MITIGATION & MONITORING PLAN

East Sacramento Ranch Project

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Chapter 1
Summary

The purpose of this document is to describe the mitigation measures proposed as compensation for the potential impacts to wetlands and other waters of the United States that would result from construction of the proposed East Sacramento Ranch Project (the "Project"). This plan was prepared with the objective of complying with the Corps of Engineers' and Environmental Protection Agency's regulations regarding compensatory mitigation projects as set forth in *Compensatory Mitigation for Losses of Aquatic Resource*s (33 CFR Part 332). This plan is also intended to serve a dual function of providing adequate conservation measures to minimize potential impacts to federally-listed threatened and endangered species that will be affected by construction of the Projects.

The overall format of this plan follows the Sacramento District Corps of Engineers' *Habitat Mitigation and Monitoring Proposal Guidelines* dated December 30, 2004. The project will directly impact approximately 4.48 acres of wetlands comprised of 1.61 acres of vernal pools, 1.45 acres of seasonal wetlands and 1.42 acres of wetland swales. The proposed mitigation plan consists of preservation and management of existing vernal pool landscapes, as well as restoration (both re-establishment and rehabilitation) of previously existing vernal pools that have either been eliminated or substantially degraded by past agricultural practices. A total of 331 acres of open space preserves will be established and managed in perpetuity. These open space preserves contain approximately 17.75 acres of existing wetlands comprised of 9.58 acres of vernal pools, 3.86 acres of seasonal wetlands, 3.26 acres of wetland

swales and 1.05 acres of intermittent stream. A total of 9.4 acres of previously existing vernal pools will be restored. Of this total, approximately 6.4 acres would consist of re-establishing previously existing vernal pools that are no longer extant and 3.0 acres would consist of rehabilitating previously existing vernal pools that, while still wetlands, have been degraded to the point they no longer support plant communities characteristic of vernal pools.

Chapter 2

Project Description

Responsible Parties

This mitigation plan is being proposed by East Sacramento Ranch, LLC as part of an application for a Department of the Army Permit for a Section 404 permit to authorize fill in waters of the United States associated with the Project as described below. The permittee will be responsible for implementing the provisions of this mitigation plan.

Location of Project

The project area is approximately 810 acres is size. It is located south of Kiefer Boulevard and west Sunrise Boulevard in Sacramento County, California. It is within Sections 19, 24, 25, and 30, Township 8 North and Ranges 6 and 7 East. **Figure 1** is a vicinity map showing the location of the project area.

Description of the Proposed Project

The Project is an 810-acre mixed use residential development that comprises a part of the NewBridge Specific Plan. A mixture of land uses are planned including low, medium and high density residential, neighborhood commercial, an elementary school, six parks, and both active and passive open space. The active open space includes landscaped parkways, a community garden and multi-use areas. The passive open space consists of three open

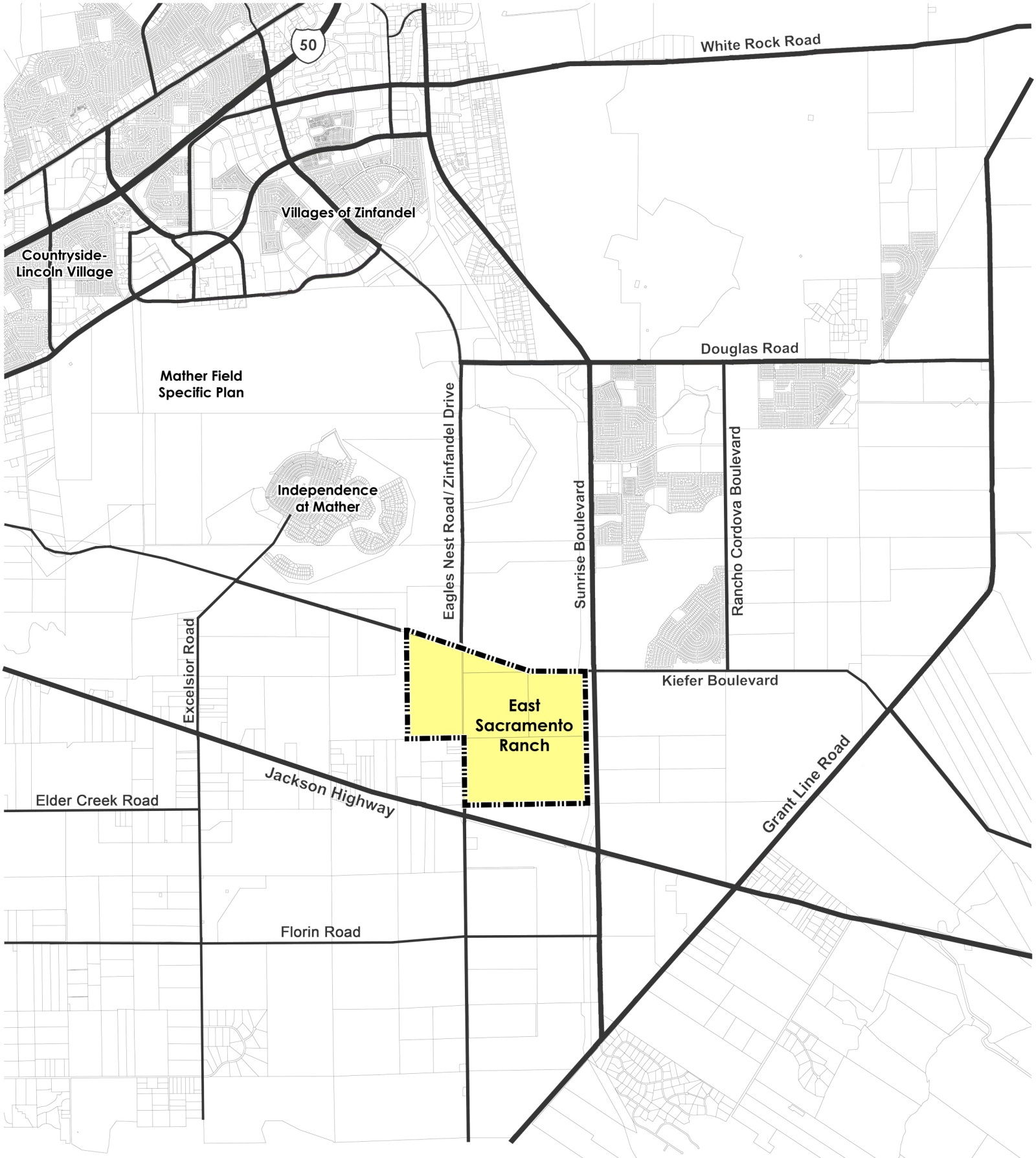

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FIGURE 1 - VICINITY MAP

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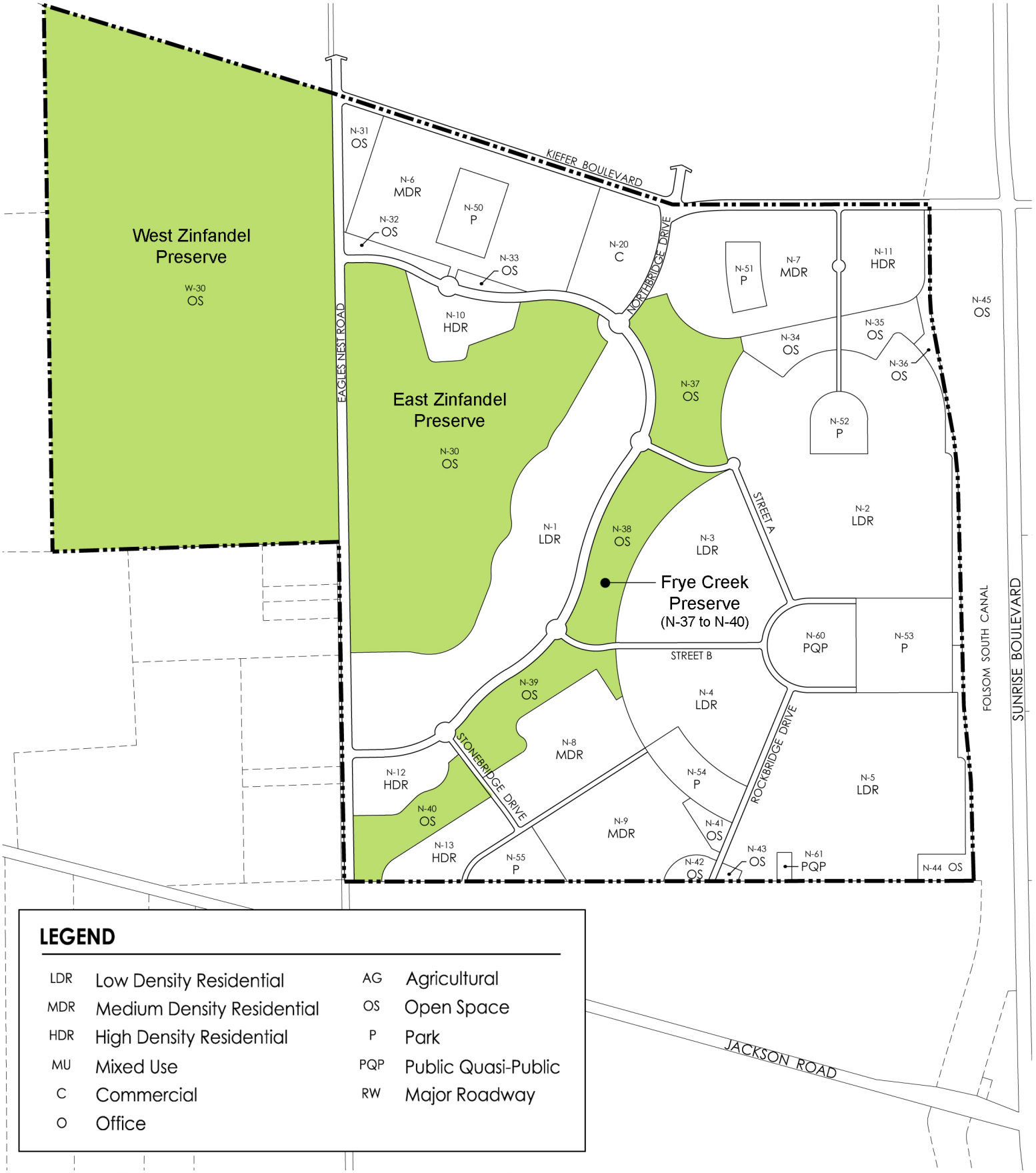
space preserves. The multi-use areas provide multiple functions including water quality, detention and floodwater conveyance. **Figure 2** is a map showing the proposed land uses. **Table 1** lists the proposed land uses, their respective areas and, where applicable, the number of dwelling units (DUs).

Table 1. East Sacramento Ranch Project Land Use Summary

Land Use		**Dwelling Units (du)**	**Area (ac)**
LDR	Low Density Residential (<7 du/ac)	945	204.1
MDR	Medium Density Residential (7-22.9 du/ac)	705	86.1
HDR	High Density Residential (23-40 du/ac)	765	29.9
	Subtotal	**2,415**	**320.1**
C	Commercial		9.1
	Subtotal		**9.1**
OS	Open Space - Preserve		331.0
OS	Open Space – Multi-Use Area		19.5
OS	Open Space – Community Garden		8.9
OS	Open Space – Landscape Parkway		34.3
P	Park		32.7
	Subtotal		**426.4**
P/QP	Elementary School		9.4
	Subtotal		**9.4**
RW	Major Roadway		45.0
	Subtotal		**45.0**
	TOTAL	**2,415**	**810.0**



LEGEND

LDR	Low Density Residential	AG	Agricultural
MDR	Medium Density Residential	OS	Open Space
HDR	High Density Residential	P	Park
MU	Mixed Use	PQP	Public Quasi-Public
C	Commercial	RW	Major Roadway
O	Office		

East Sacramento Ranch

FIGURE 2 - PROPOSED PROJECT

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Chapter 3
Description of Impacts to Aquatic Resources

Existing Resources

General Site Characteristics

The project area is approximately 810 acres in size. The terrain is gently rolling to almost flat with elevations ranging between 125 and 150 feet above sea level. The project area drains primarily to the southwest and west. The project area is bordered on the east by the Folsom Canal and Sunrise Boulevard, on the south by grasslands, on the west by grasslands and rural residences and on the north by Kiefer Boulevard.

The northeast portion of the project area is occupied by the existing animal rendering facility and its appurtenant facilities which include various buildings, roads and parking areas, agricultural fields irrigated to dispose of excess water and settling/treatment ponds.

The remainder of the project is composed of non-native annual grasslands that are grazed. The upland varies depending on soil types, historic farming practices and grazing regimes. The southeast portion is dominated by ruderal grasses and vetch. Common species include ripgut brome (*Bromus diandrus*), soft chess (*Bromus mollis*), foxtail barley (*Hordeum murinum*), filarees (*Erodium spp.)* and vetch (*Vicia villosa*). The western areas have a different soil type and the plant community is less ruderal. In areas where the soils have a higher clay content and poorer drainage,

tarweed (*Holocarpha virgata*) and spikeweed (*Centromadia fitchii*) are common. The 200 acres west of Eagles Nest Road appears less disturbed than the rest of the project area and supports a higher percentage of native species, although the most common plants are still non-native grasses.

Vernal pools, swales, and seasonal wetlands are embedded in the annual grassland over much of the project area. Vernal pools, swales and seasonal wetlands are less concentrated in the eastern half of the project area and more concentrated in the western half. Aside from landscaping around the rendering plant, very little woody vegetation occurs on the property. A row of eucalyptus trees has been planted along Kiefer Boulevard. Small clusters of walnuts (*Juglans* sp.) and locust (*Robinia pseudoacacia*) occur at several locations. Neither creek supports riparian vegetation. No woody species are present in the Morrison Creek tributary or the Frye Creek drainage.

There are seven soil mapping units have been occurring within the project area (SCS 1993):

- Fiddyment fine sandy loam, 1 to 8 percent slopes;
- Hedge loam, 0 to 2 percent slopes;
- Red Bluff loam, 0 to 2 percent slopes, and 2 to 5 percent slopes;
- Red Bluff-Redding complex, 0 to 5 percent slopes;
- Red Bluff-Xerarents complex, 0 to 2 percent slopes; and
- Redding gravelly loam, 0 to 8 percent slopes.

All soils mapped on the site are Alfisols, which are well developed soil with more clay in the B horizon than in the A horizon. Besides having a dense clay layer, the Fiddyment, Hedge, and Redding soils have a duripan at varying depths. Red Bluff soils are relatively deep and lack both a dense clay layer and a duripan. Fiddyment soils occur in the southeastern portion of the property to the east of Frye Creek. Hedge soils occur in the lower Frye Creek drainage and appear to occupy the creek channel. The rendering

plant was built on the Red Bluff-Xerarents complex. The remainder of the site, including the proposed open space preserves consists of Red Bluff and Redding soils.

All of these soils commonly underlie vernal pool landscapes. Vernal pools, seasonal wetlands and wetland swales, commonly occur within these soil types as inclusions.

Aquatic Resources

The 810-acre property encompasses several watersheds. The eastern portion drains directly into Laguna Creek east of Sunrise Boulevard. The northwest corner drains into the Morrison Creek tributary. The portion of the property along Eagles Nest Road drains to a tributary of Elder Creek, which is a tributary of Morrison Creek. Most of the central portion of the property is drained by a drainage feature referred to as Frye Creek. Based on review of historical aerial photography, the original headwater of Frye Creek appears to be near the current intersection of Sunrise and Kiefer Boulevards. This upper portion of the watershed has been truncated by construction of Sunrise Boulevard, the Folsom South Canal and the rendering plant complex.

The Morrison Creek tributary and the Frye Creek drainage appear as blueline streams on the USGS topographic maps. Both carry winter/spring flows but are dry when the rain ceases and evapo-transpiration increase. The Morrison tributary is incised and has a coarse gravel to cobble bottom and floodplain.

A jurisdictional delineation of the project area was completed by North Fork Associates in October 2008. The Corps of Engineers made a jurisdictional determination on February 14, 2011. A total of 22.23 acres of waters of the United States were delineated and verified by the Corps. This total is comprised 11.19 acres of vernal pools, 4.65 acres of seasonal wetlands, 4.68 acres of wetland swales, 1.05 acres of intermittent stream, and a 0.66 acre pond. As discussed in more detail below, the area that was delineated as a pond is a drained farm pond which, under currently existing conditions, is now essentially a depressional seasonal wetland.

Consequently, the pond category is grouped with seasonal wetlands throughout the rest of this document. **Figure 3** is a map showing the waters of the U.S. existing within the project area.

Vernal Pools

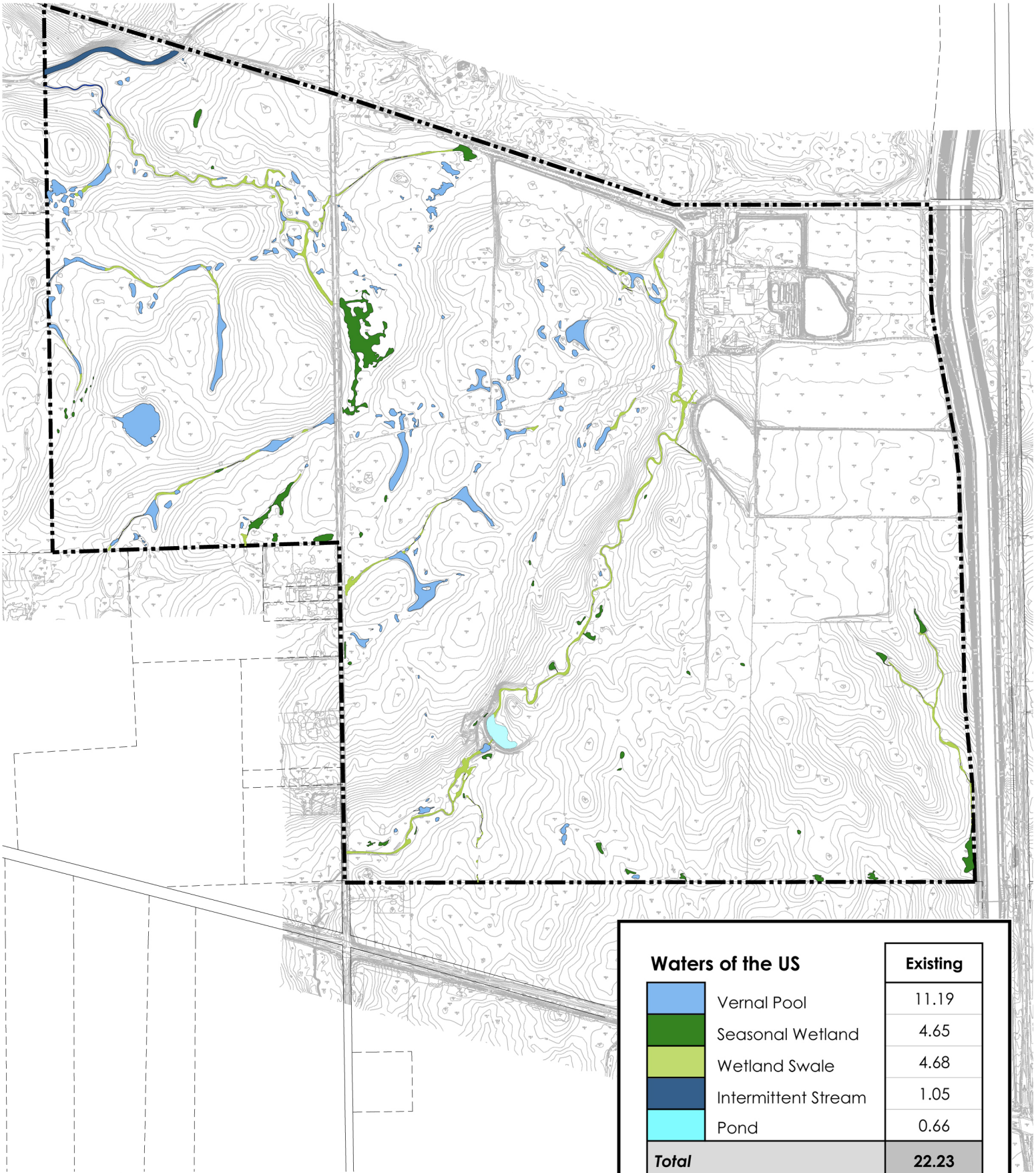
Vernal pools are depressional wetlands that occur in soils underlain by a hardpan or claypan that typically develops a seasonally perched groundwater table in the winter and early spring. They normally fill with water once sufficient precipitation has fallen to establish a perched groundwater table and remain inundated until late spring. In years with highly variable rainfall, they may go through several cycles of filling and drawdown.

Depending on their level of disturbance, they characteristically support plant communities composed primarily of native, often endemic, species adapted to alternating periods of inundation and desiccation in a Mediterranean climate. Common plants occurring within vernal pools in the project area include popcorn flowers (*Plagiobothrys stipitatus* and *P. greenei*), downingias (*Downingia bicornuta* and *D. ornatissima*), buttercup (*Ranunculus bonariensis trisepalus*), coyote thistle (*Eryngium vaseyi*), and annual hairgrass (*Deschampsia danthonioides*). In deeper pools, creeping spikerush (*Eleocharis macrostachya*), aquatic buttercup (*Ranunculus aquatilis*), and water starwort (*Callitriche marginata*) are common.

Vernal pools are widely distributed throughout the site, occurring primarily in the Redding and Red Bluff-Redding soil mapping units.

Seasonal Wetlands

Seasonal wetlands are depressional wetlands that are hydrogeomorphically quite similar to vernal pools. The primary difference between vernal pools and seasonal wetlands within the project area is that seasonal wetlands are typically dominated by non-native plants that are not endemic to vernal pools. Seasonal wetlands often have a mix of vernal pool species and FAC and FACW species such as curly dock (*Rumex crispus*), Mediterranean barley (*Hordeum marinum*), and ryegrass (*Lolium multiflorum*).



East Sacramento Ranch

FIGURE 3 - EXISTING WATERS OF THE US

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They are often situated in topographic swales that have been converted to wetlands by impeding the flow of water in the swale.

Based on a review of historic aerial photography, most or all of the areas delineated as depressional seasonal wetlands appear to be areas that were originally vernal pools that have been subsequently degraded by agricultural practices occurring over the past 76 plus years. Those agricultural practices include primarily repeated disking and dry farming. The degradation caused by those activities include importation of soil resulting in the burying of the original vernal pool surface and reducing the duration and depth of inundation, decompaction of the A horizon of the soils and muting of the topography.

Pond

The pond on Frye Creek was constructed decades ago to provide late spring water for cattle. The dam has subsequently been breached. As a result, the depth of the "pond" has been substantially reduced to the point where its hydrology is more characteristic of a depressional seasonal wetland. Common plants include perennial rye, Mediterranean barley, sand spurrey (*Spergularia rubra*), swamp grass (*Crypsis schoenoides*), pigweed (*Amaranthus* sp.), knotweed (*Polygonum arenastrum*), and dove weed (*Croton setigerus*). As stated previously, the pond category is grouped with seasonal wetlands throughout the rest of this document.

Wetland Swales

Wetland swales typically occur in sloping linear topographic depressions. Wetland swales generally have convex surfaces over much of their length that are subject to shallow sheet flow but do not pond water. They commonly have small embedded depressions that do experience shallow ponding. The wetland swales often provide a contiguous connection between vernal pools and/or depressional seasonal wetlands. The plant communities occurring within the wetland swales are similar to shallow seasonal wetlands. The dominant plants are most commonly perennial rye and Mediterranean barley.

The longest wetland swale flows north to southwest bisecting the study area. Although noted as Frye Creek on the USGS map, it generally lacks the cobbly substrate, bed and banks typically associated with intermittent streams. Frye Creek has been substantially impacted by past agricultural practices (disking) and the rendering plant and construction of the Folsom South Canal. Based on a review of historic aerial photography, it appears that the headwaters of Frye Creek historically originated in a large vernal pool complex located in the southeast corner of what is now the intersection of Sunrise Boulevard and Kiefer Boulevard. This entire upper drainage has been eliminated down to the eastern edge of what is now the proposed Frye Creek Preserve.

Intermittent Stream

There is one intermittent stream existing within the project area. This intermittent stream is a tributary to Morrison Creek that bisects the extreme northwest corner of the project area. This intermittent stream is characterized by a well-defined channel with defined bed and banks, a cobbly substrate and a generally low vegetative cover. The topsoil and finer alluvial material have been removed leaving the exposed cobble creek bed. The flora of the Morrison tributary primarily is composed of vernal pool species. By June, the dominant species along much of the tributary is the perennial wetland tarweed.

Functions

Description of Functions

The following is a description of wetland functions normally associated with the types of wetlands occurring within the project area. Each of these functions is defined, the variables affecting functional performance are described and the types of wetland performing the function are identified.

Surface Water Storage (*SWS*): This function refers to the capability of a wetland or other water to collect and retain surface water as static water above the soil surface. The volume of the basin

determines the potential volume of storage while surface water from the contributing watershed plus the infiltration of shallow subsurface water from the adjacent uplands determine the volume of water potentially contributing to the basin. The average depth of a wetland multiplied by its area yields an estimate of the volume of surface storage within the wetland. The surface water storage capacity of a wetland can be modified by altering the amount of surface and shallow subsurface water entering it, raising or lowering the spill elevation, raising or lowering its bed, or eliminating the restrictive layer in the soil. Variables that affect this function include depth of the basin, the elevation of the outlet (if present), the integrity of the wetland's watershed, and the integrity of the soil profile (particularly the restrictive layer) both within and adjacent to the wetland. *SWS* is typically a function of vernal pools and depressional seasonal wetlands but is only minimally a function of wetlands swales and intermittent streams.

Subsurface Water Storage and Interchange (*SWS&I*): This function refers to the capability of a wetland to store water below the soil surface and allow exchange of shallow subsurface water laterally with the contributing uplands bordering the wetland. The soil profile within the vernal pool as well as bordering uplands largely determines the capability of a given wetland to perform this function. If the soil profiles in either the wetland or its adjacent upland are substantially disrupted, this function will be impaired. *SWS&I* is typically a function of vernal pools and depressional seasonal wetlands but is only minimally a function of wetlands swales and intermittent streams. However, subsurface storage in adjacent wetlands is an important factor influencing the hydrology of wetland swales and intermittent streams as discussed in the following function.

Moderation of Surface and Shallow Subsurface Water Flow (MS&SSWF): This function refers to the capability of a wetland to store water below the soil surface and allow exchange of shallow subsurface water laterally with the contributing uplands bordering the wetland. The slope of a wetland, the cross-sectional area of a wetland, the condition of its watershed, and the integrity of the soil profile both within the wetland and in its surrounding uplands significantly affect the capacity of a wetland to perform this

function. *MS&SSWF* is typically a function of wetland swales and intermittent streams but is only marginally a function of vernal pools and depressional seasonal wetlands.

Element and Compound Cycling (*E&CC*): Element and compound cycling refers to the biological and physical processes that convert compounds from one form to another. These processes cycle various elements and compounds between the atmosphere, soil, water and vegetation. This cycling contributes to the nutrient capital of the ecosystem and reduces downstream particulate loading and thereby helping to maintain and improve water quality. The physical and biological variables that determine the capability of a particular wetland to perform this function are the vegetation in the wetland and the contributing watershed and the soils in the wetland and the contributing watershed. The plants absorb, transform, and temporarily store various elements and compounds. The soils contain various microorganisms that are critical to the cycling of these nutrients. The soils also provide a medium for short and long-term storage of elements and compounds. *E&CC* is typically a function of vernal pools, seasonal wetlands and wetland swales but is only marginally a function of intermittent streams.

Organic Carbon Export (*OCE*): This function refers to the exchange of dissolved or particulate organic carbon that is exported from a wetland. The export of carbon enhances the decomposition and mobilization of metals and supports aquatic food webs and downstream biogeochemical processes. The amount of organic carbon available for export is the sum of the input from the watershed and the biomass produced within the wetland itself. The degree to which this carbon can be exported downstream is affected by whether there is an outlet to convey water from the wetland to downstream waters. *OCE* is typically a function of vernal pools, seasonal wetlands, wetland swales and intermittent streams.

Maintenance of Characteristic Plant Communities (*MCPC*): This function refers to the capability of wetlands to support and sustain endemic plant communities that are characteristic of specific types of wetlands with respect to species composition, abundance and structure. This, in turn, helps to maintain ecosystem health and

biodiversity. The soil profile and its integrity, the integrity of the watershed, the duration and depth of ponding, and the degree of disturbance of the wetland and its adjacent uplands can all have a major effect on the plant community that a wetland supports. *MCPC* is typically a function of vernal pools, seasonal wetlands, wetland swales but only marginally a function of intermittent streams.

Maintenance of Characteristic Faunal Communities (*MCFC*): This function refers to the capability of wetlands to support and sustain endemic faunal communities that are characteristic of specific types of wetlands with respect to species composition, abundance and age structure. This function includes both vertebrates and invertebrates. The soil profile and its integrity, the integrity of the watershed, the duration and depth of ponding, and the degree of disturbance of the wetland and its adjacent uplands can all have a major effect on the faunal community that a wetland is capable of sustaining. *MCFC* is typically a function of vernal pools, seasonal wetlands, wetland swales and intermittent streams.

Faunal Habitat Interspersion and Connectivity (*FHI&C*): This function refers to the capability of a wetland to act as a conduit of interspersion and connectivity for vertebrates and invertebrates normally associated with wetlands. This, in turn, supports landscape and regional faunal biodiversity. The capability of a wetland to perform this function is affected by the integrity of the watershed, the presence or absence of an outlet and a mechanism for longitudinal connectivity, and the proximity of other wetland habitats. *FHI&C* is typically a function of vernal pools, seasonal wetlands, wetland swales and intermittent streams.

Assessment of Functional Performance

In order to provide a general assessment of the relative functional capacity of the existing wetlands, we qualitatively rated each of the above functions for each of the wetland types existing within the project area. These functional ratings are based on the collective professional opinion of Gibson & Skordal, LLC and Salix Inc. and are not based on any particular functional assessment methodology such as the California Rapid Assessment Methodology (CRAM).

The ratings are averaged ratings in that they reflective the average of conditions existing within the project area. **Table 2** summarizes the ratings given. For each wetland/waters type within the project area, each function was given a numeric rating from 0 to 3 where:

- A rating of 0 means the wetland/water performs the function negligibly or not at all;
- A rating of 1 means that the wetland/water performs the function at a level that is clearly less that similar types of wetlands and/or other types of wetlands/waters within the project area;
- A rating of 2 means the wetland/water performs the function at a relatively moderate level compared to similar types of wetlands/waters and/or other types of wetlands/waters within the project area; and,
- A rating of 3 means the wetland/water performs the function at a relatively high level compared to similar types of wetlands/waters and/or other types of wetlands/waters within the project area.

Table 2. Summary of Existing Wetland/Waters Relative Functions

Function	**VP**	**SW**	**WS**	**IS**
SWS	2	2	1	0
SWS&I	2	2	1	0
MS&SSWF	1	1	2	2
E&CC	2	2	1	0
OCE	2	2	2	1
MCPC	2	1	1	1
MCFC	2	2	1	1
FHI&C	2	2	2	2
Totals	**15**	**14**	**11**	**7**

A primary consideration in assigning these functional ratings was the degree to which a given type of wetland or waters would perform a given function in a relatively undisturbed state. The other primary consideration was the relative degree of disturbance

that has occurred within the project area and the degree to which that disturbance is likely to inhibit various functions. There are a number of substantial disturbances that have historically occurred within the project area that would negatively affect function. They include the construction of roads, the construction of the rendering facility and its appurtenant facilities, construction an overhead power line and access road/trail, localized grading, and dry land farming. A review of historical aerial photography reveals that a majority of the project area has been intermittently plowed, disked and dry-farmed going back to at least 1937. These agricultural activities have had a number of direct effects to wetland function. In many instances, the soils have been decompressed, the micro-topography has been muted and in some cases several inches or more of soil has been imported into vernal pools burying the original vernal pool or swale surface. These effects also have reduced the depth and duration of inundation to varying degrees. For this reason, none of the functions were assigned a rating higher than 2.

Impacts

Direct Effects

In calculating direct effects, it was typically assumed that if any portion of a non-linear, depressional wetland (i.e. seasonal wetlands and vernal pools) would be directly affected, all of it would be directly affected. An exception was the large seasonal wetland east of and adjacent to Eagles Nest Road. Because this wetland has been significantly modified and degraded in the past by both plowing and the original construction of Eagles Nest Road and because the extent of the effect relative to the overall size of the wetland is so much smaller, the direct effect was limited to the foot print of the widening of Eagles Nest Road. For linear, sloping wetlands (i.e. wetland swales) the direct effects were calculated as that portion of the wetland within the footprint of development. **Table 3** provides a summary of the direct effects to waters of the U.S. that would result from the Project. **Appendix A** is an impact map which depicts the waters of the U.S. that would be impacted, avoided and preserved.

Table 3. Summary of Direct Effects to Waters of the U.S.

Wetland Type	Existing (ac)	Impacted (ac)	Avoided (ac)
Intermittent Stream	1.05	0.00	1.05
Seasonal Wetland	5.31	1.45	3.86
Wetland Swale	4.68	1.42	3.26
Vernal Pool	11.19	1.61	9.58
Total	**22.23**	**4.48**	**17.75**

Indirect Effects

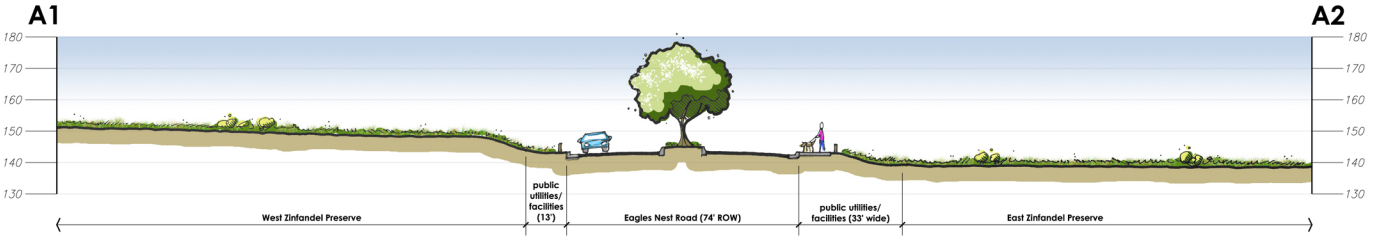
The boundaries of the open space preserves have been located in a manner to minimize potential indirect effects to the avoided wetlands as much as possible. The open space preserve located west of the existing alignment of Eagles Nest Road (West Zinfandel Preserve) which is designated critical habitat for two species of federally-listed branchiopods and two federally-listed plant species will be preserved with its currently existing boundaries. The planned widening of Eagles Nest Road has been shifted to the east so that all road improvements will be limited to the western toe of the existing road bed in order to minimize indirect impacts to vernal pools, swales wetlands and other primary constituent elements of the designated critical habitat.

The open space preserve located immediately east of the existing alignment of Eagles Nest Road (the East Zinfandel Preserve) has be designed so that adjacent development would be located outside of the contributing watersheds of the wetlands located within the preserve. The eastern and southern boundaries as well as approximately half of the northern boundary are situated so that they are outside of the contributing watersheds of the preserve. The portion of the northern boundary of the preserve that is does not capture all of the contributing watershed is situated so that the edge of development would be approximately 250’ from all but five existing vernal pools with a combined area of 0.078 acre.

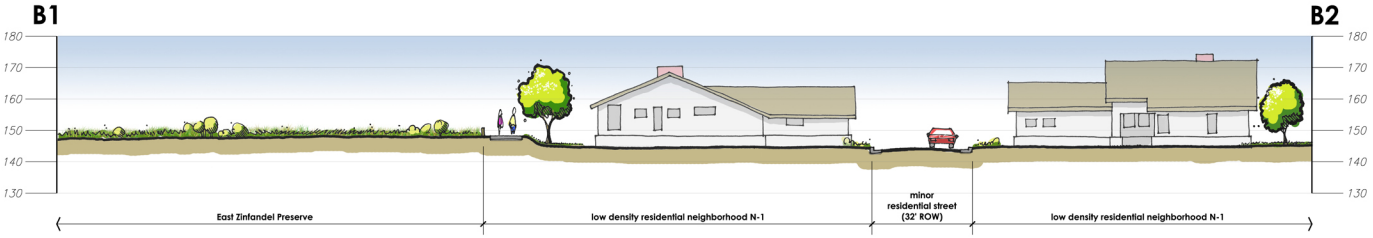
The western boundary of the East Zinfandel Preserve is bordered by Eagles Nest Road which will be widened to the east. The road widening will directly impact a small portion of the larger seasonal wetland. Given the level of direct effect, the fact that Eagles Nest Road already exists immediately adjacent to this wetland, and the fact that the wetland will be excavated and lowered as part of the proposed restoration measures, we conclude that any potential indirect effects will be minimal and far exceeded by the positive effect of the restoration.

There are eight wetlands within the East Zinfandel Preserve with a combined area of 0.147 acre that will be located within 250' of the edge of the proposed road widening. Five of these are vernal pools with a combined area of 0.059 acre, one is a depressional seasonal wetland with an area of 0.017 acre and one is a wetland swale with an area of 0.071 acre. All of these wetlands are located up-gradient from the existing and proposed roadbed of Eagles Nest Road. Any existing outflow from these wetlands through will be maintained at existing elevations to avoid any potential hydrology impacts. Given the fact that these wetlands are all located up-gradient from the existing and proposed roadbed and that fact that their hydrology will be maintained, we conclude that any potential indirect effects will be minimal.

The project has been designed so no surface runoff will be directed into either the West Zinfandel or East Zinfandel Preserves, thus avoiding any alteration of the hydrology of these preserves. The Impact Map (**Appendix A**) shows the location of all proposed outfalls. Surface runoff will be directed into the Frye Creek Preserve however it will be discharged into treatment basins which have been designed to capture and infiltrate summer nuisance flows as discussed in following paragraph. The edges of the preserves have been designed to transition from development to the preserved open space. A trail corridor will separate the preserved open space form bordering development and/or roads. The trail will be graded so that surface runoff from the trail is directed away from the preserved open space. **Figure 4** provides typical cross-sections of representative locations to demonstrate this edge treatment.



Section A



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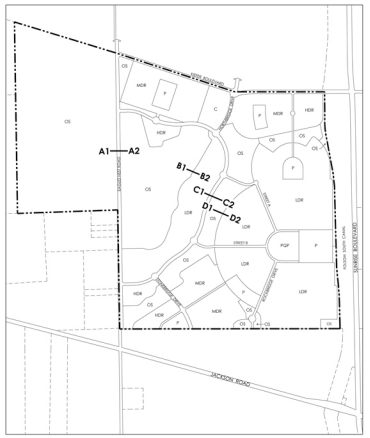

key map

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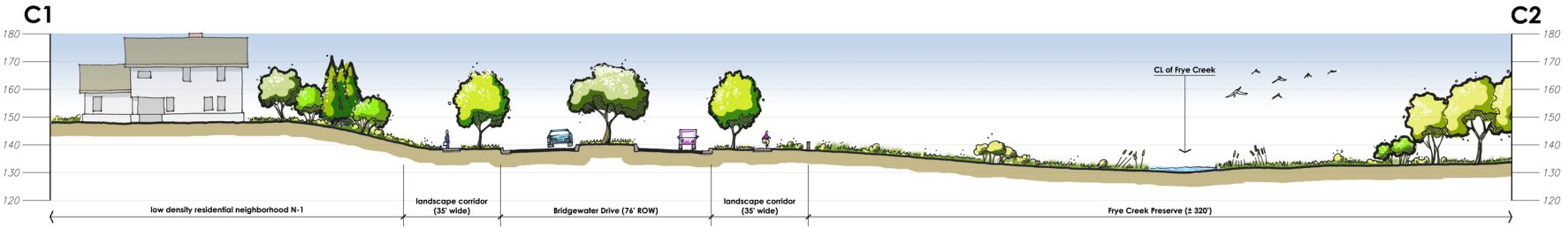

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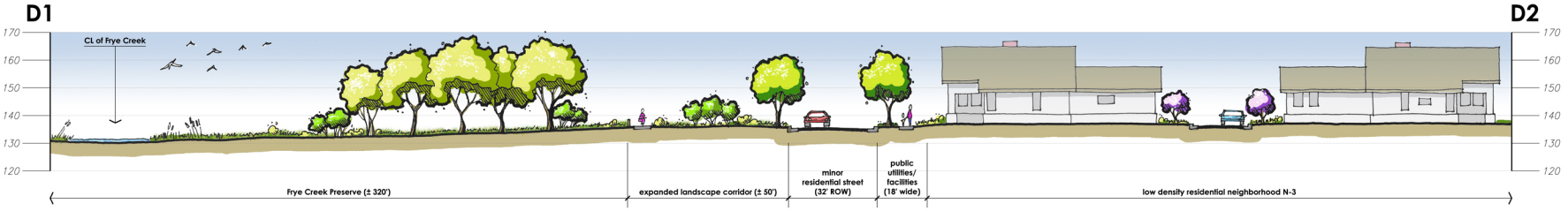

Section D

East Sacramento Ranch

FIGURE 4 - CROSS SECTIONS

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The Frye Creek Preserve will preserve 2.78 acres of existing avoided wetlands comprised of 0.22 acre vernal pools, 0.98 acre of depressional seasonal wetlands and 1.58 acre of wetland swale (Frye Creek). It was not possible to provide wider upland buffers along the Frye Creek Preserve without severely constraining the proposed development. A series of detention basins will be constructed along the outside edge of this preserve. The purpose of these basins is to comply with Hydromodification Management standards. In addition to treating projected 100-year peak flows, Hydromodification Management criteria require treatment of flows from 25 percent of the pre-project 2-year event up to the pre-project 10-year 24 hour peak flow event. In addition to these criteria, the project has also been designed to capture and treat flows less than 25 percent of the pre-project 2-year event, as discussed below.

These basins have been designed to minimize the potential indirect effect of releasing summer flows to Frye Creek. During the winter, higher inflow into these basins will be allowed to subsequently flow out to Frye Creek. During the wet season, this should not adversely affect Frye Creek. However, if outflows to Frye Creek are allowed to occur during the dry season, they will alter the hydrology of Dry Creek and probably convert it to more of an emergent marsh type of wetland. The basins have been designed with dry wells to accommodate infiltration of the low flow summer water resulting from irrigation of yards other landscaped areas. As a further precaution, the sides of the basins nearest Frye Creek will be lined with an impermeable layer to prevent subsurface seepage to Frye Creek during summer low flow periods.

The existing but breached dam across Frye Creek will be removed. This will be done in such a way as to assure that the hydrology of the depressional seasonal wetland located immediately upstream is not altered.

Functions

The land plan for the Project has been designed to avoid not only the greatest concentrations of wetlands, but to also impact those

wetlands that have been disturbed to the greatest extent (i.e. lower functioning wetlands) by past land uses. As a result the functional capacity of the wetlands to be impacted would be somewhat less that the functional capacity of the same type of wetlands for the project area as a whole. **Table 4** summarizes the ratings for the wetlands to be impacted. As compared to **Table 3**, the total functional rating for the impacted vernal pools is 12 compared to 15 for the project area as a whole. The total functional rating for impacted seasonal wetlands is 12 compared to 14 for the project area as a whole and the total functional rating for the impacted swale is 10 compared to 11 for the project area as a whole.

Table 4. Summary of Impacted Wetland/Waters Relative Functions

Function	**VP**	**SW**	**WS**
SWS	2	2	1
SWS&I	2	2	1
MS&SSWF	1	1	2
E&CC	2	2	1
OCE	2	2	2
MCPC	1	1	1
MCFC	1	1	1
FHI&C	1	1	1
Totals	**12**	**12**	**10**

Chapter 4
Proposed Mitigation Measures

Goals and Objectives

The primary objectives of this mitigation plan are to assure that there will be no net loss of wetland area and function and to conserve habitat for federally-listed threatened and endangered species. Secondary objectives that are also incorporated into this plan include providing for the restoration of previously existing wetlands rather than creation of new wetlands and accomplishing all vernal pool and listed species conservation measures within the Mather Core Recovery Area.

Description of Proposed Mitigation Measures

The proposed mitigation plan consists of preservation and management of existing vernal pool landscapes, as well as restoration (both re-establishment and rehabilitation) of previously existing vernal pools that have either been eliminated or substantially degraded by past agricultural practices.

A total of approximately 331 acres of open space preserves will be established and managed in perpetuity. There will be three open space preserves: the West Zinfandel Preserve (± 197.8 acres); the East Zinfandel Preserve (± 88.2 acres); and, the Frye Creek Preserve (± 45 acres). These open space preserves contain approximately 17.75 acres of existing wetlands comprised of 9.58 acres of vernal pools, 3.86 acres of seasonal wetlands, 3.26 acres of wetland swales and 1.05 acres of intermittent stream. **Table 5**

Lists the acreage of wetlands within each of the proposed open space wetland preserves, by type.

Table 5. Existing Wetlands in Proposed Open Space Preserves

Type	West Zinfandel (ac)	East Zinfandel (ac)	Frye Creek (ac)	Total (ac)
Vernal Pool	5.40	3.96	0.22	**9.58**
Seasonal Wetland	0.87	2.01	0.98	**3.86**
Wetland Swale	1.52	0.16	1.58	**3.26**
Intermittent Channel	1.05	0.00	0.00	**1.05**
Total	**8.84**	**6.13**	**2.78**	**17.75**

A total of 9.4 acres of previously existing vernal pools will be restored. Of this total, approximately 6.4 acres would consist of re-establishing previously existing vernal pools that are no longer extant and 3.0 acres would consist of rehabilitating previously existing vernal pools that, while still wetlands, have been degraded to the point they no longer support plant communities characteristic of vernal pools.

Design

The mitigation was designed by first reviewing historical aerial photography of the project area to determine the approximate extent of wetlands that historically existed on the site and comparing that to currently existing conditions. That analysis identified a pallet of potential restoration areas. These potential restoration areas were then examined in the field to determine the extent and probable cause(s) of their degradation and to identify appropriate restoration measures. Following that, the potential restoration areas were examined in the field with a representative of the U.S. Fish and Wildlife Service to determine which ones should be incorporated into this mitigation plan.

Figures 5, 6, 7, and **8** are 1937, 1959, 1968 and 1976 aerial photographs of the project area. These photographs track many, but not all, of the disturbances that have occurred within the project area over time. **Figure 9** is a map showing the vernal pools

East Sacramento Ranch Project
Mitigation and Monitoring Plan
February 2014

Figure 5
1937 Aerial Photograph

Figure 6
1959 Aerial Photograph

Figure 7
1968 Aerial Photograph

East Sacramento Ranch Project
Mitigation and Monitoring Plan
February 2014

Figure 8
1976 Aerial Photograph

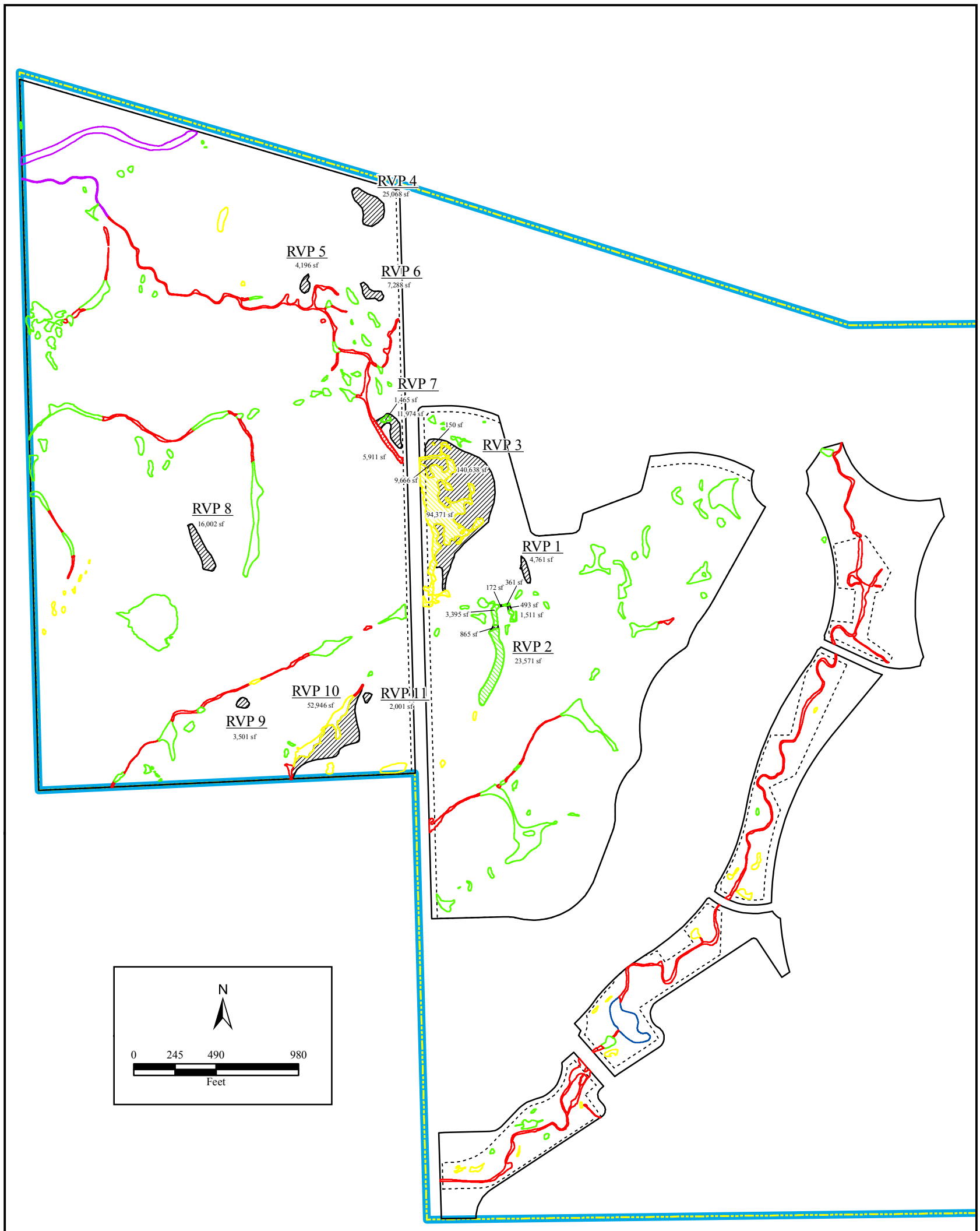

Figure 9
Proposed Vernal Pool Restoration

proposed to be restored. The restoration map differentiates between the various categories of restoration proposed as follows:

- Vernal pools that previously existed but are now extant that will be re-established (6.6 acres);
- Vernal pools that previously existed but have been converted to depressional seasonal wetlands to be rehabilitated (2.2 acres);
- Vernal pools that previously existed but have been converted to wetland swales to be rehabilitated (0.1 acres); and,
- Vernal pools that still exist but have been substantially degraded to be rehabilitated (0.7 acres).

A majority of the restoration will involve vernal pools that have been degraded primarily by repeated plowing and dry farming. These agricultural activities have resulted in the importation of soil burying the original vernal pool surface and muting cross-section topography. In some cases the effect has been so dramatic as to not only degrade the vernal pool but actually eliminate it (RVP1, RVP3, RVP5, RVP6, RVP7, RVP8, RVP9, RVP10 and RVP11). In two cases (RVP2 and RVP4), the degradation was a result of other earthmoving activities. In the case of RVP2, an ungraded road was constructed across the original vernal pool, resulting in excessive ponding in the portion of the vernal pool located south of the road bed and substantially reduced ponding north of the roadbed. In the case of RVP4, the original vernal pool was filled when excess material from construction of a pipeline along Kiefer Boulevard was disposed of and graded over the vernal pool.

Implementation

Prior to initiating construction of the restoration, the top 4 to 6 inches of topsoil in the vernal pools and seasonal wetlands to be impacted will be salvaged and temporarily stockpiled for later application to the restored vernal pools where appropriate.

For all but one of the restoration locations (RVP2), a series of shallow soil test pits will be excavated to determine the approximate depth (in inches) of imported soil overlying the native vernal pool soil and the relative elevation of the native vernal pool soil surface. It is anticipated that, because of past disking, there will be a vertical zone of several inches up to a foot where there will be an intermixing of native vernal pool soil and imported soil. This information will be used to set the restored elevation of the vernal pool.

Once the restored elevation has been determined, the basin will be excavated to a depth 2 to 4 inches below the design elevation. A portion of the excavated top soil will be temporarily stockpiled for re-application to the slopes of the basin. The remainder will be trucked to a location outside of the preserve boundaries. The slopes of the basin will then be graded. Once this initial grading has been completed, salvaged vernal pool and seasonal wetland topsoil will be applied to the bottom of the basin, salvaged upland topsoil will be applied to the slopes and the restored vernal pool will be finish-graded.

The following is a discussion of these construction measures specific to each of the restored vernal pools.

RVP1

RVP1 is a previously existing vernal pool that has been eliminated by importation of soil by repeated plowing. It no longer exhibits wetland characteristics. A basin of the approximate size and configuration will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. A portion of the excavated topsoil will be stockpile for re-application to the slopes of the restored basin. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of salvaged upland topsoil will be graded evenly over the slopes of the basin.

RVP2

RVP2 is a previously existing vernal pool that was been degraded when an ungraded road was constructed across it, resulting in excessive ponding in the portion of the vernal pool located south of the road bed and substantially reduced ponding north of the roadbed. The road bed crossing will be removed to re-establish the original ground contours.

RVP3

RVP3 is a previously existing vernal pool that has been degraded and a portion eliminated by importation of soil from repeated plowing. RVP3 was originally a very large and apparently relatively deep vernal pool interspersed with small upland islands (mima mounds). The micro-topography has been eliminated and a substantial amount of soil has been imported over the original vernal pool surface. As a result, the amount of wetland has been reduced by one half to two thirds and the wetland that remains is a very shallow seasonal wetland. Except for small pockets of shallow ($\leq$ 3 inches) embedded depressions the plant community in the wetland that remains is dominated by non-native seasonal wetland grasses (perennial rye and Mediterranean barley) and vernal pool endemics are largely absent.

A basin of the will be excavated to a depth approximately 6 to 8 inches below surface elevation of the original vernal pool with interspersed mounds. The size and configuration of the restored vernal pool will be smaller than the original vernal pool to provide for an adequate setback from adjacent development. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of upland topsoil salvaged will be graded evenly over the slopes of the basin.

RVP4

RVP4 is a previously existing vernal pool that has been eliminated by the placement of fill material from a pipeline construction project. It no longer exhibits wetland characteristics. A basin of

the will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. The size and configuration of the vernal pool will be smaller than the original vernal pool to provide for an adequate set back to allow for the possible future widening of Kiefer Boulevard. Since the current surface soil at this location is not fully developed topsoil, it will not be salvaged. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of upland topsoil salvaged from RVP3 will be graded evenly over the slopes of the basin.

RVP5

RVP5 is a previously existing vernal pool that has been eliminated by importation of soil by repeated plowing. It no longer exhibits wetland characteristics. A basin of the approximate size and configuration will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. A portion of the excavated topsoil will be stockpile for re-application to the slopes of the restored basin. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of salvaged upland topsoil will be graded evenly over the slopes of the basin.

RVP6

RVP6 is a previously existing vernal pool that has been eliminated by importation of soil by repeated plowing. It no longer exhibits wetland characteristics. A basin of the approximate size and configuration will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. A portion of the excavated topsoil will be stockpile for re-application to the slopes of the restored basin. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of salvaged upland topsoil will be graded evenly over the slopes of the basin.

RVP7

RVP7 is a previously existing vernal pool that has been eliminated by importation of soil by repeated plowing. It no longer exhibits wetland characteristics. A basin of the approximate size and configuration will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. A portion of the excavated topsoil will be stockpile for re-application to the slopes of the restored basin. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of salvaged upland topsoil will be graded evenly over the slopes of the basin.

RVP8

RVP8 is a previously existing vernal pool that has been eliminated by importation of soil by repeated plowing. It no longer exhibits wetland characteristics. A basin of the approximate size and configuration will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. A portion of the excavated topsoil will be stockpile for re-application to the slopes of the restored basin. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of salvaged upland topsoil will be graded evenly over the slopes of the basin.

RVP9

RVP9 is a previously existing vernal pool that has been eliminated by importation of soil by repeated plowing. It no longer exhibits wetland characteristics. A basin of the approximate size and configuration will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. A portion of the excavated topsoil will be stockpile for re-application to the slopes of the restored basin. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of salvaged upland topsoil will be graded evenly over the slopes of the basin.

RVP10

RVP10 is a previously existing vernal pool that has been degraded and a portion eliminated by importation of soil from repeated plowing. The vernal pool has been reduced by approximately two thirds and the wetland that remains is a very shallow seasonal wetland. The plant community in the wetland that remains is dominated by non-native seasonal wetland grasses (perennial rye and Mediterranean barley) and vernal pool endemics are largely absent.

A re-established basin of the will be excavated to a depth approximately 2 to 4 inches below surface elevation of the original vernal pool surface. The existing seasonal wetland will be left ungraded or only minimally graded to serve as the shallow edge of the restored vernal pool. Once the re-established basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of upland topsoil salvaged will be graded evenly over the slopes of the basin.

RVP11

RVP11 is a previously existing vernal pool that has been eliminated by importation of soil by repeated plowing. It no longer exhibits wetland characteristics. A basin of the approximate size and configuration will be excavated to a depth approximately 4 to 6 inches below surface elevation of the original vernal pool. A portion of the excavated topsoil will be stockpile for re-application to the slopes of the restored basin. Once the basin has been excavated, approximately 2 inches of salvaged wetland top soil will be graded evenly over the bottom of the basin and 2 inches of salvaged upland topsoil will be graded evenly over the slopes of the basin.

Best Management Practices (BMPs)

The following is a list of BMP that will be implemented to minimize the effects of construction activities and maximize the likelihood of success of the mitigation effort.

- All construction activities will be supervised by a wetland expert with experience in vernal pool creation and restoration.
- All restoration construction activities will be limited to the summer and early fall when vernal pool soils are dry.
- All wetland soil topsoil salvaged from the impacted will be temporarily stockpiled outside of the preserve boundaries.
- Temporary construction roads for vernal pool restoration construction equipment will be laid out in such a manner as to minimize the potential for indirect effects to existing vernal pools and will be limited to the minimum needed to affect the restoration measures.
- Staging areas for construction equipment will be located outside of the preserve boundaries.
- The temporary stockpiles for upland topsoil excavated within preserves will be located immediately adjacent to the vernal pool being restored.
- Once final grading of the restored vernal pools has been completed, all disturbed areas located outside the restored vernal pools will be reseeded with a seed mix of native and naturalized grasses and forbs.

Implementation Schedule

The construction of the mitigation will be initiated prior to or concurrent with initiation of construction activities for the project. It will be completed no later than November 30th of that same year.

Responsibilities for Implementing Plan

The permittee will be responsible for constructing the proposed mitigation.

Chapter 5
Monitoring

Performance Standards

Performance standards will be used to assess the relative success of the constructed mitigation. These performance standards have been developed based on *Table of Uniform Performance Standards for Compensatory Mitigation Requirements* (12505.1-SPD, Version 8/09/2012). A minimum of 9.4 acres of vernal pool restoration must be implemented and of this, a minimum of 80 percent (7.52 acres) must satisfy all of the following performance standards.

Hydrologic Standards

- The restored vernal pools shall be inundated to a depth within 10% of the range of maximum depths observed within the reference vernal pools
- The restored vernal pools shall be inundated for a duration within 10% of the range of durations observed within reference vernal pools.

Flora Standards

- The restored vernal pools shall have an absolute cover of obligate and facultative wetland species that is $\geq$ 75% of the mean absolute cover in reference vernal pools.

- The restored vernal pools shall have a relative cover by native species that is ≥ 75% of the mean relative cover of native species in the reference vernal pools
- The restored vernal pools shall have a native species richness value that is within 75% of the native species richness in the reference vernal pools.

Monitoring Protocol

The constructed wetlands will be monitored for a period of five years or until all performance criteria have been met for three successive years without human intervention, whichever is longer. The purpose of the monitoring is to assess the relative success of the mitigation as compared to performance standards and to determine whether remedial actions are necessary to assure the performance standards are met.

Monitoring of the restored and reference vernal pools will include obtaining quantitative data on their hydrology and plant communities. Photo points will be established to qualitatively monitor trends in the developing plant communities. The areal extent of constructed wetlands will be surveyed annually using GPS technology and/or GIS technology with georeferenced aerial photography.

The monitoring of the hydrology of the constructed wetlands will be emphasized primarily in the first growing season following construction. Staff gages will be installed at the deepest points in the restored and reference vernal pools. Sampling will be conducted at a frequency sufficient to document the depth and duration of inundation within the restored and reference vernal pools. Once the hydrology of the constructed wetlands has been adequately characterized, additional detailed hydrology monitoring will not be conducted over subsequent growing seasons unless specific problems are identified that warrant further monitoring.

Vegetation monitoring will be conducted during each growing season throughout the monitoring period. The plant community in

each restored and reference vernal will be characterized. Each plant observed will be identified and its relative cover will be recorded. The total cover of all species will also be estimated.

Reporting

The results of each year's monitoring will be compiled into an annual monitoring report. The annual monitoring reports will present all monitoring data, assess the implications of that data, and make recommendations for remedial actions, where warranted. The annual reports will be submitted to the Corps of Engineers not later than December 31st each year.

Responsibilities

The permittee will be responsible for implementing all aspects of the monitoring of the constructed mitigation.

Chapter 6
Long-term Maintenance and Management

Prior to initiation of construction activities in wetlands and other waters of the United States, conservation easements will be established over the open space preserves. The conservation easement will be granted to a conservation oriented third party who will be responsible for the long term maintenance of the preserves. The conservation easement(s) will limit activities within the open space preserves to those activities that are beneficial to the restoration, creation and preservation of wetlands and their surrounding upland habitats. A funding mechanism will be established to provide for the long term maintenance of the preserves in perpetuity.

The open space preserves will be owned and managed by the permittee. Once the constructed wetlands have been monitored for the required period and they have met or exceeded all performance criteria for a period of three consecutive years without human intervention, these responsibilities will have been satisfied and the third party preserve manager will be responsible for the long-term maintenance of the mitigation areas along with the preserves.

Chapter 7
References

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APPENDIX A

IMPACT MAP

Gibson & Skordal, LLC
WETLAND CONSULTANTS

KIEFER BOULEVARD

EAGLES NEST ROAD

SUNRISE BOULEVARD

JACKSON ROAD

LEGEND

- Study Area
- Wetlands
- Preserve (Primary and Secondary Open Space)
- Direct Impacts
- Land Plan
- Storm Drain Outfall
- Multi-Purpose Detention Basin inside Preserve
- Multi-Purpose Detention Basin outside Preserve

IMPACTS

Waters of the US	Existing	Avoided	Direct Impacts
Vernal Pool	11.19	9.58	1.61
Seasonal Wetland	4.65	3.21	1.45
Wetland Swale	4.68	3.27	1.42
Intermittent Stream	1.05	1.05	0.00
Pond	0.66	0.66	0.00
TOTAL	**22.23**	**17.76**	**4.47**

East Sacramento Ranch

NORTH

IMPACT MAP

0 1000 2000

November 2013

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