Integrated Pest Management Plan for the Irvine Ranch Water District

2024 Annual Report

Provided By:
Endemic Environmental Services Inc.

Prepared For:
Irvine Ranch Water District

ACKNOWLEDGEMENTS

This IPM reflects the interdisciplinary collaboration of various professionals. The authors would like to acknowledge their involvements and sincerely thank them for all of the expertise and efforts contributed.

Endemic Environmental Services (Endemic) GIS Manager Helen Lin optimized & implemented the technological tools for documenting, tracking, and analyzing a long-term database. She also created a customized ArcGIS model to generate exported map files and visualize maintenance guidelines. Endemic field biologists Caleb Martinez, Janet Gonzalez, Tristan Ray, Sarah Hefflefinger Alyssa Taylor & Alyssa Goldpenny thoroughly assessed each site monthly, identified existing and new pest species, documented pertinent geospatial information, and advised courses of action for optimal maintenance and restoration. Endemic Assistant Project Manager Phylicia Sanchez oversaw Endemic team efforts, streamlined internal field protocols, and prepared weekly presentation & GIS map content for client use. Luma Fowler oversaw project operations, communicated site recommendations, and offered insight for restoration strategies.

Thank you to Ron Vanderhoff, an expert botanist and Calflora's President of the Board. His swift ID verifications on the observations posted to Calflora aided in tracking the range expansion of multiple non-native and invasive species.

Land maintenance & restoration efforts were overseen & managed by LandCare (LC) project manager Mitchell Gonzales. Field efforts were executed by team lead, Victor Sanchez, and LandCare’s maintenance team. All of the herbicide data depicted in this report reflects the applications reported by LandCare.

Endemic restoration project manager Joshua Ball and director Luma Fowler coordinated and oversaw restoration efforts for the following sites: Eastwood Meadow, Los Olivos Meadow, Port Culver, Lower Eastfoot. Endemic field biologist Caleb Martinez provided restoration strategies and guidelines. Endemic team lead Alyssa Taylor led the crew's field efforts for invasive management & native planting work.

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1. EXECUTIVE SUMMARY

Endemic Environmental Services (Endemic) has developed this 2024 (Jan-Dec) Annual Monitoring Report for the Irvine Ranch Water District (IRWD) according to the Integrated Pest Management (IPM) Plan first established in July 2019. The purpose of the IPM Plan was to manage long-term pest prevention while protecting human health, non-target organisms, and the surrounding environment. This Annual Monitoring Report functions to document and account for the chemical and non-chemical treatment methods employed for the land management and maintenance of the San Joaquin Marsh, Recycled Water Reservoirs, and the 42 Natural Treatment System (NTS) basins. The report also describes the minimization measures in compliance with the IPM Plan to ensure that the maintenance of these sites utilized environmentally sensitive pest management strategies and least-toxic control methods at each facility. This IPM Plan began at IRWD sites in September 2019. This 2024 Monitoring Report expands on the results and recommendations established in prior annual reports.

Endemic field biologists conducted monthly plant surveys at each site for the San Joaquin Marsh and NTS basins. Surveys involved identifying native, non-native, and invasive plant species. Geospatial information was collected using ArcGIS Field Maps. Upon evaluating each site, biologists advised non-chemical treatment recommendations such as manual removal, mechanical removal, mulching, and soil solarization. In the case of large plots of non-native plants with minimal to no native species, mechanical removal methods such as hula hoes, weed trimming, and mowing were recommended. Chemical treatment methods were reserved for target species that pose a significant threat to the ecosystem and demonstrated continued resistance and resilience to non-chemical removal methods. When target species required chemical treatment, spot spraying was advised to minimize the amount of pesticide used. LandCare's reports indicate chemical treatment occurred at 10 NTS sites, throughout all SJM Zones, and at one Recycled Water Reservoir. To summarize the total amount of herbicide applied, 4.7 gallons were used across all NTS sites, 12.67 gallons at SJM, and 19.5 at the San Joaquin Reservoir (see Table 3 or Appendix C-2 for further information).

Please note that Endemic did not survey the following: Rattlesnake Reservoir, San Joaquin Reservoir, Sand Canyon Reservoir, and Syphon Reservoir. These sites are managed by IRWD's Facilities/Fleet manager. However, the pesticide usage from those facilities is in this report. Additionally, the IRWD's Facilities/Fleet Manager oversees 147 other facilities not specified in this report.

2. ABBREVIATIONS & ACRONYMS

ac acre(s)
af acre-foot/acre-feet
Cal-IPC California Invasive Plant Council
CNPS California Native Plant Society
CSS Coastal Sage Scrub
Endemic Endemic Environmental Services
LC Landcare
EPA United States Environmental Protection Agency
ft foot/feet
gal gallon(s)
I-5 Interstate 5
I-405 Interstate 405
IPM Integrated Pest Management
IRWD Irvine Ranch Water District
NTS Natural Treatment System
SJM San Joaquin Marsh
SR-133 State Route 133
SR-241 State Route 241
SR-261 State Route 261
EDRR Early Detection and Rapid Response

3. INTRODUCTION

The Irvine Ranch Water District (IRWD) Integrated Pest Management (IPM) Plan functions to provide guidelines and measures that effectively carry out the long-term prevention of pests while prioritizing the health and safety of the public and surrounding environment (soil conditions, water quality, etc.). An IPM, as defined by the USFWS, integrates management goals, consensus building, monitoring, pest biology, environmental factors, and selective technology to achieve desirable outcomes. Such outcomes should minimize any effects on non-target species and the environment (USFWS 2010). The primary approach for the IPM program is pest prevention, which applies to all pest taxa including invasive plants in conservation areas. With integrated management, this approach ultimately strives to increase the likelihood of success and more effective pest eradication.

This ecosystem-based management strategy is a science-based decision-making system that leverages non-chemical treatments to minimize and mitigate impacts from target pests. These non-chemical techniques included hand removal, hula hoeing, weed trimming, digging, mowing, mulching, and solarization. The use of chemical treatments such as the use of pesticides, herbicides, and insecticides is reserved only for persistent target species with high spreadability and high likelihood for impact on the surrounding ecosystem. This IPM defines specific tolerance levels to identify when a pest population requires pest control. Pest treatment methods are advised to provide the most effective and environmentally sustainable solution.

The integration of continuous monitoring and adaptive management also ensures that feedback and improvements can be made to establish the most effective solutions over time. In order to fulfill the objectives of the IPM, site conditions must be monitored before, during, and after all treatment methods. These methods must also be assessed and revised through active adaptive management in order to ensure IPM success criteria is being met effectively. This Annual Monitoring Report aims to summarize and assess the long-term pest management methods that were employed at the San Joaquin Marsh and IRWD NTS Sites from January to December 2024.

3.1 Guiding Principles and Core Elements

Following the lead of other public entities such as the City of Irvine and Irvine Unified School District, Irvine Ranch Water District (IRWD) is implementing this Integrated Pest Management (IPM) Plan, which focuses on long-term prevention or suppression of pests while protecting human health, the environment, and nontarget organisms. IRWD — steward of numerous facilities, wetlands and habitat, much of which is maintained in a native, natural state — adopts

an organic-first policy for landscaping and pest control, with specific limitations on the use of pesticides and chemicals.

3.2 Integrated Pest Management Plan Components

This IPM Plan includes the following components:

- A framework for implementing IPM practices at IRWD facilities and properties
- Consistency with other local agencies and their IPM approaches
- Training of staff to encourage a mindset of progressive pest-management principles
- Monitoring and reporting of actions associated with implementation of the IPM
- Making the Integrated Pest Management program accessible to the public
- Utilizing platforms like Calflora to share information with other land managers and collectively track the range expansion of non-native and invasive species.

The purpose of this plan is to guide the use of environmentally sensitive pest management strategies and least-toxic control methods at facilities maintained and managed by IRWD. IPM is designed to manage pests (plants, fungi, insects, animals) through the most effective low-risk option, and advise responsible management actions to protect human health and the surrounding environment. Core elements of IPM include:

- Pest prevention to avoid the use of pesticides or other pest-control methods
- Non-chemical methods as first choice for pest control
- Use of non synthetic-based herbicides, referred to in this plan as organic
- Use of chemicals and pesticides only in target locations and for targeted species
- Never use EPA Category I or II pesticides or glyphosate in parks, playgrounds or other areas where the public congregates
- Routine inspection, reporting and monitoring
- Transparent communication

When pest prevention is unsuccessful or when noxious weeds are already established, the approach to eliminate these species from an area should follow a systematic decision-making process. This process is led through an established system of pesticide ranking and use categories. The use of non-chemical control methods should be executed first unless the circumstances can be scientifically justified to warrant a more aggressive approach. Otherwise, when physical control methods have been attempted and proven to not be feasible for successful eradication, organic control methods can be considered. EPA Category II and III pesticides should only be used when necessary after supervisorial approval or when the non-chemical methods conflict with the regulatory requirements. High-potential-hazard

pesticide applications may only be considered in emergencies that present a public health or environmental threat.

4. METHODS

4.1 Inventory and Monitoring

Endemic biologists conducted monthly in-person field surveys at the San Joaquin Marsh and IRWD Natural Treatment System (NTS) basins. Please refer to Map 1 (Appendix B-1) for a list of all site locations surveyed as part of this effort. Surveyors observed and documented the presence and quantity of non-native and invasive species throughout each site. Endemic surveyors documented geospatial location information through ArcGIS Field Maps, which enabled the creation of customized points and polygons. Endemic biologists provided recommendations, with the highest priorities emphasized, for addressing each mapped item. Upon IRWD's review, LC received direction to execute maintenance accordingly. Depending on the species and circumstances involved, various non-chemical treatment methods were advised, such as hand removal, mechanical removal, mulching, and solarization. By re-assessing each site monthly, Endemic biologists tracked tasks executed by LC as complete, updated pre-existing site items that had since changed, and added new items whenever pertinent. All survey observations and recommendations were stored within a GIS database, thus allowing comprehensive analysis. The database provides records like percent cover (for polygons), number of individuals (for points), and the advised method(s) for removal. Further analysis allows visualization of the temporal and spatial distribution of the species documented. Comprehensively, this information reveals the most prevalent non-natives and invasive species present across each site and their occurrence(s) throughout the year.

Disclaimer: Endemic biologists did not conduct monthly surveys for Recycled Water Reservoirs sites (Rattlesnake Reservoir, San Joaquin Reservoir, Sand Canyon Reservoir, and Syphon Reservoir). Instead, these sites were solely under the management of the IRWD Facilities/Fleet Manager. This report only includes the chemical pesticide usage reported by LandCare (LC).

4.2 Target Species & Chemical Treatment

Most specified target species were plants listed on the California Invasive Plant Council (Cal-IPC) Inventory. However, additional non-native and invasive species were classified as targets if they demonstrated continuous spreadability and persistence at the IRWD sites. Accordingly, despite not all targets possessing a severely invasive designation by Cal-IPC, all chosen targets posed a credible threat within the IRWD sites. In contrast, invasive species that pose known challenges to the broader region, such as fountain grass (*Pennisetum setaceum*) and castor bean (*Ricinus communis)*, were not always necessarily problematic within the NTS basins; accordingly, this IPM plan does not define such species as targets. The primary target species throughout 2024 were as follows: Spanish false fleabane (*Pulicaria paludosa*), perennial pepperweed (*Lepidium latifolum)*, curly dock (*Rumex crispus*), Bermuda grass (*Cynodon dactylon*), Smilo grass (*Stipa miliacea var. miliacea*), pampas grass (*Cortaderia selloana*), herb of grace (*Bacopa monnieri)*, and stinknet (*Oncosiphon pilulifer*). A memorandum was written for each target species (see Appendix C) to detail the justification and decision-making process regarding warranted chemical treatment. Additionally, in response to the early detection of a new species, Seashore Paspalum (*Paspalum vaginatum)*, Endemic proposed an additional herbicide memorandum toward the end of the year (December); the advised treatment aimed to effectively and rapidly respond to this species's range expansion before it spread further and became an established invasive throughout other NTS sites.

With water flow and water quality being IRWD's utmost priorities, species like bulrush (*Schoenoplectus californicus*) and cattail (*Typha spp.*) growing within the water channels often required maintenance to ensure they didn't inhibit water flow or hinder the overall function of the Natural Treatment Systems. Mechanical trimming with physical removal was the primary method advised to treat overgrowth. As a last-resort alternative, Endemic created a herbicide memorandum to utilize in select circumstances if chemical herbicide application was necessary

4.3 Early Identification & CalFlora Weed Manager

As part of a regional coordination effort, starting in 2024, Endemic assisted IRWD in utilizing the Calflora Weed Manager as a mapping tool for selected invasive species (such as stinknet). An ESS GIS specialist extracted invasive species data from the Endemic GIS database (documented between 2023 and 2024) and uploaded those survey observations to the Calflora Weed Manager, thus also making the information publicly available to local agencies. New species and populations that Endemic field biologists have detected have been directly uploaded to the Calflora database. IRWD aspires to harbor the potential of using Calflora as a regional-scale and

state-wide weed reporting and management tool. A plan is underway to continue monitoring plant target populations.

4.4 Native Restoration

Endemic advised the restoration of native species in conjunction with the routine removal of non-native species. With barren areas being vulnerable to re-colonization of non-native and invasive species, such areas were prime candidates to undergo seeding and planting. Endemic offered customized seed pallets to ensure that chosen species were compatible with the site conditions and introduced strategically to support their growth. Overall, the seeding recommendations aimed to facilitate native establishment and thus prevent the likelihood of non-native species from rapidly dominating disturbed and open areas.

5. INTEGRATED PEST MANAGEMENT SITES

5.1 Recycled Water Reservoirs

IRWD owns and operates an extensive recycled water system, which includes four seasonal storage reservoirs: Rattlesnake, San Joaquin, Sand Canyon, and Syphon. The primary purpose of these reservoirs is to provide public and commercial irrigation. The water is not palatable but is utilized for toilet flushing, cooling towers, dust control on construction sites, and industrial processes such as concrete production and composting. The IRWD reservoirs operate on a seasonal basis, mostly filling with water from the surrounding recycling plants during the winter when the irrigation demand is low. The constructed dams are certified safe, frequently inspected, and restricted from public access.

5.1.1 Rattlesnake Reservoir

The Rattlesnake Reservoir is a recycled water storage reservoir owned and operated by IRWD. Previously, the main function of the reservoir was to provide water for agricultural irrigation. It lies south of Loma Ridge and north of Portola Parkway, between SR-261 and SR-241. The reservoir operates for both the dry and wet season flows. No chemical pesticides were used at the Rattlesnake Reservoir from January to December of 2024.

5.1.2 San Joaquin Reservoir

San Joaquin Reservoir was historically used as a drinking water reservoir by seven cities and water districts, and now the reservoir is used to store recycled water. Its location is south of Bonita Canyon Drive and North of Newport Ridge Drive between Chambord Street and San Miguel Drive. The reservoir provides roughly 1 billion gallons of seasonal water storage. The operation of this reservoir is designed to maximize water storage during the wet season when

irrigation demands are lower. During the dry season, Irvine, Newport Beach, and Newport Coast utilize the water reserves for landscape irrigation. A total of 19.5 gallons of herbicide (Prosecutor) were applied at this site between January to December of 2024.

5.1.3 Sand Canyon Reservoir

The Sand Canyon Reservoir lies adjacent to the Strawberry Farms Golf Club, parallel to Ridgeline Drive in Irvine, California. The reservoir takes up 42 acres (ac) and has a water storage capacity of 250 million gal and an average depth of 18 feet (ft). The associated watershed makes up roughly 4,288 acres of the surrounding area. This reservoir is used for both seasonal and operational storage. No chemical pesticides were applied at Sand Canyon Reservoir from January to December of 2024.

5.1.4 Syphon Reservoir

The Syphon Reservoir is located just west of State Route 133 and north of Portola Highway in Irvine, California. The reservoir has historically been used to store irrigation water and is now also used in the IRWD recycled water system as a storage facility. The reservoir is made up of a 16.2-acre area that has a water storage capacity of 174 million gallons. This site did not undergo chemical pesticide treatments from January to December of 2024.

5.2 San Joaquin Marsh

The San Joaquin Marsh (SJM) and Wildlife Sanctuary in Irvine, California, consists of 281.58 acres of coastal freshwater wetlands that provide valuable habitat for local native species while supplying natural water treatment services for San Diego Creek. Conservation and restoration efforts have restored roughly half of the San Joaquin Marsh to a natural state that helps filter contaminants when the water cycles through the system. The water from San Diego Creek is naturally treated through the SJM wetlands before it reaches the protected and preserved Upper Newport Bay and the ocean.

IRWD manages four zones within the San Joaquin Marsh, whose establishment aids in delineation, structured landscaping, and naturalized plant management. In the past year, IPM activities at the marsh consisted of primarily manual and mechanical removal methods for naturalized plants. Occasional herbicide usage was advised to control problematic populations of prioritized target species. In alignment with the goals and objectives of the IPM plan, only minimal chemical pesticides were allowed if non-chemical removal methods were deemed ineffective or counterproductive. Target species, like Spanish false fleabane, perennial pepperweed, curly dock, and pampas grass, were controlled through various treatment methods; the advised approach depended on factors like the plant's phase of growth, level of

establishment, and threat to surrounding natives. If target individuals were still young and unestablished, non-chemical treatments were advised (such as hand pulling, uprooting, and hula hoeing). In contrast, specified herbicide spot treatment may be recommended if the target species in question was already well established, growing in habitats sensitive to invasion, or if the population had already demonstrated tolerance. Table 1 identifies the number of non-native plant species to address and the various treatment methods recommended at each of the four zones.

5.3 Natural Treatment Systems

The IRWD Natural Treatment Systems design drew inspiration from the same successful NTS implemented at the San Joaquin Marsh. These sites provide an environmentally conscious and economical solution to treat dry-weather runoff. The treatment systems naturally remove contaminants from the wastewater that enters through natural and urban runoff. The NTS basins function similarly to the San Joaquin Marsh, although they utilize small man-made wetlands integrated throughout the San Diego Creek Watershed. The strategic design treats low-flow runoff and storm flows sourced throughout Irvine by removing contaminants such as nitrogen, phosphorus, and bacteria. In addition to treating runoff, the design prevents potential contaminants from reaching the ecologically sensitive Upper Newport Bay habitat. The following section describes the non-native plant treatment methods utilized from January to December 2024 for each of the 45 basins involved in the IPM Plan. Table 1 details the number of non-native species identified to address, the various methods advised, and highlights the most problematic target species per site.

6. RESULTS & DISCUSSION

6.1 Summary of Species to Address & Methods Advised

The table below (Table 1) quantifies each site's total species identified for maintenance, all treatment methods recommended, and the most problematic invasive species targeted. The values listed incorporate data from SJM and all NTS Basins between January to December of 2024. See Appendix D for data detailing all species identified to address (including non-natives and a select few natives) along with the frequency each was documented. Please note, that the data is not necessarily reflective of the executed treatment, but rather the advised approach.

Table 1. Species to Address, Advised Methods, & Invasive Targets.

Site Name	Total Species Identified for Maintenance	All Recommended Treatment Methods	Invasive Target Species
Aquila Springs	19	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal	Spanish false fleabane
Cypress Meadow A	25	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Curly dock, Pampas grass perennial pepperweed, Spanish false fleabane
Cypress Meadow B	24	Digging, Hand Removal, Hula Hoe/Tilling	Bermuda grass, Smilo grass Spanish false fleabane
Cypress Meadow C	25	Digging, Hand Removal, Hula Hoe/Tilling	Pampas grass, Smilo grass
Cypress Meadow D	24	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal	Bermuda grass, Spanish false fleabane
Eastfoot Retarding Basin	20	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling	Bermuda grass, smilo grass Spanish false fleabane
Eastwood Meadow	36	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Bermuda grass, Curly dock, Smilo grass, Spanish false fleabane
El Modena	16	Digging, Hand Removal, Hula Hoe/Tilling	Smilo grass, Spanish false fleabane
Floral View	22	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Spanish false fleabane
Forge Meadow	28	Digging, Hand Removal, Hula Hoe/Tilling, No Action, Trimming	Curly dock, Bermuda grass, Smilo grass, Spanish false fleabane
Hidden Canyon	26	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Trimming	Bermuda grass, Curly dock Smilo grass Spanish false fleabane,

			Tamarisk
Iluna Springs	14	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal	Curly dock, Spanish false fleabane
Laguna Altura North	29	Digging, Hand Removal, Hula Hoe/Tilling, Trimming	Curly dock, Spanish false fleabane, Smilo grass
Laguna Altura South	19	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Solarization, Trimming	Curly dock, Bermuda grass, Spanish false fleabane, Tamarisk
Los Olivos Meadow	15	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Curly dock, Spanish false fleabane, Tamarisk
Los Olivos South	15	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Solarization, Trimming	Bermuda grass, Curly dock, Pampas grass, Seashore paspalum, Spanish false fleabane, Tamarisk
Lower Agua Chinon Basin A	15	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal	Curly dock , Seashore paspalum, Spanish false fleabane
Lower Agua Chinon Basin B	21	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal	Curly dock, Seashore paspalum, Spanish false fleabane
Lower Agua Chinon Basin C	16	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal	Curly dock, Spanish false fleabane, Tamarisk
Lower Eastfoot	23	Digging, Hand Removal, Hula Hoe/Tilling	Bermuda grass, Curly dock, Smilo grass, Spanish false fleabane
Middle Eastfoot	19	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Solarization	Bermuda grass , Curly Dock, Smilo grass, Spanish false fleabane
Upper Eastfoot	9	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Trimming	Bermuda grass
Marine Meadow	11	Digging, Hand Removal, Hula	Spanish false fleabane

		Hoe/Tilling, Trimming	
Marshburn	21	Digging, Hand Removal, Hula Hoe/Tilling, Mowing, Tree Removal	Curly dock, Spanish false fleabane
Old Laguna	24	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Solarization, Tree Removal, Trimming	Bermuda grass, Curly dock Spanish false fleabane
Orchard Meadow	23	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Trimming	Curly dock. Spanish false fleabane
Orchard Retarding Basin	13	Digging, Hand Removal, Hula Hoe/Tilling, Trimming	Spanish false fleabane
Parasol Park	16	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal	Curly dock, Spanish false fleabane
Port Culver	27	Digging, Hand Removal, Hula Hoe/Tilling	Smilo grass, Spanish false fleabane
Portola Springs Meadow	29	Digging, Hand Removal, Hula Hoe/Tilling	Bermuda grass, Curly dock, Smilo grass, Spanish false fleabane
Quail Meadow	19	Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Mowing, Trimming	Curly dock , Spanish false fleabane
Quail Springs	31	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Weed Whacking	Curly dock, Spanish false fleabane, Tamarisk
Ridge Valley A	39	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Curly Dock , Perennial pepperweed, Spanish false fleabane
Ridge Valley B	19	Digging, Hand Removal, Hula Hoe/Tilling, Trimming	Perennial pepperweed, Spanish false fleabane
Ridge Valley C	24	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal, Trimming	Curly dock, Pampas grass, Perennial pepperweed Spanish false fleabane

SJM Zone 1	21	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal	Bermuda grass, Curly dock, Perennial pepperweed, Spanish false fleabane
SJM Zone 2	26	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal, Trimming	Curly Dock, Spanish false fleabane
SJM Zone 3	33	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Curly dock, Spanish false fleabane
SJM Zone 4	20	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Curly Dock, Spanish false fleabane
Sports Park	27	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Curly dock , Spanish false fleabane
Trabuco	20	Hand Removal, Hula Hoe/Tilling, Tree Removal, Trimming	Curly dock, Spanish false fleabane, Stinknet
Turtle Ridge	23	Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming	Spanish false fleabane
Twisted Oak	12	Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling	Bermuda grass
Upper Agua Chinon Basin A	14	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal	Pampas grass, Spanish false fleabane, Tamarisk
Upper Agua Chinon Basin B	14	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal	Curly dock, Smilo grass, Stinknet, Spanish false fleabane, Tamarisk

6.2 Summary of Integrated Pest Management Usage

Table 2 summarizes and compares the chemical pesticide use from 2018-2024. Initially, chemical pesticide use totaled 162.34 gallons for the pre-establishment year (2018). In comparison, in 2024 a total of 36.875 gallons were applied across all sites (SJM, NTS Basin, and Other Facilities).

Table 2. Pesticide Usage Comparison.

Period	Sites	Chemical Pesticide Amount (gal)	Organic Pesticide Amount (gal)	Total Pesticide Amount (gal)
Jan-Dec 2018	SJM/NTS Basins	78.34	-	162.34
	Other IRWD Facilities	84.00	-	
Jan-Dec 2019	SJM/NTS Basins	60.58	1.2	62.5
	Other IRWD Facilities	0.72		
Jan-Dec 2020	SJM/NTS Basins	13.45	-	15.7
	Other IRWD Facilities	2.25	-	
Jan-Dec 2021	SJM/NTS Basins	14.41	-	17.41
	Other IRWD Facilities	3	-	
Jan-Nov 2022	SJM/NTS Basins	14.34	-	14.34
	Other IRWD Facilities	-	-	
Jan-Nov 2023	SJM/NTS Basins	12.375	-	12.375
	Other IRWD Facilities	-	-	
Jan-Oct 2024	SJM/NTS Basins	17.375	-	36.875
	Other IRWD Facilities	19.5	-	

Note: This information was not tracked by the Fleet/Facilities Manager in 2019.
Abbreviations: gal=gallon(s), IRWD=Irvine Ranch Water District, "-" = Not Applicable, NTS = Natural Treatment System, SJM = San Joaquin Marsh.

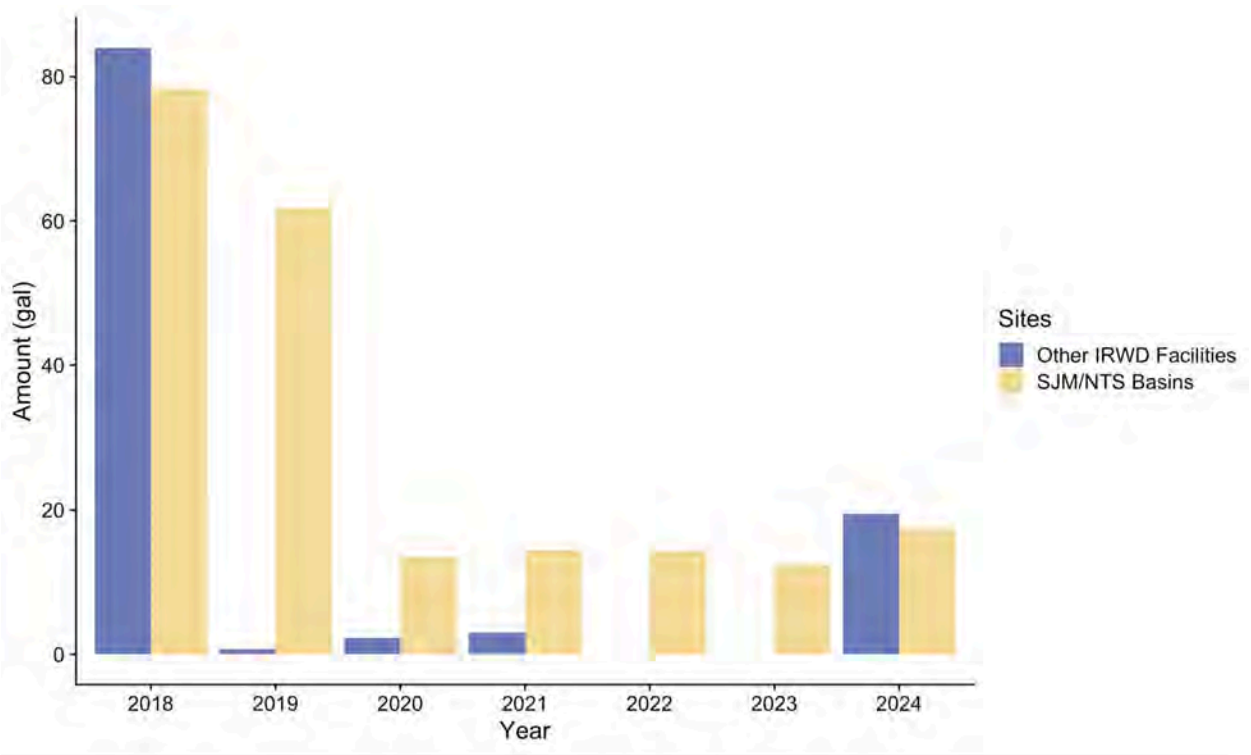

Figure 1. Annual herbicide usage across all sites, colored by site categories.

6.3 Chemical Treatment Method

The IPM activities for 2024 focused primarily on reducing the non-native plant species at each site through manual and mechanical treatments. Herbicide application was reserved for defined target species and minimized through spot treatment and selective avoidance. Chemical herbicide products were advised based on experience in conjunction with relevant literature indicating that non-chemical methods would not be productive. The following were the only target species actively advised for herbicide treatment from January to December 2024: Spanish false fleabane, curly dock, Bermuda grass, pampas grass, and seashore paspalum. While chemical treatments are known to reduce the cover of targeted invasive species, herbicide has continued to be a necessary form of control. However, as non-native and invasive seed banks further exhaust, we anticipate the need for chemical treatment to subside accordingly. Endemic highly advises furthering restoration efforts to encourage increased native plant cover and native plant biodiversity. Building up the native cover will help to outcompete non-natives and discourage colonization.

The Pesticide Usage Comparison demonstrates a continuous decline in the use of pesticides at the San Joaquin Marsh and NTS sites from 2018 to 2024 (Table 2). Between January and

December 2024, approximately 11.3 gallons of Roundup Pro-Max (glyphosate) and 1.3 gallons of Triclopyr-4 were applied at the San Joaquin Marsh. Across all NTS Sites, the following herbicide amounts were applied: 1.4 gals of Roundup Pro-Max, 2.7 gals of Triclopyr-4, and 0.6 gals of Ranger. The Recycled Water Reservoir Sites (Other Facilities) received a total of 19.5 gallons of one herbicide product - Prosecutor. Table 3 presents detailed information on herbicide applications throughout the year, the products used, and the amounts applied according to Landcare's documentation. Documentation indicates that the following sites received herbicide treatment: Aquila Springs, Cypress Meadow A, Floral View, Laguna Altura South, Los Olivos Meadow, Lower Agua Chinon C, Marshburn, Orchard Retarding Basin, Upper Agua Chinon B, Quail Springs, and the San Joaquin Marsh Zones (1-4), and San Joaquin Reservoir. Of the NTS sites, Marshburn and Cypress Meadow A received the highest documented chemical amounts. Of the SJM Zones, Zone 1 received the highest documented chemical amount. The amount of herbicide applied at the San Joaquin Reservoir site (19.5 gals) exceeded the combined totals for all NTS sites (4.7 gals) and SJM (12.67 gals). Similar to prior years, Spanish false fleabane was the primary target for removal across most sites.

To avoid further potential ecological and economic regional impact from invasive species. Endemic recommends that IRWD continue to minimize the use of chemical pesticides. For the sites with a high persistence of aggressive target species, we recommend continued strategic spot treatments to prevent further spread. In conjunction with non-native removal and invasive containment, we highly encourage leveraging native habitat restoration methods directly after removal efforts, thus supporting local ecosystem resilience. With the experience of Endemic biologists, the priority of invasive species stems from the existing written memorandums and existing literature to address the necessary stands of newly detected invasives.

Table 3. NTS Sites with Chemical Pesticide Usage Reported by LandCare

Basin Name	Date Applied	Pesticide (Brand Name) Utilized	Area Treated (sq ft)	Pesticide Application Amount (gal)	Total Pesticide Amount Per Site (gal)
Aquila Springs	06/12/2024	Roundup Pro-Max	700	0.0625	0.0625
Cypress Meadow A	05/01/2024	Roundup Pro-Max	800	0.0625	0.96875
	10/4/2024	Roundup Pro-Max	1100	0.125	

		Triclopyr-4	1100	0.125	
	10/9/2024	Roundup Pro-Max	1700	0.15625	
		Triclopyr-4	8510	0.5	
Floral View	12/28/2024	Triclopyr-4	700	0.125	0.1875
		Ranger	700	0.0625	
Laguna Altura South	12/23/2024	Ranger	550	0.0625	0.0625
Los Olivos Meadow	09/16/2024	Roundup Pro-Max	4060	0.234375	0.484375
		Triclopry-4	4250	0.25	
Lower Agua Chinon Basin C	05/17/2024	Roundup Pro-Max	600	0.0625	0.21875
	06/14/2024	Roundup Pro-Max	700	0.0625	
	12/10/2024	Ranger	1100	0.09375	
Marshburn	10/31/2024	Tricoplyr-4	2800	1.5625	2.1875
		Roundup Pro-Max	700	0.25	
	10/31/2024	Ranger	620	0.1875	
		Roundup Pro-Max	800	0.1875	
Orchard Retarding Basin	10/10/2024	Roundup Pro-Max	1900	0.203125	0.328125
		Tricoplyr-4	1200	0.125	
Upper Agua Chinon B	12/19/2024	Ranger	950	0.078125	0.078125
Quail Springs	12/06/2024	Ranger	1400	0.125	0.125
	05/02/2024	Roundup Pro-Max	36800	1.5625	5.078125
SJM Zone 1	05/01/2024	Roundup Pro-Max	79650	3.515625	
	05/10/2024	Roundup Pro-Max	36000	1.5625	2.234375
SJM Zone 2					

	04/11/2024	Triclopyr-4	7130	0.359375	
	04/10/2024	Triclopyr-4	6320	0.3125	
	04/19/2024	Triclopyr-4	7130	0.359375	3.015625
	04/18/3034	Triclopyr-4	6200	0.3125	
SJM Zone 3	05/16/2024	Roundup Pro-Max	54000	2.34375	
SJM Zone 4	04/24/2024	Roundup Pro-Max	43200	2.34375	2.34375
San Joaquin Reservoir	04/18/2024	Prosecutor	54,000	1.7578125	19.5
	05/08/2024	Prosecutor	96,300	3.515625	
	5/15/2024	Prosecutor	47,250	1.7578125	
	5/30/2024	Prosecutor	72,240	2.34375	
	6/11/2024	Prosecutor	18,000	0.5859375	
	6/12/2024	Prosecutor	34,500	1.171875	
	07/02/2024	Prosecutor	47,250	1.7578125	
	8/9/2024	Prosecutor	72,240	2.34375	
	8/13/2024	Prosecutor	10,080	0.328125	
	8/12/2024	Prosecutor	72,240	2.34375	
	9/4/2024	Prosecutor	7,200	0.234375	
	9/20/2024	Prosecutor	5,760	0.1875	
	10/29/2024	Prosecutor	32,700	1.171875	
Total 2024 Usage Across All Sites				**36.875**	

*Note - Aside from the sites detailed above, no other documented herbicide usage occurred. The following sites did not have any herbicide applications reported: Cypress Meadow B, Cypress Meadow C, Cypress Meadow D, Eastfoot Retarding Basin, Eastwood Meadow, El Modena, Forge Meadow, Hidden Canyon, Iluna Springs, Laguna Altura North, Los Olivos South, Lower Agua Chinon Basin A, Lower Agua Chinon Basin B, Upper Eastfoot, Middle Eastfoot, Lower Eastfoot, Marine Meadow, Old Laguna, Orchard Meadow, Parasol Park, Port Culver, Portola Springs Meadow, Quail Meadow, Ridge Valley A, Ridge Valley B, Ridge Valley C, Sports Park, Trabuco, Turtle Ridge, Twisted Oak, Upper Agua Chinon Basin A

6.4 Non-chemical Treatment Methods

The primary methods employed at the SJM and NTS sites included manual and mechanical removal methods, which ultimately led to a range of successful eradication. Various physical techniques, like hand removal, mechanical removal, mulching, and solarization, were considered when addressing non-native plant species. Hand removal has proven to be a cost-efficient control method with high selectivity, thus causing the least impact on the surrounding environment. With the cautious precision that hand removal allows, this method is ideal for preserving nearby native species. In contrast, manual methods like digging, cutting, uprooting, and hula hoe are most effective when utilized on newly established and small populations with limited distribution.

Certain invasives can be particularly resistant to manual removal due to their size, growth habits, or population size. To address these resistant cases, Endemic biologists opted to order mechanical removal. Mechanical removal methods, such as weed trimming, disking, and mowing, are especially beneficial for large patches of non-native plants and ones with minimal natives interspersed. While such methods can effectively clear large impacted areas, native habitat restoration should occur directly afterward to prevent invasive plants from colonizing the disturbed bareground.

In addition to LandCare using non-chemical treatment methods, the Endemic restoration team also implemented an approved native plant restoration strategy in 2024 at the following four NTS sites: Los Olivos Meadow, Port Culver, Lower Eastfoot, and Eastwood Meadow. Eastwood Meadow underwent a variety of non-native and invasive manual removal efforts. The other three sites underwent both non-native plant removal and the introduction of container plantings to increase native cover and promote overall establishment.

7. RECOMMENDATIONS

Throughout the IPM implementation period for January-December 2024, several recommendations were suggested and should continue to be reinforced to minimize the use of chemical pesticides while controlling the non-native plant populations.

- **7.1 Prevention and biosecurity should be the initial line of defense to mitigate the introduction and spread of invasive species.** Prevention is the most economical and efficient method to control the introduction and spread of invasive plants. As sites connected by waterways, the SJM and NTS basins are highly vulnerable to invasive species. Additionally, the frequent transportation of tools, equipment, and vehicles across all sites for maintenance activities poses a high risk for vector transport. Simple

thorough measures, like decontaminating boots and tools, should be practiced routinely and regularly communicated to ensure proper containment and disposal take place.

- **7.2 To prevent invasive species from encroaching, native restoration in the NTS basins should be prioritized relative to habitat and existing irrigation.** Native habitat restoration techniques such as container planting, seeding, hydromulching, and irrigation system establishment will increase native plant biodiversity, native plant coverage, and establishment. Based on the non-native cover and the presence of target species, we advise further habitat restoration for the following NTS sites: Los Olivos Meadow, Eastwood Meadow, Forge Meadow, Hidden Canyon, Twisted Oak, Parasol Park, and Aquila Springs.

- **7.3 Irrigation should be established and revised within various NTS basins.** With strategic execution, irrigation encourages native plant growth in the early spring and summer. In addition to maintaining established natives, irrigation aids with restoration like seeding and planting efforts. Furthermore, the overly dry and wet sites should undergo revisions to resolve issues with high native mortality. Especially dry or wet conditions can lead to soil degradation, early senescence, fungal issues, and reduced life expectancy of plants; accordingly, adequate irrigation is essential for success. In the interest of longevity, Endemic recommends continuously monitoring and revising existing irrigation systems to ensure that maintenance can be reduced to a minimum in planted areas.

- **7.4 Trees that demonstrate characteristic symptoms of invasive Shot Hole Borers (ISHB) should undergo official evaluation by a certified arborist.** ISHB poses an imminent threat to a wide variety of tree species. Various natives, like the Coast live oak and Western sycamore, are susceptible to becoming a host for this invasive pest species. Monitoring for entry holes, dark wet staining, sugar-like buildup, frass, and dieback should be executed periodically to detect infestations early on. A certified arborist should follow up to confirm ISHB's presence and provide the advised chemical or mechanical treatment(s).

- **7.5 A Chemical Pesticide Use field monitoring form should continue being enforced to ensure transparency and consistency with herbicide documentation.** Each chemical application should continue to specify the location(s) and square footage of the areas on-site where each chemical application occurred, species targeted, quantified details regarding mixed solutions (adjuvants, diluents, etc.), the total chemical amounts applied, and the square footage of the area addressed. Providing thorough records of this sort is essential for data analysis regarding treatment efficacy and persistence.

- ***7.6 Reinforcing Methods of Invasive Control.*** With a constantly developing understanding of the existing invasive plants in IRWD and Orange County, Endemic prioritizes incorporating the most effective methods of non-native plant control. To conform to this value, Endemic advises to continue utilizing both solarization and tarping as long-term methods to quell especially problematic plant populations. Both are ecologically friendly alternatives to chemical herbicides within suitable habitats where patches of land are highly degraded. These methods are especially cost-efficient within areas where soil disturbance, erosion, and seed bank deposits are a concern. Endemic recommends that these methods be employed with long-term monitoring and subsequent restoration to avoid further soil degradation and to discourage the colonization of natives.

    - **7.6.1 Solarization** employs transparent polyethylene sheets to trap solar radiation, creating a greenhouse effect that raises soil temperatures to levels lethal to seeds, seedlings, and soil-borne pathogens. This hydrothermal process is most effective in areas with consistent sunlight and high temperatures, typically during summer. Solarization targets the upper soil layers, sterilizing the seed bank and thus providing long-term suppression of annual invasive species. This method is ideal for treating species like Bromes *(Bromus spp.),* Rabbitsfoot grass (*Polypogon monspeliensis),* and other annual grasses within areas where they have dominated and minimal to no natives remain. This approach should also be considered for areas dominated by species like Bermuda grass (*Cynodon dactylon),* especially when chemical treatment has proven ineffective.

    - **7.6.2 Tarping** relies on light exclusion to suppress photosynthesis and inhibit plant growth. Heavy-duty, opaque tarps block sunlight and create an environment of high soil moisture that encourages weed seed germination, followed by seedling mortality due to the absence of light. This method is particularly effective for controlling species with robust vegetative structures, such as rhizomes and stolons, making it ideal for treating perennial invasive plants. Ideal for perennial monocultures, tarping can reduce seed banks, exclude tree stumps, and address perennial plants. Species relevant to this method include Curly Dock (*Rumex crispus),* Acacias (*Acacia spp.),* Smilo grass (*Stipa miliacea var. miliacea),* and Bermuda grass colonies. For maximized efficacy of this method, mowing before tarping is advised.

- **7.7 Calflora should continue to be used as a tool for early detection and rapid response (EDRR).** Calflora allows land managers across the county to track invasive expansions. With early detection, rapid responses are possible. Endemic recommends to continue

contributing to new weed observations (throughout the NTS & SJM sites) and Cal-IPC watch lists in the IRWD Calflora Weed Manager database. Additionally, we recommend enrolling the IRWD Weed Manager account as part of the OC Coordinating Group. This would allow the county and regional partner to acquire a more comprehensive reflection of ongoing weed statuses. Throughout the 2024 surveys, we discovered the following:

- Multiple new populations of *Dittrichia graveolens* were found and documented.
- *Erodium malacoides* at Lower Eastfoot were found and documented.
- Several populations of *Eragrostis barrelieri* were found and documented. There were only three reports in the county previously.
- The first wild detection of *Artemisia vulgaris* in the county was confirmed at Cypress Meadow B.
- Several dozen individuals of *Muhlenbergia lindheimeri* were detected across several sites (concern for invasion); these were first non-cultivated records in OC.
- Several dozen *Muhlenbergia capillaris* plants were detected within NTS basins. Although less of an invasive concern, these were the first non-cultivated OC records.
- *Paspalum quadrifarium,* a new species in CA*,* was detected across multiple sites.
- The first verified population of *Paspalum vaginatum* was detected at Lower Agua Chinon Basin A & B as well as Los Olivos South.

- **7.8 Organic herbicide application should not be a primary method for treating non-native plant species in the NTS basins.** Organic herbicide methods deployed at IRWD sites in the past have proven ineffective. Generally, conventional herbicides have demonstrated more efficiency in controlling established non-native plant growth. Organic herbicides are also less cost-effective and require more frequent applications. With higher application and physical contact, organic herbicides pose a range of potential negative impacts on native pollinators, soil, and water quality (Smith-Fiola and Gill 2017). For these reasons, we advise using mechanical removal and herbicide spot treatment for effective non-native management. As new technologies and organic herbicides develop, Endemic will continue to test and research the efficacy of new methods.

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APPENDIX A: SITE DETAILS

A-1: SITE GROUPS FOR RESTORTATION STRATEGIES

Categorizing the NTS sites based on contextual surroundings and typical weed composition presents an opportunity to maximize the understanding of each site and thus optimize strategies for restoration, invasive removal, and maintenance efforts. Some of the NTS sites are similar because they contain the dominant floristic components of surrounding areas or other sites. Other similarities arise due to overall vegetation composition, geographic context, and location. Variables like high moisture, human-oriented restoration, and presence along the San Diego Creek watershed actively contribute to non-native growth. Despite regional differences, species like Spanish false fleabane, pampas grass, tamarisk, Smilo grass, burr clover, bristly oxtongue, Bermuda grass, and curly dock remain consistently present throughout all NTS basins. Another pattern to highlight is the tendency for ornamentals and saplings to grow along the base of planted trees. Most trees planted along the basins continue to receive supplementary water; accordingly, the non-native plants (like Brazilian peppertree, Peruvian peppertree, Ngaio, African asparagus, Chinese elm, and Mexican Primrose) often colonize where they may otherwise struggle. With floristic composition in mind, the NTS sites can be grouped accordingly: Chinon Wash, Cypress Village & Great Park, Flood Control Basins, Isolated Sites, Orchard Hills, San Joaquin Hills, San Joaquin Marsh. These groupings can be utilized to help strategize and plan site restoration efforts.

Chinon Wash

Located along the Chinon Wash, this group of sites includes Upper Agua Chinon Basins A and B, Aquila Springs, Iluna Springs, and District 5/Lower Agua Chinon Basins A, B, and C. The Chinon Wash sites experience a rather unique combination of factors. Being located East of the El Toro Marine Corps Air Station, South of the foothills of Limestone Canyon, and North of Great Park, weed composition is a combination of CSS invasives (fountaingrass, tree tobacco, castor bean, Russian thistle, pampas grass), riparian and meadow invaders (bull thistle, umbrella sedge, common fig), and human-dispersed weeds (seashore paspalum, St. Augustine grass). Interestingly, this collection of sites is the only group where the CSS invasives have managed to establish. On top of the well-understood invasives and non-natives present here, land managers should be cautious of new introductions to the county and well-established invasives that have yet to take hold in the NTS basins.

Cypress Village and Great Park

Due to the heavily urbanized surroundings, Cypress Village and sites adjacent to the Great Park development are included in one group. This category includes Cypress Meadows A-D, Ridge Valleys A-C, Parasol Park, Floral View, Marine Meadow, and Sports Park. Nested in the city center, all sites are relatively isolated from wildland influence. It is common to witness persistent construction, high pedestrian rates, open weedy fields, and residential areas near these sites. As a result, these sites receive an inordinate amount of colonization of ornamental and street trees. Common species include Chinese Elm, Brazilian Peppertree, Chinese Rain Tree, buffelgrass, Lantana spp., Tropical milkweed, Carrotwood, Mexican primrose, and Japanese honeysuckle. Ornamentals, while rarely able to be established without significant water, should be regarded with caution in a riparian setting. Also, sites close to the Great Park development should be cautious of weeds that spread through high traffic, including stinknet, five-hook Bassia, Maltese starthistle, and garland chrysanthemum. These kinds of weeds favor dry and disturbed areas and can readily colonize the bare patches present at these sites. Land managers should exercise caution when driving onsite and ensure that all possibilities to spread seed are mitigated as much as possible in this area.

Flood Control Basins

Food control basins may retain floristic components of their respective locations. However, due to construction, their plant communities remain relatively insular compared to the other categories. Included here are Eastfoot Retarding Basin, Orchard Retarding Basin, Trabuco, Marshburn, and Quail Springs. Due to their high surface areas, ability to retain moisture, and disturbed settings, these areas are almost exclusively colonized by weeds with low native composition. Common species include Eucalyptus spp., Acacia spp., Italian rye, curly dock, Australian saltbush, white horehound, sweetclover spp., and Brome spp. Unique to these sites, all mentioned species are well-established and highly abundant. In preparation for annual mowing requirements and potential seasonal flooding, from April - December, Endemic only provided maintenance recommendations for immediate areas within 15 feet of the waterways on site.

Isolated Sites

The isolated sites are not near any specific significant weed influence. Rather, they are influenced by their insular surroundings. Included are as follows: Eastwood Meadow, Portola Springs Meadow, and El Modena. Each of these sites receives encroachments from nearby landscaping. Eastwood Meadow receives thorny olive, spearmint, common allium, and tussock

paspalum. Portola Springs Meadow often sees colonization of naturalized plants from the adjacent degraded area; Mediterranean Lovegrass was discovered here. This site receives multiple species of Acacia and Peruvian Peppertree. Finally, El Modena is almost exclusively influenced by the nearby lawn weeds and street trees. Unique species here include common flax, bird's foot trefoil, and red mulberry.

Two out of the three included sites have been locations of new weeds for the region. As such, they are separated more for their utility and potential for EDRR sites. Land managers should pay special attention to rapidly expanding and/or out-of-place plants. Despite fewer vectors spreading around these sites, high foot traffic and unorthodox landscaping choices pose a unique opportunity for further invasive establishment.

Orchard Hills

Located between the 241 and 261 highways, the Orchard Hills are directly adjacent to a large agricultural plot. To the East, it borders Limestone Canyon Regional Park. Sites included here are Lower/Middle/Upper Eastfoot, Port Culver, Orchard Meadow, Twisted Oak, and Forge Meadow. The floral community here is almost exclusively characterized by the agricultural weeds present. The slopes and basins of most of these sites are colonized by forbs like Barnyard grass spp., Dallisgrass, annual wallrocket, smilo grass, panic veldgrass, flax-leaved horseweed, and prickly lettuce. This group of sites also hosts the most severe infestations of smilo grass, with Port Culver, Forge Meadow, and Lower Eastfoot being of particular concern. These sites have particularly rocky soil, with slow drainage. This composition favors a high colonization rate of annuals and disturbance-oriented natives. In contrast, it disfavors delicate perennial establishments. Regarding restoration, specialized seeding palettes should be chosen to reflect these conditions. As with the Great Park sites, Land managers should pay particular attention to sites directly adjacent to avocado groves for any newly detected weeds. High disturbance and frequent distribution of foreign matter leave these sites vulnerable to becoming EDRR sites.

San Joaquin Hills

The final collection of separate sites are located adjacent to or within the San Joaquin Hills. Included in this category are Los Olivos South/Meadows, Laguna Altura S/N, Hidden Canyon, Old Laguna, and Turtle Ridge. The San Joaquin Hills have been a well-established area for cattle grazing in the past and recent developments. The vegetation community in these sites reflects those legacies. Along with established riparian invasives, the San Joaquin Hills sites are subject to heavy incursions of grasses (Brome spp., smilo grass, rat-tail fescue, barley spp., oat spp., fountaingrass), weedy biennials (Mallow spp.), and annual forbs (scarlet pimpernel, hyssop

loosestrife, storksbill spp., creeping saltbush). Due to their relatively well-protected nature, these sites likely have the least risk for early-detection weed species. However, of particular concern is their consistent pattern of vegetation recruitment. Specifically, mirroring the outside preserves of the San Joaquin Hills, these sites have a low presence of perennial grasses and forbs, leading to a constant limbo of pioneer species recruitment; this is a similar issue for all sites listed, especially in the basin portions. Restoration should be mindful of irrigation needs and the understanding that much of the non-native coverage has emerged due to poor native recruitment throughout. To aid in this issue, foot traffic and trampling of already established native pockets should be disturbed as little as possible.

San Joaquin Marsh

As discussed previously, San Joaquin Marsh serves as a large collection of marsh and riparian woodland communities. Due to area size and proximity to the mouth of San Diego Creek, the vegetation community in the four sites (SJM 1, 2, 3, and 4) is relatively insular. Due to the presence of high-risk invasives (Seashore paspalum, Santa Maria Feverfew, Himalayan Blackberry), land managers should be cautious of the distribution of plant material from San Diego Creek to SJM. Otherwise, unique vegetation lies primarily in the adjacent ornamental presence and high trail use, with common plant species including Dwarf nettle, common fig, camphor, Virginia creeper, and castor bean. The thickets give great potential to invasives like castor bean and common fig to grow into established trees, which should prompt high vigilance and encourage thorough monitoring of each zone.

A-2: SITE OVERVIEWS

Forge Meadow

Forge Meadow is a 2.11-acre NTS basin adjacent to Portola Parkway in north Irvine. This basin consists of two ponds connected by a long channel. Forge Meadow is characterized primarily by annual and biennial species, including western ragweed, marsh fleabane, annual saltmarsh aster, and mugwort. Relative to other NTS sites, Forge Meadow is particularly low in native diversity. Endemic advised various manual removal methods to reduce and maintain the cover of non-native & invasive species. The most prevalent species were bristly oxtongue, curly dock, smilo grass, and umbrella sedge. Other non-native species advised for maintenance included Bermuda grass, barnyard grass, burr clover, clustered dock, common purslane, common sowthistle, common stork's bill, dallisgrass, English plantain, flax-leaved horseweed, hairy crabgrass, Italian rye, jungle rice, Mexican fan palm, Mexican primrose, prickly lettuce, prostrate pigweed, spotted spurge, Spanish false fleabane, tropical horseweed, umbrella sedge, wall barely, white sweetclover, and yellow sweetclover.

Figure 2. Forge Meadow Site Overview as of December 2024.

Port Culver

Port Culver is a 3.40-acre basin north of Portola Parkway, adjacent to a large agricultural area in north Irvine. This basin consists primarily of a pilot channel, where water often overflows from the channel and spreads throughout the bottom. Due to its proximity to an avocado plantation, the site experiences high invasion rates for plants that are not particularly characteristic of the NTS sites. As a result, there is particularly low native coverage for existing perennials. Over 400 native plantings *(*i.e. *Anemopsis californica, artemisia douglasiana, asclepias fascicularis, cyperus eragrostis, elymus triticoides, elmyus codensatus, epilobium canum, heliotropium curassavicum, mimulus guttatus, muhlenbergia rigens, salvia mellifera, sisyrinchium bellum, stipa lepida, stipa pulchra)* were planted throughout the basin and slopes at the beginning of the year. Manual hand removal was the primary advised method to reduce and control non-native cover. The most prevalent non-native species on the site included bristly oxtongue, smilo grass, Italian ryegrass, and burr clover, Other non-native species observed included: annual wall-rocket, Brazilian peppertree, bristly oxtongue, common dandelion, common soft brome, common sowthistle, compact brome, english plantain, flax-leaved horseweed, Peruvian peppertree, pickerelweed, prickly lettuce, prickly sowthistle, purple nutsedge, rabbitsfoot grass, red brome, shortpod mustard, spanish false fleabane, tropical horseweed, umbrella sedge, wall barley, wax leaf privet, whorled pennywort, yellow sweetclover.

Figure 3. Overview of Port Culver as of November 2024.

Orchard Meadow

Orchard Meadow is a 1.18-acre basin located north of Portola Parkway and adjacent to a large agricultural area in north Irvine. This basin consists primarily of a pilot channel. Water often overflows from the channel and spreads throughout the bottom of the basin, creating a pond. Compared to other NTS basins in the relative area, Orchard Meadow exhibits minimal invasive slope cover due to the established Coastal Sage Scrub (CSS) vegetation. Due to this, Orchard Meadows is a particularly successful restoration project and likely to see long-term native persistence. Manual hand removal was the primary method prescribed for management. The most prevalent species included bristly oxtongue, curly dock, shortpod mustard, and Spanish false fleabane. Other non-native species observed included African asparagus, burr clover, common cattail, common sowthistle, flax-leaved horseweed, great brome, Peruvian peppertree, prickly lettuce, rabbitsfoot grass, rescuegrass, scarlet pimpernel, slender wild oats, Taiwanese firethorn, tropical horseweed, water beard grass, water smartweed, white sweetclover, yellow sweetclover.

Figure 4. Overview of Orchard Meadow as of November 2024.

Lower Eastfoot

Lower Eastfoot is a 1.62-acre basin north of Portola Parkway adjacent to residential housing and the 261 freeway in north Irvine. The site basin consists primarily of a pilot channel connected with two ponds on each side. Due to the high desiccation rate in warm months and low existing native cover, this site exhibits consistent cover of annual non-native and invasive species. This site harbors a relatively new species to the county [marking the third county detection (white-stem filaree (*Erodium malacoides)]*. This species is featured on the review board for the California Native Plant Society as potentially invasive. Over 400 plantings (i.e. *Anemopsis californica, artemisia douglasiana, asclepias fascicularis, cyperus eragrostis, elymus triticoides, elmyus codensatus, epilobium canum, heliotropium curassavicum, mimulus guttatus, muhlenbergia rigens, salvia mellifera, sisyrinchium bellum, stipa lepida, stipa pulchra*) were planted throughout the basin and slopes at the beginning of the year. The overall most prevalent non-native species observed included bristly oxtongue, burr clover, and smilo grass. Various non-native brome species densely covered the slopes during the spring. All other non-native species observed included Bermuda grass, blue water speedwell, cheeseweed, common sowthistle, compact brome, curly dock, dallisgrass, field bindweed, flax-leaved horseweed, fountain grass, hairawn muhly, Italian rye, jungle rice, musky stork's bill, oat sp., rabbitsfoot grass, rescuegrass, Russian thistle, Spanish false fleabane, and yellow sweetclover. Regarding tree health, minor symptoms characteristic of potential Invasive Shot Hole Borer infestation (ISHB) were demonstrated by a sycamore tree on site.

Figure 5. Overview of Lower Eastfoot as of November 2024.

Middle Eastfoot

Middle Eastfoot is a 3.82-acre basin located north of Settlers Road in north Irvine. This basin is adjacent to residential housing, the 261 freeway, and agricultural land. The basin consists primarily of a pilot channel, which often overflows. Water spreads throughout the bottom of the basin and creates a pond. Similarly to Lower Eastfoot, there are high rates of non-native and invasive recruitment throughout the year. The basin in particular didn't have any emerging natives this year. The most diverse portions of this basin are along the peripheries of the basin, where water from irrigation is caught and held; here native bioswale vegetation can be found, such as spikerush (*Eleocharis sp.*), false daisy (*Eclipta prostrata*), alkali bulrush (*Bolboshoenus maritimus ssp. paludosus*), fragrant flatsedge (*Cyperus odoratus*), tall flatsedge (*Cyperus eragrostis*), and California loosestrife (*Lythrum californicum*), Mexican Sprangletop (*Leptochloa fusca ssp. uninervia*). The total coverage of this habitat has undergone impacts due to the encroachment of invasive vegetation and disturbance from trampling. In terms of prevalence, the most dominant non-native species included bristly oxtongue, Bermuda grass, burr clover, curly dock, and Mexican primrose. Other non-native species observed included, bristly oxtongue, common sowthistle, dallisgrass, English plantain, fountain grass, hyssop loosestrife, Maltese star thistle, ngaio, prickly sowthistle, rabbitsfoot grass, smilo grass, Spanish false fleabane, watercress, white sweetclover, and yellow sweetclover.

Figure 6. Overview of the Middle Eastfoot as of December 2024.

Upper Eastfoot

Upper Eastfoot is a 1.41 acre basin located east of the 261 freeway in north Irvine. The basin is adjacent to residential housing and consists primarily of a pond at the base of the slope. Upper Eastfoot remains only vernally wet and thus is almost barren of all non-planted vegetation for a large portion of the year. Due to this, problem areas were within the small corners of the site with consistent irrigation, and no particular non-native species dominated. Throughout the year, hand removal and hula hoe were primarily advised to manage non-native cover. Non-native species observed included yellow sweetclover, rabbitsfoot grass, Bermuda grass, bristly oxtongue, common lantana, matted sandmat, flax-leaved horseweed, hairawn muhly, hyssop loosestrife, prickly sowthistle, and scarlet pimpernel.

Figure 7. Overview of Upper Eastfoot as of December 2024

El Modena

El Modena is a 2.37-acre basin located adjacent to S. Hewes Street in north Irvine. The basin is adjacent to residential housing and consists of a single pond. Non-native plant species advised for maintenance included birdsfoot trefoil, black-jack, bristly oxtongue, burr clover, cheeseweed, common flax, common sowthistle, compact brome, Italian rye, lesser swinecress, Mexican primrose, pineappleweed, rescuegrass, shamel ash, smilo grass, and Spanish false fleabane; birdsfoot trefoil and Mexican primrose were the most prevalent. Non-native plant species were primarily removed by hand.

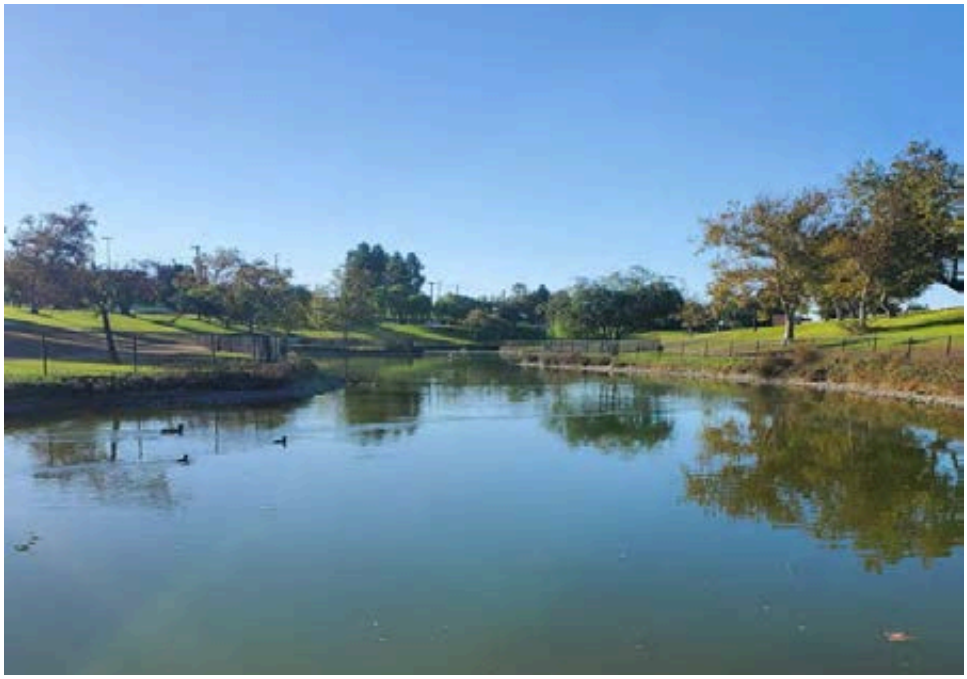

Figure 8. Overview of El Modena as of November 2024.

Trabuco

Trabuco is an 18.06-acre basin located north of Trabuco Rd in north Irvine. The basin is adjacent to residential housing. Trabuco consists of three ponds connected by two pilot channels. Characteristic of the flood basin sites, invasive cover remained relatively constant throughout the year, including on slopes, in basin waterways, and the basin bottom. Hand Removal and hula hoeing were the primary methods advised to manage the non-native cover. Following a directive from IRWD, Endemic biologists sought only to order the removal of invasives within 15 feet of the waterways in the latter half of the year. Spanish false fleabane, curly dock, and Italian rye were the most prevalent non-native species. Other non-natives advised for maintenance included: blue water speedwell, brass buttons, bristly oxtongue, burr clover, cheeseweed, Chinese elm, flax-leaved horseweed, lesser swinecress, prickly lettuce, rescuegrass, Shepherd's purse, shortpod mustard, stinknet,, water speedwell, white sweetclover, and yellow sweetclover.

Figure 9. Overview of Trabuco as of November 2024.

Parasol Park / Trabuco East

Parasol Park is a 2.07-acre site located north of Great Park Boulevard. It consists mainly of a pilot channel, with water often overflowing into the basin bottom. The site's primary spring and summer cover remains the non-native tropical horseweed (*Erigeron sumatrensis*). Despite its dense appearance, the native cover is relatively low compared to similarly seeded sites, and the waterways remain consistently weedy. Bare patches on the ground populate the site with heavy and compacted fill soil. These empty patches consistently foster Spanish false fleabane and brass buttons, with no opportunities for natives to recruit. Throughout the year, hand removal and digging were the primary methods advised to reduce total invasive cover. Tropical horseweed, curly dock, and Spanish false fleabane were the most prevalent species on site. Other non-natives advised for maintenance included black mustard, Brazilian peppertree, buffelgrass, bull thistle, carrotwood, crape myrtle, fountain grass, hairawn muhly, lindheimer's muhly, prickly lettuce, prickly sowthistle, shamel ash, stalked bulbine, and tropical milkweed.

Figure 10. Overview of Parasol Park as of December 2024.

Cypress Meadows A

Cypress Meadow A is a 6.77-acre basin north of the 5-freeway and adjacent to residential housing in north Irvine. This basin consists primarily of three pilot channels connected by a pond at the bottom. During wet months, the slopes and basins exhibited high cover by non-native species. However, during the dry season, almost all plant cover (including non-native) senesced in the basin, leaving major bare patches throughout the site the majority of the year. Slopes consistently harbored non-native and invasive growth along the drip lines of trees and on the edge of sites, where moisture was present year-round. Due to high foot traffic, low moisture, and disturbance, there has been a notable reduction of native diversity in the already disturbed basin. Large patches of creeping wild rye (*Leymus triticoides*) and alkali heath (*Frankenia salina*) have disappeared, along with a moderate loss of wetland vegetation cover on the western portion. Native species of interest in this site include Scarlet toothcup (*Ammannia coccinea*) and Narrowleaf milkweed (*Asclepias fascicularis*). Hand Removal, hula hoeing, and digging were the primary methods advised for reducing the non-native cover. The most prevalent species included Spanish false fleabane and Mexican primrose. Other non-native species advised for maintenance included Brazilian peppertree, bristly oxtongue, camphor tree, carrotwood, Chinese elm, common stork's bill, creeping myoporum, curly dock, fountain grass, Japanese cheesewood, Mexican feathergrass, pampas grass, panic veldtgrass, perennial pepperweed, Peruvian peppertree, prickly sowthistle, St. Augustine grass, sticky snakeroot, Taiwanese firethorn, and yellow sweetclover.

Figure 11. Overview of Cypress Meadows A as of November 2024.

Cypress Meadows B

Cypress Meadow B is a 2.29-acre basin located north of the 5 freeway and adjacent to residential housing in north Irvine. This basin consists primarily of a pilot channel that runs throughout the bottom. Hand removal and hula hoeing were the primary methods advised to decrease invasive cover. The most prevalent non-native species documented included bristly oxtongue, common sowthistle, prickly sowthistle and prickly lettuce. Other non-native species advised for removal included Bermuda grass, black medic, burr clover, Chinese elm, common mugwort, great brome, Japanese honeysuckle, Jersey cudweed, Mexican fan palm, Mexican primrose, Peruvian peppertree, pyracantha, rabbitsfoot grass, rat-tail fescue, scarlet pimpernel, smilo grass, Spanish false fleabane, Taiwanese firethorn, wax-leaf privet, and yellow sweetclover.

Figure 12. Overview of Cypress Meadows B as of November 2024.

Cypress Meadows C

Cypress Meadow C is a 2.92-acre basin located north of the 5 freeway and adjacent to residential housing in north Irvine. This basin consists primarily of a pilot channel that runs along the bottom. Digging and hand removal were the primary methods advised to minimize native cover. Common sowthistle, yellow sweet clover, burr clover, and bristly oxtongue were the most prevalent non-native species on site. Other non-natives species include Asian mustard, Brazilian peppertree, camphor tree, Chinese elm, common stork's bill, compact brome, flax-leaved horseweed, fountain grass, Japanese honeysuckle, Lindheimer's muhly, Mexican fan palm, Mexican primrose, musky stork's bill, pampas grass, prickly lettuce, prickly sowthistle, rabbitsfoot grass, rescuegrass, shepherd's purse, smilo grass, trumpet flower.

Figure 13. Overview of Cypress Meadows C as of November 2024.

Cypress Meadows D

Cypress Meadow D is a 3.44-acre basin located north of the 5 freeway and adjacent to residential housing in north Irvine. This basin consists primarily of a pilot channel that runs throughout the bottom. Hand removal, hula hoeing, and digging were the primary methods advised to reduce non-native plant cover. Bristly oxtongue, Mexican primrose, and prickly sowthistle were the most prevalent species. Other native plants advised for removal included annual bluegrass, bermuda grass, Brazilian peppertree, brass buttons, bull thistle, burr clover, carrotwood, common sowthistle, floating primrose-willow, jersey cudweed, Mexican fan palm, Peruvian peppertree, prickly lettuce, scarlet pimpernel, Spanish false fleabane, Taiwanese firethorn, tropical horseweed, tropical milkweed, willow dock, and yellow sweetclover.

Figure 14. Overview of Cypress Meadows D

Eastfoot Retarding Basin

Eastfoot Retarding Basin is a 14.82-acre basin located east of Leafy Pass in north Irvine. The basin is adjacent to agricultural land and residential housing. It consists primarily of a pilot channel connected to three ponds along the basin bottom. Since this site is not under the direct management of IRWD and must primarily function as a flood basin, mowing efforts were the default weed maintenance measure required. To prevent non-native seeds from spreading into the waterway, only non-native individuals within 15 feet of the channels were advised for removal. Hand removal and hula hoeing were the primary advised maintenance methods, with shortpod mustard, Maltese star thistle, common sowthistle, bristly oxtongue, and cheeseweed being the most prevalent. Other non-native species observed on the site included Australian saltbush, bermuda grass, cheeseweed, common stork's bill, compact brome, prickly lettuce, red brome, ripgut brome, Russian thistle, slender wild oats, smilo grass, smooth barley, Spanish false fleabane, stork's bill sp., wall barley, and white sweetclover.

Figure 15. Overview of Eastfoot Retarding Basin as of November 2024.

Quail Springs

Quail Springs is a 8.38 acre basin located south of the I-405 freeway in north Irvine. The basin is adjacent to a large open field area and residential housing. Quail Springs consists primarily of a pilot channel connected to four ponds. For this site to primarily function as a flood basin, mowing efforts were the default weed maintenance measure required. However, to prevent non-native seeds from spreading into the waterway, non-native individuals within approximately 15 feet of the channels were advised for removal. Hand removal and hula hoeing were the most frequent removal methods advised for decreasing non-native cover, with curly dock, Spanish false fleabane, and burr clover being the most prevalent species to address. Other non-native species observed include the following: African sumac, black mustard, black willow, bristly oxtongue, castor bean, Chinese elm, common fennel, common purslane, common sowthistle, dallisgrass, fountain grass, Italian rye, Maltese star thistle, musky stork's bill, mustard sp., perennial ryegrass, prickly sowthistle, rat-tail fescue, Russian thistle, shepherd's purse, shortpod mustard, tamarisk, wall barley, watercress, white horehound, white sweetclover, wild radish, and yellow sweetclover.

Figure 16. Overview of Quail Springs as of November 2024.

Orchard Retarding Basin

Orchard Retarding Basin is a 0.97-acre basin located adjacent to a housing development and the Orchard Hills Staging Area. The area consists of a basin connected to a channel with a paved walkway around the basin's edge. For this site to primarily function as a flood basin, mowing efforts were the default weed maintenance measure required. However, to prevent non-native seeds from spreading into the waterway, non-native individuals within approximately 15 feet of the channels were advised to remove them. As a flood basin, Orchard Retarding Basin remains relatively barren for the large majority of the year. Due to the lack of supplemental irrigation, seed bank, and foot traffic, little to no colonization of any species is present. Hula hoeing, hand removal, and digging were the primary advised methods for addressing non-natives bordering the channels, of which bristly oxtongue, Spanish false fleabane, shortpod mustard, and flax-leaved horseweed were the most prevalently observed. Other non-native species observed included common fennel, flax-leaved horseweed, Maltese star thistle, Mediterranean grass, prostrate pigweed, rabbitsfoot grass, ripgut brome, slender wild oats, and wall barley.

Figure 17. Overview of Orchard Retarding Basin as of December 2024.

Twisted Oak

Twisted Oak is a 0.40-acre basin located northeast of Northwood High School. It consists of one circular pond. This site does not have access to a controller or irrigation system. Consequently, a large bareground area occupies the majority of the basin's bottom. Hand removal and hula hoeing were the primary methods recommended to manage the sparse non-natives occupying the disturbed areas. Due to the highly exposed soil, there was no particularly dominant species. In the waterway, the dominant non-native was floating primrose-willow; Bristly oxtongue and floating primrose-willow were the most prevalent non-native species; other non-natives observed in the site include Bermuda grass, burr clover, cheeseweed, common sowthistle, flax-leaved horseweed, prickly sowthistle, rabbitsfoot grass, scarlet pimpernel, sharpleaf cancerwort, and yellow sweetclover. In December, a grade-A mulch was distributed onto the barren areas. Follow-up restoration was advised to seed the bank conjunctly with planting. However, this plan should be reconsidered once a more readily available irrigation system has been secured on-site. Additionally, plant choices should be vetted to ensure proper nativity. Among the remaining planted vegetation at Twisted Oak, a plant native to Northern California (*Leymus mollis*) was detected. Only two plants were present, and the health of the individuals appeared to indicate no invasive risks. However, caution should be taken due to the capacity of seed distribution through the waterway.

Figure 18. Overview of Twisted Oak with bareground in the basin as of November 2024.

Agua Chinon A/Upper Agua Chinon A

Aqua Chinon A is a 2.10-acre basin located near a housing development off Portola Springs Road and adjacent to SR-241. Hand removal was the primary method advised to reduce the non-native cover. Fountain grass and Spanish false fleabane were the most prevalent species observed. Due to its proximity to other weedy areas, the basins often receive 'tumbleweeds' from nearby senesced Russian thistle. Other non-natives advised for removal included bristly oxtongue, bull thistle, common sowthistle, marsh celery, pampas grass, prickly sowthistle, rabbitsfoot grass, scarlet pimpernel, shortpod mustard, stork's bill sp, and tamarisk..

Figure 19. Overview of (Upper) Agua Chinon A as of November 2024.

Aqua Chinon B/Upper Agua Chinon B

Aqua Chinon B is a 2.36-acre basin located near a housing development off Portola Spring Road and adjacent to SR-241. Hula hoeing and hand removal were the primary methods advised to decrease non-native cover. Spanish false fleabane was the most prevalent and problematic non-native species on site. Additionally, a polygon of newly germinating smilo grass was allowed to seed in the center of the site, which will be an issue to anticipate in the wet season. Other non-natives observed include bristly oxtongue, burr clover, common sowthistle, curly dock, fountain grass, golden wreath wattle, prickly sowthistle, rabbitsfoot grass, shortpod mustard, smilo grass, stinknet, tamarisk, and yellow sweetclover.

Figure 20. Overview of (Upper) Agua Chinon B as of December 2024.

Aquila Springs

Aquila Springs is a 1.19-acre basin located in the Altair Community development east of Irvine Boulevard. The basin consists of one channel, which frequently floods. Once characterized by its high native cover, excessive foot traffic and invasive encroachment have significantly reduced native recruitment. While most slopes have retained a relatively high native cover, the basins and the west slope are in the process of degradation. Furthermore, large bare patches of rocky soil populate the site, which are only colonized by ephemeral natives and annual non-natives. Hand removal and digging were the primary methods advised for reducing non-native cover. Prevalent non-natives were Spanish false fleabane, horseweed spp. (flax-leaved and tropical), yellow sweet clover, and lesser swinecress. Other non-natives advised for removal included canary island date palm, common sowthistle, common stork's bill, fountain grass, garland daisy, hairawn muhly, lesser swinecress, lindheimer’s muhly, Mexican fanpalm, milk thistle, prickly sowthistle, rabbitsfoot grass, Saharan mustard, scarlet pimpernel, shortpod mustard and yellow sweetclover.

Figure 21. Overview of Aquila Springs as of November 2024.

Floral View

Floral View is a 2.49-acre basin located east of SR-133 and west of Floral View. It consists of one channel leading to a circular pond. The site had a moderate amount of annual non-native plants. Furthermore, large stands of Tall Fescue (*Festuca arundinacea*) were detected onsite, particularly on the Northeast slopes. Tall fescue is designated as a Moderate on the Cal-IPC rating system, indicating a substantial and apparent impact on the ecosystems it invades. Most of these plants have left large holes on the slopes upon removal. As a supplementary recommendation, Endemic suggests a replanting effort upon eradicating all of the Tall Fescue stands. Hand removal and hula hoeing were the primary methods advised to reduce general non-native cover. The most prevalent species observed were Spanish false fleabane, Mexican primrose, and rescuegrass. Other non-natives advised for removal include bay laurel, black mustard, bull thistle, burr clover, common fig, common sowthistle, compact brome, Italian thistle, Jersey cudweed, Mexican fan palm, Mexican primrose, poison hemlock, red brome, rescuegrass, ripgut brome, slender thistle, tall fescue, tropical milkweed, and sweetclover spp. (white and yellow). Lastly, Floral View appears to have a notable decline in tree health, with all Coast live oaks undergoing significant stress, pest damage, and stunting.

Figure 22. Overview of Floral View as of November 2024.

Hidden Canyon

Hidden Canyon is a 2.89-acre basin located south of Lake Forest Drive and adjacent to the Hidden Canyon residential development. The basin consists of two inlets which flow into one pond. Due to high rates of flooding and perennial moisture, this basin exhibits high non-native species cover throughout the bottom and the south-facing slopes. Additionally, the site's presence in the formerly agrarian dominated San Joaquin Hills strongly influences the presence of weeds within. Thus, despite the moisture presence, invasives oriented towards high disturbance are plentiful onsite year-round. Hand removal, hula hoeing, and digging were the primary methods advised to reduce the non-native cover on site. Curly dock, bristly oxtongue, Bermuda grass, and smilo grass were among the most prevalent and problematic invasive and non-native species on site. Other non-natives observed included black mustard, bull thistle, burr clover, cheeseweed, common fennel, common sowthistle, creeping saltbush, creeping wood sorrel, flax-leaved horseweed, goosegrass, knotroot bristlegrass, musky stork's bill, prickly lettuce, prickly sowthistle, rabbitsfoot grass, rescuegrass, scarlet pimpernel, shepherd's purse, Spanish false fleabane, tamarisk, and yellow sweetclover. Oak tree(s) on site were observed experiencing root instability in October. Endemic provided irrigation adjustment recommendations to address this issue.

Figure 23. Overview of Hidden Canyon basin as of November, 2024.

Iluna Springs

Iluna Springs is a 2.66-acre basin located in the Altair Community development. The development is north of Irvine Boulevard in northeast Irvine. This basin consists of two inlet channels. The basin and surrounding slopes experienced moderate coverage of annual non-native plants throughout the year. Otherwise, large patches of bareground are primarily in the Southeast basin. Uniquely, Iluna Springs remains one of two localities (the other being the San Joaquin Marsh sites) with consistent infestation of castor bean (Ricinus communis). Hand removal and digging were the primary methods advised for reducing non-native cover. Prevalent invasive species include curly dock, Spanish false fleabane, and castor bean. Other non-native species observed were annual bluegrass, black mustard, bristly oxtongue, Chinese elm, common sowthistle, field bindweed, fountain grass, lesser swinecress, Mexican primrose, shortpod mustard, and tree tobacco.

Figure 24. Overview of Iluna Spring as of November 2024

Laguna Altura North

Laguna Altura North is a 1.53-acre basin north of the Laguna Altura housing development and south of I-405. Once characterized by a high level of native recruitment onsite, high rates of desiccation during the warm season have led to senescence and perennial mortality, creating patches of bareground. Hand removal and digging were the primary advised methods to reduce the non-native cover on site. Non-native species, such as common sowthistle, smilo grass, burr clover, and bristly oxtongue were most prevalent throughout the year. Other non-native species observed were castor bean, cheeseweed, compact brome, curly dock, field bindweed, fountain grass, hyssop loosestrife, Italian rye, lesser swinecress, Mexican primrose, Oak-leaved goosefoot, panic veldtgrass, prickly lettuce, prickly sowthistle, rabbitsfoot grass, rat-tail fescue, red brome, rescuegrass, scarlet pimpernel, tropical horseweed, wall barley, and water beard grass.

Figure 25. Laguna Altura North as of November, 2024.

Laguna Altura South

Laguna Altura South is a 0.92-acre basin located west of the Laguna Altura housing development and east of SR-133. While hand removal and hula hoeing were the primary methods advised to reduce non-native cover, solarization and herbicide were also prescribed. Laguna Altura South is another site that only remains wet during winter months. As a result, similar to other sites experiencing these conditions, bareground in the basin is present for the entirety of the warm season. Prevalent invasive species include rabbitsfoot grass and Bermuda grass. Other non-native species were as follows: bristly oxtongue, bull thistle, burr clover, common stork's bill, curly dock, field bindweed, Mexican primrose, petty spurge, prickly lettuce, prickly sowthistle, rabbitsfoot grass, rescuegrass, scarlet pimpernel, Spanish false fleabane, Taiwanese firethorn, tamarisk, and yellow sweetclover. Manual solarization was proposed in May for Bermuda grass and successfully executed later that month; to further address Bermuda, herbicide treatment was advised and reported in December, 2024.

Figure 26. Laguna Altura South as of November 2024.

Los Olivos Meadows

Los Olivos is a 3.78-acre basin located east of San Diego Creek and adjacent to the Los Olivos housing development. This basin has two inlet channels that flow into one pond. Los Olivos Meadows is one of the sites addressed by both Endemic and LC. Thus, vegetation cover is consistently managed, with the caveat that disturbance and plant mortality are more prevalent. Without careful restoration efforts, invasive colonization will continue to pose an issue on this site. To promote native biodiversity and cover, over 400 individuals (i.e. *Anemopsis californica, artemisia douglasiana, asclepias fascicularis, cyperus eragrostis, elymus triticoides, elmyus codensatus, epilobium canum, heliotropium curassavicum, mimulus guttatus, muhlenbergia rigens, salvia mellifera, sisyrinchium bellum, stipa lepida, stipa pulchra)* were planted throughout the slopes and basin at the begging of the year. The non-native cover was controlled primarily by hand removal, hula hoeing, and digging. Prevalent invasive species included bristly oxtongue and Spanish false fleabane. Other non-natives advised for maintenance included the following: black mustard, Brazilian peppertree, burr clover, common sowthistle, common stork's bill, curly dock, prickly sowthistle, rabbitsfoot grass, tamarisk, and yellow sweetclover.

Figure 27. Overview of Los Olivos Meadow as of November 2024.

Los Olivos South

Los Olivos South is a 2.86-acre basin located east of SR-133 and adjacent to the Laguna Altura housing development. High flooding conditions and hard soil lead to notable expansion of creeping non-natives. Compounding this issue, natives of interest are syntopic and often grow intermixed. Notable natives include Saltgrass (*Distichlis spicata*) and California Dock (*Rumex californicus*). Otherwise, hand removal, digging, and hula hoeing were the primary methods to reduce non-native cover on site. The prevalent naturalized species included Bermuda grass, Spanish false fleabane, and creeping saltbush. Other non-natives advised for maintenance included the following: bristly oxtongue, burr clover, common sowthistle, curly dock, lesser swinecress, pampass grass, prickly sowthistle, seashore paspalum, St. Augustine grass, tamarisk, and yellow sweetclover. Manual solarization was proposed to treat a large patch of Bermuda grass in June and was successfully executed. Herbicide was prescribed for Spanish false fleabane and curly dock in February and Bermuda grass in May. However, no chemical pesticide applications were reported at this site between January and December 2024.

Figure 28. Overview of Los Olivos South as of November 2024.

Marine Meadows

Marine Meadows is a 1.72-acre basin located west of the SR-133 and I-5 highways. The basin is adjacent to Great Park and a housing development. With the high bunchgrass cover on slopes and in the basin, non-native expansion and presence are almost non-existent. However, as a result, the site itself provides minimal habitat and utility as a wildlife resource. Here, plant diversity is incredibly low, with no more than 10 different native species in total. Hand removal and digging were the primary recommended treatments to reduce invasive plant species, with the prevalent species being common sowthistle, bristly oxtongue, and yellow sweetclover. Other non-natives observed included the following: black medic, burr clover, common soft brome, common sowthistle, hairawn muhly, Jersey cudweed, Spanish false fleabane, yellow sweetclover, and rescuegrass.

Figure 29. Overview of Marine Meadows as of November 2024.

Marshburn

Marshburn is a 11.74-acre basin located at the intersection of Irvine Boulevard and Ridge Valley in Irvine. This basin also serves as a flood retention basin. Marshburn consists of two channels that flow into one large pond. Hand removal and digging were the primary methods advised to reduce invasive cover. The most prevalent species included curly dock and Spanish false fleabane. Other non-natives observed included the following: barnyard grass, bindii, blackwood acacia, carrotwood, castor bean, cheeseweed, Chinese flame tree, common sowthistle, everblooming acacia, flax-leaved horseweed, floating primrose-willow, Italian rye, Italian thistle, narrow-leaved goosefoot, red brome, slender wild oats, white sweetclover, and wild radish.

Figure 30. Overview of Marshburn in November, 2024.

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Old Laguna

Old Laguna is a 2.95-acre basin located west of Laguna Canyon Road and south of I-405. This basin consists of two small channels that flow into one large pond. The slopes and basin exhibited a relatively high diversity of non-native cover. Hand removal and hula hoeing were the primarily advised methods to reduce the total cover of non-native and invasive plants. Prevalent non-native species included, Spanish false fleabane, curly dock, and English plantain. Other non-native species advised for removal included the following: Bermuda grass, blue water speedwell, brass buttons, bristly oxtongue, burr clover, carrotwood, common sowthistle, common stork's bill, compact brome, floating primrose-willow, marsh parsley, Mexican fan palm musky storks bill, prickly lettuce, prickly sowthistle, rabbitsfoot grass, rat-tail fescue,shortpod mustard, watercress, and yellow sweetclover.

Figure 31. Overview of Old Laguna as of November, 2024.

Portola Springs

Portola Springs Meadow is a 1.01-acre basin located north of Irvine Boulevard and east of SR-133. This basin consists of two inlets. Throughout the year, the site had primarily native cover on slopes and relatively moderate non-native cover in the basin. Dense patches of naturalized plants are within the high moisture areas along the slope. Hand removal and hula hoeing were the primary methods advised to control non-native cover. Prevalent species included Mexican primrose, Spanish false fleabane, and common sowthistle. Other non-natives included the following: Bermuda grass, common purslane, common sowthistle, compact brome, creeping lantana, curly dock, flax-leaved horseweed, golden wattle, golden wreath wattle, great brome, musky stork's bill, panic veldtgrass, prickly sowthistle, rabbitsfoot grass, red brome, ripgut brome, shoestring acacia, soft chess, water beard grass, and yellow sweetclover.

Figure 32. Overview of Portola Springs as of November 2024.

Quail Meadow

Quail Meadow is a 1.19-acre basin north of Quail Hill Shopping Center in Irvine. This basin consists of a small sediment catchment pond at the inlet, after which water percolates into the ground. Overall, there was low non-native cover in the basin and along the slopes. Hand removal and hula hoeing were the primary methods to reduce the abundance of non-native cover. The most prevalent species were Spanish false fleabane, prickly lettuce, prickly sowthistle, and burr clover. Other non-native species advised for removal include the following: brass, buttons, bristly oxtongue, burr clover, cheeseweed, common sowthistle, common stork's bill, curly dock, English plantain, hooker's evening primrose, musky stork's bill, prickly lettuce, prickly sowthistle, rat-tail fescue, ripgut brome, slender wild oats, wall barley, wild barley, and yellow sweetclover.

Figure 33. Overview of Quail Meadow as of November 2024.

Ridge Valley A

Ridge Valley A is a 6.9-acre basin located east of SR-133. It consists of two inlets that flow into one pond. High non-native cover persisted throughout the year, with fewer non-native species present during winter. Hand removal and hula hoeing were the primary advised methods to reduce non-native cover. Bristly oxtongue, curly dock, and rabbitsfoot grass were the most prevalent observed. Other non-native species advised for removal included the following: African sumac, Brazilian peppertree, bull thistle, burr clover, camphor tree, carrotwood, cheeseweed, Chinese elm, Chinese flame tree, Chinese privet, common lantana, common sowthistle, compact brome, field burrweed, flax-leaved horseweed, flaxleaf paperbark, floating primrose-willow, fountain grass, Japanese honeysuckle, jersey cudweed, Lindheimer's muhly, Mexican fan palm, Mexican primrose, moth vine, musky stork's bill, perennial pepperweed, prickly lettuce, prickly sowthistle, rescuegrass, ripgut brome, shortpod mustard, Spanish false fleabane, stork's bill, tussock paspalum, water beard grass, and yellow sweetclover.

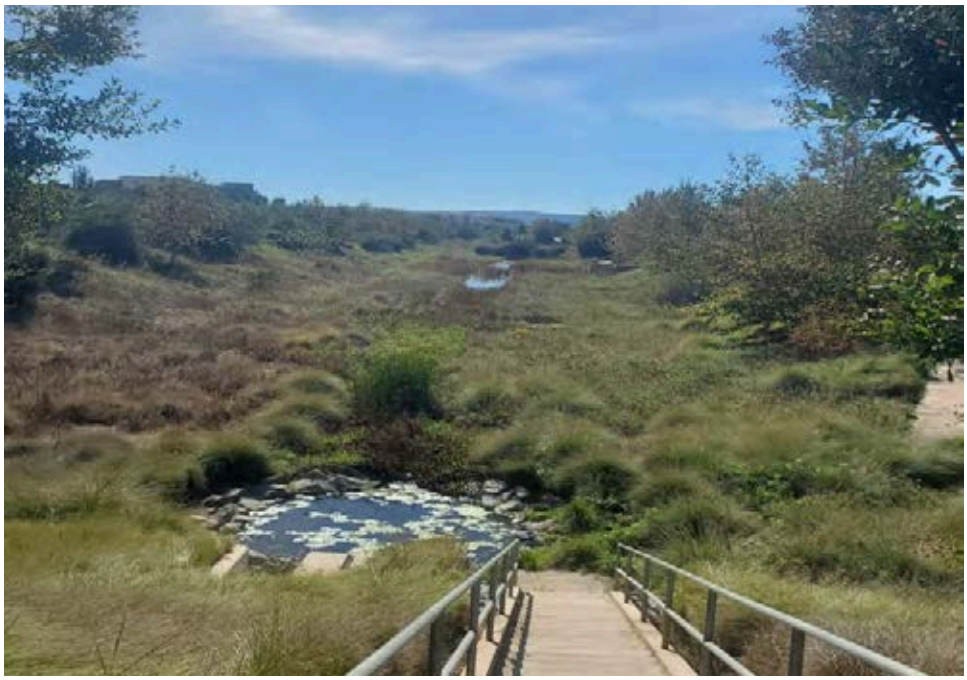


Figure 34. Overview of Ridge Valley A as of November, 2024.

Ridge Valley B

Ridge Valley B is a 1.78-acre basin located east of SR-133 and adjacent to Ridge Valley A NTS basin. Ridge Valley B consists of a channel that flows into Ridge Valley A. The northern half of the site exhibits moderate non-native cover, while the southern basin slopes and basin exhibit healthy native cover. Similar to Marine Meadows, Ridge Valley B provides poor wildlife habitat and plant diversity. Hand removal and hula hoeing were the primary removal methods advised to decrease non-native cover. Prevalent species were bristly oxtongue and Mexican primrose. Other non-natives observed included the following: bird of paradise, Brazilian peppertree, burr clover, common sowthistle, Jersey cudweed, Lindheimer's muhly, Mexican primrose, perennial pepperweed, prickly lettuce, prickly sowthistle, rabbitsfoot grass, rusty fig, scarlet pimpernel, Spanish false fleabane, tropical horseweed, tussock paspalum, watercress, and yellow sweetclover.

Figure 35. Overview of Ridge Valley B in November, 2024.

Ridge Valley C

Ridge Valley C is a 4.90-acre basin located east of SR-133 and adjacent to Ridge Valley B. The basin consists of one long channel with a pond in the center. Throughout the year, most non-native coverage was along the eastern & northern aspects of the basin. Hand removal, hula hoeing, and digging were the primary removal methods advised to decrease non-native cover. Prevalent species were Spanish false fleabane, common sowthistle, and curly dock. Other non-natives observed included the following: African sumac, Brazilian peppertree, bristly oxtongue, bull thistle, burr clover, Canary Island date palm, cheeseweed, common lantana, compact brome, fountain grass, jersey cudweed, Lindheimer's muhly, Mexican primrose, pampas grass, perennial pepperweed, prickly lettuce, prickly sowthistle, shortpod mustard, snow-in-summer,water beard grass, yellow sweetclover.

Figure 36. Overview of Ridge Valley C in November, 2024.

Sand Canyon

Sand Canyon is a 43.50 acre basin located east of Ridgeline Drive in north Irvine. The basin is adjacent to a golf course and primarily consists of a large pond. Sand Canyon has dense riparian habitat to the south of the pond. This site is considered both an NTS and a Recycled Water Reservoir. It was not surveyed by Endemic in 2024 and no chemical herbicide use was reported.

Figure 37. Overview of Ridge Valley C in November, 2024.

Sports Park

Sports Park is a 2.20-acre basin located north of the I-5 freeways at the corner of Marine Way and Skyhawk. The site exhibited relatively high annual non-native cover, especially in the spring and summer. Hand removal and digging were the primary methods advised to reduce non-native cover. Prevalent species were curly dock, Spanish false fleabane, bull thistle, and Italian thistle. Other non-native species included the following: black mustard, Brazilian peppertree, bristly oxtongue, carrotwood, castor bean, Chinese elm, Chinese flame tree, common cattail, common fig, common lantana, common sowthistle, fountain grass, hairawn muhly, Maltese star thistle, Mexican fan palm, Mexican primrose, prickly lettuce, prickly sowthistle, scarlet pimpernel, shortpod mustard, tree tobacco, vanilla scented wattle, yellow sweetclover.

Figure 38. Overview of Sports Park as of December 2024.

Turtle Ridge

Turtle Ridge is a 1.82-acre basin located south of Shady Canyon Drive. It is adjacent to an open field and residential housing and consists of a pond surrounded by vegetated slopes. Its proximity to weedy slopes has led to significant degradation. In its current state, Turtle Ridge suffers from high competition between native and naturalized annuals, leading to difficulty addressing interspersed non-natives without risking trampling and extirpating the few remaining natives. The lack of native perennials relative to other sites has exacerbated this issue. Hand removal and tilling were the primary methods advised to reduce non-native cover. Prevalent species were prickly sowthistle, bristly oxtongue, and compact brome. Other non-natives advised for maintenance included the following: African asparagus, blue water speedwell, Brazilian peppertree, bulrush, burr clover, common soft brome, common sowthistle, Italian rye, Mexican primrose, Peruvian peppertree, prickly lettuce, rabbitsfoot grass, rat-tail fescue, red brome, ripgut brome, scarlet pimpernel, slender wild oats, Spanish false fleabane, watercress, yellow sweetclover

Figure 39. Overview of Turtle Ridge in November, 2024.

Eastwood Meadow

Eastwood Meadow is a 1.87-acre basin located east of Ridgeline Drive. The site exhibited high non-native cover in open patches of the basin. Hand removal, digging, and hula hoeing were the primary methods advised to reduce non-native cover. Prevalent species include Spanish false fleabane, English plantain, and Mexican primrose. Other non-natives observed were as follows: Bermuda grass, black medic, Brazilian peppertree, bristly oxtongue, broadleaf plantain, burr clover, cheeseweed, Chinese elm, clustered dock, common cattail, common celery, common purslane, common stork's bill, curly dock, flax-leaved horseweed, goose grass, Jersey cudweed, Lindheimer's muhly, Mediterranean love grass, Mexican fan palm, mexican primrose, prickly lettuce, prostrate pigweed, rabbitsfoot grass, Shepherd’s purse, smilo grass, thorny olive, tussock paspalum, white stem filaree, white sweetclover, yellow sweetclover.

Figure 40. Overview of Eastwood as of November 2024.

Lower Agua Chinon A / District 5A

Lower Agua Chinon A is a 3.48-acre site located southeast of the Great Park Sports Complex and northeast of the I-5 freeway. During the wet months, high non-native cover persists. Once the warm months approach, the annual cover senesces and leaves large patches of bareground. Hand removal, hula hoeing, and digging were the primary methods advised to reduce non-native cover. Curly dock, umbrella sedge, and Spanish false fleabane were the most prevalent and problematic species observed. Other non-natives advised for removal included the following: annual wall-rocket, bristly oxtongue, flax-leaved horseweed, hairawn muhly, palo verde, prickly sowthistle, rabbitsfoot grass, seashore paspalum, shortpod mustard, St. Augustine grass, wild radish, yellow sweetclover.

Figure 41. Overview of Lower Agua Chinon A as of December 2024.

Lower Agua Chinon B / District 5B

Lower Agua Chinon B is a 2.44-acre site located southeast of the Great Park Sports Complex and is adjacent to District 5A/Lower Agua Chinon A. Non-native cover and persistence more or less resembles Lower Agua Chinon A. Notably, basin slopes seem to have a higher comparative rate of native recruitment and survival. Overall, hand removal and hula hoeing were the primary methods advised to reduce non-native cover. Yellow sweetclover and Spanish false fleabane were the most prevalent non-native species observed. Within the waterways, a new detection has elicited particular concern. Seashore paspalum (Paspalum vaginatum), rated by the Orange County CNPS as a high risk of invasiveness, is a relatively new weed in Orange County. This detection is concerning, as it is the farthest north documented instance in the county. The species has formed deep carpets, choking out almost all native growth in the waterways. Herbicide was advised as an early eradication measure to mitigate further range expansion. Other non-natives advised for removal included the following: black mustard, bristly oxtongue, bull thistle, common sowthistle, common stork's bill, curly dock, flax-leaved horseweed, fountain grass, hairawn muhly, Italian thistle, jersey cudweed, lesser swinecress, palo verde, prickly sowthistle, scarlet pimpernel, shortpod mustard, tree tobacco, and white sweetclover.

Figure 42. Overview of Lower Agua Chinon B as of December 2024.

Lower Agua Chinon C / District 5C

Lower Agua Chinon C is a 3.21-acre site located southeast of the Great Park Sports Complex and adjacent to District 5B. Throughout the year, slopes had high native cover, and the basin bottom had large bare patches. Significant naturalized plant growth only occurred along the margins of the basin where water from the irrigation was available. Hand removal was the primary method advised to reduce non-native cover. Shortpod mustard, Spanish false fleabane, and prickly sowthistle were the most prevalent non-native species observed. Other non-natives advised for removal included the following: black mustard, bull thistle, common fig, curly dock, hairy bittercress, Jersey cudweed, lesser swinecress, prostrate pigweed, tamarisk, tomato plant, tree tobacco, tropical horseweed, yellow sweetclover.

Figure 43. Overview of Lower Agua Chinon C/District 5C as of December 2024.

San Joaquin Marsh And Wildlife Sanctuary

Zone 1: San Joaquin Marsh

San Joaquin Marsh Landing Zone 1 is a 94.61-acre portion of the San Joaquin Marsh and Wildlife Sanctuary. It serves as a restoration area and natural treatment system for water from San Diego Creek. Hand removal and hula hoeing were the primary methods advised to reduce non-native cover. Spanish false fleabane and perennial pepperweed were the most prevalent non-native species. Other non-natives advised for removal were as follows: African sumac, Bermuda grass, black mustard, Brazilian peppertree, carrotwood, castor bean, common stork's bill, curly dock, dwarf nettle, fern pine, Jersey cudweed, lesser swinecress, Maltese star thistle, Mexican fan palm, poison hemlock, prickly sowthistle, rabbitsfoot grass, shortpod mustard, tomato plant.

Figure 44. Overview of San Joaquin Marsh Zone 1 as of November 2024.

Zone 2: San Joaquin Marsh

San Joaquin Marsh Landing Zone 2 is a 61.28-acre portion of the San Joaquin Marsh and Wildlife Sanctuary. It serves as a restoration area and natural treatment system for water from San Diego Creek. Relative to the previous year, Zone 2 exhibited a reduced cover of non-native species overall. High-traffic areas along trails yielded the most non-native density, with tree driplines harboring young naturalized saplings. Hand removal and hula hoeing were the primary methods advised to reduce non-native cover. Dwarf nettle and common fig were the most prevalently documented non-native species. Other non-natives advised for removal were as follows: black mustard, bristly oxtongue, butterfly bush, carrotwood, castor bean, cheeseweed, Chinese elm, common fig, common stork's bill, compact brome, curly dock, hairy bittercress, Indian fig opuntia, lesser swinecress, London rocket, poison hemlock, prickly sowthistle, rabbitsfoot grass, silver-dollar gum, Spanish false fleabane, tomato plant, tree tobacco, watercress, and white horehound.

Figure 45. Overview of San Joaquin Marsh Zone 2 as of November 2024.

Zone 3: San Joaquin Marsh

San Joaquin Marsh Landing Zone 3 is a 50.19-acre section of the San Joaquin Marsh and Wildlife Sanctuary. It serves as a restoration area and natural treatment system for water from San Diego Creek. Due to the high foot traffic and bird-induced disturbance, Zone 3 exhibited high non-native cover and had the largest number of non-native species compared to other zones. Hand removal and hula hoeing were the primary methods advised to reduce non-native cover. Spanish false fleabane and shortpod mustard were the most prevalent and problematic invasive species. Other non-native species advised for removal included the following: black mustard, bristly oxtongue, bull thistle, burr clover, castor bean, cheeseweed, common plantain, common sowthistle, common stork's bill, compact brome, cowpen daisy, curly dock, dwarf nettle, flax-leaved horseweed, hairy bittercress, Italian thistle, Jersey cudweed, lesser swinecress, London rocket, poison hemlock, prickly sowthistle, rabbitsfoot grass, Russian thistle, shortpod mustard, tomato plant, tree tobacco, wall barley, watercress, white horehound, white sweetclover, yellow sweetclover.

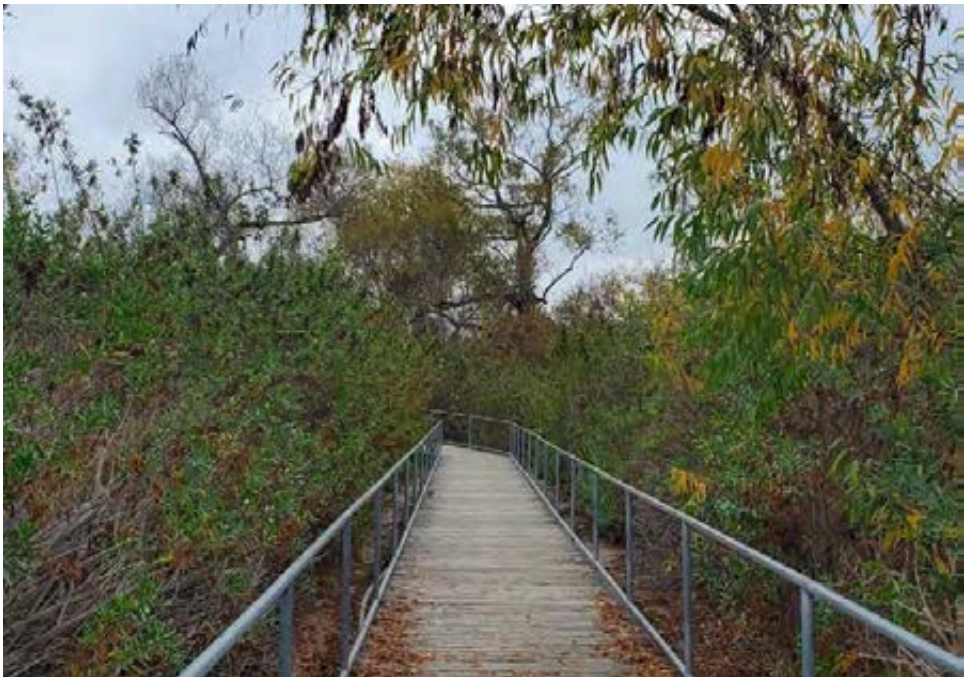


Figure 46. Overview of San Joaquin Marsh Zone 3 as of December 2024.

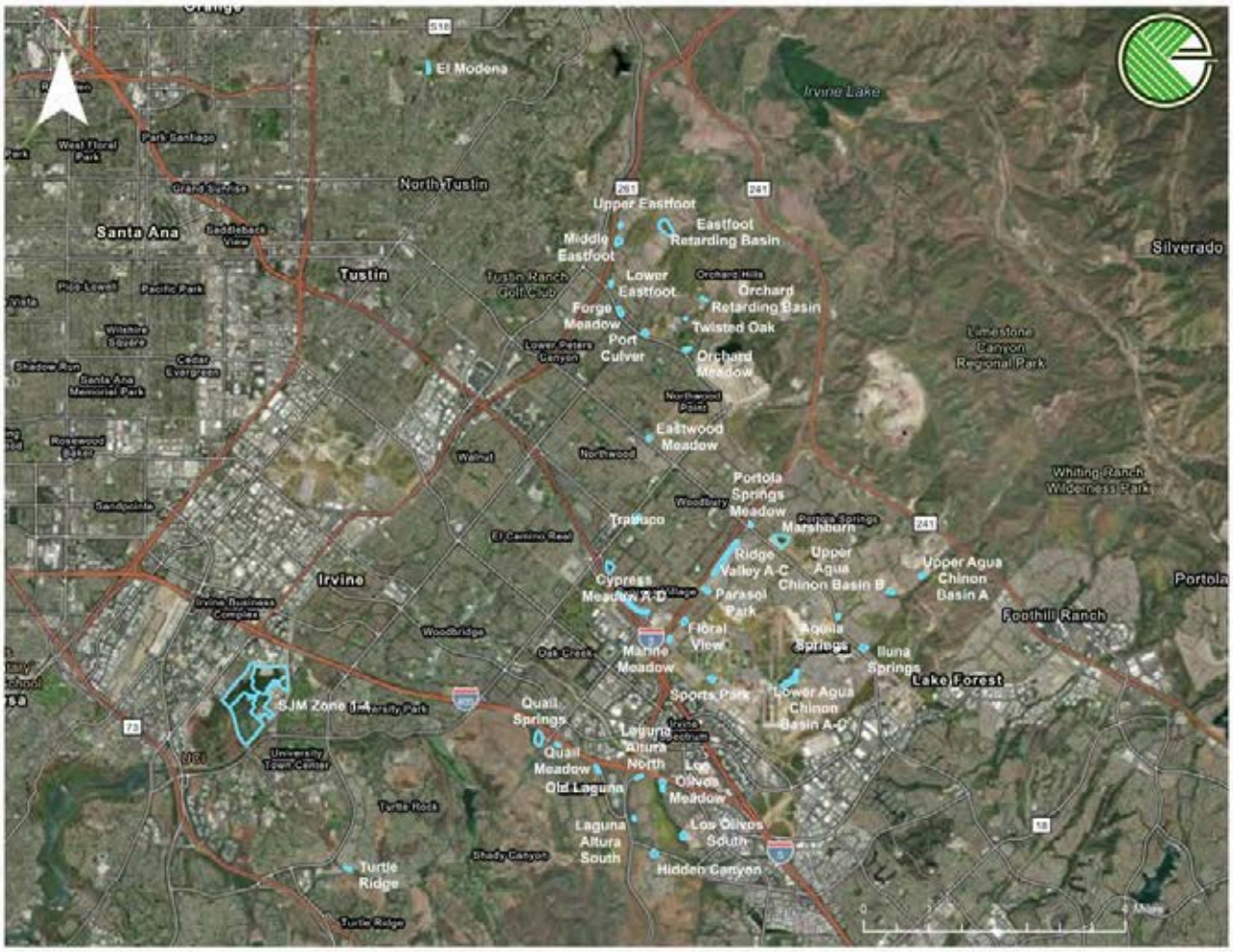
Zone 4: San Joaquin Marsh

San Joaquin Marsh Landing Zone 4 is a 67.49-acre section of the San Joaquin Marsh and Wildlife Sanctuary. It serves as a restoration area and natural treatment system for the water from the San Diego Creek. Obscure trails and reduced human traffic have aided with the prevention of trail-based invasion. Otherwise, tree canopies harbored large amounts of non-native saplings. Hand removal and hula hoeing were the primary advised methods to control non-native species. Spanish false fleabane, curly dock, and common fig were the most prevalent invasive species. Other non-native species advised for removal included the following: bull thistle, Callery pear, camphor tree, carrotwood, cheesewood, common fig, common sowthistle, common stork's bill, curly dock, dwarf nettle, lesser swinecress, London rocket, Mexican fan palm, petty spurge, poison hemlock, prickly sowthistle, Shamel ash, stork's bill sp., Virginia creeper. The herbicide usage reported indicates a chemical treatment application in April.

Figure 47. Overview of San Joaquin Marsh Zone 4 as of November 2024.

APPENDIX B: MAPS

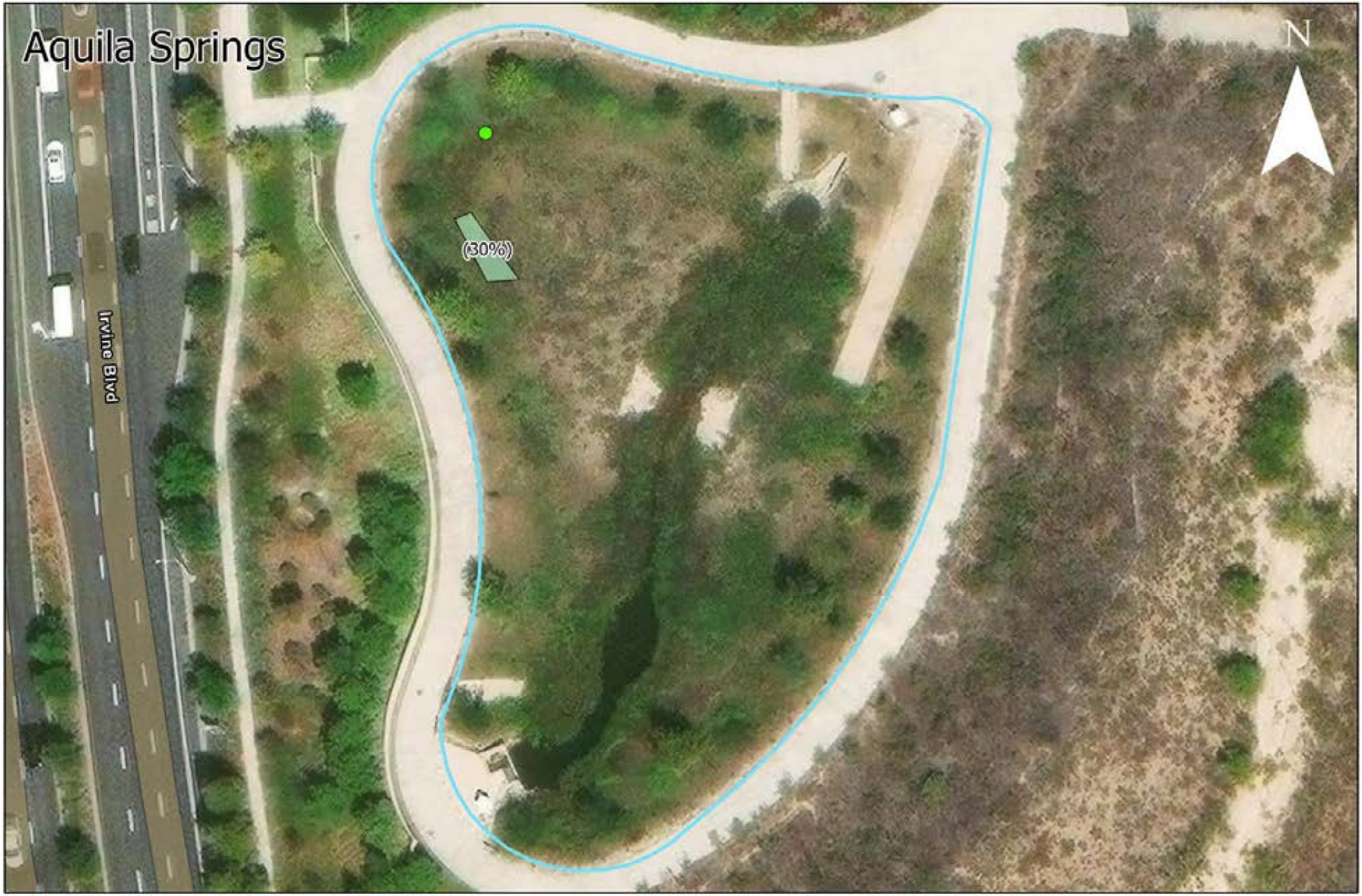
B-1: AERIAL OVERVIEW OF SITES



*This aerial overview depicts the boundaries of all NTS sites and SJM Zones managed through this IPM.

B-2 MAPS OF HERBICIDE APPLICATION AREAS:

Total Cover and Location of Herbicide-Prescribed Invasives



Herbicide Prescribed Point (1)

Site Boundaries

Invasive Coverage

21% - 40% (1)

0 25 50 100 Feet

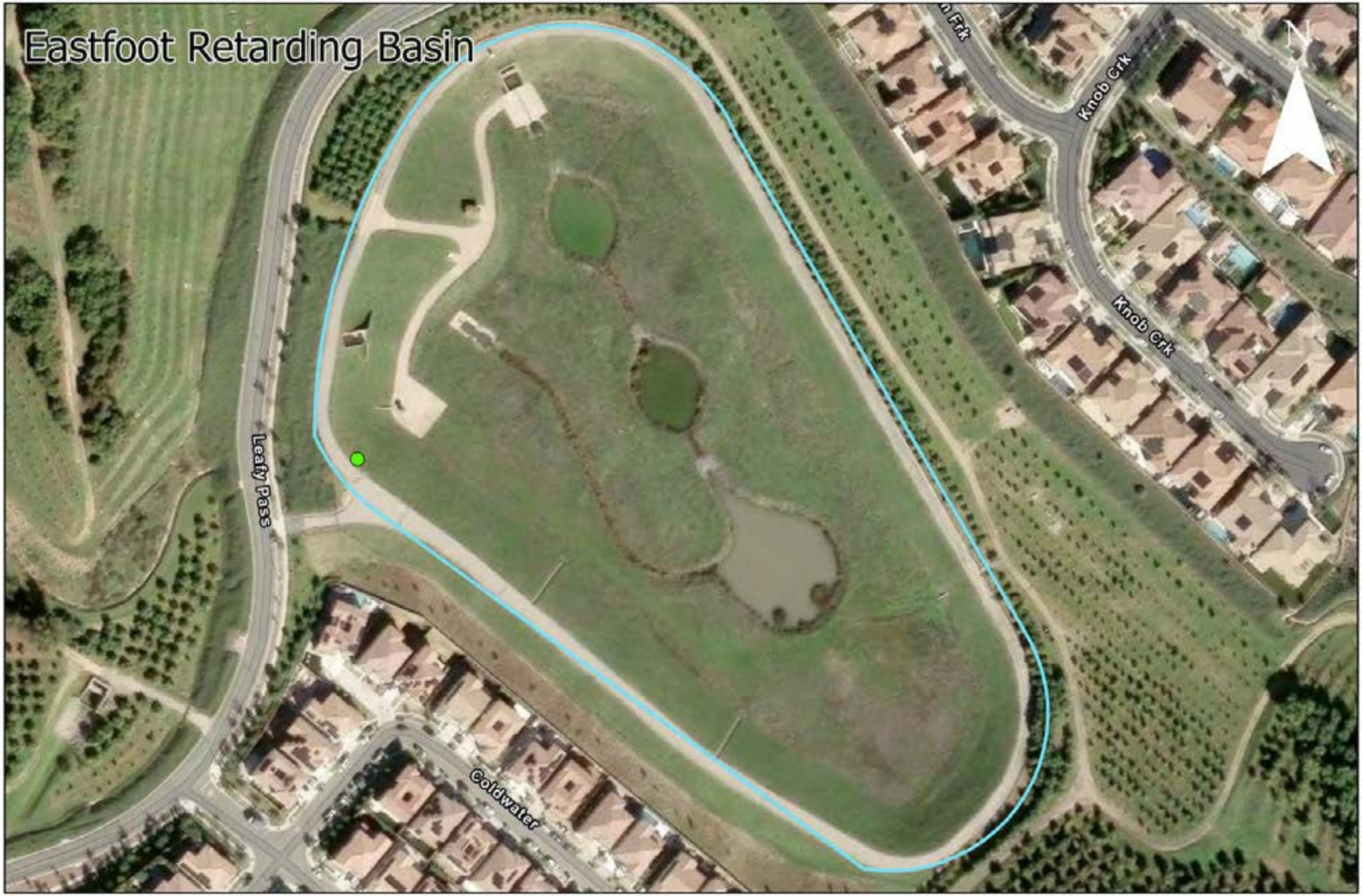
Endemic
Environmental Services

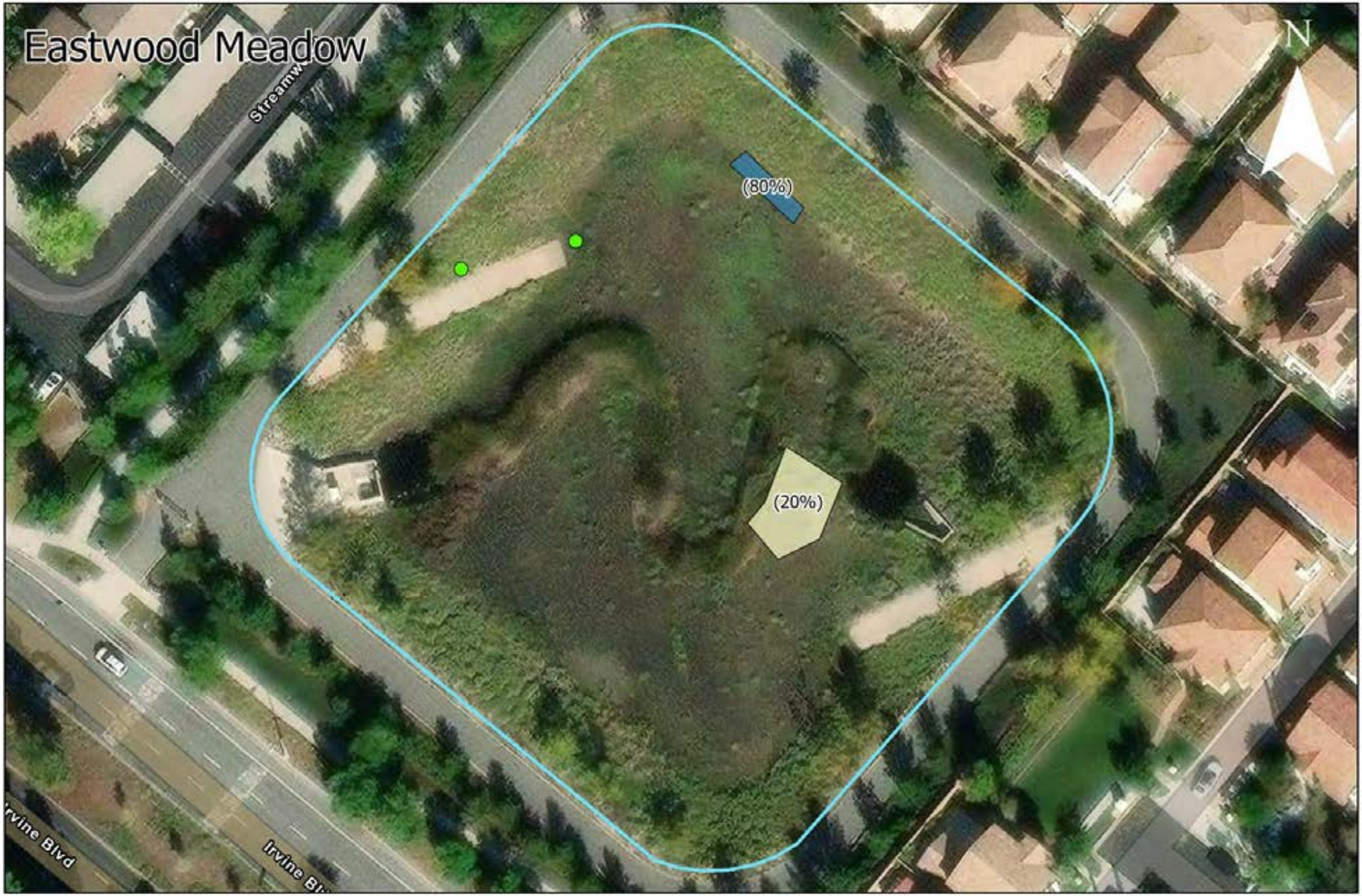
Herbicide Prescribed Point (2)

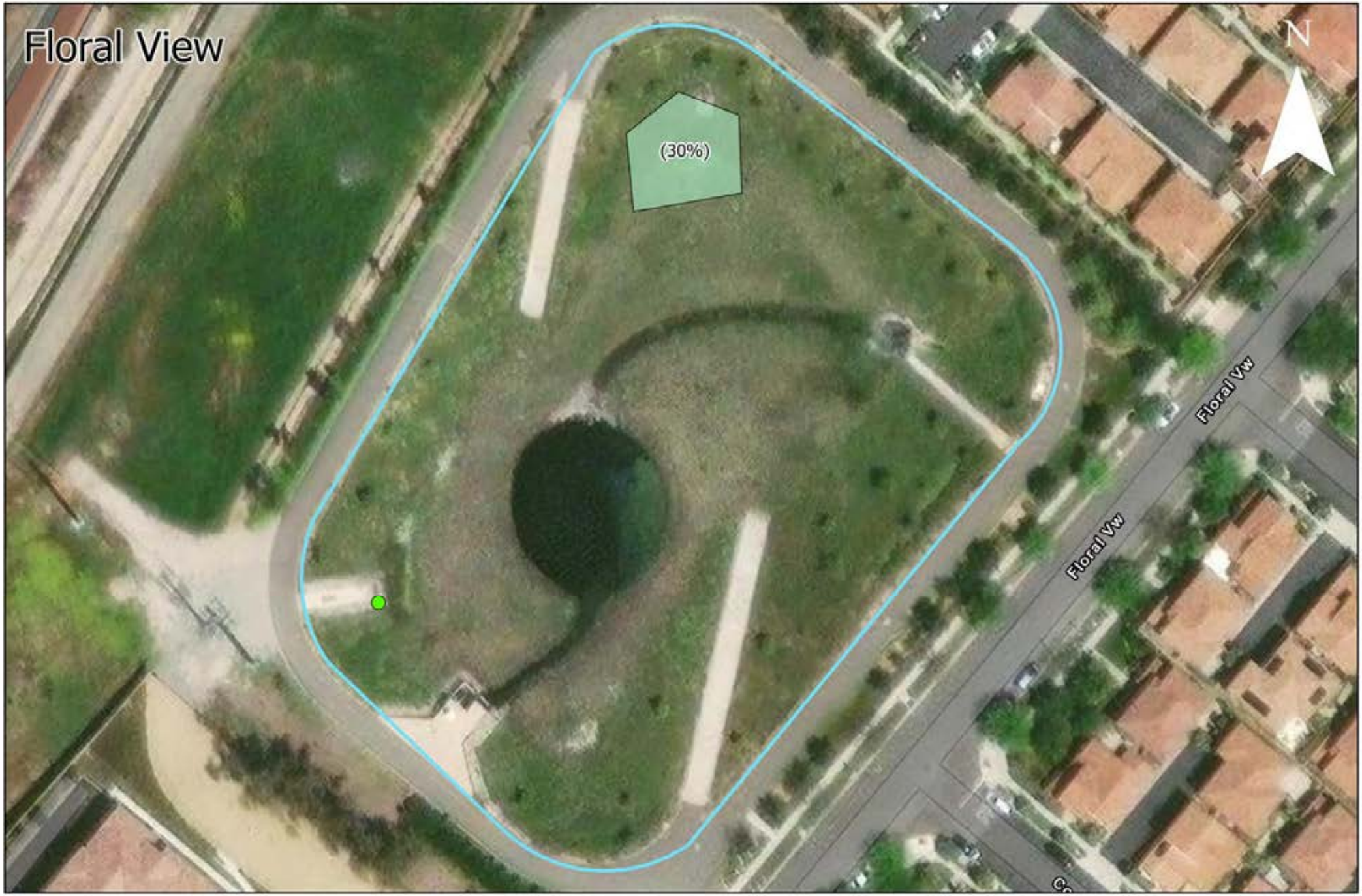
Site Boundaries

0 75 150 300 Feet

Endemic
Environmental Services


Eastfoot Retarding Basin
Knob Crk
Knob Crk
Leafy Pass
Coldwater
N
Herbicide Prescribed Point (1)
Site Boundaries
0
100
200
400 Feet
Endemic
Environmental Services


Eastwood Meadow
N
(80%)
(20%)
Herbicide Prescribed Point (2)
61% - 80% (1)
Invasive Coverage
Site Boundaries
0% - 20% (1)
0
30
60
120 Feet
Endemic
Environmental Services



Herbicide Prescribed Point (1)

Site Boundaries

Invasive Coverage

21% - 40% (1)

0 37.5 75 150 Feet

Endemic
Environmental Services

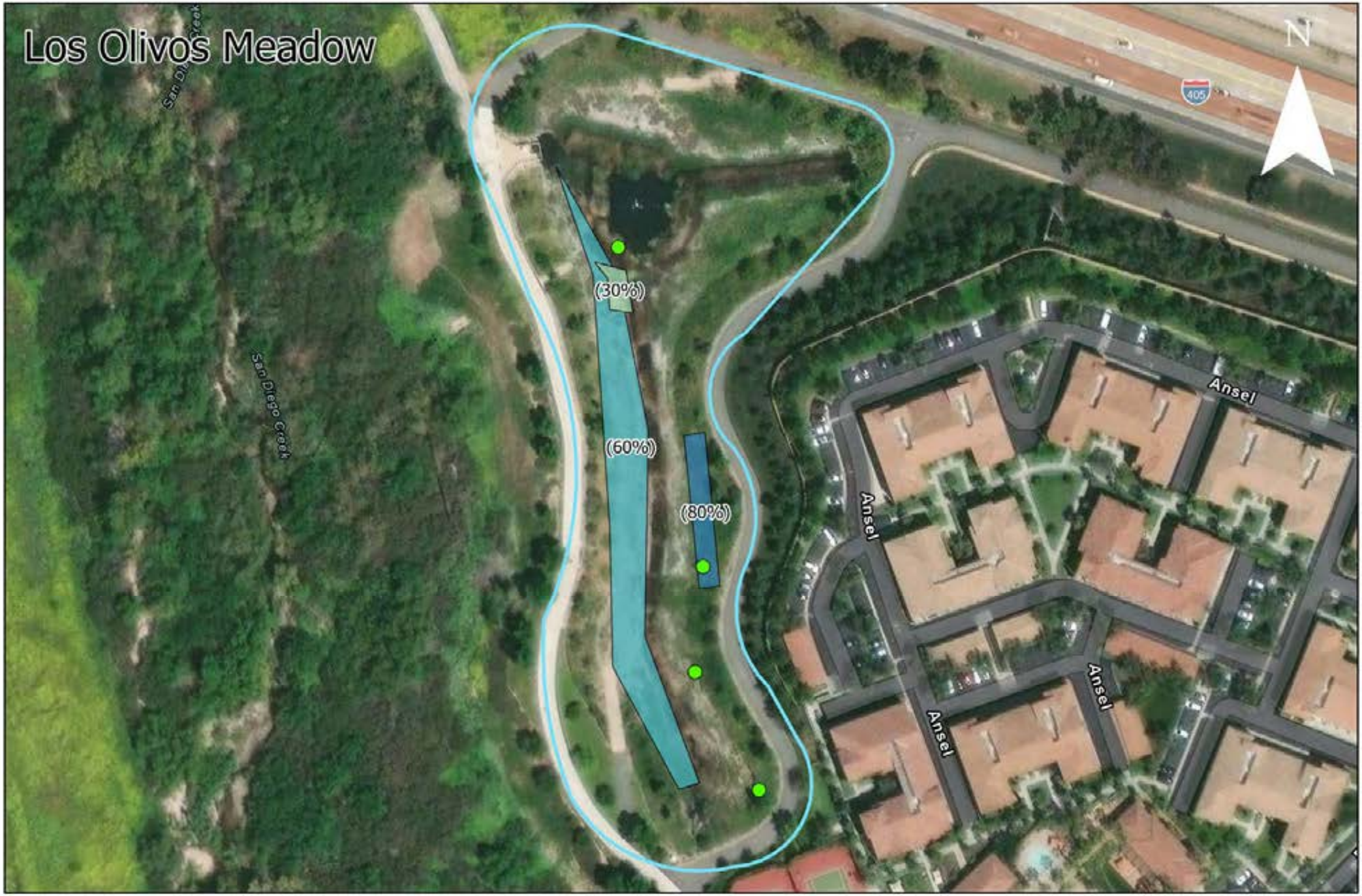

Hidden Canyon
Lake Forest Dr
Lake Forest Dr
N
Hidden Cyn
Hidden Cyn
Hidden Cyn
Herbicide Prescribed Point (1)
Site Boundaries
0
35
70
140 Feet
Endemic
Environmental Services

Herbicide Prescribed Point (1)

Site Boundaries

0 25 50 100 Feet

Endemic
Environmental Services



- Herbicide Prescribed Point (4)

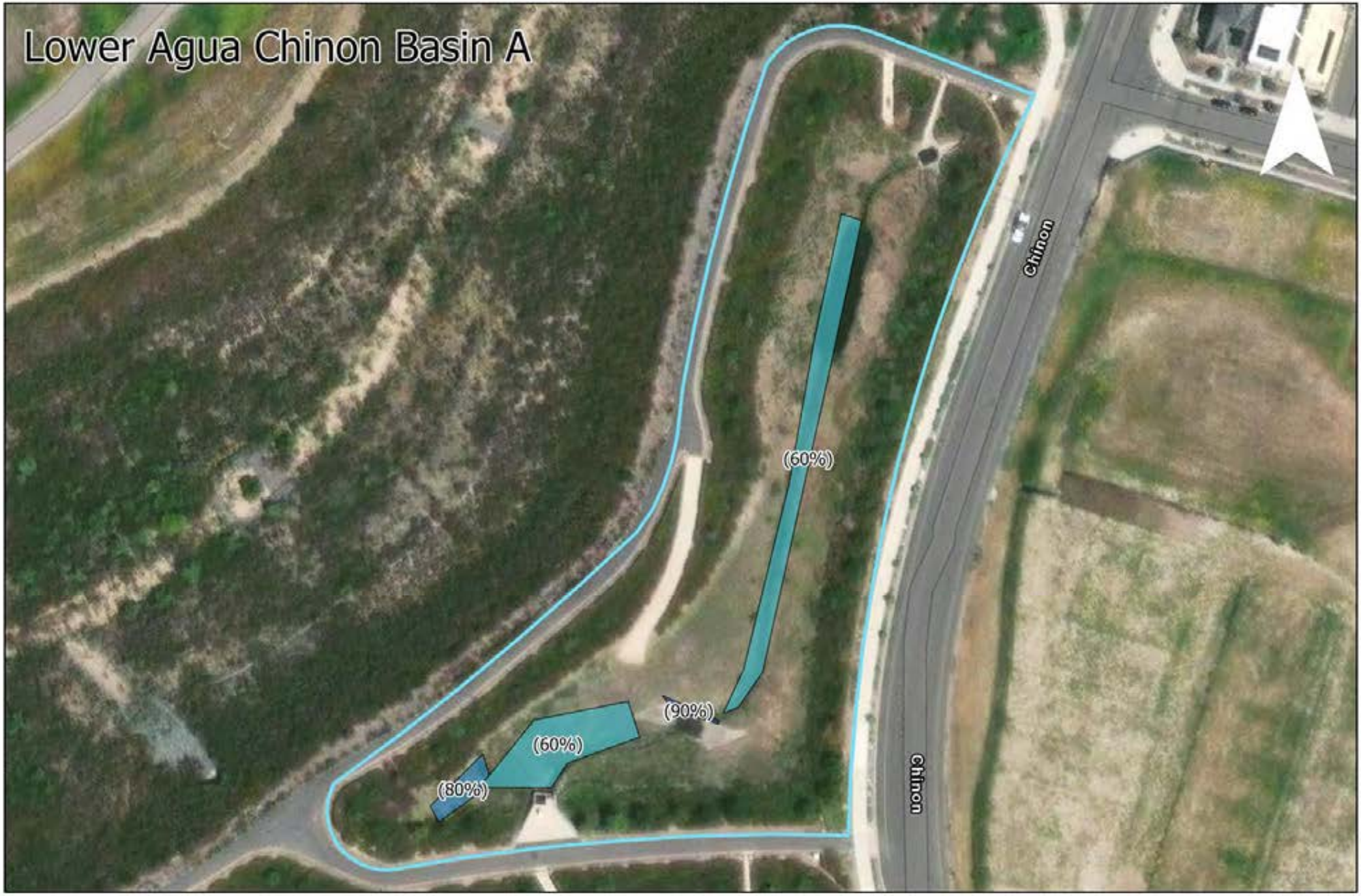
Invasive Coverage

- 21% - 40% (1)
- 41% - 60% (1)
- 61% - 80% (1)
- Site Boundaries

0 65 130 260 Feet

Endemic
Environmental Services


Los Olivos South
N
Dana
Dana
Dana
San Diego Creek
San Diego Creek
(20%)
(80%)
(40%)
Herbicide Prescribed Point (3)
Invasive Coverage
0% - 20% (1)
21% - 40% (1)
61% - 80% (1)
Site Boundaries
0
40
80
160 Feet
Endemic
Environmental Services


Lower Agua Chinon Basin A
Chinon
Chinon
(60%)
(90%)
(60%)
(80%)
Invasive Coverage
41% - 60% (2)
61% - 80% (1)
81% - 100% (1)
Site Boundaries
0
55
110
220 Feet
Endemic
Environmental Services

Invasive Coverage

81% - 100% (1)

Site Boundaries

0 30 60 120 Feet

Endemic
Environmental Services

Herbicide Prescribed Point (5)

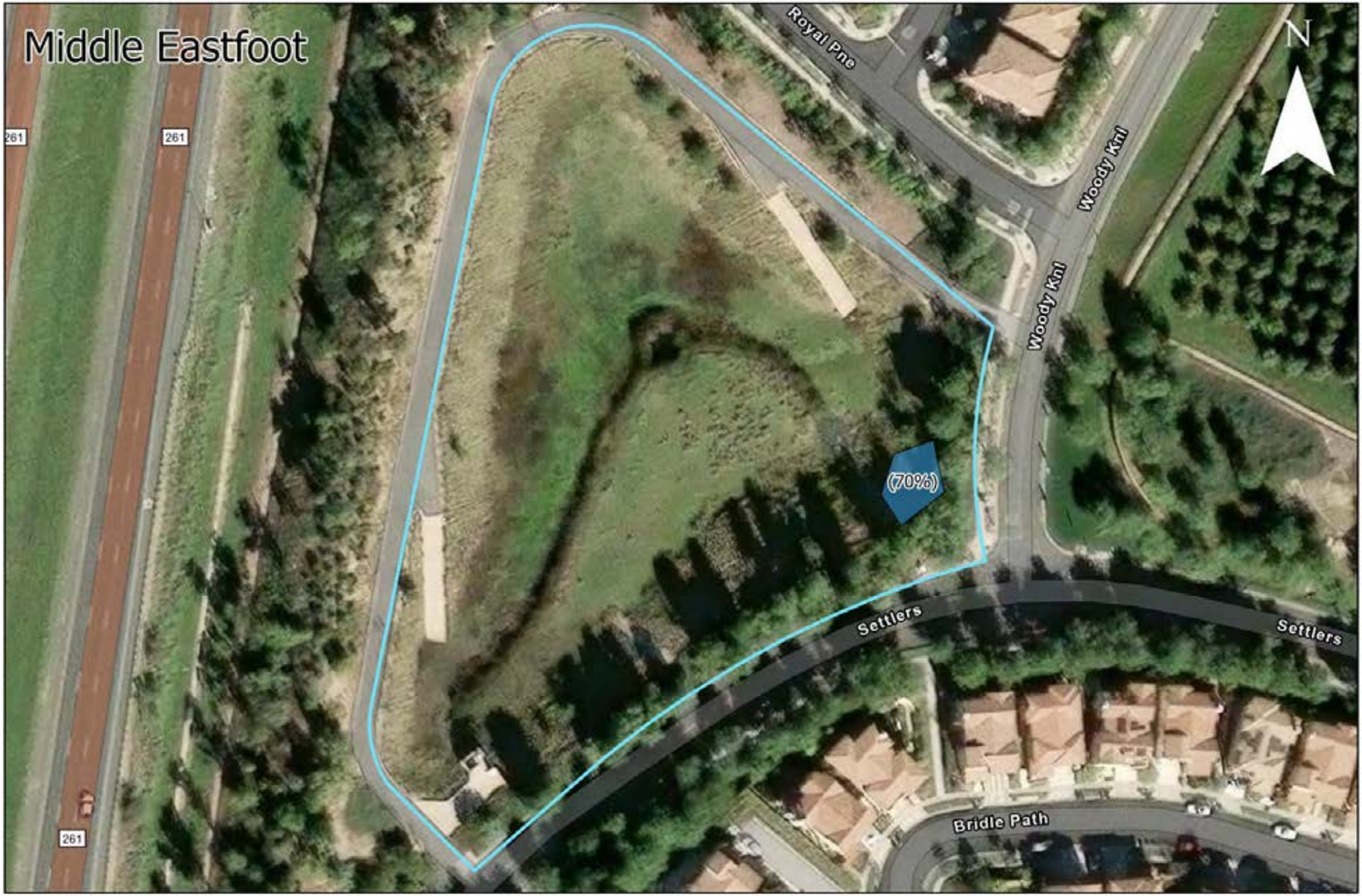
Site Boundaries

Invasive Coverage

21% - 40% (2)

0 40 80 160 Feet

Endemic
Environmental Services



Invasive Coverage

61% - 80% (1)

Site Boundaries

0 55 110 220 Feet

Endemic
Environmental Services

Herbicide Prescribed Point (2)

Site Boundaries

Invasive Coverage

21% - 40% (1)

0 60 120 240 Feet

Endemic
Environmental Services

Herbicide Prescribed Point (1)

Site Boundaries

Invasive Coverage

21% - 40% (1)

0 30 60 120 Feet

Endemic
Environmental Services

Herbicide Prescribed Point (3)

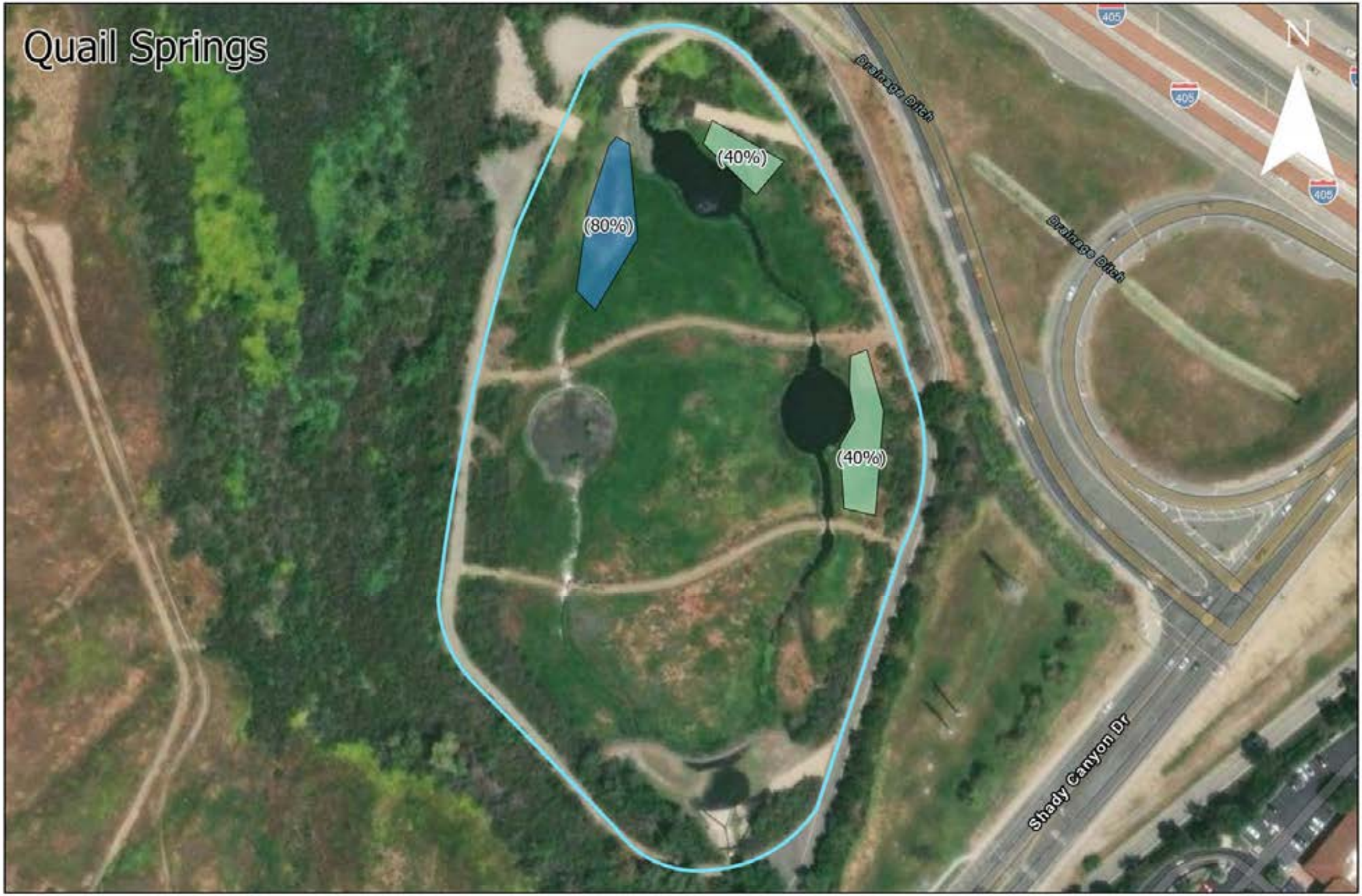
Site Boundaries

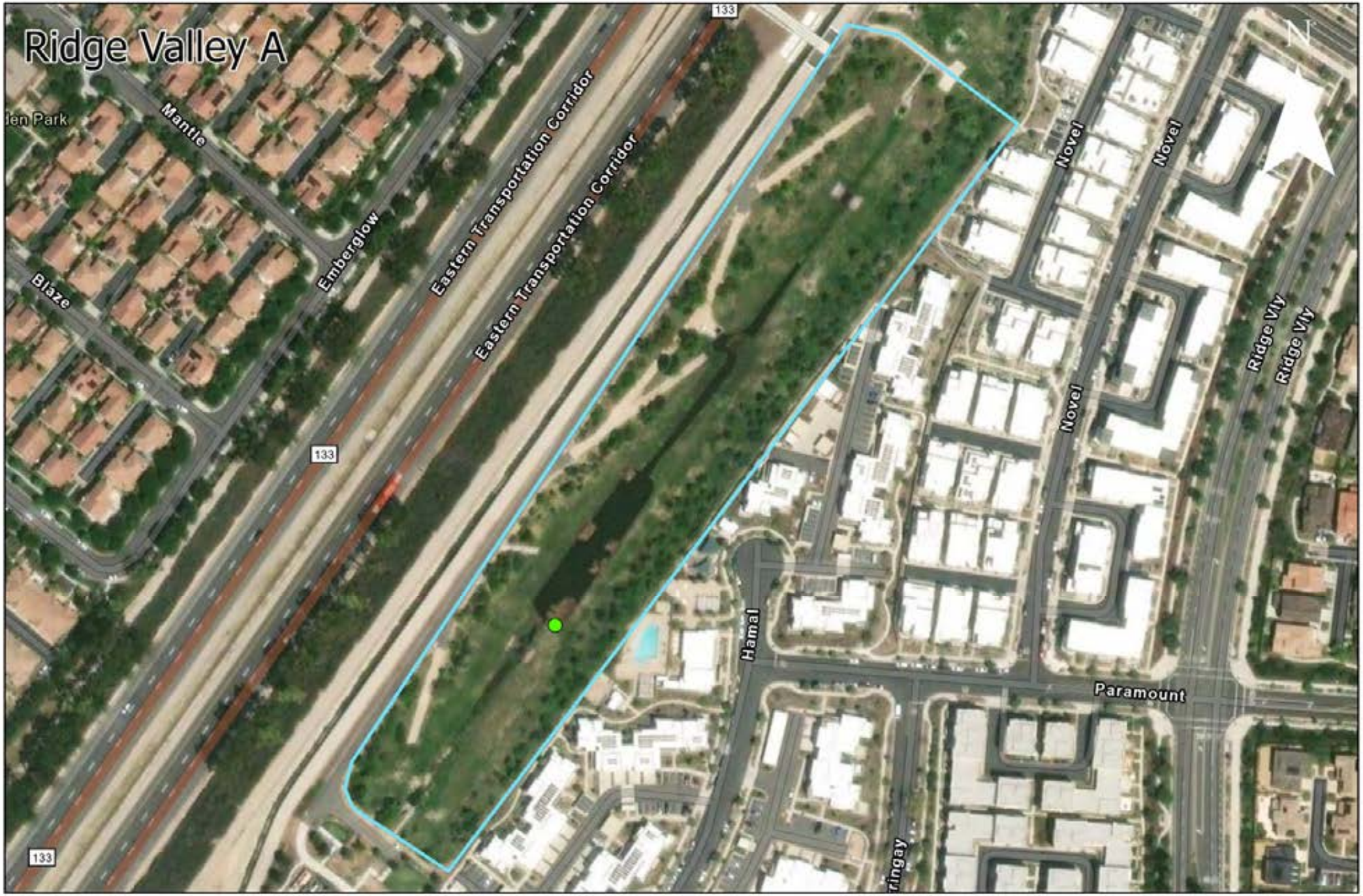
Invasive Coverage

61% - 80% (1)

0 20 40 80 Feet

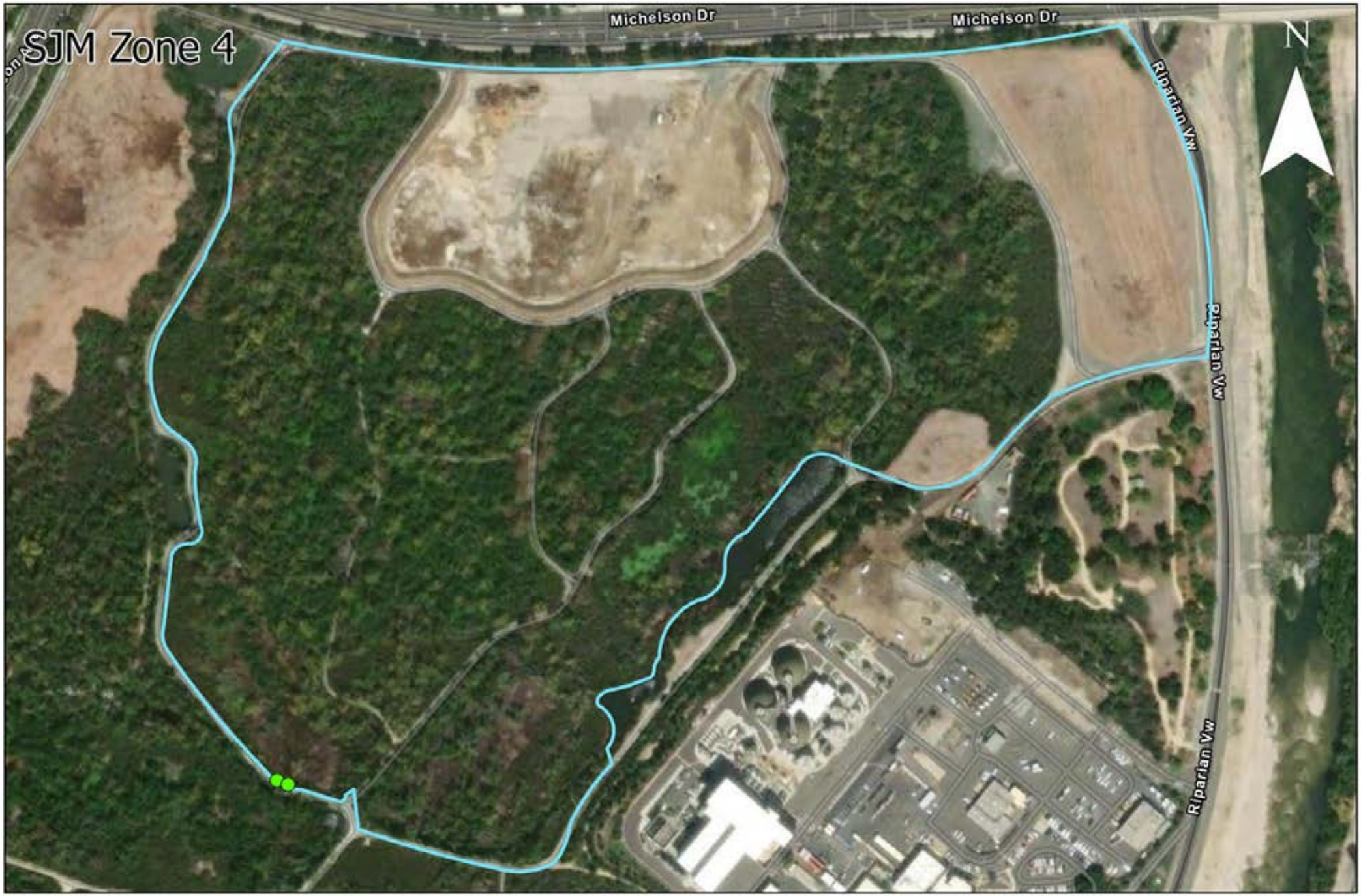
Endemic
Environmental Services


Quail Springs
(40%)
(80%)
(40%)
Drainage Ditch
Drainage Ditch
Shady Canyon Dr
405
405
405
N
Invasive Coverage
21% - 40% (2)
61% - 80% (1)
Site Boundaries
0
85
170
340 Feet
Endemic
Environmental Services


Ridge Valley A
Mantle
Emberglow
Blaze
Eastern Transportation Corridor
Eastern Transportation Corridor
133
133
133
Novel
Novel
Novel
Ridge Vly
Ridge Vly
Hamal
Paramount
N
Herbicide Prescribed Point (1)
Site Boundaries
0
105
210
420 Feet
Endemic
Environmental Services


SJM Zone 1
N
San Joaquin Marsh
Campus Dr
Carlson Ave
Riparian Vw
Harvard Ave
Rancho San Joaquin Golf Course
Sand Canyon Wash
Princeton Park
Herbicide Prescribed Point (2)
Site Boundaries
0
290
580
1,160 Feet
Endemic
Environmental Services


SJM Zone 3
N
Riparian Vw
Harvard Ave
San Joaquin Marsh
(70%)
(80%)
(40%)
Herbicide Prescribed Point (5)
61% - 80% (2)
Invasive Coverage
Site Boundaries
21% - 40% (1)
0 250 500 1,000 Feet
Endemic
Environmental Services



Herbicide Prescribed Point (2)

Site Boundaries

0 170 340 680 Feet

Endemic
Environmental Services


Sports Park
N
(70%)
(10%)
Marine Way
Marine Way
Marine Way
Marine Way
Marine Way
S 15t
SkyhawSkyhawk Blvd
Skyhawk Blvd
Skyhawk Blvd
Invasive Coverage
0% - 20% (1)
61% - 80% (1)
Site Boundaries
0
37.5
75
150 Feet
Endemic
Environmental Services


Turtle Ridge
Shady Canyon Dr
Shady Canyon Dr
N
Herbicide Prescribed Point (1)
Site Boundaries
0
25
50
100 Feet
Endemic
Environmental Services

Invasive Coverage

21% - 40% (1)

Site Boundaries

0 15 30 60 Feet

Endemic
Environmental Services

Invasive Coverage

21% - 40% (1)

Site Boundaries

0 40 80 160 Feet

Endemic
Environmental Services

Herbicide Prescribed Point (2)

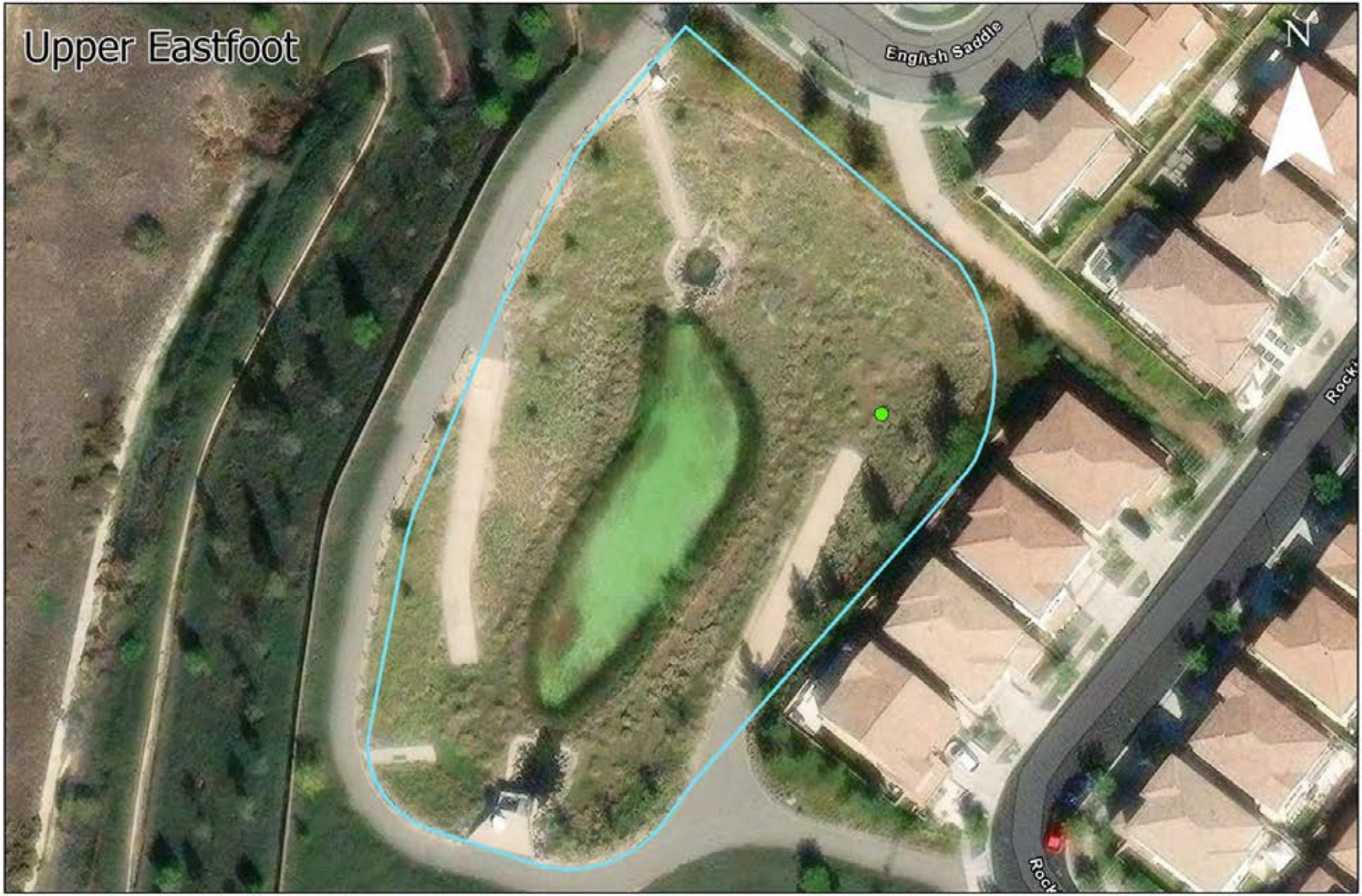
Site Boundaries

Invasive Coverage

0% - 20% (1)

0 25 50 100 Feet

Endemic
Environmental Services



Herbicide Prescribed Point (1)

Site Boundaries

0 30 60 120 Feet

Endemic
Environmental Services

B-3 MAPS OF HERBICIDE APPLICATION AREAS:

Persistence of Herbicide-Prescribed Invasives Before Treatment

Points

(2938) [Herbicide] Spanish False Fleabane

Polygons

(2939) [Herbicide] Spanish False Fleabane

Persistence

2-3 Months (1)

0-1 Month (1)

Site Boundaries

0 25 50 100 Feet

Endemic
Environmental Services

Points

(3259) [Herbicide] Pampas Grass

(3260) [Herbicide] Pampas Grass

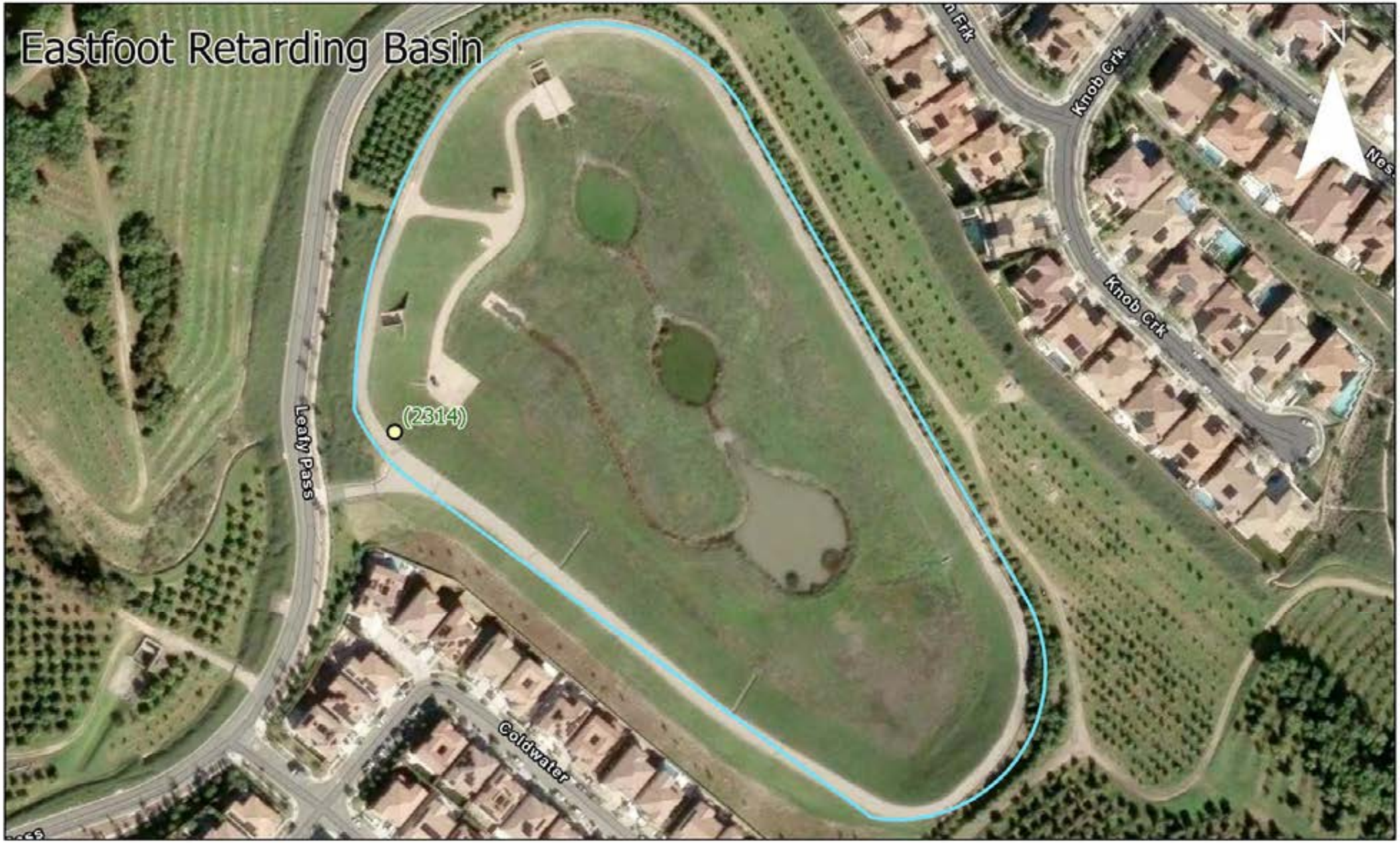
Persistence

1-2 Months (2)

Site Boundaries

0 75 150 300 Feet

Endemic Environmental Services



Points

(2314) [Herbicide] Spanish False Fleabane

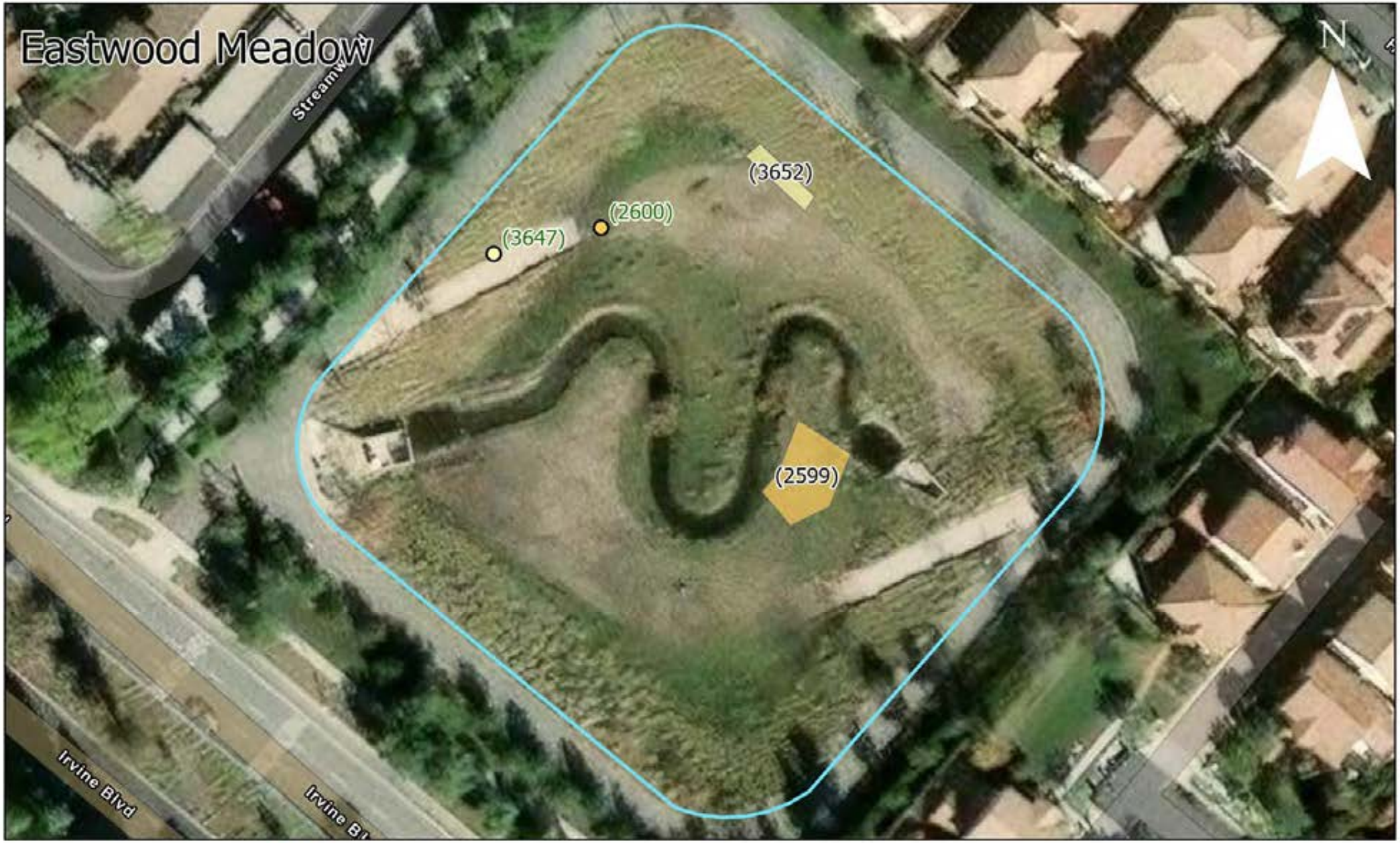
Persistence

0-1 Month (1)

Site Boundaries

0 105 210 420 Feet

Endemic Environmental Services



Points

(2600) [Herbicide] Spanish False Fleabane, Curly Dock

(3647) [Herbicide] Spanish False Fleabane

Polygons

(2599) [Herbicide] Spanish False Fleabane

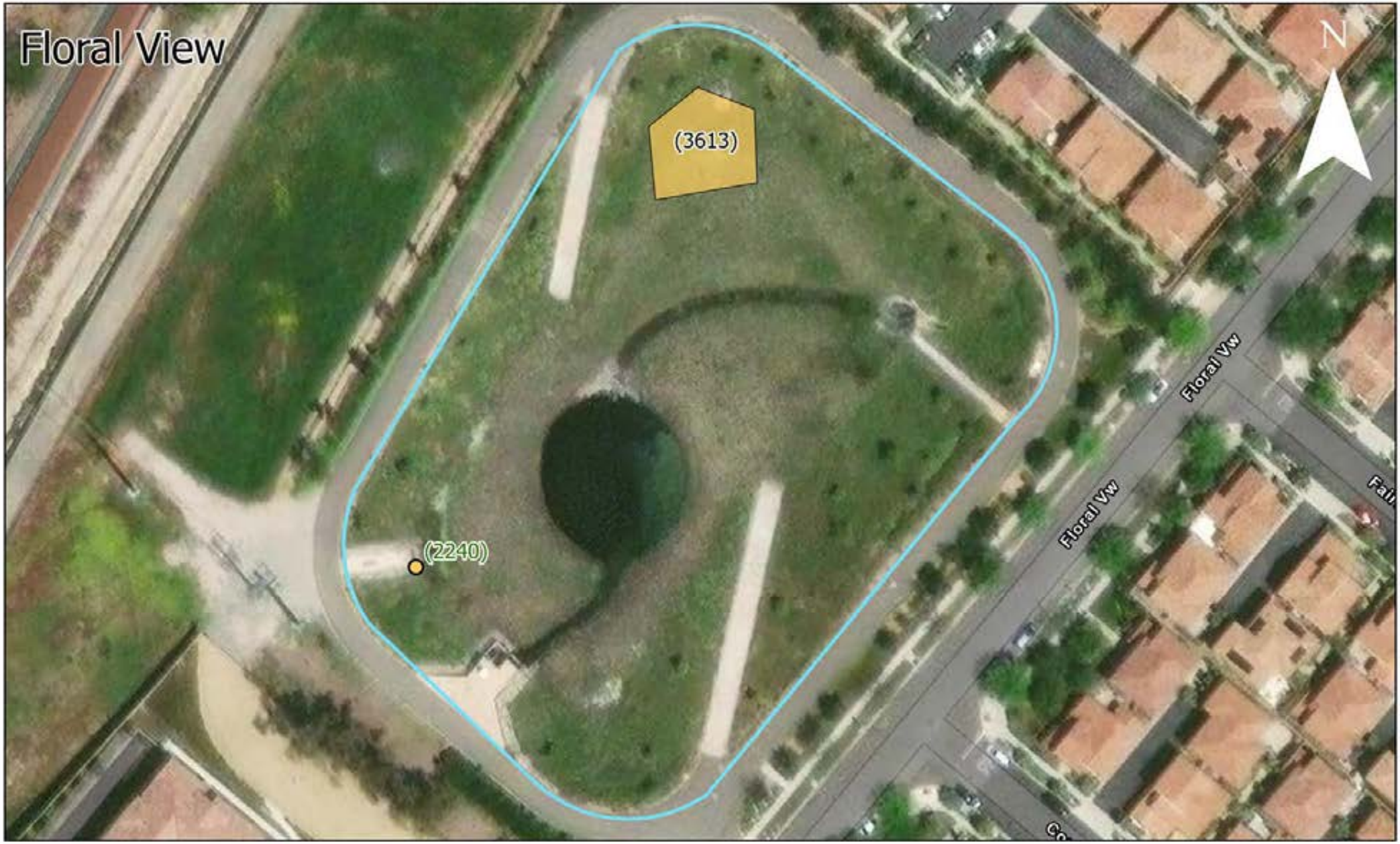
(3652) [Herbicide] Bermuda Grass

Persistence

- 0-1 Month (1)
- 1-2 Months (1)
- 0-1 Month (1)
- 1-2 Months (1)
- Site Boundaries

0 30 60 120 Feet

Endemic
Environmental Services



Points

(2240) [Herbicide] Spanish False Fleabane

Polygons

(3613) [Herbicide] Spanish False Fleabane

Persistence

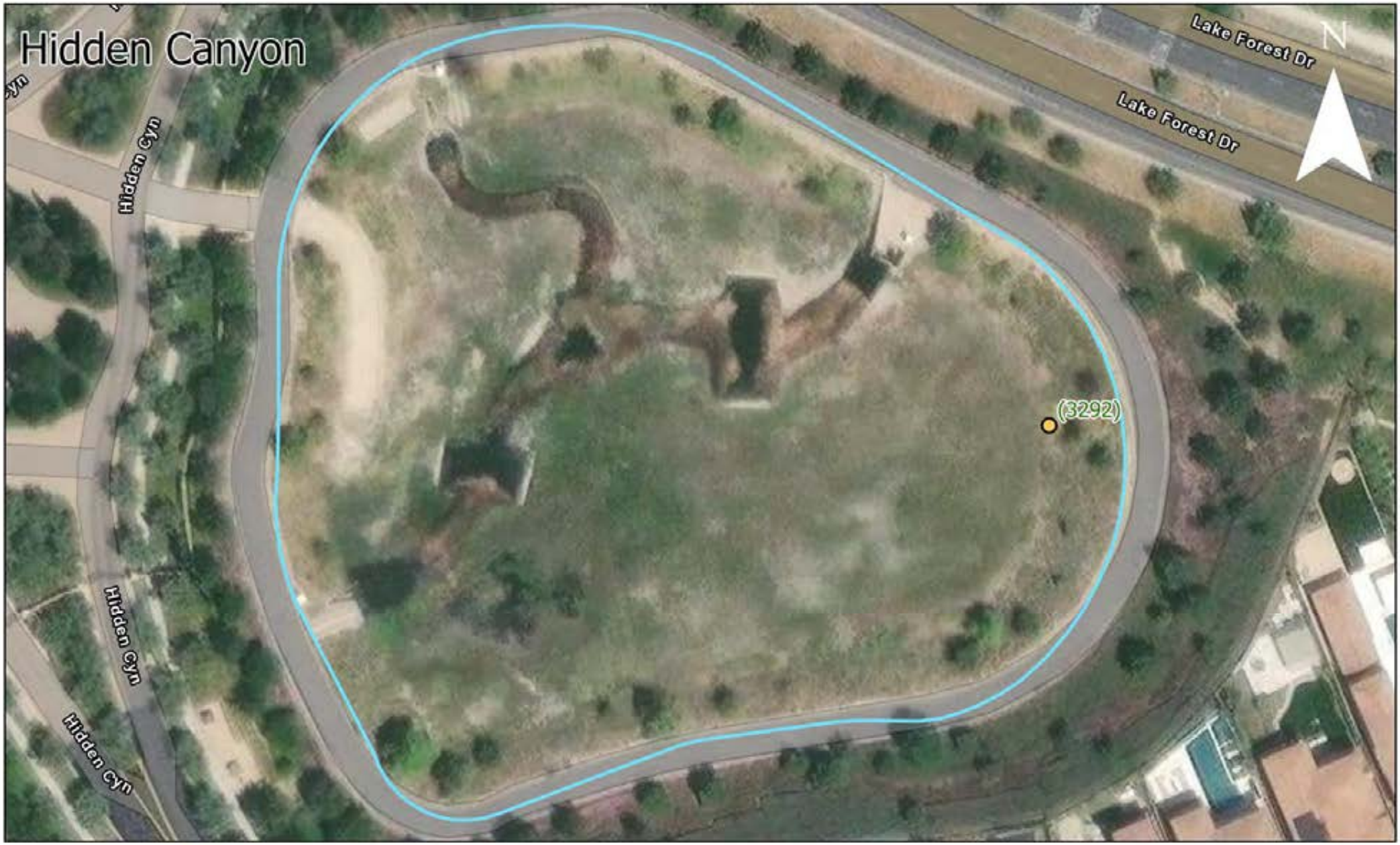
1-2 Months (1)

1-2 Months (1)

Site Boundaries

0 40 80 160 Feet

Endemic
Environmental Services



Points

(3292) [Herbicide] Bermuda Grass

Persistence

1-2 Months (1)

Site Boundaries

0 35 70 140 Feet

Endemic Environmental Services

Points

(3660) [Herbicide] Bermuda Grass

Persistence

0-1 Month (1)

Site Boundaries

0 25 50 100 Feet

Endemic
Environmental Services

Points

(3604) [Herbicide] Spanish False Fleabane
(3607) [Herbicide] Spanish False Fleabane
(3711) [Herbicide] Spanish False Fleabane
(3713) [Herbicide] Spanish False Fleabane

Polygons

(2522) [Herbicide] Spanish False Fleabane
(2530) [Herbicide] Spanish False Fleabane
(3705) [Herbicide] Spanish False Fleabane

Persistence

- 0-1 Month (2)
- 1-2 Months (2)
- 0-1 Month (3)
- Site Boundaries

0 70 140 280 Feet

Endemic
Environmental Services

Points

(2505) [Herbicide] Spanish False Fleabane
(2993) [Herbicide] Bermuda Grass
(3747) [Herbicide] Seashore Paspalum

Polygons

(2506) [Herbicide] Curly Dock
(3745) [Herbicide] Seashore Paspalum
(3746) [Herbicide] Seashore Paspalum

Persistence

- 0-1 Month (2)
- 3-6 Months (1)
- 0-1 Month (3)
- Site Boundaries

0 40 80 160 Feet

Endemic
Environmental Services

Polygons

(2826) [Herbicide] Spanish False Fleabane
(3722) [Herbicide] Spanish False Fleabane, Curly Dock
(3744) [Herbicide] Seashore Paspalum
(3790) [Herbicide] Spanish False Fleabane

Persistence

0-1 Month (3)
1-2 Months (1)
Site Boundaries

0 60 120 240 Feet

Endemic
Environmental Services

Polygons

(3748) [Herbicide] Seashore Paspalum

Persistence

0-1 Month (1)

Site Boundaries

0 30 60 120 Feet

Endemic
Environmental Services

Points

(3601) [Herbicide] Spanish False Fleabane
(3602) [Herbicide] Spanish False Fleabane
(3603) [Herbicide] Spanish False Fleabane
(3726) [Herbicide] Spanish False Fleabane
(3730) [Herbicide] Spanish False Fleabane

Polygons

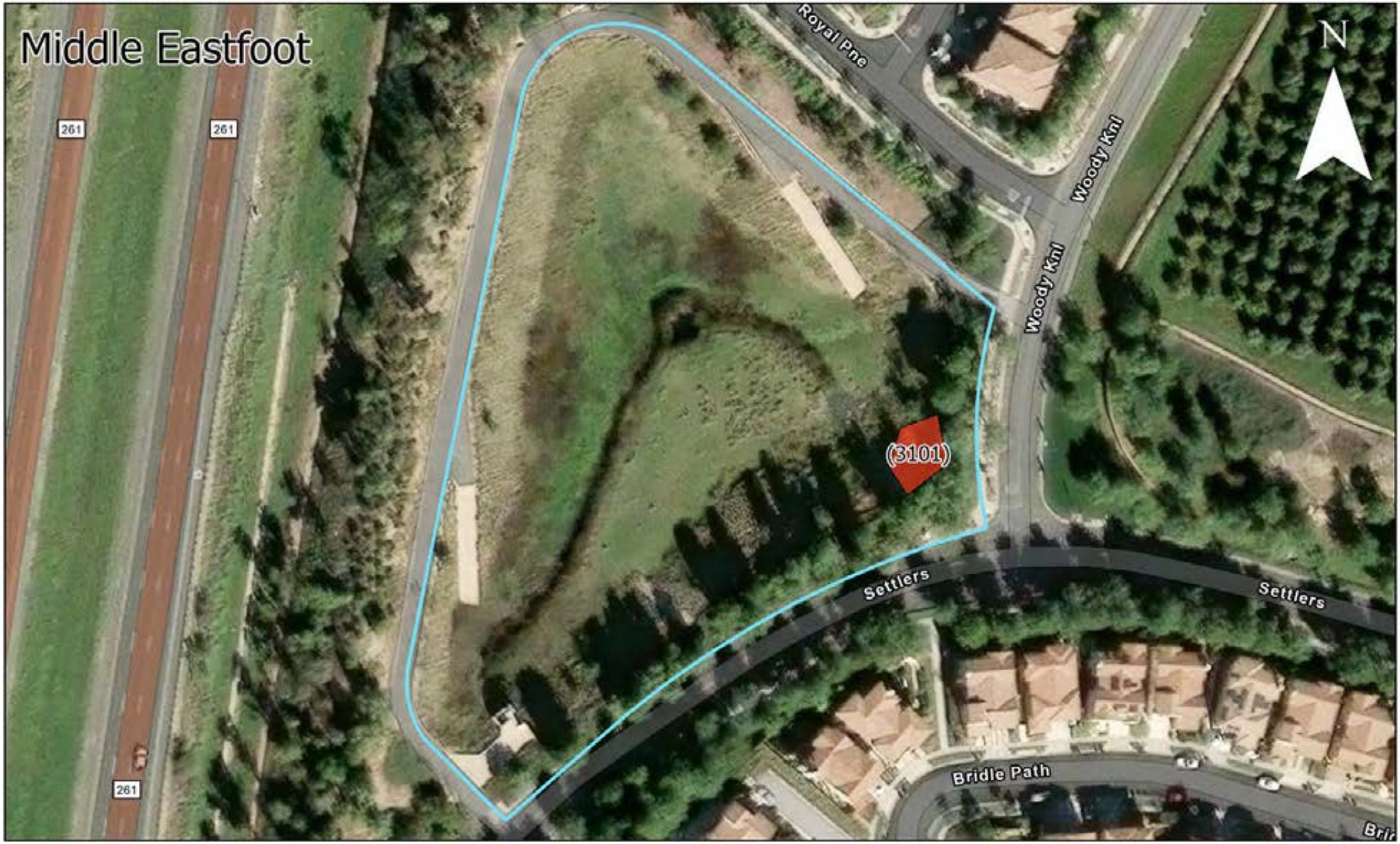
(2835) [Herbicide] Spanish False Fleabane
(3029) [Herbicide] Spanish False Fleabane

Persistence

0-1 Month (3)
1-2 Months (2)
0-1 Month (1)
2-3 Months (1)
Site Boundaries

0 40 80 160 Feet

Endemic
Environmental Services



Polygons

(3101) [Herbicide] Bermuda Grass

Persistence

3-6 Months (1)

Site Boundaries

0 55 110 220 Feet

Endemic Environmental Services

Points

(2677) [Herbicide] Spanish False Fleabane, Curly Dock

(2679) [Herbicide] Curly Dock

Polygons

(2678) [Herbicide] Spanish False Fleabane

Persistence

- 0-1 Month (2)
- 1-2 Months (1)
- Site Boundaries

0 62.5 125 250 Feet

Endemic Environmental Services

Points

(2303) [Herbicide] Curly Dock

Polygons

(3677) [Herbicide] Spanish False Fleabane

Persistence

1-2 Months (1)

1-2 Months (1)

Site Boundaries

0 25 50 100 Feet

Endemic
Environmental Services

Points

(2544) [Herbicide] Curly Dock

(2945) [Herbicide] Curly Dock

(2954) [Herbicide] Spanish False Fleabane

Polygons

(2545) [Herbicide] Spanish False Fleabane

Persistence

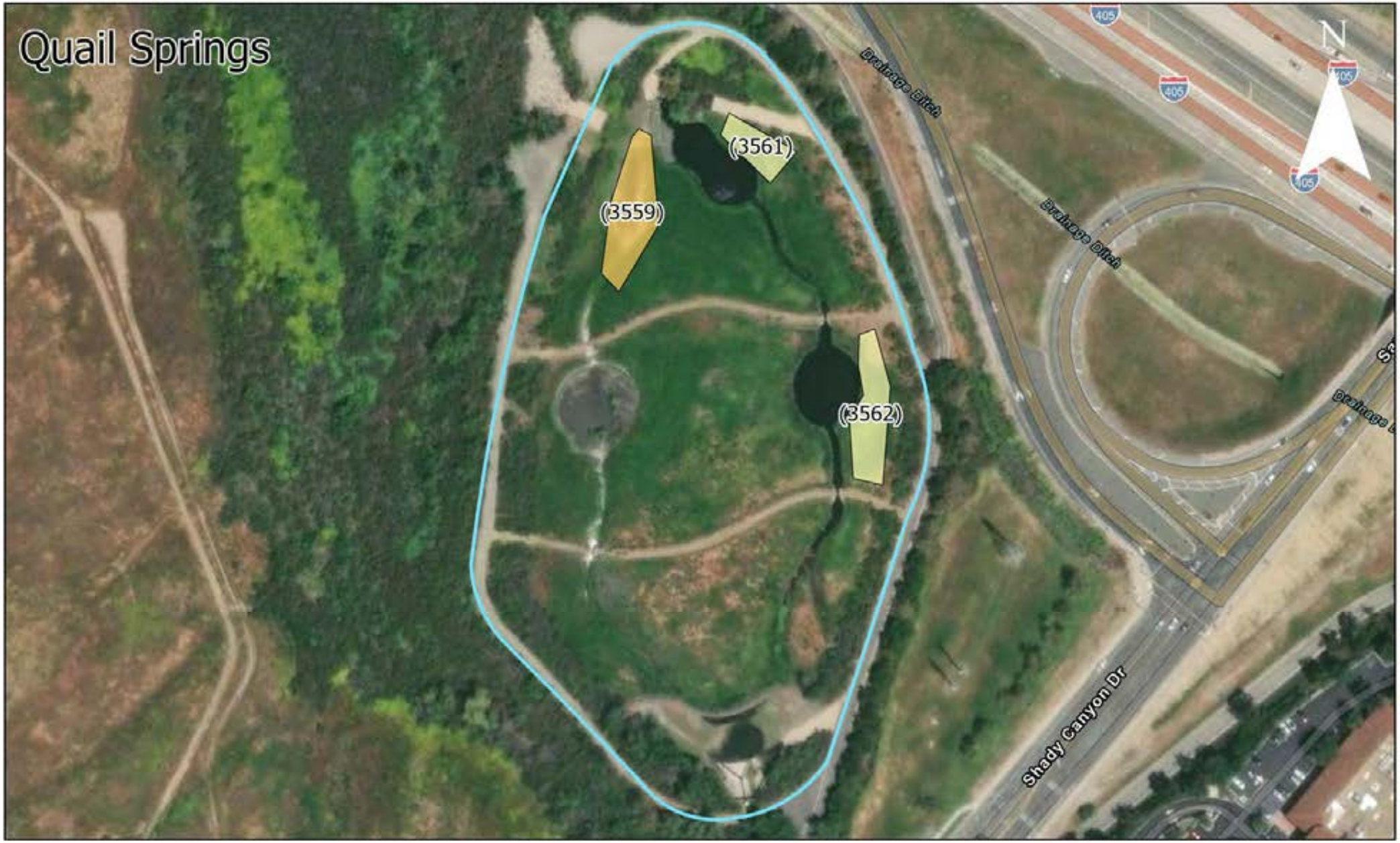
0-1 Month (3)

0-1 Month (1)

Site Boundaries

0 20 40 80 Feet

Endemic
Environmental Services



Polygons

(3559) [Herbicide] Spanish False Fleabane

(3561) [Herbicide] Spanish False Fleabane

(3562) [Herbicide] Spanish False Fleabane

Persistence

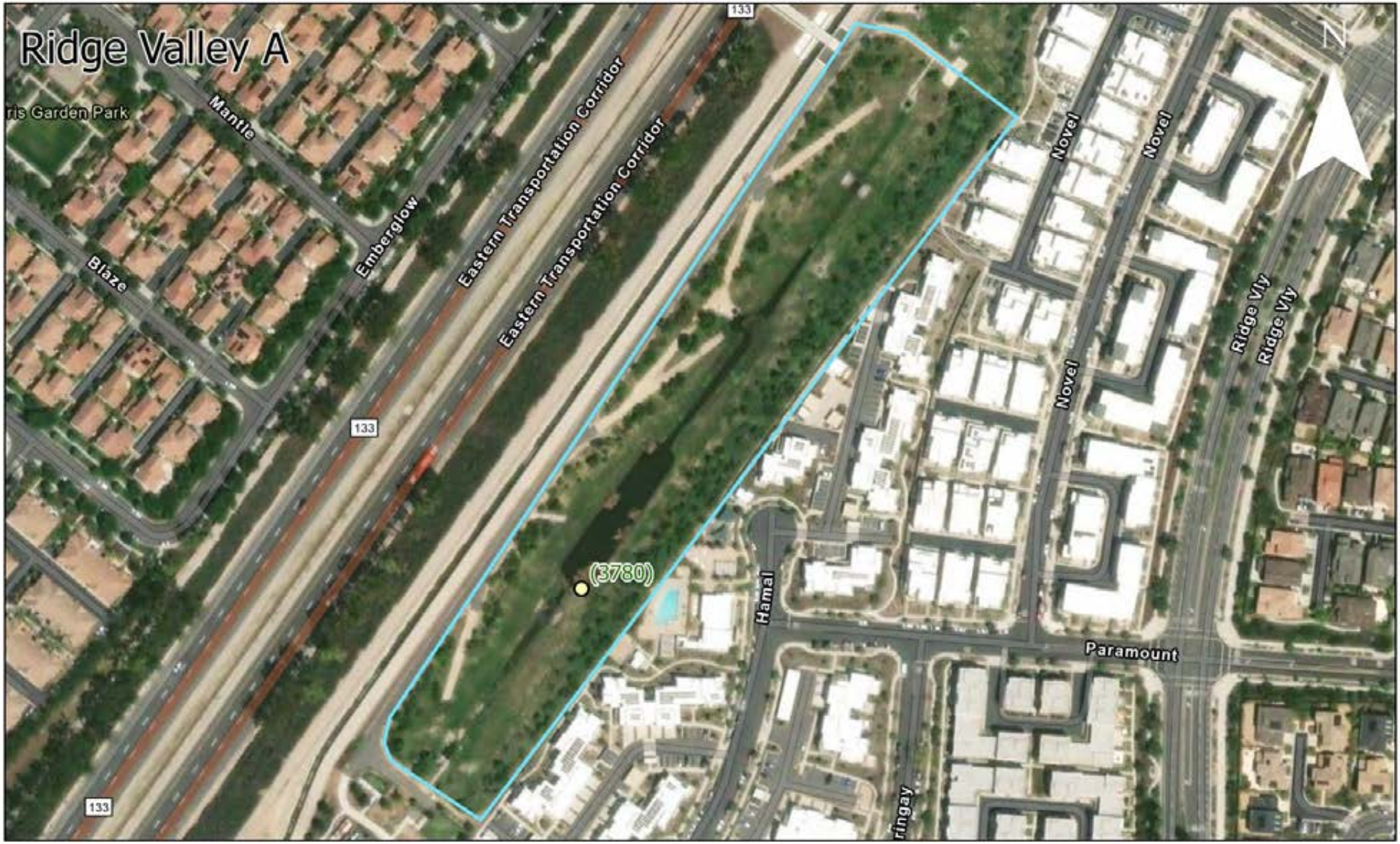
0-1 Month (2)

1-2 Months (1)

Site Boundaries

0 87.5 175 350 Feet

Endemic Environmental Services



Points

(3780) [Herbicide] Spanish False Fleabane

Persistence

0-1 Month (1)

Site Boundaries

0 105 210 420 Feet

Endemic
Environmental Services

Points

(2492) [Herbicide] Spanish False Fleabane

(3618) [Herbicide] Perennial Pepperweed

Persistence

1-2 Months (2)

Site Boundaries

0 300 600 1,200 Feet

Endemic
Environmental Services

Points

(2245) [Herbicide] Spanish False Fleabane
(2389) [Herbicide] Spanish False Fleabane
(3767) [Herbicide] Spanish False Fleabane
(3768) [Herbicide] Spanish False Fleabane
(3770) [Herbicide] Curly Dock

Polygons

(2244-B) [Herbicide] Spanish False Fleabane
(3552) [Herbicide] Spanish False Fleabane
(3655) [Herbicide] Spanish False Fleabane

Persistence

0-1 Month (3)
2-3 Months (2)
0-1 Month (2)
2-3 Months (1)
Site Boundaries

0 255 510 1,020 Feet

Endemic
Environmental Services

Points

(2290) [Herbicide] Curly Dock

(2450) [Herbicide] Curly Dock

Persistence

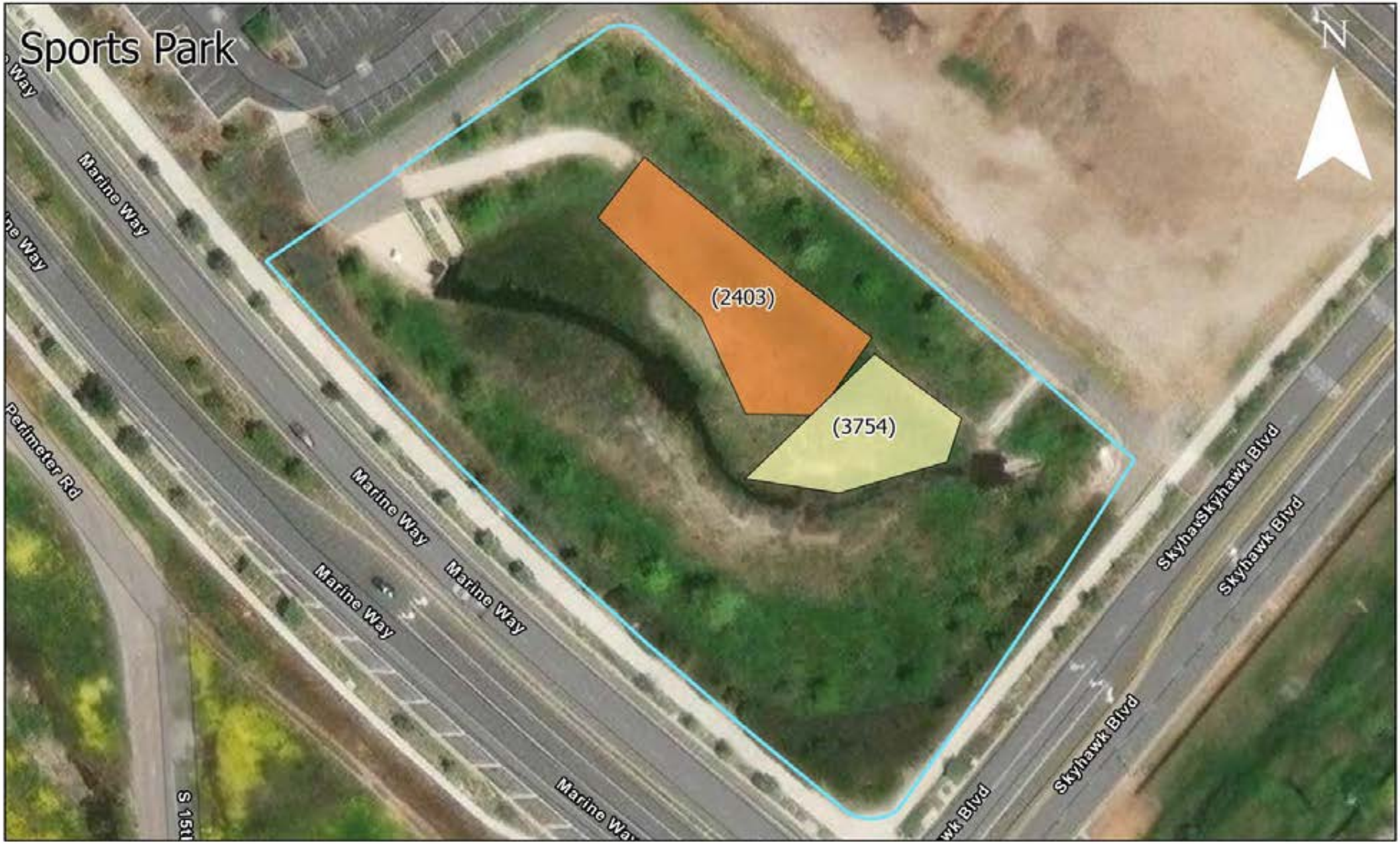
0-1 Month (1)

1-2 Months (1)

Site Boundaries

0 175 350 700 Feet

Endemic Environmental Services



Polygons

(2403) [Herbicide] Spanish False Fleabane

(3754) [Herbicide] Curly Dock

Persistence

0-1 Month (1)

2-3 Months (1)

Site Boundaries

0 37.5 75 150 Feet

Endemic Environmental Services

Points

(2674) [Herbicide] Spanish False Fleabane

Persistence

0-1 Month (1)

Site Boundaries

0 25 50 100 Feet

Endemic
Environmental Services

Polygons

(3749) [Herbicide] Bermuda Grass

Persistence

0-1 Month (1)

Site Boundaries

0 15 30 60 Feet

Endemic
Environmental Services

Polygons

(2606) [Herbicide] Spanish False Fleabane

Persistence

0-1 Month (1)

Site Boundaries

0 30 60 120 Feet

Endemic
Environmental Services

Points

(2608) [Herbicide] Spanish False Fleabane

(2610) [Herbicide] Curly Dock

Polygons

(3516) [Herbicide] Spanish False Fleabane

Persistence

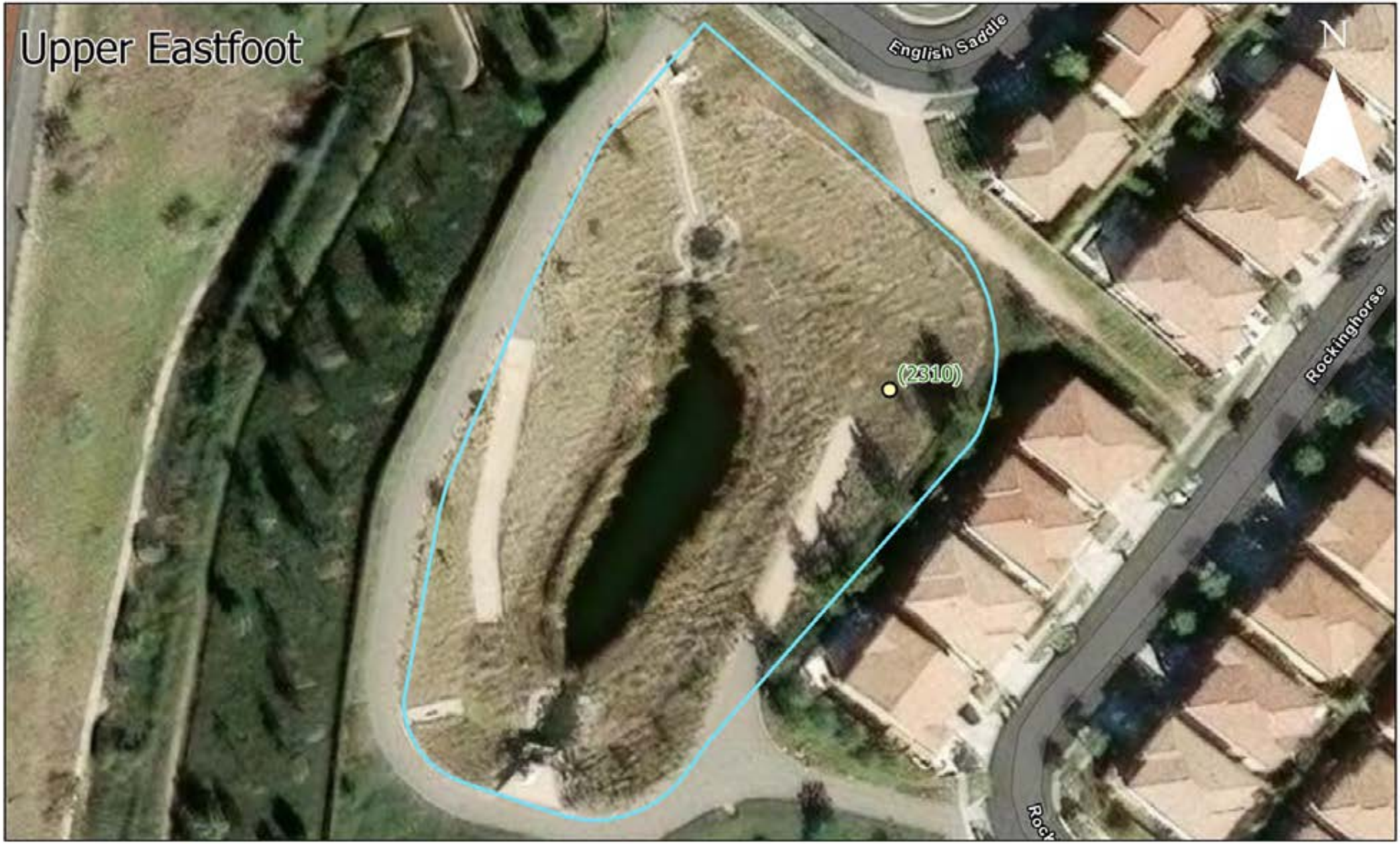
0-1 Month (2)

1-2 Months (1)

Site Boundaries

0 30 60 120 Feet

Endemic Environmental Services



Points

(2310) [Herbicide] Bermuda Grass

Persistence

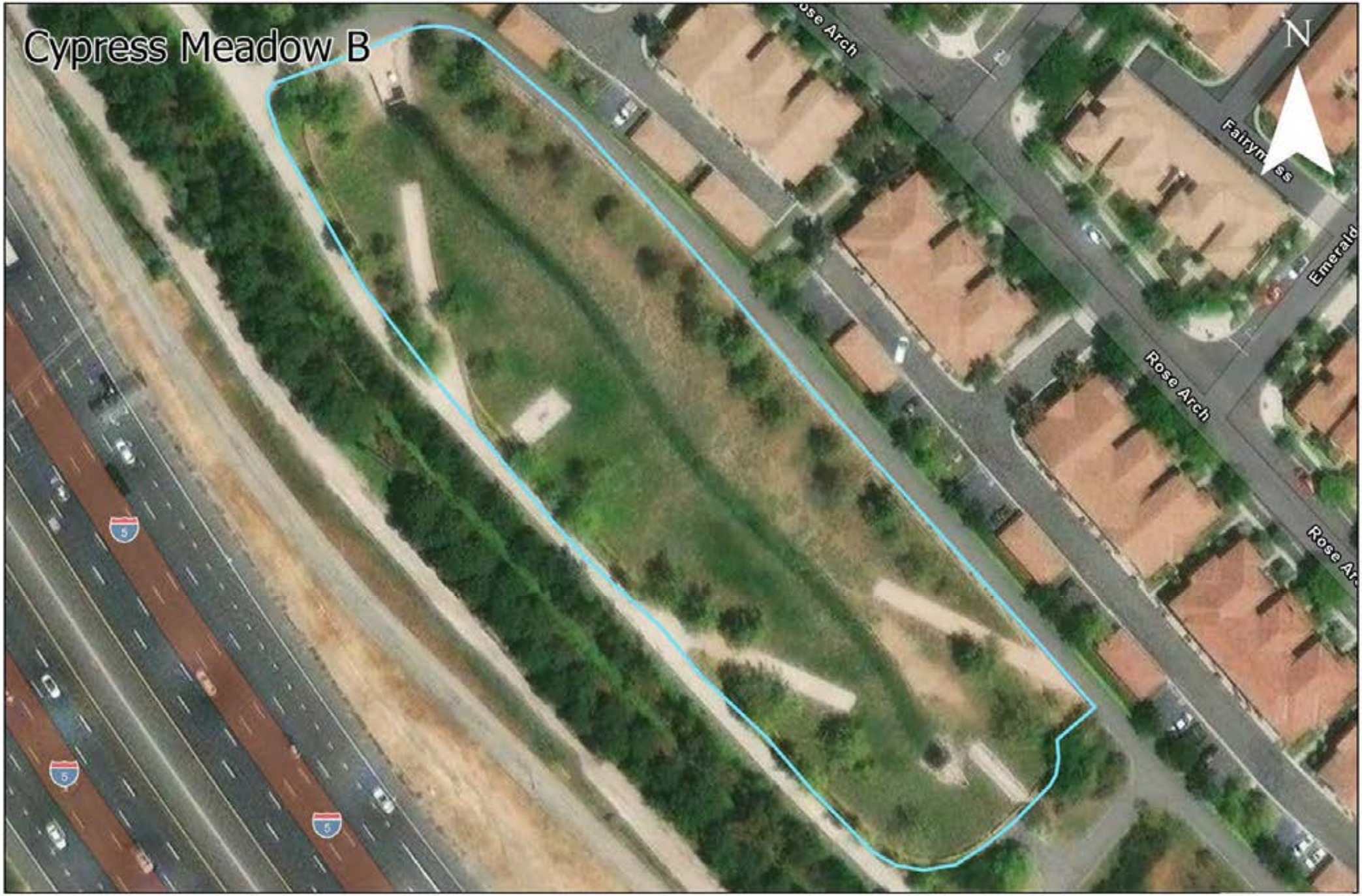
0-1 Month (1)

Site Boundaries

0 30 60 120 Feet

Endemic
Environmental Services

B-4 MAPS OF SITES WITHOUT HERBICIDE RECOMMENDATIONS



Site Boundaries

0 45 90 180 Feet

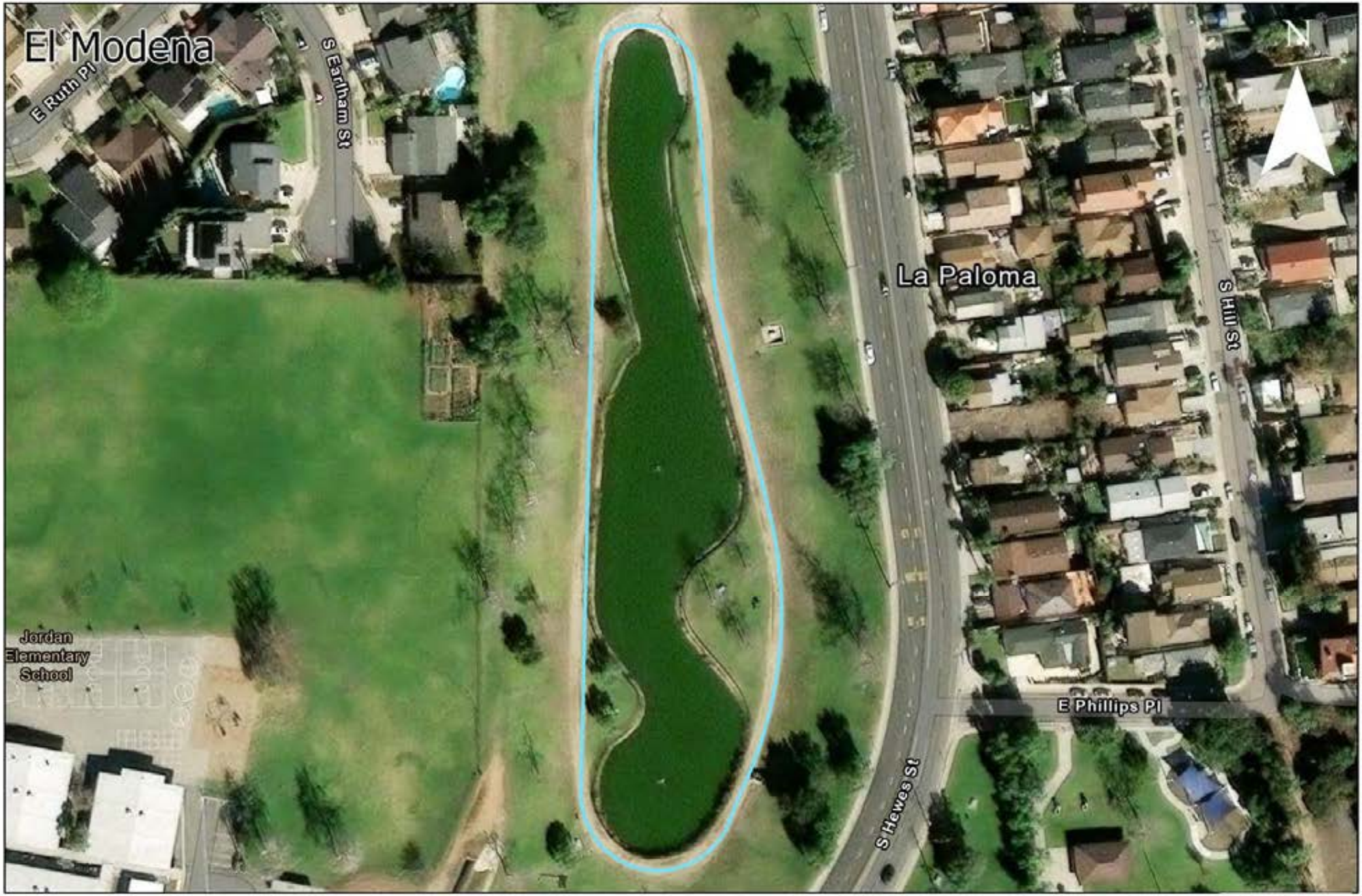
Endemic
Environmental Services

Site Boundaries

0 55 110 220 Feet

Endemic
Environmental Services


Cypress Meadow D
N
Site Boundaries
0
45
90
180 Feet
Endemic
Environmental Services



Site Boundaries

0 65 130 260 Feet

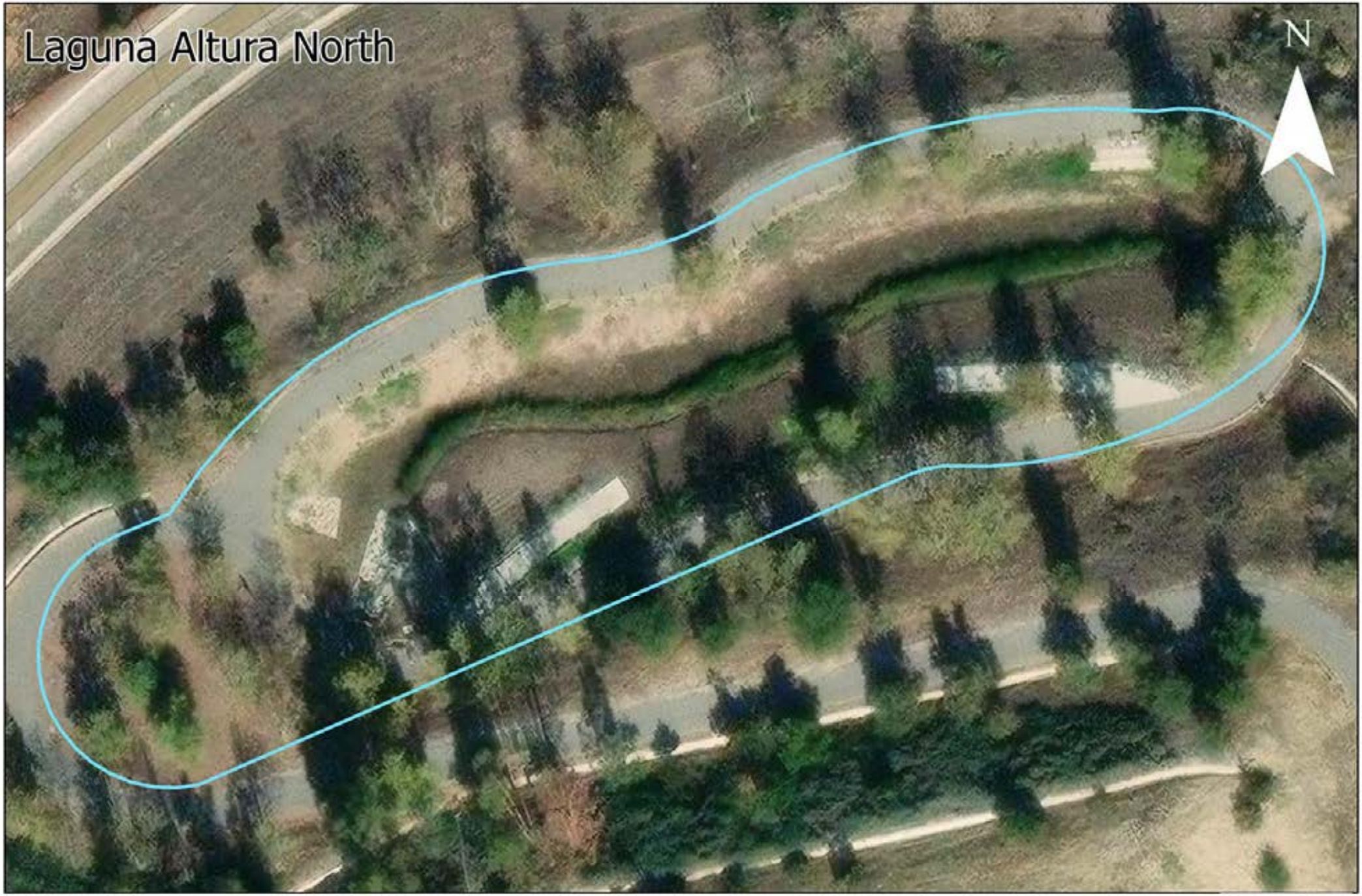
Endemic
Environmental Services

Site Boundaries

0 55 110 220 Feet

Endemic
Environmental Services

Endemic
Environmental Services



Site Boundaries

0 30 60 120 Feet

Endemic
Environmental Services

Site Boundaries

0 37.5 75 150 Feet

Endemic
Environmental Services

Site Boundaries

0 40 80 160 Feet

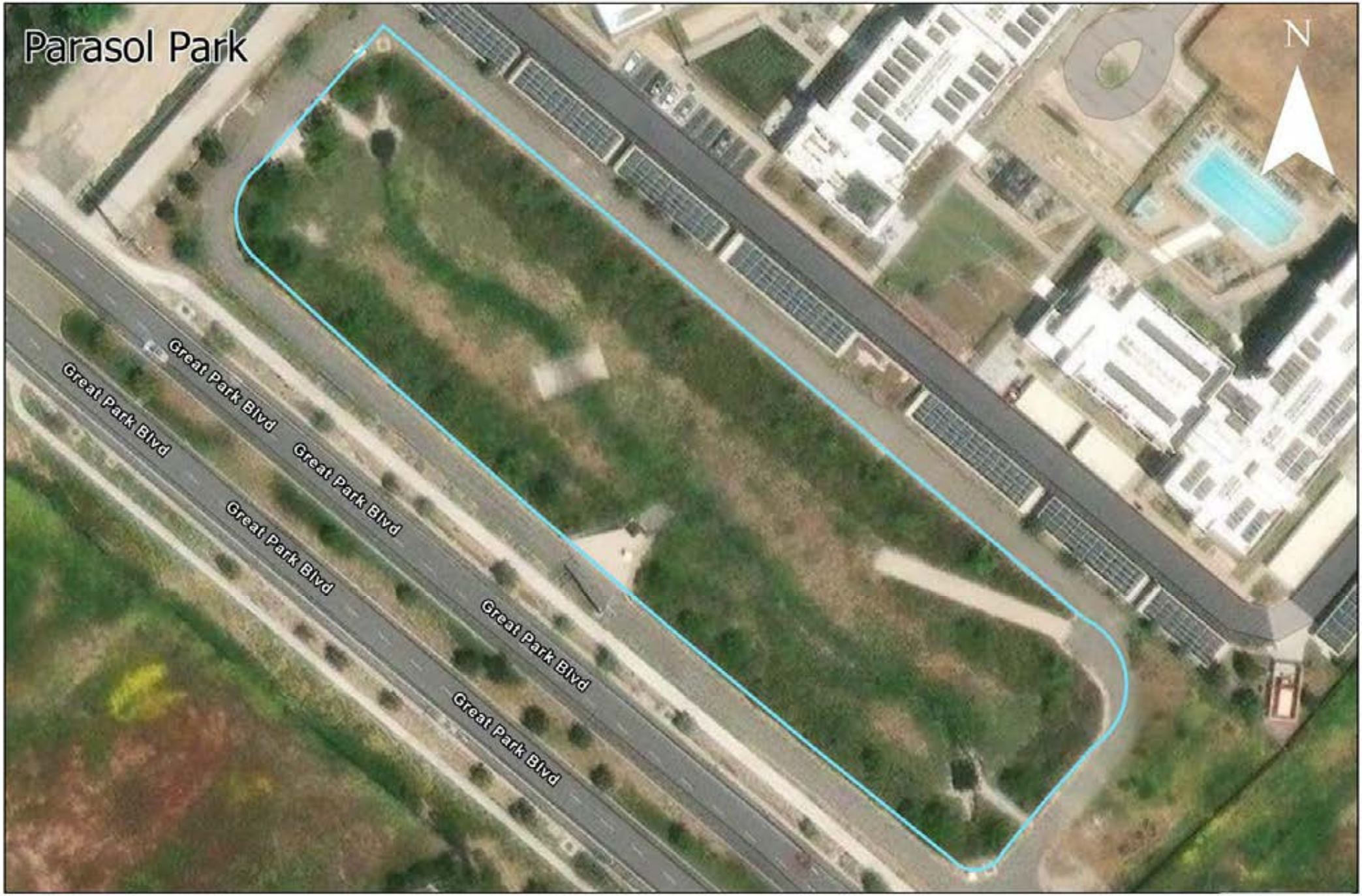
Endemic
Environmental Services

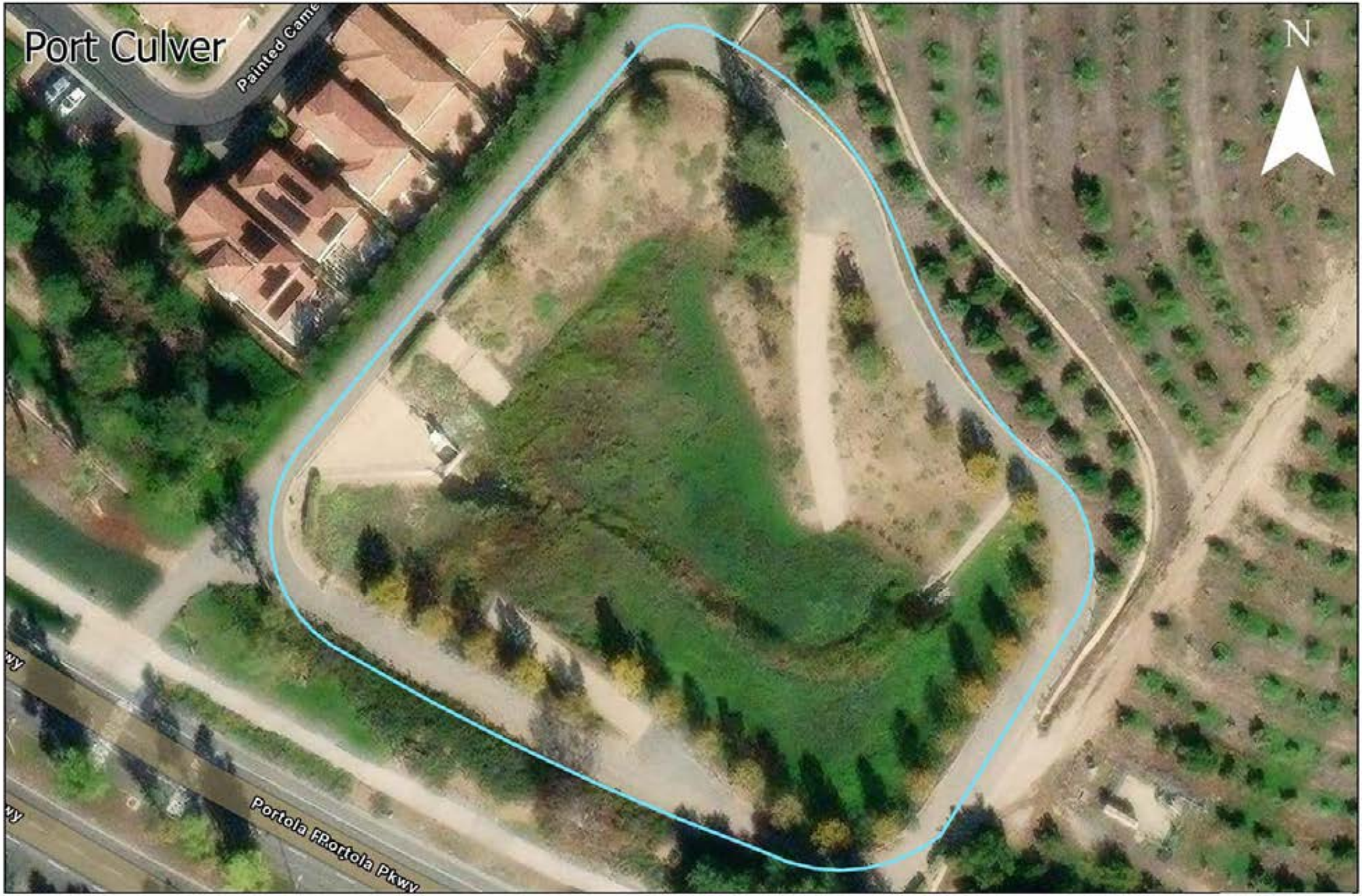
Site Boundaries

0 75 150 300 Feet

Endemic
Environmental Services


Orchard Retarding Basin
N
Site Boundaries
0
25
50
100 Feet
Endemic
Environmental Services

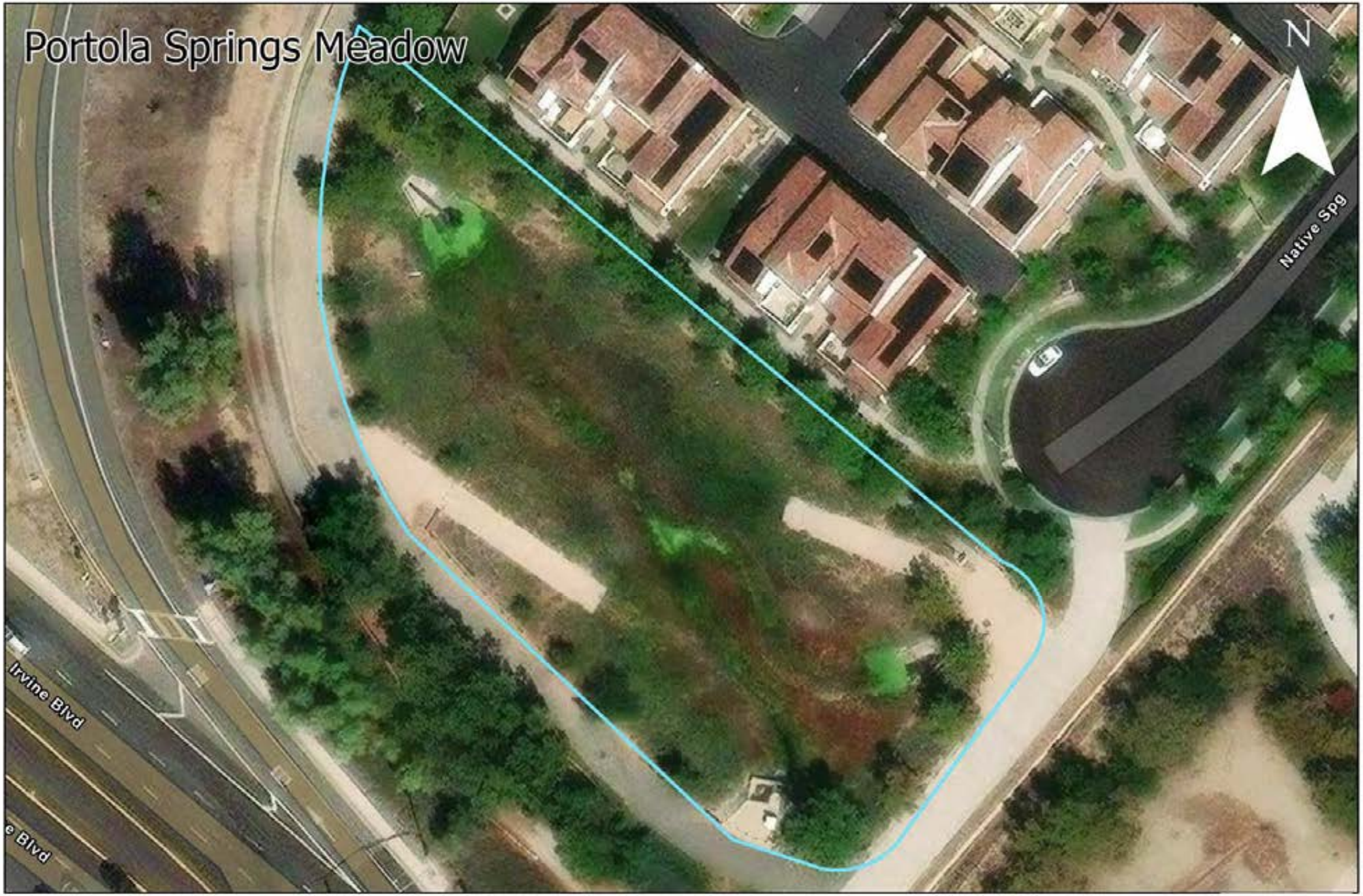

Parasol Park
N
Great Park Blvd
Great Park Blvd
Great Park Blvd
Great Park Blvd
Great Park Blvd
Great Park Blvd
Site Boundaries
0
40
80
160 Feet
Endemic
Environmental Services



Site Boundaries

0 35 70 140 Feet

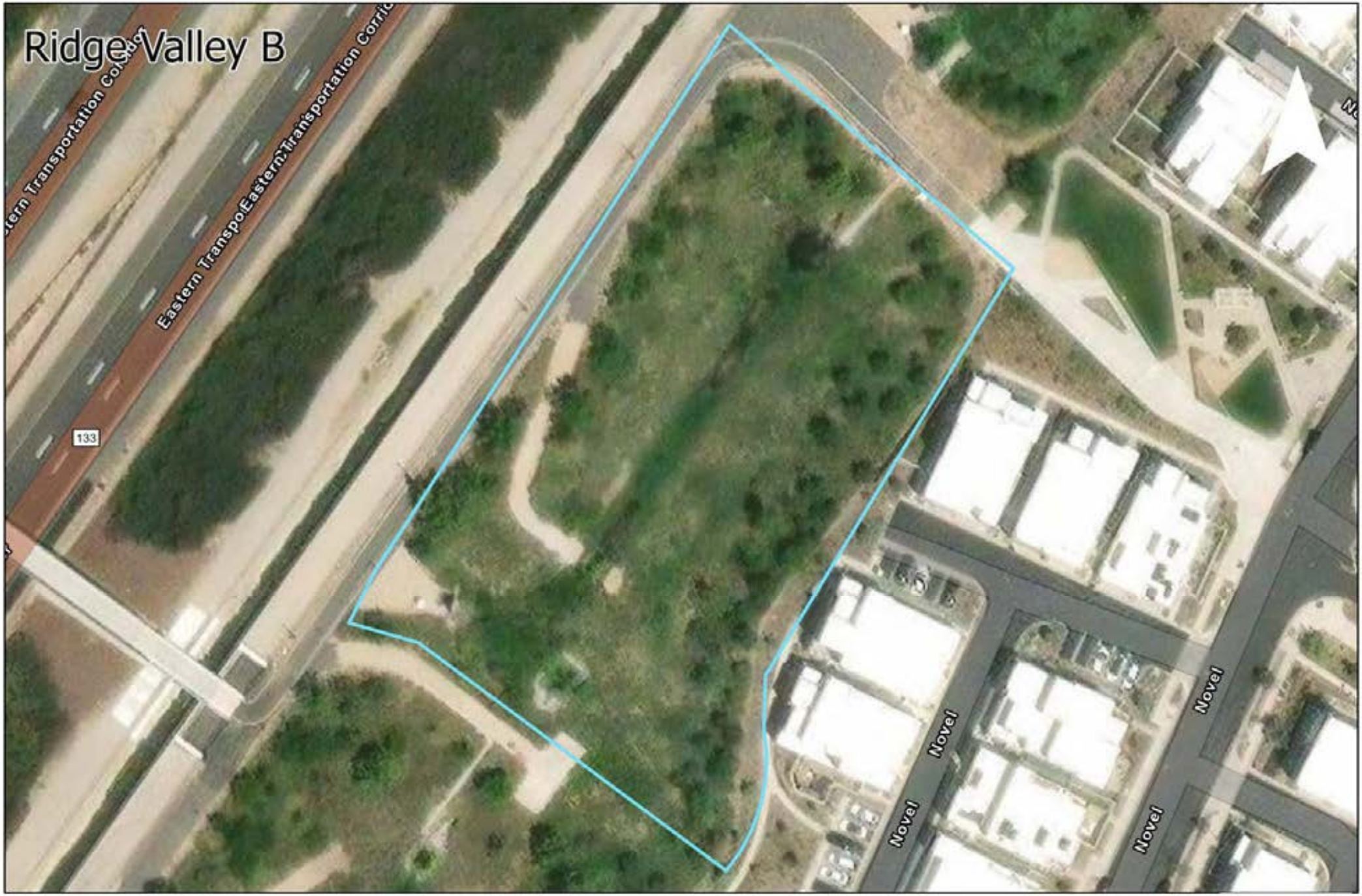
Endemic
Environmental Services



Site Boundaries

0 25 50 100 Feet

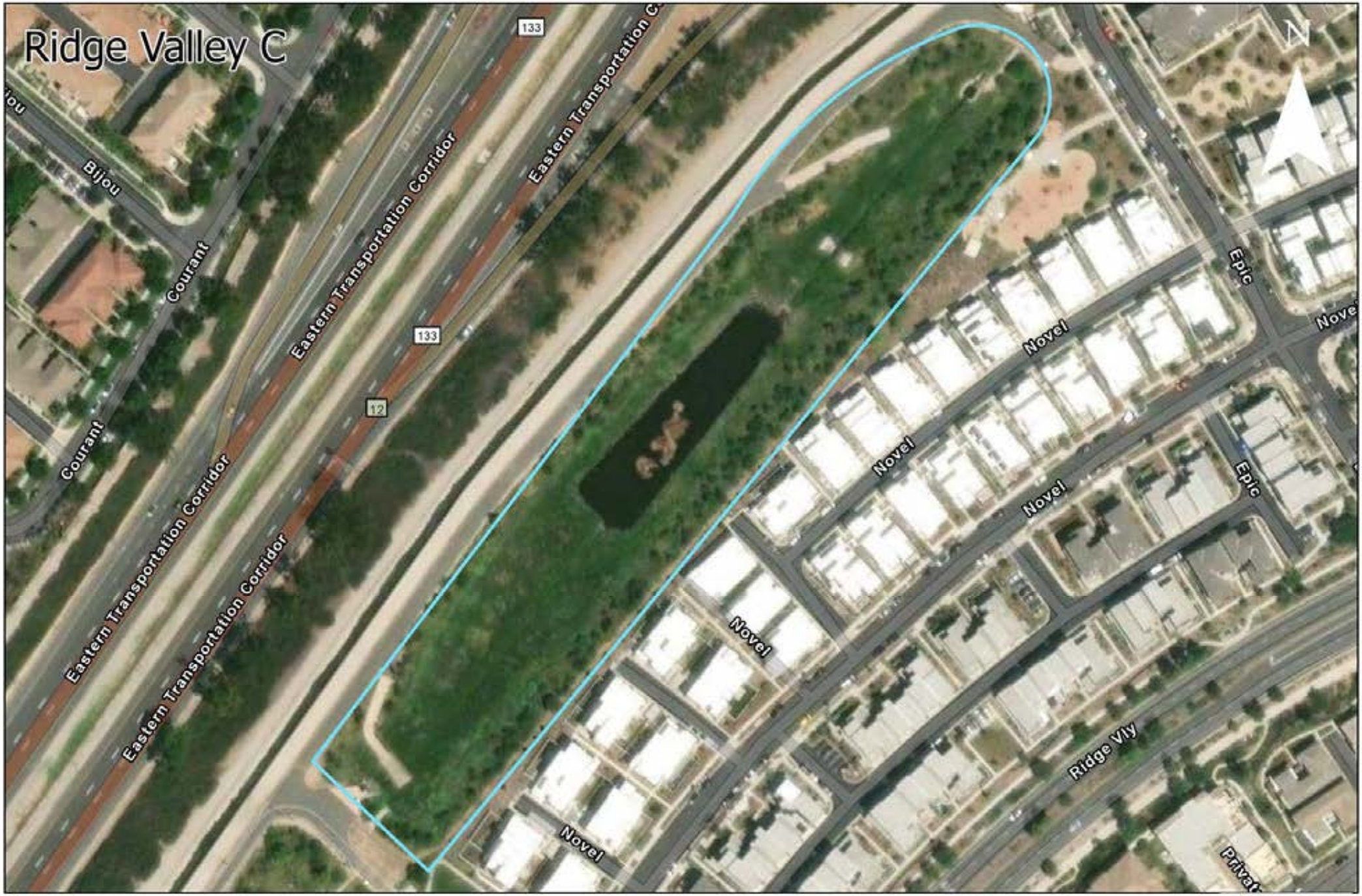
Endemic
Environmental Services



Site Boundaries

0 40 80 160 Feet

Endemic
Environmental Services


Ridge Valley C
133
Eastern Transportation Corridor
Biljou
Courant
12
Novel
Epic
Ridge Vly
Site Boundaries
0
80
160
320 Feet
Endemic
Environmental Services

Site Boundaries

0 260 520 1,040 Feet

Endemic
Environmental Services

Site Boundaries

0 50 100 200 Feet

Endemic
Environmental Services

APPENDIX C: HERBICIDE USE

C-1 HERBICIDE MEMORANDUMS

MEMORANDUM

Date: October 28, 2021

To: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

From: Barry Nerhus, President
1100 West Arroyo Drive
Fullerton, CA 92833

Subject: Chemical Pesticide Treatment Justification for Stinknet

This memorandum documents the results of treatment methods for stinknet (*Oncosiphon pilulifer*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. Stinknet is an annual herb in the sunflower (Asteraceae) family and native to South Africa. Stinknet was possibly introduced into Arizona as a cultured desert habitat plant and has since spread to California possibly by way of equipment and fill material. The first records of stinknet in California are in the early 1980s and early 1990s in Arizona. Since its establishment in both states, stinknet has become highly invasive in many habitats, including the desert. It is a great colonizer and demonstrates weedy tendencies in wildlands, disturbed and agricultural areas, especially where irrigated. Infestations spread rapidly along roadways and open fields, dried dense patches are highly flammable, and the smoke is caustic.

This invasive species is a low-growing annual herb that is difficult to control. It germinates from seed with the onset of cool-season rains, usually around late October or November, and can continue to emerge through July in moist years. The plants grow as a basal rosette of feathery green leaves resembling a carrot plant. As the rosette matures, the stems grow horizontally and vertically up to two feet in height. The oil glands in its leaves produce a pungent odor resembling turpentine that makes it unattractive for herbivory. The plant produces bright yellow, spherical flower heads from the top of bolting stems from March through July in California. Each flower in the globe can produce a seed. Therefore, the plant produces thousands of seeds and can grow into dense stands of many hundreds of plants. The plants have been sold at Arizona farmer markets advertised as wild chamomile, although they are not.

NON-CHEMICAL REMOVAL

Beginning in May 2021, biologists with Endemic Environmental Services Inc. (Endemic) identified stinknet growing in NTS basins as part of the IRWD Integrated Pest Management Plan Implementation Project (project). In subsequent months, Endemic biologists discovered stinknet in additional NTS basins.

Endemic biologists initially prescribed manual removal for the species involving hand weeding and use of hand tools. However, manual removal poses a health risk to the laborer because stinknet causes severe dermal and respiratory allergic reactions, particularly when the plant is green and flowering. Furthermore, according to the Sonoran Desert Cooperative Weed Management Area (SDWMA) and the Southwestern Vegetation Management Association (SVMA), after the species has become established for two years it is impossible to control by hand due to its rapid growth into dense patches of many hundreds of plants. Hand pulling will only work on a small scale, and multiple sessions are needed.

Mechanical removal (mowing or string trimmers) is limited in effectiveness because the cut plants re-sprout and flower closer to the ground. Multiple cuttings close to the ground attenuate this problem and can provide good control, but a simple single cutting is not very effective. Other non-chemical removal methods, such as mulching, flooding, flaming, tilling, and solarizing are not prescribed as the habitats are not amenable to these methods and are also not accepted as methods of removal for stinknet. Mowing is not advised as this species will regrow from the roots and the equipment will spread the seed to new locations unless thoroughly cleaned after each use. Non-chemical methods of removal were tested for this species and have proven ineffective.

RECOMMENDATIONS

The California Invasive Plant Council (CAL-IPC) lists stinknet as an invasive species with a “high” rating, an overall environmental impact grade of “A” and an invasiveness grade of “A”. Because the infestations are not responding to non-chemical treatment methods, and because CAL-IPC, SDWMA, SVMA, and the Orange County Native Plant Society (OCNPS) consider manual and mechanical removal to pose a high likelihood of inadvertently spreading the species to other areas, Endemic staff recommends spot treatment with prioritized chemical pesticides as a management strategy before the stinknet population expand to all sites. Literature reviews support this conclusion.

Solarizing, tilling, and mulching would not be a feasible treatment within NTS sites as the stinknet infestations are spread among areas that are host to desirable native species. Methods such as cutting and mowing can be effective, but also increase the probability for spreading the seed to new areas. Flaming is dangerous, as the plant produces a caustic smoke when burned. Flaming is also generally avoided as a treatment in the dry climate of Southern California due to the risk of brush fires.

Endemic also determined that organic chemical control methods would not be effective in controlling stinknet and are not appropriate for NTS sites, as recent studies have found that

organic pesticides can have a higher environmental impact than conventional pesticides, particularly on invertebrates.

Endemic recommends the use of prioritized chemical pesticides to facilitate the removal of stinknet in order to maintain native habitat within the NTS sites. Application of prioritized chemical pesticides should be conducted in a manner that avoids disturbance to installed and recruited native species to the fullest extent practicable. Maintenance from November through February will be most effective in reducing cover by stinknet, as the species blooms from March to July; however, year-round control efforts will be necessary.

According to SVMA, it is advisable to remove the plants before they develop mature seeds. But once stinknet is established for a second year, chemical control becomes necessary. Glyphosate with MSO surfactant can be applied to emerged plants before flowering. For areas of 70-100% coverage per square meter, Endemic recommends using pre-emergent and herbicide applications to dense stinknet stands. It should be performed by a licensed commercial applicator. The most effective herbicide strategy is pre-emergent treatment with Esplanade and post-emergent treatment with Transline (Rodriquez et al, 2021) but Transline seems to be more effective in dry years than wet years (McDonald, 2020).

Please contact Barry Nerhus at (714) 393-6249 or Luma Fowler at (949) 943-9664 if you have any questions regarding these recommendations.

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Rodriguez, Clarissa, et al. 2021. *Evaluating the Efficacy of Management Options for Oncosiphon Piluliferum (Stinknet).* University of California, Riverside, California. *(*https://www.rchca.us/DocumentCenter/View/831/UCR-Stinknet-Report-2021-FINAL).

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MEMORANDUM

Date: December 17th, 2024

To: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

From: Luma Fowler, Restoration Director

Subject: Chemical Herbicide Treatment Justification for Seashore Paspalum

This memorandum evaluates the theoretical efficacies of treatment methods for a newly detected species, Seashore Paspalum (*Paspalum vaginatum,* PAVA), present within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. As a part of the IRWD Integrated Pest Management Plant Implementation Project, Endemic Environmental Services Inc. (EES) biologists conduct monthly surveys within each of the authorized NTS basins to manage water flow, invasive spread, and other maintenance measures. On November 20th, 2024, an EES biologist detected a large stand of PAVA growing in the waterways of Lower Agua Chinon Basin B/District 5B (Figure 1). Upon uploading the observation to Calflora, Ron Vanderhoff, Calflora's current President of the Board, verified the ID. A month later, multiple established colonies, previously believed to be Bermuda grass (*Cynodon dactylon*), were identified as PAVA growing throughout the NTS basin waterway of Los Olivos South.

Figure 1: *Paspalum vaginatum* covering waterway at Lower Agua Chinon Basin B (LACB B)

Figure 2: *Paspalum vaginatum* forming smaller, but still prevalent mats at Los Olivos South

Seashore Paspalum is a perennial grass believed to be native to the southeastern seaboard in the United States, where it is documented from North Carolina to Florida and across the Gulf states to Texas (Allen *et al*., 2024). Throughout its native range, this grass primarily occupies marshes (both brackish and salty), mangroves, coastal dunes, sloughs, waterways, pastures, floodplains, and riparian habitats. This species is well established as problematic in habitats associated with ample water, due to its efficient propagation through stolons and rhizomes, easily encouraged by disturbance (Riefner *et al.*, 2008). Once established, PAVA quite effectively forms thick, impenetrable mats that can reach a thickness of two feet or more. Its successful growth habits ensure quick and decisive exclusion of all indigenous marsh/riparian vegetation, with historic colonization documenting native plant establishment by a margin of several years (Graeme *et al*., 2001).

Various ecosystems throughout the world have discerned adverse impacts pertinent to the introduction of this plant. In New Zealand estuaries, *Paspalum vaginatum*, much like introduced *Spartina* (Cordgrass) species, significantly impacts native vegetation by overtaking and displacing low-growing species, threatening populations of endangered plants, altering fish spawning and feeding grounds, and restricting access to burrowing fauna. Its dense shoot and root systems limit feeding and roosting opportunities for shorebirds and modify estuarine hydrology by promoting sediment accumulation (Graeme *et al*., 2001; Shaw *et al*., 2003). In the Galápagos Islands, Ecuador, *P. vaginatum* presents a particularly concerning case. It aggressively invades disturbed and natural wetlands, replacing native vegetation and affecting water flow and soil moisture levels (Vargas, 1995; Gravez *et al*., 2004; Guézou *et al*., 2007). The species has also spread to many lagoons, threatening these ecosystems and their globally significant avian

biodiversity. Studies show that infestations degrade fiddler crab habitats and alter aquatic bird foraging areas by reducing surface water availability for feeding (Siemens, 2006).

With the growth habit of Seashore Paspalum being conducive to rapid expansion, recruitment of native riparian and saltmarsh species is extremely common, leading to extensive failures of restoration projects and degradation of established projects (UC-IPM, 2016). Lastly, turf-forming adaptations pose a heavy risk for reduced water flow and channel habitat in NTS basins. Manual removal of pre-existing colonies likely exacerbated the propagation and spread of young PAVA stands in IRWD sites.

EES recommends using a synthetic chemical treatment to efficiently address the established colonies and extirpate the species from known sites. Several chemical formulations and application rates will be recommended, with recommendations against continuing hand removal. Lastly, EES highly advises specific decontamination protocols for all members operating in the NTS basins.

Origin

Evidence suggests that Seashore Paspalum originated primarily from purposeful introductions for lawn plantings and soil stabilization. In the 1970s and 1980s, marketers promoted PAVA as a low-water lawn alternative. Since then, the widely planted cultivars have spread slowly and without detection for decades. Heavy channelization of local waterways and native habitat fragmentation has enabled a highly adapted PAVA easy access to establish. By 2003, initial detections occurred in Orange County, documented by David Bramlet in the Upper Newport Back Bay, directly adjacent to the Delhi Channel (Bramlet 3468B, UCR). Another documentation, made by botanist Richard Riefner, occurred months later within the San Diego Creek Watershed between the transition of San Diego Creek and the Upper Newport Back Bay (Riefner 08-9, UCR). This discovery became the first major colony along the creek bank. Documentation in the past decades reveals a range expansion up the watershed.

Since preliminary detections, the California Invasive Plant Council (Cal-IPC) has designated this species as a “ watch” species with a high risk of invasiveness. This rating grants significance to the plant as not yet invasive, but with a high potential for becoming invasive(UCANR, 2024). In 2020, the annual Cal-IPC symposium highlighted PAVA as a plant to watch for, where observations have subsequently exploded. Now widely naturalized along the San Diego and San Juan Creek watersheds, the status as a “watch” species enables land managers to take early action. Due to its occupation in only a few spots in the county (and even fewer in NTS basins), PAVA currently occupies the ‘Eradication Feasible’ point on the following curve (Figure 3), indicating feasibility to extirpate all known colonies of PAVA within the NTS basins.

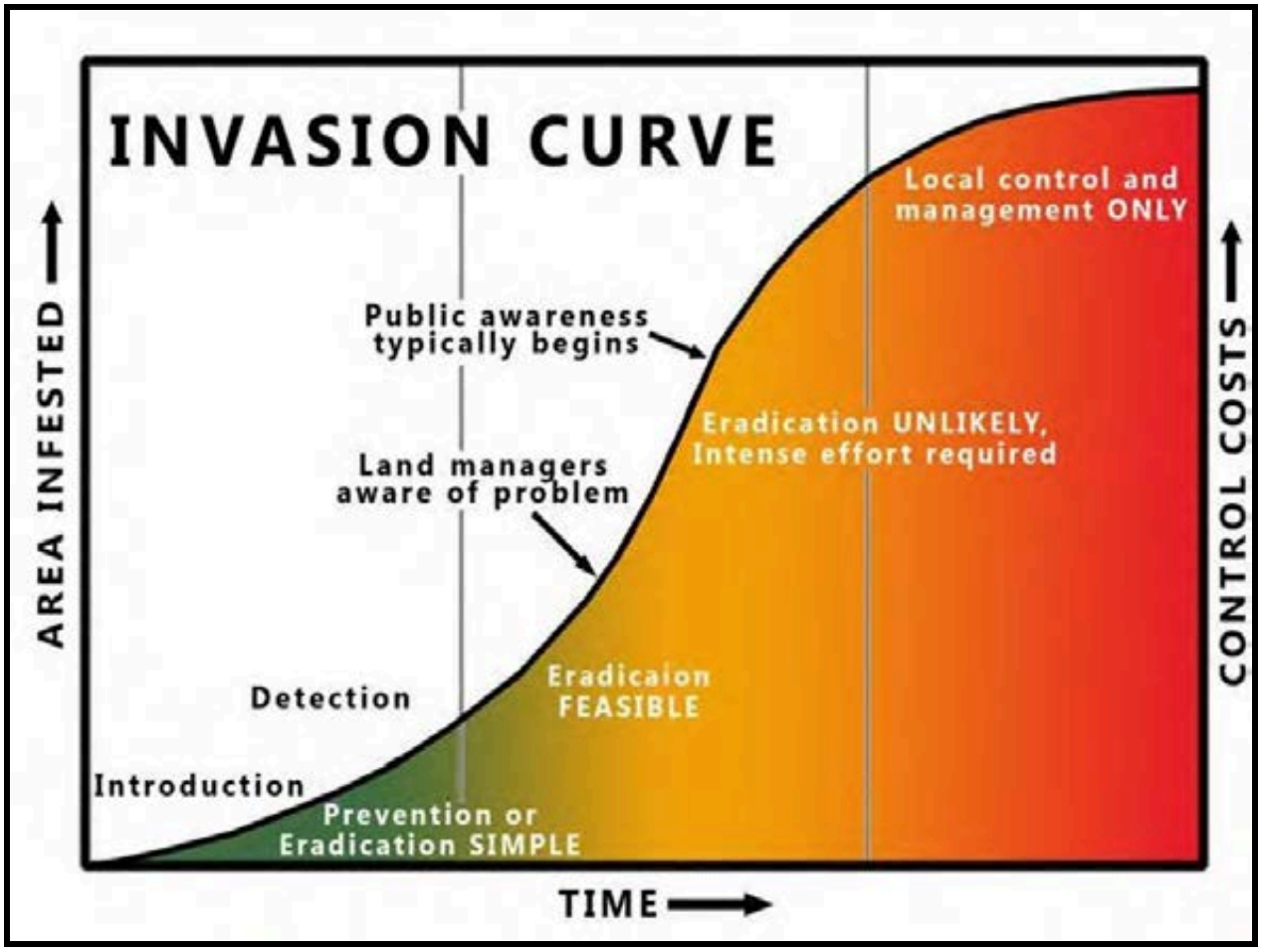

Figure 3: Invasion Curve as Depicted by the UC-IPM Program. (UC-IPM 2016).

Specific Species Characteristics

PAVAs position as a rhizomatous grass associated with wetlands lends several difficulties in terms of differentiation. Various species characteristics require careful examination and a trained eye to differentiate between native and non-native species in which Seashore Paspalum may grow sympatrically. PAVA can be easily confused with multiple common rhizomatous and stoloniferous grasses, with the most common misidentifications including Bermuda grass (*Cynodon dactylon),* Saltgrass (*Distichlis spicata)*, Knotgrass (*Paspalum distichum*), and other crowngrasses (*Paspalum spp.)*. All of the former species are known to inhabit the San Diego Creek Watershed. Importantly, inflorescences are necessary for credible identification. The following traits are the most definitive for determining the identity of PAVA. Identification should be with multiple traits instead of relying on one or the other:

1. Known to occur in estuarine, freshwater, and saltwater habitats.
2. Forms exclusion monocultures; growth habit is often thick and turf-like. It grows through both stolons and rhizomes. (Separates other crowngrasses)

3. Monocultures are notably thick, and stands appear closer to carpets than individuals comprising a colony. (Usually separates Bermuda grass)
4. Inflorescence is a raceme, not a spikelet. (Separates Saltgrass)
5. Spikelets are entirely glabrous (hairless), inflorescence is 2(3)-branched, spikelets are in two rows, membranous ligules, dense hairs along ligules, and seeds are smooth. (Glabrous spikelets will separate from native Knotgrass, which is only helpful if a small number of individuals are present).

Regarding reproduction, Seashore Paspalum is known to primarily spread vegetatively. With poor self compatibility, the seeds produced are often inviable. Seashore Paspalum is particularly resistant to seasonal inundation (flooding), tolerant to a broad range of salinity levels, and endures high levels of sediment deposition (Riefner *et. al*., 2010). Furthermore, PAVA possesses modified roots with structures known as aerenchyma, which allow for efficient and aggressive colonization of anoxic soils.

PAVA is not known to be particularly sensitive to seasonal or environmental changes. The plant adopts a C4 pathway for photosynthesis, which allows for pseudo-dormancy during subtropical winters and warm season growth during summers. A wide pH tolerance, high sun requirement, and ability to expand to a litany of soil types means that the plant can easily spread to areas with sufficient water availability. Overall, the complete eradication of this plant is an absolute priority due to the dangers it poses to ecological functions and NTS integrity.

Mechanical and Hand Removal

As suggested, mechanical and hand removal has led to the deleterious spreading and propagation of new individuals throughout both NTS sites where Seashore Paspalum has been identified. PAVA spreads through flooding habits, grazing practices, mechanical removal, and other methods where breakage of the plant is encouraged (Riefner *et al*. 2008). Under no circumstances should this plant be disturbed to facilitate plant spreading. The proximity of the two sites where the plant has been identified (LACB B & Los Olivos S) suggests that maintenance removal activities could have played a role in vector transmission. As clearing aquatic vegetation is a common task, it is plausible that rhizome breakages harbored on boots and tools could have occurred and propagated through the water.

Chemical Removal

The only approved method for removing Seashore Paspalum should be through responsible chemical herbicide use. Because of the plant's estuarine habits and presence in NTS basins, only aquatic herbicides (including adjuvants) actively registered under the California Department of Pesticide Regulation (DPR) are permitted to control vegetation spread in California water bodies of any kind. Furthermore, applications should conform to all label instructions for the specific region and site.After thorough checks with current literature, professional opinions, and historical precedent, EES recommends the following herbicides, with formulations described below: Glyphosate & Impazapyr (Table 1).Proper herbicides should be purchased with specific chemical codes in mind, as some herbicides have similar names that are no longer registered in the State of California. If listed herbicides are not chosen, the QAL should be present to approve

the brand chosen. Applicators should follow low-volume methods to mitigate harm to the surrounding sensitive habitat.

<table>
<tr><th colspan="2">Aromatic Amino Acid Inhibitor</th></tr>
<tr><td>Glyphosate
Aquamaster Herbicide
(524- 343-ZH)
Nufarm AquaNeat
Glyphosate
(228-365-ZA)</td><td>Application Volume (%) to Use-Case to Method
<table>
<tr><td>0.75%</td><td><table><tr><th>Preliminary</th><th>Secondary</th></tr><tr><td>High Risk Aquatic Habitat</td><td>High Risk Aquatic Habitat</td></tr></table></td><td>Backpack Sprayer</td></tr>
<tr><td>1%</td><td><table><tr><th>Preliminary</th><th>Secondary</th></tr><tr><td>Low Risk Aquatic Habitat</td><td>Low Risk Aquatic Habitat</td></tr></table></td><td>Backpack, Hand Sprayer</td></tr>
<tr><td>1.5%</td><td><table><tr><th>Preliminary</th><th>Secondary</th></tr><tr><td>Moderate Risk Terrestrial Habitat</td><td>All Terrestrial Habitat*</td></tr></table></td><td>Backpack, Hand Sprayer*</td></tr>
<tr><td>2.0%</td><td><table><tr><th>Preliminary</th><th>Secondary</th></tr><tr><td>Low Risk Terrestrial Habitat</td><td>-</td></tr></table></td><td>Hand Sprayer</td></tr>
</table></td></tr>
<tr><td colspan="2">Remarks: Ideal for general terrestrial applications, Glyphosate is quite versatile in its usage throughout invasive management. Generally recommended to focus on applying this chemical on terrestrial habitats for best results, however listed formulations are approved for aquatic use as well. Application may or may not be negatively impacted by inundation. To avoid</td></tr>
</table>

complications, ensure that application is during the growing season, and past major flood opportunities. An asterisk is applied to indicate that secondary treatment with 1.5% volume Glyphosate should only be performed with a hand sprayer.

Branched-Chain Amino Acid Inhibitor

Imazapyr
Alligare Imazapyr 4SL
(81927- 24-AA)

Application Volume (%) to Use-Case to Method

1.0%	**Preliminary**: High Risk Aquatic Habitat **Secondary**: Moderate to high risk aquatic habitat	Backpack Sprayer
1.5%	**Preliminary**: Low Risk Aquatic Habitat **Secondary**: Low Risk Aquatic Habitat*	Hand Sprayer*, Backpack Sprayer

Remarks: Imazapyr is generally regarded to have relatively low application utility outside of aquatic environments. For best results, apply within aquatic herbicides. Application is not negatively impacted by inundation. An asterisk is applied to indicate that secondary treatment with 1.5% volume Imazapyr should only be performed with a hand sprayer.

Mixed Use

Glyphosate and Imazapyr
(Hand mix previous brands together)

Application Volume (%) to Use-Case to Method

1.5%	**Preliminary**: All aquatic instances of PAVA. **Secondary**: Only aggressive instances of recolonizing PAVA (reforming mats)	Hand Sprayer, Backpack Sprayer

Remarks: Misapplication may lead to higher than normal residuals that will negatively impact plant life. Usage should solely be restricted to heavy aquatic infestations, whether they are preliminary or secondary.

Table 1: Details on Suggested Herbicides for Application, Brands and Use-Cases Included

Glyphosate

Glyphosate is a broad-spectrum post-emergence herbicide, particularly notable for its efficacy on a broad range of plants. It is a systemic herbicide, which inhibits plant growth by blocking amino acid production in the plant (SFEI, 2005). The chemical formulation of interest is Glyphosate IMA (Glyphosate and isopropylamine salt), due to its common usage in aquatic environments(UCANR, 2024). When using Glyphosate formations equipped for aquatic usage according to the label instructions, there is minimal impact on avian, herpeto-faunal, mammalian, and fish species. Furthermore, any presence of glyphosate not applied to the plant directly is either adsorbed into soil particles or quickly undergoes photolysis (SWRCB, 2013). Application concerns are instead found to be primarily with added adjuvants, which are known to be deleterious to local ecologies depending on the type.

Thus, a low-volume (hand spray or backpack sprayer) treatment of an aquatic formation of glyphosate is ideal. Chosen brands included in the above figure are registered actively with the California DPR, with adjuvants considered. Effective control calls for a 0.75-2.0% solution concentration in aquatic environments for hand-held equipment. In sensitive environments where herbicide drift is a high risk, the applicator should aim for a lower percent application.Circumstances where PAVA is growing in a mainly terrestrial environment warrant the use of a 1.5-2.0% volume rate.

Imazapyr

Imazapyr is another broad-spectrum herbicide, often used for pre-emergent and post-emergent purposes. Classified as an ALS herbicide, it acts much slower in its amino acid inhibition. Due to slow plant metabolization, it may be several weeks before major dieoff occurs. When sprayed, imazapyr will leave notable residuals that nearby plant roots will subsequently absorb. Accordingly, caution is necessary to avoid overspray Nevertheless, the ecological impacts of imazapyr are relatively controlled and well documented. Once it enters the water column, the chemical undergoes rapid photolysis and degrades within 4 days. No residuals have been found in long-term sediment analysis, nor does the formulation indicate any significant impacts on water quality. Studies suggest that imazapyr is practically non-toxic to birds and mammals, with a range of slight toxicity to non-toxic levels in invertebrates and fish. Furthermore, it is practically non-toxic to bees (UCANR, 2024).Therefore, a low-volume (hand spray or backpack sprayer) treatment of an aquatic formulation of imazapyr is ideal. See the above figure for recommended brands with approved formulations. Effective control advises a 1-1.5% solution concentration. Backpack sprayers should aim for a lower concentration of imazapyr to avoid overspray; hand spraying may warrant a concentration at the higher end of the recommended range.

Glyphosate and Imazapyr Mixture

Often, control of aquatic rhizomatous grasses and other graminoids incorporates a mixture of the two aforementioned products to produce a far more efficient result. Studies in the control of cogongrass (*Imperata cylindrica)*, Reed Canary Grass (*Phalaris sp.)*, Cordgrass (*Spartina spp.)*, Giant Reed (*Arundo donax),* and Common reed (*Phragmites australis ssp. australis)* have yielded efficient and long-term control of colonies compared to either single product (GLPC, 2023; Minnesota Board of Water and Soil Resources, 2016; Mozdzer et al., 2008; UCANR, 2024; UCANR, 2024). A study by weed biologist Dr. Brent Sellers identified a significant reduction of reestablishment in a group of similar rhizomatous grasses, where biomass was incapable of recovering at the same rate as either glyphosate or imazapyr individually (Sellers et al., 2008). Furthermore, monitoring periods were reduced to a timeframe of once a year on colonies, as opposed to two for glyphosateThe ultimate risk of this combination is poor control of herbicide volume, allowing for excessive residuals and drift from overspray. Even with perfect technique, there may remain a minor risk of desired root uptake by other plants.Proper precautions should minimize that concern. Therefore, a conservative mixture should be used to control PAVA. The total volume should add up to 1.5% of both chemicals (glyphosate and imazapyr), with each respective volume being 0.75%.. This helps to ensure minimal risk of collateral damage to nearby native plants while increasing the solution efficacy.

Preferred Herbicide

Because toxicity is not an issue for either identified chemical, there is no particular preference over the other. However, especially in NTS basins, reducing traffic, herbicide usage, and waterway contamination is the ideal goal for management. Thus, decisive and minimal application with a mixture is ideal and ultimately recommended. As well, due to the small area total herbicide is being applied to, cost should remain a consideration.

In preliminary aquatic control, EES recommends the hand-mixed formulation of glyphosate and imazapyr. This is to aid in the initial control and decay of established PAVA mats while accounting for costs incurred by the applicator. Casual monitoring may occur with the monthly surveys done by EES;however, an official observation should be made at least once a year after the initial treatment of the above product.

In terrestrial or secondary control, the applicator may elect to choose any of the three options, depending on the context. For terrestrial control, usage of the aquatic formulation of glyphosate is ideal, due to imazapyr’s limited applications on soil. For secondary aquatic control, minor infestations may be treated with a low concentration of either glyphosate or imazapyr. If aggressive aquatic recolonization occurs,, it is recommended that the area be retreated using the mixture.

Any time the formulations discussed are applied to PAVA, a non-toxic blue dye must be added to track the evenness and quantity applied. Furthermore, application of any of the herbicides must occur during the active growing season. For large mats, an evenly distributed cover should be slowly applied across the surface. There should be limited to no drip from the mats into the surrounding water. For small colonies of aquatic individuals or terrestrial stands, plants should be

covered by at least half, with 100% coverage ideal. There should be no dripping from the plant once finished.

Recommendations

Left unchecked, Seashore Paspalum poses a high threat of complete colonization throughout waterways. As opposed to other forbs in the NTS basins, monoculture mats of PAVA may choke out entire waterways, actively prevent water flow, and increase stagnation to a degree previously unseen. To prevent this, Endemic staff recommends the immediate cease of all mechanical control of *Paspalum* mats. Accordingly, any crews in charge of vegetation management in contaminated sites should ensure that they thoroughly brush and clean all tools and surfaces where rhizomes can be distributed (i.e. before and after entering an NTS site). Furthermore, chemical removal should be the primary and most urgent goal.

Not only will land managers benefit the overall county through performing this EDRR, but IRWD will eliminate the risk of significant damage to the constructed wetlands and basins by extirpating this plant. The introduction and establishment of *Paspalum vaginatum* highlights the pressing need for comprehensive floristic monitoring of wetland communities in southern California's rapidly urbanizing regions, including NTS basins. Early detection of emerging invasive plants can help mitigate their effects on biodiversity and ecosystem functions while reducing the substantial costs associated with their control and eradication. Successful management of these infestations will require coordinated efforts among land managers, botanists, and the broader public.

Endemic recommends the usage of a chemical 'cocktail' of 1.5% volume imazapyr and glyphosate, at a low volume rate for initial aquatic treatment. A blue dye should be incorporated in all treatments (aquatic or terrestrial) to ensure that herbicide drift risk is reduced. Furthermore, no adjuvants should be added without approval from a qualified and licensed biologist. All staff who work in the NTS basins should be made aware of the presence of this plant, as well as advised to report any new occurrences. It is recommended that all involved parties be competent in identification of *Paspalum vaginatum* and its various forms throughout the watersheds it infests. Finally, for all technicians who perform vegetation management, thorough care should be taken to avoid further distribution of rhizome fragments, with a boot brush being used before and after entering an NTS basin.

Please contact Luma Fowler at (949) 943-9664 or luma@endemicenvironmental.net for any questions regarding specific application instructions that require approval by a QAL.

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MEMORANDUM

Date: November 27, 2021

To: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

From: Barry Nerhus, President, Endemic
1100 West Arroyo Drive
Fullerton, CA 92833

Subject: Chemical Pesticide Treatment Justification for Pampas Grass

This memorandum documents the results of treatment methods for pampas grass (*Cortaderia selloana*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. In 2021, biologists with Endemic Environmental Services Inc. (Endemic) identified pampas grass growing in NTS basins as part of the IRWD Integrated Pest Management Plan Implementation Project (project). In subsequent months, Endemic biologists discovered it in additional NTS basins.

Pampas grass is a perennial grass-like herb in the Poaceae (grass) family and native to Argentina, Brazil, and Uruguay where it grows in moist conditions in riverine areas (Lean, 2021). This large, densely tufted perennial grass with feather-like inflorescence is located in coastal and inland areas of California and Oregon, and Utah. Pampas grass is a fast-growing grass that develops large clump in disturbed areas, dunes, bluffs, roadsides, and logged forests influenced by fog and maritime conditions, as well as inland riparian areas, marshes, and shrub lands that receive sufficient moisture (UC Davis, 2013).

ORIGIN

It was brought to California as a landscape ornamental and for erosion control but has since escaped cultivation and become a noxious weed in native habitat. It is believed pampas grass was introduced in California in 1848 at nurseries in Santa Barbara, California. Commercial cultivation of the plant began in California in 1874. In the 1890s, nurserymen near Santa Barbara were the primary commercial producers of pampas grass as ornamental plants. In 1946, the Soil Conservation Service throughout Ventura and Los Angeles counties planted pampas grass for

dryland forage and to prevent erosion (DiTomaso et al.1999). Pampas grass continues to be used as an ornamental in California gardens, and it can live for over a decade.

CHARACTERISTICS

Pampas grass (*Cortaderia selloana*) are tall, densely tufted perennial grasses with long, erect basal leaves and showy, feather-like inflorescence. A pampas grass plant grows as high as 6-13 feet and spreads to about 6 feet wide, which is a significant area for a grass plant. The long leaves of the grass are sharp-edged, and the stems are rigid. The fluffy plumes grow to 1-3 feet and are white, light silvery, or light pink. Female plants have lighter plumes than males. Historically, the female plants were considered more attractive and therefore the focus of cultivation. Pampas grass has long, deep, fibrous roots that grow laterally from shallow rhizomes. The root system grows quickly making it difficult to eliminate the plant. If it cuts down, the roots regrow in a matter of weeks (UC Davis, 2013).

An individual pampas grass stand can produce millions of seeds annually that travel many miles by wind and birds (CDFW, 2021). Seeds usually survive for less than 6 months and can become established without fertilization. Seedling growth occurs well on sandy soil and exposed road cuts, but typically require a cool, foggy climate and moist soil. Germination occurs after the first rains and continues through spring. Seeds are produced sexually and flowers within 2-3 years after germination. The species is dioecious; the flowers of only one sex occur on an individual plant. Flowering usually occurs from late August through September, but occasionally in winter (DiTomaso et al., 1999). These grasses are very tolerant of intense sunlight, drought, and frost. They are very efficient at establishing in many habitat types. Pampas grass is flammable; as the leaves dry, they are ready fodder for a fire.

Invasive plants such as pampas grass displace native plants and create habitats that are lower in biodiversity. Furthermore, pampas grass has leaf blades that are undesirable as food or shelter to birds and other wildlife, and can cause physical harm to animals, and humans, because the leaves are extremely sharp.

MECHANICAL REMOVAL

Mechanical removal is necessary for pampas grass due to the high accumulation of biomass in the established stands. Hand-weeding pampas grass is effective removal for seedlings. Use of a pulaski (axe on one end and hoe on the other), mattock (pick on one end and hoe on the other), and/or long-bladed shovel are effective for removal of established clumps of the plant. It is important to remove the entire crown and top section of the roots to prevent resprouting. Regrowth from the lower roots isn’t anticipated. To prevent re-rooting of detached plants left lying on the soil surface under moist soil conditions, turning the clump upside down so the roots are exposed to the air is recommended. To expose the base of the plant, allow better access for removal of the crown, and make disposal of the removed plant more manageable, a large chainsaw or weed eater has been shown to work. (Cal-IPC and UC Davis WEED Research & Information Center). To prevent seed dispersal of pampas grass during the growing season, cutting, collecting, bagging, and removal of the pampas grass inflorescence is effective (Lean, 2021).

Seedling survival is low in shaded areas or in competition with grasses or sedges. Therefore, using mulches in disturbed sites can prevent pampas grass infestations. Ideally, hydroseeding disturbed sites with desirable vegetation can hinder the establishment of pampas grass seedlings.

CHEMICAL REMOVAL

Cal-IPC provides guidance for eradication of pampas grass with herbicide. Spot treatment with a post-emergence application of a glyphosate herbicide at about 2 percent solution or 8 qts/100 gal is recommended for effective control. Addition of a non-ionic or silicone-based surfactant may enhance foliar penetration of the herbicide. Plants should be sprayed to wet but not to the level of herbicide runoff. Control is achievable in the first season with spot applications where necessary to prevent rapid reestablishment. Fall applications result in better control compared to summer applications. It may be necessary to apply the herbicide prior to seed maturation if viable seeds. Although studies were conducted on jubatagrass, low-volume (20 gal/ac) treatment with glyphosate at 4 percent is also expected to produce good control of pampas grass. Rope wick applications of glyphosate have also proven effective. Other registered post-emergence herbicides useful for control of *Cortaderia jubata*, may also be effective in the control of pampas grass. For large clumps, the top foliage can be removed by cutting or burning and the regrowth treated with a systemic post-emergence herbicide.

RECOMMENDATIONS

The California Invasive Plant Council (CAL-IPC) lists pampas grass as an invasive species with a “high” rating, having severe ecological impacts on native habitat. Endemic staff recommends both mechanical and chemical removal of the species from IRDW’s NTS sites. Literature review supports this conclusion.

Endemic recommends the use of mechanical and chemical removal of pampas grass to adequately eradicate the plant. A variety of tools discussed in the Mechanical Removal section above are effective at removal. To expose the base of the plant, allow better access for removal of the crown, and make disposal of the removed plant more manageable, a large chainsaw or weed eater has been shown to work. To prevent seed dispersal of pampas grass during the growing season, cutting, bagging, and removal of the pampas grass inflorescence is recommended.

Herbicides are commonly used to limit pampas grass growth. In this method, the grass is cut near the base of the clumps, and herbicide is applied to stop the grass from growing again from the clumps (Lean, 2021). Application of prioritized chemical herbicides should be conducted in a manner that avoids disturbance to installed and recruited native species to the fullest extent practicable. Herbicide application to pampas grass during fall with spot treatment thereafter is effective in reducing cover. Control is achievable in the first season with spot applications were necessary to prevent rapid reestablishment.

It is advisable to remove the plants before they develop mature seeds. Post-emergent herbicide applications applied in fall, after flowering when translocation of herbicide to base of tillers and rhizomes is at its peak is recommended by UC Davis Weed Research & Information Center for

effective eradication of pampas grass. Any herbicide applications to pampas grass stands should be performed by a licensed commercial applicator.

Please contact Barry Nerhus at (714) 393-6249 or Luma Fowler at (949) 943-9664 if you have any questions regarding these recommendations.

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MEMORANDUM

Date: March 23rd, 2024

To: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

From: Luma Fowler, Restoration Director

Subject: Chemical Herbicide Treatment Justification for Cattail and Bulrush

This memorandum evaluates the results of treatment methods for cattail (*Typha spp.*) and bulrush (*Schoenoplectus californicus*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. Historically, biologists from Endemic Environmental Services Inc. (Endemic) surveyed NTS basins as part of the IRWD Integrated Pest Management Plan Implementation Project (Project), and identified stands of cattail and bulrush growing in a majority of the basins.

Cattails are perennial aquatic plants that form dense colonies in shallow waters in a variety of wetland habitats. The most widespread cattail species is the common cattail (*Typha latifolia*) which commonly occurs in freshwater marshes, estuaries, streams, drainage ditches, and the margins of ponds and lakes. This species provides several ecosystem services including habitat and food source for wildlife, erosion control, and promoting water quality via filtration of pollutants and toxins. California bulrush is a perennial herbaceous aquatic plant belonging to the sedge family. It commonly occurs alongside cattails forming dense wetland colonies and canopies. Like cattails, bulrush occur in similar habitats (e.g. brackish and freshwater marshes, estuaries, and ponds) and provide similar ecosystem services (e.g. streambank stabilization, wildlife food and shelter, and water filtration).

Endemic recommends the use of mechanical and chemical removal of cattails and bulrush to adequately manage the species. The bulk of the biomass should be removed to open up space for other native plant, avian, herpetofaunal, and fish species, while leaving a small amount to grow back over time. Leaving a small amount of cattail and bulrush biomass in the water body will retain the beneficial ecosystem services of the plants. A variety of tools discussed in the Mechanical Removal section below are effective at removal of the top portion of the plant, while the herbicide is capable of foliar translocation to the root system for sustained control.

Origin

Cattails (*Typhus spp.*) and bulrush (*Schoenoplectus californicus*) are native to California.

Specific Species Characteristics

Both species grow in wetlands with many individuals having root balls submerged in the water. They are both rhizomal species that expand through vegetative rhizomes, but also propagate via sexual reproduction. *Cattail*

Cattail seedlings have a cotyledon that is filamentous and curved, which is surrounded by upright, light green, and fast growing leaves. As a mature plant, cattails can reach 5 - 10 feet in height. Near the top of this plant is the characteristic "cigar-shaped" brown flower cluster or fruit. This fruit has a velvety texture and holds a cluster of wind-dispersed seeds that open when the plant is mature. Right above the fruit is the spear-like end of the plant's leaves. These dense, stiff leaves provide excellent shelter for birds that often use cattail leaves to build nests. Prevention of soil erosion, absorption of excessive nutrients and toxins, and underwater habitat for various aquatic species are all possible due to this species' extensive rhizome systems.

California Bulrush

Mature bulrush can reach heights of 5 to 8 feet and are recognized by their slender, v-shaped blades that cover their long stems. Bulrush flowers are arranged as a spikelet and resemble ruddy-colored scales. Bulrush are capable of clonal growth and aggressively spread and occupy suitable habitat via extensive rhizome structures. As a result, bulrush can establish in new areas quickly, making management a priority.

Mechanical and Hand Removal

Under ideal conditions, both cattail and bulrush can rapidly grow and spread. To properly control this growth, one needs to disrupt the rhizome root systems. Hand removal is an effective option. However, this manner of removal is best when shoots are young, rather than fully mature. To successfully remove them, grab the base of the plant and pull slowly until the white root is exposed and out of the soil. Discard the plant onshore and repeat. Although this method is effective, it can be time consuming and labor intensive.

Another effective method is mechanical removal by mowing and cutting with mechanical tools. To fully eradicate cattails and bulrush, one must cut the roots and completely remove the root ball from the soil and water. Simply cutting the leaves of these species will not prevent regrowth. Similarly with hand removal, this method is effective but is time consuming and demanding.

Chemical Removal

A more labor efficient method of cattail and bulrush removal is responsibly using chemical herbicides. However, only aquatic herbicides that are registered by the California Department of Pesticide Regulation (DPR) are permitted for use in controlling vegetation spread in California water bodies of any kind. Cal-IPC provides guidance for eradication and/or maintenance of cattails and bulrush with aquatic herbicide, the three most commonly used being glyphosate, imazamox, and imazapyr.

Table 1. Details on three commonly used aquatic herbicides in California: Glyphosate, Imazamox, and Imazypyr.

CHEMICAL CONTROL

The following specific use information is based on published papers and reports by researchers and land managers. Other trade names may be available, and other compounds also are labeled for this weed. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Aquamaster, Rodeo* and others	**Rate:** 3 to 4 qt product *Rodeo* or *Aquamaster*/acre (3 to 4 lb a.e./acre). Spot treatment: 2 % v/v. **Timing:** Postemergence, at flowering after heads are formed and before frost. **Remarks:** Glyphosate will not kill seeds or inhibit germination the following season. Glyphosate has no soil activity. Allow 7 days or longer before clipping or tillage. Flooding after herbicide application improved control in several studies. Adding a surfactant or emulsifier is recommended as cattails have a thick waxy coating on the leaf. Retreatment with herbicides is often necessary for complete control.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazamox *Clearcast*	**Rate:** 2 to 4 pt product/acre (0.25 to 0.5 lb a.i./acre) **Timing:** Postemergence, from new growth through killing frost. **Remarks:** Imazamox has mixed selectivity and controls several broadleaf and annual grass species. It is registered for control of vegetation in and around aquatic and non-cropland sites. It has irrigation and water use restrictions. Add a spray adjuvant, such as a methylated seed oil, to improve control.
Imazapyr *Habitat*	**Rate:** 0.5 to 2 qt product/acre (0.25 to 1 lb a.e./acre) **Timing:** Postemergence from boot to flowering. **Remarks:** *Habitat* is registered for aquatic use. Also effective following early season mowing and/or disking. It is a nonselective herbicide. Imazapyr has long soil residual activity and may leave more bare ground than other treatments, even a year after application. Add a spray adjuvant. Do not apply in the root zone of desirable trees.

Glyphosate

Spot treatment with a post-emergence application of a glyphosate herbicide, such as Rodeo, at about 2 percent solution or 8 qts/100 gal is recommended for effective control. This is an effective herbicide chemical because of the foliar translocation property. Plants should be sprayed to wet, but not to the level of herbicide runoff. Control is achievable in the first season with spot applications where necessary to prevent rapid re-establishment. Success has also been seen with the stem injection application of glyphosate herbicide. This may be a better method for these purposes in order to keep surrounding habitat contamination levels low (GLPC, 2023).

Imazamox

In 2012, the DPR registered imazamox for application in aquatic environments. Past studies have found imazamox to be highly effective in reducing invasive aquatic plant species, as it has the ability of moving through the xylem and phloem of the plant, disrupting its water and nutrient transfer processes. More specifically, studies have gathered evidence pointing to the 2,4-d herbicide being especially effective against cattail species (*Typha sp.*), and imazamox was also found to cause little to no damage to other plant species surrounding the cattails (Rogers &

Black, 2012). One study in particular by LeeAnn M. Glomski for ACRP in 2013 revealed that applying imazamox alone through foliar spraying as a 2-5% solution proved to be the most effective for unwanted plant species removal. Similar to the Rogers & Black study in 2012, Glomski also found that imazamox was safe to use around surrounding native vegetation, including hardwoods. Clearcast is the current industry standard in imazamox-based aquatic herbicides for plant species such as cattails and bulrush.

Imazapyr

Imazapyr is similar in make-up to imazamox, but has been found to be less effective and so will not be further considered here (Glomski, 2013).

Preferred Herbicide

According to the United States Environmental Protection Agency (USEPA), though it is a small difference, glyphosate-based herbicides have been found to be less toxic to avian, herpetofaunal, mammalian, and fish species than 2,4-d herbicides such as imazamox. Glyphosate is considered slightly non-toxic to wildlife, while imazamox is considered to be moderately toxic. As a result, glyphosate-based herbicides appear to be the best choice for managing overgrowth of cattails and bulrush in the NTS sites.

Recommendations

According to a study by Apfelbaum for Applied Ecological Services and Cornell University, cattail and bulrush are both native species that inhabit wetland areas, but left unchecked can outcompete other native plant species, reduce water flow, and cause issues to the health and stability of wetlands. Endemic staff recommends prioritizing mechanical removal, and employing chemical removal as a last resort for these species in order to effectively manage the Irvine Ranch Water District NTS sites.

The removal of cattail and bulrush overgrowth will not only restore a healthier level of water and nutrient flow to the ecosystem, but will create space for other species populations to attain higher levels of recruitment and cover. This will push these habitats away from an unstable monoculture and toward a more diverse and stable ecosystem. A study by Solberg and Higgins in 1993 found that using glyphosate-based herbicide to manage cattail populations not only proved very effective, but also led to a rise in avian species abundance in the area due to the increase in habitat space. This study was recently complimented in an experiment by Hill et al. in 2023 whose findings showed a significant increase in waterfowl abundance following the chemical reduction of overgrown cattail colonies.

Endemic recommends the use of mechanical and chemical removal of cattails and bulrush to adequately manage the species. Each site should be assessed independently in order to reduce herbicide usage and increase effective vegetation management. The bulk of the biomass should be removed to open up space for other native plant, avian, herpetofaunal, and aquatic species, while leaving a small amount to grow back over time. Leaving a small amount of cattail and

bulrush biomass in the water body will retain the beneficial ecosystem services of the plants. A variety of tools discussed in the Mechanical Removal section above are effective at removal of the top portion of the plant, while the herbicide is capable of foliar translocation to the root system. It is generally recommended that glyphosate-based herbicides be applied to new shoot growth, between June and November, though the best time in this case would be after nesting bird season ends between mid September and November. The best results will come from performing a mass mechanical cutting or mowing of the cattail and bulrush colonies, allowing shoots to regrow to a height of around 5 feet, and then applying the herbicide to the bases of these new shoots (GLPC, 2023). Relying on mechanical methods alone will lead to the unnecessary and at times unavoidable damage of native plant cover, while relying on chemical methods alone will lead to the increased risk of watershed and wildlife contamination. Utilizing both mechanical and chemical methods significantly reduces the likelihood of further overgrowth of cattails and bulrush when compared to a singular method strategy, and is both more time and labor efficient.

Please contact Barry Nerhus at (714) 393-6249 or Luma Fowler at (949) 943-9664 if you have any questions regarding these recommendations.

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MEMORANDUM

Date: March 10, 2022

To: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

From: Barry Nerhus, President, Endemic
1100 West Arroyo Drive
Fullerton, CA 92833

Subject: Chemical Pesticide Treatment Justification for Artichoke Thistle

This memorandum documents the results of treatment methods for artichoke thistle (*Cynara cardunculus*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. In 2021, biologists with Endemic Environmental Services Inc. (EES) identified artichoke thistle growing in NTS basins as part of the IRWD Integrated Pest Management Plan Implementation Project (Project). In subsequent months, EES biologists discovered it in additional NTS basins as well.

Artichoke thistle is a large perennial thistle in the Asteraceae (sunflower) family that is originally native to the western and central Mediterranean region, where it was domesticated in ancient times and still occurs as a wild plant (DiTomaso, et al. 2013). This large perennial is closely related to cultivated artichokes (*Cynara scolymus*), however the artichoke thistle (*Cynara cardunculus*) is considered an invasive weed in both California and Australia. Artichoke thistle can be found in coastal and inland areas of California, Oregon, and Washington. Growing up to 8 feet tall, artichoke thistle thrives in disturbed open sites within chaparral, coastal sage scrub and open riparian habitats (Cal-IPC 2021).

Origin

Originating throughout the Mediterranean, cultivated globe artichoke was introduced to North America as a horticulturally derived form of artichoke thistle. The artichoke and the cardoon, another horticultural derivative of artichoke thistle, have been cultivated for centuries for their edible phyllary bases and stems (Wiklund 1992). However, wild types of Cynara's (artichoke thistle) are invasive and considered a persistent pest plant along heavily disturbed open sites and overgrazed rangelands of California, South America, South Africa, and Australia (Kelly 1996).

CHARACTERISTICS

Artichoke thistle (*Cynara cardunculus*) has large, deeply pinnate-lobed leaves and can be 5-6 feet in height and 5 feet in diameter. The solitary large purple flowering heads have spiny phyllaries and are edible, similar to globe artichokes (*Cynara scolymus*). Cynara's have a large perennial tap root, from which the plant regenerates each year. The artichoke thistle grows well in several regions of California due to its Mediterranean-like climate, and it has become a problematic invasive species with increasing ranges in San Diego, Orange, and Los Angeles Counties. The artichoke thistle can also become a serious invasive in relatively undisturbed natural habitats such as coastal sage scrub, chaparral, and riparian woodlands (Cal-IPC 2021). The seeds can survive up to 5 years in the soil. The major ecological effects of the artichoke thistle are displacement of native vegetation and the continuing invasion of habitats occupied by sensitive plant species and communities.

MECHANICAL REMOVAL

Cal-IPC provides guidance for managing artichoke thistle with various methods. Mechanical removal could be a difficult method to utilize for eradication due to the thick taproots that if not removed properly will regenerate new shoots and regrowth. Hand removal can be difficult due to the spiny phyllary that can puncture through gloves and skin if not careful. Cutting flowers before maturity has been shown to successfully reduce seed production. Some crews have been able to slow the growth by cutting down dense patches with power tools and/or tractors before the flowers have reached maturity and then coming in to treat the regrowth and roots with herbicides (DiTomaso, et al. 2013). The removal of seed heads prior to digging up the root masses prevents viable seeds from potentially being released from the seed heads and reaching the soil.

Artichoke thistles are not significantly subject to biological control from herbivores like deer or livestock (cows or sheep); although the younger seedlings are sometimes eaten by rabbits. On the contrary, large stands of artichoke thistle often become a significant obstacle for wildlife movement and reduce the quality of habitat for local nesting bird populations (Thomsen 1986).

CHEMICAL REMOVAL

Cal-IPC provides guidance for eradication of artichoke thistle with herbicide. Spot treatment with a post-emergence application of a glyphosate herbicide at about 2 percent solution or 8 qts/100 gal is recommended for effective control. This is an effective herbicide chemical because of the foliar translocation property, which is able to reach the artichoke thistle's rich starchy taproots. Plants should be sprayed to wet but not to the level of herbicide runoff. Control is achievable in the first season with spot applications where necessary to prevent rapid reestablishment.

RECOMMENDATIONS

The California Invasive Plant Council (CAL-IPC) lists artichoke as an invasive species with a "moderate" rating. EES staff recommends both mechanical and chemical removal of the species as a means to effectively manage IRWD's NTS sites. Literature review supports this conclusion.

EES recommends the use of mechanical and chemical removal of artichoke thistle to adequately eradicate the plant. A variety of tools discussed in the Mechanical Removal section above are effective at removal of the top portion of the plant, while the herbicide is capable of foliar translocation to the root system. Utilizing both mechanical and chemical methods significantly reduces the likelihood of regrowth of artichoke thistle when compared to a singular method strategy.

It is strongly advised that the plants be removed before they develop mature seeds. The UC Davis Weed Research & Information Center recommends that post-emergent herbicide applications be applied in the fall after flowering. It is advised that the herbicide be applied at the base of the plant to facilitate the translocation of the large spiny stems into the fleshy taproot for effective eradication. Any herbicide applications to artichoke thistle stands should be performed by a licensed commercial applicator.

Please contact Barry Nerhus at (714) 393-6249 or Lyell Buttermore (908) 894-8955 if you have any questions regarding these recommendations.

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Wiklund A. The genus *Cynara* L. (Asteraceae-Cardueae), *Botanical Journal of the Linnean Society*, 1992, vol. 109 (pg. 75-123)

MEMORANDUM

Date: January 10, 2023

To: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

From: Barry Nerhus, President, Endemic
1100 West Arroyo Drive
Fullerton, CA 92833

Subject: Chemical Pesticide Treatment Justification for Herb of Grace (*Bacopa monnieri*)

This memorandum presents the findings on the treatment methods used for herb of grace or bacopa (*Bacopa monnieri*) within the natural treatment system (NTS) sites of the Irvine Ranch Water District (IRWD). In 2022, Endemic Environmental Services Inc. (Endemic) biologists identified herb of grace growing in the NTS basins as part of the IRWD Integrated Pest Management Plan Implementation Project (Project). Subsequently, the biologists discovered it in additional NTS basins.

Bacopa monnieri, a perennial herb in the Plantaginaceae (plantain) family, is typically found in the wetlands of southern and eastern India, Asia, Australia, North and South America. *Bacopa* is a genus of aquatic plant species, comprising as many as 100, which can be found throughout tropical and subtropical regions of the world. This herb has small succulent leaves, spreading branches, and small white flowers. It can grow rapidly into mats in marshy places, mangroves, riverbanks, coastal areas, and along streams and ditches often resulting in significant negative impacts on wetland ecosystems. To mitigate detrimental effects on wetland ecology and hydrology, the removal of herb of grace should be considered a top priority.

ORIGIN

Bacopa monnieri is a traditional Indian medicinal plant that is commercially valued for its health benefits which include memory and learning enhancement and anticancer properties (Sharma et al. 2016) In Ayurvedic medicine it has been used for centuries as a sedative and anti-epileptic, either alone or in combination with other herbs (Calabrese et al., 2008). Today, *Bacopa monnieri* is still widely revered as a revitalizing medicine and is often used in various herbal nutritional supplements (Aguilar, 2001). It is an aquatic herb that is found in tropical and subtropical locations worldwide (Aguilar, 2001). Although believed to have originated in tropical Asia, it can now be found throughout Asia, Africa, the Arabian Peninsula, the Iberian Peninsula, Australia, the Americas, and the Caribbean. Because of its high commercial value, it has been introduced to various locations and is now listed as an invasive species in Japan, Singapore, Spain, Portugal, the Cayman Islands, and California, where it has a high potential for invading sensitive ecosystems.

CHARACTERISTICS

Bacopa monnieri is a non-aromatic herb that can creep up to 50 cm in a loosely ascending, multi-branched pattern with rooting at its nodes. The plant has succulent, oblong leaves, which are arranged oppositely on the stem and are 4–6 mm (0.16–0.24 in) thick. The small white flowers are composed of four to five petals, are highly fertile, and propagate easily through silique growth patterns. Flowers of *Bacopa monnieri* often bloom from mid-spring through fall but can bloom year-round in more temperate climates. The plant is pollinated by insects and is extremely fertile, producing pods that hold an average of 62 seeds (Mathur & Kumar, 2001).

Bacopa monnieri requires an aquatic environment to grow and has adapted to grow well in brackish environments where the soil is poorly drained and waterlogged. This species can propagate by seeds and root cuttings, and although the seeds can grow with minimal water, they require sunlight to germinate, preferring high amounts of sunlight and access to ample water. Despite this preference, *Bacopa monnieri* has a high reproductive potential and has the capacity to significantly alter the ecology and hydrology of wetland ecosystems. Once established, *Bacopa monnieri* forms dense mats on and around bodies leading to the structural degradation of riverbanks, lake and pond edges, and coastal areas (Rojas-Sandoval, 2022). These dense mats also adversely affect native plants and animals by lowering water quality, water flow, oxygen availability, and increasing sedimentation, all of which detrimentally affect wetland ecosystems.

MECHANICAL REMOVAL

The California Invasive Plant Council (Cal IPC) provides no guidance on eradicating *Bacopa monnieri* using mechanical or manual removal methods. Because *Bacopa monnieri* can grow from both seeds and stem fragments, it flourishes in aquatic areas, as these are common means of spreading in waterways. New plants can develop rapidly from any piece of stem or root material containing a node (Prosea, 2017).

Mechanical removal is often necessary to control *Bacopa monnieri* due to the speed of propagation throughout waterways. Hand-pulling can be effective for pulling out large stands of *Bacopa monnieri*, as well as the use of various tools, such as a pulaski (axe on one end and hoe on the other), a mattock (pick on one end and hoe on the other), and/or long-bladed shovel. When mechanically removing *Bacopa monnieri* it is essential to remove the entire anatomy of the plant, including the roots, to prevent any resprouting from leftover nodes. When disposing or displacing detached plants it is important to avoid contact between the plant and moist soil to prevent resprouting. This is accomplished by turning the clump upside down so the roots are exposed to the air or by completely removing the root from the site.

Despite the benefits of mechanical removal, it is not the most effective means of removal and *Bacopa monnieri* can still spread vigorously, especially if all plant parts have not been completely removed from the site. Consequently, mechanical or hand removal can potentially prolong the eradication process, and are most effective when coupled with chemical removal methods.

CHEMICAL REMOVAL

A more effective removal method to provide long-term management solutions would be chemical treatment via herbicide. Currently, Cal-IPC does not provide any guidance or recommendations for the removal of *Bacopa monnieri* with herbicide, however research has indicated *Bacopa monnieri* is responsive to new arlypicolinate herbicide (Richardson et al.).

The Cal-IPC recommendations for the eradication of herb of grace with herbicide include spot treatment with a post-emergence application of a ~ 2 percent solution or 8 qts/100 gal concentration glyphosate herbicide. Adding a non-ionic or silicone-based surfactant may also enhance the foliage penetration capacity of the herbicide. When applying the herbicide, it is recommended that plants be sprayed until wet but not to the point of herbicide runoff. This approach has demonstrated that effective management of herb of grace is achievable within the first season of application, with additional spot applications when necessary to prevent any reestablishment. Comparatively, fall applications result in better control than summer applications. Additionally, it is recommended that herbicide be applied prior to seed maturation.

When administering herbicide, rope wick applications of glyphosate have also proven to be effective. It is recommended, for large clumps, that the top foliage be removed by cutting or burning and the regrowth treated with herbicide post-emergence. The herbicide active ingredients that have been successful in treating herb of grace include:

- Diquat
- Endothall
- Fluridone
- Imazapyr
- Florpyrauxifen-benzyl

It is important to be aware of the dangers of this chemical control method. The most notable of these include the risk of an oxygen depletion event following the herbicide treatment, which is caused by the decomposition of dead plant material and can result in the death of aquatic wildlife. If the body of water is heavily infested with weeds, herbicide could be used in sections, allowing each section to decompose for approximately two weeks before treating another section. Promoting aeration, especially at night, for several days after treatment may also help mitigate the risk of oxygen depletion.

RECOMMENDATIONS

To effectively control *Bacopa monnieri*, Endemic recommends using both mechanical and chemical removal methods to eradicate this plant. The mechanical removal section above discusses various tools and methods that are effective for this purpose. Chemical herbicides have been successful in removing *Bacopa monnieri* in applicable and related studies (Richardson et al.).

When applying chemical herbicide, it is important to avoid disturbing any native species that have been planted or naturally recruited. Initial herbicide treatment in the first season followed by subsequent spot treatment is recommended to reduce the cover and re-establishment of

Bacopa monnieri. Additionally, it is best to remove the plants before they develop mature seeds. Lastly, because *Bacopa monnieri* is an aquatic plant, the use of a near water approved herbicide is highly recommended. A herbicide containing Imazapyr as its active ingredient is a frequently used option since it has proven to be effective in treating similar species and is also approved for use near water. Any herbicide applications should be performed by a licensed commercial applicator. Please contact Barry Nerhus at (714) 393-6249 or Luma Fowler at (949) 943-9664 if you have any questions regarding these recommendations.

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MEMORANDUM

DATE: January 23, 2020

TO: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

FROM: Jessica Lieuw, Assistant Biologist, LSA

SUBJECT: Chemical Pesticide Treatment Justification for Bermuda Grass

This memorandum documents the results of treatment methods for Bermuda grass (*Cynodon dactylon*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. Bermuda grass is a species of perennial grass in the *Poaceae* family that is native to Africa and has been introduced as a turf grass or livestock forage in California but has become an invasive weed in some habitats. This species is a low-growing perennial that is difficult to control, as it often spreads through stolons and rhizomes. Non-chemical methods were tested for removal of the nonnative herb, which have proven unsuccessful in reducing infestations. Moving forward, LSA recommends the use of prioritized chemical pesticides to facilitate removal of Bermuda grass in order to maintain native habitat within the NTS sites.

NON-CHEMICAL REMOVAL

Beginning in September 2019, LSA biologists identified Bermuda grass growing in several of the 34 NTS sites surveyed as part of the IRWD Integrative Pest Management Plan Implementation Project (project). LSA biologists initially prescribed manual removal for the species. Manual removal for Bermuda grass involved hand pulling plants. Other non-chemical removal methods, such as withholding water or mulching, were not prescribed because the habitats were not amenable to these methods. Non-chemical removal methods were not effective in treating areas infested by Bermuda grass as new plants would regenerate from any leftover stolons or rhizomes.

RECOMMENDATIONS

Bermuda grass is listed by the California Invasive Plant Council as an invasive species, with a "Moderate" rating. As the infestations are not responding to non-chemical treatment methods, LSA recommends spot treatment with prioritized chemical pesticides as a management strategy for Bermuda grass. Literature reviews support the aforementioned experiential conclusion that it is difficult to control Bermuda grass by manual removal methods due to its tendency to regenerate from leftover stolons and rhizomes. Withholding water is often recommended as a treatment strategy for Bermuda grass; however, this strategy is not feasible within the NTS sites as the basins are designed to receive urban runoff. LSA biologists have determined that mulching and soil solarization would not be a feasible treatment method within the NTS sites, as infestations are distributed amongst areas that host desirable native species. Flaming would likely also be ineffective due to the rhizome system; flaming as a treatment method in Southern California's dry climate is

generally not recommended because of the possibility of brush fires. LSA has also determined that organic chemical control methods would not be effective as a treatment method for Bermuda grass because of the rhizome system. Organic control methods are best suited for newly emerged weeds and treat mainly above-ground biomass, which would not affect the roots of this species, thus allowing the plant to regenerate. Moreover, recent studies have revealed that organic pesticides can have a higher environmental impact than conventional pesticides, especially towards invertebrates. Application of prioritized chemical pesticides should be conducted in a manner that avoids disturbance to installed and recruited native species to the fullest extent practicable. Maintenance over the next few months (early in the growing season) will be most effective in reducing cover by Bermuda grass, as the species blooms from April to May.

Please contact Eric Krieg or Jessica Lieuw at (949) 553-0666 if you have any questions regarding these recommendations.

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

MEMORANDUM

DATE: February 7, 2020

TO: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

FROM: Jessica Lieuw, Assistant Biologist, LSA

SUBJECT: Chemical Pesticide Treatment Justification for Perennial Pepperweed

This memorandum documents the results of treatment methods for perennial pepperweed (*Lepidium latifolium*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. Perennial pepperweed is a species of flowering plant in the Brassicaceae family that is native to southeastern Europe and Asia and has been introduced in California where it grows as a weed in disturbed areas. This species is a perennial herb that thrives in seasonally wet areas or areas with a high water table. Plants reproduce from perennial roots or seed. Established perennial pepperweed plants develop an extensive root system that can spread up to 10 feet vertically and laterally, and are capable of producing new shoots from root segments. The root system is the foundation of this species' competitiveness and the major target of control efforts. Perennial pepperweed can quickly form large, dense stands that displace desirable vegetation. Populations easily spread along waterways, and once established this plant is persistent and difficult to control. Moving forward, LSA recommends the use of prioritized chemical pesticides to facilitate removal of perennial pepperweed in order to maintain native riparian habitat within the NTS sites and prevent accumulation of the seed bank.

NON-CHEMICAL REMOVAL

Beginning in September 2019, LSA biologists identified perennial pepperweed growing in a few of the 34 NTS sites surveyed as part of the IRWD Integrative Pest Management Plan Implementation Project (project). LSA biologists initially prescribed manual removal for the species. Manual removal for perennial pepperweed involved pulling individual plants. Other mechanical removal methods, such as tillage or mowing, were not prescribed because the habitats were not amenable to these methods. Perennial pepperweed plants were observed regenerating from portions of the root left in the soil. Furthermore, IRWD personnel have extensive past experience managing perennial pepperweed in the San Joaquin Marsh, and have noted that manual removal methods were not effective.

RECOMMENDATIONS

Perennial pepperweed is listed by the California Invasive Plant Council as an invasive species, with a High rating. As the infestations are known to be difficult to control with mechanical methods and typically require multiple applications of chemical pesticides for full control, LSA recommends spot treatment with prioritized chemical pesticides as a management strategy for perennial pepperweed.

Literature reviews indicate that it is difficult to control perennial pepperweed by hand-pulling past the seedling stage, as plants can regenerate from root fragments as small as one inch. Mowing, mulching, and soil solarization are not effective treatment strategies due to the species' root system and presence of neighboring native species. Flaming is also ineffective due to the root system and perennial nature of the plant. LSA has also determined that organic chemical control methods would not be effective for perennial pepperweed as this species has such an extensive root system. Organic control methods are best suited for newly emerged weeds and treat mainly above-ground biomass, which would not affect roots of this species, thus allowing the plant to regenerate. Moreover, recent studies have revealed that organic pesticides can have a higher environmental impact than conventional pesticides, especially on invertebrates. Due to the highly invasive nature of perennial pepperweed, it is imperative to manage small invasions before they become established. Chemical pesticides are the most effective method to control infestations. Application of prioritized chemical pesticides should be conducted in a manner that avoids disturbance to installed and recruited native species to the fullest extent practicable. Maintenance before individual plants flower will be the most effective way to reduce cover and prevent accumulation of the seed bank.

Please contact Eric Krieg or Jessica Lieuw at (949) 553-0666 if you have any questions regarding these recommendations.

MEMORANDUM

DATE: January 23, 2020

TO: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

FROM: Jessica Lieuw, Assistant Biologist, LSA

SUBJECT: Chemical Pesticide Treatment Justification for Spanish False Fleabane

This memorandum documents the results of treatment methods for Spanish false fleabane (*Pulicaria paludosa*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. Spanish false fleabane is a species of flowering plant in the *Asteraceae* family that is native to Europe and has been introduced in California, where it grows as a weed in damp, disturbed areas. This species is an annual or perennial herb with a rhizomatous root system and an inflorescence that bears many flower heads. Multiple non-chemical methods were tested for removal of the nonnative herb over several months, which have proven unsuccessful in reducing infestations. Moving forward, LSA recommends the use of prioritized chemical pesticides to facilitate the removal of Spanish false fleabane in order to maintain native riparian habitat within the NTS sites.

NON-CHEMICAL REMOVAL

Beginning in September 2019, LSA biologists identified Spanish false fleabane growing in more than 20 of the 34 NTS sites surveyed as part of the IRWD Integrative Pest Management Plan Implementation Project (project). Literature reviews of Spanish false fleabane did not indicate any established management strategies. Thus, LSA biologists prescribed manual removal for the species. Manual removal methods for the species included pulling (sometimes with the help of a weed wrench), or cutting shoots in areas where the infestation was too dense to employ the use of a weed wrench without substantial soil disturbance that would negatively impact desirable native plant species. In three sites (Los Olivos Meadow, Quail Springs, and Middle Eastfoot) that exhibited higher cover by Spanish false fleabane, black plastic mulching was tested in flat areas where feasible. The above methods did not significantly reduce cover by Spanish false fleabane. In fact, in some areas, cutting the plants encouraged more growth, as several offshoots regenerated from the parent plant and/or root fragments.

RECOMMENDATIONS

Although Spanish false fleabane is not listed by the California Invasive Plant Council as an invasive species, it exhibits indicators of being an invasive plant. In areas where the infestations are severe, Spanish false fleabane appears to be displacing native species. As the infestations are not responding to non-chemical treatment methods, LSA recommends spot treatment with prioritized chemical pesticides as a management strategy for Spanish false fleabane. LSA biologists have determined that soil solarization would not be an effective treatment method due to the species'

extensive root system and the presence of native species. Flaming would also likely be ineffective due to the rhizomatous roots and perennial nature of the plant. Furthermore, flaming as a treatment method in Southern California's dry climate is generally not recommended because of the possibility of starting brush fires. LSA has also determined that organic chemical control methods would not be effective as a treatment method for Spanish false fleabane as this species can have woodier stems and an extensive root system. Organic control methods are best suited for newly emerged weeds and treat mainly above-ground biomass. Moreover, recent studies have revealed that organic pesticides can have a higher environmental impact than conventional pesticides, especially towards invertebrates. Application of prioritized chemical pesticides should be conducted in a manner that avoids disturbance to installed and recruited native species to the fullest extent practicable. Maintenance over the next few months (early in the growing season) will be most effective in reducing cover by Spanish false fleabane, as the species flowers from July to October.

Please contact Eric Krieg or Jessica Lieuw at (949) 553-0666 if you have any questions regarding these recommendations.

MEMORANDUM

DATE: February 7, 2020

TO: Ian Swift, Natural Resources Manager, Irvine Ranch Water District

FROM: Jessica Lieuw, Assistant Biologist, LSA

SUBJECT: Chemical Pesticide Treatment Justification for Curly Dock

This memorandum documents the results of treatment methods for curly dock (*Rumex crispus*) within the Irvine Ranch Water District (IRWD) natural treatment system (NTS) sites. Curly dock is a species of flowering plant in the Polygonaceae family that is native to Europe and Western Asia and has been introduced in California, where it grows as a weed in disturbed areas. This species is a perennial herb with a large, forking taproot that may extend as deep as 4 feet with side branches up to 3 feet long. Flowers and seeds are produced in clusters and range from 100 to over 60,000 seeds per plant. Nonchemical methods were tested for removal of the nonnative herb over several months but proved unsuccessful in reducing large infestations. Moving forward, LSA recommends the use of prioritized chemical pesticides to facilitate removal of large infestations of curly dock in order to maintain native riparian habitat within the NTS sites and prevent accumulation of the seed bank.

NONCHEMICAL REMOVAL

Beginning in September 2019, LSA biologists identified curly dock growing in several of the 34 NTS sites surveyed as part of the IRWD Integrative Pest Management Plan Implementation Project (project). One site in particular, Hidden Canyon, had a large infestation of curly dock. LSA biologists initially prescribed manual removal for the species. Manual removal for curly dock involved pulling individual plants. Other mechanical removal methods, such as tillage or mowing, were not prescribed because the habitats were not amenable to these methods. Manual removal did not significantly reduce cover by curly dock in large infestations, such as in Hidden Canyon, and plants were observed regenerating from portions of the root left in the soil.

RECOMMENDATIONS

Curly dock is listed by the California Invasive Plant Council as an invasive species, with a Limited rating. As the large infestation in Hidden Canyon is not responding to nonchemical treatment methods, LSA recommends spot treatment with prioritized chemical pesticides as a management strategy for curly dock. Literature reviews indicate that it is difficult to control curly dock by hand-pulling due to the deep taproot, as plants can regenerate if portions of the root are left behind. However, roots may be cut at two inches beneath the soil surface, as only the upper portion of the root is capable of regenerating. Thus, small infestations and single individuals of curly dock may be effectively controlled by manual removal methods as long as the root is cut at the appropriate depth

and the top of the plant is removed. However, this method would not be feasible in an area with a large infestation, such as Hidden Canyon, as it would cause a substantial amount of soil disturbance. Other mechanical removal methods such as continual mowing may reduce seed production; however, this method is not feasible for locations where curly dock has been observed within the NTS sites since individual plants are dispersed among desirable native species. LSA biologists have determined that mulching and soil solarization would not be an effective treatment method due to the species' large taproot and presence of neighboring native species. Flaming is also ineffective due to the large taproot and perennial nature of the plant. LSA has also determined that organic chemical control methods would not be effective for curly dock, as this species has such a deep taproot. Organic control methods are best suited for newly emerged weeds and treat mainly above-ground biomass, which would not affect roots of this species, thus allowing the plant to regenerate. Moreover, recent studies have revealed that organic pesticides can have a higher environmental impact than conventional pesticides, especially on invertebrates. Due to the reasons mentioned above, LSA recommends manual removal for small infestations and chemical pesticides for larger infestations. Application of prioritized chemical pesticides should be conducted in a manner that avoids disturbance to installed and recruited native species to the fullest extent practicable. Maintenance before individual plants flower will be the most effective way to reduce cover and prevent accumulation of the seed bank.

Please contact Eric Krieg or Jessica Lieuw at (949) 553-0666 if you have any questions regarding these recommendations.

C-2 HERBICIDE DATA SUMMARY

Date of Application	Site Name	Applicator personnel	Herbicide Name	Organic or Chemical	Size of Area Treated (Sq ft)	Quanity (ounces/onza)	Quantity (gal)	Total gallons per site
		Zacarias Campos	Triclopyr-4	Chemical	2800	200	1.5625	
10/31/2024	Marshburn	Zacarias Campos	Roundup Pro-Max	Chemical	700	32	0.25	
		Zacarias Campos	Ranger	Chemical	620	24	0.1875	
10/31/2024	Marshburn	Zacarias Campos	Roundup Pro-Max	Chemical	800	24	0.1875	2.1875
		Zacarias Campos	Roundup Pro-Max	Chemical	1900	26	0.203125	
10/10/2024	Orchard Retarding Basin	Zacarias Campos	Triclopyr-4	Chemical	1200	16	0.125	0.328125
		Zacarias Campos	Roundup Pro-Max	Chemical	1700	20	0.15625	
10/9/2024	Cypress Meadow A	Zacarias Campos	Triclopyr-4	Chemical	8510	64	0.5	
		Zacarias Campos	Roundup Pro-Max	Chemical	1100	16	0.125	
10/4/2024	Cypress Meadow A	Zacarias Campos	Triclopyr-4	Chemical	1100	16	0.125	
05/01/2024	Cypress Meadow A	Zacarias Campos	Roundup Pro-Max	Chemical	800	8	0.0625	0.96875
		Zacarias Campos	Roundup Pro-Max	Chemical	4060	30	0.234375	
09/16/2024	Los Olivos Meadow	Zacarias Campos	Triclopyr-4	Chemical	4250	32	0.25	0.484375
12/19/2024	Upper Agua Chinon B	Zacarias Campos	Ranger	Chemical	950	10	0.078125	0.078125
05/17/2024	Lower Agua Chinon C	Zacarias Campos	Roundup Pro-Max	Chemical	600	8	0.0625	
06/14/2024	Lower Agua Chinon C	Zacarias Campos	Roundup Pro-Max	Chemical	700	8	0.0625	
12/10/2024	Lower Agua Chinon C	Zacarias Campos	Ranger	Chemical	1100	12	0.09375	0.21875
06/12/2024	Aquila Springs	Zacarias Campos	Roundup Pro-Max	Chemical	700	8	0.0625	0.0625
12/06/2024	Quail Springs	Zacarias Campos	Ranger	Chemical	1400	16	0.125	0.125
		Zacarias Campos	Triclopyr-4	Chemical	700	16	0.125	
12/28/2024	Floral View	Zacarias Campos	Ranger	Chemical	700	8	0.0625	0.1875
12/23/2024	Laguna Altura South	Zacarias Campos	Ranger	Chemical	550	8	0.0625	0.0625
Totals for NTS Basins					**36940**	**602**	**4.703125**	
05/02/2024	SJM Zone 1	Victor Sanchez	Roundup Pro-Max	Chemical	36800	200	1.5625	
05/01/2024	SJM Zone 1	Victor Sanchez	Roundup Pro-Max	Chemical	79650	450	3.515625	5.078125
05/10/2024	SJM Zone 2	Victor Sanchez	Roundup Pro-Max	Chemical	36000	200	1.5625	
04/11/2024	SJM Zone 2	Damian Avellano	Triclopyr-4	Chemical	7130	46	0.359375	
04/10/2024	SJM Zone 2	Damian Avellano	Triclopyr-4	Chemical	6320	40	0.3125	2.234375
04/19/2024	SJM Zone 3	Damian Avellano	Triclopyr-4	Chemical	7130	46	0.359375	
04/18/3034	SJM Zone 3	Damian Avellano	Triclopyr-4	Chemical	6200	40	0.3125	
05/16/2024	SJM Zone 3	Victor Sanchez	Roundup Pro-Max	Chemical	54000	300	2.34375	3.015625
04/24/2024	SJM Zone 4	Victor Sanchez	Roundup Pro-Max	Chemical	43200	300	2.34375	2.34375
Totals for SJM					**276430**	**1622**	**12.671875**	
04/18/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	54,000	225	1.7578125	
05/08/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	96,300	450	3.515625	
5/15/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	47,250	225	1.7578125	
5/30/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	72,240	300	2.34375	
6/11/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	18,000	75	0.5859375	

Date of Application	Site Name	Applicator personnel	Herbicide Name	Organic or Chemical	Size of Area Treated (Sq ft)	Quanity (ounces/onza)	Quantity (gal)	Total gallons per site
6/12/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	34,500	150	1.171875	
07/02/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	47,250	225	1.7578125	
8/9/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	72,240	300	2.34375	
8/13/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	10,080	42	0.328125	
8/12/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	72,240	300	2.34375	
9/4/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	7,200	30	0.234375	
9/20/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	5,760	24	0.1875	
10/29/2024	San Joaquin Reservoir	Rafael Maldonado	Prosecutor	Chemical	32,700	150	1.171875	19.5
Totals for SJR					**32,700**	**2496**	**19.5**	

Herbicide Product Total Amounts Used

	Triclopyr 4	Roundup Pro-Max	Ranger	Prosecutor	Totals per Site Group
NTS Sites	2.6875	1.40625	0.609375	0	**4.703125**
SJM Zones	1.34375	11.328125	0	0	**12.671875**
Recyled Water Reservoir Sites	0	0	0	19.5	**19.5**
Totals per Product	**4.03125**	**12.734375**	**0.609375**	**19.5**	**36.875**

C-3 HERBICIDE USE FORM SCANS

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zaccarias Campos

Date of application / Fecha de servicio: 10/31/2024

Name & address of property treated / Nombre y domicilio de la propiedad tratada: Marshfield

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration #
- ☐ Oryxalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Alpha Cyfer Herbicide — Onzas usado: — EPA Registration #
- ☐ WaterHog — Onzas usado: — EPA Registration # 19713-42-84708
- ☐ Herbimax QII — Onzas usado: — EPA Registration #
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Specialty Herbicide — Onzas usado: — EPA Registration #
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-398
- ☐ Reclaim Amine — Onzas usado: — EPA Registration #
- ☐ Dacothal 75 DG — Lbs. usado: — EPA Registration # 64864-36
- ☐ NoFoam A — Onzas usado: — EPA Registration #
- ☐ Ortho T 180 — Onzas usado: — EPA Registration # 239-2427
- ☐ Konker — Onzas usado: — EPA Registration #
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Triclopyr 4
- ☑ Roundup Pro Max — Onzas usado: 32 — EPA Registration 524-549

Cantidad de area tratada / Cantidad area tratada:

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 10/21/2024

Name & address of property treated / Nombre y domicilio de la propiedad tratada: Marshburn

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Gator Herbicide — Onzas usado: — EPA Registration # 7969-66-84705
- ☐ Hydrolmex Oil — Onzas usado: — EPA Registration # 9688-8-80011
- ☐ Specialty Herbicide — Onzas usado: — EPA Registration # 2217-[illegible]
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81927-X-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1050[illegible]-80015
- ☐ Rohstar G — Onzas usado: — EPA Registration # 62719-[illegible]
- ☑ Vanquish — 2

- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-84708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-368
- ☐ Dazalling T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☑ Roundup Pro Max — Onzas usado: 24 — EPA Registration 524-579

Size of area treated / Cantidad area tratado:

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Jaceros Company

Date of application / Fecha de servicio: 10/10/24

Name & address of property treated / Nombre y domicilio de la propiedad tratada:
Orchard Retarding

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Aitigre Glyphosate 4 Plus — Onzas usado: — EPA Registration #
- ☐ Onyx Gator Herbicide — Onzas usado: — EPA Registration #
- ☐ Hitkimax DF — Onzas usado: — EPA Registration #
- ☐ Spredgers Herbicide — Onzas usado: — EPA Registration #
- ☐ Hi-Yield Hammer — Onzas usado: — EPA Registration #
- ☐ No Foam A — Onzas usado: — EPA Registration #
- ☐ Kohinor G — Onzas usado: — EPA Registration #
- ☐

- ☐ Oryxalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-84708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-363
- ☐ Banalima T&O — Lbs. usado: — EPA Registration # 84804-36
- ☐ Orthene T&O — Onzas usado: — EPA Registration # 280-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1081
- ☐ Roundup Pro Max — Onzas usado: 26 — EPA Registration 524-579

Cantidad of area treated / Cantidad area tratada: TRICLOPYR. 4 - 16 - 02

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 10/8/24

Name & address of property treated / Nombr y domicilioda la proiedad trafadad: Cypress-A

Name of pesticide and EPA number / Nombre del pesticida y numero de reisgro de EPA:

- ☐ **Alligare Glyphosate 4 Plus** — Onzas usado: — EPA Registration # 81927-9
- ☐ **Grass Getter Herbicide** — Onzas usado: — EPA Registration # 7969-58-54705
- ☐ **Herbimax Oil** — Onzas usado: — EPA Registration # 39208-50011
- ☐ **Spaadzone Herbicide** — Onzas usado: — EPA Registration # 2217-833
- ☐ **Sedgehammer** — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ **No Foam A** — Onzas usado: — EPA Registration # 1050775-50015
- ☐ **Ronstar G** — Onzas usado: — EPA Registration # 62719-113
- ☐ ______
- ☐ **Oryzalin** — Onzas usado: — EPA Registration # 72167-15-73220
- ☐ **Weed-Hoe** — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ **Turflon** — Onzas usado: — EPA Registration # 464-554
- ☐ **Fusilade II** — Onzas usado: — EPA Registration # 10182-399
- ☐ **Deadline T&O** — Lbs. usado: — EPA Registration # 64864-38
- ☐ **Orthene T T&O** — Onzas usado: — EPA Registration # 239-2427
- ☐ **Reward** — Onzas usado: — EPA Registration # 101-1091
- ☐ **Roundup Pro Max** — Onzas usado: 20 — EPA Registration 524-579

Size of area treated / Cantidad area treatado:

Triclopyr 4 - 64-oz

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 10/4/24

Name & address of property treated / Nombre y domicilio de la propiedad tratada:

Cypress - A

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Class Gator Herbicide — Onzas usado: — EPA Registration # 7969-98-64705
- ☐ Herbimax OII — Onzas usado: — EPA Registration # 228[illegible]0011
- ☐ Specticle Herbicide — Onzas usado: — EPA Registration # 2217-[illegible]
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1050[illegible]0015
- ☐ Ronstar G — Onzas usado: — EPA Registration # 6271-[illegible]
- ☐ _____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-664
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-998
- ☐ Dacthal W-75 — Lbs. usado: — EPA Registration # 64864-35
- ☐ Oriflame T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: 16 — EPA Registration 524-579

Size of area treated / Cantidad area tratada: Triclopyr 4 - 16 - 02

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zocorros Campos

Date of application / Fecha de servicio: 9/16/24

Name & address of property treated / Nombre y domicilio de la proiedad trefadad: Los Olivos

Name of pesticide and EPA number / Nombre del pesticida y numero de reisgro de EPA:

- ☐ [illegible] 4 Plus
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible] Herbicide
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐

- ☐ Oryzalin
  Onzas usado:
  EPA Registration # 72167-18-78920
- ☐ Weed Hoe
  Onzas usado:
  EPA Registration # 19713-42-54705
- ☐ Turflon
  Onzas usado:
  EPA Registration # 464-554
- ☐ Fusilade II
  Onzas usado:
  EPA Registration # 10182-395
- ☐ Gallery 75 DF
  Lbs. usado:
  EPA Registration # 62965-36
- ☐ Snapshot 2.5 TG
  Onzas usado:
  EPA Registration # 2862467
- ☐ Reward
  Onzas usado:
  EPA Registration # 100-1091
- ☐ Roundup Pro Max
  Onzas usado: 30
  EPA Registration 524-579

[illegible] of area treated / Cantidad area treatado: TRICLOPYR-4- 32-OZ

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 6/14/24

Name & address of property treated / Nombre y domicilio de la proiedad trateda:
Lower Agua Chinon

Name of pesticide and EPA number / Nombre del pesticida y numero de relegro de EPA:

- ☐ [illegible] 4 Plus
  Onxes usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onxes usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onxes usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onxes usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onxes usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onxes usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onxes usado:
  EPA Registration # [illegible]
- ☐ ______
- ☐ Oryzalin
  Onxes usado:
  EPA Registration # 72167-18-73220
- ☐ Weedtrine
  Onxes usado:
  EPA Registration # 19713-42-84708
- ☐ Turflon
  Onxes usado:
  EPA Registration # 464-554
- ☐ Fusilade II
  Onxes usado:
  EPA Registration # 10182-395
- ☐ Gallery 75 DF
  Lbs. usado:
  EPA Registration # 62719-[illegible]
- ☐ [illegible]
  Onxes usado:
  EPA Registration # [illegible]
- ☐ Reward
  Onxes usado:
  EPA Registration # 101-1091
- ☐ Roundup Pro Max
  Onxes usado: 8 oz
  EPA Registration 524-579

Size of area treated / Cantidad area treatado: 260 SF

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 6/12/24

Name & address of property treated / Nombre y domicilio de la proiedad tratada:
Aguila Springs

Name of pesticide and EPA number / Nombre del pesticida y numero de relegro de EPA:

- ☐ [illegible] Plus
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible] Herbicide
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible] Herbicide
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐ [illegible]
  Onzas usado:
  EPA Registration # [illegible]
- ☐
- ☐ Oryzalin
  Onzas usado:
  EPA Registration # 72167-16-73220
- ☐ Weed Hoe
  Onzas usado:
  EPA Registration # 19713-42-64705
- ☐ Turflon
  Onzas usado:
  EPA Registration # 464-554
- ☐ Surflan II
  Onzas usado:
  EPA Registration # 10182-[illegible]
- ☐ Dakeline TAO
  Lbs. usado:
  EPA Registration # [illegible]
- ☐ Ortrene T TAO
  Onzas usado:
  EPA Registration # 239-2487
- ☐ Reward
  Onzas usado:
  EPA Registration # 100-1091
- ☐ Roundup Pro Max
  Onzas usado: 8-oz
  EPA Registration 524-579

Size of area treated / Cantidad area tratado: 200-SF

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 5/17/24

Name & address of property treated / Nombre y domicilio de la propiedad tratada: Lower Agua Chiquita

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Altiger Glyphosate 4 Plus — Onzas usado: — EPA Registration #
- ☐ Gly-Star Original — Onzas usado: — EPA Registration #
- ☐ Honcho Plus — Onzas usado: — EPA Registration #
- ☐ Suprema Herbicida — Onzas usado: — EPA Registration #
- ☐ Tordon — Onzas usado: — EPA Registration #
- ☐ Nu-Farm A — Onzas usado: — EPA Registration #
- ☐ Nu-Farm G — Onzas usado: — EPA Registration #
- ☐ _____
- ☐ Glyxalin — Onzas usado: — EPA Registration # 72167-18-78220
- ☐ Weed-Rae — Onzas usado: — EPA Registration # 10718-42-84708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-108
- ☐ Barrline T&O — Lbs. usado: — EPA Registration # 84846-36
- ☐ Oriflame T&O — Onzas usado: — EPA Registration # 2602-427
- ☐ Reward — Onzas usado: — EPA Registration # 100-1091
- ☐ Roundup Pro Max — Onzas usado: 8-oz — EPA Registration 524-579

Size of area treated / Cantidad area tratado: 600-SF

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Victor Sanchez

Date of application / Fecha de servicio: 05/16/2024

Name & address of property treated / Nombre y domicilio de la propiedad tratada:
San Joaquin Marsh

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-64706
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 38808-H0011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-893
- ☐ Sequishammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1008775-59015
- ☐ Rohstar G — Onzas usado: — EPA Registration # 62719-115
- ☐ _____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-393
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-96
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☑ Roundup Pro Max — Onzas usado: 200 — EPA Registration 524-579

Size of area treated / Cantidad area treatado: _____

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Victor Sonchez

Date of application / Fecha de servicio: 05/10/2024

Name & address of property treated / Nombre y domicilioda la proledad tratadad:
San Joaquin Marsh.

Name of pesticide and EPA number / Nombre del pesticida y numero de relegro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-58-64705
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 66208-00011
- ☐ Specialty Herbicide — Onzas usado: — EPA Registration # 2217-885
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1660776-60016
- ☐ Rodeo G — Onzas usado: — EPA Registration # 62719-119
- ☐ ____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Roe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-383
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-38
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☑ Roundup Pro Max — Onzas usado: 200 — EPA Registration 524-579

Size of area treated / Cantidad area tratado: ____

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Victor Sanchez

Date of application / Fecha de servicio: 05/02/2024

Name & address of property treated / Nombre y domicilliada la proiedad tratedad:
San Joaquin Marsh

Name of pesticide and EPA number / Nombre del pesticida y numero de relegro de EPA:

- ☐ Alligate Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-66-64705
- ☐ Herbimax Off — Onzas usado: — EPA Registration # 38208-80011
- ☐ Spasdzone Herbicide — Onzas usado: — EPA Registration # 2217-833
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81850-1-10162
- ☐ No Foam A — Onzas usado: — EPA Registration # 1090776-60016
- ☐ Rotstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ ____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-983
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-98
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☒ Roundup Pro Max — Onzas usado: 200 — EPA Registration 524-579

Size of area treated / Cantidad area treatado: ____

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Victor Sancho

Date of application / Fecha de servicio: 05/01/2024

Name & address of property treated / Nombre y domicilio de la propiedad tratada: San Joaquin Marsh

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-98-64705
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 352-808-80011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-883
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1050776-80015
- ☐ Rodeo G — Onzas usado: — EPA Registration # 62719-113
- ☐ ____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-383
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-98
- ☐ Ortho T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☑ Roundup Pro Max — Onzas usado: 450 — EPA Registration 524-579

Size of area treated / Cantidad area tratado: ____

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 5/1/24

Name & address of property treated / Nombre y domicilio de la propiedad tratada:
Cypress Meadows A

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration #
- ☐ Aqua Master Herbicide — Onzas usado: — EPA Registration #
- ☐ Avail — Onzas usado: — EPA Registration #
- ☐ Aquaneat Herbicide — Onzas usado: — EPA Registration #
- ☐ Aquapro Trimmer — Onzas usado: — EPA Registration #
- ☐ Ne Foam A — Onzas usado: — EPA Registration #
- ☐ Rodeo — Onzas usado: — EPA Registration #
- ☐
- ☐ Oryxalin — Onzas usado: — EPA Registration # 72167-18-72320
- ☐ Weed Hoe — Onzas usado: — EPA Registration # 19713-42-84708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Rustler II — Onzas usado: — EPA Registration #
- ☐ Dazalina T&O — Lbs. usado: — EPA Registration #
- ☐ Quinate T&O — Onzas usado: — EPA Registration #
- ☐ Reward — Onzas usado: — EPA Registration #
- ☑ Roundup Pro Max — Onzas usado: 8-oz — EPA Registration 524-549

Size of area treated / Cantidad area tratado: 880-SF

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Victor Sanchez

Date of application / Fecha de servicio: 04/24/2024

Name & address of property treated / Nombre y domicilio de la propiedad tratada:
San Joaquin Marsh

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-54705
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 35208-55011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-883
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1060776-50015
- ☐ Renster G — Onzas usado: — EPA Registration # 62719-113
- ☐ ____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-79220
- ☐ Weed-Roe — Onzas usado: — EPA Registration # 19713-42-54705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fuellade II — Onzas usado: — EPA Registration # 10182-369
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☑ Roundup Pro Max — Onzas usado: 300 — EPA Registration 524-579

Size of area treated / Cantidad area tratado: ____

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Damian Arellano -

Date of application / Fecha de servicio: 04 / 19 / 2024

Name & address of property treated / Nombre y domicilio de la propiedad tratedad:
San Joaquin - Marsh.

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ **Alligate Glyphosate 4 Plus** — Onzas usado: — EPA Registration # 81927-9
- ☐ **Grass Getter Herbicide** — Onzas usado: — EPA Registration # 7969-66-64705
- ☐ **Herbimax Off** — Onzas usado: — EPA Registration # 36208-80011
- ☐ **Speedzone Herbicide** — Onzas usado: — EPA Registration # 2217-893
- ☐ **Sledgehammer** — Onzas usado: — EPA Registration # 81880-1-10182
- ☐ **No Foam A** — Onzas usado: — EPA Registration # 1660776-80016
- ☐ **Rotstar G** — Onzas usado: — EPA Registration # 62719-113
- ☐ Triclopir 4 4/6. oz -
- ☐ **Oryzalin** — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ **Weed-Hoe** — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ **Turflon** — Onzas usado: — EPA Registration # 464-564
- ☐ **Fusilade II** — Onzas usado: — EPA Registration # 10182-393
- ☐ **Deadline T&O** — Lbs. usado: — EPA Registration # 64864-96
- ☐ **Orthene T T&O** — Onzas usado: — EPA Registration # 239-2427
- ☐ **Reward** — Onzas usado: — EPA Registration # 101-1091
- ☐ **Roundup Pro Max** — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratedo:

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Damian Arellano

Date of application / Fecha de servicio: 04/18/2024

Name & address of property treated / Nombre y domicilliada la proiedad tratadad:

San Joaquin Marsh.

Name of pesticide and EPA number / Nombre del pesticida y numero de relegro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-66-64705
- ☐ Herbimax Off — Onzas usado: — EPA Registration # 368208-80011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-883
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1660776-80015
- ☐ Rancher C — Onzas usado: — EPA Registration # 62719-119
- ☐ Triclopiry 40 oz.
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-664
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-383
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-38
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area treatedo:

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Damian Arellano

Date of application / Fecha de servicio: 04/11/2024

Name & address of property treated / Nombre y domicilio de la propiedad tratadad:
San Joaquin Marsh.

Name of pesticide and EPA number / Nombre del pesticida y numero de relegro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-64705
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 39208-80011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-888
- ☐ Segelstrimmer — Onzas usado: — EPA Registration # 81880-1-10182
- ☐ No Foam A — Onzas usado: — EPA Registration # 1660776-60016
- ☐ Ronstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ Triclopir 4 4602.
- ☐ Oryxalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-564
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-399
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-38
- ☐ Orthene T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area treatado:

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Damian Arellano.

Date of application / Fecha de servicio: 04/10/2024

Name & address of property treated / Nombre y domicilio de la propiedad tratada:
San Joaquin Marsh.

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-66-64706
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 39208-80011
- ☐ Specticide Herbicide — Onzas usado: — EPA Registration # 2217-868
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1381977-60015
- ☐ Rattler G — Onzas usado: — EPA Registration # 62719-113
- ☐ Triclopir4 4 oz
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-15-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-989
- ☐ Dazdline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado:

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 12/28/24

Name & address of property treated / Nombre y domicilio de la propiedad tratada: Floral View

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ **Alligare Glyphosate 4 Plus** — Onzas usado: — EPA Registration # 81927-9
- ☐ **[illegible] Herbicide** — Onzas usado: — EPA Registration # [illegible]84705
- ☐ **Herbimax Oil** — Onzas usado: — EPA Registration # [illegible]
- ☐ **[illegible] Herbicide** — Onzas usado: — EPA Registration # 2217-[illegible]
- ☐ **[illegible]** — Onzas usado: — EPA Registration # [illegible]-10163
- ☐ **No Foam A** — Onzas usado: — EPA Registration # [illegible]-10015
- ☐ **[illegible]** — Onzas usado: — EPA Registration # 62719-[illegible]
- ☐ ________
- ☐ **Oryzalin** — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ **Weed-Rhap** — Onzas usado: — EPA Registration # 19713-42-54705
- ☐ **Turflon** — Onzas usado: — EPA Registration # 464-554
- ☐ **Fusilade II** — Onzas usado: — EPA Registration # 10182-393
- ☐ **Gallery T&O** — Lbs. usado: — EPA Registration # 62719-39
- ☐ **Ortho 1 T&O** — Onzas usado: — EPA Registration # 239-2497
- ☐ **Reward** — Onzas usado: — EPA Registration # 101-1091
- ☐ **Roundup Pro Max** — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: Triclopyr-4 16-oz
Ranger, 8 oz

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 12/10/24

Name & address of property treated / Nombre y domicilio de la propiedad tratada:

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration #
- ☐ Gran Caster Herbicida — Onzas usado: — EPA Registration #
- ☐ Herbimax QII — Onzas usado: — EPA Registration #
- ☐ Spidosene Herbicida — Onzas usado: — EPA Registration #
- ☐ Reglahammer — Onzas usado: — EPA Registration #
- ☐ ReFoam A — Onzas usado: — EPA Registration #
- ☐ Roundup — Onzas usado: — EPA Registration #
- ☐ Oryxalin — Onzas usado: — EPA Registration # 72167-16-79220
- ☐ Weed-Rite — Onzas usado: — EPA Registration # 19713-42-34708
- ☐ Turion — Onzas usado: — EPA Registration # 464-564
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-393
- ☐ Dazzlins T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T&O — Onzas usado: — EPA Registration #
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration # 524-549

Cantidad de area tratada / Cantidad area tratada:

Range

12-02

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 12/6/24

Name & address of property treated / Nombre y domicilio de la propiedad tratada:

Quail Springs

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Allegiance Glyphosate 4 Plus — Onzas usado: — EPA Registration #
- ☐ Aqua Master Herbicide — Onzas usado: — EPA Registration #
- ☐ Herbimax Oil — Onzas usado: — EPA Registration #
- ☐ Specialty Herbicide — Onzas usado: — EPA Registration #
- ☐ Trail Hammer — Onzas usado: — EPA Registration #
- ☐ No Foam A — Onzas usado: — EPA Registration #
- ☐ Konker G — Onzas usado: — EPA Registration #
- ☐

- ☐ Oryxalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Ree — Onzas usado: — EPA Registration # 19713-42-84708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-998
- ☐ Dazalina T&O — Lbs. usado: — EPA Registration #
- ☐ Orthene T&O — Onzas usado: — EPA Registration #
- ☐ Reward — Onzas usado: — EPA Registration # 101-1081
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration # 524-549

Area of area treated / Cantidad area tratado:

Ranger

16.02

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 12/23/24

Name & address of property treated / Nombre y domicilio de la propiedad tratedad:

Laguna Altura South

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ Allegiance Glyphosate 4 Plus — Onzas usado: — EPA Registration #
- ☐ Aqua Master Herbicide — Onzas usado: — EPA Registration # 228-366-34704
- ☐ Aquamaster Gly — Onzas usado: — EPA Registration #
- ☐ Aquamaster Herbicide — Onzas usado: — EPA Registration #
- ☐ Aquamaster Herbicide — Onzas usado: — EPA Registration #
- ☐ Nortam A — Onzas usado: — EPA Registration #
- ☐ Rodeo — Onzas usado: — EPA Registration #
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-79220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-34708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Rustler II — Onzas usado: — EPA Registration # 10182-398
- ☐ Roundup T&O — Lbs. usado: — EPA Registration # 64864-38
- ☐ Oriflone T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area treatado: Rounder 8-oz

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: Zacarias Campos

Date of application / Fecha de servicio: 12/19/24

Name & address of property treated / Nomber y domicilio de la proiedad tratedad: Upper Agua Chinon - B

Name of pesticide and EPA number / Nombre del pesticida y numero de reisgro de EPA:

☐ Alligare Glyphosate 4 Plus
Onzas usado:
EPA Registration # 81927-9

☐ [illegible] Herbicide
Onzas usado:
EPA Registration # [illegible]-54705

☐ [illegible]
Onzas usado:
EPA Registration # [illegible]

☐ [illegible] Herbicide
Onzas usado:
EPA Registration # [illegible]

☐ [illegible]
Onzas usado:
EPA Registration # [illegible]-10163

☐ No Foam A
Onzas usado:
EPA Registration # [illegible]

☐ [illegible]
Onzas usado:
EPA Registration # [illegible]

☐

☐ Oryzalin
Onzas usado:
EPA Registration # 72167-15-79220

☐ Weed Hoe
Onzas usado:
EPA Registration # 19713-42-64705

☐ Turflon
Onzas usado:
EPA Registration # 464-554

☐ Fusilade II
Onzas usado:
EPA Registration # 10182-395

☐ Dacthal T&O
Lbs. usado:
EPA Registration # 54864-36

☐ Orthene T T&O
Onzas usado:
EPA Registration # 239-2427

☐ Reward
Onzas usado:
EPA Registration # 101-1091

☐ Roundup Pro Max
Onzas usado:
EPA Registration 524-579

Size of area treated / Cantidad area trestado: Ranger 10-oz

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 4-18-24

Name & address of property treated / Nombre y domicilio de la propiedad tratedad:
SAN JOAQUIN RESERVOIR

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Aqua Master Herbicide — Onzas usado: — EPA Registration # 7969-66-64705
- ☐ Hotshot Oil — Onzas usado: — EPA Registration #
- ☐ Spandone Herbicide — Onzas usado: — EPA Registration # 2217-825
- ☐ Sequestrimer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1660778-60015
- ☐ Rodeo — Onzas usado: — EPA Registration # 62719-413
- ☐
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-398
- ☐ Transline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Garlone T T&O — Onzas usado: — EPA Registration # 228-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1081
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: IPROSECUTOR - 225-02

225 02
54,000 ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 8-13-24

Name & address of property treated / Number y domicilioda la proiedad tratedad:
~~20~~ SAN JUAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-64705
- ☐ Herbimex Oil — Onzas usado: — EPA Registration # sp208-80011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-888
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 10807776-80015
- ☐ Ronstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-79220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-564
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-998
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: PROSECUTOR 42-02

42 oz.
10,080 pt2

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 8-7-24

Name & address of property treated / Nombre y domiciliodo la proledad tratadad:
SAN JOAQUIN 2500 FORD ROAD.

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-66-54705
- ☐ Heralmax Ofl — Onzas usado: — EPA Registration # 66208-66011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-833
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1660778-66015
- ☐ Ronstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ _____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-15-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-564
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-998
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-96
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area treadado: PROSECUTOR 300-02

300 oz
72,240 Ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 8-12-24

Name & address of property treated / Nombre y domicilliada la proiedad tratedad:
SAN JUAQUIN

Name of pestipide and EPA number / Nombre del pestiolda y numero de reisgro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-54705
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 38208-86011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-993
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 10807776-50015
- ☐ Ronster G — Onzas usado: — EPA Registration # 8271-2-113
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Rite — Onzas usado: — EPA Registration # 19713-42-54705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-393
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: PROSECUTOR 300 oz

300 oz.
72,240 ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 5-30-24

Name & address of property treated / Nomber y domiciliada la proledad tratadad:
SAN JUAQUIN

Name of pestipide and EPA number / Nombre del pestiolda y numero de relagro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-8
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-64705
- ☐ Herbimax Oil — Onzas usado: — EPA Registration # 36208-10011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-833
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1050775-60015
- ☐ Ronstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-15-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-564
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-393
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: PROSECUTOR 300-02

300 02
72,240 ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 6-11-24

Name & address of property treated / Nomber y domiciliodo la proledad tratadad:
SAN JUAQUIN

Name of pestiolde and EPA number / Nombre del pestiolda y numero de relsgro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grlss Getter Herbiolde — Onzas usado: — EPA Registration # 7969-66-64705
- ☐ Herbimax OII — Onzas usado: — EPA Registration # 66208-66011
- ☐ Spasdzone Herbiolde — Onzas usado: — EPA Registration # 2217-866
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1090775-66015
- ☐ Rohstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-79220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turlon — Onzas usado: — EPA Registration # 464-664
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-998
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-38
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area treadado: PROSECUTOR

75-02
18,000 ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 6-12-24

Name & address of property treated / Nombre y domicilio de la propiedad tratadad: SAN ~~JUA~~ JUAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de reisgro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-58-64705
- ☐ Herbimax OII — Onzas usado: — EPA Registration # 38208-88011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-883
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1050775-50015
- ☐ Ronstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ _____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-393
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area treatado: PROSECUTOR 150-oz 34,500ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 7-2-24

Name & address of property treated / Nombre y domicilio de la propiedad tratada: SAN JOAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-64705
- ☐ Herbimax OII — Onzas usado: — EPA Registration # 35208-50011
- ☐ Spasdzone Herbicide — Onzas usado: — EPA Registration # 2217-833
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1050775-50015
- ☐ Ronstar G — Onzas usado: — EPA Registration # 62719-113
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-393
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-38
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: PROSECUTAR 225-02 47,250 ft2

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 5-8-24

Name & address of property treated / Nombre y domicilio de la propiedad tratada:
SAN JOAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-54705
- ☐ Herbimax Off — Onzas usado: — EPA Registration # 39208-80011
- ☐ Epsandzone Herbicide — Onzas usado: — EPA Registration # 2217-888
- ☐ Sureguard Herbicide — Onzas usado: — EPA Registration # 81850-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 10807-76-50015
- ☐ Roundup ® — Onzas usado: — EPA Registration # 62719-413
- ☐ _____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-54705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-864
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-888
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: PROSECUTAR 460-02

96,300ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 5-15-24

Name & address of property treated / Nombre y domicilio de la propiedad tratada: SAN JOAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Gross Getter Herbicide — Onzas usado: — EPA Registration # 7969-66-64705
- ☐ Herbimax OII — Onzas usado: — EPA Registration # 39208-66011
- ☐ Specticore Herbicide — Onzas usado: — EPA Registration # 2217-666
- ☐ Sledgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 1660776-66016
- ☐ Konstar G — Onzas usado: — EPA Registration # 62719-115
- ☐ _____
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-664
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-366
- ☐ Deadline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 296-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration # 524-579

Size of area treated / Cantidad area tratado: PROSECUTOR

225-OZ

47,250 FT²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 7-4-24

Name & address of property treated / Nombre y domicilio de la propiedad tratada: SAN JOAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de relagro de EPA:

- ☐ Alligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Grass Getter Herbicide — Onzas usado: — EPA Registration # 7969-56-84705
- ☐ Herbimex Oil — Onzas usado: — EPA Registration # 81206-50011
- ☐ Spotzone Herbicide — Onzas usado: — EPA Registration # 2217-[illegible]
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 10807-78-50015
- ☐ Rohster G — Onzas usado: — EPA Registration # 62719-[illegible]
- ☐ [illegible]
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-73220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 10713-42-84705
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-398
- ☐ Gasoline T&O — Lbs. usado: — EPA Registration # 64864-98
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: PROSECUTOR

30-OZ
7,200ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 9-20-24

Name & address of property treated / Nombre y domicilio de la propiedad tratada: SAN JOAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Allgare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Brea Gator Herbicide — Onzas usado: — EPA Registration # 7969-56-64708
- ☐ Herbimax QII — Onzas usado: — EPA Registration # 34704-70071
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-998
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81880-1-10163
- ☐ No Foam A — Onzas usado: — EPA Registration # 10807-70-10015
- ☐ Rohstar G — Onzas usado: — EPA Registration # 62719-313
- ☐ _____

- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-79220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-564
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-393
- ☐ Bandlife T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Orthene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration 524-579

Size of area treated / Cantidad area tratado: PROSECUTOR

24-OZ
5,760 ft²

RECORD OF PEST CONTROL OPERATIONS
RECORD DE OPERATIONS DE CONTROL DE PLAGAS

Name / Nombre: RAFAEL MALDONADO

Date of application / Fecha de servicio: 10-29-24

Name & address of property treated / Nombre y domicilio de la propiedad tratada: SAN JOAQUIN

Name of pesticide and EPA number / Nombre del pesticida y numero de registro de EPA:

- ☐ Aligare Glyphosate 4 Plus — Onzas usado: — EPA Registration # 81927-9
- ☐ Gras Getter Herbicide — Onzas usado: — EPA Registration # 7969-66-64708
- ☐ Reflamax OII — Onzas usado: — EPA Registration # 34704-89011
- ☐ Speedzone Herbicide — Onzas usado: — EPA Registration # 2217-998
- ☐ Sedgehammer — Onzas usado: — EPA Registration # 81927-1-10163
- ☐ Ke Foam A — Onzas usado: — EPA Registration # 10807-76-90015
- ☐ Rodeo G — Onzas usado: — EPA Registration # 62719-519
- ☐ Oryzalin — Onzas usado: — EPA Registration # 72167-16-79220
- ☐ Weed-Hoe — Onzas usado: — EPA Registration # 19713-42-64708
- ☐ Turflon — Onzas usado: — EPA Registration # 464-554
- ☐ Fusilade II — Onzas usado: — EPA Registration # 10182-368
- ☐ Dexaline T&O — Lbs. usado: — EPA Registration # 64864-36
- ☐ Oil Rene T T&O — Onzas usado: — EPA Registration # 239-2427
- ☐ Reward — Onzas usado: — EPA Registration # 101-1091
- ☐ Roundup Pro Max — Onzas usado: — EPA Registration # 524-579

Size of area treated / Cantidad area tratado: PROSEGUIDOR

150-02

32,700 ft²

APPENDIX D: RECOMMENDED ITEMS & METHODS PER SITE

Site Name	# of Species Identified for Maintenance	Species Names (Frequency Noted for Maintenance)	All Methods Advised
Aquila Springs	19	canary island date palm (3), common sowthistle (1), common stork's bill (1), flax-leaved horseweed (6), fountain grass (3), garland daisy (1), hairawn muhly (1), lesser swinecress (4), lindheimer's muhly (1), mexican fan palm (1), milk thistle (1), prickly sowthistle (2), rabbitsfoot grass (2), saharan mustard (1), scarlet pimpernel (1), shortpod mustard (1), spanish false fleabane (5), tropical horseweed (4), yellow sweetclover (3)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal
Cypress Meadow A	25	brazilian peppertree (4), bristly oxtongue (1), bulrush (6), camphor tree (2), carrotwood (1), chinese elm (2), common cattail (1), common stork's bill (1), creeping myoporum (4), curly dock (1), fountain grass (1), hyssop loosestrife (1), japanese cheesewood (1), mexican feathergrass (1), mexican primrose (4), pampas grass (2), panic veldtgrass (1), perennial pepperweed (1), peruvian peppertree (2), prickly sowthistle (2), spanish false fleabane (14), st. augustine grass (1), sticky snakeroot (1), taiwanese firethorn (1), yellow sweetclover (3)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
Cypress Meadow B	24	bermuda grass (1), black medic (1), bristly oxtongue (7), burr clover (6), chinese elm (1), common mugwort (1), common sowthistle (5), great brome (1), japanese honeysuckle (6), jersey cudweed (1), mexican fan palm (1), mexican primrose (7), peruvian peppertree (2), prickly lettuce (5), prickly sowthistle (6), pyracantha (1), rabbitsfoot grass (3), rat-tail fescue (1), scarlet pimpernel (4), smilo grass (1), spanish false fleabane (1), taiwanese firethorn (3), wax-leaf privet (1), yellow sweetclover (2)	Digging, Hand Removal, Hula Hoe/Tilling
Cypress Meadow C	25	asian mustard (1), brazilian peppertree (1), bristly oxtongue (8), burr clover (4), camphor tree (1), chinese elm (6), common sowthistle (7), common stork's bill (1), compact brome (1), flax-leaved horseweed (1), fountain grass (1), japanese honeysuckle (1), lindheimer's muhly (1), mexican fan palm (1), mexican primrose (7), musky stork's bill (1), pampas grass (1), prickly lettuce (2), prickly sowthistle (4), rabbitsfoot grass (1), rescuegrass (1), shepherd's purse (1), smilo grass (3), trumpet flower (1), yellow sweetclover (4)	Digging, Hand Removal, Hula Hoe/Tilling
Cypress Meadow D	24	annual bluegrass (2), bermuda grass (1), brazilian peppertree (1), brass buttons (1), bristly oxtongue (12), bull thistle (3), burr clover (2), carrotwood (2), common sowthistle (1), floating primrose-willow (2), jersey cudweed (1), mexican fan palm (2), mexican primrose (11), peruvian peppertree (1), prickly lettuce (1), prickly sowthistle (8), scarlet pimpernel (1), spanish false fleabane (2), taiwanese firethorn (1), tropical horseweed (1), tropical milkweed (1), willow dock (4), yellow sweetclover (2)	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal
Eastfoot Retarding Basin	20	australian saltbush (3), bermuda grass (3), bristly oxtongue (5), cheeseweed (4), common sowthistle (5), common stork's bill (4), compact brome (5), maltese star thistle (2), prickly lettuce (5), red brome (4), ripgut brome (4), russian thistle (2), shortpod mustard (5), slender wild oats (5), smilo grass (5), smooth barley (5), spanish false fleabane (1), stork's bill sp. (1), wall barley (2), white sweetclover (5)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling
Eastwood Meadow	36	bermuda grass (3), black medic (2), brazilian peppertree (3), bristly oxtongue (3), broadleaf plantain (1), bulrush (3), burr clover (6), cheeseweed (1), chinese elm (1), clustered dock (1), common cattail (1), common celery (1), common purslane (1), common sowthistle (7), common stork's bill (1), curly dock (4), english plantain (4), flax-leaved horseweed (4), goose grass (1), jersey cudweed (2), lindheimer's muhly (1), mediterranean love grass (1), mexican fan palm (3), mexican primrose (4), prickly lettuce (1), prickly sowthistle (1), prostrate pigweed (1), rabbitsfoot grass (4), shepherd's purse (1), smilo grass (1), spanish false fleabane (16), thorny olive (1), tussock paspalum (5), white stem filaree (1), white sweetclover (2), yellow sweetclover (5)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
El Modena	16	birdsfoot trefoil (6), black-jack (1), bristly oxtongue (1), burr clover (1), cheeseweed (2), common flax (1), common sowthistle (1), compact brome (1), italian rye (1), lesser swinecress (1), mexican primrose (2), pineappleweed (1), rescuegrass (1), shamel ash (2), smilo grass (4), spanish false fleabane (1)	Digging, Hand Removal, Hula Hoe/Tilling

Floral View	22	bay laurel (1), black mustard (1), bull thistle (4), burr clover (1), common cattail (1), common fig (3), common sowthistle (2), compact brome (2), italian thistle (1), jersey cudweed (1), mexican fan palm (1), mexican primrose (4), poison hemlock (1), red brome (1), rescuegrass (3), ripgut brome (1), slender thistle (1), spanish false fleabane (6), tall fescue (2), tropical milkweed (1), white sweetclover (1), yellow sweetclover (2)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
Forge Meadow	28	barnyard grass (2), bermuda grass (1), bristly oxtongue (16), bulrush (1), burr clover (8), clustered dock (2), common purslane (1), common sowthistle (2), common stork's bill (2) curly dock (5), dallisgrass (1), english plantain (4), flax-leaved horseweed (3), hairy crabgrass (1), italian rye (1), jungle rice (1), mexican fan palm (1), mexican primrose (1), prickly lettuce (3), prostrate pigweed (1), smilo grass (7), spanish false fleabane (5), spotted spurge (2), tropical horseweed (1), umbrella sedge (5), wall barley (1), white sweetclover (3), yellow sweetclover (1)	Digging, Hand Removal, Hula Hoe/Tilling, No Action, Trimming
Hidden Canyon	26	bermuda grass (3), black mustard (1), bristly oxtongue (17), bull thistle (1), bulrush (1), burr clover (3), cheeseweed (1), common fennel (2), common sowthistle (3), creeping saltbush (1), creeping wood sorel (1), curly dock (16), flax-leaved horseweed (2), goose grass (1), knotroot bristlegrass (1), musky stork's bill (1), prickly lettuce (4), prickly sowthistle (4), rabbitsfoot grass (1), rescuegrass (3), scarlet pimpernel (1), shepherd's purse (1), smilo grass (6), spanish false fleabane (3), tamarisk (1), yellow sweetclover (2)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Trimming
Iluna Springs	14	annual bluegrass (1), black mustard (1), bristly oxtongue (1), castor bean (4), chinese elm (2), common sowthistle (1), curly dock (5), field bindweed (1), fountain grass (2), lesser swinecress (1), mexican primrose (1), shortpod mustard (1), spanish false fleabane (4), tree tobacco (1)	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal
Laguna Altura North	29	bristly oxtongue (6), bulrush (1), burr clover (7), castor bean (3), cheeseweed (1), common cattail (1), common sowthistle (8), compact brome (2), curly dock (1), field bindweed (1), fountain grass (3), hyssop loosestrife (1), italian rye (2), lesser swinecress (1), mexican primrose (2), oak-leaved goosefoot (2), panic veldtgrass (1), prickly lettuce (2), prickly sowthistle (3), rabbitsfoot grass (3), rat-tail fescue (1), red brome (1), rescuegrass (1), scarlet pimpernel (3), smilo grass (6), spanish false fleabane (1), tropical horseweed (2), wall barley (1), water beard grass (1)	Digging, Hand Removal, Hula Hoe/Tilling, Trimming
Laguna Altura South	19	bermuda grass (2), bristly oxtongue (1), bull thistle (1), bulrush (1), burr clover (2), common stork's bill (1), curly dock (1), field bindweed (1), mexican primrose (1), petty spurge (1), prickly lettuce (1), prickly sowthistle (2), rabbitsfoot grass (3), rescuegrass (1), scarlet pimpernel (2), spanish false fleabane (1), taiwanese firethorn (1), tamarisk (1), yellow sweetclover (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Manual: Solarization, Trimming
Los Olivos Meadow	15	artichoke thistle (1), black mustard (1), brazilian peppertree (2), bristly oxtongue (8), bull thistle (1), bulrush (1), burr clover (3), common sowthistle (2), common stork's bill (1), curly dock (4), prickly sowthistle (6), rabbitsfoot grass (3), spanish false fleabane (12), tamarisk (1), yellow sweetclover (3)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
Los Olivos South	15	bermuda grass (11), bristly oxtongue (4), burr clover (3), common sowthistle (3), creeping saltbush (2), curly dock (4), hooker's evening primrose (1), lesser swinecress (2), pampas grass (1), prickly sowthistle (3), seashore paspalum (3), spanish false fleabane (5), st. augustine grass (1), tamarisk (1), yellow sweetclover (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Manual: Solarization, Trimming
Lower Agua Chinon Basin A	15	annual wall-rocket (1), bristly oxtongue (2), curly dock (17), flax-leaved horseweed (3), hairawn muhly (1), palo verde (1), prickly sowthistle (5), rabbitsfoot grass (2), seashore paspalum (1), shortpod mustard (1), spanish false fleabane (9), st. augustine grass (1), umbrella sedge (2), wild radish (4), yellow sweetclover (4)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal
Lower Agua Chinon Basin B	21	black mustard (1), bristly oxtongue (1), bull thistle (3), common sowthistle (1), common stork's bill (1), curly dock (1), flax-leaved horseweed (1), fountain grass (1), hairawn muhly (1), italian thistle (1), jersey cudweed (1), lesser swinecress (1), palo verde (2), prickly sowthistle (5), scarlet pimpernel (1), seashore paspalum (1), shortpod mustard (3), spanish false fleabane (6), tree tobacco (2), white sweetclover (1), yellow sweetclover (6)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal
Lower Agua Chinon Basin C	16	black mustard (2), bull thistle (2), common fig (2), curly dock (1), hairy bittercress (1), jersey cudweed (1), lesser swinecress (2), prickly sowthistle (8), prostrate pigweed (1), shortpod mustard (9), spanish false fleabane (13), tamarisk (1), tomato plant (1), tree tobacco (1), tropical horseweed (1), yellow sweetclover (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal

Lower Eastfoot	23	bermuda grass (2), blue water speedwell (1), bristly oxtongue (11), burr clover (7), cheeseweed (1), common sowthistle (5), compact brome (3), curly dock (1), dallisgrass (3), field bindweed (1), flax-leaved horseweed (2), fountain grass (1), hairawn muhly (1), italian rye (1), jungle rice (1), musky stork's bill (3), oat sp. (1), rabbitsfoot grass (1), rescuegrass (3), russian thistle (1), smilo grass (11), spanish false fleabane (1), yellow sweetclover (5)	Digging, Hand Removal, Hula Hoe/Tilling
Marine Meadow	11	black medic (1), bristly oxtongue (6), burr clover (1), common cattail (1), common soft brome (1), common sowthistle (8), hairawn muhly (2), jersey cudweed (1), rescuegrass (2), spanish false fleabane (1), yellow sweetclover (4)	Digging, Hand Removal, Hula Hoe/Tilling, Trimming
Marshburn	21	barnyard grass (1), bindii (1), blackwood acacia (1), carrotwood (3), castor bean (5), cheeseweed (1), chinese flame tree (1), common sowthistle (1), curly dock (10), everblooming acacia (3), flax-leaved horseweed (1), floating primrose-willow (1), guava tree (1), italian rye (3), italian thistle (1), narrow-leaved goosefoot (1), red brome (1), slender wild oats (1), spanish false fleabane (1), white sweetclover (2), wild radish (2)	Digging, Hand Removal, Hula Hoe/Tilling, Mowing, Tree Removal
Middle Eastfoot	19	bermuda grass (5), bristly oxtongue (12), burr clover (7), common sowthistle (4), curly dock (4), dallisgrass (2), english plantain (1), fountain grass (1), hyssop loosestrife (1), maltese star thistle (1), mexican primrose (6), ngaio (1), prickly sowthistle (3), rabbitsfoot grass (2), smilo grass (4), spanish false fleabane (2), watercress (1), white sweetclover (2), yellow sweetclover (2)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Manual: Solarization
Old Laguna	24	bermuda grass (2), blue water speedwell (2), brass buttons (2), bristly oxtongue (2), bulrush (5), burr clover (1), carrotwood (3), common sowthistle (1), common stork's bill (1), compact brome (2), curly dock (4), english plantain (3), floating primrose-willow (2), marsh parsley (2), mexican fan palm (1), musky stork's bill (1), prickly lettuce (2), prickly sowthistle (2), rabbitsfoot grass (2), rat-tail fescue (1), shortpod mustard (1), spanish false fleabane (7), watercress (2), yellow sweetclover (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Solarization, Tree Removal, Trimming
Orchard Meadow	23	african asparagus (2), bristly oxtongue (9), bulrush (1), burr clover (1), common cattail (1), common sowthistle (1), curly dock (3), flax-leaved horseweed (1), great brome (1), peruvian peppertree (1), prickly lettuce (1), rabbitsfoot grass (1), rescuegrass (1), scarlet pimpernel (1), shortpod mustard (2), slender wild oats (1), spanish false fleabane (7), taiwanese firethorn (1), tropical horseweed (1), water beard grass (1), water smartweed (1), white sweetclover (4), yellow sweetclover (3)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Trimming
Orchard Retarding Basin	13	bristly oxtongue (3), common cattail (1), common fennel (1), flax-leaved horseweed (3), maltese star thistle (1), mediterranean grass (1), prostrate pigweed (1), rabbitsfoot grass (3), ripgut brome (1), shortpod mustard (3), slender wild oats (1), spanish false fleabane (3), wall barley (1)	Digging, Hand Removal, Hula Hoe/Tilling, Trimming
Parasol Park	16	black mustard (2), brazilian peppertree (1), buffelgrass (1), bull thistle (3), carrotwood (1), crape myrtle (1), curly dock (7), fountain grass (1), hairawn muhly (1), lindheimer’s muhly (3), prickly lettuce (1), prickly sowthistle (2), shamel ash (5), spanish false fleabane (3), stalked bulbine (1), tropical milkweed (4)	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal
Port Culver	27	annual wall-rocket (1), brazilian peppertree (1), bristly oxtongue (15), burr clover (7), common dandelion (1), common soft brome (1), common sowthistle (4), compact brome (2), english plantain (2), flax-leaved horseweed (2), italian rye (5), peruvian peppertree (1), pickerelweed (2), prickly lettuce (1), prickly sowthistle (1), purple nutsedge (1), rabbitsfoot grass (1), red brome (1), shortpod mustard (2), smilo grass (16), spanish false fleabane (3), tropical horseweed (1), umbrella sedge (2), wall barley (1), wax leaf privot (1), whorled pennywort (1), yellow sweetclover (5)	Digging, Hand Removal, Hula Hoe/Tilling
Portola Springs Meadow	29	bermuda grass (1), brazilian peppertree (1), camphor tree (1), carrotwood (1), chinese elm (2), common purslane (1), common sowthistle (4), compact brome (1), creeping lantana (2), curly dock (2), flax-leaved horseweed (1), fountain grass (1), golden wattle (1), golden wreath wattle (2), great brome (1), mexican primrose (8), musky stork’s bill (1), panic veldtgrass (1), prickly sowthistle (2), rabbitsfoot grass (2), red brome (3), ripgut brome (3), shoestring acacia (1), smilo grass (2), soft chess (1), spanish false fleabane (6), tall fescue (1), water beard grass (1), yellow sweetclover (3)	Digging, Hand Removal, Hula Hoe/Tilling

Quail Meadow	19	brass buttons (2), bristly oxtongue (3), burr clover (4), cheeseweed (1), common sowthistle (3), common stork's bill (1), curly dock (2), english plantain (1), hooker's evening primrose (1), musky stork's bill (3), prickly lettuce (4), prickly sowthistle (4), rat-tail fescue (1), ripgut brome (1), slender wild oats (1), spanish false fleabane (5), wall barley (1), wild barley (1), yellow sweetclover (2)	Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Mowing, Trimming
Quail Springs	31	african sumac (2), black mustard (2), black willow (1), bristly oxtongue (5), burr clover (4), castor bean (1), chinese elm (4), common fennel (3), common purslane (1), common sowthistle (2), curly dock (11), dallisgrass (1), fountain grass (1), italian rye (2), maltese star thistle (1), musky stork's bill (1), mustard sp. (1), perrenial ryegrass (1), prickly sowthistle (1), rat-tail fescue (2), russian thistle (1), shepherd's purse (1), shortpod mustard (3), spanish false fleabane (17), tamarisk (1), wall barley (2), watercress (3), white horehound (1), white sweetclover (1), wild radish (2), yellow sweetclover (3)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Weed Whacking
Ridge Valley A	39	african sumac (3), brazilian peppertree (4), bristly oxtongue (10), bull thistle (1), burr clover (5), camphor tree (1), carrotwood (2), cheeseweed (5), chinese elm (3), chinese flame tree (1), chinese privet (2), common lantana (1), common sowthistle (10), compact brome (1), curly dock (10), field burrweed (1), flax-leaved horseweed (3), flaxleaf paperbark (1), floating primrose-willow (1), fountain grass (2), japanese honeysuckle (1), jersey cudweed (2), lindheimer's muhly (3), mexican fan palm (4), mexican primrose (6), moth vine (1), musky stork's bill (2), perennial pepperweed (3), prickly lettuce (2), prickly sowthistle (5), rabbitsfoot grass (6), rescuegrass (1), ripgut brome (2), shortpod mustard (1), spanish false fleabane (4), stork's bill (1), tussock paspalum (2), water beard grass (2), yellow sweetclover (13)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
Ridge Valley B	19	bird of paradise (1), brazilian peppertree (2), bristly oxtongue (2), burr clover (4), common sowthistle (1), jersey cudweed (1), lindheimer's muhly (1), mexican primrose (1), perennial pepperweed (1), prickly lettuce (1), prickly sowthistle (5), rabbitsfoot grass (1), rusty fig (1), scarlet pimpernel (1), spanish false fleabane (1), tropical horseweed (1), tussock paspalum (1), watercress (1), yellow sweetclover (8)	Digging, Hand Removal, Hula Hoe/Tilling, Trimming
Ridge Valley C	24	african sumac (1), brazilian peppertree (3), bristly oxtongue (2), bull thistle (1), burr clover (2), canary island date palm (1), cheeseweed (1), common lantana (1), common sowthistle (7), compact brome (1), curly dock (8), fountain grass (2), jersey cudweed (1), lindheimer's muhly (2), mexican primrose (3), pampas grass (1), perennial pepperweed (2), prickly lettuce (2), prickly sowthistle (4), shortpod mustard (2), snow-in-summer (1), spanish false fleabane (9), water beard grass (1), yellow sweetclover (7)	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal, Trimming
SJM Zone 1	21	african sumac (1), bermuda grass (1), black mustard (1), brazilian peppertree (2), carrotwood (3), castor bean (1), common stork's bill (1), curly dock (1), dwarf nettle (1), fern pine (1), jersey cudweed (1), lesser swinecress (4), maltese star thistle (1), mexican fan palm (2), perennial pepperweed (2), poison hemlock (1), prickly sowthistle (6), rabbitsfoot grass (1), shortpod mustard (1), spanish false fleabane (9), tomato plant (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal
SJM Zone 2	26	black mustard (2), bristly oxtongue (2), bulrush (1), butterfly bush (2), carrotwood (1), castor bean (5), cheeseweed (1), chinese elm (1), common fig (4), common stork's bill (3), compact brome (1), curly dock (1), dwarf nettle (8), hairy bittercress (2), indian-fig opuntia (1), lesser swinecress (7), london rocket (3), poison hemlock (7), prickly sowthistle (5), rabbitsfoot grass (3), silver-dollar gum (1), spanish false fleabane (4), tomato plant (2), tree tobacco (2), watercress (1), white horehound (2)	Digging, Hand Removal, Hula Hoe/Tilling, Tree Removal, Trimming
SJM Zone 3	33	black mustard (1), bristly oxtongue (1), bull thistle (3), bulrush (2), burr clover (3), castor bean (5), cheeseweed (1), common plantain (1), common sowthistle (1), common stork's bill (2), compact brome (1), cowpen daisy (3), curly dock (3), dwarf nettle (5), flax-leaved horseweed (1), hairy bittercress (2), italian thistle (4), jersey cudweed (1), lesser swinecress (1), london rocket (1), poison hemlock (4), prickly sowthistle (5), rabbitsfoot grass (4), russian thistle (1), shortpod mustard (3), spanish false fleabane (30), tomato plant (1), tree tobacco (1), wall barley (1), watercress (1), white horehound (1), white sweetclover (2), yellow sweetclover (11)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
SJM Zone 4	20	bull thistle (4), bulrush (1), callery pear (1), camphor tree (3), carrotwood (5), cheesewood (1), common fig (5), common sowthistle (1), common stork's bill (1), curly dock (4), dwarf nettle (5), lesser swinecress (4), london rocket (3), mexican fan palm (1), petty spurge (1), poison hemlock (1), prickly sowthistle (8), shamel ash (2), spanish false fleabane (5), virginia creeper (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming

Sports Park	27	black mustard (1), brazilian peppertree (1), bristly oxtongue (2), bull thistle (6), carrotwood (1), castor bean (3), chinese elm (1), chinese flame tree (2), common cattail (1), common fig (1), common lantana (1), common sowthistle (1), curly dock (12), fountain grass (3), hairawn muhly (4), italian thistle (5), maltese star thistle (1), mexican fan palm (1), mexican primrose (1), prickly lettuce (1), prickly sowthistle (1), scarlet pimpernel (2), shortpod mustard (4), spanish false fleabane (10), tree tobacco (2), vanilla scented wattle (1), yellow sweetclover (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
Turtle Ridge	23	african asparagus (2), blue water speedwell (1), brazilian peppertree (1), bristly oxtongue (8), bulrush (3), burr clover (5), common soft brome (3), common sowthistle (2), compact brome (4), italian rye (2), mexican primrose (4), peruvian peppertree (1), prickly lettuce (1), prickly sowthistle (5), rabbitsfoot grass (1), rat-tail fescue (2), red brome (3), ripgut brome (1), scarlet pimpernel (4), slender wild oats (1), spanish false fleabane (2), watercress (4), yellow sweetclover (1)	Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal, Trimming
Trabuco	20	blue water speedwell (2), brass buttons (1), bristly oxtongue (1), bulrush (2), burr clover (4), cheeseweed (2), chinese elm (1), curly dock (4), flax-leaved horseweed (4), italian rye (1), lesser swinecress (2), prickly lettuce (1), rescuegrass (1), shepherd's purse (4), shortpod mustard (2), spanish false fleabane (14), stinknet (1), water speedwell (1), white sweetclover (3), yellow sweetclover (1)	Hand Removal, Hula Hoe/Tilling, Tree Removal, Trimming
Twisted Oak	12	bermuda grass (1), bristly oxtongue (2), burr clover (1), cheeseweed (1), common sowthistle (2), flax-leaved horseweed (1), floating primrose-willow (2), prickly sowthistle (1), rabbitsfoot grass (3), scarlet pimpernel (2), sharpleaf cancerwort (1), yellow sweetclover (1)	Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling
Upper Agua Chinon Basin A	14	bristly oxtongue (2), bull thistle (1), common sowthistle (1), fountain grass (9), marsh celery (1), pampas grass (1), prickly sowthistle (3), rabbitsfoot grass (1), russian thistle (2), scarlet pimpernel (1), shortpod mustard (2), spanish false fleabane (5), stork’s bill sp. (1), tamarisk (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal
Upper Agua Chinon Basin B	14	bristly oxtongue (1), burr clover (1), common sowthistle (1), curly dock (1), fountain grass (1), golden wreath wattle (1), prickly sowthistle (4), rabbitsfoot grass (1), shortpod mustard (3), smilo grass (1), spanish false fleabane (13), stinknet (1), tamarisk (1), yellow sweetclover (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Tree Removal
Upper Eastfoot	9	bermuda grass (2), bristly oxtongue (1), bulrush (1), common cattail (1), common lantana (1), matted sandmat (1), prickly sowthistle (1), scarlet pimpernel (2), yellow sweetclover (1)	Digging, Hand Removal, Herbicide Spot Treatment, Hula Hoe/Tilling, Trimming