PROSPECTUS

COLLIER CANYON MITIGATION BANK

CONTRA COSTA COUNTY / ALAMEDA COUNTY, CALIFORNIA

Bank Sponsor:

COLLIER CREEK MITIGATION LAND, LLC
3170 Crow Canyon Place, Suite 260
San Ramon, California 94583

Prepared by:

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APN	assessor parcel number
Bank	Collier Canyon Mitigation Bank
BEI	Bank Enabling Instrument
BUOW	burrowing owl
CCML	Collier Creek Mitigation Land, LLC
CE	conservation easement
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
Corps	U.S. Army Corps of Engineers; see also USACE
CRLF	California red-legged frog
CTS	California tiger salamander
CWA	Clean Water Act
DFW	California Department of Fish and Wildlife
DPS	distinct population segment
EPA	U.S. Environmental Protection Agency
HUC	hydrologic unit code
I-80	Interstate 80
I-580	Interstate 580
IRT	Interagency Review Team
JD	jurisdictional determination
lf	linear feet
MBTA	Migratory Bird Treaty Act
NRCS	Natural Resources Conservation Service
NTCHS	National Technical Committee for Hydric Soils
PCE	primary constituent element
PG&E	Pacific Gas & Electric Company
ppt	parts per thousand
PTR	Preliminary Title Report
RWQCB	Regional Water Quality Control Board
SJKF	San Joaquin kit fox
USACE	U.S. Army Corps of Engineers; see also Corps
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
WHF	Wildlife Heritage Foundation

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This report should be cited as: Olberding Environmental, Inc. March 2016. *Prospectus for the Collier Canyon Mitigation Bank, Contra Costa County/Alameda County, California*. Prepared for CCML, Inc., San Ramon, California.

Checklist

Prospectus for Mitigation Banks

The Multi-Agency Product Delivery Team has identified the following requirements for submittal of a Prospectus; additional information may be requested to deem the prospectus complete.

Location	Requirement
Cover	Proposed Bank Name – Use a short name based on a geographic feature, if possible, and include "Mitigation Bank" in the name.
Section 2.1	Bank contacts – Include the name, address, phone, fax, and email for Bank Sponsor, Property Owner, Consultants, etc.
Attachment 1 Section 1.1	General Location map of the Proposed Bank property. Address of the proposed Bank property.
Attachment 1	Accurate current map of the proposed Bank Property on a 7.5-minute USGS map showing proposed boundaries of the mitigation bank.
Attachment 1	Color aerial photographs that reflect current conditions on the proposed Bank Property and surrounding properties.
Section 4.4	Briefly discuss compatibility of the proposed mitigation bank with adjacent property land uses including known and present and proposed zoning designations.
Section 2.0 Section 7.0	Description of how the mitigation bank will be established and operated, including the proposed ownership arrangements and long-term management strategy, and any phases planned (include description of phases, boundaries, target habitat/species, and the number of credits associated with each phase).
Section 2.3	Qualifications of the Bank Sponsor to successfully complete the type(s) of mitigation project(s) proposed, including information describing any similar activities by the Bank Sponsor.
Attachment 6	Approved or preliminary jurisdictional determination (JD) of on-site wetlands and other waters of the U.S.
Sections 4.5, 4.6 and 4.7	Preliminary Biological Resources Survey(s) – This section should describe the biotic and abiotic baseline of the proposed Bank Property and should include descriptions of the following with maps: a. Bank geographic location and features, including topography, hydrology, soils and vegetation;
Section 4.9	b. current functions and services of aquatic resources;
Sections 4.7 and 4.10	c. inventory of all biological resources, including description of vegetation communities and a complete plant species list, presence of federally threatened or endangered species, and/or their habitats, as determined by protocol surveys or other appropriate survey methodology, state-listed threatened and endangered species and other species of special concern, other wildlife species that may be present, and presence of non-native species; and
Section 4.0	d. past and present land uses, including grazing practices.
Attachment 1	Map of the proposed mitigation bank service area(s).

Location	Requirement
Section 3.3	Description of the general need for the mitigation bank and basis for such determination.
Attachment 1	A map depicting other conserved lands in the vicinity of the proposed Bank Property.
Sections 5.0 and 6.0	Bank Objectives/Conceptual Plan – This document describes the objectives of the mitigation bank and activities and methods for establishing, restoring, rehabilitating and/or preserving wetlands and other waters of the U.S. and habitat for federal and state listed species.
Attachment 1	Include maps detailing the anticipated location, acreages, and credits of wetlands and other waters of the U.S., habitat for federal and state-listed species.
Section 6.2	The plan should detail anticipated increases in functions and services of existing aquatic resources and their corresponding effect within the watershed (i.e. habitat diversity and connectivity, floodplain management, or other landscape scale functions).
Section 3.0	Describe the ecological suitability of the site to achieve the objectives of the mitigation bank (i.e., watershed/hydrology analysis, soils topography, compatibility with adjacent land uses, watershed management plans).
Attachment 1	If a restoration site, should include historic aerial photographs and/or historic topographic maps, if available.
Section 6.3	Include proposed Performance Standards and monitoring methods for assessing how the objectives of the mitigation bank will be met.
Section 1.1	Explain how the proposed bank would contribute to connectivity and ecosystem function. Also discuss potential conflicts and compatibility with any conservation plans, CDFW conceptual area plans, or other land use plans, policies or regulations.
Attachment 3	Real Estate Records and Assurances Current (within one year of submittal) Preliminary Title Report indicating any easements or other encumbrances and a figure depicting all relevant property lines, easements, dedications, etc. on the proposed Bank Property.
Section 9.2	Provide a property assessment that summarizes and explains each recorded or unrecorded lien or encumbrance on, or interest in, the proposed Bank Property, including, without limitation, each exception listed in the Preliminary Title Report and describing the manner in which each encumbrance may affect the mitigation bank's operation or habitat services.
Section 9.3	Assurance of sufficient water rights to support the long-term sustainability of the mitigation bank.
Section 9.4	Provide details including ownership information on interest of surface and subsurface mineral rights.
Section 1.1	Identification and description of access to the proposed Bank Property.
Section 2.2	An affirmative statement that a conservation easement covering the proposed Bank Property in perpetuity or fee title transfer of the proposed Bank Property to a specified and approved grantee will occur as part of the mitigation bank establishment.
Section 1.1	Include number of acres of the proposed Bank Property, excluding any easement areas that allow uses incompatible with conservation.
No	Has the proposed Bank Property been: Used as mitigation for previous project(s)?

Location	Requirement
No	Already designated or dedicated for passive park or open space uses, where that use is generally compatible with sustaining biological values?
No	Designated for purposes which are inconsistent with habitat preservation (i.e., lands purchased for roads, landfills, etc.)
No	Acquired by a public entity (e.g., with State Bond Act funds) or provided to a jurisdiction for park or natural open space uses?
No	Are there any other restrictions on the proposed Bank Property?
Not applicable	Details regarding public funding received (if applicable) for restoration, acquisition or other purposes on all or a portion of the proposed Bank Property (e.g., funding source, amount received, purpose, number of acres affected by each purpose, etc.).
Section 5.2	A list of federal, state, and local permits required for construction and operation of the mitigation bank.

Important Definitions

The following definitions found in the Compensatory Mitigation for Losses of Aquatic Resources: Final Rules dated April 10, 2008 (Section 332.2), are used in this Prospectus.

Buffer means an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes marine, and estuarine systems from disturbances associated with adjacent land uses.

Compensatory mitigation means the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances, preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Credit means a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the accrual or attainment of aquatic functions at a compensatory mitigation site. The measure of aquatic functions is based on the resources restored, established, enhanced, or preserved.

Establishment (creation) means the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

Functions means the physical, chemical, and biological processes that occur in ecosystems.

Preservation means the removal of a threat to, or preventing the decline of aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or function.

Re-establishment means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and function.

Rehabilitation means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

1.0 INTRODUCTION

1.1 Overview

The Collier Canyon Mitigation Bank (Bank or Bank Property) is located along the Contra Costa County/Alameda County line north of Interstate 580 (I-580) in Contra Costa and Alameda Counties, California (Figure 1; all figures are located in Attachment 1). The Bank Property is located west of the intersection of Highland Road and Manning Road (Figure 2). The Bank Property is in Section 13, Township 2 South, Range 1 East, and Section 18, Township 2 South, Range 2 East, Mt. Diablo Base and Meridian as shown on the United States Geological Survey (USGS) Tassajara 7.5-minute quadrangle (Figure 3)(Longitude: 121°48'30.5814", Latitude: 37°45'3132"N). An aerial photograph of the Bank Property and surrounding properties is provided in Figure 4, and site photographs documenting existing conditions are located in Attachment 2.

The Bank will consist of a total of 188.62 acres. The portion of the Bank in unincorporated Contra Costa County consists of approximately 169.65 acres (Assessor Parcel Number (APN) 006-200-006-2), and the portion of the Bank in unincorporated Alameda County consists of approximately 18.97 acres (a portion of APN's 903-0002-004 and 905-0005-007).

The 188.62 acre Bank Property straddles the southern border of Contra Costa County and the northern border of Alameda County in an undeveloped area that both counties have identified as having high conservation values. Figure 5, Conserved Lands Map, shows other properties in the vicinity of the proposed Bank that are protected with conservation easements or preserved as open space. The Bank Property is directly north of Eagle Ridge Preserve North and Eagle Ridge Preserve (Preserve Properties). The Preserve Properties consist of multiple turn-key mitigation projects which collectively consist of 695.73 acres of preserved and managed habitat containing wetlands and the same special-status species identified for the Bank. The Bank Property is also southwest of Cayetano Creek Preserve which consists of 37.65 acres of preserved and managed habitat containing approximately 7.63 acres of newly created wetlands (Corps permit # 2005-296-39-S) completed October 2015. Collectively, the Bank and all surrounding Conservation Easement areas will be managed as one large conserved area for the benefit of special-status species totaling 884.35 acres. The establishment of the Bank would contribute toward the general connectivity of these conserved lands to other conserved lands in the Livermore Valley and Mt. Diablo area.

The Bank Property is located at 8540 Manning Road, Livermore, CA 94550. The Bank Property is bounded by Collier Canyon Road to the west, Manning Road to the northeast and Carneal Road to the northwest. Manning Road provides direct legal and insurable right of access to the Bank Property.

The Bank Property contains grass covered rolling hills which serve as a watershed for two well defined partially perennial but primarily intermittent creek watersheds (west branch of Cayetano Creek and Collier Canyon Creek) flowing along the east and west boundaries respectively. Numerous scour pools occur within the creek channels which include patches of scattered willow

riparian habitat and in stream wetland habitats fed by numerous seep features along the embankments. The creeks and seasonal wetlands provide habitat for numerous wildlife species including federally and state threatened California tiger salamander (CTS; *Ambystoma californiense*) and federally threatened and California species of special concern California red-legged frog (CRLF; *Rana draytonii*). The upland habitat also provides habitat for CTS, CRLF, the federally endangered and state threatened San Joaquin kit fox (SJKF; *Vulpes macrotis mutica*) and the federally protected (under the Migratory Bird Treaty Act [MBTA]) and California species of special concern western burrowing owl (BUOW; *Athene cunicularia*).

The overall goals of the Bank are to implement a watershed restoration approach to ensure the long-term sustainability and connectivity of wetlands, riparian woodland, and sensitive plant and wildlife habitats within the Livermore Valley region, reestablish lost or degraded functions and values associated with historic agricultural activities on the Bank property and to replace functions and services of aquatic resources and associated habitats that have been degraded or destroyed as a result of activities conducted in compliance or in violation of Section 404 of the Clean Water Act (CWA), California Fish and Game Code and related laws and regulations within the surrounding region.

The Bank would provide mitigation for both permanent and temporary impacts to waters of the U.S. In addition, the Bank may be used to offset environmental losses resulting from unavoidable impacts related to activities regulated by the California Department of Fish and Wildlife (CDFW) and the San Francisco Bay Regional Water Quality Control Board (RWQCB). The Bank also will replace conservation values of habitats used by special-status plant and wildlife species and may be used to offset environmental losses resulting from impacts to special-status species as regulated by the U.S. Fish and Wildlife Service (USFWS), CDFW, and local jurisdictions.

The Bank Property is located directly adjacent to (just north of) the USFWS designated critical habitat unit 18 for the CTS and is located within the USFWS designated critical habitat unit CCS-2B for the CRLF (Figure 11). The site is within the Mt. Diablo dispersal range for the SJKF. One of the region's largest populations of Congdon's tar plant (*Centromadia parryi* ssp. *Congdonii*) also occurs on the Bank Property and surrounding conserved areas, often in conjunction with San Joaquin spearscale (*Atriplex joaquinana*).

Collier Creek Mitigation Land, LLC. (CCML) is the Bank Sponsor and will be responsible for establishing the Bank and performing all necessary work to demonstrate to the satisfaction of the Interagency Review Team (IRT) that the Bank complies with all the requirements pertaining to Bank development. CCML shall establish the Bank by following the standard Mitigation Banking Proposal Procedures checklists as revised September 2010 by the Multi-Agency Product Delivery Team.

1.2 Scope of Document

This document proposes and describes the establishment, use, operation and maintenance of the Bank. This Prospectus was developed by Olberding Environmental, Inc. on behalf of CCML. This Prospectus is being presented to the IRT which consists of the U.S. Army Corps of

Engineers (Corps), U.S. Environmental Protection Agency (EPA), the USFWS, CDFW, and RWQCB.

1.3 Bank Location

From San Francisco, access to the Bank Property is attained by taking Interstate 580 (I-580) east from Interstate 680 (I-680). Take the North Livermore Avenue exit (exit 52B) toward Livermore. Turn left (north) at North Livermore Avenue and follow it for approximately 3.6 miles. Turn left (west) at Manning Road and follow it for 1.9 miles before turning left (south) into the farmstead at 8540 Manning Road that is the entrance to the Bank Property.

1.4 Mitigation / Conservation Bank Project Description

The Bank Sponsor proposes development of an entrepreneurial mitigation bank on approximately 188.62 acres straddling the southern border of Contra Costa County and the northern border of Alameda County. The purpose of the Bank is to provide access to wetland mitigation credits (seasonal wetland, seasonal pond, riparian woodland, and intermittent and perennial creeks), and upland habitat conservation credits (California tiger salamander, California red-legged frog, San Joaquin kit fox and burrowing owl).

2.0 BANK OWNERSHIP AND OPERATION

2.1 Responsible Parties

Bank Sponsor and Land Manager:	Collier Creek Mitigation Land, LLC 3170 Crow Canyon Place, Suite 260 San Ramon, CA 94583 Contact: Mark Dawson at mdawson@waterholeland.com Phone: (925) 202-9277 Fax: (925) 866-2126
Consultant:	Olberding Environmental, Inc. 193 Blue Ravine Road, Suite 165 Folsom, CA 94630 Contact: Jeff Olberding at jeff@olberdingenv.com Phone: (916) 985-1188 Fax: (916) 985-2288
Current Property Owners:	**Alameda County Property** Collier Creek Mitigation Land, LLC **Contra Costa County Property** Collier Creek Mitigation Land, LLC

Bank Property Owners:	**Alameda County Property** Collier Creek Mitigation Land, LLC 3170 Crow Canyon Place, Suite 260 San Ramon, CA 94583 Contact: Mark Dawson at mdawson@waterholeland.com Phone: (925) 202-9277 **Contra Costa County Property** Collier Creek Mitigation Land, LLC 3170 Crow Canyon Place, Suite 260 San Ramon, CA 94583 Contact: Mark Dawson at mdawson@waterholeland.com Phone: (925) 202-9277
Conservation Easement Holder:	Wildlife Heritage Foundation 563 Second Street, Suite 120 Lincoln, CA 95648 Contact: Pat Shea at pshea@wildlifeheritage.org Phone: (916) 434-2759 Fax: (916) 434-2764
Endowment Holder:	Wildlife Heritage Foundation

2.2 Property Legal Description and Ownership

Separate Preliminary Title Reports (PTRs) were obtained for the separate properties of the Bank in Contra Costa and Alameda Counties (Attachment 3). At the time this Prospectus was being prepared, the Bank Property identified in the PTRs included the Bank, previously recorded conservation easements, and other areas being developed for permittee-responsible mitigation. Updated PTRs for the Bank Property only will be obtained for the Bank Enabling Instrument (BEI).

Collier Creek Mitigation Land, LLC will grant a permanent conservation easement covering the Bank Property in perpetuity to the Wildlife Heritage Foundation (WHF) as part of the bank establishment. WHF has been approved by the USACE, USFWS, and CDFW to hold conservation easements on mitigation lands.

2.3 Qualifications of Bank Sponsor

CCMLis a California-based company that specializes in providing turn-key mitigation solutions for projects that have impacts to endangered species, creeks, and wetland habitats. Established in 2008, CCML has already successfully conserved land in the Livermore Valley. Eagle Ridge Preserve, located immediately south of and contiguous to the Bank, consists of 508.88 acres of prime wildlife habitat preservation, wetland/pond establishment, and creek restoration land. Eagle Ridge Preserve provides customized project-specific mitigation for four separate development projects simultaneously under a single conservation easement. Eagle Ridge Preserve was approved by the USACE, USFWS, CDFW, and the RWQCB. The Eagle Ridge Preserve Conservation Easement was recorded on August 16, 2011.

CCML has also provided customized project-specific mitigation for five local development projects located within Alameda and Contra Costa Counties within the Property. Cayetano Creek Preserve is a 37.65 acre area conservation easement recorded November 2015, providing wetland, riparian and CTS mitigation for the Moller Ranch development project in the City of Dublin. Tassajara Highlands is a 42.54 acre conservation easement recorded October 2015 providing CTS, CRLF, SJKF and Congdon's tarplant mitigation for the Tassajara Highlands residential development project in the City of Dublin. Two other parcels have been set aside for Alameda County Transportation Commission's projects in Alameda County for the 1-580 and State Route 84 widening projects. A fifth parcel has been set aside for the City of Dublin in association with the widening of Dougherty Road. CCML is also proceeding on other potential permittee-responsible and mitigation bank properties in northern California.

3.0 SITE FEASIBILITY AND BANK FEASIBILITY

3.1 Feasibility of the Bank

The Bank Property is particularly suitable as a mitigation / conservation bank for several reasons including:

- **Location**: the Bank Property is located in a rural area surrounded by large properties (several hundreds of acres in size) containing predominantly undeveloped grasslands. The Bank Property is proximate to several large-scale conservation areas including Los Vaqueros Watershed and Reservoir, Morgan Territory Regional Preserve and Brushy Peak Regional Preserve to the north and east, Springtown Preserve to the southeast, and Brown Ranch and Doolan Canyon to the west. The Bank Property is also adjacent to the 508.88-acre Eagle Ridge Preserve to the south, the 37.65-acre Cayetano Creek Preserve to the north and 42.54 acre Tassajara Highlands preserve to the west. Adjacency of the Bank to the other conserved properties allows for strong ecological connectivity to existing protected lands (Figure 6).

  Special-status species: the Bank Property supports multiple plant and animal species that are not widely distributed and are recognized by the State of California and the federal government as in need of preservation or special management. Designated critical habitat for several species occurs on and in close proximity to the Bank

Property, increasing the suitability of this site for designation as a conservation bank. There are several in-stream pools (scour pools) along both Cayetano and Collier Canyon Creeks which hold water year-round. Both CTS and CRLF egg masses have been observed within these in-stream pools, and various life stages of both species have been identified on site between 2010 and 2015. California tiger salamander larvae and adults also were found in three of the four stock ponds on Eagle Ridge Preserve in the summer of 2015 (Figure 12) providing evidence of breeding habitat for CTS. Based on the results of verified observations, both species have been identified in every direction surrounding the Bank Property (Figure 10). Several pair of burrowing owls have been observed to utilize the Bank Property and adjacent Eagle Ridge Preserve. Large mammal burrows have been identified on both properties as well (Figure 20).

- **Site conditions**: past land uses (agricultural – grazing with limited hay cropping) have degraded wetland and upland habitats; however, subsurface soil conditions are intact. The feasibility of establishing seasonal wetlands is considered excellent for several reasons. The primary source of water for wetlands located within the Bank is direct precipitation and sheet flow from adjacent uplands. All proposed wetland creation areas and upland micro-watersheds are entirely contained within the Bank Property or by adjacent conserved areas (i.e. Eagle Ridge Preserve); thus, wetland boundaries and existing drainage patterns will be conserved by establishment of the Bank. The areas proposed for seasonal wetland establishment are relatively flat, with some gently rolling topography (generally no more than 1 or 2 percent slopes). These areas are underlain by restrictive soils, rich in clay and other soil components with low permeability. There are multiple locations where topography can be modified to increase water retention and aquatic habitat without dramatically altering existing site characteristics. A hydrology sufficiency analysis was conducted by Kamman Hydrology and Engineering, Inc. which concludes that there is sufficient water supply to achieve successful establishment of the proposed created wetlands based on direct rainfall alone, even without any surface or groundwater inflows, which would only serve to further enhance the hydrology of the created wetland features (Attachment 4). Based on the results reached by Kamman, a water availability analysis was conducted by ENGEO Inc. in order to develop an understanding of typical flow volumes of Cayetano and Collier Canyon Creeks in order to develop and estimate of available water to sustain various vegetation communities proposed for the channel as part of the mitigation habitat design and also to develop a final water balance for the proposed created wetlands based off the Kamman studies (Attachment 5). The results of the ENGEO analysis showed that the riparian planting plan appears to be sustainable based on an average rainfall year and likely sustainable through years of below and above average rainfall as well; and that adequate hydrology exists to achieve creation of the proposed mitigation wetlands. Based on the previous studies, Balance Hydrologics, Inc. produced a conceptual wetland design memorandum and concluded that all proposed wetland/ponds would provide CTS breeding habitat during years of average rainfall and would hold between one and two feet of water for a period of approximately 120 consecutive days until May 31 or longer between

December and May (a period long enough to allow for CTS to breed and complete metamorphosis in average rainfall years). The Balance Hydrologics report is included in Attachment 6. Subsequent technical documents were produced which provide information on appropriate wetland reference sites in the area and more recent results from hydrology monitoring being conducted at the Cayetano Creek Preserve during the 2015-16 rain year (Attachments 7 and 8).

Establishment of the Bank would eliminate any potential threat of development. Subdivision development plans were initiated on the Bank Property in 2010 by the previous land owner; however, these subdivision plans were put on hold when the Bank Property was placed into contract with CCML.

3.2 Long-Term Sustainability of the Bank

The long-term sustainability of the wetlands and riparian wetlands is good. The wetlands within the Bank Property are being designed based on local hydrologic and meteorological data and will be dependent upon winter and spring rains that inundate the seasonal wetlands and allow for the development of associated biota.

The long-term sustainability of the Bank to provide habitat for special status species is good. The Bank Property currently provides habitat for California tiger salamander, California red-legged frog, and burrowing owl and each of these species have been documented on the site. Establishment of the Bank will result in management of the habitat specifically for the benefit of these species and include protection of these habitats in perpetuity.

3.3 General Need for the Bank

There is a strong need for a wetland mitigation bank in the Livermore Valley and San Francisco Bay watershed. Mountain House Conservation Bank, located in the northeastern portion of Alameda County, has species credits available; however, the closest wetland banks approved by the Corps are North Suisun and Elsie Gridley (Solano County), Burdell Ranch (Marin County) and San Francisco Bay Wetland Mitigation Bank (San Mateo County). None of these wetland banks service the same area as the proposed Bank. During the last five years, Eagle Ridge Preserve, LLC and CCML have provided wetland mitigation on a permittee-responsible project specific basis to several clients with development projects in the Bay Area at Eagle Ridge Preserve and parcels adjacent to the proposed Bank Property. These projects were constructed between 2011 and 2015. There are several other development projects in the entitlement process that will also be needing wetland mitigation within the Livermore Valley and the proposed service area. Based on identified projects and the fact that mitigation banking is generally considered preferable to permittee-responsible mitigation, a mitigation bank is needed.

CCML has historically provided and continues to provide endangered species habitat conservation in the Livermore Valley area. The Bank will also provide conservation credits associated with the aquatic and upland habitats.

Increasing development pressure within Alameda County and Contra Costa County is affecting several other important habitats and protected species, particularly riparian/creek corridors and grasslands and their associated fauna and flora. The CRLF, CTS, SJKF and BUOW are special-status species of major concern in California for which the USFWS and CDFW have developed specific mitigation requirements and protocol; however, very few mitigation and/or conservation banks for these species exist in this region. Similarly, options for mitigating impacts to riparian/creek habitats are limited in this region. The establishment of mitigation and conservation banks is needed to compensate unavoidable impacts resulting from development projects in the region.

The proposed service area will include watersheds within both Alameda County and Contra Costa County which empty into east San Francisco Bay and south San Pablo Bay. The Bank is located in a headwaters region which benefits both destination waters from a biological prospective. The proposed service area will allow for an economically grounded region where no or very few existing alternatives exist for wetland mitigation. The establishment of mitigation and conservation banks is needed to compensate unavoidable impacts resulting from development projects in the region.

3.4 Purpose

The purpose of the Bank is to establish a single phase, multiple-user mitigation bank in the Livermore Valley and the east portion of the San Francisco Bay watershed. Bank credits will be used to offset future, unavoidable impacts to wetlands including ephemeral drainages, intermittent and perennial creeks, seasonal wetlands, stock ponds and riparian woodland, impacts to special-status plants (Congdon's tar plant and San Joaquin spearscale), and impacts to aquatic and upland habitat for special-status wildlife including CTS, CRLF, SJKF and BUOW. The Bank will be constructed in two phases: All wetland creation during phase one and riparian woodland establishment during phase two (Figure 14).

4.0 EXISTING SITE CONDITION DESCRIPTION

The Bank Property predominantly consists of actively grazed grassland habitat occurring on level flats, moderately steep hillslopes, and ridgelines. It is bounded on all sides by open space in the form of grazed rangeland and widely scattered agricultural-residential developments. Portions of Collier Canyon, Carneal and Manning Roads form the western, northern, and eastern boundaries respectively; open space and Eagle Ridge Preserve lie along the southern boundary. A single residence and outbuildings (consisting of barns and sheds that support livestock operations) occurs on the northeastern edge of the Bank Property. The homestead area comprises 3.25 acres and will be excluded from the Bank (Figure 6).

The elevation of the Bank Property ranges from approximately 950 feet in the northwestern portion to approximately 705 feet in the southwestern corner. The overall topography of the Bank Property favors a drainage system from north to south.

The eastern portion of the Bank Property consists of a somewhat broad, low-gradient floodplain valley floor where a series of ephemeral drainages form a portion of the headwaters of the west

branch of Cayetano Creek. This channel eventually forms into a channel feature containing a defined bed and bank which flows diagonally (along a northwest-to-southeast axis) bisecting the greater valley floor. In the northern end of the valley floor, a complex series of truncated low-gradient swales and drainages (impacted by current agricultural practices) intercept and convey runoff from deeply dissected hill slopes surrounding the Bank Property, contributing hydrologic inputs into the local watershed of Cayetano Creek, which is located approximately 1.6 miles to the southeast. Eight constructed wetlands (7.63 acres) have been built along this drainage within Cayetano Creek Preserve.

In the western portion of the Bank Property, Collier Canyon Creek flows towards the south along a well-defined channel. The terraced floodplain of this feature is somewhat narrow, partially constrained by Collier Canyon Road. In some sections of the stream, deep scour pools have formed.

4.1 Historic Land Use

Historically, the Bank Property has been used primarily for cattle grazing and hay production. A review of historical aerial photography suggests that hay crops have been planted in the northern portion of the Bank Property dating back to the 1940's. In 2010, the previous landowners initiated subdivision development plans and four wells were installed at various locations to facilitate the development of the site. The subdivision plans were halted in 2011 when the Bank Property was placed into contract with CCML.

4.2 Current Land Use

Currently, the Bank Property is leased for cattle grazing. No buildings, paved roads, or other developments are present on the proposed Bank Property. Firebreaks have been created along the boundaries of the Bank Property, and have been treated according to local fire control standards (mowing and/or disking) annually prior to June 1st for several decades. Water troughs provide stock water to the cattle. A small (0.07-acre) Pacific Gas & Electric (PG&E) power line easement is located at the southwestern corner of the Bank Property. Extensive cattle grazing has caused some disturbance to the ground surface within the site. Several existing dirt ranch roads allow access throughout the Bank Property. Cattle fencing is present within the Bank Property and maintained by the cattle grazer in a state to restrict cattle to intended grazing areas.

4.3 Surrounding Land Uses

Much of the surrounding land use is grazing and open land and livestock production. Land uses are predominantly agricultural with either grazing or field crop production. Adjacent parcels are currently undeveloped annual grassland/rangeland. All lands to the south are currently used as conservation areas with restricted land use for the preservation of ecological functions and values.

4.4 Zoning and Anticipated Future Land Uses

The Bank Property is surrounded by undeveloped agricultural land on all sides. The adjacent property to the south is Eagle Ridge Preserve, a conservation area of 508.88 acres. There are also several small ranchettes southwest of the Bank Property along Collier Canyon Road.

Alameda and Contra Costa Planning Departments have confirmed that none of the adjacent properties have any proposed general plan or zoning designation changes. The portion of the Bank Property located in Contra Costa County has an Agricultural Lands (AL) General Plan Land Use designation and a zoning designation of Exclusive Agriculture – Parcel 80 Acre Minimum (A-80). The portion of the Bank Property located in Alameda County is located within the Livermore Valley area of the East Alameda County Conservation Strategy area and is identified in the East County Area Plan as Resource Management. The zoning designation is A – Agriculture.

A mitigation bank is compatible with existing and anticipated future land uses.

The Programmatic Biological Opinion stipulates that conservation lands should be located within the EACCS Study Area or should provide a biological justification for acquiring conservation lands outside of the EACCS Study Area. The conservation lands chosen for this Bank fall partially outside of the EACCS Study Area; however, they are immediately adjacent to EACCS Conservation Zone 3 (CZ-3) and are located in the same watershed (Lower Tassajara Creek). Therefore, they are part of the same complex of habitats as EACCS CZ-3. Additionally, the proposed conservation lands are part of a large matrix of open space areas, some of which are already under conservation easements and therefore add value to the conservation area on a landscape level. Based on the existing conditions of these conservation lands, including the known presence of CRLF and CTS, they provide functions and values that are, at a minimum, as high as much of the habitat that could otherwise be used as mitigation within the EACCS Study Area.

4.5 Soil Conditions

The USDA Natural Resources Conservation Service (formerly the Soil Conservation Service) mapped soil types within the Bank Property (NRCS 2016). Since the Bank Property is located in two counties, it is described in two soil survey reports. The following soil types are found on the Bank Property (Figure 7):

- Cc – Clear Lake clay
- CkB – Cropley clay, 2 to 5 percent slopes
- DbE2aa – Diablo clay, 30 to 45 percent slopes, eroded
- DdE – Diablo clay, 15 to 30 percent slopes
- Pb – Pescadero clay loam
- CkBcc – Cropley clay, 2 to 5 percent slopes
- DbD – Diablo clay, 15 to 30 percent slopes
- DbE2 – Diablo clay, 30 to 45 percent slopes, eroded
- DdEcc – Diablo clay, 15 to 30 percent slopes

- LaC – Linne clay loam, 3 to 15 percent slopes
- Pbcc – Pescadero clay loam

All soil map units occurring on the Bank Property contain inclusions that are listed as hydric soils in Alameda and Contra Costa Counties, California (NRCS 2016). Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anoxic conditions in the upper part. Table 1 identifies the soil types by county.

Table 1. Hydric Soils List

Map Unit Symbol and Name	Hydric?	Inclusion Component Name	Landform Type
Contra Costa County			
Cc – Clear Lake clay	Yes	Clear Lake	Basin floor
		Pescadero	Depressions
CkB – Cropley clay, 2 to 5 percent slopes	Yes	Pescadero	Depressions
		Unnamed	Depressions
DbE2aa – Diablo clay, 30 to 45 percent slopes, eroded	Yes	Pescadero	Basin floor
DdE – Diablo clay, 15 to 30 percent slopes	No	Clear Lake	Basin floor
		Pescadero	Basin floor
Pb – Pescadero clay loam	Yes	Pescadero	Rims, valleys
		Clear Lake	Basin floor
Alameda County			
CkBcc – Cropley clay, 2 to 5 percent slopes	Yes	Pescadero	Depressions
		Unnamed	Depressions
DbD – Diablo clay, 15 to 30 percent slopes	Yes	Clear Lake	Basin floor
		Pescadero	Basin floor
DbE2 – Diablo clay, 30 to 45 percent slopes, eroded	Yes	Clear Lake	Basin floor
		Pescadero	Basin floor
DdEcc – Diablo clay, 15 to 30 percent slopes	No	Clear Lake	Basin floor
		Pescadero	Basin floor
LaC – Linne clay loam, 3 to 15 percent slopes	Yes	Clear Lake	Basin floor
		Pescadero	Basin floor
Pbcc – Pescadero clay loam	Yes	Pescadero	Rims, valleys
		Clear Lake	Basin floor

4.6 Hydrology and Topography

The Bank Property is located within the San Francisco Bay 8-digit hydrologic unit code (HUC 18050004) (Figure 8). The watershed divide on the Bank Property is represented by a steep ridgeline, with an elevation of approximately 950 feet at the highest peak. The ridgeline is aligned northwest to southeast across the Bank Property. The area east of the ridgeline falls within the Cayetano Creek watershed and the area west of the ridgeline falls within the Collier Canyon Creek watershed. The west branch of Cayetano Creek and Collier Canyon Creek are both shown as intermittent blue line features on the Tassajara USGS 7.5-minute topographic quadrangle map.

The reach of Collier Canyon Creek that flows through the Bank Property is approximately 3,881 linear feet (lf), with an average width of approximately 15.1 feet; the reach of the west branch of Cayetano Creek within the Bank Property is approximately 4,601 lf, with an average width of approximately 10.9 feet. The valley through which the west branch of Cayetano Creek flows is unconfined and flanked on both sides by moderately steep hillslopes; Collier Canyon Creek is somewhat confined by portions of Collier Canyon Road.

Both of these watercourses are tributaries to the mainstem of Arroyo Mocho which is ultimately tributary to Alameda Creek which flows into San Francisco Bay. Flows from the west branch of Cayetano Creek are discharged into the mainstem channel of Cayetano Creek, located approximately 1.6 miles to the southeast of the Bank Property. Flows from Collier Canyon Creek are discharged directly into Arroyo Mocho Canal, located approximately 3.7 miles to the south. Due to scour and bioturbation by grazing cattle, the creek banks are sparsely vegetated, but long reaches of the bed and bankfull width of both features contain embedded instream wetlands dominated by hydrophytic species.

4.7 Existing Habitat Types

The Bank Property is located along the eastern edge of the *San Francisco Bay Area Subregion* of the California Floristic Province. Generalized plant community classifications were used to classify the habitat types found in the Bank Property. The final classification and characterization of the habitat types of the Bank Property were based on field observations.

The Bank Property supports seven habitat types that consist of annual grassland, alkaline grassland, riparian, emergent marsh, seasonal wetland, swale, and wetland swale. Each habitat is described in detail below. A description of the plant species present within each habitat type is provided below; a plant species list is provided in Attachment 9. Dominant plant species are noted.

4.7.1 Annual Grassland

The vegetation observed in the annual grassland habitat consists of species typical to grazed grassland communities. The dominant grasses observed on the open hillslopes and ridgelines of the Bank Property consist of non-native species including soft chess (*Bromus hordeaceous*), rip-gut brome (*Bromus diandrus*), hare barley (*Hordeum murinum* ssp. *leporinum*) and wild oat (*Avena fatua* and *A. barbata*). Forb (i.e., wildflower) species found intermixed with the grasses

consist of non-native annual and biennial weeds such as prickly lettuce (*Lactuca serriola*), dove geranium (*Geranium molle*), field bindweed (*Convolvulus arvensis*), yellow-star thistle (*Centaurea solstitialis*), common vetch (*Vicia sativa* spp. *nigra*) and shortpod mustard (*Hirschfeldia incana*). Although native species were largely absent in the ground layer in terms of their absolute percent cover, a modest cryptic flora of geophytes (e.g., *Brodiaea, Triteleia*) and other native early-spring blooming species likely persist in the sod.

4.7.2 Alkaline Grassland

This vegetation type occurs primarily on the broad level valley floor along the eastern edge of the Bank Property and is dominated largely by naturalized annual grasses. It occurs on nearly level terrain and is strongly influenced by the presence of dark mineral heavy clay alkaline-saline soil substrates. Dominant naturalized grasses observed included soft chess, perennial ryegrass (*Festuca perennis*), Mediterranean barley (*Hordeum marinum* spp. *gussoneanum*) and rattail fescue (*Festuca myuros*); naturalized, non-native broad-leaved forbs (i.e., wildflowers) observed included filarees (*Erodium botrys* and *E. cicutarium*), strawberry clover (*Trifolium fragiferum*), cut-leaf geranium (*Geranium dissectum*), California bur-clover (*Medicago polymorpha*), and bird's-foot trefoil (*Lotus corniculatus*). Despite the dominant relative percent cover exhibited by the annual grasses, the frequency and distribution of native forbs was moderate and included alkali mallow (*Malvella leprosa*), turkey mullein (*Croton setigerus*), shining peppergrass (*Lepidium nitidum var. nitidum*), Congdon's tarplant (*Centromadia parryi* spp. *congdonii*) and San Joaquin spearscale (*Atriplex joaquiniana*).

4.7.3 Riparian (West Branch of Cayetano Creek; Collier Canyon Creek)

These two creek features within the Bank Property contain elements of both woody and herbaceous riparian (i.e. "streamside") habitat. The woody overstory is sparse along Cayetano Creek and largely absent along Collier Canyon Creek; the dominant tree species observed was red willow (*Salix laevigata*); sub-dominant associates included box-elder (*Acer negundo var. californicum*) and elm (*Ulmus* sp.). In general, the steep banks were sparsely vegetated due to scour and bioturbation (e.g. extensive trampling of the soil by cattle) and contained a mix of upland and hydrophytic species including filaree, soft chess, perennial ryegrass, alkali mallow, turkey mullein, yellow star-thistle, field hedge parsley (*Torilis arvensis*), Italian thistle (*Carduus pycnocephalus*), and narrow-leaved milkweed (*Asclepias fascicularis*).

4.7.4 Emergent Marsh

Embedded in the channels of both watercourses are a series of vegetative stands dominated by a mosaic of robust emergent monocots and a lower profile strata of graminoids (i.e. grasses and grass-like plants) including cattails (*Typha latifolia* and *T. angustifolia*), southern bulrush (*Schoenoplectus californicus*), iris-leaved rush (*Juncus xiphioides*), Baltic rush (*Juncus balticus*), tall flatsedge (*Cyperus eragrostis*), common spike-rush (*Eleocharis macrostachya*), common arrow-grass (*Triglochin maritima*), salt grass (*Distichlis spicata*), and polypogon (*Polypogon interruptus* and *P. monspeliensis*). Forbs observed included yerba mansa (*Anemopsis californica*), common plantain (*Plantago major*), willow-herb (*Epilobium ciliatum*), hyssop loosestrife (*Lythrum hyssopifolium*), and Howell's yampah (*Perideridia howellii*). Where surface

water was present, floating plants including yellow water primrose (*Ludwigia peploides*), water-cress (*Nasturtium officinale*) and duck-weed fern (*Azolla filiculoides*) was commonly observed.

4.7.5 Seasonal Wetland

Generally small and shallow, these features were concentrated near the existing residence along the northeastern portion of the Bank Property. Heavily impacted by bioturbation from livestock, the mapped seasonal wetlands were sparsely vegetated. The more commonly observed herbaceous species included soft chess, perennial ryegrass, Mediterranean barley, fiddle dock (*Rumex pulcher*), and spiny cocklebur (*Xanthium spinosum*).

4.7.6 Swale

A series of ephemeral drainageways are sited between the moderately steep hillslopes throughout the Bank Property. The majority of these swales exhibit very little scour and are generally grassy in terms of their vegetative cover (often a mix of upland and wetland species) and included soft chess, perennial ryegrasss, Mediterranean barley, rabbit's foot grass, and Bermuda grass (*Cynodon dactylon*). Forbs observed included filaree, turkey mullein, alkali mallow, fiddle dock, and Mediterranean lineseed (*Bellardia trixago*).

4.7.7 Wetland Swale

This hydrologically complex, low-gradient feature is located along the southeastern boundary of the Bank Property. The ecotone between upland and wetland habitats is pronounced, with a large percentage of obligate hydrophytes including Baltic rush, iris-leaved rush, yerba mansa, hedge-nettle, and common spike-rush. Common facultative wetland plants include rabbit's-foot grass, salt grass, meadow barley (*Hordeum brachyantherum*) and curly dock (*Rumex crispus*). On the slightly elevated edge of the saturation zone, nearly pure stands of creeping wild-rye (*Elymus triticoides*) were observed.

4.8 Jurisdictional Areas

Site hydrological characteristics, flow, and connectivity were determined in 2012 during a wetland delineation following USACE standard protocol. The hydrology of the site was evaluated using evidence of ponding or saturation, hydrologic signatures on aerial photographs, topographic and topographic characteristics, and presence of field indicators such as surface scour marks, vegetation and debris drift lines, sediment deposits, and/or watermarks. Aerial photographs were examined for signs of ponding, channelization, and routes of connectivity to surrounding features. Surface hydrology within the study area is characterized by a combination of isolated basins, seasonal swales directing overflow within and off of the parcel, and unchannelized overland flow. Dominant features within the study area are microbasins, meandering seasonal swales, and upland.

A preliminary wetland delineation submitted to the USACE on March 1, 2012, by Olberding Environmental identified 7.951 acres of jurisdictional wetlands and jurisdictional waters within the 341-acre Study Area (Figure 9). The USACE conducted a site visit on May 22, 2012, and verified the presence of approximately 2.71 acres of wetlands and approximately 5.09 acres of

other waters of the United States within the Study Area (USACE File No. 2012—00093S) (Attachment 10).

Table 2 provides specific information regarding the existing wetland/waters features identified in the Study Area and on the Bank Property.

Table 2. Jurisdictional Wetlands / Waters of the U.S.

Type of Feature	Acres within	
	Study Area	**Bank**
Jurisdictional Wetlands	2.71	1.80
Jurisdictional Waters		
Cayetano Creek (west branch); 5,813 feet	2.07	0.20
Collier Canyon Creek; 3,881 feet	1.85	0.04
Pools 1-5	0.03	0.023
Drainage 1 (D-1) See note	0.00	0.00
Drainage 2 (D-2) See note	0.00	0.00
Drainage 3 (D-3); 1,397 feet See note	0.64	0.56
Drainage 4 (D-4); 1,103 feet See note	0.41	0.00
Drainage 5 (D-5); 1,722 feet See note	0.09	0.00
Isolated Wetlands See note	0.00	0.00
Subtotal	**5.09**	**1.030**
TOTAL	**7.80**	**2.833**

Note:
The following features were identified as non-jurisdictional:
D-1 0.03 acre; 850 feet
D-2 0.001 acre; 306 feet
Isolated wetlands 0.12 acre
The following jurisdictional features falls partially within the Bank:
Cayetano Creek (west branch)
Collier Canyon Creek
D-3 0.56 acre, 1247 feet
The following Jurisdictional features were identified as within the Study Area but do not fall within the Bank:
D-4 0.41 acre, 1,103 feet
D-5 0.09 acre, 1722 feet

4.9 Aquatic Functions and Values

Wetland functions are defined as a process or series of processes that take place within a wetland. These include the storage of water, transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have value for the wetland itself, for surrounding ecosystems, and for people. Wetland values refer to the benefits that wetlands provide to the environment or to people, and include ecological, social, and economic values. The wetland

functions and values used to analyze wetlands in the Bank Property are: groundwater recharge, groundwater discharge, flood-flow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, wildlife diversity/abundance, aquatic diversity/abundance, uniqueness/heritage and recreation. There are no recreational functions associated with the wetlands.

The Bank Property is currently grazed with a winter to spring grazing season, typically between November and June. Cattle have unlimited access throughout the Bank Property and graze all the habitat types resulting in minimal riparian vegetation along the creeks and drainages and increased sediment and nutrient input into the drainage systems.

Existing wetland functions and values are detailed in Table 3.

Table 3. Existing Wetland Functions and Values

Wetland Functions and Values **General Descriptions**	**Present in Existing Wetlands Onsite?**	**Quality** **Rational for Quality and Presence / Absence of Function**
Groundwater Recharge/Discharge Wetland serves as a groundwater recharge and/or discharge area. Recharge relates to the potential for the wetland to contribute water to an aquifer. Discharge relates to the potential for the wetland to serve as an area where groundwater can be discharged to the surface.	Yes.	**Quality**: Low **Fact**: Riparian woodland habitat can provide groundwater recharge. Seeps provide groundwater discharge. Relatively low soil permeability in the seasonal wetlands does not allow groundwater recharge.
Floodflow Alteration (Storage & Desynchronization) Wetland aids in the reduction of flood damage by attenuation of floodwaters for prolonged periods following precipitation events.	Yes.	**Quality**: Minimal. **Assumption**: Based on the topographic position of the wetlands, slope, and characteristics of the soil, the wetlands onsite do not attenuate floodwaters for prolonged periods following precipitation events
Fish and Shellfish Habitat Effectiveness of seasonal or permanent water bodies associated with the wetland in question for fish and shellfish habitat.	No.	**Quality**: Not applicable. **Fact**: Creeks and wetlands too shallow and duration of ponding interrupted by seasonal drying to support fish or shellfish
Sediment / Toxicant / Pathogen Retention Wetland aids in the prevention of the degradation of water quality by trapping sediments, toxicants or pathogens.	Yes	**Quality**: Low **Assumption**: Based on physical characteristics of onsite wetlands, it is assumed the wetlands trap sediments to a limited extent; however, cattle grazing in the wetlands and riparian woodland increase sediment inputs.
Nutrient Removal / Retention / Transformation Wetland aids in the prevention of adverse effects of excess nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers or estuaries.	Yes	**Quality**: Low **Assumption**: It is assumed that the wetland habitats remove, retain and transform nutrients; however, the length of contact time between the limited wetland vegetation and inundated areas is minimal.

Table 3. Existing Wetland Functions and Values

Wetland Functions and Values General Descriptions	Present in Existing Wetlands Onsite?	Quality Rational for Quality and Presence / Absence of Function
Production Export (Nutrient) Wetland produces food or usable products for humans or other living organisms.	Yes	**Quality**: Moderate **Assumption**: The wetlands contain macroinvertebrates that amphibians and water birds feed upon during periods of surface flooding.
Sediment / Shoreline Stabilization Wetland aids in the stabilization of stream banks and shorelines against erosion.	Yes	**Quality**: Low **Fact**: Wetland vegetation along the creeks serves to protect banks and drainages during periods of flooding; however, wetland vegetation along the drainages is minimal due to cattle grazing.
Wildlife Habitat Wetland provides habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species are considered.	Yes	**Quality**: Low to moderate. **Fact**: Evidence that water birds use the wetlands within the Property; presence of CTS and CRLF. Minimal connectivity to other riparian systems.
Recreation Effectiveness of the wetland and associated watercourses to provide recreational opportunities such as canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland, whereas non-consumptive opportunities do not.	No	**Quality**: Low **Fact**: Site not open to the public.
Education / Scientific Related to the effectiveness of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.	No	**Quality**: Low **Fact**: Site not open to the public.
Uniqueness / Heritage Relates to the effectiveness of the wetland or its associated water bodies to produce certain special values. Special values may include such things as archaeological sites, unusual aesthetic quality, historical events, or unique plants, animals or geologic features, etc.	No	**Quality**: Low **Fact**: Site not open to the public.
Visual Quality / Aesthetics Related to the visual and aesthetic qualities of the wetland	No	**Quality**: Low **Fact**: Site not open to the public.
Threatened or Endangered Species Habitat Relates to the effectiveness of the wetland or associated water bodies to support threatened or endangered species.	Yes	**Quality**: Moderate **Fact**: Habitat for both CTS and CRLF present with verified observations.

4.10 Special Status Species

Properties in this region have historically been utilized as grazing land and dryland farming with limited development. The lack of development has resulted in limited biological observations and survey opportunities. Even so, numerous special-status plants and animals are known to occur in the vicinity based on California Natural Diversity Database (CNDDB) results and personal knowledge of biological conditions in the region.

Species surveys were performed by Olberding Environmental wildlife biologists and other contracted biologists in 2009, 2010, 2011, 2012, 2014 and 2015 on the Property and adjacent Eagle Ridge Preserve. In addition to these surveys, background data was collected and reviewed including aerial photographs, CNDDB, and other regional background information. The assessment also included the review of documents and survey results obtain from LSA Associates work on the Eagle Ridge Preserve site in 2008 and 2009 and Jones and Stokes Associates work performed in association with the Pacific Gas and Electric Tri-Valley Increase Capacity Project in the early 2000's. Occurrence information for the CTS and CRLF has been included as Figure 10.

The following sections provide a summary of the known records for CTS, CRLF, SJKF, and burrowing owls within the vicinity of the Property.

4.10.1 California Tiger Salamander

The Central California distinct population unit (DPS) of CTS is federally and state listed as threatened. The USFWS has identified critical habitat units for the Central California population of the CTS. Each unit contains essential occupied aquatic, upland, and dispersal habitat features. The southern portion of the Bank Property lies adjacent to the northernmost portion of the CTS Critical Habitat Unit CTS-CV-18, Doolan Canyon Unit, in Alameda County (Figure 11) (USFWS 2005) The Bank Property also falls within the Central Valley genetically distinct CTS population as identified by the CDFW (California Department of Fish and Wildlife 2010).

The USFWS has identified the following primary constituent elements (PCEs) for the Central population of CTS; all the PCEs are found on the Bank Property:

- Standing bodies of fresh water (including natural and manmade [e.g. stock]) ponds, vernal pools, and other ephemeral or permanent water bodies which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.

- Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that CTS depend upon for food, shelter, and protection from the elements and predation.

- Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

LSA and Associates found CTS larvae in a stock pond located on the adjacent Eagle Ridge Preserve in a 2009 survey providing evidence of breeding habitat for CTS. Surveys performed in the winter of 2013 by Olberding Environmental also confirmed the presence of CTS in the stock pond. In 2010, Olberding Environmental observed CTS egg masses in pools on the west branch of Cayetano Creek as it flows through the Bank Property. Approximately two seasonal wetlands and five in-stream pools (scour pools) along both creeks have been identified on the Bank Property which provide potential breeding habitat for the CTS. The in-stream pools hold water year-round and both CTS and CRLF egg masses have been observed within these in-stream pools. Verified observations of various life stages of both species have been identified on site and adjacent properties. Recently created ponds have been constructed above and below the Bank within Cayetano Creek Preserve and Eagle Ridge Preserve respectively. Ponds within Eagle Ridge showed CTS in three of five ponds in 2015. One of these ponds just south of the Bank had documented CTS larvae in spring of 2015 just months after it had been constructed in October 2014 showing a strong population in the area. See photos in Attachment 2.

Suitable breeding habitat has been documented in the numerous (approximately 35) ponds identified with a 1.24-mile radius surrounding the Bank Property (Figure 12). These ponds are located within 1.24 miles from the Bank Property boundaries which represent the dispersal ability of the CTS. It is expected that CTS have the ability to freely migrate onto the Bank Property with little obstruction from any migration barriers. Suitable upland habitat is present on and surrounding the Bank Property in the form of small mammal burrows. Several large colonies of ground squirrels were observed on the Bank Property in close proximity of CTS breeding habitat. Due to the presence of upland and breeding habitat within the Bank Property boundaries and the surrounding area, coupled with the numerous known occurrences of CTS on and in close proximity to the Eagle Ridge Preserve, it is highly probable that CTS will continue to inhabit the Bank Property.

4.10.2 California Red-legged Frog

The CRLF is federally listed as threatened and is a California species of special concern. The USFWS has identified critical habitat units for CRLF. Each unit contains essential aquatic breeding habitat, aquatic non-breeding habitat, upland habitat and dispersal habitat. The entire Bank Property falls within CRLF Critical Habitat Unit CCS-2B (USFWS 2010a).

The USFWS has identified the following PCEs for CRLF; all the PCEs are found on the Bank Property:

- Aquatic Breeding Habitat. Standing bodies of fresh water (with salinities less than 4.5 parts per thousand [ppt]), including natural and manmade (e.g. stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

- Aquatic Non-Breeding Habitat. Freshwater pond and stream habitats, as described above, that may not hold water long enough for the species to complete its aquatic life cycle but which provide for shelter, foraging, predator avoidance, and aquatic

dispersal of juvenile and adult CRLF. Other wetland habitats considered to meet these criteria include, but are not limited to, plunge pools within intermittent creeks, seeps, quiet water refugia within streams during high water flows, and springs of sufficient flow to withstand short-term dry periods.

- Upland Habitat. Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mile in most cases (i.e. depending on surrounding landscape and dispersal barriers) including various vegetational types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the CRLF.

- Dispersal Habitat. Accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mile of each other, and that support movement between such sites. Dispersal habitat includes various natural habitats, and altered habitats such as agricultural fields, that do not contain barriers (e.g. heavily traveled roads without bridges or culverts) to dispersal.

California red-legged frogs have been observed within the west branch of Cayetano Creek and Collier Canyon Creek during surveys performed in 2008, 2009, 2010, 2011, 2012, 2013 and 2015. The frogs have been found utilizing the remnant riparian habitat that grows within the creek channels. In March 2015, a single adult CRLF was observed in the channel within the existing willow riparian habitat along Cayetano Creek. Project biologists observed egg masses in scour pools located beneath the existing willow riparian habitat in Cayetano Creek in 2012. Three adults and two juveniles were also observed within this creek channel in 2012. Five adult CRLF were observed within the riparian habitat occurring in Cayetano Creek during surveys performed in September of 2011. In May 2010, a pair of adult CRLF was observed during eyeshine protocol surveys in Cayetano Creek. Eye shine surveys use flashlights or headlamps no brighter than 50,000 candle power to locate frogs by their “eye shines” which reflect light. Surveyors look for these shines by systematically shining their light along the shoreline, the surface of the water, riparian vegetation and the bank within about four feet of the waters edge. Both frogs were observed on a low-lying tree branch toward the northern end of the west branch of Cayetano Creek near the entrance to the Eagle Ridge Preserve. The creek was flowing with roughly three inches of water during the May 2010 survey, although several areas within the creek displayed much deeper pools. Both frogs observed during the May night survey were observed near one of these deeper pools. Mature riparian vegetation occurs throughout this section of the creek, with emergent vegetation occurring within the pools, offering suitable refuge to CRLF. Upland habitat is abundant in upland areas of the creek due to numerous ground squirrel burrows observed during the survey.

In April of 2009 biologists from LSA and Associates conducted eyeshine surveys on Eagle Ridge Preserve resulting in the observation of seven CRLF within the west branch of Cayetano Creek as it flows through the Preserve. Two adults and a juvenile frog were observed in the lowermost portion of the creek where a small group of willow trees (*Salix* sp.) grow. Four additional adults were observed in the uppermost portion of the creek surveyed, again within a section lined in willows and cottonwoods (*Populus fremontii*).

There are several CRLF records within the Cayetano Creek watershed both upstream and downstream of the Bank Property. The closest record is just north in the creek that runs through the Bank Property. In 2005, during pre-construction surveys for a PG&E electrical transmission line, 28 adults and 3 juveniles were observed from the 9th through the 23rd of September 2005, and 9 adults were observed during surveys from December 2005 to August 2006. There is also a record within Cayetano Creek approximately 2.5 miles downstream of the Property.

4.10.3 San Joaquin Kit Fox

The SJKF is federally and state listed as endangered. Although the precise historical range of SJKF is unknown, it is believed to have extended from Contra Costa and San Joaquin Counties in the north to Kern County in the south. The USFWS has not identified critical habitat for this species (USFWS 2010b). The SJKF is known to inhabit grassland habitat north of I-580 between Mt. Diablo to the west and the Altamont Hills to the east. Observations of this species have been recorded approximately four miles to the north of the Bank Property on Morgan Territory Road and four miles to the east at the end of Laughlin Road. While the SJKF has not been observed on the Bank Property, it is within the USFWS recognized dispersal and migratory corridor for Mt. Diablo.

4.10.4 Western Burrowing Owl

The burrowing owl is protected by the federal Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code. It is considered a species of special concern by the CDFW.

Burrowing owls require habitats with three basic attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows or burrow facsimiles; all basic attributes are found on the Bank Property.

There are several burrowing owl records and sightings on and within the vicinity of the Bank Property. Surveys of the Bank Property in the spring of 2016, fall of 2014 and fall of 2011, identified five locations of active burrows. A single owl was observed within the Bank Property during a reconnaissance survey in March 2016. Two pairs of burrowing owls were observed on Eagle Ridge Preserve in 2009 and again in 2011. Numerous occupied burrows were observed on the Bank Property during surveys performed in 2008. One adult was observed by an LSA biologist in the northeastern corner of Eagle Ridge Preserve during a site visit on October 14, 2008. On the northeastern corner of the adjoining Eagle Ridge Preserve, one wintering bird and several breeding pairs plus 7 juveniles were observed in the same location in January 2006 and between April and August of 2006 (CNDDB 2008). Based on these observations, burrowing owls are clearly using the Bank Property during both the breeding and non-breeding season. In addition, the Bank Property contains numerous ground squirrel burrows and a large ground squirrel population.

4.10.5 Congdon's Tarplant and San Joaquin Spearscale

Congdon's tarplant and San Joaquin spearscale are CNPS List 1B.2 species that are considered fairly endangered in California.

Plant surveys in 2009, 2010, 2011, 2012 and 2015 resulted in the identification of robust populations of both Congdon's tar plant and San Joaquin spearscale. Over 23.26 acres of the Bank Property are covered with these species. The densely populated area represents one of the largest populations of Congdon's tar plant in Contra Costa and Alameda Counties.

5.0 BANK PURPOSE, GOALS AND OBJECTIVES

5.1 Goals and Objectives

The overall goals of the Bank are to implement a watershed restoration approach to ensure the long-term sustainability and connectivity of wetlands, riparian woodland, and sensitive plant and wildlife habitats within the Livermore Valley region, reestablish lost or degraded functions and values associated with historic agricultural activities on the Bank Property, and to replace functions and services of aquatic resources and associated habitats that have been degraded or destroyed as a result of activities conducted in compliance or in violation of Section 404 of the CWA, California Fish and Game Code and related laws and regulations in the surrounding region. The Bank will also include conservation lands set aside to enhance, protect, maintain and manage habitat for special status species in perpetuity.

Specific objectives for the Bank include:

- Improve the retention and release of overland flow through natural flow channels and pools.

- Preserve or increase the local populations of CTS and CRLF as suitable aquatic habitat becomes available for re-colonization.

- Design the seasonal wetlands to mimic the design and function of wetlands found at the agency-approved reference site.

- Design all wetlands to fill through naturally occurring rainfall conditions and/or overland flows from the surrounding watershed, and to hold water within these features for the appropriate hydroperiod to encourage the development of self-sustaining wetland features.

- Establish (create) seasonal wetlands and seasonal ponds on landscapes impacted by historic agricultural activities.

- Maintain faunal food webs by perpetuating the availability of suitable foraging and breeding habitat on site for rodents and burrowing owls,

- Establish and rehabilitate wetlands in the landscape in a form that will support breeding and non-breeding CTS, CRLF, BUOW and other native wildlife species.

- Establish riparian woodland along intermittent and perennial drainages impacted by historic agricultural activities.

- Maintain regional and landscape biodiversity by preserving populations of rare and endangered plant and animal species in central Contra Costa and Alameda Counties.

- Assist in meeting defined recovery goals for CTS, CRLF, and SJKF populations as outlined by state and federal wildlife agencies.

5.2 Permits, Agreements and Consultations

The following permits, agreements and consultations are likely required prior to construction at the Bank:

- USACE: Section 404 nationwide permit
  - USFWS: section 7 consultation under the Endangered Species Act
  - State Historic Preservation Officer (SHPO): section 106 consultation under the National Historic Preservation Act

- California Department of Fish and Wildlife
  - Section 1600 Lake and Streambed Alteration Agreement
  - Incidental Take Permit under Section 2081 of the California Endangered Species Act

- San Francisco Bay Regional Water Quality Control Board: Section 401 water quality certification

- State Water Resources Control Board: Section 402 Construction General Permit

- Contra Costa County: Grading permit and environmental review as required by the California Environmental Quality Act (CEQA)

- Alameda County: Grading permit

6.0 DEVELOPMENT PLAN

The Development Plan is the overall plan that will govern construction and habitat establishment activities. The Development Plan will include information about performance standards, monitoring requirements and reporting requirements.

The Development Plan will identify specific avoidance and minimization measures to avoid and minimize impacts during construction of the habitats including measures to avoid impacts on special status species. The Bank proposes two separate phases of construction. The first phase will include creation of all pond and wetland locations. The second phase will include the installation of riparian woodland plantings. See Attachment 1, Figure 14 for exact locations.

During Bank construction, partially degraded areas will be restored as closely as possible to pre-disturbance conditions. Modification of existing features is not proposed except in cases where previous disturbance, such as excavation, farming or disking has changed the natural topography

of the adjacent landscape or feature. Construction will reshape existing topography to reestablish hydrological connectivity in areas where farming or vehicle disturbance has adversely modified the natural topography of the wetland or drainage complex. In several cases, farm road construction, disking and agricultural crop production has interrupted flow between previously connected wetland features. Wetland features will be created in disturbed portions of the Bank Property that show the capacity for natural maintenance of constructed features.

A mix of riparian species will be planted along the drainages where topography and soils are favorable. Riparian woodland creation will create riparian areas beneficial for wildlife. Although the riparian plantings will initially be supplied with supplemental drip irrigation for the first three years, a deep water regime will be used to encourage good taproot development. No grading is proposed as part of the riparian creation activities.

Initial activities after Bank establishment will focus primarily on removal of debris and outdated in-ground infrastructure, including drainage infrastructure, prior to construction. Exterior fencing will be inspected and upgraded, as necessary, to limit unintended uses from adjacent landowners or vehicles and to prevent trespassing.

Bank development would result in temporary disturbance to upland habitat for several listed species. These impacts would be mitigated at a 1:1 ratio through on-site preservation.

6.1 Preserved, Created and Rehabilitated Habitats

Bank establishment will preserve the annual grassland as special-status species upland and dispersal habitat for CTS, CRLF, SJKF and BUOW. The quality of the habitat will be improved through the development and introduction of site-specific grazing prescriptions. A grazing management plan will be prepared that identifies short- and long-term grazing goals to protect and improve rangeland conditions and riparian habitat. Livestock watering locations will be identified outside the riparian corridors.

Bank establishment will result in the creation of seasonal wetlands, seasonal ponds that can provide habitat for CTS and CRLF, and riparian woodland creation. The establishment of wetland habitats will focus on using existing site materials and hydrology to establish wetlands in areas that do not currently support Corps-jurisdictional wetlands. There are 1.80 acres of existing seasonal wetlands on the Bank site (Table 2, Figure 9)

Establishment of 15.78 acres of seasonal wetland habitat is proposed for the valley floor along both creek channels (Figure 13). Seasonal wetlands and seasonal ponds will be established in areas where past land uses have significantly degraded land which previously supported seasonal wetlands, seasonal swales and grasslands. These areas are generally flat and underlain by a shallow impermeable soil layer or layers. A seasonal wetland complex shall be established on soils where past land uses have altered the natural topography and interfered with normal drainage patterns. Seasonal wetlands will be created by excavating and grading in upland areas. Excavation and grading will expose the clay soils to rainfall and storm water flows that will typically pond and/or saturate the root zone on a seasonal basis during the late winter through early spring months. Construction of the wetland features in these areas will include compaction

of the clay layer to reduce infiltration. The goal is to provide the characteristic interception of precipitation and overland flow into seasonal wetlands, seasonal ponds, and swales that will help to ensure habitat diversity and ecosystem health. Details of the wetland complexes can be found within Attachment 7. Soft structured willow fascines will be designed to allow water from the established wetland features back into Collier Canyon Creek at approximately four locations. Shallow, low gradient swales (8-10 % slopes) would be graded allowing introduction from established wetland features back into existing wetland swale features. An example diagram can be found in Attachment 1, Figure 19 (Ernest Seed Products 2014).

Ideally, the design of the seasonal wetlands would be based on historic aerial photographs. Unfortunately, review of historic aerial photographs (Figure 15) indicates that the area was already in agricultural production by the late 1930s; therefore, an offsite reference site was identified approximately 3.5 miles southeast of the Bank Property within Springtown Preserve area (Figure 17). This site was selected because it has a similar landform setting and similar soil properties as the Bank Property. The typical profile is also clay. This reference site is also bounded by two roads similar to the Bank Property. Other nearby reference sites include the Lin Livermore Conservation Area, and two sites east of Vasco Road.

An extensive Hydrology Sufficiency Analysis report of wetlands within the Livermore Valley was completed by Kamman Hydrology & Engineering (KHE in August 2012 (Attachment 4). This report stated that due to soils and topography a total of 29.5 acres of wetlands were sustainable on the Bank Property and the Cayetano Creek Preserve property. Further evaluation was conducted by Balance Hydrologics in December 2013 to include proper hydrology needed for CTS to successfully breed (Attachment 6).

Further testing from ENGEO stated in their Water Availability Analysis showed that there is adequate water to support wetland creation on the Bank and adjacent Cayetano Creek Preserve (Attachment 5). ENGEO developed individual water budgets for average, median and dry year-type precipitation years for the watershed basins. Key findings of the study are listed below:

- Given the site topography and available drainage area (for the Bank and Cayetano Creek Preserve), up to 3.37 acres of CRLF and CTS breeding ponds are sustainable at the site.

- Seasonal freshwater wetlands are sustainable by direct rainfall, with no other surface water or groundwater inflows. Wetland creation is therefore controlled by suitable soil type (i.e. high clay content) and level ground. Wetland hydroperiods would be extended by introducing supplemental water supplies to seasonal wetlands, such as localized runoff (via culverts), groundwater and overbank storm flow from creeks.

- Given the extent of existing jurisdictional wetland, desireable clayey site soil and suitable topography, ENGEO estimates that a maximum of 27.5 acres of seasonal freshwater wetlands (including 3.37acres of pond) are sustainable at the approximately 350-acre project site (the project site includes the Bank and the Cayetano Creek Preserve and other preserved areas).

Restoration Resources has completed the preliminary design based on the conceptual habitat map presented in Figure 13. The location and sizes of the proposed wetlands and ponds is based on the information contained in the ENGEO Water Availability Analysis (Attachment 5), and soils information (Attachment 11).

Cayetano Creek Preserve's 7.63 acre wetlands plus the proposed 15.78 acre seasonal wetlands total 23.41 acres which is below the maximum 29.5 acres originally proposed. A hydrological analysis of the newly created Cayetano Creek Preserve wetlands has been included in Attachment 8. These successful Cayetano Creek Preserve wetlands will be the design template for the proposed conceptual wetlands on the Bank.

The soil analysis of the areas proposed for wetland construction was originally undertaken by Olberding Environmental; additional soil analysis was undertaken by GeoSolve (Attachment 11). All of the soil samples taken by GeoSolve were classified as highly plastic clay. Based on the mostly low percentage of sand tested in soil samples W-1 through W-5, the eastern and western portions of the site are good to excellent locations for proposed wetlands. Soil sample W-6 collected near Collier Canyon Creek had a higher than average sand content indicating a need to locate the wetlands away from the creek in the soils with a higher clay content.

Seasonal ponds will be established along the base of the hill slopes and along the creek channels. The locations of the seasonal ponds have been identified based on the results of the Hydrology Sufficiency Analysis that indicates sufficient hydrology to support the required hydroperiod for successful wetland development and successful breeding habitat for CTS and CRLF. Construction of the ponds will incorporate criteria to increase the potential that these features will be utilized as breeding habitat by both the CTS and CRLF.

Riparian woodland habitat will be established along both Cayetano Creek and Collier Canyon Creek. Both creeks have experienced severe degradation due to years of cattle intrusion. Portions of the creeks flowing through the Property will be fenced off from cattle and watering troughs will be relocated out of the riparian zone. Minor recontouring along both creeks would be required in the heavily damaged areas. Native riparian trees and understory habitat will be planted along the creeks. The Cayetano Creek corridor will also require the removal of noxious/invasive plant species, including yellow star-thistle. A performance standard reference site for riparian woodland will be identified on the Property prior to construction.

Riparian plantings will be chosen from previously successful plant palettes used on surrounding preserved properties. These plantings include native tree and shrub species such as coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobata*), California buckeye (*Aesculus californicus*), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), blue elderberry (*Sambucus nigra caerulea*), coyote brush (*Baccharis pilualris*), California rose (*Rosa californica*), California blackberry (*Rubus ursinus*) red flowered current (*Ribes sanguineum*) and mugwort (*Artemisia douglasiana*).

Two wildlife improvement projects are being considered. The first is creating and/or enlarging backwater areas in and adjacent to the creeks and drainages to provide additional breeding habitat for CTS and CRLF. The location and number of backwater areas cannot be determined

until additional topographic information is developed during the design phase; however, the conceptual design of the backwater areas is shown in Figure 18.

The second possible wildlife improvement project includes enhancing habitat for California ground squirrels (*Otospermophilus beecheyi*) thus creating more upland refugia for CTS and CRLF. Olberding Environmental Inc. has constructed a series of demonstration debris mounds on the adjacent Cayetano Creek Preserve mitigation parcel. These earthen mounds were constructed using large pieces of woody debris, concrete rubble, and rotted logs which were subsequently covered in dirt to create raised earthen mounds that contained voids which serve as an attractant to ground squirrel. Ground squirrels improve the mounds creating burrow networks within. The raised mounds also provide areas of high ground utilized by ground squirrels to watch for predators. CTS spend considerable time (up to 90 percent) in upland habitat. They are not capable of digging their own burrows and therefore utilize burrow networks created by ground squirrels for habitat purposes and to forage for insects and worms. The intent of creating the debris mounds adjacent to restored and created seasonal wetlands proposed for the Collier Canyon Mitigation Bank site is to provide upland habitat opportunities for CTS, CRLF and burrowing owls. Photos of test earth mounds have been included in Attachment 2.

If supported by the IRT, additional details on either or both wildlife improvement projects can be developed and presented in the BEI.

The Development Plan will also contain information about seasonal wetland construction including site preparation activities, grading activities, planting and seeding, temporary irrigation and schedule.

Vegetation (i.e. seeds and roots, and bulbs) and invertebrate materials may be collected from existing wetlands on the Bank Property and used as inoculum in rehabilitated and established wetlands. Onsite collection will be conducted so as to ensure that quantities of vegetation materials harvested at individual collection sites do not exhaust the natural functions of the existing habitat (i.e. no more than 10 percent of dry vegetation, and no more than 5 percent of live vegetation materials (plugs) will be harvested at any one site.

A temporary irrigation system will be required to establish the riparian woodland habitat along the creeks. It is anticipated that the irrigation system will be removed in year 2 or year 3.

Olberding Environmental will perform specialized wetland construction and restoration activities and will monitor construction activities in the field to assure compliance with the design plans. A restoration ecologist will oversee every part of the construction process to ensure permit terms and conditions are achieved and best management practices are used. The restoration ecologist will also approve layouts and make all decisions with the project goals in mind. Construction monitors will also be provided to oversee the day to day activities to protect threatened and endangered species that occur on site.

6.2 Functions and Values after Bank Establishment

Existing wetland functions and values on the Bank Property are identified in Table 3. The amount and value of the existing wetlands functions and values is considered low. Although the Bank Property provides several wetland functions including groundwater recharge, floodflow alteration, production export, and wildlife habitat, these functions are reduced due to current cattle grazing activities in the wetlands and along the drainages and creeks.

Wetland functions and values resulting from Bank establishment are identified in Table 4. The acreage of wetlands after Bank establishment will increase and the quality of wetlands will improve.

Large portions of the Cayetano Creek and Collier Canyon Creek channels would be fenced (Figure 16) from grazing allowing emergent vegetation to fully establish increasing even more the habitat diversity on the site. Floral diversity would increase in the wetland communities once cattle grazing is limited or excluded completely. Existing population of CTS and CRLF would find undisturbed areas for breeding, foraging and dispersal. Pools within the creek channels would allow for a high success of breeding and development with the removal of cattle. An increase in vegetative cover would also benefit insect, small mammal, bird and other wildlife species. This would improve the food base for other wildlife species. The creek channels act as wildlife corridors through the Bank Property but currently provide minimal cover for dispersal and foraging. These functions would increase significantly with the addition of thicker undisturbed vegetation providing better cover within the channels. Vegetation associated with the seasonal wetlands and the instream wetlands would improve filtration of sediment from stormwater run-off ultimately improving the water quality of watersheds contributing to Alameda Creek.

While scattered willow riparian habitat does exist along portions of both creeks, the remnant vegetation consists of only mature trees with no understory or structure due to cattle grazing. Extensive planting of additional native riparian associated plants would be undertaken to initiate the rehabilitation of historic riparian woodland corridors on the Bank Property.

6.3 Performance Standards and Monitoring

6.3.1 Performance Standards

Performance standards are intended to help ensure that overall wetland acreage and habitat functions of mitigation habitats or species replace those acreages or functions that were lost or degraded as a result of other projects in the service area. Performance standards for the established and rehabilitated habitats are identified in Table 5. Additional information on the performance standards will be presented in the BEI.

Table 4. Wetland Functions and Values Resulting from Bank Establishment

Wetland Functions and Values **General Descriptions**	**Present in Existing Wetlands Onsite?** **Rationale for Quality and Presence / Absence of Function**	**Likely Present in Restored Wetlands?**	**Quality** **Rational for Quality and Presence / Absence of Function**
Groundwater Recharge/Discharge Wetland serves as a groundwater recharge and/or discharge area. Recharge relates to the potential for the wetland to contribute water to an aquifer. Discharge relates to the potential for the wetland to serve as an area where groundwater can be discharged to the surface.	Yes **Quality**: Low **Fact**: Riparian woodland habitat can provide groundwater recharge. Seeps provide groundwater discharge. Relatively low soil permeability in the seasonal wetlands does not allow groundwater recharge.	Yes	**Quality**: Improved **Rationale**: Resulting wetlands and seasonal ponds would allow for infiltration of collected water; however, this function would be considered insignificant due to the low permeability of the soil.
Floodflow Alteration (Storage & Desynchronization) Wetland aids in the reduction of flood damage by attenuation of floodwaters for prolonged periods following precipitation events.	Yes. **Quality**: Minimal. **Assumption**: Based on the topographic position of the wetlands, slope, and characteristics of the soil, the wetlands onsite do not attenuate floodwaters for prolonged periods following precipitation events	Yes	**Quality**: Improved **Rationale**: The created seasonal wetlands and riparian woodland, and rehabilitated creek would increase the amount of floodwater stored onsite and the length of storage.
Fish and Shellfish Habitat Effectiveness of seasonal or permanent water bodies associated with the wetland in question for fish and shellfish habitat.	No. **Quality**: Not applicable. **Fact**: Creeks and wetlands too shallow and duration of ponding interrupted by seasonal drying to support fish or shellfish	No	**Quality**: No change **Rationale**: Habitat conditions not present.
Sediment / Toxicant / Pathogen Retention Wetland aids in the prevention of the degradation of water quality by trapping sediments, toxicants or pathogens.	Yes **Quality**: Low **Assumption**: Based on physical characteristics of onsite wetlands, it is assumed the wetlands trap sediments to a limited extent; however, cattle grazing in the wetlands and riparian woodland increase sediment inputs.	Yes	**Quality**: Improved **Rationale**: Modifying the cattle grazing to eliminate grazing in the creeks and riparian corridors will allow the establishment of vegetation that will trap sediments.
Nutrient Removal / Retention / Transformation Wetland aids in the prevention of adverse effects of excess nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers or estuaries.	Yes **Quality**: Low **Assumption**: It is assumed that the wetland habitats remove, retain and transform nutrients; however, the length of contact time between the limited wetland vegetation and inundated areas is minimal	Yes	**Quality**: Improved **Rationale**: Modifying the cattle grazing to eliminate grazing in the creeks and riparian corridors will allow the establishment of vegetation that will trap sediments.
Production Export (Nutrient) Wetland produces food or usable products for humans or other living organisms.	Yes **Quality**: Moderate **Assumption**: The wetlands contain macroinvertebrates that amphibians and water birds feed upon during periods of surface flooding.	Yes	**Quality**: Improved **Rationale**: Area of wetlands increased will increase production export.

Table 4. Wetland Functions and Values Resulting from Bank Establishment

Wetland Functions and Values **General Descriptions**	**Present in Existing Wetlands Onsite?** **Rationale for Quality and Presence / Absence of Function**	**Likely Present in Restored Wetlands?**	**Quality** **Rational for Quality and Presence / Absence of Function**
Sediment / Shoreline Stabilization Wetland aids in the stabilization of stream banks and shorelines against erosion.	Yes **Quality**: Low **Fact**: Wetland vegetation along the creeks serves to protect banks and drainages during periods of flooding; however, wetland vegetation along the drainages is minimal due to cattle grazing	Yes	**Quality**: Improved **Rationale**: Wetland vegetation along the creeks and drainages will be protected from cattle grazing. This vegetation will protect wetland banks and drainages during periods of flooding.
Wildlife Habitat Wetland provides habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species are considered.	Yes **Quality**: Low to moderate. **Fact**: Evidence that water birds use the wetlands within the Property; presence of CTS and CRLF. Minimal connectivity to other riparian systems.	Yes	**Quality**: Improved **Rationale**: Area of wetlands increased will provide more wetland habitat for aquatic species including special-status amphibians. Riparian establishment along the creeks will improve the wildlife corridors and improve connectivity.
Recreation Effectiveness of the wetland and associated watercourses to provide recreational opportunities such as canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland, whereas non-consumptive opportunities do not.	No **Quality**: Low **Fact**: Site not open to the public.	No	**Quality:** No change **Rationale:** Site will not be open to the public.
Education / Scientific Related to the effectiveness of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research.	No **Quality**: Low **Fact**: Site not open to the public.	No	**Quality:** Possible improvement **Rationale**: Site may be able to be used for scientific research
Uniqueness / Heritage Relates to the effectiveness of the wetland or its associated water bodies to produce certain special values. Special values may include such things as archaeological sites, unusual aesthetic quality, historical events, or unique plants, animals or geologic features, etc.	No **Quality**: Low **Fact**: Site not open to the public.	Yes	**Quality:** Improved **Rationale**: Improved land management will improve habitat for unique plants and animals
Visual Quality / Aesthetics Related to the visual and aesthetic qualities of the wetland	No **Quality**: Low **Fact**: Site not open to the public.	No	**Quality:** Improved **Rationale**: Although the site will not be open to the public, the increased amount and quality of the riparian woodland will be visible from the public roads.

Table 4. Wetland Functions and Values Resulting from Bank Establishment

Wetland Functions and Values **General Descriptions**	**Present in Existing Wetlands Onsite?** **Rationale for Quality and Presence / Absence of Function**	**Likely Present in Restored Wetlands?**	**Quality** **Rational for Quality and Presence / Absence of Function**
Threatened or Endangered Species Habitat Relates to the effectiveness of the wetland or associated water bodies to support threatened or endangered species.	Yes **Quality**: Moderate **Fact**: Habitat for both CTS and CRLF present with verified observations.	Yes	**Quality:** Improved **Rationale**: Improved land management activities will increase the habitat for CTS and CRLF.

Table 5. Performance Standards

Category	Performance Standards	Year					
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Seasonal Wetland and Seasonal Pond Creation and Seasonal Wetland Rehabilitation							
Hydrologic – 1	The area intended to be wetlands will exhibit USDA NRCS hydric soil characteristics appropriate for the region by year 5.					X	
Hydrologic – 2	The frequency of inundation and/or saturation will be a minimum of 18.25 continuous days per year.	Wetland delineation	Wetland delineation	Wetland delineation	Wetland delineation	Wetland delineation	
Physical – 1	The area intended to be wetlands will show evidence of ponding in an aerial photograph.					X	
Physical – 2	The area intended to be wetlands will provide diverse physical features or surfaces contributing to depressional wetland habitat function. The site must contain the number of structural patch types found at the selected reference site.		25% or more		50% or more	60% or more	
Physical – 3	The area of intended to be wetlands will be documented in a wetland delineation.			X		X	
Flora – 1	Survivorship: target survivorship of plant species.	70%	70%	70%	70%	70%	
Flora – 2	Recruitment: new, native individuals will be naturally recruited by year 5.					X	
Seasonal Pond (ESA) Creation							
ESA Habitat	The hydroperiod in the created pond will be suitable for successful breeding and metamorphosis of California tiger salamander and/or California red-legged frog as compared to a DFW-approved reference site.					X	
Riparian Woodland Creation							
Flora – 1	Survivorship: target survivorship of tree, shrub, and herb strata container plants. Survivorship will be monitored annually until monitoring documents two years post-irrigation success.	90%	90%	90%	90%	80% two years after cessation of supplemental irrigation	70%

Category	Performance Standards	Year					
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Intermittent and Perennial Creek Rehabilitation							
Hydrologic – 1	The area intended to be wetlands will exhibit USDA NRCS hydric soil characteristics appropriate for the region by year 5.					X	
Physical – 1	The area intended to be wetlands will be documented in a wetland delineation.	Wetland delineation	Wetland delineation	Wetland delineation	Wetland delineation	Wetland delineation	
Flora – 1	Survivorship: target survivorship of plant species.	70%	70%	70%	70%	70%	
Flora – 2	Recruitment: new, native individuals will be naturally recruited by year 5.					X	
Burrowing Owl Habitat							
Use	Burrowing owl activity and use of burrows shall be monitored throughout the Bank development phase.	X	X	X	X	X	

6.3.2 Monitoring

The duration of post-construction monitoring will be five consecutive years. The biological monitor shall monitor the Bank's seasonal wetland complexes during the first five growing seasons following construction. Monitoring will include plants, hydroperiods, and visual surveys for CTS, CRLF and BUOW. The findings of monitoring activities will be documented in brief annual monitoring reports provided to the IRT. Following the 5th annual monitoring, the findings shall be documented in a more detailed 5-year monitoring report to be submitted to the IRT. If annual monitoring reveals that all success criteria have been met for created features then those credits are proposed for release immediately upon documentation of success. Credit releases are contingent upon meeting milestones in addition to ecological performance standards, such as submitting all reports that are due, funding the endowment fund to a certain percentage, and compliance with the BEI including the exhibits.

Surveys following Burrowing Owl Consortium guidelines to ascertain use of artificial burrows by burrowing owls; camera traps (i.e. cameras equipped with motion-detecting or infrared sensor triggered to take a photograph when an animal passes by) may also be deployed at unobtrusive distances from burrow entrances to monitor burrow use with minimal disturbance to owls.

6.3.3 Remedial Actions

If required to achieve performance standards, remedial actions will be identified in the annual monitoring reports. Remedial actions may include but are not limited to: recontouring wetlands, adding inoculum, replanting, monitoring for additional years, and modifying the credit release schedule until the performance standards are met.

7.0 BANK ESTABLISHMENT AND OPERATION

7.1 Bank Establishment

Bank establishment will occur and transfer of credits may begin only when all the following activities have occurred:

1. The BEI has been fully executed by all of the Parties (members of the IRT, Bank Sponsor and Property Owner);

2. The Conservation Easement has been accepted by a Grantee approved by the IRT and recorded; and

3. The Bank Sponsor has complied with its obligation to furnish financial assurances.

7.2 Financial Assurances

The Bank Sponsor is responsible for providing financial assurances for the performance and completion of Bank construction, management, monitoring, and remedial measures. Financial assurances may be in the form of letters of credit. The Bank Sponsor shall provide the following financial assurances:

- Construction security: prior to the first credit release, a construction security must be provided in the amount of 100% of the cost to construct the habitat. The construction security shall be released when construction is complete.

- Performance security: concurrent with the transfer of the first credit, a performance security in the amount of 20 percent of the construction security must be provided. The performance security shall be released when the IRT determines that all of the performance standards have been met.

- Interim management security: concurrent with the transfer of the first credit, an interim management security equal to the estimated cost to implement the interim management plan during the first three years of the interim management period must be provided. The unused balance of the interim management security is released at the end of the interim management period.

- Endowment fund: The amount of the endowment will be based on realistic cost estimates to fully provide for the financial requirements of the long-term management of the Bank. The endowment must be fully funded for three years before disbursements can be made.

7.3 Operation of the Bank

The Bank Sponsor will be responsible for operation of the Bank including transfer of credits, interim and long-term management and monitoring, funding the endowment, maintaining financial records, and any remedial actions that may be required. The Bank Sponsor is also responsible for uploading credit sale agreements and creating ledger transactions in RIBITS.

7.3.1 Transfer of Credits

The number and types of credits will be approved at the time the Bank is established; see below. Credit releases must be approved in writing by the IRT. The Bank Sponsor will be responsible for submitting documentation required to obtain credit releases, tracking credits, and maintaining the credit ledger. Upon the transfer of each and every credit, the Bank Sponsor will submit a copy of the credit purchase agreement and an updated credit transfer ledger to each member of the IRT. At a minimum, each ledger entry will include the following information: permittee, permit number, type of permit, locality, type of impacted system, amount of impacts, amount of debit from the Bank, number of credits remaining in the Bank, and date of transaction.

7.3.2 Interim Management and Monitoring

The purpose of the interim management and monitoring is to document the annual progress of mitigation habitats towards achieving the performance standards and to identify any corrective actions that may be required to ensure their success. Interim management and monitoring activities will be implemented until all performance standards have been met and the endowment fund has been fully funded for one year.

Once the Bank's performance standards have been met and the endowment fund has been fully funded for one year, the Bank Sponsor will implement a long-term management plan that will

ensure that the Bank is managed and monitored in perpetuity to preserve the natural resource functions and values (e.g. habitat for dependent flora and fauna, including federal and state protected species).

7.3.3 Long-Term Management and Monitoring

The long-term management plan will describe long-term management, monitoring and maintenance responsibilities. CCML will retain long-term ownership of the Bank. Long-term management and maintenance of the Bank by CCML will help preserve sensitive species and habitats within the Bank lands in perpetuity. The management of the Bank will limit anthropogenic disturbances that would degrade sensitive species and habitats on the Bank properties as well as ensure monitoring of conditions to identify and reduce challenges to maintenance. Management of the Bank will include adaptive management, as necessary, which incorporates changes to management practices based on Bank annual report results and overall Bank performance and compliance. The Bank will be managed as one grazing entity with the surrounding Conservation Easements.

8.0 CREDITS AND SERVICE AREAS

8.1 Proposed Types and Number of Credits

The proposed types and numbers of credits available for purchase from the Bank are identified in Table 6. The wetland mitigation credits have been calculated based on acreages of available habitat or habitat types accounting for the USACE-verified wetland delineation. In the case of special-status species, conservation values or credits are considered equivalent to available upland grassland habitat acreage within the Bank Property.

8.2 Proposed Credit Release Schedule

The credit release schedule shall be tied to milestones and performance measures.

Upon approval of the BEI, 100 percent of Species Preservation/Upland credits shall be released.

Waters of the U.S. credits for establishment (creation) and rehabilitation shall be subject to the release schedule shown in Table 8.

Table 6. Proposed Types and Number of Credits

Type of Credit	**Credit Ratio** (credits per acre)	**Credits**
Establishment (Creation) Credits		
Seasonal Wetland**surrounds seasonal pond areas	1:1	13.63
CTS and/or CRLF Seasonal Pond[1]	1:1	2.14
Riparian Woodland	1:1	11.14 (6,420 lf)
Restoration Credits		
Seasonal Wetland	1:1	1.80
Perennial Drainage	1:1	0.24
Preservation Credits		
Annual Grasslands / Upland Habitat used by CTS, CRLF, SJKF, BUOW, Congdon's tarplant and San Joaquin Spearscale [3]	1:1	159.11
Ephemeral Drainage	1:1	0.56
TOTAL		**188.62**

Notes:

1. Seasonal pond credits may be sold as wetlands and/or aquatic breeding habitat for CTS and/CRLF. If sold as ESA credit breeding habitat would be confirmed prior to release of credits.
2. Riparian Woodland may be sold as acres or linear feet
3. Annual grasslands / upland credits may be used to compensate for impacts to CTS, CRLF, SJKF (foraging) or burrowing owl habitat. Credits may be used to compensate for any one or a combination of these species, for the same project. A single credit may not be used to compensate for impacts due to multiple projects.

Credit releases are contingent upon meeting milestones in addition to ecological performance standards, such as percentage, and compliance with the BEI including the exhibits.

Table 7. Credit Release Schedule for CRLF and CTS Pond Credits

Release Number	Percent Release	Release Requirements
1	15	Upon Bank Establishment • BEI signed by all Parties • Conservation Easement recorded • Financial assurances
2	25	A minimum of 15% of the Endowment Principal shall be funded prior to the second Preservation Credit Release
3	15	A minimum of 40% of the Endowment Principal shall be funded prior to the third Preservation Credit Release
4	15	A minimum of 70% of the Endowment Principal shall be funded prior to the fourth Preservation Credit Release
5	30	100% of the Endowment Principal shall be funded prior to the fifth Preservation Credit Release
Total	**100**	

Notes:

1. Each Credit Release must be approved in writing by the USFWS and/or CDFW depending on the specifics of the mitigation requirement.
2. Seasonal pond credits may be sold as wetlands and/or aquatic breeding habitat for CTS and/CRLF. If sold as CTS or CRLF credit, breeding habitat would be confirmed prior to release of credits.
3. Until the Endowment is fully funded, the amount of the Endowment must be adjusted annually in accordance with the requirements of the BEI.

Table 8. Credit Release Schedule for Waters of the U.S. Credits

Release Number	Percent Release	Release Requirements
1	15	Upon Bank Establishment • BEI signed by all Parties • Conservation Easement recorded • Financial assurances
2	25	Upon: • submission of the as-built drawings and • minimum of 15% of the Endowment Principal funded
3	15	Upon: • attainment of year two Performance Standards and • minimum of 40% of the Endowment Principal funded
4	15	Upon: • attainment of year three Performance Standards, • a verified Waters of the U.S. jurisdictional determination; and • minimum of 70% of the Endowment Principal funded
5	15	Upon: • attainment of year four Performance Standards and • minimum of 100% of the Endowment Principal funded
6	15	Upon attainment of year five Performance Standards and a verified Waters of the U.S. jurisdictional determination
Total	**100**	

Notes:

1. Each Credit Release must be approved in writing by the IRT.
2. Until the Endowment is fully funded, the amount of the Endowment must be adjusted annually in accordance with the requirements of the BEI.
3. The Bank Sponsor shall submit as-built drawings, with accurate maps of the created, enhanced, and restored Waters of the U.S. to the IRT no later than 90 calendar days following completion of construction.
4. Each Waters of the U.S. Credit Release, with the exception of the first and second, is also contingent upon the Bank Sponsor's submission of the annual report for the current reporting period, and an IRT site visit at the appropriate time of year, as determined by the IRT.
5. Any deviation from the Development Plan or failure to meet Performance Standards may reduce the number of Waters of the U.S. Credits available for release as determined by the USACE, in consultation with the other IRT agencies.

8.3 Service Areas

The following service areas are proposed for the Bank.

- Wetlands and Waters of the U.S.: the service area for wetlands and waters of the U.S. is generally confined to the portion of the San Francisco Bay watershed (Hydrologic Unit Code #18050004) located east of Interstate 880 (I-880). The proposed service

area will include watersheds within both Alameda County and Contra Costa County which empty into east San Francisco Bay and south San Pablo Bay (Figure 21). The Bank is located in a headwaters region which benefits both destination waters from a biological prospective. The proposed service area will allow for an economically grounded region where no or very few existing alternatives exist for wetland mitigation.

- California tiger salamander: the service area for CTS is generally confined to the Bay Area and Central Valley genetically distinct populations as described in *A Status Review of the California Tiger Salamander* (*Ambystoma californiense*), dated January 11, 2010. The proposed service area for CTS (Figure 22) encompasses suitable habitat within all or portions of Alameda, Contra Costa and Solano counties. Collier Canyon Mitigation Bank is directly adjacent to USFWS designated critical habitat unit 18 and creates important dispersal and breeding habitat for the Central California population of CTS which aligns with EACCS and the ECCC HCP goals to provide mitigation and offset local impacts to the species. This service area is loosely based on the agency approved Mountain House Conservation Bank CTS Service Area Map. CTS receives a total score of 49 of 55 points on the Impact/Mitigation scoring sheet for CTS within the EACCS study area.

- California red-legged frog: the service area for CRLF is generally confined to Recovery Unit 4 as identified in the *Recovery Plan for the California Red-legged Frog*, dated May 28, 2002. The entire Bank is located within the Alameda County and Contra Costa County Core Areas as identified in the Recovery Plan. The proposed service area for CRLF (Figure 23) encompasses suitable habitat within all or portions of Alameda, Contra Costa, Santa Clara, San Joaquin, San Francisco and San Mateo Counties. These counties are incorporated into CRLF Recovery Unit 4 which include various critical habitat locations. USFWS designated critical habitat unit CCS-2B (which Collier Canyon Mitigation bank is completely incorporated within), CCS-1, CCS-2A, ALA-1A, and ALA-1B are all areas included within the service area. Local project impacts would be consistent with the Recovery Unit 4 area. CRLF receives a total score of 59 of 60 points on the Impact/Mitigation scoring sheet for CRLF within the EACCS study area.

- San Joaquin kit fox: the service area for SJKF covers the northern Satellite Area as identified in the *San Joaquin Kit Fox* (Vulpes macrotis mutica), *5-Year Review: Summary and Evaluation*, approved February 16, 2010 (U.S. Fish and Wildlife Service 2010). The proposed service area for SJKF (Figure 24) includes portions of Contra Costa, Alameda, San Joaquin, and Stanislaus counties which are where a majority of California National Diversity Database (CNDDB) occurrences take place. This area incorporates the historical dispersal habitat for the SJKF between Mount Diablo and the Altamont Pass. The area includes the northern most extent of regional kit fox habitat. SJKF are known to occur within the ECCC HCP/NCCP inventory area. EACCS states that Altamont Hills provide extensive breeding habitat and a critical linkage in the northern part of species' range. Collier Canyon Mitigation Bank would set aside permanent open space for foraging and dispersal habitat to connect to the kit fox breeding habitat. The Alameda County portion of the Bank falls within

core habitat CZ3. SJKF receives a total score of 19 of 30 points on the Impact/Mitigation scoring sheet for SJKF within the EACCS study area.

- Burrowing owl: the service area for BUOW is generally confined to the southeast portion of the Bay Area.. The proposed service area for BUOW includes all or portions of Contra Costa, Alameda, San Joaquin, Santa Clara, and Stanislaus Counties (Figure 25). The proposed service area is based on the approved Mountain House and Haera Wildlife Conservation Bank service areas with minor adjustments due to Collier Canyon Mitigation Bank's western location. These counties are included as general regional migration corridors for BUOW in the area. This range incorporates numerous known BUOW breeding and wintering sites denoted by the CNDDB. BUOW receives a total score of 30 of 30 points on the Impact/Mitigation scoring sheet for BUOW within the EACCS study area.

9.0 REAL ESTATE RECORDS AND ASSURANCES

9.1 Existing Easements or Encumbrances on the Property

There are two separate Preliminary Title Reports (PTR)s in Attachment 3. The PTR date October 21, 2015 covers the portion of the Bank Property located in Alameda County, and a PTR dated October 20, 2015, covers the portion of the Bank Property located in Contra Costa County. Attachment 3 also includes a plotted easements map showing the location and areas of two small (approximately 0.32 acres combined) easements within Alameda County. There are no easements on the Contra Costa County portion of the Bank Property; therefore, an easements map is not provided for the Contra Costa county portion of the Bank Property.

Review of the conditions of easements, encumbrances, and exceptions was undertaken in order to determine if the likelihood existed for currently allowed uses, activities, or land alterations that could be inconsistent with this project and the proposed preservation and conservation goals.

9.2 Property Assessment

Encumbrances identified in Owner's Policy of Title Insurance (Policy Number 5005-5034-910) dated October 21, 2015, which covers the Bank Property in Alameda County (APNs 903-0002-004 & 905-0005-007) are listed below.

Encumbrances:

- Exceptions # 1 2, and 3 are standard title exceptions related to taxes and assessments.

- Exception # 4 – A PG&E easement for the operation and maintenance of a single pole overhead electrical transmission line is located at the southwest corner of the site. The easement includes the area within 10 feet of either side of the center of the line which extends approximately 305 linear feet across the southwest corner of the Bank Property. The easement includes the right to enter the premises, survey, construct, maintain, operate and control the transmission line and to remove any objects interfering therewith. However, no trees or shrubs exist under the line that may

require future removal; rather, the majority of habitat under the line is grassland. Additionally, existing facilities have already been constructed and only need to be accessed for routine line maintenance. Accordingly, significant impacts to existing vegetation, wetlands, or topography due to rights granted in this easement are not anticipated. This approximately 0.07-acre easement shall be excluded from the Conservation Easement Area and will therefore have no affect on the Bank's operation, habitat services, Conservation Easement or Conservation Values.

- Exception # 5 – Williamson Act Contract. This contract with the County of Alameda is compatible with and has no affect on the Bank's operation, habitat services, Conservation Easement or Conservation Values.

- Exception # 6 – A PG&E drainage easement is located on the southern border of the site. The easement was granted to allow access for grading of a transfer station located on the top of a hill on the adjacent Eagle Ridge Preserve parcel. Removal of vegetation from this land has not been necessary because the grasses are low-growing. Potential future impacts due to power line upgrades are not anticipated as this station was recently constructed. No new impacts to habitat are anticipated from this easement. This approximately 0.25 acre PG&E drainage easement is located in the Eagle Ridge Preserve outside the Bank and will therefore have no affect on the Bank's operation, habitat services, Conservation Easement or Conservation Values.

- Exception # 7 – Certificate of Compliance has no affect on the Bank's operation, habitat services, Conservation Easement or Conservation Values.

Encumbrances identified in the PTR (Order Number 0131-618508ala) dated January 19, 2012, for the portion of the Bank Property in Contra Costa County (APN 006-200-006-2) is listed below.

Encumbrances:

- Exceptions # 1, 2 and 3 are standard title exceptions related to taxes and assessments.

- Exception # 4 – Williamson Act Contract. This contract with the County of Contra Costa is compatible with and has no affect on the Bank's operation, habitat services, Conservation Easement or Conservation Values.

- Exceptions # 5 through # 8 – Ordinances regarding Development Impact Fees. None of these impact fees apply to the Bank Property since it will not be developed and therefore these title exceptions will have no affect on the Bank's operation, habitat services, Conservation Easement or Conservation Values.

- Exceptions # 9 – This exception relates to the existing owner and will be removed from title prior to establishment of the bank. Therefore, these title exceptions will have no affect on the Bank's operation, habitat services, Conservation Easement or Conservation Values.

In summary, no title exceptions have been identified that would affect the Bank's operation, habitat values, conservation easement or conservation values.

9.3 Assurance of Sufficient Water Rights

The water rights run with the land and are part of the property owner rights. There are no third party interests in the surface or sub-surface water rights. Recordation of the conservation easement will protect the water rights.

9.4 Interest of Surface and Sub-Surface Mineral Rights

The surface and sub-surface mineral rights run with the land and are part of the property owner rights. There are no third party interests in the surface or sub-surface mineral rights. Recordation of the conservation easement will prohibit extraction of any minerals from the Bank.

10.0 REFERENCES

California Department of Fish and Game. 2010. Report to the Fish and Game Commission. A Status Review of the California Tiger Salamander (*Ambystoma californiense*). January 11, 2010. Betsy C. Bolster. Wildlife Branch. Nongame Wildlife Program Report 2010-4. Sacramento, California. 57 pp.

California Natural Diversity Database. 2016.

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U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

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U.S. Fish and Wildlife Service. 2010b. San Joaquin Kit Fox (*Vulpes macrotis mutica*), 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento, California. 121 pp.

ATTACHMENT 1
FIGURES

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Figure 2	Vicinity Map
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Figure 4	Aerial Photo Map
Figure 5	Conserved Lands Map
Figure 6	Adjacent Conservation Easement Map
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Figure 24	Proposed San Joaquin Kit Fox Service Area
Figure 25	Proposed Burrowing Owl Service Area

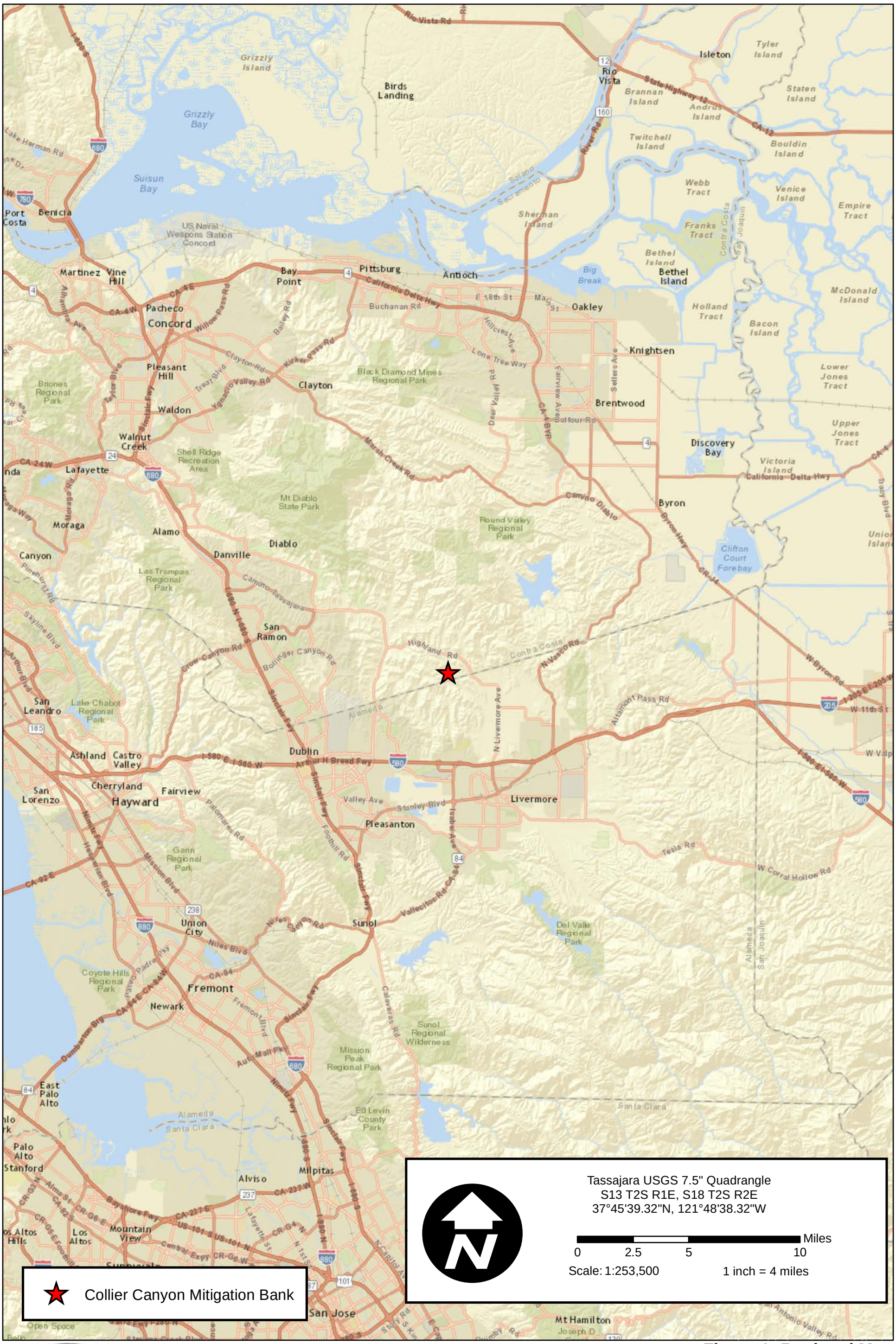

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Figure 1: Regional Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

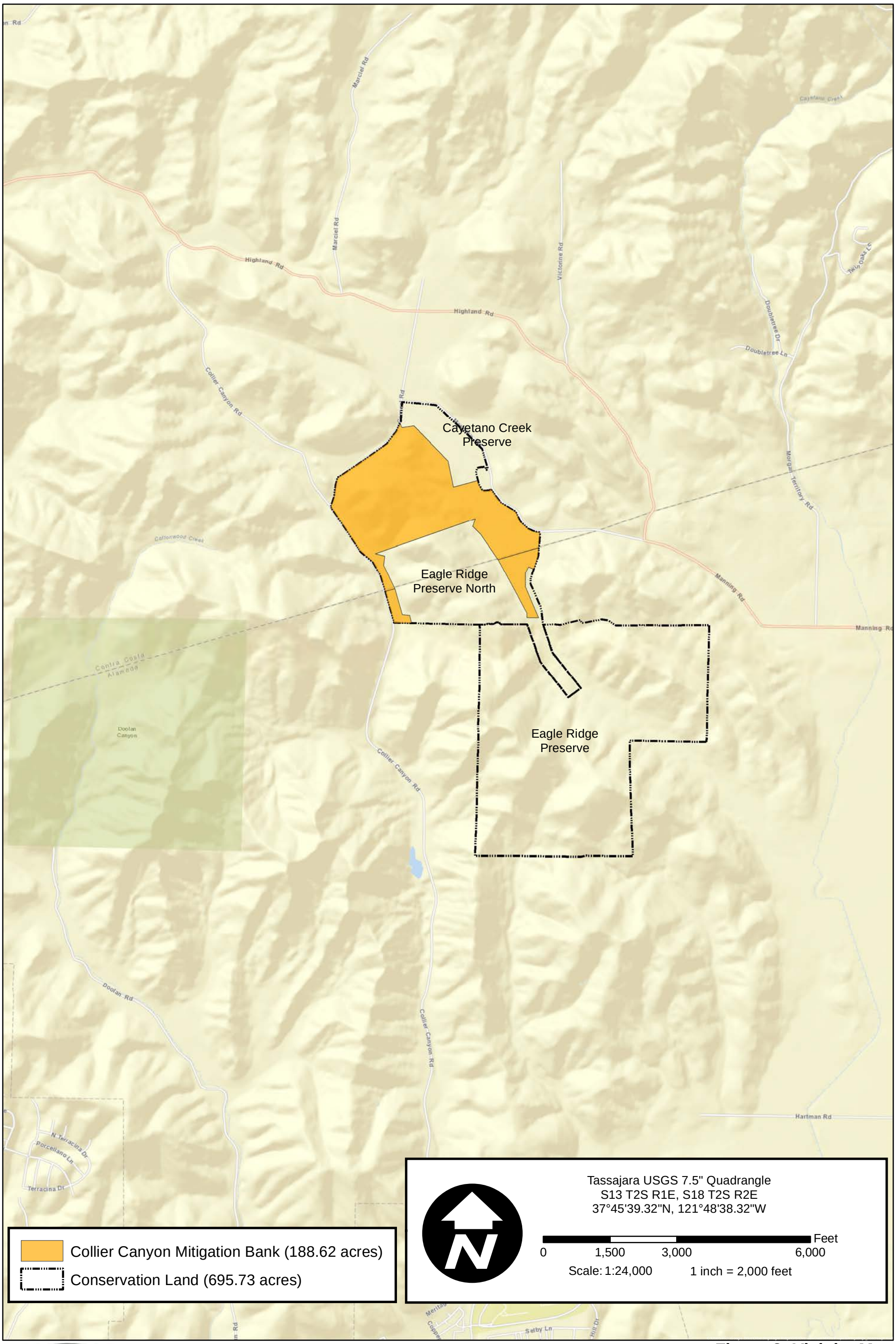

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Figure 2: Vicinity Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

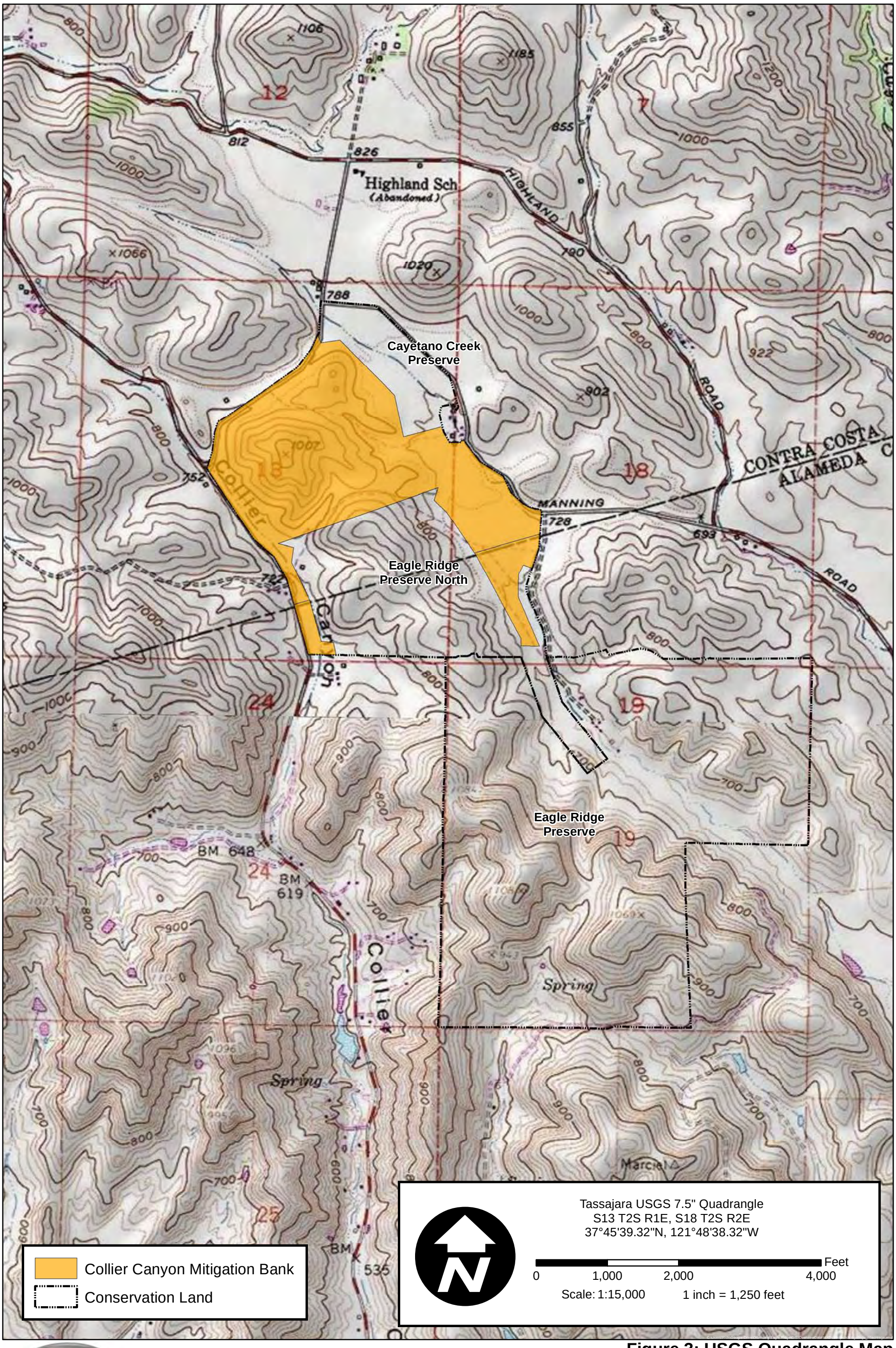

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Figure 3: USGS Quadrangle Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

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Figure 4: Aerial Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

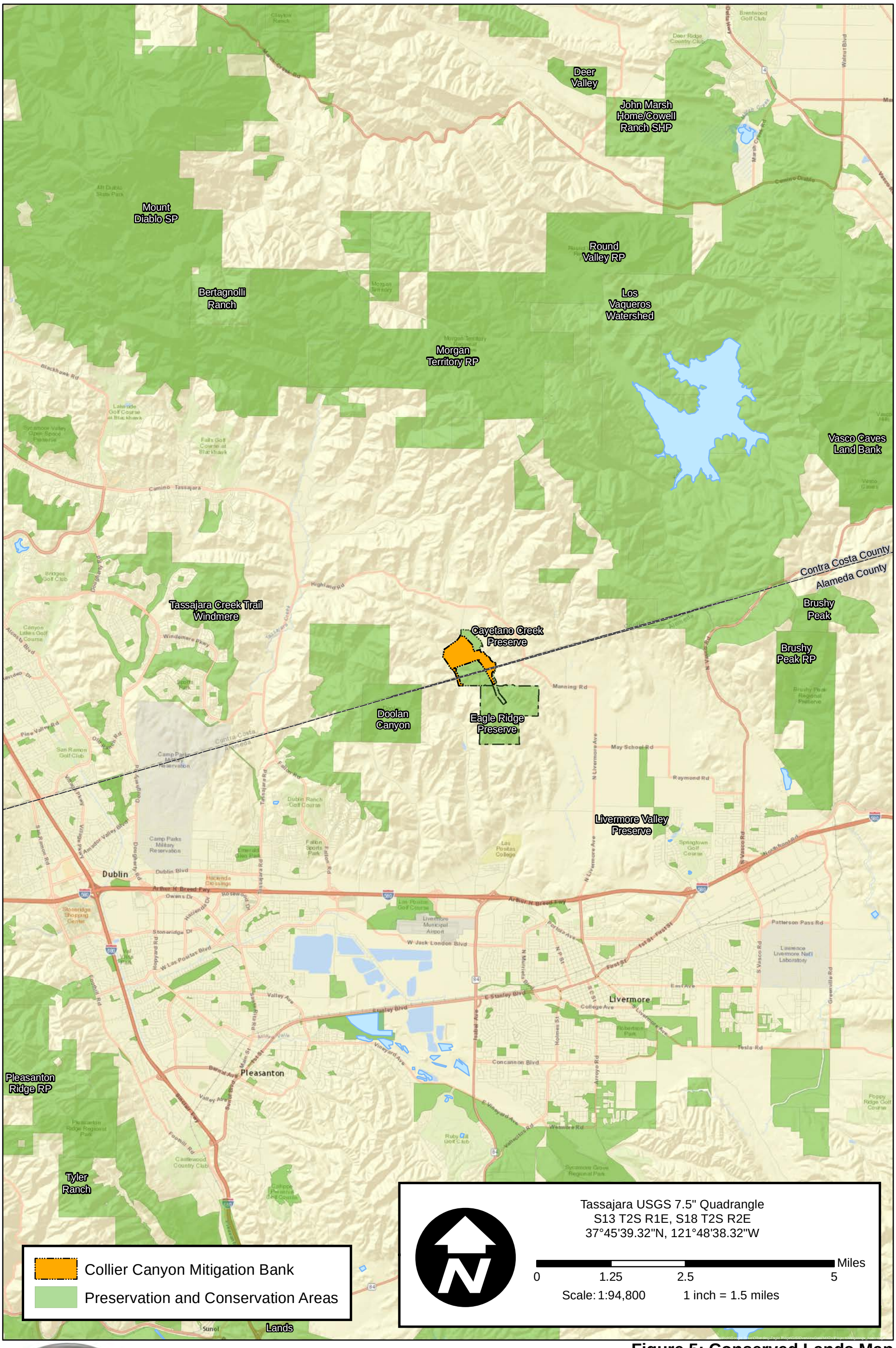

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Figure 5: Conserved Lands Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

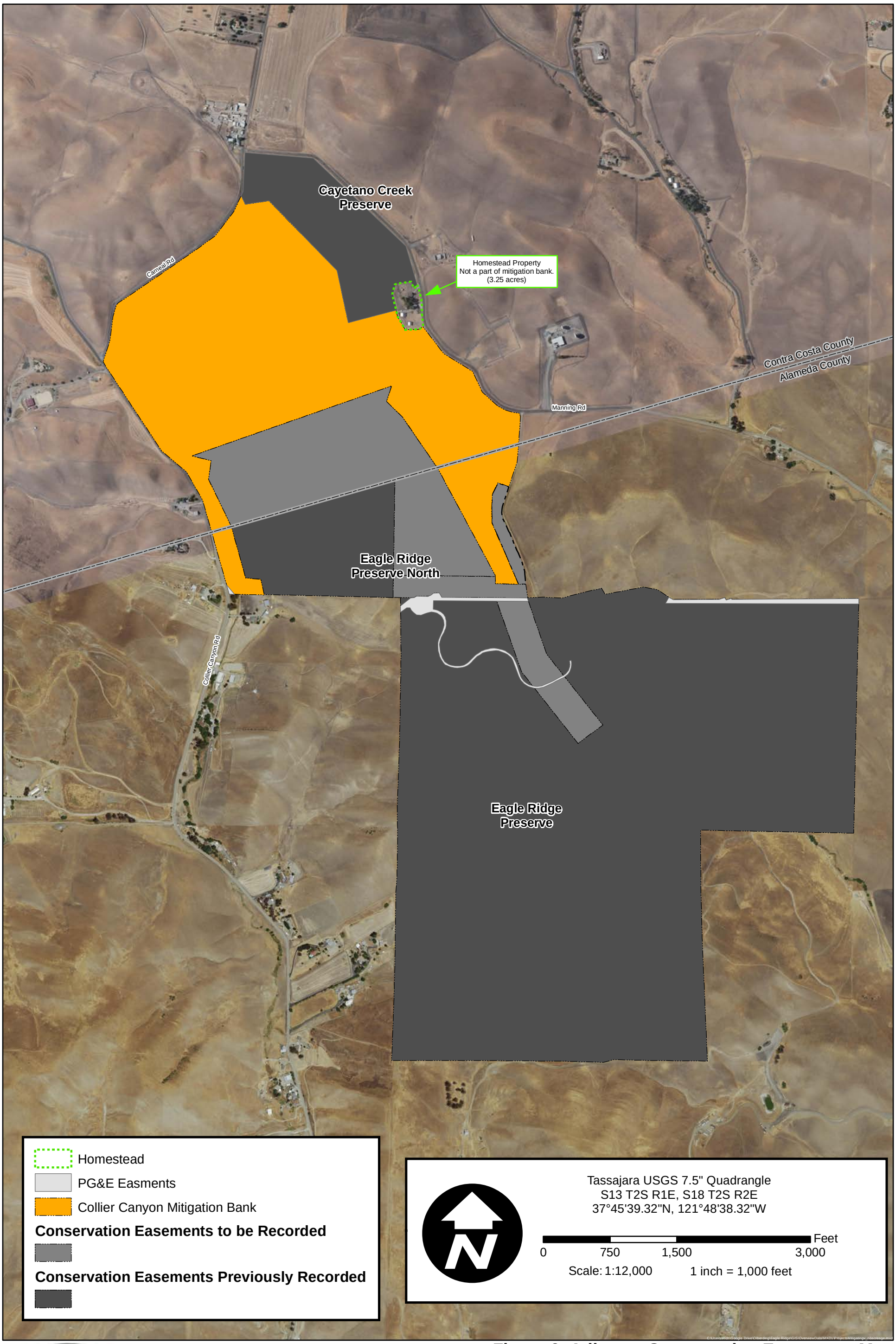

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Figure 6: Adjacent Conservation Easements Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

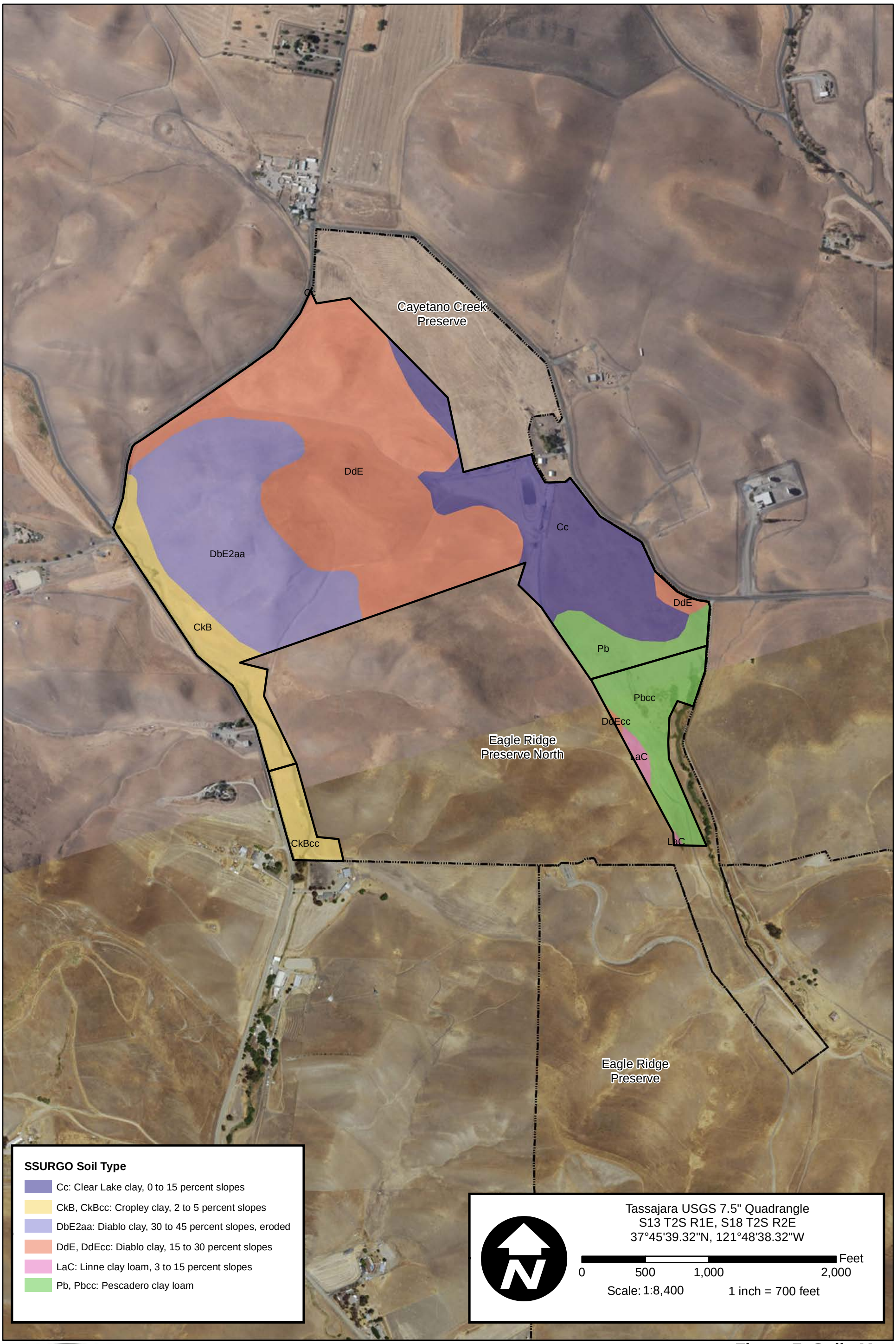

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Figure 7: Soils Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

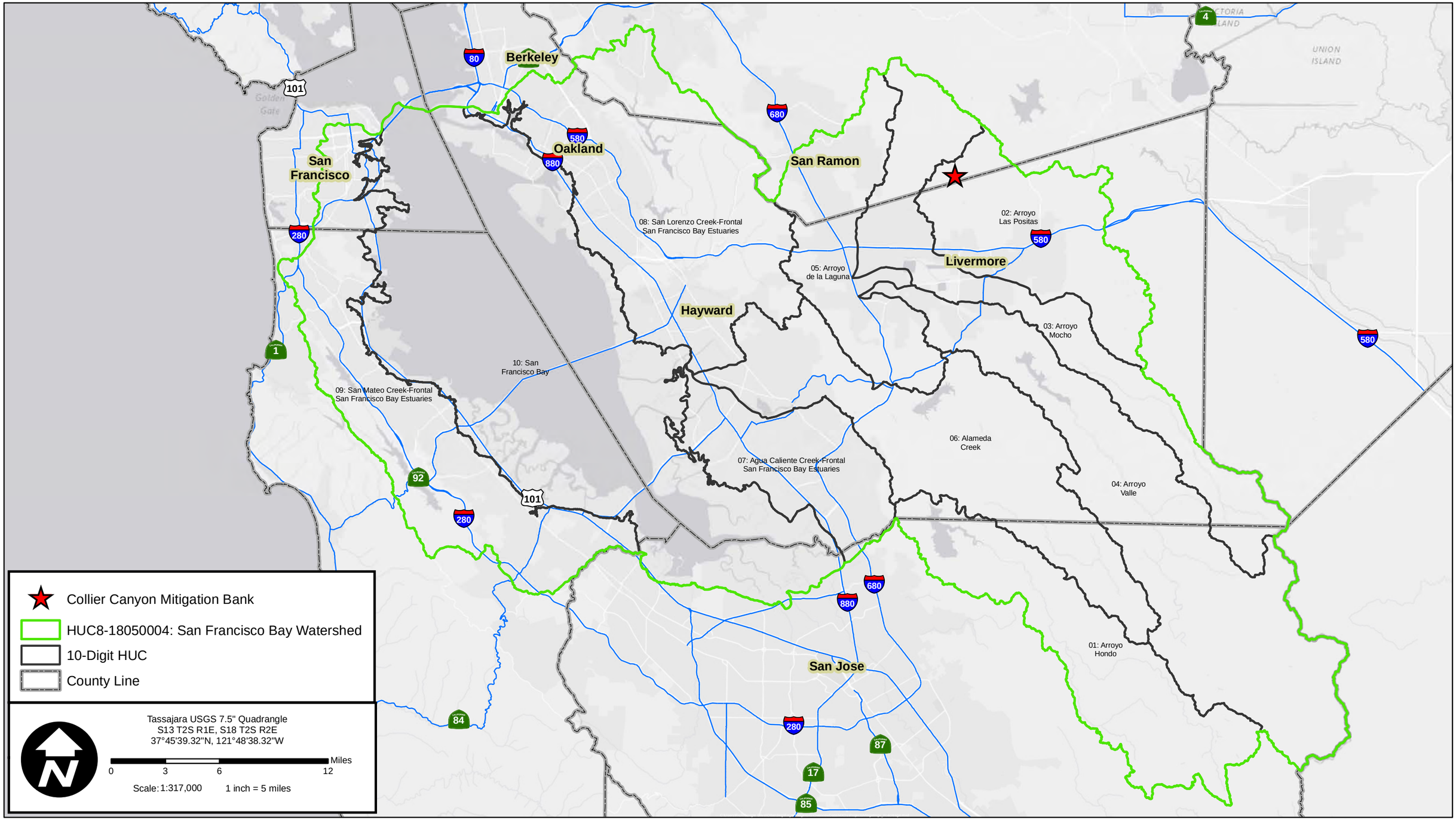

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Figure 8: 10-Digit HUC Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

culvert
culvert
T6
CAYETANO CREEK WEST BRANCH
culvert
culverts
Pool #1
D-1
Isolated Waters
culvert
APNs 903-0002-004
& 905-0005-007
CONTRA COSTA COUNTY
D-2
Isolated Wetlands
Isolated Waters
T5
a
b
Pool #2
D-3
COLLIER CANYON CREEK
T7
T1
Pool #3
T2
T3
D-4
T8
Pool #5
Pool #4
APN 006-200-006-2
ALAMEDA COUNTY
CAYETANO CREEK WEST BRANCH
D-5
T4
0 250 500 1,000 Feet

Figure 9
Collier Canyon
Mitigation Bank
Jurisdictional Delineation Map

Alameda County / Contra Costa County
California

Olberding Environmental, Inc.
3170 Crow Canyon Place, Suite 260
San Ramon, California 94583
Phone: (925) 866-2111

- Property Boundary
- Data Point
- T (Transect)
- Jurisdictional Wetland
- Jurisdictional Waters with instream wetlands
- Pool
- Ephemeral Drainage
- Non-jurisdictional waters
- Non-jurisdictional wetland

U.S. Army Corps of Engineers
San Francisco District
Regulatory Branch

Jurisdictional Determination
USACE File #2012-00093
Collier Creek Mitigation Bank Site
Dated, 8/8/2012
Accurate as mapped

Waters of the US - Area subject to Section 404 Clean Water Act jurisdiction 5.09 acres

Wetlands - Area subject to Section 404 Clean Water Act jurisdiction 2.71 acres

Project Boundary

Jurisdictional Wetlands (2.71 acres)

Seasonal Wetland (1.61 acre)
Seasonal Swale (1.10 acre)

Jurisdictional Waters (5.09 acres)

Cayetano Creek (West branch)
(2.07 acres; 5,813 linear feet)
Average width = 10.9 feet

Collier Canyon Creek
(1.85 acres; 3,881 linear feet)
Average width = 15.1 feet

Pools 1 - 5 (0.03 acre)

Ephemeral Drainages
D-3 = 0.64 acre; 1,397 feet
D-4 = 0.41 acre; 1,103 feet
D-5 = 0.09 acre; 1,722 feet

Non-Jurisdictional

Isolated Wetlands (0.12 acre)

Isolated Waters (0.031 acre)
(D-1 = 0.03 acre; 850 feet)
(D-2 = 0.001 acre; 306 feet)

N

1 inch = 200 feet

Township 2 S, Range 1 E, Section 13 and
Township 2 S, Range 2 E Section 18; M.D.M.
Image Source: USDA NAIP 2009
Field Verified by U.S. Army Corps of Engineers
on May 22, 2012

LEGEND

Collier Canyon Mitigation Bank

Conservation Land

5-mile Buffer

Observed Occurrences

California red-legged frog

California tiger salamander

CNDDB Occurrences

California red-legged frog

California tiger salamander

Information Provided by CNDDB, Agencies, Other Consultants, and In-House Staff Communication

0 625 1,250 2,500 Feet

Tassajara USGS 7.5" Quadrangle
S13 T2S R1E, S18 T2S R2E
37°45'39.32"N, 121°48'38.32"W

0 1 2 4 Miles

Scale: 1:84,000 1 inch = 7,000 feet

ENVIRONMENTAL INC.

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Phone: (916) 985-1188

Figure 10: CRLF and CTS Occurrences Within a 5-Mile Radius
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

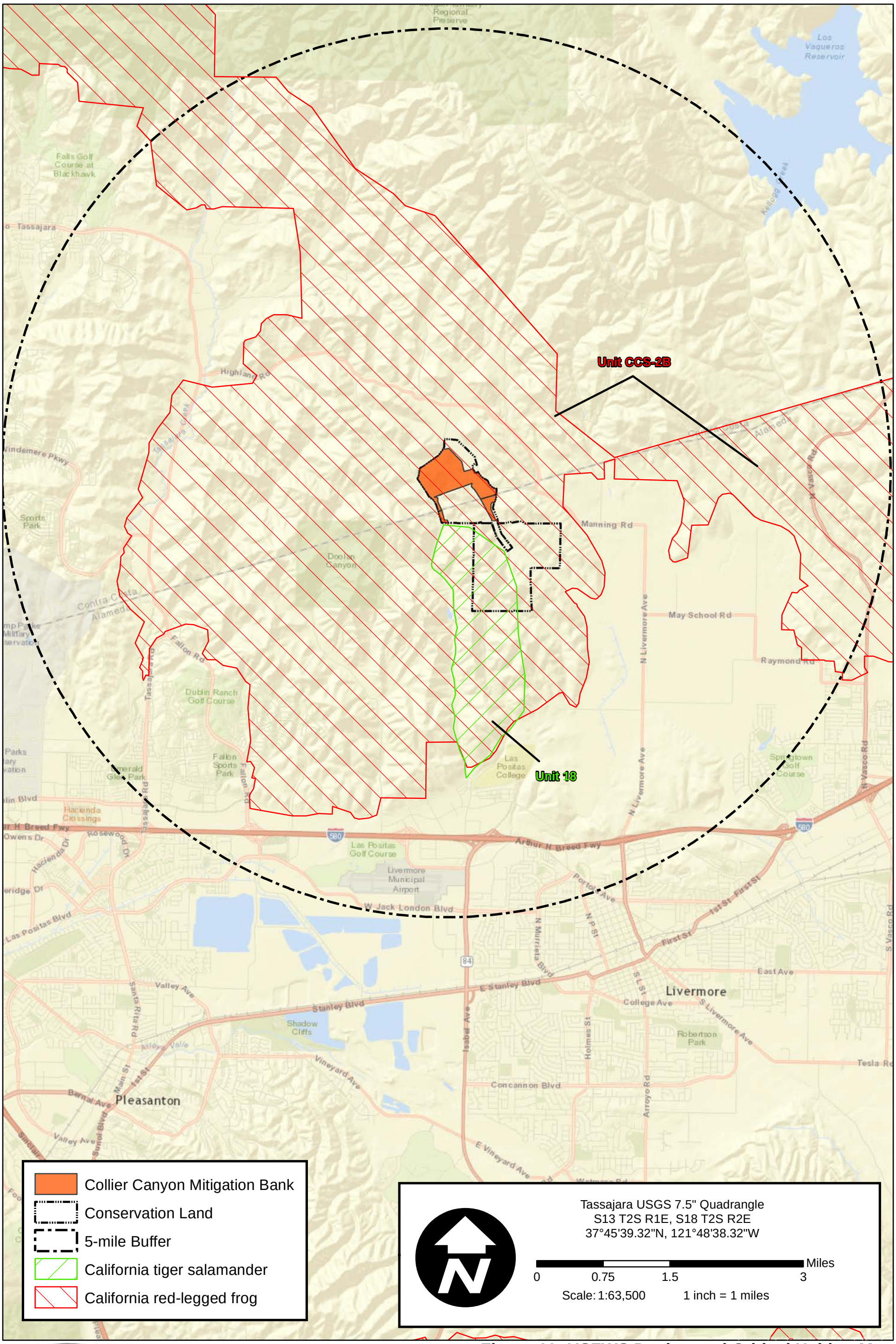
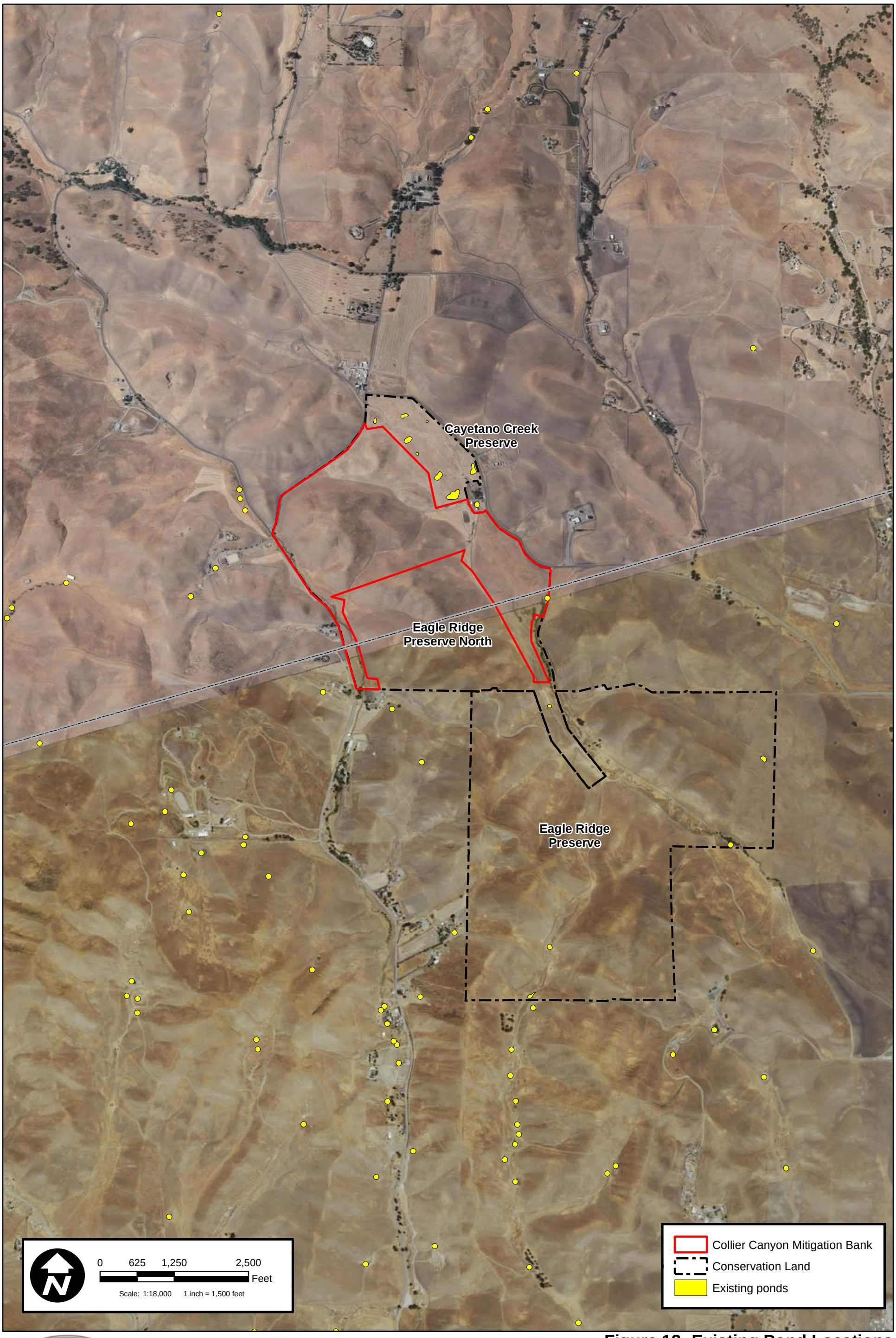


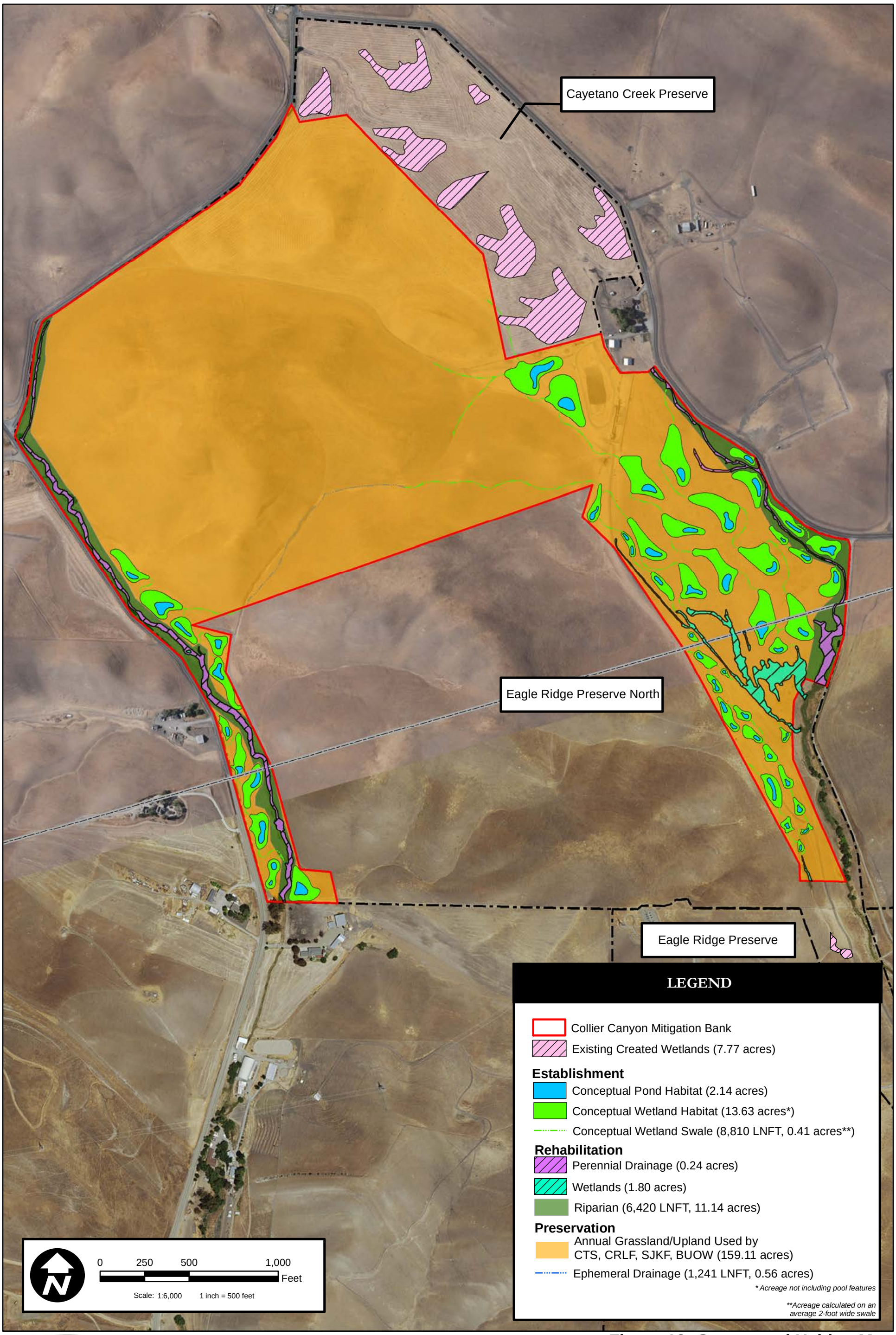
Figure 11: USFWS Designated Critical Habitat Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188



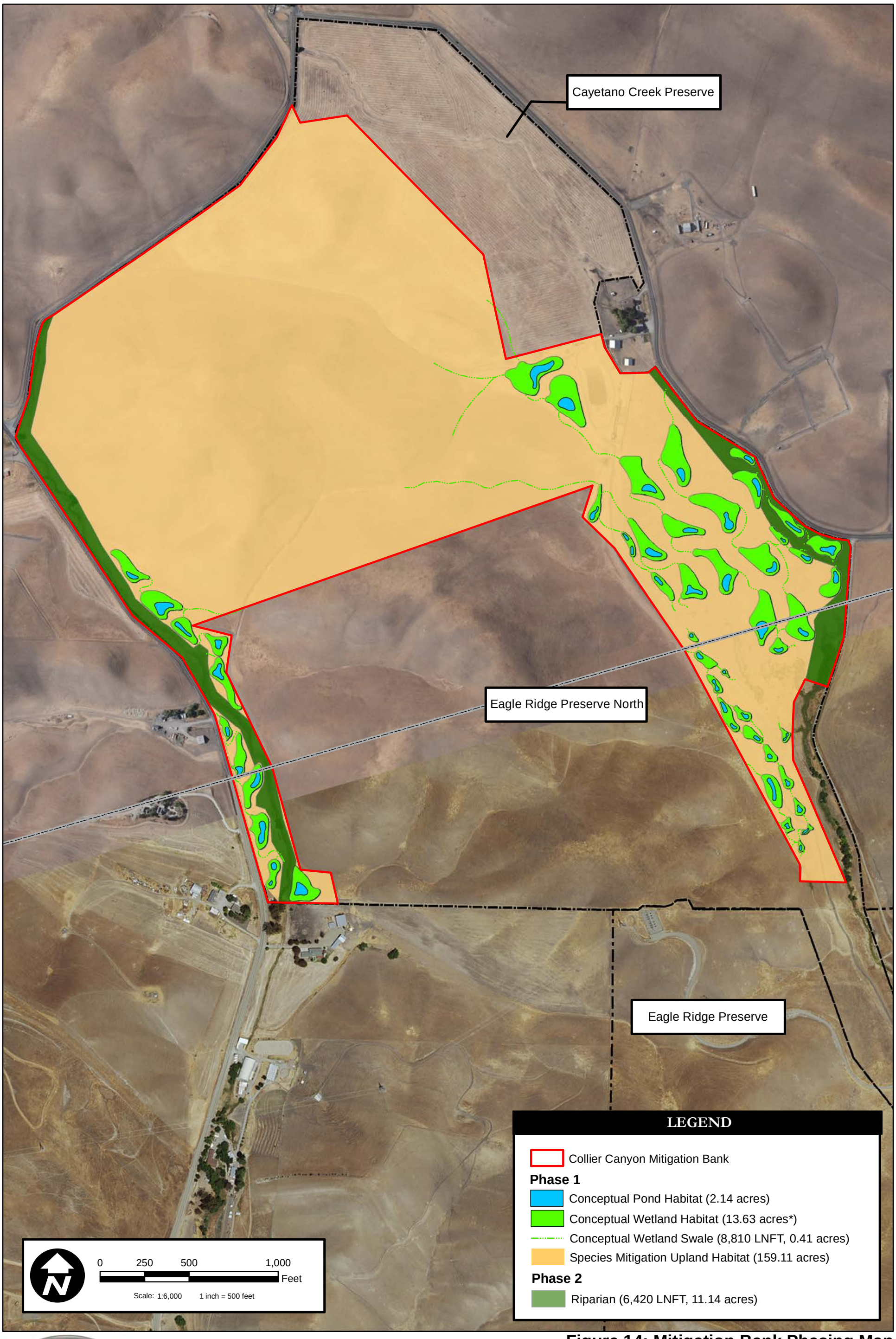
193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 12: Existing Pond Locations
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California



193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 13: Conceptual Habitat Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California



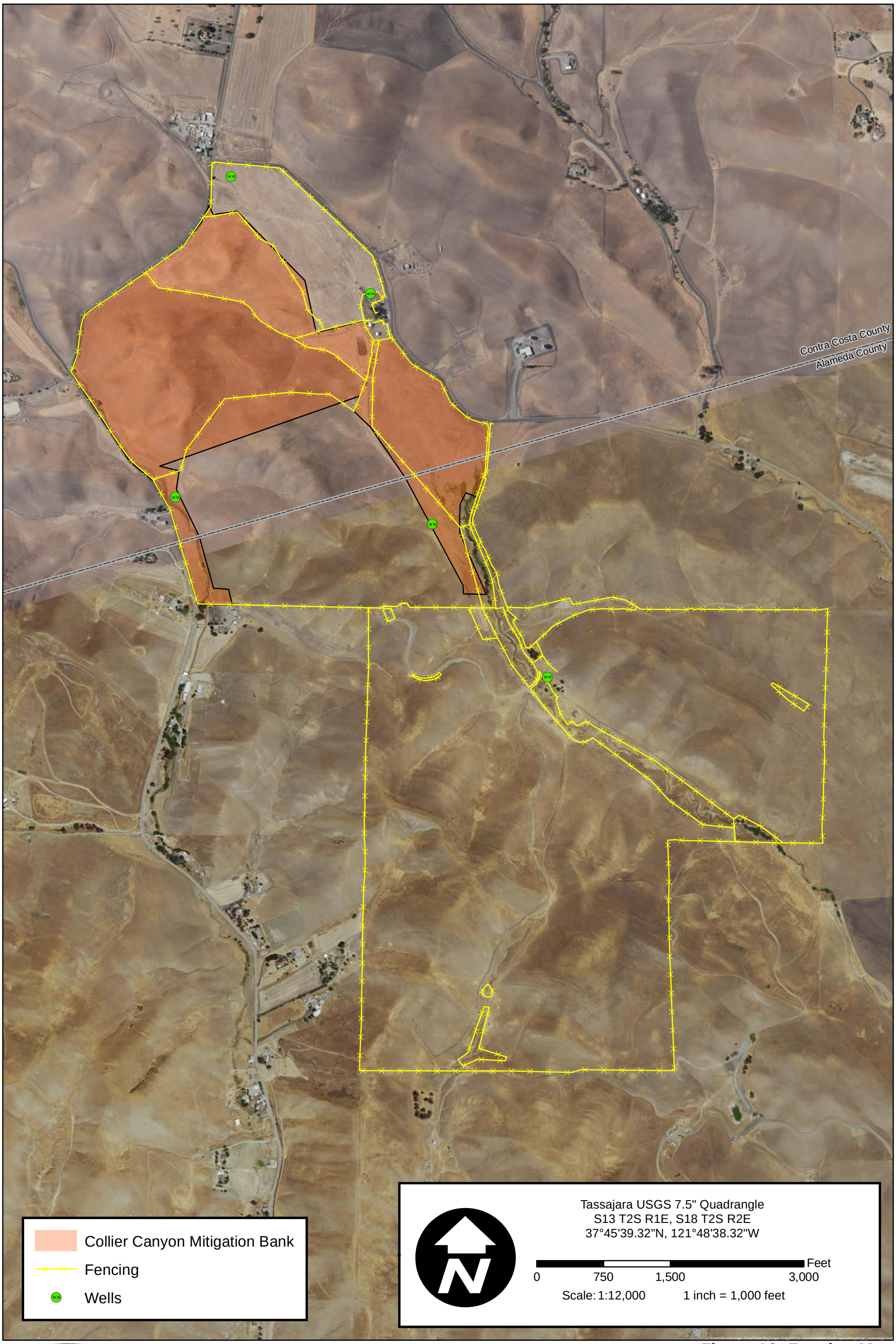
OLBERDING ENVIRONMENTAL INC.

193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 14: Mitigation Bank Phasing Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

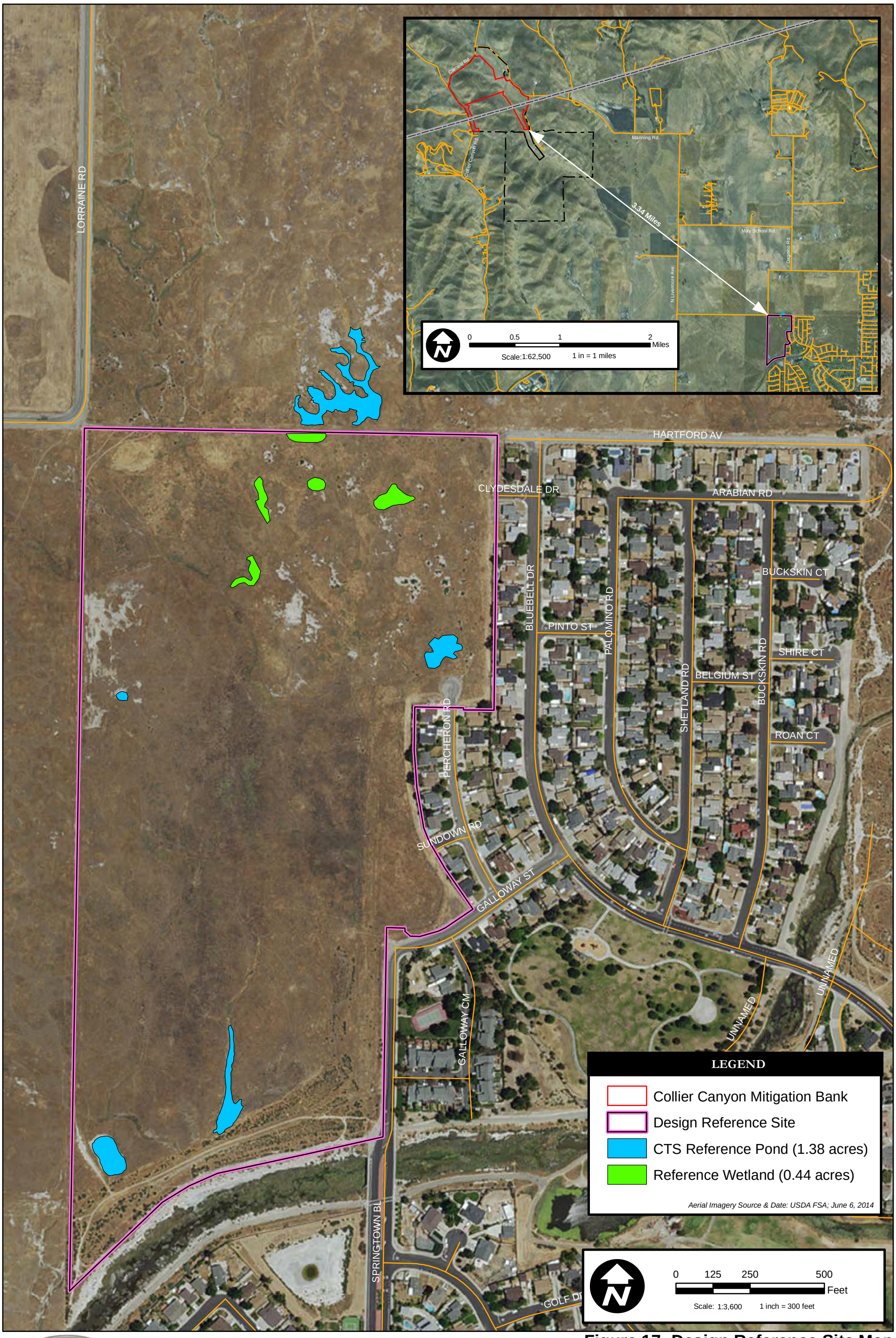
193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 15: Historical Aerial Photo Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California



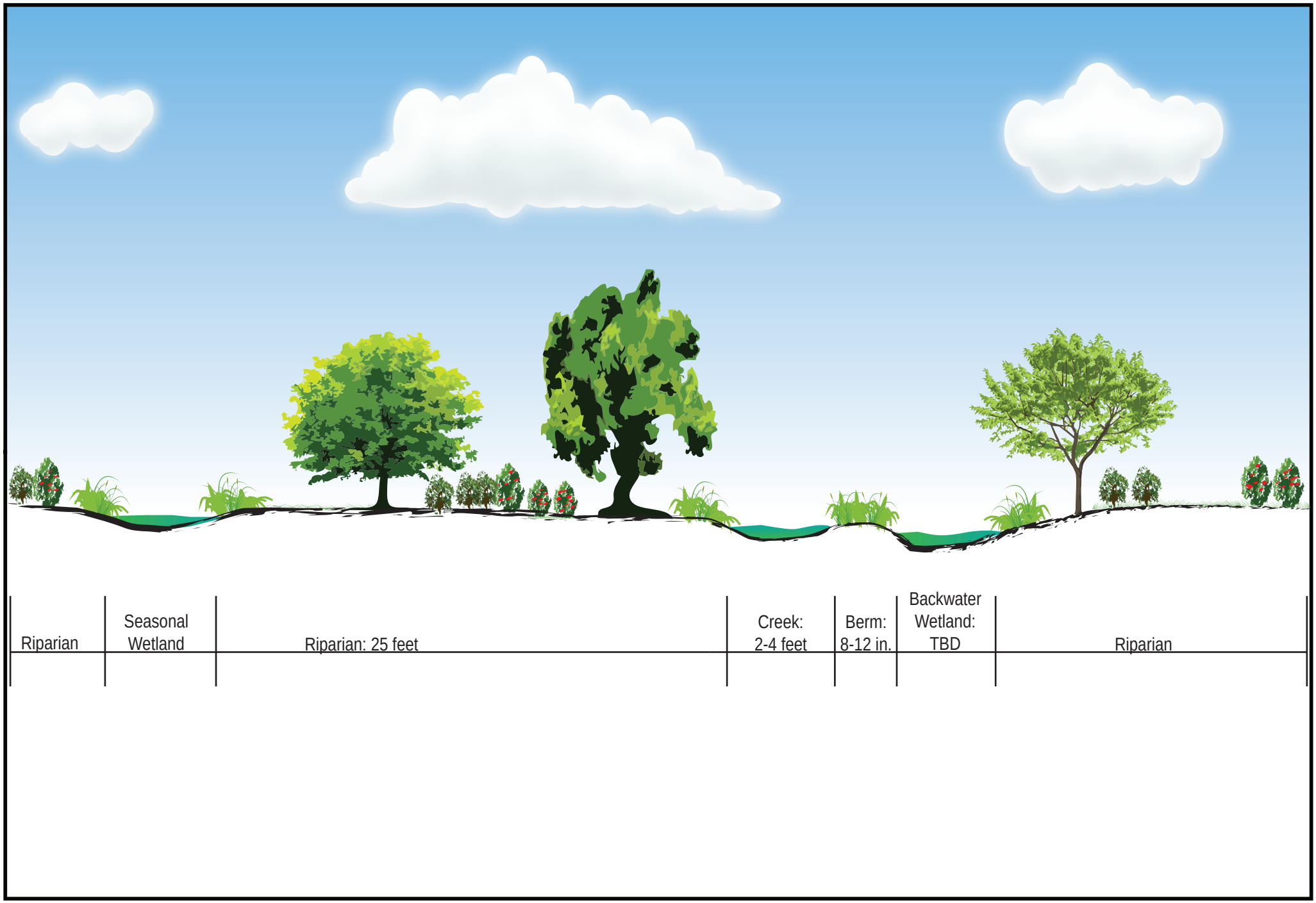
OLBERDING ENVIRONMENTAL INC.
193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 16: Fencing Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California



193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 17: Design Reference Site Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California



3170 Crow Canyon Pl. Ste. 260
San Ramon, CA 94583
Phone: (925) 866-2111

Figure 18: Conceptual Design of Backwater Wetlands
Collier Canyon Mitigation Bank
Contra Costa and Alameda Counties, California

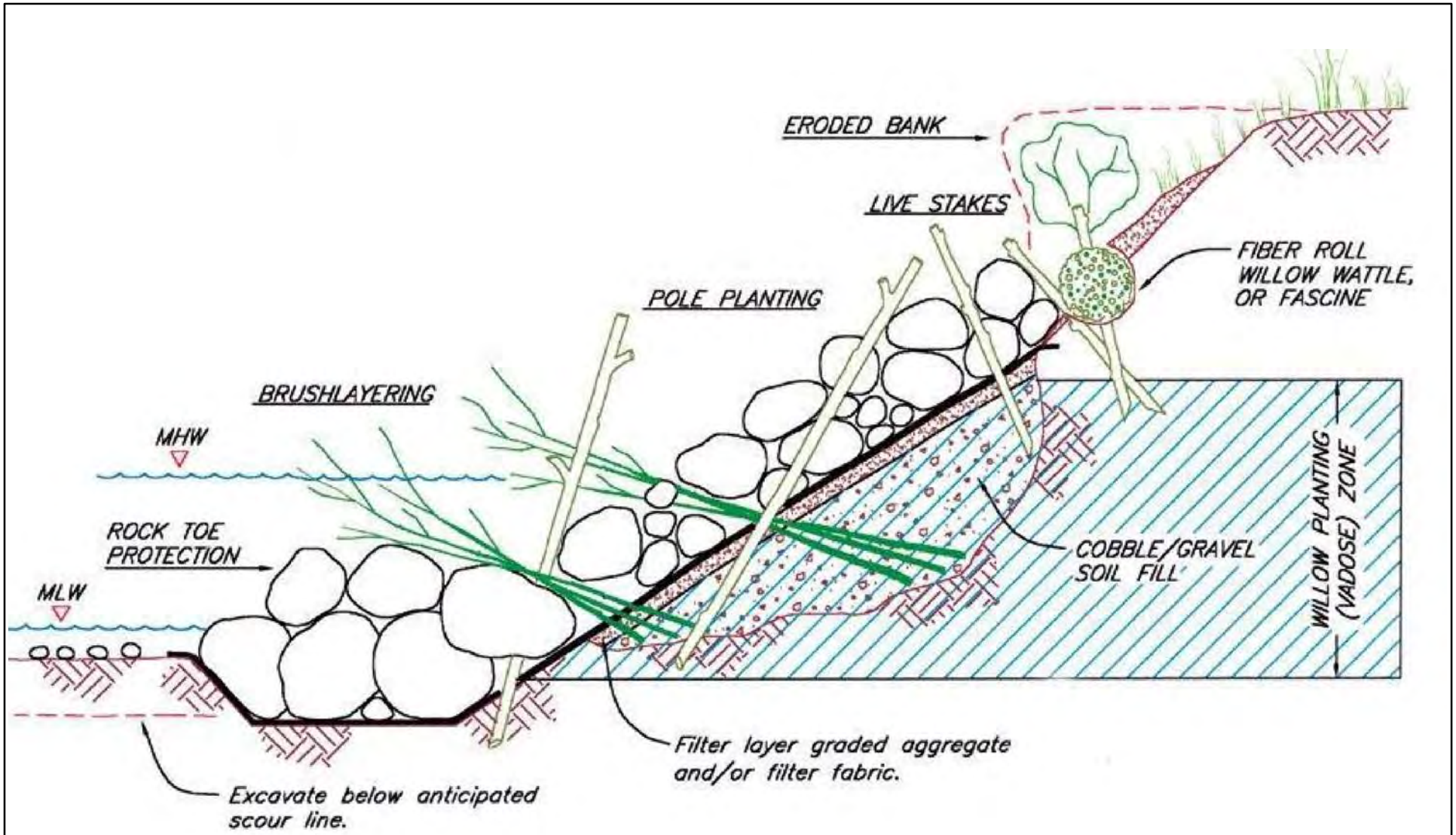
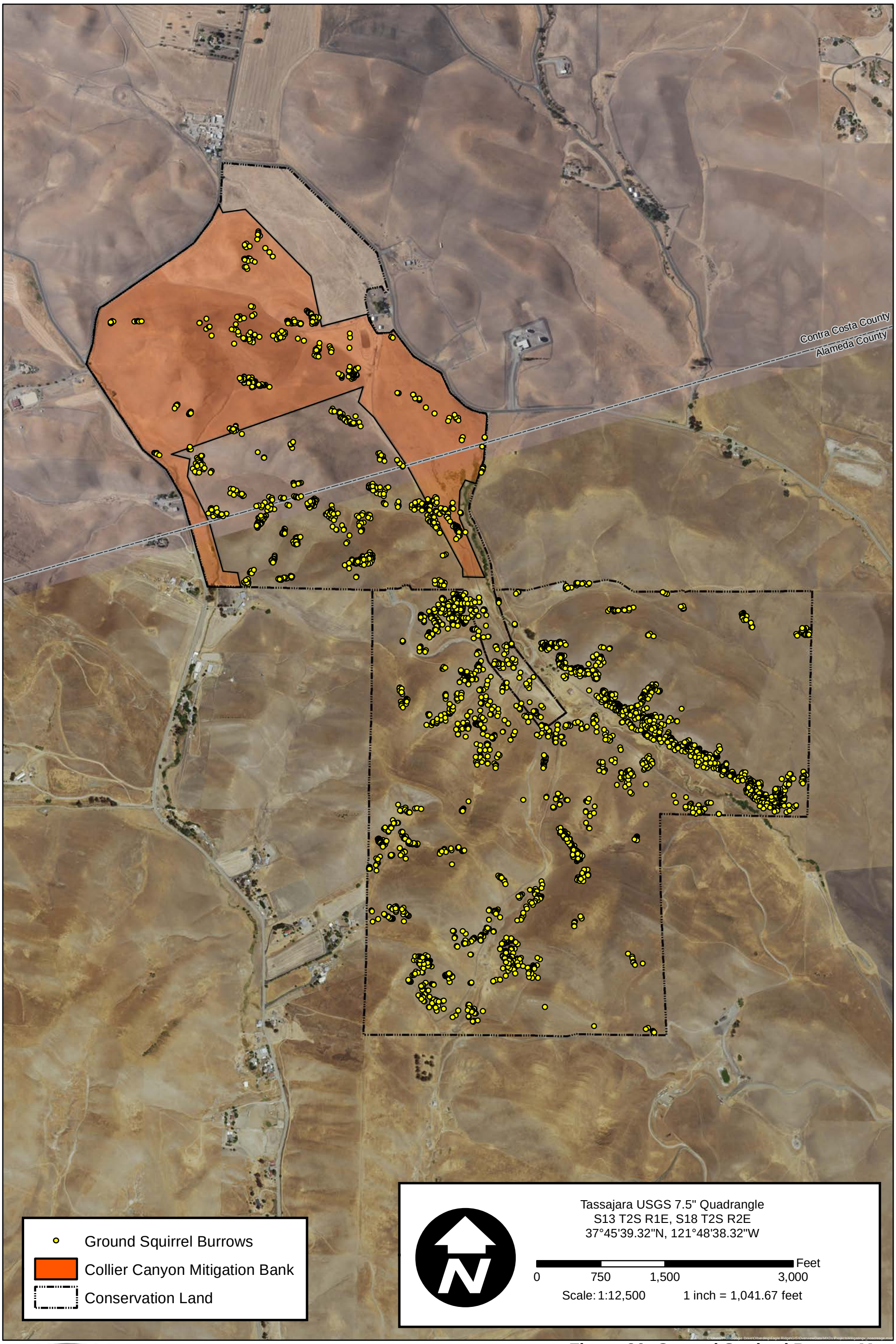


Diagram Source: http://www.ernstseed.com/products/bioengineering/

Figure 19: Stream Bank Restoration Diagram
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

GILBERDING ENVIRONMENTAL INC.
193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188



193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 20: Ground Squirrel Burrow Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

Collier Canyon Mitigation Bank
Service Area
HUC8-18050004: San Francisco Bay Watershed
10-Digit HUC
County Line

Tassajara USGS 7.5" Quadrangle
S13 T2S R1E, S18 T2S R2E
37°45'39.32"N, 121°48'38.32"W

0 3.75 7.5 15 Miles

Scale: 1:380,000 1 inch = 6 miles

OLBERDING ENVIRONMENTAL INC.
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Folsom, CA 95630
Phone: (916) 985-1188

Figure 21: Wetlands/Waters Service Area Map
Collier Canyon Mitigation Bank
Contra Costa & Alameda Counties, California

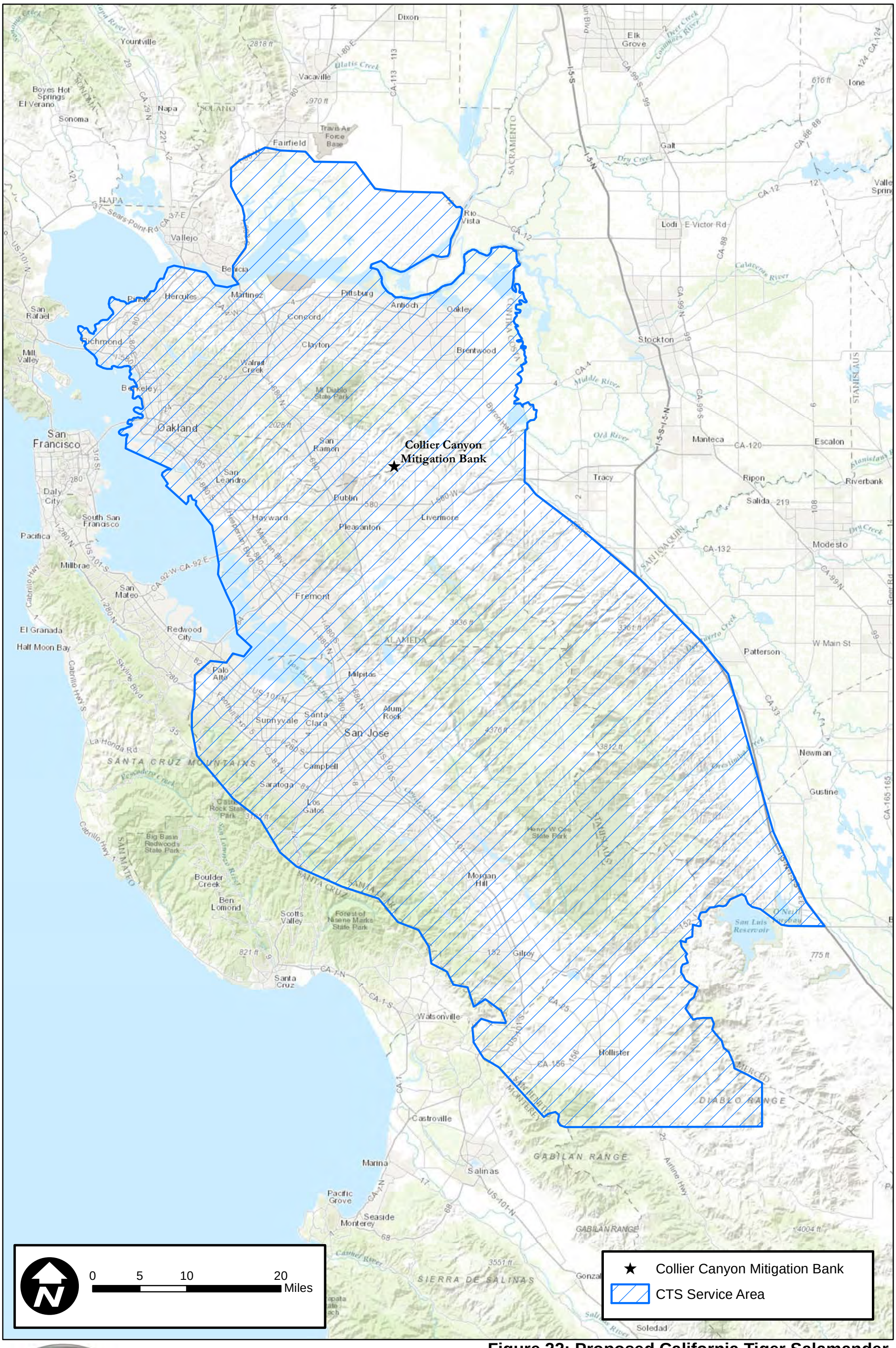
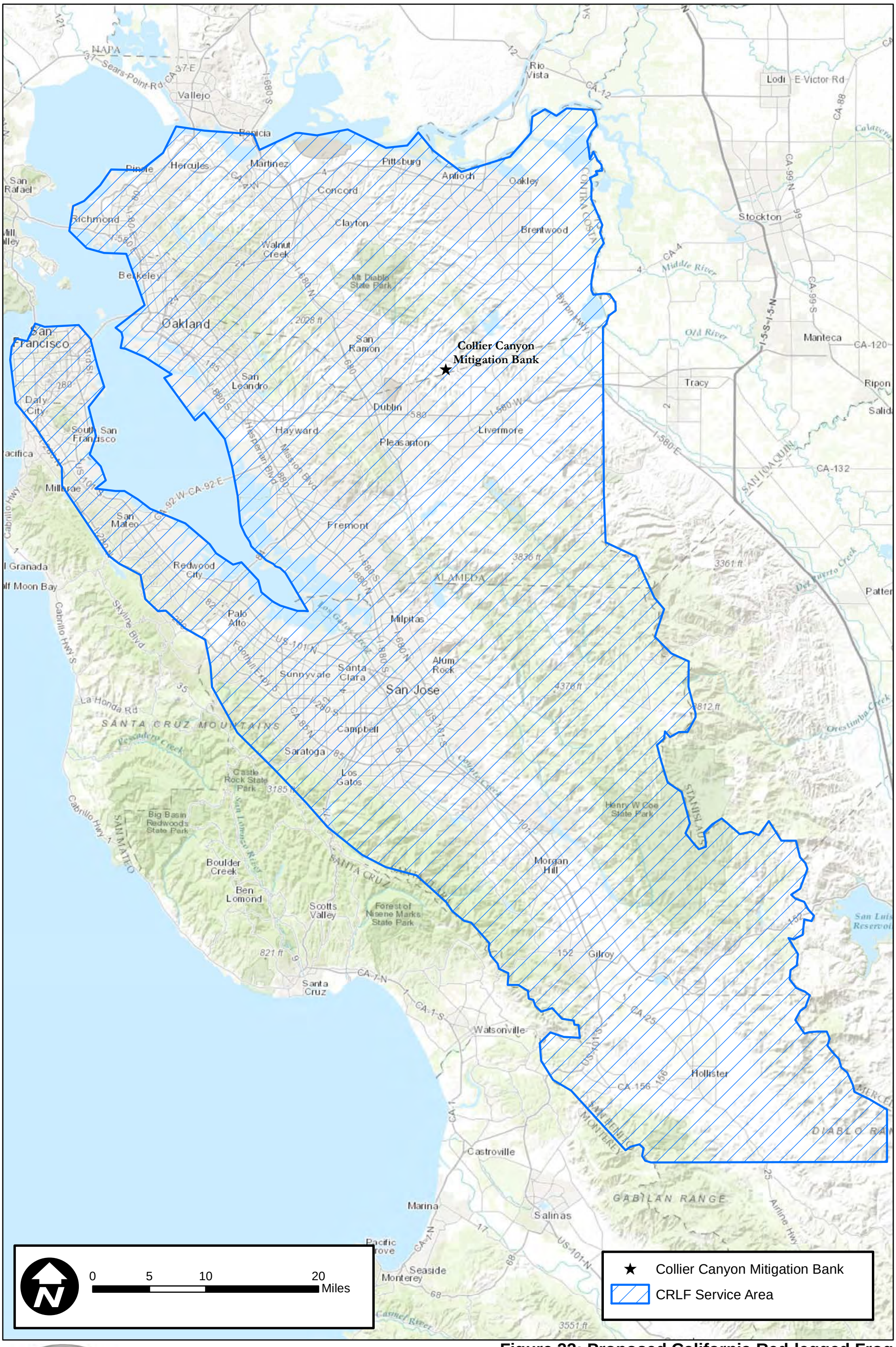


Figure 22: Proposed California Tiger Salamander Service Area For Collier Canyon Mitigation Bank

193 Blue Ravine Rd., Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188



193 Blue Ravine Rd., Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 23: Proposed California Red-legged Frog Service Area For Collier Canyon Mitigation Bank

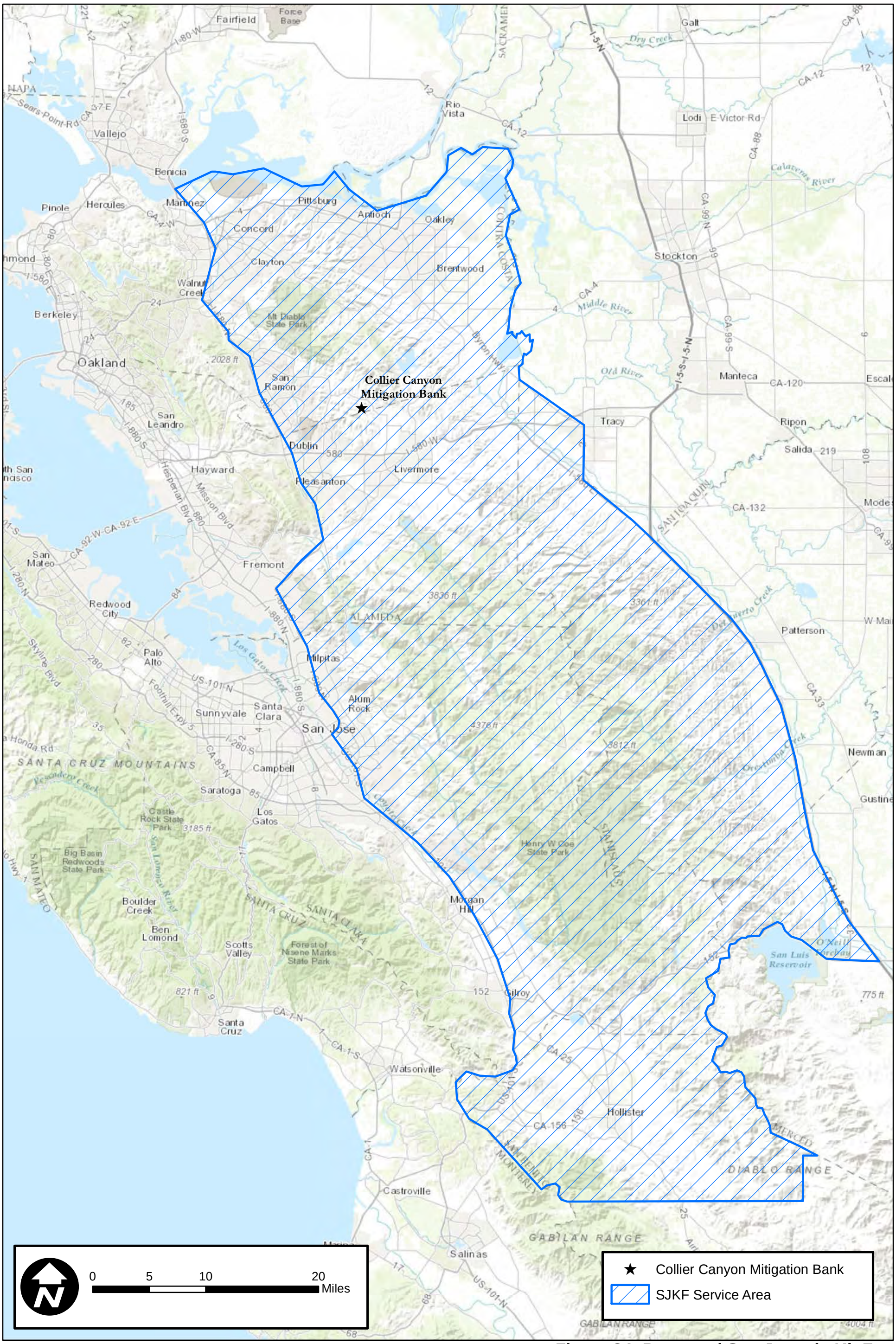


Figure 24: Proposed San Joaquin Kit Fox Service Area For Collier Canyon Mitigation Bank

193 Blue Ravine Rd., Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

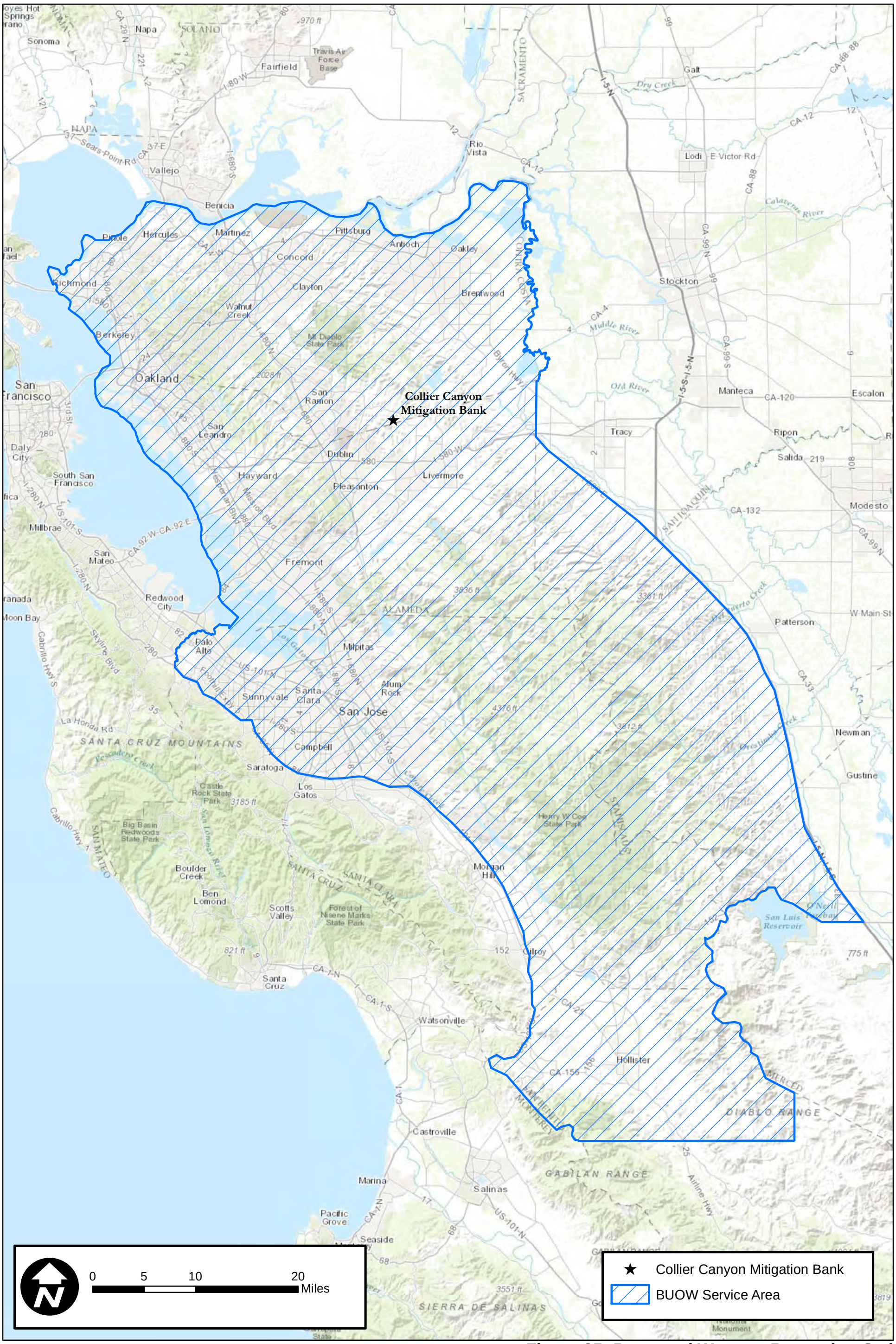


Figure 25: Proposed Western Burrowing Owl Service Area For Collier Canyon Mitigation Bank

193 Blue Ravine Rd., Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

ATTACHMENT 2
SITE PHOTOGRAPHS

Photo 1: Facing north, showing a view of the rolling hill landscape and the West Branch of Cayetano Creek. Photo taken January, 2015.

Photo 2: Facing northeast, photo shows a close up of the existing degraded wetland to be rehabilitated on Collier Canyon Mitigation Bank. Photo taken January 22, 2016.

Photo 3: Facing south, photo shows Collier Canyon Creek at the western edge of Collier Canyon Mitigation Bank. Photo taken December 31, 2014.

Photo 4: Facing north, photo shows annual grassland upland habitat. Photo taken December 31, 2014.

Photo 5: Facing west, photo shows Congdon's tarplant growth across the eastern portion of the Bank. Photo taken July 2012.

Photo 6: Facing southwest, photo shows the west branch of Cayetano Creek and to the right newly created pond and wetland on an adjacent conserved property. This pond is a verified breeding pond for California tiger salamander. Photo taken January 22,2016.

Photo 7: California tiger salamander larvae observed within the aforementioned adjacent pond during an April 2015 survey. Photo taken April 27, 2015.

Photo 8: Facing east, photo shows an overview of adjacent property, Cayetano Creek Preserve featuring newly created wetlands. Photo taken January 21, 2016.

Photo 9: Facing east, photo shows an overview of adjacent property, Cayetano Creek Preserve featuring newly created wetlands. Photo taken January 21, 2016.

Photo 10: Photo shows West Branch Cayetano Creek with Riparian habitat and standing water. Photo taken March 2014.

Photo 11: Photo shows resident California Red-legged frog sunning itself on the bank of Cayetano Creek. Photo taken March 2015.

Photo 12: Photo shows trial woody debris piles that create good cover and elevated sentry platforms to watch for California ground squirrels to watch for predators. Photo taken October 2015.

Photo 13: The piles were covered by extra excavated dirt to make ground squirrel habitat. Debris pile visible adjacent to constructed wetland. Photo taken October 2015.

Photo 14: Resident burrowing owl shown on top of one of the newly created debris piles. Photo taken March 2016.

ATTACHMENT 3
PRELIMINARY TITLE REPORTS

First American Title

First American Title Company

1506 H Street
Modesto, CA 95354

Order Number:	5005-5034910 ()
Escrow Officer:	Laura Flood
Phone:	(209)529-5000
Fax No.:	(866)386-0973
E-Mail:	lflood@firstam.com
E-Mail Loan Documents to:	ModestoEDocs@firstam.com
Buyer:	City of Dublin
Property:	903-0002-004 and 905-0005-007 Alameda, CA

PRELIMINARY REPORT

In response to the above referenced application for a policy of title insurance, this company hereby reports that it is prepared to issue, or cause to be issued, as of the date hereof, a Policy or Policies of Title Insurance describing the land and the estate or interest therein hereinafter set forth, insuring against loss which may be sustained by reason of any defect, lien or encumbrance not shown or referred to as an Exception below or not excluded from coverage pursuant to the printed Schedules, Conditions and Stipulations of said Policy forms.

The printed Exceptions and Exclusions from the coverage and Limitations on Covered Risks of said policy or policies are set forth in Exhibit A attached. *The policy to be issued may contain an arbitration clause. When the Amount of Insurance is less than that set forth in the arbitration clause, all arbitrable matters shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties.* Limitations on Covered Risks applicable to the CLTA and ALTA Homeowner's Policies of Title Insurance which establish a Deductible Amount and a Maximum Dollar Limit of Liability for certain coverages are also set forth in Exhibit A. Copies of the policy forms should be read. They are available from the office which issued this report.

Please read the exceptions shown or referred to below and the exceptions and exclusions set forth in Exhibit A of this report carefully. The exceptions and exclusions are meant to provide you with notice of matters which are not covered under the terms of the title insurance policy and should be carefully considered.

It is important to note that this preliminary report is not a written representation as to the condition of title and may not list all liens, defects, and encumbrances affecting title to the land.

This report (and any supplements or amendments hereto) is issued solely for the purpose of facilitating the issuance of a policy of title insurance and no liability is assumed hereby. If it is desired that liability be assumed prior to the issuance of a policy of title insurance, a Binder or Commitment should be requested.

Dated as of October 21, 2015 at 7:30 A.M.

The form of Policy of title insurance contemplated by this report is:

To Be Determined

A specific request should be made if another form or additional coverage is desired.

Title to said estate or interest at the date hereof is vested in:

COLLIER CREEK MITIGATION LAND, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY

The estate or interest in the land hereinafter described or referred to covered by this Report is:

A fee.

The Land referred to herein is described as follows:

(See attached Legal Description)

At the date hereof exceptions to coverage in addition to the printed Exceptions and Exclusions in said policy form would be as follows:

1. General and special taxes and assessments for the fiscal year 2015-2016.

First Installment:	$150.04, OPEN
Penalty:	$0.00
Second Installment:	$150.04, OPEN
Penalty:	$0.00
Tax Rate Area:	64-001
A. P. No.:	903-0002-004

(Affects Parcel One and Portion of Parcel Two)

2. General and special taxes and assessments for the fiscal year 2015-2016.

First Installment:	$163.89, OPEN
Penalty:	$0.00
Second Installment:	$163.89, OPEN
Penalty:	$0.00
Tax Rate Area:	64-001
A. P. No.:	905-0005-007

(Affects portion of Parcel Two)

3. The lien of supplemental taxes, if any, assessed pursuant to Chapter 3.5 commencing with Section 75 of the California Revenue and Taxation Code.

4. An easement for wires and crossarms together with a right of way along said route and incidental purposes, recorded February 10, 1939 in Book 3733, Page 195 of Official Records.
   In Favor of: Pacific Gas and Electric Company, a California corporation
   Affects: As described therein

5. Terms, provisions, covenants, restrictions and conditions contained in a document executed pursuant to the California Land Conservation Act of 1965 (Williamson Act) and recorded February 21, 1969 as Instrument No. 69-20340 in Book 2351, Page 399 of Official Records.

6. An easement for drainage facilities and incidental purposes, recorded February 16, 2005 as Instrument No. 2005-65208 of Official Records.
   In Favor of: Pacific Gas and Electric Company, a California corporation
   Affects: As described therein

7. The effect of a map purporting to show the land and other property, filed in Book 37, Page 84 of Record of Surveys.

8. Rights of the public in and to that portion of the land lying within any Road, Street, Alley or Highway.

9. Water rights, claims or title to water, whether or not shown by the public records.

10. Any claim that the Title is subject to a trust or lien created under The Perishable Agricultural Commodities Act, 1930 (7 U.S.C. §§499a, et seq.) or the Packers and Stockyards Act (7 U.S.C. §§181 et seq.) or under similar state laws.

11. Rights of parties in possession.

Prior to the issuance of any policy of title insurance, the Company will require:

12. With respect to Collier Creek Mitigation Land, LLC, a limited liability company:
a. A copy of its operating agreement and any amendments thereto;
b. If it is a California limited liability company, that a certified copy of its articles of organization (LLC-1) and any certificate of correction (LLC-11), certificate of amendment (LLC-2), or restatement of articles of organization (LLC-10) be recorded in the public records;
c. If it is a foreign limited liability company, that a certified copy of its application for registration (LLC-5) be recorded in the public records;
d. With respect to any deed, deed of trust, lease, subordination agreement or other document or instrument executed by such limited liability company and presented for recordation by the Company or upon which the Company is asked to rely, that such document or instrument be executed in accordance with one of the following, as appropriate:
(i) If the limited liability company properly operates through officers appointed or elected pursuant to the terms of a written operating agreement, such document must be executed by at least two duly elected or appointed officers, as follows: the chairman of the board, the president or any vice president, and any secretary, assistant secretary, the chief financial officer or any assistant treasurer;
(ii) If the limited liability company properly operates through a manager or managers identified in the articles of organization and/or duly elected pursuant to the terms of a written operating agreement, such document must be executed by at least two such managers or by one manager if the limited liability company properly operates with the existence of only one manager.
e. Other requirements which the Company may impose following its review of the material required herein and other information which the Company may require

INFORMATIONAL NOTES

Note: The policy to be issued may contain an arbitration clause. When the Amount of Insurance is less than the certain dollar amount set forth in any applicable arbitration clause, all arbitrable matters shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties. If you desire to review the terms of the policy, including any arbitration clause that may be included, contact the office that issued this Commitment or Report to obtain a sample of the policy jacket for the policy that is to be issued in connection with your transaction.

1. The property covered by this report is vacant land.

2. According to the public records, there has been no conveyance of the land within a period of twenty-four months prior to the date of this report, except as follows:

   None

3. We find no open deeds of trust. Escrow please confirm before closing.

The map attached, if any, may or may not be a survey of the land depicted hereon. First American expressly disclaims any liability for loss or damage which may result from reliance on this map except to the extent coverage for such loss or damage is expressly provided by the terms and provisions of the title insurance policy, if any, to which this map is attached.

LEGAL DESCRIPTION

Real property in the unincorporated area of the County of Alameda, State of California, described as follows:

PARCEL ONE: (PORTION OF APN : 903-0002-004)

REAL PROPERTY SITUATED IN THE COUNTY OF ALAMEDA, STATE OF CALIFORNIA, BEING PARCEL 1 AS SAID PARCEL IS DESCRIBED IN THAT CERTAIN QUITCLAIM DEED FROM MARY ELIZABETH BANKE TO BETTY BANKE, TRUSTEE OF THE BETTY BANKE TRUST DATED DECEMBER 20, 1994, RECORDED ON MAY 16, 1995 AS SERIES NO. 95-107486, ALAMEDA COUNTY RECORDS, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE CORNER COMMON TO SECTIONS 13 AND 24, IN TOWNSHIP 2 SOUTH, IN RANGE 1 EAST; AND SECTIONS 18 AND 19, IN TOWNSHIP 2 SOUTH, RANGE 2 EAST; OF THE MOUNT DIABLO BASE AND MERIDIAN; AND RUNNING THENCE NORTH 88° 48' EAST, 1415.4 FEET; THENCE NORTH 7° 50' WEST, 350.7 FEET; THENCE NORTH 23° 57' WEST, 385 FEET; THENCE NORTH 42° 17' WEST, 237 FEET TO THE TRUE POINT OF BEGINNING OF THE LAND HEREIN DESCRIBED; THENCE NORTH 17° 05' EAST 698 FEET; THENCE ALONG A LINE DRAWN NORTH 3° EAST, TO THE POINT OF INTERSECTION THEREOF WITH THE LINE DIVIDING CONTRA COSTA COUNTY FROM ALAMEDA COUNTY; THENCE SOUTHWESTERLY ALONG SAID LINE TO THE POINT OF INTERSECTION THEREOF, WITH A LINE DRAWN NORTH 42° 17' WEST FROM THE TRUE POINT OF BEGINNING; THENCE ALONG SAID LINE SO DRAWN, SOUTH 42° 17' EAST TO THE SAID POINT OF BEGINNING.

THIS LEGAL DESCRIPTION IS MADE PURSUANT TO THAT CERTAIN CERTIFICATE OF COMPLIANCE RECORDED AUGUST 8, 2013 AS INSTRUMENT NO. 2013273317 OF OFFICIAL RECORDS.

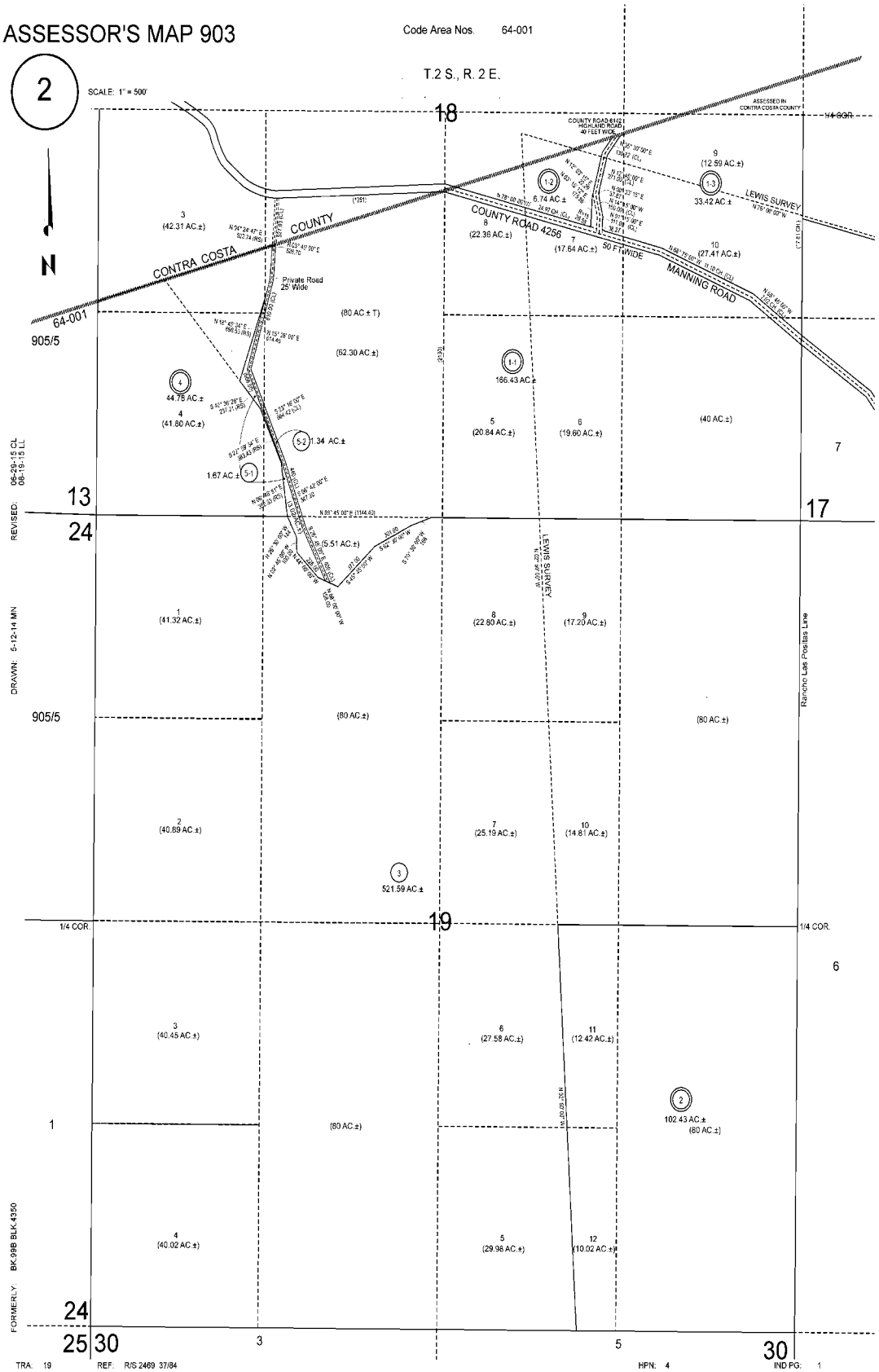
PARCEL TWO: (PORTION OF APN : 903-0002-004 AND APN : 905-0005-007)

REAL PROPERTY SITUATED IN THE COUNTY OF ALAMEDA, STATE OF CALIFORNIA, BEING PARCEL 2 AS SAID PARCEL IS DESCRIBED IN THAT CERTAIN QUITCLAIM DEED FROM MARY ELIZABETH BANKE TO BETTY BANKE, TRUSTEE OF THE BETTY BANKE TRUST DATED DECEMBER 20, 1994, RECORDED ON MAY 16, 1995 AS SERIES NO. 95-107486, ALAMEDA COUNTY RECORDS, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE CORNER COMMON TO SECTIONS 13 AND 24, IN TOWNSHIP 2 SOUTH, IN RANGE 1 EAST; AND SECTIONS 18 AND 19, IN TOWNSHIP 2 SOUTH, IN RANGE 2 EAST; OF THE MOUNT DIABLO BASE AND MERIDIAN; AND RUNNING THENCE NORTH 88° 48' EAST 1415.4 FEET; THENCE NORTH 7° 50' WEST, 350.7 FEET; THENCE NORTH 23° 57' WEST, 385 FEET; THENCE NORTH 42° 17' WEST, TO THE POINT OF INTERSECTION THEREOF, WITH THE LINE DIVIDING CONTRA COSTA COUNTY FROM ALAMEDA COUNTY; THENCE SOUTHWESTERLY ALONG SAID LINE TO THE POINT OF INTERSECTION THEREOF, WITH THE EASTERN LINE OF THE COUNTY ROAD LEADING FROM TASSAJARA TO LIVERMORE AS SAME EXISTED ON FEBRUARY 27, 1939; THENCE ALONG SAID LINE OF SAID COUNTY ROAD SOUTH 16° 18' EAST TO THE POINT OF INTERSECTION THEREOF WITH A LINE DRAWN SOUTH 89° 57' WEST FROM THE POINT OF BEGINNING; THENCE ALONG SAID LINE SO DRAWN, NORTH 89° 57' EAST, 1946.44 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

THIS LEGAL DESCRIPTION IS MADE PURSUANT TO THAT CERTAIN CERTIFICATE OF

COMPLIANCE RECORDED AUGUST 8, 2013 AS INSTRUMENT NO. 2013273317 OF OFFICIAL RECORDS.


ASSESSOR'S MAP 903
Code Area Nos. 64-001
T.2 S., R. 2 E.
SCALE: 1" = 500'
N
CONTRA COSTA COUNTY
COUNTY ROAD 4256
MANNING ROAD
50 FT WIDE
Private Road 25' Wide
LEWIS SURVEY
Rancho Las Positas Line
64-001
905/5
REVISED: 06-29-15 CL 08-19-15 LL
DRAWN: 5-12-14 MN
FORMERLY: BK-99B BLK-4350
TRA: 19
REF: R/S 2469 37/84
APN: 4
IND PG: 1

NOTICE

Section 12413.1 of the California Insurance Code, effective January 1, 1990, requires that any title insurance company, underwritten title company, or controlled escrow company handling funds in an escrow or sub-escrow capacity, wait a specified number of days after depositing funds, before recording any documents in connection with the transaction or disbursing funds. This statute allows for funds deposited by wire transfer to be disbursed the same day as deposit. In the case of cashier's checks or certified checks, funds may be disbursed the next day after deposit. In order to avoid unnecessary delays of three to seven days, or more, please use wire transfer, cashier's checks, or certified checks whenever possible.

First American Title Company
1506 H Street
Modesto, CA 95354
(209)529-5000

First American Title

INCOMING DOMESTIC WIRE INSTRUCTIONS

PAYABLE TO:	First American Title Company
BANK:	First American Trust, FSB
ADDRESS:	5 First American Way, Santa Ana, CA 92707
ACCOUNT NO:	3010520000
ROUTING NUMBER:	122241255

PLEASE REFERENCE THE FOLLOWING:

PROPERTY:	903-0002-004 and 905-0005-007, Alameda, CA
FILE NUMBER:	5005-5034910 (LF)

PLEASE USE THE ABOVE INFORMATION WHEN WIRING FUNDS TO **First American Title Company**. **FUNDS MUST BE WIRED FROM A BANK WITHIN THE UNITED STATES.** PLEASE NOTIFY YOUR ESCROW OFFICER AT **(209)529-5000** OR **lflood@firstam.com** WHEN YOU HAVE TRANSMITTED YOUR WIRE.

IF YOUR FUNDS ARE BEING WIRED FROM A NON-U.S. BANK, ADDITIONAL CHARGES MAY APPLY. PLEASE CONTACT YOUR ESCROW OFFICER/CLOSER FOR INTERNATIONAL WIRING INSTRUCTIONS.

AN ACH TRANSFER CANNOT BE ACCEPTED FOR CLOSING, BECAUSE IT IS NOT THE SAME AS A WIRE AND REQUIRES ADDITIONAL TIME FOR CLEARANCE.

FIRST AMERICAN TRUST CONTACT INFO: Banking Services 1-877-600-9473

ALL WIRES WILL BE RETURNED IF THE FILE NUMBER AND/OR PROPERTY REFERENCE ARE NOT INCLUDED

With cyber crimes on the increase, it is important to be ever vigilant. If you receive an e-mail or any other communication that appears to be generated from a First American employee that contains new, revised or altered bank wire instructions, consider it suspect and call our office at a number you trust. Our bank wire instructions seldom change.

EXHIBIT A
LIST OF PRINTED EXCEPTIONS AND EXCLUSIONS (BY POLICY TYPE)

CLTA/ALTA HOMEOWNER'S POLICY OF TITLE INSURANCE (02-03-10)
EXCLUSIONS

In addition to the Exceptions in Schedule B, You are not insured against loss, costs, attorneys' fees, and expenses resulting from:

1. Governmental police power, and the existence or violation of those portions of any law or government regulation concerning:
   (a) building; (d) improvements on the Land;
   (b) zoning; (e) land division; and
   (c) land use; (f) environmental protection.

   This Exclusion does not limit the coverage described in Covered Risk 8.a., 14, 15, 16, 18, 19, 20, 23 or 27.
2. The failure of Your existing structures, or any part of them, to be constructed in accordance with applicable building codes. This Exclusion does not limit the coverage described in Covered Risk 14 or 15.
3. The right to take the Land by condemning it. This Exclusion does not limit the coverage described in Covered Risk 17.
4. Risks:
   (a) that are created, allowed, or agreed to by You, whether or not they are recorded in the Public Records;
   (b) that are Known to You at the Policy Date, but not to Us, unless they are recorded in the Public Records at the Policy Date;
   (c) that result in no loss to You; or
   (d) that first occur after the Policy Date - this does not limit the coverage described in Covered Risk 7, 8.e., 25, 26, 27 or 28.
5. Failure to pay value for Your Title.
6. Lack of a right:
   (a) to any land outside the area specifically described and referred to in paragraph 3 of Schedule A; and
   (b) in streets, alleys, or waterways that touch the Land.
   This Exclusion does not limit the coverage described in Covered Risk 11 or 21.
7. The transfer of the Title to You is invalid as a preferential transfer or as a fraudulent transfer or conveyance under federal bankruptcy, state insolvency, or similar creditors' rights laws.

LIMITATIONS ON COVERED RISKS

Your insurance for the following Covered Risks is limited on the Owner's Coverage Statement as follows: For Covered Risk 16, 18, 19, and 21 Your Deductible Amount and Our Maximum Dollar Limit of Liability shown in Schedule A.

Your Deductible Amount	**Our Maximum Dollar Limit of Liability**
Covered Risk 16: 1% of Policy Amount or $2,500.00 (whichever is less)	$10,000.00
Covered Risk 18: 1% of Policy Amount or $5,000.00 (whichever is less)	$25,000.00
Covered Risk 19: 1% of Policy Amount or $5,000.00 (whichever is less)	$25,000.00
Covered Risk 21: 1% of Policy Amount or $2,500.00 (whichever is less)	$5,000.00

ALTA RESIDENTIAL TITLE INSURANCE POLICY (6-1-87)
EXCLUSIONS

In addition to the Exceptions in Schedule B, you are not insured against loss, costs, attorneys' fees, and expenses resulting from:

1. Governmental police power, and the existence or violation of any law or government regulation. This includes building and zoning ordinances and also laws and regulations concerning:
   (a) and use
   (b) improvements on the land
   (c) and division
   (d) environmental protection

   This exclusion does not apply to violations or the enforcement of these matters which appear in the public records at Policy Date.
   This exclusion does not limit the zoning coverage described in Items 12 and 13 of Covered Title Risks.
2. The right to take the land by condemning it, unless:

(a) a notice of exercising the right appears in the public records on the Policy Date

(b) the taking happened prior to the Policy Date and is binding on you if you bought the land without knowing of the taking

3. Title Risks:
   (a) that are created, allowed, or agreed to by you
   (b) that are known to you, but not to us, on the Policy Date -- unless they appeared in the public records
   (c) that result in no loss to you
   (d) that first affect your title after the Policy Date -- this does not limit the labor and material lien coverage in Item 8 of Covered Title Risks
4. Failure to pay value for your title.
5. Lack of a right:
   (a) to any land outside the area specifically described and referred to in Item 3 of Schedule A OR
   (b) in streets, alleys, or waterways that touch your land

   This exclusion does not limit the access coverage in Item 5 of Covered Title Risks.

2006 ALTA LOAN POLICY (06-17-06)

EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions, or location of any improvement erected on the Land;
   (iii) the subdivision of land; or
   (iv) environmental protection;

   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.

   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed, or agreed to by the Insured Claimant;
   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 13, or 14); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law.
6. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is
   (a) a fraudulent conveyance or fraudulent transfer, or
   (b) a preferential transfer for any reason not stated in Covered Risk 13(b) of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the Insured Mortgage in the Public Records. This Exclusion does not modify or limit the coverage provided under Covered Risk 11(b).

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) that arise by reason of:

1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown by the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.

4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

2006 ALTA OWNER'S POLICY (06-17-06)

EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to

   (i) the occupancy, use, or enjoyment of the Land;

   (ii) the character, dimensions, or location of any improvement erected on the Land;

   (iii) the subdivision of land; or

   (iv) environmental protection;

   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.

   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters

   (a) created, suffered, assumed, or agreed to by the Insured Claimant;

   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;

   (c) resulting in no loss or damage to the Insured Claimant;

   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 9 or 10); or

   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Title.
4. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction vesting the Title as shown in Schedule A, is

   (a) a fraudulent conveyance or fraudulent transfer, or

   (b) a preferential transfer for any reason not stated in Covered Risk 9 of this policy.
5. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A.

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) that arise by reason of:

1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown by the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

ALTA EXPANDED COVERAGE RESIDENTIAL LOAN POLICY (07-26-10)

EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to

   (i) the occupancy, use, or enjoyment of the Land;

   (ii) the character, dimensions, or location of any improvement erected on the Land;

   (iii) the subdivision of land; or

   (iv) environmental protection;

   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5, 6, 13(c), 13(d), 14 or 16.

   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 5, 6, 13(c), 13(d), 14 or 16.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters

   (a) created, suffered, assumed, or agreed to by the Insured Claimant;

   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;

   (c) resulting in no loss or damage to the Insured Claimant;

   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 16, 17, 18, 19, 20, 21, 22, 23, 24, 27 or 28); or

   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law. This Exclusion does not modify or limit the coverage provided in Covered Risk 26.
6. Any claim of invalidity, unenforceability or lack of priority of the lien of the Insured Mortgage as to Advances or modifications made after the Insured has Knowledge that the vestee shown in Schedule A is no longer the owner of the estate or interest covered by this policy. This Exclusion does not modify or limit the coverage provided in Covered Risk 11.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching subsequent to Date of Policy. This Exclusion does not modify or limit the coverage provided in Covered Risk 11(b) or 25.
8. The failure of the residential structure, or any portion of it, to have been constructed before, on or after Date of Policy in accordance with applicable building codes. This Exclusion does not modify or limit the coverage provided in Covered Risk 5 or 6.
9. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is

   (a) a fraudulent conveyance or fraudulent transfer, or

   (b) a preferential transfer for any reason not stated in Covered Risk 27(b) of this policy.

First American Title

Privacy Information
We Are Committed to Safeguarding Customer Information
In order to better serve your needs now and in the future, we may ask you to provide us with certain information. We understand that you may be concerned about what we will do with such information - particularly any personal or financial information. We agree that you have a right to know how we will utilize the personal information you provide to us. Therefore, together with our subsidiaries we have adopted this Privacy Policy to govern the use and handling of your personal information.

Applicability
This Privacy Policy governs our use of the information that you provide to us. It does not govern the manner in which we may use information we have obtained from any other source, such as information obtained from a public record or from another person or entity. First American has also adopted broader guidelines that govern our use of personal information regardless of its source. First American calls these guidelines its Fair Information Values.

Types of Information
Depending upon which of our services you are utilizing, the types of nonpublic personal information that we may collect include:

- Information we receive from you on applications, forms and in other communications to us, whether in writing, in person, by telephone or any other means;
- Information about your transactions with us, our affiliated companies, or others; and
- Information we receive from a consumer reporting agency.

Use of Information
We request information from you for our own legitimate business purposes and not for the benefit of any nonaffiliated party. Therefore, we will not release your information to nonaffiliated parties except: (1) as necessary for us to provide the product or service you have requested of us; or (2) as permitted by law. We may, however, store such information indefinitely, including the period after which any customer relationship has ceased. Such information may be used for any internal purpose, such as quality control efforts or customer analysis. We may also provide all of the types of nonpublic personal information listed above to one or more of our affiliated companies. Such affiliated companies include financial service providers, such as title insurers, property and casualty insurers, and trust and investment advisory companies, or companies involved in real estate services, such as appraisal companies, home warranty companies and escrow companies. Furthermore, we may also provide all the information we collect, as described above, to companies that perform marketing services on our behalf, on behalf of our affiliated companies or to other financial institutions with whom we or our affiliated companies have joint marketing agreements.

Former Customers
Even if you are no longer our customer, our Privacy Policy will continue to apply to you.

Confidentiality and Security
We will use our best efforts to ensure that no unauthorized parties have access to any of your information. We restrict access to nonpublic personal information about you to those individuals and entities who need to know that information to provide products or services to you. We will use our best efforts to train and oversee our employees and agents to ensure that your information will be handled responsibly and in accordance with this Privacy Policy and First American's Fair Information Values. We currently maintain physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

Information Obtained Through Our Web Site
First American Financial Corporation is sensitive to privacy issues on the Internet. We believe it is important you know how we treat the information about you we receive on the Internet.
In general, you can visit First American or its affiliates' Web sites on the World Wide Web without telling us who you are or revealing any information about yourself. Our Web servers collect the domain names, not the e-mail addresses, of visitors. This information is aggregated to measure the number of visits, average time spent on the site, pages viewed and similar information. First American uses this information to measure the use of our site and to develop ideas to improve the content of our site.
There are times, however, when we may need information from you, such as your name and email address. When information is needed, we will use our best efforts to let you know at the time of collection how we will use the personal information. Usually, the personal information we collect is used only by us to respond to your inquiry, process an order or allow you to access specific account/profile information. If you choose to share any personal information with us, we will only use it in accordance with the policies outlined above.

Business Relationships
First American Financial Corporation's site and its affiliates' sites may contain links to other Web sites. While we try to link only to sites that share our high standards and respect for privacy, we are not responsible for the content or the privacy practices employed by other sites.

Cookies
Some of First American's Web sites may make use of "cookie" technology to measure site activity and to customize information to your personal tastes. A cookie is an element of data that a Web site can send to your browser, which may then store the cookie on your hard drive.
FirstAm.com uses stored cookies. The goal of this technology is to better serve you when visiting our site, save you time when you are here and to provide you with a more meaningful and productive Web site experience.

Fair Information Values
Fairness We consider consumer expectations about their privacy in all our businesses. We only offer products and services that assure a favorable balance between consumer benefits and consumer privacy.
Public Record We believe that an open public record creates significant value for society, enhances consumer choice and creates consumer opportunity. We actively support an open public record and emphasize its importance and contribution to our economy.
Use We believe we should behave responsibly when we use information about a consumer in our business. We will obey the laws governing the collection, use and dissemination of data.
Accuracy We will take reasonable steps to help assure the accuracy of the data we collect, use and disseminate. Where possible, we will take reasonable steps to correct inaccurate information. When, as with the public record, we cannot correct inaccurate information, we will take all reasonable steps to assist consumers in identifying the source of the erroneous data so that the consumer can secure the required corrections.
Education We endeavor to educate the users of our products and services, our employees and others in our industry about the importance of consumer privacy. We will instruct our employees on our fair information values and on the responsible collection and use of data. We will encourage others in our industry to collect and use information in a responsible manner.
Security We will maintain appropriate facilities and systems to protect against unauthorized access to and corruption of the data we maintain.

Updated

First American Title

First American Title Company

9381 E. Stockton Blvd, Suite 128
Elk Grove, CA 95624

Escrow Officer:	Laura Flood
Phone:	(209)529-5000
Fax No.:	(866)386-0973
E-Mail:	lflood@firstam.com
E-Mail Loan Documents to:	Lenders please contact the Escrow Officer for email address for sending loan documents.
Buyer:	Toll CA VIII, LP
Property:	APN 006-200-006-2-01 Livermore, CA

PRELIMINARY REPORT

In response to the above referenced application for a policy of title insurance, this company hereby reports that it is prepared to issue, or cause to be issued, as of the date hereof, a Policy or Policies of Title Insurance describing the land and the estate or interest therein hereinafter set forth, insuring against loss which may be sustained by reason of any defect, lien or encumbrance not shown or referred to as an Exception below or not excluded from coverage pursuant to the printed Schedules, Conditions and Stipulations of said Policy forms.

The printed Exceptions and Exclusions from the coverage and Limitations on Covered Risks of said policy or policies are set forth in Exhibit A attached. *The policy to be issued may contain an arbitration clause. When the Amount of Insurance is less than that set forth in the arbitration clause, all arbitrable matters shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties.* Limitations on Covered Risks applicable to the CLTA and ALTA Homeowner's Policies of Title Insurance which establish a Deductible Amount and a Maximum Dollar Limit of Liability for certain coverages are also set forth in Exhibit A. Copies of the policy forms should be read. They are available from the office which issued this report.

Please read the exceptions shown or referred to below and the exceptions and exclusions set forth in Exhibit A of this report carefully. The exceptions and exclusions are meant to provide you with notice of matters which are not covered under the terms of the title insurance policy and should be carefully considered.

It is important to note that this preliminary report is not a written representation as to the condition of title and may not list all liens, defects, and encumbrances affecting title to the land.

This report (and any supplements or amendments hereto) is issued solely for the purpose of facilitating the issuance of a policy of title insurance and no liability is assumed hereby. If it is desired that liability be assumed prior to the issuance of a policy of title insurance, a Binder or Commitment should be requested.

Dated as of October 20, 2015 at 7:30 A.M.

The form of Policy of title insurance contemplated by this report is:

To Be Determined

A specific request should be made if another form or additional coverage is desired.

Title to said estate or interest at the date hereof is vested in:

COLLIER CREEK MITIGATION LAND, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY

The estate or interest in the land hereinafter described or referred to covered by this Report is:

Fee

The Land referred to herein is described as follows:

(See attached Legal Description)

At the date hereof exceptions to coverage in addition to the printed Exceptions and Exclusions in said policy form would be as follows:

1. General and special taxes and assessments for the fiscal year 2015-2016.

First Installment:	$2,512.21, OPEN
Penalty:	$0.00
Second Installment:	$2,512.21, OPEN
Penalty:	$0.00
Tax Rate Area:	68-003
A. P. No.:	006-200-006

2. Intentionally Deleted

3. The lien of supplemental taxes, if any, assessed pursuant to Chapter 3.5 commencing with Section 75 of the California Revenue and Taxation Code.

4. Terms, provisions, covenants, restrictions and conditions contained in a document executed pursuant to the California Land Conservation Act of 1965 (Williamson Act) and recorded January 20, 1969 as Book 5805, Page 619 of Official Records.

5. The terms and provisions contained in the document entitled "Ordinance No. 96-27, South County Area Benefit" recorded August 15, 1996 as Instrument No. 1996-152751 of Official Records.

6. The terms and provisions contained in the document entitled "Ordinance No. 97-30 Revision of Eastern Contra Costa Sub-Regional Transportation Mitigation Fees" recorded August 6, 1997 as Instrument No. 1997-140390 of Official Records.

7. The terms and provisions contained in the document entitled "Ordinance No. 97-29 Urgency Measure for Interim Authorization to Revise Eastern Contra Costa Sub-Regional Transportation Mitigation Fees" recorded August 6, 1997 as Instrument No. 1997-140391 of Official Records.

8. The terms and provisions contained in the document entitled "Resolution and Ordinance to Extend the Urgency Ordinance for the Eastern Contra Costa Sub-Regional Transportation Mitigation Fee Program" recorded August 18, 1997 as Instrument No. 1997-148355 of Official Records.

9. The terms and provisions contained in the document entitled "Memorandum of Agreement" recorded December 02, 2013 as Instrument No. 2013-0279395 of Official Records.

10. Rights of parties in possession.

Prior to the issuance of any policy of title insurance, the Company will require:

11. With respect to Collier Creek Mitigation Land, LLC, a limited liability company:
a. A copy of its operating agreement and any amendments thereto;
b. If it is a California limited liability company, that a certified copy of its articles of organization (LLC-1) and any certificate of correction (LLC-11), certificate of amendment (LLC-2), or restatement of articles of organization (LLC-10) be recorded in the public records;
c. If it is a foreign limited liability company, that a certified copy of its application for registration (LLC-5) be recorded in the public records;
d. With respect to any deed, deed of trust, lease, subordination agreement or other document or instrument executed by such limited liability company and presented for recordation by the Company or upon which the Company is asked to rely, that such document or instrument be executed in accordance with one of the following, as appropriate:
(i) If the limited liability company properly operates through officers appointed or elected pursuant to the terms of a written operating agreement, such document must be executed by at least two duly elected or appointed officers, as follows: the chairman of the board, the president or any vice president, and any secretary, assistant secretary, the chief financial officer or any assistant treasurer;
(ii) If the limited liability company properly operates through a manager or managers identified in the articles of organization and/or duly elected pursuant to the terms of a written operating agreement, such document must be executed by at least two such managers or by one manager if the limited liability company properly operates with the existence of only one manager.
e. Other requirements which the Company may impose following its review of the material required herein and other information which the Company may require

INFORMATIONAL NOTES

Note: The policy to be issued may contain an arbitration clause. When the Amount of Insurance is less than the certain dollar amount set forth in any applicable arbitration clause, all arbitrable matters shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties. If you desire to review the terms of the policy, including any arbitration clause that may be included, contact the office that issued this Commitment or Report to obtain a sample of the policy jacket for the policy that is to be issued in connection with your transaction.

1. Supplemental taxes for the fiscal year 2013-2014 assessed pursuant to Chapter 3.5 commencing with Section 75 of the California Revenue and Taxation Code.

First Installment:	$884.67, PAID
Penalty:	$0.00
Second Installment:	$884.67, PAID
Penalty:	$0.00
Tax Rate Area:	68-003
A. P. No.:	006-200-006

2. According to the latest available equalized assessment roll in the office of the county tax assessor, there is located on the land a(n) Commercial Structure known as (no number assigned) Collier Canyon Road, Livermore, California.

3. According to the public records, there has been no conveyance of the land within a period of twenty four months prior to the date of this report, except as follows:

   A document recorded June 10, 2014 as Instrument No. 2014-94152 of Official Records.
   From: COLLIER CREEK MITIGATION LAND LLC, A CALIFORNIA LIMITED LIABILITY COMPANY WHO ERRONEOUSLY ACQUIRED TITLE AS COLLIER CREEK, LLC A CALIFORNIA LIMITED LIABILITY COMPANY
   To: COLLIER CREEK MITIGATION LAND, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY

4. We find no open deeds of trust. Escrow please confirm before closing.

The map attached, if any, may or may not be a survey of the land depicted hereon. First American expressly disclaims any liability for loss or damage which may result from reliance on this map except to the extent coverage for such loss or damage is expressly provided by the terms and provisions of the title insurance policy, if any, to which this map is attached.

LEGAL DESCRIPTION

Real property in the unincorporated area of the County of Contra Costa, State of California, described as follows:

LOT XX, AS SHOWN AND DESCRIBED IN THAT CERTAIN LOT LINE ADJUSTMENT LL09-0014, AS ATTACHED AND PERFECTED IN THE GRANT DEEDS RECORDED JUNE 11, 2010, AS INSTRUMENT NO.'S 2010-0116861 AND 2010-0116862, OFFICIAL RECORDS OF CONTRA COSTA COUNTY, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

PORTION OF PARCEL B AS SAID PARCEL IS SHOWN ON THE SUBDIVISION MS-42-83, FILED AUGUST 6, 1984 IN BOOK 111 OF PARCEL MAPS PAGE 9, CONTRA COSTA COUNTY RECORDS AND A PORTION OF LOT 22 AS SAID LOT IS SHOWN ON THE MAP OF HOILAND RANCH, FILED IN MAP BOOK 16, PAGE 347, CONTRA COSTA COUNTY RECORDS, FURTHER DESCRIBED AS FOLLOWS;

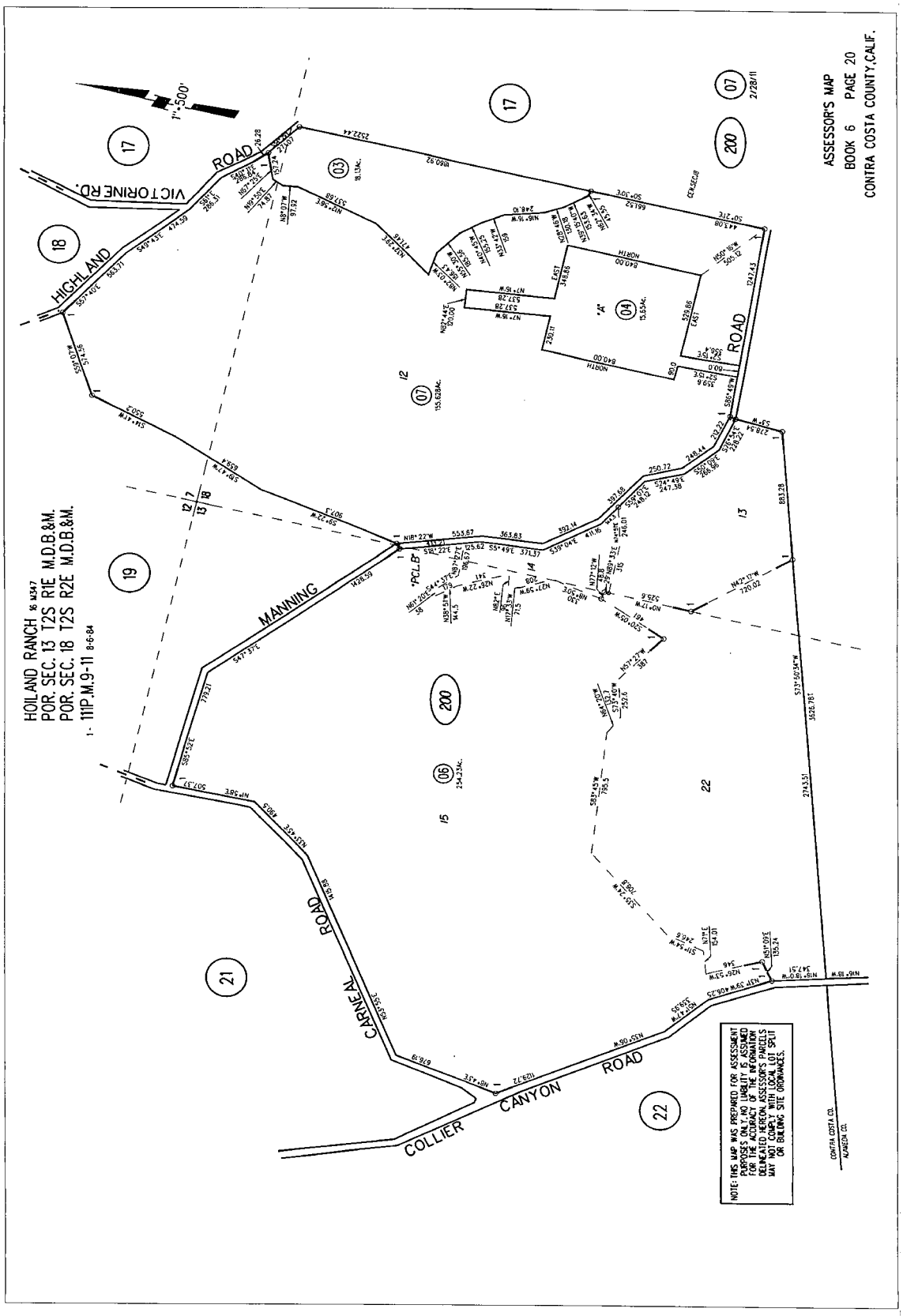
PARCEL ONE

ALL THAT PORTION OF PARCEL B LYING WEST OF MANNING ROAD, AS SAID ROAD IS SHOWN ON SAID PARCEL MAP (111PM 9).

PARCEL TWO

ALL THAT PORTION OF SAID LOT 22 LYING IN CONTRA COSTA COUNTY.

APN: 006-200-006


ASSESSOR'S MAP
BOOK 6 PAGE 20
CONTRA COSTA COUNTY, CALIF.
2/28/11
HOILAND RANCH M 4347
POR. SEC. 13 T2S R1E M.D.B.&M.
POR. SEC. 18 T2S R2E M.D.B.&M.
1 - 111 P.M. 9-11 8-6-84
1"=500'
VICTORINE RD.
HIGHLAND ROAD
MANNING ROAD
CARNEAL ROAD
COLLIER CANYON ROAD
"PCL B"
"A"
15.55Ac.
155.62Ac.
254.34Ac.
NOTE: THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE INFORMATION DELINEATED HEREON. ASSESSOR'S PARCELS MAY NOT CONFORM WITH LOCAL LOT SPLIT OR BUILDING SITE ORDINANCES.
CONTRA COSTA CO.
ALAMEDA CO.

NOTICE

Section 12413.1 of the California Insurance Code, effective January 1, 1990, requires that any title insurance company, underwritten title company, or controlled escrow company handling funds in an escrow or sub-escrow capacity, wait a specified number of days after depositing funds, before recording any documents in connection with the transaction or disbursing funds. This statute allows for funds deposited by wire transfer to be disbursed the same day as deposit. In the case of cashier's checks or certified checks, funds may be disbursed the next day after deposit. In order to avoid unnecessary delays of three to seven days, or more, please use wire transfer, cashier's checks, or certified checks whenever possible.

INCOMING DOMESTIC WIRE INSTRUCTIONS

PAYABLE TO:	First American Title Company
BANK:	First American Trust, FSB
ADDRESS:	5 First American Way, Santa Ana, CA 92707
ACCOUNT NO:	3115570000
ROUTING NUMBER:	122241255

PLEASE REFERENCE THE FOLLOWING:

PROPERTY:	APN 006-200-006-2-01, Livermore, CA
FILE NUMBER:	618508-002 (LF)
ATTENTION:	Laura Flood

PLEASE USE THE ABOVE INFORMATION WHEN WIRING FUNDS TO **First American Title Company**. **FUNDS MUST BE WIRED FROM A BANK WITHIN THE UNITED STATES.** PLEASE NOTIFY **Laura Flood** AT **(209)529-5000** OR **lflood@firstam.com** WHEN YOU HAVE TRANSMITTED YOUR WIRE.

IF YOUR FUNDS ARE BEING WIRED FROM A NON-U.S. BANK, ADDITIONAL CHARGES MAY APPLY. PLEASE CONTACT YOUR ESCROW OFFICER/CLOSER FOR INTERNATIONAL WIRING INSTRUCTIONS.

PLEASE NOTE THAT AN ACH TRANSFER IS NOT THE SAME AS A WIRE, REQUIRES ADDITIONAL TIME FOR CLEARANCE AND MAY DELAY CLOSING.

FIRST AMERICAN TRUST CONTACT INFO: Banking Services 1-877-600-9473

ALL WIRES WILL BE RETURNED IF THE FILE NUMBER AND/OR PROPERTY REFERENCE ARE NOT INCLUDED

EXHIBIT A
LIST OF PRINTED EXCEPTIONS AND EXCLUSIONS (BY POLICY TYPE)

CLTA/ALTA HOMEOWNER'S POLICY OF TITLE INSURANCE (02-03-10)
EXCLUSIONS

In addition to the Exceptions in Schedule B, You are not insured against loss, costs, attorneys' fees, and expenses resulting from:

1. Governmental police power, and the existence or violation of those portions of any law or government regulation concerning:
   (a) building; (d) improvements on the Land;
   (b) zoning; (e) land division; and
   (c) land use; (f) environmental protection.

   This Exclusion does not limit the coverage described in Covered Risk 8.a., 14, 15, 16, 18, 19, 20, 23 or 27.
2. The failure of Your existing structures, or any part of them, to be constructed in accordance with applicable building codes. This Exclusion does not limit the coverage described in Covered Risk 14 or 15.
3. The right to take the Land by condemning it. This Exclusion does not limit the coverage described in Covered Risk 17.
4. Risks:
   (a) that are created, allowed, or agreed to by You, whether or not they are recorded in the Public Records;
   (b) that are Known to You at the Policy Date, but not to Us, unless they are recorded in the Public Records at the Policy Date;
   (c) that result in no loss to You; or
   (d) that first occur after the Policy Date - this does not limit the coverage described in Covered Risk 7, 8.e., 25, 26, 27 or 28.
5. Failure to pay value for Your Title.
6. Lack of a right:
   (a) to any land outside the area specifically described and referred to in paragraph 3 of Schedule A; and
   (b) in streets, alleys, or waterways that touch the Land.
   This Exclusion does not limit the coverage described in Covered Risk 11 or 21.
7. The transfer of the Title to You is invalid as a preferential transfer or as a fraudulent transfer or conveyance under federal bankruptcy, state insolvency, or similar creditors' rights laws.

LIMITATIONS ON COVERED RISKS

Your insurance for the following Covered Risks is limited on the Owner's Coverage Statement as follows: For Covered Risk 16, 18, 19, and 21 Your Deductible Amount and Our Maximum Dollar Limit of Liability shown in Schedule A.

Your Deductible Amount	**Our Maximum Dollar Limit of Liability**
Covered Risk 16: 1% of Policy Amount or $2,500.00 (whichever is less)	$10,000.00
Covered Risk 18: 1% of Policy Amount or $5,000.00 (whichever is less)	$25,000.00
Covered Risk 19: 1% of Policy Amount or $5,000.00 (whichever is less)	$25,000.00
Covered Risk 21: 1% of Policy Amount or $2,500.00 (whichever is less)	$5,000.00

ALTA RESIDENTIAL TITLE INSURANCE POLICY (6-1-87)
EXCLUSIONS

In addition to the Exceptions in Schedule B, you are not insured against loss, costs, attorneys' fees, and expenses resulting from:

1. Governmental police power, and the existence or violation of any law or government regulation. This includes building and zoning ordinances and also laws and regulations concerning:
   (a) and use
   (b) improvements on the land
   (c) and division
   (d) environmental protection

   This exclusion does not apply to violations or the enforcement of these matters which appear in the public records at Policy Date.
   This exclusion does not limit the zoning coverage described in Items 12 and 13 of Covered Title Risks.
2. The right to take the land by condemning it, unless:

(a) a notice of exercising the right appears in the public records on the Policy Date

(b) the taking happened prior to the Policy Date and is binding on you if you bought the land without knowing of the taking

3. Title Risks:
   (a) that are created, allowed, or agreed to by you
   (b) that are known to you, but not to us, on the Policy Date -- unless they appeared in the public records
   (c) that result in no loss to you
   (d) that first affect your title after the Policy Date -- this does not limit the labor and material lien coverage in Item 8 of Covered Title Risks
4. Failure to pay value for your title.
5. Lack of a right:
   (a) to any land outside the area specifically described and referred to in Item 3 of Schedule A OR
   (b) in streets, alleys, or waterways that touch your land

   This exclusion does not limit the access coverage in Item 5 of Covered Title Risks.

2006 ALTA LOAN POLICY (06-17-06)

EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to
   (i) the occupancy, use, or enjoyment of the Land;
   (ii) the character, dimensions, or location of any improvement erected on the Land;
   (iii) the subdivision of land; or
   (iv) environmental protection;

   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.

   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters
   (a) created, suffered, assumed, or agreed to by the Insured Claimant;
   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;
   (c) resulting in no loss or damage to the Insured Claimant;
   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 13, or 14); or
   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law.
6. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is
   (a) a fraudulent conveyance or fraudulent transfer, or
   (b) a preferential transfer for any reason not stated in Covered Risk 13(b) of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the Insured Mortgage in the Public Records. This Exclusion does not modify or limit the coverage provided under Covered Risk 11(b).

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) that arise by reason of:

1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown by the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.

4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

2006 ALTA OWNER'S POLICY (06-17-06)

EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to

   (i) the occupancy, use, or enjoyment of the Land;

   (ii) the character, dimensions, or location of any improvement erected on the Land;

   (iii) the subdivision of land; or

   (iv) environmental protection;

   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5.

   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters

   (a) created, suffered, assumed, or agreed to by the Insured Claimant;

   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;

   (c) resulting in no loss or damage to the Insured Claimant;

   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 9 or 10); or

   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Title.
4. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction vesting the Title as shown in Schedule A, is

   (a) a fraudulent conveyance or fraudulent transfer, or

   (b) a preferential transfer for any reason not stated in Covered Risk 9 of this policy.
5. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A.

The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) that arise by reason of:

1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown by the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

ALTA EXPANDED COVERAGE RESIDENTIAL LOAN POLICY (07-26-10)

EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:

1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to

   (i) the occupancy, use, or enjoyment of the Land;

   (ii) the character, dimensions, or location of any improvement erected on the Land;

   (iii) the subdivision of land; or

   (iv) environmental protection;

   or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5, 6, 13(c), 13(d), 14 or 16.

   (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 5, 6, 13(c), 13(d), 14 or 16.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters

   (a) created, suffered, assumed, or agreed to by the Insured Claimant;

   (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;

   (c) resulting in no loss or damage to the Insured Claimant;

   (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 16, 17, 18, 19, 20, 21, 22, 23, 24, 27 or 28); or

   (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law. This Exclusion does not modify or limit the coverage provided in Covered Risk 26.
6. Any claim of invalidity, unenforceability or lack of priority of the lien of the Insured Mortgage as to Advances or modifications made after the Insured has Knowledge that the vestee shown in Schedule A is no longer the owner of the estate or interest covered by this policy. This Exclusion does not modify or limit the coverage provided in Covered Risk 11.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching subsequent to Date of Policy. This Exclusion does not modify or limit the coverage provided in Covered Risk 11(b) or 25.
8. The failure of the residential structure, or any portion of it, to have been constructed before, on or after Date of Policy in accordance with applicable building codes. This Exclusion does not modify or limit the coverage provided in Covered Risk 5 or 6.
9. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is

   (a) a fraudulent conveyance or fraudulent transfer, or

   (b) a preferential transfer for any reason not stated in Covered Risk 27(b) of this policy.

First American Title

Privacy Information
We Are Committed to Safeguarding Customer Information
In order to better serve your needs now and in the future, we may ask you to provide us with certain information. We understand that you may be concerned about what we will do with such information - particularly any personal or financial information. We agree that you have a right to know how we will utilize the personal information you provide to us. Therefore, together with our subsidiaries we have adopted this Privacy Policy to govern the use and handling of your personal information.

Applicability
This Privacy Policy governs our use of the information that you provide to us. It does not govern the manner in which we may use information we have obtained from any other source, such as information obtained from a public record or from another person or entity. First American has also adopted broader guidelines that govern our use of personal information regardless of its source. First American calls these guidelines its Fair Information Values.

Types of Information
Depending upon which of our services you are utilizing, the types of nonpublic personal information that we may collect include:

- Information we receive from you on applications, forms and in other communications to us, whether in writing, in person, by telephone or any other means;
- Information about your transactions with us, our affiliated companies, or others; and
- Information we receive from a consumer reporting agency.

Use of Information
We request information from you for our own legitimate business purposes and not for the benefit of any nonaffiliated party. Therefore, we will not release your information to nonaffiliated parties except: (1) as necessary for us to provide the product or service you have requested of us; or (2) as permitted by law. We may, however, store such information indefinitely, including the period after which any customer relationship has ceased. Such information may be used for any internal purpose, such as quality control efforts or customer analysis. We may also provide all of the types of nonpublic personal information listed above to one or more of our affiliated companies. Such affiliated companies include financial service providers, such as title insurers, property and casualty insurers, and trust and investment advisory companies, or companies involved in real estate services, such as appraisal companies, home warranty companies and escrow companies. Furthermore, we may also provide all the information we collect, as described above, to companies that perform marketing services on our behalf, on behalf of our affiliated companies or to other financial institutions with whom we or our affiliated companies have joint marketing agreements.

Former Customers
Even if you are no longer our customer, our Privacy Policy will continue to apply to you.

Confidentiality and Security
We will use our best efforts to ensure that no unauthorized parties have access to any of your information. We restrict access to nonpublic personal information about you to those individuals and entities who need to know that information to provide products or services to you. We will use our best efforts to train and oversee our employees and agents to ensure that your information will be handled responsibly and in accordance with this Privacy Policy and First American's Fair Information Values. We currently maintain physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

Information Obtained Through Our Web Site
First American Financial Corporation is sensitive to privacy issues on the Internet. We believe it is important you know how we treat the information about you we receive on the Internet.
In general, you can visit First American or its affiliates' Web sites on the World Wide Web without telling us who you are or revealing any information about yourself. Our Web servers collect the domain names, not the e-mail addresses, of visitors. This information is aggregated to measure the number of visits, average time spent on the site, pages viewed and similar information. First American uses this information to measure the use of our site and to develop ideas to improve the content of our site.
There are times, however, when we may need information from you, such as your name and email address. When information is needed, we will use our best efforts to let you know at the time of collection how we will use the personal information. Usually, the personal information we collect is used only by us to respond to your inquiry, process an order or allow you to access specific account/profile information. If you choose to share any personal information with us, we will only use it in accordance with the policies outlined above.

Business Relationships
First American Financial Corporation's site and its affiliates' sites may contain links to other Web sites. While we try to link only to sites that share our high standards and respect for privacy, we are not responsible for the content or the privacy practices employed by other sites.

Cookies
Some of First American's Web sites may make use of "cookie" technology to measure site activity and to customize information to your personal tastes. A cookie is an element of data that a Web site can send to your browser, which may then store the cookie on your hard drive.
FirstAm.com uses stored cookies. The goal of this technology is to better serve you when visiting our site, save you time when you are here and to provide you with a more meaningful and productive Web site experience.

Fair Information Values
Fairness We consider consumer expectations about their privacy in all our businesses. We only offer products and services that assure a favorable balance between consumer benefits and consumer privacy.
Public Record We believe that an open public record creates significant value for society, enhances consumer choice and creates consumer opportunity. We actively support an open public record and emphasize its importance and contribution to our economy.
Use We believe we should behave responsibly when we use information about a consumer in our business. We will obey the laws governing the collection, use and dissemination of data.
Accuracy We will take reasonable steps to help assure the accuracy of the data we collect, use and disseminate. Where possible, we will take reasonable steps to correct inaccurate information. When, as with the public record, we cannot correct inaccurate information, we will take all reasonable steps to assist consumers in identifying the source of the erroneous data so that the consumer can secure the required corrections.
Education We endeavor to educate the users of our products and services, our employees and others in our industry about the importance of consumer privacy. We will instruct our employees on our fair information values and on the responsible collection and use of data. We will encourage others in our industry to collect and use information in a responsible manner.
Security We will maintain appropriate facilities and systems to protect against unauthorized access to and corruption of the data we maintain.

ATTACHMENT 4
HYDROLOGY SUFFICENCY ANALYSIS

HYDROLOGIC SUFFICIENCY ANALYSIS
COLLIER CREEK MITIGATION BANK
LIVERMORE AREA OF ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA

Prepared For:

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By:

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August 2012

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APPENDICES

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1.0 Approach and Findings

Optimal design of ponds and wetlands at Collier Creek Mitigation Bank necessitates a hydrologic sufficiency analysis. Using available hydrologic and meteorological data, Kaman Hydrology & Engineering, Inc. (KHE) developed individual water budgets for watershed basins to optimize the size and function of proposed mitigation ponds and selected wetlands. Water budgets were prepared for average, median, and dry year-type precipitation years. Key findings of this study include the following:

- Given the site topography and available drainage area, up to 2.54-acres of California redlegged frog breeding pond are sustainable at the site.

- Seasonal freshwater wetlands are sustainable by direct rainfall, with no other surface water or groundwater inflows. Wetland creation is therefore controlled by suitable soil type (i.e., high clay content) and level ground. Wetland hydroperiods would be extended by introducing supplemental water supplies to seasonal wetlands, such as localized runoff, groundwater and overbank storm flow from creeks.

- Given the extent of existing jurisdictional wetland, desirable clayey site soil and suitable topography, KHE estimates that a maximum of 29.5-acres of seasonal freshwater wetlands (in addition to the 2.54-acres of pond) are sustainable at the approximately 350-acre project site.

The following Sections summarize the approach, methods and results of KHE's hydrologic sufficiency analysis.

2.0 Topography, Watersheds, and Proposed Ponds and Wetlands

All potential ponds and seasonal freshwater wetlands are located in the West Branch Cayetano Creek and Collier Canyon Creek watersheds. The drainage areas to selected ponds and proposed wetlands were determined from electronic United States Geological Survey (USGS) 10 foot-interval contour maps (referred to as US Topo) (http://nationalmap.gov/ustopo/index.html)[1]. The locations and initial sizes of the selected ponds and wetlands, as well as existing jurisdictional waters, wetlands, and ephemeral drainages, were provided by Olberding Environmental, Inc. All existing and proposed pond locations, selected wetland sites, existing hydrologic features and associated drainage areas are indicated on Figure 1. The hydrologic sufficiency analyses focus on those watersheds draining specifically to proposed ponds. Figure 1 provides a naming convention of watersheds, proposed ponds, and selected wetlands. Appendix A provides a table of watershed names, areas, and relationships of watersheds to proposed ponds and selected wetlands.

[1] US Topo is the new generation of digital topographic maps from the U.S. Geological Survey (USGS). Arranged in the traditional 7.5-minute quadrangle format, digital US Topo maps look and feel like the traditional paper topographic maps for which the USGS is so well known. At the same time, US Topo maps provide modern technical advantages that support wider and faster public distribution and enable basic, on-screen geographic analysis.

3.0 Precipitation and Water Year Types

The National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA) records daily precipitation for Livermore, California (NCDC, 2012) Station *GHCND : USC00044997* extends from 1903 through 2011. However, in order to maintain consistency between different water budget data sets, the Collier Creek Mitigation Bank Hydrologic Sufficiency Analysis utilizes data from Water Year[2] (WY) 1969 through 2010 (October 1968 through September 2010), as this time period correlates with the available pan evaporation data. The long-term (WY1969-2010) average annual rainfall estimate from these data is 14.63 inches. The value agrees well with the USGS estimate for mean annual rainfall of 15.0-inches for this site location (Rantz, 71).

Monthly total rainfall for Water Year 1969 - 2010 was also obtained from the Zone 7 Water Agency (Zone 7 Water Agency, 2011). The Zone 7 monthly data supplied average values for months where data was missing from the daily NCDC data set. The complete monthly data set was used to determine the rainfall-runoff year-type probability analysis, described below.

Monthly average rainfall values for WY 1969 – 2010 (Zone 7, 2011) were summed by water year and ranked. The exceedance probability ranking of the annual rainfall values suggests the long-term (1969-2010) average value of 14.63 inches has a 40% probability of occurring any given year. Thus, the statistical average value does not equal the median value. The median year in the data set, or that with a 50% probability of occurring within any given year, is WY 1979, and data for this year was used for the median year-type analysis. WY1979 generated 13.59 inches of rainfall annually. A water year-type with an 85% probability of occurring within any given year was selected as the representative dry year-type. The Water Year exhibiting the 85% probability range is WY 2007, which was used for the dry year-type analysis. WY2007 generated 9.66 inches of rainfall annually. Average, median, and dry year-type monthly rainfall totals are presented in Tables 1, 2 and 3, respectively.

4.0 Runoff

KHE did not identify any suitable local-area stream flow gauges to estimate surface water runoff from the site. Therefore, runoff contributing to Collier Creek Mitigation Ponds and Wetlands was calculated using the Natural Resource Conservation Service (NRCS) Runoff Curve Number (CN) Method (NRCS, 1986). The CN method approximates volume of direct surface runoff as a function of daily (24 hour) rainfall (P), the potential maximum retention after runoff begins (S), the initial abstraction (I_a), and the curve number (CN). Estimated as 20 percent of the value for S, I_a accounts for the total water losses before runoff begins and includes depression storage, interception, evaporation, and infiltration. S is directly related to CN, a function of hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition.

[2] The USGS defines a water year as the 12-month period October 1, for any given year through September 30, of the following year. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1999 is called the "1999" water year

Soil data (NRCS, 1966, 1977, 2007, 2010) overlaid onto contributing watersheds resulted in HSG coverage of nearly exclusively type D (94%). HSG D soils have high runoff potential and very low infiltration rates when thoroughly wetted. Based on the majority of type D soil, all contributing watersheds were assumed composed from 100% HSG D type soils. Assuming cover type is pasture, grassland, or range, with 50-75% ground cover and not heavily grazed (fair condition), and 100% HSG D, the universal CN chosen from Table 2-2c (NRCS, 1986) was 84.

Based on a CN value of 84, the parameters to the runoff equations were estimated as:

$S = (1000 / CN) – 10 = 1.9$ inches
$I_a = 0.2 * S = 0.38$ inches

These data indicate that within a 24-hour period, the initial 0.38 inches of rainfall goes towards depression storage, interception, evaporation, and infiltration. Below this initial rainfall total, no runoff occurs. Rainfall in excess of 0.38 inches generates surface water runoff (Q) by the equation:

$$Q = ((P – 0.2S)^2) / (P +0.8S)$$

Using the daily rainfall total data and runoff equation discussed above, daily runoff totals for the entire analysis period (WY1969-2010) were calculated. The average monthly values over the entire analysis period were used in the average water year type water budget analysis and are presented in Table 1. The long-term (WY1969-2010) average annual rainfall estimate of 14.63 inches generates an average annual runoff value of nearly 0.99-inches per year, less than 10% of the mean annual precipitation. The value agrees well with the USGS estimate for mean annual runoff of 1.0-inches for this site location (Rantz, 74).

Median and dry year type runoff totals were calculated using the runoff equation and daily rainfall totals for WY1979 (median year type) and WY2007 (dry year type). The resulting annual runoff totals were 0.85-inches and 0.28-inches, respectively (see Tables 2 and 3).

5.0 Evapotranspiration

Monthly pan evaporation at Lake Del Valle in Livermore for Water Year 1969 - 2010 was obtained from Zone 7 Water Agency (Zone 7 Water Agency, 2011). Pan evaporation data was converted to an open-water evaporation rate by multiplying by a coefficient of 0.7. The open-water evaporation rates were then increased by multiplying by a factor of 1.6 in order to account for micro-climate effects, and wind. KHE has substantiated the escalation in pond and wetland evapotranspiration losses through post-project hydrologic monitoring of other restoration sites in a similar topographic and hydrologic setting. Average, median, and dry year-type monthly evapotranspiration values are presented in Tables 1, 2 and 3, respectively.

Table 1. Average Year-Type Annual Input Values, WY 1969 – WY 2010.

	Rainfall (inches)	Runoff (inches)	Evapotranspiration (inches)
October	0.82	0.07	5.68
November	1.74	0.15	2.70
December	2.48	0.18	1.63
January	2.93	0.29	1.54
February	2.69	0.16	2.10
March	2.18	0.10	4.00
April	1.01	0.03	6.00
May	0.41	0.00	8.62
June	0.08	0.00	10.39
July	0.02	0.00	11.87
August	0.07	0.00	10.88
September	0.20	0.01	8.74
Annual	**14.63**	**0.99**	**74.14**

Table 2. Median Year-Type (50th Percentile of Being Equaled or Exceeded) Annual Input Values, WY 1969 – WY 2010.

	Rainfall (inches)	Runoff (inches)	Evapotranspiration (inches)
October	0.00	0.00	6.50
November	2.16	0.15	2.51
December	0.58	0.00	1.69
January	4.51	0.64	1.40
February	3.19	0.06	1.44
March	1.86	0.01	2.56
April	0.88	0.00	5.38
May	0.34	0.00	9.36
June	0.00	0.00	12.34
July	0.06	0.00	11.65
August	0.00	0.00	10.34
September	0.00	0.00	10.61
Annual	**13.59**	**0.85**	**75.78**

Table 3. Dry Year-Type (85th Percentile of Being Equaled or Exceeded) Annual Input Values, WY 1969 – WY 2010.

	Rainfall (inches)	Runoff (inches)	Evapotranspiration (inches)
October	0.20	0.00	5.90
November	1.68	0.00	2.34
December	2.25	0.16	2.49
January	0.52	0.00	2.22
February	3.92	0.12	1.92
March	0.33	0.00	4.86
April	0.44	0.00	6.56
May	0.11	0.00	9.61
June	0.00	0.00	10.74
July	0.00	0.00	10.99
August	0.00	0.00	11.70
September	0.21	0.00	7.84
Annual	**9.66**	**0.28**	**77.17**

6.0 Modeling Approach and Pond/Wetland Optimization

In order to optimize the nine ponds to provide the desired frog breeding habitat, the following success criteria were applied to the analysis. First, each pond must achieve two consecutive months at full volume (maximum depth) during median water year-type (50% chance of rainfall being equaled or exceeded in any given year). A second objective is to optimize pond sizes in order to create at least 2.49 acres of total pond area during the winter breeding season (acreage is measured at full volume and depth).

Pond design assumptions and steps used in the water budget analysis include: a) each pond geometry is circular in shape with 3:1 (Horizontal: Vertical) side slopes; b) Ponds P1, P4, and P7 require seven foot depths and the remaining ponds require five foot depth; c) pre-optimized pond size data was provided by Olberding Environmental, Inc. and used to produce initial area-stage-volume relationships for each pond; d) initial Pond sizes were then optimized through water budget iterations to meet the success criteria outlined above; and e) Maximum available water depth of wetland areas is 0.25-feet, with vertical side slopes. Several wetland areas with one contributing watershed are added together to create one overall wetland area.

7.0 Water Budget Analyses

The water budget analysis consisted of processing monthly inflow, outflow, and storage volume changes for each pond/wetland system. A typical pond-wetland system water budget consists of tracking the volume of: inflow into the pond; overflow from the pond and local runoff into the wetland; and finally any wetland overflow into downstream creeks. Some systems contain no wetland, and any pond overflow spills directly to the creek. Some systems contain no pond, and wetland overflow spills directly to the creek.

A typical water budget for a pond-wetland system accounts for the monthly inflows, outflows and changes in pond/wetland storage as described below. A single example pond/wetland water budget is provided in Appendix B. Water budgets were computed for each system under average, median, and dry year-type conditions.

- Monthly direct rainfall inflow is converted from inches to volume (acre-feet) by multiplying monthly rainfall by the "full volume" pond area[3].
- Monthly surface water runoff is converted from inches to volume (acre-feet) by multiplying monthly runoff from the contributing watershed area, excluding pond area (net drainage area).
- Monthly evapotranspiration outflow is converted from inches to volume (acre-feet) by multiplying the first month (October) by the "empty" pond surface area. Each successive month's evapotranspiration volume is multiplied by the previous end of month pond surface area.
- Accounting for the rainfall, runoff, and evapotranspiration volumes for each month produces the monthly pond inflow balance. The monthly inflow balance is positive if the sum of rainfall and runoff exceed evapotranspiration losses. Or, the monthly inflow balance may be zero when evapotranspiration volume is greater

[3] All direct rainfall enters the pond area even if it falls on the side slopes of an empty pond, as it is assumed to runoff and pool at the bottom of the pond.

than contributing rainfall and runoff volumes. Monthly inflow is added cumulatively, month by month, with any negative monthly values converted to zero to account for dry months.

- End-of-month pond storage is calculated during filling and draining sequence based on the pond stage-area-volume relationships derived for each pond. Outflow or spillage from the pond is quantified should inflows exceed pond capacity and converting any negative monthly values to zero, accounting for the months where the pond dries out. End of month stage (pond water depth) and pond surface areas are calculated from pond volume using the stage-area-volume relationships. The end of month pond surface area is used in the water budget to calculate the amount of evaporation occurring in the following month.
- Should spillage from the pond occur once pond capacity is exceeded, the monthly spillage volume is accounted for as an addition inflow volume to receiving wetland or creek.
- Wetland water budgets are calculated using the same methodology for ponds assuming a 3-inch deep, flat bottom feature of a designated area. Any spillage from the wetland enters a creek.

8.0 Results

In general, there is sufficient water supply to achieve creation of the overall mitigation project. Results of the water budget analyses also indicate that water use by project wetlands will not significantly impair (reduce) flows and supply to existing wetland corridors and creek flow.

Through the pond size optimization process, the target pond water depths were achieved during both average and median water year-types. Additionally, the total pond acreage increased from 2.49- to 2.54 acres under optimized conditions. Table 4 demonstrates original and optimized pond sizes. Figure 2 illustrates optimized pond and wetland water budget results for average, median year-type, and dry year-type rainfall. During dry water year types, maximum pond depths are not achieved but, the ponds would sustain at least 1.0-foot of standing water for four (4) months or more.

Water budget results indicate that the proposed wetlands achieve a target water depth of 3-inches for at least two consecutive months during the median year-type, but only remain ponded for a single month under the dry water year-type. Water budget results for selected seasonal wetlands indicted on Figure 1 are provided on the hydrographs presented in Figure 2. Seasonal wetlands at the project site are sustainable by direct rainfall alone, even without any other surface- or ground-water inflows. Figure 3 presents modeled seasonal wetland water levels (maximum of 0.25-feet) for wetlands sustained solely by rainfall.

In order to estimate the total acreage of freshwater wetland that could be created at the project site, KHE mapped other potential sites where wetlands could be created in addition to those indicated on Figure 1. Knowing that direct rainfall can sustain seasonal wetlands, additional wetland mitigation sites were identified in areas of clay soil and level topography where wetland depressions could be excavated. The hollow pink

polygons in Figure 4 indicate those areas that meet these wetland design criteria. Although this area totals 20-acres, KHE recommends that only 50% of these areas be utilized for wetland creation to account for construction buffers and a reasonable wetland density. Adding a total of 10-acres of potential freshwater wetland to the 19.5-acres of selected wetlands analyzed with the water budget model, KHE estimates that the project site can sustain a maximum of 29.5-acres of freshwater wetland. Again, such wetlands will remain ponded and saturated for two (2) months during average and median year-types and for one (1) month during dry year-types.

KHE also recommends that freshwater wetlands be constructed in a manner to optimize receiving any overbank flows that may emanate from Collier Canyon and Cayetano Creeks during storm events. Such additional water supply may extend the hydroperiod of any receiving wetland.

Table 4. Original and Optimized Pond Size.

	ORIGINAL POND SIZE			OPTIMIZED POND SIZE				
POND NO.	DRAINAGE AREA NET ACRES	POND AREA ACRES	DRAINAGE AREA GROSS ACRES	DRAINAGE AREA NET ACRES	POND AREA ACRES	DRAINAGE AREA GROSS ACRES	POND DEPTH FEET	Δ POND AREA ACRES
P1	3.90	0.49	4.39	4.29	0.10	4.39	7	-0.39
P2	26.84	0.91	27.75	27.23	0.52	27.75	5	-0.39
P3	8.86	0.14	9.00	8.81	0.19	9.00	5	0.05
P4	22.11	0.39	22.50	22.16	0.34	22.50	7	-0.05
P5	19.79	0.03	19.82	19.46	0.36	19.82	5	0.33
P6	16.91	0.19	17.10	16.78	0.32	17.10	5	0.13
P7	26.87	0.14	27.01	26.63	0.38	27.01	7	0.24
P8	9.69	0.07	9.76	9.56	0.20	9.76	5	0.13
P9	6.38	0.14	6.52	6.38	0.14	6.52	5	0.00
SUM	141.35	2.49	143.84	141.30	2.54	143.84		

9.0 Bibliography

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Figure 1. Site map with pond and selected wetland locations and contributing drainage areas.

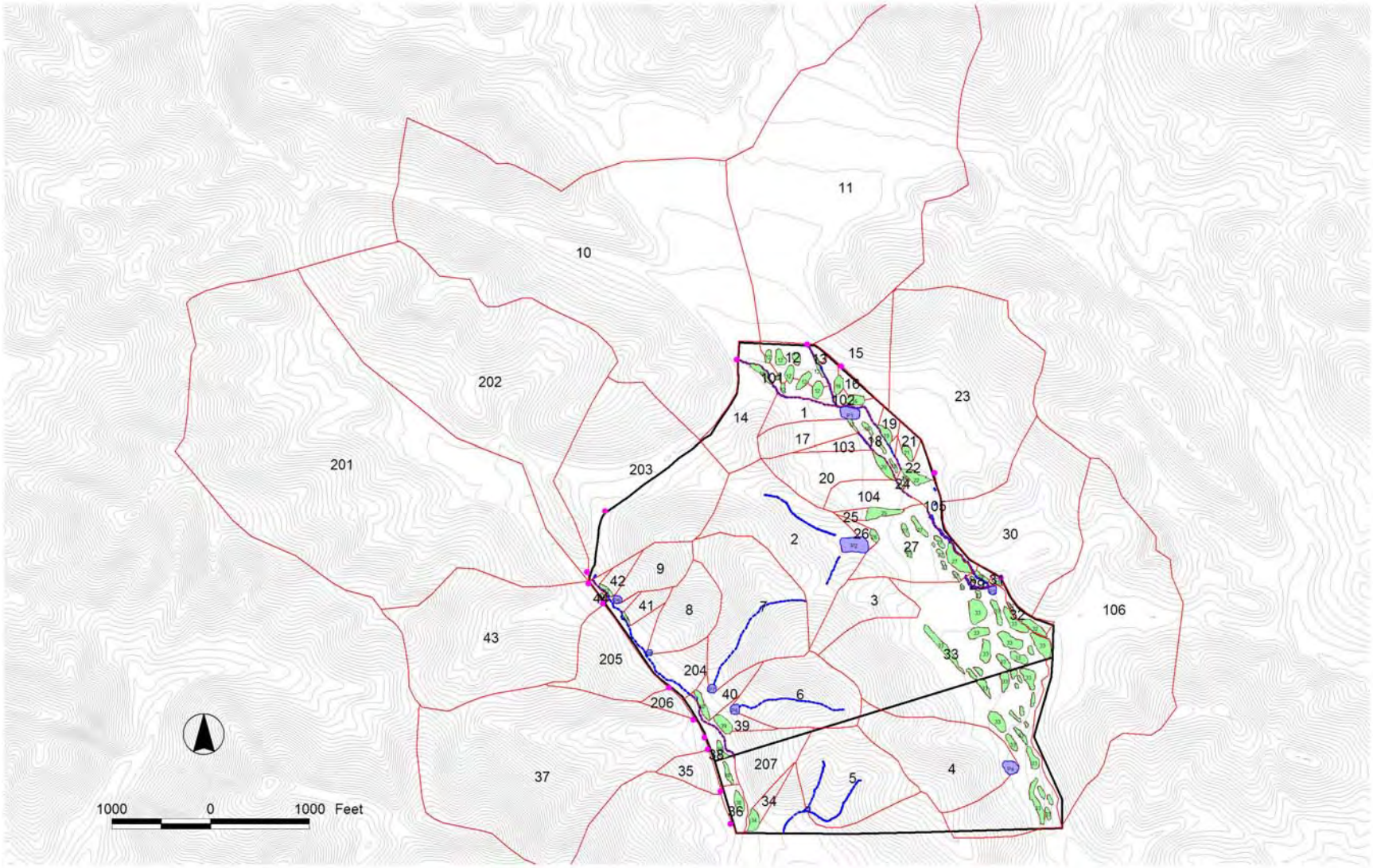
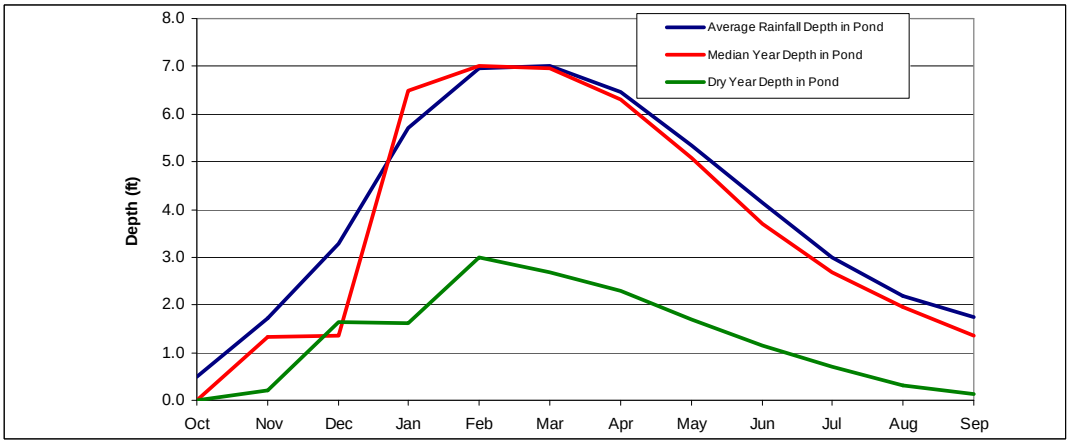
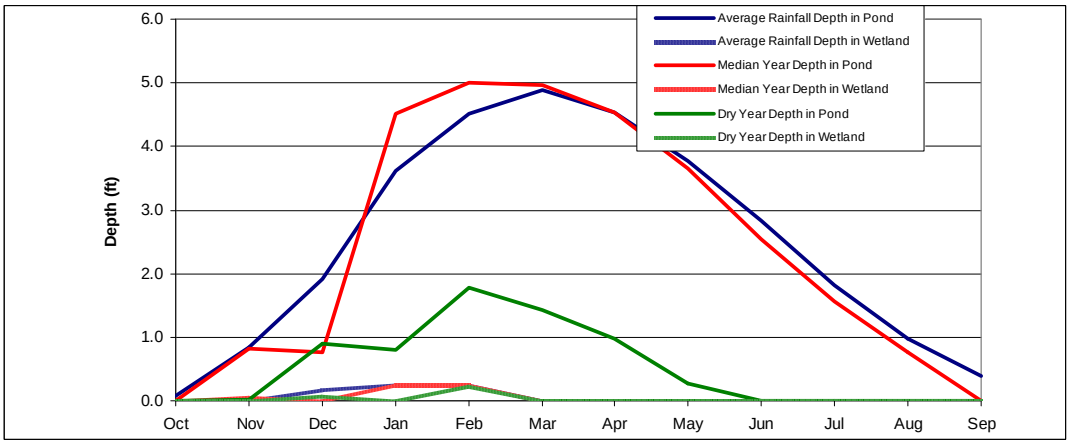


Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

Pond P1
Net DA = 4.29 Ac.
PA = 0.095 Ac.
Gross DA = 4.39 Ac.
Depth = 7'



Pond P2
Net DA = 27.23 Ac.
PA = 0.52 Ac.
Gross DA = 27.75 Ac.
Depth = 5'
Wetland 26/27
Net DA = 13.05 Ac.
WA = 1.87 Ac.
Gross DA =14.92 Ac.



Pond P3
Net DA = 8.81 Ac.
PA = 0.19 Ac.
Gross DA = 9.0 Ac
Depth = 5'
Wetland 33
Net DA = 60.51 Ac.
WA = 9.02 Ac.
Gross DA = 69.53 Ac.

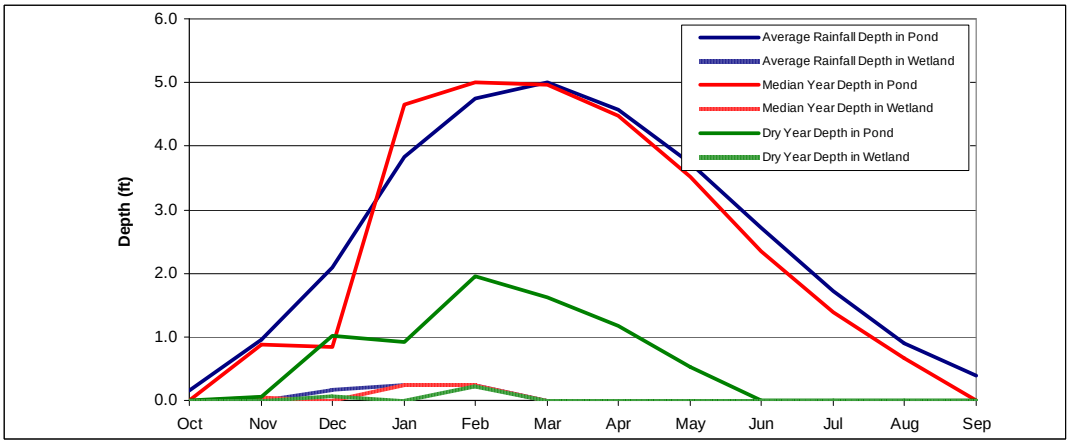
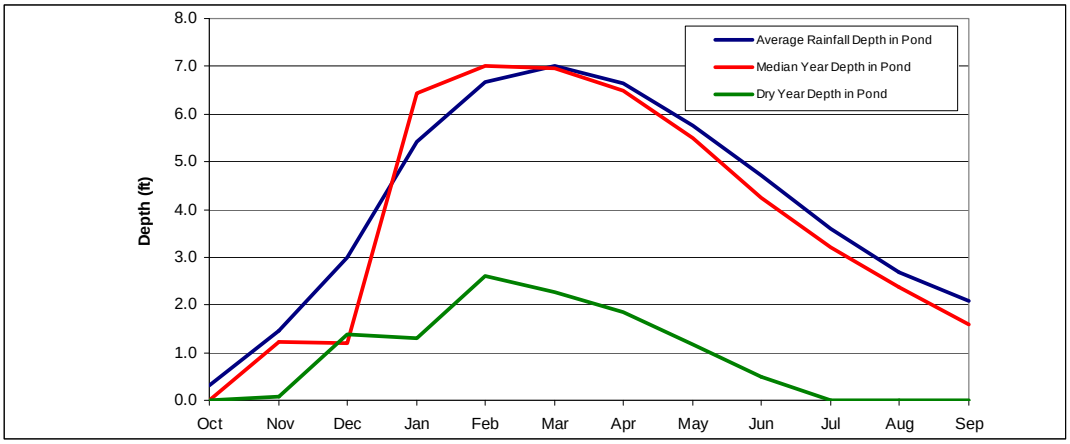
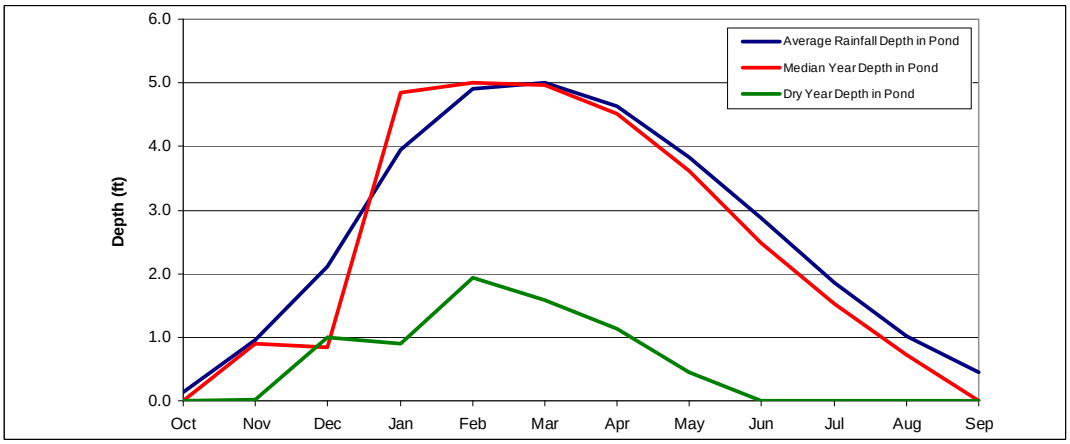


Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

Pond P4
Net DA = 22.16 Ac.
PA = 0.34 Ac.
Gross DA = 22.50 Ac.
Depth = 7'



Pond P5
Net DA = 19.46 Ac.
PA = 0.36 Ac.
Gross DA = 19.82 Ac.
Depth = 5'



Pond P6
Net DA = 16.78 Ac.
PA = 0.32 Ac.
Gross DA = 17.10 Ac.
Depth = 5'

Wetland 39
Net DA = 1.54 Ac.
WA = 0.49 Ac.
Gross DA = 2.03 Ac.

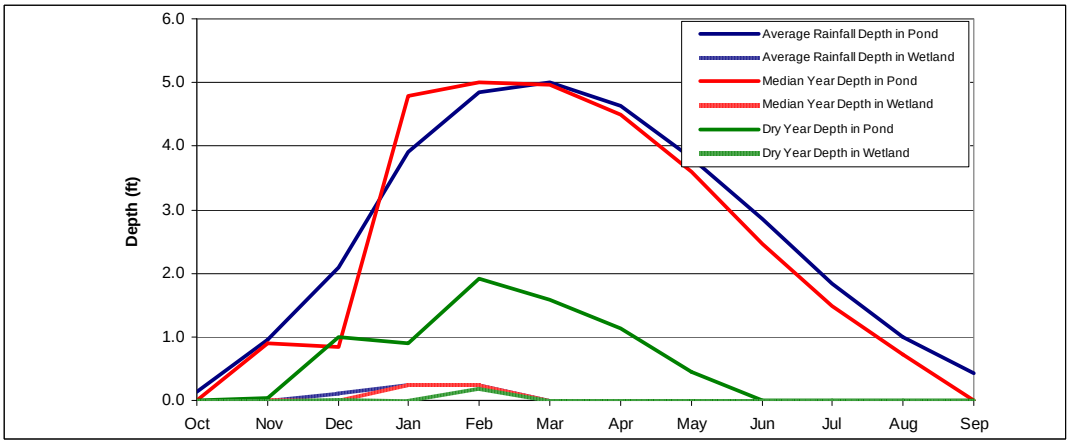


Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

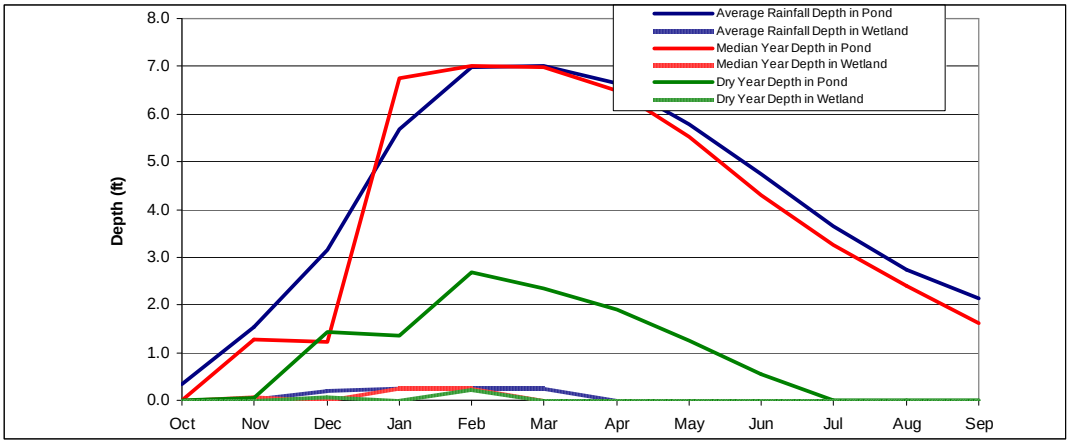
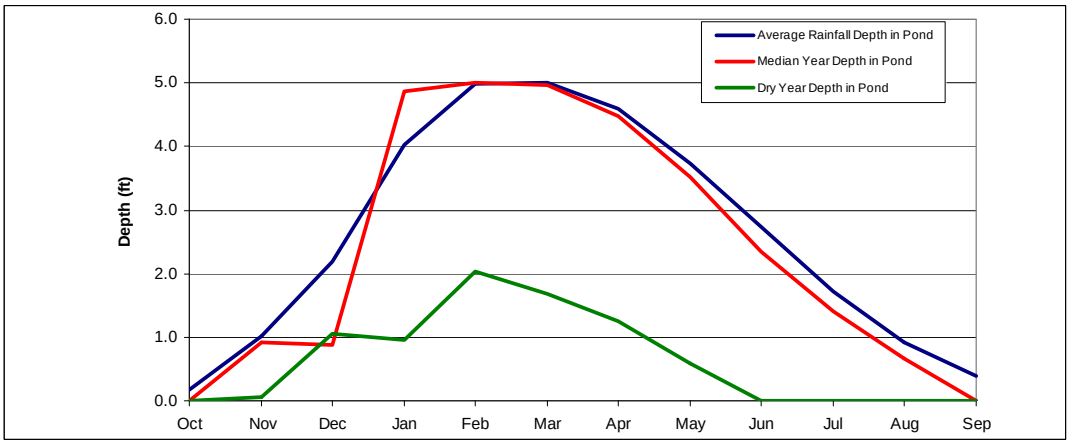
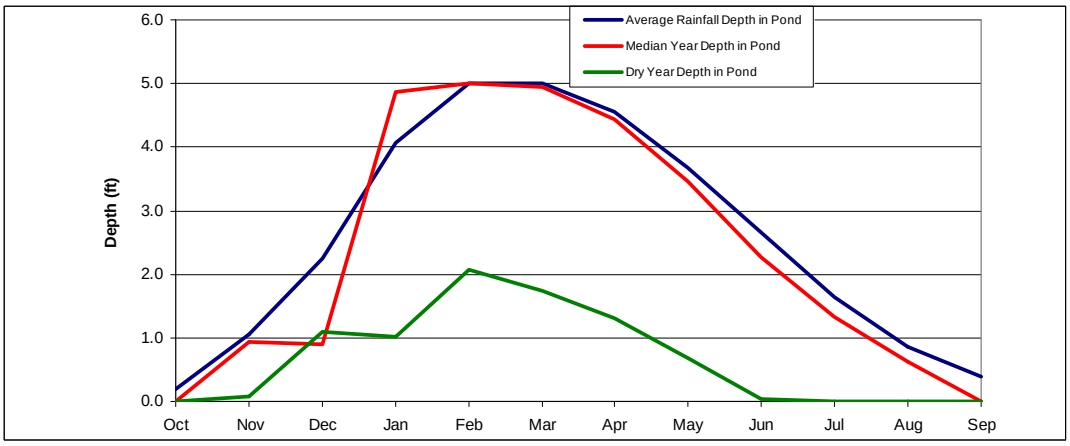
Pond P7 **Net DA = 26.63 Ac.** **PA = 0.38 Ac.** **Gross DA = 27.01 Ac.** **Depth = 7'** **Wetland 40** **Net DA = 2.95 Ac.** **WA = 0.37 Ac.** **Gross DA = 3.32 Ac.**	
Pond P8 **Net DA = 9.56 Ac.** **PA = 0.195 Ac.** **Gross DA = 9.76 Ac.** **Depth = 5'**	
Pond P9 **Net DA = 6.38 Ac.** **PA = 0.14 Ac.** **Gross DA = 6.52 Ac.** **Depth = 5'**	

Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

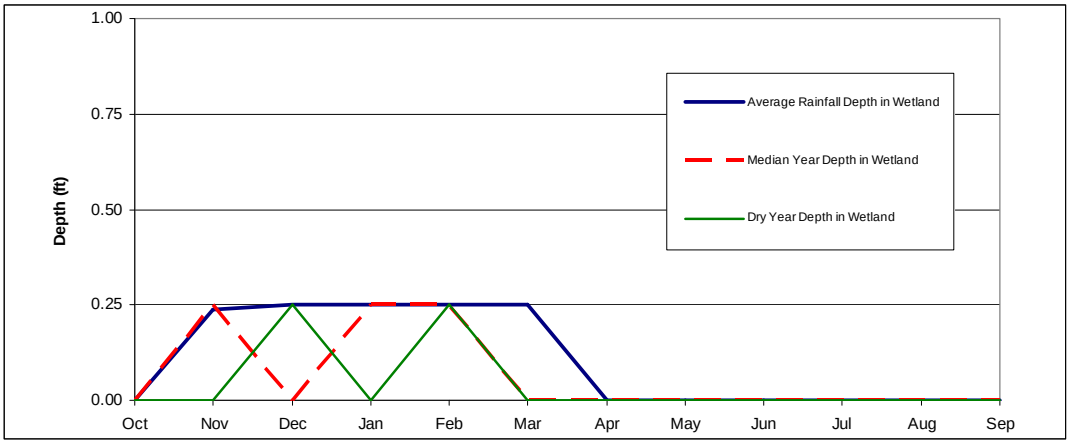
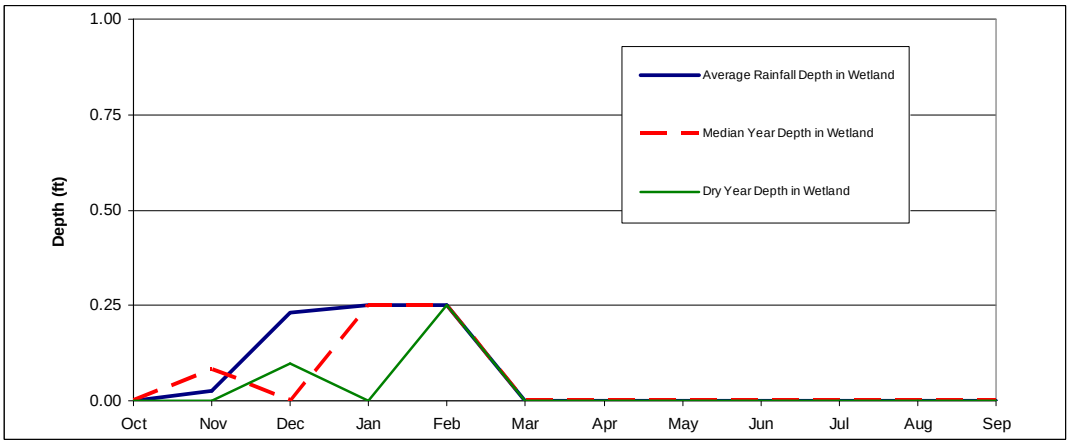
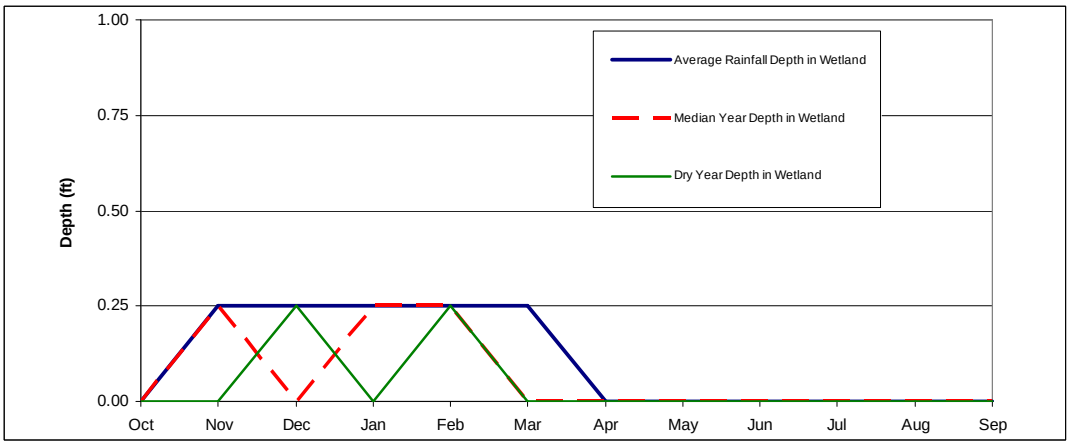
Wetland 12 + Watershed 11 **Net DA = 136.04 Ac.** **WA = 1.78 Ac.** **Gross DA = 137.82 Ac.**	
Wetland 13 **Net DA = 0.44 Ac.** **WA = 0.05 Ac.** **Gross DA = 0.49 Ac.**	
Wetland 14 **Net DA = 10.09 Ac.** **WA = 0.29 Ac.** **Gross DA = 10.38 Ac.**	

Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

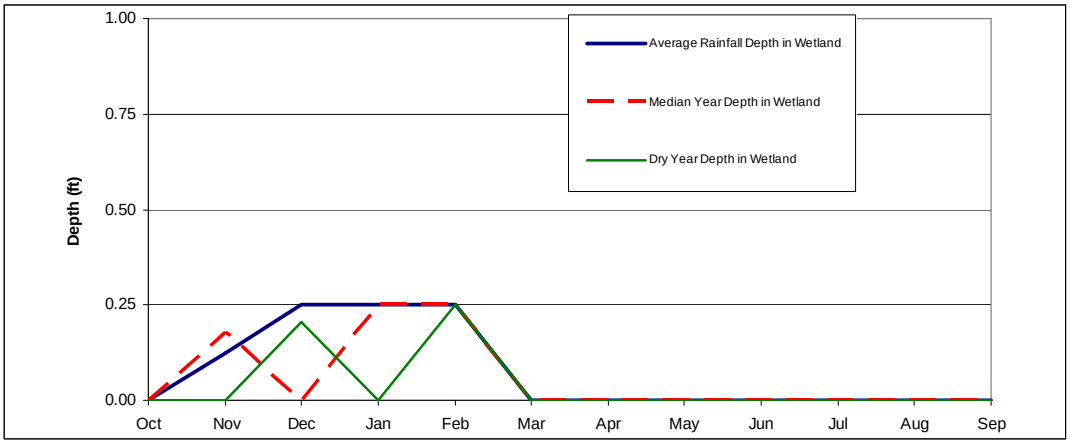
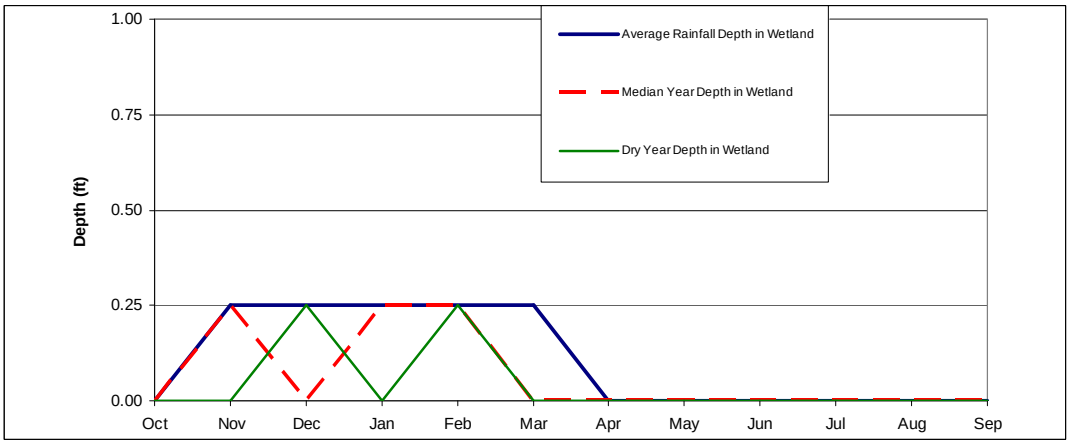
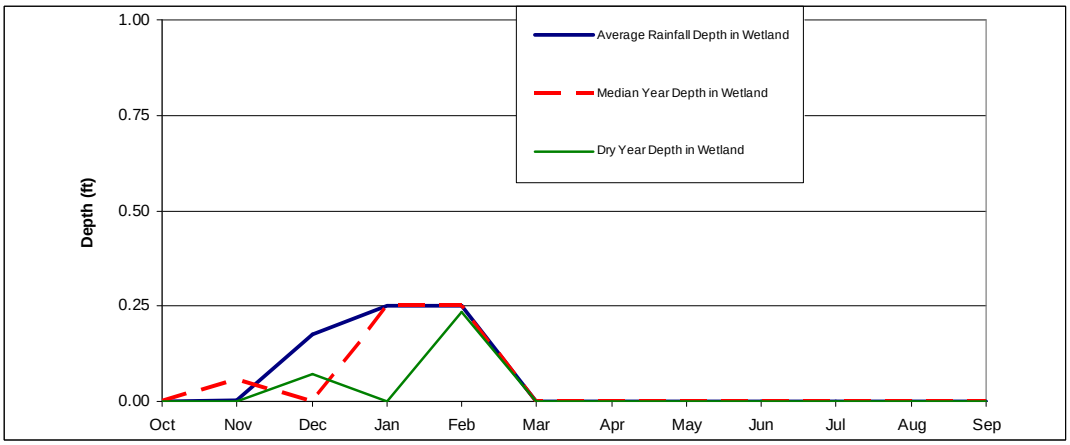
Wetland 16 + Watershed 15 **Net DA = 11.05 Ac.** **WA = 0.66 Ac.** **Gross DA = 11.71 Ac.**	
Wetland 17 **Net DA = 5.51 Ac.** **WA = 0.09 Ac.** **Gross DA = 5.60 Ac.**	
Wetland 18 **Net DA = 2.36 Ac.** **WA = 0.35 Ac.** **Gross DA = 2.71 Ac.**	

Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

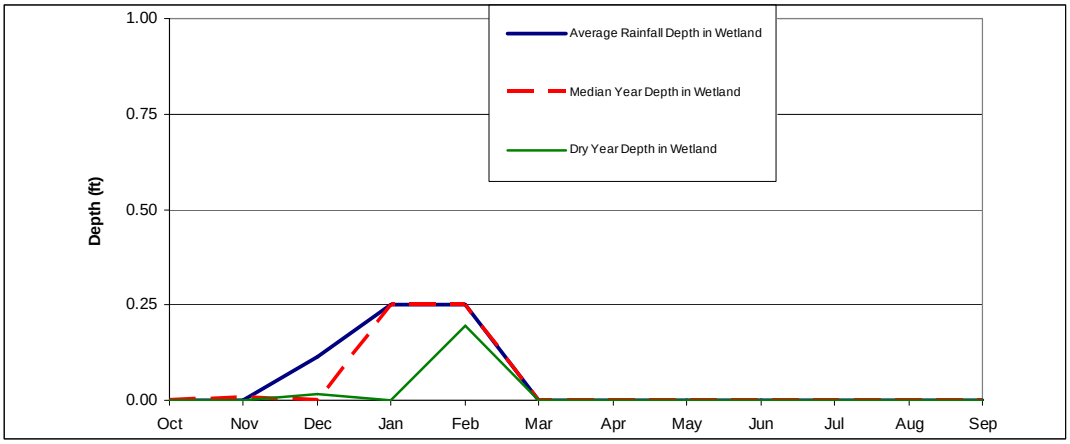
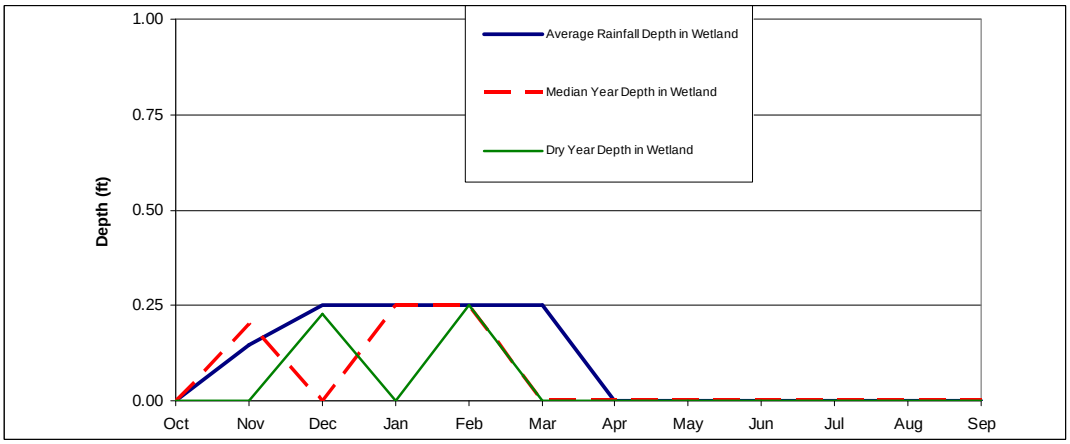
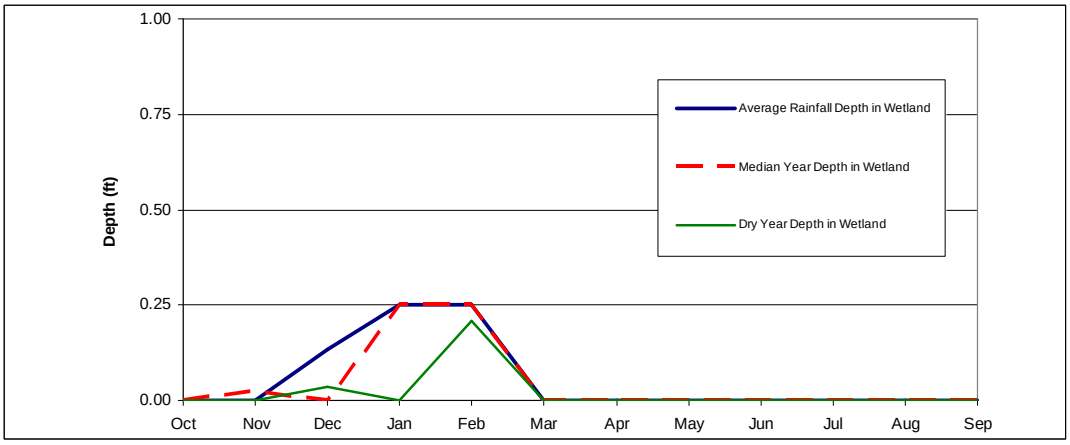
Wetland 19 **Net DA = 0.87 Ac.** **WA = 0.31 Ac.** **Gross DA = 1.18 Ac.**	
Wetland 20 **Net DA = 9.25 Ac.** **WA = 0.50 Ac.** **Gross DA = 9.75 Ac.**	
Wetland 21 **Net DA = 1.01 Ac.** **WA = 0.24 Ac.** **Gross DA = 1.25 Ac.**	

Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

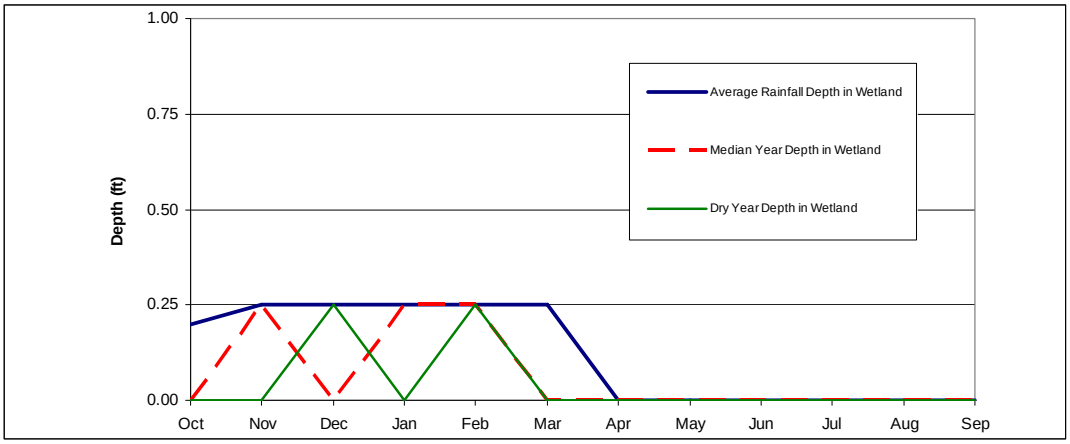
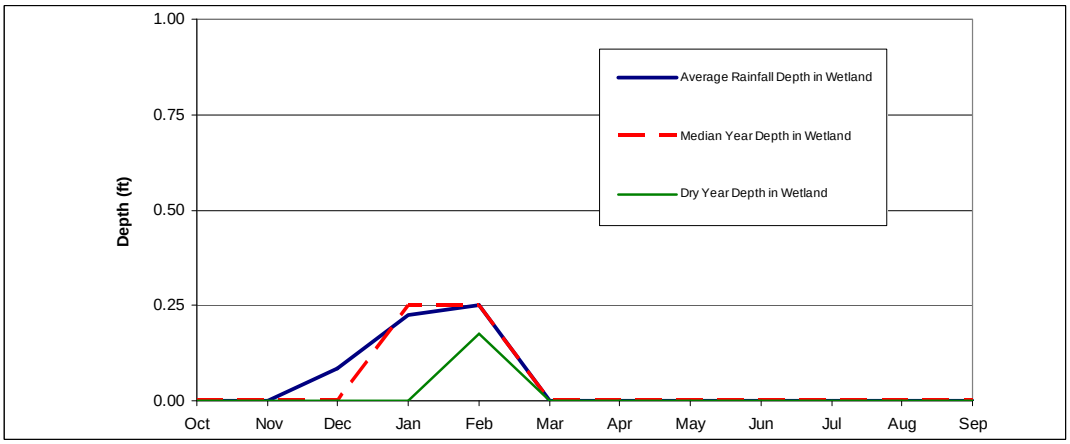
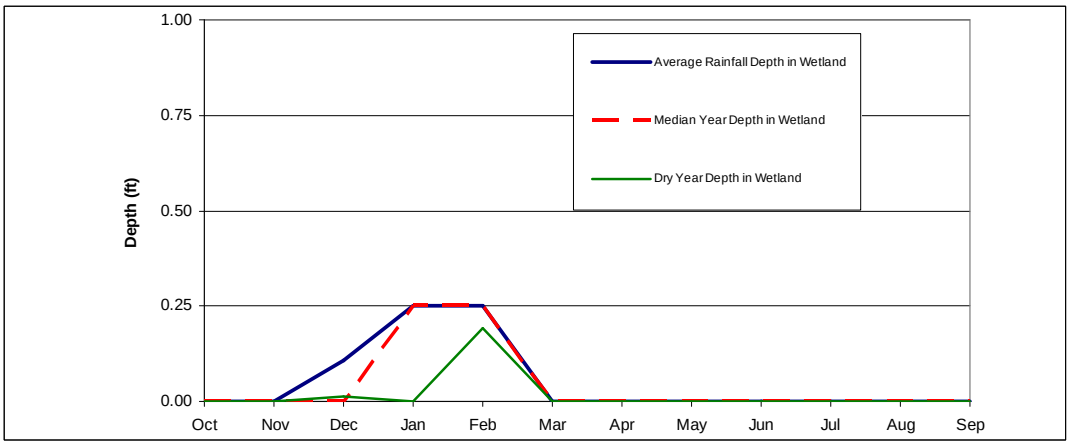
Wetland 24 + Watershed 22 / 23 **Net DA = 59.71 Ac.** **WA = 0.60 Ac.** **Gross DA = 60.31 Ac.**	
Wetland 25 **Net DA = 0.64 Ac.** **WA = 0.66 Ac.** **Gross DA = 1.30 Ac.**	
Wetland 28 **Net DA = 0.31 Ac.** **WA = 0.13 Ac.** **Gross DA = 0.44 Ac.**	

Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

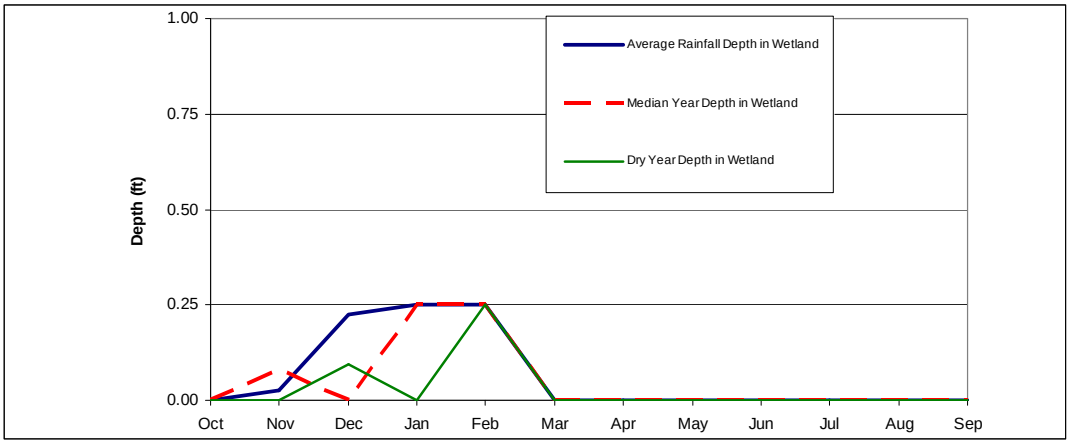
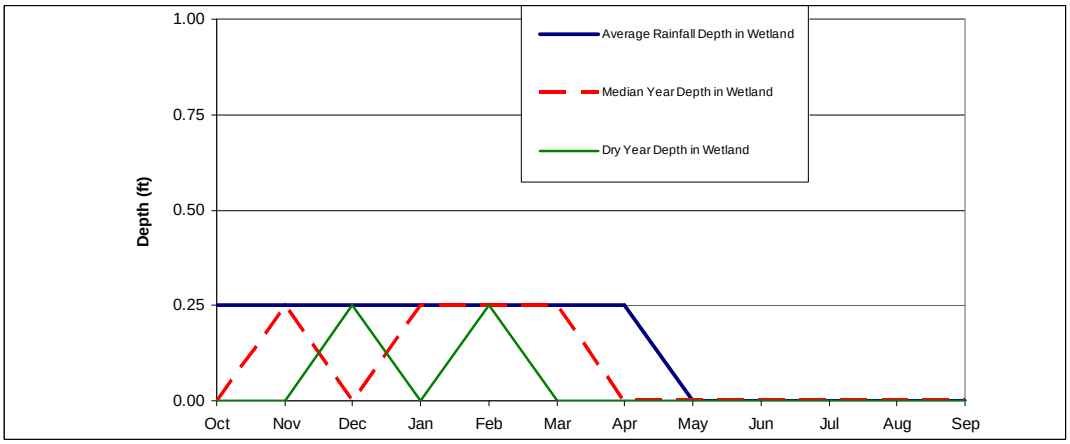
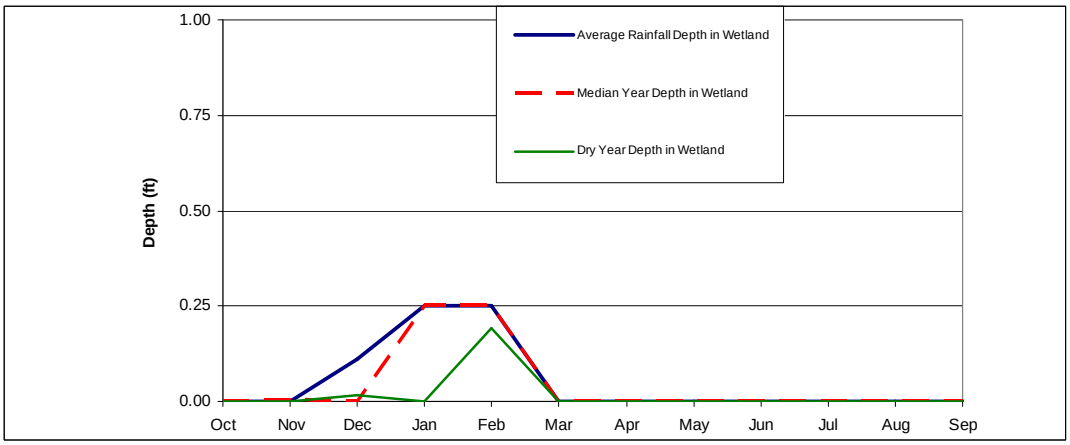
Wetland 29 **Net DA = 0.43 Ac.** **WA = 0.05 Ac.** **Gross DA = 0.48 Ac.**	
Wetland 31 + Watershed 30 **Net DA = 36.29 Ac.** **WA = 0.10 Ac.** **Gross DA = 36.39 Ac.**	
Wetland 32 **Net DA = 1.21 Ac.** **WA = 0.45 Ac.** **Gross DA = 1.66 Ac.**	

Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

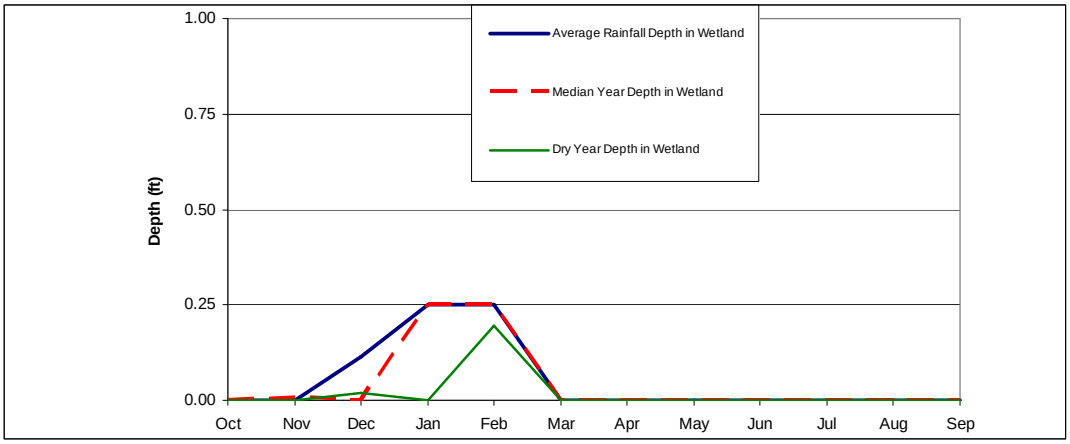
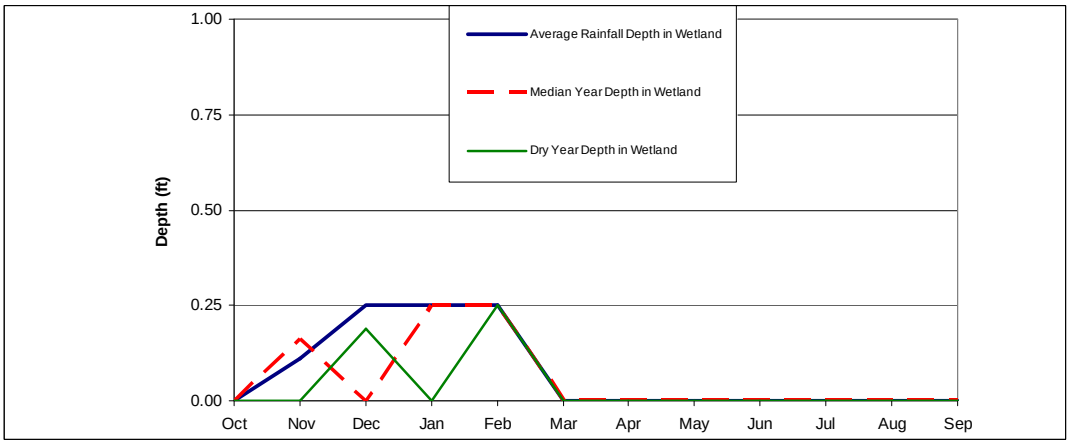
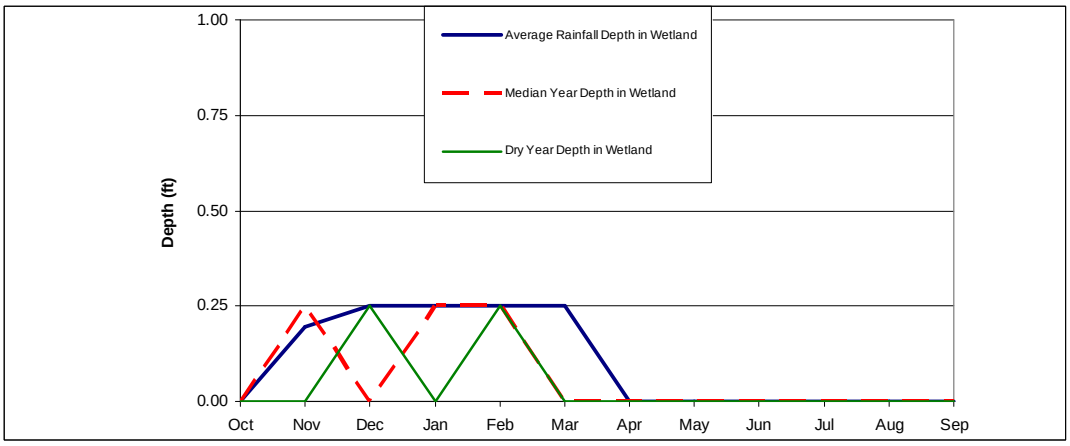
Wetland 34 **Net DA = 1.25 Ac.** **WA = 0.43 Ac.** **Gross DA = 1.68 Ac.**	
Wetland 36 + Watershed 35 **Net DA = 5.44 Ac.** **WA = 0.35 Ac.** **Gross DA = 5.79 Ac.**	
Wetland 38 + Watershed 37 **Net DA = 80.66 Ac.** **WA = 0.45 Ac.** **Gross DA = 81.11 Ac.**	

Figure 2. Optimized Pond Size Water Budget Results
Collier Creek Mitigation Bank

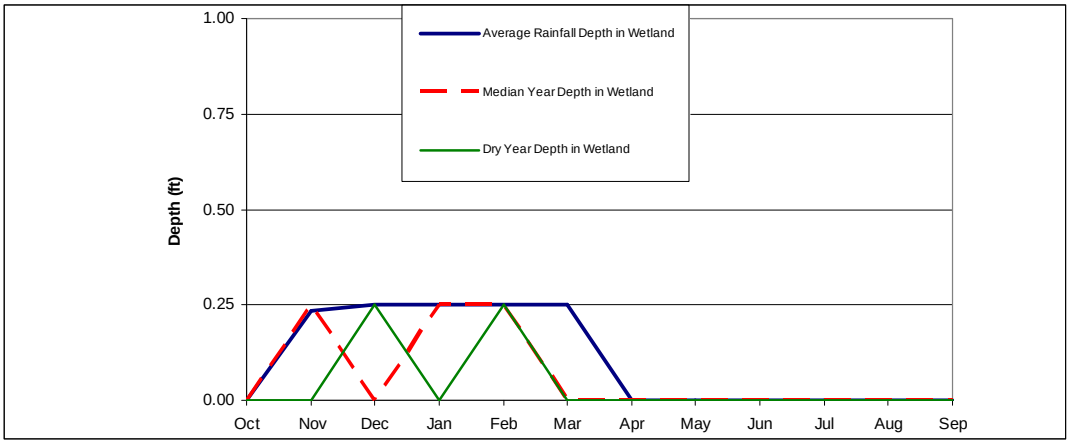
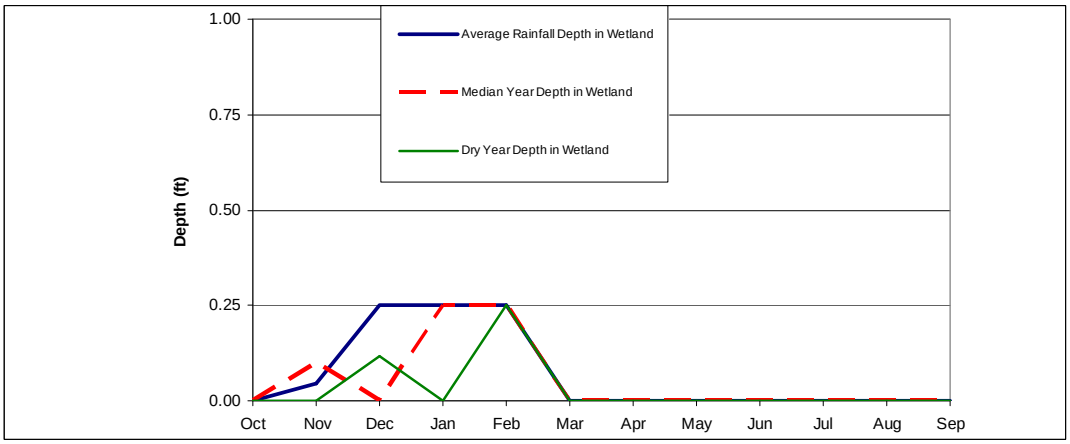
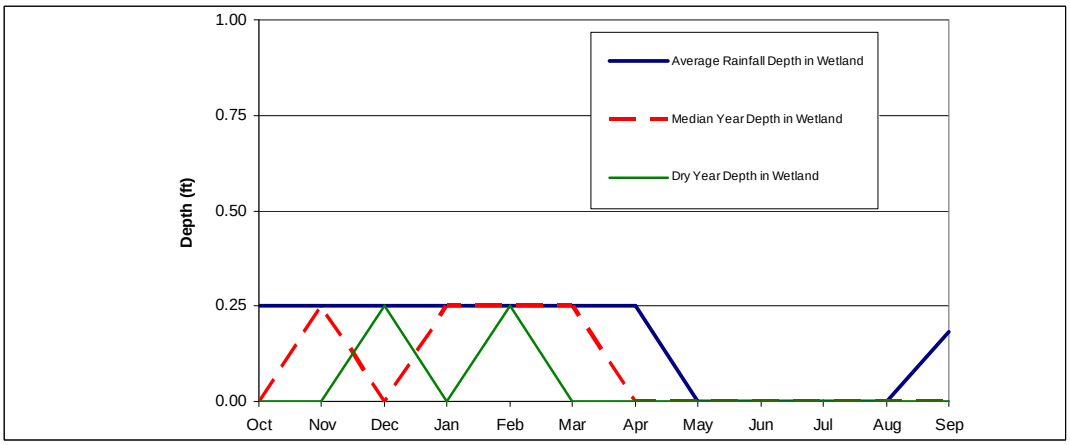
Wetland 41 **Net DA = 2.06 Ac.** **WA = 0.08 Ac.** **Gross DA = 2.14 Ac.**	
Wetland 42 **Net DA = 1.45 Ac.** **WA = 0.14 Ac.** **Gross DA = 1.59 Ac.**	
Wetland 44 + Watershed 43 **Net DA = 47.71 Ac.** **WA = 0.31 Ac.** **Gross DA = 47.74 Ac.**	

Figure 3. Seasonal wetland water levels for ponds supplied solely by rainfall.

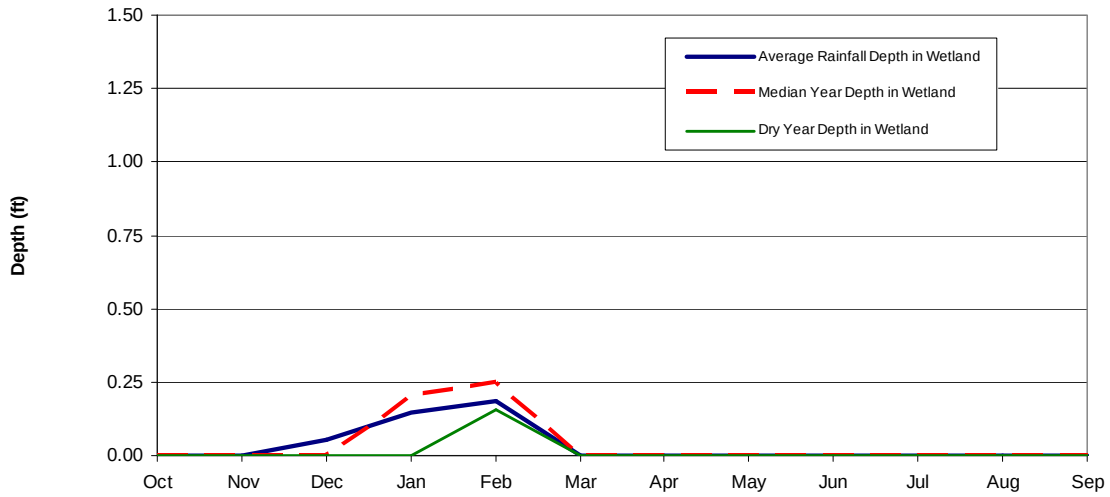
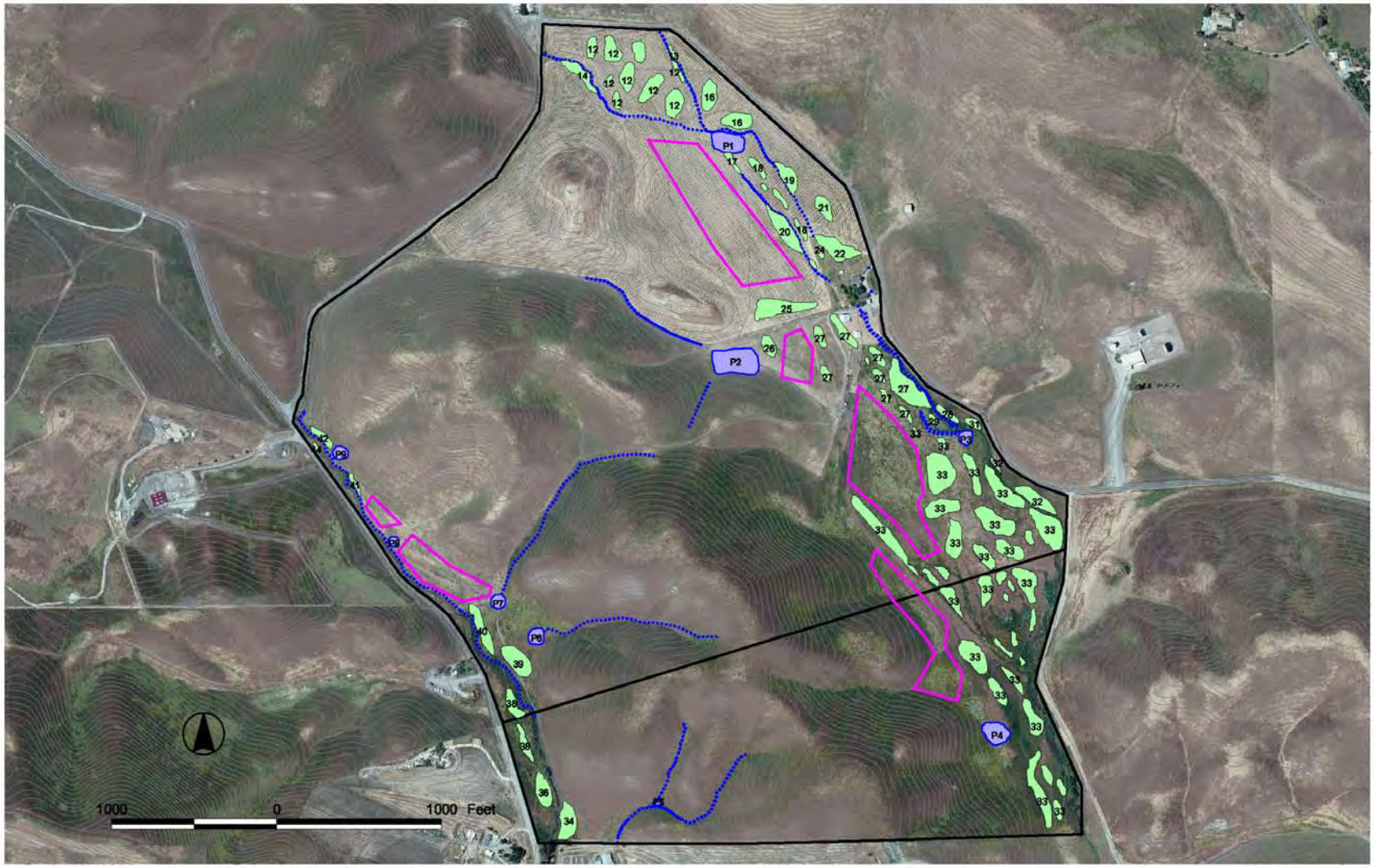


Figure 4. Site map indicating selected wetland locations and additional areas (hollow pink polygons) where freshwater wetlands are sustainable.



Appendix A

Watershed, Pond and Wetland Areas

APPENDIX A. WATERSHED, POND, AND WETLAND AREAS

DRAINAGE AREA		POND		TOTAL POND	WETLAND			TOTAL WETLAND	TOTAL	EAST OR		
NAME	AREA acres	NAME	AREA acres	AREA DA + POND acres	NAME	AREA acres	SUBTTL AREA	AREA DA + WETLAND acres	AREA DA TO CREEK	WEST DRAINAGE	Cayetano Creek acres	Collier Creek acres
1	3.90	P1	0.49	4.39					4.39	E	4.39	0
2	26.84	P2	0.91	27.75					42.66	E	42.66	0
26&27	13.05				26	0.19	1.87	14.92			0	0
					27	0.14					0	0
					27	0.10					0	0
					27	0.14					0	0
					27	0.02					0	0
					27	0.09					0	0
					27	0.06					0	0
					27	0.26					0	0
					27	0.77					0	0
					27	0.08					0	0
3	8.86	P3	0.14	9.00					78.53	E	78.53	0
33	60.51				33	0.03	9.02	69.53			0	0
					33	0.07					0	0
					33	0.30					0	0
					33	0.61					0	0
					33	0.09					0	0
					33	0.27					0	0
					33	0.10					0	0
					33	0.11					0	0
					33	0.44					0	0
					33	0.10					0	0
					33	0.05					0	0
					33	0.03					0	0
					33	0.28					0	0
					33	0.24					0	0
					33	0.09					0	0
					33	0.07					0	0
					33	0.03					0	0
					33	0.09					0	0
					33	0.17					0	0
					33	0.79					0	0
					33	0.71					0	0
					33	0.43					0	0
					33	0.56					0	0
					33	0.42					0	0
					33	0.32					0	0
					33	0.68					0	0
					33	0.51					0	0
					33	0.23					0	0
					33	0.33					0	0
					33	0.56					0	0
					33	0.12					0	0
					33	0.08					0	0
					33	0.11					0	0
4	22.11	P4	0.39	22.50					22.50	E	22.50	0
5	19.79	P5	0.03	19.82					19.82	W	0	19.82
6	16.91	P6	0.19	17.10					19.12	W	0	19.12
39	1.54				39	0.49	0.49	2.03			0	0
7	26.87	P7	0.14	27.01					30.34	W	0	30.34
40	2.95				40	0.37	0.37	3.32			0	0
8	9.69	P8	0.07	9.76					9.76	W	0	9.76
9	6.38	P9	0.14	6.52					6.52	W	0	6.52
11	132.70			132.70					137.82	E	137.82	0
12	3.34				12	0.16	1.78	5.12			0	0
					12	0.19					0	0
					12	0.05					0	0
					12	0.09					0	0
					12	0.32					0	0
					12	0.08					0	0
					12	0.28					0	0
					12	0.28					0	0
					12	0.34					0	0
13	0.44				13	0.05	0.05	0.49	0.49	E	0.49	0
14	10.09				14	0.29	0.29	10.38	10.38	E	10.38	0
15	9.88			9.88					11.71	E	11.71	0
16	1.17				16	0.32	0.66	1.83			0	0
					16	0.34					0	0
17	5.51				17	0.09	0.09	5.60	5.60	E	5.60	0

APPENDIX A. WATERSHED, POND, AND WETLAND AREAS

DRAINAGE AREA		POND		TOTAL POND	WETLAND			TOTAL WETLAND	TOTAL	EAST OR		
NAME	AREA acres	NAME	AREA acres	AREA DA + POND acres	NAME	AREA acres	SUBTTL AREA	AREA DA + WETLAND acres	AREA DA TO CREEK	WEST DRAINAGE	Cayetano Creek acres	Collier Creek acres
18	2.36				18	0.14	0.35	2.71	2.71	E	2.71	0
					18	0.03					0	0
					18	0.09					0	0
					18	0.09					0	0
19	0.87				19	0.31	0.31	1.18	1.18	E	1.18	0
20	9.25				20	0.50	0.50	9.75	9.75	E	9.75	0
21	1.01				21	0.24	0.24	1.25	1.25	E	1.25	0
23	57.70			57.70							0	0
22	1.74				22	0.52	0.60	2.61	60.31	E	60.31	0
24	0.27				24	0.05					0	0
					24	0.04					0	0
25	0.64				25	0.66	0.66	1.30	1.30	E	1.30	0
28	0.31				28	0.13	0.13	0.44	0.44	E	0.44	0
29	0.43				29	0.05	0.05	0.48	0.48	E	0.48	0
30	36.16			36.16					36.39	E	36.39	0
31	0.13				31	0.10	0.10	0.23			0	0
32	1.21				32	0.05	0.45	1.66	1.66	E	1.66	0
					32	0.40					0	0
34	1.25				34	0.43	0.43	1.68	1.68	W	0	1.68
35	3.67			3.67					5.79	W	0	5.79
36	1.77				36	0.35	0.35	2.12			0	0
37	77.66			77.66					81.11	W	0	81.11
38	3.00				38	0.21	0.45	3.45			0	0
					38	0.24					0	0
41	2.06				41	0.08	0.08	2.14	2.14	W	0	2.14
42	1.45				42	0.14	0.14	1.59	1.59	W	0	1.59
43	47.43			47.43					47.74	W	0	47.74
44	0.28				44	0.03	0.03	0.31			0	0
100	144.32								144.32	E	144.32	0
101	3.38								3.38	E	3.38	0
102	2.19								2.19	E	2.19	0
103	1.65								1.65	E	1.65	0
104	5.31								5.31	E	5.31	0
105	2.89								2.89	E	2.89	0
106	74.46								74.46	E	74.46	0
201	172.07								172.07	W	0	172.07
202	96.12								96.12	W	0	96.12
203	49.77								49.77	W	0	49.77
204	8.82								8.82	W	0	8.82
205	12.50								12.50	W	0	12.5
206	1.71								1.71	W	0	1.71
207	9.92								9.92	W	0	9.92
TTLs	1218.29		2.49	509.04		19.49	19.49	146.12	1240.26		663.75	576.52
			1749.30					1934.39				

	acres
pond_wetland=	21.97
Ttl Da=	1240.26

chk
1240.26

Appendix B

Example of Water Budget for Pond P2 and Wetland 26/27

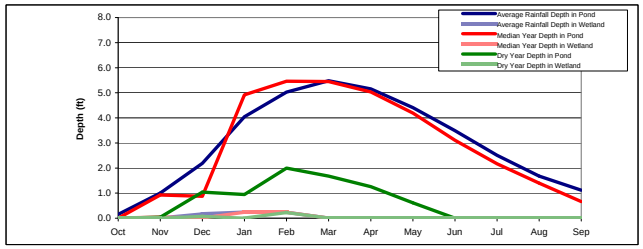
Pond DA	Gross DA	27.75	acres
	Pond Area	0.520	acres
	Net DA	27.23	acres
	Pond Depth	5.00	feet
	Pond Cap.	2.60	ac-ft
Wetland DA	Gross DA	14.92	acres
	Wetland Area	1.87	acres
	Net DA	13.05	acres
	Wetland Depth	0.25	feet
	Wetland Cap.	0.47	ac-ft

Depth (ft)	radius (ft)	Area (ac)	Vol (AF)	Cum Vol AF
7.0	84.9	0.52	0.50	2.81
6.0	81.9	0.48	0.47	2.31
5.0	78.9	0.45	0.43	1.85
4.0	75.9	0.42	0.40	1.41
3.0	72.9	0.38	0.37	1.01
2.0	69.9	0.35	0.34	0.65
1.0	66.9	0.32	0.31	0.31
0.0	63.9	0.29	0	0.00
			2.81	

(Pond geometry: round with 3:1 side slope)

7.000	0.520	2.815
0.000	0.295	0.000

slope 2.486903 *slope* forecast



Rainfall based on monthly average of daily data (this worksheet) for WY 1969 - WY 2010

	Rain (in)	Runoff (in)	Evap (in)	Supply Rain (AF)	Supply Runoff (AF)	Demand Evap (AF)	Monthly Inflow Balance R+R+E (AF)	Cum. Volume Into Pond (AF)	Filling Monthly Pond Capacity Starting Empty (AF)	Draining Monthly Pond Capacity Starting Empty (AF)	End of Month Pond Storage (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Pond Overflow to Wetland (AF)	Supply Rain (AF)	Supply Runoff (AF)	Demand Evap (AF)	Monthly Inflow Balance P+R+R+E (AF)	Cum. Volume Into Wetland (AF)	Filling Monthly Wetland Capacity Starting Empty (AF)	Draining Monthly Overflow Out Of Wetland (AF)	End of Month Wetland Storage (AF)	End of Month Wetland Depth (ft)	Monthly Wetland Overflow to Creek (AF)
Oct	0.82	0.07	5.68	0.04	0.17	-0.14	0.06	0.06	0.06	0.06	0.06	0.15	0.29	0.00	0.13	0.08	-0.88	-0.68	0.00	0.00	0.00	0.00	0.00	0.00
Nov	1.74	0.15	2.70	0.08	0.33	-0.07	0.34	0.40	0.40	0.40	0.40	1.00	0.32	0.00	0.27	0.16	-0.42	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Dec	2.48	0.18	1.63	0.11	0.41	-0.04	0.48	0.88	0.88	0.88	0.88	2.19	0.36	0.00	0.39	0.20	-0.25	0.33	0.34	0.34	0.34	0.34	0.18	0.00
Jan	2.93	0.29	1.54	0.13	0.67	-0.05	0.75	1.63	1.63	1.63	1.63	4.04	0.42	0.00	0.46	0.32	-0.24	0.54	0.88	0.47	0.47	0.47	0.25	0.41
Feb	2.69	0.16	2.10	0.12	0.35	-0.07	0.40	2.02	2.02	2.02	2.02	5.03	0.45	0.00	0.42	0.17	-0.33	0.26	1.14	0.47	0.47	0.47	0.25	0.26
Mar	2.18	0.10	4.00	0.09	0.24	-0.15	0.18	2.20	2.20	2.20	2.20	5.48	0.47	0.00	0.34	0.11	-0.62	-0.17	0.00	0.00	0.30	0.30	0.00	0.00
Apr	1.01	0.03	6.00	0.04	0.06	-0.23	-0.13	2.20	2.20	2.07	2.07	5.16	0.46	0.00	0.16	0.03	-0.94	-0.75	0.00	0.00	-0.45	0.00	0.00	0.00
May	0.41	0.00	8.62	0.02	0.01	-0.33	-0.30	2.20	2.20	1.77	1.77	4.41	0.43	0.00	0.06	0.00	-1.34	-1.28	0.00	0.00	-1.73	0.00	0.00	0.00
Jun	0.08	0.00	10.39	0.00	0.00	-0.37	-0.37	2.20	2.20	1.40	1.40	3.49	0.40	0.00	0.01	0.00	-1.62	-1.61	0.00	0.00	-3.33	0.00	0.00	0.00
Jul	0.02	0.00	11.87	0.00	0.00	-0.40	-0.39	2.20	2.20	1.01	1.01	2.51	0.37	0.00	0.00	0.00	-1.85	-1.84	0.00	0.00	-5.18	0.00	0.00	0.00
Aug	0.07	0.00	10.88	0.00	0.00	-0.34	-0.33	2.20	2.20	0.68	0.68	1.68	0.34	0.00	0.01	0.00	-1.70	-1.68	0.00	0.00	-6.86	0.00	0.00	0.00
Sep	0.20	0.01	8.74	0.01	0.02	-0.25	-0.23	2.20	2.20	0.45	0.45	1.12	0.33	0.00	0.03	0.01	-1.36	-1.32	0.00	0.00	-8.18	0.00	0.00	0.00
Annual	14.63	0.99	74.14	0.63	2.25	-2.44	0.45							0.00	2.28	1.08	-11.55	-8.19						0.67
							chk	*2.20*						*2.20*				*chk*	*1.14*					*1.14*

Median Rainfall data (50th percentile of being equalled or exceeded) for WY 1969 - WY 2010 is WY 1979 (from Monthly Precip.xls)

	WY 1979 Rain (in)	WY 1979 Runoff (in)	WY 1979 Evap (in)	Supply Rain (AF)	Supply Runoff (AF)	Demand Evap (AF)	Monthly Inflow Balance R+R+E (AF)	Cum. Volume Into Pond (AF)	Filling Monthly Pond Capacity Starting Empty (AF)	Draining Monthly Pond Capacity Starting Empty (AF)	End of Month Pond Storage (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Pond Overflow to Wetland (AF)	Supply Rain (AF)	Supply Runoff (AF)	Demand Evap (AF)	Monthly Inflow Balance P+R+R+E (AF)	Cum. Volume Into Wetland (AF)	Filling Monthly Wetland Capacity Starting Empty (AF)	Draining Monthly Overflow Out Of Wetland (AF)	End of Month Wetland Storage (AF)	End of Month Wetland Depth (ft)	Monthly Wetland Overflow to Creek (AF)
Oct	0.00	0.00	6.50	0.00	0.00	-0.16	-0.16	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	-1.01	-1.01	0.00	0.00	0.00	0.00	0.00	0.00
Nov	2.16	0.15	2.51	0.09	0.34	-0.06	0.37	0.37	0.37	0.37	0.37	0.92	0.32	0.00	0.34	0.16	-0.39	0.11	0.11	0.11	0.11	0.11	0.06	0.00
Dec	0.58	0.00	1.69	0.03	0.00	-0.05	-0.02	0.37	0.37	0.35	0.35	0.87	0.32	0.00	0.09	0.00	-0.26	-0.17	0.00	0.00	-0.06	0.00	0.00	0.00
Jan	4.51	0.64	1.40	0.20	1.45	-0.04	1.61	1.98	1.98	1.98	1.98	4.92	0.45	0.00	0.70	0.69	-0.22	1.18	1.18	0.47	0.47	0.47	0.25	0.71
Feb	3.19	0.06	1.44	0.14	0.13	-0.05	0.22	2.20	2.20	2.20	2.20	5.46	0.47	0.00	0.50	0.06	-0.23	0.34	1.51	0.47	0.47	0.47	0.25	0.34
Mar	1.86	0.01	2.56	0.08	0.01	-0.10	0.00	2.20	2.20	2.19	2.19	5.45	0.47	0.00	0.29	0.01	-0.40	-0.10	0.00	0.00	0.36	0.36	0.00	0.00
Apr	0.88	0.00	5.38	0.04	0.00	-0.21	-0.17	2.20	2.20	2.02	2.02	5.03	0.45	0.00	0.14	0.00	-0.84	-0.70	0.00	0.00	-0.33	0.00	0.00	0.00
May	0.34	0.00	9.36	0.01	0.00	-0.35	-0.34	2.20	2.20	1.69	1.69	4.19	0.43	0.00	0.05	0.00	-1.46	-1.41	0.00	0.00	-1.74	0.00	0.00	0.00
Jun	0.00	0.00	12.34	0.00	0.00	-0.44	-0.44	2.20	2.20	1.25	1.25	3.11	0.39	0.00	0.00	0.00	-1.92	-1.92	0.00	0.00	-3.66	0.00	0.00	0.00
Jul	0.06	0.00	11.65	0.00	0.00	-0.38	-0.38	2.20	2.20	0.87	0.87	2.17	0.36	0.00	0.01	0.00	-1.82	-1.81	0.00	0.00	-5.47	0.00	0.00	0.00
Aug	0.00	0.00	10.34	0.00	0.00	-0.31	-0.31	2.20	2.20	0.56	0.56	1.40	0.34	0.00	0.00	0.00	-1.61	-1.61	0.00	0.00	-7.08	0.00	0.00	0.00
Sep	0.00	0.00	10.61	0.00	0.00	-0.30	-0.30	2.20	2.20	0.27	0.27	0.66	0.31	0.00	0.00	0.00	-1.65	-1.65	0.00	0.00	-8.73	0.00	0.00	0.00
Ann	13.59	0.85	75.78	0.59	1.94	-2.44	0.09							0.00	2.12	0.93	-11.81	-8.76						1.05
							chk	*2.20*						*2.20*				*chk*	*1.51*					*1.51*

Dry Year Rainfall data (86th percentile of being equalled or exceeded) for WY 1969 - WY 2010 is WY 2007 (from Monthly Precip.xls)

	WY 2007 Rain (in)	WY 2007 Runoff (in)	WY 2007 Evap (in)	Supply Rain (AF)	Supply Runoff (AF)	Demand Evap (AF)	Monthly Inflow Balance R+R+E (AF)	Cum. Volume Into Pond (AF)	Filling Monthly Pond Capacity Starting Empty (AF)	Draining Monthly Pond Capacity Starting Empty (AF)	End of Month Pond Storage (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Pond Overflow to Wetland (AF)	Supply Rain (AF)	Supply Runoff (AF)	Demand Evap (AF)	Monthly Inflow Balance P+R+R+E (AF)	Cum. Volume Into Wetland (AF)	Filling Monthly Wetland Capacity Starting Empty (AF)	Draining Monthly Overflow Out Of Wetland (AF)	End of Month Wetland Storage (AF)	End of Month Wetland Depth (ft)	Monthly Wetland Overflow to Creek (AF)
Oct	0.20	0.00	5.90	0.01	0.00	-0.14	-0.14	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.03	0.00	-0.92	-0.89	0.00	0.00	0.00	0.00	0.00	0.00
Nov	1.68	0.00	2.34	0.07	0.00	-0.06	0.02	0.02	0.02	0.02	0.02	0.04	0.29	0.00	0.26	0.00	-0.36	-0.10	0.00	0.00	-0.10	0.00	0.00	0.00
Dec	2.25	0.16	2.49	0.10	0.36	-0.06	0.40	0.42	0.42	0.42	0.42	1.04	0.32	0.00	0.35	0.17	-0.39	0.14	0.14	0.14	0.14	0.14	0.07	0.00
Jan	0.52	0.00	2.22	0.02	0.00	-0.06	-0.04	0.42	0.42	0.38	0.38	0.94	0.32	0.00	0.08	0.00	-0.35	-0.27	0.00	0.00	-0.13	0.00	0.00	0.00
Feb	3.92	0.12	1.92	0.17	0.27	-0.05	0.39	0.80	0.80	0.80	0.80	2.00	0.35	0.00	0.61	0.13	-0.30	0.44	0.44	0.44	0.44	0.44	0.24	0.00
Mar	0.33	0.00	4.86	0.01	0.00	-0.14	-0.13	0.80	0.80	0.67	0.67	1.68	0.34	0.00	0.05	0.00	-0.76	-0.71	0.00	0.00	-0.26	0.00	0.00	0.00
Apr	0.44	0.00	6.56	0.02	0.00	-0.19	-0.17	0.80	0.80	0.51	0.51	1.26	0.33	0.00	0.07	0.00	-1.02	-0.95	0.00	0.00	-1.22	0.00	0.00	0.00
May	0.11	0.00	9.61	0.00	0.00	-0.26	-0.26	0.80	0.80	0.25	0.25	0.61	0.31	0.00	0.02	0.00	-1.50	-1.48	0.00	0.00	-2.70	0.00	0.00	0.00
Jun	0.00	0.00	10.74	0.00	0.00	-0.28	-0.28	0.80	0.80	-0.03	0.00	0.00	0.29	0.00	0.00	0.00	-1.67	-1.67	0.00	0.00	-4.37	0.00	0.00	0.00
Jul	0.00	0.00	10.99	0.00	0.00	-0.27	-0.27	0.80	0.80	-0.30	0.00	0.00	0.29	0.00	0.00	0.00	-1.71	-1.71	0.00	0.00	-6.08	0.00	0.00	0.00
Aug	0.00	0.00	11.70	0.00	0.00	-0.28	-0.28	0.80	0.80	-0.58	0.00	0.00	0.29	0.00	0.00	0.00	-1.82	-1.82	0.00	0.00	-7.91	0.00	0.00	0.00
Sep	0.21	0.00	7.84	0.01	0.00	-0.19	-0.18	0.80	0.80	-0.76	0.00	0.00	0.29	0.00	0.03	0.00	-1.22	-1.19	0.00	0.00	-9.10	0.00	0.00	0.00
Ann	9.66	0.28	77.17	0.42	0.63	-1.98	-0.93							0.00	1.51	0.30	-12.03	-10.22						0.00
							chk	*0.80*						*0.80*				*chk*	*0.44*					*0.44*

ATTACHMENT 5
WATER AVAILABILITY ANALYSIS

Project No.
11134.000.001

December 10, 2014

Mr. Mark Dawson
Water Hole Land Company
3170 Crow Canyon Place, Suite 260
San Ramon, CA 94583

Subject: North Eagle Ridge
Contra Costa County, California

WATER AVAILABILITY ANALYSIS

Dear Mr. Dawson:

We have completed our water availability analysis for the proposed North Eagle Creek Preserve located within the greater Collier Creek Mitigation area in Alameda and Contra Costa Counties northeast of Dublin, California. The North Eagle Ridge Preserve is situated in central Contra Costa County just north of the Contra Costa/Alameda County line, west of North Livermore Road, south of Manning Road, northeast of the City of Dublin. The Preserve is approximately 35 acres located within a 257.15-acre property. Historically, the property has been used for hay cropping.

The first purpose of this analysis was to develop an understanding of the typical flow volumes that could be expected in the reaches of the Cayetano Creek and Collier Creek channels where planting is proposed. The flow-volume results of the analysis were then used to develop an estimate of available water to sustain the various vegetation communities proposed for the channel as part of the mitigation area design.

The second purpose of this analysis was to develop a final water balance for the wetland creation proposed with North Eagle Ridge area, which was previously studied by Kamman Hydrology and Engineering for the larger Collier Creek Mitigation area. The study incorporates previously performed hydrologic analysis for the final proposed layout, based on refinements to the wetland systems during the regulatory review process. The intent of the final water balance analysis is to demonstrate that the ponds and wetlands fulfill the ponding and saturation requirements as set forth by the California Department of Fish and Wildlife, the United States Army Corps of Engineers, the United States Fish and Wildlife Service, and the San Francisco Bay Regional Water Quality Control Board for the project.

HYDROLOGIC SETTING

Published hydrologic mapping of the area prepared by the Contra Costa County Public Works Department indicates that an average of approximately 17 inches of annual precipitation occurs per year in the area of the project that is within Contra Costa County. This is data is based on

precipitation records collected between 1879 and 1973. Mapping prepared by the Alameda County Flood Control and Water Conservation District indicates approximately 16 inches of annual precipitation in the Alameda County portion of the watershed. The area generally exhibits a mild, Mediterranean-type climate with warm, dry summers and cool, wet winters. The North Eagle Creek project proposes to construct mitigation wetlands in the Collier Creek Watershed and the Cayetano Creek Watershed. The location of the proposed wetlands and the subwatersheds contributing surface runoff to each wetland is shown on Figure 1. A conceptual map showing proposed wetland areas is shown on Figure 2 and Figure 3 depicts areas of riparian enhancement.

GEOLOGY

The Cayetano Creek and Collier watersheds are located in the Mount Diablo fold-and-thrust belt on the south flank of the Mount Diablo uplift. The bedrock formations in the area south of Mount Diablo and north of the Livermore Valley have been folded and cut by thrust faults that typically dip toward the north, according to recent geologic mapping by Crane (1995) and Graymer, et al. (1996). The site is underlain by Pliocene non-marine sedimentary rock consisting of weakly indurated claystone, siltstone and thin beds of sandstone and pebble conglomerate.

Soil mapping of the watershed prepared by the National Resource Conservation Service (NRCS) indicates that surficial soil materials are primarily comprised of montmorillonitic clay soils with a hydrologic group rating of 'D.' Group 'D' soils are defined as having a very slow infiltration rate when thoroughly saturated. As a result, the watershed is characterized by rapid run-off characteristics after saturation has occurred. Groundwater was encountered at approximately 15 feet below existing ground elevation in May in a piezometer that has been installed onsite near the southerly end of the study area.

CLIMATE

This study uses the average monthly data to determine the water balance of the studied system. ENGEO is unaware of any current or historic precipitation study performed at or near the site that could be used to estimate the mean monthly precipitation amounts for the site. Therefore, data from a weather station located at the Livermore Municipal Airport, which is approximately 6 miles from the site, was utilized to estimate the values shown in Table 1. Historical daily precipitation data for water years 1998 to present were obtained from the Livermore Municipal Airport weather station from the joint National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC) website (NOAA and NCDC, 2010); this website identifies this weather station as Weather Station Number 724927. The site has approximately the same precipitation and temperature characteristics as the Livermore Municipal Airport, in terms of annual expected rainfall and temperature intensities. Table 1 summarizes the mean monthly precipitation amounts for the site.

TABLE 1
Monthly Mean Precipitation (inches)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.48	2.91	1.65	1.04	0.48	0.04	0.01	0.00	0.10	0.96	1.34	2.66

Source: Livermore Municipal Airport Station (NOAA and NCDC, 2010)

WATER BUDGET – PROPOSED RIPARIAN AREA

The water budget defines and quantifies the important input and output parameters, such as precipitation, evapotranspiration, and infiltration into or out of a given body of water. Each of these parameters is analyzed individually to develop expected numerical value flux estimates, and the sum of the parts provides an estimate of available water at a given time step. For this project, this summation analysis approximates the volumes of available surface water expected to flow through, or be retained in, the Riparian Restoration Area each month.

As illustrated in Diagram 1 below, the model that is analyzed in this report is expressed mathematically as:

$$\Delta S / \Delta t = R_{in} + DP - ET - R_{out} - G_{out}$$

Where,

$\Delta S/\Delta t$: Change in storage over time
R_{in}: Surface Inflow (including upstream runon in acre-ft/month)
DP: Direct Precipitation (in acre-ft/month)
ET: Evapotranspiration (in acre-ft/month)
R_{out}: Surface Outflow (in acre-ft/month)
G_{out}: Subsurface Infiltration (in ac-ft/month)

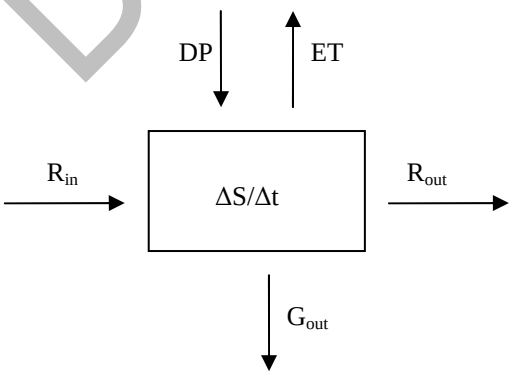


DIAGRAM 1
Water Balance Model

An estimate of the amount of water available to the proposed plant communities is considered separately in this document.

Inflow Parameters

For the water budget, we quantified several sources of both inflow and outflow to the project. Inflow components included direct precipitation falling on areas within the restored creek and predicted run-on from Cayetano Creek upstream of the proposed restoration project. We calculated these inflows using published precipitation data, approximate project watershed areas, and typical hydrologic calculations to estimate runoff from developed sites.

- For purposes of this analysis, we estimate that 10% of the total volume of rainfall occurring within the upstream Cayetano Creek and Collier Creek watersheds will be transformed into rainfall runoff and enter the creek channel as surface flow in the study area for an average month. The 10% overall estimate of total rainfall volume entering the stream channel as rainfall runoff corresponds with United States Geologic Survey estimates for the area according to a study by Rantz (1971) and with rainfall-runoff transformation estimates used by the California Stormwater Quality Association. The 10% estimate considers seasonal variations in rainfall intensity and the nature of clay soils in the watersheds, which often retain considerable water in the early rainfall season. The estimate is thus somewhat conservative in the spring after watershed saturation occurs and water requirements of plantings are higher. The upstream watershed area tributary to the restoration project is estimated by ENGEO as 416 acres for the Cayetano Creek watershed and 366 acres for Collier Creek watershed as shown on Figure 3.

- 100% of direct precipitation based on average monthly rainfall is also included in the analysis over the total project area as a hydrologic input falling directly on the proposed wetlands.

- Tables 2a and 2b below summarizes the results of the monthly inflows.

TABLE 2a
Monthly Water Inflows for North Eagle Ridge-Cayetano Creek

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Monthly Precipitation (in.)	2.48	2.91	1.65	1.04	0.48	0.04	0.01	0.00	0.10	0.96	1.34	2.66
Upstream Watershed (Ac)	416.0	416.0	416.0	416.0	416.0	416.0	416.0	416.0	416.0	416.0	416.0	416.0
(10%) Upstream Inflows (Ac-ft)	8.6	10.1	5.7	3.6	1.7	0.1	0.0	0.0	0.3	3.3	4.6	9.2
Riparian Area(Ac)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	4.8
(100%) Project Direct Rainfall (AC-ft)	0.7	0.8	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.3	0.4	1.1

TABLE 2b
Monthly Water Inflows for North Eagle Ridge-Collier Creek

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Monthly Precipitation (in.)	2.48	2.91	1.65	1.04	0.48	0.04	0.01	0.00	0.10	0.96	1.34	2.66
Upstream Watershed (Ac)	366.0	366.0	366.0	366.0	366.0	366.0	366.0	366.0	366.0	366.0	366.0	285.0
(10%) Upstream Inflows (Ac-ft)	7.6	8.9	5.0	3.2	1.5	0.1	0.0	0.0	0.3	2.9	4.1	6.3
Riparian Area(Ac)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	4.8
(100%) Project Direct Rainfall (AC-ft)	0.7	0.8	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.3	0.4	1.1

Outflow Parameters

The outflow components of our water balance consisted of evapotranspiration and groundwater infiltration, and we calculated these using both published data and approximations. Several of these assumptions are listed as follows:

- Groundwater infiltration is difficult to estimate in ephemeral channels in semiarid and arid regions such as North Eagle Ridge, because periods of stream flow are unpredictable, typically of short duration, and because seepage losses are unsteady in initially dry channels. Based on research conducted by Niswonger et al. (2008), we estimate losses to infiltration as being 5% of the total volume of stream flow entering the channel per reach, as an average, for purposes of this study.

- Evapotranspiration is estimated based on referenced evapotranspiration measured since 2004 for Pleasanton, California, based on the plant palette associated with the project. The reduction of the evapotranspiration rates by a crop factor of 0.7 was used to account for the employment of native vegetation in the planting scheme. Therefore, the total evapotranspiration for the native plant palettes used in the study and inherent in the creek corridor is estimated as 70% of the evapotranspiration rate expected for reference agricultural crops in conformance with recommendations from the California Irrigation Management Information System.

- The project reach does not contain significant areas of ponding. Evaporation is considered to be negligible during periods of stream flow.

Tables 3a and 3b below summarize the results of the monthly outflows.

TABLE 3a
Monthly Water Outflow Cayetano Creek

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Evapotranspiration (inches)	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0
Adusted Evapotranspiration (inches)	0.6	1.0	2.0	3.1	3.9	4.7	5.2	4.4	3.3	2.3	1.1	0.7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project WatershedS (ac)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	4.8
Evapotranspiration (ac-ft)	0.2	0.3	0.6	0.9	1.1	1.3	1.4	1.2	0.9	0.6	0.3	0.3
Infiltration (5% of Inflow)	0.5	0.5	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.3	0.4

TABLE 3b
Monthly Water Outflow Collier Creek

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Evapotranspiration (inches)	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0
Adusted Evapotranspiration (inches)	0.6	1.0	2.0	3.1	3.9	4.7	5.2	4.4	3.3	2.3	1.1	0.7
Project WatershedS (ac)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	4.8
Evapotranspiration (ac-ft)	0.2	0.3	0.6	0.9	1.1	1.3	1.5	1.3	0.9	0.7	0.3	0.3
Infiltration (5% of Inflow)	0.4	0.5	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.4

Plant Available Water

In months with calculated inflow, the vegetation is assumed to evapotranspire available surface water up to the limit of maximum estimated evapotranspiration. In months with no inflow, the vegetation is assumed to rely on residual water found in the vadose zone or in perched groundwater sources. However, the total amount of plant available water should not the yearly demand for the selected vegetation types as defined in Tables 5a and 5b, in order for the planting scheme to be considered sustainable.

Results of the study are summarized in Tables 4a and 4b below.

TABLE 4a
Monthly Water Balance for North Eagle Ridge

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total Inflows (ac-ft)	9.3	10.9	6.2	3.9	1.8	0.1	0.0	0.0	0.4	3.6	5.0	7.4	
Total Potential Loss (ac-ft)	0.6	0.8	0.9	1.0	1.2	1.3	1.4	1.2	0.9	0.8	0.5	0.7	
Outflow (ac-ft)	8.7	10.1	5.3	2.8	0.0	0.0	0.0	0.0	0.0	2.8	4.5	6.7	
PAW (ac-ft)	**0.2**	**0.3**	**0.6**	**0.9**	**1.1**	**0.1**	**0.0**	**0.0**	**0.4**	**0.6**	**0.3**	**0.3**	**4.8**

TABLE 4b
Monthly Water Balance for North Eagle Ridge

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total Inflows (ac-ft)	8.3	9.7	5.5	3.5	1.6	0.1	0.0	0.0	0.3	3.2	4.5	7.4	
Total Potential Loss (ac-ft)	0.6	0.8	0.9	1.1	1.2	1.3	1.5	1.3	1.0	0.8	0.5	0.7	
Outflow (ac-ft)	7.7	8.9	4.6	2.4	0.0	0.0	0.0	0.0	0.0	2.4	3.9	6.7	
PAW (ac-ft)	**0.2**	**0.3**	**0.6**	**0.9**	**1.1**	**0.1**	**0.0**	**0.0**	**0.3**	**0.7**	**0.3**	**0.3**	**4.9**

Conclusions

As shown in Table 4a and 4b above, our analysis shows that the maximum moisture we expect to observe in the Cayetano creek channel should occur in February. We expect the creek channel to be dry for approximately 4 months out of the year between May and September, with very limited amounts of flow and residual moisture occurring in April and October.

Planting Pallette

Based on concept information furnished to us by the project biologist, Olberding Environmental, the following riparian planting palette is proposed for the project. Yearly water demand for these palettes has been estimated by the Department of Water Resources (DWR) after studying average drawdown in creek channels in Southern California by various native plant species in average rainfall years. Note that in the DWR study of the facultative riparian species such as oak species, the drawdown was estimated to be equal to the annual average rainfall in a clayey loam soil type, thus the consumptive use for the facultative riparian community was reduced to equal the average annual rainfall for Dublin, California in this study. Shrub watering requirements are lower than trees and are therefore estimated as 70% of tree watering demand. Yearly water demand is estimated in the tables below.

TABLE 5a
Yearly Watering Requirements-Cayetano Creek Project Reach

Plant Community	Water Requirements (inches/year)	Study Area (acres)	Yearly Water Demand (ac-ft)
Oak Association (shrubs)	12	0.63	0.63
Oak Association (trees)	17	3.3	4.25
Total		**3.3**	**4.88**

TABLE 5b
Yearly Watering Requirements-Collier Creek Project Reach

Plant Community	Water Requirements (inches/year)	Study Area (acres)	Yearly Water Demand (ac-ft)
Oak Association (shrubs)	12	0.63	0.63
Oak Association (trees)	17	3.3	4.25
Total		**3.3**	**4.88**

Table 5 indicates that the 4.88 acre-ft of total water required to sustain the proposed planting scheme is approximately equal to, but less than the 4.9 acre-ft of available water in the watershed shown at the bottom right of Table 4. Therefore, the planting scheme appears to be sustainable

based on our analysis for an average rainfall year. Because the DWR studies examined established vegetation communities in an average rainfall year, we expect that the palette is sustainable through years of below and above average rainfall as well.

Based on the fact that the proposed planting palette consists of species that already occur within the watershed, the overall volume of water, combined with the temporal (season-to-season) availability, the proposed planting plan appears to be sustainable for an average water year.

WATER BALANCE – PROPOSED WETLANDS

In order to optimize design of ponds and wetlands for the greater Collier Creek Mitigation Bank, a hydrologic sufficiency analysis was originally performed by Kamman Hydrology & Engineering, Inc. (KHE) in 2012. The original hydrological assumptions in the 2012 KHE report are still valid for the project areas and are used in this study regarding hydrologic inputs and outputs. The assumptions are summarized below:

Topography, Watersheds and Proposed Ponds and Wetlands

The proposed wetland ponds and seasonal freshwater wetlands are located in two watersheds, the West Branch Cayetano Creek and Collier Creek watersheds. The drainage areas to proposed ponds and proposed wetlands were determined from 2012 United States Geologic Survey digital elevation model metadata from which a contour map for the area was generated. The locations and initial sizes of the proposed ponds and wetlands are conceptual representations intended to maximize the surface water captured by the wetlands for various subwatersheds, to minimize grading impacts, and to avoid disturbing already delineated wetland habitats. All existing and proposed wetland and hydrologic features and associated drainage areas are indicated on the attached Figures as well as the naming convention of watersheds, proposed ponds, and wetlands. The Wetlands labeled 9- 22 are located within the Cayetano Creek watershed and the wetlands 22- 30 are in the Collier Creek Watershed.

Precipitation and Water Year Types

The KHE study used considered data from The National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA) which records daily precipitation for Livermore, California (NCDC,2012) Station GHCND : USC00044997 and extends from 1903 through 2011. However, in order to maintain consistency between different water budget data sets, the KHE Collier Creek Mitigation Bank Hydrologic Sufficiency Analysis utilized data from Water Year 2 (WY) 1969 through 2010 (October 1968 through September 2010), as this time period correlates with the available pan evaporation data. The long-term (WY1969-2010) average annual rainfall estimate from these data is 14.63 inches. The value agrees well with the USGS estimate for mean annual rainfall of 15.0-inches for this site location (Rantz, 1971). This is slightly lower that the rainfall data used in the above water balance for the proposed plantings. However, it provides conservatism to the results of the wetland features which are more susceptible in terms of performance to variations in wet or dry water years.

KHE also considered Monthly total rainfall for Water Year 1969 - 2010 obtained from the Zone 7 Water Agency (Zone 7 Water Agency, 2011). The Zone 7 monthly data supplied average values for months where data was missing from the daily NCDC data set.

The USGS defines a water year as the 12-month period October 1, for any given year through September 30, of the following year. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1999, is called the "1999" water year and includes 9 of the 12 months.

The monthly data set was used to determine the rainfall-runoff year-type probability analysis, described below by KHE in their original study and repeated as summarized below:

Monthly average rainfall values for WY 1969 – 2010 (Zone 7, 2011) were summed by water year and ranked. The exceedance probability ranking of the annual rainfall values suggests the long-term (1969-2010) average value of 14.63 inches has a 40% probability of occurring any given year. Thus, the statistical average value does not equal the median value. The median year in the data set, or that with a 50% probability of occurring within any given year, is WY 1979, and data for this year was used for the median year-type analysis. WY1979 generated 13.59 inches of rainfall annually. A water year-type with an 85% probability of occurring within any given year was selected as the representative dry year-type. The Water Year exhibiting the 85% probability range is WY 2007, which was used for the dry year-type analysis. WY2007 generated 9.66 inches of rainfall annually. Average, median, and dry year-type monthly rainfall totals are presented in Tables 6, 7 and 8, respectively.

Runoff

KHE did not identify any suitable local-area stream flow gauges to estimate surface water runoff from the site. Therefore, runoff contributing to Collier Creek Mitigation Ponds and Wetlands was calculated using the Natural Resource Conservation Service (NRCS) Runoff Curve Number (CN) Method (NRCS, 1986). The CN method approximates volume of direct surface runoff as a function of daily (24-hour) rainfall (P), the potential maximum retention after runoff begins (S), the initial abstraction (Ia), and the curve number (CN). Estimated as 20 percent of the value for S, Ia accounts for the total water losses before runoff begins and includes depression storage, interception, evaporation, and infiltration. S is directly related to CN, a function of hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition.

Soil data (NRCS, 1966, 1977, 2007, 2010) overlaid onto contributing watersheds resulted in HSG coverage of nearly exclusively type D (94%). HSG D soils have high runoff potential and very low infiltration rates when thoroughly wetted. Based on the majority of type D soil, all contributing watersheds were assumed composed from 100% HSG D type soils. Assuming cover type is pasture, grassland, or range, with 50-75% ground cover and not heavily grazed (fair condition), and 100% HSG D, the universal CN chosen from Table 2-2c (NRCS, 1986) was 84.

Based on a CN value of 84, the parameters to the runoff equations were estimated as:

S = (1000 / CN) – 10 = 1.9 inches
Ia = 0.2 * S = 0.38 inches

These data indicate that within a 24-hour period, the initial 0.38 inch of rainfall goes towards depression storage, interception, evaporation, and infiltration. Below this initial rainfall total, no runoff occurs. Rainfall in excess of 0.38 inch generates surface water runoff (Q) by the equation:

Q = ((P – 0.2S)2) / (P +0.8S)

Using the daily rainfall total data and runoff equation discussed above, daily runoff totals for the entire analysis period (WY1969-2010) were calculated. The average monthly values over the entire analysis period were used in the average water year type water budget analysis and are presented in Table 6. The long-term (WY1969-2010) average annual rainfall estimate of 14.63 inches generates an average annual runoff value of nearly 0.99 inch per year, less than 10% of the mean annual precipitation. The value agrees well with the USGS estimate for mean annual runoff of 1.0 inch for this site location (Rantz, 74).

Median and dry year type runoff totals were calculated using the runoff equation and daily rainfall totals for WY1979 (median year type) and WY2007 (dry year type). The resulting annual runoff totals were 0.85 inch and 0.28 inch, respectively (Tables 7 and 8).

Evapotranspiration

KHE considered monthly pan evaporation using data at Lake Del Valle in Livermore for Water Year 1969 - 2010 obtained from Zone 7 Water Agency (Zone 7 Water Agency, 2011). Pan evaporation data was converted to an open-water evaporation rate by multiplying by a coefficient of 0.7. The open-water evaporation rates were then increased by multiplying by a factor of 1.6 in order to account for micro-climate effects, and wind. KHE has substantiated the escalation in pond and wetland evapotranspiration losses through post- project hydrologic monitoring of other restoration sites in a similar topographic and hydrologic setting. Average, median, and dry year-type monthly evapotranspiration values are presented in Tables 6, 7 and 8, respectively.

TABLE 6
Average Year-Type Annual Input Values
WY 1969 - WY 2010

Month	Precip (inches)	Runoff (inches)	Eto (inches)
October	0.82	0.07	5.68
November	1.74	0.15	2.70
December	2.48	0.18	1.63
January	2.93	0.29	1.54
February	2.69	0.16	2.10

Month	Precip (inches)	Runoff (inches)	Eto (inches)
March	2.18	0.10	4.00
April	1.01	0.03	6.00
May	0.41	0.00	8.62
June	0.08	0.00	10.39
July	0.02	0.00	11.87
August	0.07	0.00	10.88
September	0.20	0.01	8.74
Annual	**14.63**	**0.99**	**74.15**

TABLE 7

Median Year-Type (50th Percentile of Being Equaled or Exceeded)
for WY 1969 - WY 2010 is WY 1979

Month	Precip (inches)	Runoff (inches)	Eto (inches)
October	0.00	0.00	6.50
November	2.16	0.15	2.51
December	0.58	0.00	1.69
January	4.51	0.64	1.40
February	3.19	0.06	1.44
March	1.86	0.01	2.56
April	0.88	0.00	5.38
May	0.34	0.00	9.36
June	0.00	0.00	12.34
July	0.06	0.00	11.65
August	0.00	0.00	10.34
September	0.00	0.00	10.61
Annual	**13.58**	**0.86**	**75.78**

TABLE 8

Dry Year-Type (85th Percentile of Being Equaled or Exceeded)
for WY 1969 - WY 2010 is WY 2007

Month	Precip (inches)	Runoff (inches)	Eto (inches)
October	0.20	0.00	5.90
November	1.68	0.00	2.34
December	2.25	0.16	2.49
January	0.52	0.00	2.22

Month	Precip (inches)	Runoff (inches)	Eto (inches)
February	3.92	0.12	1.92
March	0.33	0.00	4.86
April	0.44	0.00	6.56
May	0.11	0.00	9.61
June	0.00	0.00	10.74
July	0.00	0.00	10.99
August	0.00	0.00	11.70
September	0.21	0.00	7.84
Annual	**9.66**	**0.28**	**77.17**

Modeling Approach

The following performance criteria was applied to the analysis. First, each pond must achieve two consecutive months at full volume (maximum depth) during median water year-type (50% chance of rainfall being equaled or exceeded in any given year). The second objective is to design the ponds to have 1 foot of water for a minimum of 120 days until May 31st for a median rainfall year.

Water Budget Analyses

The water budget analysis consisted of processing monthly inflow, outflow, and storage volume changes for each pond/wetland system. A typical pond-wetland system water budget consists of tracking: the volume of inflow into the pond-wetland; overflow from the wetland and local runoff into the wetland; and finally any wetland overflow into downstream creeks or subwatersheds. Given the clayey nature of the soil material, losses due to infiltration were not considered.

A typical water budget for a pond-wetland system accounts for the monthly inflows, outflows and changes in pond/wetland storage as described below:

- Monthly direct rainfall inflow is converted from inches to volume (acre-feet) by multiplying monthly rainfall by the "full volume" pond-wetland area[1].

- Monthly surface water runoff is converted from inches to volume (acre-feet) by multiplying monthly runoff from the contributing watershed area, excluding pond-wetland area (net drainage area).

[1] All direct rainfall enters the pond area even if it falls on the side slopes of the empty wetland shelf, as it is assumed to runoff and pool at the bottom of the pond.

- Monthly evapotranspiration outflow is converted from inches to volume (acre-feet) by multiplying each successive month's evapotranspiration volume by the previous end of month pond-wetland surface area. The first month has no evapotranspiration, since the pond is empty in October.

- Accounting for the rainfall, runoff, and evapotranspiration volumes for each month produces the monthly pond-wetland inflow balance. The monthly inflow balance is positive if the sum of rainfall and runoff exceed evapotranspiration losses; or, the monthly inflow balance may be zero when evapotranspiration volume is greater than contributing rainfall and runoff volumes. Monthly inflow is added cumulatively, month by month, with any negative monthly values converted to zero to account for dry months.

- End-of-month pond-wetland storage is calculated during filling and draining sequence based on the stage-area-volume relationships derived for each pond-wetland system. Outflow or spillage from the pond is quantified should inflows exceed pond-wetland capacity and converting any negative monthly values to zero, accounting for the months where the pond dries out. End of month stage (pond-wetland water depth) and pond-wetland surface areas are calculated from the pond-wetland volume using the stage-area-volume relationships. The end of month pond-wetland surface area is used in the water budget to calculate the amount of evaporation occurring in the following month.

- Should spillage from the pond-wetland system occur once capacity is exceeded, the monthly spillage volume is accounted for as an additional inflow volume to receiving wetland or creek.

Results

Results of the analysis are provided in Appendix A. In general, there is sufficient water supply to achieve creation of the proposed mitigation scheme in terms of wetland and pond design. Results of the water budget analyses also indicate that water use by project wetlands will not significantly impair (reduce) flows and supply to existing wetland corridors and creek flow. The target pond water depths were achieved during both average and median water year-types. During dry water year types, maximum pond depths are not achieved, but the ponds would sustain at least 1.0 foot of standing water for three months or more.

The ponds/wetland systems are shown on Figure 2 of this report. Table 9 summarizes the maximum size of the pond/wetland systems based on the results of our analysis.

Land uses upstream of the project are outside of the Contra Costa County urban limit line and are therefore expected to remain relatively the same in the future. Because the wetlands do not rely on upstream water sources, changes in land use would not affect the ability of the wetlands systems to retain water rainfall runoff and pond. We expect that any minor modifications to the upstream watershed that could affect run-on flows, to not adversely affect the ability of the

vegetation to be sustained given the assumptions used in the water balance calculations. We note that the State Water Resources Control Board regulates the diversion and impoundment of rainfall runoff and therefore large diversions of upstream flows are considered to be unlikely.

TABLE 9
Summary of Pond/Wetland system sizing
Cayetano Creek Preserve

Wetland #	Pond Depth (ft)	Pond Area (Acres)	Ponded Shelf/ Wetland Area (Acres)
9	3.00	0.21	1.91
10	2.00	0.07	0.81
11	1.50	0.81	0.70
12	3.00	0.21	2.71
13	2.00	0.11	0.95
14	2.00	0.03	0.26
15	3.00	0.22	1.69
16	2.00	0.23	2.26
17	2.00	0.12	0.65
18	1.50	0.09	0.92
19	3.00	0.26	3.02
20	2.00	0.12	0.77
21	1.00	0.06	0.26
22	2.00	0.18	1.71
23	2.00	0.08	1.22
24	2.00	0.09	1.29
25	2.00	0.18	1.60
26	1.50	0.07	0.75
27	2.00	0.05	0.37
28	2.00	0.06	0.29
29	1.00	0.06	0.56
30	2.00	0.06	2.86
	Total	**3.37**	**27.53**

CONCLUSION

Based on the above analyses, the project appears to be feasible from a hydrologic perspective given the performance criteria we have been provided.

We are pleased to be of service to you on this project and look forward to consulting further with you and your design team.

Sincerely,

ENGEO Incorporated

Jonathan D. Buck, PE Raymond P Skinner, CEG
jdb/rps/cjn

Attachments: Selected References
Figure 1 – Run-on Watershed Delineations
Figure 2 – Conceptual Wetland Area Map
Figure 3 – Riparian Enhancement Area Map
Appendix A – Water Balance Calculations

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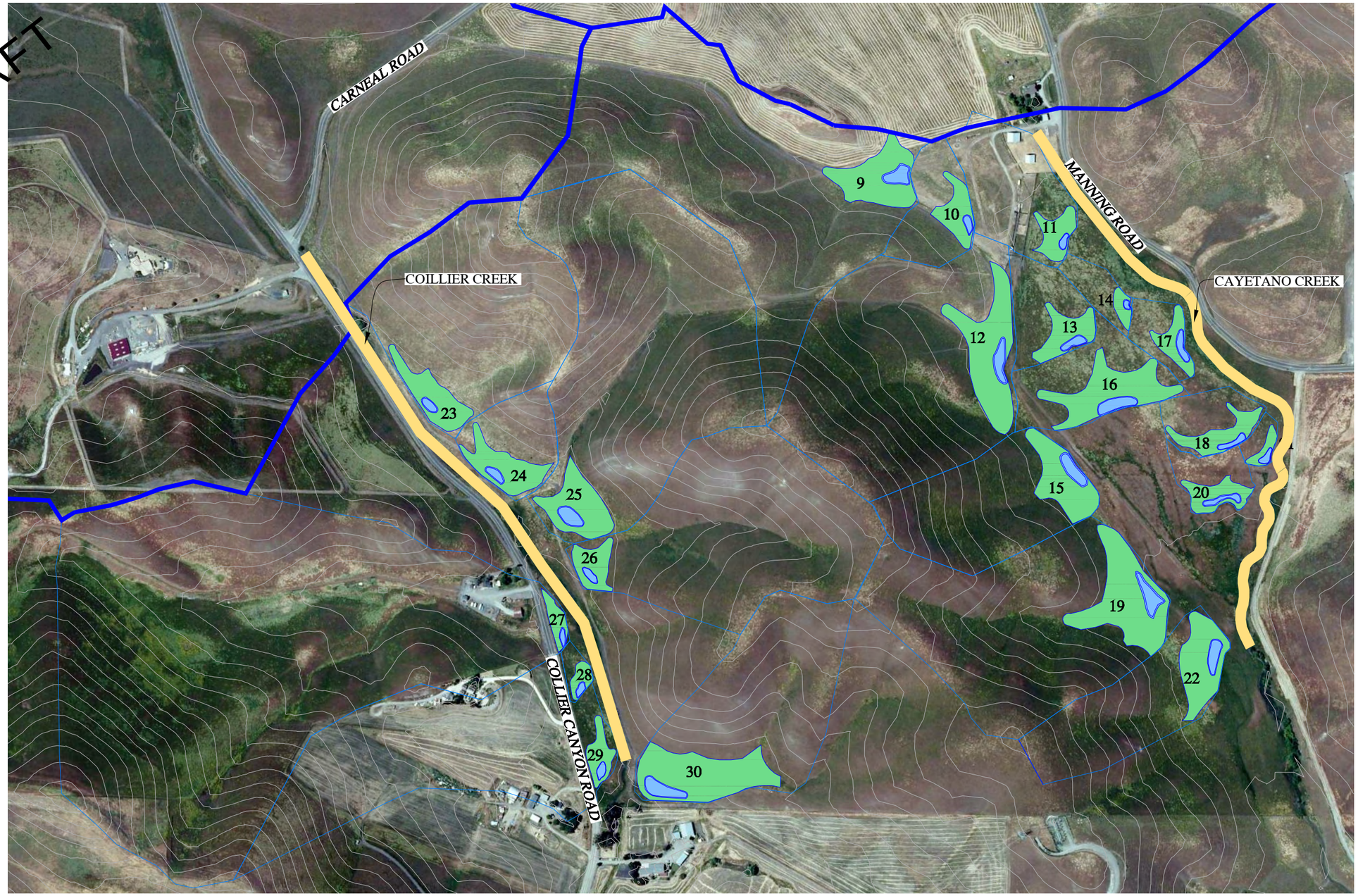
FIGURES

Figure 1 – Run-on Watershed Delineations
Figure 2 – Conceptual Wetland Area Map
Figure 3 – Riparian Enhancement Map

DRAFT



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

NORTH CREEK RIDGE RUN-ON WATERSHED AREA

P20 — WETLAND AREA-PONDED SHELF

WETLAND LABEL

WETLAND POOL AREA

N

0 FEET 500

0 METERS 250

BASE MAP SOURCE: UNKNOWN

DRAFT

ENGEO Expect Excellence

RUN-ON WATERSHED DELINETATIONS
NORTH EAGLE RIDGE
LIVERMORE, CALIFORNIA

PROJECT NO.: 11134.000.001		FIGURE NO. 1
SCALE: AS SHOWN		
DRAWN BY: SC	CHECKED BY: SC	

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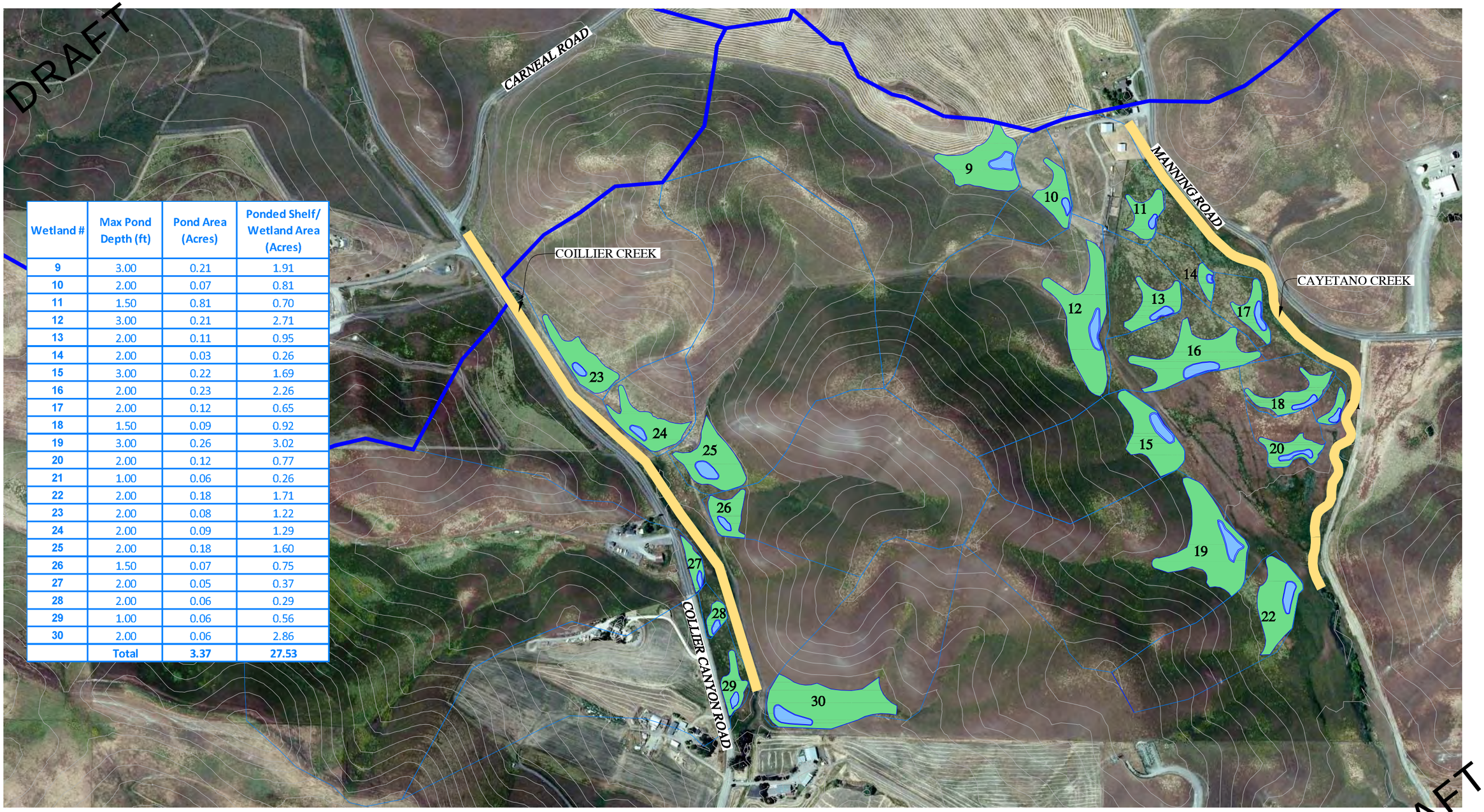
ORIGINAL FIGURE PRINTED IN COLOR

Wetland #	Max Pond Depth (ft)	Pond Area (Acres)	Ponded Shelf/ Wetland Area (Acres)
9	3.00	0.21	1.91
10	2.00	0.07	0.81
11	1.50	0.81	0.70
12	3.00	0.21	2.71
13	2.00	0.11	0.95
14	2.00	0.03	0.26
15	3.00	0.22	1.69
16	2.00	0.23	2.26
17	2.00	0.12	0.65
18	1.50	0.09	0.92
19	3.00	0.26	3.02
20	2.00	0.12	0.77
21	1.00	0.06	0.26
22	2.00	0.18	1.71
23	2.00	0.08	1.22
24	2.00	0.09	1.29
25	2.00	0.18	1.60
26	1.50	0.07	0.75
27	2.00	0.05	0.37
28	2.00	0.06	0.29
29	1.00	0.06	0.56
30	2.00	0.06	2.86
	Total	3.37	27.53



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

WETLAND PONDED SHELF

WETLAND POOL

N

0 FEET 500

0 METERS 250

BASE MAP SOURCE: UNKNOWN

ENGEO Expect Excellence

CONCEPTUAL WETLAND AREA MAP

NORTH EAGLE RIDGE

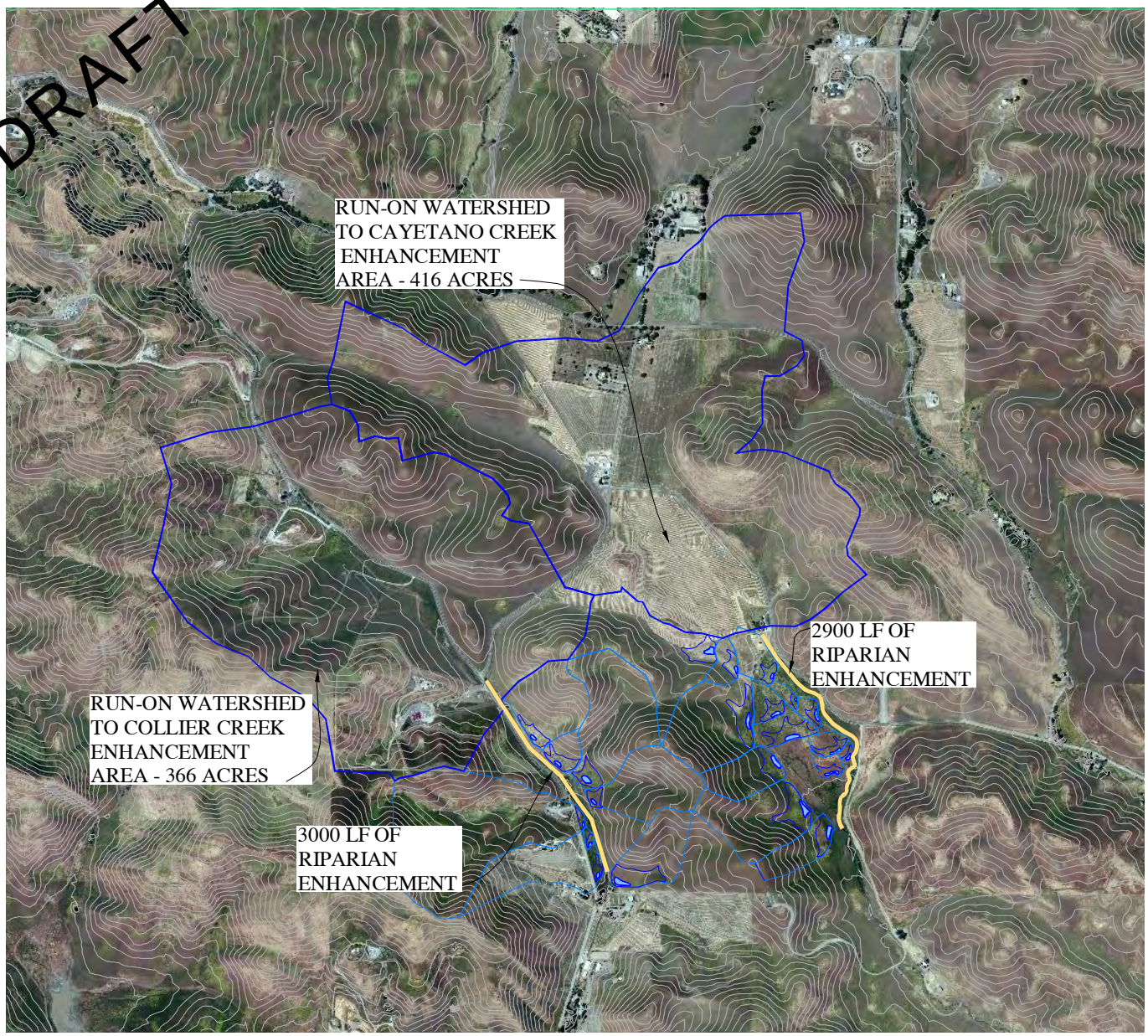
LIVERMORE, CALIFORNIA

PROJECT NO.: 11134.000.001

SCALE: AS SHOWN

DRAWN BY: SC CHECKED BY: SC

FIGURE NO. 2



N

0 FEET 2000

0 METERS 1000

BASE MAP SOURCE: UNKNOWN

ENGEO Expect Excellence

RIPARIAN ENHANCEMENT MAP

NORTH EAGLE RIDGE

LIVERMORE, CALIFORNIA

PROJECT NO.: 11134.000.001		FIGURE NO. 3
SCALE: AS SHOWN		
DRAWN BY: SC	CHECKED BY: SC	

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ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX A

Water Balance Calculations

Wetland #9

Top of Pond Area	0.21	acres
Ponded Shelf Area	1.91	acres
Watershed Area	29.02	acres
Net Drainage	30.93	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
3.25	1.910	0.811	ponded shelf
3	0.208	0.546	top
0	0.156	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.13	0.18	0.00	0.31	0.31	1.71	0.19	0.0000
Novemebr	1.74	0.15	2.70	0.28	0.39	-0.04	0.62	0.81	3.25	1.91	0.1216
December	2.48	0.18	1.63	0.39	0.46	-0.26	0.60	0.81	3.25	1.91	0.5992
January	2.93	0.29	1.54	0.47	0.75	-0.25	0.97	0.81	3.25	1.91	0.9686
February	2.69	0.16	2.10	0.43	0.41	-0.33	0.51	0.81	3.25	1.91	0.5063
March	2.18	0.10	4.00	0.35	0.26	-0.64	-0.03	0.78	3.22	1.70	0.0000
April	1.01	0.10	6.00	0.16	0.26	-0.85	-0.43	0.35	1.90	0.19	0.0000
May	0.41	0.00	8.62	0.07	0.00	-0.14	-0.07	0.27	1.51	0.18	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.16	-0.15	0.13	0.71	0.17	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.17	-0.16	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.14	-0.13	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.03	0.03	-0.11	-0.06	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	2.33	2.73	-3.09	1.98				2.196

Months of Ponding Greater Than 1ft	8
Months of Full Pond	5

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.34	0.39	-0.03	0.70	0.70	3.14	1.18	0.0000
December	0.58	0.00	1.69	0.09	0.00	-0.17	-0.07	0.62	3.07	0.71	0.0000
January	4.51	0.64	1.40	0.72	1.65	-0.08	2.28	0.81	3.25	1.91	2.0976
February	3.19	0.06	1.44	0.51	0.15	-0.23	0.43	0.81	3.25	1.91	0.4332
March	1.86	0.01	2.56	0.30	0.03	-0.41	-0.09	0.73	3.17	1.36	0.0000
April	0.88	0.00	5.38	0.14	0.00	-0.61	-0.47	0.26	1.41	0.18	0.0000
May	0.34	0.00	9.36	0.05	0.00	-0.14	-0.09	0.17	0.93	0.17	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.18	-0.18	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.15	-0.14	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.13	-0.13	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	2.16	2.22	-2.27	2.11				2.531

Months of Ponding Greater Than 1ft	6
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.03	0.00	0.00	0.03	0.03	0.17	0.16	0.0000
Novemebr	1.68	0.00	2.34	0.27	0.00	-0.03	0.24	0.27	1.47	0.18	0.0000
December	2.25	0.16	2.49	0.36	0.41	-0.04	0.73	0.81	3.25	1.91	0.1899
January	0.52	0.00	2.22	0.08	0.00	-0.35	-0.27	0.54	2.97	0.21	0.0000
February	3.92	0.12	1.92	0.62	0.31	-0.03	0.90	0.81	3.25	1.91	0.6294
March	0.33	0.00	4.86	0.05	0.00	-0.77	-0.72	0.09	0.49	0.16	0.0000
April	0.44	0.00	6.56	0.07	0.00	-0.09	-0.02	0.07	0.38	0.16	0.0000
May	0.11	0.00	9.61	0.02	0.00	-0.13	-0.11	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.15	-0.15	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.03	0.00	-0.10	-0.07	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	1.54	0.72	-1.99	0.27				0.819

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

Wetland #10

Top of Pond Area	0.07	acres
Ponded Shelf Area	0.81	acres
Watershed Area	2.84	acres
Net Drainage	3.64	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	0.809	0.225	ponded shelf
2	0.068	0.116	top
0	0.048	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.06	0.02	0.00	0.08	0.08	1.32	0.06	0.0000
Novemebr	1.74	0.15	2.70	0.12	0.05	-0.01	0.15	0.23	2.25	0.81	0.0004
December	2.48	0.18	1.63	0.17	0.05	-0.11	0.11	0.23	2.25	0.81	0.1120
January	2.93	0.29	1.54	0.20	0.09	-0.10	0.18	0.23	2.25	0.81	0.1817
February	2.69	0.16	2.10	0.18	0.05	-0.14	0.09	0.23	2.25	0.81	0.0884
March	2.18	0.10	4.00	0.15	0.03	-0.27	-0.09	0.13	2.04	0.18	0.0000
April	1.01	0.10	6.00	0.07	0.03	-0.09	0.01	0.14	2.05	0.23	0.0000
May	0.41	0.00	8.62	0.03	0.00	-0.16	-0.13	0.00	0.07	0.05	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.01	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.99	0.32	-1.06	0.25				0.382

Months of Ponding Greater Than 1ft	7
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.15	0.05	-0.01	0.18	0.18	2.15	0.51	0.0000
December	0.58	0.00	1.69	0.04	0.00	-0.07	-0.03	0.15	2.07	0.29	0.0000
January	4.51	0.64	1.40	0.30	0.19	-0.03	0.46	0.23	2.25	0.81	0.3877
February	3.19	0.06	1.44	0.21	0.02	-0.10	0.14	0.23	2.25	0.81	0.1362
March	1.86	0.01	2.56	0.13	0.00	-0.17	-0.04	0.18	2.15	0.51	0.0000
April	0.88	0.00	5.38	0.06	0.00	-0.23	-0.17	0.01	0.20	0.05	0.0000
May	0.34	0.00	9.36	0.02	0.00	-0.04	-0.02	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.92	0.26	-0.83	0.34				0.524

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.01	0.00	0.00	0.01	0.01	0.23	0.05	0.0000
Novemebr	1.68	0.00	2.34	0.11	0.00	-0.01	0.10	0.12	2.00	0.08	0.0000
December	2.25	0.16	2.49	0.15	0.05	-0.02	0.18	0.23	2.25	0.81	0.0761
January	0.52	0.00	2.22	0.04	0.00	-0.15	-0.11	0.11	1.91	0.07	0.0000
February	3.92	0.12	1.92	0.26	0.04	-0.01	0.29	0.23	2.25	0.81	0.1754
March	0.33	0.00	4.86	0.02	0.00	-0.33	-0.31	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.03	0.00	-0.03	0.00	0.00	0.06	0.05	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.04	-0.03	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.65	0.09	-0.74	-0.01				0.251

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #11

Top of Pond Area	0.06	acres
Ponded Shelf Area	0.70	acres
Watershed Area	5.39	acres
Net Drainage	6.09	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
1.75	0.696	0.167	ponded shelf
1.5	0.055	0.073	top
0	0.042	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.05	0.04	0.00	0.08	0.08	1.53	0.12	0.0000
Novemebr	1.74	0.15	2.70	0.10	0.08	-0.03	0.15	0.17	1.75	0.70	0.0653
December	2.48	0.18	1.63	0.14	0.09	-0.09	0.14	0.17	1.75	0.70	0.1406
January	2.93	0.29	1.54	0.17	0.15	-0.09	0.23	0.17	1.75	0.70	0.2278
February	2.69	0.16	2.10	0.16	0.08	-0.12	0.12	0.17	1.75	0.70	0.1154
March	2.18	0.10	4.00	0.13	0.05	-0.23	-0.05	0.11	1.60	0.32	0.0000
April	1.01	0.10	6.00	0.06	0.05	-0.16	-0.05	0.06	1.24	0.05	0.0000
May	0.41	0.00	8.62	0.02	0.00	-0.04	-0.01	0.05	0.95	0.05	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.04	-0.04	0.01	0.15	0.04	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.04	-0.03	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.01	0.01	-0.03	-0.01	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.85	0.54	-0.92	0.47				0.549

Months of Ponding Greater Than 1ft	7
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.13	0.08	-0.01	0.19	0.17	1.75	0.70	0.0256
December	0.58	0.00	1.69	0.03	0.00	-0.10	-0.06	0.10	1.58	0.26	0.0000
January	4.51	0.64	1.40	0.26	0.32	-0.03	0.56	0.17	1.75	0.70	0.4919
February	3.19	0.06	1.44	0.19	0.03	-0.08	0.13	0.17	1.75	0.70	0.1319
March	1.86	0.01	2.56	0.11	0.01	-0.15	-0.04	0.13	1.66	0.45	0.0000
April	0.88	0.00	5.38	0.05	0.00	-0.20	-0.15	0.00	0.00	0.00	0.0000
May	0.34	0.00	9.36	0.02	0.00	-0.03	-0.01	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.79	0.44	-0.76	0.46				0.650

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.01	0.00	0.00	0.01	0.01	0.24	0.04	0.0000
Novemebr	1.68	0.00	2.34	0.10	0.00	-0.01	0.09	0.10	1.57	0.24	0.0000
December	2.25	0.16	2.49	0.13	0.08	-0.05	0.16	0.17	1.75	0.70	0.0949
January	0.52	0.00	2.22	0.03	0.00	-0.13	-0.10	0.07	1.40	0.05	0.0000
February	3.92	0.12	1.92	0.23	0.06	-0.01	0.28	0.17	1.75	0.70	0.1809
March	0.33	0.00	4.86	0.02	0.00	-0.28	-0.26	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.03	0.00	-0.02	0.00	0.00	0.05	0.04	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.56	0.14	-0.68	0.02				0.276

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #12

Top of Pond Area	0.21	acres
Ponded Shelf Area	2.71	acres
Watershed Area	20.33	acres
Net Drainage	23.05	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
3.25	2.714	0.908	ponded shelf
3	0.214	0.542	top
0	0.148	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.19	0.13	0.00	0.32	0.32	1.77	0.19	0.0000
Novemebr	1.74	0.15	2.70	0.39	0.29	-0.04	0.64	0.91	3.25	2.71	0.0515
December	2.48	0.18	1.63	0.56	0.35	-0.37	0.54	0.91	3.25	2.71	0.5380
January	2.93	0.29	1.54	0.66	0.56	-0.35	0.87	0.91	3.25	2.71	0.8714
February	2.69	0.16	2.10	0.61	0.31	-0.47	0.44	0.91	3.25	2.71	0.4407
March	2.18	0.10	4.00	0.49	0.19	-0.90	-0.22	0.69	3.10	1.21	0.0000
April	1.01	0.10	6.00	0.23	0.19	-0.61	-0.19	0.50	2.78	0.21	0.0000
May	0.41	0.00	8.62	0.09	0.00	-0.15	-0.06	0.44	2.46	0.20	0.0000
June	0.08	0.00	10.39	0.02	0.00	-0.17	-0.16	0.29	1.59	0.18	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.18	-0.18	0.11	0.62	0.16	0.0000
August	0.07	0.00	10.88	0.02	0.00	-0.15	-0.13	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.05	0.02	-0.11	-0.04	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	3.31	2.04	-3.50	1.84				1.902

Months of Ponding Greater Than 1ft	9
Months of Full Pond	5

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.49	0.29	-0.03	0.75	0.75	3.14	1.61	0.0000
December	0.58	0.00	1.69	0.13	0.00	-0.23	-0.09	0.65	3.07	0.96	0.0000
January	4.51	0.64	1.40	1.02	1.23	-0.11	2.14	0.91	3.25	2.71	1.8804
February	3.19	0.06	1.44	0.72	0.12	-0.33	0.51	0.91	3.25	2.71	0.5110
March	1.86	0.01	2.56	0.42	0.02	-0.58	-0.14	0.77	3.15	1.76	0.0000
April	0.88	0.00	5.38	0.20	0.00	-0.79	-0.59	0.18	0.98	0.17	0.0000
May	0.34	0.00	9.36	0.08	0.00	-0.13	-0.06	0.12	0.68	0.16	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.17	-0.17	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.14	-0.13	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.13	-0.13	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.13	-0.13	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	3.07	1.65	-2.76	1.96				2.391

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.05	0.00	0.00	0.05	0.05	0.25	0.15	0.0000
Novemebr	1.68	0.00	2.34	0.38	0.00	-0.03	0.35	0.40	2.19	0.20	0.0000
December	2.25	0.16	2.49	0.51	0.31	-0.04	0.78	0.91	3.25	2.71	0.2628
January	0.52	0.00	2.22	0.12	0.00	-0.50	-0.38	0.52	2.90	0.21	0.0000
February	3.92	0.12	1.92	0.89	0.23	-0.03	1.08	0.91	3.25	2.71	0.6987
March	0.33	0.00	4.86	0.07	0.00	-1.10	-1.02	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.10	0.00	-0.08	0.02	0.02	0.10	0.15	0.0000
May	0.11	0.00	9.61	0.02	0.00	-0.12	-0.10	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.13	-0.13	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.05	0.00	-0.10	-0.05	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	2.18	0.54	-2.41	0.31				0.962

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

Wetland #13

Top of Pond Area	0.11	acres
Ponded Shelf Area	0.95	acres
Watershed Area	2.55	acres
Net Drainage	3.50	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	0.950	0.328	ponded shelf
2	0.111	0.195	top
0	0.084	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.06	0.02	0.00	0.09	0.09	0.87	0.10	0.0000
Novemebr	1.74	0.15	2.70	0.14	0.04	-0.02	0.16	0.25	2.09	0.43	0.0000
December	2.48	0.18	1.63	0.20	0.05	-0.06	0.19	0.33	2.25	0.95	0.1080
January	2.93	0.29	1.54	0.23	0.08	-0.12	0.19	0.33	2.25	0.95	0.1946
February	2.69	0.16	2.10	0.21	0.05	-0.17	0.09	0.33	2.25	0.95	0.0933
March	2.18	0.10	4.00	0.17	0.03	-0.32	-0.11	0.21	2.03	0.22	0.0000
April	1.01	0.10	6.00	0.08	0.03	-0.11	0.00	0.21	2.03	0.21	0.0000
May	0.41	0.00	8.62	0.03	0.00	-0.15	-0.12	0.09	0.97	0.10	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.08	-0.08	0.02	0.17	0.09	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.09	-0.08	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.08	-0.07	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.02	0.00	-0.06	-0.04	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	1.16	0.31	-1.25	0.22				0.396

Months of Ponding Greater Than 1ft	6
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.17	0.04	-0.02	0.20	0.20	2.00	0.12	0.0000
December	0.58	0.00	1.69	0.05	0.00	-0.02	0.03	0.23	2.06	0.30	0.0000
January	4.51	0.64	1.40	0.36	0.19	-0.04	0.51	0.33	2.25	0.95	0.4059
February	3.19	0.06	1.44	0.25	0.02	-0.11	0.16	0.33	2.25	0.95	0.1560
March	1.86	0.01	2.56	0.15	0.00	-0.20	-0.05	0.28	2.15	0.62	0.0000
April	0.88	0.00	5.38	0.07	0.00	-0.28	-0.21	0.07	0.70	0.09	0.0000
May	0.34	0.00	9.36	0.03	0.00	-0.07	-0.05	0.02	0.23	0.09	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.09	-0.09	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	1.07	0.25	-1.05	0.27				0.562

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.02	0.00	0.00	0.02	0.02	0.16	0.09	0.0000
Novemebr	1.68	0.00	2.34	0.13	0.00	-0.02	0.12	0.13	1.35	0.10	0.0000
December	2.25	0.16	2.49	0.18	0.05	-0.02	0.20	0.33	2.25	0.95	0.0075
January	0.52	0.00	2.22	0.04	0.00	-0.18	-0.13	0.19	1.98	0.11	0.0000
February	3.92	0.12	1.92	0.31	0.03	-0.02	0.33	0.33	2.25	0.95	0.1929
March	0.33	0.00	4.86	0.03	0.00	-0.38	-0.36	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.03	0.00	-0.05	-0.01	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.07	-0.06	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.02	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.76	0.08	-1.02	-0.17				0.200

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

Wetland #14

Top of Pond Area	0.03	acres
Ponded Shelf Area	0.26	acres
Watershed Area	1.10	acres
Net Drainage	1.36	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	0.258	0.086	ponded shelf
2	0.031	0.050	top
0	0.019	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.02	0.01	0.00	0.03	0.03	1.02	0.03	0.0000
Novemebr	1.74	0.15	2.70	0.04	0.02	-0.01	0.05	0.07	2.17	0.18	0.0000
December	2.48	0.18	1.63	0.05	0.02	-0.02	0.05	0.09	2.25	0.26	0.0369
January	2.93	0.29	1.54	0.06	0.03	-0.03	0.06	0.09	2.25	0.26	0.0627
February	2.69	0.16	2.10	0.06	0.02	-0.05	0.03	0.09	2.25	0.26	0.0308
March	2.18	0.10	4.00	0.05	0.01	-0.09	-0.03	0.06	2.06	0.08	0.0000
April	1.01	0.10	6.00	0.02	0.01	-0.04	-0.01	0.05	1.99	0.03	0.0000
May	0.41	0.00	8.62	0.01	0.00	-0.02	-0.01	0.04	1.45	0.03	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.02	-0.02	0.01	0.56	0.02	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.31	0.12	-0.34	0.10				0.130

Months of Ponding Greater Than 1ft	8
Months of Full Pond	5

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.05	0.02	0.00	0.06	0.06	2.06	0.09	0.0000
December	0.58	0.00	1.69	0.01	0.00	-0.01	0.00	0.06	2.06	0.09	0.0000
January	4.51	0.64	1.40	0.10	0.07	-0.01	0.16	0.09	2.25	0.26	0.1321
February	3.19	0.06	1.44	0.07	0.01	-0.03	0.04	0.09	2.25	0.26	0.0444
March	1.86	0.01	2.56	0.04	0.00	-0.05	-0.01	0.07	2.15	0.17	0.0000
April	0.88	0.00	5.38	0.02	0.00	-0.08	-0.06	0.01	0.59	0.02	0.0000
May	0.34	0.00	9.36	0.01	0.00	-0.02	-0.01	0.00	0.18	0.02	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.29	0.10	-0.28	0.11				0.176

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.00	0.00	0.00	0.00	0.00	0.17	0.02	0.0000
Novemebr	1.68	0.00	2.34	0.04	0.00	0.00	0.03	0.04	1.45	0.03	0.0000
December	2.25	0.16	2.49	0.05	0.02	-0.01	0.06	0.09	2.25	0.26	0.0108
January	0.52	0.00	2.22	0.01	0.00	-0.05	-0.04	0.05	1.98	0.03	0.0000
February	3.92	0.12	1.92	0.08	0.01	0.00	0.09	0.09	2.25	0.26	0.0563
March	0.33	0.00	4.86	0.01	0.00	-0.10	-0.10	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.00	0.00	-0.02	-0.01	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.21	0.03	-0.26	-0.02				0.067

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

Wetland #15

Top of Pond Area	0.22	acres
Ponded Shelf Area	1.69	acres
Watershed Area	8.07	acres
Net Drainage	9.76	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
3.25	1.689	0.813	ponded shelf
3	0.220	0.575	top
0	0.163	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.12	0.06	0.00	0.17	0.17	0.90	0.18	0.0000
Novemebr	1.74	0.15	2.70	0.24	0.12	-0.04	0.33	0.50	2.60	0.21	0.0000
December	2.48	0.18	1.63	0.35	0.15	-0.03	0.47	0.81	3.25	1.69	0.1518
January	2.93	0.29	1.54	0.41	0.24	-0.22	0.43	0.81	3.25	1.69	0.4314
February	2.69	0.16	2.10	0.38	0.13	-0.30	0.21	0.81	3.25	1.69	0.2131
March	2.18	0.10	4.00	0.31	0.08	-0.56	-0.17	0.64	3.07	0.61	0.0000
April	1.01	0.10	6.00	0.14	0.08	-0.31	-0.08	0.56	2.90	0.22	0.0000
May	0.41	0.00	8.62	0.06	0.00	-0.16	-0.10	0.46	2.38	0.21	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.18	-0.17	0.29	1.50	0.19	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.19	-0.19	0.10	0.52	0.17	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.16	-0.15	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.03	0.01	-0.12	-0.08	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	2.06	0.86	-2.25	0.67				0.796

Months of Ponding Greater Than 1ft	8
Months of Full Pond	4

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.30	0.12	-0.03	0.39	0.39	2.05	0.20	0.0000
December	0.58	0.00	1.69	0.08	0.00	-0.03	0.05	0.45	2.32	0.21	0.0000
January	4.51	0.64	1.40	0.63	0.52	-0.02	1.13	0.81	3.25	1.69	0.7626
February	3.19	0.06	1.44	0.45	0.05	-0.20	0.30	0.81	3.25	1.69	0.2951
March	1.86	0.01	2.56	0.26	0.01	-0.36	-0.09	0.72	3.16	1.13	0.0000
April	0.88	0.00	5.38	0.12	0.00	-0.51	-0.38	0.34	1.77	0.20	0.0000
May	0.34	0.00	9.36	0.05	0.00	-0.15	-0.11	0.23	1.22	0.19	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.19	-0.19	0.04	0.22	0.17	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.16	-0.15	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	1.91	0.70	-1.95	0.66				1.058

Months of Ponding Greater Than 1ft	7
Months of Full Pond	3

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.03	0.00	0.00	0.03	0.03	0.15	0.17	0.0000
Novemebr	1.68	0.00	2.34	0.24	0.00	-0.03	0.20	0.23	1.21	0.19	0.0000
December	2.25	0.16	2.49	0.32	0.13	-0.04	0.41	0.64	3.07	0.63	0.0000
January	0.52	0.00	2.22	0.07	0.00	-0.12	-0.04	0.60	3.02	0.36	0.0000
February	3.92	0.12	1.92	0.55	0.10	-0.06	0.59	0.81	3.25	1.69	0.3757
March	0.33	0.00	4.86	0.05	0.00	-0.68	-0.64	0.18	0.92	0.18	0.0000
April	0.44	0.00	6.56	0.06	0.00	-0.10	-0.04	0.14	0.73	0.18	0.0000
May	0.11	0.00	9.61	0.02	0.00	-0.14	-0.13	0.01	0.07	0.16	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.15	-0.15	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.15	-0.15	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.16	-0.16	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.03	0.00	-0.11	-0.08	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	1.36	0.23	-1.73	-0.14				0.376

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #16

Top of PondArea	0.23	acres
Ponded Shelf Area	2.26	acres
Watershed Area	3.24	acres
Net Drainage	5.50	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	2.258	0.721	ponded shelf
2	0.226	0.411	top
0	0.185	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.15	0.03	0.00	0.19	0.19	0.91	0.20	0.0000
Novemebr	1.74	0.15	2.70	0.33	0.07	-0.05	0.35	0.54	2.10	1.05	0.0000
December	2.48	0.18	1.63	0.47	0.08	-0.14	0.41	0.72	2.25	2.26	0.2219
January	2.93	0.29	1.54	0.55	0.13	-0.29	0.39	0.72	2.25	2.26	0.3945
February	2.69	0.16	2.10	0.51	0.07	-0.40	0.18	0.72	2.25	2.26	0.1844
March	2.18	0.10	4.00	0.41	0.05	-0.75	-0.30	0.42	2.01	0.32	0.0000
April	1.01	0.10	6.00	0.19	0.05	-0.16	0.08	0.50	2.07	0.82	0.0000
May	0.41	0.00	8.62	0.08	0.00	-0.59	-0.51	0.00	0.00	0.00	0.0000
June	0.08	0.00	10.39	0.02	0.00	-0.16	-0.15	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.18	-0.18	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.17	-0.15	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.04	0.00	-0.13	-0.09	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	2.75	0.49	-3.02	0.22				0.801

Months of Ponding Greater Than 1ft	6
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.41	0.07	-0.04	0.44	0.44	2.02	0.39	0.0000
December	0.58	0.00	1.69	0.11	0.00	-0.06	0.05	0.49	2.06	0.74	0.0000
January	4.51	0.64	1.40	0.85	0.29	-0.09	1.05	0.72	2.25	2.26	0.8239
February	3.19	0.06	1.44	0.60	0.03	-0.27	0.36	0.72	2.25	2.26	0.3567
March	1.86	0.01	2.56	0.35	0.00	-0.48	-0.13	0.59	2.15	1.43	0.0000
April	0.88	0.00	5.38	0.17	0.00	-0.64	-0.47	0.12	0.59	0.20	0.0000
May	0.34	0.00	9.36	0.06	0.00	-0.15	-0.09	0.03	0.15	0.19	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.19	-0.19	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.18	-0.17	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.16	-0.16	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.16	-0.16	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	2.55	0.39	-2.42	0.53				1.181

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.04	0.00	0.00	0.04	0.04	0.18	0.19	0.0000
Novemebr	1.68	0.00	2.34	0.32	0.00	-0.04	0.28	0.32	1.54	0.22	0.0000
December	2.25	0.16	2.49	0.42	0.07	-0.04	0.45	0.72	2.25	2.26	0.0473
January	0.52	0.00	2.22	0.10	0.00	-0.42	-0.32	0.40	1.95	0.23	0.0000
February	3.92	0.12	1.92	0.74	0.06	-0.04	0.76	0.72	2.25	2.26	0.4367
March	0.33	0.00	4.86	0.06	0.00	-0.91	-0.85	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.08	0.00	-0.10	-0.02	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.02	0.00	-0.15	-0.13	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.17	-0.17	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.17	-0.17	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.18	-0.18	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.04	0.00	-0.12	-0.08	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	1.82	0.13	-2.34	-0.39				0.484

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

Wetland #17

Top of PondArea	0.12	acres
Ponded Shelf Area	0.65	acres
Watershed Area	1.08	acres
Net Drainage	1.73	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	0.646	0.310	ponded shelf
2	0.123	0.214	top
0	0.091	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.04	0.01	0.00	0.05	0.05	0.51	0.10	0.0000
Novemebr	1.74	0.15	2.70	0.09	0.02	-0.02	0.09	0.15	1.38	0.11	0.0000
December	2.48	0.18	1.63	0.13	0.03	-0.02	0.14	0.29	2.20	0.55	0.0000
January	2.93	0.29	1.54	0.16	0.04	-0.07	0.13	0.31	2.25	0.65	0.1110
February	2.69	0.16	2.10	0.14	0.02	-0.11	0.05	0.31	2.25	0.65	0.0548
March	2.18	0.10	4.00	0.12	0.01	-0.22	-0.08	0.23	2.03	0.19	0.0000
April	1.01	0.10	6.00	0.05	0.01	-0.10	-0.03	0.20	1.87	0.12	0.0000
May	0.41	0.00	8.62	0.02	0.00	-0.09	-0.06	0.13	1.26	0.11	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.10	-0.09	0.04	0.40	0.10	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.10	-0.09	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.01	0.00	-0.07	-0.05	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.79	0.15	-0.96	-0.02				0.166

Months of Ponding Greater Than 1ft	7
Months of Full Pond	4

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.12	0.02	-0.02	0.12	0.12	1.11	0.11	0.0000
December	0.58	0.00	1.69	0.03	0.00	-0.02	0.02	0.13	1.26	0.11	0.0000
January	4.51	0.64	1.40	0.24	0.09	-0.01	0.32	0.31	2.25	0.65	0.1471
February	3.19	0.06	1.44	0.17	0.01	-0.08	0.10	0.31	2.25	0.65	0.1029
March	1.86	0.01	2.56	0.10	0.00	-0.14	-0.04	0.27	2.16	0.45	0.0000
April	0.88	0.00	5.38	0.05	0.00	-0.20	-0.15	0.12	1.12	0.11	0.0000
May	0.34	0.00	9.36	0.02	0.00	-0.08	-0.07	0.05	0.50	0.10	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.10	-0.10	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.09	-0.08	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.73	0.12	-0.90	-0.04				0.250

Months of Ponding Greater Than 1ft	6
Months of Full Pond	3

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.01	0.00	0.00	0.01	0.01	0.10	0.09	0.0000
Novemebr	1.68	0.00	2.34	0.09	0.00	-0.02	0.07	0.08	0.78	0.10	0.0000
December	2.25	0.16	2.49	0.12	0.02	-0.02	0.12	0.21	1.93	0.12	0.0000
January	0.52	0.00	2.22	0.03	0.00	-0.02	0.01	0.21	1.98	0.12	0.0000
February	3.92	0.12	1.92	0.21	0.02	-0.02	0.21	0.31	2.25	0.65	0.1105
March	0.33	0.00	4.86	0.02	0.00	-0.26	-0.24	0.07	0.62	0.10	0.0000
April	0.44	0.00	6.56	0.02	0.00	-0.05	-0.03	0.03	0.32	0.10	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.08	-0.07	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.09	-0.09	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.06	-0.05	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.52	0.04	-0.79	-0.23				0.110

Months of Ponding Greater Than 1ft	3
Months of Full Pond	1

Wetland #18

Top of Pond Area	0.09	acres
Ponded Shelf Area	0.92	acres
Watershed Area	1.72	acres
Net Drainage	2.64	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
1.75	0.920	0.245	ponded shelf
1.5	0.090	0.119	top
0	0.068	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.06	0.02	0.00	0.08	0.08	0.99	0.08	0.0000
Novemebr	1.74	0.15	2.70	0.13	0.03	-0.02	0.15	0.23	1.71	0.79	0.0000
December	2.48	0.18	1.63	0.19	0.04	-0.11	0.12	0.25	1.75	0.92	0.1027
January	2.93	0.29	1.54	0.22	0.06	-0.12	0.17	0.25	1.75	0.92	0.1704
February	2.69	0.16	2.10	0.21	0.04	-0.16	0.08	0.25	1.75	0.92	0.0804
March	2.18	0.10	4.00	0.17	0.02	-0.31	-0.12	0.13	1.52	0.15	0.0000
April	1.01	0.10	6.00	0.08	0.02	-0.07	0.03	0.15	1.57	0.32	0.0000
May	0.41	0.00	8.62	0.03	0.00	-0.23	-0.20	0.00	0.00	0.00	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.06	-0.05	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.02	0.00	-0.05	-0.03	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	1.12	0.23	-1.25	0.10				0.353

Months of Ponding Greater Than 1ft	6
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.17	0.03	-0.01	0.18	0.18	1.63	0.52	0.0000
December	0.58	0.00	1.69	0.04	0.00	-0.07	-0.03	0.16	1.57	0.33	0.0000
January	4.51	0.64	1.40	0.35	0.14	-0.04	0.45	0.25	1.75	0.92	0.3583
February	3.19	0.06	1.44	0.24	0.01	-0.11	0.15	0.25	1.75	0.92	0.1474
March	1.86	0.01	2.56	0.14	0.00	-0.20	-0.05	0.19	1.65	0.58	0.0000
April	0.88	0.00	5.38	0.07	0.00	-0.26	-0.19	0.00	0.00	0.07	0.0000
May	0.34	0.00	9.36	0.03	0.00	-0.05	-0.03	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.07	-0.06	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	1.04	0.19	-1.00	0.23				0.506

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.02	0.00	0.00	0.02	0.02	0.19	0.07	0.0000
Novemebr	1.68	0.00	2.34	0.13	0.00	-0.01	0.11	0.13	1.52	0.16	0.0000
December	2.25	0.16	2.49	0.17	0.04	-0.03	0.17	0.25	1.75	0.92	0.0586
January	0.52	0.00	2.22	0.04	0.00	-0.17	-0.13	0.11	1.45	0.09	0.0000
February	3.92	0.12	1.92	0.30	0.03	-0.01	0.31	0.25	1.75	0.92	0.1823
March	0.33	0.00	4.86	0.03	0.00	-0.37	-0.35	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.03	0.00	-0.04	0.00	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.02	0.00	-0.04	-0.03	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.74	0.06	-0.93	-0.13				0.241

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #19

Top of Pond Area	0.26	acres
Ponded Shelf Area	3.02	acres
Watershed Area	17.62	acres
Net Drainage	20.63	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
3.25	3.015	1.086	ponded shelf
3	0.262	0.676	top
0	0.189	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.21	0.12	0.00	0.33	0.33	1.45	0.22	0.0000
Novemebr	1.74	0.15	2.70	0.44	0.26	-0.05	0.64	0.97	3.18	2.24	0.0000
December	2.48	0.18	1.63	0.62	0.31	-0.30	0.63	1.09	3.25	3.02	0.5131
January	2.93	0.29	1.54	0.74	0.50	-0.39	0.85	1.09	3.25	3.02	0.8479
February	2.69	0.16	2.10	0.68	0.28	-0.53	0.42	1.09	3.25	3.02	0.4233
March	2.18	0.10	4.00	0.55	0.17	-1.01	-0.29	0.80	3.08	1.10	0.0000
April	1.01	0.10	6.00	0.25	0.17	-0.55	-0.12	0.68	3.00	0.27	0.0000
May	0.41	0.00	8.62	0.10	0.00	-0.20	-0.09	0.59	2.60	0.25	0.0000
June	0.08	0.00	10.39	0.02	0.00	-0.22	-0.20	0.39	1.72	0.23	0.0000
July	0.02	0.00	11.87	0.01	0.00	-0.23	-0.22	0.16	0.73	0.21	0.0000
August	0.07	0.00	10.88	0.02	0.00	-0.19	-0.17	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.05	0.02	-0.14	-0.07	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	3.68	1.82	-3.79	1.71				1.784

Months of Ponding Greater Than 1ft	9
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.54	0.26	-0.04	0.76	0.76	3.05	0.83	0.0000
December	0.58	0.00	1.69	0.15	0.00	-0.12	0.03	0.79	3.07	1.02	0.0000
January	4.51	0.64	1.40	1.13	1.10	-0.12	2.11	1.09	3.25	3.02	1.8179
February	3.19	0.06	1.44	0.80	0.10	-0.36	0.54	1.09	3.25	3.02	0.5429
March	1.86	0.01	2.56	0.47	0.02	-0.64	-0.16	0.93	3.15	1.95	0.0000
April	0.88	0.00	5.38	0.22	0.00	-0.87	-0.65	0.27	1.22	0.22	0.0000
May	0.34	0.00	9.36	0.09	0.00	-0.17	-0.09	0.19	0.84	0.21	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.22	-0.22	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.02	0.00	-0.18	-0.17	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.16	-0.16	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.17	-0.17	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	3.41	1.48	-3.05	1.84				2.361

Months of Ponding Greater Than 1ft	6
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.05	0.00	0.00	0.05	0.05	0.22	0.19	0.0000
Novemebr	1.68	0.00	2.34	0.42	0.00	-0.04	0.38	0.43	1.93	0.24	0.0000
December	2.25	0.16	2.49	0.57	0.28	-0.05	0.79	1.09	3.25	3.02	0.1402
January	0.52	0.00	2.22	0.13	0.00	-0.56	-0.43	0.66	2.92	0.26	0.0000
February	3.92	0.12	1.92	0.98	0.21	-0.04	1.15	1.09	3.25	3.02	0.7226
March	0.33	0.00	4.86	0.08	0.00	-1.22	-1.14	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.11	0.00	-0.10	0.01	0.01	0.03	0.19	0.0000
May	0.11	0.00	9.61	0.03	0.00	-0.15	-0.12	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.17	-0.17	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.17	-0.17	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.18	-0.18	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.05	0.00	-0.12	-0.07	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	2.43	0.48	-2.81	0.10				0.863

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

Wetland #20

Top of Pond Area	0.12	acres
Ponded Shelf Area	0.77	acres
Watershed Area	1.26	acres
Net Drainage	2.03	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	0.770	0.305	ponded shelf
2	0.116	0.194	top
0	0.078	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.05	0.01	0.00	0.06	0.06	0.66	0.09	0.0000
Novemebr	1.74	0.15	2.70	0.11	0.03	-0.02	0.12	0.18	1.86	0.11	0.0000
December	2.48	0.18	1.63	0.16	0.03	-0.02	0.17	0.31	2.25	0.77	0.0502
January	2.93	0.29	1.54	0.19	0.05	-0.10	0.14	0.31	2.25	0.77	0.1383
February	2.69	0.16	2.10	0.17	0.03	-0.13	0.06	0.31	2.25	0.77	0.0649
March	2.18	0.10	4.00	0.14	0.02	-0.26	-0.10	0.21	2.02	0.18	0.0000
April	1.01	0.10	6.00	0.06	0.02	-0.09	-0.01	0.20	2.00	0.13	0.0000
May	0.41	0.00	8.62	0.03	0.00	-0.09	-0.07	0.13	1.34	0.10	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.09	-0.08	0.05	0.47	0.09	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.09	-0.08	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.01	0.00	-0.06	-0.04	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.94	0.18	-1.01	0.11				0.253

Months of Ponding Greater Than 1ft	7
Months of Full Pond	5

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.14	0.03	-0.02	0.15	0.15	1.52	0.11	0.0000
December	0.58	0.00	1.69	0.04	0.00	-0.02	0.02	0.17	1.75	0.11	0.0000
January	4.51	0.64	1.40	0.29	0.11	-0.01	0.38	0.31	2.25	0.77	0.2495
February	3.19	0.06	1.44	0.20	0.01	-0.09	0.12	0.31	2.25	0.77	0.1225
March	1.86	0.01	2.56	0.12	0.00	-0.16	-0.04	0.26	2.15	0.52	0.0000
April	0.88	0.00	5.38	0.06	0.00	-0.23	-0.17	0.09	0.90	0.10	0.0000
May	0.34	0.00	9.36	0.02	0.00	-0.07	-0.05	0.03	0.36	0.08	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.09	-0.09	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.08	-0.07	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.87	0.15	-0.91	0.11				0.372

Months of Ponding Greater Than 1ft	5
Months of Full Pond	3

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.01	0.00	0.00	0.01	0.01	0.13	0.08	0.0000
Novemebr	1.68	0.00	2.34	0.11	0.00	-0.02	0.09	0.11	1.08	0.10	0.0000
December	2.25	0.16	2.49	0.14	0.03	-0.02	0.15	0.26	2.14	0.48	0.0000
January	0.52	0.00	2.22	0.03	0.00	-0.09	-0.06	0.20	2.01	0.15	0.0000
February	3.92	0.12	1.92	0.25	0.02	-0.02	0.25	0.31	2.25	0.77	0.1428
March	0.33	0.00	4.86	0.02	0.00	-0.31	-0.29	0.01	0.15	0.08	0.0000
April	0.44	0.00	6.56	0.03	0.00	-0.04	-0.02	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.08	-0.08	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.62	0.05	-0.84	-0.17				0.143

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #21

Top of PondArea	0.06	acres
Ponded Shelf Area	0.26	acres
Watershed Area	0.40	acres
Net Drainage	0.66	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
1.25	0.260	0.093	ponded shelf
1	0.059	0.054	top
0	0.049	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.02	0.00	0.00	0.02	0.02	0.40	0.05	0.0000
Novemebr	1.74	0.15	2.70	0.04	0.01	-0.01	0.03	0.06	1.01	0.07	0.0000
December	2.48	0.18	1.63	0.05	0.01	-0.01	0.05	0.09	1.25	0.26	0.0165
January	2.93	0.29	1.54	0.06	0.02	-0.03	0.05	0.09	1.25	0.26	0.0460
February	2.69	0.16	2.10	0.06	0.01	-0.05	0.02	0.09	1.25	0.26	0.0215
March	2.18	0.10	4.00	0.05	0.01	-0.09	-0.03	0.06	1.04	0.09	0.0000
April	1.01	0.10	6.00	0.02	0.01	-0.04	-0.02	0.04	0.80	0.06	0.0000
May	0.41	0.00	8.62	0.01	0.00	-0.04	-0.03	0.01	0.20	0.05	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.00	0.00	-0.04	-0.03	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.32	0.06	-0.44	-0.07				0.084

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.05	0.01	-0.01	0.04	0.04	0.84	0.06	0.0000
December	0.58	0.00	1.69	0.01	0.00	-0.01	0.00	0.05	0.92	0.06	0.0000
January	4.51	0.64	1.40	0.10	0.04	-0.01	0.13	0.09	1.25	0.26	0.0820
February	3.19	0.06	1.44	0.07	0.00	-0.03	0.04	0.09	1.25	0.26	0.0412
March	1.86	0.01	2.56	0.04	0.00	-0.06	-0.01	0.08	1.16	0.19	0.0000
April	0.88	0.00	5.38	0.02	0.00	-0.08	-0.06	0.01	0.27	0.05	0.0000
May	0.34	0.00	9.36	0.01	0.00	-0.04	-0.03	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.29	0.05	-0.42	-0.08				0.123

Months of Ponding Greater Than 1ft	3
Months of Full Pond	3

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.00	0.00	0.00	0.00	0.00	0.08	0.05	0.0000
Novemebr	1.68	0.00	2.34	0.04	0.00	-0.01	0.03	0.03	0.58	0.05	0.0000
December	2.25	0.16	2.49	0.05	0.01	-0.01	0.05	0.08	1.15	0.18	0.0000
January	0.52	0.00	2.22	0.01	0.00	-0.03	-0.02	0.06	1.01	0.07	0.0000
February	3.92	0.12	1.92	0.08	0.01	-0.01	0.08	0.09	1.25	0.26	0.0427
March	0.33	0.00	4.86	0.01	0.00	-0.11	-0.10	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.01	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.21	0.02	-0.40	-0.18				0.043

Months of Ponding Greater Than 1ft	3

Wetland #22

Top of Pond Area	0.18	acres
Ponded Shelf Area	1.71	acres
Watershed Area	6.43	acres
Net Drainage	8.13	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	1.705	0.560	ponded shelf
2	0.180	0.325	top
0	0.144	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.12	0.05	0.00	0.16	0.16	1.01	0.16	0.0000
Novemebr	1.74	0.15	2.70	0.25	0.10	-0.04	0.31	0.48	2.16	1.16	0.0000
December	2.48	0.18	1.63	0.35	0.12	-0.16	0.32	0.56	2.25	1.71	0.2326
January	2.93	0.29	1.54	0.42	0.20	-0.22	0.39	0.56	2.25	1.71	0.3940
February	2.69	0.16	2.10	0.38	0.11	-0.30	0.19	0.56	2.25	1.71	0.1923
March	2.18	0.10	4.00	0.31	0.07	-0.57	-0.19	0.37	2.05	0.47	0.0000
April	1.01	0.10	6.00	0.14	0.07	-0.24	-0.02	0.35	2.02	0.32	0.0000
May	0.41	0.00	8.62	0.06	0.00	-0.23	-0.17	0.18	1.09	0.16	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.14	-0.13	0.05	0.28	0.15	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.15	-0.15	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.13	-0.12	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.03	0.01	-0.11	-0.07	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	2.08	0.72	-2.27	0.53				0.819

Months of Ponding Greater Than 1ft	8
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.31	0.10	-0.03	0.38	0.38	2.06	0.53	0.0000
December	0.58	0.00	1.69	0.08	0.00	-0.07	0.01	0.39	2.07	0.58	0.0000
January	4.51	0.64	1.40	0.64	0.43	-0.07	1.01	0.56	2.25	1.71	0.8330
February	3.19	0.06	1.44	0.45	0.04	-0.20	0.29	0.56	2.25	1.71	0.2893
March	1.86	0.01	2.56	0.26	0.01	-0.36	-0.09	0.47	2.15	1.11	0.0000
April	0.88	0.00	5.38	0.13	0.00	-0.50	-0.37	0.10	0.60	0.16	0.0000
May	0.34	0.00	9.36	0.05	0.00	-0.12	-0.07	0.02	0.15	0.15	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.15	-0.15	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.14	-0.13	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.12	-0.12	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.13	-0.13	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	1.93	0.58	-1.90	0.61				1.122

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.03	0.00	0.00	0.03	0.03	0.18	0.15	0.0000
Novemebr	1.68	0.00	2.34	0.24	0.00	-0.03	0.21	0.24	1.47	0.17	0.0000
December	2.25	0.16	2.49	0.32	0.11	-0.04	0.39	0.56	2.25	1.71	0.0708
January	0.52	0.00	2.22	0.07	0.00	-0.32	-0.24	0.32	1.96	0.18	0.0000
February	3.92	0.12	1.92	0.56	0.08	-0.03	0.61	0.56	2.25	1.71	0.3680
March	0.33	0.00	4.86	0.05	0.00	-0.69	-0.64	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.06	0.00	-0.08	-0.02	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.02	0.00	-0.12	-0.10	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.13	-0.13	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.13	-0.13	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.14	-0.14	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.03	0.00	-0.09	-0.06	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	1.37	0.19	-1.79	-0.23				0.439

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

Wetland #23

Top of Pond Area	0.08	acres
Ponded Shelf Area	1.22	acres
Watershed Area	15.76	acres
Net Drainage	16.98	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	1.217	0.299	ponded shelf
2	0.078	0.137	top
0	0.058	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.08	0.10	0.00	0.18	0.18	2.07	0.40	0.0000
Novemebr	1.74	0.15	2.70	0.18	0.21	-0.09	0.30	0.30	2.25	1.22	0.1828
December	2.48	0.18	1.63	0.25	0.25	-0.17	0.34	0.30	2.25	1.22	0.3409
January	2.93	0.29	1.54	0.30	0.41	-0.16	0.55	0.30	2.25	1.22	0.5514
February	2.69	0.16	2.10	0.27	0.23	-0.21	0.29	0.30	2.25	1.22	0.2863
March	2.18	0.10	4.00	0.22	0.14	-0.41	-0.04	0.26	2.18	0.91	0.0000
April	1.01	0.10	6.00	0.10	0.14	-0.46	-0.21	0.04	0.62	0.06	0.0000
May	0.41	0.00	8.62	0.04	0.00	-0.05	0.00	0.04	0.55	0.06	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.06	-0.05	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.02	0.01	-0.04	-0.01	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	1.48	1.50	-1.74	1.24				1.361

Months of Ponding Greater Than 1ft	6
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.22	0.21	-0.01	0.42	0.30	2.25	1.22	0.1203
December	0.58	0.00	1.69	0.06	0.00	-0.17	-0.11	0.19	2.08	0.43	0.0000
January	4.51	0.64	1.40	0.46	0.91	-0.05	1.31	0.30	2.25	1.22	1.2009
February	3.19	0.06	1.44	0.32	0.08	-0.15	0.26	0.30	2.25	1.22	0.2624
March	1.86	0.01	2.56	0.19	0.01	-0.26	-0.06	0.24	2.16	0.82	0.0000
April	0.88	0.00	5.38	0.09	0.00	-0.37	-0.28	0.00	0.00	0.00	0.0000
May	0.34	0.00	9.36	0.03	0.00	-0.05	-0.01	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.06	-0.05	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	1.38	1.22	-1.27	1.32				1.584

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.02	0.00	0.00	0.02	0.02	0.30	0.06	0.0000
Novemebr	1.68	0.00	2.34	0.17	0.00	-0.01	0.16	0.18	2.06	0.37	0.0000
December	2.25	0.16	2.49	0.23	0.23	-0.08	0.38	0.30	2.25	1.22	0.2572
January	0.52	0.00	2.22	0.05	0.00	-0.23	-0.17	0.13	1.85	0.08	0.0000
February	3.92	0.12	1.92	0.40	0.17	-0.01	0.56	0.30	2.25	1.22	0.3827
March	0.33	0.00	4.86	0.03	0.00	-0.49	-0.46	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.04	0.00	-0.03	0.01	0.01	0.19	0.06	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.02	0.00	-0.04	-0.02	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.98	0.40	-1.10	0.28				0.640

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #24

Top of PondArea	0.09	acres
Ponded Shelf Area	1.29	acres
Watershed Area	2.63	acres
Net Drainage	3.92	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	1.287	0.329	ponded shelf
2	0.090	0.157	top
0	0.067	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.09	0.02	0.00	0.11	0.11	1.41	0.08	0.0000
Novemebr	1.74	0.15	2.70	0.19	0.05	-0.02	0.22	0.33	2.25	1.28	0.0000
December	2.48	0.18	1.63	0.27	0.06	-0.17	0.15	0.33	2.25	1.29	0.1499
January	2.93	0.29	1.54	0.31	0.09	-0.17	0.24	0.33	2.25	1.29	0.2438
February	2.69	0.16	2.10	0.29	0.05	-0.23	0.12	0.33	2.25	1.29	0.1155
March	2.18	0.10	4.00	0.23	0.03	-0.43	-0.16	0.17	2.01	0.16	0.0000
April	1.01	0.10	6.00	0.11	0.03	-0.08	0.06	0.23	2.10	0.59	0.0000
May	0.41	0.00	8.62	0.04	0.00	-0.43	-0.38	0.00	0.00	0.00	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.06	-0.05	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.07	-0.06	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.06	-0.05	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.02	0.00	-0.05	-0.02	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	1.57	0.35	-1.75	0.17				0.509

Months of Ponding Greater Than 1ft	7
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.23	0.05	-0.01	0.27	0.27	2.16	0.85	0.0000
December	0.58	0.00	1.69	0.06	0.00	-0.12	-0.06	0.21	2.08	0.45	0.0000
January	4.51	0.64	1.40	0.48	0.21	-0.05	0.64	0.33	2.25	1.29	0.5199
February	3.19	0.06	1.44	0.34	0.02	-0.15	0.21	0.33	2.25	1.29	0.2073
March	1.86	0.01	2.56	0.20	0.00	-0.27	-0.07	0.26	2.15	0.79	0.0000
April	0.88	0.00	5.38	0.09	0.00	-0.35	-0.26	0.00	0.00	0.00	0.0000
May	0.34	0.00	9.36	0.04	0.00	-0.05	-0.02	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.07	-0.06	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	1.46	0.28	-1.27	0.47				0.727

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.02	0.00	0.00	0.02	0.02	0.27	0.07	0.0000
Novemebr	1.68	0.00	2.34	0.18	0.00	-0.01	0.17	0.19	2.04	0.30	0.0000
December	2.25	0.16	2.49	0.24	0.05	-0.06	0.23	0.33	2.25	1.29	0.0891
January	0.52	0.00	2.22	0.06	0.00	-0.24	-0.18	0.15	1.87	0.09	0.0000
February	3.92	0.12	1.92	0.42	0.04	-0.01	0.45	0.33	2.25	1.29	0.2631
March	0.33	0.00	4.86	0.04	0.00	-0.52	-0.49	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.05	0.00	-0.04	0.01	0.01	0.13	0.07	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.07	-0.07	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.02	0.00	-0.04	-0.02	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	1.04	0.09	-1.17	-0.04				0.352

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #25

Top of PondArea	0.18	acres
Ponded Shelf Area	1.60	acres
Watershed Area	27.77	acres
Net Drainage	29.37	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	1.600	0.459	ponded shelf
2	0.183	0.236	top
0	0.053	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.11	0.17	0.00	0.28	0.28	2.05	0.47	0.0000
Novemebr	1.74	0.15	2.70	0.23	0.37	-0.10	0.49	0.46	2.25	1.60	0.3157
December	2.48	0.18	1.63	0.33	0.44	-0.22	0.55	0.46	2.25	1.60	0.5538
January	2.93	0.29	1.54	0.39	0.71	-0.21	0.90	0.46	2.25	1.60	0.8950
February	2.69	0.16	2.10	0.36	0.39	-0.28	0.47	0.46	2.25	1.60	0.4702
March	2.18	0.10	4.00	0.29	0.24	-0.53	0.00	0.46	2.25	1.60	0.0021
April	1.01	0.10	6.00	0.13	0.24	-0.80	-0.42	0.04	0.33	0.07	0.0000
May	0.41	0.00	8.62	0.05	0.00	-0.05	0.00	0.04	0.34	0.07	0.0000
June	0.08	0.00	10.39	0.01	0.00	-0.06	-0.05	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.01	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.03	0.02	-0.04	0.01	0.01	0.11	0.06	0.0000
Annual	14.63	1.06	74.15	1.95	2.59	-2.40	2.15				2.237

Months of Ponding Greater Than 1ft	6
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.29	0.37	-0.01	0.64	0.46	2.25	1.60	0.1851
December	0.58	0.00	1.69	0.08	0.00	-0.23	-0.15	0.31	2.08	0.66	0.0000
January	4.51	0.64	1.40	0.60	1.57	-0.08	2.09	0.46	2.25	1.60	1.9426
February	3.19	0.06	1.44	0.43	0.15	-0.19	0.38	0.46	2.25	1.60	0.3801
March	1.86	0.01	2.56	0.25	0.02	-0.34	-0.07	0.39	2.17	1.16	0.0000
April	0.88	0.00	5.38	0.12	0.00	-0.52	-0.40	0.00	0.00	0.00	0.0000
May	0.34	0.00	9.36	0.05	0.00	-0.04	0.00	0.00	0.04	0.05	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.06	-0.06	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.01	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	1.81	2.10	-1.61	2.31				2.508

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.03	0.00	0.00	0.03	0.03	0.23	0.07	0.0000
Novemebr	1.68	0.00	2.34	0.22	0.00	-0.01	0.21	0.24	2.00	0.19	0.0000
December	2.25	0.16	2.49	0.30	0.39	-0.04	0.65	0.46	2.25	1.60	0.4301
January	0.52	0.00	2.22	0.07	0.00	-0.30	-0.23	0.23	1.97	0.18	0.0000
February	3.92	0.12	1.92	0.52	0.29	-0.03	0.79	0.46	2.25	1.60	0.5606
March	0.33	0.00	4.86	0.04	0.00	-0.65	-0.60	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.06	0.00	-0.03	0.03	0.03	0.25	0.07	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.06	-0.04	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.03	0.00	-0.03	-0.01	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	1.29	0.69	-1.29	0.68				0.991

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #26

Top of PondArea	0.07	acres
Ponded Shelf Area	0.75	acres
Watershed Area	18.84	acres
Net Drainage	19.59	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
1.75	0.748	0.192	ponded shelf
1.5	0.068	0.090	top
0	0.053	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.05	0.11	0.00	0.17	0.17	1.68	0.57	0.0000
Novemebr	1.74	0.15	2.70	0.11	0.24	-0.13	0.23	0.19	1.75	0.75	0.1985
December	2.48	0.18	1.63	0.15	0.29	-0.10	0.35	0.19	1.75	0.75	0.3467
January	2.93	0.29	1.54	0.18	0.47	-0.10	0.56	0.19	1.75	0.75	0.5599
February	2.69	0.16	2.10	0.17	0.26	-0.13	0.30	0.19	1.75	0.75	0.2979
March	2.18	0.10	4.00	0.14	0.16	-0.25	0.05	0.19	1.75	0.75	0.0498
April	1.01	0.10	6.00	0.06	0.16	-0.37	-0.15	0.04	0.74	0.06	0.0000
May	0.41	0.00	8.62	0.03	0.00	-0.04	-0.02	0.03	0.45	0.06	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.01	0.02	-0.04	-0.01	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.91	1.73	-1.31	1.33				1.453

Months of Ponding Greater Than 1ft	6
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.13	0.24	-0.01	0.37	0.19	1.75	0.75	0.1762
December	0.58	0.00	1.69	0.04	0.00	-0.11	-0.07	0.12	1.58	0.29	0.0000
January	4.51	0.64	1.40	0.28	1.04	-0.03	1.29	0.19	1.75	0.75	1.2230
February	3.19	0.06	1.44	0.20	0.10	-0.09	0.21	0.19	1.75	0.75	0.2070
March	1.86	0.01	2.56	0.12	0.02	-0.16	-0.03	0.16	1.68	0.57	0.0000
April	0.88	0.00	5.38	0.05	0.00	-0.25	-0.20	0.00	0.00	0.00	0.0000
May	0.34	0.00	9.36	0.02	0.00	-0.04	-0.02	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.85	1.40	-0.89	1.36				1.606

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.01	0.00	0.00	0.01	0.01	0.21	0.05	0.0000
Novemebr	1.68	0.00	2.34	0.10	0.00	-0.01	0.09	0.11	1.54	0.18	0.0000
December	2.25	0.16	2.49	0.14	0.26	-0.04	0.36	0.19	1.75	0.75	0.2791
January	0.52	0.00	2.22	0.03	0.00	-0.14	-0.11	0.09	1.43	0.07	0.0000
February	3.92	0.12	1.92	0.24	0.20	-0.01	0.43	0.19	1.75	0.75	0.3234
March	0.33	0.00	4.86	0.02	0.00	-0.30	-0.28	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.03	0.00	-0.03	0.00	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.60	0.46	-0.75	0.31				0.603

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #27

Top of Pool Area	0.05	acres
Ponded Shelf Area	0.37	acres
Watershed Area	61.83	acres
Net Drainage	62.20	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	0.370	0.133	ponded shelf
2	0.050	0.080	top
0	0.030	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.03	0.36	0.00	0.39	0.13	2.25	0.37	0.0000
Novemebr	1.74	0.15	2.70	0.05	0.78	-0.08	0.75	0.13	2.25	0.37	0.7479
December	2.48	0.18	1.63	0.08	0.93	-0.05	0.96	0.13	2.25	0.37	0.9592
January	2.93	0.29	1.54	0.09	1.50	-0.05	1.55	0.13	2.25	0.37	1.5460
February	2.69	0.16	2.10	0.08	0.83	-0.06	0.85	0.13	2.25	0.37	0.8475
March	2.18	0.10	4.00	0.07	0.52	-0.12	0.46	0.13	2.25	0.37	0.4622
April	1.01	0.10	6.00	0.03	0.52	-0.19	0.36	0.13	2.25	0.37	0.3645
May	0.41	0.00	8.62	0.01	0.00	-0.27	-0.25	0.00	0.00	0.00	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.01	0.05	-0.02	0.04	0.04	0.90	0.04	0.0000
Annual	14.63	1.06	74.15	0.45	5.49	-0.92	5.02				4.927

Months of Ponding Greater Than 1ft	7
Months of Full Pond	7

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.07	0.78	-0.01	0.84	0.13	2.25	0.37	0.7048
December	0.58	0.00	1.69	0.02	0.00	-0.05	-0.03	0.10	2.09	0.16	0.0000
January	4.51	0.64	1.40	0.14	3.32	-0.02	3.44	0.13	2.25	0.37	3.4033
February	3.19	0.06	1.44	0.10	0.31	-0.04	0.36	0.13	2.25	0.37	0.3650
March	1.86	0.01	2.56	0.06	0.05	-0.08	0.03	0.13	2.25	0.37	0.0302
April	0.88	0.00	5.38	0.03	0.00	-0.17	-0.14	0.00	0.00	0.00	0.0000
May	0.34	0.00	9.36	0.01	0.00	-0.02	-0.01	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.42	4.46	-0.50	4.37				4.503

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.01	0.00	0.00	0.01	0.01	0.15	0.03	0.0000
Novemebr	1.68	0.00	2.34	0.05	0.00	-0.01	0.05	0.05	1.29	0.04	0.0000
December	2.25	0.16	2.49	0.07	0.83	-0.01	0.89	0.13	2.25	0.37	0.8086
January	0.52	0.00	2.22	0.02	0.00	-0.07	-0.05	0.08	2.00	0.05	0.0000
February	3.92	0.12	1.92	0.12	0.62	-0.01	0.73	0.13	2.25	0.37	0.6824
March	0.33	0.00	4.86	0.01	0.00	-0.15	-0.14	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.01	0.00	-0.02	0.00	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.02	-0.01	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.30	1.45	-0.39	1.36				1.491

Months of Ponding Greater Than 1ft	4
Months of Full Pond	3

Wetland #28

Top of Pond Area	0.06	acres
Ponded Shelf Area	0.29	acres
Watershed Area	0.29	acres
Net Drainage	0.58	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	0.290	0.136	ponded shelf
2	0.056	0.093	top
0	0.037	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.02	0.00	0.00	0.02	0.02	0.50	0.04	0.0000
Novemebr	1.74	0.15	2.70	0.04	0.01	-0.01	0.04	0.06	1.36	0.05	0.0000
December	2.48	0.18	1.63	0.06	0.01	-0.01	0.06	0.13	2.19	0.23	0.0000
January	2.93	0.29	1.54	0.07	0.01	-0.03	0.06	0.14	2.25	0.29	0.0443
February	2.69	0.16	2.10	0.07	0.01	-0.05	0.02	0.14	2.25	0.29	0.0220
March	2.18	0.10	4.00	0.05	0.00	-0.10	-0.04	0.10	2.02	0.08	0.0000
April	1.01	0.10	6.00	0.02	0.00	-0.04	-0.01	0.09	1.88	0.05	0.0000
May	0.41	0.00	8.62	0.01	0.00	-0.04	-0.03	0.06	1.25	0.05	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.04	-0.04	0.02	0.38	0.04	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.00	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.35	0.05	-0.41	-0.01				0.066

Months of Ponding Greater Than 1ft	7
Months of Full Pool	4

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.05	0.01	-0.01	0.05	0.05	1.12	0.05	0.0000
December	0.58	0.00	1.69	0.01	0.00	-0.01	0.01	0.06	1.27	0.05	0.0000
January	4.51	0.64	1.40	0.11	0.03	-0.01	0.13	0.14	2.25	0.29	0.0574
February	3.19	0.06	1.44	0.08	0.00	-0.03	0.05	0.14	2.25	0.29	0.0452
March	1.86	0.01	2.56	0.04	0.00	-0.06	-0.02	0.12	2.15	0.20	0.0000
April	0.88	0.00	5.38	0.02	0.00	-0.09	-0.07	0.05	1.09	0.05	0.0000
May	0.34	0.00	9.36	0.01	0.00	-0.04	-0.03	0.02	0.48	0.04	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.04	-0.03	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.33	0.04	-0.39	-0.02				0.103

Months of Ponding Greater Than 1ft	6
Months of Full Pond	3

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.0000
Novemebr	1.68	0.00	2.34	0.04	0.00	-0.01	0.03	0.04	0.82	0.04	0.0000
December	2.25	0.16	2.49	0.05	0.01	-0.01	0.05	0.09	1.96	0.06	0.0000
January	0.52	0.00	2.22	0.01	0.00	-0.01	0.00	0.09	2.00	0.06	0.0000
February	3.92	0.12	1.92	0.09	0.01	-0.01	0.09	0.14	2.25	0.29	0.0485
March	0.33	0.00	4.86	0.01	0.00	-0.12	-0.11	0.03	0.57	0.04	0.0000
April	0.44	0.00	6.56	0.01	0.00	-0.02	-0.01	0.01	0.30	0.04	0.0000
May	0.11	0.00	9.61	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.02	-0.02	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.23	0.01	-0.34	-0.09				0.048

Months of Ponding Greater Than 1ft	3
Months of Full Pond	2

Wetland #29

Top of Pond Area	0.06	acres
Ponded Shelf Area	0.56	acres
Watershed Area	18.04	acres
Net Drainage	18.60	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
1.25	0.557	0.131	ponded shelf
1	0.061	0.054	top
0	0.047	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.04	0.11	0.00	0.15	0.13	1.25	0.56	0.0000
Novemebr	1.74	0.15	2.70	0.08	0.23	-0.13	0.19	0.13	1.25	0.56	0.1880
December	2.48	0.18	1.63	0.12	0.28	-0.08	0.32	0.13	1.25	0.56	0.3184
January	2.93	0.29	1.54	0.14	0.45	-0.07	0.51	0.13	1.25	0.56	0.5140
February	2.69	0.16	2.10	0.12	0.25	-0.10	0.28	0.13	1.25	0.56	0.2754
March	2.18	0.10	4.00	0.10	0.16	-0.19	0.07	0.13	1.25	0.56	0.0706
April	1.01	0.10	6.00	0.05	0.16	-0.28	-0.08	0.05	1.00	0.07	0.0000
May	0.41	0.00	8.62	0.02	0.00	-0.05	-0.03	0.03	0.48	0.05	0.0000
June	0.08	0.00	10.39	0.00	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.01	0.02	-0.03	-0.01	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.15	0.68	1.64	-1.05	1.27				

Months of Ponding Greater Than 1ft	7
Months of Full Pond	7

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.51	0.10	0.23	-0.01	0.32	0.13	1.25	0.56	0.1915
December	0.58	0.00	1.69	0.03	0.00	-0.08	-0.05	0.08	1.08	0.23	0.0000
January	4.51	0.64	1.40	0.21	0.99	-0.03	1.17	0.13	1.25	0.56	1.1233
February	3.19	0.06	1.44	0.15	0.09	-0.07	0.17	0.13	1.25	0.56	0.1742
March	1.86	0.01	2.56	0.09	0.02	-0.12	-0.02	0.11	1.20	0.45	0.0000
April	0.88	0.00	5.38	0.04	0.00	-0.20	-0.16	0.00	0.00	0.00	0.0000
May	0.34	0.00	9.36	0.02	0.00	-0.04	-0.02	0.00	0.00	0.00	0.0000
June	0.00	0.00	12.34	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
July	0.06	0.00	11.65	0.00	0.00	-0.05	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.34	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
September	0.00	0.00	10.61	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	75.78	0.63	1.33	-0.72	1.25				1.489

Months of Ponding Greater Than 1ft	5
Months of Full Pond	5

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Filling Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.01	0.00	0.00	0.01	0.01	0.17	0.05	0.0000
Novemebr	1.68	0.00	2.34	0.08	0.00	-0.01	0.07	0.08	1.08	0.21	0.0000
December	2.25	0.16	2.49	0.10	0.25	-0.04	0.31	0.13	1.25	0.56	0.2546
January	0.52	0.00	2.22	0.02	0.00	-0.10	-0.08	0.05	0.97	0.06	0.0000
February	3.92	0.12	1.92	0.18	0.19	-0.01	0.36	0.13	1.25	0.56	0.2792
March	0.33	0.00	4.86	0.02	0.00	-0.23	-0.21	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.02	0.00	-0.03	-0.01	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.01	0.00	-0.04	-0.03	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.04	-0.04	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.05	-0.05	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.01	0.00	-0.03	-0.02	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	0.45	0.43	-0.62	0.26				0.534

Months of Ponding Greater Than 1ft	3
Months of Full Pond	3

Wetland #30

Top of Pond Area	0.27	acres
Ponded Shelf Area	2.86	acres
Watershed Area	11.19	acres
Net Drainage	14.05	acres

Depth (ft)	Area (acre)	Volume (AF)	Description
2.25	2.859	0.879	ponded shelf
2	0.267	0.4885	top
0	0.200	0.000	bottom

Average Year-Type Annual Input Values, WY 1969 - WY 2010

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.82	0.07	5.68	0.20	0.08	0.00	0.28	0.28	1.14	0.24	0.0000
November	1.74	0.15	2.70	0.41	0.18	-0.05	0.54	0.81	2.21	2.42	0.0000
December	2.48	0.18	1.63	0.59	0.21	-0.33	0.47	0.88	2.25	2.86	0.4067
January	2.93	0.29	1.54	0.70	0.34	-0.37	0.67	0.88	2.25	2.86	0.6706
February	2.69	0.16	2.10	0.64	0.19	-0.50	0.33	0.88	2.25	2.86	0.3278
March	2.18	0.10	4.00	0.52	0.12	-0.95	-0.32	0.56	2.05	0.76	0.0000
April	1.01	0.10	6.00	0.24	0.12	-0.38	-0.02	0.54	2.03	0.61	0.0000
May	0.41	0.00	8.62	0.10	0.00	-0.44	-0.34	0.20	0.81	0.23	0.0000
June	0.08	0.00	10.30	0.02	0.00	-0.19	-0.18	0.02	0.09	0.20	0.0000
July	0.02	0.00	11.87	0.00	0.00	-0.20	-0.20	0.00	0.00	0.00	0.0000
August	0.07	0.00	10.88	0.02	0.00	-0.18	-0.16	0.00	0.00	0.00	0.0000
September	0.20	0.01	8.74	0.05	0.01	-0.15	-0.09	0.00	0.00	0.00	0.0000
Annual	14.63	1.06	74.06	3.49		-3.75	0.98				

Months of Ponding Greater Than 1ft	7
Months of Full Pond	6

Median Year-Type (50th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 1979

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.00	0.00	5.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Novemebr	2.16	0.15	2.70	0.51	0.18	-0.05	0.65	0.65	2.10	1.31	0.0000
December	0.58	0.00	1.63	0.14	0.00	-0.18	-0.04	0.61	2.08	1.05	0.0000
January	4.51	0.64	1.54	1.07	0.75	-0.13	1.69	0.88	2.25	2.86	1.4160
February	3.19	0.06	2.10	0.76	0.07	-0.50	0.33	0.88	2.25	2.86	0.3299
March	1.86	0.01	4.00	0.44	0.01	-0.95	-0.50	0.38	1.56	0.25	0.0000
April	0.88	0.00	6.00	0.21	0.00	-0.13	0.08	0.46	1.90	0.26	0.0000
May	0.34	0.00	8.62	0.08	0.00	-0.19	-0.11	0.36	1.46	0.25	0.0000
June	0.00	0.00	10.30	0.00	0.00	-0.21	-0.21	0.14	0.58	0.22	0.0000
July	0.06	0.00	11.87	0.01	0.00	-0.22	-0.20	0.00	0.00	0.00	0.0000
August	0.00	0.00	10.88	0.00	0.00	-0.18	-0.18	0.00	0.00	0.00	0.0000
September	0.00	0.00	8.74	0.00	0.00	-0.15	-0.15	0.00	0.00	0.00	0.0000
Annual	13.58	0.86	74.06	3.24	1.01	-2.88	1.36				

Months of Ponding Greater Than 1ft	7
Months of Full Pond	4

Dry Year-Type (85th Percentile of Being Equaled or Exceeded) for WY 1969 - WY 2010 is WY 2007

Month	Precip (in)	Runoff (in)	Eto (in)	Rain (AF)	Runoff (AF)	Evap (AF)	Monthly Inflow Balance (R+R+E) (AF)	Monthly Pond Cap (AF)	End of Month Pond Depth (ft)	End of Month Pond Area (acres)	Monthly Overflow Volume (AF)
October	0.20	0.00	5.90	0.05	0.00	0.00	0.05	0.05	0.20	0.21	0.0000
Novemebr	1.68	0.00	2.34	0.40	0.00	-0.04	0.36	0.41	1.67	0.26	0.0000
December	2.25	0.16	2.49	0.54	0.19	-0.05	0.67	0.88	2.25	2.86	0.1985
January	0.52	0.00	2.22	0.12	0.00	-0.53	-0.40	0.47	1.94	0.27	0.0000
February	3.92	0.12	1.92	0.93	0.14	-0.04	1.03	0.88	2.25	2.86	0.6269
March	0.33	0.00	4.86	0.08	0.00	-1.16	-1.08	0.00	0.00	0.00	0.0000
April	0.44	0.00	6.56	0.10	0.00	-0.11	0.00	0.00	0.00	0.00	0.0000
May	0.11	0.00	9.61	0.03	0.00	-0.16	-0.13	0.00	0.00	0.00	0.0000
June	0.00	0.00	10.74	0.00	0.00	-0.18	-0.18	0.00	0.00	0.00	0.0000
July	0.00	0.00	10.99	0.00	0.00	-0.18	-0.18	0.00	0.00	0.00	0.0000
August	0.00	0.00	11.70	0.00	0.00	-0.20	-0.20	0.00	0.00	0.00	0.0000
September	0.21	0.00	7.84	0.05	0.00	-0.13	-0.08	0.00	0.00	0.00	0.0000
Annual	9.66	0.28	77.17	2.30	0.33	-2.78	-0.15				

Months of Ponding Greater Than 1ft	4
Months of Full Pond	2

ATTACHMENT 6
BALANCE HYDROLOGICS
REPORT

OLBERDING ENVIRONMENTAL, INC.
Wetland Regulation and Permitting

October 24, 2013

Mr. Craig Weightman
Environmental Program Manager
California Department of Fish and Wildlife
7329 Silverado Trail
Napa, CA 94558

Subject: Cayetano Creek Preserve Revised Wetland Design

Dear Mr. Weightman:

Attached is a memorandum prepared by Balance Hydrologics that provides a conceptual design for the 8.25 acres of proposed mitigation wetlands at Cayetano Creek Preserve. I believe the current design of the proposed mitigation wetlands reflects the content of the discussion between Cameron Johnson and yourself. As requested by Mr. Johnson, the wetlands would consist of varying depths and configurations, reflective of natural wetland systems in the region. The varying depths would ensure sufficient ponding or soil saturation and promote vegetation necessary to achieve the Corps' wetland criteria. The wetland features would also provide areas of ponding that could support California tiger salamander reproduction based on adequate hydroperiods.

We would appreciate your review and approval of the attached conceptual wetland design as soon as possible to facilitate additional planning and design. Upon your approval of the conceptual wetland design we will immediately proceed with a preliminary grading plan and completion of the wetland mitigation and monitoring plan (MMP).

Please contact me at (916) 985-1188 if you have any questions or comments. All correspondence should be sent to my attention at the letterhead address.

Sincerely,

Jeff Olberding
Wetland Regulatory Specialist

cc: Mark Dawson, Water Hole Land Company

193 Blue Ravine Road, Suite 165 · Folsom, CA 95630 · Office: (916) 985-1188 · Fax: (916) 985-2288
Email: Jeff@olberdingenv.com

MEMO

To: Jeff Olberding
From: Scott Brown, Eric Donaldson and Barry Hecht
Date: October 14, 2013

Subject: Conceptual Wetland Design Memorandum, Cayetano Creek Preserve, Livermore Area, Contra Costa County, California

This memorandum presents a conceptual design for the creation of approximately 8.25 acres of seasonal wetlands at the Cayetano Creek Preserve, near Livermore, California[1]. Figures 1 through 7 show conceptual plan and cross-section views, as further described below.

Balance Hydrologics has worked on a number of wetland restoration, enhancement, and design projects within the Bay Area and throughout California. (See attached Qualifications for a description of selected relevant projects). We outlined the attached conceptual plan based on our experience on projects within similar landscapes in Contra Costa and Alameda Counties and elsewhere in the greater Bay Area. In addition, Balance has designed and implemented several wetland monitoring, restoration, enhancement, and mitigation project specifically in clayey Clear Creek soils similar to those at the Cayetano site, including our work in assessing impacts to wetlands near Altamont Creek near Livermore; seasonal wetland studies near Lake Lagunita in Santa Clara County; seasonal wetland mitigation design associated with the closure of a geothermal facility in Lake County; monitoring seasonal wetlands near the Hawthorne Mill/McCoy Transit Village near Fairfield; and wetland design work at Kirker and Hess Creeks in Contra Costa County. Several of our project have directly addressed California Tiger Salamander habitat, including the Lake Lagunita and Kirker-Hess projects mentioned above, as well as mitigation wetland design at Madera Quarry in Madera County. In addition, Barry Hecht (Principal at Balance) has served as the hydrologist on the U.S. Fish and Wildlife Service's Santa Barbara Tiger Salamander Recovery Team since 2001.

Site summary: The attached figures outline a conceptual wetland design along the West Branch of Cayetano Creek within the roughly 37-acre Cayetano Creek Preserve. With an average annual rainfall of 15 inches, the site is entirely underlain by Clear Lake clays, a hydric soil. The

[1] The attached plan is a conceptual plan, not intended as design documentation for construction purposes. The concept will be optimized and field-fit during the detailed design phase.

surrounding uplands have developed Diablo clay soils on a tightly-followed semi-consolidated sedimentary siltstones and shales, some of which is tightly folded and deformed, generating significant amounts of sediment.

Design criteria: The wetland design meets the following criteria required by the Department of Fish and Wildlife in consideration of California Tiger Salamander (CTS): All wetland/ponds would provide CTS breeding habitat during years of average rainfall and would hold between one and two feet of water for a period of approximately 120 consecutive days until May 31 or longer between December and May (a period long enough to allow for CTS to breed and complete metamorphosis in average rainfall years). Wetland/ponds (2, 4, 7, and 8) are anticipated to provide consistently suitable CTS breeding habitat during below average rainfall years due to deeper ponding depths[2].

The US Army Corps of Engineers has requested a complex, functional network of wetlands with varying morphologies and an appearance which emulates natural systems in the region. In areas that are not ponded, inundation/saturation of soils for at least fourteen continuous days is desirable to meet the USACE wetland criteria.

Conceptual design approach: The conceptual wetland design meets the above criteria and will allow for at least 8.25 acres of delineable wetland features after five years, while also providing for some runoff to channels and wetlands downstream (see Figure 1). The proposed wetlands within Cayetano Creek Preserve are designed to maximize wetland diversity while maintaining consistent standards to optimize successful California Tiger Salamander breeding habitat.

Each of the individual wetland complexes contains the following features (see Figures 2 and 3 for a conceptual plan and cross-section view of these features[3]):

- **Wetland pool**: The deepest part of the wetland will be between two and four feet deep when the feature is completely full. This portion of the wetland is intended to meet the 120-day ponding criteria necessary for successful CTS breeding conditions.
- **Ponded wetland shelf**: Surrounding the deeper pool is a 'shelf' feature that will have shallow ponding when the wetland is at capacity and spilling. This shallow ponding will be contiguous with the deeper ponded areas, but will gradually dry back toward

[2] Optimization of pond sizes and depths will be conducted during the design phase as the hydrologic model is updated.

[3] Note that Figure 1 only shows the wetland outline and the deeper ponded areas. Figure 2 is a close-up that differentiates between the three features described here-in. Similar delineations will be provided for the other wetland features as the design moves from the conceptual to the specific design phase.

the pool as water levels recede. Expected ponding durations of these shallower areas will be considerably less than 120 days, especially during dry years, providing for a diversity of vegetation types within the ponded area.

- **Wetland fringe**: Surrounding the area of maximum ponding is a wetland fringe that will experience only shallow (less than a few inches), temporary ponding within micro-depressions during and immediately following rainfall events. These areas are to maintain extended saturated-soil conditions due to the relative low position in the landscape (similar to the existing swales on the site) and through capillary action from the adjacent ponded area. The wetlands are sited and the shelf and fringe configured in ways intended to (a) bypass and (b) assimilate sediment. Many of the wetlands have slope-parallel 'arms' that are included as wetland fringe areas. These features are planned as broad swales that direct surface flow into the wetland complex, the lowermost portion of which will maintain saturated conditions to meet wetland criteria.

The estimated maximum depth of ponding for each of the proposed conceptual wetland features is as follows:

Wetland number	Maximum depth of ponding
1	2
2	3
3	2.5
4	4
5	2.5
6	2
7	3.5
8	4

The wetland system is intended to mimic an alluvial wet/dry meadow with a distributed flow pattern that supports discreet wetland/pool complexes, as described above[4]. The wetlands were sited to take advantage of areas of apparent wetter conditions, identified through assessment of aerial photographs[5]. Overflow from a few of the larger pools will be designed to discharge water

[4] At the landscape scale, Mexican concept of 'vega' is broadly applicable to the entire valley floor. Generalized reference areas including wetlands and complexes of this type include the Livermore sinks, and the Pajaro Valley floor, specifically those within the southern half of the former Spanish land grant of Bolsa de la Vega del Rio Pajaro and near Hansen Slough and Corralitos Lake.

[5] Photographs used were dated 4/2/12, 5/19/12, 6/16/11, 5/3/11, 6/26/05, 12/13/03, all from Google Earth. Additionally we reviewed USGS color infrared (CIR) photos dated 7/8/83 and 1/17/96. Findings from this assessment will be further detailed in follow-up documentation.

from several outlets, reducing erosive effects and sustaining additional wetland complexes further down-slope.

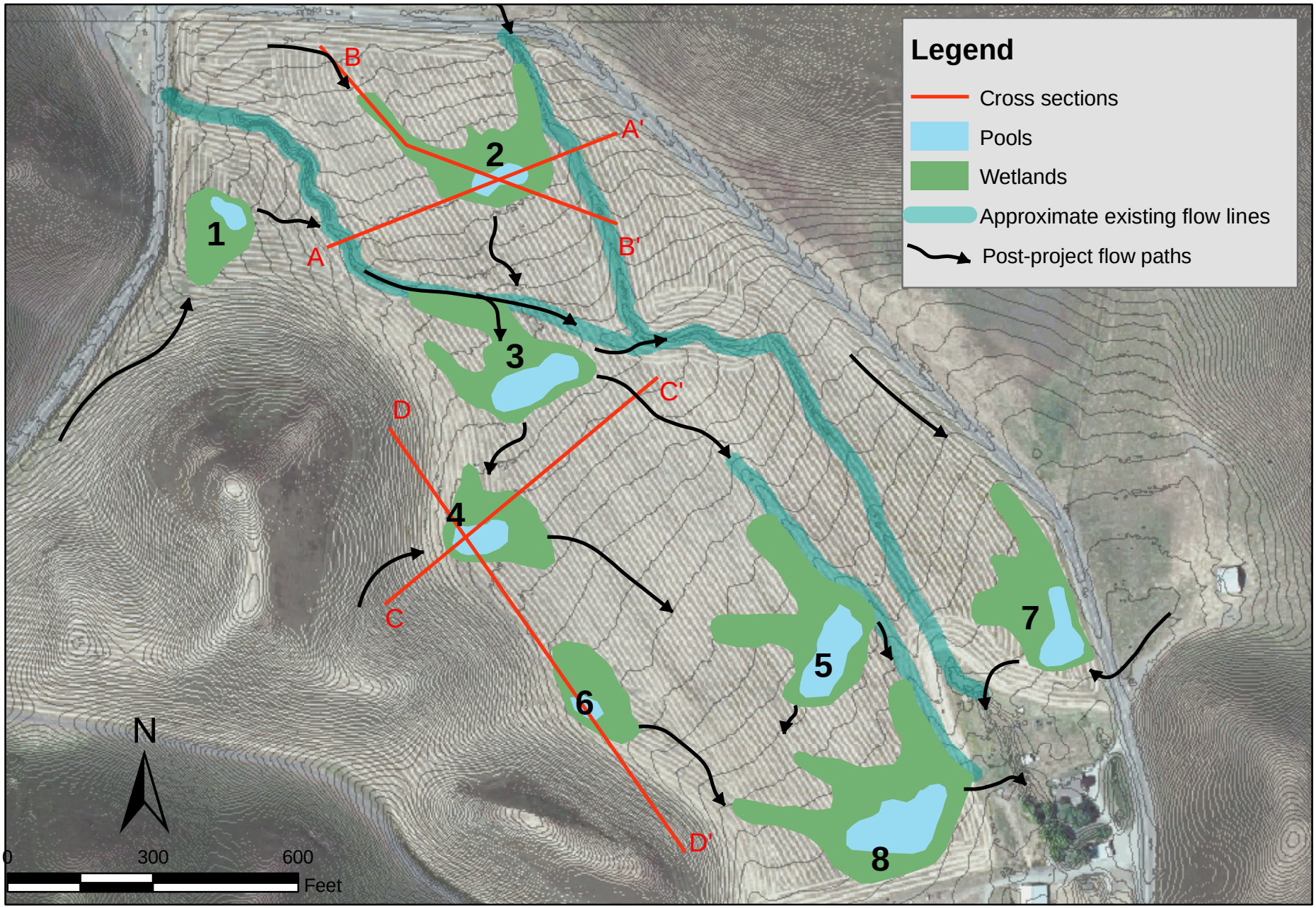
The geomorphic basis of the wetlands includes two different types of wetland features:

- Valley-marginal wetlands. These features (1, 4, 6, and 7) occupy slight topographic depressions at the sides of the valley, adjacent to the bedrock uplands. Such features often occur where down-valley sedimentation exceeds lateral sedimentation rates, or at the intersections of broad alluvial fans resulting in a relative low in the landscape. Similar features to these wetlands may have been present at these locations prior to agricultural alteration of the site; however even the earliest aerial photos of the site (1939) show extensive agricultural alteration, preventing a preliminary assessment of the presence or extent of these features in the past. Upcoming field assessment may aid in confirming and elucidating potential past analogs at the site.
- Valley-medial wetlands. These features (2, 3, 5, and 8) are designed to mimic a relict channel pattern formed prior to the current drainage pattern. Wetland 'arms' represent former channels that have been blocked by subsequent sedimentation and/or vegetation growth/debris-jam patterns. A similar wetland complex templated on a relict channel pattern is present near Raymond Road and Ames Street approximately 4.6 miles southeast of the project site.

Within this scheme, there will be a diversity of wetland types, ranging from pools that hold ponded water through most of the wet-season to small depressions with small watershed areas that will have much shorter ponding durations. The current conceptual design plans for 8.8 acres of wetland area, a portion of which of which are pools that are 2 to 4 feet deep[6]. We have planned for some excess acreage during the conceptual phase to allow some flexibility for modification and reconfiguration during the detailed design phase.

The acreage and scale of the features in the conceptual plan are similar to an earlier version of the plan for the Collier Creek Mitigation Bank (of which the Cayetano Creek Preserve is a part). Kamman Hydrology and Engineering (2012) conducted a water budget analysis for that plan, and concluded that there is sufficient water supply to support the overall project. As such, we expect that the water supply will be sufficient under the current configuration and would satisfy ponding duration requirements sufficient for CTS habitat as described above. The hydrologic analysis will be updated as final plans for the wetland mitigation proposal are developed, and we will further optimize pond size, ponding durations, and hydrologic routing based on the site-specific hydrology once this analysis has been completed.

[6] The areal extent of the deep portion of the ponded areas has not yet been calculated, pending optimization of pond sizing based on site hydrology. The full extent of ponding (including the 'ponded shelf' areas) will be greater than the area shown as deep ponds. We have not yet calculated the total ponded area at full capacity of all the wetlands, but expect this to be somewhere on the order of 4 to 5 acres.



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213113 Cayetano Concept.mxd

Figure 1. Conceptual Site Layout, Cayetano Wetland Preserve Near Livermore, Contra Costa County, California

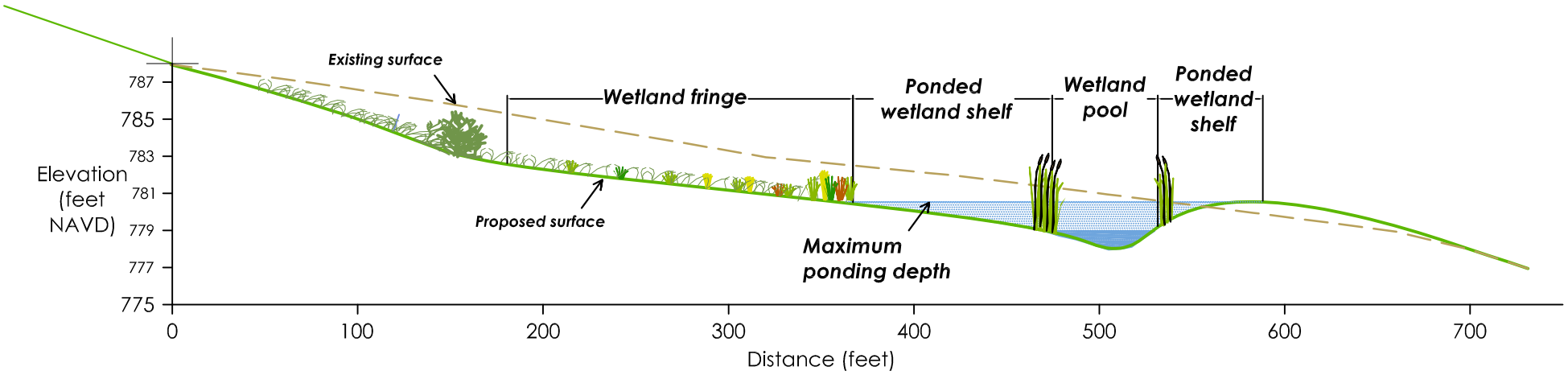
Source: Balance Hydrologics

Source: Balance Hydrologics

Balance Hydrologics, Inc.

213113 Cayetano Concept.mxd

Figure 2. **Conceptual plan for Wetland 2, Cayetano Wetland Preserve near Livermore, Contra Costa County, California. Plan shows approximate extent of the deep portion of the pool, the shallow ponded area (ponded shelf), and the saturated wetland fringe area. See Figures 3 and 4 for conceptual cross-sections of this feature.**



Balance Hydrologics, Inc.

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Figure 3. Conceptual design for mitigation wetland 2 at cross-section B, Cayetano Wetland Preserve, Livermore, CA. The wetland complex consists of a swale 'arm' that drains to a wetland fringe, ponded shelf, and deeper pool. *See Figure 2 for plan view of Wetland 2.*

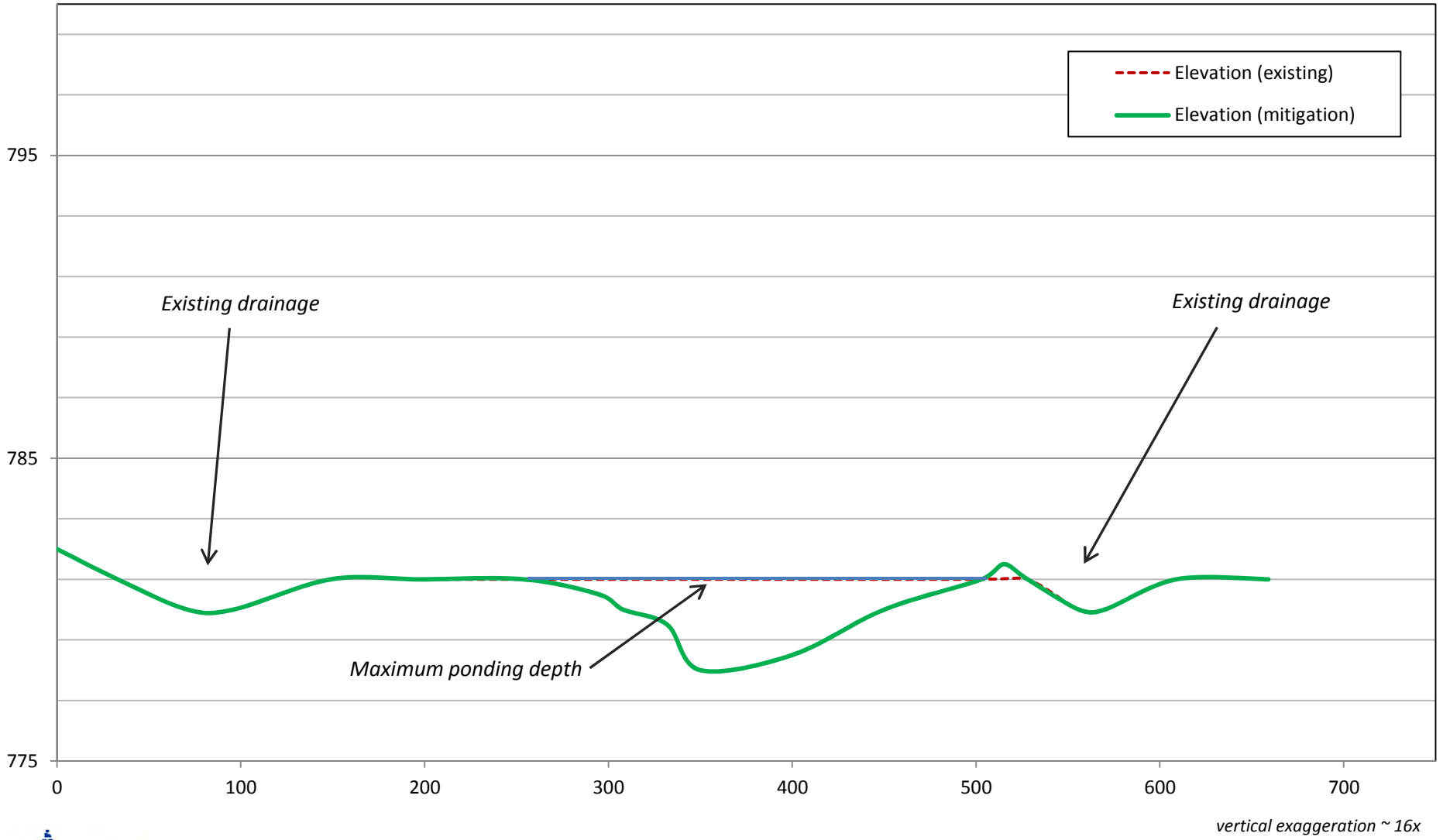

Figure 4. Cross-valley conceptual profile of proposed mitigation wetland 2 (cross-section A), Cayetano Creek Preserve near Livermore, California. See Figure 5 for down-valley profile of wetland of this wetland.

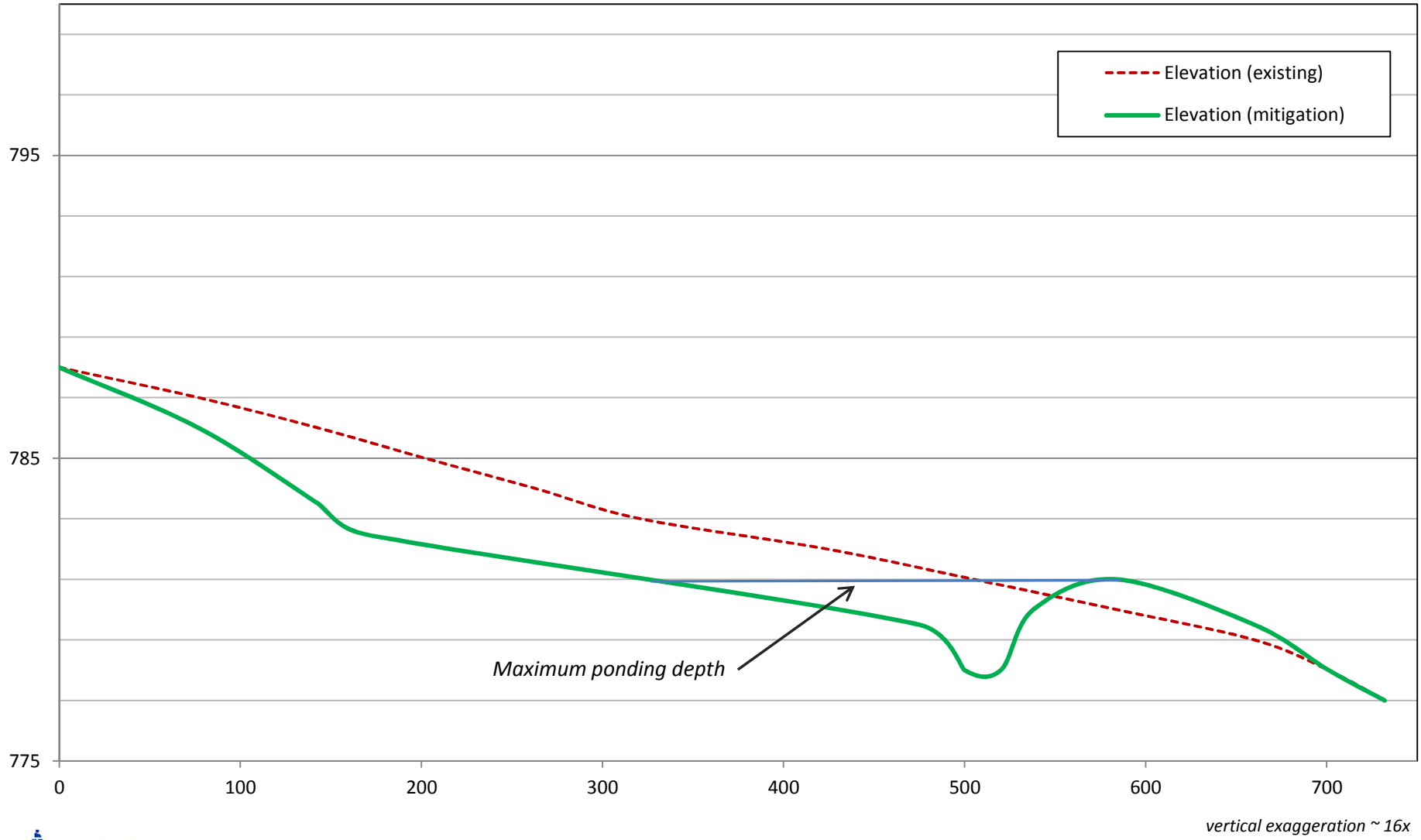

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Figure 5. Down-valley conceptual profile of proposed mitigation wetland 2 (cross-section B), Cayetano Creek Preserve, Livermore, CA. The wetland complex consists of a swale 'arm' that drains to a wetland fringe, ponded shelf, and deeper pool. See Figure 3 for conceptual diagram of the proposed the swale/wetland/pond transition, and Figure 2 for a plan view of this wetland.

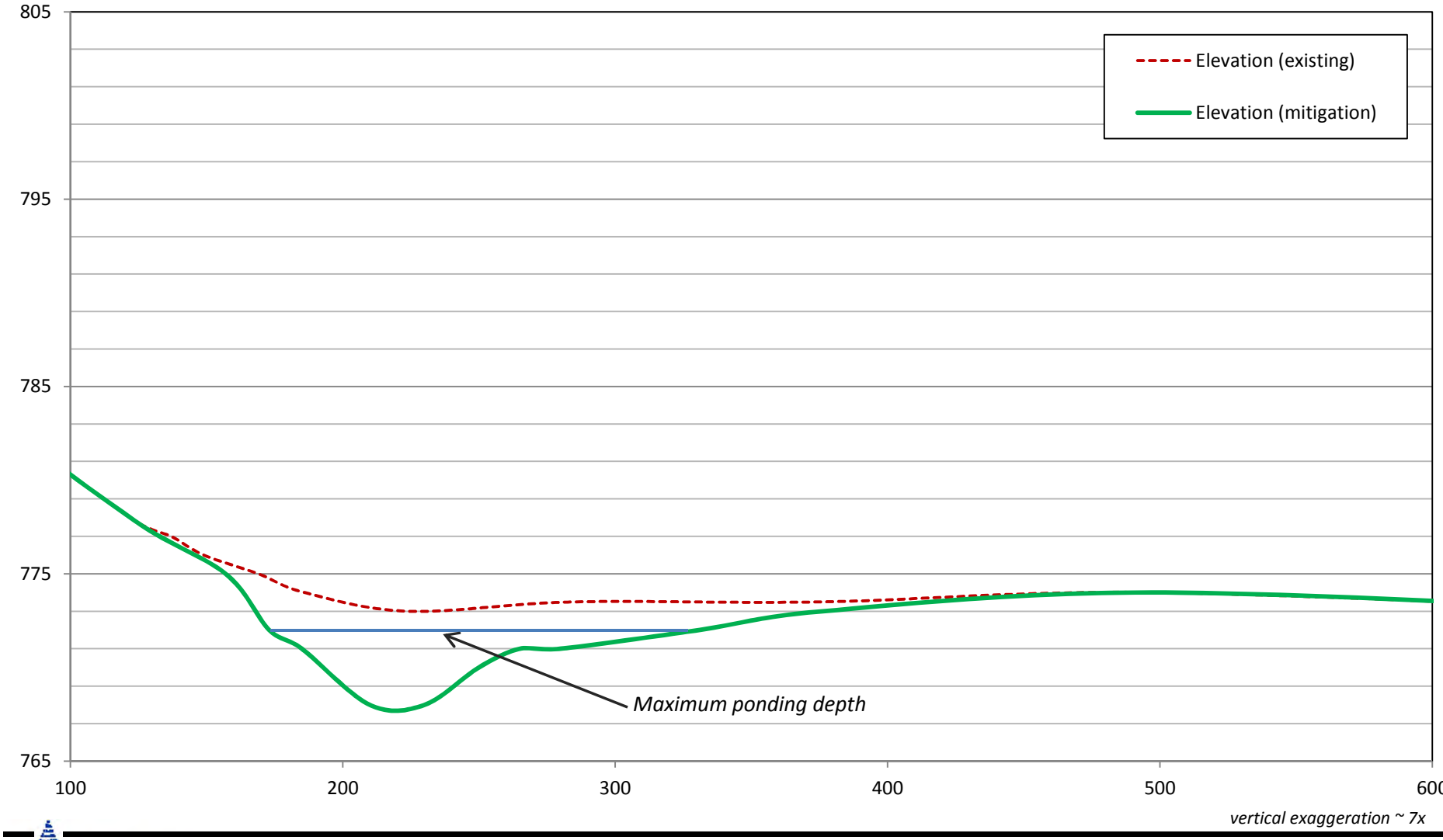

Figure 6. Cross-valley conceptual profile (cross-section C) of proposed mitigation Wetland 4, Cayetano Wetland Preserve, Livermore, CA. The pool portion of the wetland will pond to approximately 4 feet deep, with much shallower depths on the broad 'shelf' portion of the complex. See Figure 7 for a down-valley conceptual profile of this feature, along with Wetland 6.

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Figure 7. Down-valley conceptual profile (cross-section D) of proposed mitigation Wetland 4 and 6, Cayetano Wetland Preserve, Livermore, CA. The wetlands are designed as valley-margin features, blocked behind a moderately crowned valley profile (see Figure 6). The spill point of Wetland 6 (at right on cross-section) is outside the plain of the cross-section.

STATEMENT OF QUALIFICATIONS

MITIGATION PROJECTS WITH VERNAL POOLS AND SEASONAL WETLAND HABITATS

Vernal pools and related seasonal wetlands are a major area of our practice in what complex hydrologic and geomorphic skills are applied.

Our staff consists of highly-qualified professionals with particular expertise in:

- Water and sediment quality, including those in vernal pools,
- Surface and ground water hydrology, and their interaction, including vernal pools,
- Channel stability and flood hydrology, of both perennial and intermittent streams,
- Wetland protection and restoration, including in vernal pools;
- Sedimentation and sediment management, and
- Estuary, lake, and reservoir management

Our firm has experience throughout California, Nevada and Oregon with maintaining the hydrology of vernal pools, seasonal wetlands, and intermittent stream channels when adjacent land uses change. Our unique approach combining field studies and modeling has proved useful from the earliest water quality, sediment quality and water balance studies at the Phoenix Field Preserve through our recently completed work co-developing EPA's on the Hydrogeomorphic Model Manual for Southern California vernal pools. Related project work in California's Central Valley has included serving as project hydrologists on a number of residential and mitigation projects in the Laguna Creek watershed of south Sacramento, at the 1,750-acre Russell Ranch (now Empire Ranch) mixed-use project in eastern Sacramento County, the volcanic vernal pools near Roseville and Merced, and at about 20 other sites from Tulare to Siskiyou counties, and at major vernal-pool avoidance, protection and creation projects in four Southern California counties.

SPECIFIC WETLAND HABITAT RESTORATION EXPERIENCE

SANTA BARBARA TIGER SALAMANDER RECOVERY TEAM, SANTA BARBARA COUNTY, CALIFORNIA

Since 2001, Barry Hecht, Balance's senior principal, has been serving as the hydrologist and hydrogeologist on the U.S. Fish and Wildlife Service's Santa Barbara Tiger Salamander Recovery Team. He is one of eight technical experts convened by the USFWS Ventura office as it attempts to re-build populations of this threatened subspecies.

TIGER SALAMANDER ENHANCEMENT PROJECT, STANFORD UNIVERSITY, SANTA CLARA COUNTY, CALIFORNIA

Working with ecological specialists and the Center for Conservation Biology, Balance staff participated in designing and monitoring an array of seasonal wetlands for use by the growing population of California Tiger Salamanders at Lake Lagunita The key ecological criterion was deemed to be sustained duration of ponding through early May (dry years) or late May (normal and wet years). Habitat hydrologists from Balance estimated likely inflow rates, and loss rates from seepage and evapotranspiration, and then developed design approaches approved by Santa Clara County and resource agencies. Monitoring of water levels and basic water-quality parameters has now been sustained for several years during which salamander reproduction has successfully occurred in most of the created wetlands.

CALIFORNIA TIGER SALAMANDER BREEDING HABITAT ENHANCEMENT AS MITIGATION FOR THE PROPOSED MADERA QUARRY, MADERA COUNTY, CALIFORNIA

Balance Hydrologics, in conjunction with Live Oak Associates, is evaluating hydrologic feasibility for creation and enhancement of breeding habitat for the endangered California Tiger Salamander (CTS) as mitigation for a proposed hard-rock quarry in Madera County, California. The study includes field reconnaissance, topographic surveys, and hydrologic analyses to identify potential sites and develop conceptual designs for the highest quality site. Hydrologic analyses include development of a volumetric monthly water budget as well as instrumentation of potential sites for near-continuous water-level data collection. Data collection will capture winter saturation and spring draw-down and be used to better understand time of saturation and drying, length of hydroperiods and depth of ponding. Data will also provide for model calibration. The conclusions or our investigation will be used together with habitat criteria identified by project biologists as a basis for site selection, design and mitigation.

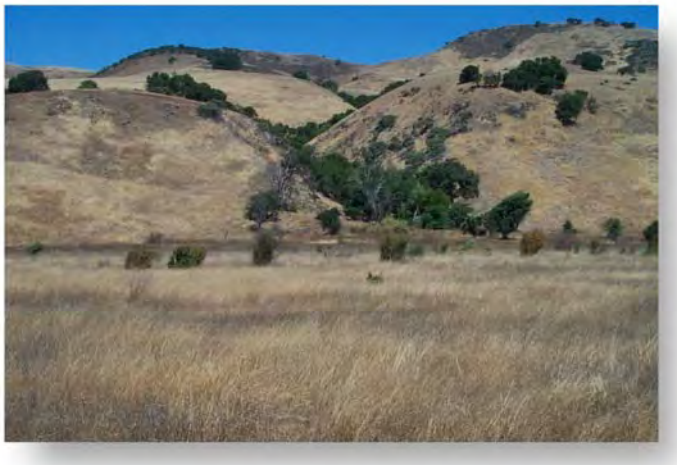
KIRKER-HESS CREEK WETLANDS CREATION, CONTRA COSTA COUNTY, CALIFORNIA

The Contra Costa County Department of Conservation and Development sought to convert a valley tributary to Hess and Kirker Creeks, once planned for a landfill, to a wetland preserve. This plan is part of a larger effort, in conjunction with the East Bay Regional Parks District, to convert the former Land Waste Disposal Inc. holdings near Kirker Pass to an environmental preserve with a diverse vegetational mosaic.

Balance, working with a well-known ecological restoration firm, evaluated alternative restoration concepts for a steep-sloped valley near the pass. The concept chosen for finalization was a series of ponded seasonal wetlands separated by a channel combined with California Tiger Salamander breeding habitat. Another concept used the mudflows beneath the sandy surficial soils of the valley as a floor upon which to use recharged groundwater to sub-irrigate a restored wetland system. Balance staff helped locate and re-interpret geotechnical reports conducted in the early 1980s at the site, using the data to establish a hydrogeologic and water-quality baseline. A series of trenches and borings were used to delineate the deposits beneath the valley to assess the 'perching potential' of the mudflows, a key to both concepts. Dynamic hydraulic properties of the soils and aquifer system were assessed with infiltrometer, falling-head permeater, and seasonal-recessional analyses. We evaluated the salinities of springs emanating from bedrock formations contributing to the valley as the hydrologic support for alkaline wetlands of varying kinds, as well as the nominal constraints posed by naturally-occurring boron, arsenic, and selenium concentrations. Various native clays were evaluated as liner materials to support ponding or create curtain walls to promote ponding. Both flood and seasonal hydrologies were evaluated using a 30-year continuous model with one-hour time steps, which served as a basis for designing an axial channel, biotechnical grade control, and diversion facilities for the ponds. Plans and specifications were developed for final design. Supervision during grading, plus response to changed conditions, was provided.

KIRBY CANYON WETLAND MITIGATION AND CHANNEL ENHANCEMENT, SANTA CLARA COUNTY, CALIFORNIA

Balance Hydrologics was retained by a large resource management company seeking to create 1.2 acres of wetlands as mitigation for ongoing operations at the Kirby Canyon Landfill, presently Santa Clara County's principal operating landfill. Located within the Coyote Creek watershed in the Diablo Range, the project site is characterized by western-facing slopes on fractured serpentine bedrock. Balance Hydrologics was asked to evaluate the hydrologic feasibility of a previously-identified mitigation area to provide saturated soils and a perennial deep-water pond in support of the Mount Hamilton thistle, a federally-listed species of concern. A monthly time-step hydrologic model developed to assess the site under normal, dry, and wet year-type scenarios showed that mitigation could be successful within established criteria. We subsequently measured seep outflows and soil moisture to validate and calibrate this model. Balance staff, responding to a request to identify and design habitat enhancement opportunities along steep headwater channels in the mitigation



envelope, developed a conceptual design to collect and pond water in the upper reaches of a channel, thereby providing additional habitat for endangered California red-legged frogs.

TIERRA REJADA VERNAL POOL PROTECTION PLAN, CARLSBERG RANCH, MOORPARK, VENTURA COUNTY

Balance Hydrologics was retained to help develop a comprehensive management, mitigation, and monitoring program for a 4.6-acre vernal pool in Ventura County. Working closely with consulting biologists and a local civil engineering firm, Balance staff prescribed a program to emulate the existing hydrology of this active fault-zone sag pond which supports two endangered species, as its watershed is partially converted to urban uses.

This project used three independent lines of hydrologic analysis:

- Detailed analysis of historical records, including approximately 20 sets of historical aerial photographs and early surveys,
- Intensive instrumentation of the watershed, using continuous-recording gages, piezometers, and evaporation pans, plus measurements of flow and infiltration rates during storms, and
- Development of a digital model of each significant component in the 40-acre watershed; the model was capable of 'blindly' predicting water level and salinities within very narrow tolerances.

Balance staff also developed a mitigation and 10+-year monitoring program for the pool and related preserve, which is to be managed by the Santa Monica Mountains Conservancy; Balance has trained the Conservancy staff in monitoring protocols, and actively assists in quality control and interpretation of the data.

VERNAL WETLANDS PROTECTION AT YOSEMITE LAKE, MERCED COUNTY, CALIFORNIA

Balance hydrologists assisted design and biological consultants with vernal pool protection plans at a 660-acre planned community adjacent to the proposed University of California campus site in northern Merced. Most of the seasonal wetlands at this site have developed on unusual volcanic-mudflow substrate. One major focus was intensive baseline investigations of three types of vernal pools and related seasonal wetlands, such that contributing areas and natural ponding regimes could be quantified. Among other efforts, we identified areas suited for creating wetlands and developed programs to preclude introducing urban runoff or irrigation water into existing or created pools.

HYDROGEOMORPHIC MODEL MANUAL FOR SOUTHERN CALIFORNIA VERNAL POOLS

Balance Hydrologics, Inc., in conjunction with Prof. Ellen Bauder of San Diego State University and Marie Simovich of University of San Diego, received a three-year grant from EPA Region IX to develop a manual for assessment of vernal pools and for developing related approaches for their protection. The manual is based on the Corps of Engineers new Hydrogeomorphic Method (HGM), which uses approximately 40 to 50 functional values to classify and evaluate wetlands. Balance's responsibilities included addressing hydrology, geomorphology, sedimentation, hydrogeology, and water quality.

UPDATE AND IMPLEMENTATION OF COASTAL/VERNAL POND COMPREHENSIVE MANAGEMENT PLAN AT LOCKE-PADDON CITY PARK AND POND, CITY OF MARINA, MONTEREY COUNTY, CALIFORNIA

Locke-Paddon Park in Monterey County, California, showcases one of seven remaining protected coastal/vernal ponds within the City of Marina that functions as a significant environmental and recreational asset. The City of Marina asked Balance Hydrologics to propose how to best update and implement the City's 1994 Coastal/Vernal Pond Comprehensive Management Plan component for Locke-Paddon Park and Pond, and to help the City conform with current environmental guidelines and design standards. City staff also sought to find ways of better buffering the pond from hydrologic and biologic effects of ongoing urbanization Phase I included gathering the key water-level and water-quality data needed to update the master plan, including identifying the sources of the water in the pond and nature of soil layers supporting it. Phase II translated the data through opportunities and constraints, into management alternatives, to be implemented in Phase III, with key success criteria to be monitored as Phase IV. We conducted this work in conjunction with a small ecological restoration firm and a landscape architect, both specializing in coastal and dune environments.

LENNAR VERNAL POOL PROTECTION PLAN, CARLSBERG RANCH, MOORPARK, VENTURA COUNTY, CALIFORNIA

Balance Hydrologics was retained to help develop a comprehensive management, mitigation, and monitoring program for a 4.6-acre vernal pool in Ventura County. Working closely with consulting biologists and a local civil engineering firm, Balance staff developed a program to emulate the existing hydrology of this active fault-zone sag pond which supports two endangered species as its watershed is partially converted to urban uses. This project used three independent lines of hydrologic analysis:

- Detailed analysis of historical records, including approximately 20 sets of historical aerial photographs and early surveys;
- Intensive instrumentation of the watershed, using continuous-recording gages, piezometers, and evaporation pans, plus measurements of flow and infiltration rates during storms; and
- Development of a digital model of each significant component in the 40-acre watershed; the model was capable of 'blindly' predicting water-level and salinities within very narrow tolerances.

Balance staff also conducted extensive baseline testing of water quality in the pool at various times during the fill/evaporation cycle, and tested the chemistry of soils on the pool bed at several depths. Balance also developed a mitigation and monitoring program for the pool and related preserve, which will be managed by the California Department of Fish and Wildlife.

ATTACHMENT 7
WETLAND DESIGN DISCUSSION

OLBERDING ENVIRONMENTAL, INC.
Wetland Regulation and Permitting

August 21, 2013

Mr. Cameron Johnson
Regulatory Division, South Branch Chief
U.S. Army Corps of Engineers
1455 Market Street, 16th Floor
San Francisco, California 94103-1398

Subject: **Cayetano Creek Preserve Wetland Design Discussion - (Corps File # 2005-29639S) and Collier Creek Mitigation and Conservation Bank (Corps File #2012-00093S and CDFW Tracking Number 1798-2013-07-R3)**

Dear Mr. Johnson:

On behalf of Water Hole Land Company, Inc., Olberding Environmental, Inc. has prepared this design memo to discuss proposed wetland design information specific to the Cayetano Creek Preserve Property (Preserve Property) located west of North Livermore Road and south of Manning Road in northern Alameda County/southern Contra Costa County, California. The Preserve Property is located at the north end of the Collier Creek Mitigation and Conservation Bank (Bank). The design of the Preserve and the design of the Bank are interconnected. We are currently focusing on the design of the Preserve. Once we reach agreement on the Preserve Property design issues, we will be able to proceed with the Bank design.

We have revised our wetland design in response to comments received from agency staff reviewing both the Preserve design and the Bank design. We are proposing to construct two seasonal wetland types: wet meadow and wetland swale. The updated design has been revised to reflect a naturally occurring wetland configuration found in the Livermore Valley region southeast of the Preserve. After discussing our original designs with agency staff and conducting additional review of the site characteristics including average annual rainfall, soils, watershed, topography, and appropriate wetland types we are confident that our design will be successful in creating high-quality seasonal wetlands. We appreciate the continued input and support of the resource agency staff.

Kamman Hydrology & Engineering prepared a Hydrology Sufficiency Analysis Report for the proposed Collier Creek Mitigation Bank site in August 2012. This report involved an analysis of the entire Collier Creek Property including the area occupied by the Cayetano Creek Preserve. Results of this report concluded that sufficient hydrology is present to support creation of the proposed wetland types presented below. Working with Kamman Hydrology & Engineering we have refined the design for the construction of approximately 8.25 acres of seasonal wetland habitat on the Preserve Property (Attachment 1). The wetland design has taken into consideration the average annual rainfall (14.63 inches), soils (Clear Lake clay), watershed (388 acres), and topography (1.6% slope) to construct two types of seasonal wetlands on site (wet meadow and wetland swale). Site specific information on the Preserve Property has been included in Attachment 2.

193 Blue Ravine Road, Suite 165 · Folsom, CA 95630 · Office: (916) 985-1188 · Fax: (916) 985-2288
Email: Jeff@olberdingenv.com

The Preserve Property predominantly consists of actively grazed grassland habitat occurring on moderately steep hill slopes, ridgelines, and level flats. It is bounded on all sides by open space in the form of grazed rangeland and widely scattered agricultural properties. Portions of Carneal and Manning Roads form the western and northern boundaries; open space lies along the southern boundary. A single residence and outbuildings (consisting of barns and sheds that support livestock operations) is located immediately southeast of the Preserve Property.

The Preserve Property consists of a somewhat broad, low-gradient valley floor where a series of swale/channel features form a portion of the headwaters of the west branch of Cayetano Creek. These intermittent channels flow diagonally (along a northwest-to-southeast axis) bisecting the greater valley floor. In the northern end of the valley floor, a complex series of truncated low-gradient swales and drainages (impacted by current agricultural practices on the parcel) intercept and convey runoff from deeply dissected hill slopes surrounding the Preserve Property, contributing hydrologic inputs into the local watershed of Cayetano Creek.

The Preserve Project site includes a watershed of approximately 388 acres. The watershed is comprised of moderate to steep hills that give way to a gently sloped valley floor. Topography within the area of proposed wetland construction ranges from an elevation of 790' at the northwestern extent to 757' at the southeastern portion of the site, resulting in a 1.6 % slope. Soils within the constructed wetland area consist of Clear Lake clay. Based on the acreage of constructed wetlands within the site (8.25) the wetland density would be approximately 2.4%.

Our intent is to create seasonal wetlands habitats which are supported locally in the Livermore Valley region. An emphasis is also placed on utilizing a naturally occurring wetland configuration in our design. In order to assess the feasibility of our proposed wetland area, two reference sites were selected. The first reference site (Reference Site #1) is representative of a natural channel/wetland habitat area with similar characteristics to the Preserve Property. The second reference site (Reference Site #2) consists of a wetland mitigation area where wetlands have been successfully created, also with similar characteristics to the Preserve Property. I have included photographs of the existing conditions on the Preserve Property in addition to photographs of representative habitats (wet meadow and wetland swales) in Attachment 3.

Utilizing information derived from these two reference sites we have designed a wetland mitigation site which captures a natural channel/wetland configuration and has a high probability of attainment of the desired habitat characteristics given the success of the created wetlands on Reference Site #2.

REFERENCE SITES

Reference Site #1 – This reference site consist of a natural wetland complex associated with the northeastern Springtown Preserve area located north of Livermore. The site is positioned southwest of the intersection of Raymond Road and Ames Street. Site specific information on Reference Site #1 has been included in Attachment 4. . This site was selected due to its undisturbed state representing a natural configuration of channel features intermixed with wetlands. The site is also similar to the Preserve Property in that hydrology is somewhat

manipulated by adjacent roadways and culverts. Ultimately, the site provides an opportunity to obtain wetland/swale design criteria for the Preserve Property.

Reference Site #1 includes a watershed of approximately 308 acres which is comparable to that of the Preserve Property. The watershed is comprised of moderately sloped hills that give way to a gently sloped valley floor. Topography within the area of existing wetlands ranges from an elevation of 531' at the northeast corner to 506' at the southwestern portion of the site, resulting in a 0.5 % slope. This slope is more level than that observed on the Preserve Property. Soils within the wetland area consist of Pescadero clay, San Ysidro loam and Solano fine sandy loam. Based on an aerial estimation it appears that there are approximately 93 acres of wetlands within the representative area. Wetland density appears to be approximately 30.5%. The increase in wetland density from that observed on the Preserve Property can be attributed to the lower gradient topography.

Aerial observations of this reference site show a combination of linear channel features intermixed with wetland swales, seasonal wetlands (wet meadows), and seasonal ponds. Large areas of wet meadow habitat can be found occurring between the numerous channel features crossing the site. The wetlands are generally connected to or an expansion of the channel/swale features. These areas appear to flood for short durations immediately following large storm events. As waters recede in the channels and swales the areas in between them drain reverting to wet meadow habitat hydrated by continually saturated soils between storm events.

Reference Site #2 – Reference Site #2 is representative of an existing created wetland mitigation site. The Lin Livermore Conservation Area (LLCA) is located north of Livermore. Site specific information on Reference Site #2 has been included in Attachment 5. . The site is located generally north of May School Road on Dagnino Road. The approximately 394-acre LLCA was developed as a compensatory mitigation site for impacts to seasonal wetlands and California red-legged frogs (*Rana aurora draytonii*; CRLF) resulting from the Dublin Ranch Project. The LLCA consists primarily of non-native grazed grassland, along with freshwater marsh and aquatic habitats consisting of an existing wetland seep and pre-existing stock pond in the north-central part of the site, a constructed 3.17-acre pond designed for California red-legged frogs immediately south of the stock pond and 18 constructed ponds in the south-central part of the site, comprising a 25.78-acre seasonal wetland complex. Within this complex, ponds were constructed at varying depths from 1 to 4 feet deep.

This property was selected as a reference site since it represents a wetland creation site which appears to have resulted in the successful establishment of wetland habitats on a site with very similar characteristics to those observed at the Preserve Property. This site provides an example of how wetland habitats can be successfully created and an increase in functions and values derived.

Reference Site #2 includes a watershed of approximately 777 acres. The watershed is comprised of moderate to steep hills that give way to a gently sloped valley floor. Topography within the area of constructed wetlands ranges from an elevation of 607' at the northern extent to 545' at the southern portion of the site, resulting in a 2.3% slope. Soils within the constructed wetland area consist of Clear Lake clay. Based on the acreage of constructed wetlands and an aerial

estimation of additional wetlands within the site, the wetland density appears to be approximately 4.8%.

Reference Site # 3 & #4 – These two reference sites have been included in order to provide additional information on channel/wetland design criteria. These reference sites are both located east of Vasco Road and occur in areas which are representative of a natural channel/wetland configuration.

WETLAND TYPES PROPOSED

Observations made at both wetland reference sites indicate that linear channel features are providing off-site surface runoff in addition to direct precipitation to hydrate a mixture of wetland swales and wet meadow habitats. Mimicking the channel/swale/wetland configuration of Reference Site #'s1, 3and 4, we are proposing to create swale and wet meadow wetland habitats that are hydrologically interconnected

Wetland Swale – Seasonal wetland swales are typically ephemeral wet linear drainage features that support a dominance of wetland vegetation and hydric soils and exhibit wetland hydrology. Shallow swales receive runoff during the wet season from natural precipitation draining off of the surrounding landscape. These areas would be categorized as seasonal wetlands depending on their floristic composition and hydrology. During periods of rainfall wetland swales collect runoff, reducing the likelihood of seasonal flooding to downstream low-lying areas. In the process of collecting and storing runoff, the vegetation of wetland swales remove the excess nutrients accumulated by the water, acting as a natural filter. This nutrient rich environment provides vital food and habitat for many insects, amphibians, reptiles, birds, and mammals.

Two existing drainage channels (Cayetano Creek and tributary) would provide approximately 28-acrefeet of water to the Preserve Property. Widening (through limited grading) of the existing channel/swale features would allow for additional wetland habitat development alongside the existing channel/swale bottom, in addition to slowing down velocities during peak events once these channel are allowed to vegetated. The swales would be generally graded at or slightly above the bed elevation of the existing channels/swales creating a broad and uniform swale bottom. Approximately 12 inches of native material would be excavated from the proposed swale locations. This material would be temporarily stockpiles to allow for shaping of the swale features. Upon completion of feature shaping the native material would be placed back into the excavated area and fine grading performed. Fine grading would result in the topography being approximately 2 inches lower than the original grade. Please refer to cross-section details provided in Attachment 1. These areas would now be able to saturate during hydrological events associated with direct precipitation and overflow from the channels during storm events. Wetland vegetation establishment would be accelerated in these areas through the use of a native hydroseed mix applied over loose subsoil allowing immediate root establishment. Representative photographs of anticipated wetland swale habitat have been included in Attachment 3.

Wet Meadow – Wet meadows are a type of wetland that commonly occurs in poorly drained areas such as shallow lake basins, low-lying farmland, and the land between shallow marshes and upland areas. Wet meadows contain grass-like vegetation and saturated soils, but seldom

have water standing on the ground surface. These wetlands, which often resemble grasslands, are typically drier than other marshes except during the winter rainy season when hydrophitic vegetation flourishes. Wet meadows are without standing water, though periodic inundation associated with constant storm events allows the soil to remain saturated. A variety of water-loving grasses, sedges, rushes, and wetland wildflowers proliferate in the highly fertile soil of wet meadows. Wet meadows would provide similar functions and values to wetland swales described above.

Wet meadow habitat would be constructed within graded areas occurring between and extending out from the channel features flowing across the site. As was observed at Reference Site #'s 1, 3 and 4 the constructed wetlands would be connected to or an expansion of the channel/swale features. These areas would flood for short durations immediately following large storm events as they would be graded at generally the same elevation as the channel/swale bed creating a "backwater" area. Following the peak flow, waters would recede in the channels and swales as well as the backwater area allowing only saturated soils to remain reverting to wet meadow habitat hydrated by continually saturated soils between storm events. Construction of these features would be similar to that described for the wetland swale features. Cross-section details are included in Attachment 1. Representative photographs of anticipated wet meadow habitat have been included in Attachment 3.

WETLAND DESIGN SUMMARY

To ensure that the constructed seasonal wetlands replicate the functions of the reference design site wetlands, the following characteristics and criteria will be incorporated into the seasonal wetland design:

- Soil profile: the soil within the constructed wetland areas consist of clay soils capable of supporting wetland development. There are no soil characteristics that would restrict the successful development of seasonal wetlands. No soil amendments are proposed.

- Ponding depths: the seasonal wetlands will be constructed to limit maximum ponding depth to 2 inches. The seasonal wetlands and swales will be constructed with water outlet features to limit maximum ponding depth. Wetland development will incorporate soil saturation rather than continual ponding.

- Ponding duration: the seasonal wetlands will be designed to function as a part of the channel system. During large storm events temporary ponding may occur as the channels reach capacity. Immediately following a storm event flows in the channels would recede allowing all accumulated surface ponding in the wet meadow and wetland swales to drain back into the channel features.

- Bottom configuration: Approximately 12 inches of native material (including top soil) would be excavated from the proposed constructed wetland locations. The excavated material would be temporarily stored in upland areas adjacent to the grading work allowing for shaping of the wetland features. Upon completion of feature shaping the native material would be placed back into the excavated wetland area and fine grading

performed. Fine grading would result in the topography being approximately 2 inches lower than the original grade.

- Plant establishment: Following construction, the site would be hydroseeded with a native wetland mix. Additional planting of wetland plant plugs and container stock would also occur to allow for immediate plant establishment. Several areas would also receive riparian (trees and shrubs) plantings to enhance the Preserve Property.

- Swales: the seasonal wetlands will be designed to guide water through the seasonal swales to downstream wetlands and to establish a functional surface flow connection between the created wetlands and the existing wetlands.

Please contact me if you require any questions or comments. All correspondence should be sent to my attention at the letterhead address. I can be reached at (916) 985-1188 if you have any questions.

Sincerely,

Jeff Olberding
Wetland Regulatory Specialist

cc: Katerina Galacatos, USACE
Nina Cavett-Cox, USACE
Valarie Layne, USFWS
Ryan Olah, USFWS
Melissa Scianni, USEPA
Marcia Grefsrud, CDFW
Janice Gan, CDFW
Liz Morrison, RWQCB
Brian Wines, RWQCB
Mark Dawson, WHLC

ATTACHMENTS

ATTACHMENT 1

CAYETANO CREEK PRESERVE
WETLAND MITIGATION PROPOSED CONDITIONS

50% SUBMITTAL
NOT FOR CONSTRUCTION

GRIZZLY BAY, LLC
3170 Crow Canyon Place
Suite 260
San Ramon, California 94583
(408) 472-4343 cell
(925) 866-2111 office
(925) 866-2126 fax

Kamman Hydrology
& Engineering, Inc.

CAYATANO CREEK PRESERVE
MITIGATION WETLAND

PLAN VIEW:
PROPOSED CONDITIONS

drawn by: SGL
project no.: 3112-9112
date: 08/20/13
scale:

C1

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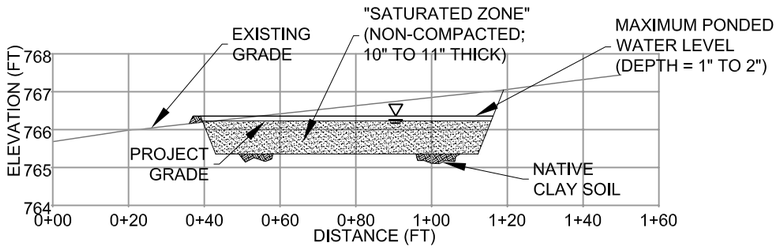

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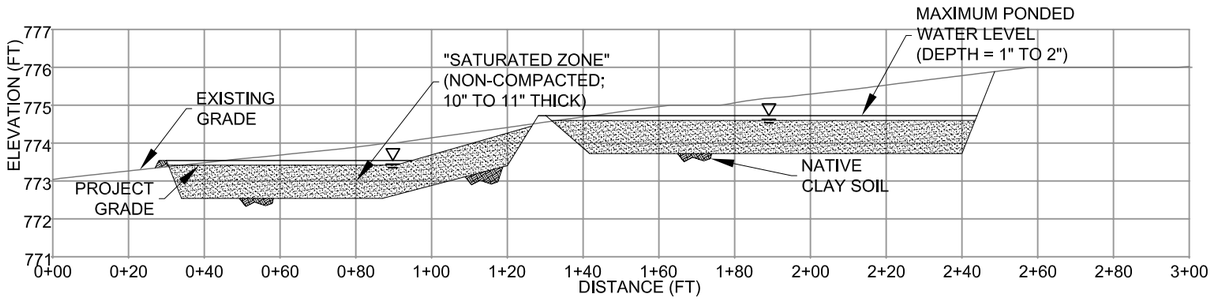

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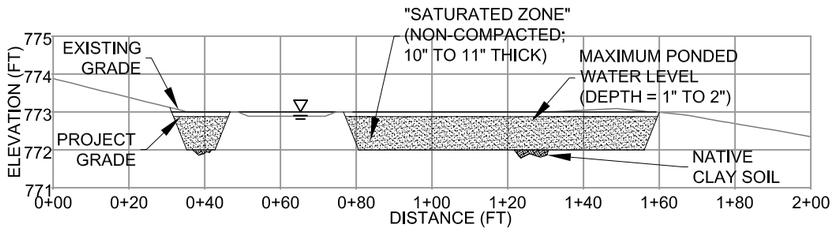

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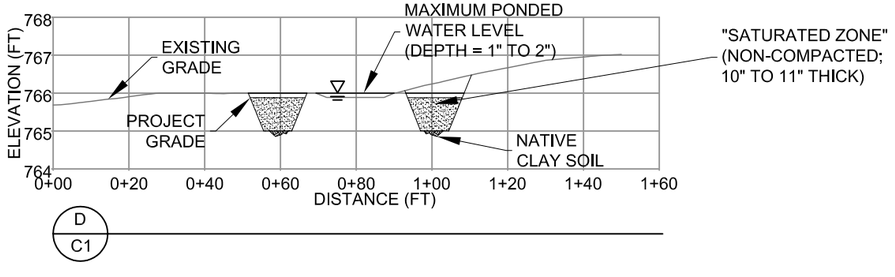

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C1

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Kamman Hydrology & Engineering, Inc.

CAYATANO CREEK PRESERVE
MITIGATION WETLAND

CROSS SECTIONS

drawn by: SGL
project no.: 3112-9112
date: 08/21/13
scale:

C2

50% SUBMITTAL
NOT FOR CONSTRUCTION

ATTACHMENT 2

PHOTOGRAPHS

Photo 1. <u>Existing Condition</u>: This photograph shows the existing channel/swale as it emerges from the culvert under Manning Road. A slight depression is all that is visible of the remnant channel which has been flattened through years of disking and planting of hay. This tributary feature eventually flows into Cayetano Creek several hundred feet down stream.

Photo 2. <u>Proposed Condition</u>: This photograph generally represents the type of vegetated swale that would exist on the Preserve following construction, hydroseeding with native species and exclusion fencing managed with selective grazing.

Photo 3. <u>Existing Conditions</u>: This photograph shows the segment of Cayetano Creek as it emerges from the culvert under Carneal Road (visible in the background). Annual planting of the oat hay crop has recently occurred.

Photo 4. <u>Proposed Conditions</u>: This photograph is representative of the wet meadow habitat being proposed on the Preserve. Again, fencing of the site will result in the development of prime habitat for wildlife.

Photo 5. <u>Existing Conditions</u>: This photograph was taken several hundred feet downstream of the site represented in Photograph 3. Note the elimination of the channel feature by agricultural activities.

Photo 6. <u>Proposed Conditions:</u> This photograph contains a wetland swale surrounded by wet meadow habitat. Similar features are proposed on the Preserve site. Note the volunteer willow habitat occurring within the wet meadow. Grazing has been eliminated from this site for 3 years.

Photo 7. This photograph shows the existing wetland swale located on the southeastern corner of the Collier Creek Property. This area is grazed but not farmed or disked allowing wetland habitat establishment.

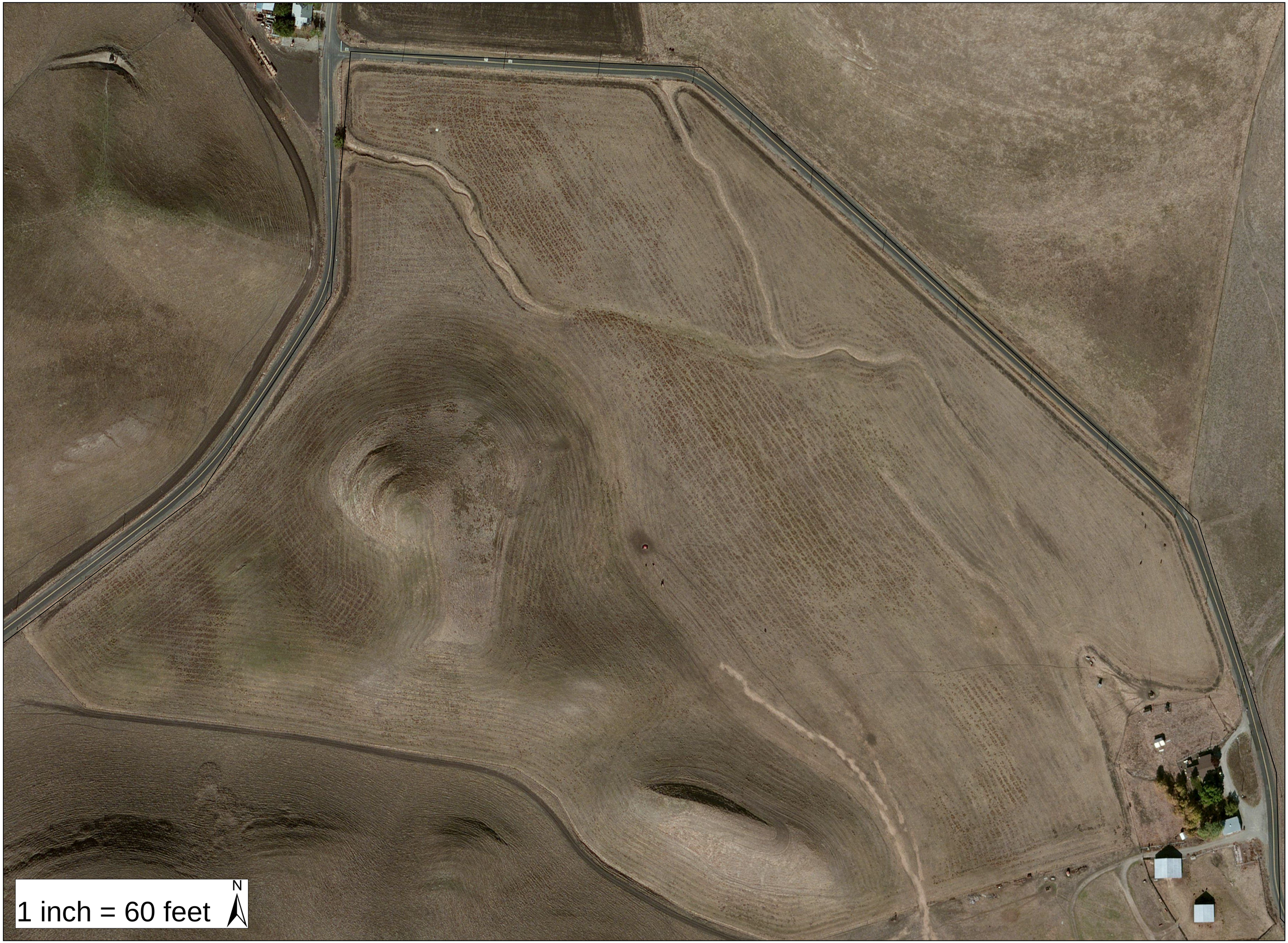
Photo 8. These seasonal wetlands are located near the Vasco Road reference site. This photograph was taken 1 day after a large storm event. While there is no ponded water, the soils in this wetland swale are completely saturated allowing for wetland plant development. Wetlands being proposed on the Preserve will be of similar hydrological nature.

Photo 9. <u>Proposed Conditions:</u> This photograph shows woody plant development along and within a broad wetland swale. This is representative of areas along the drainages on the Preserve following the planting and development of native riparian vegetation.

Photo 10. <u>Proposed Conditions:</u> This photograph also represents proposed conditions along segments of the on-site drainages following the planting and establishment of riparian habitat.

ATTACHMENT 3

CAYETANO CREEK PRESERVE
SITE ASSESSMENT FIGURES


1 inch = 60 feet
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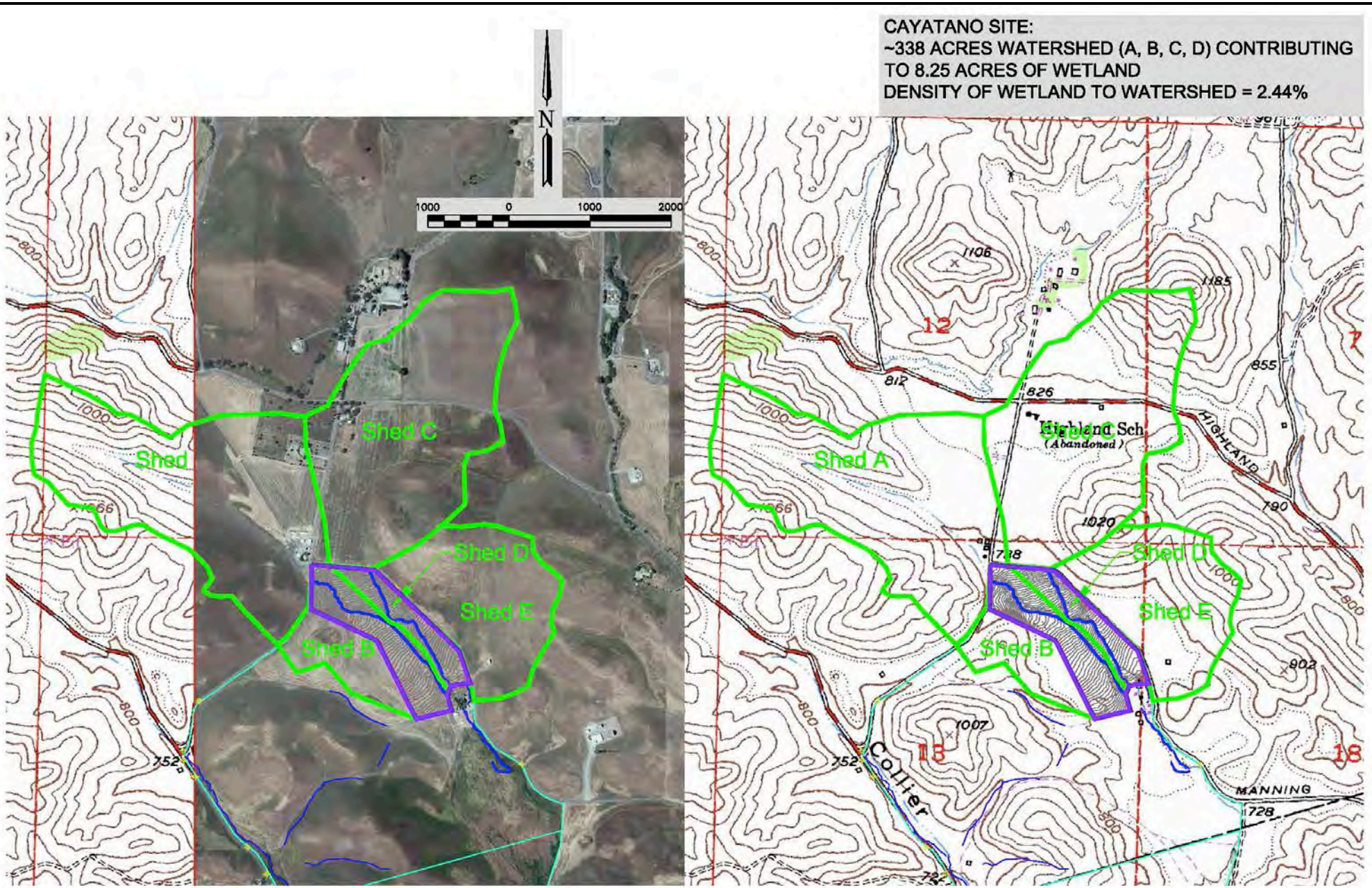

Olberding Environmental, Inc.
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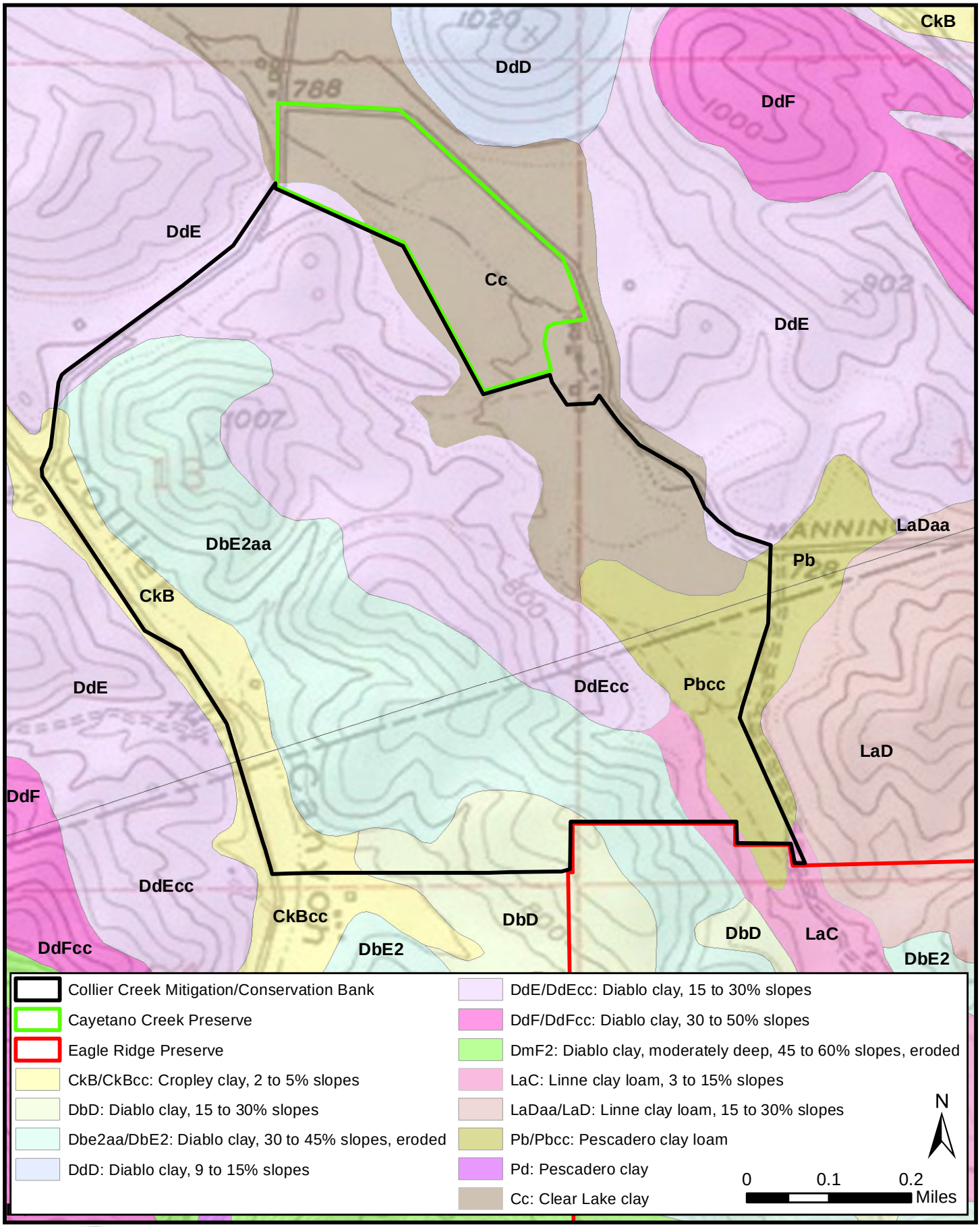
San Ramon, California 94583
Phone: (925) 866-2111

This document is not intended for detail design work.

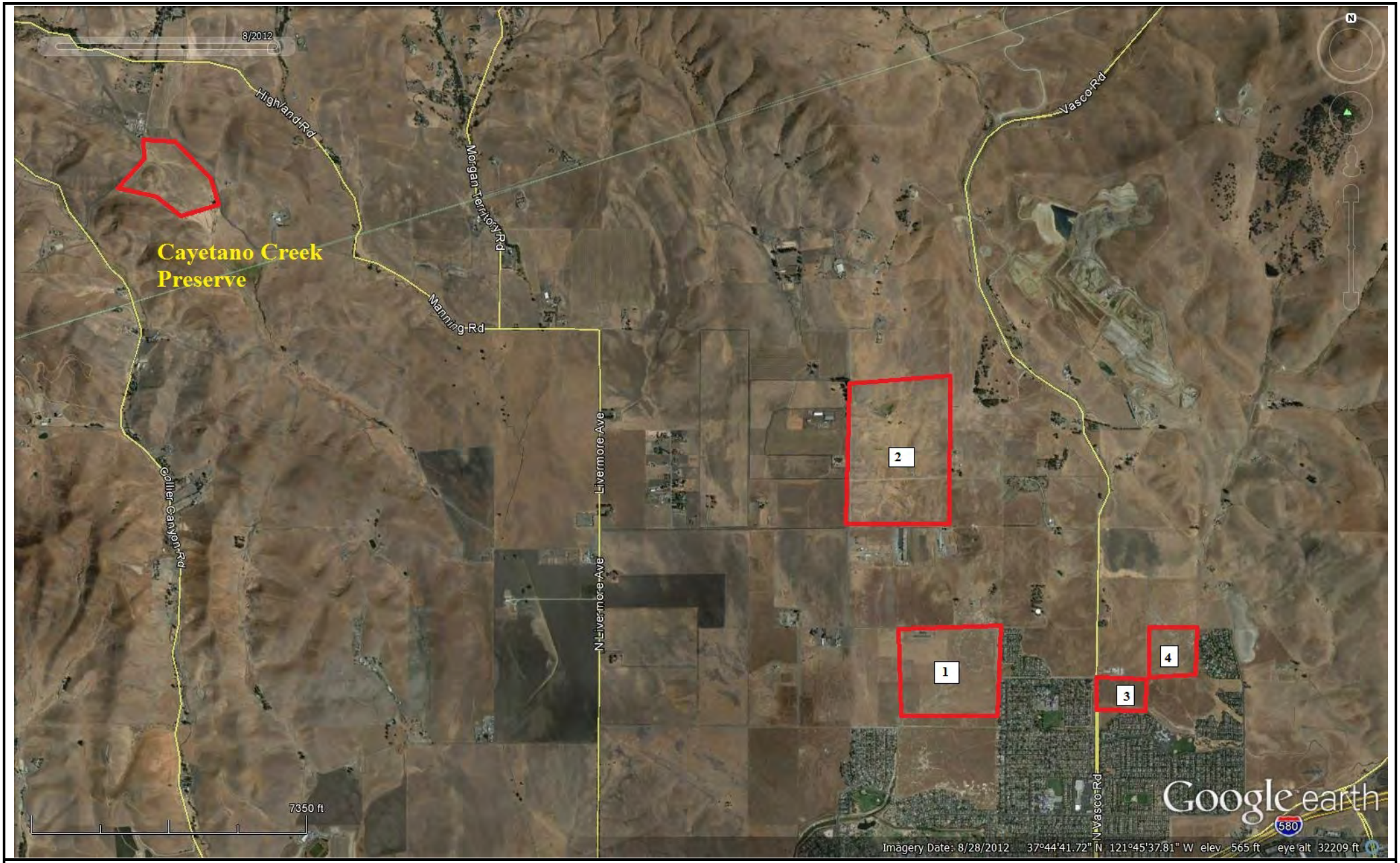
Cayetano Creek Preserve – Watershed Map
Alameda County and Contra Costa County, California



OLBERDING ENVIRONMENTAL INC.

193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Figure 7: Soils Map
Collier Creek Mitigation/Conservation Bank
Contra Costa and Alameda Counties, California



Olberding Environmental, Inc.
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San Ramon, California 94583
Phone: (925) 866-2111

This document is not intended for detail design work.

Cayetano Creek Preserve – Reference Site Location Map
Alameda County and Contra Costa County, California

ATTACHMENT 4

REFERENCE SITE 1
SITE ASSESSMENT FIGURES

Olberding Environmental, Inc.
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San Ramon, California 94583
Phone: (925) 866-2111

This document is not intended for detail design work.

Cayetano Creek Preserve – Reference Site 1 Aerial
Alameda County and Contra Costa County, California

Olberding Environmental, Inc.
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San Ramon, California 94583
Phone: (925) 866-2111

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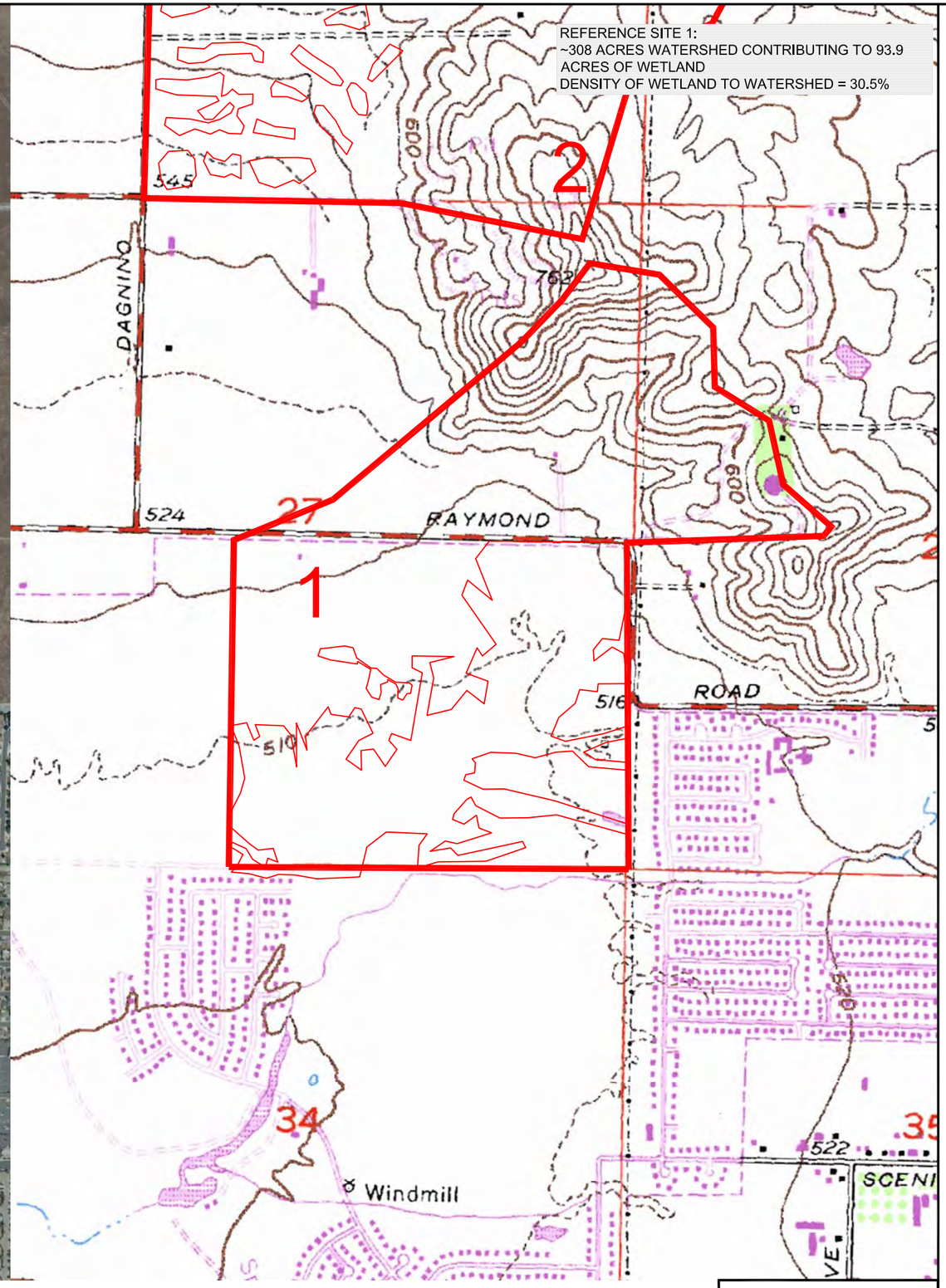
Cayetano Creek Preserve – Reference Site 1 Wetlands
Alameda County and Contra Costa County, California



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Kamman Hydrology & Engineering, Inc.

CAYATANO CREEK PRESERVE
MITIGATION WETLAND

REFERENCE SITE 1

drawn by: SGL
project no.: 3112-9112
date: 08/18/13
scale:

50% SUBMITTAL
NOT FOR CONSTRUCTION

C3

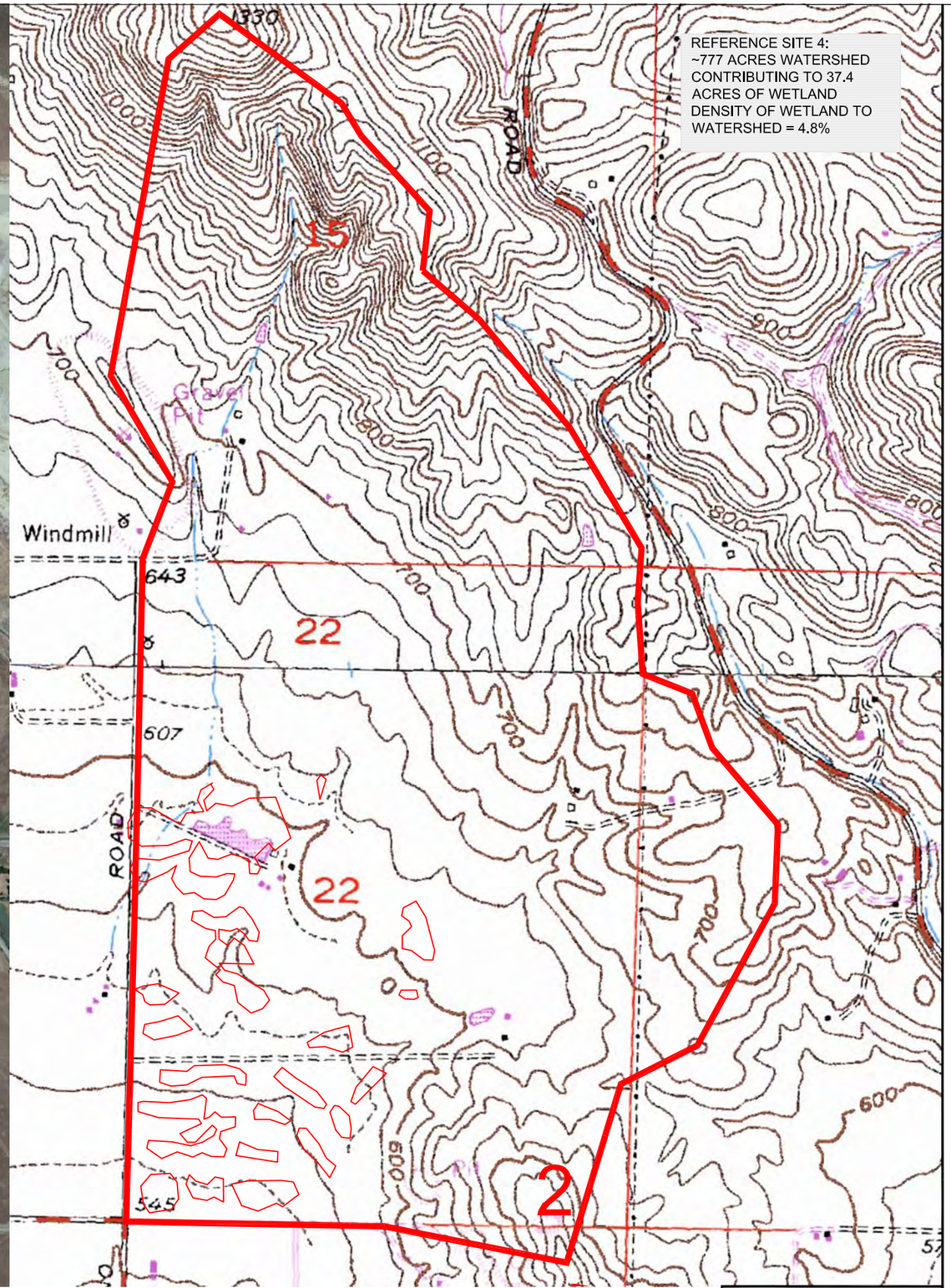
ATTACHMENT 5

REFERENCE SITE 2
SITE ASSESSMENT FIGURES

Olberding Environmental, Inc.
3170 Crow Canyon Place, Suite 260
San Ramon, California 94583
Phone: (925) 866-2111

This document is not intended for detail design work.

Cayetano Creek Preserve – Reference Site 2 Aerial
Alameda County and Contra Costa County, California



REFERENCE SITE 4:
~777 ACRES WATERSHED CONTRIBUTING TO 37.4 ACRES OF WETLAND
DENSITY OF WETLAND TO WATERSHED = 4.8%

50% SUBMITTAL
NOT FOR CONSTRUCTION

Kamman Hydrology & Engineering, Inc.

CAYATANO CREEK PRESERVE
MITIGATION WETLAND

REFERENCE SITE 2

drawn by: SCL
project no.: 3112–9112
date: 08/18/13
scale:

C4

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ATTACHMENT 6

REFERENCE SITE 3 & 4
SITE ASSESSMENT FIGURES

Olberding Environmental, Inc.
3170 Crow Canyon Place, Suite 260
San Ramon, California 94583
Phone: (925) 866-2111

This document is not intended for detail design work.

Cayetano Creek Preserve – Reference Site 3 Aerial
Alameda County and Contra Costa County, California

Olberding Environmental, Inc.
3170 Crow Canyon Place, Suite 260
San Ramon, California 94583
Phone: (925) 866-2111

This document is not intended for detail design work.

Cayetano Creek Preserve – Reference Site 4 Aerial
Alameda County and Contra Costa County, California

ATTACHMENT 8
CAYETANO CREEK PRESERVE
WETLAND ANALYSIS

WETLAND ANALYSIS REPORT

FOR THE

CAYETANO CREEK PRESERVE

CONTRA COSTA COUNTY, CALIFORNIA

Prepared for:

COLLIER CREEK MITIGATION LAND, LLC
3160 Crow Canyon Place, Suite 260
San Ramon, California 94583

Prepared by:

OLBERDING ENVIRONMENTAL, INC.
Wetland Regulatory Consultants
193 Blue Ravine Rd. Suite 165
Folsom, California 95630

Phone: (916) 885-1188 ~ FAX (916) 885-2288
Contact: Jeff Olberding

In December 2014, ENGEO prepared a Water Availability Analysis Report for the proposed Collier Canyon Mitigation Bank. This report involved an analysis of the entire Collier Canyon Property including the roughly 37 acre area occupied by the Cayetano Creek Preserve. Results of this report concluded that sufficient hydrology is present to support creation of the wetlands that were proposed (approximately 8 acres). The wetland design had taken into consideration the average annual rainfall (14.63 inches), soils (Clear Lake clay), watershed (388 acres), topography (1.6% slope) and criteria for California tiger salamander (CTS) reproduction hydroperiod.

The wetland design met the following criteria required by the Department of Fish and Wildlife in consideration of CTS: All wetland/ponds would provide CTS breeding habitat during years of average rainfall and would hold between one and two feet of water for a period of approximately 120 consecutive days until May 31 or longer between December and May (a period long enough to allow for CTS to breed and complete metamorphosis in average rainfall years). Wetland/ponds (2, 4, 7, and 8) are anticipated to provide consistently suitable CTS breeding habitat during below average rainfall years due to deeper ponding depths.

The US Army Corps of Engineers had requested a complex, functional network of wetlands with varying morphologies and an appearance which emulates natural systems in the region. In areas that are not ponded, inundation/saturation of soils for at least fourteen continuous days is desirable to meet the USACE wetland criteria.

With this information in mind Balance Hydrologics INC, ENGEO and Restoration Resources each contributed to the eventual construction of the Cayetano Creek Preserve wetlands which were completed in October 2015 to the specified plans (Attachment 1, Figure 1 & Figure 2). Each of the individual wetland complexes contain the following features:

Wetland pool: The deepest part of the wetland is between two and four feet deep when the feature is completely full. This portion of the wetland is intended to meet the 120-day ponding criteria necessary for successful CTS breeding conditions.

Ponded wetland shelf: Surrounding the deeper pool is a ‘shelf’ feature that has shallow ponding when the wetland is at capacity and spilling. This shallow ponding is contiguous with the deeper ponded areas, but will gradually dry back toward the pool as water levels recede. Expected ponding durations of these shallower areas will be considerably less than 120 days, especially during dry years, providing for a diversity of vegetation types within the ponded area.

Wetland fringe: Surrounding the area of maximum ponding is a wetland fringe that experiences only shallow (less than a few inches), temporary ponding within micro-depressions during and immediately following rainfall events. These areas are to maintain extended saturated-soil conditions due to the relative low position in the landscape (similar to the existing swales on the

site) and through capillary action from the adjacent ponded area. The wetlands are sited and the shelf and fringe configured in ways intended to (a) bypass and (b) assimilate sediment. Many of the wetlands have slope-parallel ‘arms’ that are included as wetland fringe areas. These features are planned as broad swales that direct surface flow into the wetland complex, the lowermost portion of which will maintain saturated conditions to meet wetland criteria.

Examples of each wetland complex can be seen in Attachment 1, Figure 3.

Our initial monitoring of Cayetano Creek Preserve wetlands show that each of the eight wetlands are approximately 80 percent full as of January 21, 2016. Livermore California has had an above average rainy season this wet season with approximately 10.74 inches between October and January thus far. However, each wetland is holding between 1.75-4.7 feet of water depending on maximum capacity and are functioning as jurisdictional wetlands. Photos of the overview of the Preserve and each wetland can be found in Attachment 2.

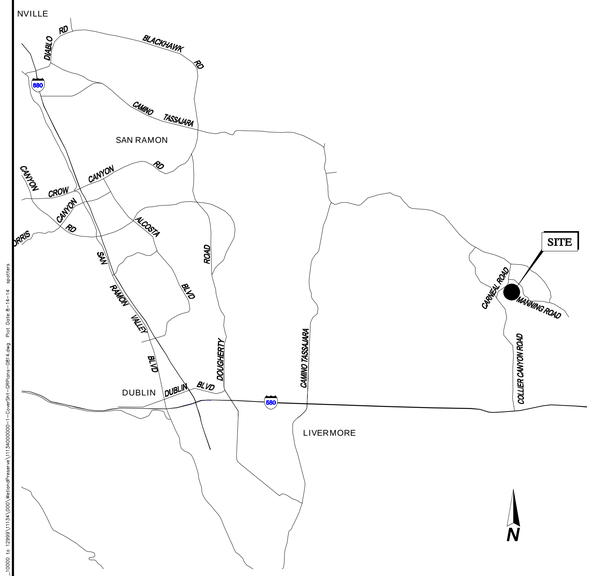
Each wetland was built based on the previously mentioned water availability analysis report which shows that accurate predictability for wetland construction and success for this property can be achieved. Future construction of wetlands along Collier Canyon Creek and Cayetano Creek within Collier Canyon Mitigation Bank will be based on the design, construction and establishment of the Cayetano Creek Preserve wetland mitigation habitat. A conceptual plan set is being finalized by Restoration Resources and will be provided to the appropriate resource agencies as necessary when fully developed.

ATTACHMENT 1
FIGURES

Figure 1: Existing and Constructed Wetland Location Map
Cayetano Creek Preserve, Eagle Ridge Preserve North

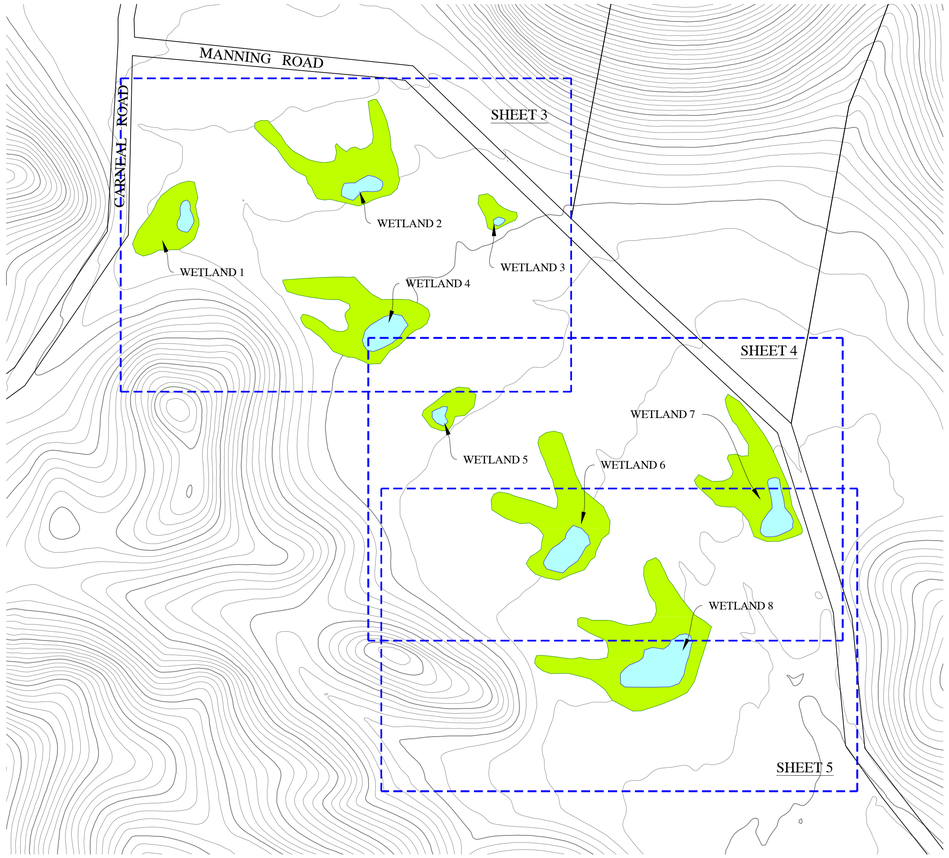
OLBERDING ENVIRONMENTAL INC.
193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

GRADING PLANS
CAYETANO CREEK PRESERVE
CONTRA COSTA COUNTY, CALIFORNIA



SITE VICINITY MAP

NO SCALE



SITE PLAN AND KEY MAP

SURVEY AND COORDINATE INFORMATION

1. ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM (NAVD) 1988. CONTRACTOR SHALL VERIFY ALL GRADES PRIOR TO CONSTRUCTION.

2. DIMENSIONS: NOTED DIMENSIONS SHALL TAKE PRIORITY OVER SCALED DIMENSIONS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY AND REQUEST CLARIFICATION IF A DISCREPANCY IS FOUND. IF DIMENSIONING IS UNCLEAR OR INSUFFICIENT, THE CONTRACTOR WILL CONTACT THE ENGINEER FOR CLARIFICATION. THE COUNTY WILL BE NOTIFIED OF ALL CLARIFICATIONS TO CONTRACTOR IN WRITING.

3. COORDINATES: HORIZONTAL COORDINATES GIVEN ON THESE PLANS ARE BASED ON CALIFORNIA COORDINATE SYSTEM ZONE

4. THE CONTRACTOR IS RESPONSIBLE FOR PRESERVATION AND/OR PERPETUATION OF ALL EXISTING MONUMENTS (WHICH CONTROL SUBDIVISIONS, TRACTS, STREETS OR HIGHWAYS, OR PROVIDE SURVEY CONTROL) WHICH WILL BE DISTURBED OR REMOVED DUE TO CONTRACTORS' WORK. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 10 WORKING DAYS NOTICE, TO PROJECT ENGINEER/SURVEYOR, PRIOR TO DISTURBANCE OR REMOVAL OF EXISTING MONUMENTS. PROJECT ENGINEER/SURVEYOR SHALL COORDINATE WITH THE CONTRACTOR TO RESET MONUMENTS OR PROVIDE PERMANENT WITNESS MONUMENTS AND FILE THE REQUIRED DOCUMENTATION WITH THE COUNTY SURVEYOR, PER BUSINESS AND PROFESSIONS CODE SECTION 8771.

SUMMARY OF POND/WETLAND SYSTEM SIZING
CAYETANO CREEK PRESERVE

Pond #	Pond Area (acres)	Max Pond Depth (feet)	Shelf Area (acres)	Fringe Area (acres)
1	0.09	2.50	0.53	0.15
2	0.15	3.00	0.53	0.22
3	0.23	2.50	1.02	0.16
4	0.02	2.00	0.14	0.04
5	0.05	2.00	0.25	0.29
6	0.28	3.50	0.25	0.47
7	0.26	3.00	0.82	0.33
8	0.54	4.00	1.59	0.39

SHEET INDEX

SHEET NO.	TITLE
1	COVER SHEET
2	GENERAL CONSTRUCTION NOTES
3	GRADING PLAN (WETLANDS 1-4)
4	GRADING PLAN (WETLANDS 5-7)
5	GRADING PLAN (WETLAND 8)
6	TYPICAL CROSS SECTIONS
7	EROSION AND SEDIMENT CONTROL PLANS

BENCH MARK

CONTRA COSTA COUNTY BENCHMARK NO. 740. BEING CONCRETE NAIL IN CONCRETE BASE OF FLAGPOLE IN HIGHLAND SCHOOL YARD. ELEVATION = 825.538 MSE

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS MAP IS TAKEN AS N 73°50'34" E BETWEEN THE ALAMEDA - CONTRA COSTA COUNTY LINE MONUMENTS 84-A AND 85-1, ON FILE IN THE OFFICE OF THE COUNTY SURVEYOR, SAID MONUMENTS ARE BASED UPON THE CALIFORNIA COORDINATE SYSTEM ZONE III. DISTANCES ARE GRID DISTANCES, TO OBTAIN GROUND DISTANCES A SCALE FACTOR OF 1.000116 WAS USED.

BASIS OF DESIGN

THESE PLANS ARE BASED ON ENGINEERING ANALYSIS, DESIGN AND RECOMMENDED IMPROVEMENTS DEVELOPED BY ENGEO, INC. THESE ARE IMPROVEMENT PLANS FOR THE CONSTRUCTION OF DESIGN PREPARED BY ENGEO INC.

SEAN P. CLEARY DATE
CIVIL ENGINEER C73795 EXPIRES 6-30-15

THIS PLAN HAS BEEN REVIEWED BY OLBERDING ENVIRONMENTAL, INC. AND APPEARS TO BE IN CONFORMITY WITH THE BIOLOGICAL REQUIREMENTS OF THE PROJECT.

JEFF OLBERDING DATE
BIOLOGICAL MONITORING AND
REVEGETATION CONSULTANT

ABBREVIATIONS

AP	ANGLE POINT
BC	BEGIN CURVE
BOP	BOTTOM OF PIPE
BOT	BOTTOM
CFS	CUBIC FEET PER SECOND
CL	CENTERLINE
EL	ELEVATION
EC	END CURVE
ECF	EROSION CONTROL FABRIC
E	EXISTING
FF	FILTER FABRIC
FG	FINISHED GRADE
FL	FLOWLINE
FT/SEC	FEET PER SECOND
LBS	POUNDS
MAX	MAXIMUM
MIN	MINIMUM
N	NEW
NIC	NOT IN CONTRACT
PCC	POINT OF CONCENTRIC CURVATURE
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
S	SLOPE
STA	STATION
TOB	TOP OF BANK (WEST BANK)
TYP	TYPICAL
WSE	WATER SURFACE ELEVATION
YR	YEAR

ENGEO
Expect Excellence
2010 CROW CANYON PLACE
SUITE 250
SAN RAMON, CALIFORNIA 94583
(925) 866-9000
FAX (888) 279-2698
SAN RAMON - SAN JOSE - SAN FRANCISCO - OAKLAND - ROCKLIN - IRVINE
SANTA CLARITA - IRVINE - NEW ZEALAND

COVER SHEET
GRADING PLAN
CAYETANO CREEK PRESERVE
CONTRA COSTA COUNTY, CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER SEAN P. CLEARY No. 73795 Exp. 6/30/2015 CIVIL STATE OF CALIFORNIA

DESIGNED BY: SPC
DRAWN BY: SRP
CHECKED BY: JB
DATE: AUGUST, 2014
SCALE: AS SHOWN

REV.	DATE	DESCRIPTION	BY

SHEET NUMBER
1
OF 7 SHEETS

PROJECT NO.
11134.000.00

Source: Balance Hydrologics

Balance Hydrologics, Inc.

213113 Cayetano Concept.mxd

Figure 3. **Conceptual plan for Wetland 2, Cayetano Wetland Preserve near Livermore, Contra Costa County, California. Plan shows approximate extent of the deep portion of the pool, the shallow ponded area (ponded shelf), and the saturated wetland fringe area.**

ATTACHMENT 2
PHOTO DOCUMENTATION

Overview of Cayetano Creek Preserve facing east featuring wetlands 1 and 2. Photo taken January 21, 2016.

Overview of Cayetano Creek Preserve facing north. Photo taken January 21, 2016.

Overview of Cayetano Creek Preserve facing southeast featuring wetland 8. Photo taken January 21, 2016.

Overview of Cayetano Creek Preserve facing southeast featuring wetlands 4 and 5 with 7 in the background. Photo taken January 21, 2016.

Photo shows wetland 1 holding 1.75 feet of water. Photo taken January 21, 2016.

Photo shows wetland 2 holding 2.2 feet of water. Photo taken January 21, 2016.

Photo shows wetland 3 holding 2.1 feet of water. Photo taken January 21, 2016.

Photo shows wetland 4 holding 4.7 feet of water. Photo taken January 21, 2016.

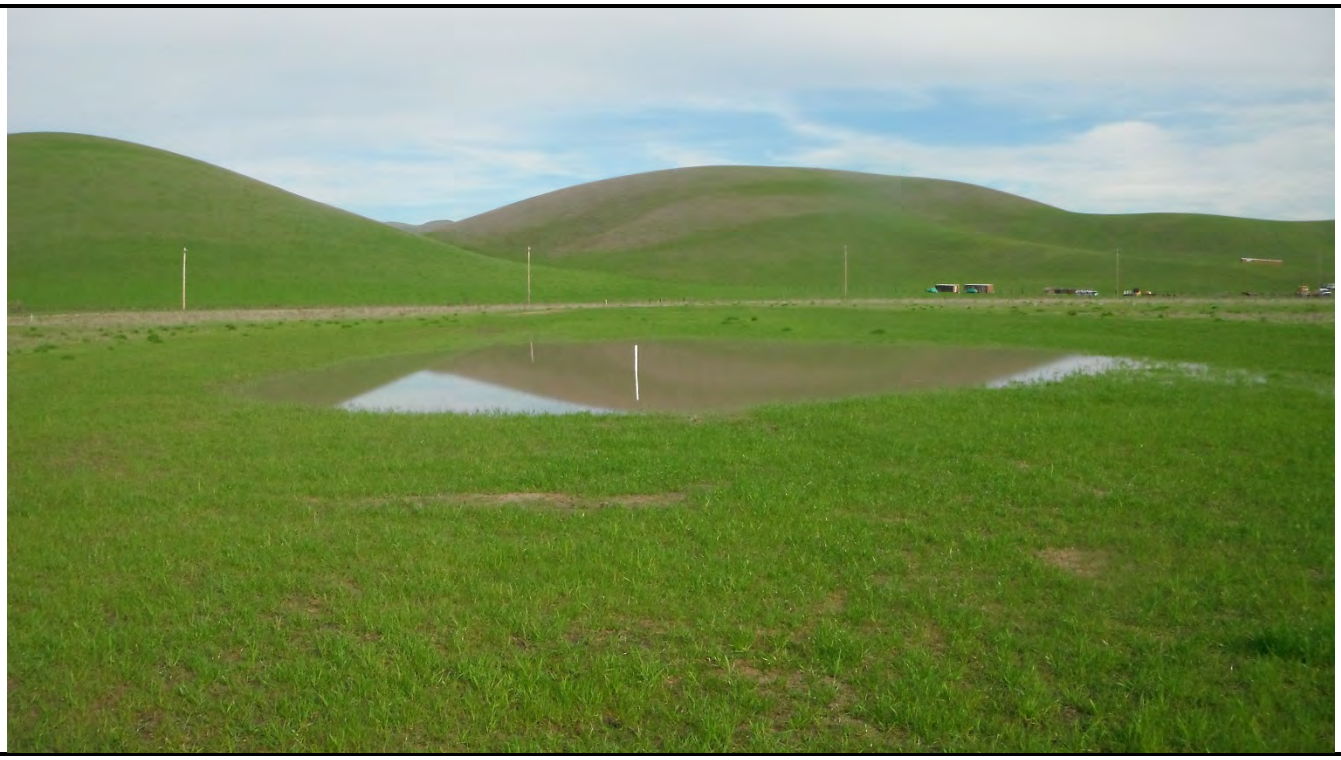


Photo shows wetland 5 holding 2.9 feet of water. Photo taken January 21, 2016.

Photo shows wetland 6 holding 2.8 feet of water. Photo taken January 21, 2016.

Photo shows wetland 7 holding 4.3 feet of water. Photo taken January 21, 2016.

Photo shows wetland 8 holding 2 feet of water. Photo taken January 21, 2016.

ATTACHMENT 9
PLANT LIST

Project:	Collier Creek Mitigation Bank; Alameda/Contra Costa Counties
Date:	June 21, 2011; February 9, 2012
Delineators:	Christopher Bronny, Josh Good

[ ] denotes recent taxonomic name change (The Jepson Manual, 2nd Ed., 2012)

*denotes naturalized species

Scientific Name	Common Name	Wetland Indicator Status
Section - Eudicots		
Apiaceae		
Eryngium aristulatum	Jepson's button-celery	**OBL**
*Foeniculum vulgare**	Sweet fennel	**FACU**
Lomatium sp.	Lomatium	
Perideridia howellii	Howell's yampah	**FACW**
*Torilis arvensis**	Field hedge parsley	**UPL**
Apocynaceae		
Asclepias fascicularis	Narrow-leaved milkweed	**FAC**
Asteraceae		
*Anthemis cotula**	Mayweed	**FACU**
Baccharis pilularis	Coyote brush	**UPL**
*Carduus pycnocephalus**	Italian thistle	**UPL**
*Centaurea solstitialis**	Yellow star-thistle	**UPL**
Centromadia parryi ssp. *congdonii*	Congdon's tarplant	
Centromadia pungens ssp. *pungens*	Common tarweed	**FAC**
*Cirsium vulgare**	Bull thistle	**UPL**
*Cotula coronopifolia**	Brass-buttons	**FACW**
*Cynara cardunculus**	Cardoon	**UPL**
Grindelia camporum	Great Valley gumweed	**FACU**
Holocarpha virgata	Pitgland tarweed	**UPL**
*Hypochaeris glabra**	Smooth cat's-ear	**UPL**
*Lactuca saligna**	Willowleaf lettuce	**NI**
*Lactuca serriola**	Prickly lettuce	**FAC**
*Picris echioides**	Bristly ox-tongue	**FAC**
*Senecio vulgaris**	Common groundsel	**NI**
*Silybum marianum**	Milk thistle	**UPL**
*Sonchus asper**	Spiny sow-thistle	**FAC**
*Sonchus oleraceus**	Common sow-thistle	**NI**
*Tragopogon porrifolius**	Salsify	**UPL**
Xanthium spinosum	Spiny cocklebur	**FAC**
Azollaceae		
Azolla filiculoides	Duck-weed fern	**OBL**
Boraginaceae		

Amsinckia menziesii	Small-flowered fiddleneck	**UPL**
Cryptantha sp.	Cryptantha	**UPL**
Brassicaceae		
*Brassica nigra**	Black mustard	**UPL**
*Hirschfeldia incana**	Shortpod mustard	**UPL**
*Lepidium latifolium**	Perennial pepperweed	**FACW**
Lepidium nitidum var. *nitidum*	Shining peppergrass	**UPL**
Nasturtium officinale	Water-cress	**OBL**
*Raphanus sativus**	Wild radish	**UPL**
Caryophyllaceae		
*Cerastium glomeratum**	Mouse-ear chickweed	**UPL**
*Spergularia bocconi**	Boccone's sand-spurrey	**UPL**
Spergularia macrotheca var. *longistyla*	Sticky sand-spurrey	**FAC**
Chenopodiaceae		
Atriplex joaquiniana	San Joaquin spearscale	**UPL**
Atriplex triangularis	Spearscale	
Convolvulaceae		
*Convolvulus arvensis**	Field bindweed	**UPL**
Cressa truxillensis	Alkali weed	**FACW**
Euphorbiaceae		
Croton setigerus	Turkey mullein	**UPL**
Fabaceae		
*Lotus corniculatus**	Bird's-foot trefoil	**FAC**
*Medicago polymorpha**	California bur-clover	**UPL**
*Melilotus indica**	Sour clover	**FAC**
*Trifolium fragiferum**	Strawberry clover	**NI**
*Trifolium hirtum**	Rose clover	**UPL**
Trifolium spp.	Clover	**Varies**
Vicia sativa spp. *nigra**	Common vetch	**UPL**
Frankeniaceae		
Frankenia salina	Alkali heath	**FACW**
Geraniaceae		
*Erodium botrys**	Filaree	**UPL**
*Erodium cicutarium**	Red-stem filaree	**UPL**
*Geranium dissectum**	Cut-leaf geranium	**UPL**
*Geranium molle**	Dove geranium	**UPL**
Lamiaceae		
Stachys ajugoides	Hedge-nettle	**OBL**
Lythraceae		
*Lythrum hyssopifolium**	Hyssop loosestrife	**FACW**
Malvaceae		
*Malva parviflora**	Cheeseweed	**UPL**

Malvella leprosa	Alkali mallow	**FAC**
Mrysinaceae		
*Anagallis arvensis**	Scarlet pimpernel	**FAC**
Centunculus minimus	Chaffweed	**FACW**
Onagraceae		
Epilobium brachycarpum	Annual fireweed	**UPL**
Epilobium ciliatum	Willow-herb	**FACW**
*Ludwigia peploides**	Yellow water primrose	**OBL**
Orobanchaceae		
*Bellardia trixago**	Mediterranean lineseed	**UPL**
Papaveraceae		
Eschscholzia californica	California poppy	**UPL**
Plantaginaceae		
Plantago elongata	Prairie plantain	**FACW**
*Plantago lanceolata**	English plantain	**FAC**
*Plantago major**	Common plantain	**FACW**
Polygonaceae		
*Polygonum arenastrum**	Common knotweed	**FAC**
*Rumex crispus**	Curly dock	**FACW**
*Rumex pulcher**	Fiddle dock	**FAC**
Rosaceae		
Prunus sp.*	Prunus	
Rosa californica	California wild rose	**FAC**
Salicaceae		
Salix laevigata	Red willow	
Sapindaceae		
Acer negundo var. *californicum*	Box-elder	**FACW**
Sauraceae		
Anemopsis californica	Yerba mansa	**OBL**
Ulmaceae		
Ulmus sp.*	Elm	
Section - Monocots		
Cyperaceae		
Carex sp.	Carex	**Varies**
Cyperus eragrostis	Tall flatsedge	**FACW**
Eleocharis macrostachya	Common spike-rush	**OBL**
Schoenoplectus californicus	Southern bulrush	**OBL**
Juncaceae		
Juncus balticus	Baltic rush	**OBL**
Juncus bufonius	Toad rush	**FACW**
Juncus xiphioides	Iris-leaved rush	**OBL**
Juncaginaceae		

Triglochin maritima	Common arrow-grass	**OBL**
Poaceae		
*Avena barbata**	Slender wild oat	**UPL**
*Avena fatua**	Wild oat	**UPL**
*Bromus diandrus**	Rip-gut brome	**UPL**
*Bromus hordeaceus**	Soft chess	**FACU**
Bromus madritensis ssp. *rubens**	Red brome	**UPL**
*Cynodon dactylon**	Bermuda grass	**FAC**
Deschampsia danthanioides	Annual hairgrass	**FACW**
Distichlis spicata	Salt grass	**FACW**
Elymus [*Leymus*] *triticoides*	Creeping wild-rye	**FAC**
Festuca [*Lolium*] *perennis**	Perennial rye grass	**FAC**
Festuca **[***Vulpia*] *myuros**	Rat-tail fescue	**FACU**
Hordeum brachyantherum	Meadow barley	**FACW**
Hordeum marinum ssp. *gussoneanum**	Mediterranean barley	**FAC**
Hordeum murinum ssp. *leporinum**	Hare barley	**NI**
*Poa annua**	Annual bluegrass	**FACW**
*Polypogon interruptus**	Ditch polypogon	**OBL**
*Polypogon monspeliensis**	Rabbit's-foot grass	**FACW**
Themidaceae		
	Geophytes	
Typhaceae		
Typha angustifolia	Narrow-leaved cattail	**OBL**
Typha latifolia	Broad-leaved cattail	**OBL**
Urticaceae		
Urtica dioica ssp. *holosericea*	Stinging nettle	**FACW**

Wetland Plant Indicator Status Categories:

Indicator Category	**Symbol**	**Frequency of Occurrence**
Obligate	OBL	> 99%
Facultative Wetland	FACW	67-99%
Faculatative	FAC	34-66%
Facultative Upland	FACU	1-33%
Upland	UPL	< 1%

***** Based upon information contained in Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987).

ATTACHMENT 10
CORPS JURISDICTIONAL DELINEATION AND JURISDICTIONAL DETERMINATION LETTER

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET, 16TH FLOOR
SAN FRANCISCO, CALIFORNIA 94103-1398

REPLY TO
ATTENTION OF

AUG 13 2012

Regulatory Division

SUBJECT: File No. 2012-00093S

Mr. Jeff Olberding
Olberding Environmental, INC
3170 Crow Canyon Place, Suite 260
San Ramon, Califonia 94583

Dear Mr. Olberding:

This correspondence is in reference to your submittal of March 1, 2012, on behalf of Water Hole Land Company, INC, requesting an approved jurisdictional determination of the extent of navigable waters of the United States and waters of the United States occurring within the 341 acre Collier Creek study area. The study area is located along the Alameda/Contra Costa County line, north of Interstate-580, in Alameda/Contra Costa Counties, California (APN'S 006-200-006-2 , 903-0002-004, and 905-0005-007).

All proposed discharges of dredged or fill material occurring below the plane of ordinary high water in non-tidal waters of the United States; or below the high tide line in tidal waters of the United States; and within the lateral extent of wetlands adjacent to these waters, typically require Department of the Army authorization and the issuance of a permit under Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq.*). Waters of the United States generally include the territorial seas; all traditional navigable waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters subject to the ebb and flow of the tide; wetlands adjacent to traditional navigable waters; non-navigable tributaries of traditional navigable waters that are relatively permanent, where the tributaries typically flow year-round or have continuous flow at least seasonally; and wetlands directly abutting such tributaries. Where a case-specific analysis determines the existence of a "significant nexus" effect with a traditional navigable water, waters of the United States may also include non-navigable tributaries that are not relatively permanent; wetlands adjacent to non-navigable tributaries that are not relatively permanent; wetlands adjacent to but not directly abutting a relatively permanent non-navigable tributary; and certain ephemeral streams in the arid West.

All proposed structures and work, including excavation, dredging, and discharges of dredged or fill material, occurring below the plane of mean high water in tidal waters of the United States; in former diked baylands currently below mean high water; outside the limits of mean high water but affecting the navigable capacity of tidal waters; or below the plane of ordinary high water in non-tidal waters designated as navigable waters of the United States, typically require Department of the Army authorization and the issuance of a permit under Section 10 of the Rivers and Harbors Act of 1899, as amended (33 U.S.C. § 403 *et seq.*).

Navigable waters of the United States generally include all waters subject to the ebb and flow of the tide; and/or all waters presently used, or have been used in the past, or may be susceptible for future use to transport interstate or foreign commerce.

The enclosed delineation map entitled, USACE # 2012-00093S Collier Creek Property, Jurisdictional Determination, in one (1) sheet, date certified July, 11 2012, accurately depicts the extent and location of approximately 2.71 acres of wetlands and approximately 5.09 acres of other waters of the United States, within the boundary area of the site that are subject to U.S. Army Corps of Engineers' regulatory authority under Section 404 of the Clean Water Act. This approved jurisdictional determination is based on the current conditions of the site, as verified during a field investigation of May 22, 2012 a review of available digital photographic imagery, and a review of other data included in your submittal. This approved jurisdictional determination will expire in five (5) years from the date of this letter, unless new information or a change in field conditions warrants a revision to the delineation map prior to the expiration date.

The enclosed delineation map further depicts the extent and location of wetlands and other waters of the United States within the boundary area of the site that are **not** subject to U.S. Army Corps of Engineers' regulatory authority under Section 404 of the Clean Water Act. These particular intrastate water bodies are considered to be isolated with no apparent connection to interstate or foreign commerce. This approved jurisdictional determination is presumed to be consistent with the U.S. Supreme Court decision of January 9, 2001, concerning the *Solid Waste Agency of Northern Cook County v. United States Corps of Engineers*, 531 U.S. 159 (2001) ("SWANCC"). In the SWANCC decision, the Court invalidated, at least, portions of the Migratory Bird Rule as a sole nexus to the Commerce Clause, and ruled that the U.S. Army Corps of Engineers had exceeded its statutory authority in exerting jurisdiction over non-navigable isolated, intrastate waters that did not provide some other interstate or foreign commerce use (33 C.F.R § 328.(a)(3)). These delineated wetlands and other waters, however, may be considered as "waters of the State," and, therefore, subject to regulation by the California Regional Water Quality Control Board, San Francisco Bay Region, North Coast Region, under the Porter-Cologne Water Quality Control Act, as amended (California Water Code § 1300 *et seq.*).

You are advised that the approved jurisdictional determination may be appealed through the U.S. Army Corps of Engineers' *Administrative Appeal Process*, as described in 33 C.F.R. Part 331 (65 Fed. Reg. 16,486; Mar. 28, 2000), and outlined in the enclosed flowchart and *Notification of Administrative Appeal Options, Process, and Request for Appeal* (NAO-RFA) Form. If you do not intend to accept the approved jurisdictional determination, you may elect to provide new information to this office for reconsideration of this decision. If you do not provide new information to this office, you may elect to submit a completed NAO-RFA Form to the Division Engineer to initiate the appeal process; the completed NAO-RFA Form must be submitted directly to the Appeal Review Officer at the address specified on the NAO-RFA Form.

You will relinquish all rights to a review or an appeal, unless this office or the Division Engineer receives new information or a completed NAO-RFA Form within sixty (60) days of the date on the NAO-RFA Form. If you intend to accept the approved jurisdictional determination, you do not need to take any further action associated with the Administrative Appeal Process.

You may refer any questions on this matter to Nina Cavett-Cox of my Regulatory staff by telephone at 415-503-6765 or by e-mail at Christina.Cavett-Cox@usace.army.mil. All correspondence should be addressed to the Regulatory Division, South Branch, referencing the file number at the head of this letter.

The San Francisco District is committed to improving service to our customers. My Regulatory staff seeks to achieve the goals of the Regulatory Program in an efficient and cooperative manner, while preserving and protecting our nation's aquatic resources. If you would like to provide comments on our Regulatory Program, please complete the Customer Service Survey Form available on our website: http://www.spn.usace.army.mil/regulatory/.

Sincerely,

for

Jane M. Hicks
Chief, Regulatory Division

Enclosures

Copy Furnished (w/ encls):

Waterhole Land Company, LLC
193 Blue Ravine Road, Suite 165
Folsom, California 95630

Copy Furnished (w/ encl 1 only):

CA RWQCB, Oakland, CA

Copy Furnished (w/o encls):

U.S. EPA, San Francisco, CA

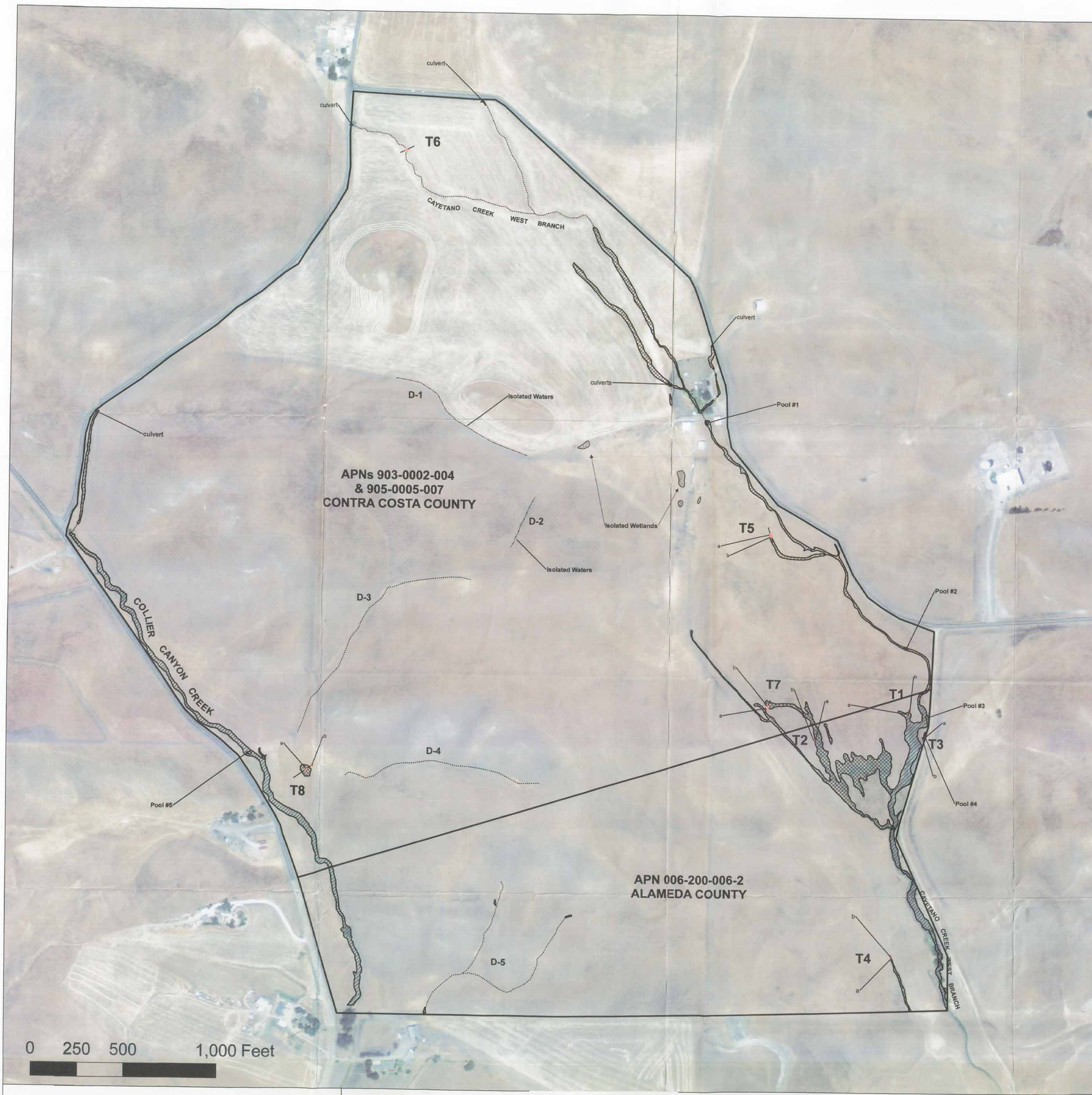


Figure 9
Collier Creek
Mitigation/Conservation Bank
Jurisdictional Delineation Map

Alameda County / Contra Costa County
California

Olberding Environmental, Inc.
3170 Crow Canyon Place, Suite 260
San Ramon, California 94583
Phone: (925) 866-2111

- Property Boundary
- Data Point
- T (Transect)
- Jurisdictional Wetland
- Jurisdictional Waters with instream wetlands
- Pool
- Ephemeral Drainage
- Non-jurisdictional waters
- Non-jurisdictional wetland

U.S. Army Corps of Engineers
San Francisco District
Regulatory Branch

Jurisdictional Determination
USACE File #2012-000935
Collier Creek Mitigation Bank Site
Dated: 8/8/2012
Accurate as mapped

Waters of the US - Area subject to Section 404 Clean Water Act jurisdiction 5.09 acres

Wetlands - Area subject to Section 404 Clean Water Act jurisdiction 2.71 acres

Project Boundary

Jurisdictional Wetlands (2.71 acres)

Seasonal Wetland (1.61 acre)
Seasonal Swale (1.10 acre)

Jurisdictional Waters (5.09 acres)

Cayetano Creek (West branch)
(2.07 acres; 5,813 linear feet)
Average width = 10.9 feet

Collier Canyon Creek
(1.85 acres; 3,881 linear feet)
Average width = 15.1 feet

Pools 1 - 5 (0.03 acre)

Ephemeral Drainages
D-3 = 0.64 acre; 1,397 feet
D-4 = 0.41 acre; 1,103 feet
D-5 = 0.09 acre; 1,722 feet

Non-Jurisdictional

Isolated Wetlands (0.12 acre)

Isolated Waters (0.031 acre)
(D-1 = 0.03 acre; 850 feet)
(D-2 = 0.001 acre; 306 feet)

N

1 inch = 200 feet

Township 2 S, Range 1 E, Section 13 and
Township 2 S, Range 2 E Section 18; M.D.M.
Image Source: USDA NAIP 2009
Field Verified by U.S. Army Corps of Engineers
on May 22, 2012

ATTACHMENT 11
EVALUATION OF SOIL PARTICLE SIZE ANALYSES

GeoSolve, Inc.
Geoscience Solutions rather than Status Quo

Visit us at www.geosolve-inc.com

Project No. 2013-02
February 4, 2013

Mr. Mark Dawson
Water Hole Land Company
3170 Crow Canyon Place, Suite 260
San Ramon, California 94583

Subject: Proposed Wetlands – 30-acres
Collier Creek Property – APNs 903-0002-004 & 903-0005-007
Contra Costa County, California
EVALUATION OF SOIL PARTICLE SIZE ANALYSES

Dear Mr. Dawson:

At your request, ***GeoSolve, Inc.*** has prepared this Evaluation of Soil Particle Size Analyses for the Collier Creek property situated between Collier Canyon Road and Manning Road in southern Contra Costa and northern Alameda Counties, California. The subject site is situated along Collier Creek and Collier Creek Road, north of Livermore, California. Wetlands are planned to be constructed in various locations around the subject site and the purpose of this work was to evaluate the clay content of the subsurface soil to promulgate wetland development along Collier Creek and the West Branch of the Cayetano Creek in Alameda and Contra Costa Counties, California. This work was conducted in accordance with our Proposal No. 13-06 dated January 23, 2013.

Fieldwork

On January 28, 2013, a ***GeoSolve, Inc.*** field geologist visited the subject to randomly collect six (6) grab soil samples from approximately 2 feet below ground surface (bgs) from proposed wetland locations. The soil samples were collected using a narrow-headed shovel, and each sampling location was hand-excavated to approximately 2 feet bgs, and grab soil from 2 feet bgs was placed within zip-lock baggies, which were labeled, and placed within a crate. Each soil sampling location was recorded using a portable global positioning satellite (GPS) device. Four of the soil samples (W-1 through W-4) were collected along the eastern boundary of the property and two of the soil samples (W-5 and W-6) were collected along the western property boundary, near Collier Creek. The location of the site is shown on Figure 1, Site Vicinity Map and soil sample locations are shown on Figure 2, Soil Sample Locations, which are attached to this letter report. Soil samples W-5 and W-6 were collected in close proximity due to newly installed barbed-wire fencing, which prevented sampling north of sample W-5. Pictures of sampling locations and the site are shown below.

Soil sample location W-3 and view from soil sample location W-2. The soil sample GPS locations are shown below.

Soil Sample Number	Latitude	Longitude
W-1	N37.75161	-W121.80035
W-2	N37.75538	-W121.80264
W-3	N37.76223	-W121.80509
W-4	N37.76530	-W121.81134
W-5	N37.75623	-W121.81322
W-6	N37.75564	-W121.81295

Soil samples W-1 through W-6 were listed on a Consolidated Engineering Laboratories, Inc. (CEL) Laboratory Test Request form, and submitted to CEL for particle size analyses using American Standards for Testing Materials (ASTM) D422-67 (2007).

The laboratory testing results indicated most of the samples consisted of fatty clay and all the soil samples were classified as highly plastic clay (CH) according to the Unified Soil Classification System (USCS). The soil particle size percentage results are shown on the attached Table 1, Particle Size Distribution Results. A copy of the CEL testing report is also attached to this letter report.

Discussion and Conclusion

The CEL soil particle size distribution results indicated an average of 60.4% of clay, 21.6% of silt, and 18% of sand. The greatest sand percentage was tested from soil sample W-6, near Collier Creek at 47.4%, and the greatest clay percentage was tested from soil sample W-3 at 79.6%. Based on the mostly low percentage of sand tested in soil samples W-1 through W-5, the eastern and western portions of the site are good to excellent locations for proposed wetlands. Soil sample W-6

was collected closer to Collier Creek and proposed wetlands should be sited further away from the Collier Creek. Although the soil samples were collected from approximately 2 feet bgs, the surficial soil to approximately 2 feet bgs consisted of very hard and plastic clay. In addition, the soil erodibility factor (K) was calculated from the sediment percentages and an average k factor of 0.18 was calculated for the soil samples tested. Medium textured soil, such as the silt loam soil, has a moderate K value, about 0.25 to 0.4, because they are moderately susceptible to detachment and produce moderate runoff. Soil indicating high silt content is most erodible of all soil, since they are easily detached, tend to crust and produce high rates of runoff. Values of K for silty soil tend to be greater than 0.4. The K value of 0.18 indicates mostly clay soil.

Based on the geologic map of Contra Costa County (Brabb et al., 1994), the bedrock at the subject site consists of the non-marine Pilocene and Pleistocene Green Valley and Tassajara Formations, which are mapped as alternating layers of conglomerate, sandstone, siltstone and claystone divided by the Lawlor Tuff, highly plastic clay. The geologic units within the hills around the subject site are more consistent with siltstone and claystone, which has eroded into the valley below and provided the high clay content to the soil.

Although soil sampling was limited to 2 feet bgs, ***GeoSolve, Inc.*** suggests the subsurface soil below 2 feet bgs consists of silty clay with very low permeability, based on the surrounding outcrops of siltstone and claystone with minor sandstone (Brabb, et al, 1994). The subject valley areas evaluated in soil samples W-1 through W-6 are good locations for wetlands. Given the soil type was fairly consistent in the sampling locations W-1 through W-5 it appears wetlands can be sited on and around these sampling locations. Soil sample W-6 was collected near Collier Creek and indicated a higher than average sand percentage. Future wetlands should be sited further away from Collier Creek to limit the percentage of sand and increase the percentage of clay in the soil. The wetlands should be designed by biological professionals in accordance with United States Army Corps of Engineers standards.

Should you have any questions regarding this letter report or other questions, please contact us at your convenience.

Sincerely,

GeoSolve, Inc.

Robert D. Campbell, M.S., P.G., C.E.G., Q.S.D.
Principal Geologist

Attachments: Figure 1, Site Vicinity Map
Figure 2, Soil Sample Locations
Table 1, Particle Size Distribution Results
CEL Particle Size Testing Results

Reference: Brabb, E.E., Graymer, R.W., Jones, D.L., 1994. *Preliminary Geologic Map Emphasizing Bedrock Formations in Contra Costa County, California: A Digital Database, U.S.G.S. Open File Report 94-622.*

Reference: Google Maps, 2012

GeoSolve, Inc.
Geoscience solutions rather than Status-Quo
Address: 1807 Santa Rita Rd, Suite D-165
Pleasanton, California 94566

VICINITY MAP

WATER HOLE LAND COMPANY
PROPOSED WETLAND PROJECT
COLLIER CANYON ROAD
ALAMEDA and CONTRA COSTA COUNTIES
CALIFORNIA

Project No.	Drawn by:
2013-03	GC
Scale:	Date:
NTS	01/2013

Figure No.
1

Reference: Google Earth, 2013

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Pleasanton, California 94566

SOIL SAMPLE LOCATIONS

WATER HOLE LAND COMPANY
PROPOSED WETLAND PROJECT
COLLIER CANYON ROAD
ALAMEDA and CONTRA COSTA COUNTIES
CALIFORNIA

Project No.	Drawn by:
2013-03	GC
Scale:	Date:
≈ 1" = 1000'	01/2013

Figure No.
2

Table 1 - Particle Size Distribution Results
Water Hole Development Company
GeoSolve, Inc. Project No. 2013-02
Collier Creek Canyon
Alameda and Contra Costa Counties, California

Sample ID	Sand %	Silt %	Clay %	USCS Classification	Soil Erodibility Factor (k)
W-1	18.1	23.7	58.2	CH	0.19
W-2	10.7	21.5	67.8	CH	0.17
W-3	2.7	17.7	79.6	CH	0.16
W-4	8.5	25.1	66.4	CH	0.18
W-5	20.6	23.6	55.8	CH	0.19
W-6	47.4	18	34.6	CH	0.17
Average	***18***	***21.6***	***60.4***	***CH***	***0.18***

USCS = Unified Soil Classification System
CH = Clay with high plasticity (fatty clay)

[redacted]

P.O. GEO-000258

Results to Roger

LABORATORY TEST REQUEST - CEL

Job No.: 2013-02

Project: Water Hole

Save Tubes til: (Date)

Save Bulks til: (Date)

Comments: (925) 963-1198

rcampbell@geosolve-inc.com

Report Results to: Rob Campbell - GeoSolve

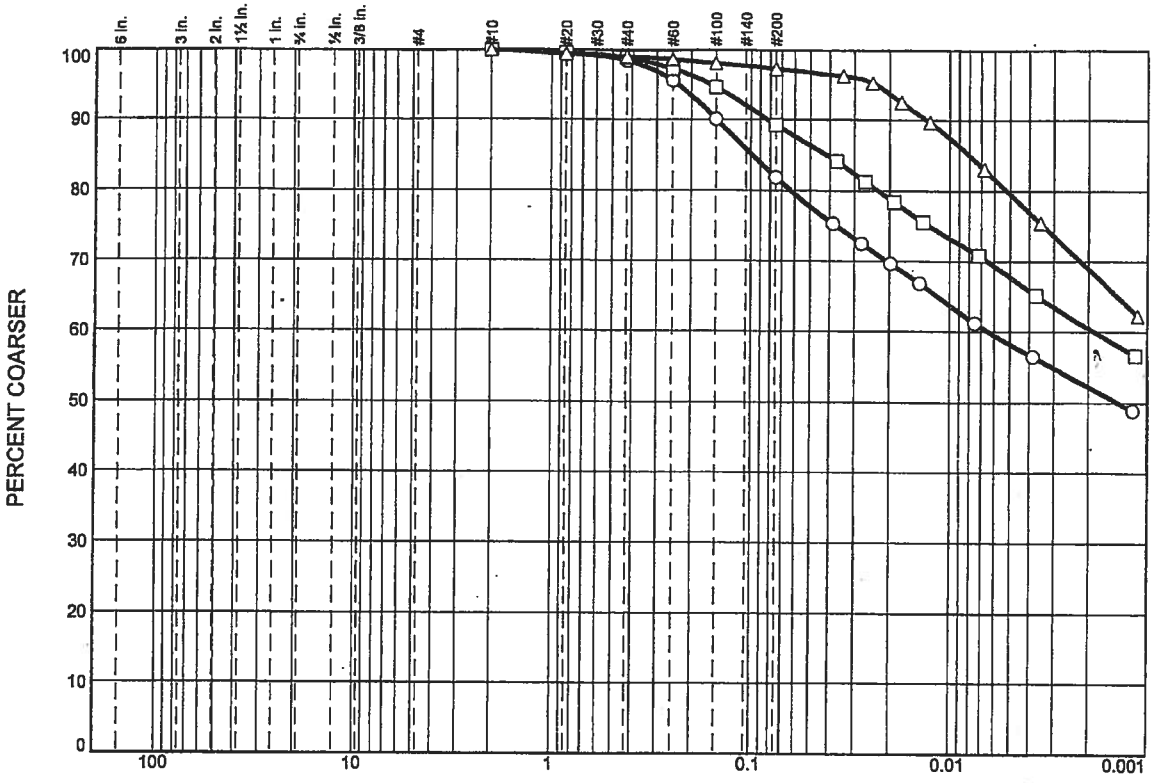
Date: 1/28/13

Requested By: Rob Campbell

Due Date: 2/3/13

SAMPLE No.	DEPTH (feet)	SAMPLE TYPE	USCS SOIL TYPE	Density/Moisture	Moisture Content	SIEVE		Hydrometer	Atterberg Limits	Expansion Index	Unconfined Compression	DIRECT SHEAR			CONSOLIDATION or SWELL					R-VALUE	Water Soluble Sulfate	Corrosion	MAXIMUM DENSITY			Sand Equivalent	Comments or Other Testing
						Sieves	200 wash					Undisturbed	Remolded	Residual	Single Point	Multi-Point	Swell	Collapse	Time-rate				4-inch	6-inch	Check Point		
				2046	2088	2230	2238	2054	2040	2037	2083	2029	2027	2030	2048	2047	2051	2013	2049	2065		2022	2018	2018	2016	2071	ASTM Unless Specified
W-1	2	Grab				X		X																			
W-2	2	↓				X		X																			
W-3	2					X		X																			
W-4	2					X		X																			
W-5	2					X		X																			
W-6	2					X		X																			

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	1.5	16.6	23.7	58.2
□	0.0	0.0	0.0	0.0	1.1	9.6	21.5	67.8
△	0.0	0.0	0.0	0.0	1.0	1.7	17.7	79.6

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○		W-1	2'	Greyish black FAT CLAY.Some fine sand.Trace organics.	CH
□		W-2	2'	Greyish black FAT CLAY.Some fine sand.Trace organics.	CH
△		W-3	2'	Gryish black FAT CLAY.Trace organics.	CH

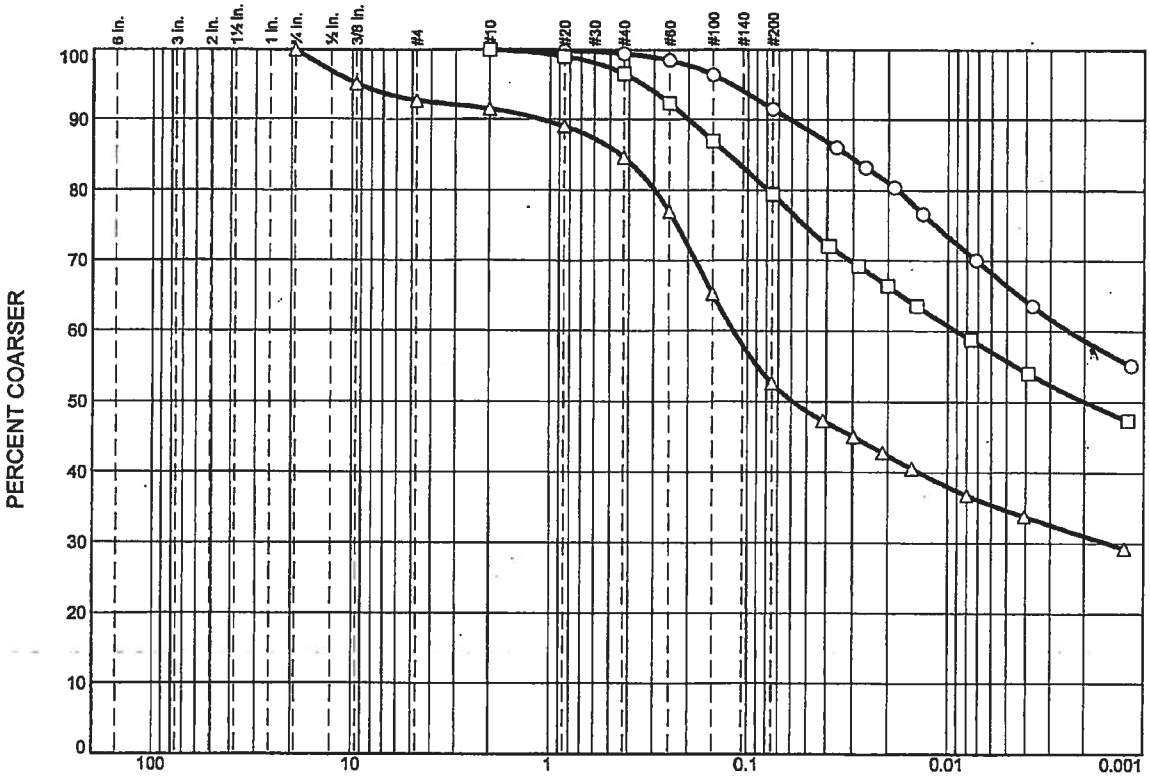
Soil Mechanics Lab

Oakland, California

Client: Geosphere Consultants,Inc.
Project: Water Hole
Project No.: 91-2013-02 **Plate**

Tested By: MA

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.6	7.9	25.1	66.4
□	0.0	0.0	0.0	0.0	3.5	17.1	23.6	55.8
△	0.0	0.0	7.3	1.2	6.9	32.0	18.0	34.6

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○		W-4	2'	Greyish black FAT CLAY.Trace fine sand and organics	CH
□		W-5	2'	Greyish black FAT CLAY.Some fine sand.Trace organics.	CH
△		W-6	2'	Greyish black FAT CLAY with f-c sand.Trace f-gravel and	CH
				organics.	

Soil Mechanics Lab

Oakland, California

Client: Geosphere Consultants,Inc.
Project: Water Hole
Project No.: 91-2013-02 **Plate**

Tested By: MA