of perennial pepperweed occur along the northwestern boundary of the Mitigation Site and within the small sag pond to the east of Devil's Gate Pond, near the east end of transect DG2. Both populations will be treated and monitored over the coming year. Land Veritas staff have been trained or retrained on the identification of this species and best practices for controlling perennial pepperweed, and efforts to control populations of perennial pepperweed are ongoing.

The results of the Year 5 target NNIP species mapping are shown on Figure 6.

In addition to the NNIPs targeted for management, other NNIPs of regional or local concern are also present within the Mitigation Site, including:

- Three Cal-IPC Moderate species: one non-native grass (rattail sixweeks grass [*Festuca myuros*]) and two broad-leaved species (bull thistle [*Cirsium vulgare*] and short-pod mustard [*Hirschfeldia incana*])
- Three Cal-IPC Limited species: one broad-leaved species (white horehound [*Marrubium vulgare*], and two grass species (soft chess [*Bromus hordeaceus*] and annual beard grass [*Polypogon monspeliensis*])
- Three unrated broad-leaved species: annual yellow sweetclover (*Melilotus indicus*), prickly lettuce (*Lactuca serriola*), prickly sow thistle (*Sonchus asper* ssp. *asper*), and Jersey cudweed (*Pseudognaphalium luteoalbum*).

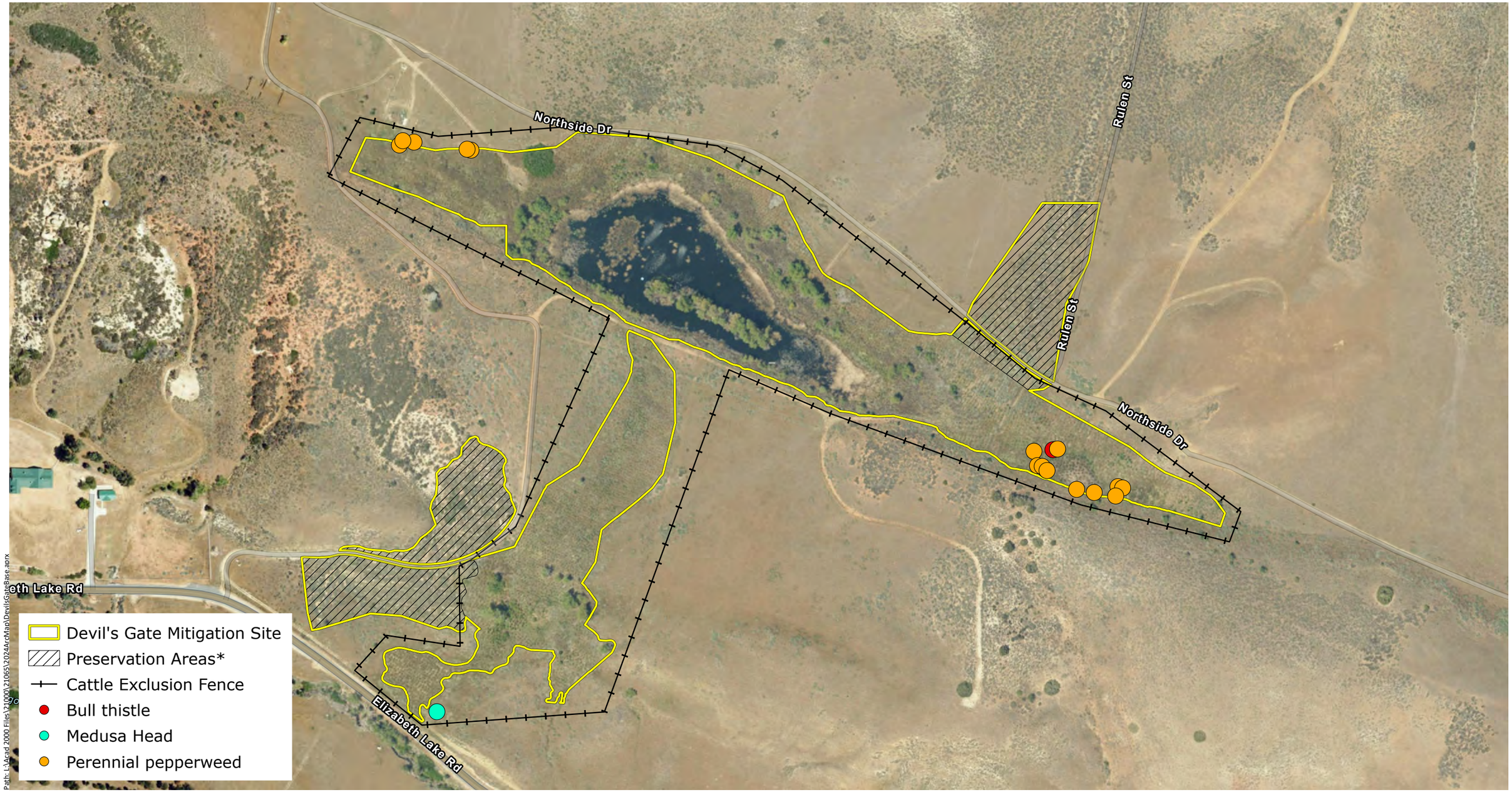
Land Veritas staff have been trained on the identification of these species and appropriate control strategies to facilitate rapid weed management efforts upon observation during regular surveys of the Mitigation Site throughout the year.

5.2.3 Cattle Exclusion Fencing

Installation of the cattle exclusion fencing and associated gates was completed concurrent with restoration activities in early 2019. The fence remains intact, cattle have been successfully excluded from the Mitigation Site, and no major repairs to the fence have been required.

5.2.4 Hydrologic Conditions

Continuous irrigation of the Mitigation Site ended in the Fall of 2022. Maintenance of the irrigation system will continue as needed, which includes system flushes and vegetation management in the immediate vicinity of control mechanisms. Irrigation will not be renewed during the interim management period unless there is major risk of mass mortality among the planted mulefat and willow. Filling of the Devil's Gate Pond may be warranted to maintain groundwater levels in the event of die-back or severe drought conditions. During the Long-Term Management Period, irrigation will continue on an as-needed basis.



Sources: USDA NAIP Imagery 2022, WRA | Prepared By: gillespie, 9/11/2024

*Not surveyed for NNIPs.

Figure 6. Target Non-Native Invasive Plants within Mitigation Site Planting Areas

Petersen Ranch Mitigation Bank
Los Angeles County, California

0 250 500 Feet

N

wra Environmental Consultants

6 SUMMARY AND MANAGEMENT RECOMMENDATIONS

6.1 Performance Monitoring Summary

6.1.1 Mulefat and Willows Cover and Survivorship

The Year 5 performance standard states, "The planting areas must contain 68% or more absolute cover of mulefat and willow". Year 5 annual performance monitoring results indicate that the average combined cover of mulefat and willow is 59% using the monitoring transects (Table 3) and 54% using the UAV multispectral analysis (Table 4). The transect data reflects a year over year increase in riparian vegetation (i.e., mulefat and willows), rising from 17% in Year 1, to 33% in Year 2, 38% in Year 3, 48% in Year 4 and up to the current amount of 59% in Year 5. From Year 4 to Year 5, an increase in absolute cover of mulefat was noted at every monitoring transect while an increase in absolute cover of willows was noted at DG2 (DG1, DG3 and DG4 saw no change in absolute cover of willows).

Year 5 annual monitoring at DG1 revealed that the total absolute cover of native species is 152%, with the dominant native species consisting of mulefat (92% absolute cover), field sedge (26% absolute cover), Mexican rush (16% absolute cover), and beardless wild rye (12% absolute cover). Year 5 annual monitoring at DG2 revealed the total absolute cover of native species is 87%, with the dominant native species consisting of Mexican rush (23% absolute cover), mulefat (16% absolute cover), red willow (*Salix laevigata*; 16% absolute cover), and salt grass (*Distichilis spicata*; 11% absolute cover). Year 5 annual monitoring at DG3 revealed the total absolute cover of native species is 115%, with dominant native species consisting of mulefat (55% absolute cover), rubber rabbitbrush (*Ericameria nauseosa*; 26% absolute cover, tarragon (9% absolute cover), saltgrass (9% absolute cover), and ladies' tobacco (*Pseudognaphalium californicum*; 8% absolute cover). Year 5 annual monitoring at DG4 revealed the total absolute cover of native species is 117%, with the dominant native species consisting of mulefat (57% absolute cover), field sedge (16% absolute cover), tarragon (13% absolute cover), purple needle grass (*Stipa pulchra*; 10% absolute cover), and gumweed (*Grindelia camporum*; 7% absolute cover).

In addition to required transect monitoring, UAV multispectral analysis was conducted to supplement transect monitoring data. This data can often times help understand how the site is performing as whole when transects are limited. The results of this analysis indicate that the absolute cover of native wetland and riparian vegetation within the planting areas is 70%; of which 63% is native riparian vegetation, including 54% mulefat and willow (Table 4). The UAV data collected in Year 5 represents a decrease in mulefat throughout the site when compared to Year 4, which contradicts the transect data. Comparing rainfall data from Year 4 to Year 5 (NOAA 2024), it was noted that Year 4 saw consistent heavy rainfall throughout the winter and early springtime, and even saw summer rainfall. Year 5 however had lower rainfall in the winter and spring with little to no summer rainfall. These rain patterns would allow for mulefat to continue to leaf out well into the summer of Year 4, but show die back in the summer of Year 5 (when the drone imagery was collected). In addition, there was a 3-acre increase in other vegetative cover in Year 5, which is consistent with the 3 acres of mulefat that decreased in Year 5. Therefore, based on this information and the transect data, it is theorized that there was not actually a reduction in mulefat but rather a reduction in mulefat aerial signature as a result of the lack of late-season rainfall and the mulefat not leafing out during the aerial data collection.

The primary goal of the Project is to create mitigation areas that could provide suitable habitat for federally and state-listed species, including least Bell's vireo (WRA 2018). The total riparian

cover across the entire planting area is 63% based on the UAV multispectral analysis[2], which is greater than the mean riparian vegetation required for least Bell's vireo habitat as determined by the habitat suitability model developed by the United States Geological Survey Wildlife Program (Preston *et al.* 2021). This includes cover from mulefat (51-55% absolute cover), willow (3-4% absolute cover), Fremont cottonwood (8% absolute cover), and desert olive (*Forestiera pubescens*; 1% absolute cover) based on both the transect and UAV data (as applicable). In addition, the prevalence of native wetland species and the presence of a mixture of open canopy and closed canopy habitat types is consistent with the objective seeking to improve the riparian habitat structure and increase the riparian habitat diversity (Section 1.2, WRA 2018). **Due to the prevalence of robust native wetland and riparian cover, structural diversity and inherently meeting overarching project goals of providing habitat for least Bell's vireo, it is requested that the Mitigation Site be considered for sign-off despite not meeting the Year 5 willow/mulefat performance standards.** No management actions are recommended at this time.

6.1.2 Cal-IPC High Broad-Leaved Invasive Species Cover

The Year 5 performance standard for non-native invasive cover at the Mitigation Site is, "Percent cover of Cal-IPC rated High broad-leaved invasive plant species must cover no more than 10% absolute cover of the Mitigation Site". Year 5 annual monitoring revealed very little cover of Cal-IPC High broad-leaved invasive plant species at the monitoring transects (Table 3); however, one Cal-IPC High rated broad-leaved invasive species individual is known to occur at the Mitigation Site, perennial pepperweed. The distribution of perennial pepperweed throughout the Mitigation Site is known and has been documented for multiple years (Figure 6). Treatment for this species is underway; however, some occurrences are more established and will take several years to eradicate. **The Mitigation Site is meeting the Year 5 performance standard for percent absolute cover of Cal-IPC rated High broad-leaved invasive plant species.**

6.2 Management Recommendations

All management tasks will be conducted in accordance with the schedules and protocols outlined in the Long-Term Management Plan once sign-off is achieved. Until sign-off is achieved, the following tasks are recommended:

6.2.1 Biological Resources

NNIPs surrounding each planted stake are cleared in the spring and managed throughout the growing season. It is recommended that NNIP treatment within the Mitigation Site continue in conjunction with invasive species treatments across the rest of the Bank Property.

Specific NNIP management actions may include:

- Regular qualitative surveys for target NNIP species by Land Veritas staff;
- Implementation of best management practices for individual NNIP species as issues arise;
- Focused eradication efforts of target NNIP species documented in the Mitigation Site, such as perennial pepperweed and medusahead; and

[2] *The riparian cover is 59% based on the transect data, however, the transect data only includes mulefat and willow cover. The UAV multispectral analysis data was determined to be a more accurate representation of riparian cover that was analyzed in the habitat suitability model.*

- Regular training of Land Veritas staff on identification of target and other NNIP species of concern.

6.2.2 Infrastructure and Facilities

The Mitigation Site's infrastructure and facilities will be subject to regular standard maintenance to ensure proper function. Land Veritas staff will complete regular and frequent walk-throughs of the Mitigation Site to identify potential maintenance needs, including the condition of the cattle exclusion fencing. Issues will be immediately addressed and repaired. Land Veritas staff will also survey the Mitigation Site for evidence of erosion following large rain events and implement erosion mitigation strategies as appropriate.

7 REFERENCES

ECORP 2018 ECORP Consulting, Inc. 2018. Devil's Gate Sediment Removal and Management Project. Final Habitat Restoration Plan. Pasadena, California, Los Angeles County. November 2018.

Land Veritas Corp 2016 Land Veritas Corp. 2016. Petersen Ranch Mitigation Bank Bank Enabling Instrument. Online at: https://ribits.usace.army.mil/ribits_apex/f?p=107:278:6186733530681::NO:RP,278:P278_BANK_ID:2854

NOAA 2024 National Oceanic and Atmospheric Administration (NOAA). 2024. https://agacis.rcc-acis.org.

Preston et al. 2021 Preston, K.L., Kus, B.E., and Perkins, E., 2021, Modeling Least Bell's Vireo habitat suitability in current and historic ranges in California: U.S. Geological Survey Open-File Report 2020–1151, 44 p. https://pubs.usgs.gov/publication/ofr20201151.

Sawyer et al. 2009 Sawyer JO, T Keeler-Wolf, and JM Evens. A Manual of California Vegetation, Second Edition. California Native Plant Society in collaboration with California Department of Fish and Game. Sacramento, CA.

Weih 2009 Weih, M. 2009. Genetic and environmental variation in spring and autumn phenology of biomass willows (Salix spp.): effects on shoot growth and nitrogen economy. Tree Physiology 29(12):1479–1490. Online at https://doi.org/10.1093/treephys/tpp081.

WRA 2013 WRA, Inc. Biological Resources Inventory: Petersen Ranch. Leona Valley, Los Angeles County, California. March 2013.

WRA 2018 WRA, Inc. 2018. Devil's Gate Off-Site Mitigation Project Habitat Mitigation and Monitoring Plan. Petersen Ranch Mitigation Bank. Los Angeles County, California. October 2018.

WRA 2019 WRA, Inc. 2019. Devil's Gate Off-Site Project As-Built Report Letter. April 23, 2019.

APPENDIX A. ANNUAL MONITORING DATA

Site and Transect:	DG1
Date:	7/18/2024
Staff:	TSH & JA
Transect length:	50m
Starting Point:	0m
Data Entry:	JA
Data QC:	MS

Quadrat Size:	**5m x 2.5m**		
Photo #:			
(start, finish)			

Class			
0 (0.5)	**<1**	**4 (62.5)**	**50-75%**
1 (2.5)	**1-5%**	**5 (85)**	**75-95%**
2 (15)	**5-25%**	**6 (97.5)**	**>95%**
3 (37.5)	**25-50%**		

	Photo #:						**Mid-Point Absolute Cover (%)**										
Scientific Name	**Common Name**	**Origin**	**Form**	**Rarity Status**	**CAL-IPC Status**	**Wetland Status (AW 2016)**	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**Transect**
Bare	Bare						0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Litter	Litter						0.5%	85%	85%	37.5%	85%	85%	15%	15%	0.5%	15%	42.4%
Baccharis salicifolia ssp. salicifolia	Mule fat	native	shrub	-	-	FAC	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	85%	85%	62.5%	97.5%	91.5%
Elymus triticoides	Beardless wild rye	native	perennial grass	-	-	FAC	85%	15%			15%						11.5%
Heliotropium curassavicum var. oculatum	Alkali heliotrope	native	perennial herb	-	-	FACU	15%	2.5%									1.8%
Stachys albens	Cobwebby hedge nettle	native	perennial herb	-	-	OBL	2.5%	0.5%	2.5%					0.5%	2.5%	37.5%	4.6%
Carex praegracilis	Field sedge	native	perennial grasslike herb	-	-	FACW		2.5%	15%	15%	15%	15%	85%	85%	15%	15%	26.3%
Juncus mexicanus	Mexican rush	native	perennial grasslike herb	-	-	FACW			15%	37.5%	0.5%	0.5%	2.5%	15%	85%	2.5%	15.9%
Asclepias fascicularis	Narrow leaved milkwed	native	perennial herb	-	-	FAC							0.5%	0.5%	0.5%		0.2%
Urtica dioica	Stinging nettle	native	perennial herb	-	-	FAC							2.5%		2.5%		0.5%
Sonchus asper ssp. asper	Prickly sow thistle	non-native	annual herb	-	-	FAC										0.5%	0.1%
						Total cover	**201.00%**	**203.50%**	**215.50%**	**188.00%**	**213.50%**	**198.50%**	**191.00%**	**201.50%**	**169.00%**	**168.50%**	**195.0%**
						Vegetative cover	**200.00%**	**118.00%**	**130.00%**	**150.00%**	**128.00%**	**113.00%**	**175.50%**	**186.00%**	**168.00%**	**153.00%**	**152.2%**
						Native cover	**200.00%**	**118.00%**	**130.00%**	**150.00%**	**128.00%**	**113.00%**	**175.50%**	**186.00%**	**168.00%**	**152.50%**	**152.2%**
						***Salix* sp. cover**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
						Mulefat cover	**97.50%**	**97.50%**	**97.50%**	**97.50%**	**97.50%**	**97.50%**	**85.00%**	**85.00%**	**62.50%**	**97.50%**	**91.5%**
						***Salix* sp. & mulefat cover**	**97.50%**	**97.50%**	**97.50%**	**97.50%**	**97.50%**	**97.50%**	**85.00%**	**85.00%**	**62.50%**	**97.50%**	**91.5%**
						High invasive broad-leaf cover	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Site and Transect:	DG2
Date:	7/17/2024
Staff:	TSH & JA
Transect length:	50m
Starting Point:	0m
Data Entry:	JA
Data QC:	MS

Quadrat Size:	**5m x 2.5m**		
Photo #:			
(start, finish)			

Class			
0 (0.5)	**<1**	**4 (62.5)**	**50-75%**
1 (2.5)	**1-5%**	**5 (85)**	**75-95%**
2 (15)	**5-25%**	**6 (97.5)**	**>95%**
3 (37.5)	**25-50%**		

	Photo #:						**Mid-Point Absolute Cover (%)**										
Scientific Name	**Common Name**	**Origin**	**Form**	**Rarity Status**	**CAL-IPC Status**	**Wetland Status (AW 2016)**	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**Transect**
Bare	Bare						0.5%	2.5%	0.5%	0.5%	0.5%	0.5%	2.5%	0.5%	2.5%	37.5%	4.8%
Litter	Litter						2.5%	0.5%	2.5%	37.5%	62.5%	37.5%	62.5%	62.5%	62.5%	37.5%	36.8%
Baccharis salicifolia ssp. salicifolia	Mule fat	native	shrub	-	-	FAC	15%	15%	15%	37.5%	37.5%	37.5%					15.8%
Cirsium vulgare	Bullthistle	non-native (invasive)	perennial herb	-	Moderate	FACU	37.5%	15%									5.3%
Distichlis spicata	Salt grass	native	perennial grass	-	-	FAC	62.5%	37.5%	2.5%			2.5%					10.5%
Carex praegracilis	Field sedge	native	perennial grasslike herb	-	-	FACW	15%	2.5%									1.8%
Juncus mexicanus	Mexican rush	native	perennial grasslike herb	-	-	FACW	0.5%	62.5%	85%	37.5%	15%	15%	15%	2.5%			23.3%
Eleocharis macrostachya	Spike rush	native	perennial grasslike herb	-	-	OBL	2.5%										0.3%
Asclepias fascicularis	Narrow leaved milkwed	native	perennial herb	-	-	FAC	0.5%	0.5%	0.5%			0.5%	0.5%	0.5%	0.5%		0.4%
Melilotus indicus	Annual yellow sweetclover	non-native	annual herb	-	-	FACU	2.5%										0.3%
Heliotropium curassavicum var. oculatum	Alkali heliotrope	native	perennial herb	-	-	FACU	0.5%	0.5%									0.1%
Malvella leprosa	Alkali mallow	native	perennial herb	-	-	FACU	0.5%	0.5%									0.1%
Polypogon monspeliensis	Annual beard grass	non-native (invasive)	annual grass	-	Limited	FACW	0.5%										0.1%
Pseudognaphalium luteoalbum	Jersey cudweed	non-native	annual herb	-	-	FAC	0.5%										0.1%
Lactuca serriola	Prickly lettuce	non-native	annual herb	-	-	FACU	0.5%		0.5%								0.1%
Lepidium latifolium	Perennial pepperweed	non-native (invasive)	perennial herb	-	High	FAC		0.5%	0.5%								0.1%
Elymus triticoides	Beardless wild rye	native	perennial grass	-	-	FAC			2.5%	37.5%	15%	37.5%	2.5%	2.5%	2.5%		10.0%
Hirschfeldia incana	Short-podded mustard	non-native (invasive)	perennial herb	-	Moderate	-						0.5%	0.5%		0.5%	0.5%	0.2%
Salix laevigata	Red willow	native	tree	-	-	FACW							15%	62.5%	15%	62.5%	15.5%
Ericameria nauseosa	Rubber rabbitbrush	native	shrub	-	-	-							0.5%	15%	2.5%		1.8%
Festuca myuros	Rattail sixweeks grass	non-native (invasive)	annual grass	-	Moderate	FACU							15%	37.5%	37.5%		9.0%
Artemisia dracunculus	Tarragon	native	perennial herb	-	-	FACU							0.5%	0.5%	2.5%	62.5%	6.6%
Salix lasiolepis	Arroyo willow	native	tree, shrub	-	-	FACW								2.5%	2.5%		0.5%
Bromus tectorum	Cheat grass	non-native (invasive)	annual grass	-	High	-								0.5%		15%	1.6%
Cucurbita foetidissima	Missouri gourd	native	perennial herb, vine	-	-	-										0.5%	0.1%
						Total cover	**141.50%**	**137.50%**	**109.50%**	**150.50%**	**130.50%**	**131.50%**	**114.50%**	**187.00%**	**128.50%**	**216.00%**	**144.7%**
						Vegetative cover	**139%**	**135%**	**107%**	**113%**	**68%**	**94%**	**50%**	**124%**	**64%**	**141%**	**103.1%**
						Native cover	**97%**	**119%**	**106%**	**113%**	**68%**	**93%**	**34%**	**86%**	**26%**	**126%**	**86.6%**
						***Salix* sp. cover**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**15.0%**	**65.0%**	**17.5%**	**62.5%**	**16.0%**
						Mulefat cover	**15%**	**15%**	**15%**	**38%**	**38%**	**38%**	**0%**	**0%**	**0%**	**0%**	**15.8%**
						***Salix* sp. & mulefat cover**	**15.0%**	**15.0%**	**15.0%**	**37.5%**	**37.5%**	**37.5%**	**15.0%**	**65.0%**	**17.5%**	**62.5%**	**31.8%**
						High invasive broad-leaf cover	**0.0%**	**0.5%**	**0.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**

Site and Transect:	DG3
Date:	7/17/2024
Staff:	TSH & JA
Transect length:	50m
Starting Point:	0m
Data Entry:	JA
Data QC:	MS

Quadrat Size:	**5m x 2.5m**	
Photo #: (start, finish)		

Class			
0 (0.5)	**<1**	**4 (62.5)**	**50-75%**
1 (2.5)	**1-5%**	**5 (85)**	**75-95%**
2 (15)	**5-25%**	**6 (97.5)**	**>95%**
3 (37.5)	**25-50%**		

	Photo #:						**Mid-Point Absolute Cover (%)**										
Scientific Name	**Common Name**	**Origin**	**Form**	**Rarity Status**	**CAL-IPC Status**	**Wetland Status (AW 2016)**	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**Transect**
Bare	Bare						15%	2.5%	0.5%	2.5%	0.5%	2.5%	2.5%	2.5%	0.5%	0.5%	3.0%
Litter	Litter						15%	15%	15%	15%	15%	15%	15%	85%	37.5%	37.5%	26.5%
Baccharis salicifolia ssp. salicifolia	Mule fat	native	shrub	-	-	FAC	2.5%	15%	85%	85%	37.5%	37.5%	85%	97.5%	85%	15%	54.5%
Senecio flaccidus	Shrubby ragwort	native	shrub	-	-	-	2.5%										0.3%
Hirschfeldia incana	Short-podded mustard	non-native (invasive)	perennial herb	-	Moderate	-	15%	2.5%	2.5%	0.5%	2.5%	2.5%	0.5%		0.5%	2.5%	2.9%
Ericameria nauseosa	Rubber rabbitbrush	native	shrub	-	-	-	37.5%	37.5%	0.5%	15%	37.5%	37.5%	62.5%		15%	15%	25.8%
Artemisia dracunculus	Tarragon	native	perennial herb	-	-	FACU	15%	15%	2.5%	0.5%	2.5%	0.5%	0.5%	0.5%	15%	37.5%	9.0%
Bromus rubens	Red brome	non-native (invasive)	annual grass	-	High	UPL	2.5%	2.5%	2.5%	0.5%	0.5%	2.5%	0.5%	2.5%	0.5%	15%	3.0%
Bromus hordeaceus	Soft chess	non-native (invasive)	annual grass	-	Limited	FACU	15%	15%		0.5%	2.5%	15%	2.5%			15%	6.6%
Festuca myuros	Rattail sixweeks grass	non-native (invasive)	annual grass	-	Moderate	FACU	15%	15%			15%	15%	2.5%				6.3%
Pseudognaphalium californicum	Ladies' tobacco	native	annual, perennial herb	-	-	-	2.5%	0.5%	62.5%	15%					2.5%	0.5%	8.4%
Heliotropium curassavicum var. oculatum	Alkali heliotrope	native	perennial herb	-	-	FACU		0.5%		0.5%	0.5%		0.5%	0.5%		2.5%	0.5%
Asclepias fascicularis	Narrow leaved milkwed	native	perennial herb	-	-	FAC		0.5%			0.5%	0.5%					0.2%
Grindelia camporum	Gumweed	native	perennial herb	-	-	FACW		0.5%									0.1%
Marrubium vulgare	White horehound	non-native (invasive)	perennial herb	-	Limited	FACU		0.5%	2.5%								0.3%
Sonchus asper ssp. asper	Prickly sow thistle	non-native	annual herb	-	-	FAC		0.5%				0.5%	0.5%		0.5%		0.2%
Juncus mexicanus	Mexican rush	native	perennial grasslike herb	-	-	FACW			2.5%	15%	2.5%	2.5%	2.5%	15%	15%	0.5%	5.6%
Distichlis spicata	Salt grass	native	perennial grass	-	-	FAC				15%	62.5%	15%					9.3%
Carex praegracilis	Field sedge	native	perennial grasslike herb	-	-	FACW				15%							1.5%
Verbena lasiostachys	Western vervain	native	perennial herb	-	-	FAC					0.5%						0.1%
Lactuca serriola	Prickly lettuce	non-native	annual herb	-	-	FACU					0.5%						0.1%
Bromus tectorum	Cheat grass	non-native (invasive)	annual grass	-	High	-						0.5%					0.1%
Melilotus indicus	Annual yellow sweetclover	non-native	annual herb	-	-	FACU							0.5%		0.5%	15%	1.6%
Malvella leprosa	Alkali mallow	native	perennial herb	-	-	FACU							0.5%				0.1%
Pseudognaphalium luteoalbum	Jersey cudweed	non-native	annual herb	-	-	FAC									0.5%		0.1%
Euphorbia albomarginata	Rattlesnake sandmat	native	perennial herb	-	-	-										0.5%	0.1%
Cirsium vulgare	Bullthistle	non-native (invasive)	perennial herb	-	Moderate	FACU										0.5%	0.1%
						Total cover	**138%**	**123%**	**176%**	**180%**	**181%**	**147%**	**176%**	**204%**	**173%**	**158%**	**182.0%**
						Vegetative cover	**107.5%**	**105.5%**	**160.5%**	**162.5%**	**165.0%**	**129.5%**	**158.50%**	**116.0%**	**135.0%**	**119.5%**	**149.6%**
						Native cover	**60.0%**	**69.5%**	**153.0%**	**161.0%**	**144.0%**	**93.5%**	**151.5%**	**113.5%**	**132.5%**	**71.5%**	**126.6%**
						***Salix* sp. cover**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
						Mulefat cover	**2.5%**	**15.0%**	**85.0%**	**85.0%**	**37.5%**	**37.5%**	**85.0%**	**97.5%**	**85.0%**	**15.0%**	**60.0%**
						***Salix* sp. & mulefat cover**	**2.5%**	**15.0%**	**85.0%**	**85.0%**	**37.5%**	**37.5%**	**85.0%**	**97.5%**	**85.0%**	**15.0%**	**60.0%**
						High invasive broad-leaf cover	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Site and Transect:	DG4
Date:	7/17/2024
Staff:	TSH & JA
Transect length:	50m
Starting Point:	0m
Data Entry:	JA
Data QC:	MS

Quadrat Size:	**5m x 2.5m**		
Photo #:			
(start, finish)			

Class			
0 (0.5)	**<1**	**4 (62.5)**	**50-75%**
1 (2.5)	**1-5%**	**5 (85)**	**75-95%**
2 (15)	**5-25%**	**6 (97.5)**	**>95%**
3 (37.5)	**25-50%**		

	Photo #:						**Mid-Point Absolute Cover (%)**										
Scientific Name	**Common Name**	**Origin**	**Form**	**Rarity Status**	**CAL-IPC Status**	**Wetland Status (AW 2016)**	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**Transect**
Bare	Bare						15%	15%	15%	15%	15%	15%	0.5%	2.5%	0.5%	0.5%	9.4%
Litter	Litter						37.5%	62.5%	85%	62.5%	37.5%	15%	15%	15%	2.5%	15%	34.8%
Baccharis salicifolia ssp. salicifolia	Mule fat	native	shrub	-	-	FAC	85%	85%	97.5%	85%	85%	37.5%	37.5%	37.5%	15%	2.5%	56.8%
Cirsium vulgare	Bullthistle	non-native (invasive)	perennial herb	-	Moderate	FACU	15%	2.5%	2.5%	15%	15%	0.5%			0.5%		5.1%
Asclepias fascicularis	Narrow leaved milkwed	native	perennial herb	-	-	FAC	2.5%	15%		0.5%		0.5%	0.5%	0.5%	0.5%	2.5%	2.3%
Carex praegracilis	Field sedge	native	perennial grasslike herb	-	-	FACW	15%	15%	2.5%			0.5%	37.5%	37.5%	37.5%	15%	42.3%
Juncus mexicanus	Mexican rush	native	perennial grasslike herb	-	-	FACW	2.5%	15%	0.5%	0.5%		2.5%	15%			0.5%	3.7%
Ericameria nauseosa	Rubber rabbitbrush	native	shrub	-	-	-	2.5%	0.5%	2.5%	15%		15%	15%	2.5%	0.5%		5.4%
Plantago major	Common plantain	non-native	perennial herb	-	-	FAC	0.5%	0.5%			0.5%	2.5%	0.5%				0.5%
Bromus rubens	Red brome	non-native (invasive)	annual grass	-	High	UPL	0.5%	0.5%				2.5%					0.4%
Marrubium vulgare	White horehound	non-native (invasive)	perennial herb	-	Limited	FACU		0.5%									0.1%
Hirschfeldia incana	Short-podded mustard	non-native (invasive)	perennial herb	-	Moderate	-		15%	2.5%	15%	2.5%	0.5%	0.5%			0.5%	3.7%
Verbena lasiostachys	Western vervain	native	perennial herb	-	-	FAC		0.5%									0.1%
Artemisia dracunculus	Tarragon	native	perennial herb	-	-	FACU			0.5%	15%	62.5%	37.5%	2.5%	15%			13.3%
Elymus triticoides	Beardless wild rye	native	perennial grass	-	-	FAC				0.5%		15%					1.6%
Malvella leprosa	Alkali mallow	native	perennial herb	-	-	FACU					0.5%	0.5%	0.5%				0.2%
Melilotus indicus	Annual yellow sweetclover	non-native	annual herb	-	-	FACU					0.5%	0.5%	0.5%	0.5%	0.5%		0.3%
Heliotropium curassavicum var. oculatum	Alkali heliotrope	native	perennial herb	-	-	FACU						0.5%					0.1%
Bromus hordeaceus	Soft chess	non-native (invasive)	annual grass	-	Limited	FACU						2.5%				0.5%	0.3%
Distichlis spicata	Salt grass	native	perennial grass	-	-	FAC						2.5%					0.3%
Grindelia camporum	Gumweed	native	perennial herb	-	-	FACW							0.5%	15%	37.5%	15%	6.8%
Populus fremontii ssp. fremontii	Fremont cottonwood	native	tree	-	-	FACW							0.5%	2.5%			0.3%
Lactuca serriola	Prickly lettuce	non-native	annual herb	-	-	FACU								0.5%	0.5%		0.1%
Stipa pulchra	Purple needle grass	native	perennial grass	-										2.5%	37.5%	62.5%	10.3%
						Total cover	**176.0%**	**228.0%**	**209.0%**	**224.0%**	**219.0%**	**151.0%**	**127.0%**	**132.0%**	**133.0%**	**115.0%**	**171.2%**
						Vegetative cover	**124.0%**	**150.0%**	**109.0%**	**147.0%**	**167.0%**	**121.0%**	**111.0%**	**114.0%**	**130.0%**	**99.0%**	**127.0%**
						Native cover	**108.0%**	**131.0%**	**104.0%**	**117.0%**	**148.0%**	**112.0%**	**110.0%**	**113.0%**	**129.0%**	**98.0%**	**116.8%**
						***Salix* sp. cover**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
						Mulefat cover	**85.0%**	**85.0%**	**98.0%**	**85.0%**	**85.0%**	**38.0%**	**38.0%**	**38.0%**	**15.0%**	**3.0%**	**57.0%**
						***Salix* sp. & mulefat cover**	**85.0%**	**85.0%**	**98.0%**	**85.0%**	**85.0%**	**38.0%**	**38.0%**	**38.0%**	**15.0%**	**3.0%**	**57.0%**
						High invasive broad-leaf cover	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

APPENDIX B. MITIGATION SITE OBSERVED SPECIES LIST

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3]
Artemisia dracunculus	Tarragon	native	perennial herb	-	-	FACU
Asclepias fascicularis	Narrow leaved milkwed	native	perennial herb	-	-	FAC
Baccharis salicifolia ssp. salicifolia	Mule fat	native	shrub	-	-	FAC
Bromus hordeaceus	Soft chess	non-native (invasive)	annual grass	-	Limited	FACU
Bromus rubens	Red brome	non-native (invasive)	annual grass	-	High	UPL
Bromus tectorum	Cheat grass	non-native (invasive)	annual grass	-	High	-
Carex praegracilis	Field sedge	native	perennial grasslike herb	-	-	FACW
Cirsium vulgare	Bullthistle	non-native (invasive)	perennial herb	-	Moderate	FACU
Cucurbita foetidissima	Missouri gourd	native	perennial herb, vine	-	-	-
Distichlis spicata	Salt grass	native	perennial grass	-	-	FAC
Elymus triticoides	Beardless wild rye	native	perennial grass	-	-	FAC
Ericameria nauseosa	Rubber rabbitbrush	native	shrub	-	-	-
Festuca myuros	Rattail sixweeks grass	non-native (invasive)	annual grass	-	Moderate	FACU
Grindelia camporum	Gumweed	native	perennial herb	-	-	FACW
Heliotropium curassavicum var. oculatum	Alkali heliotrope	native	perennial herb	-	-	FACU
Hirschfeldia incana	Short-podded mustard	non-native (invasive)	perennial herb	-	Moderate	-
Juncus mexicanus	Mexican rush	native	perennial grasslike herb	-	-	FACW
Lactuca serriola	Prickly lettuce	non-native	annual herb	-	-	FACU
Lepidium latifolium	Perennial pepperweed	non-native (invasive)	perennial herb	-	High	FAC
Malvella leprosa	Alkali mallow	native	perennial herb	-	-	FACU
Marrubium vulgare	White horehound	non-native (invasive)	perennial herb	-	Limited	FACU
Melilotus indicus	Annual yellow sweetclover	non-native	annual herb	-	-	FACU
Polypogon monspeliensis	Annual beard grass	non-native (invasive)	annual grass	-	Limited	FACW
Salix laevigata	Red willow	native	tree	-	-	FACW
Senecio flaccidus	Shrubby ragwort	native	shrub	-	-	-

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3]
Sonchus asper ssp. asper	Prickly sow thistle	non-native	annual herb	-	-	FAC
Stachys albens	Cobwebby hedge nettle	native	perennial herb	-	-	OBL
Stipa pulchra	Purple needle grass	native	perennial grass	-	-	-
Urtica dioica	Stinging nettle	native	perennial herb	-	-	FAC
Verbena lasiostachys	Western vervain	native	perennial herb	-	-	FAC
Eleocharis macrostachya	Spike rush	native	perennial grasslike herb	-	-	OBL
Pseudognaphalium luteoalbum	Jersey cudweed	non-native	annual herb	-	-	FAC
Salix lasiolepis	Arroyo willow	native	tree, shrub	-	-	FACW
Pseudognaphalium californicum	Ladies' tobacco	native	annual, perennial herb	-	-	-
Euphorbia albomarginata	Rattlesnake sandmat	native	perennial herb	-	-	-
Populus fremontii ssp. fremontii	Fremont cottonwood	native	tree	-	-	FACW

Note: All species identified using the *Jepson eFlora* [Jepson Flora Project (eds.) 2024]; nomenclature follows *Jepson eFlora* [Jepson Flora Project (eds.) 2024] or Rare Plant Inventory (CNPS 2024). Sp.: "species," intended to indicate that the observer was confident in the identity of the genus but uncertain which species.

[1] **California Native Plant Society. 2024. Rare Plant Inventory (online edition, v9.5). Sacramento, California. Online at: http://rareplants.cnps.org/; most recently accessed: August 2024.**

FE:	Federal Endangered
FT:	Federal Threatened
SE:	State Endangered
ST:	State Threatened
SR:	State Rare
Rank 1A:	Plants presumed extinct in California
Rank 1B:	Plants rare, threatened, or endangered in California and elsewhere
Rank 2:	Plants rare, threatened, or endangered in California, but more common elsewhere
Rank 3:	Plants about which we need more information – a review list
Rank 4:	Plants of limited distribution – a watch list

[2] **California Invasive Plant Council. 2024. California Invasive Plant Inventory Database. California Invasive Plant Council, Berkeley, CA. Online at: http://www.cal-ipc.org/paf/; most recently accessed: August 2024.**

High:	Severe ecological impacts; high rates of dispersal and establishment; most are widely distributed ecologically.
Moderate:	Substantial and apparent ecological impacts; moderate-high rates of dispersal, establishment dependent on disturbance; limited-moderate distribution ecologically
Limited:	Minor or not well documented ecological impacts; low-moderate rate of invasiveness; limited distribution ecologically
Assessed:	Assessed by Cal-IPC and determined to not be an existing current threat

[3] **U.S. Army Corps of Engineers. 2022. National Wetland Plant List, version 3.6. Online at: http://wetland-plants.sec.usace.army.mil/**

OBL:	Almost always found in wetlands
FACW:	Usually found in wetlands
FAC:	Equally found in wetlands and uplands
FACU:	Usually not found in wetlands
UPL:	Almost never found in wetlands
NL:	Not listed, assumed almost never found in wetlands
NI:	No information; not factored during wetland delineation

[4] **Lake, D [compiler]. 2024. Rare, Unusual, and Significant Plants of Alameda and Contra Costa Counties (web application). Berkeley, California: East Bay Chapter of the California Native Plant Society. Online at: https://rareplants.ebcnps.org/; most recently accessed: August 2024.**

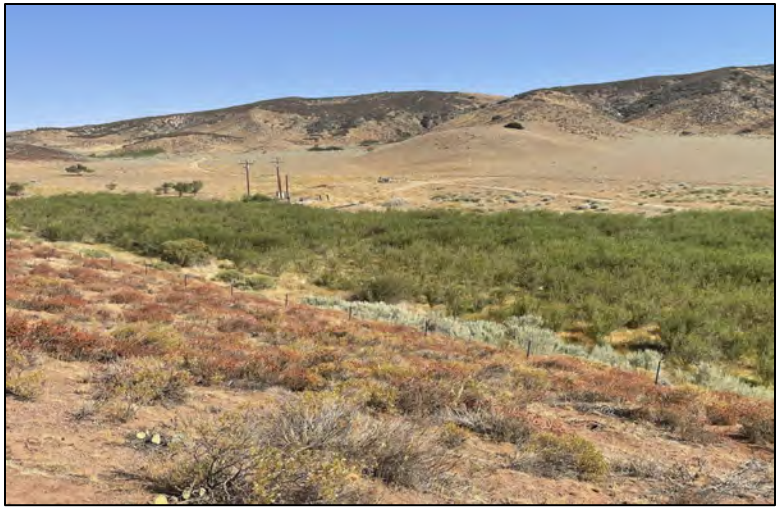
A1:	Locally Rare Species. Species occurring in two or fewer regions in Alameda and Contra Costa counties
A1x:	Locally Rare Species. Species presumed extirpated from Alameda and Contra Costa counties
A1?:	Locally Rare Species. Species possibly occurring in Alameda and Contra Costa counties. Identification or location is uncertain
A2:	Locally Rare Species. Plants occurring in three to five regions or are otherwise threatened in Alameda and Contra Costa counties.
B:	High Priority Watch List. Plants occurring in six to nine regions in Alameda and Contra Costa counties.
C:	Second Priority Watch List. Plants occurring in ten to fifteen regions in Alameda and Contra Costa counties.
*:	Ranks preceded by an asterisk (e.g. "*A1") also have a statewide rarity ranking

APPENDIX C. PHOTO MONITORING AND TRANSECT PHOTO

Pre-restoration photo of western lobe of Mitigation Site looking to the northwest.

Western lobe of Mitigation Site looking to the northwest. Taken September 10, 2020.

Western lobe of Mitigation Site looking to the northwest. Taken June 24, 2021.



Western lobe of Mitigation Site looking to the northwest. Taken July 29, 2022.

Western lobe of Mitigation Site looking to the northwest. Taken July 26, 2023.

Western lobe of Mitigation Site looking to the northwest. Taken August 23, 2024.

Pre-restoration photo of the northern section of the Mitigation Site looking to the northeast.

Northern section of the Mitigation Site looking to the northeast. Taken September 10, 2020.

Northern section of the Mitigation Site looking to the northeast. Taken June 24, 2021.

Northern section of the Mitigation Site looking to the northeast. Taken July 29, 2022.

Northern section of the Mitigation Site looking to the northeast. Taken July 26, 2023.

Northern section of the Mitigation Site looking to the northeast. Taken August 23, 2024.

Pre-restoration photo of southern section of Mitigation Site looking to the southeast.

Southern section of the Mitigation Site looking to the southeast. Taken September 10, 2020.

Southern section of the Mitigation Site looking to the southeast. Taken June 24, 2021.

Southern section of the Mitigation Site looking to the southeast. Taken July 29, 2022.

Southern section of the Mitigation Site looking to the southeast. Taken July 26, 2023.

Southern section of the Mitigation Site looking to the southeast. Taken August 23, 2024.

Pre restoration photo of the Mitigation Site taken from the northeastern lobe looking to the northwest.

Mitigation Site taken from the northeastern lobe looking to the northwest. Taken September 11, 2020.

Mitigation Site taken from the northeastern lobe looking to the northwest. Taken June 24, 2021.

Mitigation Site taken from the northeastern lobe looking to the northwest. Taken July 29, 2022.

Mitigation Site taken from the northeastern lobe looking to the northwest. Taken July 26, 2023.

Mitigation Site taken from the northeastern lobe looking to the northwest. Taken August 23, 2024.

Transect DG1 Start. Taken: July 18, 2024

Transect DG1 End. Taken: July 18, 2024

Transect DG2 Start. Taken: July 17, 2024

Transect DG2 End. Taken: Taken: July 17, 2024

Transect DG3 Start. Taken: July 17, 2024

Transect DG3 End. Taken: July 17, 2024

Transect DG4 Start. Taken: July 17, 2024

Transect DG4 End. Taken: July 17, 2024