Final
Restoration Plan for the Shinohara II Restoration Project, Chula Vista, California

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1.0 Introduction

This Final Habitat Restoration Plan (Plan) describes the methods and materials by which the approximately 5.57-acre project area will be restored at the Shinohara II Restoration Project (project) site in the City of Chula Vista, California. The purpose of the project is to restore the site to higher quality habitat and to include soil remediation of a historical burn dump deposit site. The Plan provides an implementation strategy, a five-year maintenance, monitoring, and reporting program, and project performance standards.

1.1 Project Description

The project site is located in the City of Chula Vista (City), adjacent to the southern edge of the Otay River and within the lower floodplain. The site is east of Interstate 805 and north of Dennery Road (Figure 1). The site is located within Section 19 of Township 18 South, Range 1 West, of the U.S. Geological Survey 7.5-minute topographic map National City quadrangle (USGS 1975) as shown in Figure 2. The project area is within Area 1 of the Otay Valley Regional Park (HDR Engineering, Inc. [HDR] 2006). The project area is shown on an aerial photograph in Figure 3.

The City owns approximately 1 acre of the site, and the remainder is owned by the Shinohara Family Trust. The site is known to have historically received waste from a burn dump and is recorded as a known burn site (RECON 2015a). Burn ash from the South Bay Burn Site and other locations were brought to the site as fill material in the late 1970s.

The project site is part of a larger property made up of two parcels. The City is undertaking restoration work at the site to facilitate the reuse as part of the Otay Valley Regional Park (OVRP). Eventually, it is envisioned that the project site will be part of a 13-mile stretch of OVRP along the Otay River that will be developed with recreational trails.

A jurisdictional resource survey conducted for the Jurisdictional Waters/Wetland Delineation Report for the Shinohara II Restoration Project (RECON 2015b) mapped wetland waters on the project site that are under the jurisdiction of Army Corps of Engineers (ACOE), California Department of Fish and Wildlife (CDFW), California's Regional Water Quality Control Board (RWQCB), and the City of Chula Vista. Acreages of each jurisdictional resource are provided in Table 1, further defined by the vegetation communities delineated within each jurisdiction.

Project Location

FIGURE 1

Regional Location

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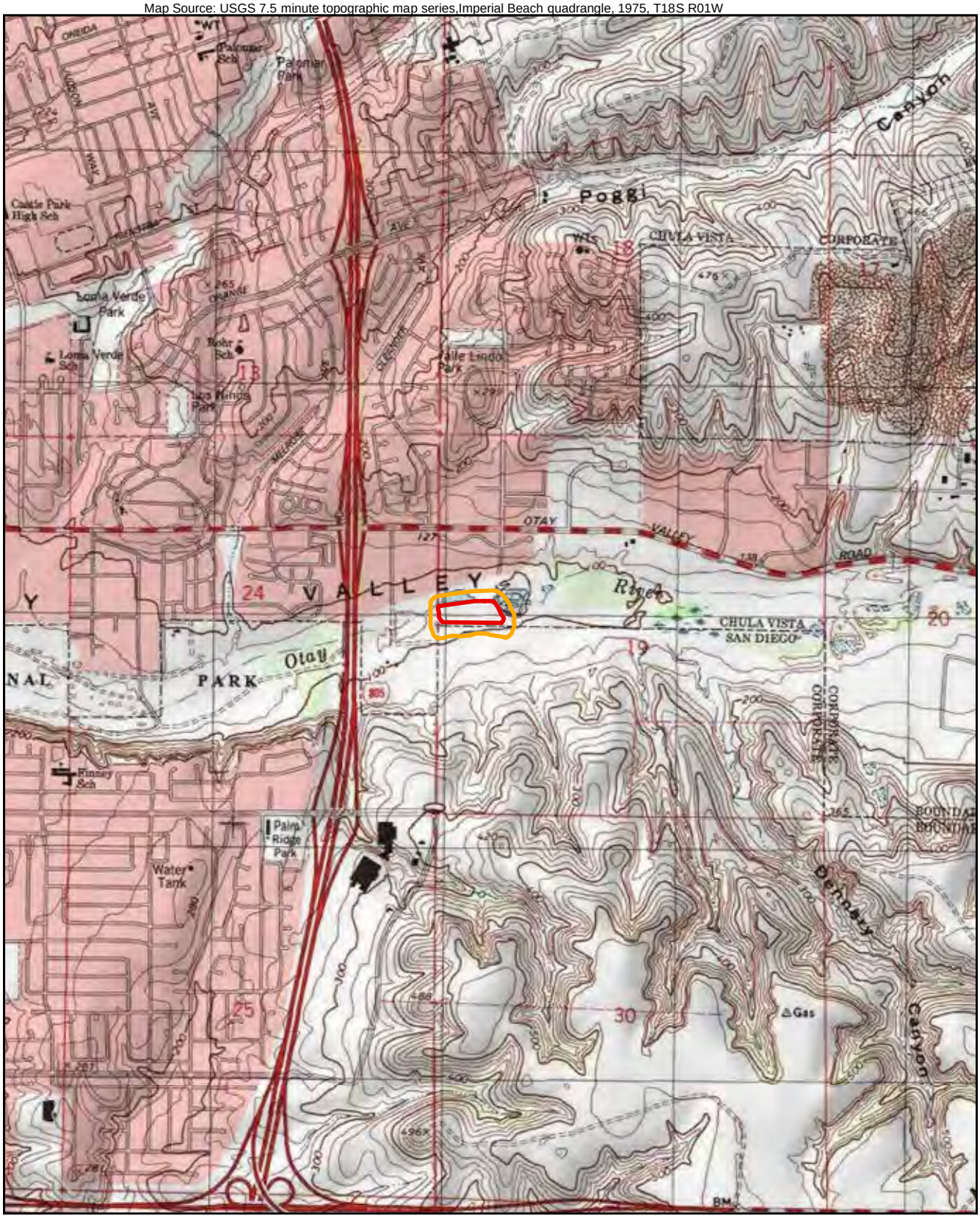
Map Source: USGS 7.5 minute topographic map series,Imperial Beach quadrangle, 1975, T18S R01W



0 Feet 2,000

Project Area/Limit of Work

Survey Area

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FIGURE 2

Project Location on USGS Map

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Image Source: SanGIS (flown May 2012)

Project Area/Limit of Work
Survey Area
Municipal Boundary
Otay Valley Regional Park

0 Feet 200

FIGURE 3

Project Location on Aerial Photograph

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TABLE 1
JURISDICTIONAL RESOURCES TO BE RESTORED

Jurisdictional Resource	Coast and Valley Freshwater Marsh (acres)	Southern Willow Scrub (acres)	Total Jurisdiction Resource (acres)	Proposed Restoration (acres)[1]
ACOE Wetlands	0.04	0.05	0.09	0.10
RWQCB Waters[2]	0.04	0.05	0.09	0.10
CDFW Wetlands	0.06	0.82	0.88	0.97
City of Chula Vista Wetlands	0.06	0.82	0.88	0.97

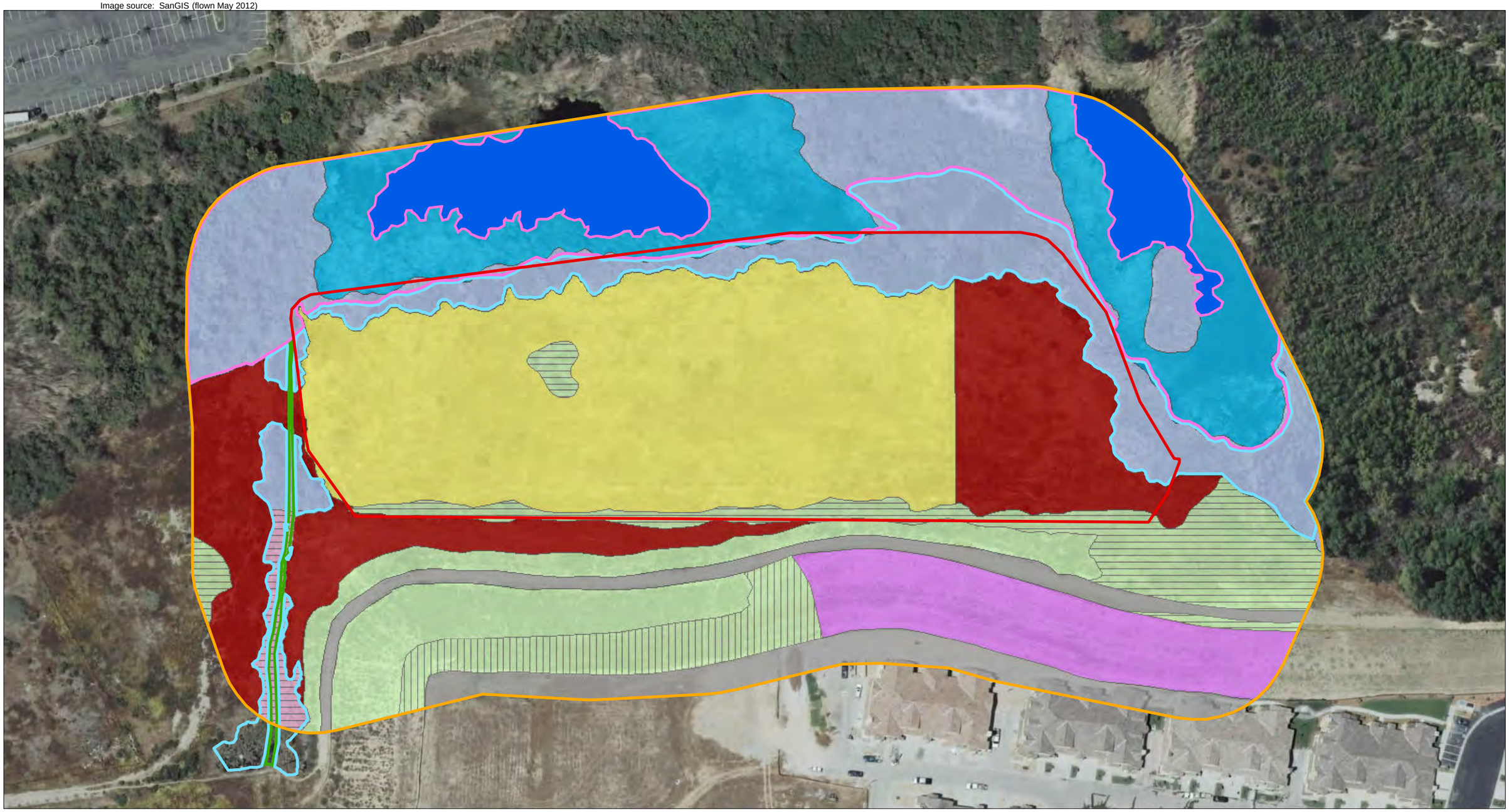
[1]See Table 2 for the proposed restoration by vegetation community. Restoration will consist of a minimum of 1:1 replacement for the each of the impacted vegetation communities delineated as a jurisdictional resource.
[2]This reflects the waters of the State that are subject to Clean Water Act Section 401, Water Quality Certification.

A biological resources survey conducted for the Biological Technical Report for the Shinohara II Restoration Project (RECON 2015a) mapped existing vegetation communities on the project site as non-native grassland, disturbed land, Diegan coastal sage scrub, southern willow scrub, and freshwater marsh (Figure 4). Acreages of each vegetation community mapped within the project area are shown in Table 2.

TABLE 2
NATIVE VEGETATION COMMUNITIES TO BE RESTORED

Existing Conditions Vegetation Community	Existing Conditions (acres)	Proposed Restoration Vegetation Community	Proposed Restoration (acres)
Disturbed Diegan coastal sage scrub	0.29	Diegan coastal sage scrub	4.60
Non-native grassland	3.49		
Disturbed habitat	0.91		
Southern willow scrub	0.82	Southern willow scrub	0.92
Coast and valley freshwater marsh	0.06	Freshwater marsh	0.05
TOTAL	**5.57**		**5.57**

Image source: SanGIS (flown May 2012)



Project Area
Survey Area

Vegetation and Landcover Types

- Diegan Coastal Sage Scrub
- Revegetated Diegan Coastal Sage Scrub
- Disturbed Diegan Coastal Sage Scrub
- Non-native Grassland
- Coast and Valley Freshwater Marsh
- Southern Willow Scrub
- Disturbed Wetland
- Open Water
- Ornamental / Landscaped
- Disturbed Habitat
- Urban / Developed

Jurisdictional Waters

- ACOE Non-wetland Water, CDFW Wetland, RWQCB Waters of the State
- ACOE Wetland, CDFW Wetland, RWQCB Waters of the State
- CDFW Wetland
- Open Water - ACOE Non-wetland Water, CDFW Wetland, RWQCB Waters of the State

0 Feet 100

FIGURE 4

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Existing Vegetation Communities, Jurisdictional Waters and Project Impacts

1.2 Burn Site Remediation

This project includes the remediation of burn ash on the slopes and the adjacent disturbed uplands. The following remediation is proposed:

1. Consolidation of a portion of the waste in areas where it is economically feasible, such as river banks and portions of the burn dump that encroach property lines.

2. Provide a minimum cover of 24 inches of clean, compacted soil over the existing refuse fill. Areas to receive cover placement will be stripped of all existing vegetation.

3. Grade the compacted soil cover such that a minimum grade of 3 percent occurs.

4. Provide engineered stormwater runoff collection and conveyance facilities to prevent future ponding of stormwater over the burn dump.

5. Provide improved drainage channel walls or slope armoring and scour protection along the natural drainage courses to prevent washout of the landfill from a 100-year, 24-hour storm event.

6. Provide erosion control and seeding to prevent future erosion of the final cover.

7. Provide final cover planting to sustain natural erosion protection compatible with the surrounding biota and consistent with the proposed end use of the properties as specified by the City's General Plan.

8. Provide a maintenance and inspection plan for the site during the post-closure period (typically 10 to 30 years, as determined by the regulatory authority).

1.3 Restoration of Jurisdictional Resources

A jurisdictional resource survey conducted for the Jurisdictional Waters/Wetland Delineation Report for the Shinohara II Restoration Project (RECON 2015b) mapped the extent of jurisdictional resources according to ACOE, CDFW, California's RWQCB, and the City of Chula Vista. The results of the jurisdictional resource survey provided 0.88 acre of total wetland within the project area, of which 100 percent is under the jurisdiction of CDFW, and the City of Chula Vista and 10 percent (0.09 acre) is classified as ACOE wetland water of the United States. There were no ACOE non-wetland waters mapped within the project area. While the entire mapped resources would be classified as RWQCB Waters of the State, 10 percent (0.09 acre) are subject to the federal Clean Water Act Section 401 Water Quality Certification.

Since site remediation plans are limited to the project area along the bank of the Otay River, hydrologic function of the Otay River is expected to remain intact and water availability to the project site will be consistent with existing condition. Therefore, areas of jurisdictional resources expected for the finished project site were estimated by comparing final grade topography to existing conditions defined in the Jurisdictional Waters/Wetland Delineation Report (RECON 2015b) and the Biological Technical Report for the Shinohara II Restoration Project (RECON 2015a). Existing conditions showed the upper extent of ACOE wetland waters to be at 88 to 90 feet above sea level, and the upper extent of all wetland jurisdictions to be at 100 to 102 feet above sea level. Therefore the final rules were applied:

1. Wetland jurisdiction for CDFW, RWQCB, and the City of Chula Vista includes all of the project area below a finished grade of 102 feet.

2. Wetland jurisdiction for ACOE wetland waters of the U.S. and RWCQB waters subject to CWA Section 401 Water Quality Certification includes all of the project area below a finished grade of 90 feet.

Results of the assessment provided a total of 0.97 acre within the final project area that will be classified as jurisdictional wetland by the CDFW, RWQCB, and the City of Chula Vista, of which 0.10 will fall under jurisdiction of the ACOE as wetland waters of the U.S. and RWQCB as waters subject to CWA Section 401 Water Quality Certification. This plan for jurisdictional resource restoration exceeds project requirements of zero net loss by providing an increase in wetland area for both categories; ACOE and RWQCB will increase from 0.09 to 0.10 acre and state/local jurisdictional area will increase from 0.88 to 0.97 acre.

1.4 Restoration of Vegetation

Vegetation restoration goals for the project area are to establish self-sustaining native vegetation communities that improve upon existing condition, and to succeed in no net loss of jurisdictional wetland areas on-site. As shown in Table 2, the final plan for on-site restoration provides an increase in areas suitable for freshwater marsh and southern willow scrub vegetation communities.

Disturbed Diegan coastal sage scrub, non-native grassland, and disturbed habitat will be restored to high-quality Diegan coastal sage scrub. Southern willow scrub and freshwater marsh will be restored in kind. Non-native grassland and disturbed land will be converted to Diegan coastal sage scrub in order to reduce cover of non-native vegetation, increase the cover of Diegan coastal sage scrub for restoration requirements, and improve the natural resource quality of the area for wildlife, aesthetics, and recreational purposes.

Due to the presence of the federally listed threatened coastal California gnatcatcher (*Polioptila californica californica*) (RECON 2015a), the Diegan coastal sage scrub restoration will be structured to provide suitable habitat for this species. Due to the presence of the federally listed endangered least Bell's vireo (*Vireo bellii pusillus*) and California Watch List species Cooper's hawk (*Accipiter cooperii*) (RECON 2015a), the southern willow scrub restoration will be structured to provide suitable habitat for these species.

Specific habitat restoration goals include:

- Establish self-sustaining, high-quality, native vegetation communities that require minimal long-term maintenance.
- Provide effective means of erosion control that will maintain the structural integrity of remediation efforts.
- Improve the ecological quality of the disturbed project areas by reducing or eliminating non-native plant infestations.
- Provide suitable habitat for plants and wildlife, especially state and federally listed species coastal California gnatcatcher, least Bell's vireo, and Cooper's hawk.
- Create a native vegetation community that will provide ecological and recreational services to the OVRP and the City of Chula Vista.

One sensitive plant species, desert fragrance (*Ambrosia monogyra*), was observed on-site. Although impacts to this species are not considered significant, reestablishment of this species will be encouraged if plant or seed material is available at the time the seed order is placed.

The Plan has been written to comply with all requirements of the *Otay Valley Regional Park Habitat Restoration Plan and Non-native Plant Removal Guidelines* (OVRP Restoration Plan; HDR 2006).

1.4.1 Planting Areas

Successful establishment of wetland and riparian vegetation communities depends upon adequate access to surface and ground water supply. The boundaries of planting areas and jurisdictional features for the restoration area were determined using final grade topography provided for this project with reference to existing site conditions that provided information on water availability (surface and ground) at the project site (Figure 5). Existing conditions showed a general trend of upland to wetland transition

Image source: SANDAG (flown Nov 2014)

Project Area/Limit of Work
Municipal Boundary
2-foot Final Grade Contours

Planting Area
Freshwater Marsh - 0.05 ac
Southern Willow Scrub - 0.92 ac
Diegan Coastal Sage Scrub - 4.60 ac

Planned Jurisdictional Features
ACOE Wetland, CDFW Wetland, RWQCB Waters of the State - 0.10 ac
CDFW Wetland - 0.87 ac

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FIGURE 5

Planting Areas and Jurisdictional Features

around 102 feet above sea level, and a transition of southern willow scrub to freshwater marsh around 88 feet elevation. Therefore, the planting areas for native vegetation communities to be restored were delineated as such:

1. Diegan coastal sage scrub includes all elevations within the project area above a finished grade of 102 feet above sea level (4.60 acres).

2. Southern willow scrub includes all areas between 88 and 102 feet above sea level (0.92 acre).

3. Freshwater marsh includes all elevations within the project area below a finished grade of 88 feet above sea level (0.05 acre).

Results of the assessment identified a total of 4.60 acres available for upland vegetation and 0.97 acre for riparian/wetland vegetation communities, for a total of 5.57 acres.

1.4.2 Diegan Coastal Sage Scrub

All upland areas above 102 feet will be restored to Diegan coastal sage scrub. The uplands include project areas mapped as disturbed Diegan coastal sage scrub, non-native grassland, and disturbed land (RECON 2015a). Restoration of the uplands will begin above southern willow scrub and continue to the highest elevations of the site. The final planting area of Diegan coastal sage scrub will be approximately 4.60 acres.

Diegan coastal sage scrub is unique to southern California and consists of sparse, low-growing shrubs that include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*), and lemonade berry (*Rhus integrifolia*). Since most of the project area was grassland prior to remediation, seeding will emphasize high density and diversity of native grasses.

The non-native grass species in the upland project area prior to project activities were similar throughout all vegetation communities and included wild oat (*Avena barbata*), rye grass (*Festuca perenis*), and red brome (*Bromus madritensis* ssp. *rubens*). Dominant non-native species found primarily in the non-native grassland and disturbed vegetation communities were crystalline ice plant (*Mesembryanthemum crystallinum*), Australian saltbush (*Atriplex semibaccata*), and Russian thistle (*Salsola tragus*).

1.4.3 Southern Willow Scrub

The 0.92-acre southern willow scrub vegetation community planting area occurs on the slopes below the Diegan coastal sage scrub community, at elevations between 88 and 102 feet. The final planting area of southern willow scrub is intended to restore all of the jurisdictional waters for CDFW and City of Chula Vista as well as the upper slopes of the

ACOE wetland waters and RWQCB resources subject CWA Section 401; to ensure no-net-loss of these riparian/wetland habitats.

Southern willow scrub vegetation will be planted immediately up slope from freshwater marsh, where inundation is periodic but not sustained, and roots have access to consistent water supply. Southern willow scrub vegetation communities occur in riparian areas where water is readily available and floodwaters inundate during flood events. These communities are densely vegetated and dominated by willow species (*Salix* spp.). Other broadleaf trees like cottonwood (*Populus fremontii*) and sycamore (*Platanus racemosa*) are also common.

Prior to project activities, the southern willow scrub at the project site supported a canopy of arroyo willow (*Salix lasiolepis*) and black willow (*Salix gooddingii*) with a subdominant cover of mule fat (*Baccharis salicifolia*) and non-native tamarisk (*Tamarix ramossisima*).

1.4.4 Freshwater Marsh

The planned 0.05 acre freshwater marsh vegetation community will occur on elevations of the project site below 88 feet, on the lowest part of the slopes adjacent to the Otay River where inundation is perennial. No initial planting or seeding will occur in this area, as the project area is very small, has extensive edge with surrounding freshwater marsh, and occurs within a complex of healthy vegetation that is expected to fill in on its own.

Freshwater marsh vegetation communities develop only in areas permanently flooded by fresh water. Vegetation usually forms dense canopies and is dominated by perennial, emergent monocots. Prior to project activities, the coast and valley freshwater marsh was almost exclusively vegetated by dense bulrush (*Typha latifolia*) with some soft rush (*Juncus effusus*) interspersed throughout. It was intermixed with southern willow scrub in several locations.

1.5 Restoration Contractor Qualifications

The restoration contractor will have experience implementing successful riparian and upland habitat restoration projects in southern California. Habitat restoration activities will be managed by a qualified restoration ecologist or biologist with a minimum of five years of experience implementing and maintaining restoration projects in southern California. Herbicide application will be conducted under the supervision of an individual holding a California Qualified Applicator's License and experience in at least two wetland/riparian restoration projects. The project manager will coordinate and supervise all implementation and maintenance activities as well as monitoring and reporting.

2.0 Implementation

Restoration implementation activities will include site preparation, container plant installation, hydraulic seed application, and a 120-day plant establishment period (PEP). Implementation activities will begin after project activities are complete. The project will provide a clean, compacted topsoil cap over the existing refuse fill. The capped area will have been stripped of all existing vegetation, graded, and contoured. The erodible slopes will be structurally sound and stabilized prior to restoration activities.

Site preparation, as described in Section 2.2, can be completed at any time of year. Plant installation will be conducted late fall to early winter when rainfall and relatively low temperatures encourage plant growth and minimize plant stress. After completion of the PEP, maintenance and monitoring will be conducted for a five-year period, or until the final performance standards are achieved. All implementation and maintenance activities will be overseen by a qualified restoration biologist.

2.1 Construction Monitoring

The restoration biologist or qualified monitor will be on-site during final grading and contouring. The monitor will take note of problems encountered, alternative approaches used, and provide input that will support habitat restoration goals.

2.1.1 Surface Contour

The surface of the soil cap will be contoured with micro-topographic variation by the final grading contractor, as directed by the restoration biologist. These small variations in soil height and surface texture will support infiltration of surface runoff, seed germination, and habitat for small wildlife. Micro-topography will include ridges, mounds, stones/boulders, and woody debris that create landscape variation from 6 to 18 inches in height. Micro-topography may not be feasible in highly erodible areas. Scarification will be considered if soils are compacted.

2.2 Site Preparation

The restoration biologist will assess site conditions at the start of implementation and determine which site preparation procedures will be conducted. Site preparation might include application of soil amendments, non-native plant (weed) treatment, and site protection.

2.2.1 Soil Amendment

The soil cap on the burn site will be comprised of clean soil that may need to be amended in order to support healthy vegetation. If the soil cap is lacking in organic material, amendments will include nutrient-rich compost or mulch. Mulch applied to soil surface can be an effective way of reducing weed cover, holding moisture in the soil, and adding organic content to the soil. Amendments and mulch will be applied to the upland planting areas only to keep material from getting into the river during high flows. Amendments will be mixed into the topsoil or applied with the slurry during hydroseeding.

2.2.2 Weed Treatment

All non-native species will be treated or removed prior to implementation activities. Removing weeds will allow for easier plant installation and improve the opportunity for their successful establishment. Large woody or seeding weeds will be cut, bagged, and disposed of off-site. Small, herbaceous weeds will be treated with herbicide. If the soil cap has been in place for more than one year without weed treatment measures, one grow/kill cycle will be completed to deplete the seed bank prior to implementation.

2.2.3 Site Protection

Temporary fencing and/or signage will be installed by the restoration contractor to assure protection of the restoration area from vandalism and unauthorized access. The type of site protection needed will be determined by the restoration biologist in conjunction with the City of Chula Vista.

2.2.4 Slope Stabilization

The recontoured slopes above the Otay River along the northern edge of the project site will be stabilized prior to restoration activities by an erosion control fiber mat. The erosion control mat will consist of a biodegradable, natural fiber netting (i.e., jute or coconut) and will be installed per the manufacturer's recommendations. It is assumed that the mat will be installed during remediation project activities.

2.3 Plant Palettes

Plant and seed palettes are guidelines that may be changed due to a variety of circumstances, including seed and plant availability at the time of installation. Changes to the palettes will be made at the recommendation of the restoration biologist with consultation and approval from regulatory agencies.

2.3.1 Diegan Coastal Sage Scrub

Restoration of the 4.6 acres of Diegan coastal sage scrub will include both installation of container plants and hydraulic seed application. This combined approach will maximize success of larger shrubs that do not germinate well from seed while initiating a healthy native seed bank, promoting good cover of diverse vegetation, and providing nutrients to the soil by hydraulic application. Hydroseeding will only be completed in areas not containing an erosion control fiber mat. Installation of the Diegan coastal sage scrub seed and plants will begin at the top of the slope and therefore will not coincide with the fiber mat.

Plant and seed palettes are provided in Tables 3 and 4. A total of 11,500 plants and 73.6 pounds of seed are recommended. Native grasses will be seeded at high rates to improve the non-native grassland vegetation that existed prior to project activities.

TABLE 3
DIEGAN COASTAL SAGE SCRUB — CONTAINER PLANTS

Scientific Name	Common Name	Size	Plants per Acre	Number of Plants (4.60 acres)
Ambrosia monogyra	desert fragrance	1 gallon	50	230
Artemisia californica	California sagebrush	1 gallon	500	2300
Baccharis pilularis	coyote brush	1 gallon	50	230
Baccharis sarothroides	broom baccharis	1 gallon	50	230
Bahiopsis laciniata	San Diego sunflower	1 gallon	100	460
Cylindropuntia prolifera	coast cholla	1 gallon	50	230
Encelia californica	common encelia	1 gallon	150	690
Eriogonum fasciculatum	California buckwheat	1 gallon	350	1610
Hazardia squarrosa	sawtooth goldenbush	1 gallon	100	460
Isocoma menziesii	coast goldenbush	1 gallon	200	920
Malosma laurina	laurel sumac	1 gallon	150	690
Opuntia littoralis	coast prickly pear	1 gallon	50	230
Peritoma arborea	bladderpod	1 gallon	150	690
Rhus integrifolia	lemonadeberry	1 gallon	200	920
Salvia apiana	white sage	1 gallon	150	690
Salvia mellifera	black sage	1 gallon	150	690
Simmondsia chinensis	jojoba	1 gallon	50	230
Total			**2,500**	**11,500**

TABLE 4
DIEGAN COASTAL SAGE SCRUB — SEED MIX

Scientific Name	Common Name	Pounds per Acre	Number of Pounds (4.60 acres)
Bromus carinatus	California brome	3.0	13.8
Deinandra fasciculata	common tarplant	2.0	9.2
Melica imperfecta	coast range melic	2.5	11.5
Muhlenbergia rigens	Deergrass	1.0	4.6
Stipa cernua	Nodding needle grass	2.5	11.5
Stipa lepida	foothill needle grass	2.5	11.5
Stipa pulchra	purple needlegrass	2.5	11.5
Total		**16.0**	**73.6**

2.3.2 Southern Willow Scrub

Restoration of the 0.92-acre southern willow scrub area will include installation of container plants only with optional/supplemental willow pole cuttings. The surface soils will be covered by an erosion control fiber mat and will therefore not be seeded. The container plants and supplemental willow poles, if employed, will be installed through the fiber mat by cutting an “x” shape large enough to comply with specifications provide in Section 2.4 below. Approximately 1,565 container plants will be installed; optional/supplemental willow pole cuttings are not included in these numbers. The plant palette is provided in Table 5.

TABLE 5
SOUTHERN WILLOW SCRUB — CONTAINER PLANTS

Scientific Name	Common Name	Size	Plants per Acre	Number of Plants (0.92 acres)
Baccharis salicifolia	mule fat	1 gallon	350	322
Muhlenbergia rigens	deergrass	1 gallon	250	230
Populus fremontii	Fremont cottonwood	1 gallon	100	92
Platanus racemosa	California sycamore	1 gallon	100	92
Salix goodingii	black willow	1 gallon	350	322
Salix laevigata	red willow	1 gallon	200	184
Salix lasiolepis	arroyo willow	1 gallon	350	322
Sambucus nigra	black elderberry	1 gallon	100	92
Total			**1,800**	**1,656**

2.3.3 Freshwater Marsh

The 0.05-acre freshwater marsh area is dominated by dense bulrush, a native aquatic plant that is expected to recolonize any areas affected by the remediation efforts without plant or seed installation. The area will be maintained for weeds to support bulrush

recolonization. Remedial planting will be considered if restored areas are not well-vegetated by the end of Year 2. Remedial planting efforts will relocate mature bulrush individuals from the adjacent freshwater marsh to the restored area.

2.4 Plant Installation

Plant installation will include container plants, hydroseed application, and an option for willow pole cuttings in the southern willow scrub areas. Species selected for installation are native to southern California, appropriate for the local area and vegetation community, and will provide robust plant cover once established.

Local seed will be used for plant propagation and hydroseeding. Seed will be collected within 10 miles of the project area, ideally within the boundary of the OVRP boundary. If local seed collection is not possible or additional seed is needed, seed will be purchased from vendors with approval from the restoration biologist and regulatory agencies. Seed will not be more than two years old.

2.4.1 Container Plant Installation

Production of plants grown from seed will begin at least six months before implementation by a nursery experienced with growing native plant species for habitat restoration purposes. If propagation from seed is not possible or additional plant material is needed, plants will be purchased from vendors with approval from the restoration biologist and regulatory agencies. Prior to installation, plants will be robust, well-rooted, and adapted for poor soils and drought conditions.

Plant installation will begin immediately following site preparation activities and occur between November 1 and January 31 to coincide with seasonal rainfall. All plants will be inspected by the restoration biologist prior to installation and approved as healthy, disease free, and of appropriate size prior to planting. Plants will be installed evenly throughout the site with some clustering of shrubs and trees. The restoration biologist will approve the final layout of all plant materials in the field prior to planting.

Container plants will be installed using standard horticultural practices of backfilling a hole at least twice the diameter of the root ball. All plants and planting holes will be thoroughly watered before installation. A small soil berm of 2 to 3 inches tall and 24 inches in diameter will be constructed around the base of each plant to collect rainfall and irrigation water. Fertilizer will not be used unless recommended by the restoration biologist, as it can result in unnaturally rapid growth of native plants.

2.4.2 Optional Willow Pole Installation

As an optional addition to container plantings, cuttings from willows near the project site will be salvaged, soaked, and installed on-site. Willow poles are intended as supplemental rather than a mandatory measure; container plant installation alone will be sufficient to meet vegetation cover requirements.

All pole cutting must be performed between September 16 and January 14, which is outside the avian nesting season. Density of planting will be 150 to 200 per acre, or whatever is feasible with available resources. Poles will be collected from straight, secondary branches that are approximately six months to one year old with a diameter between one-half to one inch. Poles will be cut into four- to five-foot segments.

After collection, the poles will be placed into buckets of water (i.e., a 30-gallon trash can) in the same orientation as they were collected so that more than half of each pole is submerged. The buckets will be left on-site for one to two weeks to allow the cuttings to begin to root, which increases the survival rates of poles once installed. Willow poles will be installed approximately three or more feet below the surface when the soil is very wet or saturated. Poles will be watered regularly after planting.

2.4.3 Hydroseed

Hydroseed will be applied to the upland vegetation communities only and will occur after container plant installation. The slurry will include erosion control fiber and soil amendments, as directed by the restoration biologist. Seed will be provided by the restoration contractor.

Erosion control fiber matrix is not necessary in areas containing fiber mat. If seed or soil amendments are desired where fiber mat has been installed, application will be done prior to installation of the erosion control fiber mat.

2.5 Plant Establishment Period

The 120-day PEP will begin after all container plants have been installed. During this time, the site will be visited every two weeks to monitor for weeds, erosion, and other disturbances. Weeds will be treated once per month unless no treatment is needed. The site will be kept well-irrigated by water truck if natural precipitation and/or stream flow is lacking.

3.0 Maintenance

The maintenance program ensures that native species are being allowed to recruit, container plants are becoming established, and weeds are not outcompeting native vegetation. The maintenance period will begin concurrent with the start of Year 1, immediately following the PEP. Maintenance activities will include erosion control, supplemental irrigation, weed control, trash removal, and remedial planting (as needed). Maintenance activities will be conducted for five years following implementation or until performance standards and restoration goals have been met. The restoration biologist will oversee all aspects of the maintenance program to detect and remedy problems at the earliest stage. An approximate maintenance schedule is provided in Table 6. Adjustments will be made as needed to ensure project success.

TABLE 6
MAINTENANCE SCHEDULE

Type/Task	PEP	Year 1	Year 2	Year 3	Year 4	Year 5
Erosion Control	As needed	As needed	As needed	As needed	As needed	As needed
Irrigation*	Bi-weekly	Bi-weekly	As needed	As needed	--	--
Weed Control	Monthly	Bi-monthly	Quarterly	Quarterly	Semi-annually	Semi-annually
Trash Removal	As needed	As needed	As needed	As needed	As needed	As needed

*Schedule will vary based on rainfall, weather, and site conditions. Irrigation will not occur if rainfall is sufficient to establish container plants.

3.1 Avoidance and Minimization Measures

During the avian nesting season of January 15 to September 15, a qualified biologist will survey the site no more than 10 days prior to weed control activities. Active nests will be flagged and maintenance activities restricted at least 100 feet from any active nest (500 feet for raptors). If nests of any sensitive species are detected, including coastal California gnatcatcher (*Polioptiola californica californica*) or least Bell's vireo (*Vireo pusillus bellii*), a biological monitor will be present during weed control activities.

3.2 Erosion Control

Structural integrity of the soil cap and slopes will be monitored during all qualitative monitoring visits and repaired immediately, as needed. Remedial measures could include wattle installation, sand or gravel bags, cloth, or other approved measure of erosion control.

3.3 Supplemental Irrigation

Immediately after installation the container plants will require frequent rain or irrigation to establish. Supplemental irrigation will also increase germination and survival rate of seed. Irrigation will be conducted by water truck and hose from the adjacent access road. Timing and frequency of supplemental irrigation will be as-needed and determined by the restoration biologist. Supplement irrigation will be discontinued after Year 3 if container plants are able to self-sustain with natural rainfall. The recommended watering frequency and duration is included in Table 6.

3.4 Weed Control

Early and aggressive efforts in non-native species abatement will be the first step toward restoring a favorable environment for desired native plant species. Weed maintenance will be a priority for the duration of the project to keep weed species from producing seeds and to control weed competition with native plants. Weed maintenance will consist primarily of crews applying herbicide with backpack sprayers and hand-weeding. Additional weed control methods, such as line trimming dense herbaceous areas or cutting and painting woody species, will be conducted as needed and as directed by the restoration biologist. All herbicide applications will be completed by personnel trained to distinguish native from non-native species and under the supervision of an individual holding a California Qualified Applicator's License. Herbicide adapted for aquatic systems will be used where applicable. For control of specific non-native species, methods will follow procedures outlined in the OVRP Restoration Plan, Section 6 (HDR 2006). The OVRP Restoration Plan provides specific guidelines for control methods for the following species:

- giant reed (*Arundo donax*)
- pampas grass (*Cortaderia selloana*)
- tree tobacco (*Nicotiana glauca*)
- castor bean (*Ricinus communis*)
- Tamarisk (*Tamarix* spp.)
- Palms and broadleaf trees

Weed maintenance will continue throughout the maintenance period. Weeds will be killed or removed before they set seed. A list of non-native species found on or near the site prior to project activities is provided in Table 7.

TABLE 7
ANTICIPATED WEED SPECIES

Scientific Name	Common Name
Atriplex semibaccata	Australian saltbush
Avena spp.	wild oat
Brassica spp.	mustard
Bromus spp.	brome grass
Carpobrotus chilensis	sea fig
Chenopodium album	lamb's quarters
Erodium spp.	filaree, storksbill
Foeniculum vulgare	fennel
Hordeum spp.	barley
Hirschfeldia incana	short podded mustard
Mesembryanthemum crystallinum	crystalline iceplant
Nicotiana glauca	tree tobacco
Ricinus communis	castor bean
Scientific Name	Common Name
Salsola tragus	Russian thistle
Sisymbrium irio	London rocket
Sonchus spp.	sow thistle
Tamarix ramosissima	tamarisk

3.5 Trash Removal

The project site will be free of trash and debris prior to implementation. All trash from restoration activities, such as plant containers and pin flags, will be removed when they are no longer in use. The maintenance crew will remove trash and debris that accumulates on-site due to road traffic, residences, and occasional foot traffic. Additional trash, due to unauthorized site access or dumping, will not be the responsibility of the restoration contractor. Any trespass concerns will be brought to the attention of the City of Chula Vista.

3.6 Remedial Planting

All or part of the site may be reseeded and/or replanted if native cover is lacking such that restoration goals cannot be met. This may be the case if germination and/or container plant survival rates are low, or if excessive erosion occurs. Qualitative and quantitative monitoring results will indicate if and when remedial planting is required. Whenever possible, planting and seeding efforts will be timed to coincide with the rainy winter season. The protocol for seed collection, plant production, and planting will follow the procedures described in Section 2.0 of this Plan.

4.0 Monitoring

Frequent evaluation of site conditions and plant health is necessary to identify and correct problems as they arise and ensure successful vegetation establishment. Qualitative monitoring will be conducted throughout the PEP and maintenance and monitoring periods as outlined in the schedule provided in Table 8. Quantitative monitoring will begin in Year 1 and be conducted annually through Year 5. Monitoring methods presented are consistent with or more stringent than those outlined in the ORVP Restoration Plan, Section 8.0 (HDR 2006).

TABLE 8
MONITORING SCHEDULE

Type/Task	PEP	Year 1	Year 2	Year 3	Year 4	Year 5
Qualitative Monitoring	Bi-weekly	Monthly	Bi-monthly	Bi-monthly	Bi-monthly	Bi-monthly
Visual Assessments	–	August-September	August-September	August-September	August-September	August-September
Plant Count	–	Spring	Spring	Spring	Spring	Spring
Tree Height	–	–	Spring	Spring	Spring	Spring
Vegetation Cover	–	Spring	Spring	Spring	Spring	Spring
Photo Documentation	yes	Spring	Spring	Spring	Spring	Spring

4.1 Qualitative Monitoring

Qualitative monitoring visits will be conducted by the restoration biologist to ensure that the site is progressing toward project goals. Monitoring visits will assess native species germination, general health of native vegetation, container plant survival, weed presence, vandalism, erosion, and wildlife species observed while on-site. Total foliar cover of native and non-native vegetation within each vegetation community will be recorded. The restoration biologist will prepare a brief report summarizing observations and recommended remedial action, if needed. This report will serve as a memorandum compliant with the OVRP Restoration Plan, Section 8.2.1.

4.2 Quantitative Monitoring

Quantitative monitoring will be conducted annually each project year (Years 1 through 5) during the peak growing season. Quantitative data will be compared to performance standards to determine progress toward project goals. Methods for quantitative monitoring – as described in this section – generally follow those outlined in the OVRP Restoration Plan.

4.2.1 Visual Assessments

Annual quantitative monitoring will include a visual estimate of native and the non-native vegetation cover within each vegetation community, as is conducted during qualitative monitoring visits. Erosional features will also be noted.

4.2.2 Plant Survival Inventory

Annual quantitative monitoring will include a count of surviving container plants. Survival counts will be conducted by establishing 10 random points per acre in planted areas using Geographic Information System (GIS). At each point, the biologist will count the 20 installed container plants nearest to them and note whether they are alive or dead; counts will not include natural recruitments. A dead plant will be included in the inventory for more than one year as long as it is still partially intact and in growth position (i.e., plant debris will not be counted).

4.2.3 Vegetation Transects

Vegetation transects will be used to measure percent cover and species composition (in addition to visual estimates). Transects will be 50 meters long and placed at a density of three transects per acre within each vegetation community; length and number of transects can be adjusted at the recommendation of the restoration biologist with consultation and approval from regulatory agencies.

Transect locations will be determined during the first year of survey by the restoration biologist who will choose them from a set of randomly generated points. Using GIS, a set of points will be randomly generated in GIS at a number approximately 25 percent more than the number of transects needed to survey the site; from this set of points, the restoration biologist will create transects that (1) each begins or ends on a randomly generated point, (2) provide a representative sample of the vegetation on-site, and (3) can be safely accessed for survey. The beginning and/or end points of each transect will be marked by the restoration biologist and mapped using sub-meter accuracy Global Positioning System (GPS).

Vegetation will be sampled at 0.5-meter intervals along the length of each transect; all species that intersect a vertical line from the sample point will be recorded. During Year 3 and Year 5, the height of each native tree within a 5-meter band along transects (2.5 meters on each side) will be measured and its height recorded.

4.3 Photo-documentation

Annual quantitative monitoring will include photographic documentation of the site using photo-points established during the PEP. Photo points will provide an overview of the site and of each vegetation community. Photographs will be taken from all photo-points during the PEP and each year thereafter during annual quantitative monitoring. Photographs taken from each photo-point will be consistent over time (taken in the same direction and at the same height) and will visually confirm information discussed in the annual report.

4.4 Performance Standards

Habitat restoration will be considered successful when the goals established in Section 1.2 and the Year 5 performance standards provided in this section have been met. Annual quantitative monitoring data will be used for all vegetation-based performance standards. The erosion control observations can be made any time. A wetland delineation will be conducted during Year 5 to verify that minimum wetland area requirements have been met or exceeded. Success of a performance standard will be considered completed if final requirements are met at any time during the project duration.

Table 9 provides a general summary of all performance standards, Table 10 provides annual vegetation cover standards for each vegetation community, and Table 11 provides specific standards for tree height. Annual performance standards for years other than Year 5 are for the purpose of assessing progress toward restoration goals. Failure to meet interim annual goals may suggest a need for remedial seeding, planting or other measures.

Performance standards closely follow those provided by the OVRP Restoration Plan, Section 9.0, where possible. The OVRP Restoration Plan did not provide criteria for minimum native cover for Diegan coastal sage scrub and freshwater marsh communities. Minimum native cover for southern willow scrub vegetation follows requirements for native overstory canopy cover.

Plant survival standards provided herein deviate from the OVRP Restoration Plan. The OVRP recommends 100 percent container plant survival during Year 1, but here it has been adjusted to 90 percent to allow for some natural levels of mortality; plant densities recommended in Section 2.3 have been adjusted to accommodate this mortality rate. In addition, although the OVRP provides standards for willow pole survival, no standards have been included herein because willow plantings are intended as supplemental rather than a mandatory measure; container plant installation alone will be sufficient to meet vegetation cover requirements.

TABLE 9
PROJECT PERFORMANCE STANDARDS

Performance Standard Name	Data Source	Metric	Performance Standard
Wetland Area	Wetland Delineation	Acreage	Required minimum acreages are met or exceeded to ensure no-net-loss
Vegetation Community	Field Verification and New Vegetation Map	Acreage	Required minimum acreages are met or exceeded to ensure no-net-loss
Native Cover	Vegetation Transects	Percent of sample points covered by at least one species	Must exceed minimum cover provided in Table 9
Non-native Cover	Vegetation Transects	Percent of sample points covered by at least one species	Must not exceed maximum cover provided in Table 9
Species Composition	Visual Assessments	Percent of installed species (planted or seeded) present in the project area	Must exceed 70% by Year 5
Species Composition	Vegetation Transects	Percent of vegetation cover that is comprised of installed species (planted or seeded)	Must exceed 70% by Year 5
Container Plant Survival	Survival Inventory	Percent of plants from all sample points that are surviving	Must exceed: 90% in Year 1 80% all other years
Tree Height	Vegetation Transects	Mean height by species	Must exceed minimum heights provided in Table 10
Erosion	Visual Assessments	Presence/absence	Erosional features are minor; the slopes are stable; sediment is not adversely affecting surrounding wetlands
Irrigation	N/A	N/A	Vegetation is in good health and without supplemental irrigation for at least one year.

TABLE 10
PERFORMANCE STANDARDS FOR VEGETATION COVER

	Native Cover Minimum (%)			Non-Native Cover Maximum (%)
Year	DCSS	SWS	FWM	Total Cover
1	10	25	20	10
2	20	40	30	10
3	30	65	45	10
4	45	75	60	10
5	60	80	75	10

DCSS = Diegan coastal sage scrub
SWS = southern willow scrub
FWM = freshwater marsh

Minimum tree height criteria, as specified in the OVRP Restoration Plan, are summarized in Table 11. Annual tree height monitoring data will be used to determine success.

TABLE 11
MINIMUM TREE HEIGHT CRITERIA

Scientific Name	Common Name	Minimum Height (feet)	
		Year 3	Year 5
Baccharis salicifolia	mule fat	4	6
Platanus racemosa	California sycamore	4	9
Populus fremontii	Fremont cottonwood	8	20
Salix gooddingii	black willow	5	15
Salix laevigata	red willow	5	12
Salix lasiolepis	arroyo willow	5	12
Sambucus nigra	black elderberry	4	5

5.0 Reporting

A 120-day PEP report will be prepared detailing implementation activities, irrigation and weed maintenance activities, results of qualitative monitoring visits, and photo-point photographs. The 120-day PEP report will make recommendations, if needed, to address any outstanding maintenance issues. The report will be submitted to the City of Chula Vista within 60 days of the end of PEP.

Annual reports will be prepared each project year (Years 1 through 5) to summarize project activities and monitoring results. The reports will include dates of maintenance activities and site visits, discuss general site conditions and trends, include photo documentation, compare monitoring results with the surrounding habitat, and make recommendations for remedial actions, if needed. The reports will be submitted to the City of Chula Vista within 60 days of the end of each project year and to each of the regulatory agencies, as required. The Year 5 report will serve as a final project report that will be submitted within 120 days of project completion; it will provide an overall summary of the project activities and monitoring data from implementation through completion.

6.0 References Cited

RECON Environmental, Inc. (RECON)

2015a Biological Technical Report for the Shinohara II Restoration Project, Chula Vista, California. RECON Environmental, 1927 Fifth Ave, San Diego California 92101. Prepared July 9, 2015; revised October 7, 2015.

2015b Jurisdictional Waters/Wetland Delineation Report for the Shinohara II Restoration Project, Chula Vista, California. Prepared by RECON. July 9, 2015. Revised October 29, 2015.

HDR Engineering, Inc. (HDR)

2006 The Otay Valley Regional Park Habitat Restoration Plan and Non-Native Plant Removal Guidelines. July.

U.S. Geological Survey (USGS)

1975 Imperial Beach 7.5-minute topographic map.