David Magney Environmental Consulting

WETLAND MITIGATION AND MONITORING PLAN FOR NORTH VINEYARD GREENS DEVELOPMENT PROJECT

(CORPS REGULATORY #200600428)

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS

and

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

On Behalf of:

NORTH VINEYARD GREENS

DMEC Mission Statement:

To provide quality environmental consulting services, with integrity, that protect and enhance the human and natural environment.

August 2007

DMEC

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Prepared for:

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SECTION 1. INTRODUCTION

PROJECT BACKGROUND

The ±206.3-acre North Vineyard Greens (NVG) project site is part of the ±1,594.5-acre North Vineyard Station Specific Plan (NVSSP) area in southern Sacramento County. The Project consists of NVG Unit 1 (±146.7 acres), NVG Unit 3 (±49.4 acres), and Gosal Estates (±10.2 acres). It is expected that approximately 750 dwelling units will be built on approximately 139 gross residential acres within the NVG project site. Single-family housing will account for about 525 dwelling units and multiple-family housing will account for about 225 units (County of Sacramento 2005).

The Specific Plan was prepared according to direction in the Sacramento County General Plan[1] and involved public input, extensive analyses of environmental conditions, adjacent land use, and area-wide infrastructure needs. It places a high priority on aesthetics, quality of life, and land use compatibility. The Specific Plan area is bounded by Florin Road to the north, Gerber Road and/or Gerber Creek on the south, the northerly extension of Vineyard Road on the east, and generally by Elder Creek on the west side. The Specific Plan consists of a 5,732-dwelling unit residential land use plan with supporting commercial, business professional, park, school, and open space uses.

The proposed project responds to the need for a well-planned, high quality suburban environment in the North Vineyard Station area. The NVSSP area is located within the County's Urban Services Boundary (USB) and the South Sacramento Habitat Conservation Plan (SSHCP) area. The North Vineyard Station Specific Plan Environmental Impact Report (County of Sacramento 1998) was prepared to identify potential environmental impacts from the development of the North Vineyard Station Area.

The Specific Plan includes a regional flood control plan for Gerber and Elder Creeks. The North Vineyard Station Drainage Master Plan identifies existing drainage facilities and flooding patterns and analyzes alternatives to recommend preferred flood control and conveyance facilities to serve the drainage needs of the Plan area. The County of Sacramento has submitted an individual permit application for the North Vineyard Station Drainage Master Plan project that includes the improvements to Gerber Creek and construction of the detention basin within the project area.

David Magney Environmental Consulting (DMEC) was contracted to prepared the Alternatives Analysis (AA) for the NVG project site (DMEC 2007) required by Section 404(b)(1) of the Clean Water Act for 404 individual permit applications[2]. The AA identified the filling of 1.60 acres of jurisdictional wetlands with onsite mitigation through the creation of wetland preserve as the least environmentally damaging practicable alternative (LEDPA). DMEC was also contracted to prepare this Wetland Mitigation Plan (Plan), which describes the proposed approach to the required onsite wetland mitigation. DMEC has not conducted focused biological resources surveys onsite; however, DMEC conducted a cursory site visit on 1 August and 21 September 2006 to generally assess conditions and habitats.

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[1] County of Sacramento, Planning and Community Development Department. www.saccounty.net/planning/gpupdate/gpu-index.html

[2] Section 404(b)(1) Guidelines. www.usace.army.mil/cw/cecwo/reg/40cfr230.pdf

PROJECT OBJECTIVES

Guidelines call for project objectives to be expressed in terms of basic and overall purpose. The basic project purpose is to provide housing in southern Sacramento County. The overall project purpose is to create a small, low density single-family subdivision as well as a high-density component, beginning in 2008, that is proximate to local and regional job centers and existing infrastructure in a manner that is consistent with Sacramento County's urban growth policies requiring compact urban form. The project is not dependent on water.

The NVG project would provide additional housing needed to accommodate job growth and housing demand within Sacramento County projected by the Sacramento Area Council of Governments (SACOG)[3]. Sacramento County continues to experience a dramatic population increase, with growth rates in the unincorporated areas of the County averaging 27.7% between 1970 and 1990. (Sacramento County General Plan[4], Housing Element p. 130-31; the Vineyard Community Planning Area, which contains Mequity, LLC's proposed NVG community, experienced a 116% growth rate between 1990 and 2000[5].)

SACOG projects that the Sacramento area will need to house more than 1 million additional people in the next 25 years. This population growth continues to put tremendous pressure on the housing market, and SACOG projects that current conditions would yield a shortfall of over 500,000 dwelling units for the Sacramento region by 2050. Rising housing demand, coupled with a shortage of approved residential development sites near established urban areas and regional job centers, have led to a rapid escalation in home prices. Also, homebuilders must look further from urban areas and job centers to find available homesites and developable land. Mequity, LLC conceived the proposed NVG community to provide new housing to accommodate some of the high demand for housing in the Sacramento region resulting from sustained population growth. NVG is located in an underdeveloped rural residential portion of South/Central Sacramento County that is proximate to established commercial/industrial uses and convenient to major regional job centers in downtown Sacramento, Rancho Cordova, and along the Highway 50 corridor. It is also proximate to existing infrastructure.

PROJECT LOCATION

The ±206.3-acre project site is located north of Gerber Road, west of Bradshaw Road, south of Florin Road, and east of Elk Grove Florin Road (Figure 1, General Location Map). The site corresponds to a portion of Section 6 of Township 7 North, Range 6 East of the Elk Grove, California 7.5-minute quadrangle (U.S. Department of the Interior, Geological Survey, photorevised 1979). The NVG site corresponds to Assessor's Parcel Numbers 066-0070-020, 043-046; 066-0080-001-003, 016; 065-080-027, 029, 057, 064, 070 and 080.

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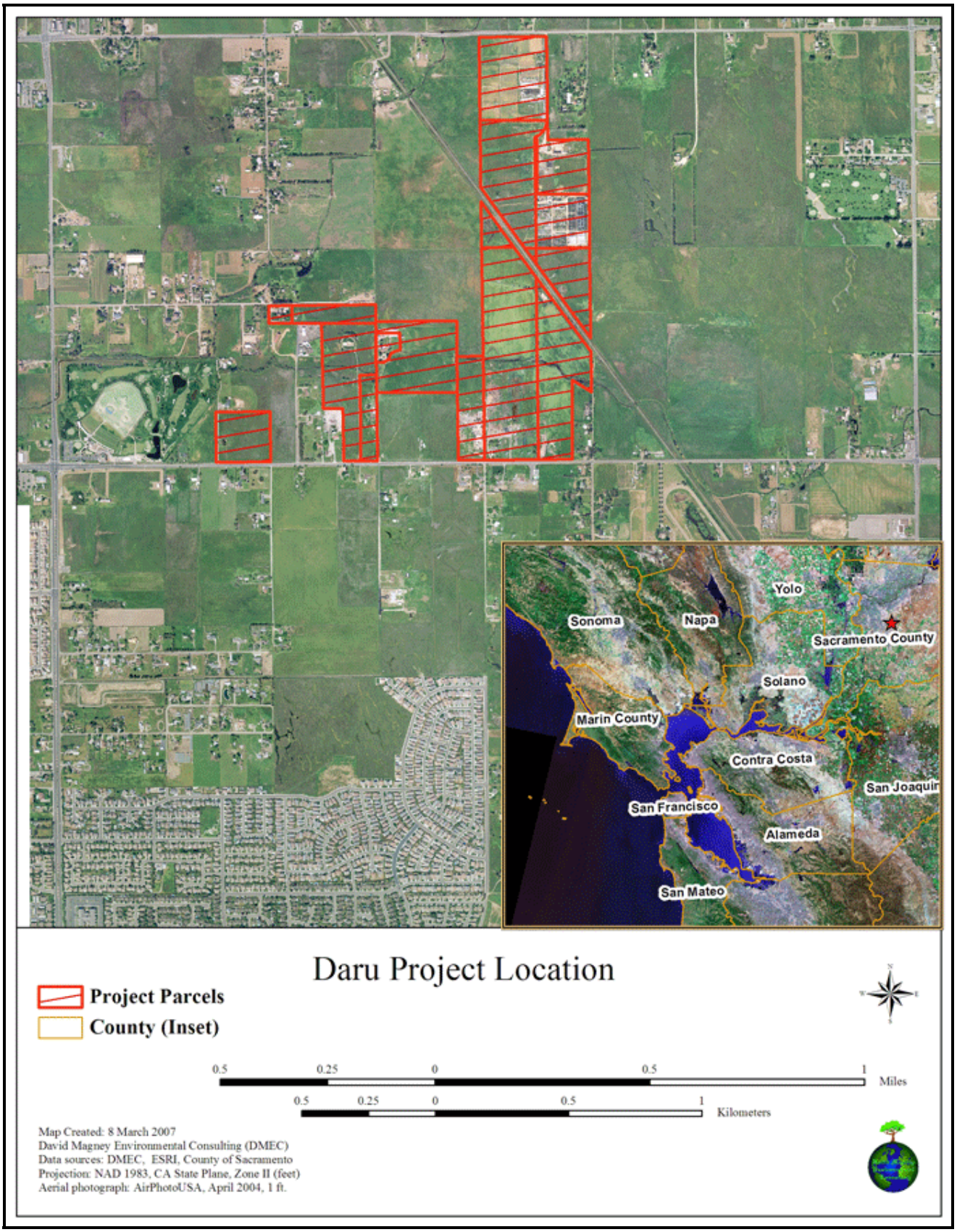
[3] Sacramento Area Council of Governments Employment and Housing Demand projections. www.sacog.org/demographics/projections/index.cfm

[4] Planning and Community Development Department, County of Sacramento. www.saccounty.net/planning/gpupdate/gpu-index.html

[5] Sacramento Area Council of Government Population projections. www.sacog.org/demographics/projections/index.cfm

Figure 1. General Location Map



SECTION 2. EXISTING CONDITIONS

This section describes the conditions currently existing onsite, including geology and soils, and botanical and wildlife resources, including special-status biological resources. DMEC has not conducted focused biological resources surveys onsite; however, DMEC conducted a cursory site visits on 1 August and 21 September 2006 to generally assess conditions and habitats onsite. In addition to the resources observed by DMEC, the following existing conditions are supported by findings reported by the South Sacramento Habitat Conservation Plan (SSHCP) and ECORP Consulting, Inc. (ECORP 2004, 2006).

SITE CHARACTERISTICS

Much of the site is leveled pasture and is currently fallow but was farmed and irrigated historically. Rural residences and plant nursery operations are located in the northern and southern portions of the site (Figure 2, Aerial Photograph of the NVG Project Site). The nurseries are currently active and several drainage ditches are located west of the northern nursery. The Central California Traction Railroad easement runs diagonally through NVG Unit 1, dividing it into two unequal portions.

The primary vegetation community present onsite is annual grassland. Within the annual grassland are ephemeral wetland features that include seasonal wetlands and vernal pools. Gerber Creek meanders through the southern and central portions of NVG Units 1 and 3. A non-jurisdictional man-made fish pond is situated in the southern portion of NVG Unit 1 and south of Gerber Creek. The site is situated at an elevation of approximately 50 feet (15 meters) above mean sea level.

GEOLOGIC SETTING AND SOILS

The NVG project site is located within the Lower Unit Riverbank Formation. This formation is characterized by a broad floodplain, very deep alluvial soils, lack of constraint to lateral channel migration, and frequent flooding. The Formation is made up of higher riverbank terraces and remnants of alluvial fans composed of alluviums containing claypans and duripans, soils that are capable of supporting seasonal wetlands, swales, and vernal pools (SSHCP).

According to the Soil Survey of Sacramento County, California (U.S. Department of Agriculture, Natural Resource Conservation Service 1993), three soil units, or types, have been mapped for the site (ECORP 2006), including: (213 [mapping unit designation]) San Joaquin silt loam, leveled, 0-1 percent slopes, (214) San Joaquin silt loam, 0-3% slopes and (216) San Joaquin-Durixeralfs complex, 0-1 percent slopes. The San Joaquin silt loam, 0-1% slopes is not listed as a hydric soil and does not contain listed hydric inclusions. The San Joaquin-Durixeralfs complex and San Joaquin silt loam, 0-3 % slopes are not considered to be hydric soils; however; they do contain listed hydric inclusions. This is summarized in Table 1, Soil Units Present at the NVG Site.

Figure 2. Aerial Photograph of the NVG Project Site

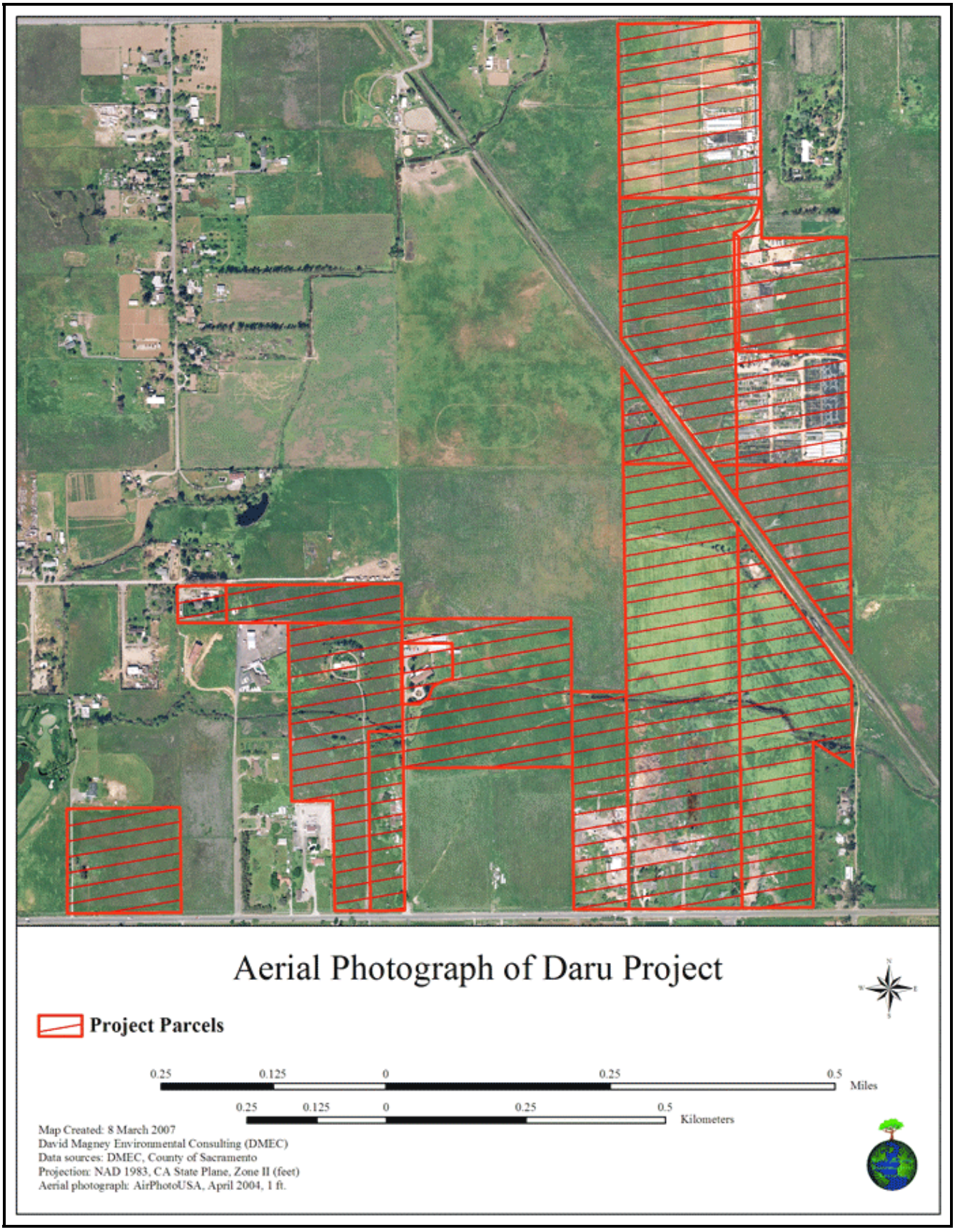


Table 1. Soil Units Present at the NVG Site

NVG Unit	Soil Units Present	Hydric Soil	Hydric Inclusions or Components
#1	(213) San Joaquin silt loam, leveled, 0-1% slopes	No	Not present
	(216) San Joaquin-Durixeralfs complex, 0-1% slopes	No	Present
#3	(213) San Joaquin silt loam, leveled, 0-1% slopes	No	Not present
	(214) San Joaquin silt loam, 0-3% slopes	No	Present
#11	(213) San Joaquin silt loam, leveled, 0-1% slopes	No	Not present
Gosal	(213) San Joaquin silt loam, leveled, 0-1% slopes	No	Not present

BOTANICAL RESOURCES

Botanical resources of the NVG project site include the property flora (or all plant taxa contributing to the plant communities onsite), and the habitats and plant alliances (plant communities) that occupy the property and provide resources to wildlife species frequenting and occupying the property.

Flora

The vascular plant species observed by DMEC and reported by ECORP during the NVG wetland delineations (ECORP 2004) and Section 404 Individual Permit Application (ECORP 2006), are listed in Table 2, Plant Species of the NVG Project Site. Table 2, which is alphabetized by scientific (botanical) name, includes the common name, growth habit, wetland indicator status, and botanical family name for each species reported onsite.

A total of 154 vascular plants have been observed and reported for the NVG project site. Of the 154 plant species onsite, sixty-three (63) species are native and ninety (91) are introduced species. The ratio of native to nonnative taxa for the project site (41% native to 59% non-native) is not representative of the ratio for the entire California flora (Hickman 1993) and other smaller regions within California (approximately 75% native to 25% nonnative). This is indicative of a site that has been substantially disturbed by human activities. Seventy-five (75) of the 154 taxa (49%) are considered hydrophytes, and are assigned a wetland indicator status of least FAC (including 24 FAC, 22 FACW, and 29 OBL species).

Table 2. Plant Species of the NVG Project Site

Scientific Name[6]	Common Name	Habit[7]	WIS[8]	Family
Acer negundo	Box Elder	T	FACW	Sapindaceae
*Aegilops triuncialis**	Barbed Goatgrass	AG	-	Poaceae
*Ailanthus altissima**	Tree-of-heaven	T	FACU	Hippocastinaceae
*Aira caryophyllea**	Silver Hairgrass	AG	-	Poaceae
*Alisma lanceolatum**	Lanceleaf Water Plantain	PH	OBL	Alismataceae
Alnus rhombifolia	White Alder	T	FACW	Betulaceae
Amaranthus retroflexus	Redroot Amaranth	AH	FACU	Amaranthaceae
Amsinckia menziesii	Rancher's Fire	AH	-	Boraginaceae
*Anagallis arvensis**	Scarlet Pimpernel	AH	FAC	Primulaceae
*Anthemis cotula**	Mayweed	AH	FACU	Asteraceae
*Arundo donax**	Giant Reed	PG	FACW	Poaceae
Asclepias fascicularis	Narrowleaf Milkweed	PH	FAC	Apocynaceae
*Asparagus officinalis**	Garden Asparagus	PG	FACU	Asparagaceae
*Avena barbata**	Slender Wild Oat	A/PG	-	Poaceae
*Avena fatua**	Wild Oat	AG	-	Poaceae
Azolla filiculoides	Pacific Mosquitofern	F	OBL	Azollaceae
*Brachypodium distachyon**	Purple False Brome	A/PG	-	Poaceae
*Brassica nigra**	Black Mustard	AH	-	Brassicaceae
*Brassica rapa**	Field Mustard	AH	-	Brassicaceae
*Briza minor**	Little Quakinggrass	AG	FACW-	Poaceae
Brodiaea coronaria	Harvest Brodiaea	PH	(FAC)	Liliaceae
Bromus carinatus	California Brome	AG	-	Poaceae
*Bromus diandrus**	Ripgut Brome	AG	(FACU)	Poaceae
*Bromus hordeaceus**	Soft Brome	AG	FACU-	Poaceae
Bromus madritensis ssp. *rubens**	Red Brome	AG	NI	Poaceae
Callitriche marginata	Winged Water-starwort	AH	OBL	Callitrichaceae
*Carduus pycnocephalus**	Italian Thistle	AH	-	Asteraceae
Castilleja attenuata	Valley Tassels	AH	-	Orobanchaceae
Castilleja campestris ssp. *campestris*	Field Owl's Clover	AH	OBL*	Orobanchaceae

[6] * = Introduced plant species that have become naturalized. Scientific names of the plant species follow Hickman (1993) and Flora of North America Committee (2001-2007). Brackets [ ] indicate updated nomenclature.

[7] Habit definitions: AG = annual graminoid; AH = annual herb; AV = annual vine; F = Fern; PG = perennial graminoid; PH = perennial herb; PV = perennial vine; S = shrub; T = tree.

[8] WIS = Wetland Indicator Status. The following code definitions are according to Reed (1988):
OBL = obligate wetland species, occurs almost always in wetlands (>99% probability).
FACW = facultative wetland species, usually found in wetlands (67-99% probability).
FAC = facultative species, equally likely to occur in wetlands or nonwetlands (34-66% probability).
FACU = facultative upland species, usually found in nonwetlands (67-99% probability).
UPL = obligate upland species in this region (99% probability), occurs in wetlands in another region
NI = no indicator status has been assigned due to a lack of information.
+ or - symbols are modifiers that indicate greater or lesser affinity for wetland habitats.
* = tentative assignment to that indicator status by Reed (1988).
( ) Parentheses indicate a wetland status suggested by David L. Magney based on extensive field observations.

Scientific Name[6]	Common Name	Habit[7]	WIS[8]	Family
*Centaurea solstitialis**	Yellow Star-thistle	AH	-	Asteraceae
Centaurium muhlenbergii	Monterey Centaury	AH	FAC	Gentianaceae
*Cerastium glomeratum**	Mouse-ear Chickweed	AH	FACU	Caryophyllaceae
*Chamomilla suaveolens**	Pineapple Weed	AH	FACU	Asteraceae
*Chenopodium album**	Lambsquarters	AH	FAC	Chenopodiaceae
*Cichorium intybus**	Chicory	PH	-	Asteraceae
*Cirsium vulgare**	Bull Thistle	PH	FACU	Asteraceae
*Convolvulus arvensis**	Bind Weed	PV	-	Convolvulaceae
*Cortaderia selloana**	Uruguayan Pampas Grass	PG	-	Poaceae
*Crassula tillaea**	Water Pygmy-weed	AH	NI*	Crassulaceae
*Crypsis schoenoides**	Swamp Grass	AG	OBL	Poaceae
*Cynodon dactylon**	Bermuda Grass	PG	FAC	Poaceae
Cyperus eragrostis	Umbrella-sedge	PG	FACW	Cyperaceae
*Daucus carota**	Queen Anne's Lace	PH	-	Apiaceae
Deschampsia danthonioides	Annual Hairgrass	AG	FACW	Poaceae
Eleocharis macrostachya	Creeping or Pale Spikerush	PG	OBL	Cyperaceae
Epilobium brachycarpum	Tall Annual Willow-herb	AH	UPL	Onagraceae
Epilobium ciliatum	Northern Willow-herb	PH	FACW	Onagraceae
Epilobium densiflorum	Dense-flowered Willow-herb	AH	OBL	Onagraceae
Epilobium pygmaeum	Smooth Spike-primrose	AH	OBL	Onagraceae
Eremocarpus setigerus	Dove Weed	AH	-	Euphorbiaceae
*Erodium botrys**	Broadleaf Filaree	AH	-	Geraniaceae
*Erodium moschatum**	Whitestem Filaree	AH	-	Geraniaceae
Eryngium vaseyi	Coyotethistle	PH	FACW	Apiaceae
*Eucalyptus globulus**	Blue Gum	T	-	Myrtaceae
Euphorbia spathulata	Warty Spurge	AH	-	Euphorbiaceae
*Festuca arundinacea**	Tall Fescue	PG	FAC-	Poaceae
Fraxinus latifolia	Oregon Ash	T	FACW	Oleaceae
Galium aparine	Goose Grass	AH	FACU	Rubiaceae
*Geranium dissectum**	Cut-leaved Geranium	AH	-	Geraniaceae
*Glyceria declinata**	Waxy Mannagrass	PG	-	Poaceae
Gnaphalium palustre	Lowland Cudweed	AH	FACW	Asteraceae
Gratiola ebracteata	Bractless Hedgehyssop	AH	OBL	Scrophulariaceae
Grindelia camporum	Great Valley Gumplant	PH	FACU	Asteraceae
Hemizonia fitchii	Fitch's Tarweed	AH	-	Asteraceae
*Hirschfeldia incana**	Summer Mustard	PH	-	Brassicaceae
Holocarpha virgata	Yellowflower Tarweed	AH	-	Asteraceae
Hordeum marinum ssp. *gussoneanum**	Mediterranean Barley	AG	FAC	Poaceae
*Hordeum murinum**	Summer Barley	AG	NI	Poaceae
*Hypochaeris glabra**	Smooth Cat's-ear	AH	-	Asteraceae
Juglans californica	Southern California Walnut	T	FAC	Juglandaceae
Juncus balticus	Baltic Rush	PG	OBL	Juncaceae
Juncus bufonius	Common Toad Rush	AG	OBL	Juncaceae

Scientific Name[6]	Common Name	Habit[7]	WIS[8]	Family
*Juncus capitatus**	Leafybract Dwarf Rush	AG	FACU	Juncaceae
Juncus effusus	Common Rush	PG	OBL	Juncaceae
Juncus xiphioides	Iris-leaved Rush	PG	OBL	Juncaceae
*Kickxia elatine**	Cancerwort	AH	NI*	Veronicaceae
*Lactuca serriola**	Prickly Wild Lettuce	AH	FAC	Asteraceae
Lasthenia fremontii	Fremont's Goldfields	A/PH	OBL	Asteraceae
Lasthenia glaberrima	Smooth Goldfields	AH	OBL	Asteraceae
*Lathyrus angulatus**	Angled Pea	AV	-	Fabaceae
Lemna minuscula	Least Duckweed	PH	OBL	Lemnaceae
*Leontodon taraxacoides**	Hawkbit	A/B/PH	FACU	Asteraceae
Lepidium nitidum	Common Peppergrass	AH	-	Brassicaceae
*Lolium multiflorum**	Italian Ryegrass	AG	FAC*	Poaceae
*Lotus corniculatus**	Birdsfoot Trefoil	PH	FAC	Fabaceae
Lotus purshianus	Spanish Clover	AH	UPL	Fabaceae
Ludwigia peploides	Floating Water-primrose	PH	OBL	Onagraceae
*Lythrum hyssopifolium**	Hyssop Loosestrife	AH	FACW	Lythraceae
*Malva parviflora**	Cheeseweed	AH	-	Malvaceae
*Medicago polymorpha**	Burclover	AH	-	Fabaceae
*Mentha pulegium**	Pennyroyal	PH	OBL	Lamiaceae
*Morus alba**	White Mulberry	T	NI	Moraceae
Navarretia leucocephala	Whitehead Navarretia	AH	OBL	Polemoniaceae
*Olea europaea**	Olive	T	-	Oleaceae
*Paspalum dilatatum**	Dallisgrass	PG	FAC	Poaceae
*Phalaris aquatica**	Bulbous Canarygrass	PG	FAC+	Poaceae
Phyla nodiflora	Turkey Tangle Fogfruit	PH	FACW	Verbenaceae
*Phytolacca americana**	American Pokeweed	PH	NI	Phytolaccaceae
*Picris echioides**	Bristly Ox-tongue	AH	(FAC)	Asteraceae
Pinus sabiniana	California Foothill Pine	T	-	Pinaceae
Plagiobothrys stipitatus	Stalked Popcornflower	AH	OBL	Boraginaceae
Plantago erecta	California Plantain	AH	-	Plantaginaceae
*Plantago lanceolata**	English Plantain	PH	FAC-	Plantaginaceae
*Poa annua**	Annual Bluegrass	AG	FACW-	Poaceae
*Polygonum arenastrum**	Common Knotweed	AH	FAC	Polygonaceae
Polygonum hydropiperoides	Swamp Smartweed	PH	OBL	Polygonaceae
Polygonum punctatum	Dotted Smartweed	A/PH	OBL	Polygonaceae
*Polypogon monspeliensis**	Rabbitsfoot Grass	AG	FACW+	Poaceae
*Populus alba**	White Poplar	T	-	Salicaceae
Populus fremontii	Fremont's Cottonwood	T	FACW	Salicaceae
*Pseudognaphalium luteo-album**	Everlasting Cudweed	AH	FACW-	Asteraceae
Psilocarphus brevissimus	Dwarf Woollyheads	AH	OBL	Asteraceae
*Punica granatum**	Pomegranate	S	-	Punicaceae
Quercus lobata	Valley Oak	T	FAC*	Fagaceae
Quercus wislizenii+	Interior Live Oak	S/T	-	Fagaceae

Scientific Name[6]	Common Name	Habit[7]	WIS[8]	Family
Ranunculus bonariensis	Carter's Buttercup	AH	OBL	Ranunculaceae
*Ranunculus muricatus**	Spinyfruit Buttercup	A/B/PH	FACW+	Ranunculaceae
*Raphanus raphanistrum**	Wild Radish	A/PH	-	Brassicaceae
*Raphanus sativus**	Radish	A/BH	-	Brassicaceae
*Robinia pseudoacacia**	Black Locust	T	FAC*	Fabaceae
Rosa spp.*	Cultivated Rose	S	-	Rosaceae
*Rubus discolor**	Himalaya Blackberry	S	FACW*	Rosaceae
*Rumex acetosella**	Common Sheep Sorrel	PH	FAC-	Polygonaceae
*Rumex crispus**	Curly Dock	PH	FACW-	Polygonaceae
*Rumex pulcher**	Fiddle Dock	PH	FAC+	Polygonaceae
Salix exigua	Narrow-leaved Willow	S/T	OBL	Salicaceae
Salix gooddingii	Goodding's Black Willow	T	OBL	Salicaceae
*Schinus molle**	Peruvian Pepper Tree	T	-	Anacardiaceae
Schoenoplectus [*Scirpus*] *acutus*	Hardstem Bulrush	PH	OBL	Cyperaceae
*Silene gallica**	Windmill Pink	AH	-	Caryophyllaceae
*Silybum marianum**	Milk Thistle	AH	-	Asteraceae
*Sonchus oleraceus**	Common Sow-thistle	AH	NI*	Asteraceae
*Sorghum halepense**	Johnsongrass	PG	FACU	Poaceae
*Spergularia rubra**	Purple (Red) Sandspurrey	A/PH	FAC-	Caryophyllaceae
*Stellaria media**	Common Chickweed	AH	FACU	Caryophyllaceae
*Taeniatherum caput-medusae**	Medusahead	AG	-	Poaceae
*Tanacetum parthenium**	Feverfew	PH	-	Asteraceae
*Taraxacum officinale**	Dandelion	PH	FACU	Asteraceae
Trichostema lanceolatum	Vinegarweed	AH	-	Lamiaceae
*Trifolium dubium**	Suckling Clover	AH	FACU*	Fabaceae
*Trifolium hirtum**	Rose Clover	AH	-	Fabaceae
*Trifolium repens**	White Clover	PH	FACU+	Fabaceae
Triteleia hyacinthina	White Brodiaea	PH	FACW*	Liliaceae
Triteleia laxa	Ithuriel's Spear	PG	-	Liliaceae
Typha latifolia	Cattail	PH	OBL	Typhaceae
*Veronica anagallis-aquatica**	Water Speedwell	PH	OBL	Veronicaceae
Veronica peregrina	Neckweed	AH	OBL	Veronicaceae
*Vicia sativa**	Common Vetch	AH	FACU	Fabaceae
*Vicia villosa**	Hairy Vetch	AH	-	Fabaceae
*Vinca major**	Greater Periwinkle	PH	(FAC)	Apocynaceae
Vitis californica	California Wild Grape	PV	FACW	Vitaceae
*Vulpia bromoides**	Brome Fescue	AG	FACW	Poaceae
Wyethia angustifolia	California Compassplant	PH	FACU-	Asteraceae
Xanthium strumarium	Cocklebur	AH	FAC+	Asteraceae

Habitats

General habitats found onsite, and in the immediate vicinity of the NVG project site, include grassland, wetland areas, and remnants of past agricultural operations. The habitat types and associated plant communities that contribute to the landscape of the project site and are discussed in the following subsections, include:

- Grassland
  - Valley Grassland
  - Vernal Pool Grassland
- Wetlands
  - Seasonal Wetlands and Swales
  - Seasonal Marsh
  - Vernal Pools
  - Riparian
- Agricultural
  - Fallow Land
  - Agricultural Wetlands

Grassland

Grassland consists of herbaceous vegetation dominated by annual grasses and forbs. Annual grasslands in the Central Valley grow primarily during the early spring through early summer, with most of the grass species completing their life cycles by the end of spring. Grasslands at the project site consist of Valley Grassland and Vernal Pool Grassland, which are described below.

VALLEY GRASSLAND

Valley Grassland habitat is the most widespread natural habitat throughout the undeveloped lowlands and rolling hills in the general area of the NVG project site. Valley Grassland is dominated by several common non-native annual grasses, with other native and non-native grasses and numerous forbs also present. Grasses typically dominant in Valley Grassland that have been reported onsite include bromes (*Bromus diandrus*, *B. hordeaceus*), wild oats (*Avena barbata, A. fatua*), barley (*Hordeum marinum, H. murinum*), ryegrass (*Lolium multiflorum*), and annual fescue (*Vulpia bromoides*).

Other non-native grasses that are commonly associated with Valley Grassland reported onsite include *Aira caryophyllea, Briza minor, Cynodon dactylon, Poa annua,* and *Taeniatherum caput-medusae.* Non-native forbs representative of this community onsite include: mustards (*Brassica* spp.), radishes (*Raphanus* spp.), filarees (*Erodium* spp.), clovers (*Trifolium* spp.), vetches (*Vicia* spp.), *Centaurea solstitialis*, as well as several other species. Associated native forbs onsite include: *Eremocarpus setigerus, Holocarpha virgata*, *Lotus purshianus,* and *Trichostema lanceolatum.*

Additional native species onsite that commonly occur in grasslands include: *Amsinckia menziesii, Asclepias fascicularis, Brodiaea coronaria, Bromus carinatus, Castilleja attenuata, Epilobium brachycarpum, Galium aparine, Grindelia camporum, Hemizonia fitchii, Lepidium nitidum, Plantago erecta, Triteleia laxa,* and *Wyethia angustifolia.*

VERNAL POOL GRASSLAND

The habitat subtype Vernal Pool Grassland occurs on a few distinctive landscape formations, most often alluvial formations such as the Lower Unit Riverbank Formation that includes the project site. Vernal Pool Grassland has two distinct components: an upland grassland component, and a wetland component associated with vernal pools and vernal swales. The upland grassland component is very similar to Valley Grassland (see Valley Grassland above), and only differs in areas influenced by and immediately adjacent to vernal pools and swales.

A distinctive association of grasses and forbs, both native and non-native, characterizes the wetland component. Native species commonly a part of this association onsite include *Deschampsia danthonioides*, *Lasthenia* spp., *Juncus bufonius*, and *Hemizonia fitchii,* with non-natives *Leontodon taraxacoides, Juncus capitatus, Lythrum hyssopifolium*, and *Hordeum marinum*.

Wetlands

Wetland plant communities onsite are found in seasonal wetland, seasonal wetland swale, seasonal marsh, vernal pool, and riparian habitats.

SEASONAL WETLANDS AND SWALES

Seasonal wetlands and swales are typically found in flat to gently rolling grasslands where water pools in depressions or flows overland via shallow, ephemeral drainages. These wetland habitats tend to form on shallow soils with an impermeable clay or hardpan layer below and are often associated with vernal pool complexes. Because of their close association with vernal pools, seasonal swales may serve as conduits for the movement of plant propagules and wildlife between vernal pools. These wetlands may fill and empty several times per year as a result of seasonal weather patterns. Soils remain saturated during cool, wet periods, and then dry through a combination of surface run-off and evapotranspiration in warm, dry periods.

Some seasonal wetlands develop as a result of human activities such as scraping or grading in grasslands, which creates artificial depressions with shallow soil. Disturbed wetlands tend to have weedy or ruderal plant species such as: *Lythrum hyssopifolium*, *Lolium multiflorum*, *Hordeum marinum*, *Polypogon monspeliensis, Glyceria declinata,* and *Rumex crispus*, all of which are reported or were observed on the NVG site. Seasonal swales associated with vernal pools support some of the same native plants commonly found in vernal pools, and two such plants, *Deschampsia danthonioides* and *Plagiobothrys stipitatus,* are known onsite.

Additional native species onsite that commonly occur in seasonal wetlands and swales include *Centaurium muhlenbergii, Cyperus eragrostis, Epilobium ciliatum, E. densiflorum, Gnaphalium palustre, Juncus balticus, J. bufonius, J. effusus, J. xiphioides, Phyla nodiflora, Triteleia hyacinthina, Veronica peregrina,* and *Xanthium strumarium.*

SEASONAL MARSH

Seasonal marshes have many of the characteristics of seasonal wetlands and swales described above. Seasonal marshes are seasonally flooded with shallow water (<2m depth) and soils are saturated most or all of the time. Soils are anaerobic clays and silts that support a characteristic assemblage of upright, perennial monocots. Representative species onsite include *Juncus effusus, J. xiphioides*,

Polygonum hydropiperoides, P. punctatum, Schoenoplectus [*Scirpus*] *acutus, Typha latifolia,* and *Xanthium strumarium.*

Additional native species onsite that commonly occur in seasonal marshes include: *Callitriche marginata, Cyperus eragrostis, Eleocharis macrostachya, Ludwigia peploides,* and *Ranunculus bonariensis.*

VERNAL POOLS

Vernal pools are characterized by their physical characteristics and the unique assemblages of highly specialized endemic plants and animals associated with them. Vernal pools develop in depressional basins on soils with an impermeable hardpan or claypan (or both) layer that restricts the downward percolation of water. Cool, wet winters and warm, extremely dry summers create cycles of inundation and drying of pool basins and soil profiles.

Species associated with smaller, shallower vernal pools intergrade with less specialized and often non-native seasonal wetland species, and, at higher and drier positions, with upland annual grassland vegetation (see Vernal Pool Grassland above). At lower, wetter positions, the species associated with larger and deeper vernal pools intergrade with seasonal marshes and swales (see descriptions above). The vernal pools onsite are of the small/shallow type.

Native species commonly associated with the vernal pools found in the area of the project site that are reported to be present include: *Callitriche marginata, Castilleja campestris* ssp. *campestris, Deschampsia danthonioides*, *Eleocharis macrostachya*, *Gratiola ebracteata, Lasthenia fremontii, L. glaberrima*, *Plagiobothrys stipitatus, Psilocarphus brevissimus,* and *Ranunculus bonariensis*. Several sensitive, uncommon plant species are known to occur in vernal pools in the vicinity of the project, but none are known on the NVG site.

Additional native species onsite that commonly occur in vernal pool habitat include: *Epilobium ciliatum, E. densiflorum, Juncus bufonius, Triteleia hyacinthina,* and *Veronica peregrina.*

RIPARIAN

Riparian vegetation typically intergrades with emergent marsh and permanent or seasonal wetlands at lower and wetter positions, and with upland vegetation types at higher and drier positions. Streambed sediment bars serve as recruitment surfaces for woody riparian species, particularly willows (*Salix* spp) and *Populus fremontii*. Riparian sites in a natural state located within the Lower Unit Riverbank Formation typically support thick riparian woodland and scrub associations. *Acer negundo, Alnus rhombifolia, Fraxinus latifolia, Juglans californica, Populus fremontii, Quercus* spp., *Salix* spp, and *Vitis californica* are native riparian woodland species that are found onsite, which may be remnants of historic riparian woodlands.

Seasonal drainages may have enough runoff to support some hydrophytic species, but may not be able to support riparian woodlands. These seasonal drainages can flow through annual grasslands that include marginally hydrophytic non-native species such as *Lolium multiflorum* and *Hordeum marinum* ssp. *gussoneanum*. Gerber Creek, which occurs onsite in the southern and central portions of NVG Units 1 and 3, is a seasonal drainage that is largely unvegetated, with non-native *Rubus discolor* present along the banks.

Agricultural

FALLOW LAND

Fallow land includes farmland temporarily held out of production, non-producing areas adjacent to land that is actively farmed, and abandoned farmlands that were once in production. In general, fallow agricultural lands support weedy species and annual grassland species, many of which were observed onsite. Fallow land is typically not tilled or irrigated, though sometimes it may be mowed or disced (especially along public roads and fence lines) to create firebreaks.

AGRICULTURAL WETLANDS

Agricultural wetlands are generally associated with irrigation canals, drainage ditches, and impoundments such as stock and tailwater ponds. The overall values of agricultural wetlands can be similar to those of naturally occurring wetlands as sources of seasonal or perennial water for dependent plant and wildlife species. The native species *Eleocharis macrostachya, Populus fremontii, Ranunculus bonariensis,* and *Salix* spp. are known onsite in association with agricultural wetlands.

WILDLIFE RESOURCES

The habitat features on the NVG project site attract a diversity of wildlife. Wildlife potentially occurring onsite are listed, and are identified either as individual species or by taxonomic groups that could include more than one species. Wildlife that are typically associated with the onsite habitat features are identified. Fish species are not included since onsite wetland habitats are not considered to be capable of supporting sustainable populations of fish.

Fauna

Wildlife known, or with the potential, to occur in the South Sacramento Habitat Conservation Plan area are discussed in the SSHCP Habitat Analysis Documents. Table 3, South Sacramento HCP Wildlife Potentially Occurring on the NVG Site, lists a total of 54 wildlife species and 7 taxonomic groups. Table 3 includes the scientific and common names of the amphibians, reptiles, birds, mammals, and invertebrates that are expected onsite based on the SSHCP information. Focused wildlife surveys would be required to determine the presence of the particular species that inhabit and frequent the project site. Surveys for *Branchinecta lynchi* and *Lepidurus packardi* are pending, and will be completed in June 2008 if required.

Table 3. South Sacramento HCP Wildlife Potentially Occurring on the NVG Site

Scientific Name[9]	Common Name
Amphibians	
Ambystoma californiense	California Tiger Salamander
Bufo boreas	Western Toad
Hyla regilla	Pacific Treefrog
Scaphiopus hammondii	Western Spadefoot Toad
Reptiles	
Emys [*Clemmys*] *marmorata marmorata*	Northwestern Pond Turtle
Thamnophis gigas	Giant Garter Snake
Birds	
Accipiter cooperii	Cooper's Hawk
Accipiter striatus	Sharp-Shinned Hawk
Aechmophorus spp.	Grebes
Agelaius tricolor	Tricolored Blackbird
Aquila chrysaetos	Golden Eagle
Ardea alba	Great Egret
Ardea herodias	Great Blue Heron
Asio flammeus	Short-eared Owl
Asio otus	Long-eared Owl
Athene cunicularia hypugea	Western Burrowing Owl
Buteo jamaicensis	Red-tailed Hawk
Buteo regalis	Ferruginous Hawk
Buteo swainsoni	Swainson's Hawk
Circus cyaneus	Northern Harrier
Egretta thula	Snowy Egret
Elanus leucurus	White-tailed Kite
Eremophila alpestris	Horned Lark
Euphagus cyanocephalus	Brewer's Blackbird
Falco columbarius	Merlin
Falco peregrinus anatum	American Peregrine Falcon
Fulica americana	American Coot
Grus canadensis tabida	Greater Sandhill Crane
Haliaeetus leucocephalus	Bald Eagle
Icteria virens	Yellow Breasted Chat
Lanius ludovicianus	Loggerhead Shrike
Pelecanus erythrorhyncos	American White Pelican
Plegadis chihi	White-faced Ibis
Rallus spp.	Rails
Sturnella neglecta	Western Meadowlark
*Sturnus vulgaris**	European Starling

[9] An asterisk (*) indicates introduced, non-native species.

Scientific Name[9]	Common Name
Mammals	
Antrozous pallidus	Pallid Bat
Bassariscus astutus	Ringtail
Canis latrans	Coyote
Castor canadensis	Beaver
Lasiurus blossevillii	Western Red Bat
Microtus californicus	California Vole
*Mus musculus**	House Mouse
Myotis yumanensis	Yuma Myotis Bat
Peromyscus maniculatus	Deer Mouse
Reithrodontomys megalotis	Western Harvest Mouse
Sorex ornatus	Ornate Shrew
Spermophilus beecheyi	California Ground Squirrel
Taxidea taxus	American Badger
Urocyon cinereoargenteus	Gray Fox
Invertebrates	
Andrenidae (Family)	Andrenid or Mining bees
Anisoptera (Suborder)	Dragonflies
Branchinecta mesovallensis	Mid-valley Fairy Shrimp
Branchinecta lynchi	Vernal Pool Fairy Shrimp
Corixidae (Family)	Water Boatman
Desmocerus californicus dimorphus	Valley Elderberry Longhorn Beetle
Dytiscidae (Family)	Predaceous Diving Beetle
Hydrochara rickseckeri	Ricksecker's Water Scavenger Beetle
Lepidurus packardi	Vernal Pool Tadpole Shrimp
Notonecta undulata	Backswimmer
Zygoptera (Suborder)	Damselflies

Wildlife Habitats

The onsite habitats described in the Botanical Resources section above contain numerous attributes and resources that are important for particular wildlife species. Aquatic habitats, in addition to directly supporting aquatic species, are also an important source of water for many upland wildlife species. The following subsections discuss the amphibians, reptiles, birds, mammals, and invertebrates typically associated with the habitats found on the NVG project site.

Annual Grassland

VALLEY GRASSLAND

The most numerous small mammal species that use Valley Grassland include *Spermophilus beecheyi, Microtus californicus, Peromyscus maniculatus,* and *Reithrodontomys megalotis,* with *Sorex ornatus* occurring in lesser numbers. *Mus musculus* also occurs regularly in Valley Grassland. These species are primarily herbivores; however, some, such as shrews, eat insects, and all are important prey for

other species, such as raptors. The most abundant bird species[10] occurring in Valley Grassland include: Brewer's Blackbird, European Starling, Horned Lark, Western Meadowlark, Red-tailed Hawk, and other raptors.

Sensitive species that complete their entire life cycle in Valley and Vernal Pool Grasslands include *Taxidea taxus* and *Athene cunicularia hypugea.* Sensitive species that use grasslands, primarily for foraging, and that nest or breed elsewhere, include: *Antrozous pallidus, Lasiurus blossevillii, Myotis yumanensis, Elanus leucurus, Accipiter cooperii, A. striatus, Buteo regalis, B. swainsoni, Aquila chrysaetos, Falco columbarius, Lanius ludovicianus, Asio otus,* and *Agelaius tricolor.*

VERNAL POOL GRASSLAND

See the Valley Grassland subsection above for wildlife associated with the grassland component of Vernal Pool Grassland. Refer to the Vernal Pool subsection below for wildlife associated with the vernal pool component.

Wetlands

SEASONAL WETLANDS AND SWALES

Seasonal wetlands and swales are highly productive habitats that offer food, cover, nesting sites, and other resources for numerous amphibians, reptiles, birds, mammals, and invertebrates. Many resident and migratory bird species use these wetlands, including: White-faced Ibis, rails, American Coot, Greater Sandhill Crane, grebes, Great Blue Heron, and Great Egret. Northern Harrier and Short-eared Owl are known to forage and nest in these emergent wetlands. The lack of predatory fish in seasonal wetlands and swales, if their hydroperiods are sufficient, make them excellent breeding habitats for amphibians. Wetlands with short hydroperiods tend to support more invertebrates, which comprise a large portion of the diet of many wetland birds and other wildlife.

The quality and number of connections between wetlands is important to many wildlife species. Seasonal swales are often closely associated with vernal pools and may provide corridors for the movement of amphibians such as *Ambystoma californiense*, *Scaphiopus hammondii,* and others between vernal pools. Snakes, salamanders, and turtles move between multiple wetlands to escape predation, heat stress, desiccation, or lack of food as wetlands dry. Many wetland birds move among wetlands to find better forage, avoid predators, and locate optimal nesting sites.

SEASONAL MARSH

Seasonal marsh habitat offers wildlife resources that are much the same as those provided by seasonal wetlands and swales, and can contribute to the diversity and connectivity of wetlands in an area. *Thamnophis gigas* requires freshwater marsh as its primary habitat. Habitat requirements include: adequate water and dense wetland vegetation, such as cattails and rushes; grassy banks and openings in waterside vegetation for basking; and vegetated uplands for cover and refuge from flood waters during winter dormancy.

10 Common names are used here for birds since it is the only group of wildlife for which one common name has been formally established for each taxon, unlike that for other groups of wildlife.

VERNAL POOLS

The following four species of amphibians are known to occur in vernal pools within the SSHCP area: *Bufo boreas* and *Hyla regilla,* along with the vernal pool-dependent species *Ambystoma californiense* and *Scaphiopus hammondii*. Adults lay eggs in vernal pools when they are inundated, the eggs hatch, and the tadpoles mature before the pools dry. The newly matured and older surviving adults then migrate to upland rodent burrows to spend the summer in a state of dormancy.

The crustacean species *Branchinecta mesovallensis, Branchinecta lynchi,* and *Lepidurus packardi* also occur in the area and are dependent on vernal pool habitat. Other invertebrates associated with vernal pools include *Hydrochara rickseckeri* and many other aquatic insects. Some vernal pool plant species (including *Lasthenia, Downingia, Blennosperma,* and *Limnanthes*) are pollinated by specialist solitary bees in the family Andrenidae. These solitary bees nest in small tunnels excavated in uplands near vernal pools, and their eggs and larvae are dependent on the pollen of vernal pool plants for development. The plants, in turn, depend on the bees for pollination.

Some vernal pool species require a relatively extended inundation period for completion of their life cycles, and some are adapted to shorter inundation durations. *Ambystoma californiense, Scaphiopus hammondii,* and *Lepidurus packardi* require longer development periods afforded by larger, deeper vernal pools. *Branchinecta mesovallensis* and *Branchinecta lynchi* complete their life cycles in less time and are adapted to smaller, shallower vernal pools that dry more quickly. The vernal pools onsite are the small/shallow type.

RIPARIAN

Riparian habitat perhaps supports the greatest diversity of wildlife species in California. Many amphibians, reptiles, birds, mammals, and invertebrates are typically associated with relatively undisturbed riparian habitats within the SSHCP area. The riparian areas on the NVG site have been significantly degraded by human activity, though some associated features are still present. Remaining riparian woodland species contribute to the structural diversity of the project site, and provide food, cover, nesting sites, and other resources for numerous resident and migratory wildlife species. Swainson's Hawk frequently nests in riparian woodland, often in *Populus fremontii* or *Quercus lobata*.

Agricultural

FALLOW LAND

Fallow agricultural land typically supports weedy and annual grassland plant species, as well as large rodent populations. Such fallow land can provide important foraging habitat for *Buteo swainsoni* and other raptors, and Short-eared Owl and Western Burrowing Owl may forage or nest in these areas. *Sambucus mexicana*, host plant and critical habitat for *Desmocerus californicus dimorphus*, can become established on fallow agricultural land.

AGRICULTURAL WETLANDS

Agricultural wetlands are generally associated with irrigation canals, drainage ditches, and impoundments such as stock and tailwater ponds. The overall values of agricultural wetlands can be similar to those of naturally occurring wetlands as sources of seasonal or perennial water for dependent plant and wildlife species. Sensitive wildlife species that can be associated with agricultural wetlands and potentially occur onsite include: *Emys marmorata marmorata, Thamnophis gigas,* Tricolored Blackbird, Greater Sandhill Crane, and White-faced Ibis.

SPECIAL-STATUS BIOLOGICAL RESOURCES

This section discusses the definitions of special-status biological resources and addresses the special-status biological resources observed, reported, or having the potential to occur on the project site. These resources include plant and wildlife species and habitats that have been afforded special-status and/or recognition by federal and state resource agencies, as well as private conservation organizations. In general, the principal reason an individual taxon (i.e. species, subspecies, or variety) is given such recognition is the documented or perceived decline or limitations of its population size, geographic range, and/or distribution resulting in most cases from habitat loss.

A literature review was conducted prior to the initiation of the general biological resources surveys in order to determine the potential special-status elements known to occur in the project region that may occur on the project site. The California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2001) and California Department of Fish and Game's California Natural Diversity Database (CNDDB) RareFind3 (CDFG 2007) were reviewed. Nine (9) California Quadrangles (USGS 7.5-minute Series Topographic Map) were queried for the CNDDB RareFind3 records search. The Elk Grove Quadrangle, in which the project site occurs, was searched, as well as the eight surrounding quadrangles, including Bruceville, Buffalo Creek, Carmichael, Clay, Florin, Galt, Sacramento East, and Sloughhouse. The CNDDB Special Animals List (CDFG 2006) was also referenced to determine if any wildlife species observed onsite are considered special-status.

Special-Status Definitions

Special-status habitats are vegetation types, associations, or sub-associations that support concentrations of special-status plant or wildlife species, are of relatively limited distribution, or are of particular value to wildlife. Special-status species are plants and animals that are at least one of the following:

- *Listed as endangered or threatened* under Federal or California Endangered Species Acts,
- *Listed as rare* under the California Native Plant Protection Act, or
- *Considered rare* (but not formally listed) by resource agencies, professional organizations (e.g. Audubon Society, CNPS, The Wildlife Society), and the scientific community.

Listed species are those taxa that are formally listed as endangered or threatened by the federal government (e.g. U.S. Fish and Wildlife Service), pursuant to the Federal Endangered Species Act or as endangered, threatened, or rare (for plants only) by the State of California (i.e. California Fish and Game Commission), pursuant to the California Endangered Species Act or the California Native Plant Protection Act. Special-status species are defined in Table 4 below.

Table 4. Definitions of Special-Status Species

○ Plants and animals legally protected under the California and Federal Endangered Species Acts or under other regulations. ○ Plants and animals considered sufficiently rare by the scientific community to qualify for such listing; or ○ Plants and animals considered to be sensitive because they are unique, declining regionally or locally, or are at the extent of their natural range.	
Special-Status Plant Species	**Special-Status Animal Species**
○ Plants listed or proposed for listing as threatened or endangered under the Federal Endangered Species Act (50 CFR 17.12 for listed plants and various notices in *Federal Register* for proposed species). ○ Plants that are Category 1 or 2 candidates for possible future listing as threatened or endangered under the Federal Endangered Species Act (55 CFR 6184, February 21, 1990). ○ Plants that meet the definitions of rare or endangered species under the CEQA (*State CEQA Guidelines*, Section 15380). ○ Plants considered by CNPS to be "rare, threatened, or endangered" in California (Lists 1B and 2 in CNPS 2001). ○ Plants listed by CNPS as plants needing more information and plants of limited distribution (Lists 3 & 4 in CNPS 2001). ○ Plants listed by CNPS as locally rare. ○ Plants listed or proposed for listing by the State of California as threatened or endangered under the California Endangered Species Act (14 CCR 670.5). ○ Plants listed under the California Native Plant Protection Act (California Fish and Game Code 1900 et seq.). ○ Plants considered sensitive by other federal agencies (i.e. U.S. Forest Service, Bureau of Land Management) or state and local agencies or jurisdictions. ○ Plants considered sensitive or unique by the scientific community; occurs at natural range limits (*State CEQA Guidelines*, Appendix G).	○ Animals listed/proposed for listing as threatened/endangered under the Federal Endangered Species Act (50 CFR 17.11 for listed animals and various notices in *Federal Register* for proposed species). ○ Animals that are Category 1 or 2 candidates for possible future listing as threatened or endangered under Federal Endangered Species Act (54 CFR 554). ○ Animals that meet the definitions of rare or endangered species under the CEQA (*State CEQA Guidelines*, Section 15380). ○ Animals listed or proposed for listing by the State of California as threatened and endangered under the California Endangered Species Act (14 CCR 670.5). ○ Animal species of special concern to the CDFG. ○ Animal species that are fully protected in California (California Fish & Game Code, Sections 3511 [birds], 4700 [mammals], 5050 [reptiles, amphibians]).

The CNPS' *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2001, 2006[11]) categorizes rare California plants into one of five lists (1A, 1B, 2, 3, and 4) representing five levels of species status, one of which is assigned to a sensitive species to indicate its status of rarity or endangerment and distribution. Most taxa also receive a threat code extension following the List (e.g. 1B.1, 2.3), which replaces the old R-E-D Code previously used by CNPS. Table 5, California Native Plant Society List, provides a definition for each List code number, and Table 6, California Native Plant Society List Threat Code Extensions defines the CNPS List Threat Code Extensions that indicates the level of endangerment within the state.

[11] Changes to the *Inventory* as published on the CNPS website: http://www.cnps.org/programs/Rare_Plant/inventory/changes/changes_accepted.htm.

Table 5. California Native Plant Society List (CNPS List)

CNPS List	Definition
1A	Presumed Extinct in California
1B	Rare, Threatened, or Endangered in California and elsewhere
2	Rare, Threatened, or Endangered in California, but more common elsewhere
3	Need more information (a Review List)
4	Plants of Limited Distribution (a Watch List)

Table 6. California Native Plant Society List Threat Code Extensions

CNPS Threat Code Extension	Definition
.1	Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2	Fairly endangered in California (20-80% occurrences threatened)
.3	Not very endangered in California (<20% of occurrences threatened)

The CNDDB Element Ranking system provides a numeric global and state ranking system for all special-status species tracked by the CNDDB. The global rank (G-rank) is a reflection of the overall condition of an element (species or natural community) throughout its global range. The state rank (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank. This Element Ranking system is defined in Table 7, California Natural Diversity Database Element Ranking System.

Table 7. California Natural Diversity Database Element Ranking System

Global Ranking (G)	
G1	Less than 6 viable elements occurrences (populations for species), OR less than 1,000 individuals, OR < 809.4 hectares (ha) (2,000 acres [ac]).
G2	6 to 20 element occurrences OR 809.4 to 4,047 ha (2,000 to 10,000 ac).
G3	21 to 100 element occurrences OR 3,000 to 10,000 individuals OR 4,047 to 20,235 ha (10,000 to 50,000 ac).
G4	Apparently secure; this rank is clearly lower than G3, but factors exist to cause some concern (i.e. there is some threat, or somewhat narrow habitat).
G5	Population, or stand, demonstrably secure to ineradicable due to being commonly found in the world.
GH	All sites are **historic**; the element has not been seen for at least 20 years, but suitable habitat still exists.
GX	All sites are **extirpated;** this element is extinct in the wild.
GXC	Extinct in the wild; exists in cultivation.
G1Q	The element is very rare, but there is a taxonomic question associated with it.
Subspecies Level: Subspecies receive a **T-rank** attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety. * For example: *Chorizanthe robusta* var. *hartwegii* is ranked G2T1. The G-rank refers to the whole species range (*Chorizanthe robusta*), whereas the T-rank refers only to the global condition of the variety (var. *hartwegii*).	
State Ranking (S)	
S1	Less than 6 element occurrences OR less than 1,000 individuals OR less than 809.4 ha (2,000 ac). S1.1 = very threatened S1.2 = threatened S1.3 = no current threats known
S2	6 to 20 element occurrences OR 3,000 individuals OR 809.4 to 4,047 ha (2,000 to 10,000 ac). S2.1 = very threatened S2.2 = threatened S2.3 = no current threats known..
S3	21 to 100 element occurrences OR 3,000 to 10,000 individuals OR 4,047 to 20,235 ha (10,000 to 50,000 ac). S3.1 = very threatened S3.2 = threatened S3.3 = no current threats known
S4	Apparently secure within California; this rank is clearly lower than S3 but factors exist to cause some concern (i.e., there is some threat, or somewhat narrow habitat). NO THREAT RANK.
S5	Demonstrably secure to ineradicable in California. NO THREAT RANK.
SH	All California sites are **historic**; the element has not been seen for at least 20 years, but suitable habitat still exists.
SX	All California sites are **extirpated;** this element is extinct in the wild.
Notes	
1. Other considerations used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take an aerial view when ranking sensitive elements rather than simply counting element occurrences.	
2. Uncertainty about the rank of an element is expressed in two major ways: by expressing the rank as a range of values (e.g. S2S3 means the rank is somewhere between S2 and S3), and by adding a ? to the rank (e.g. S2?). This represents more certainty than S2S3, but less than S2.	

Special-Status Plants

The literature review and CNDDB (CDFG 2007) search identified 13 special-status species of vascular plants known in the vicinity of the NVG project site. None of these federally or state listed plant species have been directly observed or reported onsite.

Table 8, Likelihood of Occurrence of Special-Status Plants Known in the Vicinity of the NVG Site, summarizes the status of these special-status plant species and includes scientific names, common names, species status, habitat requirements, and the likelihood of occurrence within the project boundaries.

Table 8. Likelihood of Occurrence of Special-Status Plants Known in the Vicinity of NVG Site

Scientific Name	Common Name	Species Status					Habitat Requirements	Likelihood of Occurrence[12]
		G-Rank[13]	S-Rank	Fed	CA	CNPS		
Carex comosa	Bristly Sedge	G5	S2?	-	-	2.1	Marshes and swamps. Lake margins, wet places; site below sea level is on a delta island. 5-1,005m.	Unlikely
Downingia pusilla	Dwarf Downingia	G3	S3.1	-	-	2.2	Valley and foothill grassland (mesic sites), vernal pools. Vernal lake and pool margins with a variety of associates. In several types of vernal pools. 1-485m.	Likely
Gratiola heterosepala	Boggs Lake Hedgehyssop	G3	S3.1	-	E	1B.2	Marshes and swamps (freshwater), vernal pools. Clay soils; usually in vernal pools, sometimes on lake margins. 5-2,400m.	Possible
Hibiscus lasiocarpus	Rose-Mallow	G4	S2.2	-	-	2.2	Marshes and swamps (freshwater). Moist, freshwater-soaked river banks & low peat islands in sloughs; in Calif., known from the Delta watershed. 0-150m.	Unlikely
Juglans hindsii	Northern California Black Walnut	G1	S1.1	-	-	1B.1	Riparian forest, riparian woodland. Few extant native stands remain; widely naturalized. Deep alluvial soil associated with a creek or stream. 0-395m.	Possible
Juncus leiospermus var. *ahartii*	Ahart's Dwarf Rush	G2T1	S1.2	-	-	1B.2	Vernal pools. Restricted to the edges of vernal pools. 30-100m.	Likely
Lathyrus jepsonii var. *jepsonii*	Delta Tule Pea	G5T2	S2.2	-	-	1B.2	Freshwater and brackish marshes. Often found w/ *Typha*, *Aster lentus*, *Rosa calif.*, *Juncus* spp., *Scirpus*, etc. Usually on marsh and slough edges.	Likely
Legenere limosa	Legenere	G2	S2.2	-	-	1B.1	Vernal pools. Many historical occurrences are extirpated. In beds of vernal pools. 1-880m.	Possible

[12] Likelihood of occurrence based on species' habitat requirements and presence of required habitat onsite.

Reported = Species has been reported onsite;

Likely = Required habitat exists onsite and the species is tracked by CNDDB onsite or nearby;

Possible = Marginal required habitat reported onsite, and/or required habitat is found in surrounding areas;

Unlikely = Required habitat not reported onsite, nor is it found nearby.

[13] See Tables 4 through 7 above for descriptions of rank and status categories. Federal (Fed) and State (CA) status listings: E = Endangered; T = Threatened; R = Rare; C = Candidate.

Scientific Name	Common Name	Species Status					Habitat Requirements	Likelihood of Occurrence[12]
		G-Rank[13]	S-Rank	Fed	CA	CNPS		
Lilaeopsis masonii	Mason's Lilaeopsis	G3	S3.1	-	R	1B.1	Freshwater and brackish marshes, riparian scrub. Tidal zones in muddy or silty soil formed by river deposition or river bank erosion. 0-10m.	Possible
Orcuttia tenuis	Slender Orcutt Grass	G3	S3.1	T	E	1B.1	Vernal pools. 30-1,735m.	Possible
Orcuttia viscida	Sacramento Orcutt Grass	G1	S1.1	E	E	1B.1	Vernal pools. 30-100m.	Possible
Sagittaria sanfordii	Sanford's Arrowhead	G3	S3.2	-	-	1B.2	Marshes and swamps. In standing or slow-moving freshwater ponds, marshes, and ditches. 0-610m.	Likely
Scutellaria lateriflora	Blue Skullcap	G5	S2S3	-	-	2.2	Meadows and seeps, marshes and swamps. Wet meadows and marshes. 3-500m.	Likely

Special-Status Habitats

Special-status habitat types include plant communities that are threatened by urbanization and are continually influenced by human activities. Table 9, Sensitive Habitats Known in the Vicinity of the NVG Site, lists the six (6) sensitive habitat types tracked by CNDDB that occur onsite or nearby. These habitats are either unique, of relatively limited distribution in the region, or of particularly high wildlife value. These resources have been defined by Federal, State, and local government conservation programs as sensitive.

Of the six sensitive habitat types known in the vicinity of the project site, only Northern Hardpan Vernal Pool was observed onsite. However, it should be noted that no soil survey was conducted in this habitat to definitively determine whether the vernal pool observed onsite is Northern Hardpan specifically. Regardless, DMEC expects that the vernal pool onsite is Northern Hardpan Vernal Pool. The freshwater marsh onsite is seasonal and not permanently flooded as indicated for Coastal and Freshwater Marsh.

Table 9. Sensitive Habitats Known in the Vicinity of the NVG Site

CNDDB Sensitive Habitat Name (Holland 1986, CDFG 2007)	G Rank[14]	S Rank	Reported Onsite?
Coastal and Valley Freshwater Marsh	G3	S2.1	Not observed
Elderberry Savanna	G2	S2.1	Not observed
Great Valley Mixed Riparian Forest	G2	S2.2	Not observed
Great Valley Oak Riparian Forest	G1	S1.1	Not observed
Northern Hardpan Vernal Pool	G3	S3.1	Observed
Valley Oak Woodland	G3	S2.1	Not observed

[14] See Tables 4 through 7 above for descriptions of rank categories.

Special-Status Wildlife

Twenty-seven (27) special-status wildlife species have potential to inhabit or frequent the NVG project site and surrounding areas (CDFG 2007). Several of the special-status wildlife species known to occur in the vicinity of the project require habitat consistent with the habitat types present onsite. For example, annual grassland habitat is found on most of the project site, and it can provide suitable resources for several wildlife species.

The 27 wildlife species with potential to occur on, or in the vicinity of, the project site are listed in Table 10, Likelihood of Occurrence of Special-Status Wildlife Known Near the NVG Site. Table 10 lists the scientific and common names, gives species status and habitat requirements, and provides each species' likelihood of occurrence onsite. No federally or state listed wildlife species have been directly observed or reported on the NVG site; however, five (5) of the 27 special-status wildlife species are mapped by CNDDB as having occurrences in the immediate vicinity of the NVG site.

The five species tracked and mapped by CNDDB immediately nearby include two (2) species of birds (*Agelaius tricolor* and *Elanus leucurus*) and three (3) species of aquatic invertebrates (*Branchinecta lynchi* [Federally Listed as Threatened], *Lepidurus packardi* [Federally Listed as Endangered], and *Linderiella occidentalis*), two of which are federally listed as indicated. The two federally listed species appear to be associated with seasonal wetlands along the Central California Traction Railroad right-of-way that transects the eastern portion of the project site but is not part of the site.

Table 10. Likelihood of Occurrence of Special-Status Wildlife Known Near the NVG Site

Scientific Name	Common Name	Species Status					Habitat Requirements	Likelihood of Occurrence[15]
		G-Rank[16]	S-Rank	Fed	CA	CDFG		
AMPHIBIANS								
Ambystoma californiense	California Tiger Salamander	G2G3	S2S3	T	-	SC	Central Valley DPS listed as threatened; Santa Barbara & Sonoma counties DPS listed as endangered. Need underground refuges, especially ground squirrel burrows & vernal pools or other seasonal water sources for breeding	Likely
Spea (=Scaphiopus) hammondii	Western Spadefoot Toad	G3	S3	-	-	SC	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	Likely
REPTILES								
Emys (=Clemmys) marmorata marmorata	Northwestern Pond Turtle	G3G4T3	S3	-	-	SC	Associated with permanent or nearly permanent water in a wide variety of habitats. Requires basking sites. Nest sites may be found up to 0.5 km from water.	Possible

[15] Likelihood of occurrence based on species' habitat requirements and presence of required habitat onsite.
Reported = Species is known to occur onsite;
Likely = Required habitat exists onsite and the species is tracked by CNDDB onsite or nearby;
Possible = Marginal required habitat reported onsite, and/or required habitat is found in surrounding areas;
Unlikely = Required habitat not reported onsite, nor is it found nearby.

[16] See Tables 4 through 7 above for descriptions of rank and status categories. Federal (Fed) and State (CA) status listings:
E = Endangered; T = Threatened; R = Rare; C = Candidate.

Scientific Name	Common Name	Species Status					Habitat Requirements	Likelihood of Occurrence[15]
		G-Rank[16]	S-Rank	Fed	CA	CDFG		
Thamnophis gigas	Giant Garter Snake	G2G3	S2S3	T	T	-	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals & irrigation ditches. This is the most aquatic of the garter snakes in California.	Likely
BIRDS								
Accipiter cooperii	Cooper's Hawk	G5	S3	-	-	SC	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river floodplains; also, live oaks.	Possible
Agelaius tricolor	Tricolored Blackbird	G2G3	S2	-	-	SC	Highly colonial species, most numerous in Central Valley & vicinity. Largely endemic to California. Requires open water, protected nesting substrate, & foraging area with insect prey within a few km of the colony.	Likely (reported in immediate vicinity of NVG site)
Ardea alba	Great Egret	G5	S4	-	-	-	Colonial nester in large trees. Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes.	Likely
Ardea herodias	Great Blue Heron	G5	S4	-	-	-	Colonial nester in tall trees, cliffsides, and sequestered spots on marshes. Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.	Likely
Athene cunicularia	Burrowing Owl	G4	S2	-	-	SC	Open, dry annual or perennial grasslands, deserts & scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California Ground Squirrel.	Likely
Buteo regalis	Ferruginous Hawk	G4	S3S4	-	-	SC	Open grasslands, sagebrush flats, desert scrub, low foothills & fringes of pinyon-juniper habitats. Eats mostly lagomorphs, ground squirrels, and mice. Population trends may follow lagomorph population cycles.	Possible
Buteo swainsoni	Swainson's Hawk	G5	S2	-	T	-	Breeds in grasslands with with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch sites. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	Likely
Elanus leucurus	White-Tailed Kite	G5	S3	-	-	-	Rolling foothills and valley margins with scattered oaks & river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	Likely (reported in immediate vicinity of NVG site)
Nycticorax nycticorax	Black-Crowned Night Heron	G5	S3	-	-	-	Colonial nester, usually in trees, occasionally in tule patches. Rookery sites located adjacent to foraging areas: lake margins, mud-bordered bays, marshy spots.	Possible

Scientific Name	Common Name	Species Status					Habitat Requirements	Likelihood of Occurrence[15]
		G-Rank[16]	S-Rank	Fed	CA	CDFG		
Phalacrocorax auritus	Double-Crested Cormorant	G5	S3	-	-	SC	Colonial nester on coastal cliffs, offshore islands, & along lake margins in the interior of the state. Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins.	Unlikely
Progne subis	Purple Martin	G5	S3	-	-	SC	Inhabits woodlands, low elevation coniferous forest of Douglas-fir, Ponderosa Pine, & Monterey Pine. Nests in old woodpecker cavities mostly, also in human-made structures. Nest often located in tall, isolated tree/snag.	Possible
Riparia riparia	Bank Swallow	G5	S2S3	-	T	-	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, or ocean to dig nesting holes.	Unlikely
Xanthocephalus xanthocephalus	Yellow-Headed Blackbird	G5	S3S4	-	-	-	Nests in freshwater emergent wetlands with dense vegetation & deep water. Often along borders of lakes or ponds. Nests only where large insects such as Odonata are abundant, nesting timed with maximum emergence of aquatic insects.	Possible
MAMMALS								
Taxidea taxus	American Badger	G5	S4	-	-	SC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Need sufficient food, friable soils & open, uncultivated ground. Prey on burrowing rodents. Dig burrows.	Possible
FISH								
Pogonichthys macrolepidotus	Sacramento Splittail	G2	S2	-	-	SC	Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay, & associated marshes. Slow moving river sections, dead end sloughs. Require flooded vegetation for spawning & foraging for young.	Unlikely
INVERTEBRATES								
Andrena blennospermatis	A vernal pool Andrenid bee	G2	S2	-	-	-	This bee is oligolectic on vernal pool *Blennosperma*. Bees nest in the uplands around vernal pools.	Possible
Branchinecta lynchi	Vernal Pool Fairy Shrimp	G3	S2S3	T	-	-	Endemic to the grasslands of the Central Valley, Central Coast mtns, and South Coast mtns, in astatic rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	Likely (reported in immediate vicinity of NVG site)
Branchinecta mesovallensis	Midvalley Fairy Shrimp	G2	S2	-	-	-	Vernal pools in the Central Valley.	Likely

Scientific Name	Common Name	Species Status					Habitat Requirements	Likelihood of Occurrence[15]
		G-Rank[16]	S-Rank	Fed	CA	CDFG		
Desmocerus californicus dimorphus	Valley Elderberry Longhorn Beetle	G3T2	S2	T	-	-	Occurs only in the Central Valley of California, in association with Blue Elderberry (*Sambucus mexicana*). Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	Possible
Dumontia oregonensis	A water flea	G1G3	S1	-	-	-	Vernal pools. In California, known only from Mather Field.	Unlikely
Hydrochara rickseckeri	Ricksecker's Water Scavenger Beetle	G1G2	S1S2	-	-	-	Aquatic.	Unlikely
Lepidurus packardi	Vernal Pool Tadpole Shrimp	G3	S2S3	E	-	-	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water. Pools commonly found in grass-bottomed swales of unplowed grasslands. Some pools are mud-bottomed & highly turbid.	Likely (reported in immediate vicinity of NVG site)
Linderiella occidentalis	California Linderiella	G3	S2S3	-	-	-	Seasonal pools in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions. Water in the pools has very low alkalinity, conductivity, and TDS.	Likely (reported in immediate vicinity of NVG site)

WETLAND RESOURCES

A wetland delineation and assessment was submitted to the U.S. Army Corps of Engineers (Corps) for the entire North Vineyard Station Specific Plan Area and any other parcels affected by the North Vineyard Station Drainage Master Plan (NVS DMP) on December 31, 2002, as part of the NVS DMP Corps Application. The project site wetlands were delineated by ECORP, Inc., of Rocklin, California (ECORP 2004), and verified by U.S. Army Corps of Engineers (Corps), Sacramento District, in 2006.

A total of 1.60 acres of jurisdictional waters of the U.S., including wetlands, have been delineated on the NVG project site (Figure 3, NVG Project Site Wetland Delineation). Individual acreages for the onsite wetlands shown in Figure 3 are listed in Table 11, Acreages for Delineated NVG Wetlands.

Vernal pools totaling 0.15 acre have been mapped within the non-irrigated pastures. Vernal pools are topographic basins within annual grassland that are typically underlain with an impermeable or semi-permeable hardpan or duripan layer. Vernal pools are inundated to depths of up to one foot throughout the wet season and are dry by late spring through the following wet season. The plant species composition within vernal pools is predominantly native annuals. Refer to the Botanical Resources subsection (above) for detailed descriptions of the vegetation associated with the onsite wetlands discussed in this section.

Seasonal wetlands are ephemerally wet areas where surface runoff and rainwater accumulate within low-lying areas or adjacent to larger creeks and streams. Some seasonal wetlands develop as a result of human activities such as scraping or grading in grasslands, which creates shallow artificial depressions. Disturbed wetlands tend to be dominated by non-native annual species. Jurisdictional seasonal wetlands totaling 0.52 acre have been mapped onsite.

Table 11. Acreages for Delineated NVG Wetlands

Wetland Type	Code[17]	Acreage	Subtotals
Vernal Pool	V1	0.10	0.15
	V2	0.04	
	V3	<0.005	
Seasonal Wetland	S1	0.08	0.52
	S2	0.09	
	S3	0.16	
	S4	<0.005	
	S5	0.04	
	S6	0.01	
	S7	0.02	
	S8	0.01	
	S9	0.10	
	S10	<0.005	
	S11	0.01	
	Snj1*	(1.13)	
	Snj2*	(0.35)	
Seasonal Wetland Swale	Sw1	0.01	0.01
Seasonal Marsh	M1	0.92	0.92
Mitigation Plan Total Acres			**1.60**

A total of 0.01 acre of **seasonal wetland swale** was mapped on the project site. Seasonal swales are ephemerally wet, relatively shallow areas that often connect to other wetlands and/or drainages, and that typically occur as linear features. Seasonal swales generally have characteristics (depth, vegetation, hydrology, and soil) intermediate between associated wetlands and adjacent upland areas.

The **seasonal marsh** totals 0.92 acre, and is located just south of the Central California Traction Railroad Tracks. Plants within the seasonal marsh are typical seasonal wetland and moist soil species. This marsh is situated in a low-lying area of the project vicinity and, in addition to the runoff during the wet season, may also receive periodic runoff from the nursery throughout the year.

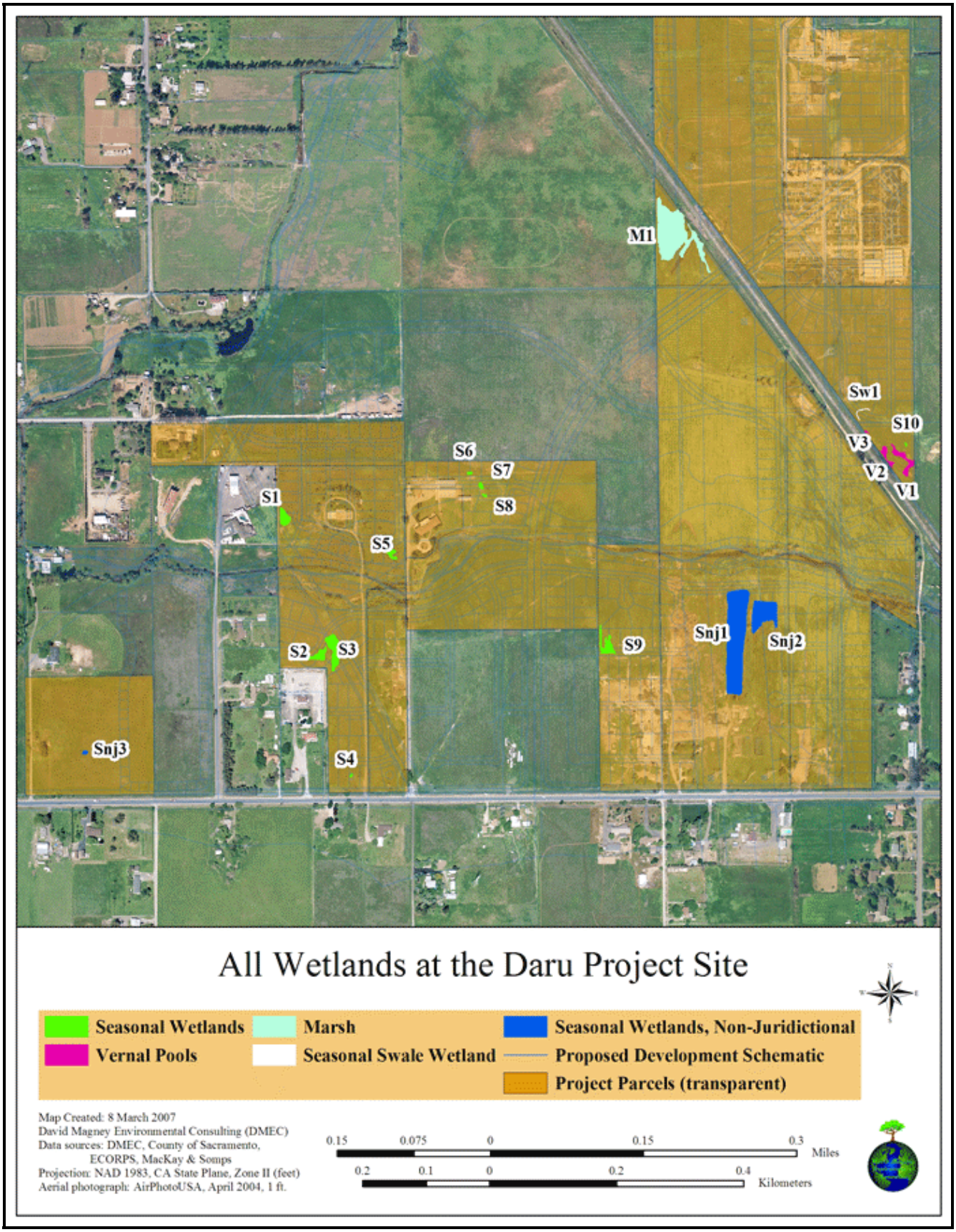
A man-made stock/fish pond and several drainage ditches are located in the eastern and northeastern portion of the project site. These waters are considered non-jurisdictional, as per the field verification visit on 12 August 2004 by the Corps. The man-made pond, and associated seasonal wetland adjacent to it in the southern portion of NVG Unit 1, is considered non-jurisdictional based on their isolation from waters of the U.S., and personal communication with Ms. Andrea Jones, Regulatory Project Manager, U.S. Army Corps of Engineers, Sacramento, California. Formal designation of these areas as non-jurisdictional, which total 1.48 acres (Figure 3, NVG Project Site Wetland Delineation), is expected.

Note: Gerber Creek is addressed by the North Vineyard Station Drainage Master Plan Individual Permit Application and the Vineyard Creek project (Corps Regulatory Branch #200300251) and is not included in the NVG project.

Impacts to wetlands onsite are discussed in the following Section 3, Impact Assessment.

[17] Labeling code used in Figure 3 to identify individual wetlands. * = Not included in the total of 1.60 acres of existing seasonal wetlands to be mitigated; 1.48 acres (Snj 1 and Snj 2) are expected to be classified as non-jurisdictional by the Corps.

Figure 3. NVG Project Site Wetland Delineation



SECTION 3. IMPACT ASSESSMENT

IMPACTS TO WATERS OF THE U.S., INCLUDING WETLANDS

A total of 1.60 acres of jurisdictional waters of the U.S., including wetlands, have been delineated on the NVG project site, and project implementation would result in direct impacts to all 1.60 acres of waters of the U.S, including wetlands. Figure 4, Proposed Development Plan and Associated Impacts, shows the proposed NVG development in relation to the existing jurisdictional waters and wetlands of the U.S.

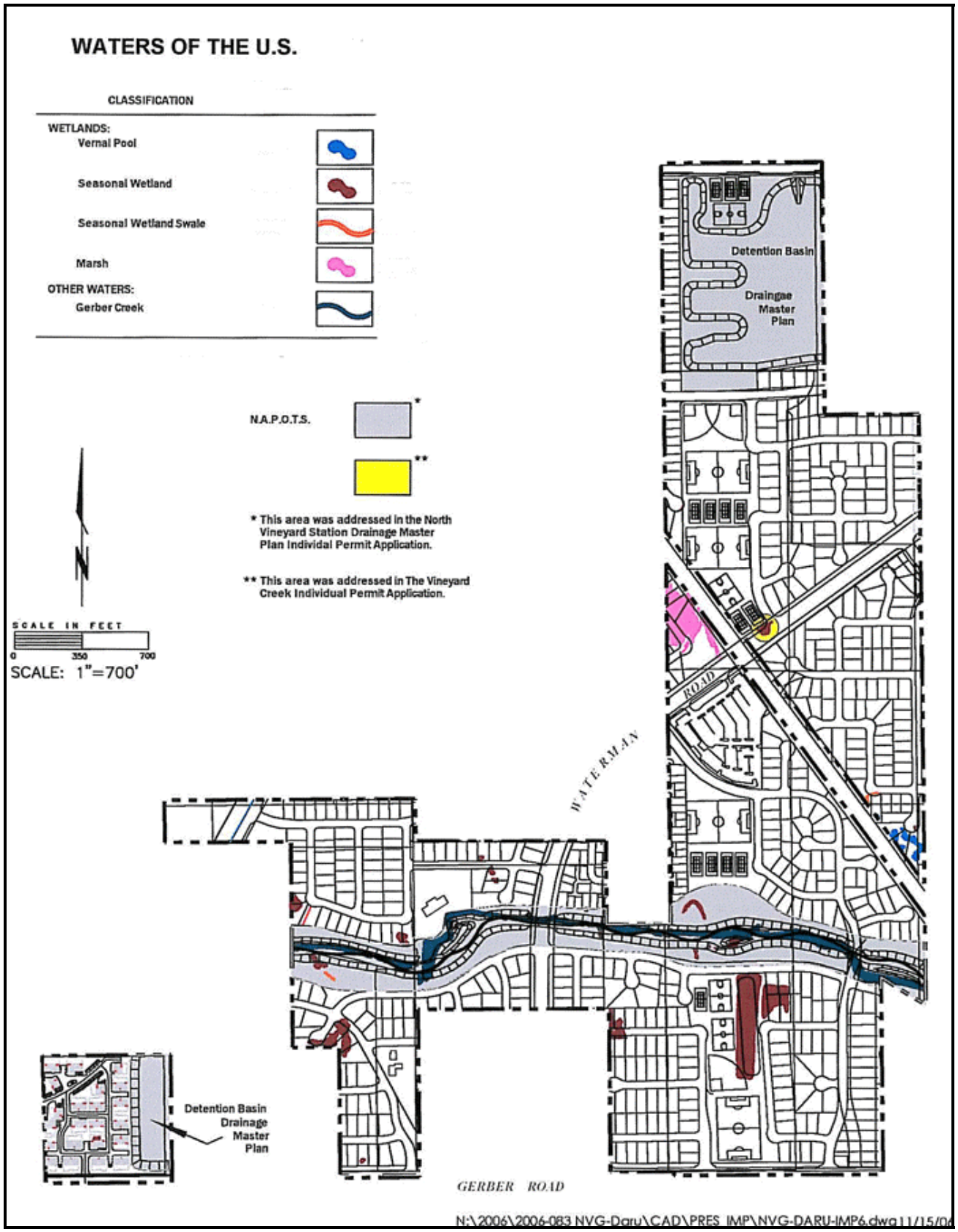
Note: Impacts to 0.52 acre of seasonal wetlands are addressed under the NVG project, with impacts to 0.32 acre addressed by other NVSSP projects. Impacts to less than 0.005 acre of seasonal wetland swale are addressed under another NVSSP project, leaving approximately 0.01 acre to be addressed under this NVG project. Impacts to Gerber Creek (2.20 acres), as well as seasonal wetlands (0.25 acre) and seasonal wetland swale (less than 0.005 acre) impacted by the proposed widening and realignment of Gerber Creek, will be assessed and mitigated separately as part of the North Vineyard Station Drainage Master Plan. Impacts to another onsite seasonal wetland totaling 0.07 acre have been mitigated in accordance with the Vineyard Creek project (Regulatory Branch Number 200300251), because the seasonal wetland was directly impacted by the construction of Waterman Road, an offsite improvement required by Sacramento County for the Vineyard Creek project.

ALTERNATIVES ANALYSIS

The purpose of the Alternatives Analysis (AA) (DMEC 2007) is to objectively evaluate the practicability of project alternatives and provide the Corps with documentation to be used in evaluating the proposed project permit application in compliance with 404(b)(1) guidelines (Guidelines).

The project, as proposed, would result in the discharge of dredged and fill material into 1.60 acres of waters of the U.S., including wetlands. In addition to requiring the identification of the least environmentally damaging practicable alternative (LEDPA), the Guidelines mandate that a project must not violate any applicable toxic effluent standard or prohibition, 40 C.F. R. §230.10(b)(2), jeopardize the continued existence of any endangered or threatened species (or destroy or adversely modify critical habitat), 40 C.F.R. §230.10(b)(1), or cause or contribute to significant degradation of waters of the U.S., 40 C.F.R. §230.10(c). Prior to completing its review, the Corps must also evaluate the proposed project in light of the public interest. Finally, the Corps must ensure that its environmental review complies with the National Environmental Policy Act (NEPA), codified at 42 U.S. C. §4321 et seq.

Figure 4. Proposed Development Plan and Associated Impacts



Note: This figure was adapted from Figure 7 in the 404 IP application prepared by ECORP Consulting, Inc. (ECORP 2006).

Proposed Project Alternatives

Six project alternatives were proposed to provide the required range of alternatives to satisfy NEPA and AA Guidelines. The least environmentally damaging practicable alternative was identified through the analysis of the proposed alternatives. The six project alternatives considered are summarized below:

Alternative 1 (No Project) does not impact the NVG site, nor does it provide housing or meet project objectives. Does not meet guidelines as LEDPA.

Alternative 2 (Alternate Site) does not impact the NVG site, has unknown potential impacts on alternate sites, and project objectives cannot be met because no suitable alternate sites are currently available. Does not meet guidelines as LEDPA.

Alternative 3 (Total Avoidance) significantly impacts avoided jurisdictional wetlands due to isolation and urban edge effects, provides less housing with significantly higher per-acre project development costs, and does not fully meet project objectives. Does not meet guidelines as LEDPA.

Alternative 4 (Partial Avoidance) impacts avoided wetlands, minimally restores wetland function onsite with mitigation, increases per-acre project costs, and partially meets project objectives. Does not meet guidelines as LEDPA.

Alternative 5 (Project with Onsite Mitigation) restores contiguous wetland ecosystem function onsite and meets project objectives. Meets guidelines as LEDPA.

Alternative 6 (Project with Offsite Mitigation) eliminates wetland function onsite, preserves wetland function at offsite locations, and meets project objectives. Does not meet guidelines as LEDPA.

Least Environmentally Damaging Alternative

The preferred alternative, Proposed Project with Onsite Mitigation (Alternative 5), represents a balanced approach that allows the NVG development project to meet the environmental, project purpose, logistics, availability, and cost evaluation criteria. Avoiding direct impacts to onsite wetlands is considered generally infeasible since the wetlands are scattered across the NVG project site in different areas and would result in the loss of dwelling units if the project were to be reconfigured.

The Proposed Project with Onsite Mitigation Alternative restores contiguous wetland ecosystem functions onsite and fully meets project objectives. Because the onsite mitigation provides the opportunity for connectivity among created wetlands and with Gerber Creek, the environmental effects appear to be low. Because this alternative is also highly practicable it meets guidelines as LEDPA. The LEDPA is represented in Figure 5, Proposed Project with Onsite Mitigation Alternative.

County of Sacramento Impact Assessment

The County of Sacramento prepared an EIR for the North Vineyard Station Specific Plan Area, which was approved in 1998 (County of Sacramento 1998). Subsequently, the County prepared a Supplemental EIR for the NVG project (County of Sacramento 2005), and imposed specific measures to protect or mitigate for significant adverse impacts to biological and cultural resources. These impacts are summarized below, and the County mitigation measures specifically pertaining to this wetland mitigation and monitoring plan are summarized under Section 4, Mitigation Plan.

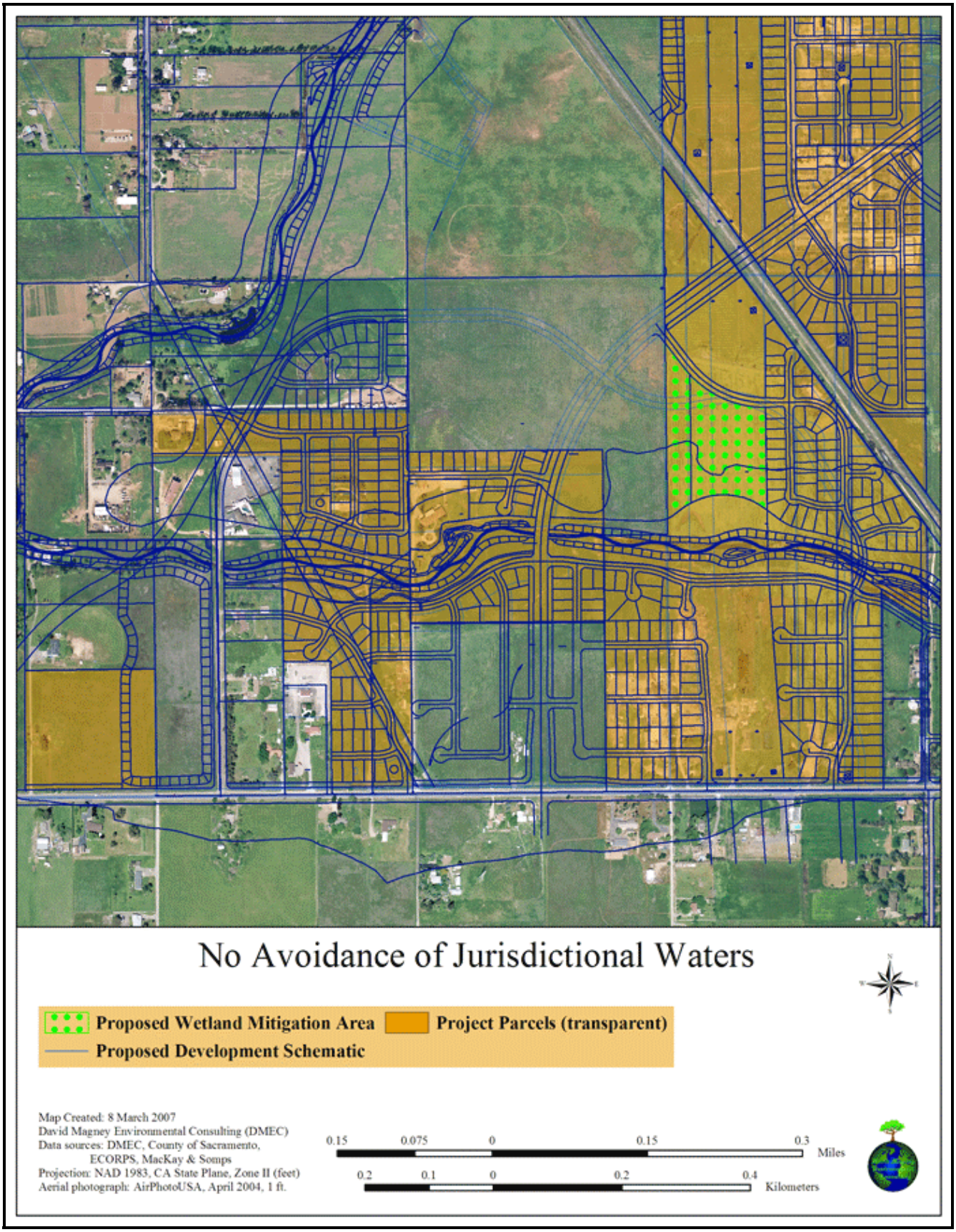
- **Impacts To Biological Resources**: Potentially Significant

  The proposed project is expected to result in the loss of jurisdictional wetlands, potentially impact special-status species, and result in the loss of native oak and black walnut trees. Special-status species potentially impacted include plants, wetland invertebrate species, and vertebrate species, including: Giant Garter Snake (*Thamnophis gigas*), Northwestern Pond Turtle (*Emys marmorata marmorata*), and Swainson's Hawk (*Buteo swainsoni*). Mitigation is recommended to reduce the potential impacts of the project to less than significant**.**

- **Impacts To Cultural Resources**: Potentially Significant

  The project is not expected to impact cultural resources. However, mitigation is recommended in the event that cultural resources are found during project construction. With mitigation as recommended, impacts to cultural resources are expected to be less than significant.

Figure 5. Proposed Project with Onsite Mitigation Alternative



SECTION 4. MITIGATION PLAN

This section discusses the regulatory context in which the mitigation plan will be implemented, the mitigation approach, existing constraints as to mitigation effectiveness, the mitigation design, and details, sequence, and scheduling of the mitigation effort, focusing on requirements of Section 401 and 404 of the Clean Water Act.

REGULATORY CONTEXT

This plan is prepared to meet regulatory requirements to mitigate for impacts to waters of the U.S., including wetlands, incurred as a result of the NVG development project. Historically, the effectiveness of mitigation of waters/wetlands has been measured using an area metric alone. However, the Clinton Administration Wetlands Policy (1993) mandates that:

- "…all wetlands are not the same…";
- a fair, flexible approach should be encouraged that allows restoration of waters/wetland functions; and
- a hydrogeomorphic approach to restoring waters/wetlands functions should be used.

The restoration of functions is a preferable alternative to habitat enhancement and/or creation (Kusler and Kentula 1989). This is reflected in the Memorandum of Agreement (MOA) on Mitigation of 6 February 1990 that guides policy nationally for the U.S. Environmental Protection Agency (EPA), the Corps, and the U.S. Fish and Wildlife Service (USFWS). The MOA sets forth specific guidelines to

> "…restore and maintain the chemical, physical, and biological integrity of the Nation's waters, including wetlands".

As indicated by the LEDPA analysis, the avoidance of wetlands with preservation and restoration of wetland functions in place on the NVG site was not found to be practicable. Instead, onsite mitigation through the creation of a wetland preserve was determined to be the superior alternative.

County of Sacramento Mitigation Measures

The County of Sacramento, through its environmental impact assessment of project-related impacts to biological and cultural resources, imposed specific measures to mitigate impacts that were considered significant pursuant to CEQA Guidelines (County of Sacramento 2005). The County biological and cultural resources mitigation measures that specifically pertain to this wetland mitigation and monitoring plan are summarized below:

- **BR-2:** The project applicant shall obtain all applicable jurisdictional wetlands permits from the U. S. Army Corps of Engineers and shall pay to the County of Sacramento a per acre fee if less than 1:1 replacement/compensation for the loss of jurisdictional wetlands occurs through the Federal permitting process.

- **BR-3:** The project site shall be surveyed by a qualified biologist prior to the start of construction activities within 200 feet of all jurisdictional wetlands to assess impacts to special-status plants and the habitats of special-status species. Permits must be obtained for the take of any protected species per USFWS, CDFG, or other jurisdictional requirements. Results of the pre-construction survey shall be reported within 24 hours to the County Department of Environmental Review and Assessment (DERA).
- **BR-4:** Prior to the start of construction activities, determinate-level special-status wetland invertebrate species surveys shall be conducted during the appropriate season(s) by a qualified biologist. If surveys are positive the applicant shall comply with USFWS requirements and obtain all applicable permits. A copy of the survey results and all required permits shall be submitted to DERA. Any incidental take shall be reported to USFWS and DERA within one working day.
- **BR-5:** The project site shall be surveyed for special-status reptiles by a qualified biologist within 24 hours prior to the start of construction activities within 200 feet of all jurisdictional wetlands. Survey of the area shall be repeated if a lapse in construction activity of two weeks or greater occurs. If a special-status reptile is encountered during construction activities shall cease until appropriate measures can be implemented. Special-status reptiles should be allowed to move away on their own, and, if necessary, capture and relocation shall only be attempted by personnel with current USFWS recovery permits. Any incidental take shall be reported to USFWS and DERA within one working day. Any special-status amphibian or reptile sightings shall be reported within 24 hours to DERA.
- **CR-1:** Should any cultural resources be encountered during any development activities, work shall be suspended and DERA shall be immediately notified. DERA will coordinate the investigation of cultural resources and the project applicant shall be required to implement any mitigation deemed necessary for their protection. In the event of the discovery of human remains, all work is to stop and the County Coroner shall be immediately notified.

OBJECTIVES

Wetland ecosystems that will be impacted as a result of project implementation are proposed to be recreated onsite and in-kind. The overall mitigation objective is to have no net loss of wetland extent or function resulting from project implementation. In addition, it is proposed that non-wetland areas of the mitigation site be restored as grassland with emphasis on the establishment of native species, particularly in the areas immediately surrounding the wetlands.

This project targets the restoration and enhancement of wetland ecosystem functions through the creation of geomorphic and biological attributes and processes on the NVG project site. Specifically, this project will restore natural wetland morphology and native plant communities in the mitigation area, resulting in the overall enhancement of ecosystem functions on the project site.

GENERAL APPROACH

The approach presented herein proposes to recreate and enhance the physical, chemical, and biological attributes and processes of the impacted waters of the U.S., including wetlands, on the NVG project site. The overall area of waters/wetlands will be increased, overall ecosystem function is expected to be enhanced by allowing connectivity among created wetlands and with Gerber Creek, and revegetation will result in a more appropriate assemblage of native plants associated with the wetlands.

The general approach of the NVG Wetland Mitigation Plan is to focus on the physical and biological factors involved in wetland function. Identifying specific locations within the mitigation site that have suitable wetland soil characteristics is critical to the success of this Plan. Many native, locally adapted plant species exist onsite that can be salvaged and/or propagated for use in vegetating the mitigation site. Working with naturally occurring physical and biological features will help to facilitate the success of this Mitigation Plan.

Each created wetland will be planted at appropriate densities with suitable indigenous plants commonly associated with each wetland type. The remaining upland areas are proposed to be restored as grassland, with emphasis on using suitable indigenous plants. The Botanical Resources section above identifies the plant species onsite that can be utilized to vegetate the mitigation site.

The mitigation approach for the NVG project site includes, but is not necessarily limited to:

- Identifying the specific locations within the mitigation area most suitable for creating particular wetland types;
- Establishing a landscape plan for the locations of wetlands and grassland that effectively provides connectivity among wetlands;
- Recontouring portions of the mitigation area to establish optimal conditions for wetland and grassland creation;
- Establishing functional wetland hydrology as a foundation for the mitigation effort;
- Removing existing non-native, exotic plants from the mitigation area;
- Collecting cuttings and seeds, and salvaging plants for propagation and planting;
- Allowing natural succession to play a governing role in supplemental mitigation efforts;
- Attempting to attract native pollinators by providing suitable habitat;
- Installing temporary irrigation systems, where appropriate or necessary;
- Monitoring the work of the grading and planting contractors; and
- Monitoring the created wetland ecosystem for a minimum of 5-year period.

Prior to any construction, biologists will survey for special-status and/or otherwise vulnerable wildlife species within the vicinity of the mitigation site. Wildlife species observed in the construction area will be relocated to a safe location with appropriate required habitat as feasible. Once the mitigation site has been prepared, it will be planted with appropriate indigenous plant species to promote the establishment of wetland and grassland habitat.

CONSTRAINTS

Considerable controversy exists regarding the ability to successfully create or restore vernal pool ecosystems and the appropriateness of using habitat creation and restoration for mitigating impacts to vernal pools. Many creation efforts have proven successful, while others have failed to meet the desired level of wetland function. Causes of failure include a lack of goal definition leaving interpretations of what a "successfully created vernal pool" is, or a lack of habitat variability in design and a lack of biodiversity in the created habitat. To meet required performance standards, created pools have often been built based on a single model with less diversity than natural complexes. Other efforts have suffered from insufficient geomorphic and soils analyses, and insufficient buffer areas and management guidelines (Sutter and Francisco 1998).

Typical problems with mitigation creation include (De Weese 1998):

- Lack of goal definition and goal documentation by mitigation designers and regulatory staff;
- Creation of pools on inappropriate geomorphic landform and/or soils;
- Failure to establish appropriate hydrology;
- Inappropriate pool densities (often due to high land costs and onsite mitigation requirements);
- Failure to recognize potential effects of land use changes in the area;
- Negative edge effects of human activity due to inadequate core area size and buffer; and
- Lack of consideration of grazing and fire management in long-term stewardship of mitigation.

Successful creation and restoration require clearly defined goals and conducting detailed geomorphic, topographic, and soils analyses as the dominant factors in design. The full range of variability in physical parameters (e.g. depth and size of pools), and ecological diversity in natural pool complexes, should be considered as the primary design goal for creation (Sutter and Francisco 1998).

MITIGATION DESIGN

This section discusses the methods used to design the physical and biological mitigation plans for mitigating wetland habitats on the NVG project site. Also presented below is the wetland mitigation design that will guide the mitigation efforts.

Design Methods

Based on De Weese's (1998) findings, DMEC evaluated the proposed mitigation site for suitability, and as a guide for this plan. These potential problems were discussed with the Corps and wetland and vernal pool creation experts (such as Joel Butterworth, Matt Gause, Mark Rains) to support DMEC's own experience and expertise.

Soil profiles on the approximate 4.2-acre mitigation site were evaluated for their wetland creation suitability in May of 2007 (Valley Environmental Consulting 2007).

The data gathered from the soil pits excavated onsite include:

- Thickness of topsoil present;
- Depth to the upper restrictive layer (Bt horizon);
- Thickness of the upper restrictive layer (Bt horizon); and
- Depth to the lower restrictive horizon (Bqm).

The entire mitigation area is located on San Joaquin silt loam, leveled, 0-1 percent slopes. The moderately permeable silt loam has a depth of approximately 23 inches where it has not been disturbed by leveling. A very slowly permeable clay or clay loam claypan (Bt horizon) exists at a depth range of approximately 23 to 28 inches, and in some profiles the claypan is absent. Beneath the claypan is a very slowly permeable iron-silica cemented duripan (Bqm horizon), which ranges in thickness from 12 to 72 inches. Both the Bt and Bqm horizons are considered restrictive layers with respect to wetlands. Fifteen (15) of the seventeen (17) soil profiles evaluated within the mitigation site were found to be suitable for wetland creation, subject to excavation or filling to create optimal conditions.

All variables, both quantitative and qualitative, helped to determine which areas are most suitable for wetland mitigation. The quantitative measurements were taken for each pit excavated; however, in a

number of pits, certain horizons were absent or not discernable, resulting in null values for these variables. In addition, two qualitative measurements were taken at each pit:

- Suitability of the restrictive layers for wetland development (e.g., how well-cemented they were and how well they would prove to be impermeable); and
- Overall suitability for wetland creation, which takes into consideration the strength, depth, and thickness of the restrictive layers present.

For all variables (with the exception of the thickness of topsoil present, which correlated exactly with depth of upper restrictive layer), spline interpolation was used to estimate the value of the variables in areas between the excavated soil pits. *Spline interpolation* is an interpolation method that estimates values using a mathematical function that minimizes variability in the dataset; it minimizes curvature within the variable space, resulting in a smooth surface. The spline method is best suited for gently varying natural phenomenon, such as data associated with elevation, water table heights, or pollution concentrations. DMEC found that this method was also accurately applied to data pertaining to depth and thickness of soil horizons, especially in areas with little surface contouring (as would result from a stream channel, for example).

Using ArcGIS software, data from the soil pits was successfully interpolated across the project space using the *tension spline method*. This method creates a smooth "variable surface" with values that are closely constrained by the sample data range. (The *regularized spline method*, on the other hand, creates a smoother surface with less fluctuation, but with resultant values that could fall far out of the sample data range. The regularized method was not appropriate in this case, especially since the data was collected as positive integers, and some hypothetical range values would be negative using the regularized method).

The two qualitative measurements (layer suitability and overall suitability) were likewise interpolated across the project space. In order to perform this interpolation, the data had to be converted to numerical values. Thus, "high" or "good" was tabulated as having a score of 100, whereas "low" or "bad" was assigned a value of 0. "Medium" was assigned 50, and "medium-high" was assigned 75.

Using this method, DMEC and Valley Environmental Consulting LLC are able to recommend that wetland creation be focused in specific areas onsite. Additional soil pits may need to be excavated, however, to determine the accuracy of the interpolated data.

Since the majority of the wetlands to be created are not vernal pool, wetland to upland area ratio consideration is not as important than if the majority of wetlands to be created were vernal pool types. Hydrology is the primary factor that will determine the success of establishing seasonal wetlands within the proposed mitigation site. The fact that two seasonal wetlands onsite that pond water for the longest duration are man-made (with almost no supporting upland habitat), and functioning relatively well, it is reasonable to conclude that creation of similar habitat types on the same soil formation has a high likelihood of success within the proposed mitigation site.

Wetland Mitigation Design

Wetland ecosystem function will be restored by the following measures: (1) creating approximately 1.75 acres of wetlands onsite, including 0.30 acre of vernal pool wetland, 0.52 acre of seasonal wetland, 0.01 acre of seasonal wetland swale, and 0.92 acre of seasonal marsh; (2) establishing functional wetland hydrology; (3) eradicating invasive non-native plants in the mitigation area; and (4) revegetating the wetland types with more compositionally and structurally diverse assemblages of

plant communities. The proposed mitigation ratios and acreages for each wetland type are presented in Table 12, Proposed Wetland Mitigation Ratios and Acreages.

Seven (7) vernal pools are proposed for the mitigation site and will be excavated to a depth of approximately 12 to 14 inches, with approximately 3 to 4 inches of soil remaining above the claypan/duripan layer. The existing seasonal wetlands onsite tend to be shallow and excavation of the created seasonal wetlands will be to a depth of approximately 12 inches or less. The seasonal marsh will be excavated to a depth of approximately 25 inches. Seasonal swales will be excavated to a minimal depth that will allow hydrologic connectivity between adjacent wetlands and with Gerber Creek to the south. The will be many transitional areas between wetlands and adjacent uplands that will add to the mitigation site's geomorphic complexity. Figure 6, Proposed NVG Wetland Mitigation, illustrates the general locations of each wetland type proposed for the mitigation site.

Since the project site is essentially flat, and the design depths are known, and since hydrology is the key component to successful seasonal wetland creation, a detailed grading plan was not considered necessary at this time. On-the-ground conditions will determine the exact locations and depths and widths of each created wetland. The design as described in concept above will be used as a template for the grading contractor and DMEC to determine the final configuration and layout of the wetlands created as mitigation during the first phase of wetland construction.

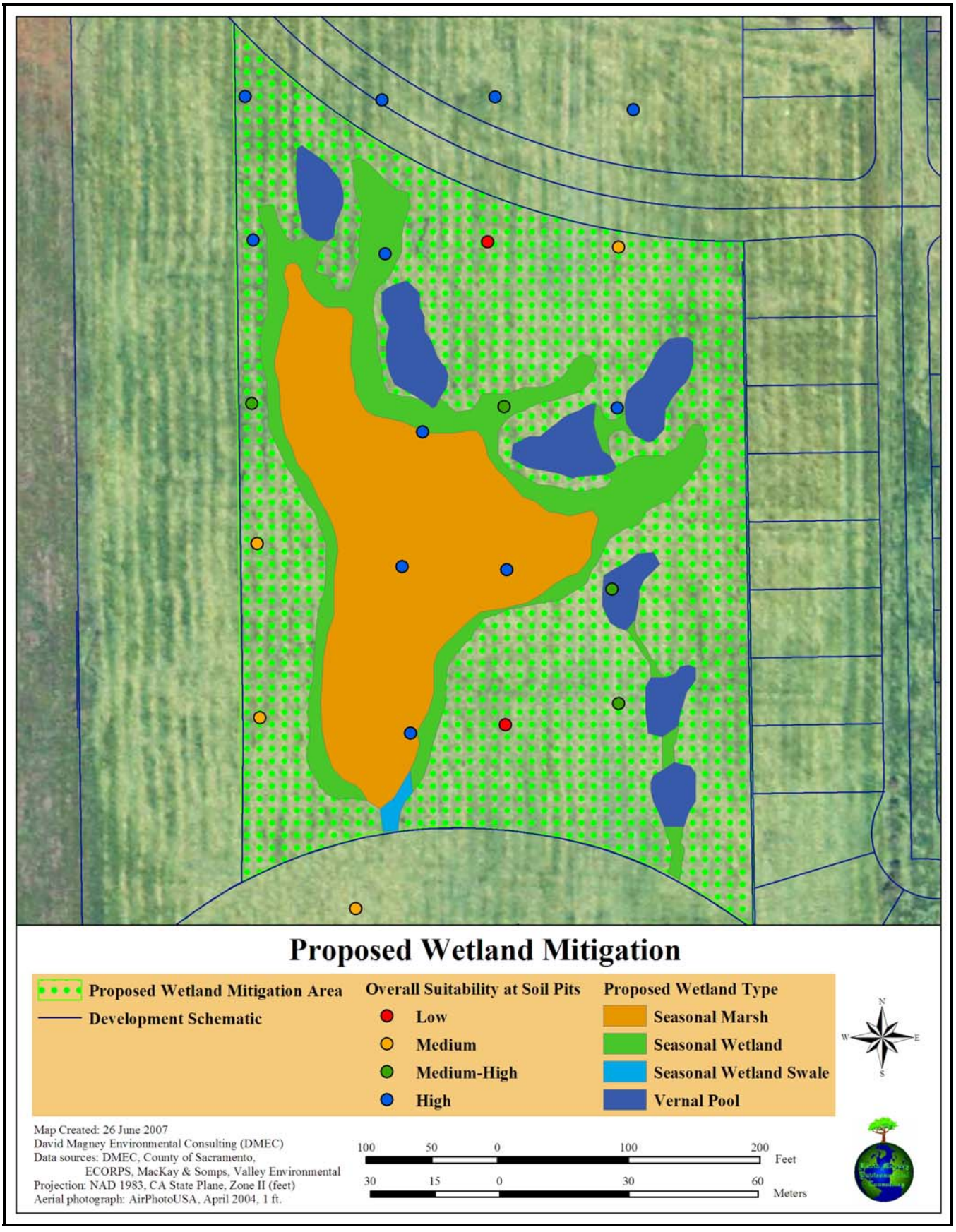
In order for correct wetland hydrology to be achieved, extreme caution and precision in grading and excavation will be necessary to prevent disturbance of the claypan/duripan layer and to establish suitable soil conditions, elevations, and connectivity for each of the wetlands relative to adjacent features.

Table 12. Proposed Wetland Mitigation Ratios and Acreages

Wetland Type	**Number of Existing Wetlands**	**Impacted Area** (Acres)	**Mitigation Ratio**	**Mitigation Area** (Acres)
Vernal Pool	3	0.15	2:1	0.30
Seasonal Wetland	11	0.52	1:1	0.52
Seasonal Wetland Swale	1	0.01	1:1	0.01
Seasonal Marsh	1	0.92	1:1	0.92
Total	**16**	**1.60**	**1.1:1**[18]	**1.75**

18 Determined by calculating area created with area impacted.

Figure 6. Proposed NVG Wetland Mitigation Design



Restoration of Mitigation Site Uplands

In addition to the creation of the wetlands, DMEC proposes that the remaining approximately 2.4 acres of upland on the mitigation site be restored as grassland that includes a diversity of native grasses and forbs. It will be attempted to establish suitable native species in upland areas to the extent practicable, especially in the wetland buffers. The vegetation in the buffers surrounding the wetlands is closely associated with wetland vegetation, and high populations of exotic plants in the uplands may have a negative impact on overall ecosystem function and mitigation success. Though not directly included in the regulatory mitigation requirements, restoration of the upland areas will enhance wetland mitigation efforts as well as improve the overall habitat value of the mitigation site. Many species of wildlife that occur in the area utilize or depend on grassland for cover and foraging.

Vernal pool specialist bees of the family Andrenidae are often the pollinators that most frequently visit the flowers of their preferred hosts. Among the vernal pool plants on the NVG site, the two *Lasthenia* species are pollinated by several species of specialist Andrenid bees. Many non-specialist pollinators, including other bees and members of several other insect families, also visit *Lasthenia.* Andrenid bees, often the most important *Lasthenia* pollinators, build shallow nests in upland soils near host plant populations close to the time the plants begin to bloom in the spring. Larvae develop in the nests on a diet of pollen and then overwinter there as adults to allow rapid emergence as their hosts start to bloom the following spring. Andrenid bees may naturally colonize new sites that offer suitable habitat, and there appears to have been some success with their artificial transplantation. Upland habitats support both specialist and non-specialist pollinators of vernal pool plants and are an important consideration when creating vernal pools (Thorp and Leong 1998).

Plant Palettes

The wetland areas resulting after hydrology assessment and grading is completed will be planted at varying densities with suitable indigenous wetland species. Since the wetland types to be created onsite have varying hydrology, soil moisture, and soil depth requirements, the recommended plants specific for each wetland type are listed in Table 13, Wetland Plant Palette for the NVG Mitigation Effort. The recommended native grasses and forbs for the approximately 2.4 acres of uplands proposed to be restored as grassland are listed in Table 14, Restored Grassland Native Plant Palette for the NVG Mitigation Site.

The mitigation areas will be planted with a combination of seed and vegetative material of plant species with local provenance so that the genetic integrity of the local habitat is preserved in the restored wetland ecosystem.

Table 13. Wetland Plant Palette for the NVG Mitigation Effort

Scientific Name	Common Name	Habit[19]	WIS[20]	Propagation Method
Vernal Pool				
Callitriche marginata	Winged Water-starwort	AH	OBL	Seed
Castilleja campestris ssp. *campestris*	Field Owl's Clover	AH	OBL*	Seed
Deschampsia danthonioides	Annual Hairgrass	AG	FACW	Seed
Eleocharis macrostachya	Creeping Spikerush	PG	OBL	Seed/Cuttings
Epilobium ciliatum	Northern Willow-herb	PH	FACW	Seed
Epilobium densiflorum	Dense-flowered Willow-herb	AH	OBL	Seed
Epilobium pygmaeum	Smooth Spike-primrose	AH	OBL	Seed
Eryngium vaseyi	Coyote-thistle	PH	FACW	Seed
Gratiola ebracteata	Bractless Hedge Hyssop	AH	OBL	Seed
Hordeum brachyantherum	Meadow Barley	PG	FACW	Seed
Hordeum depressum	Alkali Barley	AG	FACW	Seed
Juncus bufonius	Common Toad Rush	AG	OBL	Seed/Cuttings
Lasthenia fremontii	Fremont's Goldfields	A/PH	OBL	Seed
Lasthenia glaberrima	Smooth Goldfields	AH	OBL	Seed
Navarretia leucocephala	Whitehead Navarretia	AH	OBL	Seed
Plagiobothrys stipitatus	Stalked Popcornflower	AH	OBL	Seed
Psilocarphus brevissimus	Dwarf Woollyheads	AH	OBL	Seed
Ranunculus bonariensis	Carter's Buttercup	AH	OBL	Seed
Triteleia hyacinthina	White Brodiaea	PH	FACW*	Seed
Veronica peregrina	Neckweed	AH	OBL	Seed

[19] Habit definitions: AG = annual grass or graminoid; AH = annual herb; F = Fern; PG = perennial grass or graminoid; PH = perennial herb; PV = perennial vine; S = shrub; T = tree.

[20] WIS = Wetland Indicator Status. The following code definitions are according to Reed (1988):

OBL = obligate wetland species, occurs almost always in wetlands (>99% probability).

FACW = facultative wetland species, usually found in wetlands (67-99% probability).

FAC = facultative species, equally likely to occur in wetlands or nonwetlands (34-66% probability).

FACU = facultative upland species, usually found in nonwetlands (67-99% probability).

UPL = obligate upland species in this region (99% probability), occurs in wetlands in another region

NI = no indicator status has been assigned due to a lack of information.

+ or - symbols are modifiers that indicate greater or lesser affinity for wetland habitats.

* = tentative assignment to that indicator status by Reed (1988).

( ) Parentheses indicate a wetland status suggested by David L. Magney based on extensive field observations.

Scientific Name	Common Name	Habit[19]	WIS[20]	Propagation Method
Seasonal Wetland & Seasonal Wetland Swale				
Centaurium muhlenbergii	Monterey Centaury	AH	FAC	Seed
Cyperus eragrostis	Umbrella-sedge	PG	FACW	Seed/Cuttings
Epilobium ciliatum	Northern Willow-herb	PH	FACW	Seed
Epilobium densiflorum	Dense-flowered Willow-herb	AH	OBL	Seed
Gnaphalium palustre	Lowland Cudweed	AH	FACW	Seed
Hordeum brachyantherum	Meadow Barley	PG	FACW	Seed
Hordeum depressum	Alkali Barley	AG	FACW	Seed
Juncus balticus	Baltic Rush	PG	OBL	Seed/Cuttings
Juncus bufonius	Common Toad Rush	AG	OBL	Seed/Cuttings
Juncus effusus	Common Rush	PG	OBL	Seed/Cuttings
Juncus xiphioides	Iris-leaved Rush	PG	OBL	Seed/Cuttings
Phyla nodiflora	Turkey Tangle Fogfruit	PH	FACW	Seed/Cuttings
Triteleia hyacinthina	White Brodiaea	PH	FACW*	Seed
Veronica peregrina	Neckweed	AH	OBL	Seed
Xanthium strumarium	Cocklebur	AH	FAC+	Seed
Seasonal Marsh				
Callitriche marginata	Winged Water-starwort	AH	OBL	Seed
Cyperus eragrostis	Umbrella-sedge	PG	FACW	Seed/Cuttings
Eleocharis macrostachya	Creeping Spikerush	PG	OBL	Seed/Cuttings
Epilobium pygmaeum	Smooth Spike-primrose	AH	OBL	Seed
Juncus effusus	Common Rush	PG	OBL	Seed/Cuttings
Juncus xiphioides	Iris-leaved Rush	PG	OBL	Seed/Cuttings
Lemna minuscula	Least Duckweed	AH	OBL	Transplant
Ludwigia peploides	Floating Water-primrose	PH	OBL	Seed
Polygonum hydropiperoides	Swamp Smartweed	PH	OBL	Seed
Polygonum punctatum	Dotted Smartweed	A/PH	OBL	Seed
Ranunculus bonariensis	Carter's Buttercup	AH	OBL	Seed
Schoenoplectus [*Scirpus*] *acutus*	Hardstem Bulrush	PG	OBL	Seed/Cuttings
Typha latifolia	Cattail	PG	OBL	Seed/Cuttings
Xanthium strumarium	Cocklebur	AH	FAC+	Seed

Table 14. Restored Grassland Native Plant Palette for the NVG Mitigation Site

Scientific Name	Common Name	Habit[21]	WIS[22]	Propagation Method
Grasses				
Bromus carinatus	California Brome	AG	-	Seed
Deschampsia danthonioides	Annual Hairgrass	AG	FACW	Seed
Elymus glaucus	Blue Wildrye	PG	FACU	Seed
Elymus multisetus	Big Squirreltail Grass	AG	-	Seed
Hordeum brachyantherum	Meadow Barley	PG	FACW	Seed
Hordeum depressum	Alkali Barley	AG	FACW	Seed
Leymus triticoides	Creeping Wildrye	PG	FAC+	Seed/Sod/Rhizome
Poa secunda	Sandberg Bluegrass	PG	FACU	Seed
Vulpia microstachys	Small Fescue	AG	-	Seed
Vulpia octoflora	Slender Fescue	AG	UPL	Seed
Forbs				
Amsinckia menziesii	Rancher's Fire	AH	-	Seed
Asclepias fascicularis	Narrowleaf Milkweed	PH	FAC	Seed/Rhizome
Brodiaea coronaria	Harvest Brodiaea	PH	(FAC)	Seed
Castilleja attenuata	Valley Tassels	AH	-	Seed
Epilobium brachycarpum	Panicled Willow-herb	AH	UPL	Seed
Eremocarpus setigerus	Dove Weed	AH	-	Seed
Galium aparine	Goose Grass	AH	FACU	Seed
Grindelia camporum	Great Valley Gumplant	PH	FACU	Seed
Hemizonia fitchii	Fitch's Tarweed	AH	-	Seed
Holocarpha virgata	Yellowflower Tarweed	AH	-	Seed
Lepidium nitidum	Common Peppergrass	AH	-	Seed
Lotus purshianus	Spanish Clover	AH	UPL	Seed
Plantago erecta	California Plantain	AH	-	Seed
Trichostema lanceolatum	Vinegarweed	AH	-	Seed
Triteleia laxa	Ithuriel's Spear	PH	-	Seed
Wyethia angustifolia	California Compassplant	PH	FACU-	Seed

[21] Habit definitions: AG = annual grass or graminoid; AH = annual herb; F = Fern; PG = perennial grass or graminoid; PH = perennial herb; PV = perennial vine; S = shrub; T = tree.

[22] WIS = Wetland Indicator Status. The following code definitions are according to Reed (1988):

OBL = obligate wetland species, occurs almost always in wetlands (>99% probability).

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FAC = facultative species, equally likely to occur in wetlands or nonwetlands (34-66% probability).

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( ) Parentheses indicate a wetland status suggested by David L. Magney based on extensive field observations.

DETAILS, SEQUENCE, AND SCHEDULE

This subsection discusses administrative activities, onsite activities prior to implementation, onsite activities during implementation, and post-implementation activities. Finally, this section provides the mitigation schedule.

Administrative Activities

Administrative activities include obtaining appropriate permits and approvals, and implementing the contracting process.

Permits and Approvals

DMEC will assist Mr. Daru in securing necessary permits from the Corps, USFWS, and the Regional Water Quality Control Board for the NVG project.

Contracting

Mr. Daru will prepare a request for bids to Corps-approved qualified landscape contractors that are experienced with wetland mitigation projects. To minimize delays in executing a contract, DMEC recommends that Mr. Daru request all necessary contract information from each bidder as part of their bid submittal, rather than waiting until a contractor is selected.

Onsite Activities Prior to Implementation

Once this mitigation and monitoring plan is approved, the wetland functional assessment and vegetation surveys will be conducted on the existing wetlands to establish a set of baseline data. Sediment and erosion control measures may need to be implemented, trash will need to be removed, work areas will need to be marked (delineate the different proposed wetland types), and plant collection, propagation, and salvage operations will need to be conducted. These measures and tasks are discussed in the following subsections.

Assessment of Baseline Conditions

Prior to grading activities onsite, a wetland functional assessment and vegetation surveys will be conducted on the existing wetlands to establish a set of baseline data to be compared against post-implementation conditions. These comparisons will help determine the level of wetland function present prior to mitigation work and will aid in determining mitigation success over the five-year monitoring period. Refer to Section 5, Monitoring Plan, for more details.

Sediment and Erosion Control

Best Management Practices (BMPs) with regard to sediment and erosion control shall be employed prior to initiation of construction on the mitigation site. The construction area shall be inspected and maintained throughout the mitigation effort to ensure that BMPs are being implemented correctly. If necessary, silt fencing shall be installed along the perimeter of the work area to keep sediments contained on the mitigation site, and measures to prevent erosion shall be employed.

Delineate Work Areas

All work areas shall be demarcated with flags or stakes prior to construction activities. All contractors, subcontractors, and equipment operators shall be instructed to remain within the flagged boundaries. Vegetation and soils shall not be disturbed outside of the flagged boundaries. All debris, such as wood debris, non-native gravel, cured or uncured concrete, and trash shall be removed from the mitigation site prior to mitigation activities described in this plan. The proposed wetland areas will be delineated to facilitate implementation of the grading plan.

Plant Collection, Propagation, and Salvage Operations

Plant material will primarily be derived from seeds or cuttings obtained from plants on the project site. Salvage and translocation of native perennial species will aid in the planting effort. Collection of plant material should be done during the fall and winter when the plants are dormant or have gone to seed. If necessary, a qualified nursery facility experienced in growing California native plants can be contracted to store and/or propagate plant material collected from the project site.

Any plant stock that cannot be collected from the project site shall be obtained from an approved native plant nursery and derived from native sources within the local watershed. The contractor shall provide a detailed list of all materials prior to planting, and unacceptable plant material will be rejected, at the contractor's expense, by DMEC restoration specialists or other qualified individuals contracted by Mr. Daru.

Onsite Activities During Implementation

All mitigation activities within the proposed wetland areas of the NVG project site will be supervised by DMEC personnel or other qualified restoration ecologists approved by the Corps. Activities during the implementation of the mitigation include grading, hydrology assessment, removal and control of exotic plant species, initial functional and vegetation assessments, and planting implementation. These activities are discussed in the subsections below.

Grading

A general engineering contractor (yet to be determined) will develop the grading plan for this project. The following is a summary of the general grading activities proposed for the NVG project mitigation site. Seven (7) vernal pools are proposed for the mitigation site and will be excavated to a depth of approximately 12 to 14 inches, with approximately 3 to 4 inches of soil remaining above the claypan/duripan layer. Excavation of the seasonal wetlands will be to a depth of approximately 12 inches or less, and the seasonal marsh will be excavated to a depth of approximately 25 inches. Seasonal swales will be excavated to a minimal depth that will allow hydrologic connectivity between the wetlands and with Gerber Creek to the south (see Figure 6, Proposed NVG Wetland Mitigation).

In order for correct wetland hydrology to be achieved, extreme caution and precision in grading and excavation will be necessary to prevent disturbance of the claypan/duripan layer and to establish suitable soil conditions, elevations, and connectivity for each wetland relative to adjacent features.

Hydrology Assessment

After initial mitigation site grading and preparation is complete, the hydrology of the wetlands will need to be assessed to assure that proper excavation depths, relative elevations, connectivity, and soil conditions have been achieved. Piezometers, flow meters, and depth gauges will be utilized as necessary to evaluate hydrologic factors. Water depth and duration of inundation will be closely monitored. It is preferable for the wetlands to be charged as the result of rainfall, and if precipitation is inadequate to fully charge the wetlands it may be necessary to postpone the hydrology assessment until conditions are suitable. Normal peak precipitation occurs from November to March, when approximately fifteen (15) of the annual eighteen (18) inches of rain falls[23]. Artificial introduction of supplemental water is an option that may be considered. Based on the hydrology assessment any necessary design and grading adjustments will then be made. Mitigation site hydrology will be monitored throughout the five-year monitoring period as necessary, especially in the first season.

Removal and Control of Exotic Plants

Exotic plant species targeted for regular removal and control on the mitigation site primarily include those already occurring on the NVG project site. Many of these non-native plants have invasive characteristics and some are highly invasive, and none of them are desired species in the plant communities to be established on the mitigation site. Because the mitigation site is a disturbed area that will undergo additional disturbance as a result of mitigation activities, any of these exotic species could occur there and interfere with revegetation efforts. The list of target exotic plants to be eradicated and controlled is presented in Table 15, Target Exotic Plant Species. Species listed by the California Invasive Plant Council (Cal-IPC 2006) as invasive and threatening to wildlands in California are highlighted with bold type.

All non-native plants, including any that are not listed in Table 15, shall be removed from the work areas and disposed of in a manner consistent with pertinent regulations, using practices that prevent their re-establishment. Removal will be conducted at least twice annually during spring and summer seasons, and as needed over the five-year monitoring period. Plants shall be removed or controlled by hand or mechanical means whenever possible, rather than with the use of herbicides. If surface water is present and control of exotic plants using herbicides is required within wetlands, a licensed pesticide applicator shall be hired and only those herbicides and surfactants that are approved for aquatic use shall be applied.

Reducing populations of exotic species in the restored grassland will enhance its habitat value and reduce the potential for infestation of wetland areas. Emphasis will be placed on controlling invasive and exotic species in the created wetlands and the vegetated buffers immediately surrounding them. These buffers include portions of the upland areas proposed for restoration as grassland. Though restoration of uplands is not directly included in the regulatory mitigation requirements, high populations of exotic species in these areas can affect overall wetland ecosystem function. As a result, it will be necessary to reduce the levels of exotic species in upland areas as much as is practicable, though some common exotics will undoubtedly persist despite control efforts.

[23] http://www.idcide.com/weather/ca/elk-grove.htm

Table 15. Target Exotic Plant Species

Scientific Name[24]	Common Name	Habit[25]	Family
Aegilops triuncialis	Barbed Goatgrass	AG	Poaceae
Ailanthus altissima	Tree-of-heaven	T	Hippocastinaceae
Aira caryophyllea	Silver Hairgrass	AG	Poaceae
*Alisma lanceolatum**	Lanceleaf Water Plantain	PH	Alismataceae
Anthemis cotula	Mayweed	AH	Asteraceae
Arundo donax	Giant Reed	PG	Poaceae
Asparagus officinalis	Garden Asparagus	PG	Asparagaceae
Anagallis arvensis	Scarlet Pimpernel	AH	Primulaceae
Avena barbata	Slender Wild Oat	A/PG	Poaceae
Avena fatua	Wild Oat	AG	Poaceae
Brachypodium distachyon	Purple False Brome	A/PG	Poaceae
Brassica nigra	Black Mustard	AH	Brassicaceae
Brassica rapa	Field Mustard	AH	Brassicaceae
Briza minor	Little Quakinggrass	AG	Poaceae
Bromus diandrus	Ripgut Brome	AG	Poaceae
Bromus hordeaceus	Soft Brome	AH	Poaceae
Bromus madritensis* ssp. *rubens	Red Brome	AG	Poaceae
Carduus pycnocephalus	Italian Thistle	AH	Asteraceae
Centaurea solstitialis	Yellow Star-thistle	AH	Asteraceae
Cerastium glomeratum	Mouse-ear Chickweed	AH	Caryophyllaceae
Chamomilla suaveolens	Pineapple Weed	AH	Asteraceae
Chenopodium album	Lambsquarters	AH	Chenopodiaceae
Cichorium intybus	Chicory	PH	Asteraceae
Cirsium vulgare	Bull Thistle	PH	Asteraceae
Convolvulus arvensis	Bind Weed	PV	Convolvulaceae
Cortaderia selloana	Uruguayan Pampas Grass	PG	Poaceae
Crassula tillaea	Water Pygmy-weed	AH	Crassulaceae
Crypsis schoenoides	Swamp Grass	AG	Poaceae
Cynodon dactylon	Bermuda Grass	PG	Poaceae
Daucus carota	Queen Anne's Lace	PH	Apiaceae
Erodium botrys	Broadleaf Filaree	AH	Geraniaceae
Erodium moschatum	Whitestem Filaree	AH	Geraniaceae
Eucalyptus globulus	Blue Gum	T	Myrtaceae
Festuca arundinacea	Tall Fescue	PG	Poaceae
Geranium dissectum	Cut-leaved Geranium	AH	Geraniaceae
Glyceria declinata	Waxy Mannagrass	PG	Poaceae
Hirschfeldia incana	Summer Mustard	PH	Brassicaceae
Hordeum marinum	Mediterranean Barley	AG	Poaceae
Hordeum murinum	Summer Barley	AG	Poaceae
Hypochaeris glabra	Smooth Cat's-ear	AH	Asteraceae
Juncus capitatus	Leafybract Dwarf Rush	AH	Juncaceae
Kickxia elatine	Arrowleaf Fluvellin	AH	Veronicaceae

[24] **Bold** = Cal-IPC invasive threat to wildlands. * = Obligate wetland species potentially a problem in mitigation site wetlands.

[25] Habit definitions: AG = annual grass or graminoid; AH = annual herb; AV = annual vine; PG = perennial grass graminoid; PH = perennial herb; S = shrub; T = tree.

Scientific Name[24]	Common Name	Habit[25]	Family
Lactuca serriola	Prickly Wild Lettuce	AH	Asteraceae
Lathyrus angulatus	Angled Pea	AV	Fabaceae
Leontodon taraxacoides	Hawkbit	A/B/PH	Asteraceae
Lolium multiflorum	Italian Ryegrass	AG	Poaceae
Lotus corniculatus	Birdsfoot Trefoil	PH	Fabaceae
Lythrum hyssopifolium	Hyssop Loosestrife	AH	Lythraceae
Malva parviflora	Cheeseweed	AH	Malvaceae
Medicago polymorpha	Burclover	AH	Fabaceae
Mentha pulegium*	Pennyroyal	PH	Lamiaceae
Morus alba	White Mulberry	T	Moraceae
Olea europaea	Olive	T	Oleaceae
Paspalum dilatatum	Dallisgrass	PG	Poaceae
Phalaris aquatica	Bulbous Canarygrass	PG	Poaceae
Phytolacca americana	American Pokeweed	PH	Phytolaccaceae
Picris echioides	Bristly Ox-tongue	AH	Asteraceae
Plantago lanceolata	English Plantain	PH	Plantaginaceae
Polygonum arenastrum	Common Knotweed	AH	Polygonaceae
Polypogon monspeliensis	Rabbitsfoot Grass	AG	Poaceae
Populus alba	White Poplar	T	Salicaceae
Pseudognaphalium luteoalbum	Everlasting Cudweed	AH	Asteraceae
Punica granatum	Pomegranate	S	Punicaceae
Ranunculus muricatus	Spinyfruit Buttercup	A/B/PH	Ranunculaceae
Raphanus raphanistrum	Wild Radish	A/PH	Brassicaceae
Raphanus sativus	Radish	A/BH	Brassicaceae
Robinia pseudoacacia	Black Locust	T	Fabaceae
Rosa spp.	Cultivated Rose	S	Rosaceae
Rubus discolor	Himalaya Blackberry	S	Rosaceae
Rumex acetosella	Common Sheep Sorrel	PH	Polygonaceae
Rumex crispus	Curly Dock	PH	Polygonaceae
Rumex pulcher	Fiddle Dock	PH	Polygonaceae
Schinus molle	Peruvian Pepper Tree	T	Anacardiaceae
Silene gallica	Windmill Pink	AH	Caryophyllaceae
Silybum marianum	Milk Thistle	AH	Asteraceae
Sonchus oleraceus	Common Sow-thistle	AH	Asteraceae
Sorghum halepense	Johnsongrass	PG	Poaceae
Spergularia rubra	Purple Sandspurrey	A/PH	Caryophyllaceae
Taeniatherum caput-medusae	Medusahead	AG	Poaceae
Tanacetum parthenium	Feverfew	PH	Asteraceae
Taraxacum officinale	Dandelion	PH	Asteraceae
Trifolium dubium	Suckling Clover	AH	Fabaceae
Trifolium hirtum	Rose Clover	AH	Fabaceae
Trifolium repens	White Clover	PH	Fabaceae
*Veronica anagallis-aquatica**	Water Speedwell	PH	Veronicaceae
Vicia sativa	Common Vetch	AH	Fabaceae
Vicia villosa	Hairy Vetch	AH	Fabaceae
Vinca major	Greater Periwinkle	PH	Apocynaceae
Vulpia bromoides	Brome Fescue	AG	Poaceae

Initial Functional and Vegetation Assessments

Prior to planting and after the hydrology of the mitigation site has been evaluated and final design and grading adjustments have been made, an initial assessment of the mitigation site will be conducted. Wetland functionality and the general status of any vegetation present before planting, though expected to be sparse, will be evaluated. The purpose of these assessments is to document initial mitigation site conditions prior to revegetation and establish another benchmark to help gauge mitigation success. These assessments may also reveal unexpected issues and yield information that will be useful in guiding subsequent mitigation site activities. In particular, any especially problematic exotic plant species can be identified, as well as any desirable native species that are able to become established on their own. Refer to Section 5, Monitoring Plan, for more details.

Planting Implementation

Planting shall not proceed until the hydrology of the mitigation site has been evaluated and final design and grading adjustments have been made. All planting areas will then be staked and flagged to ensure that the appropriate species are planted within them. Planting activities should take place during fall and winter (November to March) when normal precipitation is the greatest and produces adequate soil moisture. Within this window of opportunity, planting shall begin as soon as possible following the completion of the staking and flagging of the planting zones. Supplemental planting shall be conducted after the first year to fill in areas of the mitigation site that have not adequately revegetated. Supplemental irrigation may be necessary depending on soil moisture and timing of expected rainfall at the time of planting, but is not expected.

Onsite Activities After Implementation

The activities required after the implementation of the wetland mitigation include documentation of as-built conditions, installing a temporary irrigation system, and performing mitigation maintenance to achieve mitigation objectives.

Documentation of As-Built Conditions

After mitigation site grading and planting are complete, as-built conditions will be described, photographed, and mapped. This information will serve as a basis to gauge any changes in landscape features over time, as well as provide a qualitative look at the initial success of vegetative plantings and the initial levels of vegetative cover.

Hydrology Assessment

Mitigation site hydrology will continue to be monitored through the five-year monitoring period as needed to assure that proper excavation depths, relative elevations, connectivity, and soil conditions have been achieved. This will be especially important in the first season or two to verify that the wetland hydrology is functional. Piezometers and depth gauges will be utilized as necessary to evaluate hydrologic factors. Water depth and duration of inundation will be closely monitored during the wet season.

Irrigation

Supplemental irrigation is typically supplied in habitat restoration sites where trees and shrubs are used primarily. Since the seasonal wetlands planned as mitigation here, dominated by annual hydrophyte species that are dependent solely on precipitation, and that the plants proposed for mitigation are mostly annual species, the need for supplemental irrigation at this mitigation site is not necessary. A temporary irrigation system will not be installed. However, temporary irrigation will be supplied, if necessary, by water trucks in the unlikely event that supplemental irrigation is deemed necessary in certain parts of the mitigation site, to be determined by the monitor. If at some point an irrigation system for parts of the site is needed, it will be installed in only those areas necessary.

Mitigation Maintenance

Maintenance of the mitigation area is essential to achieve mitigation objectives, and failure to perform adequate maintenance is likely to result in non-attainment of the performance criteria as determined by compliance monitoring. The landscape contractor assigned to implement this plan must be approved as qualified and experienced with native habitat (including wetlands) mitigation and maintenance. Included maintenance measures are weed control, trash removal, replanting, and irrigation upkeep, as described below:

- **Weed Control.** Planted areas shall be weeded regularly to reduce plant competition. Weeding is necessary to encourage the success of planted native plant material and to discourage nonnative ruderal or invasive species from establishing populations at the mitigation site. Plants shall be removed or controlled by hand or mechanical means whenever possible, rather than with the use of herbicides. Weed control shall only be conducted by persons able to recognize native plant seedlings in order to prevent mortality of native plants onsite. Plants that are removed shall be disposed of in a manner that prevents recontamination of the site.
- **Trash Removal.** All foreign material used during the mitigation effort shall be removed from the project site during and after mitigation implementation. All trash shall also be removed in all mitigation areas on a regular basis, particularly following significant windstorm events.
- **Replanting.** Replanting and reseeding native species onsite shall be necessary if the mitigation site is not achieving success based on compliance monitoring. Replacement plantings and additional seeding shall be required if a significant portion of the plantings in the mitigation area die off or do not resprout the next wet season, and the mitigation effort is not replacing ecological function onsite.
- **Irrigation Upkeep.** Irrigation components, if installed, shall be monitored on a regular basis to verify that equipment is in working order. Replacement or repair of broken irrigation components will be completed as necessary. All site visits by contractors shall be documented and submitted to the compliance monitor.
- **Scheduling.** Maintenance of all habitat mitigation plantings shall be conducted according to the following schedule: maintenance shall be performed weekly for the first three (3) months after planting, quarterly for the remainder of the first year, and semiannually thereafter for the duration of the compliance monitoring period. The timing and frequency of maintenance activities may need to be modified based on site conditions.

Mitigation Schedule

The mitigation activities will be completed in as timely a fashion as possible. The rough grading portion of the project will commence on or before 1 September 2008 and be completed by 31 October 2008. Initial planting will begin once grading is completed and the initial functional and vegetation survey has been conducted. The majority of seeding will be conducted one year after initial grading has been completed, to allow careful monitoring of the hydrology of each created wetland before sowing seeds. All grading and planting is expected to be completed by 31 October 2009.

The proposed implementation schedule is provided below as Table 16, Suggested NVG Mitigation Implementation Schedule. This schedule may be modified as necessary to properly implement all aspects of this mitigation plan. This particularly applies to planting, since planting should take place under optimum conditions. The schedule does not show weeks 16 through 31; which are essentially identical to the bounding weeks.

Table 16. Suggested NVG Mitigation Implementation Schedule

Task	Schedule of Tasks by Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	32
Submit Bid Request(s)																
Select Contractor(s)																
Execute Contract(s)																
Conduct Start-up Meeting(s)																
Conduct Baseline Survey																
Install Sediment/Erosion Controls																
Collect Plant Propagules																
Remove/Control Exotic Plants																
Monitor Planting, Grading, and Maintenance Operations																
Rough Grading																
Evaluate/Monitor Hydrology																
Fine Grading/Adjust Design																
Initial Function/Vegetation Survey																
Install Plantings[26]																
Install Irrigation System (optional)																
Mitigation Maintenance																
Collect As-Built Data																

26 Only plants that are salvaged from other onsite wetlands to be filled/destroyed by development will be planted in the created wetlands at this time. Most planting and sowing of seeds will be conducted the following fall.

SECTION 5. MONITORING PLAN

GENERAL MONITORING APPROACH

The MOA on Mitigation of 6 February 1990 that guides policy for the U.S. Environmental Protection Agency (EPA), the Corps, and the U.S. Fish and Wildlife Service (USFWS) states:

> "Monitoring should be directed toward determining whether permit conditions are complied with and whether the purpose intended to be served by the condition is actually achieved."

In this regard, monitoring protocols need to be established that allow effective and efficient analyses of the project insofar as the project purposes are concerned. Thus, monitoring protocols include project standards (i.e. success criteria) that are triggers for more detailed analyses and/or the implementation of contingency measures.

Corps compliance will be based on the creation of approximately 1.75 acres of wetlands and the restoration of their associated wetland ecosystem functions after a period of five (5) years. Prior to project implementation DMEC will assess the general level of wetland ecosystem function on the existing 1.60 acres of wetlands onsite proposed for filling using the hydrogeomorphic method (HGM) to establish a basis for comparison with the created wetlands on the mitigation site. The HGM methodology that DMEC proposes to use was developed for depressional waters and wetlands in Sacramento and San Joaquin Counties, with the potential reference domain including most of the Central Valley (L.C. Lee et al. 1997). DMEC will also survey additional plant community characteristics associated with the wetlands that are not completely captured by the HGM methodology.

Once the approximate 1.75 acres of created wetland depressions and swales have been graded on the mitigation site, the hydrology of the site will be evaluated, any grading adjustments will be made, and then initial HGM and plant community assessments on the created wetlands will be conducted. Revegetation efforts and yearly monitoring for a period of five (5) years will begin thereafter.

MONITORING METHODS AND PROJECT STANDARDS

The focus of the monitoring plan is to determine the success of the restoration of wetland ecosystem functions to the North Vineyard Greens project site through the five-year monitoring period. The monitoring protocol is based on the physical and biological attributes and processes of the wetland ecosystem. Comparing the assessment results of baseline conditions to the assessment results on the mitigation site provides an objective and duplicable means of determining mitigation success.

The mitigation site will be expected to meet an increasing percentage of the baseline assessment results annually for five years for each applicable metric. Mitigation success can then be determined on the basis of the reestablishment of wetland ecosystem functions as quantified by HGM methodology and the vegetation survey assessments.

HGM Wetland Functional Assessment

The HGM method identifies nine (9) depressional wetland ecosystem functions that are derived from fifteen (15) variables that are assessed for the wetland site, which is a holistic approach. These functions and variables are listed in Table 17, HGM Functions and Variables for Depressional Wetlands. The HGM assessment methodology and worksheets can be found as Appendix B, HGM Methodology. The benefit of using this model is that it provides a systematic and objective method to measure the relative change in wetland ecosystem functions related to the project that may not be readily detectable by other methods, provide a more holistic assessment. Numerical comparisons of pre- and post-implementation conditions can be made and mitigation success over the required five-year monitoring period can be determined in an objective manner. This information may also be used to effectively guide mitigation efforts throughout the course of the project.

Table 17. HGM Functions and Variables for Depressional Wetlands

Functions	Variables
Hydrologic Functions	1. Buffer Condition 2. Buffer Continuity 3. Buffer Width 4. Indicator Species 5. Vegetation Abundance 6. Land Use or Condition 7. Longitudinal Connections 8. Organic Material 9. Outlet 10. Percent Native Plant Species 11. Sediment Deposition 12. Soil Profile Integrity 13. Wetland Density 14. Watershed Condition 15. Swale/Channel Cross-Section
1. Surface and Shallow Subsurface Water Storage and Exchange 2. Landscape Hydrologic Connections	
Biogeochemical Functions	
3. Element and Compound Cycling 4. Organic Carbon Export	
Plant Community and Habitat Functions	
5. Plant Community 6. Faunal Habitat 7. Faunal Habitat Interspersion and Connectivity 8. Invertebrate Assemblage 9. Vertebrate Assemblage	

HGM Definitions

The HGM functions and variables for depressional wetlands are briefly described below:

HGM FUNCTIONS

Hydrologic Functions

1. Surface and Shallow Subsurface Water Storage and Exchange: The capacity to capture surface and shallow subsurface water and to allow for exchange between these components.
2. Landscape Hydrologic Connections: The hydrologic connectivity with source areas and downgradient features.

Biogeochemical Functions

3. Element and Compound Cycling: The biotic and abiotic processes that cycle compounds between atmosphere, water, soil, and vegetation.
4. Organic Carbon Export: The mechanisms for export of organic carbon in dissolved and particulate forms.

Plant Community and Habitat Functions

5. Plant Community: The species composition and physical characteristics of vegetation.
6. Faunal Habitat: The capacity to provide habitats that support animal populations and guilds.
7. Faunal Habitat Interspersion and Connectivity: The capacity to permit movement of and access by aquatic and terrestrial vertebrates and invertebrates.
8. Invertebrate Assemblage: The aquatic and terrestrial invertebrate population.
9. Vertebrate Assemblage: The aquatic and terrestrial vertebrate population.

HGM VARIABLES

1. Buffer Condition: The predominant land use or condition in the wetland buffer (20 feet perpendicular to and outward from the wetland boundary, or to the top of the source area divide, whichever is less).
2. Buffer Continuity: The proportion of the wetland buffer that is intact.
3. Buffer Width: The mean width of the wetland buffer.
4. Indicator Species: The dominant plant taxa (>50% vegetative cover or >20% total cover) in plots within the assessment area (AA, or the area within the boundary of the wetland) that are restricted to or typically associated with the depressional wetland.
5. Vegetation Abundance: The percent cover and species composition of the dominant plant taxa in plots within the AA, as well as the nature of the boundary between the vegetation in the AA and that in the surrounding buffer.
6. Land Use or Condition: The predominant land use or condition within a 3,000-foot radius from the center of the AA.
7. Longitudinal Connections: The predominant land use or condition in the longitudinal connections to downgradient waters/wetlands within 500 feet of the AA.
8. Organic Material: The percent cover of the accumulated organic detrital matter on the soil surface in the AA.
9. Outlet: The presence or absence and elevation of hydrologic outlets or swale features that connect the wetland to other waters/wetlands.
10. Percent Native Plant Species: The percent of the dominant plant taxa in plots within the AA that are native species.
11. Sediment Deposition: The area and/or rate of sediment deposition in the AA.
12. Soil Profile Integrity: The condition of the soil profile in a soil pit representative of the AA.
13. Wetland Density: The percent of the total area that is occupied by depressional, slope, and riverine waters/wetlands within a 3000-foot radius from the center of the AA.

14. Watershed Condition: The predominant land use or condition in the watershed source area of the wetland.
15. Swale/Channel Cross-Section: The condition of a swale or channel cross-section in terms of its width, depth, cross-sectional area, and width:depth ratio.

HGM Functional Scores

The HGM variables are scaled on the basis of their characteristics relative to those established for the depressional wetland class within the Sacramento/San Joaquin County reference domain. Each variable is assigned a value between 0 and 1.0 depending upon how closely it conforms to defined functional levels for depressional wetland ecosystems based on reference standard conditions. The values of the variables are then used to calculate the values of the HGM functions. Equations have been developed for each function that incorporate the variables that contribute to that function, and that weight the included variables according to their relative significance. Calculated values for the functions also fall between 0 and 1.0. Values closer to 0 indicate a high degree of disturbance and low levels of wetland function, and values closer to 1.0 indicate greater conformity with reference standard, or less disturbed and more highly functional, conditions. Refer to Appendix B, HGM Methodology, for more details.

Vegetation Surveys

The recovery of the characteristic plant communities associated with the created wetlands is critical for successful mitigation. As described in the above section, HGM captures some plant community metrics. DMEC proposes to expand the plant community metrics surveyed in order to enhance the level of monitoring of the vegetation associated with each wetland type on the mitigation site. In addition, the restored grassland will be monitored to determine the general characteristics of the vegetation there. Refer to Appendix C, Mitigation Monitoring Forms, including the Floristic Assessment Form and the Grassland Assessment Form. The additional metrics are described below:

Floristic Assessment

This metric is based on an inventory of all the plant species present in the assessment area (AA) and the surrounding vegetated wetland buffer. The total number of species present, the number and percent of native species present, the total percent vegetative cover, the percent cover by native species, percent cover by nonnative species, and percent bare ground will be determined. Refer to Appendix C, Mitigation Monitoring Forms, for the Floristic Assessment Form.

Characteristic Native Wetland Species

This metric is derived from the floristic assessment by identifying the native plant species characteristic of the wetland type present in the AA and the surrounding vegetated wetland buffer. The number of characteristic native species present, the percent cover for each species, and their combined percent cover will be determined.

Restored Grassland

This metric is based on an inventory of the co-dominant native plant species (>10% vegetative cover) present in the upland areas of the mitigation site that are outside of the wetland AAs and their surrounding buffers. The number of co-dominant species present, the percent cover for each, the total percent co-dominant species cover, the percentage of native co-dominant species, and the percent cover of native co-dominant species will be determined. In addition, the overall percent vegetative cover for all species, including those that are not co-dominant, will be estimated. Refer to Appendix C, Mitigation Monitoring Forms, for the Grassland Assessment Form.

Baseline Conditions

For the purpose of this report, a general office-level baseline condition assessment was conducted to estimate current conditions onsite and to estimate general mitigation success criteria. Data for the general North Vineyard Specific Plan Area and North Vineyard Greens project site, summarized as Appendix C, Baseline Floristic Data, provide the floristic information from onsite and the region to aid in estimating baseline floristic data. However, more accurate baseline conditions will be determined for each of the wetland types currently on the project site with HGM functional assessments and vegetation surveys onsite prior to project implementation. Table 12 (above) lists the type and acreages for each of the existing wetlands onsite. It is proposed that all three vernal pools (a small isolated complex), the seasonal marsh, and the seasonal swale be surveyed, and that representative examples of the eleven seasonal wetlands be selected for the baseline survey. An initial assessment on the newly created wetlands will be conducted after their hydrology has been evaluated and any design and grading adjustments have been made, but prior to site revegetation.

Mitigation Success Criteria

Based on the HGM functional assessments and vegetation surveys the mitigation site will be measured against interim minimum success thresholds for each of the five years of monitoring as a percentage of the baseline conditions, with minimum required success thresholds at the end of the five-year monitoring period. The preliminary minimum thresholds for mitigation success are summarized in Table 18, Mitigation Success Criteria for NVG Vernal Pools, Table 19, Mitigation Success Criteria for NVG Seasonal Wetlands and Swales, and Table 20, Mitigation Success Criteria for NVG Seasonal Marsh. Appendix C provides the plant species by habitat type at the NVG project site, which helped to estimate the baseline floristic data provided in Tables 18, 19, and 20. The target values for the metrics to be met each year are preliminary and some of these percentages may change once field assessments are underway. DMEC suggests that adjusting thresholds based on actual site conditions is a more effective approach than strictly adhering to these preliminary guidelines.

Thresholds of success for each metric itemized in Tables 18, 19, and 20 must be generally met after five (5) years. Parameters that have values less than the established annual thresholds will require remediation and additional monitoring until the mitigation site conditions are brought up to satisfactory levels. Refer to Appendix D, Mitigation Monitoring Forms, for the General Progress, Observations, and Recommendations Forms.

Table 18. Mitigation Success Criteria for NVG Vernal Pools

Vernal Pool Assessment Area		Baseline (Existing)[27]	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
HGM Functional Score	*1. Surface/Shallow Subsurface Water Storage/ Exchange*	0.72	0.25	0.25	0.50	0.65	0.75	0.95
	2. Landscape Hydrologic Connections	0.65	0.25	0.40	0.50	0.65	0.75	1.00
	3. Element and Compound Cycling	0.76	0.25	0.25	0.50	0.65	0.75	0.96
	4. Organic Carbon Export	0.71	0.01	0.25	0.50	0.65	0.75	0.98
	5. Plant Community	0.51	0.01	0.25	0.35	0.50	0.65	0.78
	6. Faunal Habitat	0.76	0.01	0.25	0.35	0.50	0.75	0.96
	7. Faunal Habitat Interspersion and Connectivity	0.39	0.01	0.15	0.25	0.35	0.50	0.62
	8. Invertebrate Assemblage[28]	-	-	-	-	-	-	-
	9. Vertebrate Assemblage	-	-	-	-	-	-	-
Floristic Assessment	*Total # Species*	25	0	8	12	14	18	20
	Total # Natives	17	0	5	8	11	14	17
	% Native Species	68%	0%	63%	66%	75%	78%	85%
	Total % Cover	50%	0%	10%	20%	30%	40%	50%
	% Cover by Native Species	40%	0%	5%	15%	25%	35%	45%
	% Cover by Nonnative Species	10%	0%	5%	5%	5%	5%	5%
	% Bare Ground	50%	0%	90%	80%	70%	60%	50%
Characteristic Native Species	*# Species*	7	0	2	3	5	7	9
	% Cover	30%	0%	5%	10%	20%	25%	30%
Vernal Pool Buffer		**Baseline (Existing)**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Floristic Assessment	*Total # Species*	21	0	8	12	14	18	20
	Total # Natives	4	0	5	8	11	14	17
	% Native Species	19%	0%	63%	66%	75%	78%	85%
	Total % Cover	70%	0%	15%	30%	45%	60%	70%
	% Cover by Native Species	20%	0%	10%	20%	35%	50%	60%
	% Cover by Nonnative Species	50%	0%	5%	10%	10%	10%	10%
	% Bare Ground	30%	0%	85%	70%	55%	40%	30%
Characteristic Native Species	*# Species*	4	0	2	3	5	7	9
	% Cover	5%	0%	5%	10%	20%	25%	30%

27 Baseline data presented are estimates of existing conditions, as well as for post-mitigation conditions after 5 years.

28 For functions 8 and 9, the *Draft Guidebook* (L.C. Lee et al. 1997) states that the presence of invertebrates and vertebrates should be reported by direct assessment of the monitoring biologist. The number and species of wildlife directly and indirectly observed inhabiting and frequenting the assessment area should be recorded and reported.

Table 19. Mitigation Success Criteria for NVG Seasonal Wetlands and Swales

Seasonal Wetlands and Swales Assessment Area		Baseline (Existing)[29]	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
HGM Functional Score	*1. Surface/Shallow Subsurface Water Storage/ Exchange*	0.72	0.25	0.25	0.50	0.65	0.75	0.95
	2. Landscape Hydrologic Connections	0.65	0.25	0.40	0.50	0.65	0.75	1.00
	3. Element and Compound Cycling	0.76	0.25	0.25	0.50	0.65	0.75	0.96
	4. Organic Carbon Export	0.71	0.01	0.25	0.50	0.65	0.75	0.98
	5. Plant Community	0.51	0.01	0.25	0.35	0.50	0.65	0.78
	6. Faunal Habitat	0.76	0.01	0.25	0.35	0.50	0.75	0.96
	7. Faunal Habitat Interspersion and Connectivity	0.39	0.01	0.15	0.25	0.35	0.50	0.62
	8. Invertebrate Assemblage[30]	-	-	-	-	-	-	-
	9. Vertebrate Assemblage	-	-	-	-	-	-	-
Floristic Assessment	*Total # Species*	26	0	5	8	10	113	15
	Total # Natives	15	0	3	6	8	11	13
	% Native Species	58%	0%	60%	75%	80%	85%	85%
	Total % Cover	75%	0%	20%	35%	50%	65%	75%
	% Cover by Native Species	50%	0%	10%	25%	40%	50%	60%
	% Cover by Nonnative Species	25%	0%	10%	10%	10%	15%	15%
	% Bare Ground	25%	0%	80%	65%	50%	35%	25%
Characteristic Native Species	*# Species*	5	0	2	3	5	6	7
	% Cover	15%	0%	8%	15%	25%	35%	40%
Seasonal Wetlands and Swales Buffer		**Baseline (Existing)**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Floristic Assessment	*Total # Species*	23	0	5	8	10	113	15
	Total # Natives	5	0	3	6	8	11	13
	% Native Species	22%	0%	60%	75%	80%	85%	85%
	Total % Cover	75%	0%	20%	35%	50%	65%	75%
	% Cover by Native Species	15%	0%	10%	25%	40%	50%	60%
	% Cover by Nonnative Species	60%	0%	10%	10%	10%	15%	15%
	% Bare Ground	25%	0%	80%	65%	50%	35%	25%
Characteristic Native Species	*# Species*	5	0	2	3	5	6	7
	% Cover	5%	0%	8%	15%	25%	35%	40%

29 Baseline data presented are estimates of existing conditions, as well as for post-mitigation conditions after 5 years.

30 For functions 8 and 9, the *Draft Guidebook* (L.C. Lee et al. 1997) states that the presence of invertebrates and vertebrates should be reported by direct assessment of the monitoring biologist. The number and species of wildlife directly and indirectly observed inhabiting and frequenting the assessment area should be recorded and reported.

Table 20. Mitigation Success Criteria for NVG Seasonal Marsh

Seasonal Marsh Assessment Area		Baseline (Existing)[31]	Initial	Year 1	Year 2	Year 3	Year 4	Year 5
HGM Functional Scores	*1. Surface/Shallow Subsurface Water Storage/ Exchange*	0.72	0.25	0.25	0.50	0.65	0.75	0.95
	2. Landscape Hydrologic Connections	0.65	0.25	0.40	0.50	0.65	0.75	1.00
	3. Element and Compound Cycling	0.76	0.25	0.25	0.50	0.65	0.75	0.96
	4. Organic Carbon Export	0.71	0.01	0.25	0.50	0.65	0.75	0.98
	5. Plant Community	0.51	0.01	0.25	0.35	0.50	0.65	0.78
	6. Faunal Habitat	0.76	0.01	0.25	0.35	0.50	0.75	0.96
	7. Faunal Habitat Interspersion and Connectivity	0.39	0.01	0.15	0.25	0.35	0.50	0.62
	8. Invertebrate Assemblage[32]	-	-	-	-	-	-	-
	9. Vertebrate Assemblage	-	-	-	-	-	-	-
Floristic Assessment	*Total # Species*	17	0	4	7	9	12	14
	Total # Natives	11	0	2	5	7	10	12
	% Native Species	65%	0%	50%	70%	78%	83%	85%
	Total % Cover	50%	0%	10%	20%	30%	40%	50%
	% Cover by Native Species	40%	0%	5%	15%	25%	35%	45%
	% Cover by Nonnative Species	10%	0%	5%	5%	5%	5%	5%
	% Bare Ground	50%	0%	90%	80%	70%	60%	50%
Characteristic Native Species	*# Species*	6	0	2	3	5	6	7
	% Cover	25%	0%	5%	10%	15%	25%	30%
Seasonal Marsh Buffer		**Baseline (Existing)**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Floristic Assessment	*Total # Species*	24	0	4	7	9	12	14
	Total # Natives	5	0	2	5	7	10	12
	% Native Species	21%	0%	50%	70%	78%	83%	85%
	Total % Cover	50%	0%	10%	20%	30%	40%	50%
	% Cover by Native Species	10%	0%	5%	15%	20%	25%	40%
	% Cover by Nonnative Species	40%	0%	5%	5%	10%	10%	10%
	% Bare Ground	50%	0%	90%	80%	70%	60%	50%
Characteristic Native Species	*# Species*	4	0	2	3	5	6	7
	% Cover	10%	0%	5%	10%	15%	25%	30%

31 Baseline data presented are estimates of existing conditions, as well as for post-mitigation conditions after 5 years.

32 For functions 8 and 9, the *Draft Guidebook* (L.C. Lee et al. 1997) states that the presence of invertebrates and vertebrates should be reported by direct assessment of the monitoring biologist. The number and species of wildlife directly and indirectly observed inhabiting and frequenting the assessment area should be recorded and reported.

CONTINGENCY MEASURES

DMEC fully anticipates the possibility that the site may not satisfy some or all of the stated project criteria. If project standards are not being met at any time during the monitoring period, immediate steps will be taken to develop and implement appropriate contingency measures to restore wetland ecosystem functions to a level of compliance with project requirements.

Specific contingency measures are not outlined herein since approaches must be case specific. For example, excessive plant mortality could occur for a variety of reasons: inappropriate planting location, drought or flood damage, browsing damage, disease, or physical disturbance, to name a few. Clearly, merely replanting the same species in the same locations is not always the appropriate solution. Thus, contingency measures must be based on a detailed analysis of the events or site conditions responsible for any failures.

Finally, the general approach of this mitigation plan is to utilize naturally occurring physical and biological attributes and processes to support and guide the restoration of wetland ecosystem functions onsite. Thus, it is possible that an initial appearance of deviation from the originally stated objectives actually could be natural processes altering the course of the mitigation to one that is slightly different but equally functional. In this regard, this monitoring plan must remain flexible enough to allow the incorporation of changing objectives (Weinstein et al. 1997).

SECTION 6. ACKNOWLEDGEMENTS

This mitigation plan was written by Stephen Hoskinson and Cher Batchelor. David Magney managed this project, and reviewed and edited this report. William Abbott and Mr. Magney prepared graphics for this report. Mr. Magney conducted the site visits and assisted with the revised wetland delineation.

Joel Butterworth, Valley Environmental Consulting, provided technical assistance with an analysis of onsite soil conditions, and suitability of wetland habitat creation within the proposed mitigation site. Matt Gause, formerly of Wildlands, Inc., provided general site evaluation and suitability advise. Craig Hiatt, ECORP, provided background information about the project site wetlands, environmental review, and special-status species present onsite. Diana Rains provided coordination support and background information for this effort.

Andrea Jones, U.S. Army Corps of Engineers, provided guidance throughout the development of this mitigation and monitoring plan. Mary Butterwick, U.S. Environmental Protection Agency, provided DMEC with a copy of the Borden Ranch HGM model guidebook, and provided guidance related to applicability of HGM for this project.

SECTION 7. CITATIONS

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PERSONAL COMMUNICATIONS

Andrea Jones, Regulatory Project Manager, U.S. Army Corps of Engineers, Sacramento, California; Meeting in Sacramento on 27 February 2007 regarding the North Vineyard Greens Section 404 Individual Permit Application.

APPENDICES

APPENDIX A.
PROJECT SITE PHOTOGRAPHS

APPENDIX B.
HGM METHODOLOGY

APPENDIX C.
BASELINE FLORISTIC DATA

APPENDIX D.
MITIGATION MONITORING FORMS