Permittee-Responsible Wetland Mitigation and Monitoring Plan

Amoruso Ranch

Placer County, California

Prepared for:

Brookfield Sunset LLC

August 28, 2019

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ECORP Consulting, Inc. has assisted public and private land owners with environmental regulation compliance since 1987. We offer full service capability, from initial baseline environmental studies through environmental planning review, permitting negotiation, liaison to obtain legal agreements, mitigation design, and construction monitoring and reporting.

Citation: ECORP Consulting, Inc. DRAFT. 2019. Mitigation and Monitoring Plan for the Amoruso Ranch Project. Prepared for Brookfield Sunset LLC. August.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 RESPONSIBLE PARTIES

1.1 Applicant:

Brookfield Sunset, LLC
Attn: Mr. John Norman
2271 Lava Ridge Court, Suite 220
Roseville, California 95661
Phone: (916) 783-1177

1.2 Agent:

Attn: Mr. Dave Krolick
ECORP Consulting, Inc.
2525 Warren Drive
Rocklin, California 95677
Phone: (916) 782-9100
Fax: (916) 782-9134

2.0 PROJECT DESCRIPTION

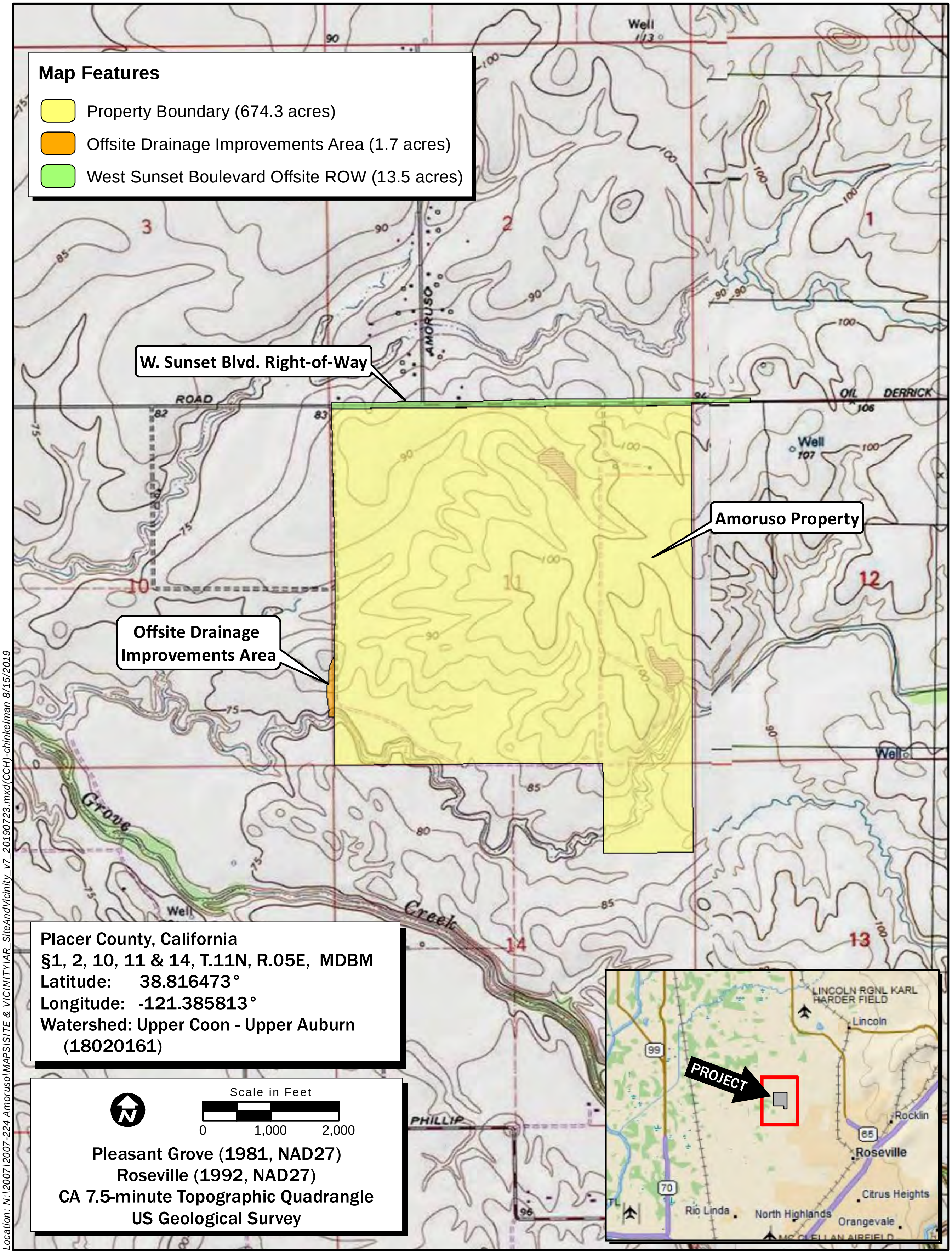
2.1 Project Location

The Amoruso Ranch Project (Project) is located west of Fiddyment Road and south of West Sunset Boulevard in Placer County, California (Figure 1. *Amoruso Ranch Property and Offsite Improvements Location and Vicinity*). The Project corresponds to portions of Sections 1, 2, 10, 11 & 14, Township 11 North, Range 5 East, of the "Pleasant Grove, California" USGS 7.5-minute quadrangle (U.S. Geological Survey [USGS] 1981) and the "Roseville, California" USGS 7.5-minute quadrangle (USGS 1992). The center of the site is located at approximately 38.816473° North, -121.385813° West.

2.2 Project Description

The ±646-acre Project lies within a portion of the ±674-acre Amoruso Ranch property, and also includes the ±13.5-acre West Sunset Boulevard right-of-way (ROW), and ±1.7 acres of the Al Johnson Wildlife Area property referenced as Offsite Drainage Improvements Area (Figure 2. *Amoruso Ranch Project Detail*). The Project area excludes the future Placer Parkway alignment, which is shown on Figure 2 as Not a Part of this Subdivision (NAPOTS).

The Project consists of a mixture of land uses (Figure 3. *Amoruso Ranch Land Use Plan*). It will include ±328 gross acres of residential uses including low- (0.5-6.9 dwelling units per acre), medium- (7.0-12.9 dwelling units per acre), and high-density (13.0 and more dwelling units per acre). The residential areas are intended to be a blend of densities and housing types very similar to an older neighborhood established in the 1920s.



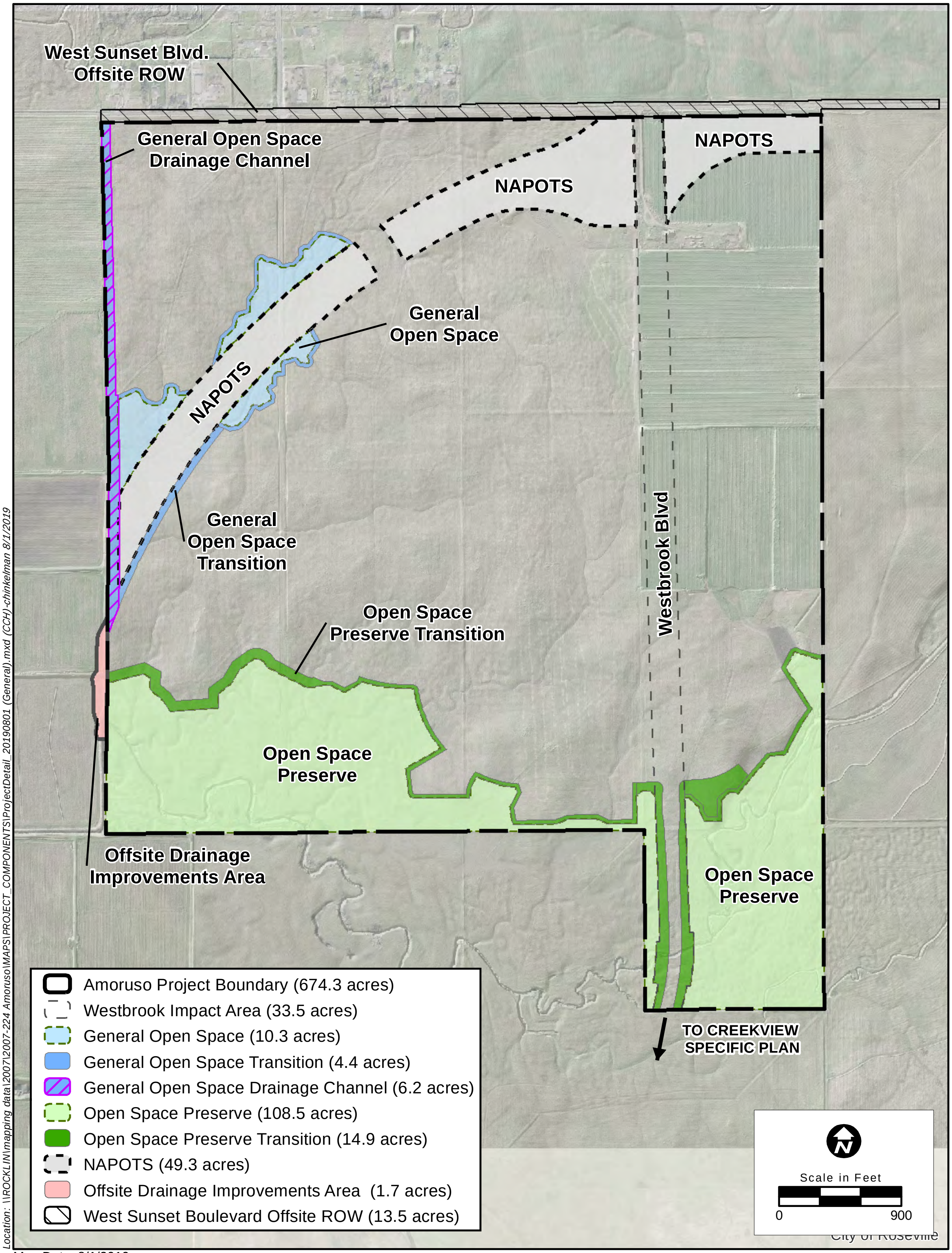
Map Date: 8/15/2019
Sources: ESRI, DeLorme, USGS

DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 1. Amoruso Ranch Property and Offsite Improvements Location and Vicinity

2007-224 Amoruso Ranch



Map Date: 8/1/2019
Photo Source: 2017, City of Roseville Ortho

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 2. Amoruso Ranch Project Detail

2007-224 Amoruso Ranch

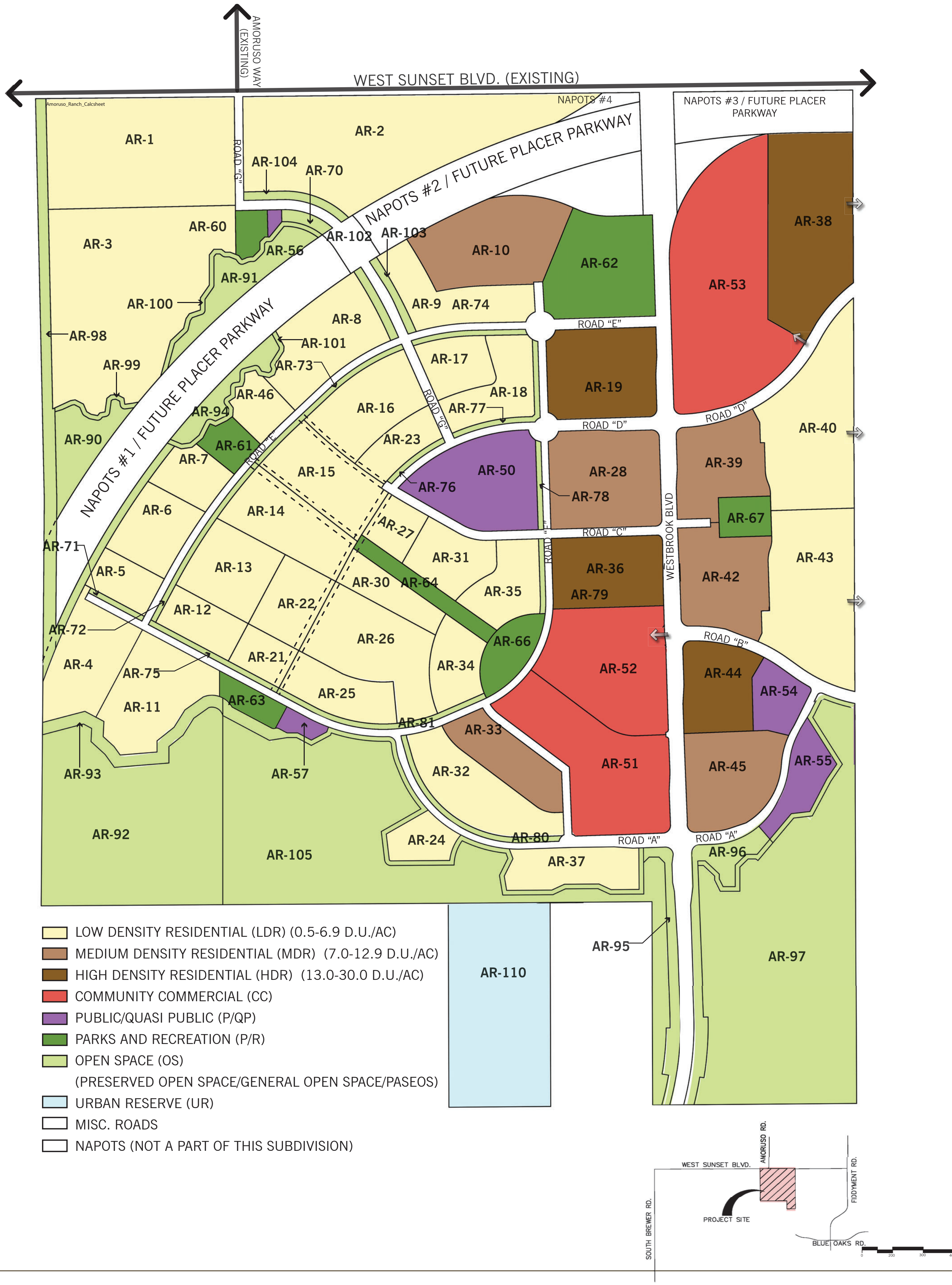


Figure 3. Amoruso Ranch Land Use Plan

BROOKFIELD RESIDENTIAL, ROSEVILLE, CA

DAHLIN group
JOB NO. 316.002
DATE 06-27-2019
5865 Owens Drive
Pleasanton, CA 94588
925-251-7200

Other land uses that make up the proposed community include Village Center and community Commercial (±51 acres), Public/Quasi-Public (±17 acres [includes three acres for a fire station and 10 acres for a school]), parks and recreation (±22 acres), open space (±155 acres [includes the approximately 108-acre Onsite Preserve, 36 acres of General Open Space/Transition Zone, and 11 acres of paseos]), and roads/ROWs (±101 acres [includes 18 acres for the northern portion of Westbrook Boulevard and 49 acres for NAPOTS]).

The Commercial land uses will consist of a Village Center (CC-CMU), intended to create a small village atmosphere, and a more conventional Commercial site (CC) located adjacent to the future interchange along Placer Parkway, which will allow for regional commercial and business park uses. A significant amount of the Project is dedicated to open space and park usage. These include parcels for Parks and Recreation (P/R) and Public, General, and preserved open space (OS), and Public/Quasi-Public (P/QP).

The P/R land uses will include parcels where formal developed park facilities are planned, which can include active and passive park spaces ranging in size from 1 to 10 acres. The Open Space (OS[1]) parcels include lands that will be landscaped public paseos, lands that are preserved and contain environmentally sensitive resources regulated by federal permit (as the 108-acre Onsite Preserve), and lands that are general Open Space (OS) and OS Transition Zones, which are intended for resource avoidance, maintenance of public utilities, fire breaks and trails. The Public/Quasi-Public areas accommodate a variety of public-serving uses and facilities, such as school, fire station, and areas for specific infrastructure related items (e.g., water storage tank).

The development of the proposed Project will result in the unavoidable direct impact to 13.98 acres of regulated Waters of the U.S., of which, 8.96 acres are considered potential habitat for federally listed branchiopod species. The mitigation proposed to offset Project impacts is the protection of onsite open space wetlands and the creation (establishment per USACE 2008 Mitigation Rule) and preservation of wetlands within adjacent properties to the Project which will be conserved as permanent private open space (Offsite Preserves). The overall mitigation strategy for the Project includes three properties: Mourier East and Mourier West (collectively Offsite Preserves), and Skover. The Mourier Properties will be used for aquatic resource and species habitat mitigation. The Skover Property is an active laser-leveled rice field that is adjacent to the Offsite Preserves. Skover is currently reserved for upland mitigation and therefore is not included in this Wetland Mitigation and Monitoring Plan.

2.3 Plan Purpose and Objectives

This Permittee-Responsible Wetland Mitigation and Monitoring Plan (Plan) has been prepared per requirements of the U.S. Army Corps of Engineers (USACE) and the U.S. Fish and Wildlife Service (USFWS). The purpose of this plan is to describe the permittee-responsible approach by which the Project's impacts will be mitigated, including quantification of Project impacts, determination of mitigation ratios, establishment and conservation of the Onsite Preserve within the Project and Offsite Preserves at Mourier

[1]General Open Space and Open Space Preserve as defined in Section 3.2 of the agency-approved *City of Roseville Open Space Preserve Overarching Management Plan* (ECORP 2011).

East and Mourier West Properties, establishment of wetlands/habitat at the Offsite Preserves, and the monitoring methods and performance standards for established wetlands/habitat.

2.4 Plan Goals

The goal of this Plan is to successfully mitigate for the loss of wetland habitat functions and values within the Amoruso Ranch Project by implementing permittee-responsible establishment of vernal pools/complexes and marsh within the same watershed as the proposed impacts and in areas that historically supported these aquatic resources. In support of the goal, the Project Applicant has retained purchase options on neighboring private properties (Offsite Preserves) with the intention to establish and preserve wetland habitat that would provide greater benefits to the Upper Coon-Upper Auburn watershed than purchasing mitigation credits outside of the watershed and/or wetlands of a different classification. The proposed mitigation will benefit regional aquatic resources by protecting endemic plant and wildlife species associated with local wetlands, including vernal pool ecosystems, and contributing to the recovery and survival of vernal pool invertebrates listed under the federal Endangered Species Act (ESA) within the Onsite and Offsite Preserves. Additionally, the proposed Onsite and Offsite Preserves will add to the adjacent regional conservation areas, resulting in larger contiguous preserved and open space areas. The Onsite and Offsite Preserves will be placed under conservation easement and managed for their resources in perpetuity.

3.0 BIOLOGICAL SETTING OF PROJECT SITE

The Amoruso Ranch property is comprised of gently rolling terrain at an elevational range of approximately 70 to 100 feet above mean sea level. The property is comprised of an abandoned homestead, agricultural fields, and largely undeveloped grasslands. The property has been managed for cattle grazing for over 50 years.

3.1 Vegetation

Annual grassland is the dominant vegetation community onsite. The annual grassland community is comprised primarily of non-native, naturalized Mediterranean grasses. These include soft brome (*Bromus hordeaceus*), Italian ryegrass (*Festuca perennis*), wild oat (*Avena fatua*), barbed goatgrass (*Aegilops triuncialis*), little quaking grass (*Briza minor*), medusahead grass (*Elymus caput-medusae*), and Oldfield's three-awn (*Aristida oligantha*). Other herbaceous species in this community include rose clover (*Trifolium hirtum*), little hop clover (*Trifolium dubium*), clustered clover (*Trifolium glomeratum*), yellow star-thistle (*Centaurea solstitialis*), filaree (*Erodium botrys*), winter vetch (*Vicia villosa*), sticky tarweed (*Holocarpha virgata*), chicory (*Cichorium intybus*), common dandelion (*Taraxacum officinale*), cat's ear (*Hypochaeris* sp.), vinegarweed (*Trichostema lanceolatum*), soft geranium (*Geranium molle*) and cut-leaved geranium (*Geranium dissectum*). Valley oak (*Quercus lobata*) trees are scattered throughout the southern portion of the site.

The majority of the Offsite Drainage Improvements Area is composed of leveled agricultural fields situated at elevations ranging from 70 to 80 feet above mean sea level. These leveled fields have been used for rice and wheat cultivation and are separated by small earthen checks or berms approximately two feet tall.

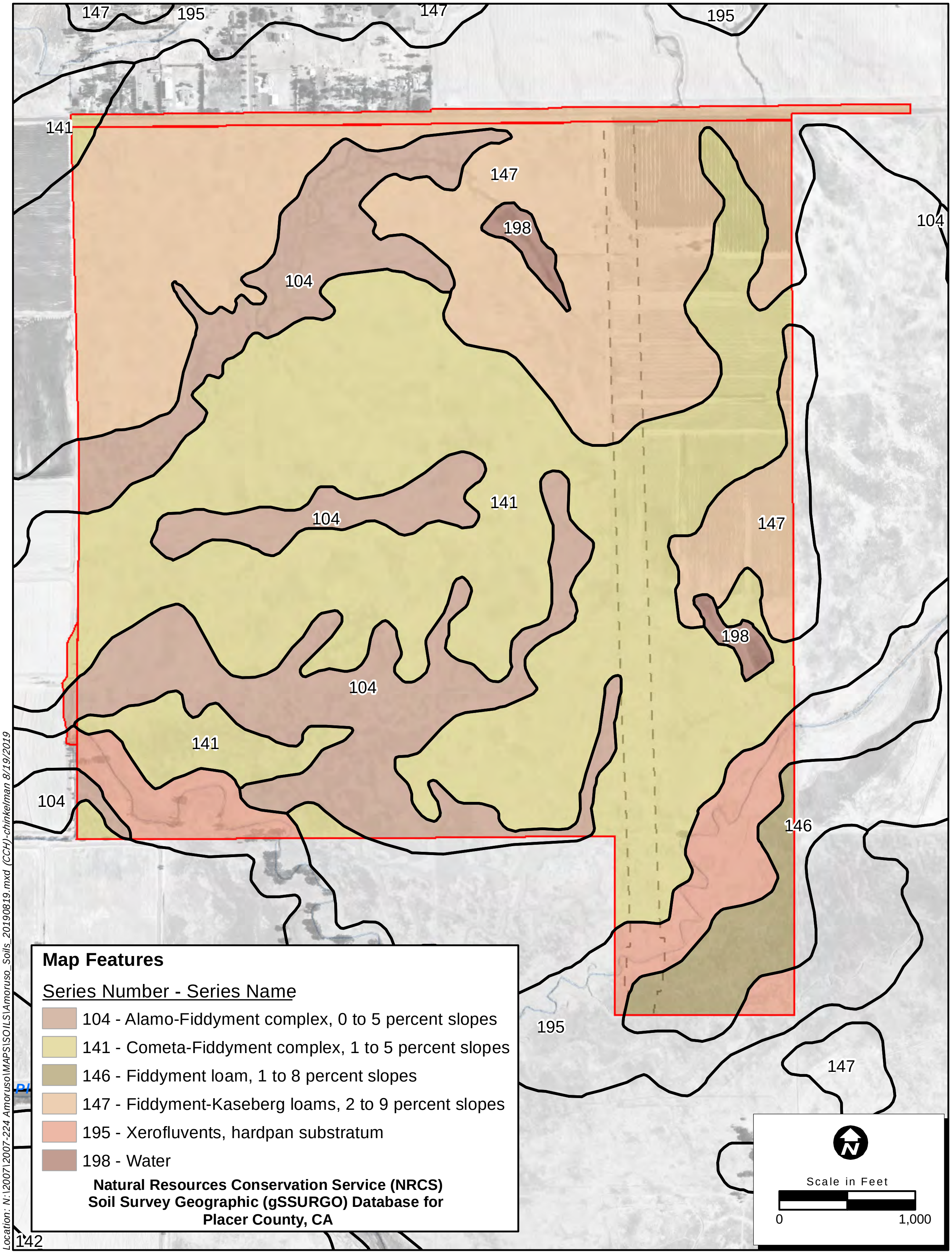
A portion of University Creek lies within the improvements area. This feature has been channelized, creating man-made constrictions and a reduction in floodwater conveyance. The dominant plant community within the Offsite Drainage Improvements Area includes wheat (*Triticum aestivum*), with scattered cut-leaved geranium and filaree.

3.2 Soils

According to the Soil Survey of Placer County Western Part, California (U.S. Department of Agriculture [USDA] 1980), five soil units, or types, have been mapped within the Amoruso Ranch Project (Figure 4. *Amoruso Ranch Project NRCS Soil Classifications*). These are: (104) Alamo-Fiddyment complex, 0-5% slopes; (141) Cometa-Fiddyment complex, 0-5% slopes; (146) Fiddyment loam, 1-8% slopes; (147) Fiddyment-Kaseberg loams, 2-9% slopes, and; (195) Xerofluvents, hardpan substratum. Units (104) and (195) consist of hydric components, and units (141), (146), and (147) may contain hydric inclusions (USDA 1992).

3.3 Waters of the U.S.

ECORP completed a wetland delineation of the Amoruso Ranch property and the adjacent West Sunset Boulevard ROW in August 2008 (Figure 5. *Amoruso Ranch Property Wetland Delineation*). This wetland delineation was conducted in accordance with the USACE Wetlands Delineation Manual (Environmental Laboratory 1987) and verified by USACE in a letter dated March 30, 2011 (Regulatory # SPK-2004-00888) (Attachment A). Additional Waters of the U.S. have been mapped within the Offsite Drainage Improvements Area and the West Sunset Boulevard ROW as shown on Figure 5 and summarized in Table 1. The aquatic features found within the Amoruso Ranch Project are described below and summarized into two functional groups for analysis purposes: Vernal Pool Type features and Riverine/Open Water Type features.



Location: N:\2007\2007-224 Amoruso\MAPS\SOILS\Amoruso_Soils_20190819.mxd (CCH)-chinkelman 8/19/2019

Map Date: 8/19/2019
Photo (or Base) Source: Enter Source

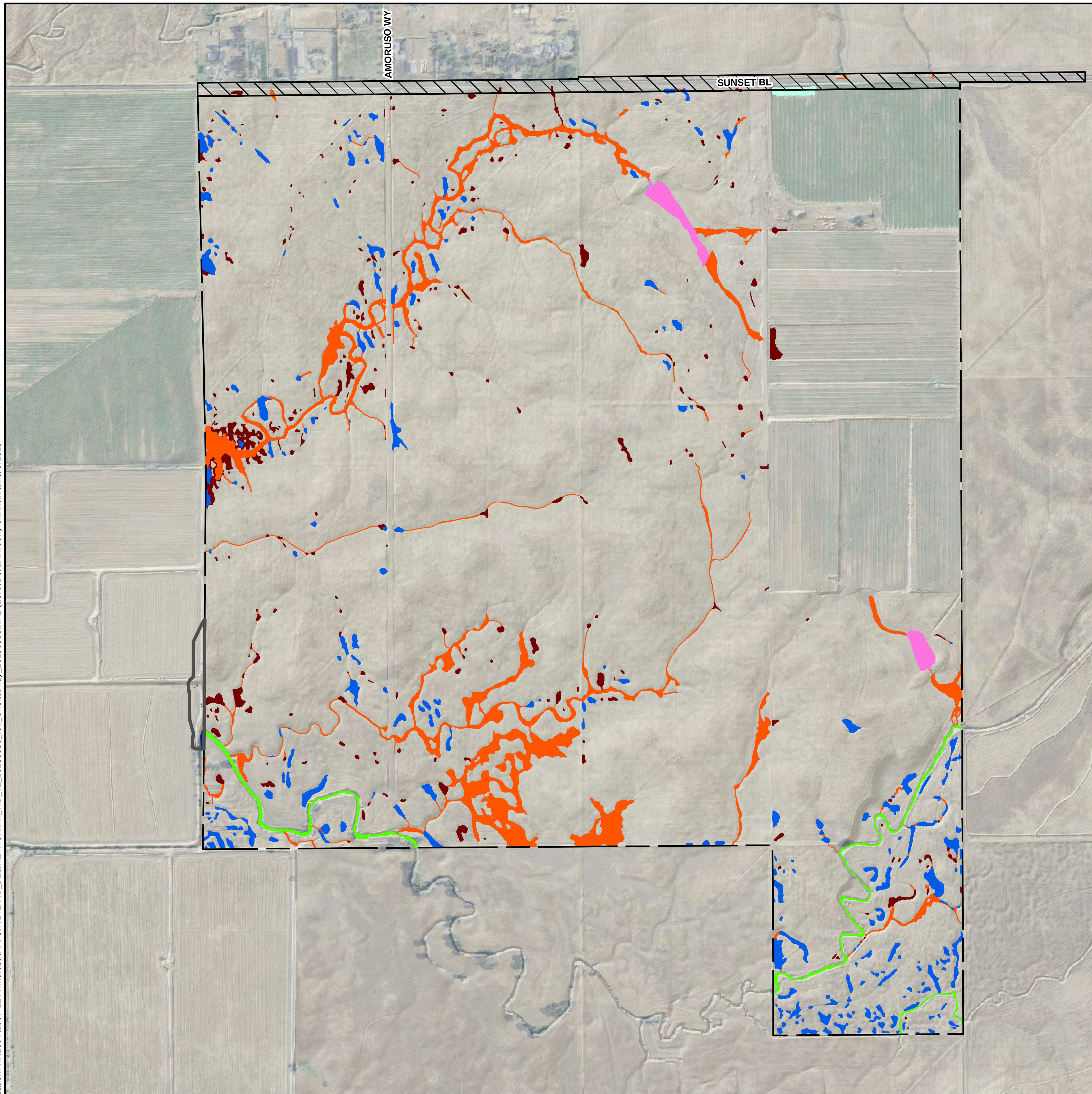
DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 4. Amoruso Ranch Project NRCS Soil Classifications

Amoruso Ranch 2007-224

Figure 5. Amoruso Ranch Property
Wetland Delineation



Map Features

- Project Boundary
- Offsite Drainage Improvements Area
- West Sunset Boulevard Offsite ROW

Wetland Type

- Ephemeral Drainage
- Farmed Wetland
- Intermittent Drainage
- Marsh
- Seasonal Creek/Stream
- Seasonal Wetland
- Seasonal Wetland Swale
- Stock Pond
- Vernal Pool

Waters of the U.S.	Amoruso Ranch Property	Off-site Drainage Area	West Sunset Blvd	Total (acres)
Wetlands				
Vernal Pool	9.758	0.000	0.055	**9.813**
Seasonal Wetland	4.767	0.000	0.060	**4.827**
Seasonal Wetland Swale	19.720	0.000	0.051	**19.771**
Marsh	1.822	0.000	0.000	**1.822**
Farmed Wetland	0.000	0.003	0.000	**0.003**
Subtotal (acres)	**36.068**	**0.003**	**0.166**	**36.237**
Other Waters				
Intermittent Drainage	1.920	0.000	0.000	**1.920**
Ephemeral Drainage	0.002	0.000	0.000	**0.002**
Seasonal Creek/Stream	0.000	0.037	0.000	**0.037**
Stock Pond	0.313	0.000	0.051	**0.364**
Subtotal (acres)	**2.235**	**0.037**	**0.051**	**2.323**
Total (acres)	**38.303**	**0.040**	**0.217**	**38.560**

Notes:
-Impact calculations are approximate and are based on the best available information to date.
-The acreage value for each feature has been rounded to the nearest 1/1000 decimal.
Summation of these values may not equal the total acreage reported.

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Map Date: 8/6/2019

Location: N:\2007\2007-224 Amoruso\MAPS\WETLAND_DELINEATION\AR_WD_v2_20180330_rev_OffsiteBndy_20190806.mxd *(ECK/JDS/LMH/CCH)-chinkelman 8/6/2019*

2007-224 Amoruso Ranch

Scale in Feet
0 800

DRAFT

Table 1. Waters of the United States*

Type	Amoruso Ranch Property	Offsite Drainage Improvements Area	West Sunset Blvd Right-Of-Way	Total
Vernal Pool Type Features				
Vernal Pool	9.758	--	0.055	9.813
Seasonal Wetland	4.767	--	0.060	4.827
Seasonal Wetland Swale	19.720	--	0.051	19.771
Farmed Wetland	--	0.003	--	0.003
Subtotal	***34.246***	***0.003***	***0.166***	***34.415***
Riverine/Open Water Type Features				
Marsh	1.822	--	--	1.822
Intermittent Drainage	1.920	--	--	1.920
Ephemeral Drainage	0.002	--	--	0.002
Seasonal Creek	--	0.037	--	0.037
Stock Pond	0.313	--	0.051	0.364
Subtotal	***4.057***	***0.037***	***0.051***	***4.145***
Total	**38.30**	**0.04**	**0.22**	**38.560**

*Note: Wetland areas are measured on the NAD83 datum in State Plane coordinates. All measurements are in the defined units for this coordinate system (feet) and all impact calculations and summations of wetland areas are calculated in defined units for maximum precision and accuracy. Results are converted to acreages for ease of use, however this conversion may lead to minor rounding errors in the reporting of acreage summaries.

Vernal Pool

Vernal pools are scattered through the Project's annual grassland habitats and are topographic basins within the grassland community and typically are underlain with an impermeable or semi-permeable hardpan or duripan layer. Vernal pools are inundated through the wet season and are dry by late spring through the following wet season. The composition of plant species within the vernal pools onsite is predominantly endemic native annual species that include creeping spikerush (*Eleocharis macrostachya*), Vasey's coyote-thistle (*Eryngium vaseyi*), slender popcorn flower (*Plagiobothrys stipitatus*), Carter's buttercup (*Ranunculus bonariensis*), smooth goldfields (*Lasthenia glaberrima*), and mannagrass (*Glyceria declinata*).

Seasonal Wetland

Seasonal wetlands are ephemerally wet areas where runoff accumulates within low-lying depressions and/or adjacent to watercourses. These areas most likely remain inundated for extended periods into the spring and summer. The vegetative composition of these seasonal wetlands included annual hairgrass (*Deschampsia danthonioides*), Mediterranean barley (*Hordeum marinum ssp. gussoneanum*), Italian ryegrass, slender popcorn flower, white-head navarretia (*Navarretia leucocephalus*), hairy hawkbit (*Leontodon saxatilis*), tidy tips (*Layia fremontii*), Fitch's spikeweed (*Centromadia fitchii*), and little hop clover.

Seasonal Wetland Swale

Seasonal wetland swales are ephemerally wet areas that carry runoff to larger drainages and creeks. These typically occur as linear features. Seasonal wetland swales have a vegetative community consisting of native and non-native wetland generalist plants. These include creeping spikerush, Italian ryegrass, annual rabbitsfoot grass (*Polypogon monspeliensis*), spiny-fruited buttercup (*Ranunculus muricatus*), Mediterranean barley, Vasey's coyote-thistle, Bermuda grass (*Cynodon dactylon*), and annual hairgrass.

Farmed Wetland

One farmed wetland was mapped within the agricultural fields of the Offsite Drainage Improvements Area where accumulations of surface runoff and rainwater were observed within a low-lying portion of a field. These leveled fields were at one time used for rice production, but have not been in rice since the City of Roseville purchased the property in 2003. Since then, the fields have been dry farmed with crops such as wheat or Italian ryegrass. The dominant plant species observed the farmed wetland was Italian ryegrass. Other wetland plant species present included hyssop loosestrife (*Lythrum hyssopifolia*) and purselane speedwell (*Veronica peregrina*).

Marsh

Two marshes were mapped within the Amoruso Ranch property and the adjacent West Sunset Boulevard ROW. Marshes are depressional basins that are inundated or saturated year-around and exhibit emergent vegetation. Plant species observed within these features included sprangletop (*Leptochloa fascicularis*), Bermuda grass, dotted smartweed (*Polygonum punctatum*), barnyard grass (*Echinochloa crus-galli*), cut-leaved geranium, and clover (*Trifolium* sp.).

Intermittent Drainage

Three sections of intermittent drainage that are tributary to Pleasant Grove Creek were mapped within the Amoruso Ranch property. Intermittent drainages are linear features that exhibit an ordinary high-water mark. These features tend to be unvegetated due to the depth and scouring effects of flowing water.

Ephemeral Drainage

A small ephemeral drainage was mapped within the Amoruso Ranch property. Ephemeral drainages are linear features that exhibit an ordinary high water mark. These are seasonal features that typically convey runoff for short periods of time, immediately following rain events and are not influenced by groundwater.

Seasonal Creek

A small portion of University Creek has been mapped flowing east to west in the southern portion of the Offsite Drainage Improvements Area. Seasonal creeks are linear features that exhibit an ordinary high water mark. These are seasonal features that typically convey runoff during the wet season. Persistent flows into the dry season may be supported by groundwater influences or urban runoff. They typically support a riparian corridor or at least some riparian vegetation.

Stock Pond

One stock pond is located in the northeast corner of the Project, overlapping with the adjacent West Sunset Boulevard ROW. Stock ponds are ephemeral or perennial deep water filled basins that are human made and generally used for water storage for irrigation or cattle grazing. The stock pond is split by the Amoruso Ranch property and West Sunset Boulevard ROW boundary line and receives irrigation run-off from the adjacent irrigated pasture, resulting in this feature ponding water year-round.

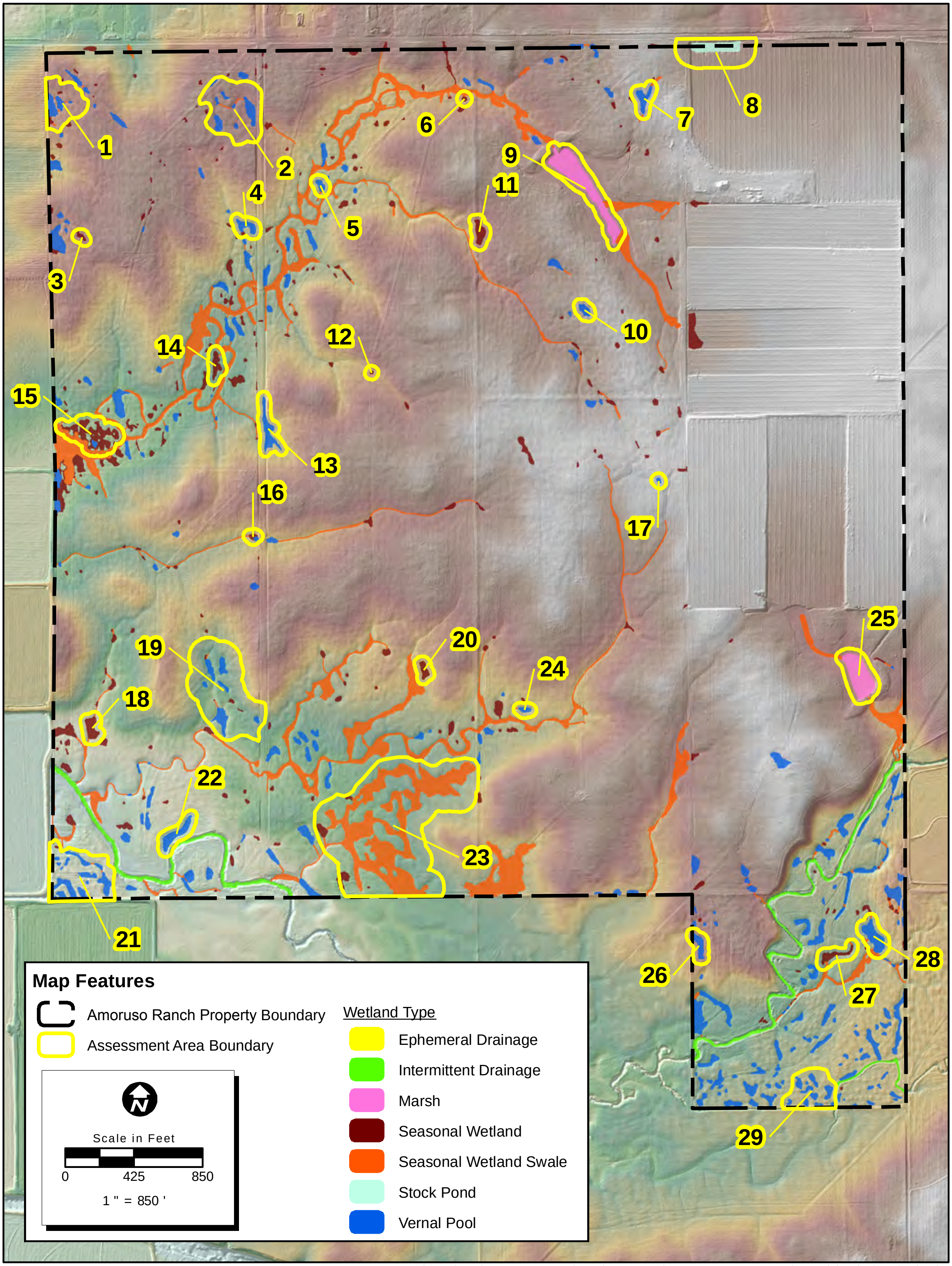
3.3.1 Baseline CRAM Assessment

In 2012 a California Rapid Assessment Method (CRAM) assessment was conducted on a subset of wetlands within the Amoruso Ranch property (Attachment B). Resource agencies and science professionals throughout California have been collaborating to develop CRAM with the goal to provide a rapid, scientifically defensible, standardized, cost-effective method to assess the status and trends in the condition of wetlands throughout California. CRAM scores can range from a low of 0 to a high of 100 and, in general, scores are lower for wetlands that have “undesirable” attributes and higher for wetlands with “desirable” attributes.

The purpose of the CRAM analysis of the Amoruso Ranch property was to document baseline conditions of representative wetlands within the site using a repeatable methodology that could be used to document changes to the wetlands within the property over time. Wetlands were assessed using the latest versions of the CRAM User’s Manual, Version 6.0 (California Wetlands Monitoring Workgroup [CWMW] 2012a); CRAM for Wetlands, Perennial Depressional Wetlands Field Book, Version 5.0.2 (CWMW 2008); CRAM for Wetlands, Vernal Pool Systems Field Book, Version 6.0 (CWMW 2012b); and CRAM for Wetlands, Individual Vernal Pools Field Book, Version 6.0 (CWMW 2012c). The property was divided into 29 Assessment Areas (AAs) where the CRAM analysis was performed; however, AA-12 was excluded from the analysis during field surveys because the feature was part of a linear vernal swale rather than an individual seasonal depressional wetland. Therefore, CRAM was performed on the remaining 28 AAs (Figure 6. *Amoruso Ranch Property CRAM Assessment Areas*). Each AA is a wetland system, or portion of a wetland system, that was assessed. Following the CRAM guidelines, the boundaries of the AA were delineated primarily based on watershed boundaries. The watershed boundary incorporates the topography, hydrology, and other features that control the sources, volumes, rates, or general composition of sediment or water supply that would influence the wetlands within each AA.

3.3.2 CRAM Results

Of the 28 AAs that were established, four AAs (AA-02, AA-19, AA-21 and AA-29) were comprised of vernal pool systems, 11 AAs (AA-01, AA-04, AA-05, AA-07, AA-10, AA-13, AA-17, AA-22, AA-24, AA-26 and AA-28) were individual vernal pools, and the remaining 13 AAs (AA-03, AA-06, AA-08, AA-09, AA-11, AA-14, AA-15, AA-16, AA-18, AA-20, AA-23, AA-25 and AA-27) were comprised of seasonal depressional wetland features. Table 2 below summarizes the results of the baseline CRAM assessment for each AA within the Amoruso Ranch property.



Map Date: 12/17/2012

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\Amoruso_CRAM_AA_Overview.mxd *(, 12/21/2012)* - ekeethe

Figure 6. Amoruso Ranch Property CRAM Assessment Areas

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Table 2. Final Attribute Scores (%) and Overall AA Scores (%) for Amoruso Ranch Property[1]

Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
1	85.4	91.7	62.5	70.8	**77.6**
2	85.4	91.7	66.7	62.5	**76.6**
3	60.4	100	25.0	55.6	**60.3**
4	85.4	91.7	62.5	70.8	**77.6**
5	85.4	100	50.0	70.8	**76.6**
6	60.4	83.3	25.0	58.3	**56.8**
7	70.4	100	50.0	62.5	**70.7**
8	43.1	91.7	50.0	77.8	**65.7**
9	47.9	83.3	37.5	63.9	**58.2**
10	60.4	100	50.0	79.2	**72.4**
11	47.9	100	37.5	63.9	**62.3**
13	85.4	91.7	62.5	87.5	**81.8**
14	47.9	100	25.0	61.1	**58.5**
15	47.9	100	25.0	61.1	**58.5**
16	47.9	66.7	37.5	38.9	**47.8**
17	60.4	100	50.0	58.3	**67.2**
18	47.9	100	37.5	72.2	**64.4**
19	72.9	91.7	75.0	58.3	**74.5**
20	47.9	100	50.0	72.2	**67.5**
21	85.4	100	75.0	54.2	**78.7**
22	85.4	100	75.0	87.5	**87.0**
23	60.4	100	37.5	80.6	**69.6**
24	85.4	100	50.0	45.8	**70.3**
25	47.9	75.0	37.5	61.1	**55.4**
26	85.4	100	50.0	66.7	**75.5**
27	60.4	100	25.0	58.3	**60.9**
28	85.4	100	62.5	79.2	**81.8**
29	85.4	100	50.0	50.0	**71.4**

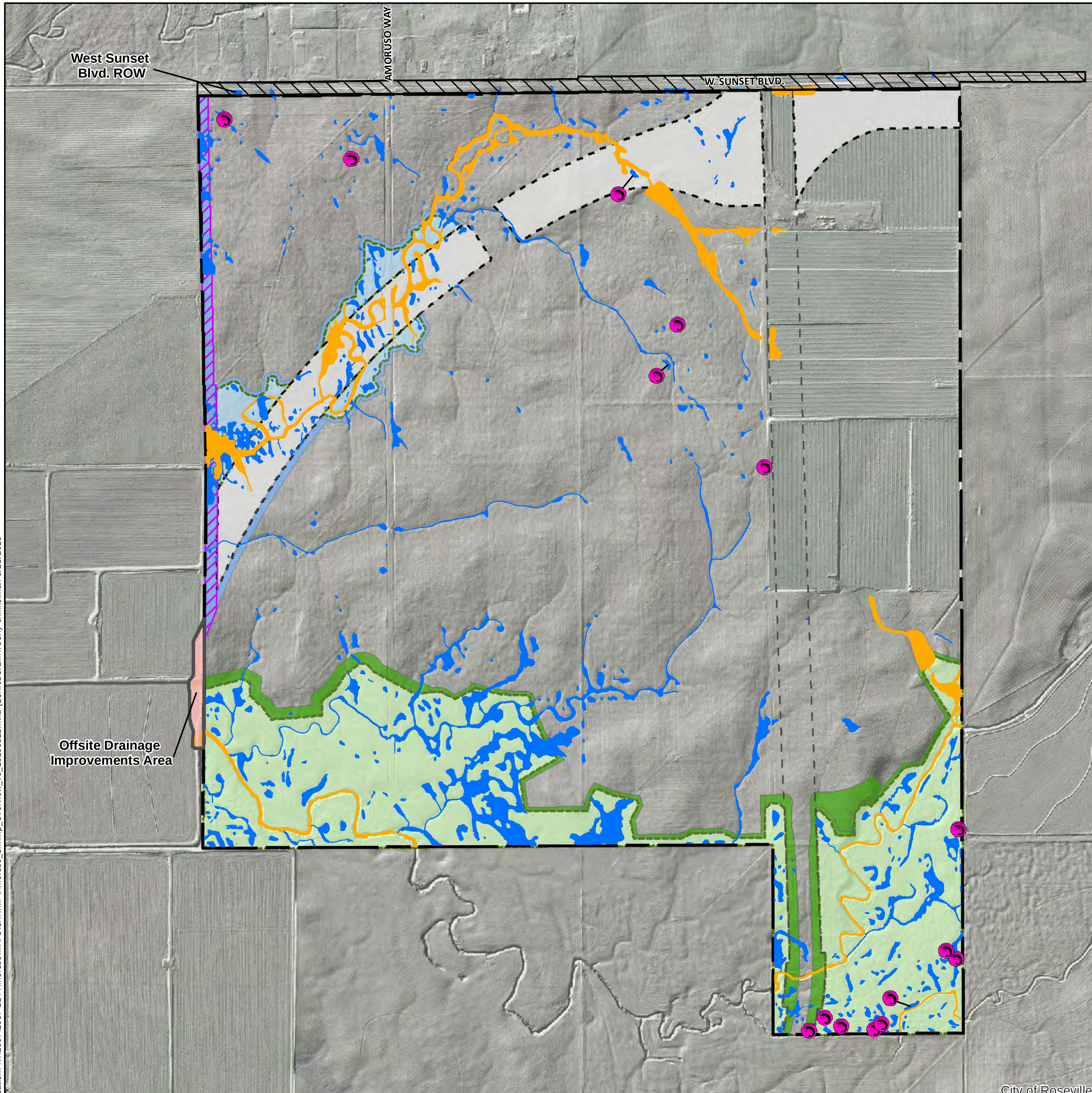
[1] Upon field investigation, AA 12 was excluded from the analysis because it was part of a linear swale. A total of 28 AAs were assessed for the CRAM analysis.

These scores represent the 2012 baseline conditions at the Amoruso Ranch property, and these data can be used for comparisons of similar CRAM analyses conducted on the same AAs in future years.

3.4 Special-Status Species

Guideline-level wet season surveys for federally listed branchiopods were conducted at the Amoruso Ranch property by ECORP during the 2007-2008 and 2008-2009 wet seasons (ECORP 2008, 2009). Guideline-level wet season surveys for federally listed branchiopods were conducted within the Offsite Drainage Improvements Area during the 2013-2014 wet season and 2004 dry season and no listed branchiopods were identified (ECORP 2017). A total of 15 wetlands were documented to support the federally threatened vernal pool fairy shrimp at the Amoruso Ranch property (Figure 7. *Amoruso Ranch Vernal Pool Fairy Shrimp Locations*). Therefore, a majority of the vernal pools, seasonal wetlands, and seasonal wetland swales within or adjacent to the Amoruso Ranch Project have potential to support this federally listed invertebrate species. However, vernal pools, seasonal wetlands, and seasonal wetland

Figure 7. Amoruso Ranch
Vernal Pool Fairy Shrimp Locations



Map Features

- Project Boundary
- Offsite Drainage Improvements Area
- West Sunset Boulevard Offsite ROW
- Westbrook Impact Area
- Vernal Pool Fairy Shrimp Occurrence

Shrimp Habitat

- Habitat
- Not Habitat

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2007\2007-224 Amoruso\MAPS\SHRIMP\Amoruso_Shrimp_Overview_v5_20190821.mxd (ECK/JDS/LMH/CCH)-chinkelman 8/23/2019

2007-224 Amoruso Ranch

Scale in Feet
0 800

Map Date: 8/23/2019

DRAFT

swales that are influenced or established by irrigated pasture or experience inundation nearly year round are not considered habitat for vernal pool fairy shrimp.

4.0 PROJECT IMPACT ANALYSIS AND PHASING

The Project will be constructed in three phases outlined in the Environmental Impact Report (Figure 8. *Project Phasing,* AES 2016 - State Clearinghouse No. 2013102057). The first phase would occur in the southern portion of the Project and would include the preservation of the Onsite Preserve. The second phase would include the remainder of the Project located south of the future Placer Parkway. The third phase would include all planned development north of the future Placer Parkway as well as the majority of the avoided General Open Space. Similarly, this Proposal includes a phased mitigation strategy that follows the schedule of Project impacts to Waters of the U.S.

4.1 Phased Impacts to Waters of the U.S.

Project development will result in a total of 13.98 acres of direct impacts, 2.64 acres of indirect impacts, and 0.06 acre of temporary impact to Waters of the U.S. (Table 3 and Figure 9. *Phased Proposed Project Impacts to Waters of the U.S.*).

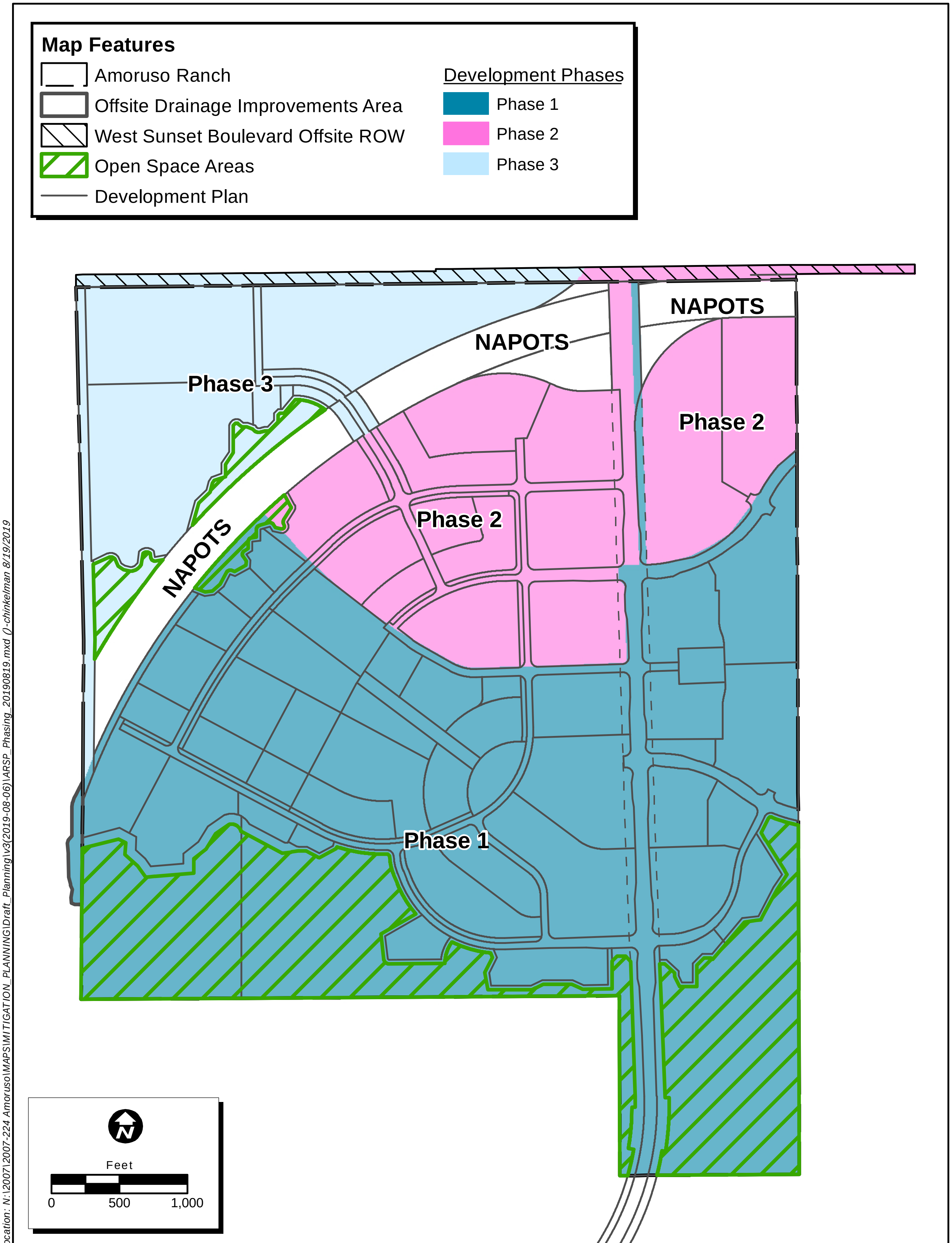
Table 3. Project Total Impacts

Waters Type	Preserve/ Avoided	Direct Impact	Indirect Impact	Temporary Impact	Total Waters[1]
Riverine/Open Water Feature Types	1.83	2.06	0.21	0.06	4.15
Vernal Pool Feature Types	15.76	11.92	2.43	0.00	30.10
Grand Total	**17.58**	**13.98**	**2.64**	**0.06**	**34.25**

[1]Includes Waters of the U.S. within the West Sunset Boulevard right-of-way, the Offsite Drainage Improvements area, and indirect impacts to a wetland within the Creekview Specific Plan. Does not include NAPOTS direct effects.

*Note: Wetland areas are measured on the NAD83 datum in State Plane coordinates. All measurements are in feet and converted to acreages for ease of use, which may lead to minor rounding errors in the reporting of acreage summaries. Final totals rounded to the 100th decimal place.

Direct impacts discussed in this Proposal would be the result of direct fill of Waters of the U.S. within the development footprint of the Project. Waters of the U.S. within the future Placer Parkway are considered NAPOTS and therefore not assessed direct impacts but are subject to indirect effects. Indirect effects were analyzed for all adjacent aquatic features to the Project area, both onsite and offsite (Attachment C). Portions of depressional features to be filled are considered directly impacted. The remaining avoided portion of the feature was then considered indirectly impacted. Additionally, indirect effects were assessed based on flow patterns, connectivity, and landscape context. Aquatic features classified as indirectly impacted could include the entire feature as mapped in the wetland delineation or a portion of the feature based on its morphology. Linear features adjacent to temporary impacts were not considered indirectly impacted. A summary of the proposed impacts to Waters of the U.S. by phase is provided in Tables 4 - 6.



Location: N:\2007\2007-224 Amoruso\MAPS\MITIGATION_PLANNING\Draft_Planning\v3(2019-08-06)\ARSP_Phasing_20190819.mxd (J-chinkelman 8/19/2019

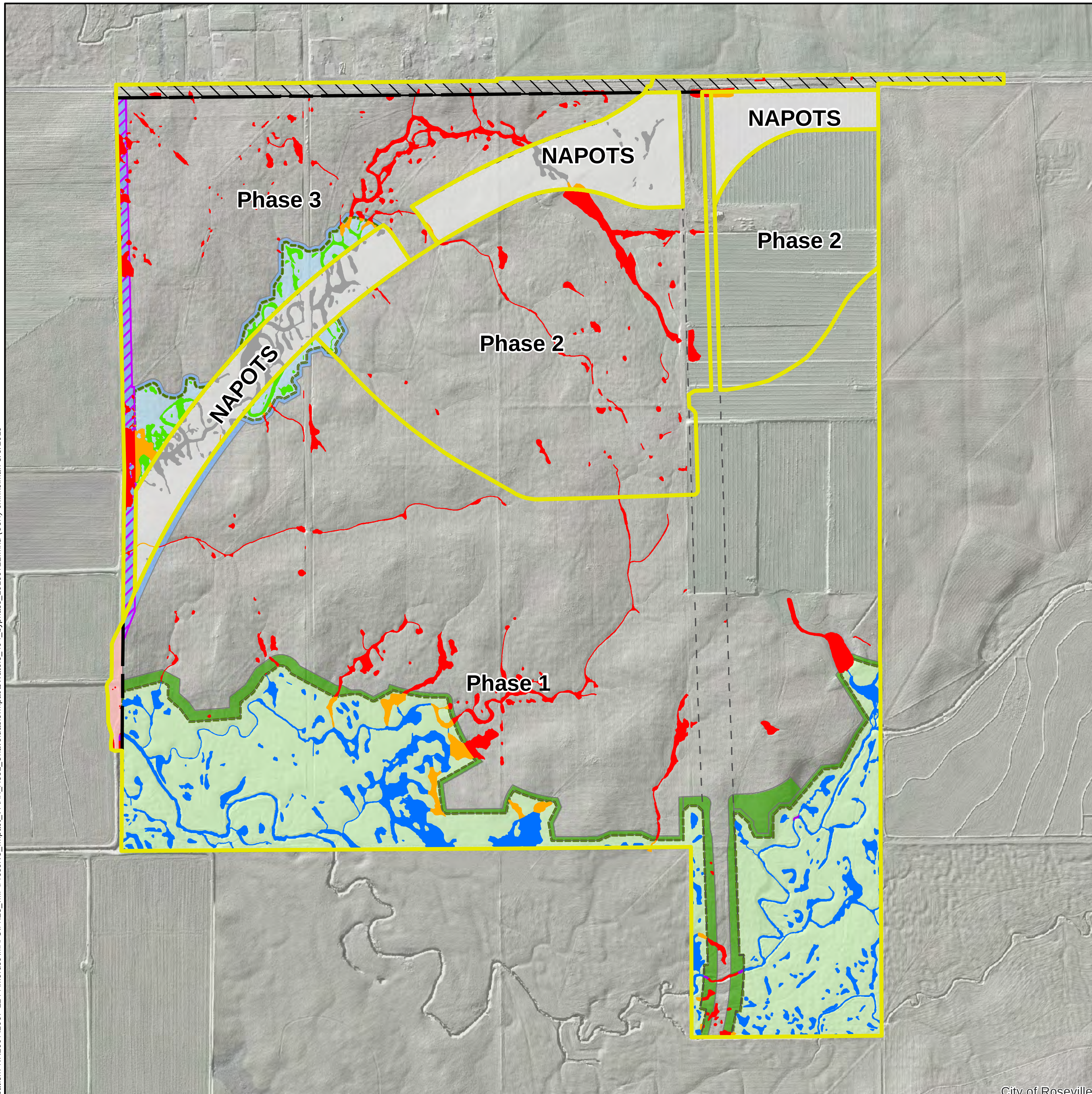
Map Date: 8/19/2019
Photo (or Base) Source: Wood Rodgers

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

DRAFT

Figure 8. Project Phasing

2007-224.3 Amoruse Ranch Specific Plan



Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_ACOE_UnavoidableImpactsWaters_404_byphase_20190722.mxd (CCH)-chinkelman 8/6/2019

Figure 9. Phased Proposed Project Impacts to Waters of the U.S.

Map Features

- Amoruso Project Boundary
- Westbrook Impact Area
- General Open Space
- General Open Space Transition
- General Open Space Drainage Channel
- Open Space Preserve
- Open Space Preserve Transition
- NAPOTS
- Offsite Drainage Improvements Area
- West Sunset Boulevard Offsite ROW

ACOE Impacts

- Preserved
- Avoided
- Temporary
- Direct
- Indirect
- NAPOTS

Waters of the U.S.	Preserved	Avoided	Temporary	Direct	Indirect	NAPOTS	Total (acres
NAPOTS	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***4.324***	***4.324***
Seasonal Wetland	0.000	0.000	0.000	0.000	0.000	0.664	0.664
Seasonal Wetland Swale	0.000	0.000	0.000	0.000	0.000	2.907	2.907
Vernal Pool	0.000	0.000	0.000	0.000	0.000	0.753	0.753
Phase 1	***15.659***	***0.328***	***0.057***	***6.109***	***1.803***	***0.000***	***23.957***
Ephemeral Drainage	0.002	0.000	0.000	0.000	0.000	0.000	0.002
Farmed Wetland	0.000	0.000	0.000	0.016	0.000	0.000	0.016
Intermittent Drainage	1.823	0.000	0.035	0.061	0.000	0.000	1.919
Marsh	0.000	0.000	0.000	0.699	0.000	0.000	0.699
Seasonal Creek/Stream	0.000	0.000	0.022	0.021	0.000	0.000	0.043
Seasonal Wetland	1.158	0.090	0.000	0.682	0.005	0.000	1.935
Seasonal Wetland Swale	7.131	0.238	<0.001	3.230	1.578	0.000	12.176
Stock Pond	0.000	0.000	0.000	0.233	0.132	0.000	0.364
Vernal Pool	5.545	0.001	0.000	1.167	0.089	0.000	6.802
Phase 2	***0.000***	***0.044***	***0.000***	***3.250***	***0.131***	***0.000***	***3.425***
Marsh	0.000	0.000	0.000	1.042	0.081	0.000	1.124
Seasonal Wetland	0.000	0.018	0.000	0.798	0.004	0.000	0.820
Seasonal Wetland Swale	0.000	0.026	0.000	1.172	0.046	0.000	1.244
Vernal Pool	0.000	0.000	0.000	0.238	0.000	0.000	0.238
Phase 3	***0.000***	***1.552***	***0.000***	***4.617***	***0.703***	***0.000***	***6.873***
Seasonal Wetland	0.000	0.534	0.000	0.819	0.054	0.000	1.407
Seasonal Wetland Swale	0.000	0.535	0.000	2.274	0.641	0.000	3.450
Vernal Pool	0.000	0.483	0.000	1.524	0.009	0.000	2.016
Grand Total	**15.659**	**1.925**	**0.057**	**13.976**	**2.638**	**4.324**	**38.578**

Notes:
-Impact calculations are approximate and are based on the best available informationto date.
-The acreage value for each feature has been rounded to the nearest 1/1000 decimal. Summation of these values may not equal the total acreage reported.

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

2007-224 Amoruso Ranch

DRAFT

Scale in Feet
0 800

Photo Source: City of Roseville, 2017

Map Date: 8/6/2019

Table 4. Proposed Phase 1 Impacts/Avoidance

Waters Type	Preserve/ Avoided	Direct Impact	Indirect Impact	Temporary Impact	Total Waters
Ephemeral Drainage	0.002	0.000	-	-	0.002
Intermittent Drainage	1.823	0.061	-	0.035	1.919
Seasonal Creek/Stream	-	0.021	-	0.022	0.043
Marsh	-	0.699	-	-	0.699
Stock Pond	-	0.233	0.132	-	0.364
Riverine/Open Water Subtotals	***1.83***	***1.01***	***0.13***	***0.06***	***3.03***
Farmed Wetland	-	0.016	-	-	0.016
Seasonal Wetland	1.248	0.682	0.005	0.000	1.935
Seasonal Wetland Swale	7.369	3.230	1.578	-	12.177
Vernal Pool	5.545	1.167	0.089	-	6.802
Vernal Pool Type Subtotals	***14.16***	***5.10***	***1.67***	***0.00***	***20.93***
Grand Total	**15.99**	**6.11**	**1.80**	**0.06**	**23.96**

Table 5. Proposed Phase 2 Impacts/Avoidance

Waters Type	Preserve/ Avoided	Direct Impact	Indirect Impact	Temporary Impact	Total Waters
Marsh	-	1.042	0.081	-	1.123
Riverine/Open Water Subtotals	***0.00***	***1.04***	***0.08***	***0.00***	***1.12***
Seasonal Wetland	0.018	0.798	0.004	-	0.820
Seasonal Wetland Swale	0.026	1.172	0.046	-	1.244
Vernal Pool	-	0.238	-	-	0.238
Vernal Pool Type Subtotals	***0.04***	***2.21***	***0.05***	***0.00***	***2.30***
Grand Total	**0.04**	**3.25**	**0.13**	**0.00**	**3.42**

Table 6. Proposed Phase 3 Impacts/Avoidance

Waters Type	Preserve/ Avoided	Direct Impact	Indirect Impact	Temporary Impact	Total Waters
Seasonal Wetland	0.534	0.819	0.054	-	1.407
Seasonal Wetland Swale	0.535	2.274	0.641	-	3.450
Vernal Pool	0.483	1.524	0.009	-	2.016
Vernal Pool Type Subtotals	***1.55***	***4.62***	***0.70***	***0.00***	***6.87***
Grand Total	**1.55**	**4.62**	**0.70**	**0.00**	**6.87**

In addition to the direct impacts that would result from Project development, there are 0.13 acres of vernal pools and 4.19 acres of seasonal wetlands for a total of 4.32 acres of wetlands located within the northeast corner of the Mourier West mitigation property that will be graded and restored during mitigation implementation.

4.2 Phased Impacts to Federally-Listed Species Habitat[2]

Project development will result in a total of 8.96 acres of direct impacts and 3.74 acres of indirect impacts to Federally-listed species habitat (Table 7, Figure 10. *Phased Proposed Project Impacts to Federally Listed Species Habitat*). Habitat for federally-listed species within the Project includes all vernal pools, seasonal wetlands, and most seasonal wetland swales. The large seasonal wetland swale complex in the northern portion of the Project receives year-round irrigation, and thus is not considered habitat. Additionally, the farmed wetlands within the offsite drainage improvement area were excluded as habitat as a result of negative survey results during protocol branchiopod surveys. A summary of the proposed impacts to Federally-listed Species Habitat by phase is provided in Tables 8 - 10.

Direct impacts discussed in this Plan would be the result of direct fill of potential habitat within the development footprint of the Project. Indirect impacts were assessed based on a drainage pattern and micro-watershed approach. In general, entire depressional habitat features or a portion of linear habitat features that were downstream of direct fill and were within a micro-watershed that would have greater than 10 percent of its area impacted by the development footprint were considered indirectly impacted. The methodology for defining indirect impacts to federally listed species habitat may be refined further through ongoing discussions with USFWS.

Table 7. Total Project Impacts to Federally-Listed Species Habitat[1]

Waters Type	Preserved	Avoided	Direct Impact	Indirect Impact	Total Waters
Vernal Pool Type Features	12.32[2]	1.15	8.96	3.74	26.16

[1]Includes Waters of the U.S. within the West Sunset Boulevard right-of-way, the Offsite Drainage Improvements area and NAPOTS. Direct and Indirect impacts do not match Waters of the U.S. impact analysis due to different calculation methodologies and exclusion of non-shrimp habitat wetlands.

[2]Excludes indirectly impacted habitat within the Onsite Preserve.

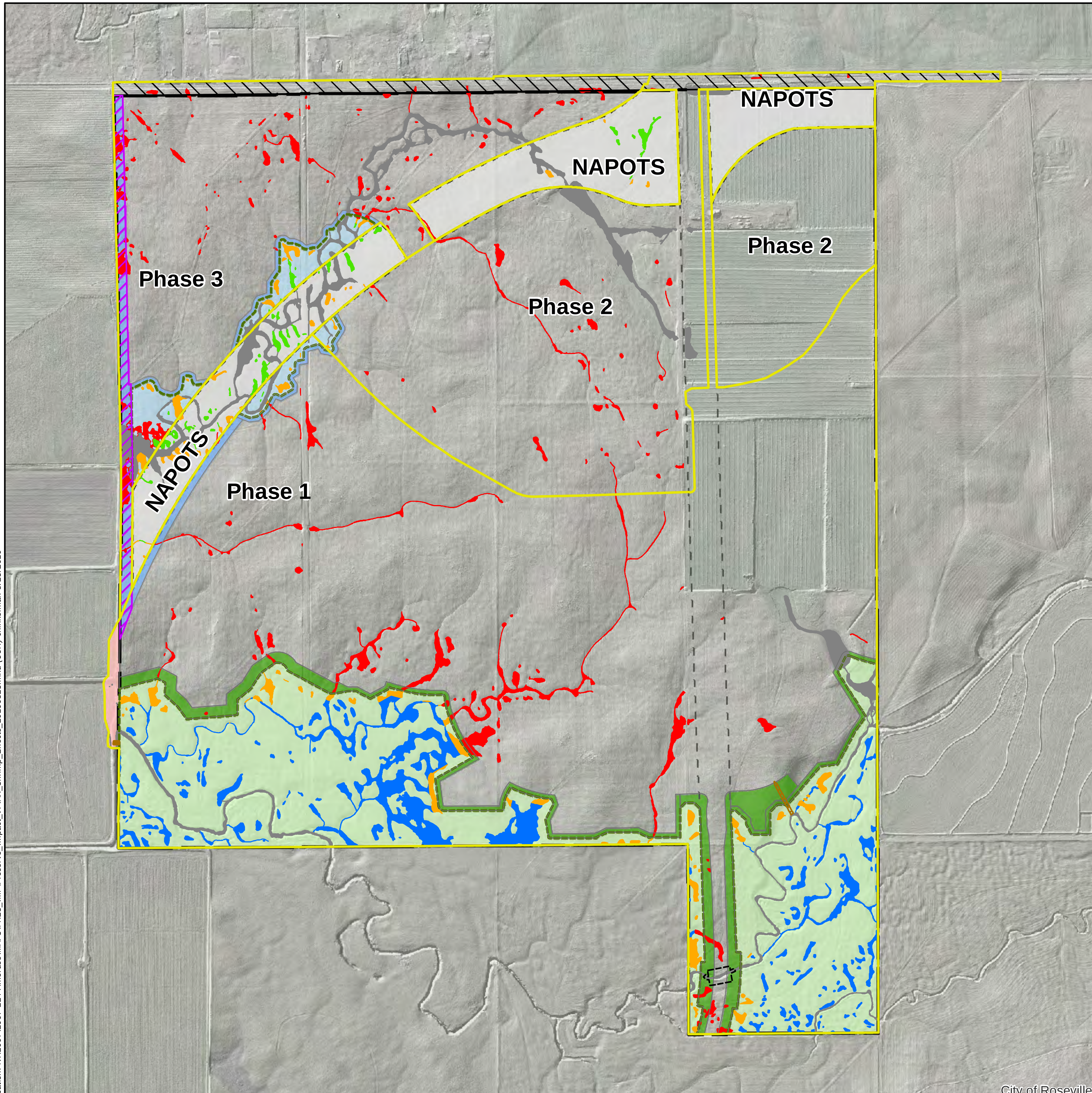
*Note: Wetland areas are measured on the NAD83 datum in State Plane coordinates. All measurements are in feet and converted to acreages for ease of use, which may lead to minor rounding errors in the reporting of acreage summaries. Final totals rounded to the 100th decimal place.

Table 8. Proposed Phase 1 Impacts/Avoidance to Federally-Listed Species Habitat

Waters Type	Preserved	Avoided	Direct Impact	Indirect Impact	Total Habitat
Seasonal Wetland	0.712	0.216	0.687	0.661	2.277
Seasonal Wetland Swale	7.409	0.039	3.018	0.768	11.233
Vernal Pool	4.201	0.145	1.256	1.436	7.039
Vernal Pool Type Features	***12.32***	***0.40***	***4.96***	***2.87***	***20.55***

[2] The only federally-listed species habitat within the Project is for vernal pool fairy shrimp (*Branchinecta lynchi*).

Figure 10. Phased Proposed Project Impacts to Federally Listed Species Habitat



Map Features

- Amoruso Project Boundary
- Phase Boundary
- Westbrook Impact Area
- General Open Space
- General Open Space Transition
- General Open Space Drainage Channel
- Open Space Preserve
- Open Space Preserve Transition
- NAPOTS
- Offsite Drainage Improvements Area
- West Sunset Boulevard Offsite ROW
- Offsite Drainage Area Bridge Structure
- Culvert
- Bioswale/Outfall/Crossing

Shrimp Effects

Non-Habitat

- Irrigated Features

Habitat

- Avoided
- Direct
- Indirect
- Preserved

Waters of the U.S.	Avoided	Direct	Indirect	Preserved	Total (acres)
Phase 1	**0.400**	**4.961**	**2.865**	**12.322**	**20.549**
Seasonal Wetland	0.216	0.687	0.661	0.712	2.277
Seasonal Wetland Swale	0.039	3.018	0.768	7.409	11.233
Vernal Pool	0.145	1.256	1.436	4.201	7.039
Phase 2	**0.003**	**1.108**	**0.159**	**0.000**	**1.271**
Seasonal Wetland	0.003	0.526	0.050	0.000	0.579
Seasonal Wetland Swale	0.000	0.344	0.003	0.000	0.347
Vernal Pool	0.000	0.238	0.107	0.000	0.345
Phase 3	**0.743**	**2.889**	**0.712**	**0.000**	**4.343**
Seasonal Wetland	0.288	1.173	0.234	0.000	1.695
Seasonal Wetland Swale	0.045	0.184	0.067	0.000	0.296
Vernal Pool	0.410	1.533	0.411	0.000	2.353
Grand Total	**1.146**	**8.958**	**3.736**	**12.322**	**26.163**

Notes:
-Impact calculations are approximate and are based on the best available information to date.
-The acreage value for each feature has been rounded to the nearest 1/1000 decimal.
Summation of these values may not equal the total acreage reported.

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_Shrimp_Effects_20190823.mxd (CCH)-chinkelman 8/23/2019

2007-224 Amoruso Ranch

Scale in Feet
0 800

Photo Source: City of Roseville, 2017

DRAFT

Map Date: 8/23/2019

Table 9. Proposed Phase 2 Impacts/Avoidance to Federally-Listed Species Habitat

Waters Type	Preserved	Avoided	Direct Impact	Indirect Impact	Total Habitat
Seasonal Wetland	-	0.003	0.526	0.050	0.573
Seasonal Wetland Swale	-	-	0.344	0.003	0.347
Vernal Pool	-	-	0.238	0.107	0.345
Vernal Pool Type Features	***0.00***	***0.00***	***1.11***	***0.16***	***1.27***

Table 10. Proposed Phase 3 Impacts/Avoidance to Federally-Listed Species Habitat

Waters Type	Preserved	Avoided	Direct Impact	Indirect Impact	Total Habitat
Seasonal Wetland	-	0.288	1.173	0.234	1.694
Seasonal Wetland Swale	-	0.045	0.184	0.067	0.290
Vernal Pool	-	0.410	1.533	0.411	2.353
Vernal Pool Type Features	***0.00***	***0.74***	***2.89***	***0.71***	***4.34***

5.0 COMPENSATORY MITIGATION PREFERENCE EVALUATION

The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to Waters of the U.S. authorized by Department of the Army (DA) permits. The 2008 USACE (33 Code of Federal Regulations [CFR] Parts 325 and 332) and USEPA (40 CFR Part 230) Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (Rule) states a hierarchical preference for determining the source of compensatory mitigation. This section discusses the considerations presented in 33 CFR 332.3(b)(2)-(6) with respect to the hierarchy and this proposed plan.

The USACE's preferred hierarchy for determining the source of compensatory mitigation is mitigation bank credits, then in-lieu fee (ILF) credits, followed by permittee-responsible mitigation (33 CFR 332.3(b)). The Rule also requires that the USACE take a watershed approach for mitigation decisions. Meaning, compensatory mitigation should be located within the same watershed as the impact site and should be located where it is most likely to successfully replace lost functions and services, taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources, trends in land use, ecological benefits, and compatibility with adjacent land uses (33 CFR 332.3(b)). In making determinations regarding the compensatory mitigation to be required in a DA permit, the district engineer (DE) must assess which option is environmentally preferable based on the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and their significance within the watershed, as well as the costs of the compensatory mitigation project (33 CFR 332.3). Due to these factors, the Rule states that the DE should give preference to the use of mitigation bank credits when these considerations are applicable and when appropriate credits are available. However, these same considerations may also be used to override this preference where appropriate, as, for example, where an ILF program has released credits available from a specific approved ILF project, or when a permittee-responsible project will restore an outstanding resource based on rigorous scientific and technical analysis (33 CFR 332.3(b)).

The proposed permittee-responsible Mitigation Plan described in the following sections is the environmentally preferable approach. To provide up-to-date information on credit availability at mitigation banks and ILF programs for use in this evaluation, the USACE Regulatory ILF and Bank Information Tracking System (RIBITS) website was queried on August 15, 2019 and banks were contacted to confirm availability (notes are provided in Attachment D).

5.1 Mitigation Bank Credits

When permitted impacts are located within the service area of an approved mitigation bank, and the bank has the appropriate number and resource type of credits available, the permittee's compensatory mitigation requirements may be met by securing those credits (33 CFR 332.3(b)(2)). Mitigation bank credits are often the preferred source of compensatory mitigation because mitigation banks may include larger, more ecologically valuable parcels, and may be subject to more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources often not practicable for many ILF programs (33 CFR 332.3(b)(2)). However, the USACE must still use a watershed approach to evaluate the use of mitigation bank credits as compensatory mitigation.

For this Project, the use of permittee-responsible mitigation is preferable to the use of mitigation bank credits for multiple reasons. These include the watershed approach used, habitat connectivity and ecological value of the proposed mitigation, and level of planning and scientific rigor used in developing the mitigation approach. These factors are discussed below.

The Project is located within the service area for 14 mitigation banks (Attachment D). However, of those banks, only two provide vernal pool establishment credits within the same HUC-8 watershed as the Project (Toad Hill Ranch Mitigation Bank and Antonio Mountain Ranch Mitigation Bank). Toad Hill Ranch has 8.38 vernal pool establishment credits currently available, and Antonio Mountain Ranch has no vernal pool establishment credits available for public sale. Therefore, there are insufficient mitigation bank credits available within the same HUC-8 watershed as the Project. In contrast, the proposed permittee-responsible mitigation would establish vernal pool habitat within the same HUC-12 watershed as the impact site (Pleasant Grove Creek; HUC #180201610302). While there are vernal pool and marsh establishment mitigation bank credits in neighboring watersheds, these credits are less closely hydrologically connected to the location of project impacts, making permittee-responsible mitigation the preferable option from a watershed perspective. In concert with other preserves/open space in the area, the Onsite and Offsite Preserves will have a substantial effect on preserving the hydrology of the Pleasant Grove Creek watershed, which the identified available mitigation bank credits would not be able to provide.

While mitigation banks are often preferred for their larger size and habitat contiguity, the proposed permittee-responsible mitigation will accomplish these objectives by providing connectivity between existing conserved lands in the Pleasant Grove Creek Watershed. The Offsite Preserves will provide needed connectivity between the 1,646-acre Toad Hill Mitigation Bank, 1,767-acre Al Johnson Wildlife Area, and 227-acre Reason Farms Environmental Preserve by providing an additional 505 acres of preserve lands that will act as "puzzle pieces" to help complete the existing network of preserves and open space. While the mitigation proposed is permittee-responsible rather than bank credits, the establishment of the Offsite Preserves will contribute to the integrity of the Toad Hill Mitigation Bank by conserving adjacent lands. In addition, the establishment of the 108-acre Onsite Preserve (though preservation and not compensatory mitigation) will establish a contiguous preserve system along University Creek (a tributary to Pleasant Grove Creek), and provide connectivity to the complex of existing and proposed open space in the area (including the Al Johnson Wildlife Area and open space within the Creekview Specific Plan, Placer Ranch Specific Plan, and West Roseville Specific Plan).

Mitigation banks are also prioritized due to the level of advance planning and scientific rigor required. However, the proposed permittee-responsible mitigation also includes a high level of advance planning and scientific rigor. The Onsite and Offsite Preserves were first identified as proposed mitigation sites during the initial stages of Project planning due to their hydrological connectivity and proximity to the Project, and the degraded nature of the vernal pool habitat (and thus the mitigation value of establishing vernal pools within the sites). The applicant has made a significant time (over 15 years) and financial investment of considerable equity payments on the proposed permittee-responsible mitigation, including biological and other technical studies conducted with the scientific rigor required for mitigation bank development. These studies included two years of protocol-level surveys for federally-listed shrimp, aquatic resource delineations and CRAM studies, surveys for special-status plant species, biological resource assessments and surveys to ensure absence of Valley elderberry longhorn beetle, cultural and paleontological studies, and topographic mapping and soil surveys using ground-penetrating radar to determine the sites' suitability for vernal pool establishment. In 2011, the applicant and ECORP conducted three site visits to the Project, Onsite and Offsite Preserves with representatives from the USACE, USFWS, EPA, and CVRWQCB. The intent of these site visits was to provide the Regulatory Agencies an opportunity to see the habitat present and provide feedback on use of the sites for compensatory mitigation and preservation. These meetings indicated that using the Onsite and Offsite Preserves to fulfill wetland mitigation requirements was well received and fulfilled important aspects of the Mitigation Rule.

5.2 ILF Program Credits

The Rule states that where permitted impacts are located within the service area of an approved ILF program, and the sponsor has the appropriate number and resource type of credits available, the permittee's compensatory mitigation requirements may be met by securing those credits (33 CFR 332.3(b)(3)). ILF projects typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation (33 CFR 332.3(b)(3)). However, again, a watershed approach must be used when considering mitigation decisions.

There are two ILF programs with service areas that apply to the project. The first is the National Fish and Wildlife Foundation (NFWF) ILF Program. As of August 2019, the NFWF ILF Program had 67.5 American Aquatic Resource advanced credits, and 14 vernal pool advance credits within the Southeastern Sacramento Valley Vernal Pool Service Area. Therefore, there are likely inadequate credits available in the NFWF ILF Program to serve the Project's needs (assuming a greater than 1:1 ratio is required). In addition, no vernal pool credits have been released in the Southeastern Sacramento Valley Vernal Pool Service Area as of this date (2019), meaning that the compensatory mitigation has not yet been completed by NFWF to fulfill the advance credits. An ILF project would need to be proposed and completed by NFWF in order to fulfill the advance credits. The Mitigation Rule provides that in cases where permittee-responsible mitigation is likely to successfully meet performance standards before advance credits secured from an ILF program are fulfilled, the DE should give consideration to this factor in deciding between ILF and permittee-responsible mitigation (33 CFR 332.3(b)(3)). While the NFWF ILF is required to use a watershed approach, the ILF is not mandated to complete compensatory mitigation within the same watershed as impacts; therefore, the ILF project would likely be outside of the Pleasant Grove Creek HUC-12 watershed. Additionally, a temporal loss would occur since the compensatory mitigation has not yet been completed to fulfill the advance vernal pool credits. As discussed in Section 5.1, the proposed permittee-responsible mitigation is within the same HUC-12 watershed as the Project. The permittee-responsible mitigation would be completed concurrently with Project impacts, reducing temporal loss relative to use of ILF credits.

The second applicable ILF is the Western Placer County ILF Program (WPILF). As discussed in several meetings between the Sacramento District and the applicant, most recently on May 2, 2019, at USACE Sacramento and July 23, 2019 at USFWS Sacramento, there are a number of challenges with using the WPILF as mitigation for the Project. The use of the WPILF would require that the USFWS issue a Biological Opinion allowing for the use of the WPILF, which would require the Project Applicant comply with the terms of use of the program, including the payment of additional Habitat Restoration fees associated with the pending Placer County Conservation Program (PCCP). Since the PCCP is not adopted, the Project is unable to participate or mitigate under the PCCP strategy. The use of WPILF credits is therefore infeasible. Additionally, as of August 2019, the WPLIF has been granted 210 advanced credits of varying types but these credits are not yet secured by completed mitigation. Placer County staff have expressed an interest in acquiring the Offsite Preserves to satisfy their obligations related to the ILF advanced credits. This is in large part due to the fact that the Offsite Project mitigation properties are within the Reserve Acquisition Area for the PCCP, making them a desirable candidate for backing WPILF credits. The benefit of the Project Applicant performing permittee-responsible mitigation versus using the WPILF is that the proposed wetland establishment would occur concurrently with the loss of aquatic resources at the proposed Project site, rather than resulting in temporal loss under the WPILF.

As noted in Section 5.1, the properties proposed for conservation and restoration are large, regionally connected, and have been rigorously studied at a level much greater than typical for permittee-responsible mitigation projects. When considering these factors as well as the location within the Pleasant Grove Creek watershed and the reduced temporal loss relative to ILF programs, the permittee-responsible mitigation plan is environmentally preferable to ILF program credits.

5.3 Permittee-Responsible Mitigation

The Project Applicant's permittee-responsible mitigation proposal should be approved because it would fulfill the requirements of the Mitigation Rule by use of a watershed approach to site wetland establishment activities, providing habitat connectivity with existing preserves/open space, using rigorous scientific studies and advance planning, and minimizing temporal loss. In addition, the proposed preserves include a diverse variety of locally important aquatic habitats, and will establish a permanent barrier to land development within the northern portion of the Pleasant Grove Creek watershed. The prioritization of using a watershed-based approach and the habitat connectivity that the permittee-responsible mitigation sites would provide are environmentally preferable to mitigation through bank or ILF credits.

The key aspects of the proposed mitigation for the Project are as follows:

- Consistent with the Mitigation Rule, the proposed mitigation prioritizes a watershed approach to mitigation. The Onsite and Offsite Preserves are within the same HUC-12 watershed (Pleasant Grove Creek; 180201610302) as the Project, and the establishment of these preserves will offset the Project's impacts and contribute to water quality and nutrient cycling in the watershed.
- The Offsite Preserves would provide 505 acres of protected private open space that links with 3,625 acres of existing adjacent preserves/open space, thereby contributing to habitat connectivity and creating a cohesive system of preserve/open space lands.
- The proposed 26.95 acres of compensatory mitigation (20.72 acres of vernal pool and 6.23 acres of marsh as described in Section 7) will restore the degraded vernal pool grassland and riparian ecosystems within the Offsite Preserves to historic conditions, and will provide in-kind mitigation (or better than in-kind, in the case of type conversion to vernal pool habitat), thereby maintaining the integrity of the unique resource types remaining in Placer County.
- In addition, the Onsite Preserve would preserve 108.5 acres of protected private open space directly adjacent to the Creekview Open Space Preserve and West Roseville Open Space Preserve, thereby contributing to habitat connectivity and preserving the hydrology of University Creek.
- The Onsite and Offsite Preserves contain populations of federally listed vernal pool fairy shrimp (*Branchinecta lynchi*) and would provide approximately 49.40 acres of preserved habitat.
- The Offsite Preserves also contain a significant nesting population of tricolored blackbird (*Agelaius tricolor*) that would be protected, and the marsh habitat in which they nest would be expanded as a component of the proposed wetland establishment.

The proposed mitigation is described in detail in Sections 7 through 10.

6.0 PROPOSED MITIGATION RATIOS

6.1 Waters of the U.S. Compensation Ratios

The *12501-SPD Regulatory Program Standard Operating Procedure for Determination of Mitigation Ratios* (USACE 2013) includes a Mitigation Ratio-Setting Checklist (MRSC) used by the USACE to determine compensation mitigation requirements for projects obtaining a Department of the Army permit under Section 404 of the Clean Water Act. MRSCs were completed for all aquatic resource impacts by combining similar functional groups and applying adjustments to the baseline 1:1 ratio set in the MRSC. The MRSCs were also broken down into two sets to account for Project phasing. The Phase 1 MRSCs account for approximately the first half of Project impacts. The Future Phases MRSCs account for the remaining half of Project impacts that are planned to occur at least a few years after Phase 1. The complete sets of the MRSCs along with a brief explanation of assumptions is provided as Attachment E. A number of considerations were assessed in order to calculate the appropriate mitigation ratios for direct impacts in this Proposal; these considerations and ratio adjustments are discussed below for the Amoruso Ranch Project. The final proposed ratios are provided in Section 7.1. Phased Compensatory Waters of the U.S. Mitigation.

The Project Applicant proposes a 0.5:1 mitigation ratio for indirect and temporary impacts. There is no formal USACE framework for assessing indirect impacts or subsequent mitigation, so the Project Applicant is proposing a comparable ratio as has been issued for other projects in the region.

6.1.1 Mitigation Ratio-Setting Checklist Considerations

Qualitative or Quantitative Impact-Mitigation Comparison

The USACE's MRSC considers either a qualitative or quantitative assessment to compare functional losses at an impact site to the expected functional gains at a mitigation site(s). The proposed MRSCs use both types of assessments depending on the type of resource being evaluated.

Qualitative assessments were made for intermittent drainage/seasonal creek and marsh/stock pond. The proposed MRSCs use the biological information on the properties and estimated the relative loss or gain of hydrological and biological functions on the impact site as compared to the Offsite Preserves, assuming establishment of new wetlands/waters was complete. On average, there is an anticipated moderate gain in functions at the Offsite Preserves and an adjustment of +1 was applied to the baseline ratio to account for the small loss in function at the impact site.

Quantitative comparisons were made for vernal pool, seasonal wetland/farmed wetland, and seasonal wetland swale using the CRAM assessments for each property. The CRAM assessment methodology is a scientifically defensible assessment method for monitoring the conditions of wetlands throughout California, is designed for assessing ambient conditions within watersheds, regions, and throughout the State, and is an appropriate quantitative assessment methodology for the Mitigation Ratio-Setting Checklist. As such, the proposed MRSCs use the Project's CRAM assessments for the Before-After-Mitigation-Impact (BAMI) worksheet provided as part of the MRSC to determine if a functional lift is expected at the Offsite Preserves following wetland establishment efforts.

As discussed in Sections 3.1.4 and 9.2.4, separate CRAM assessments were conducted on a subset of wetlands within each of the three properties tied to the Project (Amoruso Ranch, Mourier East, and Mourier West) (ECORP 2013a, 2013b, and 2013c). These CRAM scores were used to compare the relative values of the AAs across the Amoruso Ranch property and the Offsite Preserves. The evaluation shows that the overall CRAM scores of the AAs within Mourier East and Mourier West were comparable in habitat function to the wetlands proposed for impact within the Amoruso Ranch property. Following the proposed wetland establishment activities, a moderate lift in habitat function is expected to occur across the Offsite Preserves largely due to an increased density of wetlands that will be designed and managed to have greater complexity and higher quality species composition than what currently exists. Specific notes on each CRAM attribute are provided in the MRSCs (Attachment E).

The BAMI calculations resulted in a baseline ratio of 1:1 for vernal pool, seasonal wetland/farmed wetland, and seasonal wetland swale. No additional adjustment to the baseline ratio was warranted based on the comparison of impacted functions on the Project site with future functions at the Offsite Preserves. Adjustments to the final ratio are discussed below.

Offsite Preserve Location

Per the USACE's MRSC, mitigation located outside of the impacted watershed generally warrants a higher mitigation ratio. The Amoruso Ranch property and the Offsite Preserves are located within the Upper Coon-Upper Auburn Watershed (#18020161, USGS 1978). Additionally, these sites are all located within the Pleasant Grove Creek Natural Resources Conservation Service (NRCS) Hydrologic Unit Code (HUC 12), which is a sixth-level sub-watershed and the smallest level of watershed mapped by NRCS (Figure 11. *Hydrologic Unit Code-12 Watersheds*). Since the Offsite Preserves are located in the same sub-watershed as the Amoruso Ranch Project, the loss of the wetland habitat at the impact site will be replaced by wetland habitat within the same small watershed unit, resulting in no net loss of wetland functions and values within this watershed. No adjustment was made to the Offsite Preserve Location portion of the MRSC.

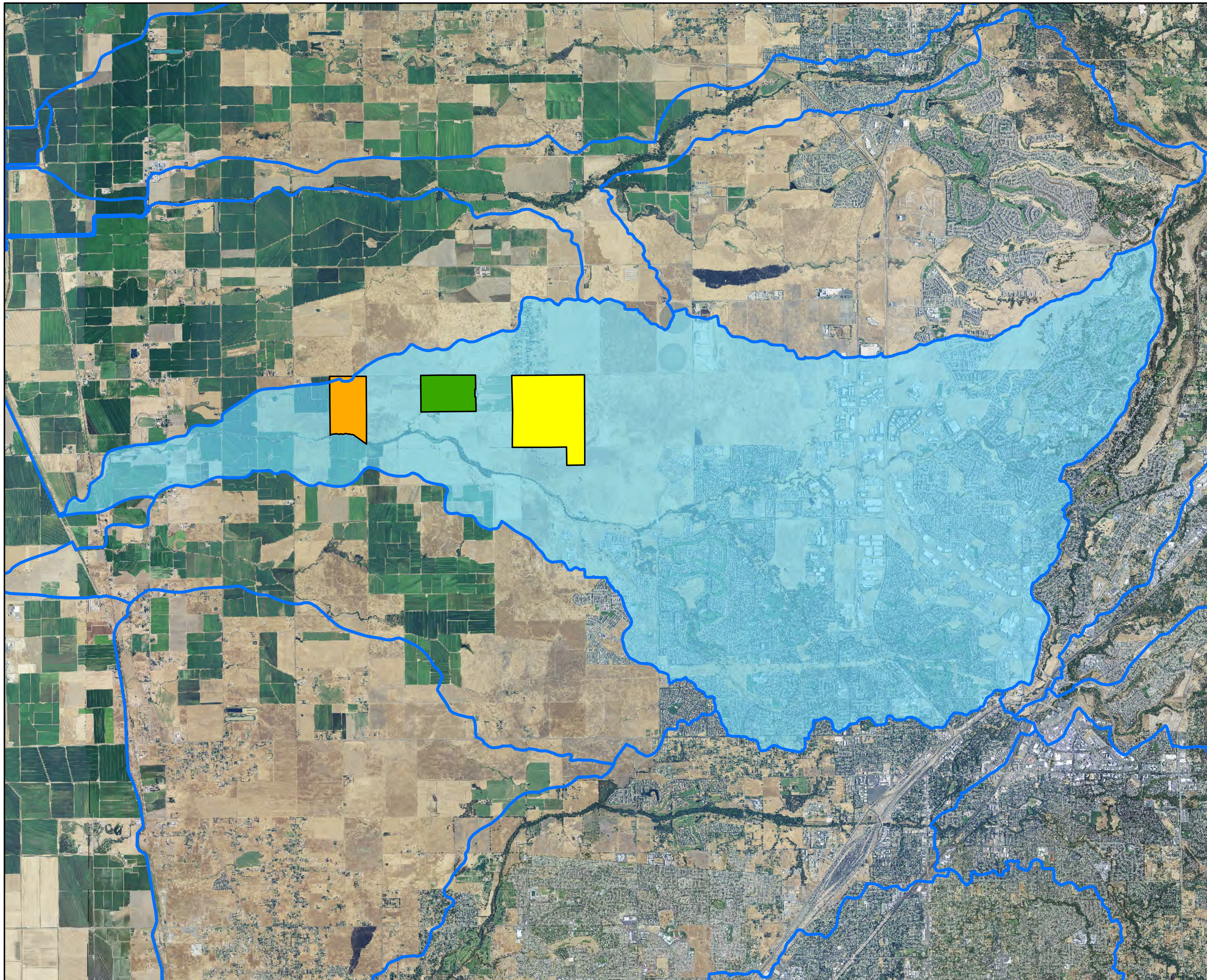
Net Loss of Aquatic Resource Surface Area

Per the USACE's MRSC, different types of mitigation result in varying net losses of aquatic resource area. This proposal calls for establishment of new vernal pools and marsh, which in some areas will be where historic wetlands were located. Based on the assessment of the historical aerial photographs (USDA 1937), there were more wetted features within the Offsite Preserves than currently exist. The majority of the degraded historic wetlands appeared to be vernal pools, seasonal wetlands, and seasonal wetland swales. This mitigation proposal would replace the missing surface area within the Offsite Preserves as well as the lost resources on the impact site, resulting in a gain in aquatic resource surface area. No adjustment was made to the Net Loss of Aquatic Resource Surface Area portion of the MRSC.

Type Conversion

Per the USACE's MRSC, out-of-kind mitigation may warrant a higher mitigation ratio; however, out-of-kind mitigation can be appropriate if the proposed mitigation habitat type serves the aquatic resources needs of the watershed/ecoregion and/or is of greater ecological value to the region. Wetland impacts that would occur during implementation of the Amoruso Ranch Project are largely to vernal pools, seasonal wetlands, and seasonal wetland swales. Mitigation proposed at the Offsite Preserves is establishment of vernal pools and riverine marsh within a historic vernal pool landscape that also contains a marsh associated with the same riverine system as the impact site.

Figure 11.
Hydrologic Unit Code-12 Watersheds



Map Features

- HUC 12 Watershed Boundaries
- 180201610302 - Pleasant Grove Creek
- Amoruso Ranch Property
- Mourier East Property
- Mourier West Property

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2007\2007-224 Amoruso\MAPS\HYDROLOGY\Watersheds\Am_and _MitSites_huc12_20190807.mxd *(ck/(CCH)-chinkelman 8/7/2019*

2007-224 Amoruso Ranch

Miles
0 2 4

Photo Source: NAIP 2012

Map Date: 8/7/2019

The majority of the proposed mitigation would be in-kind or better than in-kind and would serve the aquatic resource needs of the watershed/ecosystem by restoring historic functions of a degraded vernal pool landscape and expanding the riverine system.

A range of +0.5 to -0.5 ratio adjustment was applied if an aquatic resource was being mitigated out-of-kind and depending on whether the establishment would result in a better than in-kind conversion.

Risk and Uncertainty

The USACE's Mitigation Ratio-Setting Checklist includes a number of items for the USACE to consider when assessing the inherent uncertainty of mitigation. The Project Applicant is proposing permittee-responsible mitigation (establishment) of vernal pool complexes and riverine marsh within the Offsite Preserves. ECORP has successfully designed and overseen the establishment of numerous compensation wetland mitigation projects in Sacramento and Placer Counties, including those in locations with similar attributes to the Offsite Preserves. This experience will be used in the design and implementation of the established wetlands at the Offsite Preserves. Additionally, the Offsite Preserves currently support wetlands and vernal pool fairy shrimp, demonstrating that they have the appropriate characteristics to support these habitats. As the Offsite Preserves have supported vernal pool complexes in the past, there is a high likelihood of success for future establishment. Further, the Offsite Preserves are adjacent to two successful wetland restoration projects: the Toad Hill Mitigation Bank and the City of Roseville's Reason Farms Environmental Preserve. This further supports the appropriateness of the Offsite Preserves for the proposed wetland mitigation. Final details on the design and long-term maintenance of the mitigation sites will be developed as part of the final O&M Plan, but the Offsite Preserves are expected to function as natural vernal pool complexes without altered hydrology (e.g., pumped water) or structures (e.g., culverts, weirs). Following wetland restoration efforts and the completion of the wetland success monitoring, the Offsite Preserves will be managed in perpetuity in accordance with all requirements of the Regulatory Agencies, including the implementation of an Agency-approved long-term management plan, conservation easement/deed restriction, funding mechanism, and Preserve Manager.

An adjustment for Risk and Uncertainty of +0.3 for permittee-responsible mitigation and +0.1 for difficult to replace resources for vernal pool impacts only was applied to the Phase 1 MRSCs. The adjustments were reduced for Future Phases MRSCs because the mitigation will be established with a contingency amount and protected under easement before future phases are implemented, thereby reducing the level of uncertainty and risk of mitigation.

Temporal Loss

The final consideration of the USACE's Mitigation Ratio-Setting Checklist includes an estimate of time between when authorized impacts occur and constructed mitigation is expected to replace lost functions. Impacts and corresponding mitigation to Waters of the U.S., including those that are potential habitat to the federally threatened vernal pool fairy shrimp, are proposed to be phased to correspond to the Project's development phasing. Wetland construction will occur concurrent with the first phase of wetland impacts, minimizing the temporal loss of wetland habitats. Further, the established wetlands are expected to fully pond during the first rainy season following construction, and should support some herbaceous vegetation the following spring, providing some functions to off-set the loss of the unavoidable impacts to wetlands within the Project.

Temporal loss was applied to Phase 1 because the impacts will occur concurrently with the establishment. The adjustment of +1 for one year was used to account for the time between impacting wetland vegetation and re-establishing herbaceous vegetation. The temporal loss adjustment was reduced to +0.5 in Future Phases MRSCs because mitigation wetlands will be established prior to future phased impacts. The ratio was not reduced to 0 as future phases may occur during the wetland mitigation monitoring period.

7.0 PROJECT MITIGATION

Mitigation for impacts to aquatic features and federally listed branchiopod habitat will be fulfilled by the following:

- Preservation of habitat within a 108-acre Onsite Preserve;
- Preservation of habitat within two Offsite Preserves (Mourier East and Mourier West); and
- Establishment of vernal pool and marsh habitat within the Offsite Preserves.

Details regarding the proposed Onsite Preserve are provided in Section 8.0. The Offsite Preserves are discussed in Section 9.0, and proposed establishment of vernal pool and marsh habitat within the Offsite Preserves is discussed in Section 10.0.

7.1 Compensatory Mitigation for Waters of the U.S.

The Amoruso Ranch Project will result in a total of 13.98 acres of direct impact, 2.69[3] acres of indirect impacts, and 0.06 acre of temporary impact to Waters of the U.S. The mitigation ratios for direct impacts range from 1.83:1 to 3.8:1 for Phase 1 impacts and 1.13:1 to 2.6:1 for Future Phases impacts. Using these mitigation ratios, a total of 26.95 acres of wetland establishment will be needed as mitigation for the Amoruso Ranch Project (Table 11). More specifically, 20.72 acres of vernal pool establishment and 6.23 acres of riverine marsh establishment would be required. The impacts, ratios, and proposed mitigation is described by phase below.

[3] Includes onsite and offsite indirect impacts.

Table 11. Total Project Mitigation Proposed					
Waters Type	**Direct Impact**	**Indirect/ Temporary Impact**	**Establishment Mitigation for Direct**	**Establishment Mitigation for Indirect**	**Total Establishment Required**
Riverine/Open Water Feature Types	2.056	0.270	6.097	0.135	6.232
Vernal Pool Feature Types	11.920	2.425	19.509	1.213	20.722
Total	**13.98**	**2.69**	**25.61**	**1.35**	**26.95**

*Note: Wetland areas are measured on the NAD83 datum in State Plane coordinates. All measurements are in feet and converted to acreages for ease of use, which may lead to minor rounding errors in the reporting of acreage summaries. Final totals rounded to the 100th decimal place.

For Phase 1, a total of 11.17 acres of vernal pool establishment is proposed to compensate for impacts to 6.77 acres of vernal pool type features. A total of 3.48 acres of riverine marsh establishment is proposed for impacts to 1.20 acres of riverine/open water type features (Table 12).

Table 12. Proposed Phase 1 Mitigation							
Waters Type	**Direct Impact**	**Indirect/ Temporary Impact**	**Direct Ratio**	**Indirect Ratio**	**Establishment Mitigation for Direct**	**Establishment Mitigation for Indirect**	**Total Establishment Required**
Ephemeral Drainage	0.000	0.000	3.8:1	0.5:1	-	-	-
Intermittent Drainage	0.061	0.035	3.8:1	0.5:1	0.232	0.018	0.249
Seasonal Creek/Stream	0.021	0.022	3.8:1	0.5:1	0.081	0.011	0.092
Marsh	0.699	0.000	3.3:1	0.5:1	2.306	-	2.306
Stock Pond	0.233	0.132	3.3:1	0.5:1	0.768	0.066	0.834
Riverine/Open Water Subtotals	***1.01***	***0.19***		**Totals**	***3.39***	***0.09***	***3.48***
Farmed Wetland	0.016	0.000	2.08:1	0.5:1	0.033	-	0.033
Seasonal Wetland	0.682	0.005	2.08:1	0.5:1	1.556	0.003	1.558
Seasonal Wetland Swale	3.230	1.578	1.83:1	0.5:1	5.910	0.789	6.699
Vernal Pool	1.167	0.089	2.43:1	0.5:1	2.836	0.044	2.881
Vernal Pool Type Subtotals	***5.10***	***1.67***		**Totals**	***10.34***	***0.84***	***11.17***
Total	**6.11**	**1.86**		***Grand Totals***	**13.72**	**0.93**	**14.65**

For Phase 2, a total of 2.86 acres of vernal pool establishment is proposed to compensate for impacts to 2.26 acres of vernal pool type features. A total of 2.75 acres of riverine marsh establishment is proposed for impacts to 1.12 acres of riverine/open water type features (Table 13).

Table 13. Proposed Phase 2 Mitigation							
Waters Type	**Direct Impact**	**Indirect/ Temporary Impact**	**Direct Ratio**	**Indirect Ratio**	**Establishment Mitigation for Direct**	**Establishment Mitigation for Indirect**	**Total Establishment Required**
Marsh	1.042	0.081	2.6:1	0.5:1	2.710	0.041	2.750
Riverine/Open Water Subtotals	***1.04***	***0.08***		***Totals***	***2.71***	***0.04***	***2.75***
Seasonal Wetland	0.798	0.004	1.38:1	0.5:1	1.101	0.002	1.103
Seasonal Wetland Swale	1.172	0.046	1.13:1	0.5:1	1.324	0.023	1.347
Vernal Pool	0.238	-	1.73:1	0.5:1	0.412	0.000	0.412
Vernal Pool Type Subtotals	***2.21***	***0.05***		***Totals***	***2.84***	***0.03***	***2.86***
Total	**3.25**	**0.13**		***Grand Totals***	**5.55**	**0.07**	**5.61**

For Phase 3, a total of 6.69 acres of vernal pool establishment is proposed to compensate for impacts to 5.32 acres of vernal pool type features (Table 14).

Table 14. Proposed Phase 3 Mitigation							
Waters Type	**Direct Impact**	**Indirect/ Temporary Impact**	**Direct Ratio**	**Indirect Ratio**	**Establishment Mitigation for Direct**	**Establishment Mitigation for Indirect**	**Total Establishment Required**
Seasonal Wetland	0.819	0.054	1.38:1	0.5:1	1.131	0.027	1.158
Seasonal Wetland Swale	2.274	0.641	1.13:1	0.5:1	2.570	0.320	2.890
Vernal Pool	1.524	0.009	1.73:1	0.5:1	2.637	0.004	2.641
Vernal Pool Type Subtotals	***4.62***	***0.70***		***Totals***	***6.34***	***0.35***	***6.69***
Total	**4.62**	**0.70**		**Grand Totals**	**6.34**	**0.35**	**6.69**

No compensatory mitigation is proposed for the aquatic resources that are within the Mourier West property full restoration area. The 4.33 acres of wetlands will be replaced during restoration activities.

7.2 USFWS Preservation Mitigation

The Amoruso Ranch Project will result in 8.96 acres of direct impact to potential habitat for the federally listed vernal pool fairy shrimp. An additional 3.74 acres of potential habitat for the federally listed vernal pool fairy shrimp may also be indirectly impacted during Project implementation. As the USFWS' goal is the preservation of species habitat, the Project Applicant proposes to permanently protect and manage the federally-listed species habitat within the Onsite and Offsite Preserves. The Onsite and Offsite Preserves will be placed under easement prior to the start of Project construction so that all proposed preservation features are protected at the onset. A total of 49.40 acres of vernal pool fairy shrimp habitat will be preserved between the Onsite and Offsite Preserves.

The Offsite Preserves contain a total of 38.25 acres of existing vernal pool fairy shrimp habitat, of which 33.92 acres will be preserved, with an additional 20.72 acres of vernal pool fairy shrimp habitat restoration (i.e., establishment) proposed as part of the Waters of the U.S. mitigation (see Table 11). The total preservation within the Offsite Preserves is reduced due to the restoration work proposed within the Mourier West property, which will directly impact 4.33 acres of habitat. While there may also be temporary or indirect effects to some preserved features, it is expected that all preserved features will continue to function as vernal pool fairy shrimp habitat.

The ±108.5-acre Onsite Preserve will preserve 12.32 acres of habitat for the federally threatened vernal pool fairy shrimp (excluding 3.14 acres of indirectly impacted habitat) and contains 60 percent of the known onsite occurrences of this species. The Onsite and the Offsite Preserves will be preserved in perpetuity as described in Sections 8.3 and 9.3.

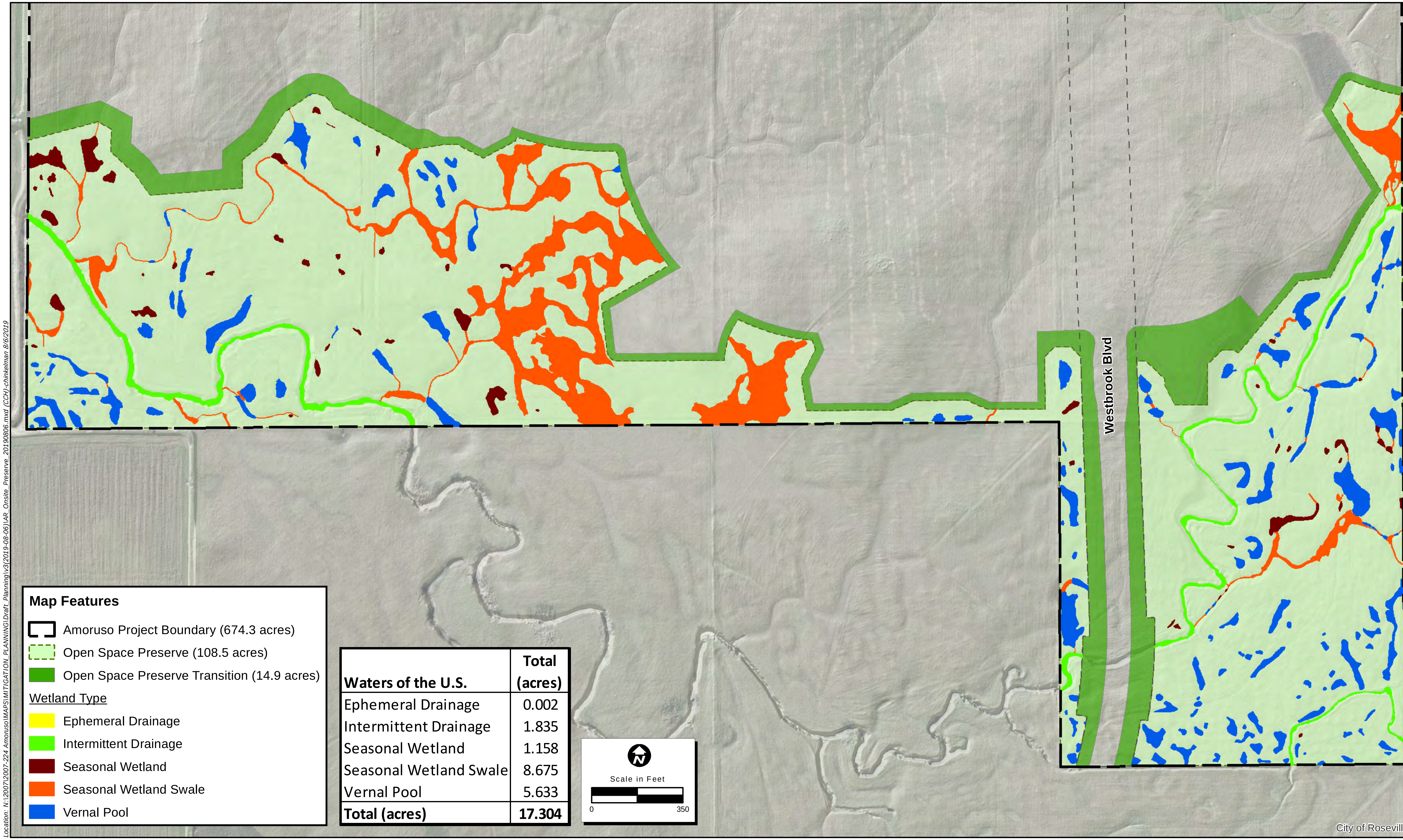
8.0 ONSITE PRESERVE

The Amoruso Ranch Project proposes to establish an ±108.5-acre Onsite Preserve, permanently preserving and protecting 17.30 acres of Waters of the U.S. including 15.47 total acres of habitat for vernal pool fairy shrimp, and associated upland habitat (Figure 12. *Amoruso Onsite Preserve*; however as noted above, 3.14 acres of habitat is considered indirectly impacted).

8.1 Rationale for Onsite Preserve

Numerous consultation meetings were conducted with the USACE, USFWS, U.S. Environmental Protection Agency, Regional Water Quality Control Board, and the City of Roseville from 2011 to the present, and agency comments resulting from these meetings were incorporated into the design and configuration of the Project's Onsite Preserve. Past changes made to the Onsite Preserve include reconfiguring the Preserve to 1) capture additional swale (clay flat) connections, and 2) to expand the Open Space along the southern boundary to establish a single, contiguous preserve, therefore providing connectivity to other regional conservation lands (i.e., the Creekview Specific Plan's Open Space Preserve which lies immediately to the south of the Project). The original proposed Onsite Preserve was 98 acres and now the new proposed Onsite Preserve has increased to 108.5 acres to accommodate these agency requests.

In addition, a minimum 30-foot transition area (as shown in Figure 12) has been added to fulfill the City of Roseville Open Space Preserve Overarching Management Plan (OSPOMP) requirements. Within the transitional open space, activities such as slope grading, outfall/stormwater structures, bike trails, weed abatement activities, and health and safety and open space maintenance vehicle access will be permitted, and all wetlands within this area are considered directly impacted. The transitional open space will not be protected by a deed restriction or conservation easement. The transitional open space will function as a buffer for the Onsite Preserve and provides a designated area for structures that otherwise would need to be located within the Onsite Preserve (e.g., bike trails, outfalls, power lines). This will reduce the need to access the Onsite Preserve for structure maintenance and reduces the risk of inadvertent wetland impacts.



Waters of the U.S.	Total (acres)
Ephemeral Drainage	0.002
Intermittent Drainage	1.835
Seasonal Wetland	1.158
Seasonal Wetland Swale	8.675
Vernal Pool	5.633
Total (acres)	**17.304**

Location: N:\2007\2007-224 Amoruso\MAPS\MITIGATION_PLANNING\Draft_Planning\v3(2019-08-06)\AR_Onsite_Preserve_20190806.mxd (CCH)-chinkelman 8/6/2019

Map Date: 8/6/2019
Photo Source: 2017, City of Roseville Ortho

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

DRAFT

Figure 12. Amoruso Onsite Preserve

2007-224 Amoruso Ranch

8.2 Biological Setting

8.2.1 Surrounding Land Uses

The Onsite Preserve will be adjacent to the Project to the north, the Creekview Specific Plan Area to the south, the Al Johnson Wildlife Area to the west, and Placer Ranch Specific Plan Area and West Roseville Specific Plan Area to the east. As shown on Figure 13. *Regional Conservation Areas*, the Onsite Preserve is primarily bordered by preserves/open space to the west, south, and east, creating a contiguous preserve/open space system along University Creek (a tributary to Pleasant Grove Creek), and providing connectivity to the complex of existing and proposed preserves/open space to the west (including Al Johnson Wildlife Area, Toad Hill Mitigation Bank, Reason Farms Environmental Preserve, and the proposed Offsite Preserves; described further in Section 9.1.2).

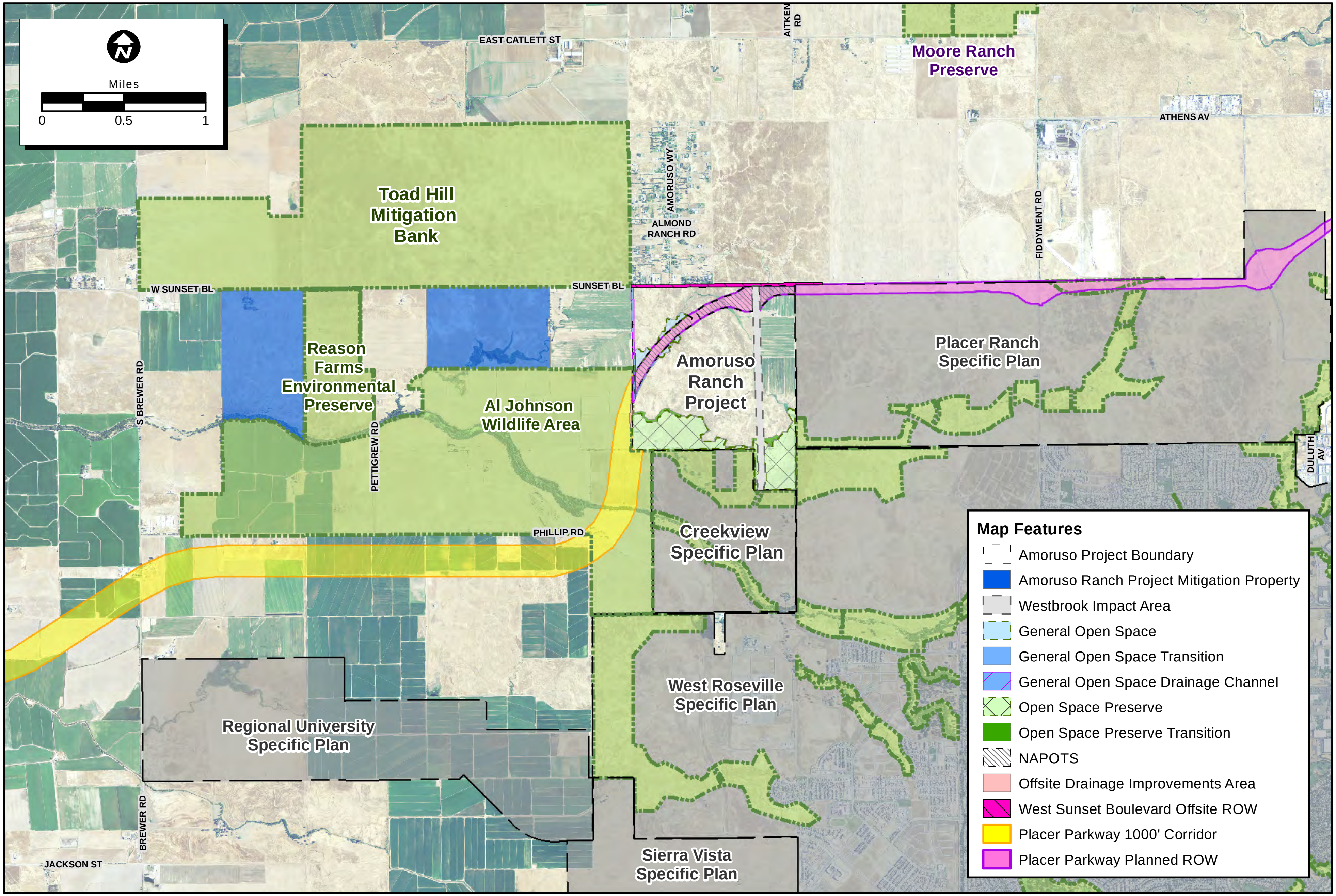
8.2.2 Biological Setting

The biological setting of the Onsite Preserve is similar to that of the overall Project as described in Section 3.0. However, the Onsite Preserve contains the highest concentration of vernal pools and other aquatic features. The Onsite Preserve contains 5.63 acres of vernal pool, 1.16 acres of seasonal wetland, 8.68 acres of seasonal wetland swale, 1.84 acres of intermittent drainage and 0.002 acre of ephemeral drainage (Figure 12); 15.47 acres of the aquatic features within the Onsite Preserve represent habitat for vernal pool fairy shrimp (see Figure 7 for results of wet-season surveys).

Baseline CRAM data for the Project has been collected and is described in Section 3.1.4, and several assessment areas are located within the planned Onsite Preserve.

8.3 Long-Term Management

For long-term management of the Onsite Preserve, the Applicant proposes to append the Preserve to the OSPOMP. The OSPOMP has been approved by the USFWS and the USACE and guides the management of other open space areas owned by the City of Roseville and provides mechanisms for consistent application of preserve management strategies across the City. The OSPOMP outlines open space management strategies such as site protection during adjacent construction, fencing maintenance, grazing, utility maintenance/installation activities, pedestrian/bike paths, habitat management for protected species, annual biological monitoring and reporting, invasive weed management, restoration activities, mosquito abatement, and other allowed and prohibited activities. The Project would follow the interim management and improvement process described in Chapters 5 and 9 of the OSPOMP. As outlined in Chapter 5 of the OSPOMP, during Project build-out and installation of authorized open space improvements, the Onsite and Offsite Preserves would remain privately owned and managed. Further, a conservation easement is proposed to be placed over the Onsite Preserve and a Land Trust Alliance accredited third party 501(c)(3) entity, such as Placer Land Trust, would be retained to hold both a conservation easement and related endowment to ensure easement provisions are enforced.



Map Date: 8/13/2019
Photo Source: NAIP 2012

Location: N:\2007\2007-224 Amoruso\MAPS\MITIGATION_PLANNING\Regional Context\RegionalOS_2017-09-22_Rev_20190813.mxd (ECK/JDS/ELL, 8/13/2019) - chinkelman

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 13. Regional Conservation Areas

2007-224 Amoruso Ranch

Once adjacent Project build-out has occurred and all preserve improvements have been installed, the landowner would dedicate the Onsite and Offsite Preserve to the City of Roseville for management in accordance with the OSPOMP in perpetuity and the conservation easement would continue to be enforced by the selected third party 501(c)(3) entity. Following fee title transfer, the City would assume management responsibility in perpetuity in accordance with the OSPOMP. Long-term funding for City open space management would be provided via a Community Facilities District administered by the City. Long-term funding for easement enforcement by the third-party land trust would be provided via an endowment established by the Project Applicant.

9.0 OFFSITE PRESERVES

The Mourier East and Mourier West properties will be established as the Offsite Preserves for the Project. The location of these preserves in relation to the Project is shown on Figure 14. *Mitigation Properties Site and Vicinity*.

9.1 Rationale for Offsite Preserve Selection

The Offsite Preserves currently support wetlands and vernal pool fairy shrimp, indicating that they have the appropriate characteristics to support these habitats. However, these sites have been degraded by past agricultural uses, presenting an opportunity for improvement of site conditions through management activities and establishment of additional vernal pool habitat consistent with historic conditions.

As all wetland mitigation proposed is designed to be consistent with the historic/natural conditions of vernal pool grassland in the Placer County area, the Offsite Preserves have high likelihood of success. Further, the Offsite Preserves are adjacent to two successful wetland restoration projects; the Toad Hill Mitigation Bank and the City of Roseville’s Reason Farms Environmental Preserve. This further supports the appropriateness of the Offsite Preserves for the proposed wetland mitigation.

The Offsite Preserves were selected based on a number of factors, including:

- Close proximity to the Project and location within the same HUC-12 watershed as the Project
- Landscape connectivity/proximity to other regional conservation areas
- Presence of vernal pool fairy shrimp
- Appropriate soils characteristics
- Similar habitat function as the impact site
- Potential for establishment of vernal pool habitat and amelioration of site conditions

The first three factors above are examined more closely in the sections below. Suitability is further discussed in Section 9.3.2. Mitigation Design.

9.1.1 Proximity to Project and Location within Watershed

The Offsite Preserves are less than three miles from the Project sites (see Figure 14). This close proximity ensures that the replacement of habitat impacted at Amoruso Ranch property will be mitigated for at properties that are close to and having similar characteristics as the impacted area.

The Amoruso Ranch property and all of the Offsite Preserves are located within the Upper Coon-Upper Auburn Watershed (#18020161, USGS 1978). Additionally, these sites are all located within the Pleasant Grove Creek NRCS HUC 12, which is a sixth-level sub-watershed and the smallest level of watershed mapped by NRCS (Figure 11). Since the Offsite Preserves are located in the same sub/micro-watershed as the Amoruso Ranch property, the loss of the wetland habitat at the impact sites will be replaced by wetland habitat within the same small watershed unit, resulting in no net loss of wetlands within this watershed.

9.1.2 Landscape Connectivity and Conservation Contiguity

In addition to being near to the Amoruso Ranch property, the Offsite Preserves also lie within a complex of preserve/open space lands (Figure 13). To the north of the Offsite Preserves lies the ±1,646-acre Toad Hill Ranch Mitigation Bank (a bank containing preserved and established vernal pool habitat with an easement held by Placer Land Trust), and to the south lies the 1,767-acre Al Johnson Wildlife Area (a proposed floodplain/open space area owned by the City of Roseville). In addition, the 227-acre Reason Farms Environmental Preserve (owned by the City of Roseville with an easement held by Placer Land Trust) lies immediately to the east of the Mourier West Property. The Offsite Preserves provide needed connectivity between these preserves, acting as "puzzle pieces" to help complete the existing network of preserves/open space, providing habitat corridors for wildlife movement, and helping to preserve the hydrology of the Pleasant Grove Creek watershed.

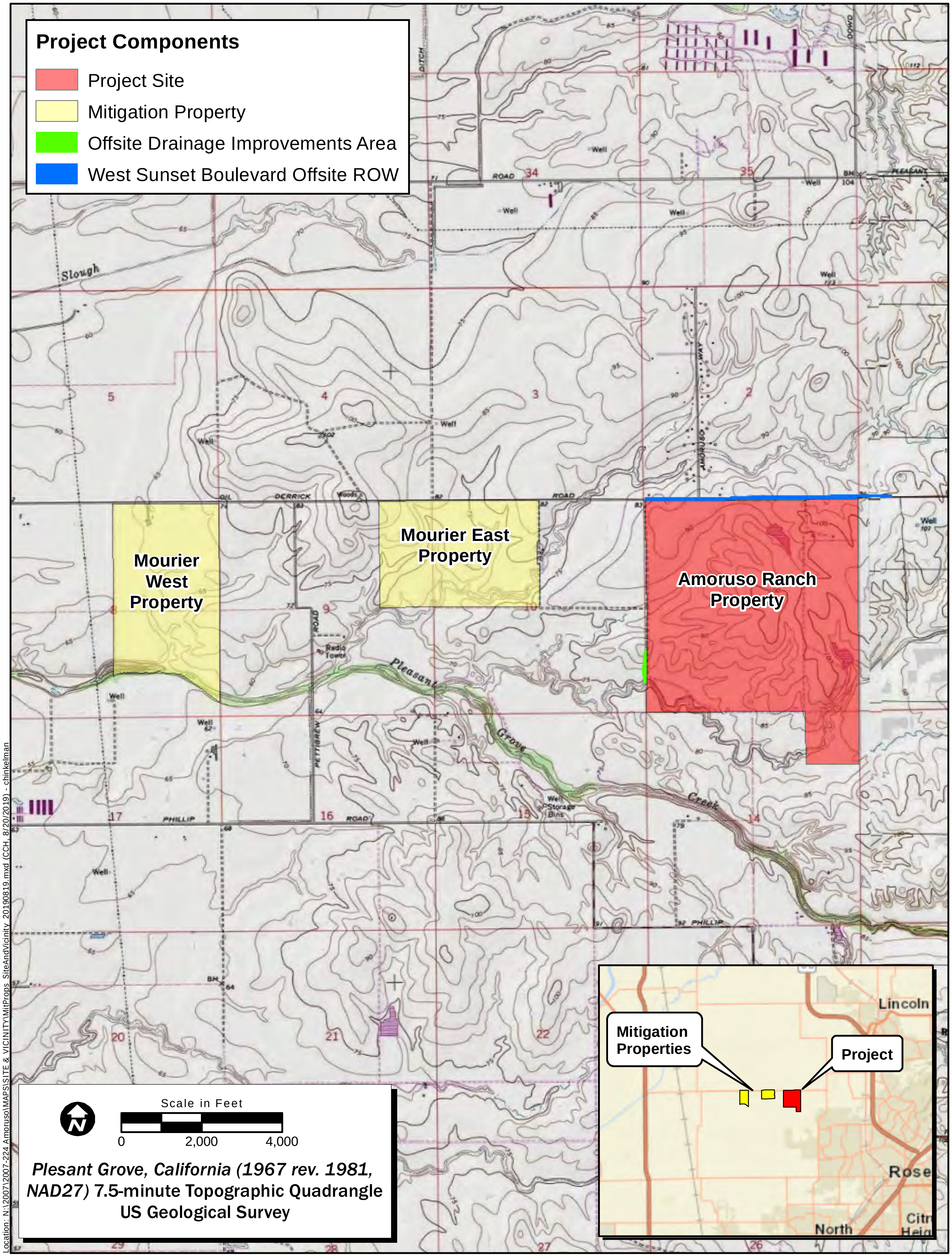
9.1.3 Presence of Vernal Pool Fairy Shrimp

Both Offsite Properties have been documented to support the federally threatened vernal pool fairy shrimp. As the Amoruso Ranch property has also been documented to support vernal pool fairy shrimp, it is important that the offsite mitigation sites also support this species to help facilitate its long-term recovery and survival. Additionally, the Offsite Preserves lie within the Western Placer County core areas within the Southeastern Sacramento Valley vernal pool region (USFWS 2005) (Figure 15. *Western Placer County Core Areas*).

9.2 Biological Setting of Offsite Preserves

9.2.1 Surrounding Land Uses

The surrounding land uses of the Offsite Preserves primarily include open space, preserves and rice cultivation. The Offsite Preserves will provide landscape connectivity to existing preserves/open space as described in Section 9.1.2.



Location: N:\2007\2007-224 Amoruso\MAPS\SITE & VICINITY\MitProps_SiteAndVicinity_20190819.mxd (CCH, 8/20/2019) - chinkelman

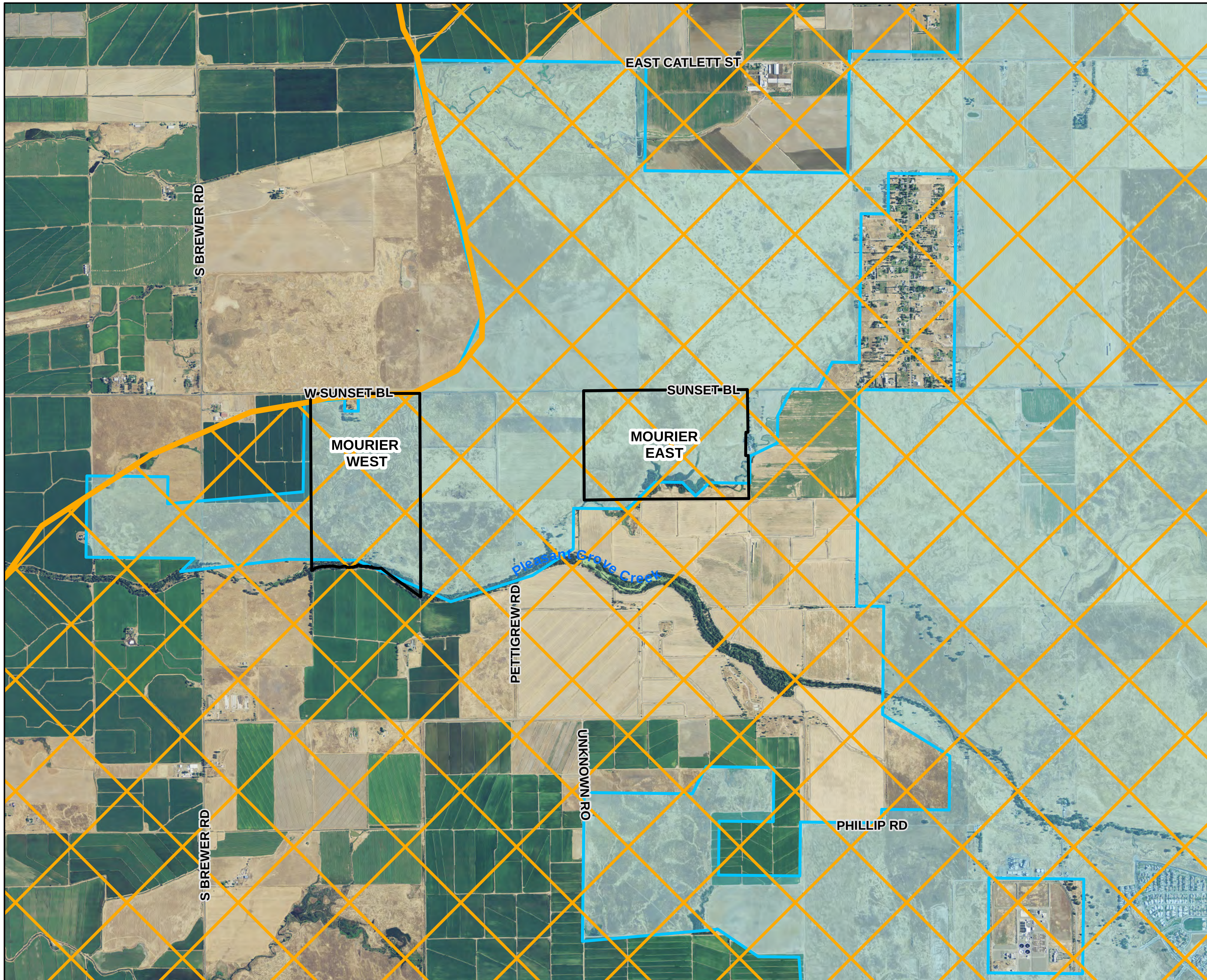
Map Date: 8/20/2019
Service Layer Credits: ESRI, USGS, OpenStreetMap contributors, GIS User Community.

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 14. Mitigation Properties Site and Vicinity

2007-224 Amoruso Ranch

Figure 15.
Western Placer County Core Areas



Map Features

- Mitigation Property
- Western Placer County Core Area
- Southeastern Sacramento Valley Vernal Pool Recovery Unit

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

2007-224 Amoruso Ranch

Feet
0 2,000 4,000

N

Map Date: 8/7/2019

Location: N:\2007\2007-224 Amoruso\MAPS\MISC\MitigationProperties_CoreArea_20190807.mxd *(ck/CCH)-chinkelman 8/7/2019*

9.2.2 *Mourier East Property*

Location

The ±240-acre Mourier East Property is located north of Pleasant Grove Creek, east of Pettigrew Road, south of West Sunset Boulevard, and west of Fiddyment Road (see Figure 14). The Mourier East Property corresponds to a portion of Sections 9 and 10 of Township 12 North and Range 5 East MDBM of the "Pleasant Grove, California" 7.5-minute quadrangle (USGS 1981). The approximate center of the Mourier East Property is located at 38° 49′ 15′′ North and 121° 24′ 40′′ West within the Upper Coon-Upper Auburn Watershed (#18020161, USGS 1978).

Topography and Vegetation

The Mourier East Property is comprised of gently rolling to flat terrain, and is situated at an elevation range of approximately 50 to 75 feet above mean sea level. Annual grassland is the dominant vegetation community onsite. The annual grassland community is comprised primarily of non-native, naturalized Mediterranean grasses including soft brome, Italian ryegrass, little quaking grass, and medusahead grass. Other herbaceous species in this community include rose clover, little hop clover, yellow star-thistle, filaree, winter vetch, sticky tarweed, and cut-leaved geranium.

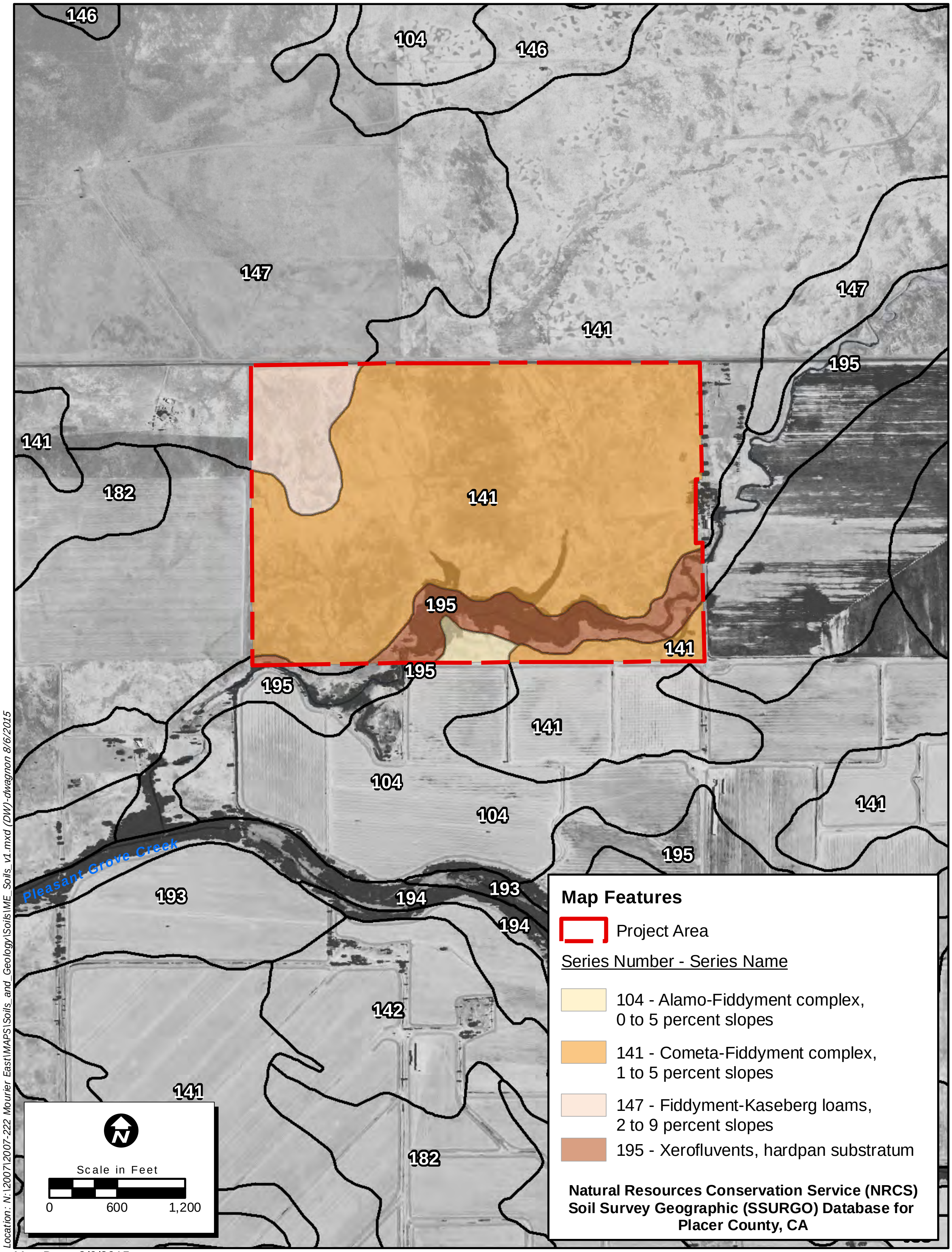
Soils

According to the Soil Survey of Placer County, California, Western Part (USDA 1980), four soil units, or types, have been mapped within the Mourier East Property (Figure 16. Mourier East NRCS Soil Classifications). These are: (104) Alamo-Fiddyment complex, 0-5% slopes, (141) Cometa-Fiddyment complex, 1-5% slopes, (147) Fiddyment-Kaseberg loams, 2-9% slopes, (195) Xerofluvents, hardpan substratum. Units (104) and (195) consist of hydric components and units (141) and (147) may contain hydric inclusions (USDA 1992). A soil and topography study utilizing ground-penetrating radar was also performed on the property (Attachment J).

Waters of the U.S.

ECORP completed a wetland delineation of the Mourier East Property and the adjacent West Sunset Boulevard ROW in 2005 (Figure 17. *Mourier East Waters of the U.S.*). The wetland delineation was conducted in accordance with the USACE Wetlands Delineation Manual (Environmental Laboratory 1987) and verified by the USACE in a letter dated September 1, 2011 (Regulatory # SPK-2004-00898) (Attachment F).

The Mourier East Property supports jurisdictional Waters of the U.S. including 3.81 acres of vernal pools, 2.76 acres of seasonal wetlands, 2.93 acres of drainage swales, 19.68 acres of marsh, and 0.97 acre of intermittent creek. An additional 0.007 acre of drainage swale occurs within the West Sunset Boulevard ROW.

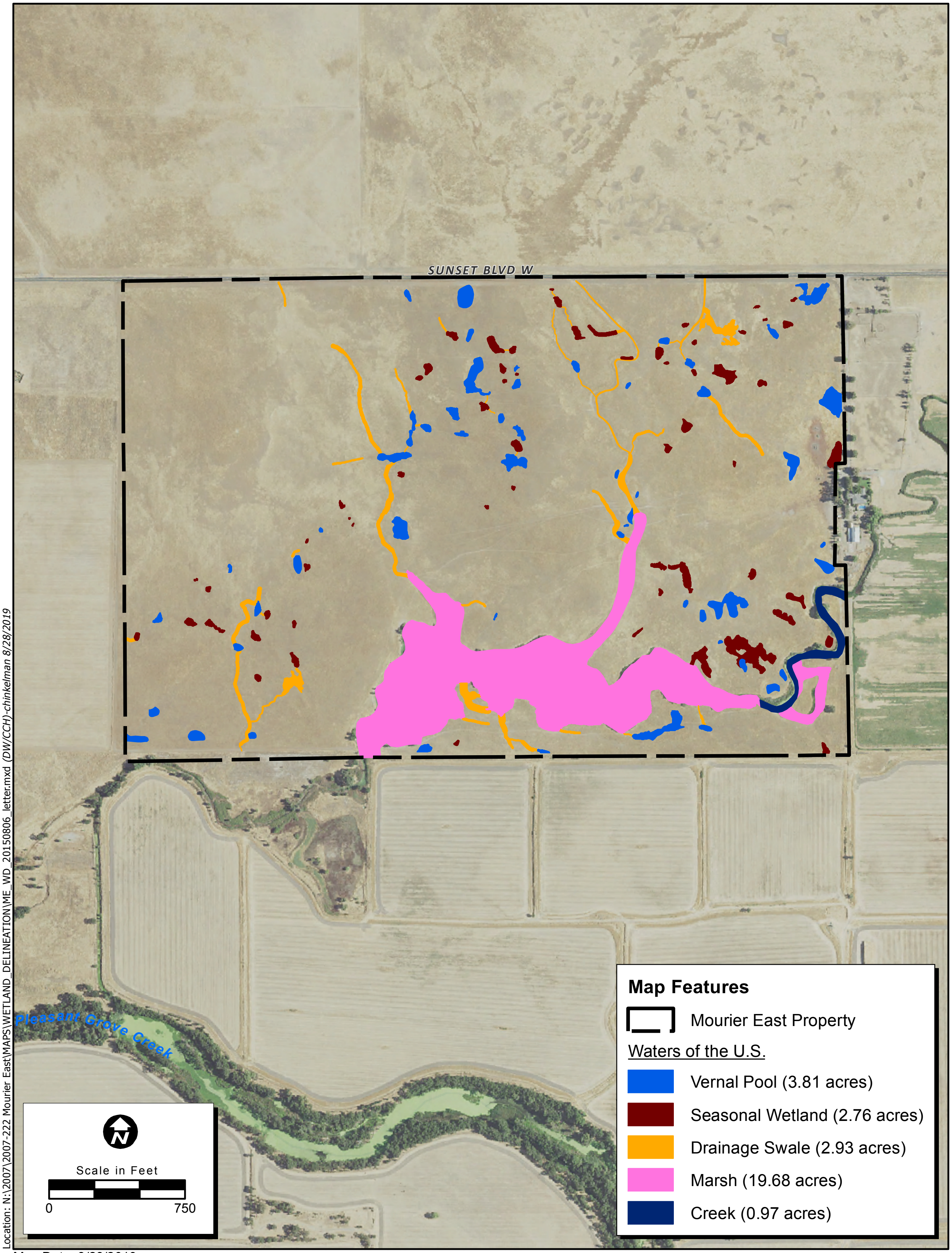


Map Date: 8/6/2015
Photo Source: NAIP (2012)

DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 16. Mourier East NRCS Soil Classifications



Location: N:\2007\2007-222 Mourier East\MAPS\WETLAND_DELINEATION\ME_WD_20150806_letter.mxd (DW/CCH)-chinkelman 8/28/2019

Map Date: 8/28/2019
Photo Source: NAIP (2014)

DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 17. Mourier East Waters of the U.S.

2007-222 Mourier East

Federally Listed Species

Dry season and wet season surveys for federally listed branchiopods were conducted by ECORP during 2015-2016 at the Mourier East Property (ECORP 2016). Vernal pool fairy shrimp were detected in four features onsite, as shown on Figure 18. *Mourier East Offsite Preserve Shrimp Survey Results*. The Mourier East Property supports 9.04 wetted acres of potential vernal pool fairy shrimp habitat.

9.2.3 Mourier West Property

Location

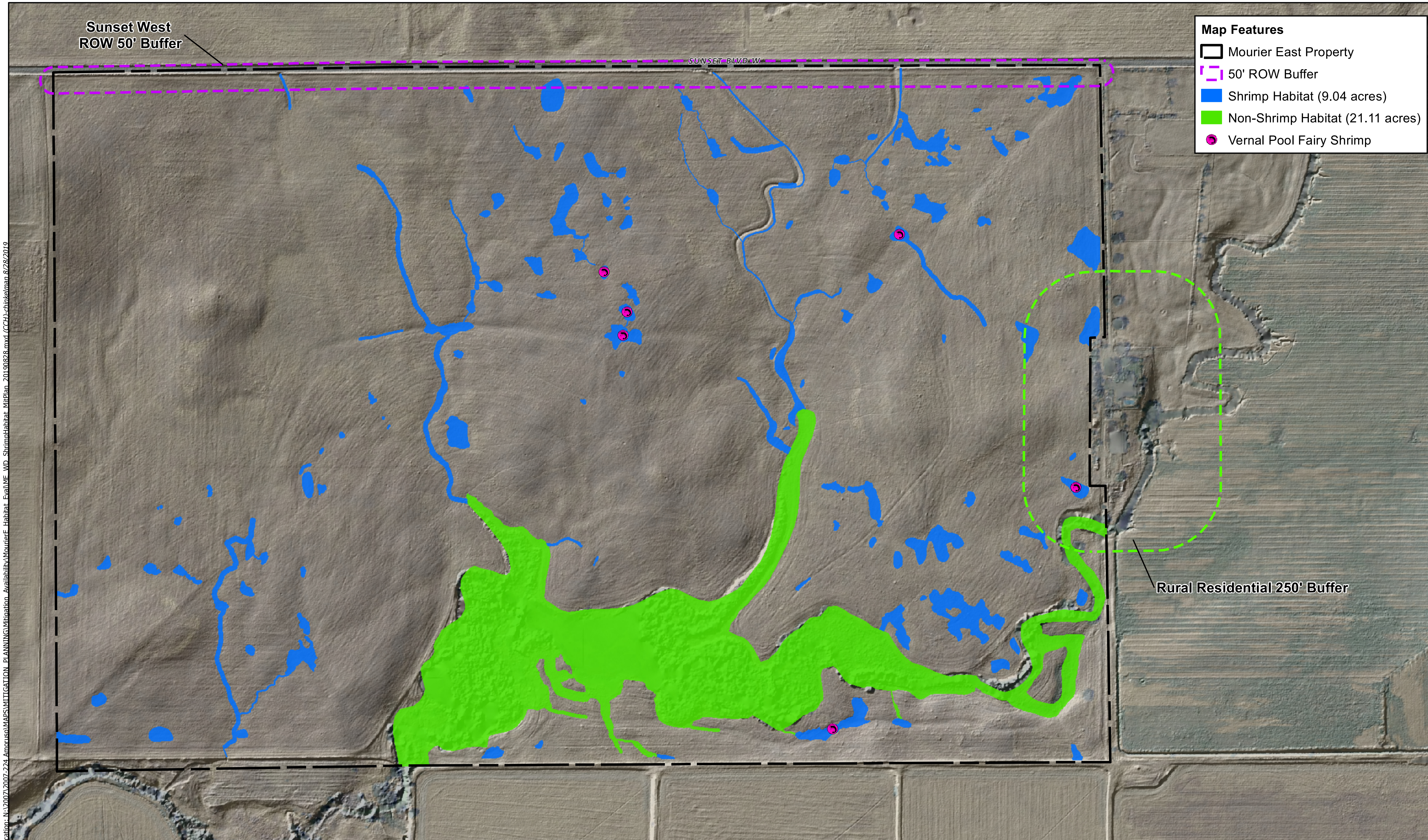
The ±265-acre Mourier West Property is located north of Phillip Road, west of Pettigrew Road, south of West Sunset Boulevard, and east of South Brewer Road (see Figure 14). Additionally, the Mourier West Property is located in the east ½ of Section 8, Township 12 North, and Range 5 East MDBM of the "Pleasant Grove, California" 7.5-minute quadrangle (USGS 1981). The approximate center of the Mourier West Property is located at 38° 49′ 05′′ North and 121˚ 26′ 10′′ West within the Upper Coon-Upper Auburn Watershed (#18020161, USGS 1978).

Topography and Vegetation

The Mourier West Property is composed of leveled to gently rolling terrain and is situated at an elevation of approximately 50 to 75 feet above mean sea level. The majority of the site is annual grassland. The annual grassland community is comprised primarily of non-native, naturalized Mediterranean grasses including medusahead grass, soft brome, ripgut brome (*Bromus diandrus*), wild oat, yellow star-thistle, filaree, Italian ryegrass, barley (*Hordeum murinum*), and vetch (*Vicia* sp.). Riparian woodland habitat is present along Pleasant Grove Creek, which occurs on the southern boundary of the site. Dominant trees within the riparian woodland include Valley oak, interior live oak (*Quercus wislizenii*), and Gooding's black willow (*Salix gooddingii*). The understory of the woodland is made up of Himalayan blackberry (*Rubus armeniacus*), soap plant (*Chlorogalum species*), Dallis grass (*Paspalum dilatatum*), and curly dock (*Rumex crispus*). A grove of blue gum eucalyptus (*Eucalyptus globulus*) occurs around a rural residence and associated barns in the northern portion of the site.

Soils

According to the Soil Survey of Placer County, California, Western Part (USDA 1980), five soil units, or types, have been mapped within the Mourier West Property (see Figure 19. *Mourier West NRCS Soil Classifications*). These are: (141) Cometa- Fiddyment complex, 1-5% slopes, (146) Fiddyment loam, 1-8% slopes (147) Fiddyment-Kaseberg loams, 2-9% slopes, (193) Xerofluvents, and (194) Xerofluvents. Although none of these soil units contain hydric components, they may all contain hydric inclusions (USDA 1992). A soil and topography study utilizing ground-penetrating radar was also performed on the property (Attachment K).



Map Date: 8/28/2019
Photo Source: 2014, NAIP

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Scale in Feet
0 350

DRAFT

Figure 18. Mourier East Offsite Preserve Shrimp Survey Results

2007-222 Mourier East

Waters of the U.S.

ECORP completed a wetland delineation of the Mourier West Property and the adjacent Sunset West Boulevard ROW in 2008 (Figure 20. *Mourier West Waters of the U.S.*). The wetland delineation was conducted in accordance with the USACE Wetlands Delineation Manual (Environmental Laboratory 1987) and the Interim Regional Supplement to the USACE Wetland Delineation Manual: Arid West Region (Arid West Region Supplement) (USACE 2006) and verified by the USACE in a letter dated February 17, 2012 (Regulatory # SPK-2011-01067) (Attachment G).

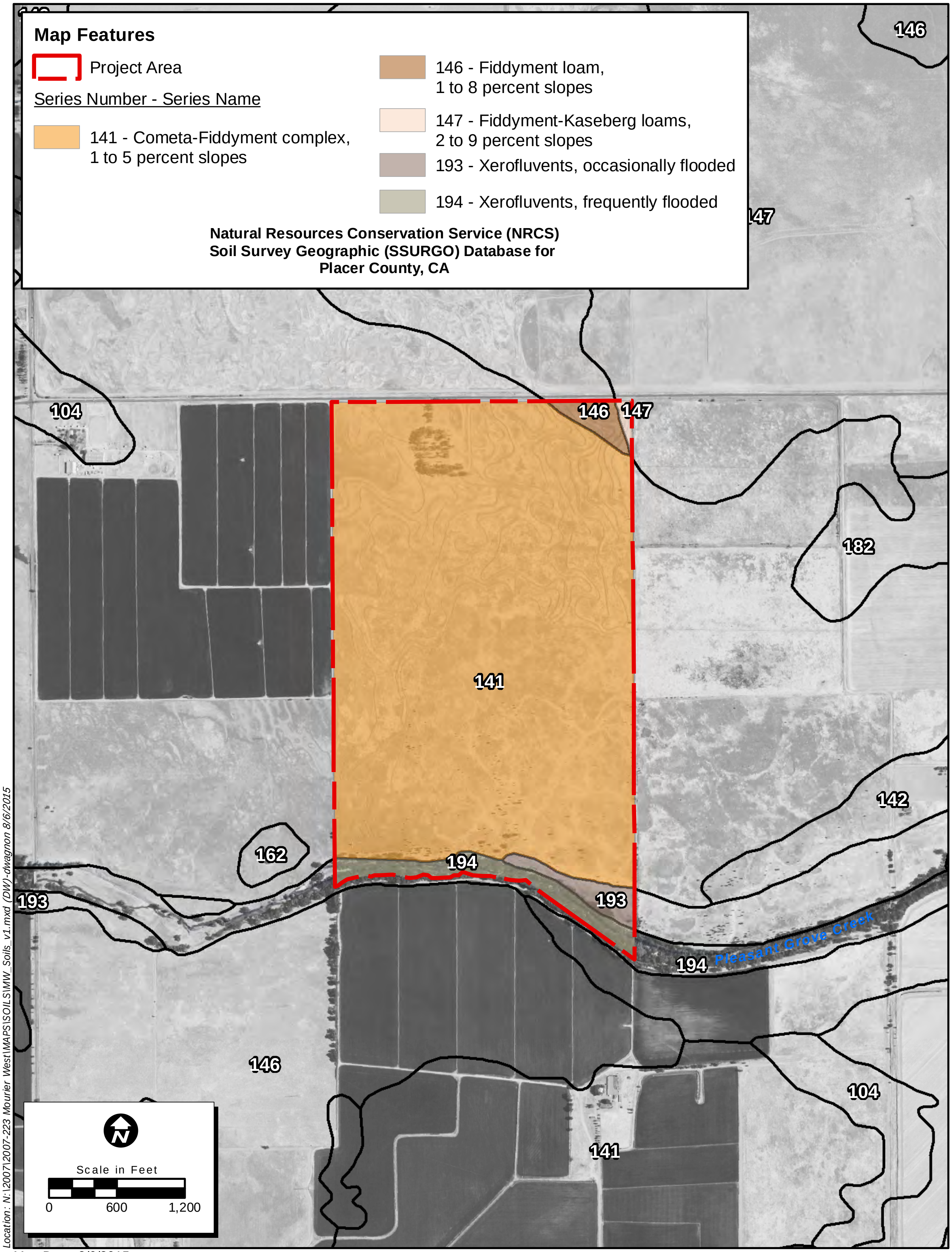
The Mourier West Property supports jurisdictional waters of the U.S. including 8.58 acres of vernal pools, 17.74 acres of seasonal wetlands, 2.89 acres of seasonal wetland swales, 0.11 acre of drainage ditch, and 10.21 acres of creek (Pleasant Grove Creek). The adjacent West Sunset Boulevard ROW supports and additional 0.001 acre of seasonal wetland swale and 0.06 acre of roadside ditch.

Federally Listed Species

Dry season and wet season surveys for federally listed branchiopods were conducted by ECORP during 2015-2016 at the Mourier West Property (ECORP 2016). Vernal pool fairy shrimp were detected in multiple locations throughout the site’s features, as shown on Figure 21. *Mourier West Offsite Preserve Shrimp Survey Results*. The Mourier West Property currently supports 29.21 acres of potential vernal pool fairy shrimp habitat.

9.2.4 Baseline CRAM Assessment

In 2012, CRAM assessments were conducted on a subset of wetlands within each of the Offsite Preserves (ECORP 2013b and 2013c). The Mourier East CRAM assessment is located in Attachment H and the Mourier West CRAM assessment is located in Attachment I. The same CRAM methods and analyses used for the Amoruso Ranch property as described in Section 3.3.4 were conducted for the Offsite Preserves.



Location: N:\2007\2007-223 Mourier West\MAPS\SOILS\MW_Soils_v1.mxd (DW)-dwagnon 8/6/2015

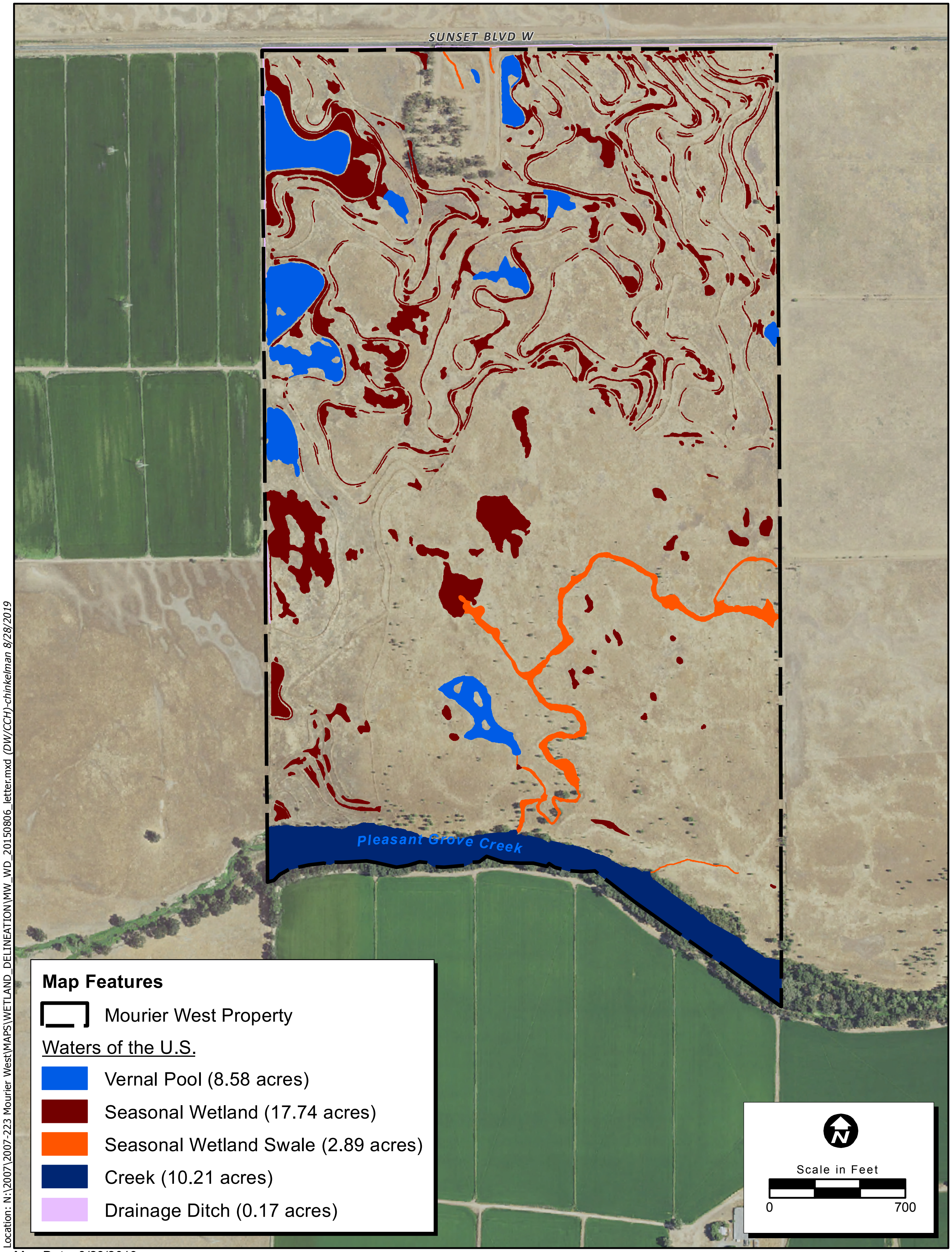
Map Date: 8/6/2015
Photo Source: NAIP (2012)

DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 19. Mourier West NRCS Soil Classifications

2007-223 Mourier West



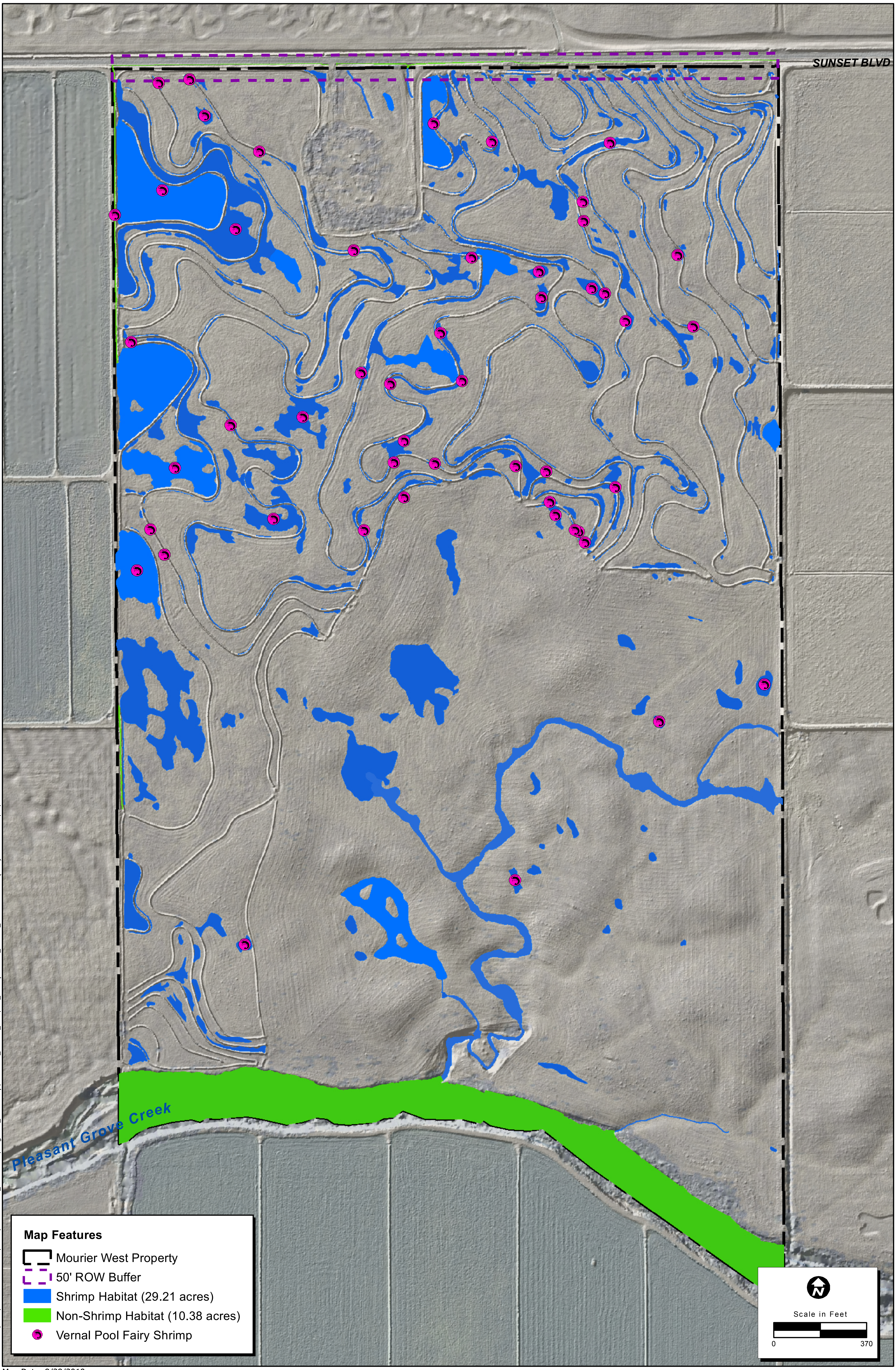
Map Date: 8/28/2019
Photo Source: NAIP (2014)

DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 20. Mourier West Waters of the U.S.

2007-223 Mourier West



Location: N:\2007\2007-224 Amoruso\MAPS\MITIGATION_PLANNING\Mitigation_Availability\MourierW_Habitat_Eval\MW_ShrimpHabitat_MitPlan_20190828.mxd (CCH)-chinkelman 8/28/2019

Map Date: 8/28/2019
Base Source: HJW Photo Science LiDAR Jan 2012

DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 21. Mourier West Offsite Preserve Shrimp Survey Results

2007-224 Amoruso Ranch

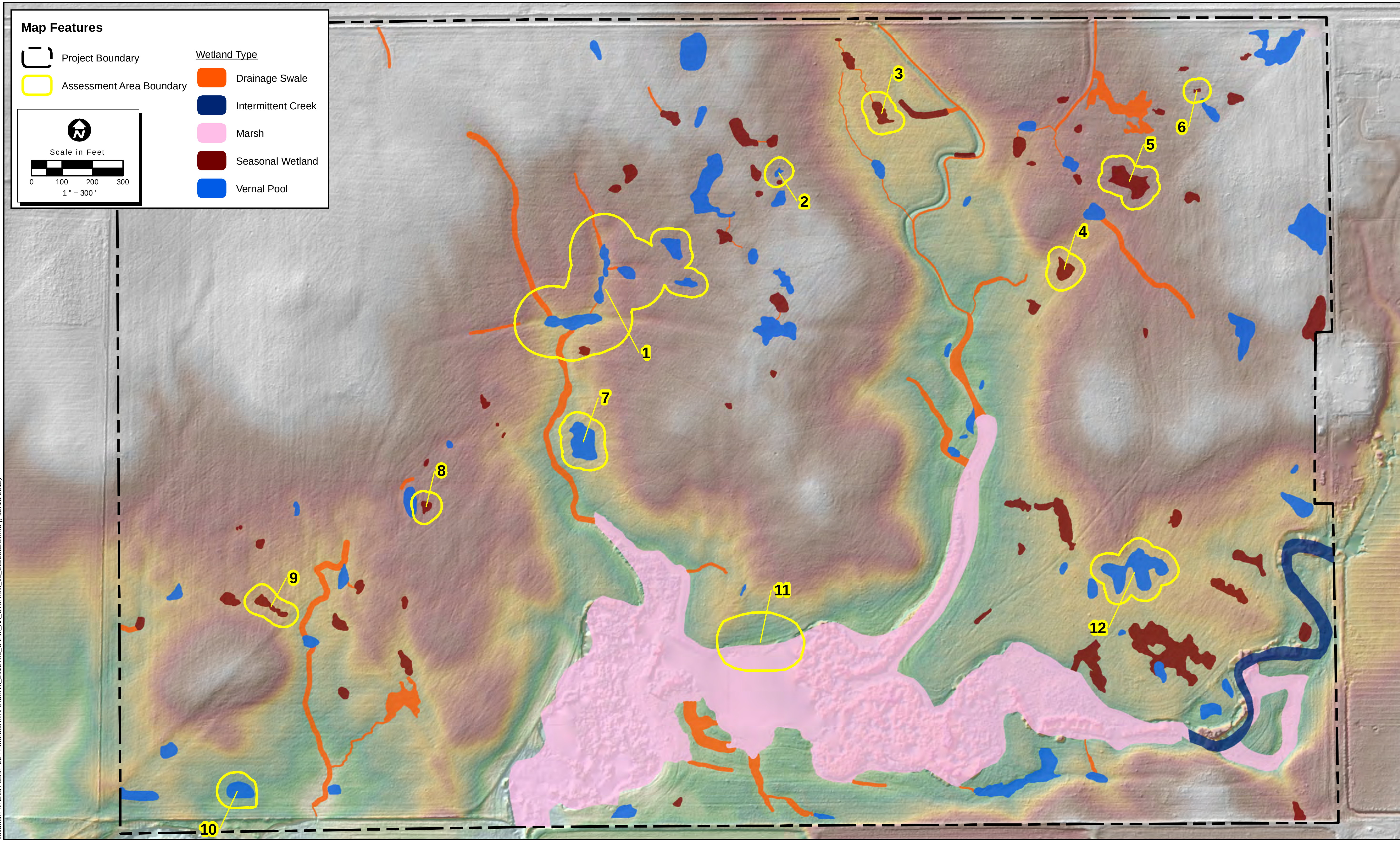
Mourier East Property

The wetlands at the Mourier East Property were divided into 12 AAs within which the CRAM analysis was performed (Figure 22. *Mourier East CRAM Assessment Areas*). One AA (A-1) was comprised of a vernal pool system, four AAs (AA-2, AA-7, AA-10, and AA-12) were comprised of individual vernal pool features, and the remaining seven AAs (AA-3, AA-4, AA-5, AA-6, AA-8, AA-9 and AA-11) were comprised of seasonal depressional wetland features. The seasonal depressional wetland features onsite include seasonal wetlands and a marsh (A-11); however, only a small portion of AA-11 was analyzed due to the large size of the wetland feature that was inundated at the time of the assessment. The portion of AA-11 that was sampled was representative of the whole feature. Table 15 below summarizes the results of the baseline CRAM assessment for each AA within the Mourier East Property.

Table 15. Final Attribute Scores (%) and Overall AA Scores (%) for Mourier East

Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
1	85.4	100.0	58.3	45.8	**72.4**
2	85.4	100.0	25.0	45.8	**64.1**
3	47.9	100.0	25.0	56.6	**57.4**
4	60.4	100.0	25.0	58.3	**60.9**
5	47.9	100.0	37.5	55.6	**60.3**
6	45.4	100.0	25.0	47.2	**54.4**
7	85.4	100.0	50.0	62.5	**74.5**
8	47.9	100.0	25.0	55.6	**57.1**
9	47.9	100.0	25.0	63.9	**59.2**
10	68.1	100.0	62.5	45.8	**69.1**
11	45.4	100.0	37.5	88.9	**68.0**
12	85.4	100.0	50.0	70.8	**76.6**

These scores represent the 2012 baseline conditions at the Mourier East Property, and these data can be used for comparisons of similar CRAM analyses conducted on the same AAs in future years.



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\ME_CRAM_AA_Overview_v2_20120925.mxd (, 12/18/2012)

Map Date: 12/18/2012

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 22. Mourier East CRAM Assessment Areas

2007-224 Amoruso Ranch

ekeethe

Mourier West Property

The wetlands at the Mourier West Property were divided into 15 AAs within which the CRAM analysis was performed (Figure 23. *Mourier West CRAM Assessment Areas*). One AA (AA-10) was not analyzed because it was determined to be similar to AA-11 in all attributes and metrics, so only AA-11 was analyzed. Five AAs (AA-1, AA-5, AA-8, AA-11 and AA-14) were comprised of individual vernal pool features, and the remaining nine remaining AAs (AA-2, AA-3, AA-4, AA-6, AA-7, AA-9, AA-12, AA-13, and AA-15) were comprised of seasonal depressional wetland features. Table 16 below summarizes the results of the baseline CRAM assessment for each AA within the Mourier West Property.

Table 16. Final Attribute Scores (%) and Overall AA Scores (%) for Mourier West[1]

Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
1	93.3	75.0	25.0	41.7	**58.8**
2	57.9	83.3	25.0	52.8	**54.8**
3	60.4	91.7	37.5	66.7	**64.1**
4	50.0	83.3	37.5	61.1	**58.0**
5	85.4	83.3	25.0	75.0	**67.2**
6	47.9	83.3	37.5	44.4	**53.3**
7	47.9	83.3	37.5	44.4	**53.3**
8[2]	85.4	100.0	37.5	79.2	**75.5**
9	65.3	75.0	25.0	52.8	**54.5**
11[2]	85.4	100.0	37.5	79.2	**75.5**
12	47.9	100.0	37.5	52.8	**59.6**
13	47.9	100.0	25.0	52.8	**56.4**
14	85.4	100.0	50.0	87.5	**80.7**
15	47.9	100.0	37.5	63.9	**62.3**

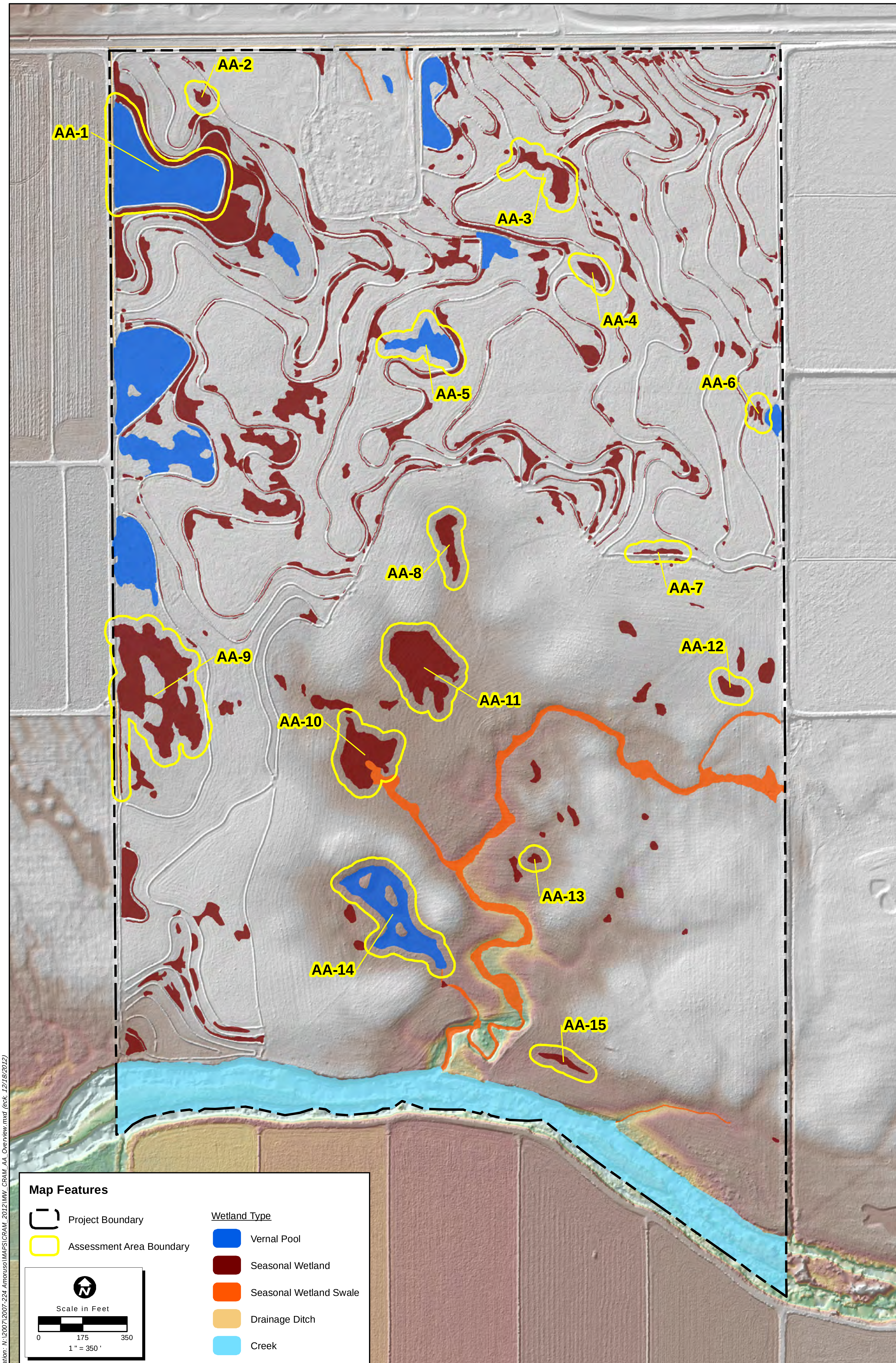
[1] Upon field investigation, AA-10 was determined to be similar to AA-11 in all attributes and metrics and was therefore not analyzed due to this similarity. A total of 14 AAs were assessed for the CRAM analysis.

[2] AA-8 and AA-11 were originally delineated as seasonal wetlands (as seen on Figure 6). Upon field investigation, the floristic composition of these two features more closely resembled vernal pools. Therefore, they were surveyed using the IVP field book.

These scores represent the 2012 baseline conditions at the Mourier West Property, and these data can be used for comparisons of similar CRAM analyses conducted on the same AAs in future years.

9.3 Long-Term Management of the Offsite Preserves

Long-term ownership and management of the Offsite Preserves will be the same for the Onsite Preserve, which is described in Section 8.3.



Map Date: 12/18/2012

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 23. Mourier West CRAM Assessment Areas

2007-223 Mourier West

10.0 PROPOSED WETLAND CREATION WITHIN OFFSITE PRESERVES

10.1 Schedule of Proposed Creation

All wetland establishment will occur concurrently with the first phase of the Project. Project phasing is described in Section 4.0.

10.2 Mitigation Design

Potential wetland (vernal pool and marsh) establishment within the Offsite Preserves is shown in Figures 24 and 25. The exact acreage, locations, and configurations of wetlands to be established will be determined upon approval of the final mitigation required. However, the potential amount of vernal pool and marsh that could be established at each of the Offsite Preserves is discussed in the sections below. The acreages described below and shown in Figures 24 and 25 represent the maximum proposed establishment, and include additional acreage beyond what is required by the mitigation ratios proposed in Section 6.0 for use as contingency.

For each preserve, detailed topographic mapping and subsurface stratigraphy using ground-penetrating radar were conducted to identify suitable locations for establishment. Site and soil suitability reports are provided in Attachments J and K. While not shown on the conceptual plans, swales will also be constructed to establish hydrological connectivity between established vernal pools. Location and configuration of swales will be determined in the field during construction to determine the most appropriate locations.

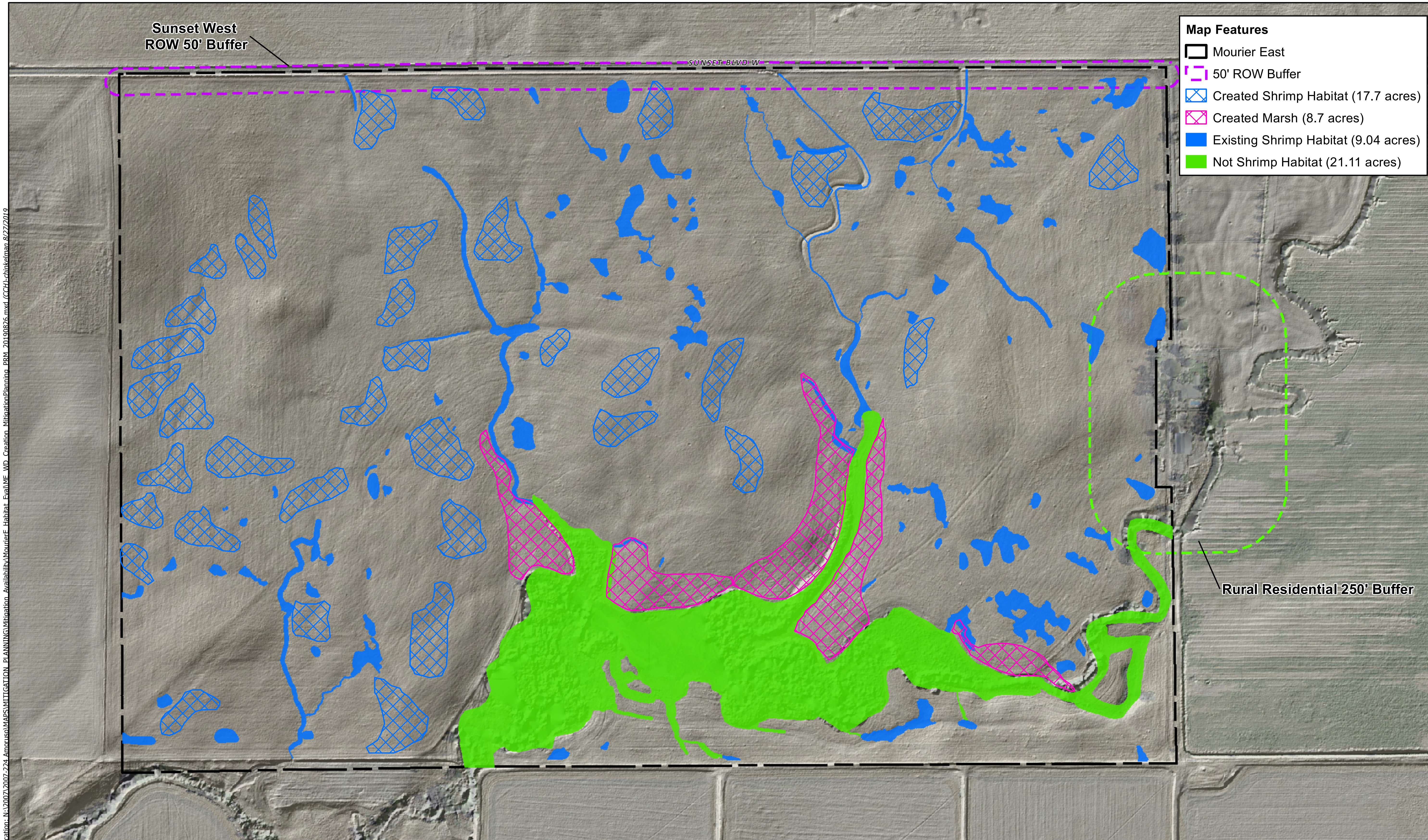
10.2.1 Mourier East

Through the site and soil suitability study for the Mourier East Property (Attachment J), as well as an assessment of indirect impacts prepared in the Biological Assessment (ECORP, prepared concurrently) it was determined that up to ±17.7 acres of additional vernal pools could potentially be established within this site while minimizing indirect impacts to preserved vernal pools. In addition, an existing marsh could be expanded by establishing up to ±8.7 additional acres of marsh. At a minimum, 13.00 acres of vernal pools and 6.23 acres of marsh are proposed to be established at Mourier East, plus 2.70 acres of additional vernal pools for contingency purposes.

10.2.2 Mourier West

Through the site and soil suitability study for the Mourier West Property (Attachment K), as well as an assessment of indirect impacts prepared in the Biological Assessment (ECORP, prepared concurrently) it was determined that up to ±12.6 acres of additional vernal pool habitat could be established within this site. At a minimum, 7.72 acres of vernal pools are proposed to be established at Mourier West.

The USFWS expressed concern over the long-term impact of the existing berms on preserved species habitat within Mourier West. In order to remediate any potential negative impact, the Mourier West Preserve has been divided into three areas, in which different vernal pool establishment methods will be implemented: the preservation area, berm removal area, and full restoration area.



Location: N:\2007\2007-224 Amoruso\MAPS\MITIGATION_PLANNING\Mitigation_Availability\MourierE_Habitat_Eval\ME_WD_Creation_MitigationPlanning_PRM_20190826.mxd *(CCH)-chinkelman 8/27/2019*

Map Date: 8/27/2019
Photo Source: 2014, NAIP

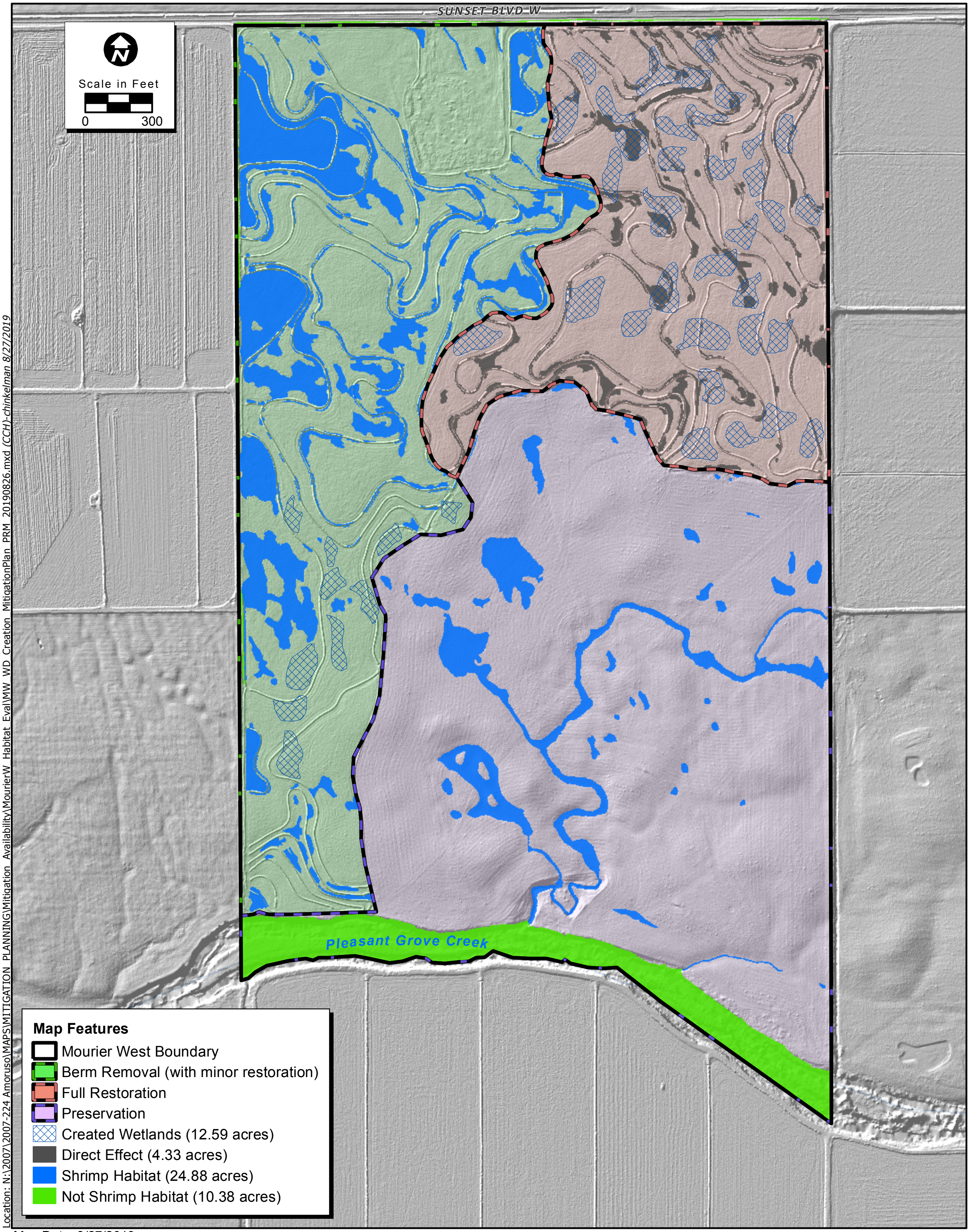
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Scale in Feet
0 350

DRAFT

Figure 24. Mourier East
Proposed Wetland Establishment

2007-222 Mourier East



Location: N:\2007\2007-224 Amoruso\MAPS\MITIGATION_PLANNING\Mitigation_Availability\MourierW_Habitat_Eval\MW_WD_Creation_MitigationPlan_PRM_20190826.mxd (CCH)-chinkelman 8/27/2019

Map Date: 8/27/2019
Photo Source: NAIP (2014)

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

DRAFT

Figure 25. Mourier West
Proposed Wetland Establishment

2007-223 Mourier West

Within the preservation area, no establishment would occur, and existing vernal pools would be preserved.

Within the berm removal area, existing rice check berms will be removed per the request of USFWS. The berms will be graded and the berm material distributed throughout the uplands. A grader with a 12-foot-wide blade will be used. The soil will be compacted onsite with no material hauled offsite. This grading is anticipated to increase the elevation of the upland areas by approximately one inch. All existing wetlands to be avoided will be flagged and an environmental monitor will be onsite during the grading. Once berm removal is completed, additional vernal pool features will be established.

Within the full restoration area, which contains low-quality habitat, the ground will be graded and recontoured over the entirety of the area to establish vernal pool complexes. Once site regrading is completed, additional vernal pool features will be established.

10.2.3 Inoculation of Established Vernal Pools

At both Offsite Preserves, inoculum consisting of native soil containing propagules of vernal pool plant and invertebrate species will be collected using a bobcat or similar equipment to scrape the top 2-3 inches of soil. The inoculum is anticipated to be placed immediately into a dump truck and taken directly to the established vernal pools where it will be placed and spread over the pools. However, if the inoculum needs to be temporarily stored due to logistical constraints, it will be stored at the mitigation site and covered with a tarp to avoid exposure to moisture. Inoculation will help facilitate colonization of the established pools by appropriate vernal pool plant and invertebrate species.

10.3 Monitoring and Performance Standards for Vernal Pool Habitat

In order to judge whether the goal of no net loss of function and values has been met for the constructed vernal pools, a set of performance standards have been developed (Table 17). The reference pools will be used to establish the range of values for performance standards on a yearly basis, where applicable. No formal performance standards have been provided for seasonal wetland swales, as these will mainly function to provide interconnectivity between pools. Qualitative monitoring of swales will occur as described in Section 10.3.3.

Table 17. Performance Standards for Established Vernal Pools

Performance Standard	Monitoring Year						
	1	2	3	4	5	7	10
Hydrology-1: In Years 1 and 2, established pools must be inundated (or have soil saturation within the top 6 inches of the soil) for at least 21 days, or hydroperiod must within the range of the Reference Pools. From Year 3 on, hydroperiod must within the range of the Reference Pools[1].	≥21 days or within range of Reference Pools	≥21 days or within range of Reference Pools	Within in range of Reference Pools	Within range of Reference Pools	Within range of Reference Pools	Within range of Reference Pools	Within range of Reference Pools
Hydrology-2: Depth of inundation must be within the range of the Reference Pools[1].	N/A	N/A	Within range of Reference Pools	Within range of Reference Pools	Within range of Reference Pools	Within range of Reference Pools	Within range of Reference Pools
Vegetation-1: Richness of vernal pool endemics must be maintained or increase each year, and must fall within or above the range of the Reference Pools by Year 5.	N/A	N/A	≥Year 2 or ≥ range of Reference Pools	≥Year 3 or ≥ range of Reference Pools	≥ range of Reference Pools	≥ range of Reference Pools	≥ range of Reference Pools
Vegetation-2: Relative cover of vernal pool endemics must be maintained or increase each year, and must fall within or above the range of the Reference Pools by Year 5.	N/A	N/A	≥Year 2 or ≥ range of Reference Pools	≥Year 3 or ≥ range of Reference Pools	≥ range of Reference Pools	≥ range of Reference Pools	≥ range of Reference Pools
Vegetation-3: The relative cover of invasive species[3] must be within or below the range of values of the Reference Pools.	N/A	≤ range of Reference Pools	≤ range of Reference Pools	≤ range of Reference Pools	≤ range of Reference Pools	≤ range of Reference Pools	≤ range of Reference Pools

[1] Established vernal pools with hydroperiods and/or depths of inundation that fall either below or above the range of the Reference Pools will be considered to have met this standard if they meet the vegetation Performance Standards beginning in Year 3.

[2] See Section 10.1.5 for definition of "Vernal pool endemics".

[3] Invasive species are defined as species with a "High" and/or "Red Alert" status in the Cal-IPC Invasive Plant Inventory, Online Database (Cal-IPC 2018).

The performance standards are discussed further below, and monitoring methods are described in Section 10.3.3.

10.3.1 Hydrology Standards

Due to lower rates of transpiration, established vernal pools typically have longer hydroperiods for several wet seasons prior to full vegetation establishment. To account for this, per performance standard Hydrology-1 the Year 1 and 2 hydrology will be assessed based on a static hydroperiod requirement (21 days of inundation/soil saturation) for the first two years following reestablishment.

Beginning in Year 3, Hydrology-1 and -2 require that the hydroperiod of the established vernal pools fall within the range of the Reference Pools. The established pools will be monitored in Years 3, 5, 7, and 10 to determine if these performance standards are being met. Established vernal pools with hydroperiods and/or depths of inundation that fall either below or above the range of the reference pools will be considered to have met this standard if they meet the vegetation performance standards (e.g., have sufficient hydrology to support an endemic vernal pool plant community), beginning in Year 3.

10.3.2 Vegetation Standards

For performance standard Vegetation-1, the richness of vernal pool endemics within the established vernal pools must fall within or above the range exhibited by the Reference Pools in Year 5, 7, and 10. In Years 2, 3, and 4, the richness of vernal pool endemics must be greater than or equal to the previous year’s richness value or within the range of the Reference Pools.

For performance standard Vegetation-2, the relative cover of vernal pool endemics within the established vernal pools must fall within or above the range exhibited by the Reference Pools in Years 5, 7, and 10. In Years 2, 3, and 4, the richness of vernal pool endemics must be greater than or equal to the previous year’s richness value or within the range of the Reference Pools.

To meet Vegetation-3, the percent relative cover of invasive plant species must fall within or below the range of the Reference Pools in Years 2, 3, 4, 5, 7, and 10.

10.3.3 Monitoring Methods

The monitoring schedule and methods to determine whether the established vernal pools are meeting performance standards are described below.

Selection of Vernal Pools for Monitoring

As described in Table 17, monitoring activities will include monitoring of either the entire set of established pools or a subset of established pools, and a set of reference pools, depending on the given metric being monitored.

The selected subset of established pools will consist of a minimum of 20 percent of the total number of established pools at each of the two Offsite Preserves. This subset will be systematically selected and spatially stratified to capture a representative sample of the established vernal pools in terms of location, size, and depth.

Approximately 30 existing, natural vernal pools will be selected as reference pools. Baseline hydrology and vegetation data will be collected to inform the selection of reference pools. It is anticipated that eight to ten of the reference pools will be selected from Mourier East, three to five from Mourier West, and up to 20 from within the Amoruso Onsite Preserve. Reference pools will be subjectively selected and spatially stratified to capture the natural variation in local vernal pool ecosystems, including variation in size, depth, vegetation composition, and hydrology. Reference pools to be used at Mourier East and Mourier West will be located a sufficient distance from vernal pool establishment activities, and reference pools from the Onsite Preserve will be located such that their hydrology will not be affected by Project activities. Specific reference pools are yet to be determined, and information on the reference pools will be provided to USACE and USFWS prior to finalization of construction plans for vernal pool establishment.

Hydrology Monitoring

In order to determine if the established vernal pools are meeting performance standards Hydrology-1 and Hydrology-2, hydroperiod and inundation depth will be measured using either water level dataloggers, staff gauges, site visits, and/or aerial photography using an unmanned aerial vehicle (UAV). Hydrology data is anticipated to be collected during all monitoring years as described below. However, because precipitation can vary significantly year-to-year, the hydrologic monitoring schedule can be adjusted to accommodate for this inter-annual variation if determined appropriate (i.e. in the event of severe drought).

During Years 1 and 2, established pools must demonstrate inundation or soil saturation in the upper 6 inches of soil for a period of at least 21 days per Hydrology-1. This standard will be assessed using either water level dataloggers in each established pool, weekly site visits during the period of inundation, or weekly UAV monitoring during the period of inundation. If data loggers are used, they will be installed at the lowest topographic point of each vernal pool.

During Years 3 through 10, established pools must have a hydroperiod and inundation depth within 10 percent of the range of the reference pools per Hydrology-2. This standard will be assessed using either water level dataloggers, or weekly site visits and use of staff gauges to assess inundation/saturation and water depth in each established pool and all reference pools. Information related to ponding depths, duration, and inundation responses to rainfall events will be collected by using staff gauges or data loggers installed at the lowest topographic point of each vernal pool. However, from Year 2 on, established vernal pools with hydroperiods and/or depths of inundation that fall either below or above the range of the Reference Pools will be considered to have met this standard if they meet the vegetation performance standards.

Vegetation Monitoring

The purpose of floristic monitoring is to determine if the constructed vernal pools are supporting appropriate vernal pool flora and are functioning within the range exhibited by the reference pools.

The vegetation in the established vernal pools will be qualitatively monitored in the first year, by observing the development of vegetation within the pools concurrently with hydrological monitoring.

The established pools will be quantitatively monitored beginning in Year 2 to determine the species richness of vernal pool endemics, percent relative cover of vernal pool endemics, and percent relative cover of invasive plant species. These metrics will be monitored on a subset of 20 percent of the established pools in Years 2, 4, and 7, and all established pools will be monitored in Years 3, 5, and 10. Reference pools will be monitored for comparison in Years 2, 3, 4, 5, 7, and 10. However, because precipitation can vary significantly year-to-year, the vegetation monitoring schedule can be adjusted to accommodate for this inter-annual variation if determined to be appropriate (i.e., in the event of severe drought).

Quantitative floristic surveys will be conducted in the spring during peak flowering periods. Timing of floristic surveys will be adjusted according to site specific conditions (typically in April or May). The established pools will be monitored per the schedule described in Table 18.

Data collected will include an estimate of absolute vegetative cover (based upon aerial coverage of the total vegetative aggregate, excluding cover such as bare ground, rocks, and algal matting); a cumulative species list; and the absolute cover of each species present within each pool (using the cover scale described in Table 18; modified from Braun-Blanquet 1932). An example of the floristic monitoring data sheet to be used is provided in Attachment L.

Table 18. Braun-Blanquet Cover Estimate Scale

Scale	Percent Cover
0	< 1%
1	1-5%
2	6-25%
3	26-50%
4	51-75%
5	76-100%

The data collected will be used to calculate the following parameters: the richness of vernal pool endemics (per performance standard Vegetation-1), the relative cover of vernal pool endemics (per Vegetation-2), and the relative cover of invasive species (per Vegetation-3). Methods for calculating the information needed to assess each floristic success criterion are described below.

Richness of Vernal Pool Endemics

"Vernal Pool Endemic Species" are defined in Appendix 1 of the CWMW's *California Rapid Assessment Method (CRAM) for Wetlands, Version 6.1*. Individual Vernal Pools Field Book (CWMW 2013). Species richness for each vernal pool will be calculated by totaling the number of vernal pool endemic species found in an individual vernal pool.

Relative Cover

The absolute cover of each plant species present within a vernal pool will be estimated in the field using the Braun-Blanquet cover scale (Table 18) and recorded during floristic monitoring. Total absolute vegetative cover is determined by summing the absolute cover of each species, and may exceed 100 percent. The absolute cover will then be used to calculate relative cover.

Relative cover reflects the percentage of the total absolute cover of vegetation made up of each species within an individual wetland. The cover of vernal pool endemics relative to total vegetative cover will be calculated using the absolute cover data recorded for each wetland sampled. Since the percent cover of each species will be recorded according to the Braun-Blanquet cover scale, the cover of each vernal pool endemic species will be estimated to be equivalent to the mid-point of its cover class value. The Braun-Blanquet cover scale has six possible cover classes; each has been assigned a mid-point value as shown in Table 19.

Table 19. Braun-Blanquet Cover Class Mid-Point Values

Cover Class	Mid-Point Value
0	0.1
1	2.5
2	15.0
3	37.5
4	62.5
5	87.5

Invasive Plant Cover

Invasive plant species are defined as those having a "High" and/or "Red Alert" status in the California Invasive Plant Council's (Cal-IPC's) *California Invasive Plant Inventory, Online Database* (Cal-IPC 2018). Relative cover of invasive plant species will be calculated for each vernal pool monitored using the same methods described above.

Monitoring of Seasonal Wetland Swales

No quantitative performance standards have been established for the constructed seasonal wetland swales. Seasonal wetland swales are shallow, ephemerally wet areas that convey water among vernal pools, and other features, providing hydrological connectivity and a means of propagule dispersal for vernal pool species. Concurrent with monitoring of vernal pools during the wet season, seasonal wetland swales will be visually assessed to determine whether they are appropriately meeting the goal of providing hydrological connectivity between vernal pools. In particular, if any vernal pools are not meeting performance standards, adjoining swale features will be examined during wet periods to determine whether swale contours require adjustment to provide appropriate hydrology.

Aquatic Resource Delineation

Aquatic resource delineations for the site will be conducted in Years 5 and 10 to verify the acreage of established vernal pool habitat.

In Year 5, the aquatic resource delineation will be conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Arid West Region Supplement* (USACE 2008b), or future updated publication(s). The *Jepson Manual, 2nd Edition* (Baldwin et al. 2012), or future updated publication, will be used for plant nomenclature and identification. The wetland classifications of each plant species observed during the delineations will be defined using the most up-to-date USACE-published list of wetland plant species.

In Year 10, the delineation data from Year 5 will be reviewed and updated as needed through a site visit and/or aerial photograph interpretation. Pools that were not meeting three-parameter delineation criteria during Year 5 will be revisited and re-delineation.

CRAM

In Years 5 and 10, the Offsite Preserves will be evaluated using the methods outlined in the most current version of the of the CRAM Vernal Pools and Depressional Field Books (California Wetlands Monitoring Workgroup 2013). The same assessment areas used for baseline data collection (as described under Section 9.2.4) will be used.

Site Photographs and UAV Aerial Photographs

Site photographs will be collected annually at a minimum of five set photo point locations in each offsite preserve. Photo point locations will be established during the first monitoring year. Photo point locations, compass angle, and date of photograph will be noted.

Aerial photographs will be collected using an UAV at least once annually in all monitoring years to qualitatively assess hydrologic and vegetation conditions. Additional UAV monitoring may be implemented to substitute for field monitoring as described above under Hydrology.

10.4 Monitoring and Performance Standards for Marsh Habitat

Performance standards for the established marsh are provided below. The performance standards will determine whether the established marsh is functioning as expected (Table 20).

Table 20. Performance Standards for Established Marsh

Performance Standard	Monitoring Year						
	1	2	3	4	5	7	10
Hydrology-1: Hydrology indicators such as standing water, soil saturation, biotic crust, water marks, muck, soil cracking (or other wetland hydrology indicators listed in the USACE Arid West delineation datasheet) will be present.	Yes	Yes	Yes	Yes	N/A	N/A	N/A
Soil-1: Hydric soil features (consistent with those listed in the USACE Arid West delineation datasheet) will be present.[1]	N/A	N/A	N/A	N/A	Yes	N/A	Yes
Vegetation-1: Richness of wetland species[2] must be maintained or increase each year, and must fall within or above the range of the reference data by Year 5.	N/A	N/A	≥Year 2 or ≥ range of Reference	≥Year 3 or ≥ range of Reference	≥ range of Reference	≥ range of Reference	≥ range of Reference

Table 20. Performance Standards for Established Marsh

Performance Standard	Monitoring Year						
	1	2	3	4	5	7	10
Vegetation-2: Relative cover of wetland species must be maintained or increase each year, and must fall within or above the range of the Reference data by Year 5.	N/A	N/A	≥Year 2 or ≥ range of Reference	≥Year 3 Or ≥ range of Reference	≥ range of Reference	≥ range of Reference	≥ range of Reference
Vegetation-3: The relative cover of invasive species[3] must be within or below the range of values of the Reference data.	N/A	≤ range of Reference	≤ range of Reference	≤ range of Reference	≤ range of Reference	≤ range of Reference	≤ range of Reference

[1] If vegetation standards are met in Year 5, this condition can be considered to be met.
[2] As defined in USACE's National Wetland Plant List (Lichvar 2013, Lichvar et al. 2014, or future updated publication), where OBL, FACW, and FAC categories are considered wetland plant species as follows:
Obligate Wetland (OBL) = occur almost always in wetlands (>99 percent probability).
Facultative Wetland (FACW) = usually occur in wetlands (67 percent-99 percent probability).
Facultative (FAC) = equally likely to occur in wetlands and non-wetlands (34 percent-66 percent probability).
Facultative Upland (FACU) = usually occur in non-wetlands (67 percent-99 percent probability).
Obligate Upland (UPL) = occur almost always in non-wetlands (>99 percent probability).
[3] Invasive species are defined as species with a "High" and/or "Red Alert" status in the Cal-IPC Invasive Plant Inventory, Online Database (Cal-IPC 2018).

10.4.1 Hydrology Standards

The hydrology and soil standards do not refer to reference data, since there is variability in inundation period throughout the existing large marsh. Instead, the standards refer to USACE delineation criteria for hydrology and soils.

In the first four years, qualitative hydrology indicators will be evaluated per Hydrology-1 to determine whether the marsh is developing and maintaining appropriate hydrology. Soil-2 requires that the established marsh soils contain hydric soil indicators. In Years 5 and 10, a delineation will be conducted as described in Section 10.3.3, and during the delineation, soil points will be taken from the established marsh to determine whether the Soil-1 standard is met. If there are drought conditions over the first four years, hydric soil indicators may not be met by Year 5. If that case, if vegetation standards are met in Year 5, then Soil-1 can be considered to have been met.

10.4.2 Vegetation Standards

The vegetation standards require that the established marsh support a similar vegetation community to the existing marsh. In the first three years, the wetland vegetation community will be developing, and standards Vegetation-1 and -2 require that the richness and proportion of wetland vegetation be greater than or equal to the previous year's richness value or within the range of values of the existing marsh. By Year 3, it is expected that the established marsh will have species richness and relative cover of wetland vegetation similar to the existing marsh.

10.4.3 Monitoring Methods

Selection of Sampling and Reference Points

At least five representative sampling transects or plots will be set within the established marsh areas, and at least five representative reference transects or plots will be determined within the existing marsh, during the first monitoring year. Data collected from the reference locations will be used to establish the reference range for vegetation standards. Sampling methods (e.g., transects, plots, or relevé/rapid assessment method) will be determined during the first monitoring year based on site conditions and accessibility, and will be designed to avoid disturbance of the nesting colony of tricolored blackbirds which has been known to nest in this location in past years.

Hydrology and Soil Monitoring

In order to determine if the established vernal pools are meeting performance standard Hydrology-1, the five sampling locations within the marsh will be examined for qualitative hydrology indicators during the first four monitoring years. The USACE Arid West Wetland Determination Data Form will be referenced for appropriate wetland hydrology indicators.

Concurrently with the delineation to be conducted in years 5 and 10 (described in Section 10.3.3), soil samples will be collected from the five sampling points in the established marsh and examined for hydric soil indicators. Matrix color and redox features will be described and any hydric soil indicators will be listed. The USACE Arid West Wetland Determination Data Form will be referenced for appropriate hydric soil indicators.

Vegetation Monitoring

The vegetation in the established marsh will be qualitatively monitored in the first year, by observing the development of vegetation at the five sampling locations in comparison to the five reference locations.

The established marsh will be quantitatively monitored beginning in Year 2 to determine the species richness of wetland species, percent relative cover of wetland species, and percent relative cover of invasive plant species. Quantitative floristic surveys will be conducted in the spring during peak flowering periods. Timing of floristic surveys will be adjusted according to site specific conditions (typically in April or May). These metrics will be monitored for the five sampling locations and the five reference locations in Years 2, 3, 4, 5, 7, and 10 (i.e., concurrent with monitoring of the established vernal pools).

Data collected will include an estimate of absolute vegetative cover (based upon aerial coverage of the total vegetative aggregate, excluding cover such as bare ground, rocks, and algal matting); a cumulative species list; and the absolute cover of each species present within each pool (using the cover scale described in Table 18; modified from Braun-Blanquet 1932). An example of the floristic monitoring data sheet to be used is provided in Attachment L.

Descriptions of the calculations of species richness, relative cover, and relative cover of invasive plants are provided in Section 10.3.3 for vernal pool monitoring. The same methods will be used for the established marsh; however, instead of calculating richness and relative cover of vernal pool endemics, richness and relative cover of all wetland species will be calculated. Wetland species are defined as those present on the USACE National Wetland Plant List as OBL, FACW, or FAC.

10.5 Monitoring Schedule

Monitoring of the established and reference features (vernal pools and marsh) will be conducted per the schedule described in Table 21.

Table 21. Monitoring Schedule for Established Wetlands

Monitoring Activity	Monitoring Year									
	1	1	3	4	5	6	7	8	9	10
Hydrology standards (all established pools and reference pools, and marsh)	X	X	X	X	X	X	X			X
Vegetation (subset of established pools and reference pools, and marsh)		X		X			X			
Vegetation (all established pools and reference pools, and marsh)			X		X					X
Aquatic Resource Delineation (all established pools, and marsh per Soil-1)					X					X
CRAM					X					X
Site Photographs	X	X	X	X	X		X			X
UAV Photography	X	X	X	X	X	X	X	X	X	X

10.6 Adaptive Management During the Monitoring Period

During the first two years after construction, the initial hydrological data and vegetation data collected will be used to determine whether the established features are functioning as intended, or whether any remedial measures are needed. Remedial measures may include raising or lowering the elevation of connections to adjacent swales (for vernal pool habitat), re-grading the feature, or adding additional inoculum.

Management during the monitoring period will generally be conducted according to the OSPOMP. However, no grazing of the established features will be permitted for the first two years following construction, followed by light grazing as described in the OSPOMP.

10.7 Reporting

10.7.1 As-Built Conditions

An as-built report will be submitted to USFWS and USACE within 60 days of completion of each phase of wetland construction. This as-built will consist of a set of the wetland construction plans with any changes clearly marked in red ink. The total acreage of wetlands built will be included.

10.7.2 Annual Reports

Monitoring reports presenting the results of the success monitoring of the constructed wetlands will be prepared and submitted for each year of success monitoring by December 31 of each monitoring year. The report will refer to USACE regulatory project number SPK-2004-00888 and USFWS file number TBD. The reports will be sent to the attention of Chief, Sacramento Valley Office, Regulatory Branch, at the USACE and Branch Chief, Endangered Species Branch, Sacramento Field Office, at the USFWS.

Monitoring reports shall include:

- A map of the Offsite Preserves showing wetland locations, locations of various monitoring activities outlined in this proposal, and photo points;
- Performance standard monitoring results as described above;
- An assessment of the monitoring results against the established performance standards;
- A description of the overall site condition and any management actions taken during that year; and
- Any recommended management actions to be conducted (if necessary, a contingency plan, as described in Section 10.8, will be prepared).

10.8 Potential Contingency Measures

10.8.1 Initiating Procedures

If any constructed features appear to be underperforming during monitoring, or if the final performance standards are not met in Year 10, the applicants shall prepare an analysis of the cause or causes of underperformance. If deemed necessary by the USACE and the USFWS, the applicant shall propose remedial action for approval.

10.8.2 Remediation and Contingency Plan

The remediation plan will identify those measures (e.g., regrading, reseeding) appropriate to remediate the situation. The remediation plan and associated post-remediation monitoring will be developed on a case by case basis as the type of remediation and monitoring may vary depending on the extent and type of remediation needed. If remediated features do not meet performance standards by the end of the monitoring period, monitoring for those features will be extended until performance standards are met.

If a constructed feature fails to meet performance standards despite remediation, and additional remediation is not feasible, not practical, or would result in an unnatural condition, then the feature will be deemed non-functional. If the total functioning wetland area as delineated after the 10-year monitoring period, is less than required by the permit, the acreage shortfall may be mitigated for at an offsite mitigation bank, other mitigation area, or by payment into an in-lieu fund as approved by the USACE and the USFWS.

10.9 Completion of Compensatory Mitigation Responsibilities

10.9.1 Notification

When the applicants believe that the final performance standards have been met, the applicant shall notify the USACE and the USFWS and provide details on the success of the constructed features.

10.9.2 Agency Confirmation

Following receipt of the report, the USACE and/or USFWS may require a site visit to confirm the completion of the mitigation effort. Monitoring will cease at the end of the ten-year monitoring period for the established vernal pools if the mitigation is found by the USFWS and USACE to be in substantial compliance with the performance standards.

11.0 MITIGATION SUMMARY

The total proposed mitigation for unavoidable impacts to Waters of the U.S. and federally listed species habitat is the establishment of 26.95 acres and the preservation of 82.71 acres of Waters of the U.S., of which, 49.40 acres are habitat for federally-listed species within the proposed Onsite and Offsite Preserves. A complete summary of mitigation by resource type is provided in Table 22.

Table 22. Total Waters of the U.S. Mitigation Proposed for the Amoruso Ranch Project[1]

	Mourier East Preserve	Mourier West Preserve	Onsite Preserve	Total
Preserved Waters of the U.S.				
Ephemeral Drainage	-	-	0.00	0.00
Intermittent Drainage	0.97	-	1.84	2.81
Creek	-	10.21	-	10.21
Marsh	19.68	-	-	19.68
Riverine/Open Water Type Subtotal:	*20.65*	*10.21*	*1.84*	*32.70*
Vernal Pool	3.81	8.44	5.63	17.89
Seasonal Wetland	2.76	13.55	1.16	17.47
Seasonal Wetland Swale	2.93	2.89	8.68	14.50
Vernal Pool Type Subtotal:	*9.5*	*24.89*	*15.47*	*49.86*
Total Preservation	**30.15**	**35.26**	**17.30**	**82.71**
Established Waters of the U.S.[2]				
Marsh	6.23	-	-	6.23
Vernal Pool	13	7.72	-	20.72
Contingency Wetlands	2.7	-	-	2.70
Total Establishment	**21.93**	**7.72**	**0.00**	**29.65**
Grand Total of Preserved and Established Features:	**52.08**	**42.82**	**17.30**	**112.21**

[1]Note: Wetland acreages rounded to the 100th decimal place and represent the remaining area after restoration activities are complete. Totals include potential indirectly impacted wetlands as they will still be preserved.

[2]Wetland acreages to be established may vary depending on final vernal pool design, but the total establishment between Mourier East and Mourier West will not be less than 20.72 acres.

The implementation of this permittee-responsible mitigation plan will fully mitigate for all impacts associated with the Project. When impacts to mitigation are compared on a whole for the Project, effectively the watershed will lose 13.98 acres but gain 112.21 acres of preserved Waters of the U.S., which ultimately is a benefit to the local watershed.

12.0 OBJECTIVE LOCATOR GUIDE

Objective	Mitigation Rule Language	Referenced in this document
(2) Objectives.	A description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project will address the needs of the watershed, ecoregion, physiographic province, or other geographic area of interest.	Sections 2.3 and 2.4
(3) Site selection	A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation project site.	Section 9.1 and 8.1
(4) Site protection instrument.	A description of the legal arrangements and instrument, including site ownership, that will be used to ensure the long-term protection of the compensatory mitigation project site.	Section 8.3
(5) Baseline information.	A description of the ecological characteristics of the proposed compensatory mitigation project site and, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other site characteristics appropriate to the type of resource proposed as compensation. The baseline information should also include a delineation of waters of the United States on the proposed compensatory mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site, not the mitigation bank or in-lieu fee project site.	Sections 3.0 and 9.2
(6) Determination of credits.	A description of the number of credits to be provided, including a brief explanation of the rationale for this determination. (i) For permittee-responsible mitigation, this should include an explanation of how the compensatory mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity. (ii) For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these were determined.	Section 6.0 and Attachment E
(7) Mitigation work plan.	Detailed written specifications and work descriptions for the compensatory mitigation project, including, but not limited to, the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; soil management; and erosion control measures. For stream compensatory mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel	Section 10.2

Objective	Mitigation Rule Language	Referenced in this document
	form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.	
(8) Maintenance plan.	A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.	Section 8.3
(9) Performance standards.	Ecologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives. (See § 332.5.)	Sections 10.3 and 10.4
(10) Monitoring requirements.	A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results to the district engineer must be included. (See § 332.6.)	Section 10.3.3 and 10.5
(11) Long-term management plan.	A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management. (See § 332.7(d).)	Section 8.3
(12) Adaptive management plan.	A management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success. (See § 332.7(c).)	Sections 8.3 and 10.6
(13) Financial assurances.	A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards (see § 332.3(n)).	Section 8.3

13.0 REFERENCES

Braun-Blanquet. 1932. Plant sociology (Transl. G. D. Fuller and H. S. Conrad). McGraw-Hill, New York.

Cal-IPC. 2018. California Invasive Plant Inventory. Berkeley, California: California Invasive Plant Council (Cal-IPC). http://www.cal-ipc.org/paf/.

CWMW. 2012a. California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas. Version 6.0. User's Manual. 95 pp.

_____. 2012b. California Rapid Assessment Method (CRAM) for Wetlands. Version 6.0. Vernal Pool Systems Field Book. 42 pp.

_____. 2012c. California Rapid Assessment Method (CRAM) for Wetlands. Version 6.0. Individual Vernal Pools Field Book. 30 pp.

_____. 2008. California Rapid Assessment Method (CRAM) for Wetlands. Version 5.0.2. Perennial Depressional Wetlands Field Book. 37 pp.

Code of Federal Regulations. 2011. Title 33 – Navigation and Navigable Waters. Chapter II Corps of Engineers, Department of the Army, Department of Defense. Part 332. Compensatory Mitigation for Losses of Aquatic Resources. Section 332.3 – General Compensatory mitigation requirements.

ECORP. 2017. 2015-2016 *Guideline-Level Surveys for Federally Listed Large Branchiopods for the Al Johnson Wildlife Reserve Improvement Area, Placer County, California*. Prepared for Brookfield Sunset LLC, September.

_____. 2013a. Confidential California Rapid Assessment Method Analysis For Amoruso Ranch Property, Placer County, California. Prepared for Brookfield Sunset LLC. Dated August 20, 2013. 10 pp.

_____. 2013b Confidential California Rapid Assessment Method Analysis For Mourier East Property, Placer County, California. Prepared for Brookfield Sunset LLC. Dated August 20, 2013. 8 pp.

_____. 2013c. Confidential California Rapid Assessment Method Analysis For Mourier West Property, Placer County, California. Prepared for Brookfield Sunset LLC. Dated August 20, 2013. 8 pp.

_____. 2009. 2008-2009 Wet Season 90-Day Report of Findings Regarding Federally Listed Branchiopods for Amoruso Property, Placer County, California. Prepared for Brookfield California Land Holdings, Inc. 11 pp.

_____. 2008. 2007-2008 Wet Season 90-Day Report of Findings Regarding Federally Listed Branchiopods for Amoruso Property, Placer County, California. Prepared for Brookfield California Land Holdings, Inc. 11 pp.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U. S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi. 100 pp. + app.

Lichvar, R. W. 2013. The National Wetland Plant List.: 2013 Wetland Ratings. Phytoneuron. 49:1-241. http://rsgisias.crrel.usace.army.mil/NWPL/.

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. The National Wetland Plant List: 2014 Update of Wetland Ratings. Phytoneuron 2014-41: 1-42. Retrieved from U.S. Army Corps of Engineers, Engineer Research and Development Center. Available Online: http://rsgisias.crrel.usace.army.mil/NWPL/#

USACE. 2008. 2008 Mitigation Rule.

_____. 2006. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region. ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USDA. 1992. Hydric Soils List for Sacramento County. U.S. Department of Agriculture, Soil Conservation Service, Davis, California.

_____. 1980. Soil Survey of Placer County, California, Western Part. U.S. Department of Agriculture, Soil Conservation Service. Davis, California.

_____. 1937. Aerial Photo flown by the United States Department of Agriculture.

USFWS. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Portland, Oregon. xxvi +606 pages. Available Online: http://www.fws.gov/sacramento/es/Recovery-Planning/Vernal-Pool/es_recovery_vernal-pool-recovery.htm. Accessed December 15, 2015.

USGS, 1992 "Roseville, California" 7.5-minute Quadrangle. U.S. Department of the Interior.

_____. 1981. "Pleasant Grove, California" 7.5-minute Quadrangle. Geological Survey. Denver, Colorado

_____. 1978. Hydrologic Unit Map, State of California. Geological Survey. Reston, Virginia.

LIST OF ATTACHMENTS

ATTACHMENT A

Amoruso Wetland Delineation Verification Letter

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

RECEIVED
APR 05 2011
ECORP Consulting

Amoruso Ranch
2007-224.1
DMS|SMV|FILE|REG
org wpl

REPLY TO ATTENTION OF

March 30, 2011

Regulatory Division SPK-2004-00888

Ms. Daria Snider
ECORP Consulting, Incorporated
2525 Warren Drive
Rocklin, California 95677

Dear Ms. Snider:

We are responding to your March 23, 2011, revised request, on behalf of Brookfield California Land Holdings, Inc., for a preliminary jurisdictional determination (JD), in accordance with our Regulatory Guidance Letter (RGL) 08-02, for the Amoruso Ranch site. This approximately 679-acre site is immediately south of Sunset Boulevard West, north of and adjacent to Pleasant Grove Creek, in Sections 11 and 14, Township 11 North, Range 5 East, MDBM, Latitude 38.8160°, Longitude -121.3872°, Roseville, Placer County, California.

Based on available information, we concur with the estimate of potential waters of the United States, as depicted on your March 23, 2011, revised Amoruso Wetland Delineation drawing. The approximately 38.5 acres of aquatic resources, shown as vernal pools, seasonal wetlands, marsh and other waters, present within the survey area appear to be jurisdictional waters of the United States. These waters may be regulated under Section 404 of the Clean Water Act.

A copy of our RGL 08-02 Preliminary Jurisdictional Determination Form for this site is enclosed. Please sign and return a copy of the completed form to this office. Once we receive a copy of the form with your signature we can accept and process a Pre-Construction Notification or permit application for your proposed project.

You should not start any work in potentially jurisdictional waters of the United States unless you have Department of the Army permit authorization. You may request an approved JD for this site at any time prior to starting work within waters. In certain circumstances, as described in RGL 08-02, an approved JD may later be necessary.

You should provide a copy of this letter and notice to all other affected parties, including any individual who has an identifiable and substantial legal interest in the property.

This preliminary determination has been conducted to identify the potential limits of wetlands and other water bodies which may be subject to Corps of Engineers' jurisdiction for the particular site identified in this request. A Notification of Appeal Process and Request for Appeal (RFA) form is enclosed to notify you of your options with this determination. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

We appreciate your feedback. At your earliest convenience, please tell us how we are doing by completing the customer survey on our website under *Customer Service Survey*.

Please refer to identification number SPK-2004-00888 in any correspondence concerning this project. If you have any questions, please contact me at Sacramento District, Regulatory Division, 1325 J Street, Room 1480, Sacramento, California 95814-2922, email *Michael.C.Finan@usace.army.mil*, or telephone 916-557-5324. For more information regarding our program, please visit our website at *www.spk.usace.army.mil/regulatory.html*.

Sincerely,

Michael Finan
Wetland Specialist

Enclosures

Copy Furnished without enclosures:

Deanne Green, Brookfield California Land Holdings, Inc. 555 Capitol Mall, Suite 600, Sacramento, California 95814
Jason Brush, U.S. Environmental Protection Agency, Region IX, Wetlands Regulatory Office,(WTR-8), 75 Hawthorne Street, San Francisco, California 94105
William Marshall, Central Valley Regional Water Quality Control Board, 11020 Sun Center Drive, #200, Rancho Cordova, California 95670-6114
Ken Sanchez, U.S. Fish and Wildlife Service, Endangered Species Division, 2800 Cottage Way, W-2605, Sacramento, California 95825
Kent Smith, California Department of Fish and Game, Region 2, 1701 Nimbus Drive, Rancho Cordova, California 95670-4599

PRELIMINARY JURISDICTIONAL DETERMINATION FORM
Sacramento District

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

Regulatory Branch: **California North** File/ORM #: **SPK-2004-00888** PJD Date: **March 30, 2011**

State: **CA** City/County: **Roseville, Placer County** Nearest Waterbody: Location (Lat/Long): **38.8160276652515°, -121.387299456187°** Size of Review Area: acres	Name/Address Of Property Owner/ Potential Applicant: **Deanne Green** **Brookfield CA Land Holdings, Incorporated** **555 Capitol Mall, Suite 600** **Sacramento, California 95814**
Identify (Estimate) Amount of Waters in the Review Area **Non-Wetland Waters:** linear feet ft wide **2.16** acre(s) Stream Flow: **N/A** **Wetlands: 36.34** acre(s) Cowardin **N/A** Class:	Name of any Water Bodies on the site identified as Section 10 Waters: Tidal: Non-Tidal: ☒ Office (Desk) Determination ☒ Field Determination: Date(s) of Site Visit(s): **1-19-11**

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply – checked items should be included in case file and, where checked and requested, appropriately reference sources below)

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Data sheets prepared by the Corps.
☐ Corps navigable waters' study.
☐ U.S. Geological Survey Hydrologic Atlas:
  ☐ USGS NHD data.
  ☐ USGS HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: **1:24K; CA-PLEASANT GROVE**
☒ USDA Natural Resources Conservation Service Soil Survey.
☒ National wetlands inventory map(s).
☐ State/Local wetland inventory map(s).
☐ FEMA/FIRM maps.
☐ 100-year Floodplain Elevation (if known):
☒ Photographs: ☒ Aerial
  ☒ Other
☒ Previous determination(s). File no. and date of response letter: **200500247**
☐ Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

3/30/11

Signature and Date of Regulatory Project Manager (REQUIRED)

Signature and Date of Person Requesting Preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Deanne Green, Brookfield CA Land Holdings, Incorporated		File No.: SPK-2004-00888	Date: March 30, 2011
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
	APPROVED JURISDICTIONAL DETERMINATION		D
x	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at h*ttp://www.usace.army.mil/inet/functions/cw/cecwo/reg* or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Michael Finan Regulatory Project Manager U.S. Army Corps of Engineers 1325 J Street, Room 1480 Sacramento, California 95814-2922 Phone: 916-557-5324, FAX 916-557-6877 Email: Michael.C.Finan@usace.army.mil (Use this address for submittals to the **district** engineer)	If you only have questions regarding the appeal process you may also contact: Thomas J. Cavanaugh Administrative Appeal Review Officer U.S. Army Corps of Engineers 1455 Market Street San Francisco, California 94103-1399 Phone: 415-503-6574, FAX 415-503-6646) Email: Thomas.J.Cavanaugh@usace.army.mil (Use this address for submittals to the **division** engineer)

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

________________________ Signature of appellant or agent.	Date:	Telephone number:

ATTACHMENT B

Amoruso Wetland Delineation Verification Letter

Comprehensive

California Rapid Assessment Method Evaluation

For

Amoruso Ranch Project

Placer County, California

7 November 2013

Prepared For:
Brookfield Sunset LLC

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Comprehensive
California Rapid Assessment Method Evaluation
for
Amoruso Ranch Project

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The approximately 674-acre Amoruso Ranch property is part of the Amoruso Ranch Specific Plan (ARSP), located within western Placer County west of Fiddyment Road and south of West Sunset Boulevard, just outside of the northwestern portion of the City of Roseville, California. The ARSP is a mixed-use planned community that includes the approximately 470-acre Amoruso Ranch Project, the approximately 21-acre Westbrook Boulevard project, and the approximately 65-acre Placer Parkway Regional Transportation Improvement project. The Amoruso Ranch Project and the Westbrook Boulevard project are being permitted separately by the Applicant, Brookfield Sunset, LLC. The Placer Parkway project, although within the overall Amoruso Ranch property, is a separate project and will be permitted by others.

As mitigation for unavoidable impacts to wetlands and other waters of the U.S. incurred during implementation of the Amoruso Ranch Project and Westbrook Boulevard Project (Project), the project applicant is proposing three potential mitigation properties for both wetland preservation and wetland restoration. The three proposed mitigation properties are Skover, Mourier East, and Mourier West.

1.1 Property Locations

The Amoruso Ranch property and the three proposed mitigation sites are all located south of Sunset Boulevard West, west of Fiddyment Road, east of South Brewer Road, and north of Pleasant Grove Creek in Placer County, California (Figure 1. *Project Locations and Vicinity*).

The Amoruso Ranch property is located within portions of Sections 11 and 14 of Township 11 North and Range 5 East of the “Pleasant Grove, California” 7.5-minute quadrangle (U.S. Department of the Interior, Geological Survey [USGS] 1978). The approximate center of the site is located at 38° 49’ 00” North and 121° 23’ 05” West within the Upper Coon-Upper Auburn watershed (#18020161, USDA-NRCS, USGS and EPA 2013).

The Skover property is located within a portion of Section 8 of Township 11 North and Range 5 East of the “Pleasant Grove, California” 7.5-minute quadrangle (USGS 1978). The approximate center of the site is located at 38° 49' 15" North and 121° 26' 10" West within the Upper Coon-Upper Auburn watershed (#18020161, USDA-NRCS, USGS and EPA 2013).

The Mourier East property is located within a portion of Sections 9 and 10 of Township 11 North and Range 5 East of the "Pleasant Grove, California" 7.5-minute quadrangle (USGS 1978). The approximate center of the site is located at 38° 49' 15'' North and 121° 24' 40'' West within the Upper Coon-Upper Auburn watershed (#18020161, USDA-NRCS, USGS and EPA 2013).

The Mourier West property is located within a portion of Section 8 of Township 11 North and Range 5 East of the "Pleasant Grove, California" 7.5-minute quadrangle (USGS 1978). The approximate center of the site is located at 38° 49' 05'' North and 121° 26' 10'' West within the Upper Coon-Upper Auburn watershed (#18020161, USDA-NRCS, USGS and EPA 2013).

1.2 CRAM Evaluation

This comprehensive California Rapid Assessment Method (CRAM) evaluation is intended to present baseline information on the current conditions of the wetlands within the four properties, and to compare the relative values of the wetlands across the Amoruso Ranch property and between proposed off-site mitigation properties. In particular, a comparison of CRAM attribute scores and overall Assessment Area (AA) scores between wetlands proposed for impact and wetlands proposed to be preserved or avoided is provided in this evaluation.

2.0 METHODS

2.1 Individual CRAM Analyses

Separate CRAM assessments were conducted for each of the four properties in the spring of 2012. The results of each CRAM assessment were summarized in a separate report for each property (ECORP 2013a, ECORP 2013b, ECORP 2013c, and ECORP 2013d). For each individual CRAM analysis, a subset of the wetlands within each property was chosen to represent the wetland types found throughout the site. The representative wetlands were then classified as three different wetland types based on the available modules for conducting CRAM (CWMW

2012a): vernal pool systems (VPS), individual vernal pools (IVP), and depressional wetlands (DW). AAs were established around these wetlands using the guidelines outlined in the CRAM User's Manual, Version 6.0 (CWMW 2012a) and the individual field books for each module [Vernal Pool Systems (CWMW 2012b), Individual Vernal Pools (CWMW 2012c), and Perennial Depressional Wetlands (CWMW 2008)]. Most of the depressional wetlands within the four properties are considered seasonal with a natural dry-down in the spring and summer. While the CRAM for Wetlands, Perennial Depressional Wetlands Field Book, Version 5.0.2 (CWMW 2008) was not specifically designed for assessing ephemeral features, it is the only field book currently available for these features.

2.1.1 Amoruso Ranch Property

At the Amoruso Ranch property, 28 AAs were selected to represent the wetlands on-site (*Figure 2. Amoruso: CRAM Assessment Areas*). These include:

- four VPS AAs (AA-02, AA-19, AA-21 and AA-29);
- 11 IVP AAs (AA-01, AA-04, AA-05, AA-07, AA-10, AA-13, AA-17, AA-22, AA-24, AA-26 and AA-28); and
- 13 DW AAs (AA-03, AA-06, AA-08, AA-09, AA-11, AA-14, AA-15, AA-16, AA-18, AA-20, AA-23, AA-25 and AA-27).

The depressional features within the AAs included seasonal wetlands, a stock pond, and a marsh. Table 1 shows the Final Attribute Scores and Overall AA Scores for Amoruso Ranch. These scores represent the 2012 conditions at the site.

Table 1 – Final Attribute Scores (%) and Overall AA Scores (%) for Amoruso Ranch[1]

Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
1	85.4	91.7	62.5	70.8	**77.6**
2	85.4	91.7	66.7	62.5	**76.6**
3	60.4	100	25.0	55.6	**60.3**
4	85.4	91.7	62.5	70.8	**77.6**
5	85.4	100	50.0	70.8	**76.6**

Table 1 – Final Attribute Scores (%) and Overall AA Scores (%) for Amoruso Ranch[1] (Cont.)					
Assessment Area	**Final Attribute Score**				**Overall AA Score**
	Buffer and Landscape	**Hydrology**	**Physical Structure**	**Biotic Structure**	
6	60.4	83.3	25.0	58.3	**56.8**
7	70.4	100	50.0	62.5	**70.7**
8	43.1	91.7	50.0	77.8	**65.7**
9	47.9	83.3	37.5	63.9	**58.2**
10	60.4	100	50.0	79.2	**72.4**
11	47.9	100	37.5	63.9	**62.3**
13	85.4	91.7	62.5	87.5	**81.8**
14	47.9	100	25.0	61.1	**58.5**
15	47.9	100	25.0	61.1	**58.5**
16	47.9	66.7	37.5	38.9	**47.8**
17	60.4	100	50.0	58.3	**67.2**
18	47.9	100	37.5	72.2	**64.4**
19	72.9	91.7	75.0	58.3	**74.5**
20	47.9	100	50.0	72.2	**67.5**
21	85.4	100	75.0	54.2	**78.7**
22	85.4	100	75.0	87.5	**87.0**
23	60.4	100	37.5	80.6	**69.6**
24	85.4	100	50.0	45.8	**70.3**
25	47.9	75.0	37.5	61.1	**55.4**
26	85.4	100	50.0	66.7	**75.5**
27	60.4	100	25.0	58.3	**60.9**
28	85.4	100	62.5	79.2	**81.8**
29	85.4	100	50.0	50.0	**71.4**

[1] Upon field investigation, AA 12 was excluded from the analysis because it was part of a linear swale. A total of 28 AAs were assessed for the CRAM analysis.

2.1.2 Skover Property

At the Skover property, seven AAs were selected to represent the wetlands on-site (*Figure 3. Skover: CRAM Assessment Areas*). All of the AAs were active rice fields and were assessed as individual DW AAs. For the purposes of assessing buffer metrics, adjacent rice fields were not considered buffer since they are highly manipulated agricultural fields (CWMW 2012a). As such, the eight, 250-meter buffer lines used to assess the average buffer width were adjusted to fall within buffered areas and to exclude non-buffer rice fields. Table 2 shows the Final Attribute Scores and Overall AA Scores for the Skover property. These scores represent the 2012 conditions at the site, and these data represent baseline scores that were used for this evaluation.

Table 2 – Final Attribute Scores (%) and Overall AA Scores (%) for Skover					
Assessment Area	**Final Attribute Score**				**Overall AA Score**
	Buffer and Landscape	**Hydrology**	**Physical Structure**	**Biotic Structure**	
1	48.3	33.3	25.0	50.0	**39.2**
2	55.6	33.3	25.0	50.0	**41.0**
3	65.3	33.3	25.0	52.8	**44.1**
4	43.1	33.3	25.0	52.8	**38.6**
5	35.8	33.3	25.0	52.8	**36.7**
6	55.6	33.3	25.0	52.8	**41.7**
7	55.6	33.3	25.0	61.1	**43.8**

2.1.3 Mourier East Property

At the Mourier East Property, 12 AAs were selected to represent the wetlands found on-site (Figure 4. *Mourier East: CRAM Assessment Areas*). These include:

- one VPS AA (AA-1),
- four IVP AAs (AA-2, AA-7, AA-10, and AA-12), and
- seven DW AAs (AA-3, AA-4, AA-5, AA-6, AA-8, AA-9 and AA-11).

The depressional features within the AAs included seasonal wetlands and a marsh. Table 3 shows the Final Attribute Scores and Overall AA Scores for the Mourier East property. These scores represent the 2012 conditions at the site.

Table 3 – Final Attribute Scores (%) and Overall AA Scores (%) for Mourier East					
Assessment Area	**Final Attribute Score**				**Overall AA Score**
	Buffer and Landscape	**Hydrology**	**Physical Structure**	**Biotic Structure**	
1	85.4	100.0	58.3	45.8	**72.4**
2	85.4	100.0	25.0	45.8	**64.1**
3	47.9	100.0	25.0	56.6	**57.4**
4	60.4	100.0	25.0	58.3	**60.9**
5	47.9	100.0	37.5	55.6	**60.3**
6	45.4	100.0	25.0	47.2	**54.4**
7	85.4	100.0	50.0	62.5	**74.5**
8	47.9	100.0	25.0	55.6	**57.1**

Table 3 – Final Attribute Scores (%) and Overall AA Scores (%) for Mourier East (Cont.)					
Assessment Area	**Final Attribute Score**				**Overall AA Score**
	Buffer and Landscape	**Hydrology**	**Physical Structure**	**Biotic Structure**	
9	47.9	100.0	25.0	63.9	**59.2**
10	68.1	100.0	62.5	45.8	**69.1**
11	45.4	100.0	37.5	88.9	**68.0**
12	85.4	100.0	50.0	70.8	**76.6**

2.1.4 Mourier West Property

At the Mourier West property, 14 AAs were identified to represent the wetlands found on-site (Figure 5. *Mourier West: CRAM Assessment Areas*). These include:

- five IVP AAs (AA-1, AA-5, AA-8, AA-11 and AA-14)
- nine DW AAs (AA-2, AA-3, AA-4, AA-6, AA-7, AA-9, AA-12, AA-13, and AA-15).

All of the depressional wetland AAs on-site were seasonal wetlands. Table 4 shows the Final Attribute Scores and Overall AA Scores for the Mourier West property. These scores represent the 2012 conditions at the site.

Table 4 – Final Attribute Scores (%) and Overall AA Scores (%) for Mourier West[1]					
Assessment Area	**Final Attribute Score**				**Overall AA Score**
	Buffer and Landscape	**Hydrology**	**Physical Structure**	**Biotic Structure**	
1	93.3	75.0	25.0	41.7	**58.8**
2	57.9	83.3	25.0	52.8	**54.8**
3	60.4	91.7	37.5	66.7	**64.1**
4	50.0	83.3	37.5	61.1	**58.0**
5	85.4	83.3	25.0	75.0	**67.2**
6	47.9	83.3	37.5	44.4	**53.3**
7	47.9	83.3	37.5	44.4	**53.3**
8[2]	85.4	100.0	37.5	79.2	**75.5**
9	65.3	75.0	25.0	52.8	**54.5**
11[2]	85.4	100.0	37.5	79.2	**75.5**

Table 4 – Final Attribute Scores (%) and Overall AA Scores (%) for Mourier West[1] (Cont.)					
Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
12	47.9	100.0	37.5	52.8	**59.6**
13	47.9	100.0	25.0	52.8	**56.4**
14	85.4	100.0	50.0	87.5	**80.7**
15	47.9	100.0	37.5	63.9	**62.3**

[1] Upon field investigation, AA-10 was determined to be similar to AA-11 in all attributes and metrics and was therefore not analyzed due to this similarity. A total of 14 AAs were assessed for the CRAM analysis.
[2] AA-8 and AA-11 were originally delineated as seasonal wetlands (as seen on Figure 5). Upon field investigation, the floristic composition of these two features more closely resembled vernal pools. Therefore, they were surveyed using the IVP field book.

3.0 COMPREHENSIVE EVALUATION

3.1 AA Classification

This analysis only addresses AAs within the Amoruso Ranch property that are proposed "Impact Areas" as part of the Project and compares the results of the individual CRAM analyses for proposed "Preserved/Avoided" (P/A) Areas. "Preserved Areas" are proposed to become permanent open space, while the "Avoided Areas" are those areas that are within the Amoruso Ranch property that will not be developed but are also not proposed as open space (Figure 6. *Preserve/Impact Map*). The proposed Placer Parkway is not part of the Project and these areas will be avoided by the project proponent. Impacts will only occur if the proposed Placer Parkway project is implemented in the future by a separate project proponent.

For this evaluation, attribute scores and overall CRAM scores were averaged for all AAs (inclusive of all AA types). Comparisons were made in two ways: 1. Impact AAs versus P/A AAs within Amoruso Ranch and 2. Impact AAs versus P/A AAs on two of the potential mitigation sites (Mourier East and Mourier West). The Skover property was not included in this evaluation. Section 4.4.1 discusses the Skover property in more detail.

Since AA boundaries were established based on guidelines outlined in the CRAM User's Manual (CWMW 2012a) and not on the proposed Preserve/Impact map (see Figure 6), the boundaries of many of the AAs on Amoruso Ranch property were positioned in both Impact and P/A areas. As such, AAs were classified as either Impact or P/A based on the following guidelines:

- If greater than 50% of the AA was in the Impact Area, then classify as Impact.
- If greater than 50% of the AA was in the P/A area, then classify as P/A; however, if the majority of the watershed for the wetland or wetland system is within the Impact Area, then classify as Impact.
- If the AA falls within the proposed Placer Parkway alignment or within the "Avoided" area adjacent to the parkway alignment, then classify as P/A since the proposed Parkway is not part of the proposed Project.

Using these guidelines, the following AAs were classified as impact or P/A based on the following rationale:

- AA-4: P/A since it is within the Avoided Area;
- AA-5: P/A since more than 50% of the AA is within the Avoided Area;
- AA-7: P/A since it falls within the Avoided Area;
- AA-8: Impact since 50% of the AA is within the Impact Area;
- AA-9: Impact since more than 50% of the AA is within the Impact Area;
- AA-14: P/A since it is within the Avoided Area;
- AA-15: P/A since it is within the Avoided Area;
- AA-19: Impact since the majority of the watershed is within the Impact Area;
- AA-23: Impact since the majority of the watershed is within the Impact Area; and
- AA-26: P/A since more than 50% of the AA is within the Preserved Area.

For this evaluation, AAs at the Mourier East and Mourier West properties were classified as P/A since potential restoration efforts within these two sites are not proposed within these AAs.

3.2 Limitations to this Study

In general, CRAM scores are lower for wetlands that have "undesirable" attributes; conversely, wetlands with "desirable" attributes score higher in a given metric. Wetlands of the same type, such as vernal pools, that have the same (or similar) score probably represent the same overall condition and functional capacity (CWMW 2012a). However, different types of wetlands, such as vernal pools and seasonal wetlands, with similar scores do not represent the same level of function because they likely have different functions and ecological services (CWMW 2012a). As such, due to the inherent differences in wetland function that different wetlands have, we did not make those types of comparisons in this evaluation (i.e., VPS AAs were not directly compared to DW AAs). Also, as mentioned previously, the *CRAM for Wetlands, Perennial Depressional Wetlands Field Book, Version 5.0.2* (CWMW 2008) was not specifically designed for seasonal features, but it was used since it is the only field book currently available.

4.0 RESULTS AND DISCUSSION

4.1 Impact Areas Versus On-Site Preserve/Avoided Areas

Within the Amoruso Ranch property, 15 AAs were classified as Impact AAs whereas 13 AAs were classified as P/A AAs. Of the 15 Impact AAs within Amoruso Ranch, eight were DW AAs, five were IVP AAs and two were VPS AAs. Of the 13 P/A AAs, five were DW AAs, six were IVP AAs, and two were VPS AAs.

Table 5 shows the comparison of average attribute scores and overall AA scores between Impact AAs and P/A AAs within the Amoruso Ranch property. These averages include all AAs regardless of wetland or AA type.

Table 5 – Average Attribute Scores (%) and Overall AA Scores (%) for Impact AAs vs. P/A AAs Within Amoruso Ranch

	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
Impact	63.7	91.7	46.9	63.8	66.6
Preserved/Avoided	70.4	98.7	49.0	67.1	71.3

Overall, the average attribute scores and overall CRAM scores for the P/A AAs were greater than the Impact AAs. The Average overall AA score for Impact AAs was 66.6% and ranged from

47.8% (AA-16) to 81.8% (AA-13). The average overall AA score for P/A AAs was 71.3% and ranged from 58.5% (AA-14 and AA-15) to 87.0% (AA-22). Average attribute scores for all attributes were slightly higher for P/A AAs than for Impact AAs.

4.2 Impact Areas Versus Off-Site Preserve/Avoided Areas

The 15 Impact AAs are the same for this evaluation, but the 26 P/A AAs are located on two proposed mitigation sites, Mourier East and Mourier West. Of the 26 P/A AAs, 16 were DW AAs, nine were IVP AAs, and one was a VPS AA.

Table 6 shows the comparison of average attribute scores and overall AA scores between Impact AAs on the Amoruso Ranch property versus P/A AAs on the Mourier East and Mourier West properties. These averages include all AAs regardless of wetland or AA type.

Table 6 – Average Attribute Scores (%) and Overall AA Scores (%) for Impact AAs vs. Off-site P/A AAs

	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
Impact	63.7	91.7	46.9	63.8	66.6
Preserved/Avoided	63.9	94.5	35.4	59.7	63.4

The average overall AA score for Impact AAs was 66.6% and ranged from 47.8% (AA-16) to 81.8% (AA-13). The average overall AA score for P/A AAs was 63.4% and ranged from 53.3% (AA-6 and AA-7, both on Mourier East) to 80.7% (AA-14, Mourier East). Average attribute scores were lower for P/A AAs for only the Physical Structure and Biotic Structure attributes. Buffer and Landscape Context was the same for both Impact and P/A AAs and hydrology was higher for P/A AAs than for Impact AAs.

4.3 Evaluation of Scores and Expected Variation

The expected allowable variation for Overall AA Scores and for attribute scores for riverine and estuarine wetlands is 10% (CWMW 2009). This translates to an approximate 10-point variation for Overall AA Scores and three to five point variation for the individual attribute scores. AAs that score within these ranges are considered to be within the standard error of the CRAM methodology and should not be considered to represent differences in overall condition. These standards have been established based on riverine and estuarine data, and similar standards will be determined for other CRAM modules as they are calibrated and validated (CWMW 2009). However, it is assumed that the expected variation will be similar for other CRAM modules.

Within the Amoruso Ranch property, the P/A AAs scored higher than the Impact AAs for both the attribute scores and the overall AA scores. However, the difference in overall AA scores falls within the range of expected variation discussed above, and therefore, these are considered to have similar overall conditions. For the attribute scores, P/A AAs scored higher for all four attributes. However, scores for two of the four attributes, Physical Structure and Biotic Structure, fell within the range of expected variation. The Landscape and Buffer and Hydrology attributes were higher for the P/A AAs likely due to their overall position in the landscape and the adjacent and surrounding land uses. Overall, it appears that the conditions of the P/A AAs are similar to those of the Impact AAs.

When comparing the Impact AAs to the off-site P/A AAs, the Impact AAs scored higher than the P/A AAs. However, as seen in the on-site comparison, the scores also fell within the range of expected variation. The only exception to this was the Physical Structure attribute where the average Impact AAs score was 11 points higher than the average P/A AAs. This is outside the three to five point expected variation for attribute scores. While the reason for this difference is not clear, it may be due to the historic land use on the Mourier West property, as a large portion of this site is fallow contour rice fields and several of the DW AAs included in this evaluation are situated adjacent to the historic berms of the rice fields. These wetlands are remnants from the historic agricultural practices on the site and are not representative of naturally occurring seasonal wetlands in the region. Despite the 11-point difference in Physical Structure scores, the overall AA scores between the off-site P/A AA and the Impact AAs were only three points apart, well within the 10-point range of expected variation. As such, the conditions of the off-site P/A AAs are similar to those of the Impact AAs.

4.4 Restoration Efforts

4.4.1 Skover Property

For the purposes of this evaluation, the scores from the Skover property were not included as P/A AAs. The Skover property is currently being used for rice production. The site has been laser-leveled and the hydrology is controlled through pumps and berms. It is a highly manipulated agricultural practice. A CRAM analysis was conducted on the rice fields at the Skover property, and the Final Attribute Scores and Final Overall AA Scores are presented in Table 2. Due to the extreme anthropogenic manipulation of these wetlands, the CRAM scores for the Skover wetlands are lower than for the naturally occurring wetlands on the other three sites. As such, Skover AAs were not compared to the AAs on the other three sites.

Similar to the Mourier East and Mourier West properties, the Skover property is also being considered by the project applicant as a potential mitigation site. The current mitigation proposal is to return the Skover property back to its historic land use. This would include removing the current rice fields by recontouring the landscape and restoring the historic wetlands on-site. By restoring the site to a vernal pool grassland community, the relatively natural, un-manipulated wetlands will provide unique functions and values that are now rare across the region. Thus, future AAs that are established around the restored wetlands are likely to have higher CRAM scores than the current rice fields.

4.4.2 Mourier East and Mourier West Properties

Restoration efforts are also proposed for the Mourier East and Mourier West properties. Historic wetlands will be restored; however, no restoration or enhancement of currently existing wetlands would occur. Theoretically, CRAM scores would increase for AAs on the Mourier East and Mourier West properties as a result of restoration efforts. At a minimum, the aquatic area abundance metric of the landscape and buffer context attribute will likely increase due to the addition of wetlands within the landscape.

5.0 SUMMARY

ECORP conducted a CRAM evaluation to compare the 2012 pre-project conditions on the Amoruso Ranch property and three potential mitigation sites: Skover, Mourier East and Mourier West. Two comparisons were made between the Amoruso Ranch Impact Assessment Areas (AAs) and both the on-site and off-site Preserved/Avoided (P/A) AAs. The P/A AAs within Amoruso Ranch property scored higher than the Impact AAs, and the Impact AAs scored higher than the P/A AAs within Mourier East and Mourier West properties. However, the scores fell within the 10-point range of expected variation for both of these comparisons. Therefore, the sites should be considered to have the same overall function and are comparable replacement for the impacted wetlands on the Amoruso Ranch property. It is possible that with the proposed restoration efforts, future CRAM scores on the mitigation sites will likely be higher.

6.0 REFERENCES

California Wetlands Monitoring Workgroup (CWMW). 2008. California Rapid Assessment Method (CRAM) for Wetlands. Version 5.0.2. Perennial Depressional Wetlands Field Book. 37 pp.

California Wetlands Monitoring Workgroup (CWMW). 2009. Using CRAM (California Rapid Assessment Method) To Assess Wetland Projects As an Element of Regulatory and Management Programs: Technical Bulletin. Dated 13 October 2009. 29 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012a. California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas. Version 6.0. User's Manual. 95 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012b. California Rapid Assessment Method (CRAM) for Wetlands. Version 6.0. Vernal Pool Systems Field Book. 42 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012c. California Rapid Assessment Method (CRAM) for Wetlands. Version 6.0. Individual Vernal Pools Field Book. 30 pp.

ECORP, Consulting Inc. (ECORP). 2013a. Confidential California Rapid Assessment Method Analysis For Amoruso Ranch Property, Placer County, California. Prepared for Brookfield Sunset LLC. Dated 20 August 2013. 10 pp.

ECORP, Consulting Inc. (ECORP). 2013b. Confidential California Rapid Assessment Method Analysis For Skover Property, Placer County, California. Prepared for Brookfield Sunset LLC. Dated 20 August 2013. 6 pp.

ECORP, Consulting Inc. (ECORP). 2013c. Confidential California Rapid Assessment Method Analysis For Mourier East Property, Placer County, California. Prepared for Brookfield Sunset LLC. Dated 20 August 2013. 8 pp.

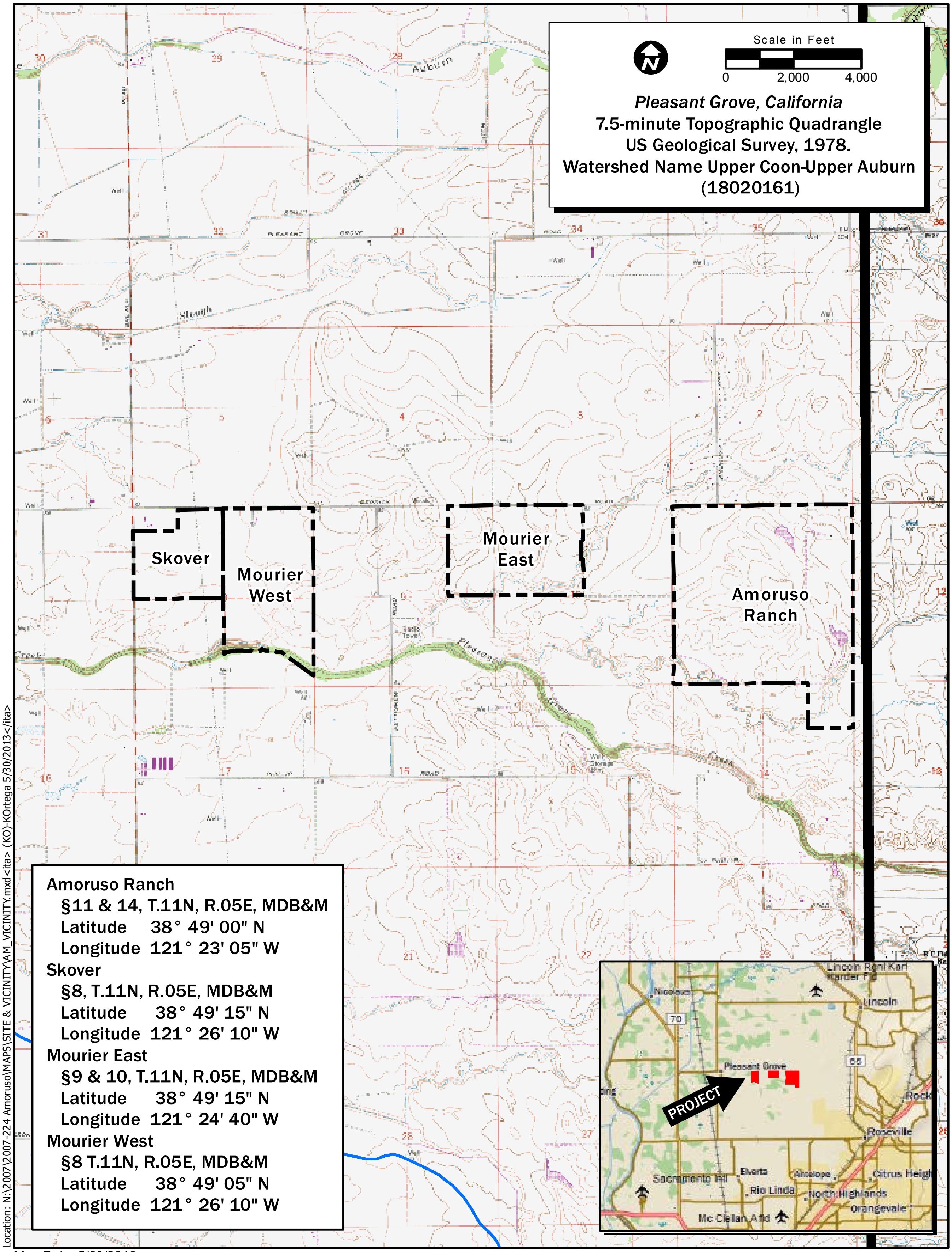
ECORP, Consulting Inc. (ECORP). 2013d. Confidential California Rapid Assessment Method Analysis For Mourier West Property, Placer County, California. Prepared for Brookfield Sunset LLC. Dated 20 August 2013. 8 pp.

United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS), the United States Geological Survey (USGS), and the Environmental Protection Agency (EPA) (coordinated effort). 2013. The Watershed Boundary Dataset (WBD) was created from a variety of sources from each state and aggregated into a standard national layer for use in strategic planning and accountability. Watershed Boundary Dataset for Placer County, California. Available Online at http://datagateway.nrcs.usda.gov. Accessed 4 April 2013.

U.S. Department of the Interior, Geological Survey (USGS). 1978. "Pleasant Grove, California" 7.5-minute Quadrangle. Geological Survey. Denver, Colorado.

LIST OF FIGURES

Location: N:\2007\2007-224 Amoruso\MAPS\SITE & VICINITY\AM_VICINITY.mxd<ita> (KO)-KOrtega 5/30/2013</ita>

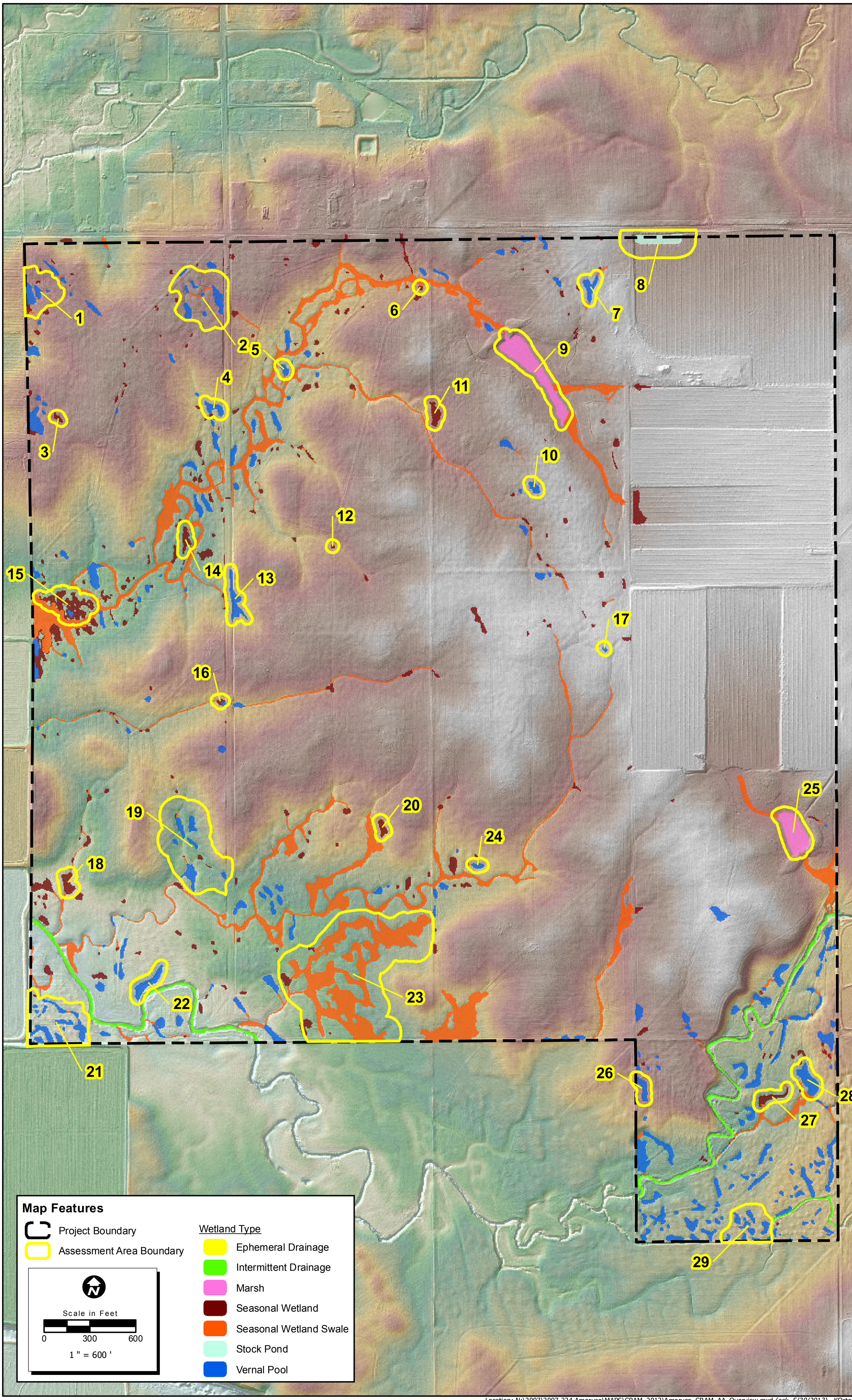


Map Date: 5/30/2013
Service Layer Credits: Copyright:© 2012 DeLorme

Figure 1. Project Locations and Vicinity

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS



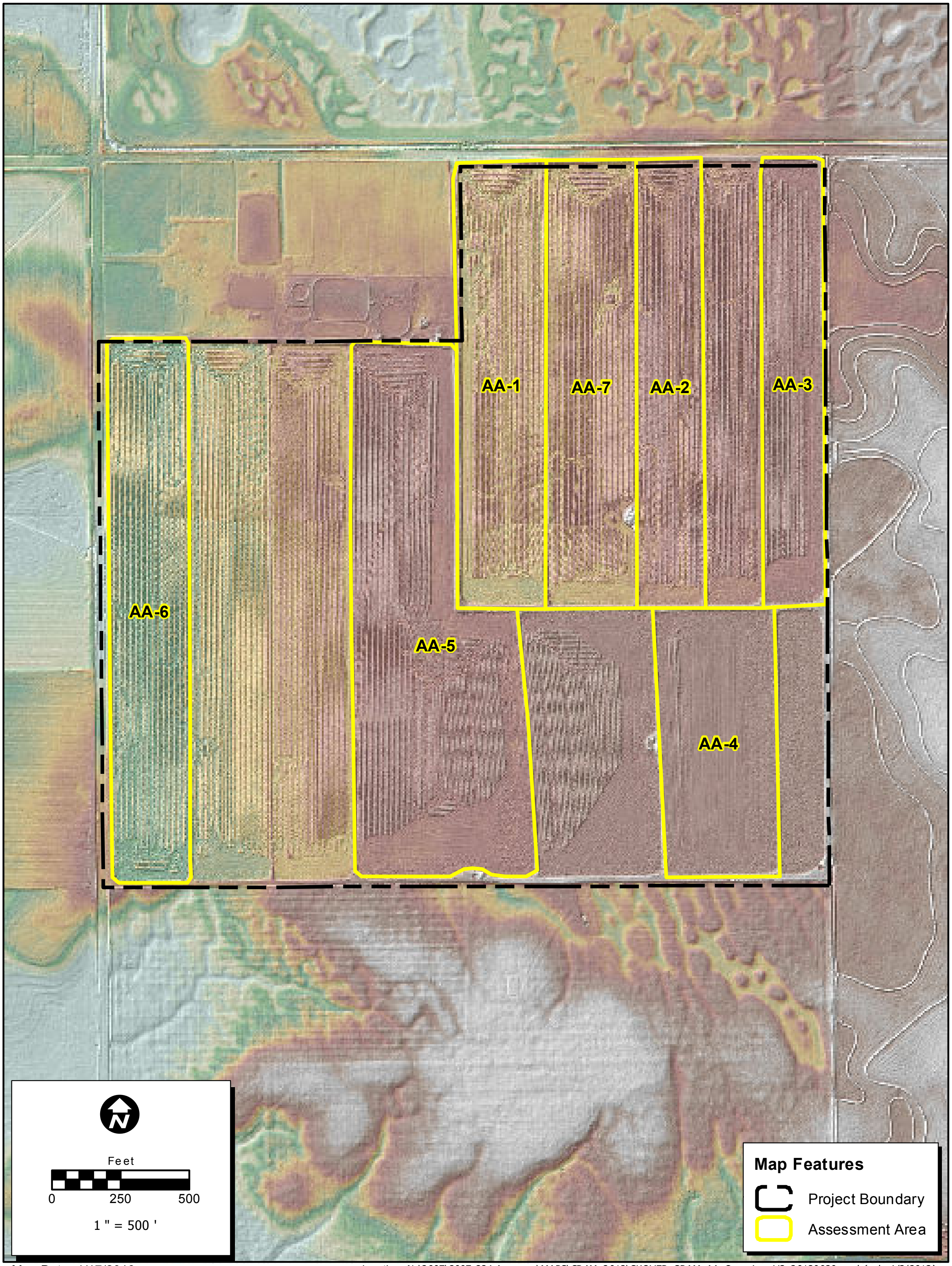
Map Date: 5/30/2013

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\Amoruso_CRAM_AA_Overview.mxd *(eck, 5/30/2013)* - KOrtega

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 2. Amoruso Ranch: CRAM Assessment Areas

2007-224 Amoruso Ranch



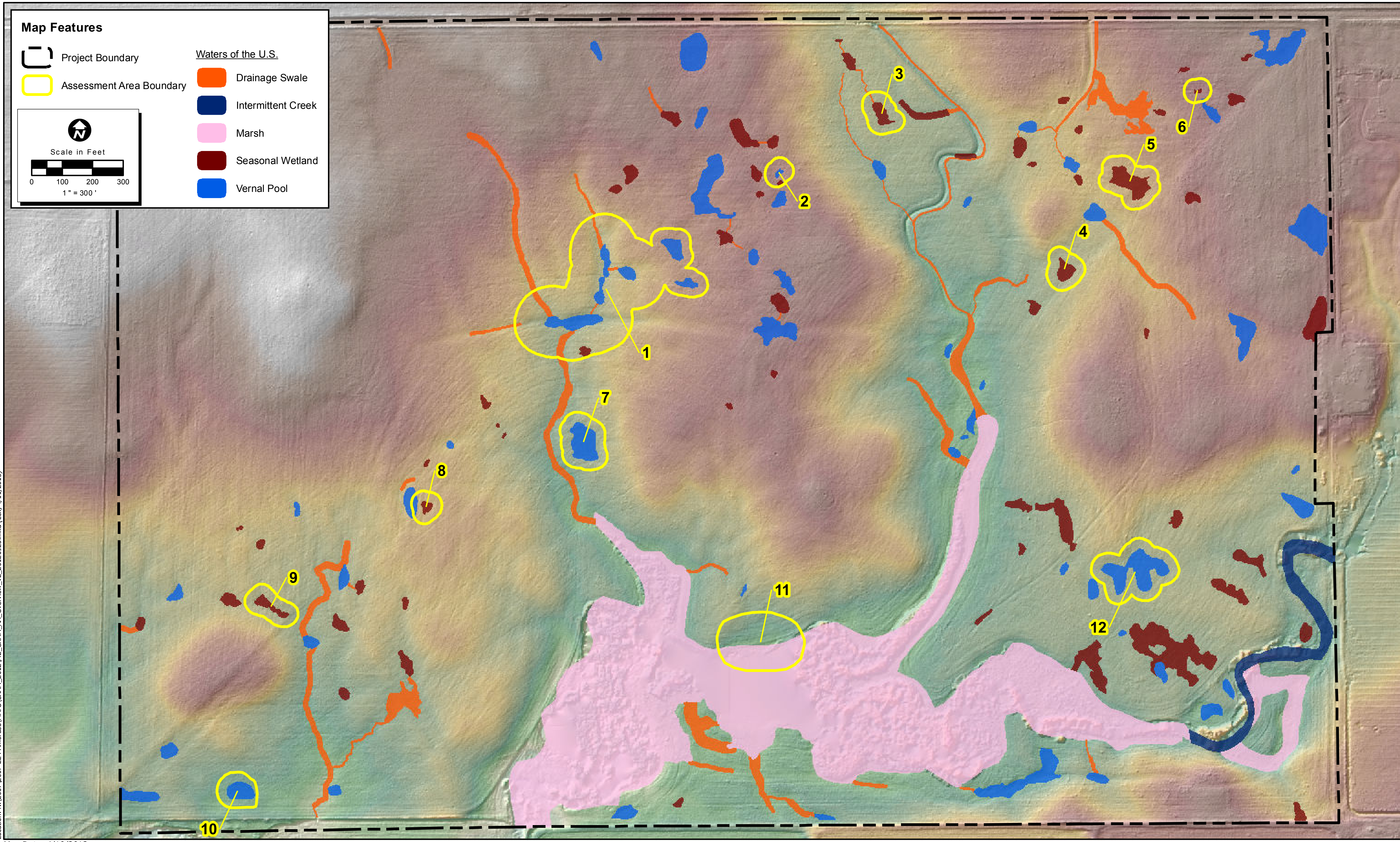
Map Date: 1/17/2013

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\SKOVER_CRAM_AA_Overview_V3_20120920.mxd *(eck, 4/3/2013)*

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 3. Skover: CRAM Assessment Areas

2007-221 Skover



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\ME_CRAM_AA_Overview_v2_20120925.mxd (eck, 4/11/2013)

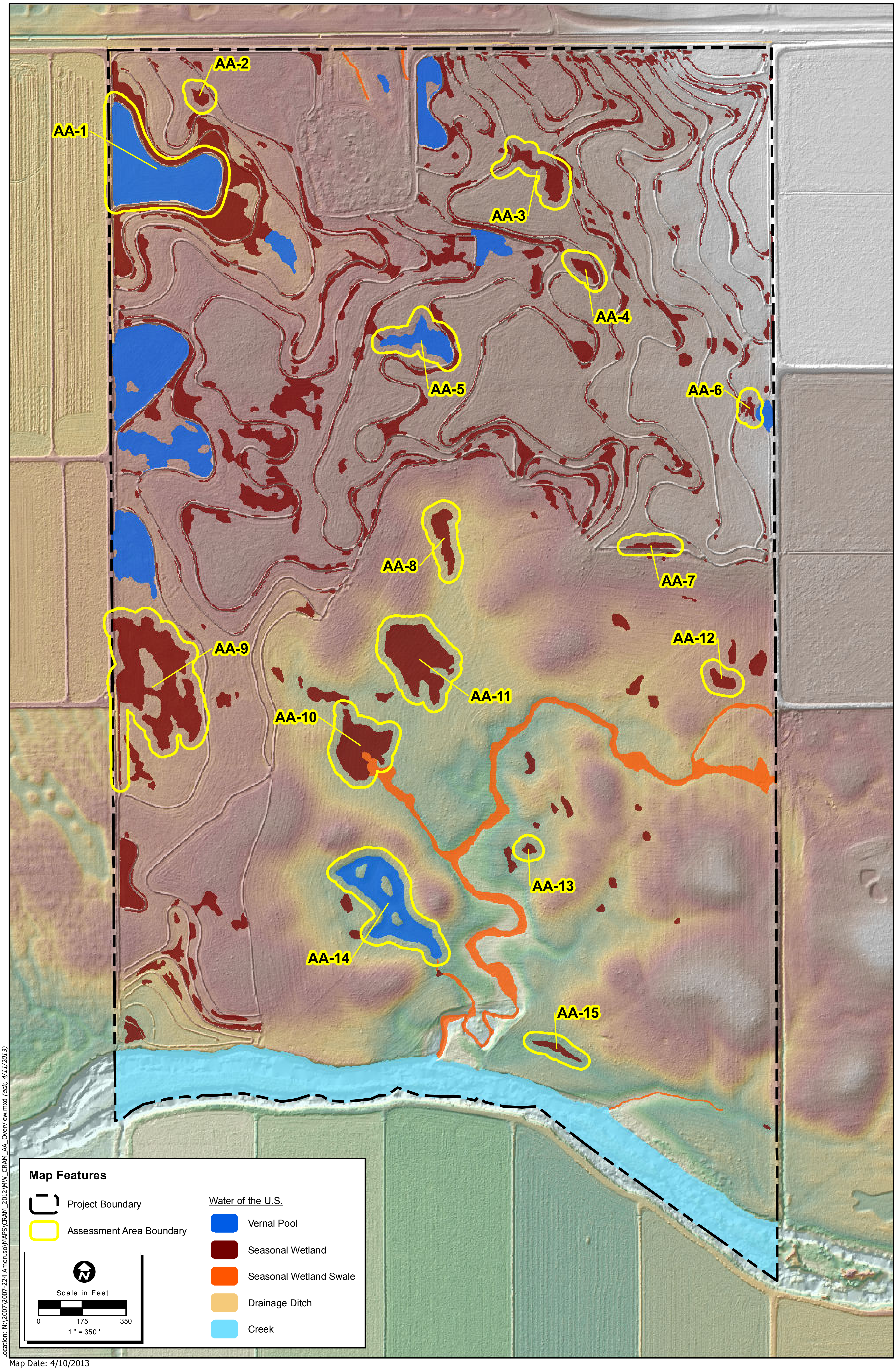
Map Date: 4/10/2013

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 4. Mourier East: CRAM Assessment Areas

2007-224 Amoruso Ranch

KOrtega

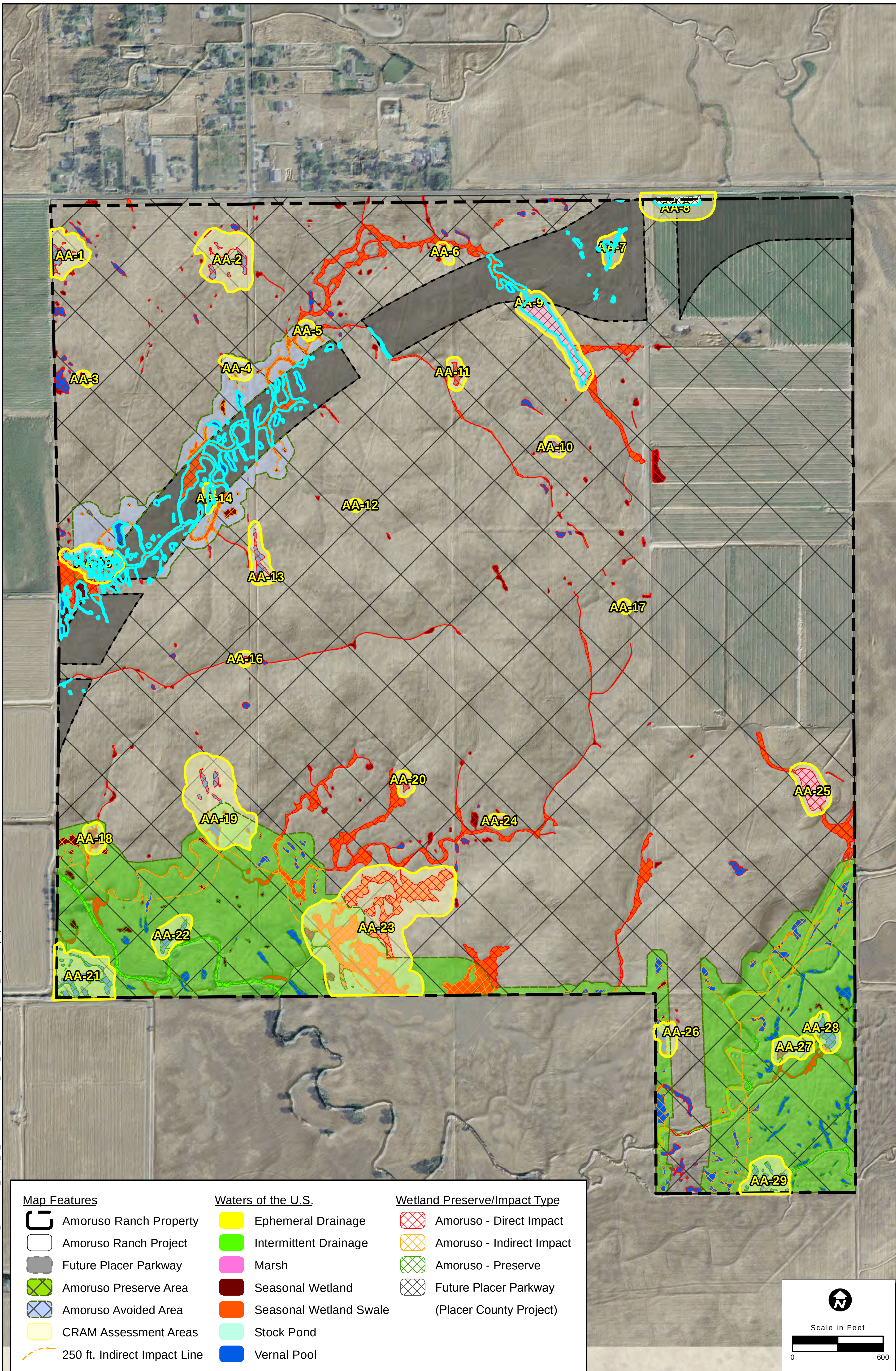


Map Date: 4/10/2013

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 5. Mourier West: CRAM Assessment Areas

2007-223 Mourier West



Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v3_20131105\AMORUSO_PRES_IMP_20131219_withAAs_11x17.mxd (KO)-ekeefhe 12/19/2013

Map Date: 12/19/2013
Photo Source: NAIP 2012

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 6. Preserve/Impact Map

2007-224 Amoruso Ranch

ATTACHMENT C

Amoruso Ranch Potential Indirect Impacts to Aquatic Resources

TECHNICAL MEMORANDUM

TO:	U.S. Army Corps of Engineers
FROM:	ECORP Consulting, Inc.
DATE:	August 23, 2019
RE:	Amoruso Ranch (SPK-2004-00888) – Potential Indirect Impacts to Aquatic Resources

INTRODUCTION AND PURPOSE OF THE INDIRECT IMPACTS ANALYSIS

Per the request of the U.S. Army Corps of Engineers (USACE), ECORP Consulting, Inc. (ECORP) is providing additional information regarding ECORP's assessment methods and quantification of the potential future indirect impacts to wetlands and Waters of the U.S that may result from the implementation of the Amoruso Ranch Specific Plan Development (Project). Planned implementation of the Project will result in direct impacts to aquatic resources and indirect impacts are anticipated in some locations.

The purpose of this analysis is to quantify the potential indirect impacts to aquatic resources that may result from the construction of the Project. Indirect impacts under the Clean Water Act have not been explicitly defined in regulatory guidance from the USACE, and the request from the USACE has been for the applicant to conduct analysis of indirect effects. In this memo, ECORP examines the effects of the Project on the immediate watersheds of preserved or avoided aquatic features in order to anticipate potential future loss of wetland functional value. As requested by USACE, ECORP has evaluated potential indirect impacts to preserved and avoided onsite aquatic features as well as offsite aquatic features on adjacent properties.

PROPERTY HYDROLOGY

The agricultural history, soils, and topography of the Amoruso Property and surrounding properties have all contributed to the current hydrology of the existing aquatic resources. Before conducting detailed analyses of individual aquatic features for indirect effects, ECORP evaluated onsite and surrounding areas for hydrologic connectivity. The Amoruso Property and adjacent area were categorized into zones that are hydrologically distinct. Factors that were considered in identifying these zones include site topography, flow patterns, and land uses. The zones of distinct hydrology are summarized in Table 1 and shown on Attachment A – *Hydrology Zones*. Many of the surrounding offsite zones are not expected to experience indirect impacts due to the presence of existing hydrological barriers that will prevent potential impacts.

Table 1. Areas with distinct hydrology relative to the Project - see Attachment A		
Zone	**Potential for Indirect Impacts to Hydrology**	**Hydrologic Connectivity**
A - University Creek	No	A hydrologic study provided by the Applicant (see Attachment B, p. 37) has determined that University Creek's function will be nearly identical to pre-Project conditions after implementation.
B - Offsite Properties East, North, and West	No	Areas north, east, and west of the Project are hydrologically disconnected from the Project by existing berms or roads.
C - General Open Space and Not a Part of This Study (NAPOTS)	Yes	Aquatic features within the general open space and future Placer Parkway Area may experience indirect impacts.
D - Onsite Open Space Preserve	Yes	Portions of the Amoruso Ranch Open Space Preserve may experience indirect impacts.
E - Creekview Preserve	Yes	Areas of the Creekview Specific Plan that receive stormwater from the Amoruso Property may experience indirect impacts.
F - South of University Creek	Yes	Areas south of University Creek are hydrologically disconnected from Project impacts by University Creek, except for areas that may be impacted by the construction of Westbrook Boulevard.

A – University Creek

University Creek is an intermittent drainage that flows through the southern portion of the Amoruso Property. The creek is largely preserved within the planned Onsite Preserve.

A-1. The construction of two crossings and two stormwater drain outfalls associated with the Project will temporarily impact small segments of University Creek at the location of each improvement only. These disturbances will be temporary as flows of the creek will be maintained and disturbed areas will be revegetated/seeded. A detailed hydrologic study developed by the Applicant in conjunction with the City of Roseville for the Project concluded that there will be little difference between the pre-Project and post-Project hydroperiod and flowrate of University Creek (KHA 2016; provided as Attachment B – *Amoruso Ranch Hydrologic Study*). The Project will be constructed as the "Project without Onsite Storage" as displayed in the hydrologic study, and the hydrograph for pre-Project and Post-Project flowrate are nearly identical (Attachment B. p. 28-33). Therefore, indirect impacts are not expected in University Creek.

A-2. The upstream portion of University Creek flows west toward the Project Area and will not be affected by Project implementation. The flow of water will not be impeded as University Creek crosses into the Onsite Preserve.

B – Offsite Properties East, North, and West

The land use surrounding the Amoruso Property includes grazing, other agriculture, and rural residential. One consequence of this land use history is the current presence of structures and/or topographic features that prevent water from flowing across property lines, thus preventing potential indirect impacts to hydrologic function due to the Project. A discussion of each sub area follows.

B-1. An earthen berm currently runs along the length of the eastern boundary of the Amoruso Property, which separates the Project's impact area and the Placer Ranch Plan Area to the east (Attachment A). The berm prevents water flow across the property line and, as such, no indirect impacts to aquatic resources to the east of the Amoruso Property will occur as a result of Project development. Indirect impacts are not expected in this area due to the lack of hydrologic connectivity.

B-2. The Amoruso Property is bounded to the north by Sunset Boulevard West, which is a two-lane paved road with drainage ditches on either side. Sunset Boulevard West and its drainage infrastructure create a hydrologic barrier that currently prevents drainage from the Amoruso Property, affecting areas to the north of the property. The road/ditch system will continue to prevent water from flowing to the north after Project implementation. In addition, the Amoruso Property has been designed to collect stormwater and nuisance flows into its overall drainage system, further preventing potential modification of wetland function due to urban runoff. Indirect impacts to the aquatic resources to the north of the Project are not expected due to the lack of hydrologic connectivity.

B-3. An earthen berm runs along the western boundary of the Amoruso Property, restricting overland flow onto the adjacent pasture land parcels to the west (Attachment A). No indirect impacts to aquatic features west of the berm are expected due to the lack of hydrologic connectivity.

C – General Open Space and NAPOTS

The overall quality of the aquatic features in the northern portion of the Amoruso Property are not easily determined using a pre- and post-project comparison. These aquatic features are dominated by a wetland swale system that receives year-round water inputs from irrigated pastures on the Amoruso Property. The majority of these features experience wetland hydrology that is atypical for the area in that soils are saturated or near field capacity throughout the typically dry summer season. While these features resemble high-quality natural wetlands, their hydroperiods are not reflective of typical wetlands in Placer County. Determining the Project's impacts on these wetlands is complicated by the artificially long hydroperiod and the influence of continued irrigation. Once irrigation ceases, these features will likely revert to wetland functions more representative of the surrounding area primarily due to their topography. The post-Project condition of the preserved wetlands is anticipated to be similar to their pre-agricultural condition.

Some avoided aquatic resources in the northern portion of the Project Area may experience a loss of function where immediate watersheds are reduced by the Project. Features within the future Placer Parkway are expected to be graded by the construction of the Placer Parkway but may experience indirect impacts until that time or permanently if the Parkway is not constructed. The features that may experience a loss of function due to Project activities are listed in Table 2 below.

D – Onsite Open Space Preserve

The Onsite Preserve is adjacent to Project impacts and north of University Creek. The aquatic features near Project grading limits may experience a loss of function where the immediate aquatic feature watersheds are reduced by the Project. The features that may experience a loss of function due to Project implementation are listed in Table 2. Remaining features within the Onsite Preserve will persist due to topography, existing water-restrictive soils, and intact contributory watersheds.

E – Creekview Preserve

A portion of the offsite Creekview Open Space Preserve is located north of University Creek and within the same watershed as the Project. The hydrology of this are can be divided into two sections due to the west to east flow of surface water in this area (Attachment C – *Amoruso Ranch Specific Plan/Creekview Hydrologic Connectivity*)

E-1. The eastern side of the Creekview Specific Plan Preserve contains features for which the watersheds will be impacted by the Project. Some features may experience a loss of function where aquatic feature watersheds are reduced by Project implementation. Indirect impacts may occur close to the Project and Onsite Preserve boundary interface. The 0.013-acre features that may experience a loss of function due to Project activities is listed in Table 2. All remaining aquatic features within the preserve will persist due to topography, existing water-restrictive soils, and intact contributory watersheds.

E-2. The western portion of the Creekview Specific Plan Preserve contains aquatic features with watersheds that will be preserved and are buffered by the Amoruso Onsite Preserve or a large portion of the Creekview Specific Plan Preserve to the south and east. Indirect impacts to aquatic features are not expected in this area.

F – South of University Creek

The Project is preserving nearly all aquatic resources within the Amoruso Property that are south of University Creek. The exception is the small area where Westbrook Boulevard will cross the creek in the southeast corner of the Project Area, and this is considered a temporary impact to the creek.

F-1. The portion of the Onsite Preserve south of University Creek and east of the planned Westbrook Boulevard extension is higher in elevation than the impact area. The topography generates flows toward the impact area. The construction of Westbrook Boulevard will not substantially reduce the watershed of these features and the road will be constructed in such a manner as to control offsite flows from the road. As a result, indirect impacts to aquatic resources are not expected in this area.

F-2. A small portion of the Onsite Preserve south of University Creek and west of Westbrook Boulevard may be indirectly impacted by the Project. After detailed analysis, only one vernal pool may lose greater than 10 percent of its immediate watershed. This 0.015-acre vernal pool was considered indirectly impacted and is listed in Table 2.

F-3. Aquatic resources to the south of University Creek are hydrologically disconnected from Project impacts by the creek itself. With the exception of resources near Westbrook Boulevard, no indirect impacts to aquatic features are expected to the south of University Creek.

INDIRECT IMPACT ANALYSIS METHODS

For the zones determined to be hydrologically connected to Project impacts, a fine-scale watershed analysis was performed on individual wetlands. Per guidance from USACE staff provided during a meeting held May 2, 2019, ECORP applied the approach taken by the previously approved Cordova Hills project to evaluate indirect effects. Through this approach, potential indirect effects were evaluated separately for depressional wetland features and linear wetland features.

Depressional Features (Vernal Pools, Seasonal Wetlands, Ponds, Marshes)

Portions of a depressional feature to be filled were determined to be directly impacted. The remaining avoided portion of the feature was then considered to be indirectly impacted. As with the Cordova Hills project, aquatic features within the Project that are not designated to be filled/impacted by grading or otherwise directly impacted were not considered indirectly impacted in ECORP's analysis.

Linear Features (Seasonal Wetland Swales, Drainages)

Indirect effects to linear features require a more complex analysis, particularly seasonal wetland swales. The many seasonal wetland swales in the Project Area were mapped and verified as one feature type but represent a range of hydrologic characteristics. The avoided seasonal wetland swales in the north (Zone C) currently exhibit artificially long hydroperiods due to irrigation and may be more likely to exhibit locally-typical swale hydrology after the Project is constructed. By contrast, the seasonal wetland swales in the southern portion of the Project Area exhibit different morphology. These "clay flat" seasonal wetland swales alternate between narrow, typical in the region, swale morphology that transports surface water and shallow wide clay conveyance areas where water movement slows. The latter portions of clay flat type swales can retain precipitation long enough to support hydrophytic vegetation with minimal water transport. As a result, it is not possible to apply a single rule to determine whether the hydrologic function of preserved or avoided linear features will be indirectly impacted by the Project.

As with the Cordova Hills project, linear features within the Project that are partially truncated by development or other direct effects resulting in fill can be considered either indirectly impacted or avoided. Each linear feature was evaluated and classified individually for loss of hydrologic function by ECORP professional biologists, and this evaluation was based on a number of factors including:

1. The amount of feature remaining post-development (i.e., can the remaining area continue to function post-development?)
2. The direction and extent of surface flow/connectivity (i.e., direct impacts should be upstream and connected for a feature to be considered indirectly impacted); and
3. The context for the preserved portion of the feature in the landscape.

Aquatic areas classified as indirectly impacted could include the entire feature as mapped in the wetland delineation or a portion of the feature based on its morphology. Linear features adjacent to temporary impacts were not considered indirectly impacted. As with depressional features, features not filled/impacted by grading or otherwise directly impacted were not considered indirectly impacted.

INDIRECT IMPACTS TO AQUATIC FEATURES

Features within Zones C, D, E, and F that were determined to be indirectly impacted by the Project are listed in Table 2 and detailed in Attachment D (Attachment D. *Amoruso Ranch Aquatic Feature Indirect Impacts Map Book*).

Table 2. Features Assessed for Indirect Impact (see Attachment D).

Depressional Features					Linear Features			
Wetland Type	**Wetland ID**	**Indirect Impact Zone**	**Acres**		**Wetland Type**	**Wetland ID**	**Indirect Impact Zone**	**Acres**
Marsh	MARSH-001	C	0.081		Seasonal Wetland Swale	SWS-070	C	0.046
Seasonal Wetland	SW-268	C	0.004		Seasonal Wetland Swale	SWS-107b	C	0.007
Seasonal Wetland	SW-065	C	0.003		Seasonal Wetland Swale	SWS-035a	C	0.507
Seasonal Wetland	SW-193a	C	0.002		Seasonal Wetland Swale	SWS-070j	C	0.043
Seasonal Wetland	SW-062b	C	0.000		Seasonal Wetland Swale	SWS-070g	C	0.090
Seasonal Wetland	SW-078	C	0.000		Seasonal Wetland Swale	SWS-003b	D	0.009
Seasonal Wetland	SW-079	C	0.001		Seasonal Wetland Swale	SWS-035d	D	0.004
Seasonal Wetland	SW-080	C	0.001		Seasonal Wetland Swale	SWS-035f	D	0.009
Seasonal Wetland	SW-008a	C	0.051		Seasonal Wetland Swale	SWS-014b	D	0.100
Stock Pond	POND-01	C	0.132		Seasonal Wetland Swale	SWS-014e	D	0.341
Vernal Pool	VP-209b	C	0.009		Seasonal Wetland Swale	SWS-014g	D	0.140
Vernal Pool	VP-081b	D	0.017		Seasonal Wetland Swale	SWS-110b	D	0.368
Vernal Pool	VP-083b	D	0.002		Seasonal Wetland Swale	SWS-110c	D	0.345
Vernal Pool	VP-085b	D	0.011		Seasonal Wetland Swale	SWS-069	D	0.106
Vernal Pool	VP-167b	D	0.011		Seasonal Wetland Swale	SWS-069	D	0.136
Vernal Pool	VP-194	D	0.032		Seasonal Wetland Swale	OS-02b	E	0.013
Vernal Pool	VP-222b	D	0.001		**Total:**			**2.264**
Vernal Pool	VP-091b	F	0.015					
Total:			**0.374**					

Based on this rule set and evaluation, in total, ±2.638 acres of aquatic features are considered indirectly impacted on the Project out of the ±38.56 acres within the Project. For comparison, Cordova Hills had 2.55 acres of aquatic features considered indirectly impacted from a total of 89.11 acres onsite.

Please contact me at (916) 782-9100 with any additional questions or comments.

Sincerely,

Dave Krolick
Vice President

cc: Mr. John Norman, Brookfield Sunset, LLC

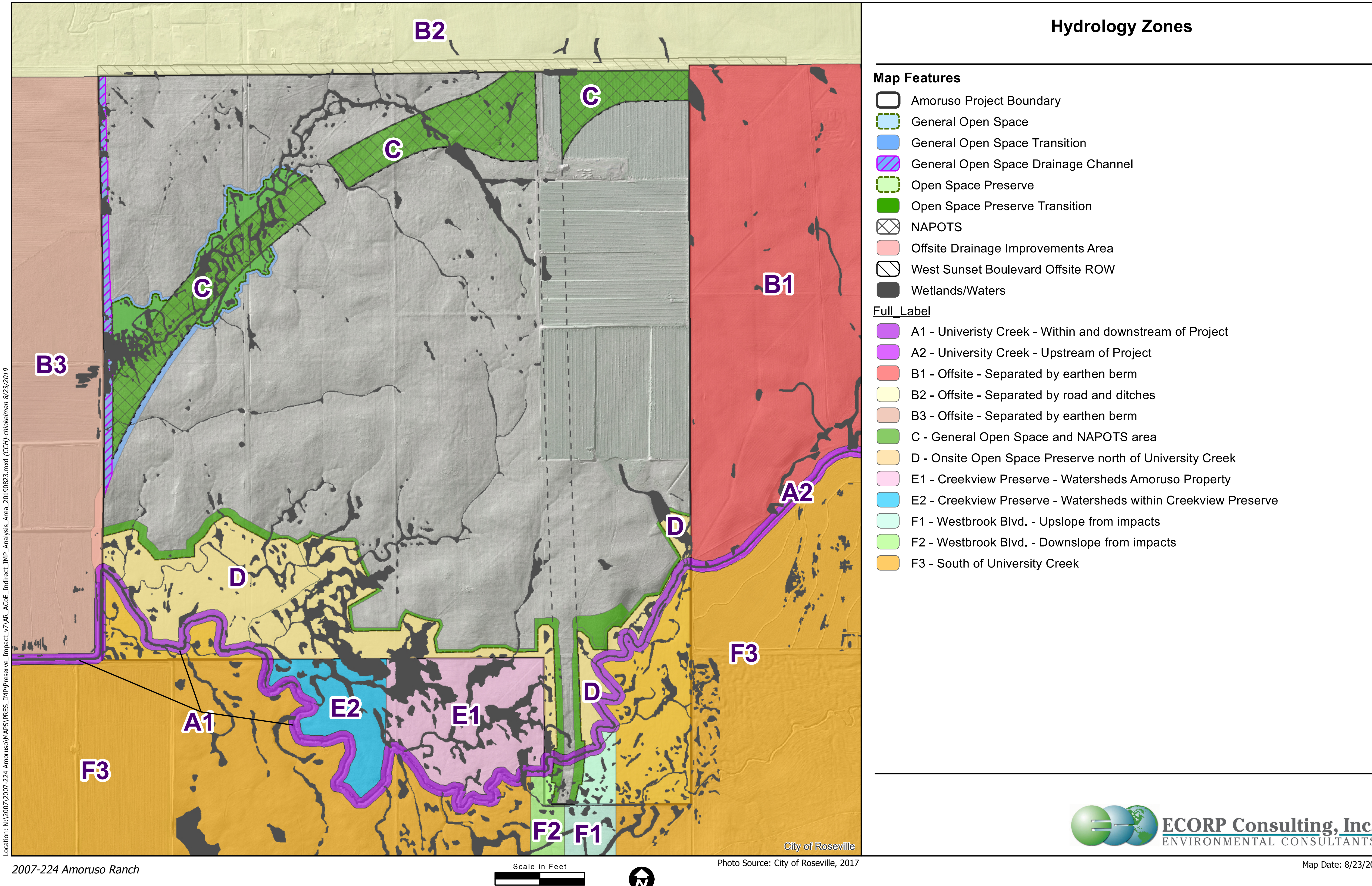
REFERENCES

KHA. 2016. Amoruso Ranch Specific Plan Area – Drainage Master Plan. 294 p. Available online: https://www.roseville.ca.us/government/departments/development_services/planning/specific_plans_planning_areas/amoruso_ranch_specific_plan

LIST OF ATTACHMENTS

ATTACHMENT A

Hydrology Zones



Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_ACoE_Indirect_IMP_Analysis_Area_20190823.mxd *(CCH)-chinkelman 8/23/2019*

2007-224 Amoruso Ranch

Photo Source: City of Roseville, 2017

Map Date: 8/23/2019

ATTACHMENT B

Amoruso Ranch Hydrologic Study

the storm drainage infrastructure and overland conveyance system will be reviewed by the City's Engineering Department to ensure it complies with the City Improvement Standards and the ARSP Drainage Master Plan.

HYDROLOGY ANALYSES

Site-specific hydrologic modeling was performed for the 2-year, 10-year and 100-year 24-hour storm events using HEC-HMS (Version 4.0) following Placer County methodology as outlined in the Placer County Stormwater Management Manual (SWMM).

PRECIPITATION

2-year, 10-year, and 100-year Storm Events

Precipitation data for the regional and site models were developed using methodology outlined in the SWMM, which requires multiple storm centering scenario analysis. HEC-1 models were prepared using PGCDesktop Tools created by Civil Engineering Solutions, Inc. (CESI) for the FEMA CTP Revised Model. The PGCDesktop tools create HEC-1 input files using the SWMM methodology, including allowing efficient processing of multiple storm scenarios involving multiple recurrence intervals, storm centerings, and storm approach angles. The storm centering that produces the highest runoff rate at a given location is selected as the controlling centering for that location.

Hydrology for the City of Roseville uses a storm centering approach that requires analyzing multiple storm centerings over various watersheds and four angles of rotation and determining which storm centering generates the peak flow at the location of interest. For multiple locations of interest, multiple storm centerings may need to be reviewed. Specific to the ARSP, the storm centering that causes peak flows to occur on University Creek is a storm centered on watershed PL10H at an angle of rotation of 30°. This storm centering was provided by the City and was used for all hydrologic analyses presented in this report.

SOILS AND GROUND COVER

Tabular and spatial soils data showing the SCS hydrologic soil groups were obtained from the Natural Resource Conservation Service (NRCS). ***Table*** 3 describes the hydrologic soil groups.

Table 3 – NRCS SCS Hydrologic Soil Groups

Hydrologic Soil Group	Description
A	Soils having a low runoff potential due to high infiltration rates. These soils consist primarily of deep, well-drained sands and gravel.
B	Soils having a moderately low runoff potential due to moderate infiltration rates. These soils consist primarily of moderately deep to deep, moderately well-drained to well-drained soils with moderately fine to moderately coarse textures.
C	Soils having a moderately high runoff potential due to slow infiltration rates. These soils consist primarily of soils in which a layer exists near the surface that impedes the downward movement of water, or soils with moderately fine to fine texture.
D	Soils having a high runoff potential due to very slow infiltration rates. These soils consist primarily of clays with high water tables, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious parent material.

The project site consists entirely of hydrologic soil group D. Preliminary geotechnical exploration verifies that the soils have high runoff potential and low infiltration rates. Existing ground cover is predominantly grasses. The hydrologic soil groups are summarized in Figure 4.

Kimley»Horn

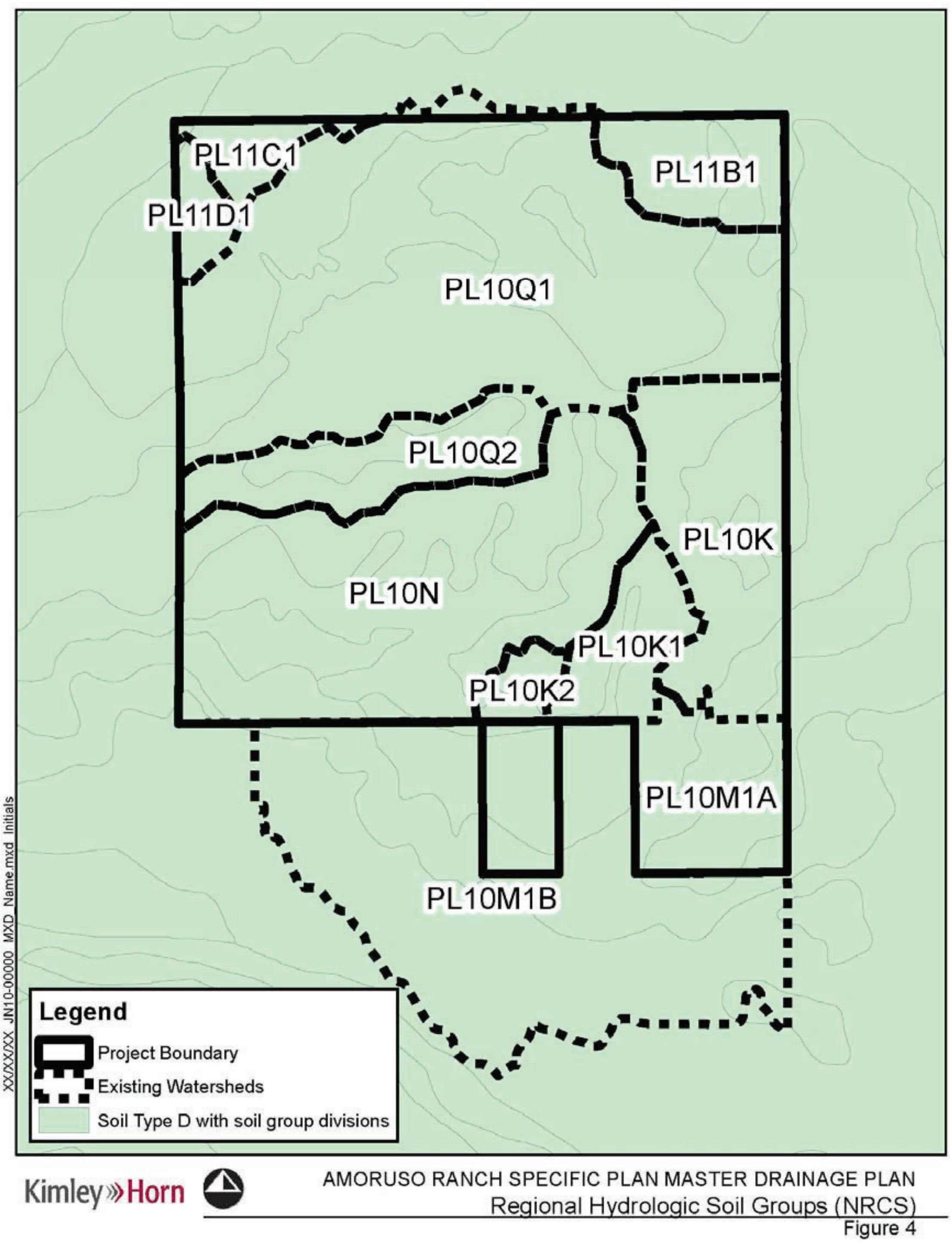


Figure 4 - Regional Hydrologic Soil Groups (NRCS)

INFILTRATION LOSSES

The initial and constant loss method was used for each of the models for the rainfall to runoff transformation. This method uses an initial value and a uniform (constant) value to define infiltration losses. Input parameters include the initial loss in inches, the constant rate in inches per hour and the percent impervious. For undeveloped areas, initial loss was assumed to be 0.1 inches and the constant loss was assumed to be 0.07 inches per hour. These assumed losses correspond to "grass, fair" for hydrologic soil group D of Table 5-3 of the SWMM. For the pervious portion of developed areas such as proposed residential and commercial areas, the constant loss was assumed to be 0.12 inches per hour, which corresponds to "residential or commercial landscaping" for hydrologic soil group D of the previously referenced table. Percent impervious values were determined based on land use (Appendix B).

LAND USE

Existing

For existing conditions, the land use was defined as "Open Space" which corresponds to 2% impervious area for roads and other compacted areas. Also, a 4.5 acre residential area north of Sunset Boulevard drains south onto the project site.

Proposed

Impervious area was defined based on the proposed land use (Appendix B). The proposed land use is summarized in Figure 3 and as part of Exhibits 7 and 8a. Based on the site plan, it is estimated that the ARSP project will add approximately 220-acres of impervious area (Table 2) to the existing 14-acres of impervious area (Table 1) over the approximate 675-acre drainage study area, not including the area reserved for Placer Parkway or Sunset Boulevard. Placer Parkway and Sunset Boulevard are expected to contribute an additional 44 impervious acres. The addition of LID features, as discussed elsewhere in this document, could decrease the directly connected impervious area with features such as pervious pavement, vegetated swales, bio-retention areas and disconnected roof drains.

WATERSHED DELINEATION

The ARSP area is located within the Pleasant Grove Creek watershed (Exhibit 1). Natural watershed boundaries have been modified by development within the watershed, including roadways and agricultural operations. The pre-project watershed boundaries were delineated based on existing drainage areas in the watershed. The pre-project watersheds are summarized in Exhibit 4.

The post-project watershed boundaries were adjusted to conform to the proposed on-site drainage patterns associated with the developed areas (Exhibits 6 and 7).

PRE-PROJECT CONDITIONS HYDROLOGIC MODELING

A Pre-Project HEC-HMS (Version 4.0) model was prepared using the existing drainage areas presented in Table 1 and shown in Exhibit 4. The model used the existing conditions boundaries as shown in Exhibit 4 to allow comparison of discharges at the existing and proposed discharge locations. The basis for the Pre-Project model was the FEMA CTP Revised Model provided by the City of Roseville, May 2015 and includes the Creekview Development (Civil Engineering Solutions, 2010). The parameters for all models are summarized in Appendix B. The ARSP Pre-Project model includes the Placer Parkway corridor alignment in its current state, undeveloped.

Peak flow results for each discharge point (Exhibit 4) from the Pre-Project modeling are shown in ***Table*** 4. ***Table*** 4 presents peak runoff rates with Placer Parkway undeveloped (in the state it exists at the time of this report).

Table 4 – Pre-Project Peak Flow and Runoff Volume Results

Discharge Point	HMS Model Location	Description	Peak Flow (cfs) [24-hr Runoff Volume, ac-ft]		
			2-year 24-hour	10-year 24-hour	100-year 24-hour
A	YPL10J	Flow in University Creek upstream of ARSP	110 [72]	391 [228]	847 [448]
B	YPL10K	Flow in University Creek Downstream of PL10K, PL10K1, and PL10K2	112 [73]	399 [235]	866 [466]
C	PL10K1	Flow out of PL10K1	1.2 [0.8]	5.8 [2.6]	14 [5.3]
D	PL10K2	Flow out of PL10K2	0.4 [0.3]	2.8 [0.9]	4.9 [1.8]
E	YPL10N	Flow in University Creek exiting ARSP	127 [73]	446 [281]	970 [589]
F	PL10Q2	Flow out of PL10Q2	2.2 [1.4]	7.8 [3.7]	22 [8.1]
G	PL10Q1	Flow out of PL10Q1	12 [7.7]	43 [21]	120 [46]
H	PL11D1	Flow out of PL11D1	0.5 [0.3]	1.7 [0.8]	4.8 [1.9]
I	PL11C1	Flow out of PL11C1	0.7 [0.4]	2.3 [1.1]	6.5 [2.4]
J	PL11B1	Flow out of PL11B1	1.6 [1.0]	6.7 [2.9]	17 [6.1]
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	127 [63]	447 [262]	972 [574]
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	1017 [794]	2020 [1542]	4336 [3050]
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	1115 [857]	2440 [1805]	5279 [3624]
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	1192 [722]	2663 [1731]	5747 [3802]

PROPOSED CONDITIONS HYDROLOGIC MODELING

Proposed Conditions (Post-Project without Onsite Storage)

The 100-year, 24-hour Proposed Conditions hydrologic model (also referred to as the Post-Project without Onsite Storage model) includes Placer Parkway if it were developed, Sunset Boulevard if it were developed, and the Creekview Planned Development (Civil Engineering Solutions, 2010). The basis for all the Post-Project models is the FEMA CTP Revised Model provided by the City of Roseville. The **100-year, 24-hour Post-Project without Onsite Storage model** was prepared using the drainage areas shown in Table 2 and Exhibit 6. Impervious area was defined based on the land use; these parameters are summarized in Appendix B. The 100-year, 24-hour Post-Project without Onsite Storage flows for discharge points common to the Pre-Project model (Exhibit 6) are summarized in ***Table*** 5. Also included in ***Table*** 5 are the net changes in peak flows between the Post-Project without Onsite Storage and Pre-Project models.

The peak flows exiting the site under Post-Project without Onsite Storage conditions exceed the Pre-Project peak flows for the 2-year and 10-year events. Peak flows in Pleasant Grove Creek downstream of the confluence do not increase under Post-Project without Onsite Storage 100-year, 24-hour conditions. However, flow volumes exiting the watershed increase under Post-Project without Onsite Storage conditions. (see Section below titled Volumetric Impacts).

A Post-Project with Onsite Storage model was developed for the 100-year, 24-hour event to evaluate impacts of onsite storage. Three one-acre detention basins were added to the Post-Project without Onsite Storage model to create the Post-Project with Onsite Storage model. The detention basins were added downstream of shed PL10K and junctions YPL10Q3 and YPL10N1. The results are summarized in ***Table*** 5 and ***Table*** 6. Although onsite storage reduces flow volume (numbers not presented here), onsite storage causes higher peak flows than those under the Post-Project without Onsite Storage condition. This is due to peak flow timing. As seen in ***Table*** 7, the flows due to the proposed development, including those associated with the Creekview Development, peak before the flows on University Creek and Pleasant Grove Creek. Detaining the peak flows with onsite storage brings them closer in timing to those associated with University Creek and Pleasant Grove Creek.

Table 5 – Comparison of peak Post-Project without Onsite Storage flows, to pre-project peak flows

Discharge Point	HMS Model Location	Description	Peak Flow (cfs) [Net Flow Difference]			
			2-year, 24-hour	10-year, 24-hour	100-year, 24-hour without Onsite Storage	100-year, 24-hour with Onsite Storage
A	YPL10J	Flow in University Creek upstream of ARSP	110 [0]	391 [0]	847 [0]	847 [0]
B	YPL10K	Flow in University Creek Downstream of PL10K	111 [-1]	393 [-6]	851 [-15]	860 [-6]
E	YPL10N	Flow in University Creek exiting ARSP	133 [+6]	452 [+6]	970 [0]	990 [+20]
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	134 [+7]	453 [+7]	972 [0]	992 [+20]
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	1017 [0]	2020 [0]	4336 [0]	4336 [0]
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	1123 [+8]	2442 [+2]	5276 [-3]	5294 [+15]
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	1194 [+2]	2647 [-16]	5704 [-43]	5715 [-32]
O	VPL10N1	Flow from ARSP on-site Channels (Pre-Project PL10N)	58 [+50]	151 [+119]	394 [+310]	359 [+275]

Kimley»Horn

Table 6 –Post-Project without Onsite Storage 24-hour Runoff Volume

Discharge Point	HMS Model Location	Description	Runoff Volume (ac-ft)			
			2-year, 24-hour	10-year, 24-hour	100-year, 24-hour without Onsite Storage	100-year, 24-hour with Onsite Storage
A	YPL10J	Flow in University Creek upstream of ARSP	72	228	448	448
B	YPL10K	Flow in University Creek Downstream of PL10K	75	235	462	460
E	YPL10N	Flow in University Creek exiting ARSP	108	332	671	656
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	95	313	655	640
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	794	1542	3050	3050
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	889	1855	3705	3689
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	743	1752	3819	3800
O	VPL10N1	Flow from ARSP on-site Channels	34	60	105	92

Table 7 – Pre-Project versus Post-Project without Onsite Storage 100-year, 24-hour Peak Flow Timing of Hydrologic Analysis

HMS Model Location	Description	Peak Flow Timing (hh:mm)	
		Pre-Project	Post-Project without Onsite Storage
YPL10J	Flow in University Creek upstream of ARSP	16:50	16:50
PL10K	Flow into University Creek from PL10K	14:05	12:35
PL10L	Flow into University Creek from PL10L	13:50	13:50
YPLM1H	Flow into University Creek from PL10M Sheds (Includes Creekview Development)	12:40	12:40
VPL10M	Flow in University Creek just upstream of ARSP	18:25	18:25
Pre: PL10N Post: VPL10N1	Flow in University Creek from ARSP Area (Post-Project Includes ARSP Development Sheds)	14:20	12:50
YPL10N	Flow in University Creek exiting ARSP (Includes Creekview Development and ARSP)	18:20	18:25
YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	19:05	19:05
YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	18:20	18:20
YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	18:30	18:35
YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	19:45	19:45

Post-Project without Onsite Storage, Sheds PL11B1 and PL11C1 Flowing North

Under Pre-Project conditions, drainage areas PL11B1 and PL11C1 (Exhibit 4), flow to the north. The Post-Project without Onsite Storage model was revised to maintain these flow directions. A new exhibit was not generated to reflect this. In this scenario, PL11B1, 13.1 acres, is in the northeast corner of the project site and PL11C1, 5.1 acres, is in the northwest corner of the project site. The flows for the common discharge points for the 100-year, 24-hour event are summarized in ***Table*** 8 along with the net change from Pre-Project conditions. The peak flows are slightly less than those from the Post-Project without Onsite Storage model.

Table 8 – Post-Project without Onsite Storage, with PL11C1 and PL11B1 Flowing North, Peak Flow Results

Discharge Point	HMS Model Location	Description	Peak Flow (cfs) [Net Change from Pre-Project] 100-year 24-hour
A	YPL10J	Flow in University Creek upstream of ARSP	847 [0]
B	YPL10K	Flow in University Creek Downstream of PL10K, PL10K1, and PL10K2	851 [-15]
E	YPL10N	Flow in University Creek exiting ARSP	968 [-2]
I	PL11C1	Flow out of PL11C1	6.5 [0]
J	PL11B1	Flow out of PL11B1	17 [0]
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	970 [-2]
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	4336 [0]
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	5273 [-6]
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	5703 [-44]

Future-Fully Developed without Onsite Storage and with ARSP Model

A Future-Fully Developed without Onsite Storage and with ARSP model was developed by taking the Future-Fully Developed model provided by the City of Roseville in May 2015 and adding the ARSP development. The Future-Fully Developed model provided by the City, which is used here as a basis for the Future-Fully Developed without Onsite Storage and with ARSP model, includes the Creekview, Placer Ranch, and West Roseville Plans as incorporated by the City. The flows for the common discharge points are summarized in ***Table* 9**.

Table 9 – Future-Fully Developed without Onsite Storage and with ARSP 100-year, 24-hour Peak Flow Results

Discharge Point	HMS Model Location	Description	Peak Flow (cfs)
A	YPL10J	Flow in University Creek upstream of ARSP	844
B	YPL10K	Flow in University Creek Downstream of PL10K	848
E	YPL10N	Flow in University Creek exiting ARSP	929
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	931
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	4513
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	5332

PEAK FLOW RESPONSE

In Figure 5 through Figure 9 the peak flow responses (flood frequency curves) have been plotted for the Pre-Project, Post-Project without Onsite Storage, and the Post-Project with Onsite Storage Conditions for the following points: University Creek upstream of Westbrook Crossing, University Creek exiting ARSP, University Creek upstream of Pleasant Grove Creek, Pleasant Grove Creek downstream of University Creek, and Pleasant Grove Creek at Al Johnson Wildlife Area. The response for the following events is provided in the graphs: 2-year, 10-year, 25-year, 50-year, 100-year, and 200-year. The graphs demonstrate that peak flow increases under Post-Project without Onsite Storage conditions will not occur for the full range of events. Adding onsite storage increases peak flows in University Creek over the range of events.

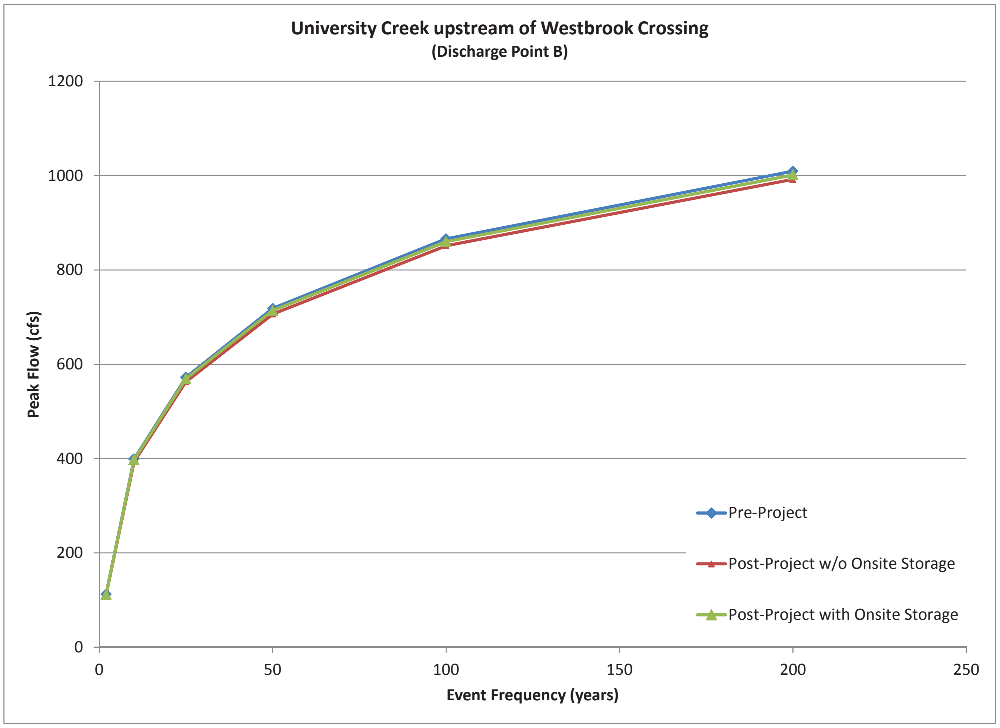


Figure 5 – Peak flowrate comparisons in University Creek upstream of Westbrook Crossing (Discharge Point B)

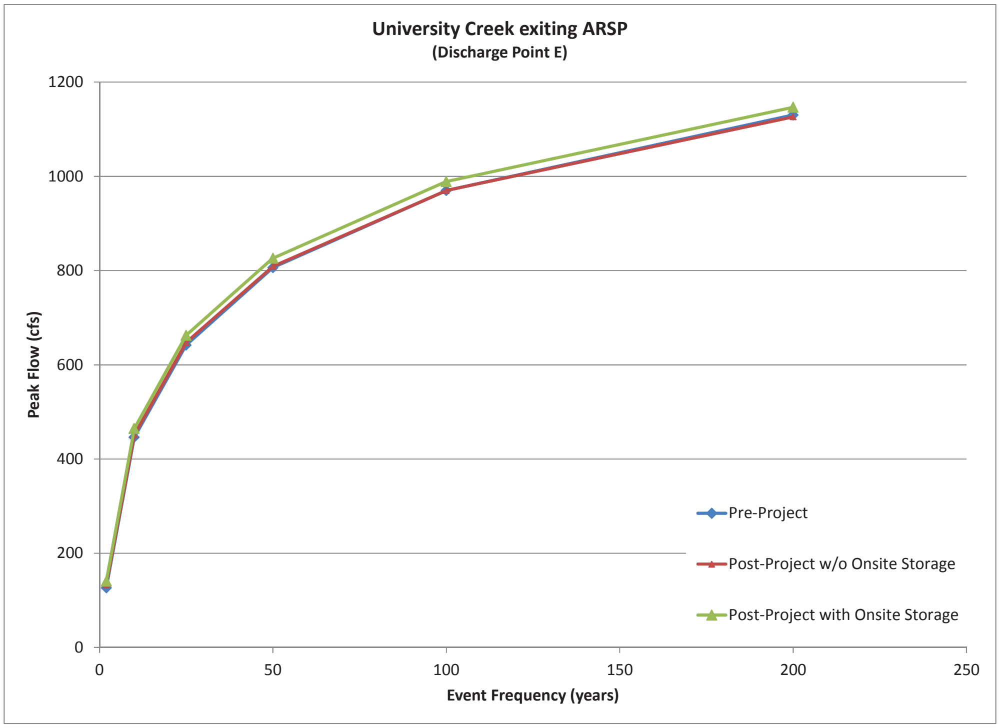


Figure 6 – Peak flowrate comparisons in University Creek exiting ARSP (Discharge Point E)

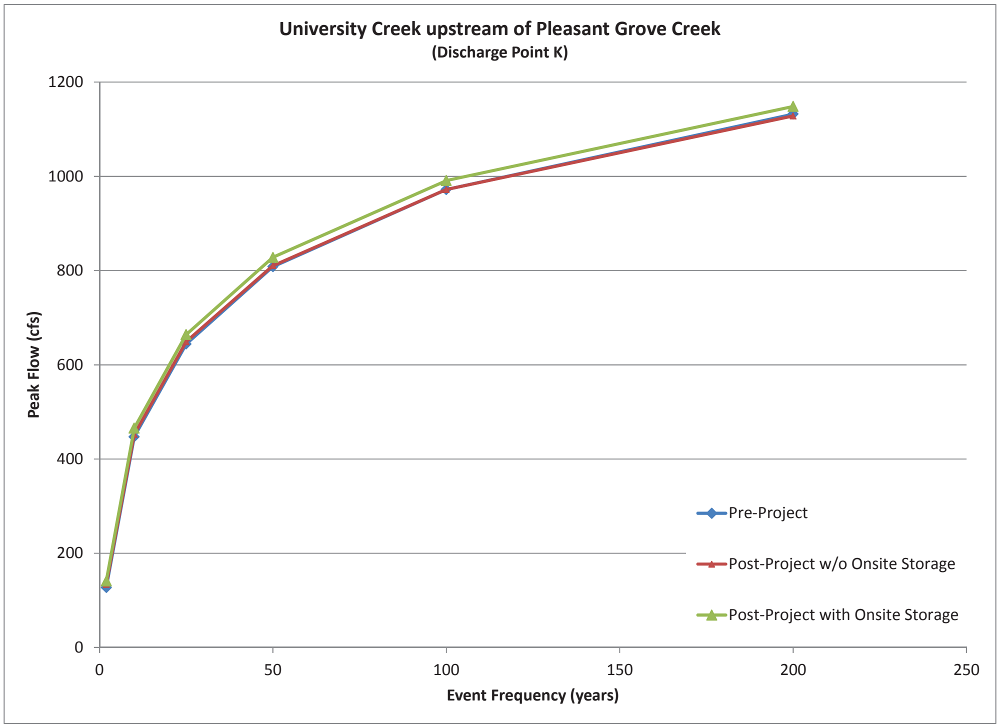


Figure 7 – Peak flowrate comparisons in University Creek upstream of Pleasant Grove Creek (Discharge Point K)

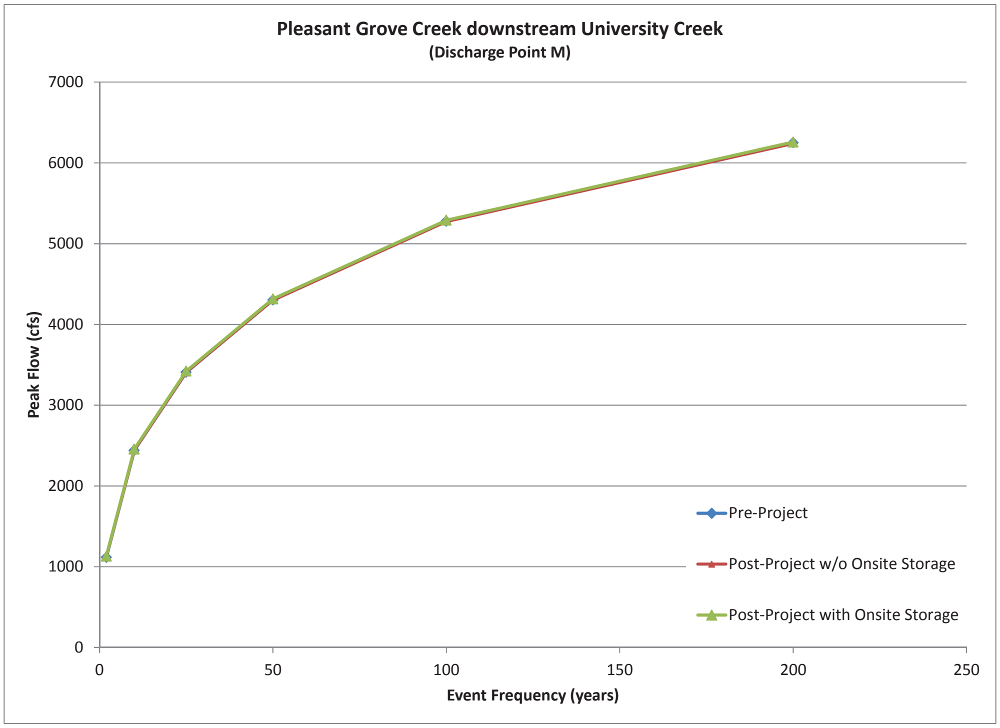


Figure 8 – Peak flowrate comparisons in Pleasant Grove Creek downstream of University Creek (Discharge Point M)

Kimley»Horn

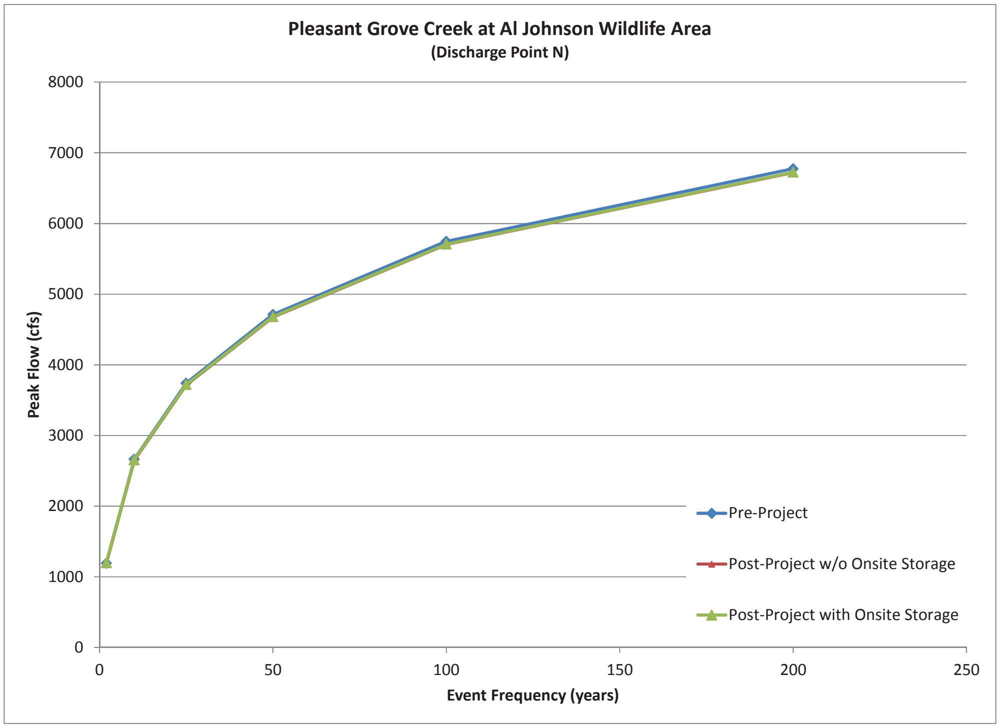


Figure 9 – Peak flowrate comparisons in Pleasant Grove Creek at Al Johnson Wildlife Area (Discharge Point N)

HYDROLOGY ANALYSIS - SUMMARY OF FINDINGS

The peak flows from the Pre-Project, Post-Project without Onsite Storage, Post-Project with Onsite Storage, Post-Project without Onsite Storage with PL11B1 and PL11C1 Flowing North, and the Future-Fully Developed without Onsite Storage and with ARSP models are summarized in ***Table*** 4 through ***Table*** 9. All models are provided on disc. A discussion of the flow impacts on University Creek and Pleasant Grove Creek are provided below and in the Hydraulic Analysis Section.

100-year Flow Interactions with Pleasant Grove Creek and University Creek, without Onsite Storage Flow Analysis

The southern portion of the project site drains to University Creek, in the existing condition (Exhibit 4). The peak discharges in University Creek are largely controlled by runoff from about four square-miles of upstream area that are for the most part, currently undeveloped. Much of this upstream area is expected to be developed as part of the Sunset Industrial area, Placer Ranch and West Roseville Specific Plan areas. Immediately downstream from the project area University Creek has been modified as a result of past farming activities and redirected to the south within a drainage ditch which then turns due west to its confluence with

Pleasant Grove Creek. Under existing conditions, this ditch, which is downstream of ARSP, often overtops.

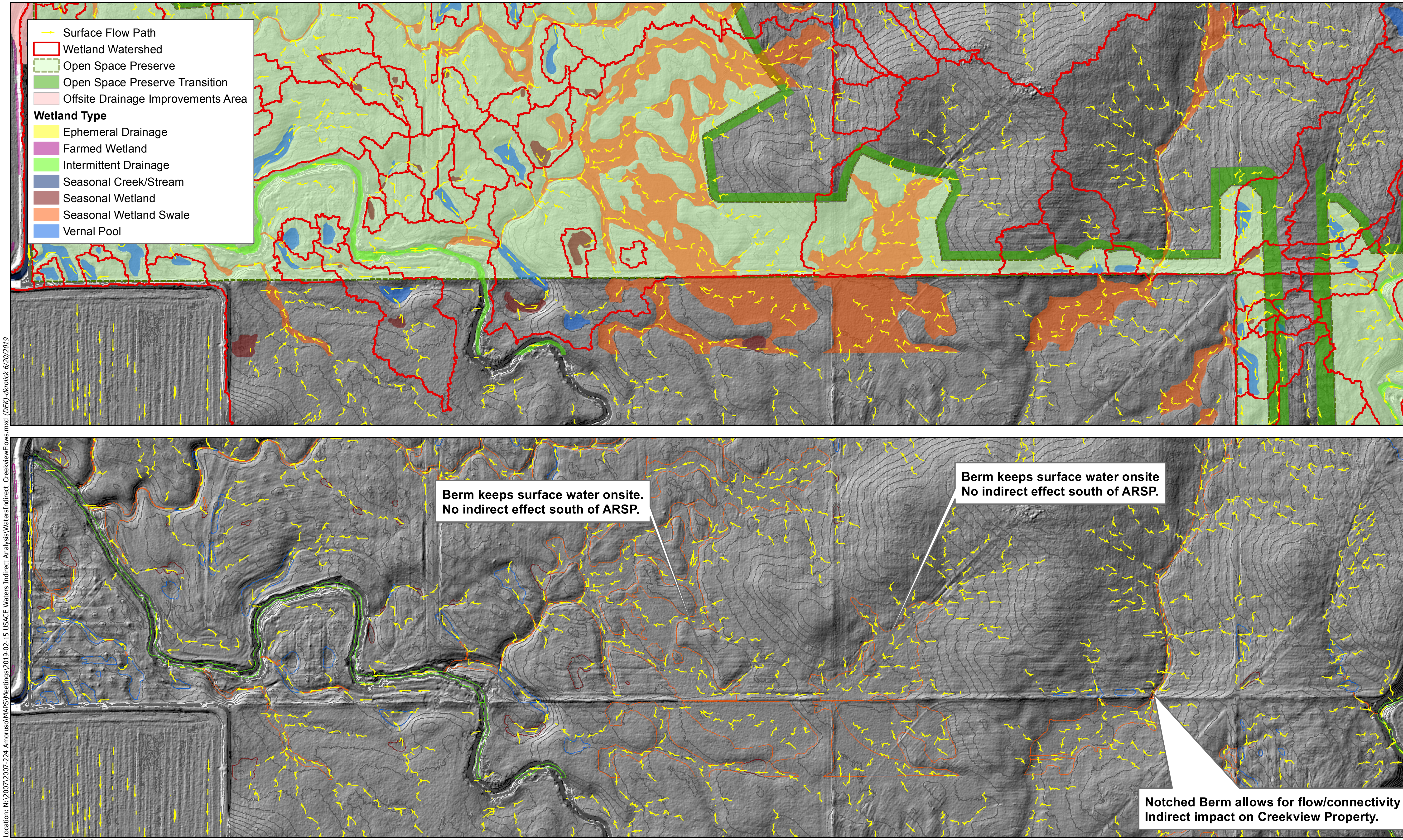
Under the ARSP proposed conditions, the majority of on-site drainage will be collected in on-site channels that merge and outlet to University Creek at Discharge Point O as shown on Exhibit 6. The outlet is located within the ARSP project area and discharges into the existing University Creek which drains through the Al Johnson Wildlife Area. The on-site channel outlet will be designed to minimize erosion and provide stormwater management. The final design will be evaluated prior to construction plan approval. These channels are further discussed in the Hydraulic Analyses section.

To better understand the interactions of 100-year peak flows from the proposed ARSP project in Pleasant Grove Creek, hydrology models for Pre-Project and Post-Project conditions were generated.

The 100-year peak flows generated from the Post-Project without Onsite Storage condition are less than the Pre-Project flows that naturally occur within University Creek. Hydrographs in Pleasant Grove Creek downstream of University Creek are plotted in Figure 10. As illustrated in Figure 10, there is little difference between the Pre-Project and Post-Project without Onsite Storage conditions in Pleasant Grove Creek downstream of University Creek.

ATTACHMENT C

Amoruso Ranch Specific Plan/Creekview Hydrologic Connectivity



Location: N:\2007\2007-224 Amoruso\MAPS\Meetings\2019-02-15 USACE Waters Indirect Analysis\WatersIndirect_CreekviewFlows.mxd (DEK)-dkrolick 6/20/2019

Map Date: 6/20/2019

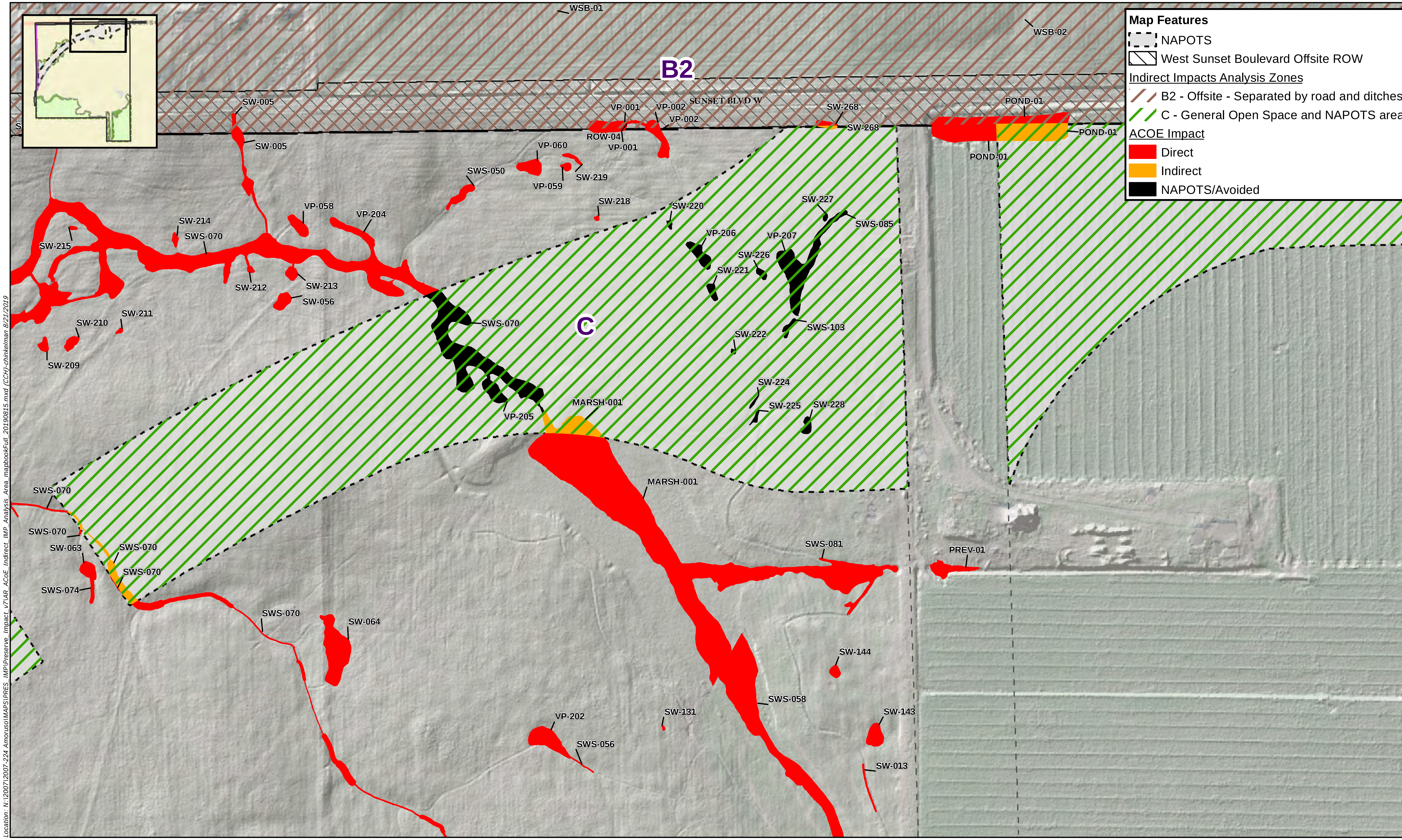
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Amoruso Ranch Specific Plan/Creekview Hydrologic Connectivity

2007-224 Amoruso Ranch SP

ATTACHMENT D

Amoruso Ranch Aquatic Feature Indirect Impacts Map Book



Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_ACoE_Indirect_IMP_Analysis_Area_mapbookFull_20190815.mxd (CCH)-chinkelman 8/21/2019

Map Date: 8/21/2019
Photo Source: City of Roseville, 2017

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

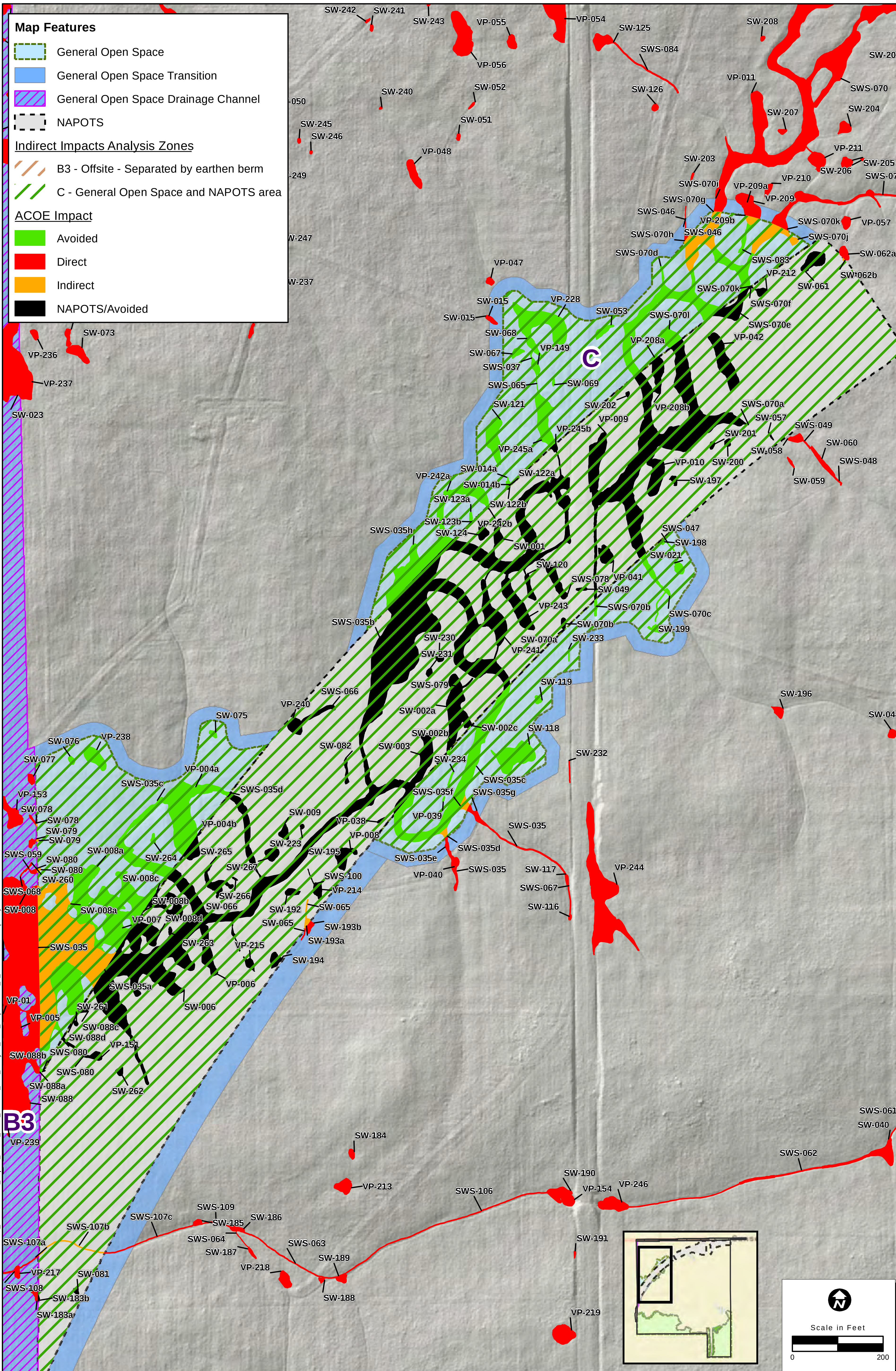
Scale in Feet
0 200

N

2007-224 Amoruso Ranch

Sheet 1 of 4

Proposed Project Impacts to Waters of the U.S.



Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_ACOE_Indirect_IMP_Analysis_Area_mapbookFull_P_20190815.mxd (CCH)-chinkelman 8/21/2019

Map Date: 8/20/2019
Photo Source: City of Roseville, 2017

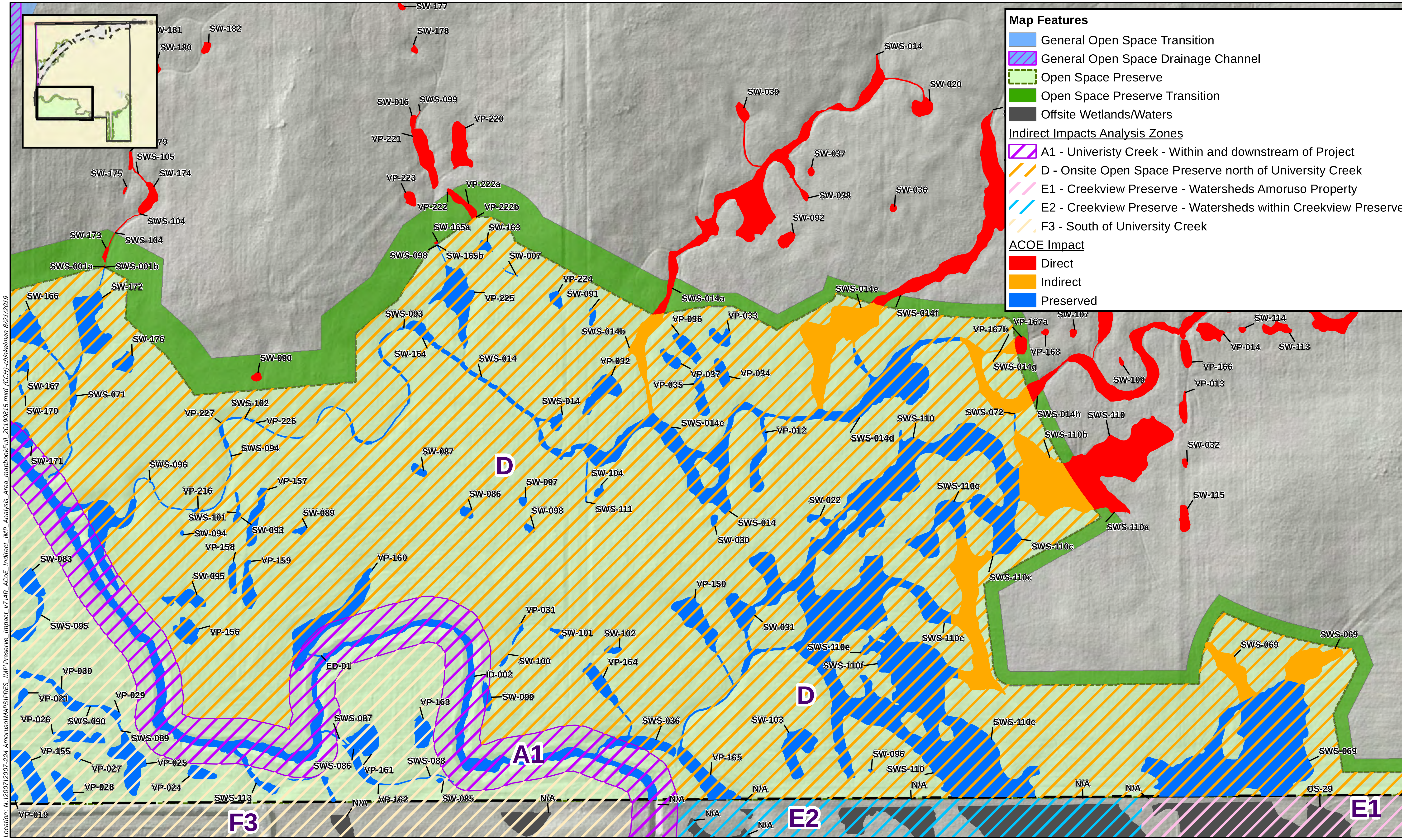
DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

2007-224 Amoruso Ranch

Sheet 2 of 4

Proposed Project Impacts to Waters of the U.S.



Map Date: 8/21/2019
Photo Source: City of Roseville, 2017

Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_ACoE_Indirect_IMP_Analysis_Area_mapbookFull_20190815.mxd (CCH)-chinkelman 8/21/2019

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

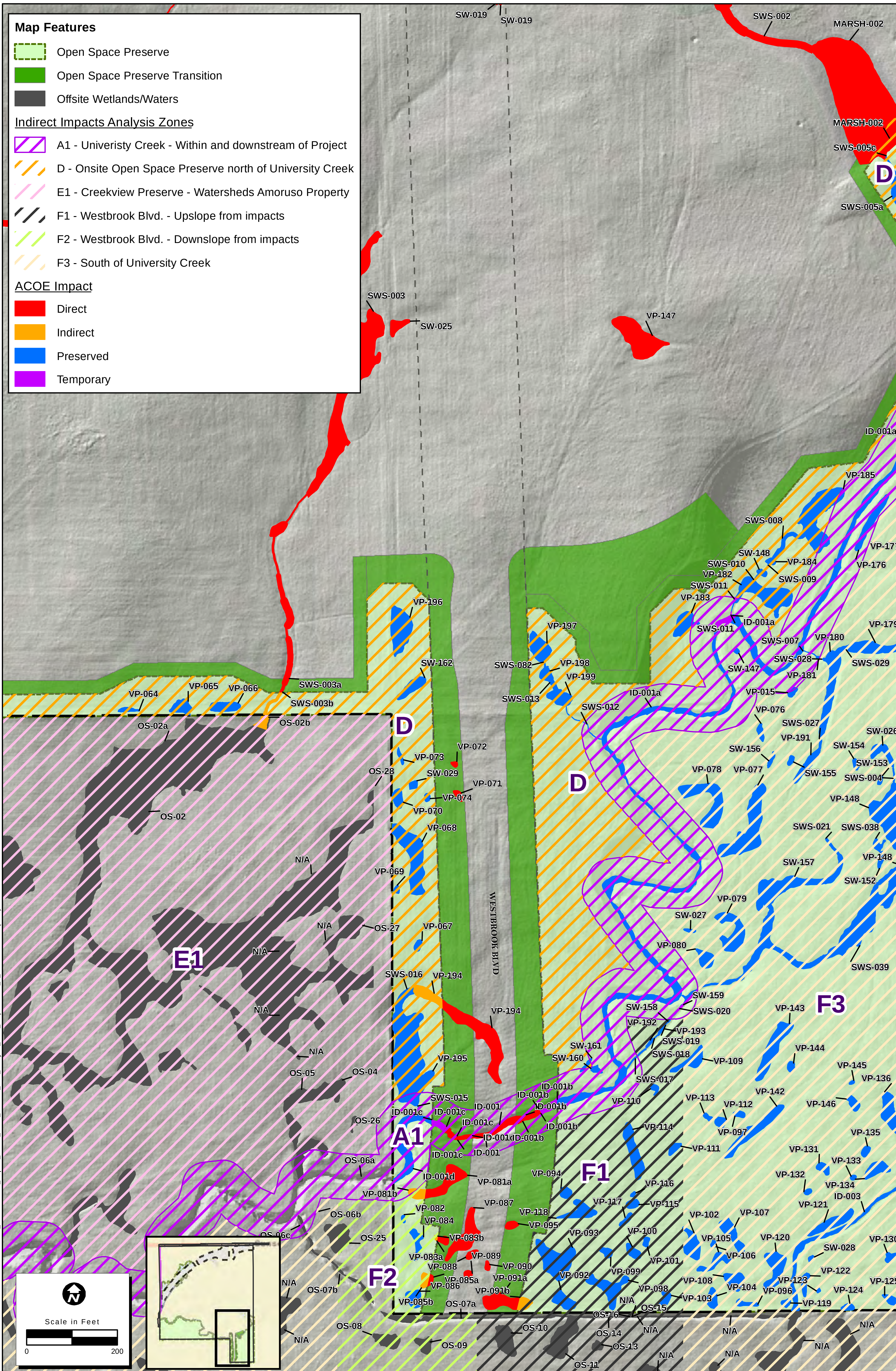
Scale in Feet
0 200

DRAFT

2007-224 Amoruso Ranch

Sheet 3 of 4

Proposed Project Impacts to Waters of the U.S.



Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_ACoE_Indirect_IMP_Analysis_Area_mapbookFull_P_20190815.mxd (CCH)-chinkelman 8/21/2019

Map Date: 8/20/2019
Photo Source: City of Roseville, 2017

DRAFT

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

2007-224 Amoruso Ranch

Sheet 4 of 4

Proposed Project Impacts to Waters of the U.S.

ATTACHMENT D

Mitigation Bank Credit Availability

Notice: The credit totals shown do **NOT reflect any credit reservations or pending transactions**.
It is the responsibility of potential purchasers to contact the Sponsor and obtain written confirmation of credit availability.

Latitude: 38.81595214247758, **Longitude** -121.38602473995468

State:	California
County:	Placer
8-digit Hydrologic Unit Code:	18020161
USFWS Field Office:	Sacramento
USACE District:	Sacramento
NOAA Region:	West Coast
Mitigation/Conservation Banks & ILF Sites in Primary Service Area	14
Mitigation/Conservation Banks & ILF Sites in Secondary Service Area	0
Mitigation/Conservation Banks & ILF Sites in Tertiary Service Area	0
ILF Program Advance Credits	2

Search Criteria:
Excluding single clients
excluding banks with zero available credits
using service areas of rank Primary

Mitigation/Conservation Banks & ILF Sites in Primary Service Area

Bank Name: 1 - Antonio Mountain Ranch Mitigation Bank

Bank Type: Private Commercial
Total Acres: 797.9
Distance to impact: 4 Miles
Permit No: SPK-2007-02181, FWS File #08ESMF00-2018-B-0212
Bank States: California
Bank Sponsor: **Ron Bertolina**
Lewis Antonio Mountain Ranch, LLC
7700 College Town Drive, Suite 101
Sacramento, CA 95826-2303
Email: ron@aktinvestments.com
Phone: (916) 383-2500
Fax: (916) 383-0552

Bank POC: **Ron Bertolina**
7700 College Town Drive
Suite 101
Sacramento, CA 95826-2303
Email: ronb@aktdev.com

Ms Niki Doan
7700 College Town Dr. Ste. 101
Sacramento, CA 95826
Email: nikid@aktdev.com
Phone: (916) 383-2500
Fax: (916) 383-0552

Bank Manager: **Toby McBride**
2800 Cottage Way
W-2605
Sacramento, CA 95825
Email: toby_mcbride@fws.gov
Phone: (916) 414-6603

Laura Shively
Senior Project Manager
1325 J Street, Room 1350
Sacramento, CA 95814
Email: Laura.Shively@usace.army.mil
Phone: (916) 557-5258

Antonio Mountain Ranch : vernal pool credits not for public sale

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: (SWHA + TRBL) Foraging		43.50	Non Federal
Group	Group: Intermittent Stream (404 + CDFW Enhancement)		0.01	Federal
Group	Group: Intermittent Stream (404 + CDFW Riparian Enhancement)		0.00	Federal
Group	Group: Perennial Marsh (404 + CDFW Rehabilitation + TRBL Nesting)		0.00	Federal
Group	Group: Perennial Marsh (Rehab+TRBL Nesting)		0.00	Non Federal
Group	Group: Perennial Stream (404 + CDFW Enhancement)		0.01	Federal
Group	Group: Perennial Stream (404 + CDFW Riparian Enhancement)		0.00	Federal
Group	Group: Perennial Stream (Enhance + TRBL Nesting)		1.84	Non Federal
Group	Group: Seasonal Wetland (404+CDFW)		0.00	Federal
Group	Group: Seasonal Wetland (404+VPFS Establishment)		0.00	Federal
Group	Group: Vernal Pool (404+VPFS Establishment)		4.25	Federal
Stream	Intermittent Stream (404/CDFW)	California Rapid Assessment Methods	0.00	Federal
Stream	Intermittent Stream (CDFW - Enhancement)	Ratio	0.12	Non Federal
Stream	Intermittent Stream (CDFW - Preservation)	Ratio	0.23	Non Federal
Stream	Intermittent Stream (CDFW - Riparian Enhancement)	STREAM	0.00	Non Federal
Stream	Perennial Stream (CDFW - Enhancement)	STREAM	0.36	Federal, Non Federal
Stream	Perennial Stream (CDFW - Riparian Enhancement)	Ratio	0.00	Non Federal
Stream	Riparian (CDFW - Enhancement)	Ratio	0.00	Non Federal
Stream	Riparian (CDFW - Re-establishment)	Ratio	0.00	Non Federal
Wetland	Seasonal Wetlands	California Rapid Assessment Methods	0.00	Federal
Species	Tricolored Blackbird (TRBL)	Species	0.52	Non Federal
Species	Vernal Pool Fairy Shrimp (VPFS) - establishment	California Rapid Assessment Methods	0.61	Federal
Species	Vernal Pool Fairy Shrimp (VPFS) - preservation	California Rapid Assessment Methods	25.57	Federal

Notes:

Bank Name: 2 - Bryte Ranch Conservation Bank

Bank Type: Private Commercial
Total Acres: 573
Distance to impact: 25 Miles
Permit No: FWS File #81420-2006-B-0003
Bank States: California
Comments: This bank is authorized to offer preservation credits for vernal pool fairy shrimp and vernal pool tadpole shrimp habitat. This bank is located within the Mather Core area of the Southeast Sacramento Valley Vernal Pool Region.
Bank Sponsor:
Bank POC: **Marcus Bole**
Bole & Associates
104 Brock Drive
Wheatland, CA 95692
Email: mbole@aol.com
Phone: (530) 633-0117
Cell Phone: (916) 747-8501
Fax: (530) 633-0119

Taraneh Emam
ECORP Consulting, Inc.
2525 Warren Drive
Rocklin, CA 95677
Email: temam@ecorpconsulting.com
Phone: (916) 782-9100

Richard L. Thurn
Gray and Thurn, Inc.
195 Cadillac Drive
Sacramento, CA 95825
Email: rthurn@grayandthurn.com
Phone: (916) 920-2800
Fax: (916) 920-3409

Bank Manager: **Mr. Jerry Bielfeldt**
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Email: jerry_bielfeldt@fws.gov
Phone: (916) 414-6600
Fax: (916) 414-6713

Bryte Ranch: no vernal pool establishment credits

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: Vernal Pool Preservation		13.11	Federal

Notes:

Bank Name: 3 - COPY Elsie Gridley MB

Bank Type: Private Commercial
Total Acres: 1815
Distance to impact: 43 Miles
Permit No: 200000614
Bank States: California
Comments: This bank is approved to sell vernal pool preservation and creation credits. This copy of the bank was created Sept 18, 2018 by TMcBride. Bank managers held call on Oct 4, 2018 to correct ledger errors. This copy is now the current working version.
Bank Sponsor:
Bank POC: **Mr. Tim Degraff**
Chief Executive Officer
WRA, Inc.
2169-G East Francisco Boulevard
San Rafael, CA 94901
Email: degraff@wra-ca.com
Phone: (415) 454-8868
Cell Phone: (415) 259-9793

Mr. Ed Flynn
17 East Pier
Kappas Marina
Sausalito, CA 94965
Email: 1022flynn@sbcglobal.net
Phone: (415) 289-0250

Ben Winslow
Wetland Resources, LLC
3223 Webster Street
San Francisco, CA 94123
Email: brwlaw@aol.com
Phone: (415) 441-5943

Bank Manager: **William Connor**
1455 Market Street
16th Floor, Regulatory Division
San Francisco, CA 94103
Email: william.m.connor@usace.army.mil
Phone: (415) 503-6631

Mr. Peck Ha
Senior Project Manager
1325 J Street, Room 1350
Sacramento, CA 95814
Email: Peck.Ha@usace.army.mil
Phone: (916) 557-6617

Toby McBride
2800 Cottage Way
W-2605
Sacramento, CA 95825
Email: toby_mcbride@fws.gov
Phone: (916) 414-6603

Kim S Turner
CA
Email: kim_s_turner@fws.gov
Phone: (916) 414-6606

Elsie Gridley: Out of watershed; minimal credits available

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Wetland	Constructed Channel	Ratio	0.00	Federal
Wetland	Freshwater Emergent Marsh (Preservation)	Ratio	8.69	Federal
Group	Group: BUOW/SWHA		6.41	Non Federal
Group	Group: CTS upland/BUOW/SWHA		296.20	Federal
Group	Group: Preservation: CTS (aquatic) + CFS + VPTS		22.06	Federal
Group	Group: Preservation: CTS aquatic + VPFS + VPTS		3.34	Federal
Group	Group: Preservation: VPFS + VPTS		24.15	Federal
Group	Group: Preservation: VPTS + CFS		44.46	Federal
Group	Group: Vernal Pool/Seasonal Wetland Creation		0.25	Federal
Wetland	Riparian (creation)	Ratio	0.08	Federal
Wetland	Vernal Pool (404)	Ratio	0.00	Federal

Notes:

Bank Name: 4 - Clay Station Mitigation Bank

Bank Type: Private Commercial
Total Acres: 405
Distance to impact: 33 Miles
Permit No: 199600291
Bank States: California
Comments: This bank is approved to sell vernal pool creation credits (vernal pool tadpole shrimp and vernal pool fairy shrimp) The bank is also approved to sell Corps of Engineers wetlands mitigation credits Other sensitive species present: Swainson's hawk

Bank Sponsor: **The Elliot Conservancy**
Tom Gamette
340 Palladio Parkway, Suite 521
Folsom, CA 95630
Email: t.gamette@elliotthomes.com
Phone: (916) 984-1300

Bank POC: **Taraneh Emam**
ECORP Consulting, Inc.
2525 Warren Drive
Rocklin, CA 95677
Email: temam@ecorpconsulting.com
Phone: (916) 782-9100

Marin Meza
ECORP Consulting
ECORP
2525 Warren Drive
Rocklin, CA 95677
Email: mmeza@ecorpconsulting.com
Phone: (916) 782-9100
Fax: (916) 782-9834

Bank Manager: **Ms. Chandra Jenkins**
Project Manager
US Army Corps of Engineers
1325 J Street, Room 1350
Sacramento, CA 95814-2922
Email: Chandra.L.Jenkins@usace.army.mil
Phone: (916) 557-6652
Fax: (916) 557-7803

Ms. Valerie L. Layne
Conservation Banking Coordinator
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Email: Valerie_Layne@fws.gov
Phone: (916) 414-6600
Fax: (916) 414-6712

Clay Station: Out of watershed; verified availability is
8.82 vernal pool establishment
3.45 marsh establishment

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: Seasonal Wetlands/Marsh		9.23	Federal
Group	Group: Vernal Pool Establishment (ESA + CWA)		16.05	Federal

Notes:

Bank Name: 5 - Colusa Basin Mitigation Bank

Bank Type: Private Commercial
Total Acres: 162.78
Distance to impact: 40 Miles
Permit No: SPK-2012-00871; FWS File #08ESMF00-2014-B-0022
Bank States: California
Comments: This bank is authorized to provide offsets for impacts to seasonal wetlands, and to giant garter snakes or their habitat, with appropriate agency approvals. Please see the Service Area maps for the geographic area in which the credits can be applied.
Bank Sponsor: **Westervelt Ecological Services, Western Region**
600 North Market Boulevard, Suite 3
Sacramento, CA 95834
Email: www.wesmitigation.com
Phone: (916) 646-3644
Fax: (916) 646-3675

Bank POC: **Tara Beltran**
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: tbeltran@westervelt.com
Phone: (916) 646-3644

Mr. Robert Capriola
Bank Management POC
Westervelt Ecological Services
600 North Market Boulevard, Suite 3
Sacramento, CA 95834
Email: rcapriola@westervelt.com
Phone: (916) 646-3644 X 213

Matt Coyle
Bank Stewardship POC
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: mcoyle@westervelt.com
Phone: (916) 646-3644

Jessica Daugherty
Weservelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: jdaugherty@westervelt.com
Phone: (916) 646-3644

Mr. Travis Hemmen
Sales POC
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: themmen@westervelt.com
Phone: (916) 646-3644 X 204

Bank Manager: **Ms. Melissa M France**
Project Manager
1325 J Street
Room 1350
Sacramento, CA 95814
Email: Melissa.M.France@usace.army.mil
Phone: (916) 557-7759

Dana Herman
2800 Cottage Way
W-2605
Sacramento, CA 95825
Email: dana_herman@fws.gov
Phone: (916) 414-6683

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Species	Giant garter snake (GGS)	Species	58.50	Federal
Wetland	Seasonal Wetlands	HGM	1.49	Federal

Notes:

Colusa Basin: no vernal pool establishment credits

Bank Name: 6 - Fremont Landing Conservation Bank (FLCB)

Bank Type: Private Commercial
Total Acres: 100
Distance to impact: 13 Miles
Permit No: SPK-2007-01472
Bank States: California
Comments: The FLCB is a former orchard located in northern Elkhorn Basin, between the Sacramento River and the Yolo Bypass at RM 78-80 on the west bank of the Sacramento River.
Bank Sponsor: **Riparian Ranch LLC**
c/o Wildlands, Inc.
, CA

Bank POC: **Ms. Julie Maddox**
Marketing Coordinator
Wildlands, Inc.
3301 Industrial Ave
Rocklin, CA 95765
Email: jmaddox@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Bank Manager: **Hilary Glenn**
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814
Email: hilary.glenn@noaa.gov
Phone: (916) 930-3720

Fremont Landing: no vernal pool establishment credits

Tancy Moore
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814
Email: tancy.moore@noaa.gov
Phone: (916) 930-3605

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: RFF + O-C SRA		8.65	Federal
Group	Group: RFF + R SRA		0.00	Federal
Species	RFF	Ratio	20.66	Federal

Notes:

Bank Name: 7 - Locust Road Mitigation Bank

Bank Type: Private Commercial
Total Acres: 74.56
Distance to impact: 5 Miles
Permit No: 200700855; FWS file #08ESMF00-2012-B-0067
Bank States: California
Bank Sponsor: **Wildlands**
3855 Atherton Road
Rocklin, CA 95765
Email: ctambini@wildlandsinc.com
Phone: (916) 435-3555

Locust Road: out of watershed; minimal credit availability

Bank POC: **Ms. Julie Maddox**
Marketing Coordinator
Wildlands, Inc.
3301 Industrial Ave
Rocklin, CA 95765
Email: jmaddox@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Ms Cindy Tambini
Wildlands, Inc
3855 Atherton Road
Rocklin, CA 95765
Email: ctambini@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Bank Manager: **Ms. Leah M. Fisher**
Regulatory Project Manager
U.S. Army Corps of Engineers
1325 J Street, Room 1350
Sacramento, CA 95814-2922
Email: leah.m.fisher@usace.army.mil
Phone: (916) 557-6639
Fax: (916) 557-6877

Toby McBride
2800 Cottage Way
W-2605
Sacramento, CA 95825
Email: toby_mcbride@fws.gov
Phone: (916) 414-6603

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: Vernal Pool Creation (404+VPFS)		4.74	Federal
Wetland	Seasonal Wetlands	HGM	0.30	Federal

Notes:

Bank Name: 8 - River Ranch Wetland Mitigation Bank

Bank Type: Private Commercial
Total Acres: 110
Distance to impact: 14 Miles
Permit No: SPK-2007-00418
Bank States: California
Comments: This 110-acre wetland bank will be developed in two phases. Phase I consists of 21.2 acres of wetlands and Phase II will consist of 88.8 acres of wetlands.

River Ranch: out of watershed; minimal credit availability

Bank Sponsor: **Wildlands, Inc.**
3301 Industrial Ave
Rocklin, CA 95765
Email: wildlands@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Bank POC: **Ms. Julie Maddox**
Marketing Coordinator
Wildlands, Inc.
3301 Industrial Ave
Rocklin, CA 95765
Email: jmaddox@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Bank Manager: **Mr. Will Ness**
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922
Email: william.w.ness@usace.army.mil
Phone: (916) 557-5268
Fax: (916) 557-6877

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Wetland	Freshwater Marsh Complex (creation)	HGM	0.01	Federal
Wetland	Riparian (creation)	HGM	0.02	Federal

Notes:

SAJ 1: out of watershed; not using an ILF

Bank Name: 9 - SAJ 1 - Mitigation Bank Credit Purchase

Bank Type: Private Commercial
Total Acres:
Distance to impact: 129 Miles
Permit No:
Bank States: California
Comments: Purchase of 3.08 Seasonal Wetland Credits from the Grasslands Mitigation Bank.
Bank Sponsor:

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Wetland	Aquatic Resource - ILF Sites ONLY	Ratio	3.08	Federal

Notes:

Bank Name: 10 - Stillwater Plains Mitigation Bank - Phase I

Bank Type: Private Commercial
Total Acres: 834
Distance to impact: 126 Miles
Permit No: SPK-1996-00064
Bank States: California
Comments: Stillwater Plains Mitigation Bank - Phase I is located near Redding, CA and offers USACE 404 credits as well as USFWS ESA credits for the Valley Elderberry Longhorn Beetle and CDFW Oak Woodland credits.
Bank Sponsor:
Bank POC: **Glenn Hawes**
P.O. Box 52
Palo Cedro, CA 96073
Phone: (530) 365-4233
Fax: (530) 365-5078

Ms. DeANNE E. Parker
Attorney at Law
1930 West Street
Redding, CA 96001
Email: dparker@dparkerlaw.com
Phone: (530) 242-6025
Fax: (530) 242-6296

Bank Manager: **Amy Henderson**
California Department of Fish and Wildlife - Northern Region
601 Locust Street
Redding, CA 96001
Email: amy.henderson@wildlife.ca.gov
Phone: (530) 225-2779

Dana Herman
2800 Cottage Way
W-2605
Sacramento, CA 95825
Email: dana_herman@fws.gov
Phone: (916) 414-6683

Ms. Valerie L. Layne
Conservation Banking Coordinator
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Email: Valerie_Layne@fws.gov
Phone: (916) 414-6600
Fax: (916) 414-6712

Stillwater Plains: out of watershed; minimal credit availability

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Wetland	Emergent Marsh	Ratio	14.25	Federal, Non Federal
Wetland	Emergent Marsh Creation	Ratio	0.02	Non Federal
Species	Oak Woodland Creation	Species	1.13	Non Federal
Species	Oak Woodland Preservation	Species	1.93	Non Federal
Species	Valley elderberry longhorn beetle (VELB)	Species	61.03	Federal
Wetland	Vernal Pool (404)	Ratio	0.45	Federal, Non Federal
Wetland	Vernal Pool Preservation (404)	Ratio	19.39	Federal, Non Federal
Wetland	Vernal Swale	Ratio	7.04	Federal, Non Federal
Wetland	Vernal Swale Creation	Ratio	0.26	Federal, Non Federal

Notes:

Bank Name: 11 - Sunrise Douglas Mitigation Bank

Bank Type: Private Commercial
Total Acres: 482
Distance to impact: 27 Miles
Permit No:
Bank States: California
Comments: Sacramento Orcutt Grass, Slender Orcutt Grass, Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp preservation bank located in Sacramento, CA.
Bank Sponsor: **The Sunridge Conservancy**
1425 River Park Dr, Ste 530
Sacramento, CA 95815
Phone: (916) 929-3193

Bank POC: **Ms Niki Doan**
7700 College Town Dr. Ste. 101
Sacramento, CA 95826
Email: nikid@aktdev.com
Phone: (916) 383-2500
Fax: (916) 383-0552

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: Vernal Pool Preservation		15.09	Federal

Notes:

Bank Name: 12 - Sutter Basin Conservation Bank

Bank Type: Private Commercial
Total Acres: 429.14
Distance to impact: 17 Miles
Permit No: NA
Bank States: California
Comments: The Sutter Basin Conservation Bank was established to provide mitigation for impacts to the Giant Garter Snake (Thamnophsis gigas) and its habitat in the northeast central valley. it will be managed in perpetuity as high quality habitat for the Giant Garter Snake (GGS)

Bank Sponsor: **Westervelt Ecological Services, Western Region**
600 North Market Boulevard, Suite 3
Sacramento, CA 95834
Email: www.wesmitigation.com
Phone: (916) 646-3644
Fax: (916) 646-3675

Sutter Basin: out of watershed; no vernal pool credits

Bank POC: **Tara Beltran**
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: tbeltran@westervelt.com
Phone: (916) 646-3644

Mr. Robert Capriola
Bank Management POC
Westervelt Ecological Services
600 North Market Boulevard, Suite 3
Sacramento, CA 95834
Email: rcapriola@westervelt.com
Phone: (916) 646-3644 X 213

Matt Coyle
Bank Stewardship POC
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: mcoyle@westervelt.com
Phone: (916) 646-3644

Jessica Daugherty
Weservelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: jdaugherty@westervelt.com
Phone: (916) 646-3644

Mr. Travis Hemmen
Sales POC
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: themmen@westervelt.com
Phone: (916) 646-3644 X 204

Ms. Tina Rosa
Bank Coordinator POC
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: trosa@westervelt.com
Phone: (916) 646-3644 X 206

Bank Manager: **Dana Herman**
2800 Cottage Way
W-2605
Sacramento, CA 95825
Email: dana_herman@fws.gov
Phone: (916) 414-6683

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Species	Giant garter snake (GGS) Species		69.34	Federal

Notes:

Bank Name: 13 - Toad Hill Ranch Mitigation Bank

Bank Type: Private Commercial
Total Acres: 1630.72
Distance to impact: 2 Miles
Permit No: 200700857
Bank States: California
Comments: The 1630-acre Bank property will be developed in four phases to restore 48 acres of vernal pools and 55 acres of seasonal wetlands for a total of 103 acres of created/restored habitat.

Bank Sponsor: **Wildlands, Inc.**
3301 Industrial Ave
Rocklin, CA 95765
Email: wildlands@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Bank POC: **Ms. Julie Maddox**
Marketing Coordinator
Wildlands, Inc.
3301 Industrial Ave
Rocklin, CA 95765
Email: jmaddox@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Ms Cindy Tambini
Wildlands, Inc
3855 Atherton Road
Rocklin, CA 95765
Email: ctambini@wildlandsinc.com
Phone: (916) 435-3555
Fax: (916) 435-3556

Bank Manager: **Ms. Leah M. Fisher**
Regulatory Project Manager
U.S. Army Corps of Engineers
1325 J Street, Room 1350
Sacramento, CA 95814-2922
Email: leah.m.fisher@usace.army.mil
Phone: (916) 557-6639
Fax: (916) 557-6877

Toby McBride
2800 Cottage Way
W-2605
Sacramento, CA 95825
Email: toby_mcbride@fws.gov
Phone: (916) 414-6603

Toad Hill: in watershed; verified credits available
8.38 vernal pool
0.57 seasonal wetland
Not enough to satisfy mitigation

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: Vernal Pool Establishment (404 + VPTS + VPFS)		10.78	Federal
Group	Group: Vernal Pool Preservation (VPTS + VPFS)		2.45	Federal
Wetland	Seasonal Wetlands	Ratio	1.18	Federal

Notes:

Bank Name: 14 - Van Vleck Ranch Mitigation Bank

Bank Type: Private Commercial
Total Acres: 775.03
Distance to impact: 30 Miles
Permit No: 200701147; FWS file #81420-2007-B-0219
Bank States: California
Comments: The Bank is located in eastern Sacramento County, comprised primarily of rolling grassland habitat. The landscape supports several vernal pool complexes, drainage channels, seeps, and artificial ponds. Vernal pool fairy shrimp (Branchinecta lynchi) have been documented as occurring in the pools on site, and Swainson's hawk (Buteo swainsoni) are known to forage and nest in the vicinity of the Bank. Due to the presence of natural mima-mound topography on site, and the relatively low density of existing natural wetlands (3.7%), vernal pool creation is proposed in suitable non-wetland areas in proximity to vernal pool complexes.

Bank Sponsor: **Westervelt Ecological Services, Western Region**
600 North Market Boulevard, Suite 3
Sacramento, CA 95834
Email: www.wesmitigation.com
Phone: (916) 646-3644
Fax: (916) 646-3675

Van Vleck: no vernal pool establishment credits

Bank POC: **Tara Beltran**
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: tbeltran@westervelt.com
Phone: (916) 646-3644

Mr. Robert Capriola
Bank Management POC
Westervelt Ecological Services
600 North Market Boulevard, Suite 3
Sacramento, CA 95834
Email: rcapriola@westervelt.com
Phone: (916) 646-3644 X 213

Jessica Daugherty
Weservelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: jdaugherty@westervelt.com
Phone: (916) 646-3644

Matt Gause
Bank Stewardship POC
600 North Market Blvd.
Suite 3
Sacramento, CA 95834
Email: mgause@westervelt.com
Phone: (916) 646-3644 X 209

Mr. Travis Hemmen
Sales POC
Westervelt Ecological Services
600 North Market Blvd., Suite 3
Sacramento, CA 95834
Email: themmen@westervelt.com
Phone: (916) 646-3644 X 204

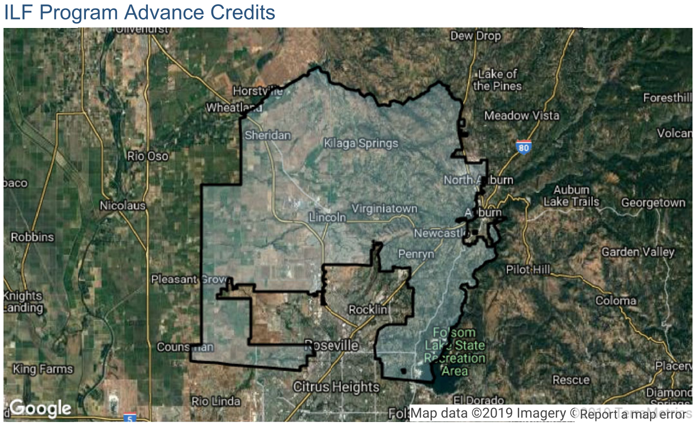
Bank Manager: **Elizabeth Demarse**
USFWS, Sacramento FWO
2800 Cottage Way, W-2605
Sacramento, CA 95825
Email: elizabeth_demarse@fws.gov

Ms. Chandra Jenkins
Project Manager
US Army Corps of Engineers
1325 J Street, Room 1350
Sacramento, CA 95814-2922
Email: Chandra.L.Jenkins@usace.army.mil
Phone: (916) 557-6652
Fax: (916) 557-7803

Credit Type	Credit Classifications	Assessment Method	Available Credits	Jurisdiction
Group	Group: Vernal Pool Establishment (404 +- VPTS +- VPFS)		0.00	Federal
Species	Swainson's hawk (SWHA)	Species	585.16	Non Federal
Species	Vernal Pool Fairy Shrimp (VPFS) - preservation	Species	3.62	Federal

Notes:

ILF Program Advance Credits



Program Name: NFWF Sacramento District California ILF Program

Program Type: ILF
Distance to impact: 65 Miles
Permit No: SPK-2012-00286
Program States: California
Comments: ILF program that operates in the Sacramento District area of responsibility within the state of California.
Program Sponsor: **National Fish and Wildlife Foundation**
San Francisco, CA

Program POC: **Ms. Jana Doi**
Manager
90 New Montgomery Street, Suite 1010
San Francisco, CA 94105
Email: Jana.Doi@nfwf.org
Phone: (415) 243-3102
Fax: (415) 778-0998

Stephanie Tom Coupe
90 New Montgomery Street
Suite 1010
San Francisco, CA 94105
Email: Stephanie.TomCoupe@NFWF.ORG
Phone: (415) 243-3103

Program Manager: **Mr. Howard Brown**
Sacramento River Branch Chief
650 Capitol Mall
Sacramento, CA 95814
Email: howard.brown@noaa.gov
Phone: (916) 930-3600

Leana Rosetti
75 Hawthorne St., WTR2-4
San Francisco, CA 94105
Email: Rosetti.Leana@epa.gov
Phone: (415) 972-3070

Mr. Zachary Simmons
Regulatory Project Manager
US Army Corps of Engineers
1325 J Street, Room 1480
Sacramento, CA 95814-2922
Email: zachary.m.simmons@usace.army.mil
Phone: (916) 557-6746
Fax: (916) 557-6877

Credit Type	Service Area	Advanced Credits
Aquatic Resource	American Aquatic Resource	29.78
Vernal Pool	Southeastern Sacramento Valley Vernal Pool	14.00
Aquatic Resource	Unallocated Advanced Credits	37.72
Vernal Pool	Vernal Pool all other areas	14.00

Notes:

Program Name: Western Placer County In-Lieu Fee Program

Program Type: ILF
Distance to impact: 8 Miles
Permit No: SPK-2005-00485
Program States: California

Program Sponsor: **Gregg McKenzie**
3091 Coutny Center Drive
Auburn, CA 95603
Email: gamckenz@placer.ca.gov
Phone: (530) 745-3074
Fax: (530) 745-3080

Program POC: **Jennifer Byous**
3091 County Center Drive
Auburn, CA 95603
Email: JByous@placer.ca.gov

Gregg McKenzie
PCCP Administrator
3091 County Center Drive
Auburn, CA 95603
Email: GAMckenz@placer.ca.gov
Phone: (530) 745-3074
Cell Phone: (530) 320-1695

Program Manager: **Ms. Angela Calderaro**
Mitigation and Conservation Bank Coordinator
California Department of Fish and Wildlife
1701 Nimbus Road
Rancho Cordova , CA 95670
Email: angela.calderaro@wildlife.ca.gov
Phone: (916) 358-2920
Fax: (916) 358-2912

Ms. Leah M. Fisher
Regulatory Project Manager
U.S. Army Corps of Engineers
1325 J Street, Room 1350
Sacramento, CA 95814-2922
Email: leah.m.fisher@usace.army.mil
Phone: (916) 557-6639
Fax: (916) 557-6877

Stephanie Jentsch
Senior Wildlife Biologist
2800 Cottage Way
Sacramento, CA 95825
Email: stephanie_jentsch@fws.gov
Phone: (916) 474-6496

Credit Type	Service Area	Advanced Credits
Fresh Emergent Marsh	Service Area	5.00
Lacustrine	Service Area	5.00
Riparian	Service Area	20.00
Riverine	Service Area	5.00
Seasonal Wetlands	Service Area	25.00
Vernal Pool	Service Area	100.00
Vernal Pool Complex	Service Area	50.00

Notes:

ATTACHMENT E

Mitigation Ratio Setting Checklists

July 31, 2019

AMORUSO RANCH – MITIGATION RATIO-SETTING CHECKLIST PROCESS

In support of estimating mitigation for the Amoruso Ranch Specific Plan Project, ECORP Consulting has created draft Mitigation Ratio-Setting Checklists (MRSC) for impacts to Waters of the U.S. based on the project configuration as discussed during the May 2, 2019 meeting between the USACE and the Applicant.

The current process uses both the qualitative and quantitative approach for Before-After-Mitigation-Impact (BAMI) ratio calculation. The mitigation proposed for use includes the creation of vernal pools and riverine marsh within the proposed off-site mitigation properties to compensate for impacts to vernal pools, seasonal wetlands, seasonal wetland swales, intermittent drainage/creek, marsh, and stock pond.

USACE Impact Calculations

Direct impacts are assessed based on the open space boundary discussed at the May 2, 2019 USACE meeting.

Indirect impacts are assessed using the framework adopted from the Cordova Hills Development impact determination as requested by USACE staff at the May 2, 2019 meeting. Potential additional indirect impact quantification is still under review.

All impacts are calculated separately for the Phase 1 area and the Future Phase area(s).

USACE Mitigation Ratios

We propose the USACE MRSC to calculate mitigation ratios for direct impacts to features.

We propose a 0.5:1 ratio to calculate mitigation for indirect impacts to features.

We propose a 0.5:1 ratio to calculate mitigation for temporary impacts. Temporary impacts are those that do not include permanent fill and where pre-project functions would be restored.

Mitigation Ratio-Setting Checklist Assumptions

- Impacts were combined based on like-kind features for calculation purposes of the following:
  Intermittent Drainage/Seasonal Creek – referred to as Riverine/Riparian

  Marsh/Stock pond – referred to as Aquatic/Wetland Complex

  Seasonal wetland/Farmed wetland – referred to as Vernal Pool Type
- Quantitative comparisons were made for vernal pool, seasonal wetland, and seasonal wetland swale. CRAM scores of these features were used for the Before Impact calculation and future hypothetical CRAM on the mitigation sites post restoration activities for the After Impact calculation.

2525 Warren Drive • Rocklin, CA 95677 • Tel: (916) 782-9100 • Fax: (916) 782-9134 • Web: www.ecorpconsulting.com

- Qualitative comparisons were made for Intermittent Drainage/Seasonal Creek and Marsh/Stock pond. An Adjustment of +1 was applied to the baseline ratios to account for a minor loss of function on the impact site that is offset by a greater gain in function on the mitigation sites.
- Checklists are split between Phase 1 and Future Phases

Phase 1 checklist adjustments include:

- Mitigation Site Location +0 – No adjustment was made to Mitigation Site Location because the mitigation properties are within the same HUC-12 watershed as the impact site.
- Net Loss of Aquatic Resource Surface Area +0 – No adjustment was made to Net Loss of Aquatic Resource because the proposed establishment (creation) of new wetlands will offset the surface area lost on the impact site.
- Type Conversion +0 to -0.5 – A Type Conversion adjustment was applied if a resource is being mitigated with vernal pool creation and would result in a better than in-kind conversion.
- Risk and Uncertainty +0.3 to +0.4 – An adjustment for Risk and Uncertainty of +0.3 for permittee-responsible mitigation and +0.1 for difficult to replace resources for vernal pool impacts only was applied. We used the adjustments because there has been proven success for vernal pool creation adjacent to the offsite mitigation properties at Toad Hill, the technical studies have shown there is proper soils and ample space for establishment, and there are establishment plans in progress.
- Temporal Loss +1 – Temporal loss was applied to Phase 1 because the impacts will occur concurrently with the creation. The adjustment of one year was used to account for the time between impacting wetland vegetation and re-establishing herbaceous vegetation.

Future Phases checklist adjustments include:

All the above have been applied to future phases but there are modifications to the temporal loss and risk/uncertainty adjustments as follows:

- Risk and Uncertainty +0.1 to +0.2 – An adjustment for Risk and Uncertainty of +0.1 for permittee-responsible mitigation and +0.1 for difficult to replace resources for vernal pool impacts only was applied. We used a reduced adjustment for permittee-responsible mitigation because the mitigation will be established with a contingency amount and protected under easement once future phases are implemented, thereby reducing the level of uncertainty and risk of mitigation.
- Temporal Loss +0.5 – The temporal loss adjustment was reduced because mitigation wetlands will be created prior to future phased impacts. The ratio was not reduced to 0 as future phases may occur during the wetland mitigation monitoring period.

Proposed Mitigation

For Phase 1, a total of 11.14 acres of vernal pool establishment and 3.51 acres of riverine marsh establishment are proposed to compensate for 6.11 acres of direct and 1.86 acres of indirect impacts (See Table 1 and Figure 1).

For Future Phases, a total of 9.55 acres of vernal pool establishment and 2.75 acres of riverine marsh establishment are proposed to compensate for 7.87 acres of direct and 0.84 acres of indirect impacts (See Table 2).

The total establishment mitigation proposed for the complete Project is 26.95 acres of waters.

Wetland Creation

The Mourier East and Mourier West mitigation properties have the potential for approximately 38.5 acres of vernal pool creation and 8 acres of riverine marsh creation.

Long-Term Management

The offsite mitigation properties will be placed under conservation easement and managed under an USACE-approved Long-term Management Plan by an approved entity.

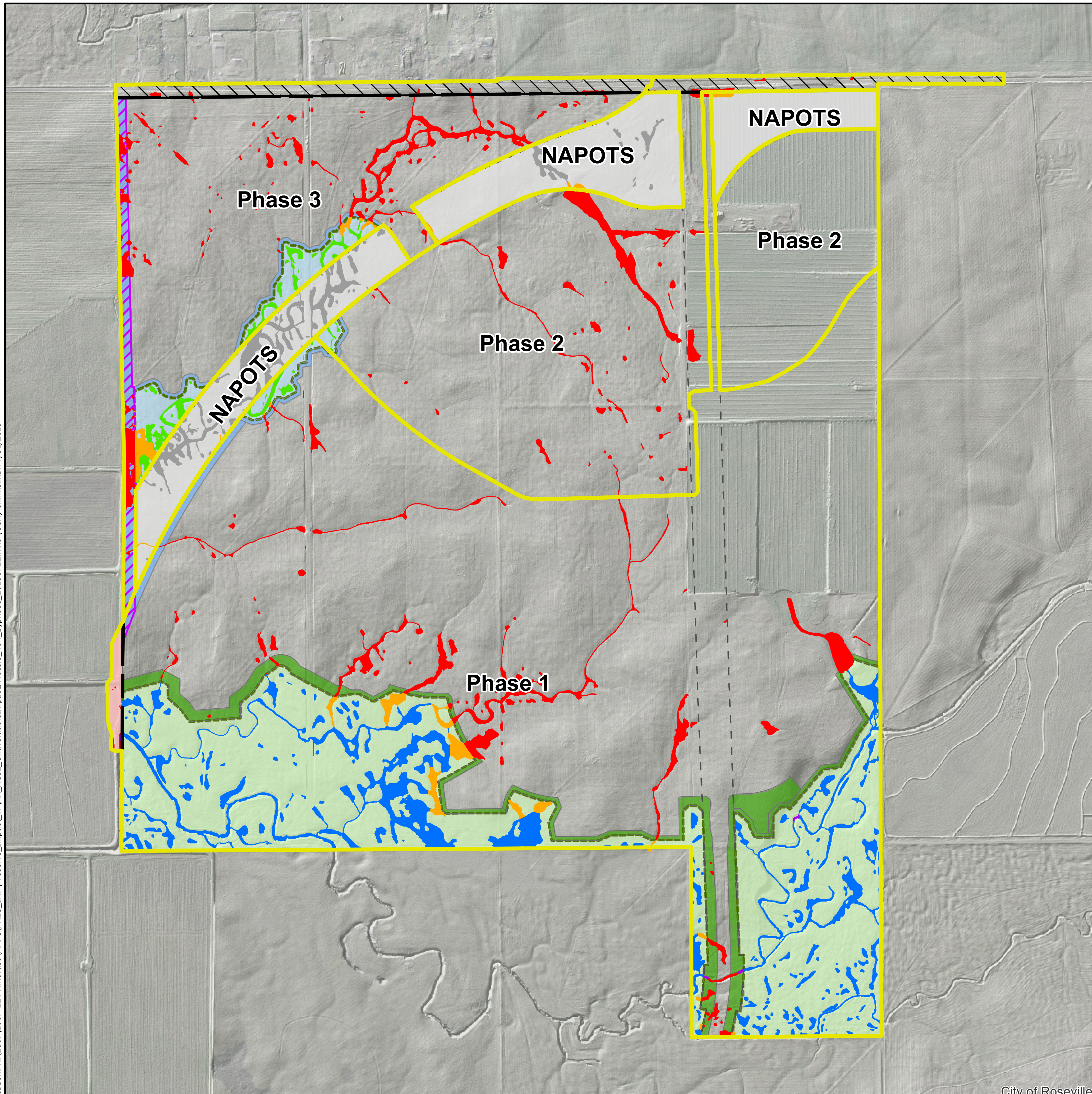
Table 1. Proposed Phase 1 Mitigation

Waters Type	Direct Impact	Indirect/ Temporary Impact	Direct Ratio	Indirect Ratio	Creation Mitigation for Direct	Creation Mitigation for Indirect	Total Creation Required
Ephemeral Drainage	0.000	0.000	3.8:1	0.5:1	-	-	-
Intermittent Drainage	0.061	0.035	3.8:1	0.5:1	0.232	0.018	0.249
Seasonal Creek/Stream	0.021	0.022	3.8:1	0.5:1	0.081	0.011	0.092
Riverine/Riparian SubTotals	***0.082***	***0.057***		***Totals***	***0.313***	***0.028***	***0.342***
Farmed Wetland	0.016	0.000	2.08:1	0.5:1	0.033	-	0.033
Marsh	0.699	0.000	3.3:1	0.5:1	2.306	-	2.306
Stock Pond	0.232	0.132	3.3:1	0.5:1	0.766	0.066	0.832
Aquatic/Wetland Complex SubTotals	***0.947***	***0.132***		***Totals***	***3.105***	***0.066***	***3.171***
Seasonal Wetland	0.682	0.005	2.08:1	0.5:1	1.556	0.003	1.558
Seasonal Wetland Swale	3.230	1.578	1.83:1	0.5:1	5.910	0.789	6.699
Vernal Pool	1.167	0.089	2.43:1	0.5:1	2.836	0.044	2.881
Vernal Pool Type SubTotals	***5.079***	***1.672***		***Totals***	***10.303***	***0.836***	***11.139***
Total	**6.109**	**1.861**		***Grand Totals***	**13.721**	**0.930**	**14.651**

Table 2. Proposed Mitigation for Future Phases

Waters Type	Direct Impact	Indirect/ Temporary Impact	Direct Ratio	Indirect Ratio	Creation Mitigation for Direct	Creation Mitigation for Indirect	Total Creation Required
Ephemeral Drainage	0.000	0.000	-	-	-	-	-
Intermittent Drainage	0.000	0.000	-	-	-	-	-
Seasonal Creek/Stream	0.000	0.000	-	-	-	-	-
Riverine/Riparian SubTotals	***0.000***	***0.000***		***Totals***	***0.000***	***0.000***	***0.000***
Farmed Wetland	0.000	0.000	-	-	-	-	-
Marsh	1.042	0.081	2.6:1	0.5:1	2.710	0.041	2.750
Stock Pond	0.000	0.000	-	-	-	-	-
Aquatic/Wetland Complex SubTotals	***1.042***	***0.081***		***Totals***	***2.710***	***0.041***	***2.750***
Seasonal Wetland	1.617	0.058	1.38:1	0.5:1	2.231	0.029	2.261
Seasonal Wetland Swale	3.446	0.687	1.13:1	0.5:1	3.894	0.344	4.237
Vernal Pool	1.762	0.009	1.73:1	0.5:1	3.048	0.004	3.053
Vernal Pool Type SubTotals	***6.825***	***0.754***		***Totals***	***9.173***	***0.377***	***9.550***
Total	**7.867**	**0.835**		***Grand Totals***	**11.883**	**0.417**	**12.301**

Phased Proposed Project Impacts to Waters of the U.S.



Map Features

- Amoruso Project Boundary
- Westbrook Impact Area
- General Open Space
- General Open Space Transition
- General Open Space Drainage Channel
- Open Space Preserve
- Open Space Preserve Transition
- NAPOTS
- Offsite Drainage Improvements Area
- West Sunset Boulevard Offsite ROW

ACOE Impacts

- Preserved
- Avoided
- Temporary
- Direct
- Indirect
- NAPOTS

Waters of the U.S.	Preserved	Avoided	Temporary	Direct	Indirect	NAPOTS	Total (acres
NAPOTS	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***	***4.324***	***4.324***
Seasonal Wetland	0.000	0.000	0.000	0.000	0.000	0.664	0.664
Seasonal Wetland Swale	0.000	0.000	0.000	0.000	0.000	2.907	2.907
Vernal Pool	0.000	0.000	0.000	0.000	0.000	0.753	0.753
Phase 1	***15.659***	***0.328***	***0.057***	***5.927***	***1.803***	***0.000***	***23.957***
Ephemeral Drainage	0.002	0.000	0.000		0.000	0.000	0.002
Farmed Wetland	0.000	0.000	0.000	0.016	0.000	0.000	0.016
Intermittent Drainage	1.823	0.000	0.035	0.061	0.000	0.000	1.919
Marsh	0.000	0.000	0.000	0.699	0.000	0.000	0.699
Seasonal Creek/Stream	0.000	0.000	0.022	0.021	0.000	0.000	0.043
Seasonal Wetland	1.158	0.090	0.000	0.682	0.005	0.000	1.935
Seasonal Wetland Swale	7.131	0.238	<0.001	3.230	1.578	0.000	12.176
Stock Pond	0.000	0.000	0.000	0.233	0.132	0.000	0.364
Vernal Pool	5.545	0.001	0.000	1.167	0.089	0.000	6.802
Phase 2	***0.000***	***0.044***	***0.000***	***3.432***	***0.131***	***0.000***	***3.425***
Marsh	0.000	0.000	0.000	1.042	0.081	0.000	1.124
Seasonal Wetland	0.000	0.018	0.000	0.798	0.004	0.000	0.820
Seasonal Wetland Swale	0.000	0.026	0.000	1.172	0.046	0.000	1.244
Vernal Pool	0.000	0.000	0.000	0.238	0.000	0.000	0.238
Phase 3	***0.000***	***1.552***	***0.000***	***4.617***	***0.703***	***0.000***	***6.873***
Seasonal Wetland	0.000	0.534	0.000	0.819	0.054	0.000	1.407
Seasonal Wetland Swale	0.000	0.535	0.000	2.274	0.641	0.000	3.450
Vernal Pool	0.000	0.483	0.000	1.524	0.009	0.000	2.016
Total (acres)	**15.659**	**1.925**	**0.057**	**13.976**	**2.638**	**4.324**	**38.578**

Notes:
-Impact calculations are approximate and are based on the best available informationto date.
-The acreage value for each feature has been rounded to the nearest 1/1000 decimal.
Summation of these values may not equal the total acreage reported.

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2007\2007-224 Amoruso\MAPS\PRES_IMP\Preserve_Impact_v7\AR_ACOE_UnavoidableImpactsWaters_404_byphase_20190722.mxd (CCH)-chinkelman 7/31/2019

2007-224 Amoruso Ranch

DRAFT

Scale in Feet
0 800

Photo Source: City of Roseville, 2017

Map Date: 7/31/2019

Phase 1 MRSC Pages

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

ECORP Version May 2019

1	Date: July 30, 2019	Corps File No.:	SPK-2004-00888	Project Manager:	Leah Fisher		
	Impact Site Name:	Amoruso Ranch - Phase 1	ORM Resource Type:	Vernal Pool		Hydrology:	Wetland - seasonally flooded
	Impact Cowardin or HGM type:	Palustrine Depressional	Impact area : Direct	1.167	acres	Impact distance:	linear feet
		Column A	Phase 1	**Column B**		**Column C**	
		Mitigation Site Name:	Mourier East and West	Mitigation Site Name:		Mitigation Site Name:	
		Mitigation Type:	Establishment	Mitigation Type:		Mitigation Type:	
		ORM Resource Type:	Vernal Pool	ORM Resource Type:		ORM Resource Type:	
		Cowardin/HGM type:	Palustrine Depressional	Cowardin/HGM type:		Cowardin/HGM type:	
		Hydrology:	Seasonally flooded	Hydrology:		Hydrology:	
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**
		Ratio adjustment:		Ratio adjustment:		Ratio adjustment:	
		Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**
		PM justification:	see tab 2	PM justification:	see tab 2	PM justification:	see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**1.0 : 1.0**	Ratio adjustment from BAMI procedure (attached):	**: 1.0**	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: within same watershed				PM justification:	
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: restoration/creation of wetlands for no net loss				PM justification:	
6	**Type conversion:**	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: in-kind				PM justification:	
7	**Risk and uncertainty**:	Ratio adjustment:	**0.4**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: Added 0.3 for permittee-responsible mitigation and 0.1 for difficult to replace resources				PM justification:	
8	**Temporal loss**:	Ratio adjustment:	**1**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: accepts +1 for temporal loss for re-establishment of wetland herbacious vegetation				PM justification:	
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	1.03 : 1.00	Baseline ratio from 2 or 3:	0.00 : 1.00	Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!
		Total adjustments (4-8):	1.4	Total adjustments (4-8):	0	Total adjustments (4-8):	0
		Final ratio:	**2.43 : 1.00**	Final ratio:	**0.00 : 1.00**	Final ratio:	**#DIV/0! : #DIV/0!**
		Proposed impact (total):	1.167 acres	Remaining impact:	0.00 acres	Remaining impact (acres):	acres
			0 linear feet		0 linear feet	Remaining impact (linear feet):	#VALUE! linear feet
		to Resource type:	0	to Resource type:	0	to Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional
		Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded
		Required Mitigation*:	2.83 acres	Required Mitigation*:	0.00 acres	Required Mitigation:	#DIV/0! acres
			0 linear feet		0.0 linear feet		#DIV/0! linear feet
		of Resource type:	Vernal Pool	of Resource type:	0	of Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	0	Cowardin or HGM:	0
		Hydrology:	Seasonally flooded	Hydrology:	0	Hydrology:	0
		Proposed Mitigation**:	2.83 acres	Proposed Mitigation**:	acres	Proposed Mitigation**:	acres
			linear feet		linear feet		linear feet
		Impact Unmitigated:	0 %	Impact Unmitigated:	%	Impact Unmitigated:	%
			0.00 acres		acres		acres
		Additional PM comments:		Additional PM comments:		Additional PM comments:	
10	**Final compensatory mitigation requirements:**	Final requirement is for					

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 3: Before-After-Mitigation-Impact (BAMI) procedure **(CRAM example)**

Functions/conditions	$Impact_{Before}$	$Impact_{After}$	$Impact_{delta}$	$Mitigation_{Before}$	$Mitigation_{After}$	$Mitigation_{delta}$	y Mitigation Before and After based on hypothetical AAs; reasoning for each su
4.1 Buffer and Landscape Context							
4.1.1 Landscape Connectivity	11	5		9	12	3	Additional pools increased the overall density of water resources onsite
4.1.2 Percent of AA with Buffer	12	6		12	12	0	Most of property does not have a constriction on buffer
4.1.3 Average Buffer Width	12	5		9	9	0	All pools are affected by the same road barrier, averaging out the size of the buffer
4.1.4 Buffer Condition	6	3		6	9	3	Additional pools increased the likelihood of encountering native plants vs non-native grassland; less human visitation once preserved
RAW SCORE	**19.5**	**9.1**	**-10**	**16.9**	**21.7**	**5**	
FINAL SCORE	**81.2**	**37.8**	**-43**	**70.5**	**90.3**	**20**	
4.2 Attribute 2: Hydrology							
4.2.1 Water Source	12	6		12	12	0	Exisitng land and pools will receive the same inputs as future created pools
4.2.2 Hydroperiod or Channel Stability	12	6		0	12	12	There is no pool before mitigation, hence no hydroperiod
4.2.3 Hydrologic Connectivity	11	6		0	12	12	There is no pool before mitigation, hence no hydrolic connectivity
RAW SCORE	**35.0**	**18.0**	**-17**	**12.0**	**36.0**	**24**	
FINAL SCORE	**97.3**	**50.0**	**-47**	**33.4**	**100.0**	**67**	
4.3 Attribute 3: Physical Structure							
4.3.1 Structural Patch Richness	6	3		3	6	3	The new pools may have additional patch types such as soil cracks and cobble - conservative estimate since more patch types may be possible
4.3.2 Topographic Complexity	9	5		3	6	3	Altering the landscape from flat/concave to a convex slope with at least one break in slope
RAW SCORE	**15.0**	**8.0**	**-7**	**6.0**	**12.0**	**6**	Additional pools increased the likelihood of encountering another pool
FINAL SCORE	**62.5**	**33.4**	**-29**	**25.0**	**50.0**	**25**	
4.4 Attribute 4: Biotic Structure							
4.4.1 Co-Dominant Species	10	6		6	9	3	Increase potential number of co-dominants with the added plant diversity within pools
4.4.2 Percent Non-native Species	8	4		3	9	6	Change from non-native grassland to pool with endemic species cover
4.4.3 Endemic Species	4	2		3	4	1	Change from non-native grassland to pool with endemic species cover, but caped by score of impact site inoculum (pool can only be as good as its inoculum)
4.4.4 Interspersion/Zonation	9	5		3	9	6	Change from homogenous non-native grassland to pools with plant zones, low to moderate shared edge
4.4.5 Vertical Structure -NA for wetlands						0	$Quotient=ABS(M/I)_{deltas}$
RAW SCORE	**16.33333333**	**9**	**-7**	**7**	**16.33333333**	**9**	**35/36**
FINAL SCORE	**45.4**	**25.0**	**-20**	**19.5**	**45.4**	**26**	Baseline ratio:
OVERALL SCORE	**72.0**	**37.0**	**-36**	**38.0**	**72.0**	**35**	**1 : 1.0**

Instructions:

1. Choose functional method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and must be approved by the applicable Corps District.

2. List functions/condition categories in leftmost column. 0.861111

3. Utilize Before-After-Mitigation-Impact (BAMI) procedure above to calculate function deltas. 1.16129

4. Obtain absolute value (ABS*) of quotient of mitigation-delta over impact-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions). *Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of -9/3 = 3.

5. To get baseline ratio: If quotient (Q) is less than 1, baseline ratio = 1/Q : 1; if quotient is greater than 1, baseline ratio = 1 : Q.

6. Input Step 3 baseline ratio into the checklist document.

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

ECORP Version May 2019

1	Date: July 30, 2019	Corps File No.:	SPK-2004-00888	Project Manager:	Leah Fisher		
	Impact Site Name:	Amoruso Ranch-Phase 1	ORM Resource Type:	Seasonal/Farmed Wetland		Hydrology:	Wetland - seasonally flooded
	Impact Cowardin or HGM type:	Palustrine Depressional	Impact area : Direct	0.698	acres	Impact distance:	linear feet
		Column A	Phase 1	**Column B**		**Column C**	
		Mitigation Site Name:	Mourier East and West	Mitigation Site Name:		Mitigation Site Name:	
		Mitigation Type:	Establishment	Mitigation Type:		Mitigation Type:	
		ORM Resource Type:	Vernal Pool	ORM Resource Type:		ORM Resource Type:	
		Cowardin/HGM type:	Palustrine Depressional	Cowardin/HGM type:		Cowardin/HGM type:	
		Hydrology:	Seasonally flooded	Hydrology:		Hydrology:	
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**
		Ratio adjustment:		Ratio adjustment:		Ratio adjustment:	
		Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**
		PM justification:	see tab 2	PM justification:	see tab 2	PM justification:	see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**1.0 : 1.0**	Ratio adjustment from BAMI procedure (attached):	**: 1.0**	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: within same watershed				PM justification:	
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: restoration/creation of wetlands for no net loss				PM justification:	
6	**Type conversion:**	Ratio adjustment:	**-0.25**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: VP is greater value than like-kind				PM justification:	
7	**Risk and uncertainty**:	Ratio adjustment:	**0.3**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: added 0.3 for permittee-responsible mitigation				PM justification:	
8	**Temporal loss**:	Ratio adjustment:	**1**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: accepts +1 for temporal loss for re-establishment of wetland herbacious vegetation				PM justification:	
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	1.03 : 1.00	Baseline ratio from 2 or 3:	0.00 : 1.00	Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!
		Total adjustments (4-8):	1.05	Total adjustments (4-8):	0	Total adjustments (4-8):	0
		Final ratio:	**2.08 : 1.00**	Final ratio:	**0.00 : 1.00**	Final ratio:	**#DIV/0! : #DIV/0!**
		Proposed impact (total):	0.698 acres	Remaining impact:	0.00 acres	Remaining impact (acres):	acres
			0 linear feet		0 linear feet	Remaining impact (linear feet):	#VALUE! linear feet
		to Resource type:	0	to Resource type:	0	to Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional
		Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded
		Required Mitigation*:	1.45 acres	Required Mitigation*:	0.00 acres	Required Mitigation:	#DIV/0! acres
			0 linear feet		0.0 linear feet		#DIV/0! linear feet
		of Resource type:	Vernal Pool	of Resource type:	0	of Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	0	Cowardin or HGM:	0
		Hydrology:	Seasonally flooded	Hydrology:	0	Hydrology:	0
		Proposed Mitigation**:	1.45 acres	Proposed Mitigation**:	acres	Proposed Mitigation**:	acres
			linear feet		linear feet		linear feet
		Impact Unmitigated:	0 %	Impact Unmitigated:	%	Impact Unmitigated:	%
			0.00 acres		acres		acres
		Additional PM comments:		Additional PM comments:		Additional PM comments:	
10	**Final compensatory mitigation requirements:**	Final requirement is for					

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 3: Before-After-Mitigation-Impact (BAMI) procedure **(CRAM example)**

Functions/conditions	$\text{Impact}_{\text{Before}}$	$\text{Impact}_{\text{After}}$	$\text{Impact}_{\text{delta}}$	$\text{Mitigation}_{\text{Before}}$	$\text{Mitigation}_{\text{After}}$	$\text{Mitigation}_{\text{delta}}$		Mourier Property Mitigation Before and After based on hypothetical AAs; reasoning
4.1 Buffer and Landscape Context								
4.1.1 Landscape Connectivity	11	5		9	12	3		Additional pools increased the overall density of water resources onsite
4.1.2 Percent of AA with Buffer	12	6		12	12	0		Most of property does not have a constriction on buffer
4.1.3 Average Buffer Width	12	5		9	9	0		All pools are affected by the same road barrier, averaging out the size of the buffer
4.1.4 Buffer Condition	6	3		6	9	3		Additional pools increased the likelihood of encountering native plants vs non-native grassland; less human visitation once preserved
RAW SCORE	**19.5**	**9.1**	**-10**	**16.9**	**21.7**	**5**		
FINAL SCORE	**81.2**	**37.8**	**-43**	**70.5**	**90.3**	**20**		
4.2 Attribute 2: Hydrology								
4.2.1 Water Source	12	6		12	12	0		Exisitng land and pools will receive the same inputs as future created pools
4.2.2 Hydroperiod or Channel Stability	12	6		0	12	12		There is no pool before mitigation, hence no hydroperiod
4.2.3 Hydrologic Connectivity	11	6		0	12	12		There is no pool before mitigation, hence no hydrolic connectivity
RAW SCORE	**35.0**	**18.0**	**-17**	**12.0**	**36.0**	**24**		
FINAL SCORE	**97.3**	**50.0**	**-47**	**33.4**	**100.0**	**67**		
4.3 Attribute 3: Physical Structure								
4.3.1 Structural Patch Richness	6	3		3	6	3		The new pools may have additional patch types such as soil cracks and cobble - conservative estimate since more patch types may be possible
4.3.2 Topographic Complexity	9	5		3	6	3		Altering the landscape from flat/concave to a convex slope with at least one break in slope
RAW SCORE	**15.0**	**8.0**	**-7**	**6.0**	**12.0**	**6**		Additional pools increased the likelihood of encountering another pool
FINAL SCORE	**62.5**	**33.4**	**-29**	**25.0**	**50.0**	**25**		
4.4 Attribute 4: Biotic Structure								
4.4.1 Co-Dominant Species	10	6		6	9	3		Increase potential number of co-dominants with the added plant diversity within pools
4.4.2 Percent Non-native Species	8	4		3	9	6		Change from non-native grassland to pool with endemic species cover
4.4.3 Endemic Species	4	2		3	4	1		Change from non-native grassland to pool with endemic species cover, but caped by score of impact site inoculum (pool can only be as good as its inoculum)
4.4.4 Interspersion/Zonation	9	5		3	9	6		Change from homogenous non-native grassland to pools with plant zones, low to moderate shared edge
4.4.5 Vertical Structure -NA for wetlands						0	$\text{Quotient=ABS(M/I)}_{\text{deltas}}$	
RAW SCORE	**16.33333333**	**9**	**-7**	**7**	**16.33333333**	**9**	**35/36**	
FINAL SCORE	**45.4**	**25.0**	**-20**	**19.5**	**45.4**	**26**	Baseline ratio:	
OVERALL SCORE	**72.0**	**37.0**	**-36**	**38.0**	**72.0**	**35**	**1 : 1.0**	

Instructions:

1. Choose functional method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and must be approved by the applicable Corps District.

2. List functions/condition categories in leftmost column. 0.861111

3. Utilize Before-After-Mitigation-Impact (BAMI) procedure above to calculate function deltas. 1.16129

4. Obtain absolute value (ABS*) of quotient of mitigation-delta over impact-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions). *Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of -9/3 = 3.

5. To get baseline ratio: If quotient (Q) is less than 1, baseline ratio = 1/Q : 1; if quotient is greater than 1, baseline ratio = 1 : Q.

6. Input Step 3 baseline ratio into the checklist document.

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

1	Date: July 30, 2019	Corps File No.: SPK-2004-00888	Project Manager: Leah Fisher			
	Impact Site Name:	Amoruso Ranch-Phase 1	ORM Resource Type: Seasonal Wetland Swale		Hydrology: Wetland - seasonally flooded	
	Impact Cowardin or HGM type:	Palustrine Depressional	Impact area : Direct 3.23 acres		Impact distance: linear feet	
		Column A	Phase 1	**Column B**		**Column C**
		Mitigation Site Name: Mourier East and West		Mitigation Site Name:		Mitigation Site Name:
		Mitigation Type: Establishment		Mitigation Type:		Mitigation Type:
		ORM Resource Type: Vernal Pool		ORM Resource Type:		ORM Resource Type:
		Cowardin/HGM type: Palustrine Depressional		Cowardin/HGM type:		Cowardin/HGM type:
		Hydrology: Seasonally flooded		Hydrology:		Hydrology:
2	**Qualitative impact-mitigation comparison**:	Starting ratio: **1.0 : 1.0**		Starting ratio: **1.0 : 1.0**		Starting ratio: **1.0 : 1.0**
		Ratio adjustment:		Ratio adjustment:		Ratio adjustment:
		Baseline ratio: **1.00 : 1.00**		Baseline ratio: **1.00 : 1.00**		Baseline ratio: **1.00 : 1.00**
		PM justification: see tab 2		PM justification: see tab 2		PM justification: see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached): **1.0 : 1.0**		Ratio adjustment from BAMI procedure (attached): **: 1.0**		Ratio adjustment from BAMI procedure (attached): **#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment: **0**		Ratio adjustment: **0**		Ratio adjustment:
		PM justification: within same watershed				PM justification:
5	**Net loss of aquatic resource surface area**:	Ratio adjustment: **0**		Ratio adjustment: **0**		Ratio adjustment:
		PM justification: restoration/creation of wetlands for no net loss				PM justification:
6	**Type conversion:**	Ratio adjustment: **-0.5**		Ratio adjustment: **0**		Ratio adjustment:
		PM justification: VP is greater value than like-kind				PM justification:
7	**Risk and uncertainty**:	Ratio adjustment: **0.3**		Ratio adjustment: **0**		Ratio adjustment:
		PM justification: Added 0.3 for permittee-responsible mitigation				PM justification:
8	**Temporal loss**:	Ratio adjustment: **1**		Ratio adjustment: **0**		Ratio adjustment:
		PM justification: accepts +1 for temporal loss for re-establishment of wetland herbacious vegetation				PM justification:
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3: 1.03 : 1.00		Baseline ratio from 2 or 3: 0.00 : 1.00		Baseline ratio from 2 or 3: #DIV/0! : #DIV/0!
		Total adjustments (4-8): 0.8		Total adjustments (4-8): 0		Total adjustments (4-8): 0
		Final ratio: 1.83 : 1.00		Final ratio: **0.00 : 1.00**		Final ratio: **#DIV/0! : #DIV/0!**
		Proposed impact (total): 3.23 acres		Remaining impact: 0.00 acres		Remaining impact (acres): acres
		0 linear feet		0 linear feet		Remaining impact (linear feet): #VALUE! linear feet
		to Resource type: 0		to Resource type: 0		to Resource type: 0
		Cowardin or HGM: Palustrine Depressional		Cowardin or HGM: Palustrine Depressional		Cowardin or HGM: Palustrine Depressional
		Hydrology: Wetland - seasonally flooded		Hydrology: Wetland - seasonally flooded		Hydrology: Wetland - seasonally flooded
		Required Mitigation*: 5.91 acres		Required Mitigation*: 0.00 acres		Required Mitigation: #DIV/0! acres
		0 linear feet		0.0 linear feet		#DIV/0! linear feet
		of Resource type: Vernal Pool		of Resource type: 0		of Resource type: 0
		Cowardin or HGM: Palustrine Depressional		Cowardin or HGM: 0		Cowardin or HGM: 0
		Hydrology: Seasonally flooded		Hydrology: 0		Hydrology: 0
		Proposed Mitigation**: 5.91 acres		Proposed Mitigation**: acres		Proposed Mitigation**: acres
		linear feet		linear feet		linear feet
		Impact Unmitigated: 0 %		Impact Unmitigated: %		Impact Unmitigated: %
		0.00 acres		acres		acres
		Additional PM comments:		Additional PM comments:		Additional PM comments:
10	**Final compensatory mitigation requirements:**	Final requirement is for				

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 3: Before-After-Mitigation-Impact (BAMI) procedure **(CRAM example)**

Functions/conditions	$Impact_{Before}$	$Impact_{After}$	$Impact_{delta}$	$Mitigation_{Before}$	$Mitigation_{After}$	$Mitigation_{delta}$		Mourier Property Mitigation Before and After based on hypothetical AAs;
4.1 Buffer and Landscape Context								
4.1.1 Landscape Connectivity	11	5		9	12	3		Additional pools increased the overall density of water resources onsite
4.1.2 Percent of AA with Buffer	12	6		12	12	0		Most of property does not have a constriction on buffer
4.1.3 Average Buffer Width	12	5		9	9	0		All pools are affected by the same road barrier, averaging out the size of the buffer
4.1.4 Buffer Condition	6	3		6	9	3		Additional pools increased the likelihood of encountering native plants vs non-native grassland; less human visitation once preserved
RAW SCORE	**19.5**	**9.1**	**-10**	**16.9**	**21.7**	**5**		
FINAL SCORE	**81.2**	**37.8**	**-43**	**70.5**	**90.3**	**20**		
4.2 Attribute 2: Hydrology								
4.2.1 Water Source	12	6		12	12	0		Exisitng land and pools will receive the same inputs as future created pools
4.2.2 Hydroperiod or Channel Stability	12	6		0	12	12		There is no pool before mitigation, hence no hydroperiod
4.2.3 Hydrologic Connectivity	11	6		0	12	12		There is no pool before mitigation, hence no hydrolic connectivity
RAW SCORE	**35.0**	**18.0**	**-17**	**12.0**	**36.0**	**24**		
FINAL SCORE	**97.3**	**50.0**	**-47**	**33.4**	**100.0**	**67**		
4.3 Attribute 3: Physical Structure								
4.3.1 Structural Patch Richness	6	3		3	6	3		The new pools may have additional patch types such as soil cracks and cobble - conservative estimate since more patch types may be possible
4.3.2 Topographic Complexity	9	5		3	6	3		Altering the landscape from flat/concave to a convex slope with at least one break in slope
RAW SCORE	**15.0**	**8.0**	**-7**	**6.0**	**12.0**	**6**		Additional pools increased the likelihood of encountering another pool
FINAL SCORE	**62.5**	**33.4**	**-29**	**25.0**	**50.0**	**25**		
4.4 Attribute 4: Biotic Structure								
4.4.1 Co-Dominant Species	10	6		6	9	3		Increase potential number of co-dominants with the added plant diversity within pools
4.4.2 Percent Non-native Species	8	4		3	9	6		Change from non-native grassland to pool with endemic species cover
4.4.3 Endemic Species	4	2		3	4	1		Change from non-native grassland to pool with endemic species cover, but caped by score of impact site inoculum (pool can only be as good as its inoculum)
4.4.4 Interspersion/Zonation	9	5		3	9	6		Change from homogenous non-native grassland to pools with plant zones, low to moderate shared edge
4.4.5 Vertical Structure -NA for wetlands						0	$Quotient=ABS(M/I)_{deltas}$	
RAW SCORE	**16.33333333**	**9**	**-7**	**7**	**16.33333333**	**9**	**35/36**	
FINAL SCORE	**45.4**	**25.0**	**-20**	**19.5**	**45.4**	**26**	Baseline ratio:	
OVERALL SCORE	**72.0**	**37.0**	**-36**	**38.0**	**72.0**	**35**	**1 : 1.0**	

Instructions:

1. Choose functional method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and must be approved by the applicable Corps District.

2. List functions/condition categories in leftmost column.

0.861111

3. Utilize Before-After-Mitigation-Impact (BAMI) procedure above to calculate function deltas.

1.16129

4. Obtain absolute value (ABS*) of quotient of mitigation-delta over impact-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions). *Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of -9/3 = 3.

5. To get baseline ratio: If quotient (Q) is less than 1, baseline ratio = 1/Q : 1; if quotient is greater than 1, baseline ratio = 1 : Q.

6. Input Step 3 baseline ratio into the checklist document.

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

ECORP Version May 2019

1	Date: July 30, 2019	Corps File No.:	SPK-2004-00888	Project Manager:	Leah Fisher		
	Impact Site Name:	Amoruso Ranch - Phase 1	ORM Resource Type:	Riverine Marsh / Stock Pond		Hydrology:	Riverine - Seasonal
	Impact Cowardin or HGM type	RP2EM	Impact area : Direct	0.931	acres	Impact distance:	linear feet
		Column A		**Column B**		**Column C**	
		Mitigation Site Name:	Mourier East	Mitigation Site Name:		Mitigation Site Name:	
		Mitigation Type:	Establishment	Mitigation Type:		Mitigation Type:	
		ORM Resource Type:	Riverine - Marsh	ORM Resource Type:		ORM Resource Type:	
		Cowardin/HGM type:	RP2EM	Cowardin/HGM type:		Cowardin/HGM type:	
		Hydrology:	Seasonally flooded	Hydrology:		Hydrology:	
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**
		Ratio adjustment:	**1.0**	Ratio adjustment:		Ratio adjustment:	
		Baseline ratio:	**2.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**
		PM justification:	see tab 2	PM justification:	see tab 2	PM justification:	see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**0.0 : #DIV/0!**	Ratio adjustment from BAMI procedure (attached):	**: 1.0**	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: within same watershed				PM justification:	
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: restoration/creation of wetlands for no net loss				PM justification:	
6	**Type conversion:**	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: in-kind and better				PM justification:	
7	**Risk and uncertainty**:	Ratio adjustment:	**0.3**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: added 0.3 for permittee-responsible mitigation				PM justification:	
8	**Temporal loss**:	Ratio adjustment:	**1**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: accepts +1 for temporal loss for re-establishment of wetland herbacious vegetation				PM justification:	
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	2.00 : 1.00	Baseline ratio from 2 or 3:	0.00 : 1.00	Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!
		Total adjustments (4-8):	1.3	Total adjustments (4-8):	0	Total adjustments (4-8):	0
		Final ratio:	**3.30 : 1.00**	Final ratio:	**0.00 : 1.00**	Final ratio:	**#DIV/0! : #DIV/0!**
		Proposed impact (total):	0.931 acres	Remaining impact:	0.00 acres	Remaining impact (acres):	acres
			0 linear feet		0 linear feet	Remaining impact (linear feet):	#VALUE! linear feet
		to Resource type:	0	to Resource type:	0	to Resource type:	0
		Cowardin or HGM:	RP2EM	Cowardin or HGM:	RP2EM	Cowardin or HGM:	RP2EM
		Hydrology:	Riverine - Seasonal	Hydrology:	Riverine - Seasonal	Hydrology:	Riverine - Seasonal
		Required Mitigation*:	3.07 acres	Required Mitigation*:	0.00 acres	Required Mitigation:	#DIV/0! acres
			0 linear feet		0.0 linear feet		#DIV/0! linear feet
		of Resource type:	Riverine - Marsh	of Resource type:	0	of Resource type:	0
		Cowardin or HGM:	RP2EM	Cowardin or HGM:	0	Cowardin or HGM:	0
		Hydrology:	Seasonally flooded	Hydrology:	0	Hydrology:	0
		Proposed Mitigation**:	3.07 acres	Proposed Mitigation**:	acres	Proposed Mitigation**:	acres
			linear feet		linear feet		linear feet
		Impact Unmitigated:	0 %	Impact Unmitigated:	%	Impact Unmitigated:	%
			0.00 acres		acres		acres
		Additional PM comments:		Additional PM comments:		Additional PM comments:	
10	**Final compensatory mitigation requirements:**	Final requirement is for					

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 2: Qualitative comparison of functions (functional loss vs. gain)

Functions (Column A)	Impact site	Mitigation site
Short- or long-term surface water storage	small loss	large gain
Subsurface water storage	small loss	moderate gain
Moderation of groundwater flow or discharge	even	even
Dissipation of energy	small loss	moderate gain
Cycling of nutrients	small loss	large gain
Removal of elements and compounds	even	moderate gain
Retention of particulates	small loss	large gain
Export of organic carbon	small loss	moderate gain
Maintenance of plant and animal communities	small loss	large gain

Adjustment: 1

PM Justification: The functions provided by creating additional riverine marsh are greater than the functions lost by impacting a low quality marsh and stock pond that is fed by irrigation. The created riverine marsh will allow for temporary water storage and the habitat created will be of greater quality than the impact site.

Function (Column B)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Function (Column C)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Instructions:
1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

1	Date: July 30, 2019	Corps File No.:	SPK-2004-00888		Project Manager:	Leah Fisher						
	Impact Site Name:	Amoruso Ranch	ORM Resource Type:		Intermittent Drainage/Creek			Hydrology:	Riverine - Seasonal			
	Impact Cowardin or HGM type	R4	Impact area : Direct		0.082	acres		Impact distance:		linear feet		
		Column A			**Column B**			**Column C**				
		Mitigation Site Name:	Mourier East		Mitigation Site Name:			Mitigation Site Name:				
		Mitigation Type:	Creation		Mitigation Type:			Mitigation Type:				
		ORM Resource Type:	Riverine - Marsh		ORM Resource Type:			ORM Resource Type:				
		Cowardin/HGM type:	RP2EM		Cowardin/HGM type:			Cowardin/HGM type:				
		Hydrology:	Seasonally flooded		Hydrology:			Hydrology:				
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**		Starting ratio:	**1.0 : 1.0**		Starting ratio:	**1.0 : 1.0**			
		Ratio adjustment:	**1.0**		Ratio adjustment:			Ratio adjustment:				
		Baseline ratio:	**2.00 : 1.00**		Baseline ratio:	**1.00 : 1.00**		Baseline ratio:	**1.00 : 1.00**			
		PM justification:	see tab 2		PM justification:	see tab 2		PM justification:	see			
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**0.0 : #DIV/0!**		Ratio adjustment from BAMI procedure (attached):	**: 1.0**		Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**			
4	**Mitigation site location**:	Ratio adjustment:	**0**		Ratio adjustment:	**0**		Ratio adjustment:				
		PM justification: within same watershed						PM justification:				
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0**		Ratio adjustment:	**0**		Ratio adjustment:				
		PM justification: restoration/creation of wetlands for no net loss						PM justification:				
6	**Type conversion:**	Ratio adjustment:	**0.5**		Ratio adjustment:	**0**		Ratio adjustment:				
		PM justification: out of-kind but created feature is a part of the riverine system						PM justification:				
7	**Risk and uncertainty**:	Ratio adjustment:	**0.3**		Ratio adjustment:	**0**		Ratio adjustment:				
		PM justification: added 0.3 for permittee-responsible mitigation						PM justification:				
8	**Temporal loss**:	Ratio adjustment:	**1**		Ratio adjustment:	**0**		Ratio adjustment:				
		PM justification: accepts +1 for temporal loss for re-establishment of wetland herbacious vegetation						PM justification:				
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	2.00 :	1.00	Baseline ratio from 2 or 3:	0.00 :	1.00	Baseline ratio from 2 or 3:	#DIV/0! :	#DIV/0!		
		Total adjustments (4-8):	1.8		Total adjustments (4-8):	0		Total adjustments (4-8):	0			
		Final ratio:	**3.80 : 1.00**		Final ratio:	**0.00 : 1.00**		Final ratio:	**#DIV/0! : #DIV/0!**			
		Proposed impact (total):	0.082	acres	Remaining impact:	0.00	acres	Remaining impact (acres):		acres		
			0	linear feet		0	linear feet	Remaining impact (linear feet):	#VALUE!	linear feet		
		to Resource type:	0		to Resource type:	0		to Resource type:	0			
		Cowardin or HGM:	R4		Cowardin or HGM:	R4		Cowardin or HGM:	R4			
		Hydrology:	Riverine - Seasonal		Hydrology:	Riverine - Seasonal		Hydrology:	Riverine - Seasonal			
		Required Mitigation*:	0.31	acres	Required Mitigation*:	0.00	acres	Required Mitigation:	#DIV/0!	acres		
			0	linear feet		0.0	linear feet		#DIV/0!	linear feet		
		of Resource type:	Riverine - Marsh		of Resource type:	0		of Resource type:	0			
		Cowardin or HGM:	RP2EM		Cowardin or HGM:	0		Cowardin or HGM:	0			
		Hydrology:	Seasonally flooded		Hydrology:	0		Hydrology:	0			
		Proposed Mitigation**:	0.31	acres	Proposed Mitigation**:		acres	Proposed Mitigation**:		acres		
				linear feet			linear feet			linear feet		
		Impact Unmitigated:	1	%	Impact Unmitigated:		%	Impact Unmitigated:		%		
			0.00	acres			acres			acres		
		Additional PM comments:			Additional PM comments:			Additional PM comments:				
10	**Final compensatory mitigation requirements:**	Final requirement is for										

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.
**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 2: Qualitative comparison of functions (functional loss vs. gain)

Functions (Column A)	Impact site	Mitigation site
Short- or long-term surface water storage	small loss	large gain
Subsurface water storage	small loss	moderate gain
Moderation of groundwater flow or discharge	even	even
Dissipation of energy	small loss	moderate gain
Cycling of nutrients	small loss	large gain
Removal of elements and compounds	even	moderate gain
Retention of particulates	small loss	large gain
Export of organic carbon	small loss	moderate gain
Maintenance of plant and animal communities	small loss	large gain

Adjustment: 1

PM Justification: The functions provided by creating additional riverine marsh are greater than the functions lost by impacting a small amount of riverine type features. The created riverine marsh will still allow for flow of water and the habitat created will be of greater quality than the impact site.

Function (Column B)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Function (Column C)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Instructions:
1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

Future Phases MRSC Pages

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

1	Date: July 30, 2019	Corps File No.:	SPK-2004-00888	Project Manager:	Leah Fisher		
	Impact Site Name:	Phases	ORM Resource Type:	Vernal Pool		Hydrology:	Wetland - seasonally flooded
	Impact Cowardin or HGM type:	Palustrine Depressional	Impact area : Direct	1.762	acres	Impact distance:	linear feet
		Column A		**Column B**		**Column C**	
		Mitigation Site Name:	Mourier East and West	Mitigation Site Name:		Mitigation Site Name:	
		Mitigation Type:	Establishment	Mitigation Type:		Mitigation Type:	
		ORM Resource Type:	Vernal Pool	ORM Resource Type:		ORM Resource Type:	
		Cowardin/HGM type:	Palustrine Depressional	Cowardin/HGM type:		Cowardin/HGM type:	
		Hydrology:	Seasonally flooded	Hydrology:		Hydrology:	
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**
		Ratio adjustment:		Ratio adjustment:		Ratio adjustment:	
		Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**
		PM justification:	see tab 2	PM justification:	see tab 2	PM justification:	see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**1.0 : 1.0**	Ratio adjustment from BAMI procedure (attached):	**: 1.0**	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: within same watershed				PM justification:	
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: restoration/creation of wetlands for no net loss				PM justification:	
6	**Type conversion:**	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: in-kind				PM justification:	
7	**Risk and uncertainty**:	Ratio adjustment:	**0.2**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: added 0.1 for these factors: permittee-responsible mitigation, hard to replace resources				PM justification:	
8	**Temporal loss**:	Ratio adjustment:	**0.5**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: reduced temporal loss because wetlands created at least one year prior to impacts and herbaceous vegetation will be re-establishing				PM justification:	
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	1.03 : 1.00	Baseline ratio from 2 or 3:	0.00 : 1.00	Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!
		Total adjustments (4-8):	0.7	Total adjustments (4-8):	0	Total adjustments (4-8):	0
		Final ratio:	**1.73 : 1.00**	Final ratio:	**0.00 : 1.00**	Final ratio:	**#DIV/0! : #DIV/0!**
		Proposed impact (total):	1.762 acres	Remaining impact:	0.00 acres	Remaining impact (acres):	acres
			0 linear feet		0 linear feet	Remaining impact (linear feet):	#VALUE! linear feet
		to Resource type:	0	to Resource type:	0	to Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional
		Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded
		Required Mitigation*:	3.05 acres	Required Mitigation*:	0.00 acres	Required Mitigation:	#DIV/0! acres
			0 linear feet		0.0 linear feet		#DIV/0! linear feet
		of Resource type:	Vernal Pool	of Resource type:	0	of Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	0	Cowardin or HGM:	0
		Hydrology:	Seasonally flooded	Hydrology:	0	Hydrology:	0
		Proposed Mitigation**:	3.05 acres	Proposed Mitigation**:	acres	Proposed Mitigation**:	acres
			linear feet		linear feet		linear feet
		Impact Unmitigated:	0 %	Impact Unmitigated:	%	Impact Unmitigated:	%
			0.00 acres		acres		acres
		Additional PM comments:		Additional PM comments:		Additional PM comments:	
10	**Final compensatory mitigation requirements:**	Final requirement is for					

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 3: Before-After-Mitigation-Impact (BAMI) procedure **(CRAM example)**

Functions/conditions	$\text{Impact}_{\text{Before}}$	$\text{Impact}_{\text{After}}$	$\text{Impact}_{\text{delta}}$	$\text{Mitigation}_{\text{Before}}$	$\text{Mitigation}_{\text{After}}$	$\text{Mitigation}_{\text{delta}}$		Mourier Property Mitigation Before and After based on hypothetical AAs;
4.1 Buffer and Landscape Context								
4.1.1 Landscape Connectivity	11	5		9	12	3		Additional pools increased the overall density of water resources onsite
4.1.2 Percent of AA with Buffer	12	6		12	12	0		Most of property does not have a constriction on buffer
4.1.3 Average Buffer Width	12	5		9	9	0		All pools are affected by the same road barrier, averaging out the size of the buffer
4.1.4 Buffer Condition	6	3		6	9	3		Additional pools increased the likelihood of encountering native plants vs non-native grassland; less human visitation once preserved
RAW SCORE	**19.5**	**9.1**	**-10**	**16.9**	**21.7**	**5**		
FINAL SCORE	**81.2**	**37.8**	**-43**	**70.5**	**90.3**	**20**		
4.2 Attribute 2: Hydrology								
4.2.1 Water Source	12	6		12	12	0		Exisitng land and pools will receive the same inputs as future created pools
4.2.2 Hydroperiod or Channel Stability	12	6		0	12	12		There is no pool before mitigation, hence no hydroperiod
4.2.3 Hydrologic Connectivity	11	6		0	12	12		There is no pool before mitigation, hence no hydrolic connectivity
RAW SCORE	**35.0**	**18.0**	**-17**	**12.0**	**36.0**	**24**		
FINAL SCORE	**97.3**	**50.0**	**-47**	**33.4**	**100.0**	**67**		
4.3 Attribute 3: Physical Structure								
4.3.1 Structural Patch Richness	6	3		3	6	3		The new pools may have additional patch types such as soil cracks and cobble - conservative estimate since more patch types may be possible
4.3.2 Topographic Complexity	9	5		3	6	3		Altering the landscape from flat/concave to a convex slope with at least one break in slope
RAW SCORE	**15.0**	**8.0**	**-7**	**6.0**	**12.0**	**6**		Additional pools increased the likelihood of encountering another pool
FINAL SCORE	**62.5**	**33.4**	**-29**	**25.0**	**50.0**	**25**		
4.4 Attribute 4: Biotic Structure								
4.4.1 Co-Dominant Species	10	6		6	9	3		Increase potential number of co-dominants with the added plant diversity within pools
4.4.2 Percent Non-native Species	8	4		3	9	6		Change from non-native grassland to pool with endemic species cover
4.4.3 Endemic Species	4	2		3	4	1		Change from non-native grassland to pool with endemic species cover, but caped by score of impact site inoculum (pool can only be as good as its inoculum)
4.4.4 Interspersion/Zonation	9	5		3	9	6		Change from homogenous non-native grassland to pools with plant zones, low to moderate shared edge
4.4.5 Vertical Structure -NA for wetlands						0	$\text{Quotient=ABS(M/I)}_{\text{deltas}}$	
RAW SCORE	**16.33333333**	**9**	**-7**	**7**	**16.33333333**	**9**	**35/36**	
FINAL SCORE	**45.4**	**25.0**	**-20**	**19.5**	**45.4**	**26**	Baseline ratio:	
OVERALL SCORE	**72.0**	**37.0**	**-36**	**38.0**	**72.0**	**35**	**1 : 1.0**	

Instructions:

1. Choose functional method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and must be approved by the applicable Corps District.

2. List functions/condition categories in leftmost column. 0.861111

3. Utilize Before-After-Mitigation-Impact (BAMI) procedure above to calculate function deltas. 1.16129

4. Obtain absolute value (ABS*) of quotient of mitigation-delta over impact-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions). *Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of -9/3 = 3.

5. To get baseline ratio: If quotient (Q) is less than 1, baseline ratio = 1/Q : 1; if quotient is greater than 1, baseline ratio = 1 : Q.

6. Input Step 3 baseline ratio into the checklist document.

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet) ECORP Version May 2019

1	Date: July 30, 2019	Corps File No.:	SPK-2004-00888	Project Manager:	Leah Fisher		
	Impact Site Name:	Phases	ORM Resource Type:	Seasonal Wetland		Hydrology:	Wetland - seasonally flooded
	Impact Cowardin or HGM type:	Palustrine Depressional	Impact area : Direct	1.617	acres	Impact distance:	linear feet
		Column A		**Column B**		**Column C**	
		Mitigation Site Name:	Mourier East and West	Mitigation Site Name:		Mitigation Site Name:	
		Mitigation Type:	Establishment	Mitigation Type:		Mitigation Type:	
		ORM Resource Type:	Vernal Pool	ORM Resource Type:		ORM Resource Type:	
		Cowardin/HGM type:	Palustrine Depressional	Cowardin/HGM type:		Cowardin/HGM type:	
		Hydrology:	Seasonally flooded	Hydrology:		Hydrology:	
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**
		Ratio adjustment:		Ratio adjustment:		Ratio adjustment:	
		Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**
		PM justification:	see tab 2	PM justification:	see tab 2	PM justification:	see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**1.0 : 1.0**	Ratio adjustment from BAMI procedure (attached):	**: 1.0**	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: within same watershed				PM justification:	
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: restoration/creation of wetlands for no net loss				PM justification:	
6	**Type conversion:**	Ratio adjustment:	**-0.25**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: VP is greater value than like-kind				PM justification:	
7	**Risk and uncertainty**:	Ratio adjustment:	**0.1**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: permittee-responsible mitigation				PM justification:	
8	**Temporal loss**:	Ratio adjustment:	**0.5**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: reduced temporal loss because wetlands created at least one year prior to impacts and herbaceous vegetation will be re-establishing				PM justification:	
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	1.03 : 1.00	Baseline ratio from 2 or 3:	0.00 : 1.00	Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!
		Total adjustments (4-8):	0.35	Total adjustments (4-8):	0	Total adjustments (4-8):	0
		Final ratio:	**1.38 : 1.00**	Final ratio:	**0.00 : 1.00**	Final ratio:	**#DIV/0! : #DIV/0!**
		Proposed impact (total):	1.617 acres	Remaining impact:	0.00 acres	Remaining impact (acres):	acres
			0 linear feet		0 linear feet	Remaining impact (linear feet):	#VALUE! linear feet
		to Resource type:	0	to Resource type:	0	to Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional
		Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded
		Required Mitigation*:	2.23 acres	Required Mitigation*:	0.00 acres	Required Mitigation:	#DIV/0! acres
			0 linear feet		0.0 linear feet		#DIV/0! linear feet
		of Resource type:	Vernal Pool	of Resource type:	0	of Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	0	Cowardin or HGM:	0
		Hydrology:	Seasonally flooded	Hydrology:	0	Hydrology:	0
		Proposed Mitigation**:	2.23 acres	Proposed Mitigation**:	acres	Proposed Mitigation**:	acres
			linear feet		linear feet		linear feet
		Impact Unmitigated:	0 %	Impact Unmitigated:	%	Impact Unmitigated:	%
			0.00 acres		acres		acres
		Additional PM comments:		Additional PM comments:		Additional PM comments:	
10	**Final compensatory mitigation requirements:**	Final requirement is for					

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 3: Before-After-Mitigation-Impact (BAMI) procedure **(CRAM example)**

Functions/conditions	$Impact_{Before}$	$Impact_{After}$	$Impact_{delta}$	$Mitigation_{Before}$	$Mitigation_{After}$	$Mitigation_{delta}$	Mourier East Mitigation Before and After based on hypothetical AAs;
4.1 Buffer and Landscape Context							
4.1.1 Landscape Connectivity	11	5		9	12	3	Additional pools increased the overall density of water resources onsite
4.1.2 Percent of AA with Buffer	12	6		12	12	0	Most of property does not have a constriction on buffer
4.1.3 Average Buffer Width	12	5		9	9	0	All pools are affected by the same road barrier, averaging out the size of the buffer
4.1.4 Buffer Condition	6	3		6	9	3	Additional pools increased the likelihood of encountering native plants vs non-native grassland; less human visitation once preserved
RAW SCORE	**19.5**	**9.1**	**-10**	**16.9**	**21.7**	**5**	
FINAL SCORE	**81.2**	**37.8**	**-43**	**70.5**	**90.3**	**20**	
4.2 Attribute 2: Hydrology							
4.2.1 Water Source	12	6		12	12	0	Exisitng land and pools will receive the same inputs as future created pools
4.2.2 Hydroperiod or Channel Stability	12	6		0	12	12	There is no pool before mitigation, hence no hydroperiod
4.2.3 Hydrologic Connectivity	11	6		0	12	12	There is no pool before mitigation, hence no hydrolic connectivity
RAW SCORE	**35.0**	**18.0**	**-17**	**12.0**	**36.0**	**24**	
FINAL SCORE	**97.3**	**50.0**	**-47**	**33.4**	**100.0**	**67**	
4.3 Attribute 3: Physical Structure							
4.3.1 Structural Patch Richness	6	3		3	6	3	The new pools may have additional patch types such as soil cracks and cobble - conservative estimate since more patch types may be possible
4.3.2 Topographic Complexity	9	5		3	6	3	Altering the landscape from flat/concave to a convex slope with at least one break in slope
RAW SCORE	**15.0**	**8.0**	**-7**	**6.0**	**12.0**	**6**	Additional pools increased the likelihood of encountering another pool
FINAL SCORE	**62.5**	**33.4**	**-29**	**25.0**	**50.0**	**25**	
4.4 Attribute 4: Biotic Structure							
4.4.1 Co-Dominant Species	10	6		6	9	3	Increase potential number of co-dominants with the added plant diversity within pools
4.4.2 Percent Non-native Species	8	4		3	9	6	Change from non-native grassland to pool with endemic species cover
4.4.3 Endemic Species	4	2		3	4	1	Change from non-native grassland to pool with endemic species cover, but caped by score of impact site inoculum (pool can only be as good as its inoculum)
4.4.4 Interspersion/Zonation	9	5		3	9	6	Change from homogenous non-native grassland to pools with plant zones, low to moderate shared edge
4.4.5 Vertical Structure -NA for wetlands						0	$Quotient=ABS(M/I)_{deltas}$
RAW SCORE	**16.33333333**	**9**	**-7**	**7**	**16.33333333**	**9**	**35/36**
FINAL SCORE	**45.4**	**25.0**	**-20**	**19.5**	**45.4**	**26**	Baseline ratio:
OVERALL SCORE	**72.0**	**37.0**	**-36**	**38.0**	**72.0**	**35**	**1 : 1.0**

Instructions:

1. Choose functional method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and must be approved by the applicable Corps District.

2. List functions/condition categories in leftmost column. 0.861111

3. Utilize Before-After-Mitigation-Impact (BAMI) procedure above to calculate function deltas. 1.16129

4. Obtain absolute value (ABS*) of quotient of mitigation-delta over impact-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions). *Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of -9/3 = 3.

5. To get baseline ratio: If quotient (Q) is less than 1, baseline ratio = 1/Q : 1; if quotient is greater than 1, baseline ratio = 1 : Q.

6. Input Step 3 baseline ratio into the checklist document.

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet)

ECORP Version May 2019

1	Date: July 30, 2019	Corps File No.:	SPK-2004-00888	Project Manager:	Leah Fisher		
	Impact Site Name:	Phases	ORM Resource Type:	Seasonal Wetland Swale		Hydrology:	Wetland - seasonally flooded
	Impact Cowardin or HGM type:	Palustrine Depressional	Impact area : Direct	3.446	acres	Impact distance:	linear feet
		Column A		**Column B**		**Column C**	
		Mitigation Site Name:	Mourier East and West	Mitigation Site Name:		Mitigation Site Name:	
		Mitigation Type:	Establishment	Mitigation Type:		Mitigation Type:	
		ORM Resource Type:	Vernal Pool	ORM Resource Type:		ORM Resource Type:	
		Cowardin/HGM type:	Palustrine Depressional	Cowardin/HGM type:		Cowardin/HGM type:	
		Hydrology:	Seasonally flooded	Hydrology:		Hydrology:	
2	**Qualitative impact-mitigation comparison**:	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**	Starting ratio:	**1.0 : 1.0**
		Ratio adjustment:		Ratio adjustment:		Ratio adjustment:	
		Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**	Baseline ratio:	**1.00 : 1.00**
		PM justification:	see tab 2	PM justification:	see tab 2	PM justification:	see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached):	**1.0 : 1.0**	Ratio adjustment from BAMI procedure (attached):	**1.2 : 1.0**	Ratio adjustment from BAMI procedure (attached):	**#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: within same watershed				PM justification:	
5	**Net loss of aquatic resource surface area**:	Ratio adjustment:	**0**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: restoration/creation of wetlands for no net loss				PM justification:	
6	**Type conversion:**	Ratio adjustment:	**-0.5**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: VP is greater value than like-kind				PM justification:	
7	**Risk and uncertainty**:	Ratio adjustment:	**0.1**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: permittee-responsible mitigation				PM justification:	
8	**Temporal loss**:	Ratio adjustment:	**0.5**	Ratio adjustment:	**0**	Ratio adjustment:	
		PM justification: reduced temporal loss because wetlands created at least one year prior to impacts and herbaceous vegetation will be re-establishing				PM justification:	
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3:	1.03 : 1.00	Baseline ratio from 2 or 3:	1.16 : 1.00	Baseline ratio from 2 or 3:	#DIV/0! : #DIV/0!
		Total adjustments (4-8):	0.1	Total adjustments (4-8):	0	Total adjustments (4-8):	0
		Final ratio:	**1.13 : 1.00**	Final ratio:	**1.16 : 1.00**	Final ratio:	**#DIV/0! : #DIV/0!**
		Proposed impact (total):	3.446 acres	Remaining impact:	0.00 acres	Remaining impact (acres):	acres
			0 linear feet		0 linear feet	Remaining impact (linear feet):	#VALUE! linear feet
		to Resource type:	0	to Resource type:	0	to Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	Palustrine Depressional
		Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded	Hydrology:	Wetland - seasonally flooded
		Required Mitigation*:	3.89 acres	Required Mitigation*:	0.00 acres	Required Mitigation:	#DIV/0! acres
			0 linear feet		0.0 linear feet		#DIV/0! linear feet
		of Resource type:	Vernal Pool	of Resource type:	0	of Resource type:	0
		Cowardin or HGM:	Palustrine Depressional	Cowardin or HGM:	0	Cowardin or HGM:	0
		Hydrology:	Seasonally flooded	Hydrology:	0	Hydrology:	0
		Proposed Mitigation**:	3.89 acres	Proposed Mitigation**:	acres	Proposed Mitigation**:	acres
			linear feet		linear feet		linear feet
		Impact Unmitigated:	0 %	Impact Unmitigated:	%	Impact Unmitigated:	%
			0.00 acres		acres		acres
		Additional PM comments:		Additional PM comments:		Additional PM comments:	
10	**Final compensatory mitigation requirements:**	Final requirement is for					

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.

**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 3: Before-After-Mitigation-Impact (BAMI) procedure **(CRAM example)**

Functions/conditions	$Impact_{Before}$	$Impact_{After}$	$Impact_{delta}$	$Mitigation_{Before}$	$Mitigation_{After}$	$Mitigation_{delta}$	Mourier Property Mitigation Before and After based on hypothetical AAs;
4.1 Buffer and Landscape Context							
4.1.1 Landscape Connectivity	11	5		9	12	3	Additional pools increased the overall density of water resources onsite
4.1.2 Percent of AA with Buffer	12	6		12	12	0	Most of property does not have a constriction on buffer
4.1.3 Average Buffer Width	12	5		9	9	0	All pools are affected by the same road barrier, averaging out the size of the buffer
4.1.4 Buffer Condition	6	3		6	9	3	Additional pools increased the likelihood of encountering native plants vs non-native grassland; less human visitation once preserved
RAW SCORE	**19.5**	**9.1**	**-10**	**16.9**	**21.7**	**5**	
FINAL SCORE	**81.2**	**37.8**	**-43**	**70.5**	**90.3**	**20**	
4.2 Attribute 2: Hydrology							
4.2.1 Water Source	12	6		12	12	0	Exisitng land and pools will receive the same inputs as future created pools
4.2.2 Hydroperiod or Channel Stability	12	6		0	12	12	There is no pool before mitigation, hence no hydroperiod
4.2.3 Hydrologic Connectivity	11	6		0	12	12	There is no pool before mitigation, hence no hydrolic connectivity
RAW SCORE	**35.0**	**18.0**	**-17**	**12.0**	**36.0**	**24**	
FINAL SCORE	**97.3**	**50.0**	**-47**	**33.4**	**100.0**	**67**	
4.3 Attribute 3: Physical Structure							
4.3.1 Structural Patch Richness	6	3		3	6	3	The new pools may have additional patch types such as soil cracks and cobble - conservative estimate since more patch types may be possible
4.3.2 Topographic Complexity	9	5		3	6	3	Altering the landscape from flat/concave to a convex slope with at least one break in slope
RAW SCORE	**15.0**	**8.0**	**-7**	**6.0**	**12.0**	**6**	Additional pools increased the likelihood of encountering another pool
FINAL SCORE	**62.5**	**33.4**	**-29**	**25.0**	**50.0**	**25**	
4.4 Attribute 4: Biotic Structure							
4.4.1 Co-Dominant Species	10	6		6	9	3	Increase potential number of co-dominants with the added plant diversity within pools
4.4.2 Percent Non-native Species	8	4		3	9	6	Change from non-native grassland to pool with endemic species cover
4.4.3 Endemic Species	4	2		3	4	1	Change from non-native grassland to pool with endemic species cover, but caped by score of impact site inoculum (pool can only be as good as its inoculum)
4.4.4 Interspersion/Zonation	9	5		3	9	6	Change from homogenous non-native grassland to pools with plant zones, low to moderate shared edge
4.4.5 Vertical Structure -NA for wetlands						0	
RAW SCORE	**16.33333333**	**9**	**-7**	**7**	**16.33333333**	**9**	
FINAL SCORE	**45.4**	**25.0**	**-20**	**19.5**	**45.4**	**26**	
OVERALL SCORE	**72.0**	**37.0**	**-36**	**38.0**	**72.0**	**35**	

$Quotient=ABS(M/I)_{deltas}$
35/36
Baseline ratio:
1 : 1.0

Instructions:

1. Choose functional method. Acceptable functional assessment methods must be aquatic resource-based, standardized, comparable from site to site, peer-reviewed, and must be approved by the applicable Corps District.

2. List functions/condition categories in leftmost column. 0.861111

3. Utilize Before-After-Mitigation-Impact (BAMI) procedure above to calculate function deltas. 1.16129

4. Obtain absolute value (ABS*) of quotient of mitigation-delta over impact-delta for overall score (if method has no overall score, use median of quotients for function categories or individual functions). *Absolute value is the nonnegative number for any real number, so if your quotient is negative, simply drop the negative sign to get the ABS. For example: the ABS of -9/3 = 3.

5. To get baseline ratio: If quotient (Q) is less than 1, baseline ratio = 1/Q : 1; if quotient is greater than 1, baseline ratio = 1 : Q.

6. Input Step 3 baseline ratio into the checklist document.

Attachment 12501.6 - SPD Mitigation Ratio Setting Checklist (See 12501-SPD for Revisions Sheet) ECORP Version May 2019

1			
Date: July 30, 2019	Corps File No.: SPK-2004-00888	Project Manager: Leah Fisher	
Impact Site Name:	Amoruso Ranch - Future	ORM Resource Type: Riverine Marsh / Stock Pond	Hydrology: Riverine - Seasonal
Impact Cowardin or HGM type	RP2EM	Impact area : Direct 1.042 acres	Impact distance: linear feet

#	Item	Column A	Column B	Column C
1		Mitigation Site Name: Mourier East Mitigation Type: Establishment ORM Resource Type: Riverine - Marsh Cowardin/HGM type: RP2EM Hydrology: Seasonally flooded	Mitigation Site Name: Mitigation Type: ORM Resource Type: Cowardin/HGM type: Hydrology:	Mitigation Site Name: Mitigation Type: ORM Resource Type: Cowardin/HGM type: Hydrology:
2	**Qualitative impact-mitigation comparison**:	Starting ratio: **1.0 : 1.0** Ratio adjustment: **1.0** Baseline ratio: **2.00 : 1.00** PM justification: see tab 2	Starting ratio: **1.0 : 1.0** Ratio adjustment: Baseline ratio: **1.00 : 1.00** PM justification: see tab 2	Starting ratio: **1.0 : 1.0** Ratio adjustment: Baseline ratio: **1.00 : 1.00** PM justification: see
3	**Quantitative impact-mitigation comparison**:	Ratio adjustment from BAMI procedure (attached): **0.0 : #DIV/0!**	Ratio adjustment from BAMI procedure (attached): **1.2 : 1.0**	Ratio adjustment from BAMI procedure (attached): **#DIV/0! : #DIV/0!**
4	**Mitigation site location**:	Ratio adjustment: **0** PM justification: within same watershed	Ratio adjustment: **0** PM justification: within same watershed	Ratio adjustment: PM justification:
5	**Net loss of aquatic resource surface area**:	Ratio adjustment: **0** PM justification: restoration/creation of wetlands for no net loss	Ratio adjustment: **0** PM justification: restoration/creation of wetlands for no net loss	Ratio adjustment: PM justification:
6	**Type conversion:**	Ratio adjustment: **0** PM justification: in-kind and better	Ratio adjustment: **-0.5** PM justification: in-kind	Ratio adjustment: PM justification:
7	**Risk and uncertainty**:	Ratio adjustment: **0.1** PM justification: permittee-responsible mitigation	Ratio adjustment: **0** PM justification: permittee-responsible mitigation	Ratio adjustment: PM justification:
8	**Temporal loss**:	Ratio adjustment: **0.5** PM justification: reduced temporal loss because wetlands created at least one year prior to impacts and herbaceous vegetation will be re-establishing	Ratio adjustment: **0** PM justification: no temporal loss because restoration will occur before impacts	Ratio adjustment: PM justification:
9	**Final mitigation ratio(s):**	Baseline ratio from 2 or 3: 2.00 : 1.00 Total adjustments (4-8): 0.6 **Final ratio: 2.60 : 1.00** Proposed impact (total): 1.042 acres 0 linear feet to Resource type: 0 Cowardin or HGM: RP2EM Hydrology: Riverine - Seasonal Required Mitigation*: 2.71 acres 0 linear feet of Resource type: Riverine - Marsh Cowardin or HGM: RP2EM Hydrology: Seasonally flooded Proposed Mitigation**: 2.71 acres linear feet Impact Unmitigated: 0 % 0.00 acres Additional PM comments:	Baseline ratio from 2 or 3: 1.16 : 1.00 Total adjustments (4-8): -0.5 Final ratio: **1.16 : 1.50** Remaining impact: 0.00 acres 0 linear feet to Resource type: 0 Cowardin or HGM: RP2EM Hydrology: Riverine - Seasonal Required Mitigation*: 0.00 acres 0.0 linear feet of Resource type: 0 Cowardin or HGM: 0 Hydrology: 0 Proposed Mitigation**: acres linear feet Impact Unmitigated: % acres Additional PM comments:	Baseline ratio from 2 or 3: #DIV/0! : #DIV/0! Total adjustments (4-8): 0 Final ratio: **#DIV/0! : #DIV/0!** Remaining impact (acres): acres Remaining impact (linear feet): #VALUE! linear feet to Resource type: 0 Cowardin or HGM: RP2EM Hydrology: Riverine - Seasonal Required Mitigation: #DIV/0! acres #DIV/0! linear feet of Resource type: 0 Cowardin or HGM: 0 Hydrology: 0 Proposed Mitigation**: acres linear feet Impact Unmitigated: % acres Additional PM comments:
10	**Final compensatory mitigation requirements:**	Final requirement is for		

*At PM's discretion, if applicant's proposed mitigation is less than checklist requirement and additional mitigation type(s) proposed, complete additional columns as needed.
**Only enter proposed mitigation into spreadsheet if accepting applicant's lower (than required ratio) proposal.

Step 2: Qualitative comparison of functions (functional loss vs. gain)

Functions (Column A)	Impact site	Mitigation site
Short- or long-term surface water storage	small loss	large gain
Subsurface water storage	small loss	moderate gain
Moderation of groundwater flow or discharge	even	even
Dissipation of energy	small loss	moderate gain
Cycling of nutrients	small loss	large gain
Removal of elements and compounds	even	moderate gain
Retention of particulates	small loss	large gain
Export of organic carbon	small loss	large gain
Maintenance of plant and animal communities	small loss	large gain

Adjustment: 1

PM Justification: The functions provided by creating additional riverine marsh are greater than the functions lost by impacting a low quality marsh and stock pond. The created riverine marsh will allow for temporary water storage and the habitat created will be of greater quality than the impact site.

Function (Column B)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Function (Column C)	Impact site	Mitigation site
Short- or long-term surface water storage		
Subsurface water storage		
Moderation of groundwater flow or discharge		
Dissipation of energy		
Cycling of nutrients		
Removal of elements and compounds		
Retention of particulates		
Export of organic carbon		
Maintenance of plant and animal communities		

Adjustment:

PM Justification:

Instructions:
1. Describe amount of functional loss (impact) and gain (mitigation) in each respective column. Gain and loss can be
2. Note: alternate lists of functions may be used.
3. Note: a single adjustment should be used to account for all functions combined (see example 7 in attachment 12501.3)

ATTACHMENT F

Mourier East Wetland Delineation Verification Letter

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

September 1, 2011

Regulatory Division SPK-2004-00898

Ms. Deanne Green
Brookfield California Land Holdings, Inc.
555 Capitol Mall, Suite 600
Sacramento, California 95814

Dear Ms. Green:

We are responding to your request for a preliminary jurisdictional determination (JD), in accordance with our Regulatory Guidance Letter (RGL) 08-02, for their Brookfield Sunset Mourier East site. The approximately 240-acre site is located on the south side of Sunset Boulevard West, west of Amoruso Way, on an unnamed tributary to Pleasant Grove Creek in Sections 9 and 10, Township 11 North, Range 5 East, MDBM, Latitude 38.820619°, Longitude -121.412373°, northwest of Roseville, in Placer County, California.

Based on available information, we concur with the amount and location of potential waters of the United States, as depicted on ECORP's November 18, 2008, revised Mourier East Wetland Delineation drawing. The approximately 30.15 acres of wetlands and other water bodies present within the survey area may be jurisdictional waters of the United States. These waters may be regulated under Section 404 of the Clean Water Act.

A copy of our RGL 08-02 Preliminary Jurisdictional Determination Form for this site is enclosed. Please sign and return a copy of the completed form to this office. Once we receive a copy of the form with your signature we can accept and process a Pre-Construction Notification or permit application for your proposed project.

You should not start any work in potentially jurisdictional waters of the United States unless you have Department of the Army permit authorization. You may request an approved JD for this site at any time prior to starting work within waters. In certain circumstances, as described in RGL 08-02, an approved JD may later be necessary.

You should provide a copy of this letter and notice to all other affected parties, including any individual who has an identifiable and substantial legal interest in the property.

This preliminary determination has been conducted to identify the potential limits of wetlands and other water bodies which may be subject to Corps of Engineers' jurisdiction for the particular site identified in this request. A Notification of Appeal Process and Request for

Appeal (RFA) form is enclosed to notify you of your options with this determination. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

We appreciate your feedback. At your earliest convenience, please tell us how we are doing by completing the customer survey on our website under *Customer Service Survey.*

Please refer to identification number SPK-2004-00898 in any correspondence concerning this project. If you have any questions, please contact me at our Sacramento District Regulatory Division, 650 Capitol Mall, Suite 5-200, Sacramento, California 95814-4708, email *Michael.C.Finan@usace.army.mil*, or telephone 916-557-5324. For more information regarding our program, please visit our website at *www.spk.usace.army.mil/regulatory.html.*

Sincerely,

ORIGINAL SIGNED

Michael Finan
Wetland Specialist, Regulatory Division

Enclosures

Copies Furnished without enclosures:

Ms. Sara VonderOhe, ECORP Consulting, 2525 Warren Drive, Rocklin, California 95677
Mr. Jason Brush, U.S. Environmental Protection Agency, Region IX, Wetlands Regulatory Office, (WTR-8), 75 Hawthorne Street, San Francisco, California 94105

ATTACHMENT G

Mourier West Wetland Delineation Verification Letter

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

February 17, 2012

Regulatory Division SPK-2011-01067

Ms. Deanne Green
Brookfield California Land Holdings, Inc.
2271 Lava Ridge Court, Suite 220
Roseville, California 95661

Dear Ms. Green:

We are responding to ECORP's request, on your behalf, for a preliminary jurisdictional determination (JD), in accordance with our Regulatory Guidance Letter (RGL) 08-02, for the Mourier West site. The approximately 265-acre site is immediately south of Sunset Boulevard West, east of South Brewer Road and north of and including a portion of Pleasant Grove Creek in Section 8, Township 12 North, Range 5 East, MDBM, Latitude 38.818056, Longitude -121.436111, in Placer County, California.

Based on available information, we concur with the amount and location of wetlands and/or other water bodies on the site as depicted on ECORP's enclosed October 5, 2011, revised Mourier West Wetland Delineation drawing. The approximately 39.588 acres of wetlands and/or other water bodies present within the survey area are potential waters of the United States regulated under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act.

A copy of our RGL 08-02 Preliminary Jurisdictional Determination Form for this site is enclosed. Please sign and return a copy of the completed form to this office. Once we receive a copy of the form with your signature we can accept and process a Pre-Construction Notification or permit application for your proposed project.

You should not start any work in potentially jurisdictional waters of the United States unless you have Department of the Army permit authorization for the activity. You may request an approved JD for this site at any time prior to starting work within waters. In certain circumstances, as described in RGL 08-02, an approved JD may later be necessary.

You should provide a copy of this letter and notice to all other affected parties, including any individual who has an identifiable and substantial legal interest in the property.

This preliminary determination has been conducted to identify the potential limits of wetlands and other water bodies which may be subject to Corps of Engineers' jurisdiction for the particular site identified in this request. A Notification of Appeal Process and Request for

Appeal form is enclosed to notify you of your options with this determination. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

We appreciate your feedback. At your earliest convenience, please tell us how we are doing by completing the customer survey on our website under *Customer Service Survey.*

Please refer to identification number SPK-2011-01067 in any correspondence concerning this project. If you have any questions, please contact me at the letterhead address, email *Michael.C.Finan@usace.army.mil*, or telephone 916-557-5324. For more information regarding our program, please visit our website at *www.spk.usace.army.mil/regulatory.html.*

Sincerely,

ORIGINAL SIGNED

Michael Finan
Wetland Specialist

Enclosures

Copy Furnished without enclosures:

Jason Brush, U.S. Environmental Protection Agency, Region IX, Wetlands Regulatory Office (WTR-8), 75 Hawthorne Street, San Francisco, California 94105-3901
William Marshall, Storm Water and Water Quality Certification Unit, Central Valley Regional Water Quality Control Board, 11020 Sun Center Drive #200, Rancho Cordova, California 95670
Sarah VonderOhe, ECORPS Consulting, Inc., 2525 Warren Drive, Rocklin, California 95677

RECEIVED
FEB 2 3 2012
ECORP Consulting

Mourier West
2007-223
SMV | JDS | REG | WPL
orig.

ATTACHMENT H

California Rapid Assessment Evaluation for the Mourier East Property

Confidential

California Rapid Assessment Method Analysis

For

Mourier East Property

Placer County, California

12 August 2013

Prepared For:

Brookfield Sunset LLC

ECORP Consulting, Inc.

ENVIRONMENTAL CONSULTANTS

CONTENTS

Confidential California Rapid Assessment Method Analysis For Mourier East Property

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

At the request of the Brookfield Sunset LLC, ECORP Consulting, Inc. (ECORP) conducted a California Rapid Assessment Method (CRAM) analysis of the wetlands within the ±240-acre Mourier East Property in Placer County, California. The site is located north of Pleasant Grove Creek, east of Pettigrew Road, south of Sunset Boulevard West, and west of Fiddyment Road (Figure 1. *Property Location and Vicinity*). The site corresponds to a portion of Sections 9 and 10 of Township 12 North and Range 5 East (Mount Diablo Base Meridian [MDBM]) of the "Pleasant Grove, California" 7.5-minute quadrangle (U. S. Department of the Interior, Geological Survey [USGS] 1981). The approximate center of the site is located at 38° 49' 15'' North and 121° 24' 40'' West within the lower Sacramento River Watershed (#18020109) (USGS 1978).

The purpose of the analysis was to provide baseline information on the current condition of wetlands within the Mourier East Property, and to compare relative values of wetlands across the site.

2.0 METHODS

2.1 CRAM Methodology

CRAM was developed as a methodology to conduct repeatable measurements of the same wetland or wetland system over time. These data can be used to monitor the progress of a restoration or mitigation site, to track changes in wetland function, or to detect "negative" influences to wetlands due to development or other stressors. As such, these data can also be used to compare wetlands to one another, based on their relative functions and values.

The CRAM methodology assesses four attributes (buffer and landscape context, hydrology, physical structure, and biotic structure). These four attributes have been determined to be important for wetland function (e.g., water storage, groundwater discharge and flow, dissipation of energy, nutrient cycling), and all wetlands share these four attributes (CWMW 2012a). Each of the four attributes is further subdivided into distinct metrics, which are the measureable components of an attribute (Table 1).

Table 1 – CRAM Attributes and Metrics[1]

Attributes	Metrics
Buffer and Landscape Context	Landscape Connectivity Buffer -Percentage of Assessment Area with Buffer -Average Buffer Width -Buffer Condition
Hydrology	Water Source Hydroperiod or Channel Stability Hydrological Connectivity
Physical Structure	Structural Patch Richness Topographic Complexity
Biotic Structure	Plant Community -Number of Plant Layers Present (individual depressional wetlands) or Native Species Richness (vernal pools) -Number of Co-dominant species -Percent Invasion Horizontal Interspersion and Zonation Vertical Biotic Structure (individual depressional wetlands only)

[1] Table modified from *CWMW 2012a.*

The metrics are defined by narrative descriptive conditions that are assessed in the field and each narrative condition correlates to a numeric value. In general, the numeric values are lower for wetlands that have “undesirable” attributes; conversely, wetlands with “desirable” attributes are scored higher in a given metric. Numerical values contribute to an overall CRAM score, which indicates the overall condition of the wetlands (from 25% to 100%).

2.2 Assessment Areas

For purposes of the CRAM analysis, assessment areas (AA) were identified. Each AA is a wetland system, or portion of a wetland system to be assessed. The AA should remain constant over time to allow for a repeatable CRAM survey in future years.

Prior to conducting field work, 12 AAs were identified to represent the wetlands found on-site (Figure 2. *Mourier East: CRAM Assessment Areas*). AAs were established using the guidelines outlined in the CRAM User's Manual, Version 6.0 (CWMW 2012a). One AA (AA-1) was comprised of a vernal pool system (VPS), four AAs (AA-2, AA-7, AA-10, and AA-12) were comprised of individual vernal pool features (IVP), and the remaining seven AAs (AA-3, AA-4, AA-5, AA-6, AA-8, AA-9 and AA-11) were comprised of individual depressional wetland features (DW). Depressional wetland features on-site include seasonal wetlands and a marsh.

The one VPS AA was assessed using the CRAM for Wetlands, Vernal Pool Systems Field Book, Version 6.0 (CWMW 2012b). The four IVP AAs were assessed using the CRAM for Wetlands, Individual Vernal Pools Field Book, Version 6.0 (CWMW 2012c). The seven seasonal wetland AAs were assessed using the CRAM for Wetlands, Perennial Depressional Wetlands Field Book, Version 5.0.2 (CWMW 2008) which was not specifically designed for assessing seasonal wetlands, but is the only Field Book currently available for assessing these features.

2.3 Field Data Collection

The field survey was conducted on 21 May 2012 by ECORP biologist and trained CRAM practitioner Eric Stitt and ECORP biologist Natasha Bartley.

Following the methodology of the CRAM Field Books, each AA was assessed for buffer and landscape context, hydrology, physical structure, and biotic structure. The overall AA score was calculated following the field book guidelines and copies of the CRAM scoring sheets and maps for each AA have been included in Attachment A.

3.0 RESULTS

Table 2 summarizes the scores for each of the attributes and the overall score for each AA at the Mourier East Property. These scores represent the 2012 conditions at the site, and these data represent baseline scores that can be used for future comparisions.

Table 2 – Final Attribute Scores and Overall AA Scores

Assessment Area	Final Attribute Score (%) Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	Overall AA Score (%)
1	85.4	100.0	58.3	45.8	**72.4**
2	85.4	100.0	25.0	45.8	**64.1**
3	47.9	100.0	25.0	56.6	**57.4**
4	60.4	100.0	25.0	58.3	**60.9**
5	47.9	100.0	37.5	55.6	**60.3**
6	45.4	100.0	25.0	47.2	**54.4**
7	85.4	100.0	50.0	62.5	**74.5**
8	47.9	100.0	25.0	55.6	**57.1**
9	47.9	100.0	25.0	63.9	**59.2**
10	68.1	100.0	62.5	45.8	**69.1**
11	45.4	100.0	37.5	88.9	**68.0**
12	85.4	100.0	50.0	70.8	**76.6**

The overall AA scores ranged from 54.4% (AA-6) to 76.6% (AA-12) across all AA types (n=12). Buffer and landscape context scores ranged from 45.4% (AA-6 and AA-11) to 85.4% (AA-1, AA-2, AA-7, and AA-12). All of the AAs had the same hydrology score (100%). Physical structure scores ranged from 25% (AA-2, AA-3, AA-4, AA-6, AA-8, and AA-9) to 62.5% (AA-10), and biotic structures scores ranged from 47.2% (AA-1, AA-2, and AA-6) to 88.9% (AA-11). On average, DW AAs scored lower (59.6%) than the VPS and IVP AAs (71.3% combined average for VPS and IVP AAs) for the site.

3.1 Vernal Pool System and Individual Vernal Pool Assessment Areas

One VPS AA (AA-1) and four IVP AAs (AA-2, AA-7, AA-10, and AA-12) were assessed on the Mourier East Property. Overall AA scores for these two AA types (n=5) ranged from 64% (AA-2) to 77% (AA-12). Table 3 summarizes the scores for each of the attributes and the overall score for each VPS and IVP AAs at the site.

Table 3 – Final Attribute Scores (%) and Overall AA Scores (%) for Individual Vernal Pools and Vernal Pool Systems

Assessment Area	Final Attribute Score (%)				Overall AA Score (%)
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
1	85.4	100.0	58.3	45.8	**72.4**
2	85.4	100.0	25.0	45.8	**64.1**
7	85.4	100.0	50.0	62.5	**74.5**
10	68.1	100.0	62.5	45.8	**69.1**
12	85.4	100.0	50.0	70.8	**76.6**

Buffer and landscape scores for VPS and IVP AAs were identical (85.4%) with the exception of AA-10, which scored lower (68.1%) than the others due to a lower score for the aquatic area abundance metric and the percent of AA with buffer and average buffer width sub-metrics.

The hydrology attribute score was the same (100%) for all five VPS and IVP AAs.

Physical structure scores for VPS and IVP AAs ranged from 25.0% (AA-2) to 62.5% (AA-10). The structural patch richness metric scored low for all IVP and VPS AAs. Topographic complexity varied between AAs with no discernible pattern and likely is the contributing factor to variances in the physical structure attribute scores.

Biotic structure scores for VPS and IVP AAs ranged from 45.8% (AA-1, AA-2, and AA-10) to 70.8% (AA-12). AAs that scored lower all had lower endemic species richness scores, but the other metric and submetric scores varied with no discernible pattern.

3.2 Depressional Wetland Assessment Areas

The overall scores of the DW AAs (n= 7) ranged from 54.4% (AA-6) to 68.0% (AA-11). On average, the DW AAs scores were lower than those for the IVP and VPS AAs. Table 4 summarizes the scores for each of the attributes and the overall score for each DW AA at the Mourier East Property.

Table 4 – Final Attribute Scores (%) and Overall AA Scores (%) for Depressional Wetlands

Assessment Area	Final Attribute Score (%)				Overall AA Score (%)
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
3	47.9	100.0	25.0	56.6	**57.4**
4	60.4	100.0	25.0	58.3	**60.9**
5	47.9	100.0	37.5	55.6	**60.3**
6	45.4	100.0	25.0	47.2	**54.4**
8	47.9	100.0	25.0	55.6	**57.1**
9	47.9	100.0	25.0	63.9	**59.2**
11	45.4	100.0	37.5	88.9	**68.0**

Buffer and landscape context scores for DW AAs ranged from 45.4% (AA-6 and AA-11) to 60.4% (AA-4). AA-6 and AA-11 scored the lowest due to low landscape connectivity and a low score for the average buffer width metric. AA-3, AA-5, AA-8, and AA-9 scored higher (47.9%) due to higher scores for average buffer width, and AA-4 scored the highest (60.4%) due to more landscape connectivity than any of the other DW AAs.

The score for the hydrology attribute for all DW AAs was identical (100%).

Scores for the physical structure for the DW AAs were either 25.0% (AA-3, AA-4, AA-6, AA-8, and AA-9) or 37.5% (AA-5 and AA-11). These differences were based on the structural patch richness metric.

Biotic structure scores for the DW AAs ranged from 47.2% (AA-6) to 88.9% (AA-11). AA-11 scored much higher than the other DW AAs for this attribute because this feature is a marsh and scored higher for the number of co-dominant species submetric, and the horizontal interspersion and vertical biotic structure metrics. The remaining seasonal wetland DW AAs all scored lower for these metrics and submetrics. Variations in their scores are based on differences in scores for horizontal interspersion and vertical biotic structure.

4.0 SUMMARY

ECORP conducted a CRAM analysis at the Mourier East Property in Placer County, California. The CRAM analysis was conducted to document 2012 conditions and compare relative values of features across the site. ECORP biologists collected field data related to four attributes identified by the CRAM methodology as important indicators of wetland conditions. Overall AA scores ranged from 54.4% to 76.6%. In general, DW features scored lower than IVP and VPS AAs for overall AA scores.

5.0 REFERENCES

California Wetlands Monitoring Workgroup (CWMW). 2008. California Rapid Assessment Method (CRAM) for Wetlands. Version 5.0.2. Perennial Depressional Wetlands Field Book. 37 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012a. California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas. Version 6.0. User's Manual. 95 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012b. California Rapid Assessment Method (CRAM) for Wetlands. Version 6.0. Vernal Pool Systems Field Book. 42 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012c. California Rapid Assessment Method (CRAM) for Wetlands. Version 6.0. Individual Vernal Pools Field Book. 30 pp.

U.S. Department of the Interior, Geological Survey (USGS). 1981. "Pleasant Grove, California" 7.5-minute Quadrangle. Geological Survey. Denver, Colorado.

U.S. Department of Interior, Geological Survey (USGS). 1978. Hydrologic unit Map, State of California. Geological Survey. Reston, Virginia.

LIST OF FIGURES

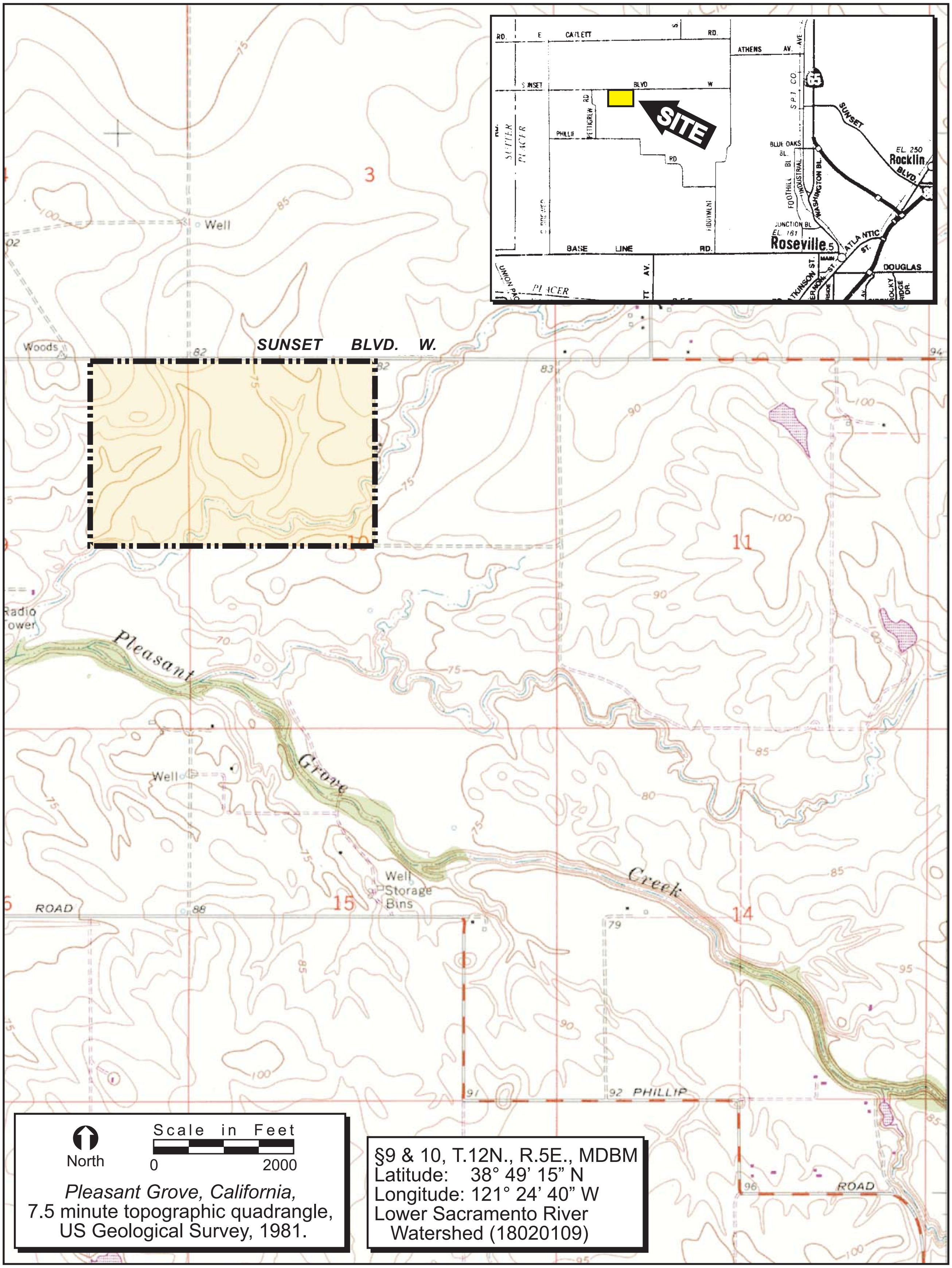
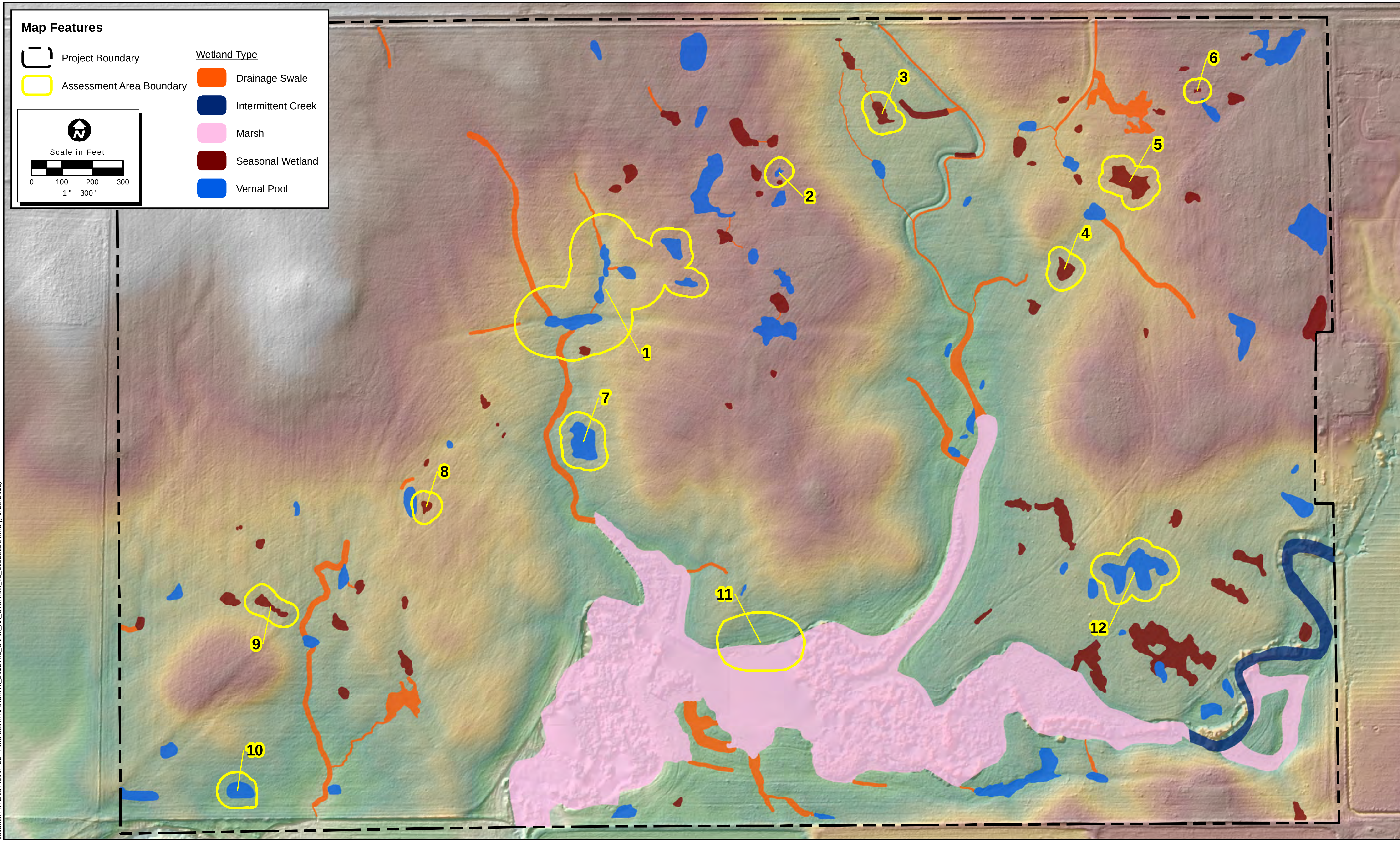


Figure 1. Property Site and Vicinity

2007-224.2 Amoruso 2012 - Mourier East



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\ME_CRAM_AA_Overview_v2_20120925.mxd (, 9/26/2012)

Map Date: 9/26/2012

Figure 2. Mourier East: CRAM Assessment Areas

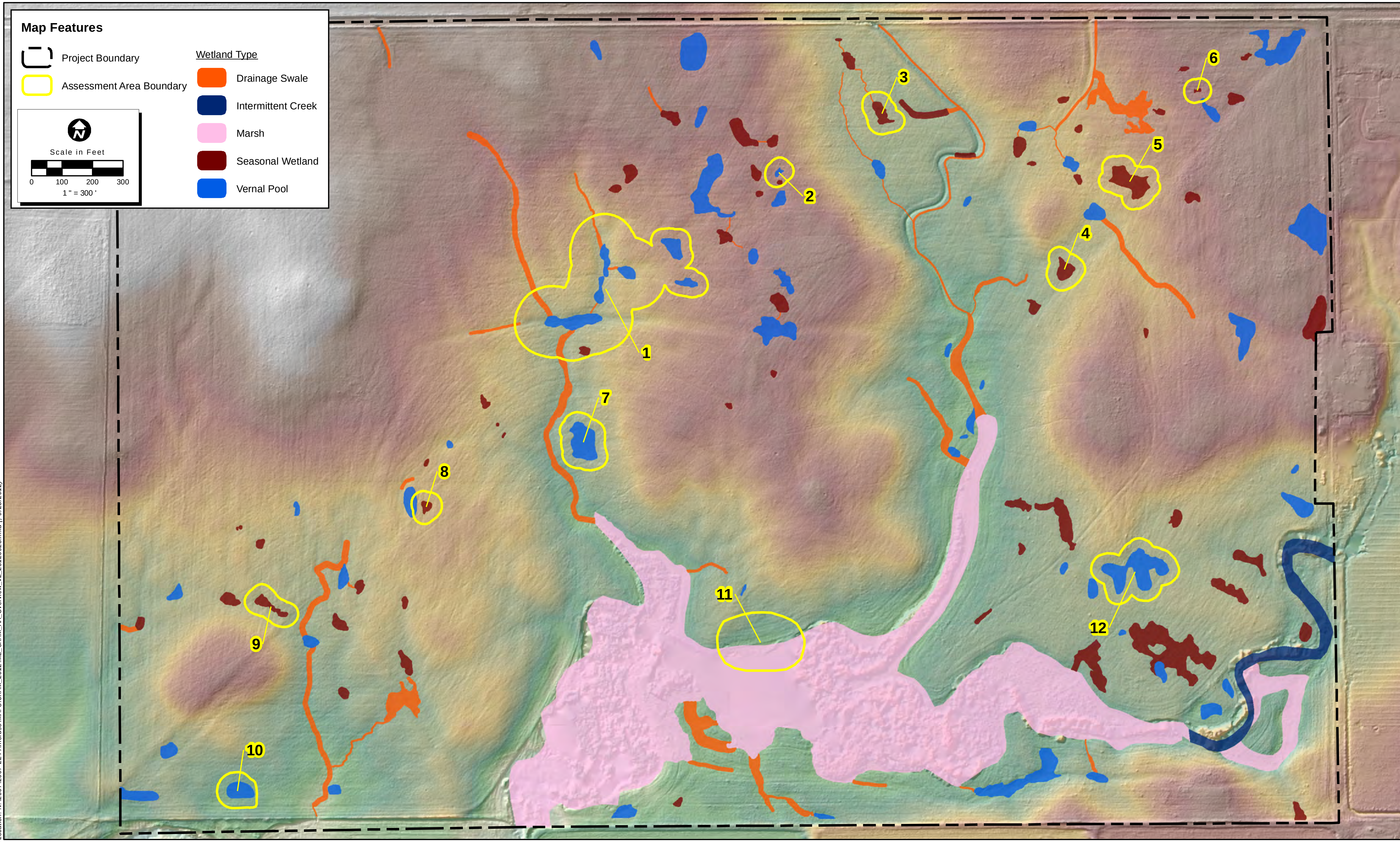
2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

ATTACHMENT A

CRAM Scoring Sheets and Maps



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\ME_CRAM_AA_Overview_v2_20120925.mxd (-, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area Overview

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

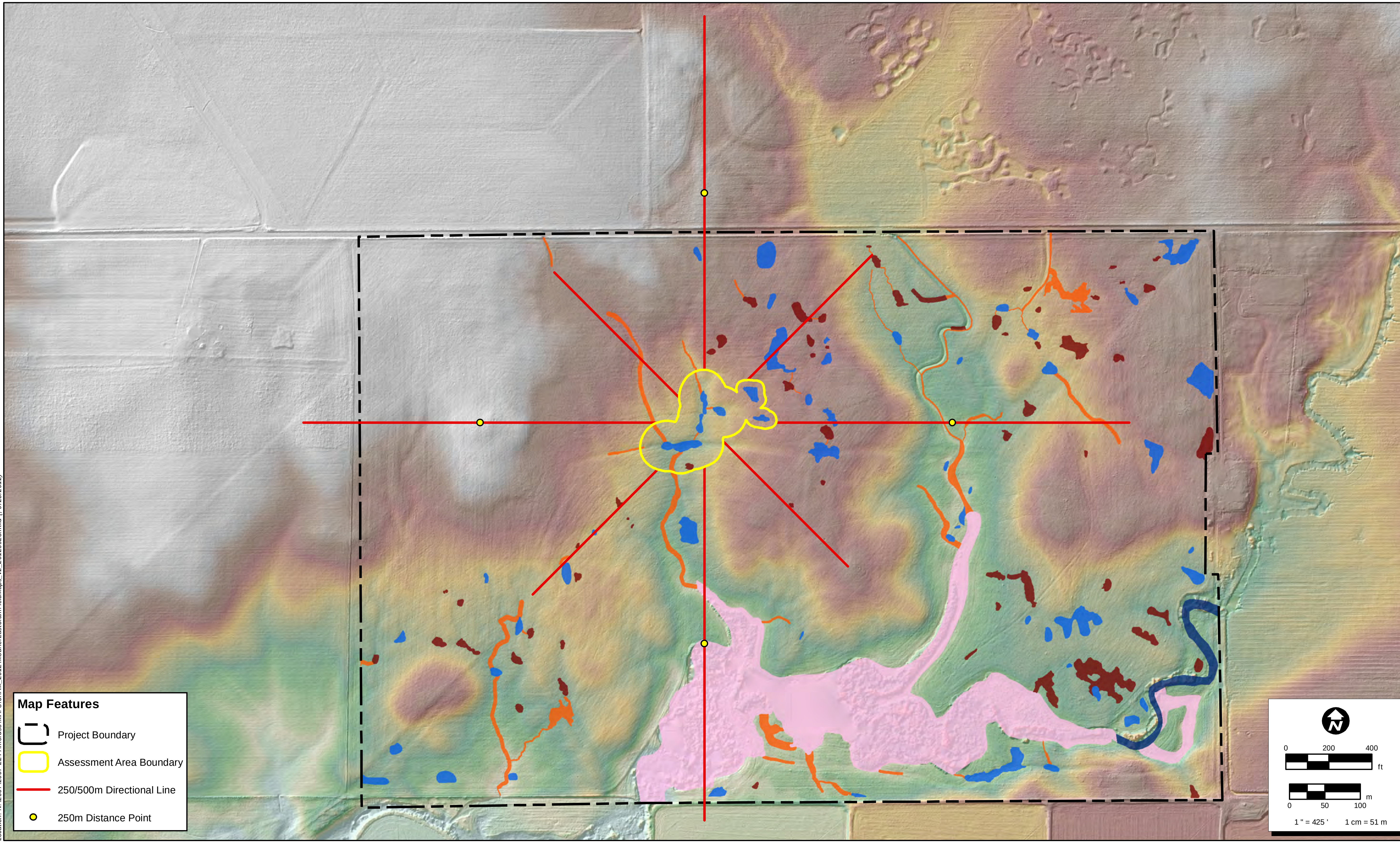
ekeethe

Basic Information: Vernal Pool System (AA-01)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-01				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Natasha Bartley				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool System				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool System (AA-01)

AA Name: AA-01				**Date: 5/21/2012**	
Attributes and Metrics			**Scores**	**Comments**	
Attribute 1: Buffer and Landscapre Context					
Aquatic Area Abundance (A):			Alpha	Numeric	
			A	12	
Buffer Sub Metrics:	Alpha	Numeric			
Percent of AA with Buffer Score (B):	A	12			
Average Buffer Width Score (C):	A	12			
Buffer Condition Score (D):	C	6			
Raw Attribute Score = A + [D x (B x C)^½]^½:			**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology					
Water Source Score:			Alpha	Numeric	
			A	12	
Hydroperiod Score:			A	12	
Hydrologic Connectivity Score:			A	12	
Raw Attribute Score = sum of metric scores			**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure					
Structural Patch Richness Score:			Alpha	Numeric	
			C	6	
Topographic Complexity Score:			C	6	
Pool and Swale Density Score:			B	9	
Raw Attribute Score = sum of metric scores			**21.00**	**Final Attribute Score = (Raw Score /36) x 100**	**58.33**
Attribute 4: Biotic Structure					
Biotic Structure					
Plant Community Sub Metrics:	Alpha	Numeric			
Co-dominant species Score (A):	C	6			
Percent Non Native Score (B):	C	6			
Endemic Species Richness Score (C):	D	3			
Plant Community Metric Score:				5.00	
Horizontal Interspersion Score:			C	6	
Raw Attribute Score = sum of metric scores			**11.00**	**Final Attribute Score = (Raw Score /24) x 100**	**45.83**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*				**72**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 1

2007-224 Amoruso Ranch

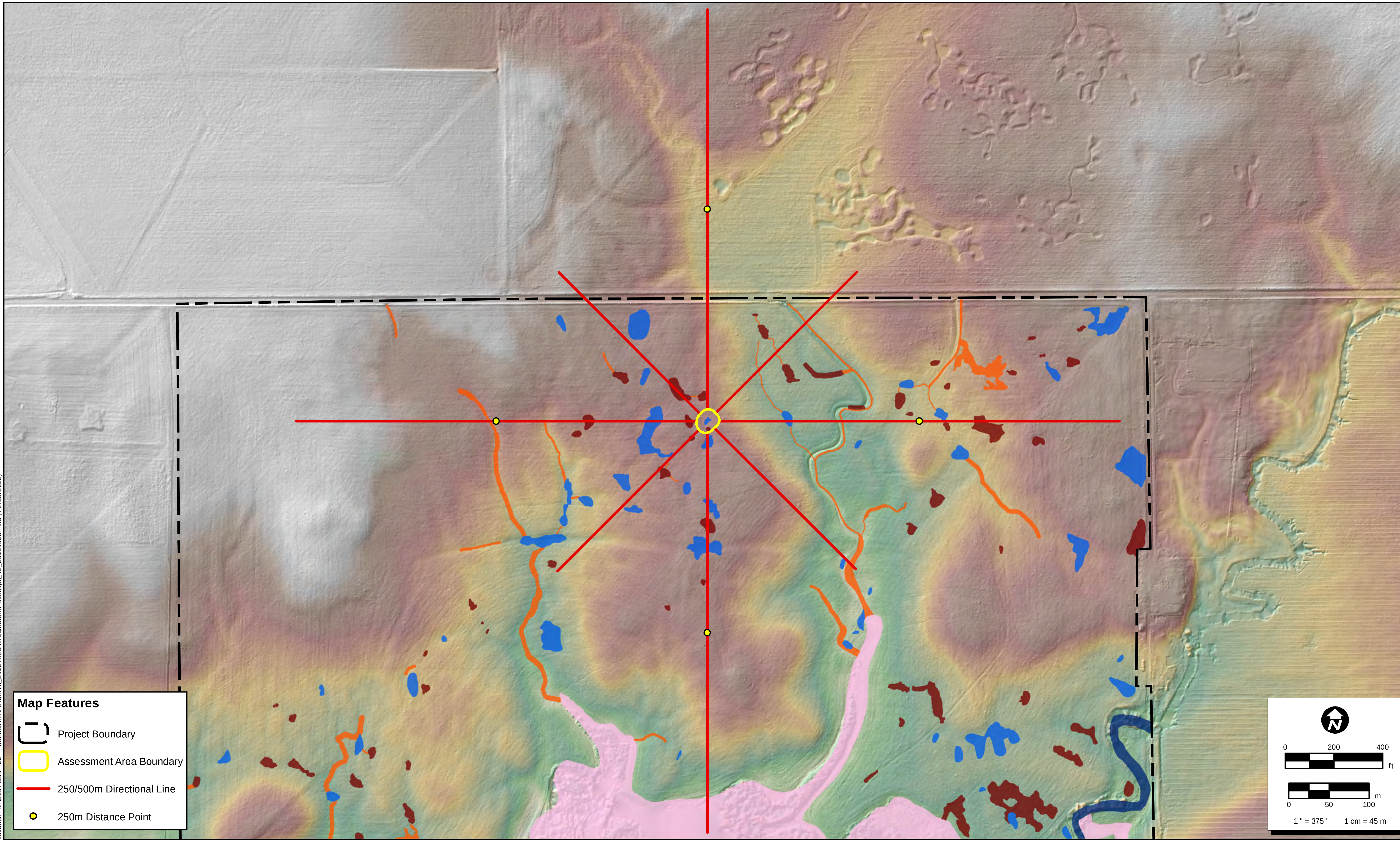
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Vernal Pool (AA-02)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-02				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Natasha Bartley				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-02)

AA Name: AA-02					**Date: 5/21/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			A	12		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	B	9				
Percent Non Native Score (B):	A	12				
Endemic Species Richness Score (C):	D	3				
Plant Community Metric Score:				8.00		
Horizontal Interspersion Score:			D	3		
Raw Attribute Score = sum of metric scores				**11.00**	**Final Attribute Score = (Raw Score /24) x 100**	**45.83**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*					**64**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 2

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

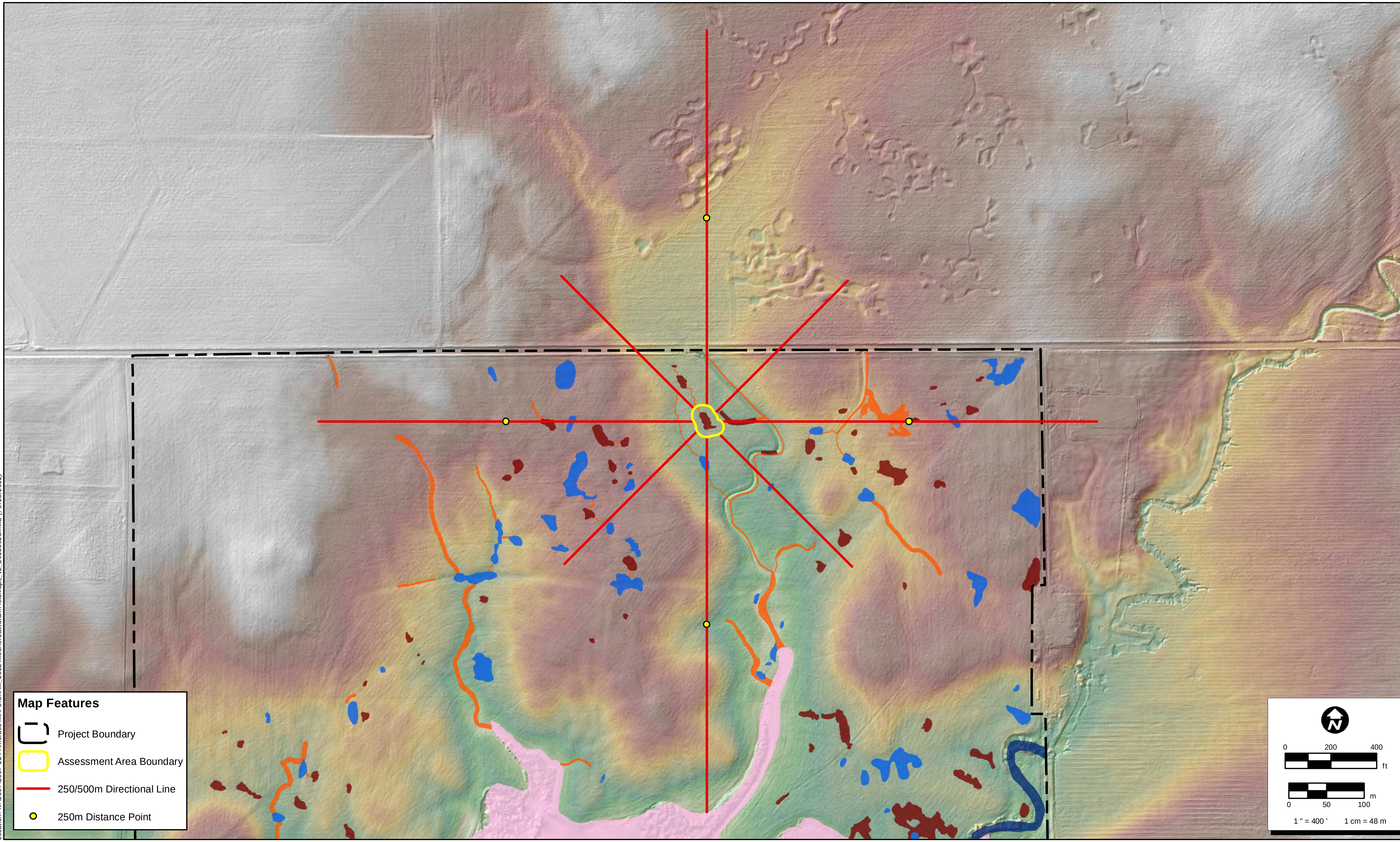
ekeethe

Basic Information: Depressional Wetland (AA-03)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-03				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Eric Stitt				
Natasha Bartley				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-03)

AA Name: AA-03						Date: 5/21/2012	
Attributes and Metrics			**Scores**			**Comments**	
Attribute 1: Buffer and Landscapre Context							
Landscape Connectivity (A):			Alpha	Numeric			
			D	3			
Buffer Sub Metrics:	Alpha	Numeric					
Percent of AA with Buffer Score (B):	A	12					
Average Buffer Width Score (C):	A	12					
Buffer Condition Score (D):	C	6					
Raw Attribute Score = A + [D x (B x C)^½]^½:				**11.49**		**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology							
Water Source Score:			Alpha	Numeric			
			A	12			
Hydroperiod or Channel Stability Score:			A	12			
Hydrologic Connectivity Score:			A	12			
Raw Attribute Score = sum of metric scores				**36.00**		**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure							
Structural Patch Richness Score:			Alpha	Numeric			
			D	3			
Topographic Complexity Score:			D	3			
Raw Attribute Score = sum of metric scores				**6.00**		**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure							
Biotic Structure							
Plant Community Sub Metrics:	Alpha	Numeric					
Co-dominant species Score (A):	D	3					
Percent Non Native Score (B):	C	6					
Number of Plant Layers (C):	C	6					
Plant Community Metric Score:				5.00			
Horizontal Interspersion Score:			D	3			
Vertical Biotic Structure:			A	12			
Raw Attribute Score = sum of metric scores				**20.00**		**Final Attribute Score = (Raw Score /36) x 100**	**55.56**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*						**57**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 3

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

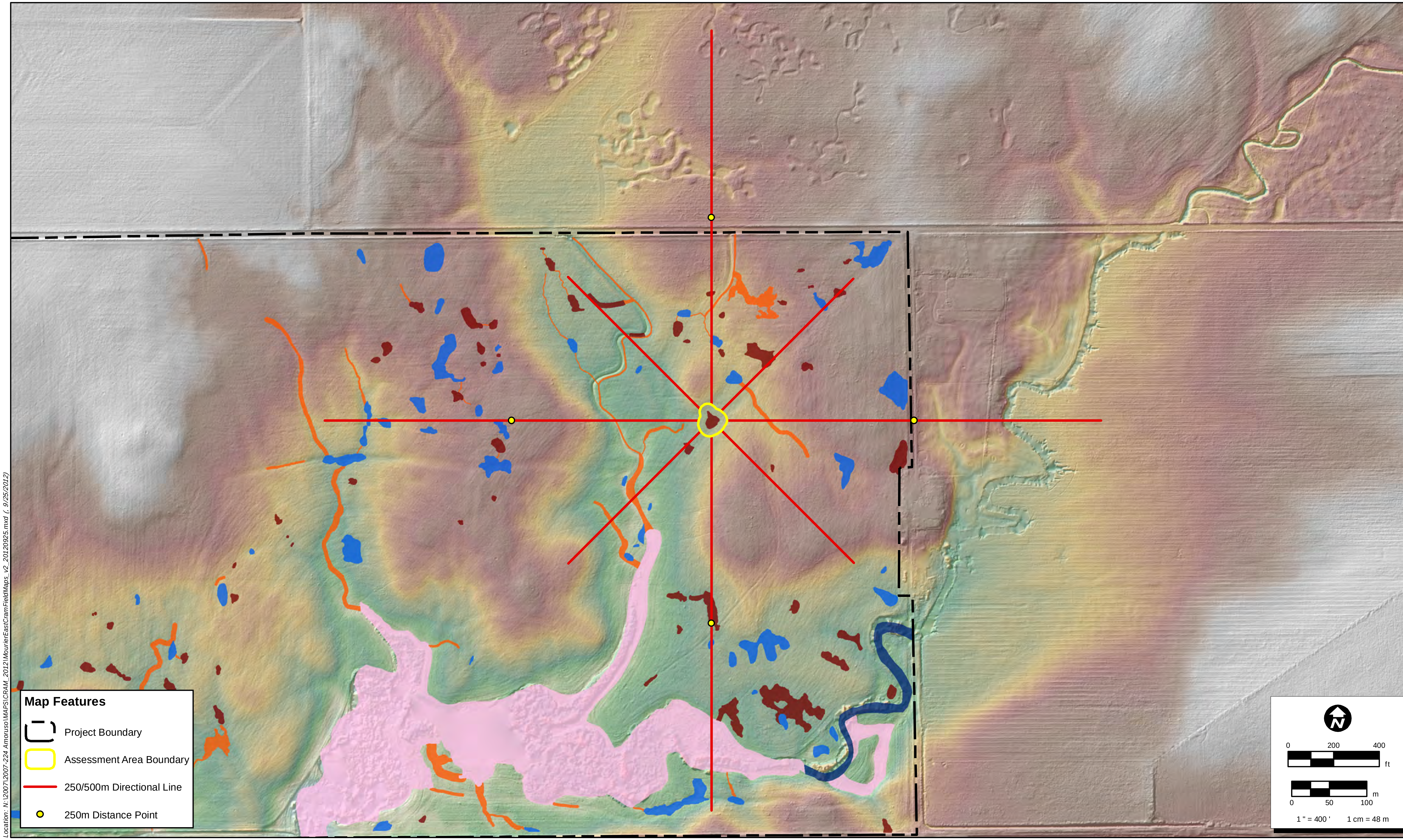
Basic Information: Depressional Wetland (AA-04)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-04				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Eric Stitt				
Natasha Bartley				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-04)

AA Name: AA-04					Date: 5/21/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			C	6		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**14.49**	**Final Attribute Score = (Raw Score /24) x 100**	**60.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	B	9				
Number of Plant Layers (C):	C	6				
Plant Community Metric Score:				6.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**21.00**	**Final Attribute Score = (Raw Score /36) x 100**	**58.33**
Overall AA Score* (Average of Final Attribute Scores)					**61**	

**Final AA score is rounded to the nearest whole number*



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 4

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

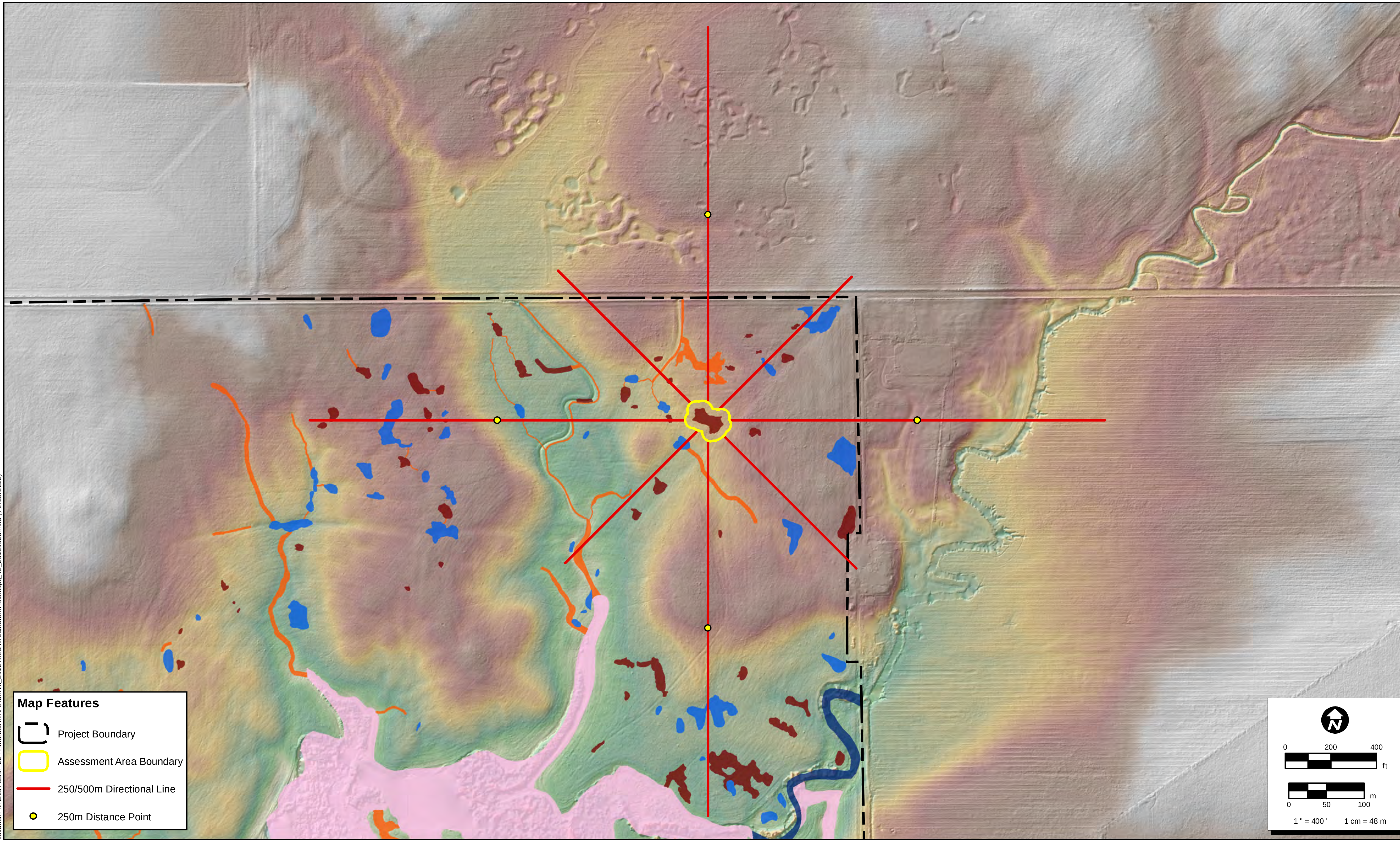
Basic Information: Depressional Wetland (AA-05)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-05				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Eric Stitt				
Natasha Bartley				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-05)

AA Name: AA-05					Date: 5/21/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	C	6				
Plant Community Metric Score:				5.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**20.00**	**Final Attribute Score = (Raw Score /36) x 100**	**55.56**
Overall AA Score* (Average of Final Attribute Scores)					**60**	

**Final AA score is rounded to the nearest whole number*



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 5

2007-224 Amoruso Ranch

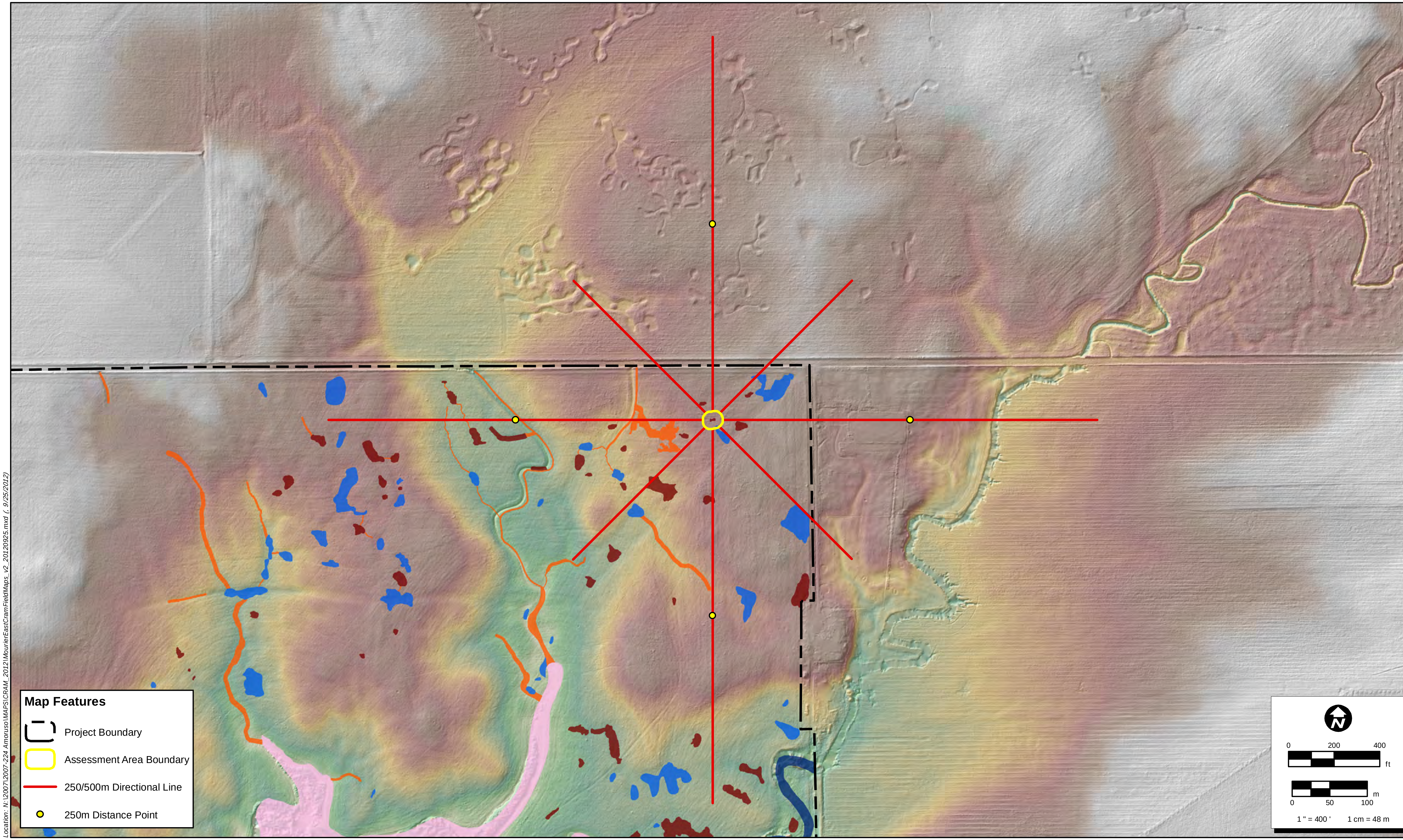
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Depressional Wetland (AA-06)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-06				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Eric Stitt				
Natasha Bartley				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-06)

AA Name: AA-06					**Date: 5/21/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	B	9				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**10.90**	**Final Attribute Score = (Raw Score /24) x 100**	**45.40**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	C	6				
Plant Community Metric Score:				5.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			B	9		
Raw Attribute Score = sum of metric scores				**17.00**	**Final Attribute Score = (Raw Score /36) x 100**	**47.22**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*					**54**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 6

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

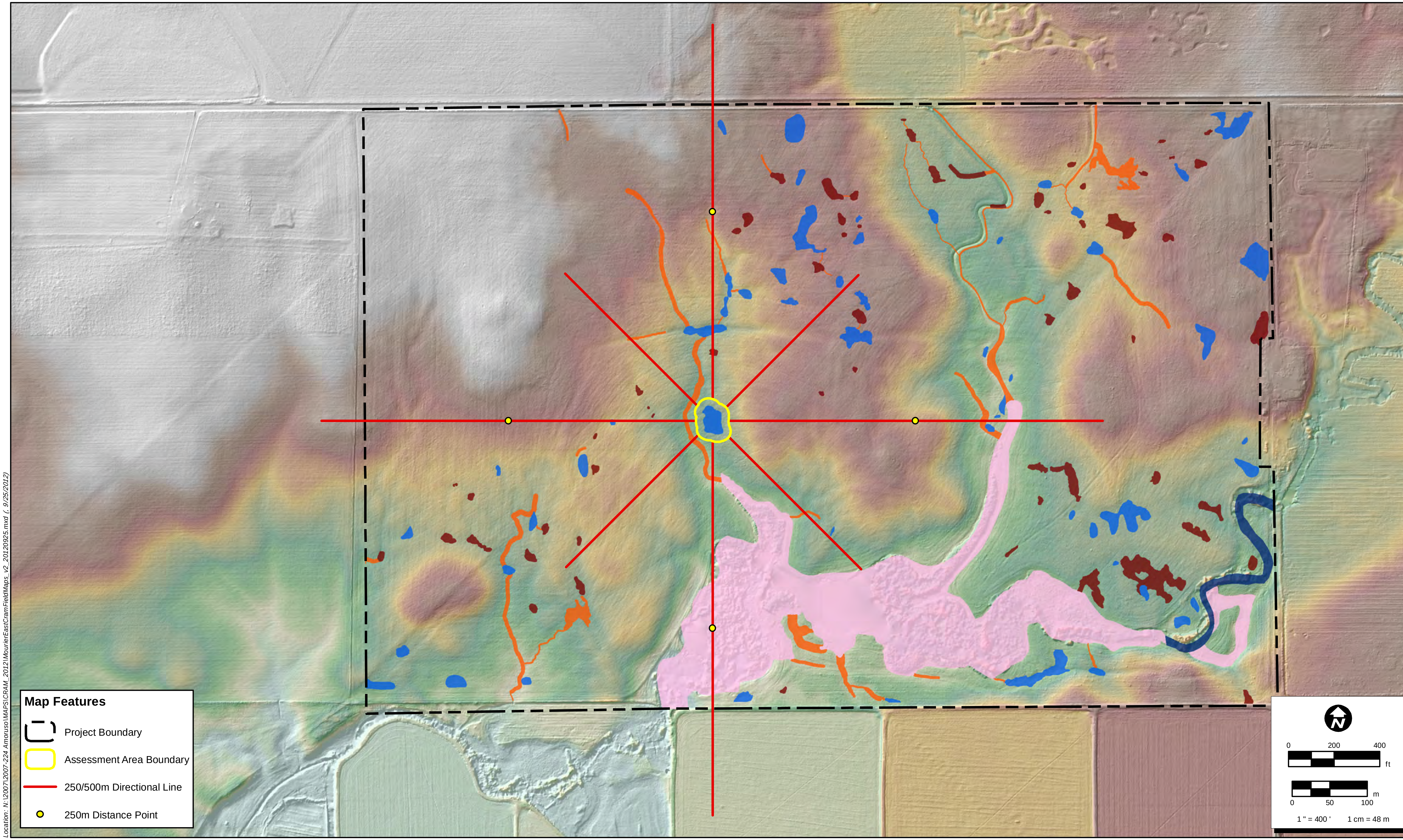
ekeethe

Basic Information: Vernal Pool (AA-07)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-07				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Natasha Bartley				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-07)

AA Name: AA-07					**Date: 5/21/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			A	12		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			B	9		
Raw Attribute Score = sum of metric scores				**12.00**	**Final Attribute Score = (Raw Score /24) x 100**	**50.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	B	9				
Percent Non Native Score (B):	C	6				
Endemic Species Richness Score (C):	D	3				
Plant Community Metric Score:				6.00		
Horizontal Interspersion Score:			B	9		
Raw Attribute Score = sum of metric scores				**15.00**	**Final Attribute Score = (Raw Score /24) x 100**	**62.50**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*					**74**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Page 7 of 12

Mourier East: CRAM Assessment Area 7

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

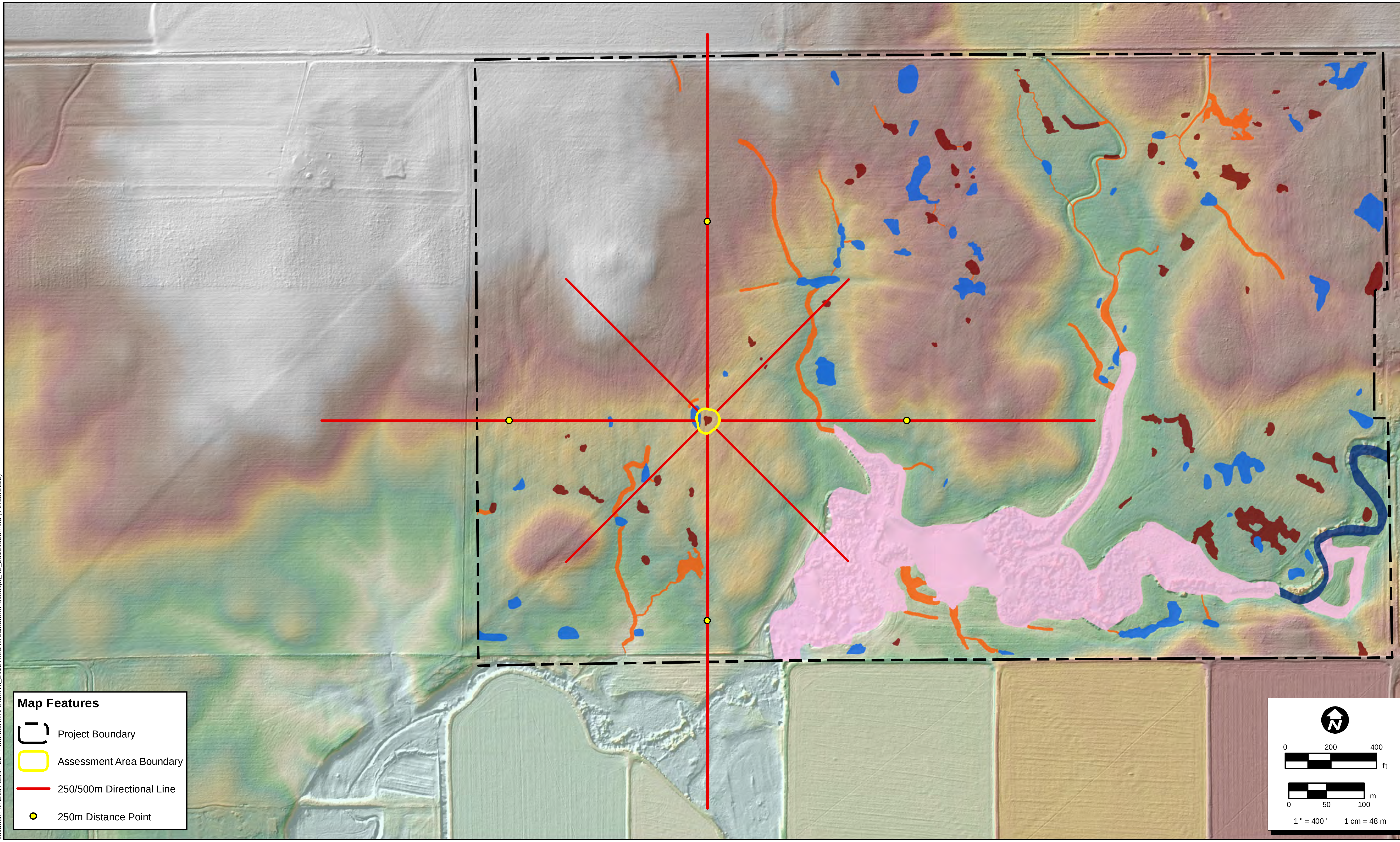
Basic Information: Depressional Wetland (AA-08)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-08				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Eric Stitt				
Natasha Bartley				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? medium-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-08)

AA Name: AA-08					**Date: 5/21/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	C	6				
Plant Community Metric Score:				5.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**20.00**	**Final Attribute Score = (Raw Score /36) x 100**	**55.56**
Overall AA Score* (Average of Final Attribute Scores)					**57**	

**Final AA score is rounded to the nearest whole number*



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 8

2007-224 Amoruso Ranch

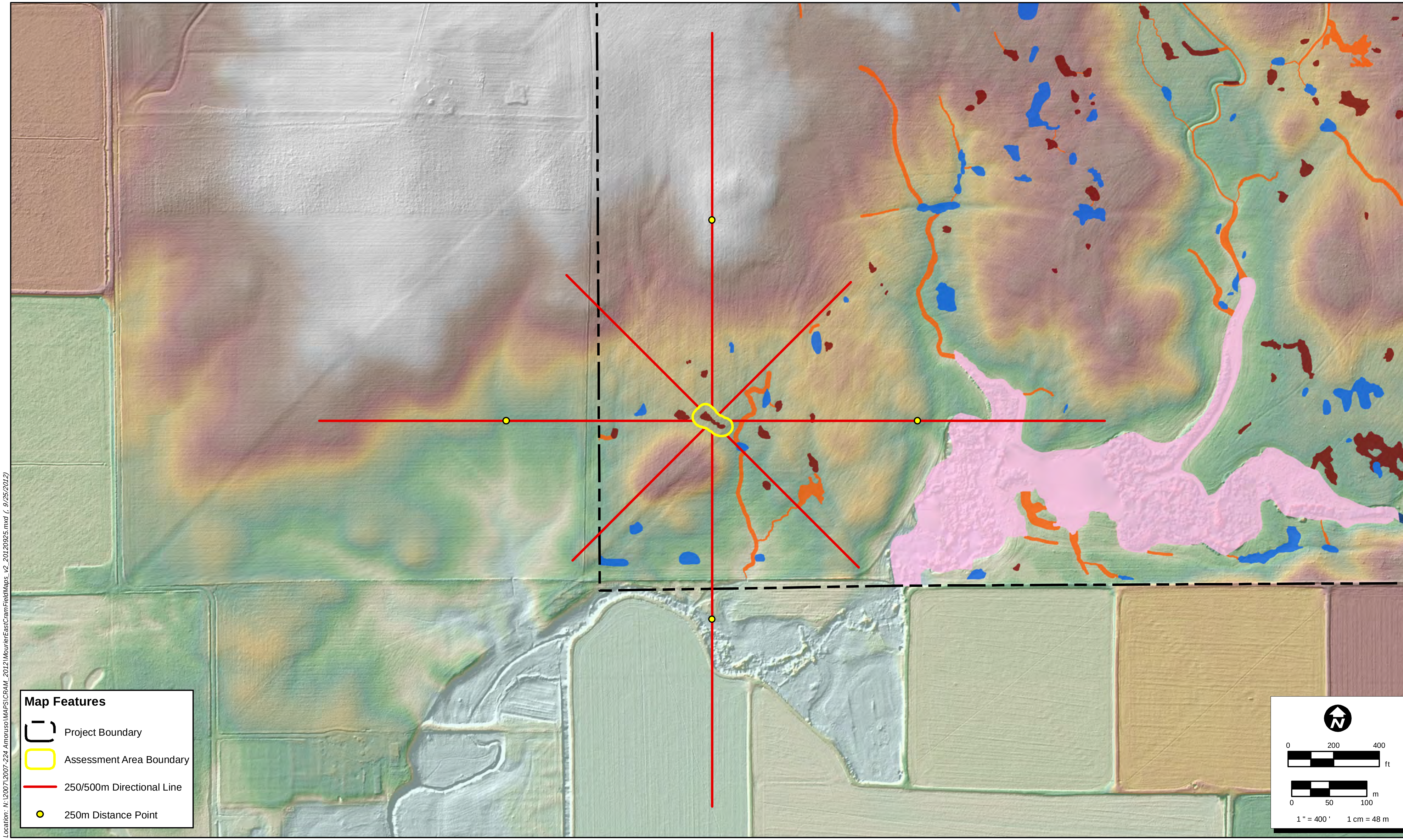
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Depressional Wetland (AA-09)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-09				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Eric Stitt				
Natasha Bartley				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments:				

Scoring Sheet: Depressional Wetland (AA-09)

AA Name: AA-09					**Date: 5/21/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	C	6				
Plant Community Metric Score:				5.00		
Horizontal Interspersion Score:			C	6		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**23.00**	**Final Attribute Score = (Raw Score /36) x 100**	**63.89**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*					**59**	



Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 9

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

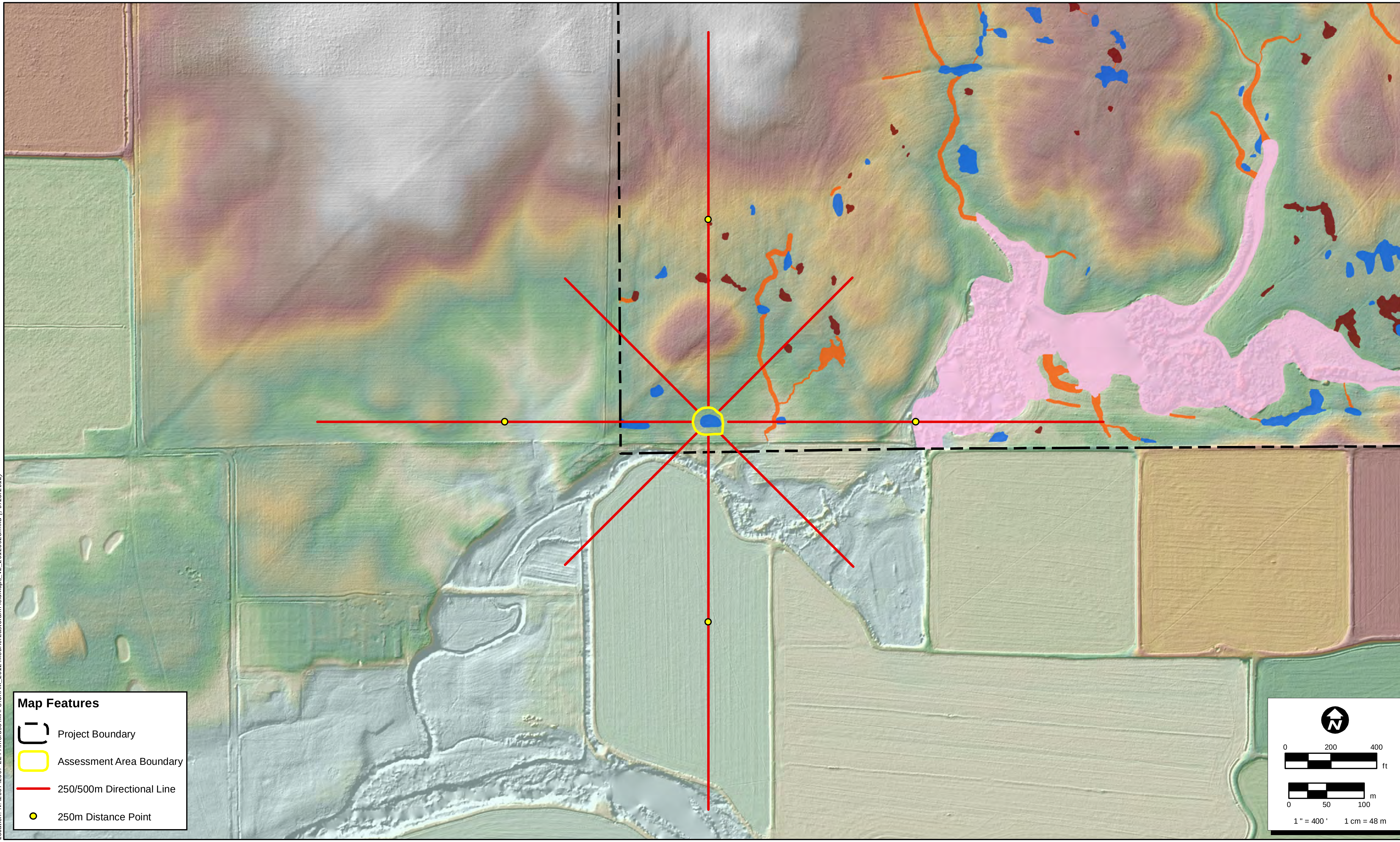
ekeethe

Basic Information: Vernal Pool (AA-10)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-10				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Natasha Bartley				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-10)

AA Name: AA-10					Date: 5/21/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			B	9		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	B	9				
Average Buffer Width Score (C):	B	9				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**16.35**	**Final Attribute Score = (Raw Score /24) x 100**	**68.12**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			A	12		
Raw Attribute Score = sum of metric scores				**15.00**	**Final Attribute Score = (Raw Score /24) x 100**	**62.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	C	6				
Percent Non Native Score (B):	C	6				
Endemic Species Richness Score (C):	D	3				
Plant Community Metric Score:				5.00		
Horizontal Interspersion Score:			C	6		
Raw Attribute Score = sum of metric scores				**11.00**	**Final Attribute Score = (Raw Score /24) x 100**	**45.83**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*					**69**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 10

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

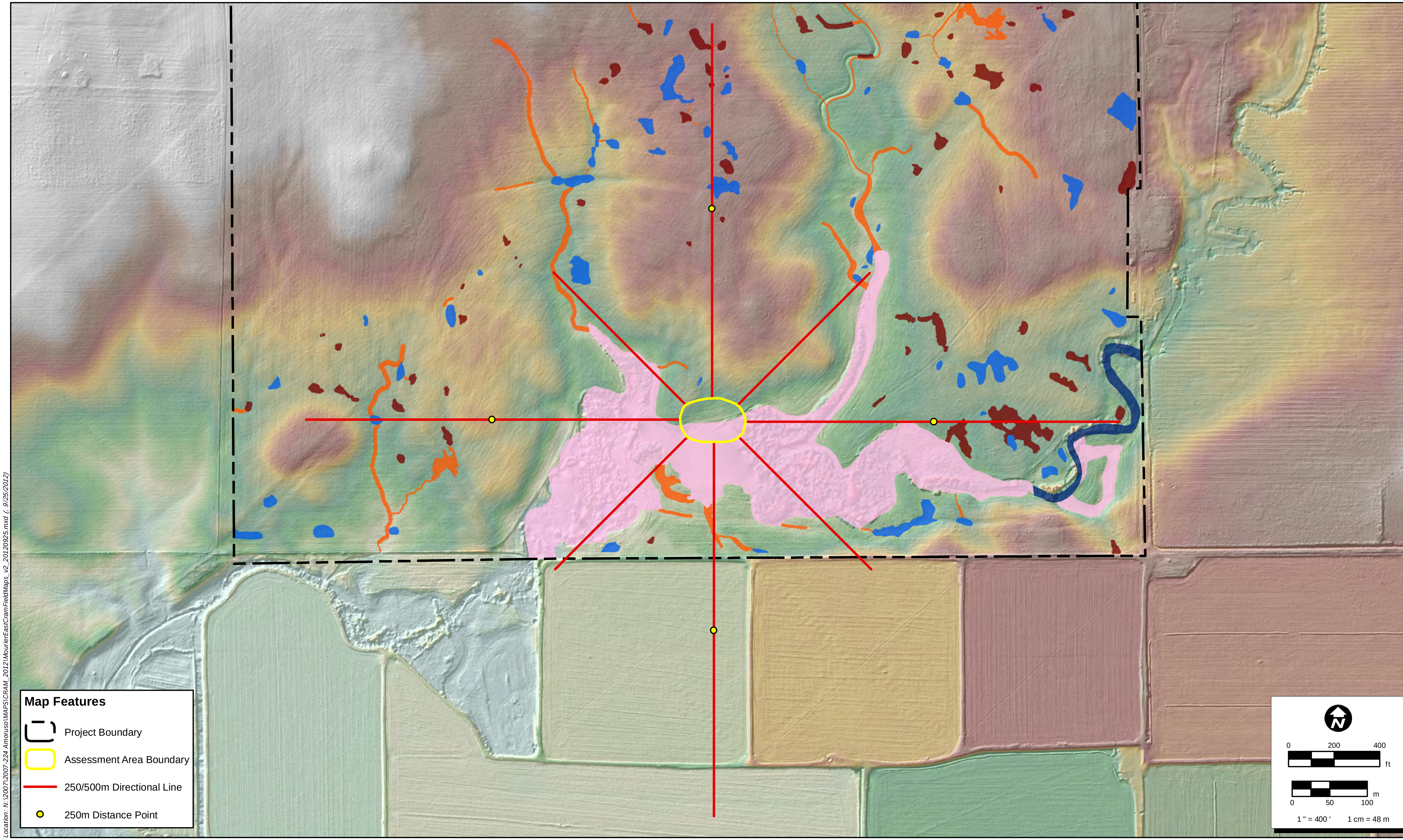
ekeethe

Basic Information: Depressional Wetland (AA-11)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-11				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Eric Stitt				
Natasha Bartley				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? ponded/inundated				
What is the apparent hydrologic regime of the wetland? long-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? Yes				
Is the topographic basin of the wetland distinct Yes An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-11)

AA Name: AA-11					**Date: 5/21/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	B	9				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**10.90**	**Final Attribute Score = (Raw Score /24) x 100**	**45.40**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			C	6		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	B	9				
Percent Non Native Score (B):	B	9				
Number of Plant Layers (C):	C	6				
Plant Community Metric Score:				8.00		
Horizontal Interspersion Score:			A	12		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**32.00**	**Final Attribute Score = (Raw Score /36) x 100**	**88.89**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*					**68**	



Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 11

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

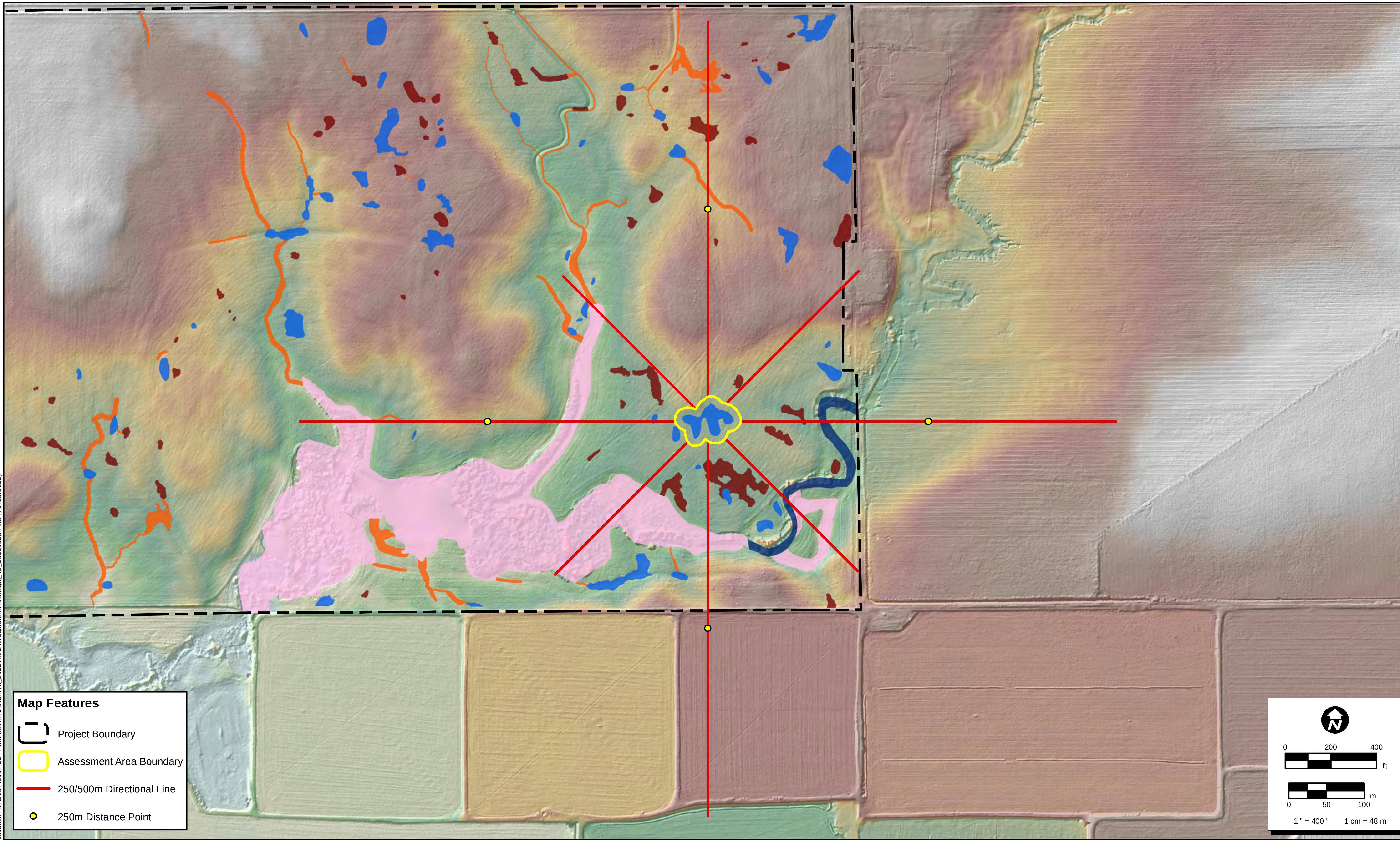
ekeethe

Basic Information: Vernal Pool (AA-12)

Project Site ID: 2007-227.2				
Assessment Area Name: AA-12				
Project Name: Mourier East	Date (m/d/y):	5	21	2012
Assessment Team Members for This AA:				
Natasha Bartley				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? medium-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-12)

AA Name: AA-12					**Date: 5/21/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			A	12		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			B	9		
Raw Attribute Score = sum of metric scores				**12.00**	**Final Attribute Score = (Raw Score /24) x 100**	**50.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	B	9				
Percent Non Native Score (B):	B	9				
Endemic Species Richness Score (C):	C	6				
Plant Community Metric Score:				8.00		
Horizontal Interspersion Score:			B	9		
Raw Attribute Score = sum of metric scores				**17.00**	**Final Attribute Score = (Raw Score /24) x 100**	**70.83**
Overall AA Score* (Average of Final Attribute Scores) **Final AA score is rounded to the nearest whole number*					**77**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierEastCramFieldMaps_v2_20120925.mxd (, 9/25/2012)

Map Date: 9/25/2012

Mourier East: CRAM Assessment Area 12

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

ATTACHMENT I

California Rapid Assessment Evaluation for the Mourier West Property

Confidential

California Rapid Assessment Method Analysis

For

Mourier West Property

Placer County, California

I have reviewed this document and approved its submittal to the appropriate agencies.

Signature	Date

12 August 2013

Prepared For:
Brookfield Sunset LLC

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Confidential

California Rapid Assessment Method Analysis

For

Mourier West Property

Placer County, California

12 August 2013

Prepared For:
Brookfield Sunset LLC

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

CONTENTS

California Rapid Assessment Method Analysis

Mourier West Property

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

At the request of Brookfield Sunset LLC, ECORP Consulting, Inc. (ECORP) conducted a California Rapid Assessment Method (CRAM) analysis of the wetlands within the ±265-acre Mourier West Property in Placer County, California. The Property is located north of Phillip Road, west of Pettigrew Road, south of Sunset Boulevard West, and east of South Brewer Road (Figure 1. *Property Location and Vicinity*). The Property is located in a portion of Section 8 of Township 12 North, and Range 5 East (Mount Diablo Base Meridian [MDBM]) of the "Pleasant Grove, California" 7.5-minute quadrangle (U. S. Department of the Interior, Geological Survey [USGS] 1981). The approximate center of the site is located at 38° 49' 05'' North and 121° 26' 10'' West within the lower Sacramento River Watershed (#18020109) (USGS 1978).

The purpose of the CRAM analysis was to provide baseline information on the current condition of the wetlands within the Property, and to compare relative values of wetlands across the site.

2.0 METHODS

2.1 CRAM Methodology

CRAM was developed as a methodology to conduct repeatable measurements of the same wetland or wetland system over time. These data can be used to monitor the progress of a restoration or mitigation site, to track changes in wetland function, or to detect "negative" influences to wetlands due to development or other stressors. As such, these data can also be used to compare wetlands to one another, based on their relative functions and values.

The CRAM methodology assesses four attributes (buffer and landscape context, hydrology, physical structure, and biotic structure). These four attributes have been determined to be important for wetland function (e.g., water storage, groundwater discharge and flow, dissipation of energy, nutrient cycling), and all wetlands share these four attributes (CWMW 2012a). Each of the four attributes is further subdivided into distinct metrics, which are the measureable components of an attribute (Table 1).

Table 1 – CRAM Attributes and Metrics[1]	
Attributes	**Metrics**
Buffer and Landscape Context	Landscape Connectivity Buffer -Percentage of Assessment Area with Buffer -Average Buffer Width -Buffer Condition
Hydrology	Water Source Hydroperiod or Channel Stability Hydrological Connectivity
Physical Structure	Structural Patch Richness Topographic Complexity
Biotic Structure	Plant Community -Number of Plant Layers Present (individual depressional wetlands) or Native Species Richness (vernal pools) -Number of Co-dominant species -Percent Invasion Horizontal Interspersion and Zonation Vertical Biotic Structure (individual depressional wetlands only)

[1] Table modified from *CWMW 2012a.*

The metrics are defined by narrative descriptive conditions that are assessed in the field and each narrative condition correlates to a numeric value. In general, the numeric values are lower for wetlands that have "undesirable" attributes; conversely, wetlands with "desirable" attributes are scored higher in a given metric. Numerical values contribute to an overall CRAM score, which indicates the overall condition of the wetlands (from 25% to 100%).

2.2 Assessment Areas

For purposes of the CRAM analysis, assessment areas (AA) were identified. Each AA is a wetland system, or portion of a wetland system to be assessed. The AA should remain constant over time to allow for a repeatable CRAM survey in future years.

Prior to conducting field work, 15 AAs were identified to represent the wetlands found on-site. AAs were established using the guidelines outlined in the CRAM User's Manual, Version 6.0 (CWMW 2012a). Five AAs (AA-1, AA-5, AA-8, AA-11 and AA-14) were comprised of individual vernal pools (IVP), and the remaining nine AAs (AA-2, AA-3, AA-4, AA-6, AA-7, AA-9, AA-12, AA-13, and AA-15) were comprised of seasonal depressional wetlands (DW). Upon field examination, one AA (AA-10) was determined to be similar to AA-11 in all attributes and metrics and was therefore not analyzed due to this similarity. As such, CRAM was performed on the remaining 14 AAs (Figure 2. *Mourier West: CRAM Assessment Areas*). In addition, AA-8 and AA-11 were originally delineated as seasonal wetlands (as seen on Figure 2); however, upon field examination, the floristic composition of these two features more closely resembled vernal pools. Therefore, they were surveyed using the IVP field book.

The five IVP AAs were assessed using the CRAM for Wetlands, Individual Vernal Pools Field Book, Version 6.0 (CWMW 2012b). The nine seasonal wetland AAs were assessed using the CRAM for Wetlands, Perennial Depressional Wetlands Field Book, Version 5.0.2 (CWMW 2008) which was not specifically designed for assessing seasonal wetlands, but is the only Field Book currently available for assessing these features.

2.3 Field Data Collection

The field survey was conducted on 23 May 2012 by ECORP biologists and trained CRAM practitioners Daria Snider and Eric Stitt.

Following the methodology of the CRAM Field Books, each AA was assessed for buffer and landscape context, hydrology, physical structure, and biotic structure. The overall AA score was calculated following the field book guidelines and copies of the CRAM scoring sheets and maps for each AA have been included in Attachment A.

3.0 RESULTS

Table 2 summarizes the scores for each of the attributes and the overall score for each AA at the Property. These scores represent the 2012 conditions at the site, and these data represent baseline scores that can be used for future comparisons.

Table 2 – Final Attribute Scores and Overall AA Scores

Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
1	93.3	75.0	25.0	41.7	**58.8**
2	57.9	83.3	25.0	52.8	**54.8**
3	60.4	91.7	37.5	66.7	**64.1**
4	50.0	83.3	37.5	61.1	**58.0**
5	85.4	83.3	25.0	75.0	**67.2**
6	47.9	83.3	37.5	44.4	**53.3**
7	47.9	83.3	37.5	44.4	**53.3**
8	85.4	100.0	37.5	79.2	**75.5**
9	65.3	75.0	25.0	52.8	**54.5**
11	85.4	100.0	37.5	79.2	**75.5**
12	47.9	100.0	37.5	52.8	**59.6**
13	47.9	100.0	25.0	52.8	**56.4**
14	85.4	100.0	50.0	87.5	**80.7**
15	47.9	100.0	37.5	63.9	**62.3**

The overall AA scores ranged from 53.3% (AA-6 and AA-7) to 80.7% (AA-14) across all AA types (n=14). Buffer and landscape context scores ranged from 47.9% to 93.3%, hydrology scores ranged from 75% to 100%, physical structure scores ranged from 25% to 50%, and biotic structure scores ranged from 41.7% to 87.5%. On average, DW AAs scored lower (57.4%) than IVP AAs (71.5%) for the site. Also, DW AAs consistently scored lower, on average, for all four attributes.

For the purposes of assessing buffer metrics for AA-1 and AA-9, adjacent rice fields were not considered buffer since they are highly manipulated agricultural fields (CWMW 2012a). As such, the eight 250-meter buffer lines used to assess the average buffer width were adjusted to fall within buffered areas and to exclude non-buffering rice fields.

3.1 Individual Vernal Pool Assessment Areas

Overall AA scores for IVP AAs (n=5) ranged from 58.8% (AA-1) to 80.7% (AA-14). Table 3 summarizes the scores for each of the attributes and the overall score for each IVP AA at the Property.

Table 3 – Final Attribute Scores (%) and Overall AA Scores (%) for Individual Vernal Pools

Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
1	93.3	75.0	25.0	41.7	**58.8**
5	85.4	83.3	25.0	75.0	**67.2**
8	85.4	100.0	37.5	79.2	**75.5**
11	85.4	100.0	37.5	79.2	**75.5**
14	85.4	100.0	50.0	87.5	**80.7**

Buffer and landscape context scores were identical (85.4%) for the IVP AAs with the exception of AA-1, which scored higher (93.3%) than the others due to a higher score for the buffer condition metric.

Hydrology scores were also similar for IVP AAs, ranging from 75% to 100%. Three AAs (AA-8, AA-11 and AA-14) scored 100%. The remaining two IVP AAs (AA-1 and AA-5) scored lower (75% and 83.3%, respectively) for hydrology due to lower score for the hydrologic connectivity metric.

Physical structure scores ranged from 25.0% (AA-1 and AA-5) to 50.0% (AA-14). AA-1 and AA-5 scored low because they are relatively flat pools lacking topographic complexity and structural patch richness. AA-8 and AA-11 scored lower (37.5%) due to low structural patch richness.

Biotic structure scores ranged from 41.7% (AA-1) to 87.5% (AA-14) making it the most variable of all the attributes. AA-1 scored the lowest (41.7%) for this attribute due to less horizontal interspersion and fewer endemic species. AA-5, AA-8, and AA-11 scored lower (75.0%, 79.2%, and 79.2%, respectively) due to low scores for the percent non-native species and endemic species richness metrics.

3.2 Seasonal Depressional Wetland Assessment Areas

The overall scores of the DW AAs (n=9) ranged from 53% (AA-6 and AA-7) to 63% (AA-3). On average, the DW AAs scores were lower than those of the IVP AAs for all attributes and for the overall AA score. Table 4 summarizes the scores for each of the attributes and the overall score for each DW AA at the Property.

Table 4 – Final Attribute Scores (%) and Overall AA Scores (%) for Depressional Wetlands

Assessment Area	Final Attribute Score				Overall AA Score
	Buffer and Landscape	Hydrology	Physical Structure	Biotic Structure	
2	57.9	83.3	25.0	52.8	**54.8**
3	60.4	91.7	37.5	66.7	**64.1**
4	50.0	83.3	37.5	61.1	**58.0**
6	47.9	83.3	37.5	44.4	**53.3**
7	47.9	83.3	37.5	44.4	**53.3**
9	65.3	75.0	25.0	52.8	**54.5**
12	47.9	100.0	37.5	52.8	**59.6**
13	47.9	100.0	25.0	52.8	**56.4**
15	47.9	100.0	37.5	63.9	**62.3**

Buffer and landscape context scores ranged from 47.9% (AA-6, AA-7, AA-12, AA-13 and AA-15) to 65.3% (AA-9). The AAs that scored the lowest (47.9%) all had lower landscape connectivity scores than the other DW AAs, likely due to adjacent land use (both current and historic). For the remaining DW AAs, the final buffer and landscape context scores varied based on differences in the buffer sub-metric scores with no discernible pattern.

Hydrology scores for DW AAs ranged from 75% (AA-9) to 100% (AA-12, AA-13, and AA-15). The difference in hydrology scores for the DW AAs was based solely on the hydrologic connectivity metric. AAs that scored lower for this metric are located in fallow rice fields with historic berms which effects hydrologic connectivity. The AAs that scored the highest are located in the southern half of the property where historic rice fields are not present.

Physical structure scores for DW AAs were the least variable of all the attributes. DW AAs either scored 25.0% (AA-2, AA-9, and AA-13) or 37.5% (AA-3, AA-4, AA-6, AA-7, AA-12, and AA-15). The difference in score was based on topographic complexity.

The biotic structure scores for DW AAs ranged from 44.4% (AA-6 and AA-7) to 66.7% (AA-3). The AAs (AA-6 and AA-7) that scored the lowest (44.4%) for the biotic structure attribute all scored low for the plant community metric and for horizontal interspersion. AAs that scored higher (52.8% for AA-9, AA-13, AA-12, and AA-2, and 61.1% for AA-4) also had low plant community metric scores. However, they scored higher due to higher scores for horizontal interspersion and vertical biotic structure, but with no discernible pattern. The two AAs (AA-15 and AA-3) that scored the highest for the biotic structure attribute (63.9% and 66.7%, respectively) scored higher due to the presence of more plant layers within the AA and higher scores for the horizontal interspersion metric.

4.0 SUMMARY

ECORP conducted a CRAM analysis at the Mourier West Property in Placer County, California. The CRAM analysis was conducted to document 2012 conditions and compare relative values of features across the site. ECORP biologists collected field data related to four attributes identified by the CRAM methodology as important indicators of wetland conditions. Overall AA scores ranged from 53.3% to 80.7%. In general, individual vernal pool features scored higher than depressional wetland features for all attribute scores and for overall AA scores.

5.0 REFERENCES

California Wetlands Monitoring Workgroup (CWMW). 2008. California Rapid Assessment Method (CRAM) for Wetlands. Version 5.0.2. Perennial Depressional Wetlands Field Book. 37 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012a. California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas. Version 6.0. User's Manual. 95 pp.

California Wetlands Monitoring Workgroup (CWMW). 2012b. California Rapid Assessment Method (CRAM) for Wetlands. Version 6.0. Individual Vernal Pools Field Book. 30 pp.

U.S. Department of Interior, Geological Survey. 1978. Hydrologic unit Map, State of California. Geological Survey. Reston, Virginia.

U.S. Department of the Interior, Geological Survey. 1981. "Pleasant Grove, California" 7.5-minute Quadrangle. Geological Survey. Denver, Colorado.

LIST OF FIGURES

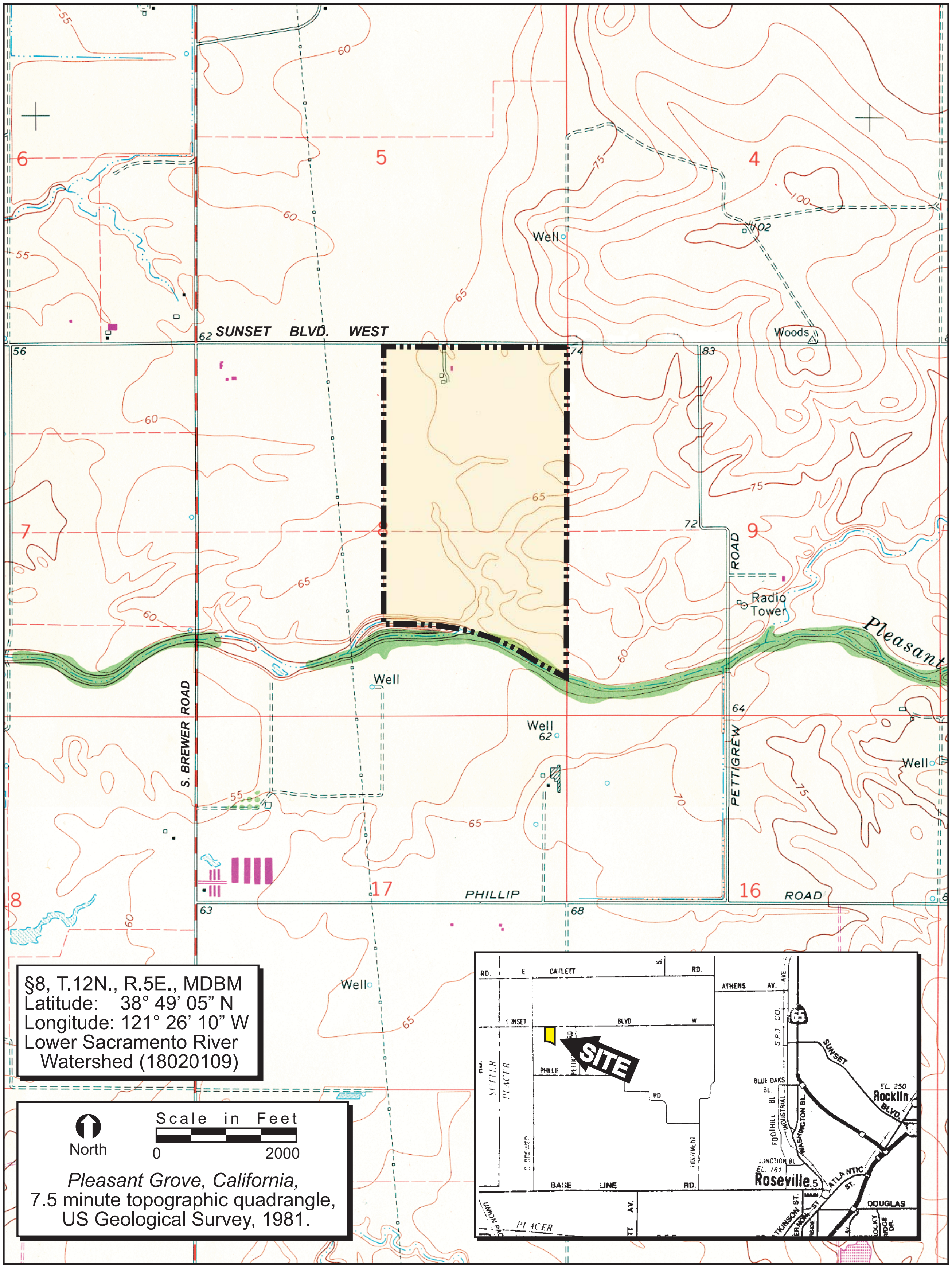
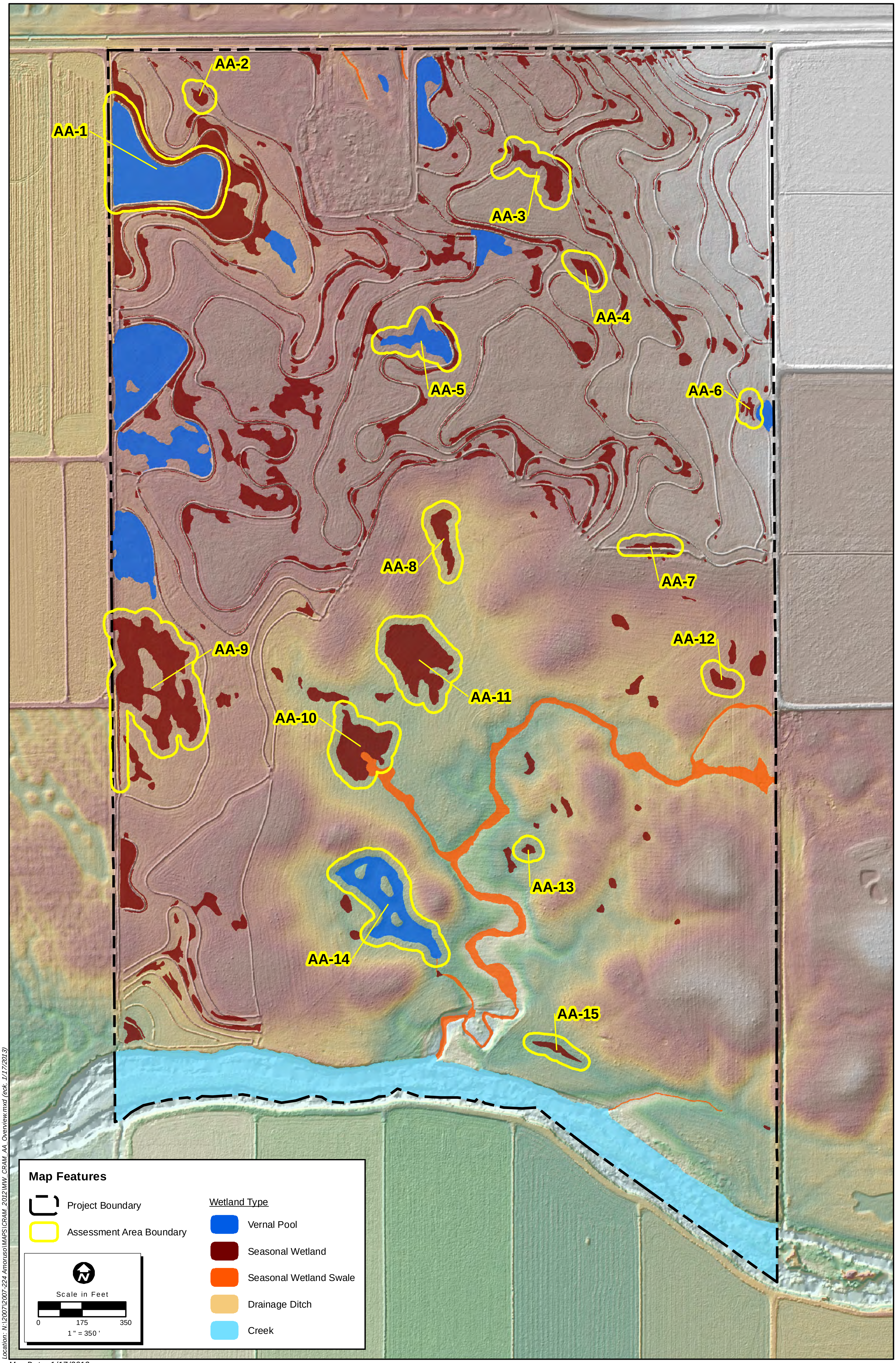


Figure 1. Property Site and Vicinity

2007-223 Mourier West

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS



Map Date: 1/17/2013

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 2. Mourier West: CRAM Assessment Areas

2007-223 Mourier West

ATTACHMENT A

CRAM Scoring Sheets and Assessment Area Maps

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MW_CRAM_AA_Overview.mxd (eck, 11/8/2012)

Map Date: 10/29/2012

Figure 2. Mourier West: CRAM Assessment Areas

2007-223 Mourier West

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Vernal Pool (AA-01)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-01				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Daria Snider				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-01)

AA Name: AA-01					Date: 5/23/2012	
Attributes and Metrics			Scores		Comments	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			A	12		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	B	9				
Raw Attribute Score = A + [D x (B x C)^½]^½:				22.39	Final Attribute Score = (Raw Score /24) x 100	93.30
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			D	3		
Raw Attribute Score = sum of metric scores				27.00	Final Attribute Score = (Raw Score /36) x 100	75.00
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				6.00	Final Attribute Score = (Raw Score /24) x 100	25.00
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	A	12				
Percent Non Native Score (B):	C	6				
Endemic Species Richness Score (C):	D	3				
Plant Community Metric Score:				7.00		
Horizontal Interspersion Score:			D	3		
Raw Attribute Score = sum of metric scores				10.00	Final Attribute Score = (Raw Score /24) x 100	41.67
Overall AA Score (Average of Final Attribute Scores)					58.74	

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Page 1 of 15

Mourier West: CRAM Assessment Area 1

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

Basic Information: Depressional Wetland (AA-02)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-02				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-02)

AA Name: AA-02					**Date: 5/23/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			C	6		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	B	9				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**13.90**	**Final Attribute Score = (Raw Score /24) x 100**	**57.90**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			C	6		
Raw Attribute Score = sum of metric scores				**30.00**	**Final Attribute Score = (Raw Score /36) x 100**	**83.33**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	D	3				
Plant Community Metric Score:				4.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**19.00**	**Final Attribute Score = (Raw Score /36) x 100**	**52.78**
Overall AA Score (Average of Final Attribute Scores)					**54.75**	

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 2

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

Basic Information: Depressional Wetland (AA-03)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-03				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-03)

AA Name: AA-03					Date: 5/23/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			C	6		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**14.49**	**Final Attribute Score = (Raw Score /24) x 100**	**60.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			B	9		
Raw Attribute Score = sum of metric scores				**33.00**	**Final Attribute Score = (Raw Score /36) x 100**	**91.67**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	B	9				
Number of Plant Layers (C):	C	6				
Plant Community Metric Score:				6.00		
Horizontal Interspersion Score:			C	6		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**24.00**	**Final Attribute Score = (Raw Score /36) x 100**	**66.67**
Overall AA Score (Average of Final Attribute Scores)					**64.05**	

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 3

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

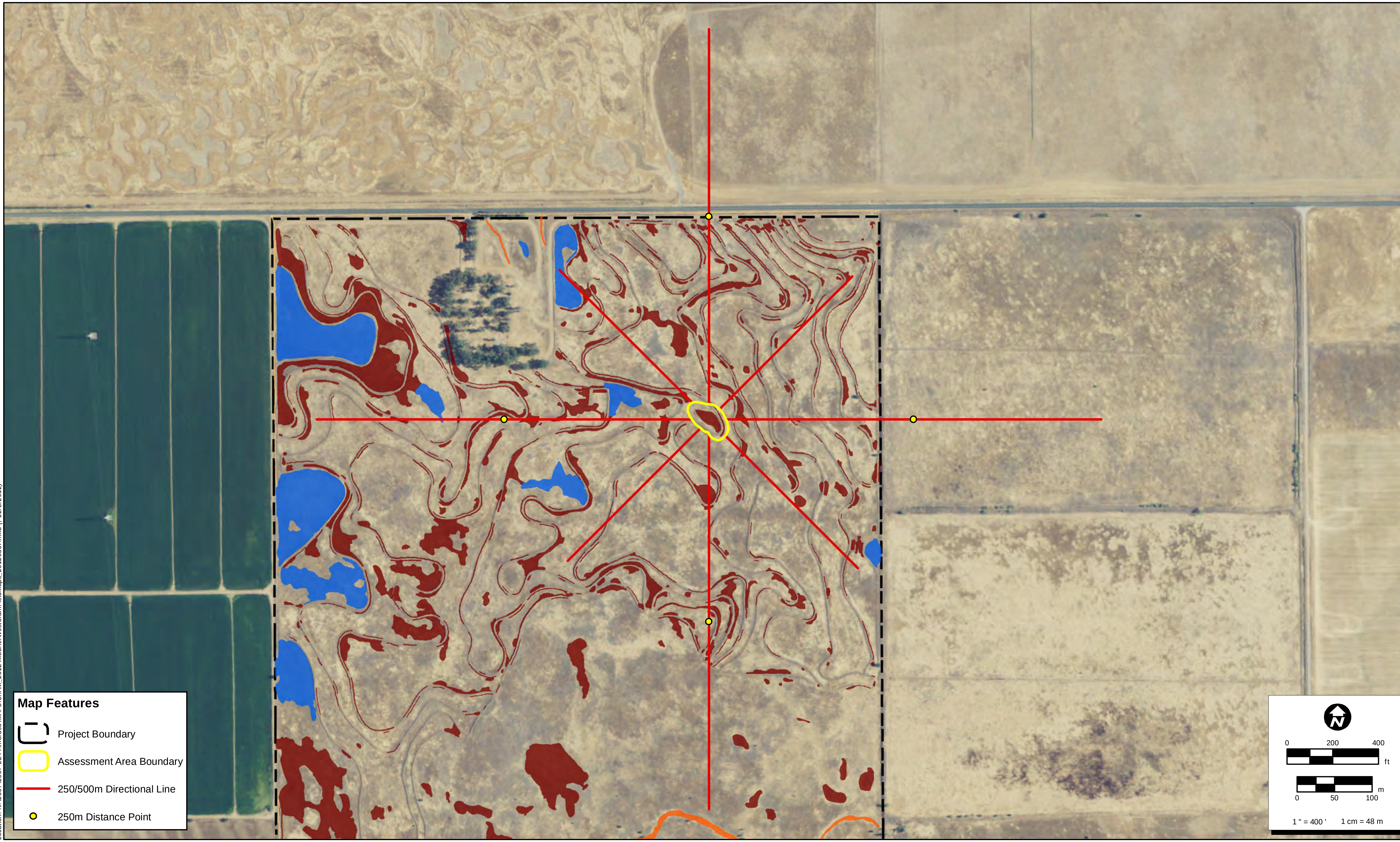
ekeethe

Basic Information: Depressional Wetland (AA-04)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-04				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-04)

AA Name: AA-04					Date: 5/23/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			C	6		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	D	3				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**12.00**	**Final Attribute Score = (Raw Score /24) x 100**	**50.00**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			C	6		
Raw Attribute Score = sum of metric scores				**30.00**	**Final Attribute Score = (Raw Score /36) x 100**	**83.33**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	D	3				
Plant Community Metric Score:				4.00		
Horizontal Interspersion Score:			C	6		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**22.00**	**Final Attribute Score = (Raw Score /36) x 100**	**61.11**
Overall AA Score (Average of Final Attribute Scores)					**57.99**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 4

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Vernal Pool (AA-05)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-05				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Daria Snider				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-05)

AA Name: AA-05				**Date: 5/23/2012**	
Attributes and Metrics			**Scores**	**Comments**	
Attribute 1: Buffer and Landscapre Context					
Aquatic Area Abundance (A):			Alpha / Numeric		
			A / 12		
Buffer Sub Metrics:	Alpha	Numeric			
Percent of AA with Buffer Score (B):	A	12			
Average Buffer Width Score (C):	A	12			
Buffer Condition Score (D):	C	6			
Raw Attribute Score = A + [D x (B x C)^½]^½:			**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology					
Water Source Score:			Alpha / Numeric		
			A / 12		
Hydroperiod Score:			A / 12		
Hydrologic Connectivity Score:			C / 6		
Raw Attribute Score = sum of metric scores			**30.00**	**Final Attribute Score = (Raw Score /36) x 100**	**83.33**
Attribute 3: Physical Structure					
Structural Patch Richness Score:			Alpha / Numeric		
			D / 3		
Topographic Complexity Score:			D / 3		
Raw Attribute Score = sum of metric scores			**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure					
Biotic Structure					
Plant Community Sub Metrics:	Alpha	Numeric			
Co-dominant species Score (A):	B	9			
Percent Non Native Score (B):	C	6			
Endemic Species Richness Score (C):	D	3			
Plant Community Metric Score:			6.00		
Horizontal Interspersion Score:			A / 12		
Raw Attribute Score = sum of metric scores			**18.00**	**Final Attribute Score = (Raw Score /24) x 100**	**75.00**
Overall AA Score (Average of Final Attribute Scores)				**67.17**	

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 5

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

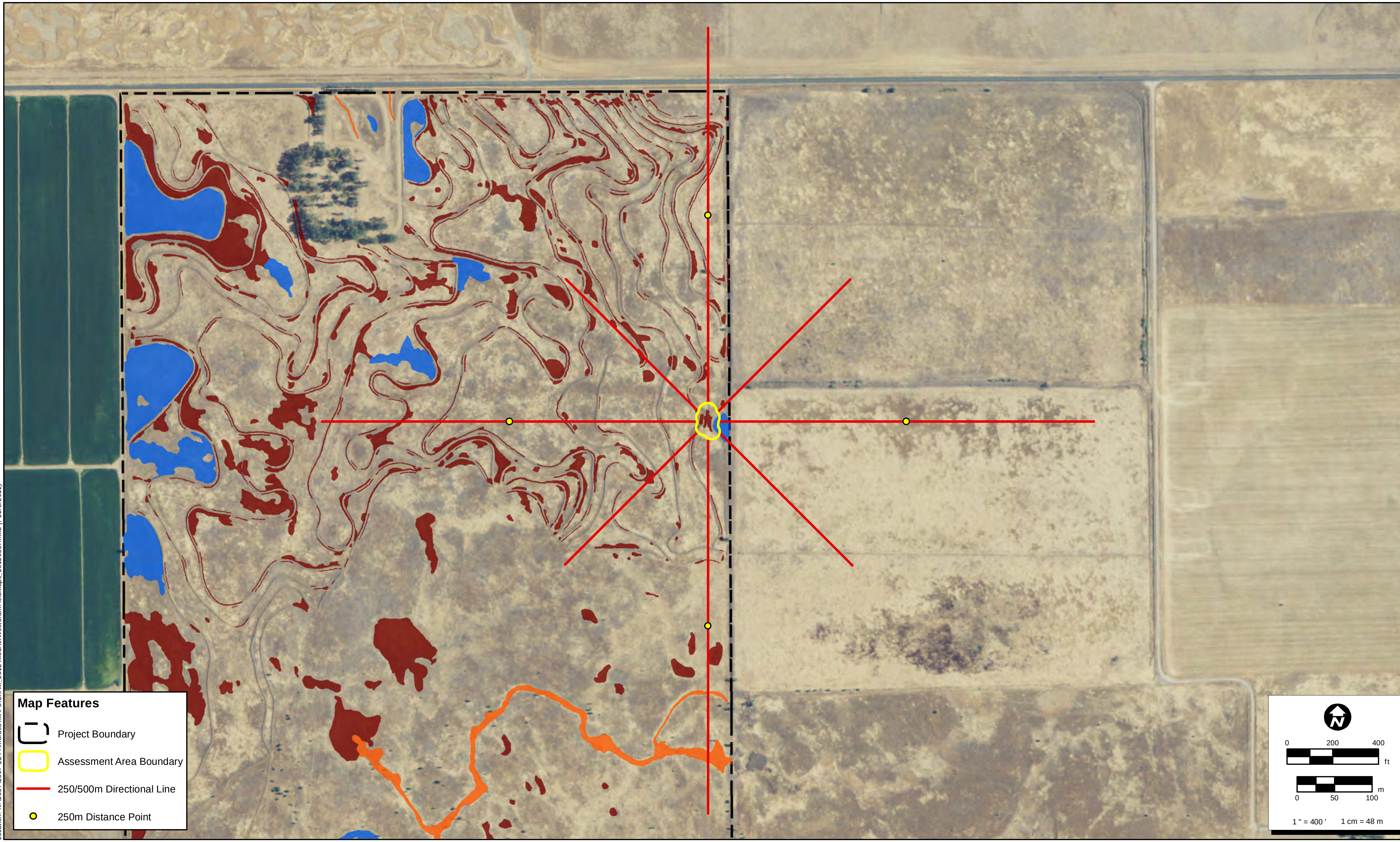
ekeethe

Basic Information: Depressional Wetland (AA-06)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-06				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-06)

AA Name: AA-06					**Date: 5/23/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			C	6		
Raw Attribute Score = sum of metric scores				**30.00**	**Final Attribute Score = (Raw Score /36) x 100**	**83.33**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	D	3				
Plant Community Metric Score:				4.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			B	9		
Raw Attribute Score = sum of metric scores				**16.00**	**Final Attribute Score = (Raw Score /36) x 100**	**44.44**
Overall AA Score (Average of Final Attribute Scores)					**53.28**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 6

2007-224 Amoruso Ranch

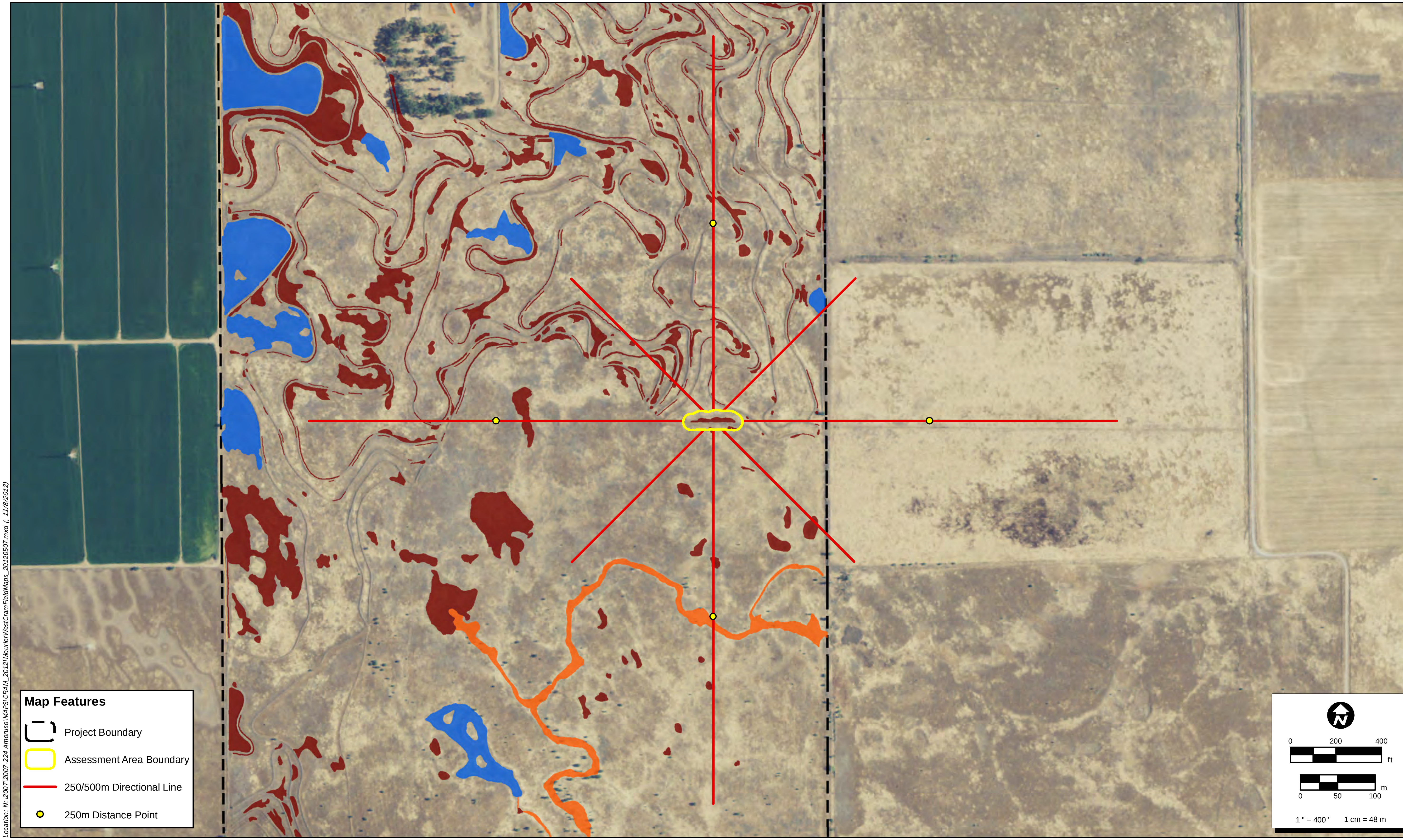
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Depressional Wetland (AA-07)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-07				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-07)

AA Name: AA-07					Date: 5/23/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			C	6		
Raw Attribute Score = sum of metric scores				**30.00**	**Final Attribute Score = (Raw Score /36) x 100**	**83.33**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	D	3				
Plant Community Metric Score:				4.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			B	9		
Raw Attribute Score = sum of metric scores				**16.00**	**Final Attribute Score = (Raw Score /36) x 100**	**44.44**
Overall AA Score (Average of Final Attribute Scores)					**53.28**	



Map Date: 8/21/2012

Page 7 of 15

Mourier West: CRAM Assessment Area 7

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

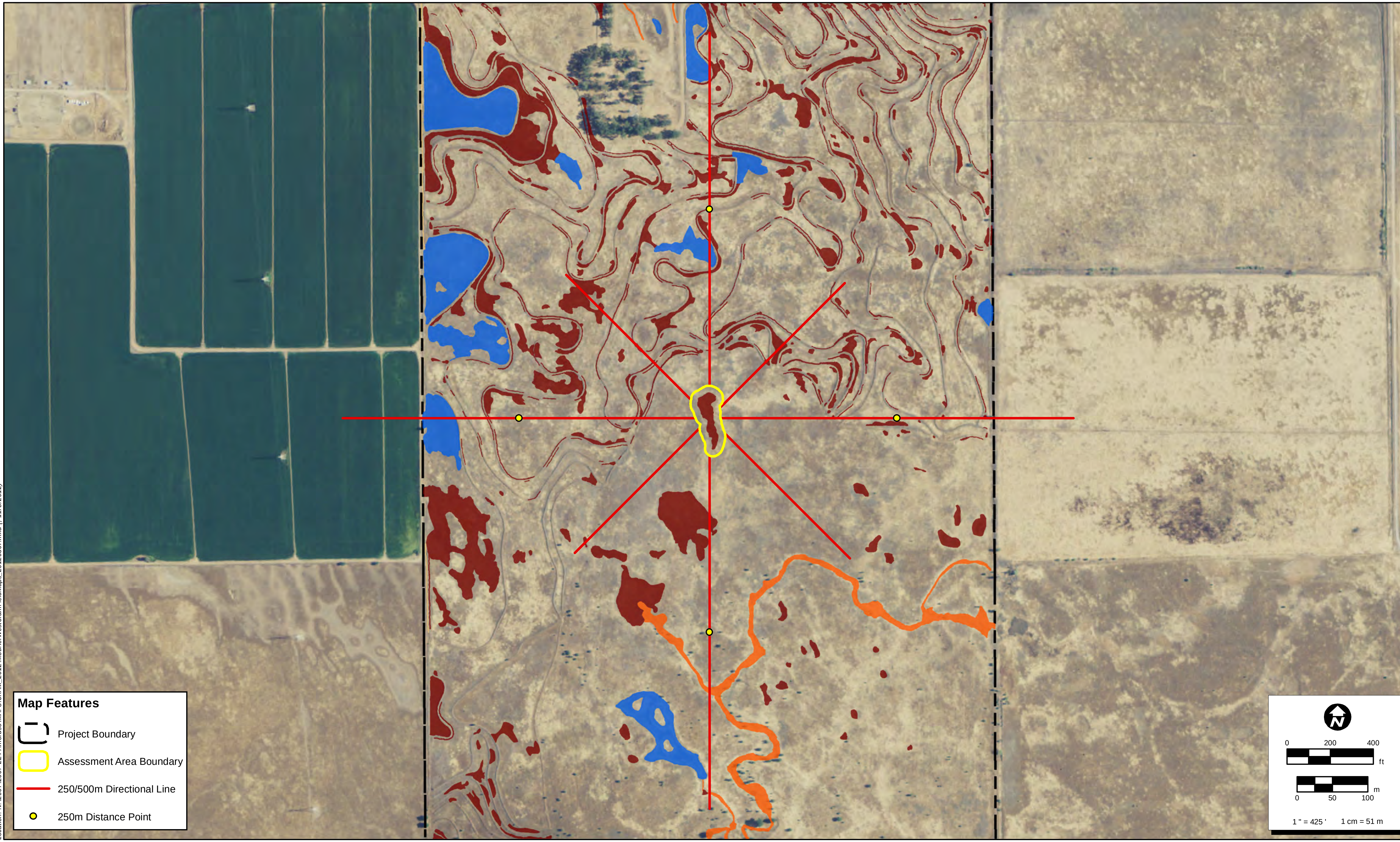
ekeethe

Basic Information: Vernal Pool (AA-08)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-08				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Daria Snider				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-08)

AA Name: AA-08					Date: 5/23/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			A	12		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	B	9				
Percent Non Native Score (B):	C	6				
Endemic Species Richness Score (C):	C	6				
Plant Community Metric Score:				7.00		
Horizontal Interspersion Score:			A	12		
Raw Attribute Score = sum of metric scores				**19.00**	**Final Attribute Score = (Raw Score /24) x 100**	**79.17**
<u>Overall AA Score (Average of Final Attribute Scores)</u>					**<u>75.51</u>**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 8

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

Basic Information: Depressional Wetland (AA-09)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-09				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-09)

AA Name: AA-09					Date: 5/23/2012	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			C	6		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	B	9				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	B	9				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**15.67**	**Final Attribute Score = (Raw Score /24) x 100**	**65.30**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			D	3		
Raw Attribute Score = sum of metric scores				**27.00**	**Final Attribute Score = (Raw Score /36) x 100**	**75.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	D	3				
Plant Community Metric Score:				4.00		
Horizontal Interspersion Score:			D	3		
Vertical Biotic Structure:			A	12		
Raw Attribute Score = sum of metric scores				**19.00**	**Final Attribute Score = (Raw Score /36) x 100**	**52.78**
Overall AA Score (Average of Final Attribute Scores)					**54.52**	

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 9

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

Basic Information: Vernal Pool (AA-11)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-11				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Daria Snider				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-11)

AA Name: AA-11					**Date: 5/23/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			A	12		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	B	9				
Percent Non Native Score (B):	C	6				
Endemic Species Richness Score (C):	C	6				
Plant Community Metric Score:				7.00		
Horizontal Interspersion Score:			A	12		
Raw Attribute Score = sum of metric scores				**19.00**	**Final Attribute Score = (Raw Score /24) x 100**	**79.17**
Overall AA Score (Average of Final Attribute Scores)					**75.51**	

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 11

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

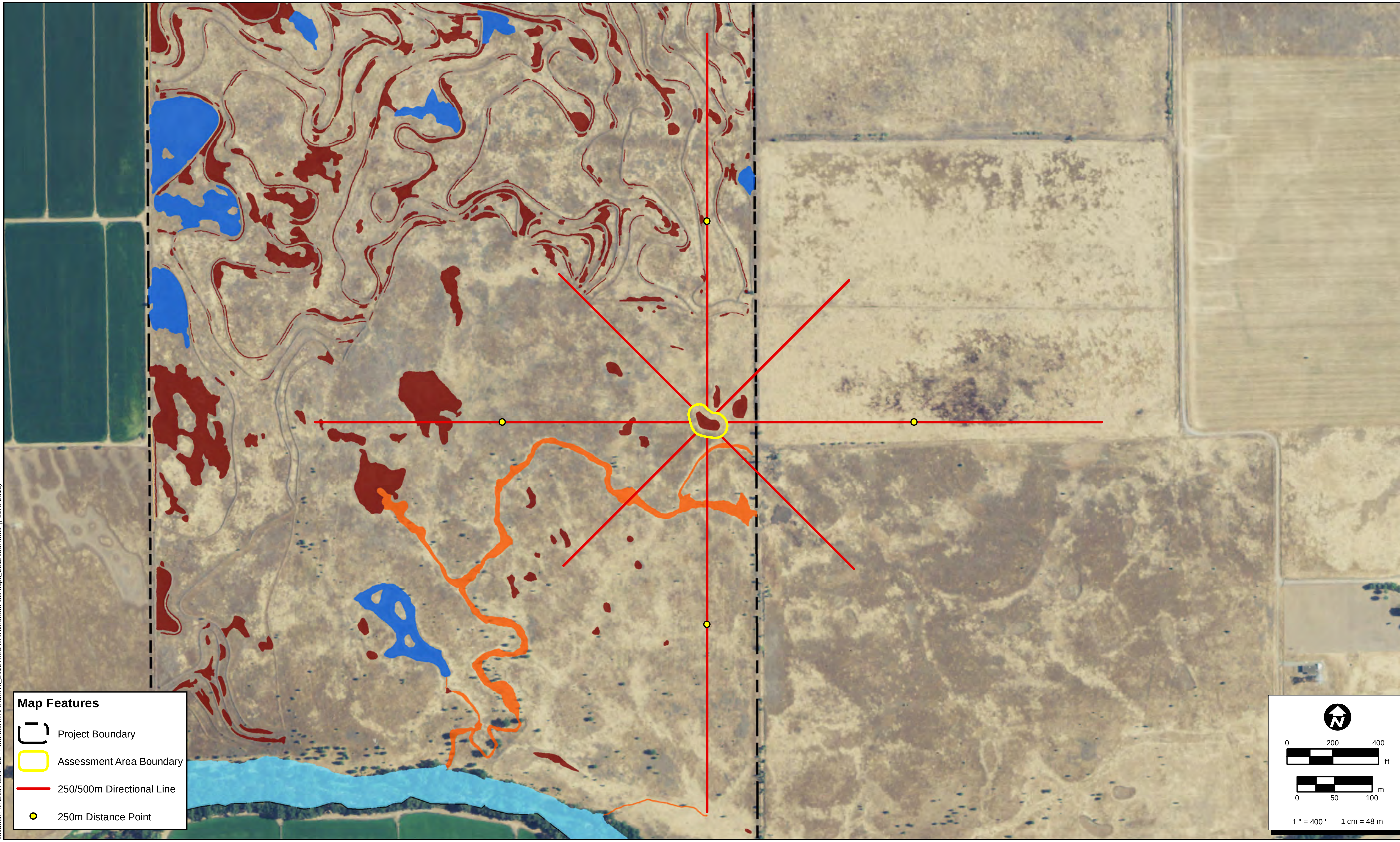
ekeethe

Basic Information: Depressional Wetland (AA-12)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-12				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-12)

AA Name: AA-12				**Date: 5/23/2012**	
Attributes and Metrics			**Scores**	**Comments**	
Attribute 1: Buffer and Landscapre Context					
Landscape Connectivity (A):		Alpha	Numeric		
		D	3		
Buffer Sub Metrics:	Alpha	Numeric			
Percent of AA with Buffer Score (B):	A	12			
Average Buffer Width Score (C):	A	12			
Buffer Condition Score (D):	C	6			
Raw Attribute Score = A + [D x (B x C)^½]^½:			**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology					
Water Source Score:		Alpha	Numeric		
		A	12		
Hydroperiod or Channel Stability Score:		A	12		
Hydrologic Connectivity Score:		A	12		
Raw Attribute Score = sum of metric scores			**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure					
Structural Patch Richness Score:		Alpha	Numeric		
		D	3		
Topographic Complexity Score:		C	6		
Raw Attribute Score = sum of metric scores			**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure					
Biotic Structure					
Plant Community Sub Metrics:	Alpha	Numeric			
Co-dominant species Score (A):	D	3			
Percent Non Native Score (B):	C	6			
Number of Plant Layers (C):	D	3			
Plant Community Metric Score:			4.00		
Horizontal Interspersion Score:		C	6		
Vertical Biotic Structure:		B	9		
Raw Attribute Score = sum of metric scores			**19.00**	**Final Attribute Score = (Raw Score /36) x 100**	**52.78**
Overall AA Score (Average of Final Attribute Scores)				**59.53**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 12

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

Basic Information: Depressional Wetland (AA-13)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-13				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-13)

AA Name: AA-13					Date: 5/23/2012	
Attributes and Metrics			Scores		Comments	
Attribute 1: Buffer and Landscapre Context						
Landscape Connectivity (A):			Alpha	Numeric		
			D	3		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod or Channel Stability Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			D	3		
Topographic Complexity Score:			D	3		
Raw Attribute Score = sum of metric scores				**6.00**	**Final Attribute Score = (Raw Score /24) x 100**	**25.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	D	3				
Percent Non Native Score (B):	C	6				
Number of Plant Layers (C):	D	3				
Plant Community Metric Score:				4.00		
Horizontal Interspersion Score:			C	6		
Vertical Biotic Structure:			B	9		
Raw Attribute Score = sum of metric scores				**19.00**	**Final Attribute Score = (Raw Score /36) x 100**	**52.78**
Overall AA Score (Average of Final Attribute Scores)					**56.41**	

Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 13

2007-224 Amoruso Ranch

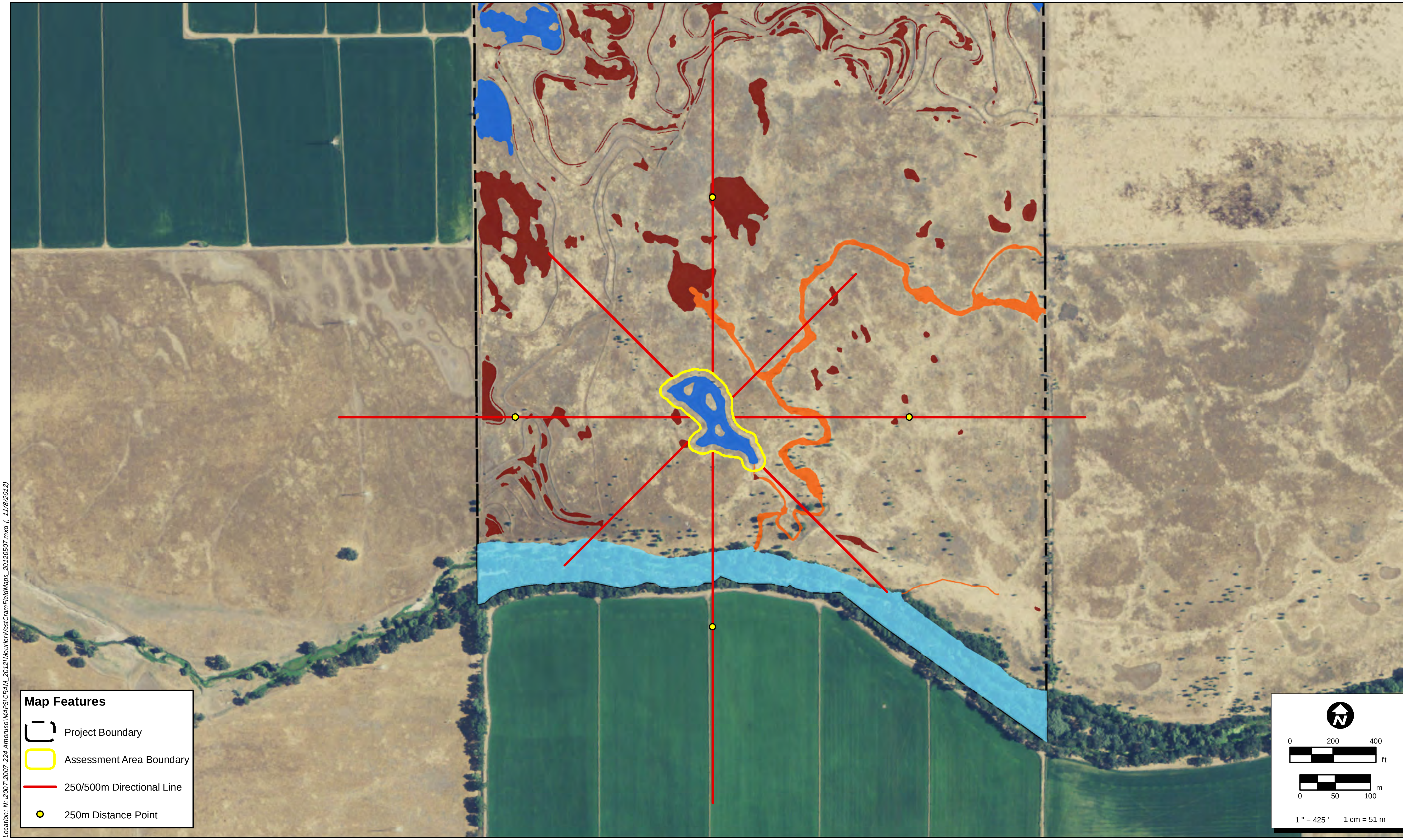
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Vernal Pool (AA-14)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-14				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Daria Snider				
Eric Stitt				
AA/Wetland Category: Natural				
Which best describes the type of depressional wetland? Other: Vernal Pool				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Vernal Pool (AA-14)

AA Name: AA-14					**Date: 5/23/2012**	
Attributes and Metrics			**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context						
Aquatic Area Abundance (A):			Alpha	Numeric		
			A	12		
Buffer Sub Metrics:	Alpha	Numeric				
Percent of AA with Buffer Score (B):	A	12				
Average Buffer Width Score (C):	A	12				
Buffer Condition Score (D):	C	6				
Raw Attribute Score = A + [D x (B x C)^½]^½:				**20.49**	**Final Attribute Score = (Raw Score /24) x 100**	**85.36**
Attribute 2: Hydrology						
Water Source Score:			Alpha	Numeric		
			A	12		
Hydroperiod Score:			A	12		
Hydrologic Connectivity Score:			A	12		
Raw Attribute Score = sum of metric scores				**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure						
Structural Patch Richness Score:			Alpha	Numeric		
			C	6		
Topographic Complexity Score:			C	6		
Raw Attribute Score = sum of metric scores				**12.00**	**Final Attribute Score = (Raw Score /24) x 100**	**50.00**
Attribute 4: Biotic Structure						
Biotic Structure						
Plant Community Sub Metrics:	Alpha	Numeric				
Co-dominant species Score (A):	B	9				
Percent Non Native Score (B):	A	12				
Endemic Species Richness Score (C):	C	6				
Plant Community Metric Score:				9.00		
Horizontal Interspersion Score:			A	12		
Raw Attribute Score = sum of metric scores				**21.00**	**Final Attribute Score = (Raw Score /24) x 100**	**87.50**
Overall AA Score (Average of Final Attribute Scores)					**80.71**	



Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 14

2007-224 Amoruso Ranch

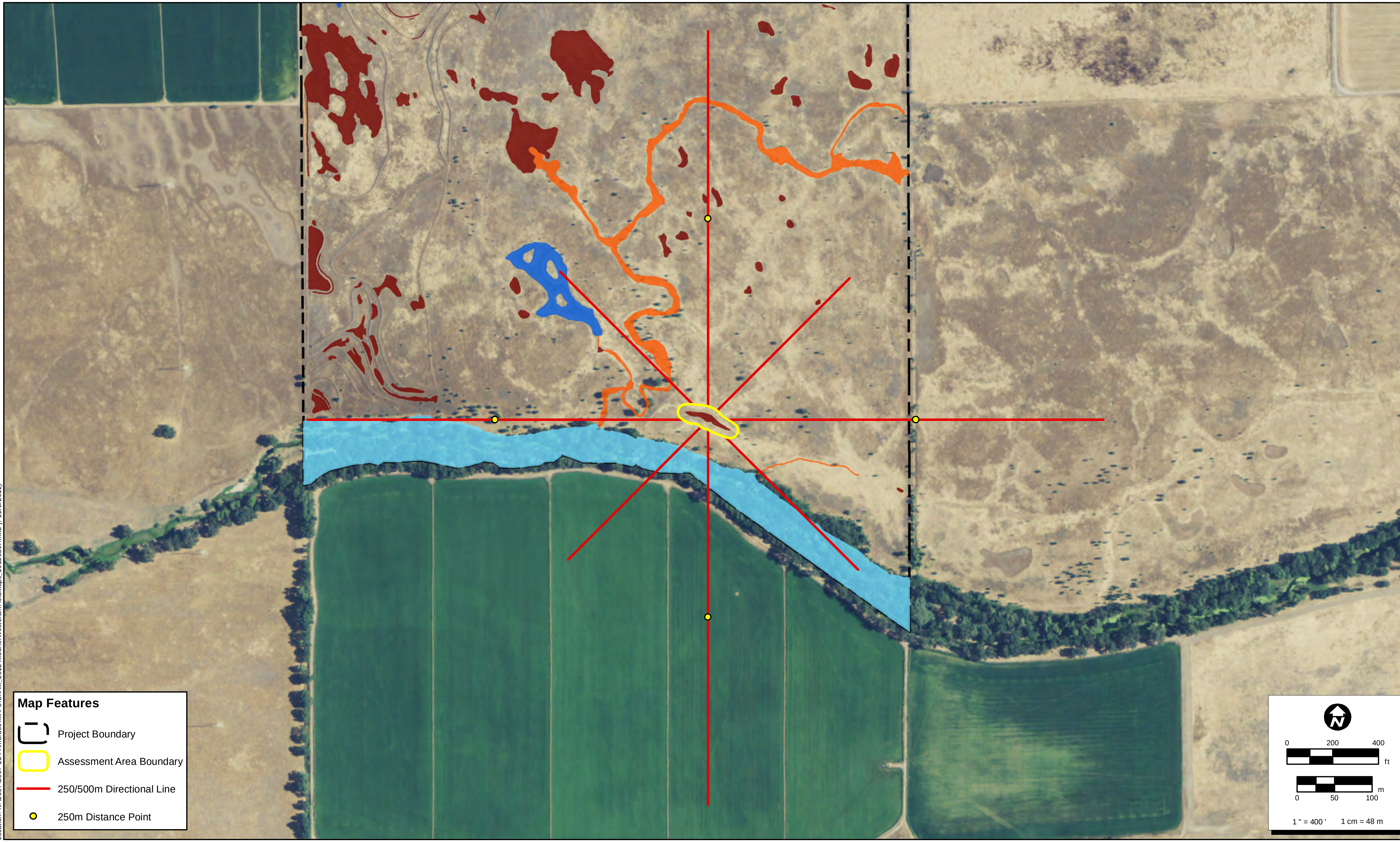
ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
ekeethe

Basic Information: Depressional Wetland (AA-15)

Project Site ID: 2007-227.1				
Assessment Area Name: AA-15				
Project Name: Mourier West	Date (m/d/y):	5	23	2012
Assessment Team Members for This AA:				
Eric Stitt				
Daria Snider				
AA/Wetland Category: Other				
Which best describes the type of depressional wetland?				
If Created or Restored, does the action encompass: N/A				
What best describes the hydrologic state of the wetland at the time of assessment? dry				
What is the apparent hydrologic regime of the wetland? short-duration				
Does your wetland/wetland complex connect with the floodplain of a nearby stream? No				
Is the topographic basin of the wetland distinct No An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.				
Comments: Photos taken toward the north, east, south and west.				

Scoring Sheet: Depressional Wetland (AA-15)

AA Name: AA-15				Date: 5/23/2012	
Attributes and Metrics		**Scores**		**Comments**	
Attribute 1: Buffer and Landscapre Context					
Landscape Connectivity (A):		Alpha	Numeric		
		D	3		
Buffer Sub Metrics:	Alpha	Numeric			
Percent of AA with Buffer Score (B):	A	12			
Average Buffer Width Score (C):	A	12			
Buffer Condition Score (D):	C	6			
Raw Attribute Score = A + [D x (B x C)^½]^½:			**11.49**	**Final Attribute Score = (Raw Score /24) x 100**	**47.86**
Attribute 2: Hydrology					
Water Source Score:		Alpha	Numeric		
		A	12		
Hydroperiod or Channel Stability Score:		A	12		
Hydrologic Connectivity Score:		A	12		
Raw Attribute Score = sum of metric scores			**36.00**	**Final Attribute Score = (Raw Score /36) x 100**	**100.00**
Attribute 3: Physical Structure					
Structural Patch Richness Score:		Alpha	Numeric		
		D	3		
Topographic Complexity Score:		C	6		
Raw Attribute Score = sum of metric scores			**9.00**	**Final Attribute Score = (Raw Score /24) x 100**	**37.50**
Attribute 4: Biotic Structure					
Biotic Structure					
Plant Community Sub Metrics:	Alpha	Numeric			
Co-dominant species Score (A):	D	3			
Percent Non Native Score (B):	C	6			
Number of Plant Layers (C):	C	6			
Plant Community Metric Score:			5.00		
Horizontal Interspersion Score:		C	6		
Vertical Biotic Structure:		A	12		
Raw Attribute Score = sum of metric scores			**23.00**	**Final Attribute Score = (Raw Score /36) x 100**	**63.89**
Overall AA Score (Average of Final Attribute Scores)				**62.31**	



Location: N:\2007\2007-224 Amoruso\MAPS\CRAM_2012\MourierWestCramFieldMaps_20120507.mxd (, 11/8/2012)

Map Date: 8/21/2012

Mourier West: CRAM Assessment Area 15

2007-224 Amoruso Ranch

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

ekeethe

ATTACHMENT J

Site and Soil Suitability Report for the Mourier East Property

Site and Soil Suitability to Determine the Hydrological Potential for Restoring Vernal Pool Wetlands at the Mourier East Property, Placer County, California

Prepared for

Brookfield Residential

2271 Lava Ridge Court

Suite 220

Roseville, CA

95661

Prepared by

Institute for Ecohydrology Research

1213 Carriage Drive

Woodland, CA

95776

June 3, 2016

Summary

The Mourier East property in Placer County, California was historically a vernal pool wetland landscape according to historical aerial photos from 1947, USGS 1910 topographic map, existing wetland mapping and field assessments of current topography and soils. The US Army Corps of Engineers developed Guidelines for Wetland Mitigation and Monitoring (2015) including the use of restoration and creation to offset the loss of wetlands, including vernal pools. Those Guidelines recommend conducting a site evaluation that takes a watershed approach to the landscape scale of mitigation and determines the soils are suitable in the case of vernal pools.

The current studies conducted detailed topographic mapping and soil surveys using ground-penetrating radar to identify the geophysical structure of the landscape to specifically identify the suitability of the site for vernal pool restoration. It is believed that historically the site supported many more acres of vernal pools wetlands although the exact number cannot be determined. However, the site was found to have an extensive catchment structure that provides upland water input to wetlands down the slope. The uplands have the potential to provide significant water inputs to vernal pools that increase their annual hydroperiod even during below average rainfall years. The soils study determined the site had been graded, and some historical vernal pools were probably filled in, and the existing vernal pools and seasonal wetlands are remnants of those pools. The soil characteristics of claypan and duripan water restricting soils layers are still intact and can form a seasonal water table that is the hydrological basis for vernal pool functioning.

Some areas of the site are too steep to support vernal pools, but their area provides the critical upland water inputs. 81.6 acres of the 241-acre property were found to be contiguous areas lacking existing vernal pools and suitable for vernal pool restoration. The first estimate of 11.67 acres and up to 15 acres of restoration could be developed within 11 areas identified on the property. Theoretically, 10% of the property could support vernal pools based on a maximum vernal pool density established by the US Fish and Wildlife Service. This would potentially allow for 24.1 acres less the 3.81 existing acres of vernal pools giving 20.29 acres of potential restoration. An engineering design process could evaluate all the opportunities within the landscape and conduct hydrological assessments to identifying the locations, depths, and acres of individual vernal pools.

Introduction

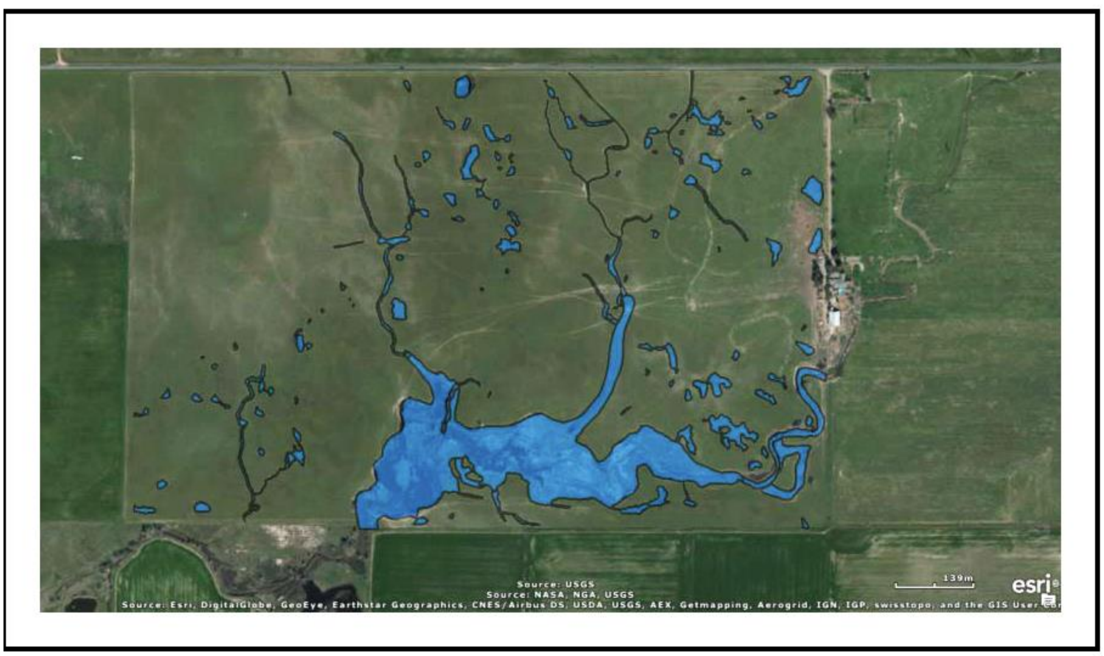
This report is a site evaluation and soil suitability assessment for determining the feasibility of restoring or creating vernal pools and other seasonal wetlands at the Mourier East property, Placer County, California. The Mourier East property covers 241 acres on the south side of Sunset Blvd West, Pleasant Grove, California (Figure 1). The US Army Corps of Engineers' (USACOE) Mitigation and Monitoring Guidelines (December 30, 2015) recommends an assessment of soil suitability for restoring, creating or enhancing wetlands. Also, those guidelines specify taking a watershed approach to developing a wetland mitigation design and plan. This study conducted a site assessment for the potential of restoring or creating vernal pools using existing soil and wetland data and by surveying the surface topography to identify the direction of water flow and subsurface stratigraphy to determine the presence of water-restricting soil layers. The combination of topography and soil water-restricting layers is critical to the formation of a seasonal water table the causes the wetland hydrology.

Background Information and Existing Conditions

Vernal pools are recognized as complex seasonal wetlands due to the structure of the soils and importance of the presence of soil depressions overlaying a shallow water-restricting layer (Hobson and Dahlgren 2001, Smith and Verrill 1998). The water-restricting layers called claypan and hardpan for some specific types of soil horizon are critical in the formation of a seasonal, perched water table (McCarten et al. 2009, Rains et al. 2006). The presence, depth, and topography of the water-restricting layer determine the hydrological functioning of individual vernal pools and their subsurface connectivity. The presence of the water-restricting layer is one requirement for soils in their consideration as potential sites for vernal pool restoration or creation. Information on existing wetlands and biological resources were provided by ECORP that showed the presence of wetlands.

Figure 1 Mourier East Arial Photo Showing the Approximate Property Boundary and the Second Order Tributary Creek Draining into Pleasant Grove Creek (Source Google Earth 2015).

Figure 2 Mourier East Site Showing Existing Jurisdictional Wetlands (Source ECORP 2016)



Methods

Information on the soils are mapped for the property (Appendix A) was obtained from Natural Resources Conservation Service Online Soil Survey 2016 (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx). Current and historical aerial photos were viewed on Google Earth Professional (Google Earth 2015). Historical aerial photo from 1947 and a historical 1910 USGS 7.5' topographic map was obtained from National Environmental Title Research.

Field Surveys

Topographic Survey

A Trimble R8 RTK GPS was used to survey the property in order to make high resolution (spatial precision of ±1 cm, elevation ±2 cm) topographic maps. This level of precision is needed to accurately measure relationships between vernal pool elevation gradients, soil horizons and surface and subsurface hydrology. This survey provides a baseline for the overall property upon which more detailed RTK GPS surveys can add to the existing data to develop a vernal pool grading plan. The survey was conducted throughout the property capturing the property boundaries and sufficient data point collection to create an accurate topographic map of the site.

Subsurface Stratigraphy

The GPR was used to conduct a non-destructive survey of the soil profile to evaluate the presence, continuity, and topography of soil horizons that form a water-restricting layer. An MALÅ Geosciences GPR system using an 800 MHz shielded antenna with a cart to measure distance was used to conduct the field surveys The GPR transects, identified as DAT files, ranged in length from about 25 feet to about 1,000 feet. The GPR was set to measure to a depth of five feet on all but one transect. One GPR transect (DAT 2) was set to measure to seven feet below the soil surface as a comparison to confirm the thickness of the water-restricting layers. The antenna sends out a set of energy waves some of which are reflected back to the antenna when they hit a medium of higher density such as soils of different texture (e.g., clay). The GPR takes a sample approximately every two inches (5 cm sampling interval).

Calibration of the water-restricting layers was conducted using hand auger holes along GPR transects to determine the depth to claypan and hardpan.

Results

The NRCS Soil Web survey identified the property as having a combination of Cometa and Fiddyment soil series (Appendix A). The Cometa soil series has a claypan water-restricting soil horizon that is typically present starting at 18 inches below the soil surface and extending to about 29 inches in depth. The Fiddyment soil series has a weak claypan overlaying a hardpan as the water-restricting layers with the claypan typically ranging from 12 to 28 inches below the soil surface and the hardpan occurring from 28 to 35 inches below the surface which are then underlain by bedrock.

Historical Aerial and USGS Topographic Map

Figure 2 is a historic 1947 aerial photo of the Mourier East property showing the property was not yet in rice cultivation, but some surface disturbance had occurred with remnant vernal pool and swale features. That figures also shows the adjacent properties that had been disturbed to a lesser degree than at the Mourier East property. In that aerial photo, the vernal pools and swales are more distinct some of which remain today particularly south and west of the Mourier East property. **Figure 3** is a historic 1942 USGS topographic map of the Mourier East property, and adjacent property shows the topographic relief prior to the cultivation of rice. These historical documents confirm the Mourier East property had vernal pools and swales extending throughout much of the property. The topography indicates there was and existing drainage of shallow swales starting on the southwest corner of the Mourier East property and draining southwest over what is South Brewer Road. The historical aerial photos indicate a series of vernal pool and swale systems outside the Mourier East property that indicates correspondence with the historical topographic drainage patterns. Pleasant Grover Creek south of the Mourier East Property historically will have affected the soils in the area.

Figure 3 Historical 1947 Aerial Photo of Mourier East Prior to Rice Cultivation. The Site was Graded Extensively Although Plowing or Ripping is not Evident.

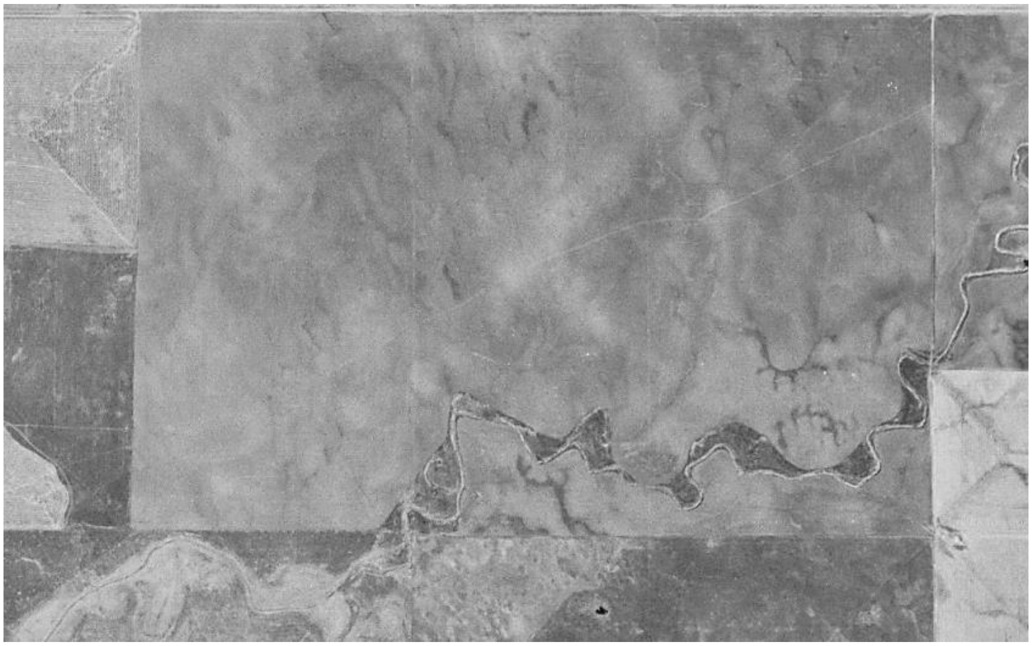
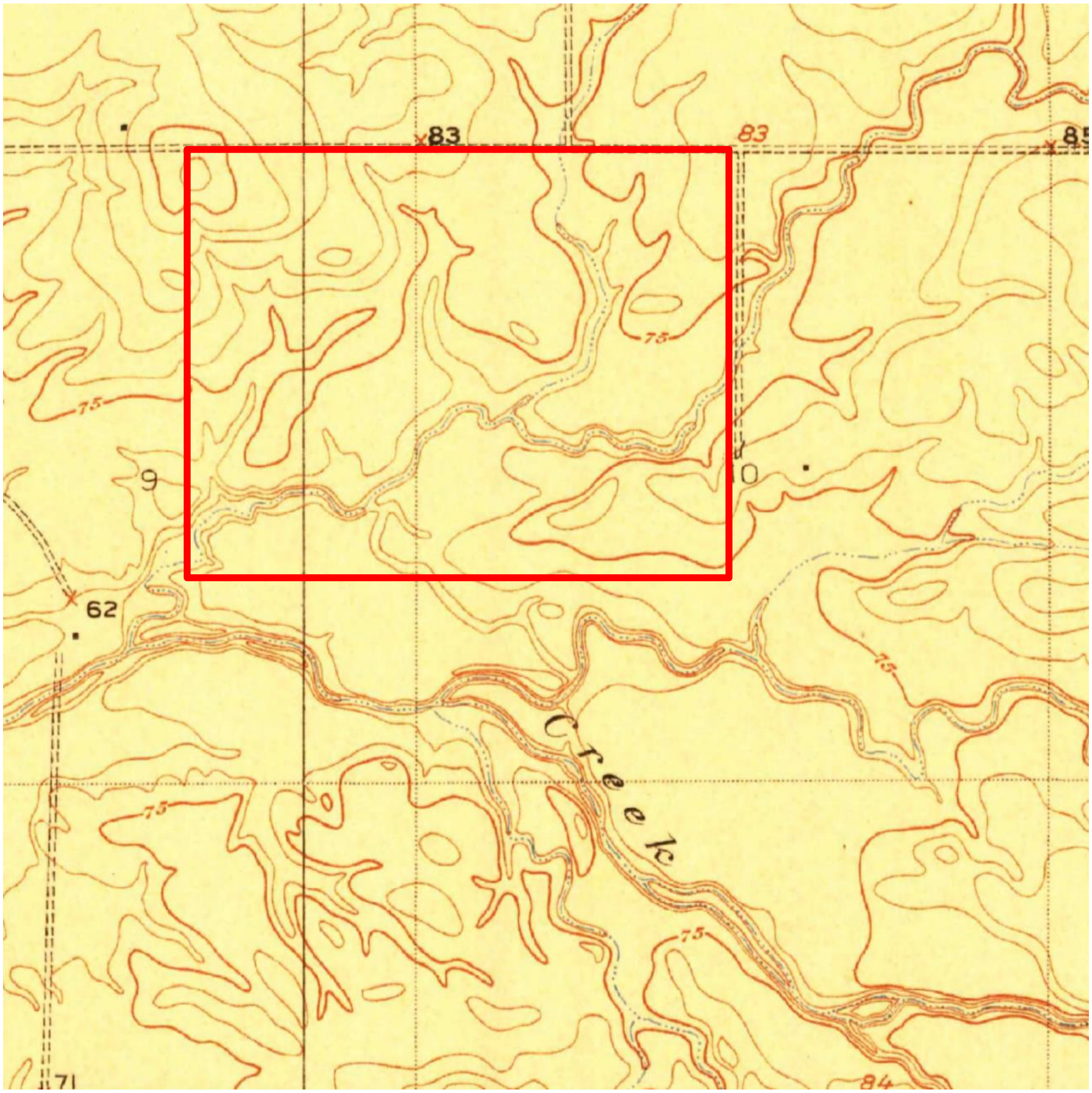


Figure 4 Historical 1993 Aerial Photograph Showing Mourier East Property with Rice Cultivation on the South Side of the Property

Figure 5 USGS 1910 Topographic Map Showing the Mourier East Property Prior to Grading. The Red Rectangle is the Approximate Current Property Boundary.



Topographic Survey

The GPS survey collected 682 data points that were entered into topographic modeling software. Figure 6 shows a color topographic map of the Mourier East property with labeled elevations in five-foot intervals and one-foot contour lines were shown. The highest elevation is 108 feet msl at the northwest corner of the property, and the lowest is 74 feet msl is just along the creek edge.

Figure 6Digital Elevation Model of the Mourier East Property.

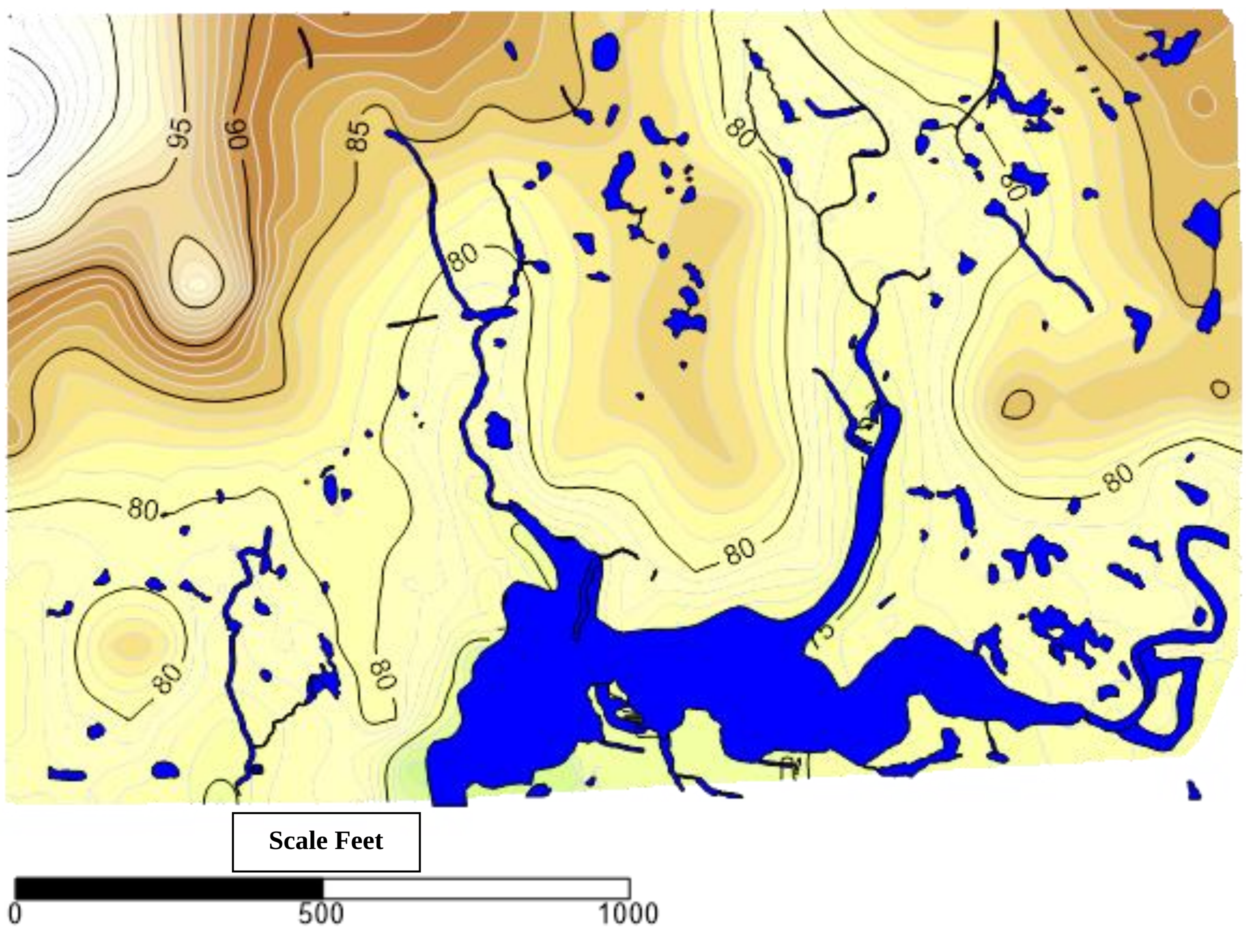
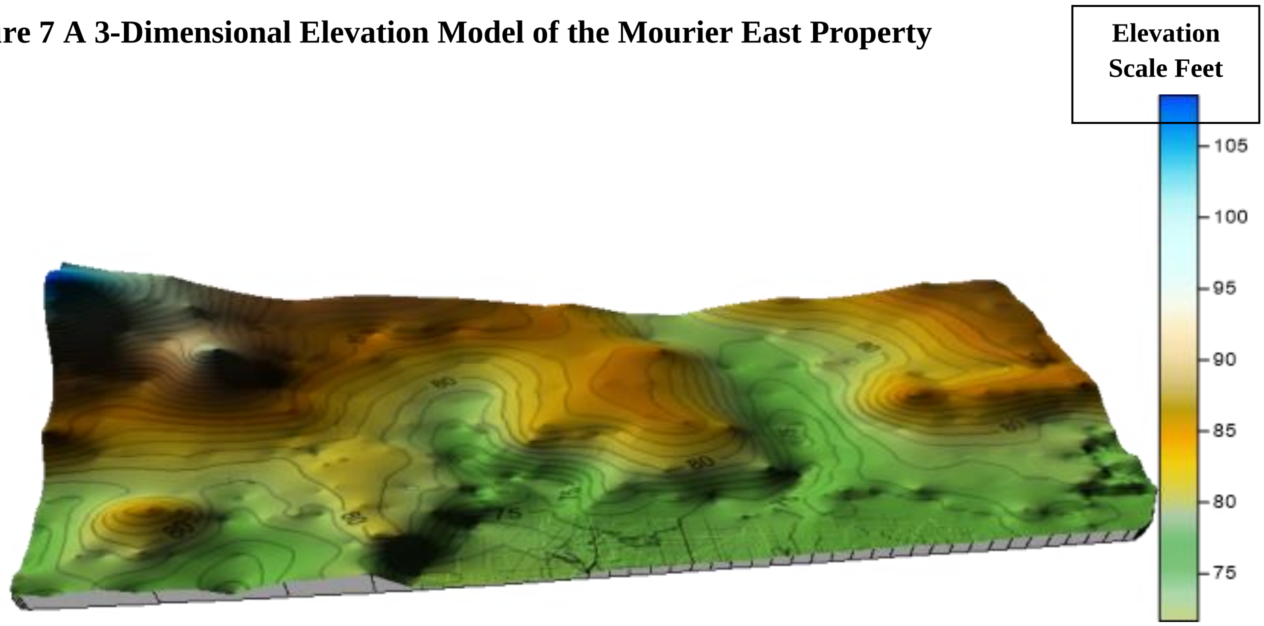


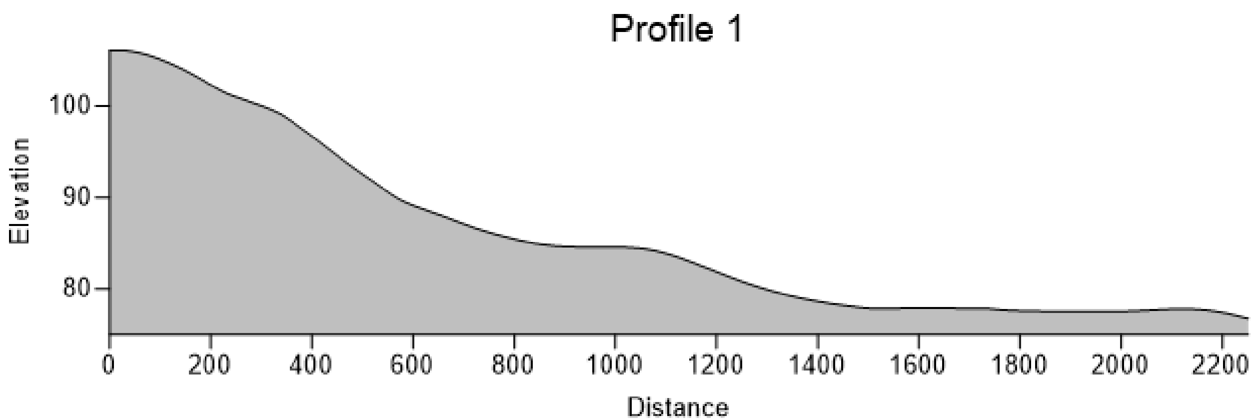
Figure 7 is a 3-dimensional model of the site that gives a better visual perspective of the differences in elevations across the property. The figure shows the overall grade of the site remains similar to the 1910 USGS topographic map (Figure 4).

Figure 7 A 3-Dimensional Elevation Model of the Mourier East Property



An assessment of the elevation gradients at the property was made by making cross-sections along seven profiles from the topographic map. Appendix B shows the topographic map with red lines and numbers indicating the location and topographic cross-section of each profile. Each profile was made starting from the highest point and moving to the lowest point. Figure 8 shows the cross section of the westernmost profile this profile and the six additional ones are all shown in Appendix B. The importance of these profiles will be discussed in the hydrology section below.

Figure 8 A Landscape Profile 1 Is a North-South Cross-Section Showing the Elevation Gradient from the Northwest Part of the Property to Just North of the Creek.



Subsurface Stratigraphy

The GPR survey included 45 transects shown in Appendix C. Thirty GPR DAT files or transects identified by transect number are shown in Appendix C. The GPR data represents the soil profile by showing a change in soil density. The top of each figure gives the distance in feet and scale in feet indicating depth in the soil is generally in the center of each figure. Figure 9A shows a GPR soil profile at a Fiddyment soil series site that includes a vernal pool. In that figure, the blue and red lines indicate the positive and negative parts of the energy wave reflected back to the antenna if there is a change in density of the soil texture then there is an increase in the intensity of the color. In Figure 9, the energy wave leaving the antenna first goes through the air then intercepts the soil surface causing an increase in color intensity. Below the soil surface the next change in density if due to the clay horizon in the soil (claypan) which is followed by the presence of a hardpan or duripan. The distance in feet along each transect is shown at the top of each figure, and depth below the soil surface is indicate by a scale in the middle of each figure.

The GPR soil profile data correspond with changes in the density of the soil. In a typical, undisturbed Fiddyment soil series the soil profile is characterized by an A horizon which is loam, a Bt horizon which is a clay loam or clay and a Bqm horizon which is a hardpan also called a duripan. Figure 9 and 10 shows the relationship between the color intensities in the GPR data and the soil profile in a vernal pool landscape. The GPR data in the figure are not adjusted for topography, so the soil surface appears flat but in reality, the depression in the landscape where the vernal pool is located is represented as the claypan appearing closer to the soil surface. As the topography changes such as upslope from the vernal pool, the claypan is deeper. The example of a Fiddyment soil series applies to Mourier East site because the site is a mixed soil series of Fiddyment and Cometa (Appendix A). The Fiddyment soils series is distinct due the presence of a duripan (hardpan) which is a mineral (iron-silicate) cemented or indurated soil horizon that has very low water permeability. The clay loam horizon above the duripan also has low water permeability, and therefore, the Fiddyment soil series is one that typically has vernal pools and seasonal wetlands. The Cometa soil lacks a duripan but has a high percent clay horizon or claypan that also has sufficiently low water permeability to form a seasonal water table.

Figure 9 Example of a GPR Soil Profile of a Fiddyment Soil Series Including a Vernal Pool (Sacramento County Site).

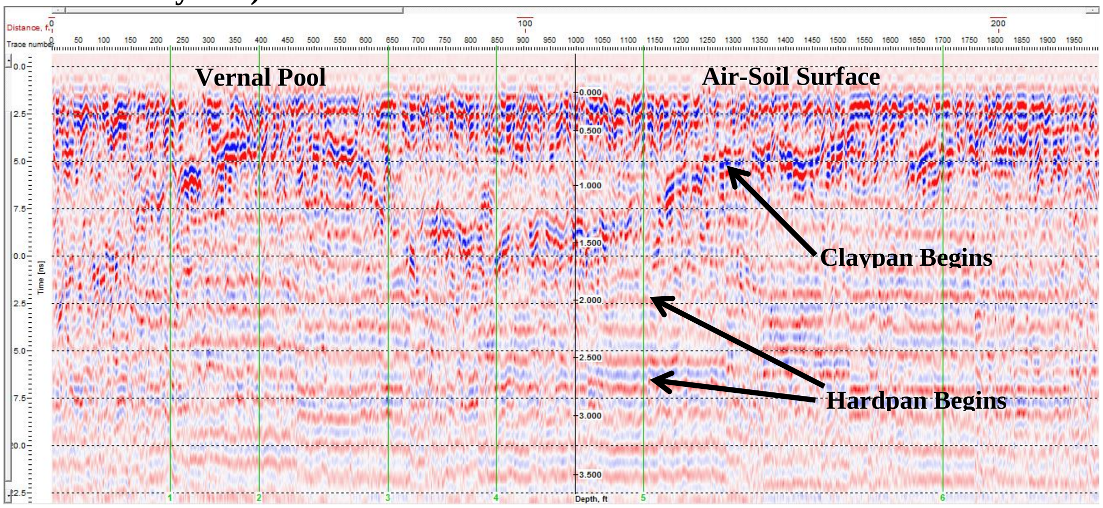
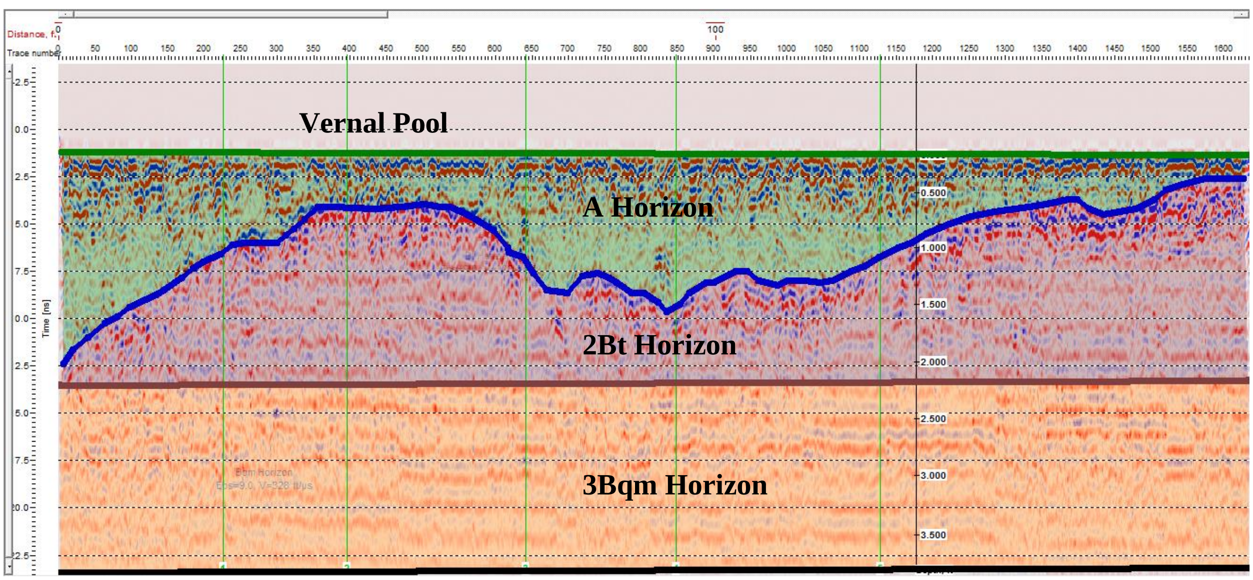
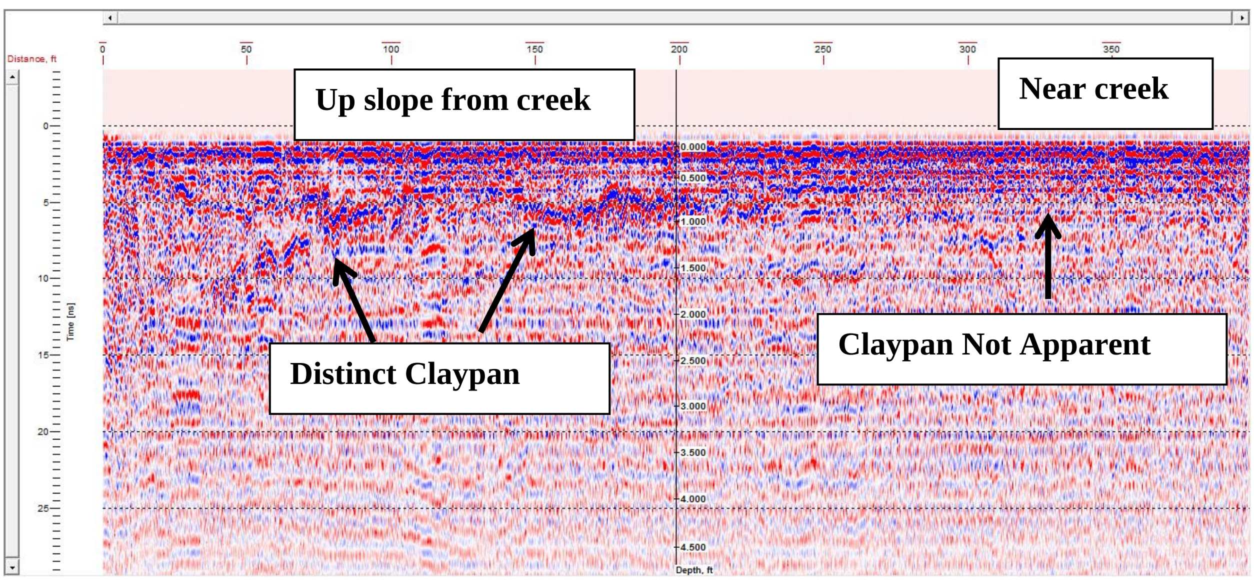


Figure 10 GPR Soil Profile from Figure 9 Showing the Correspondence with the Fiddyment Soil Series Horizons A (Loam), Bt (Clay), and Bqm (Duripan or hardpan).



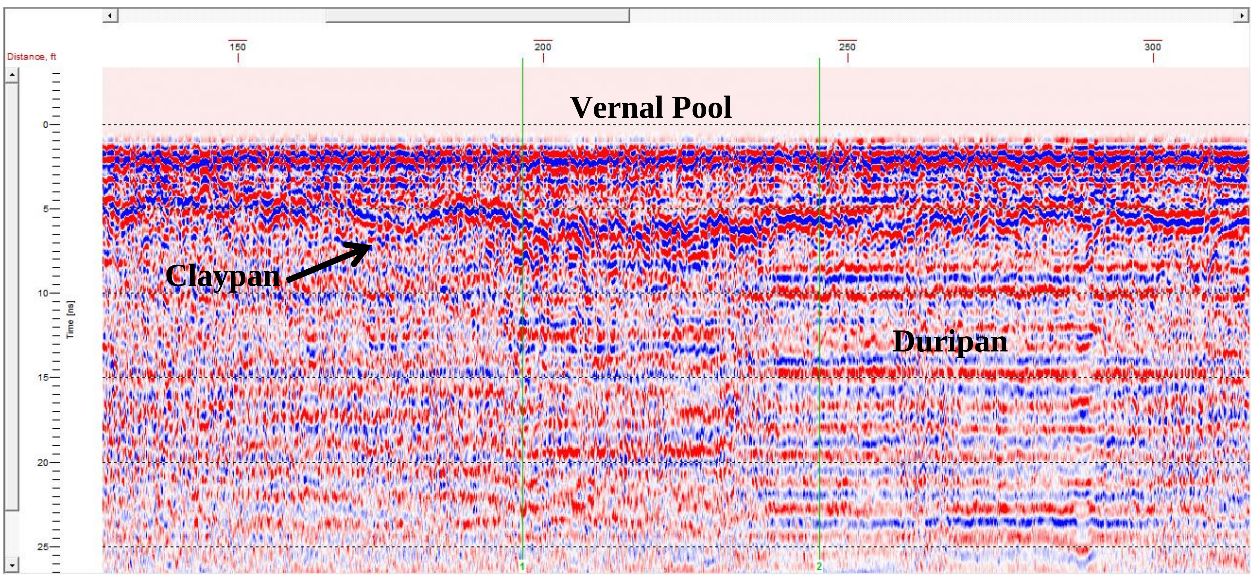
The 30 GPR transects (Appendix C) show soil profiles consistent with both the Cometa and Fiddyment soils. In fact, the GPR profiles indicate that there are areas throughout the site that have a distinct claypan and hardpan. Both claypan and hardpan are common throughout the site, and some areas have a more distinct claypan or duripan. Grading of the site probably removed much of the loam soils in the upper horizons placing the claypan near the soil surface. A claypan near the soil surface is more difficult to detect in the GPR because of the change in density measured as the energy wave travels from the air above the soil and into the soil. A claypan or duripan is not always present because the soil has been altered or more specifically eroded due to movement of the creek. Figure 11 shows where the claypan has probably been eroded by the creek. That area adjacent to the creek has lost the normal soil profile due to erosion and has become an incipient soil or one that is poorly developed, and these are referred to as Xerofluvents but at the Mourier East site, they still have a hardpan (Appendix A).

Figure 11 Shows the Claypan No Longer Well Defined Near the Creek. The Fluctuations in the Creek Positon Probably Cut Into the Claypan. The Soils Immediately Next to the Creek May Not Be Suitable for Restoring Vernal Pools. Specific GPR Surveys Are Needed to Identify Suitable Sites (Transect DAT 49)



The Mourier East site has numerous small vernal pools and seasonal wetlands. GPR surveys included transects across the vernal pools to gather information on the soil profile in the surrounding uplands and the horizons immediately below the vernal pool basin. Figure 12 shows a transect that included a vernal pool approximately 50 feet in diameter. The claypan beneath the vernal pool is deeper than the uplands. This is unusual because in most natural vernal pools the claypan is typically closer to the surface due to the low topography of the basin and as the topographic elevation increases outside the pool the claypan is observed to decrease in depth. The grading of the landscape probably accounts for this unusual situation where the surface soil was graded, and the soil was pushed into the vernal pool basin in an attempt to make the landscape of equal grade for agricultural purposes.

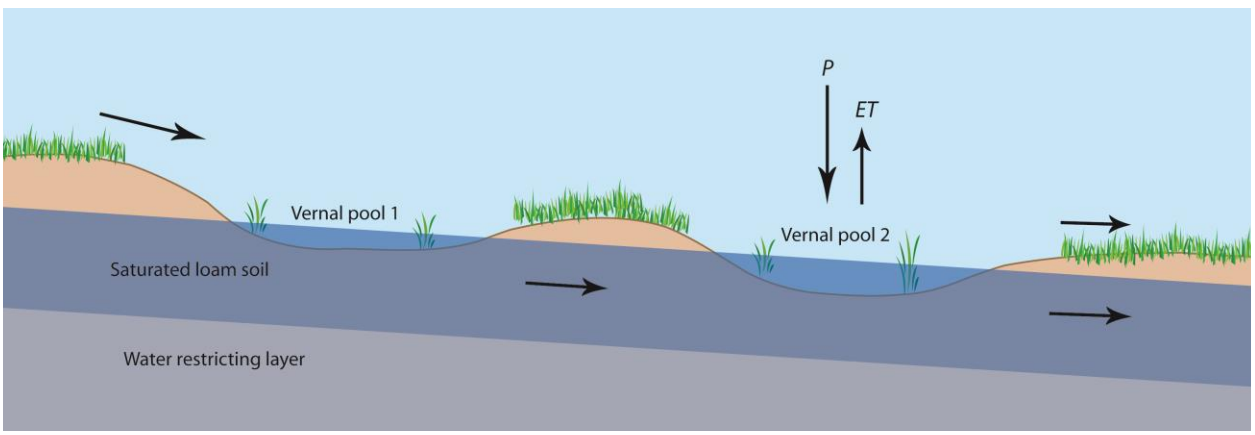
Figure 12 Shows GPR Transect DAT 63 That Includes a Vernal Pool, which is Underlain by a Distinct Claypan and a Hardpan.



Hydrology

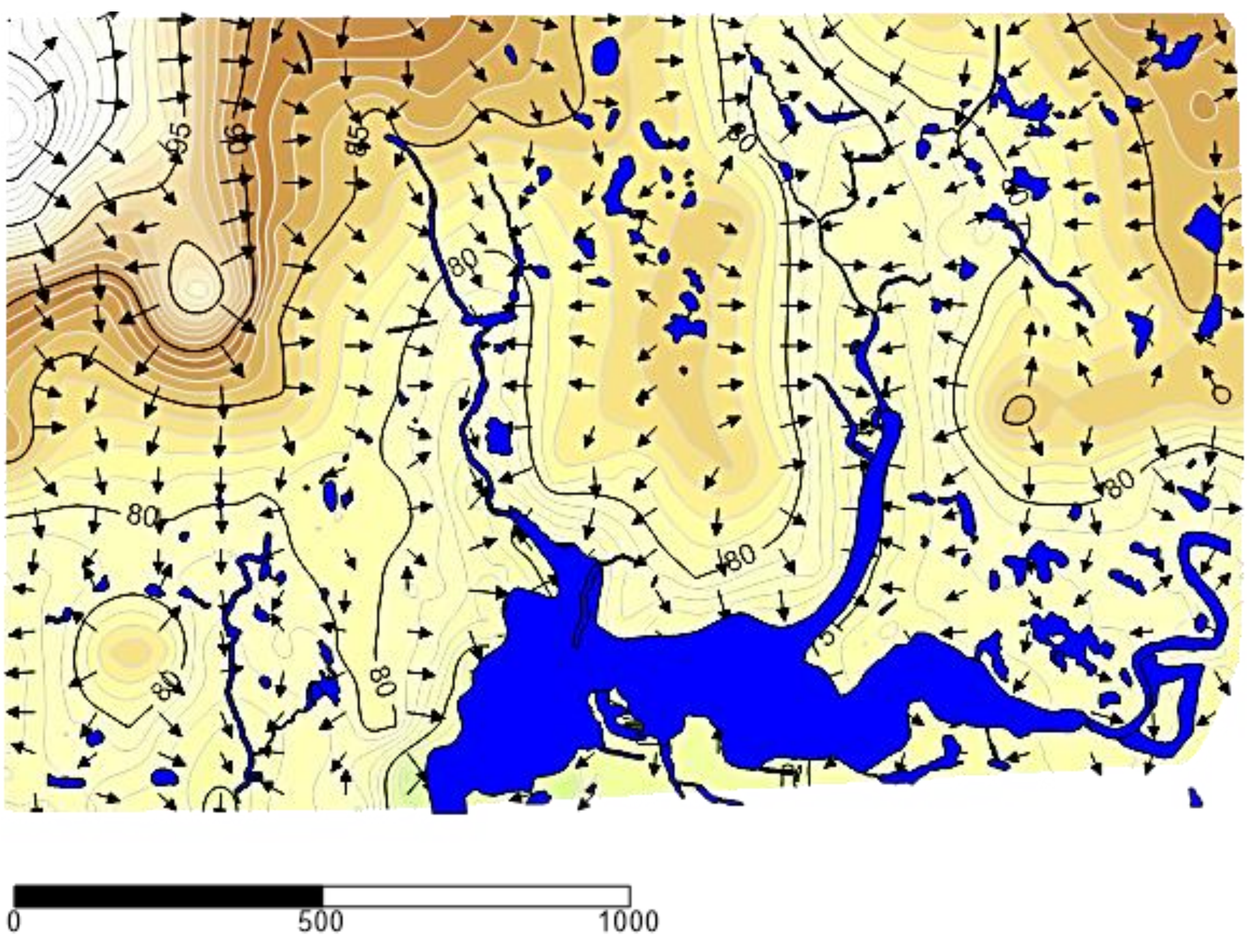
The hydrology of a vernal pool landscape depends on the area of the upland that contributes water to the pools and swales, the slope of the uplands, the depth of soil above the water-restricting layer, discharge out of the pools and swales downslope, and the meteorological variables (McCarten et al. 2016). Figure 13 shows a conceptual cross-section of a vernal pool landscape with subsurface water flow over the water-restricting layer. The larger the contributing upland is to the vernal pool the longer the hydroperiod or period of inundation within the pool. The cascading of vernal pools connected by swales allows for the combined use of upland water inputs and additional water input downslope contributed by direct precipitation. The depth of the soil to the hardpan determines the amount of water needed for the water table to extend above the soil surface creating the pool. Forty to fifty percent of the dry soil is air space and, therefore, requires that amount of water to cause saturation.

Figure 13 Conceptual Cross Section of a Vernal Pool Landscape Showing Water Table and Direction of Flow



The water flow within the vernal pool landscape determines the orientation of the vernal pool swale system. The slope of the landscape determines the rate of flow into the vernal pools. The slope of the hardpan was consistent with the slope of the surface topography in most cases. A vector flow model predicting the direction of surface water flow and the subsurface flow for the site based on topography is shown in Figure 14. The direction of water flow follows the downslope path which indicates the natural direction water would flow for a vernal pool landscape after restoration.

Figure 14 Vector Flow Map Showing Direction of Surface Water Flow and Direction of Subsurface Water Table Flow



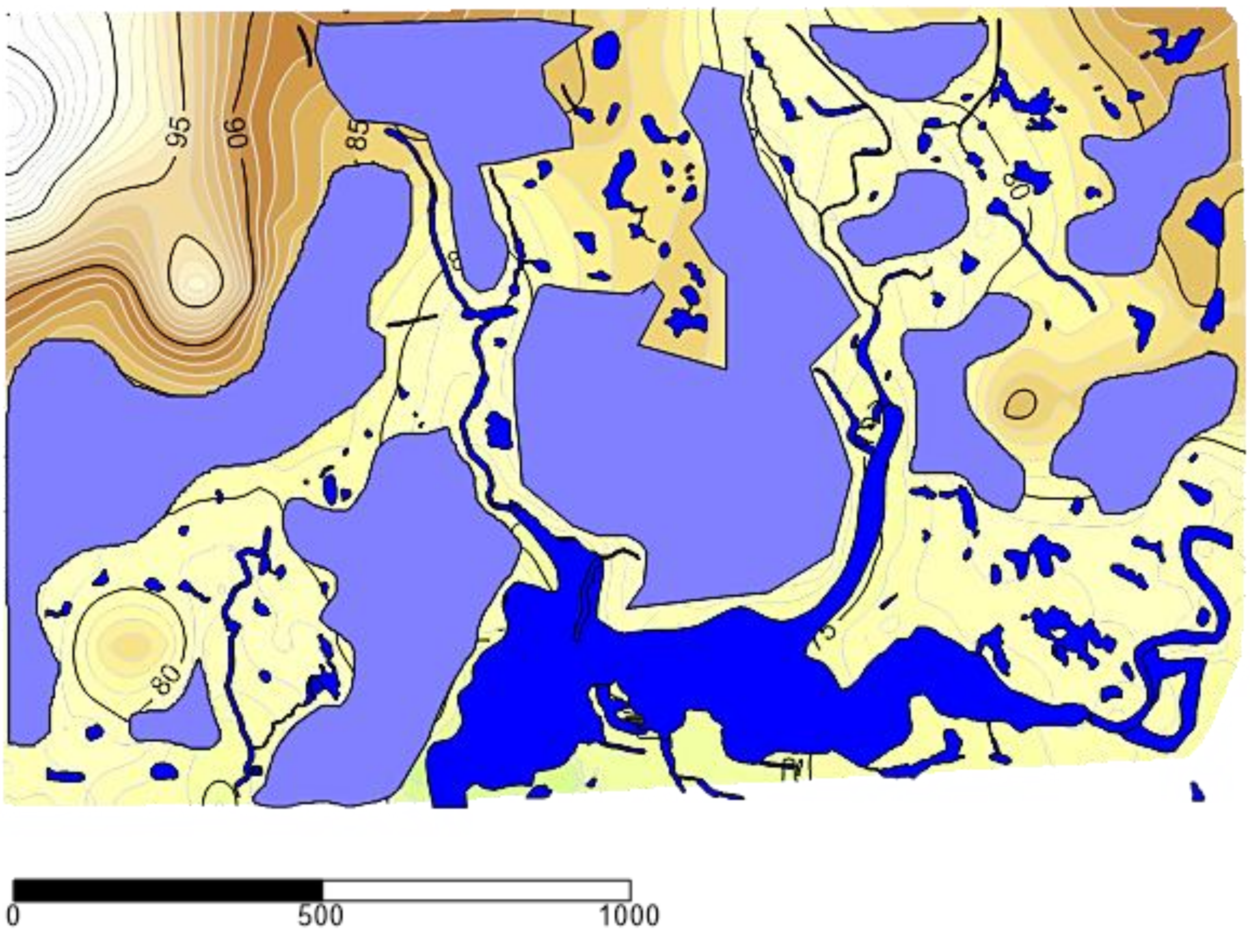
The vector flow map (Figure 14) indicates there are areas of directional, downslope flow from the uplands generally towards the creek. The topography of the site includes several upland areas that are too steep to support vernal pools but these areas provide an important source of water flow down the slope to existing wetlands, the creek and potentially to restored wetland. Appendix B shows a series of cross-sections of the landscape that provide information on the slopes and specifically identifies where the slope is gradual enough to support vernal pool restoration.

Discussion

The Mourier East property historically supported more vernal pools than occur today due to historical land grading activities that occurred as far back as 1947 (Figure 3). It cannot be determined precisely if all the existing vernal pools and seasonal wetlands were former wetlands or remnants of former wetlands but it is very likely they are remnants. The topography of the landscape and field observations of extensive areas of very shallow depressions suggests there was an extensive vernal pool landscape was present. The filling of those vernal pools resulted in reduced area and depth causing loss of hydrological functioning. Today, the depressions support some vernal pool plants and have been identified as vernal pools in the jurisdictional wetland delineation while other depressions are dominated by non-native plants that meet the wetland indicator status for hydrophytic vegetation. However, in the soil due to filling most likely means the soils are no longer hydric which is important for the native vernal pool wetland plants. Both the Cometa and Fiddyment soil series present on the property is known to have claypan and/or hardpan soil horizons that are required to create a seasonal water table that when exposed in surface depressions form the vernal pools.

The site is very suitable for restoration of vernal pools that once occupied the site. It cannot be determined what the vernal pool density was prior to grading, but it could have been up to 15% or more locally in some parts of the property. Using the topography, profiles, and vector flow model and soil profile data 11 polygons were identified as areas having a high potential for vernal pool restoration (Figure 15). These polygons total 81.6 acres of land with the property and do not contain existing vernal pools and only one or two small seasonal wetlands. These areas should be the focus of restoring vernal pools, but vernal pools could be restored in other areas in association with other seasonal wetlands or vernal pools.

Figure 15 Map Showing 11 Polygons that should be a Focus of Vernal Pool Restoration. The Polygons Total 81.6 acres.



Vernal Pool Density and Restoration

ECORP identified 3.81 acres of existing vernal pools within the 241-acre property at Mourier East. The standard 10% maximum density used by the US Fish & Wildlife Service would indicate 24.1 acres of vernal pools could conceptually exist within the property. Subtracting the 3.81 acres would allow for 20.29 acres of vernal pools. This would suggest that 24.1 acres could be constructed, and a majority would need to be restored within the 81.6 acres identified which would be about 24.9% pool density in the polygons (Figure 15).

A study of natural vernal pool density in Sacramento County found that local catchments could have a density of 14% to over 18% while the overall property density was only 3.5% (Figure 16). A catchment assessment of Mourier East was also conducted (Figure 17). Seven catchments that would have independent hydrology exist, and it is within those catchments the restoration would need to be engineered. The first estimate for vernal pool restoration would be using a range from 14.3 to 18.5% density within the identified polygon area which would be 11.67 acres up to 15.1 acres. This would, of course, require the ability to construct vernal pools within 50 to 100 feet of existing vernal pools. Additional vernal pool restoration could be engineered on a more local basis by detailed analysis of areas outside the polygons but within the catchments assuming the hydrology is suitable.

Figure 16 Catchment Assessment of Vernal Pool Density in Sacramento Area Landscape.

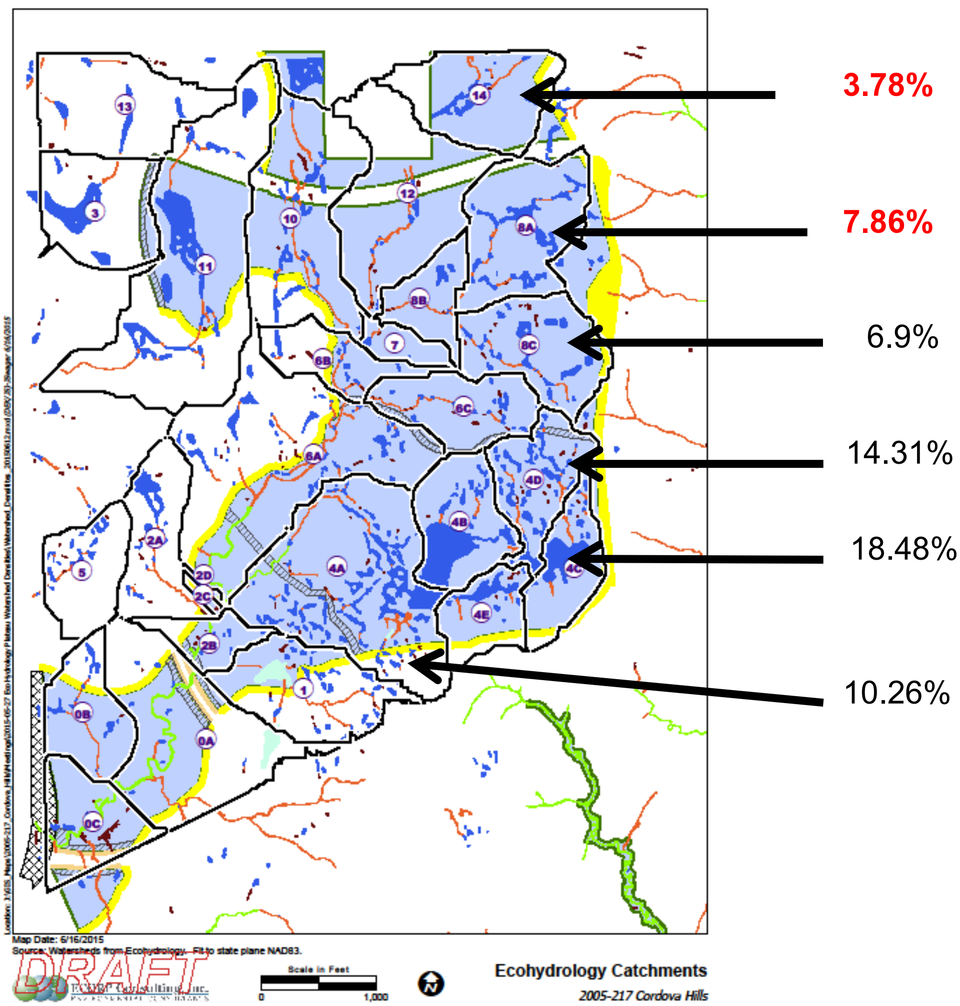
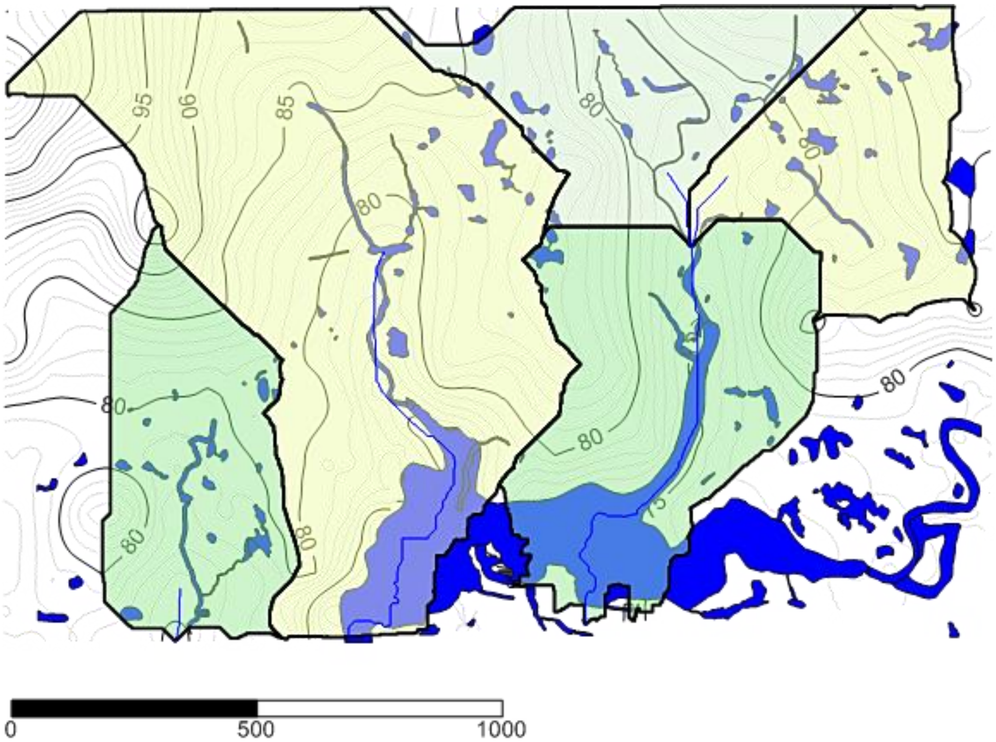


Figure 17 Catchment Structure of Mourier East. Individual Catchments are Shown Divided by Dark Black Lines.



The data gathered for this report can be used to develop a more detailed engineering approach to identifying where specific vernal pools and swales could be restored and shown to be hydrologically functional during below average, average and above average rainfall years. Specific areas identified in this report would have additional topographic data collection and soil subsurface surveys to engineer the size, depth and hydrological flow patterns for individual pools. During the engineering design process evaluating whether additional acres of pools beyond the 11.67 to 15 acres of vernal pool restoration could be determined.

References

Hobson, W.A. and R.A. Dahlgren. 2001. Wetland soils of basins and depressions: Case studies of vernal pools. In Wetland Soils: Genesis, Hydrology, Landscapes, and Classification. J.L Richardson and M.J. Vepraskas eds. CRC Press, New York.

McCarten, N., M.C. Rains, and T. Harter. 2009. Ecohydrology of vernal pool wetland ecosystems. American Geophysical Union. San Francisco, CA.

McCarten, N., T. Harter, A. O'Geen, R. Dahlgren, and G. Fogg. 2016. Geophysical Structure and Meteorological Effects on Vernal Pool Wetland Functioning. Hydrological Processes. In press.

Rains, M.C., G.Fogg, T. Harter, R.Dahlgren, R. Williamson. 2006. The role of perched aquifers in hydrological connectivity and biogeochemical processes in vernal pool landscapes, Central Valley, California. Hydrological Processes

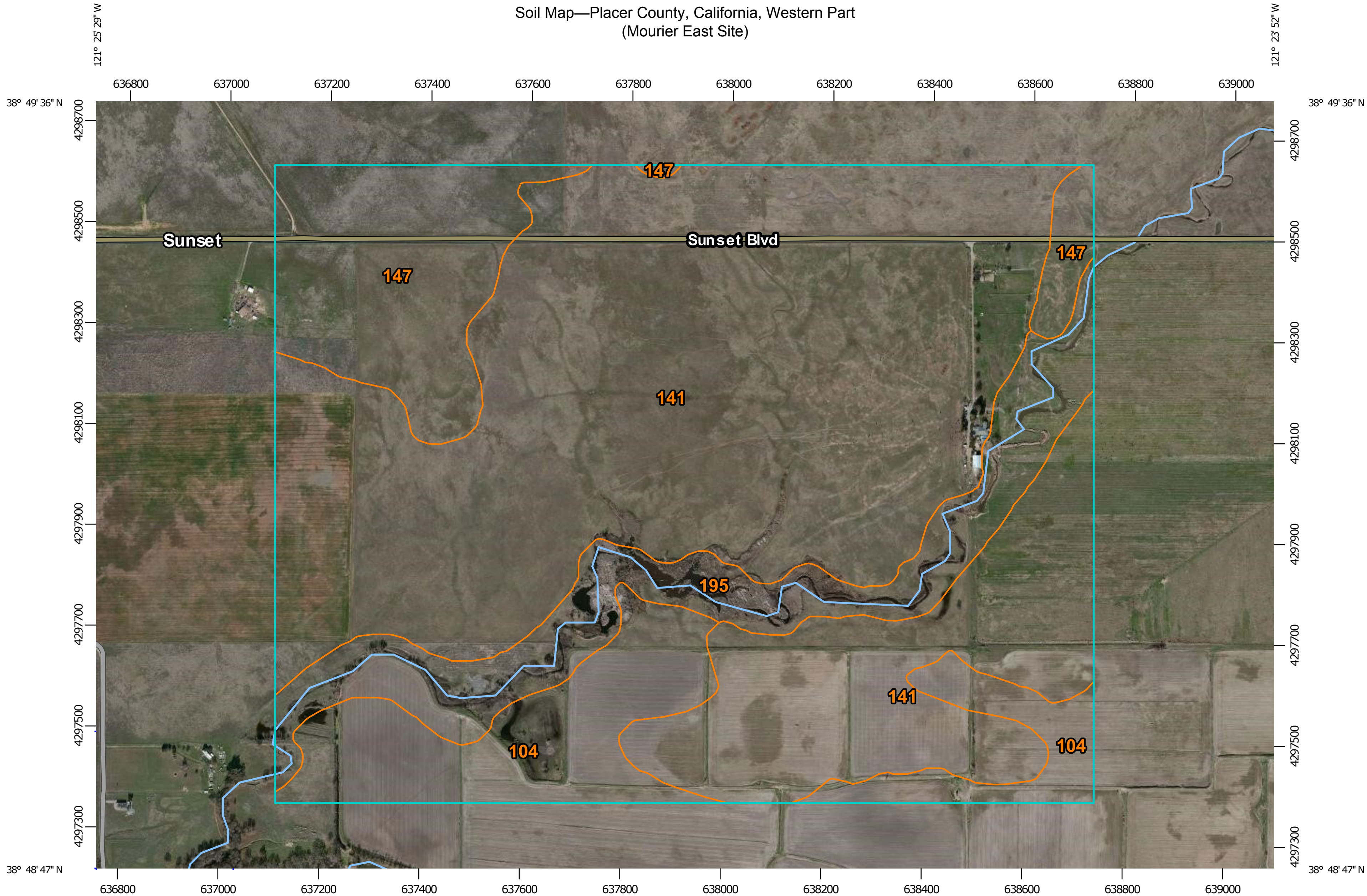
NRCS Web Soils Map. 2016.

Smith, D.W. and W.L. Verrill. 1998. Vernal pool landforms and soils of the Central Valley, California. In The Conference on the Ecology, Conservation, and Management of Vernal Pool Ecosystems. California Native Plant Society, Sacramento.

Appendix A

Natural Resources Conservation Service Soil Series Map

Soil Map—Placer County, California, Western Part
(Mourier East Site)



Map Scale: 1:10,700 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 7, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 2, 2012—Apr 29, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Placer County, California, Western Part (CA620)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
104	Alamo-Fiddyment complex, 0 to 5 percent slopes	60.4	11.8%
141	Cometa-Fiddyment complex, 1 to 5 percent slopes	334.6	65.4%
147	Fiddyment-Kaseberg loams, 2 to 9 percent slopes	58.3	11.4%
195	Xerofluvents, hardpan substratum	58.0	11.3%
Totals for Area of Interest		**511.4**	**100.0%**

Placer County, California, Western Part

141—Cometa-Fiddyment complex, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: hfzk
Elevation: 20 to 400 feet
Mean annual precipitation: 10 to 23 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Fiddyment and similar soils: 35 percent
Cometa and similar soils: 35 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cometa

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 18 inches: sandy loam
H2 - 18 to 29 inches: clay
H3 - 29 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: CLAYPAN (R017XD093CA)

Description of Fiddyment

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from siltstone

Typical profile

H1 - 0 to 12 inches: loam
H2 - 12 to 28 inches: clay loam
H3 - 28 to 35 inches: indurated
H4 - 35 to 39 inches: weathered bedrock

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 35 inches to duripan; 35 to 39 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: CLAYPAN (R017XD093CA)

Minor Components

Kaseberg

Percent of map unit: 10 percent

San joaquin

Percent of map unit: 10 percent

Ramona

Percent of map unit: 5 percent

Alamo

Percent of map unit: 5 percent

Landform: Depressions

Data Source Information

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 7, Sep 17, 2014

Placer County, California, Western Part

195—Xerofluvents, hardpan substratum

Map Unit Setting

National map unit symbol: hg19
Elevation: 300 to 3,500 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Xerofluvents and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerofluvents

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 40 inches: stratified loam to clay loam
H2 - 40 to 44 inches: indurated

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: About 40 inches to duripan
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D

Minor Components

Alamo

Percent of map unit: 10 percent

Landform: Depressions

Unnamed

Percent of map unit: 3 percent
Landform: Drainageways

Unnamed

Percent of map unit: 2 percent
Landform: Drainageways

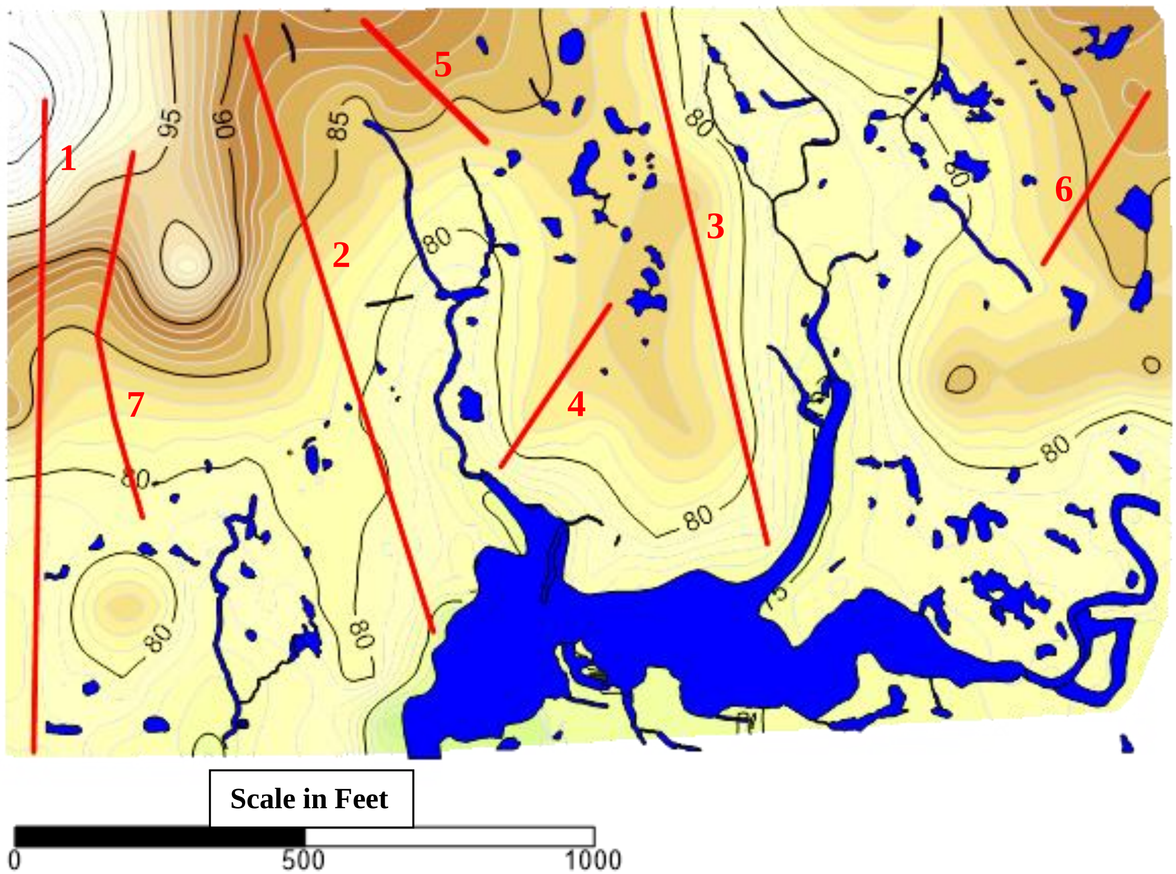
Data Source Information

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 7, Sep 17, 2014

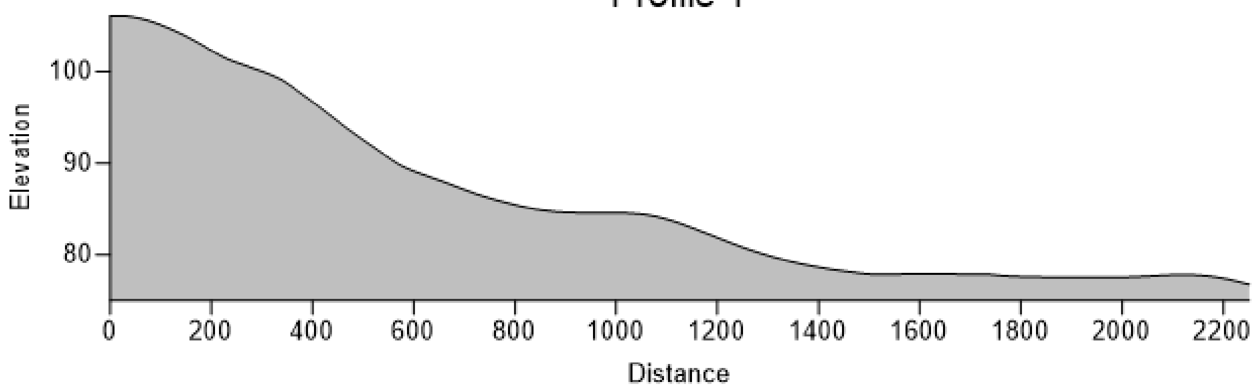
Appendix B

Landscape Profiles

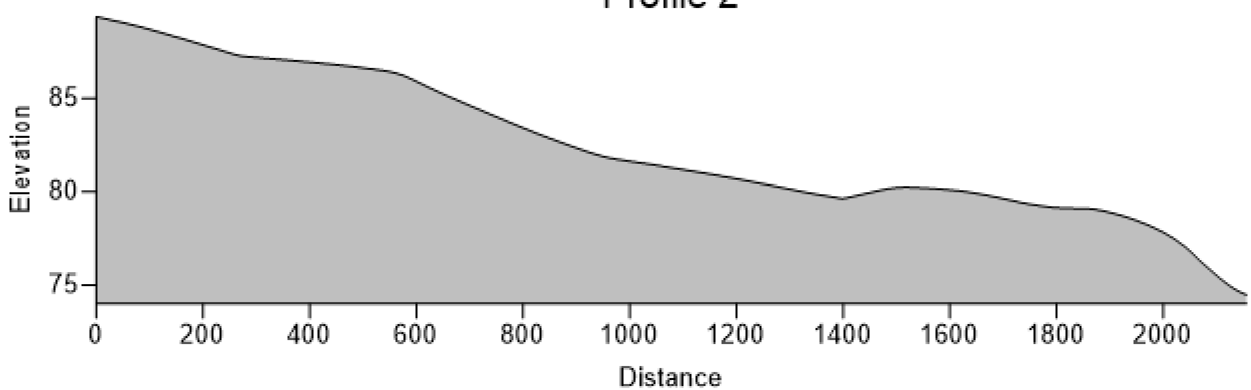
Lanscape Profile, Shown as Red Lines and Red Numbers, Indicate Location of Cross-Section Analysis Given Below



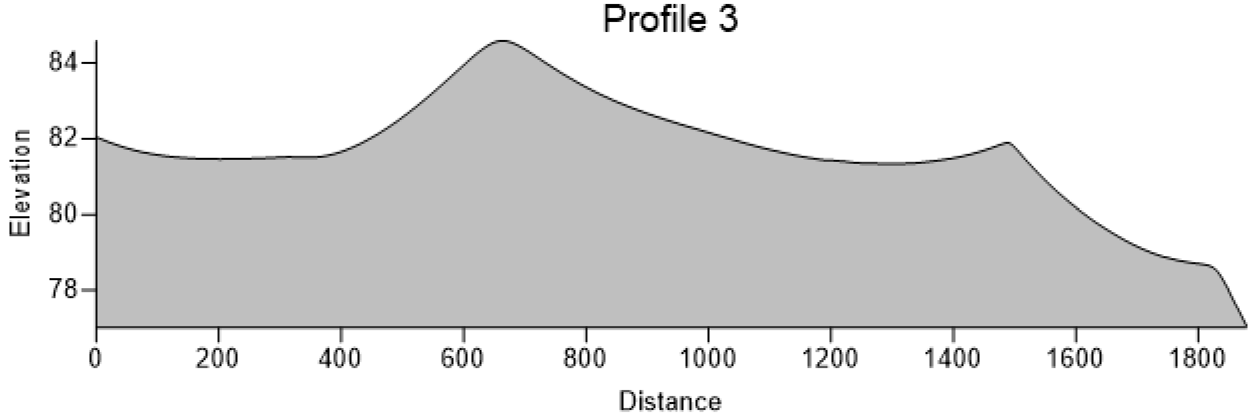
Profile 1

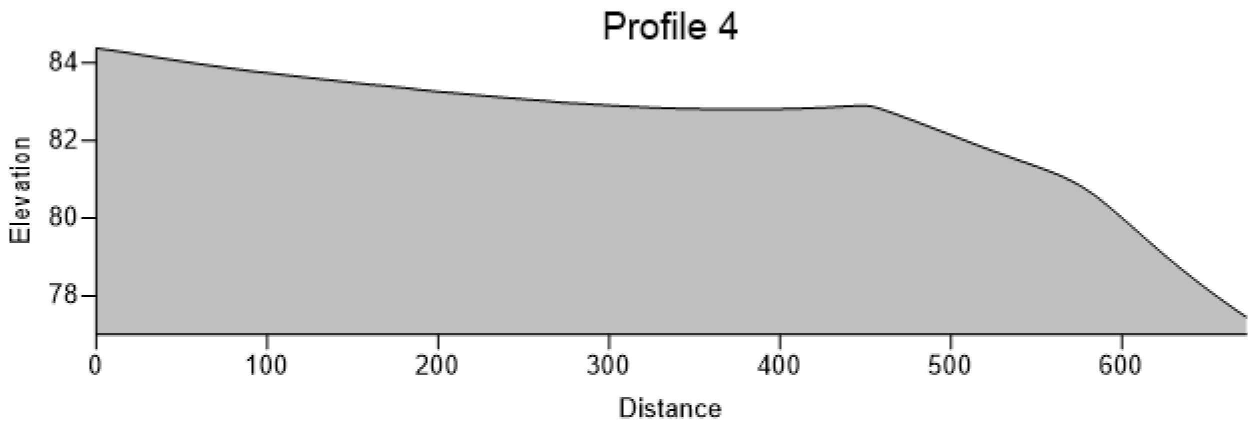


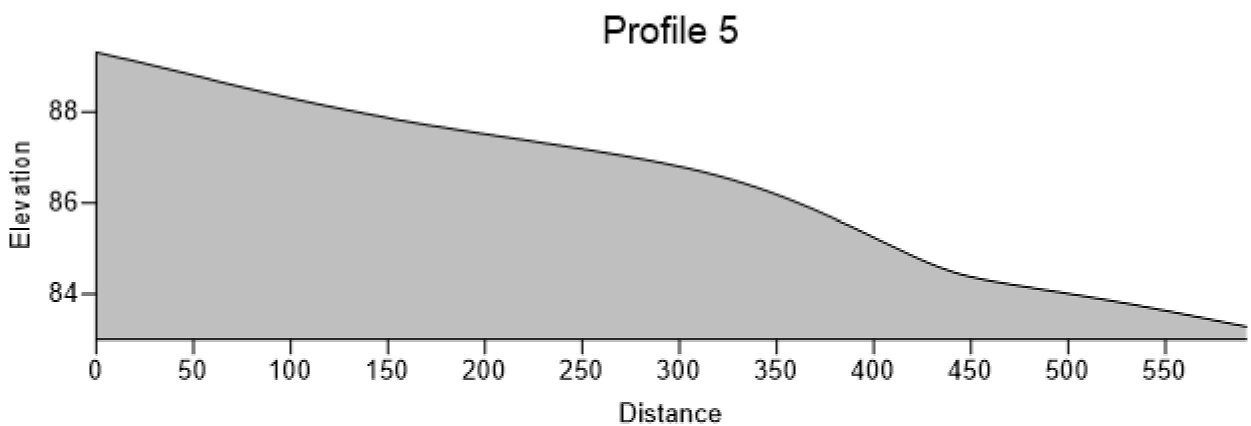
Profile 2

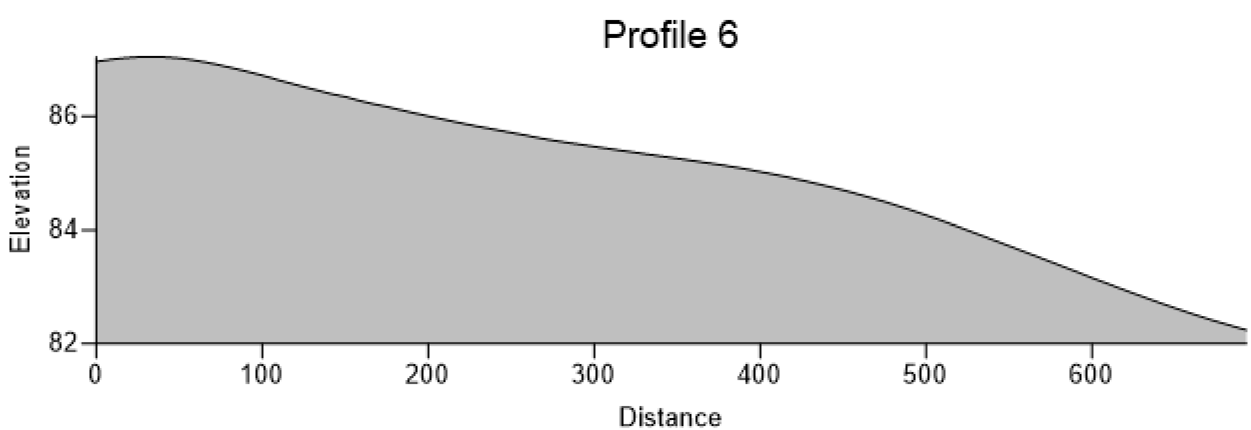


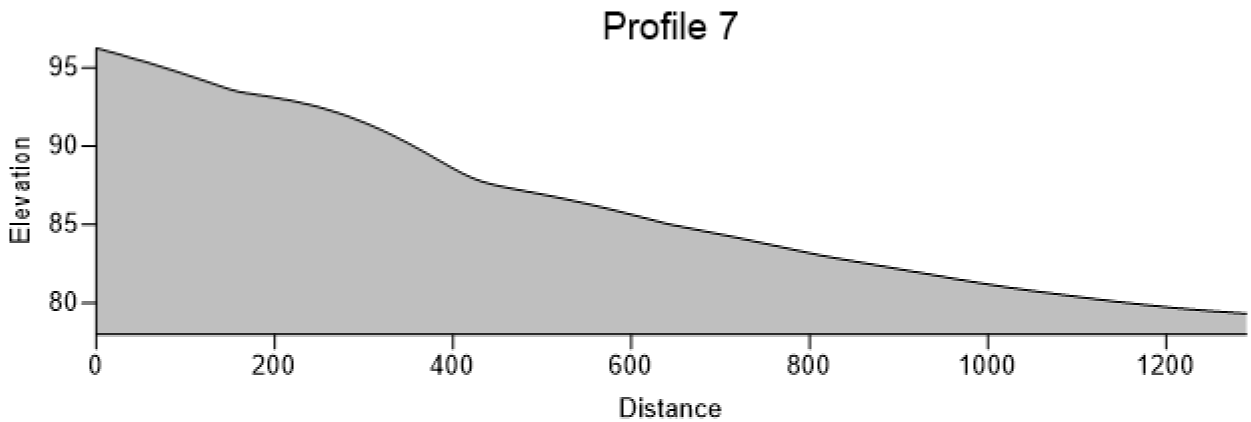
Profile 3




Profile 4
Elevation
84
82
80
78
0
100
200
300
400
500
600
Distance


Profile 5
Elevation
88
86
84
0
50
100
150
200
250
300
350
400
450
500
550
Distance

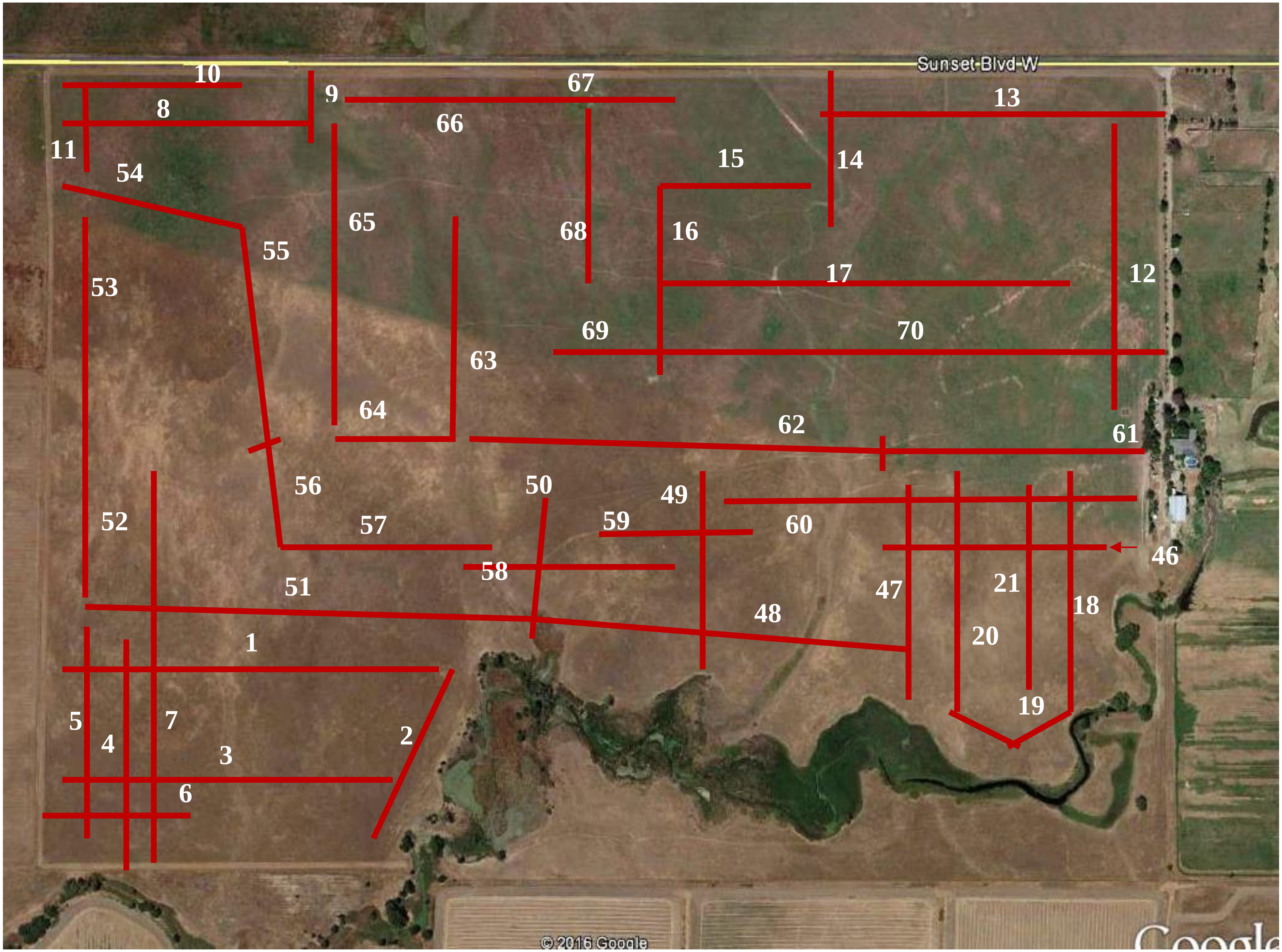

Profile 6
Elevation
86
84
82
0
100
200
300
400
500
600
Distance


Profile 7
Elevation
95
90
85
80
0
200
400
600
800
1000
1200
Distance

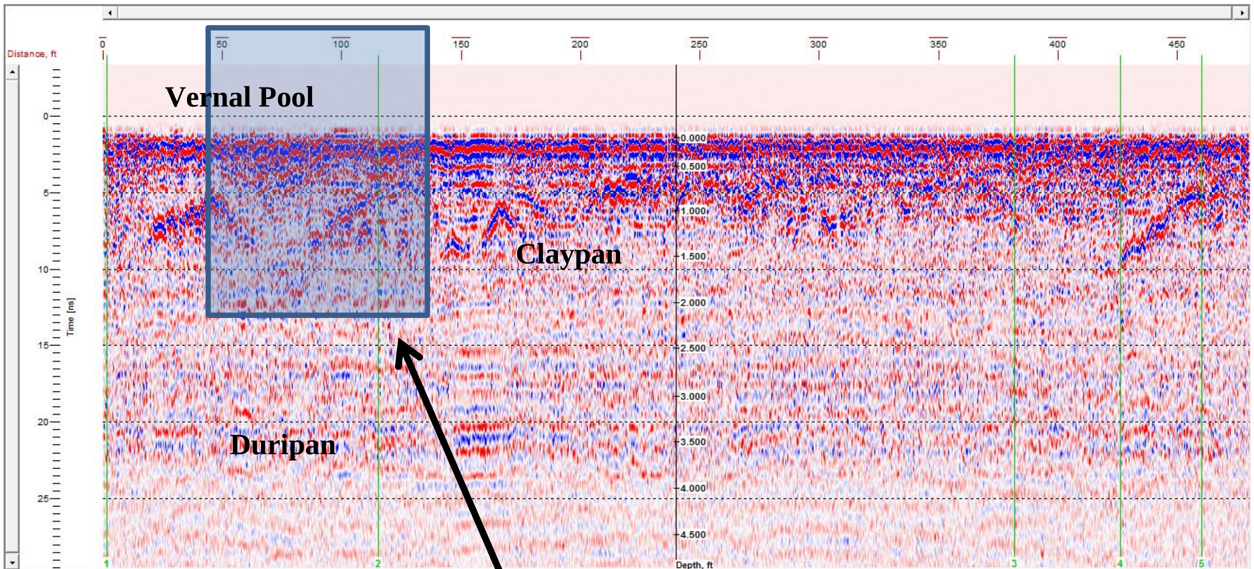
Appendix C

Ground Penetrating Radar Profiles

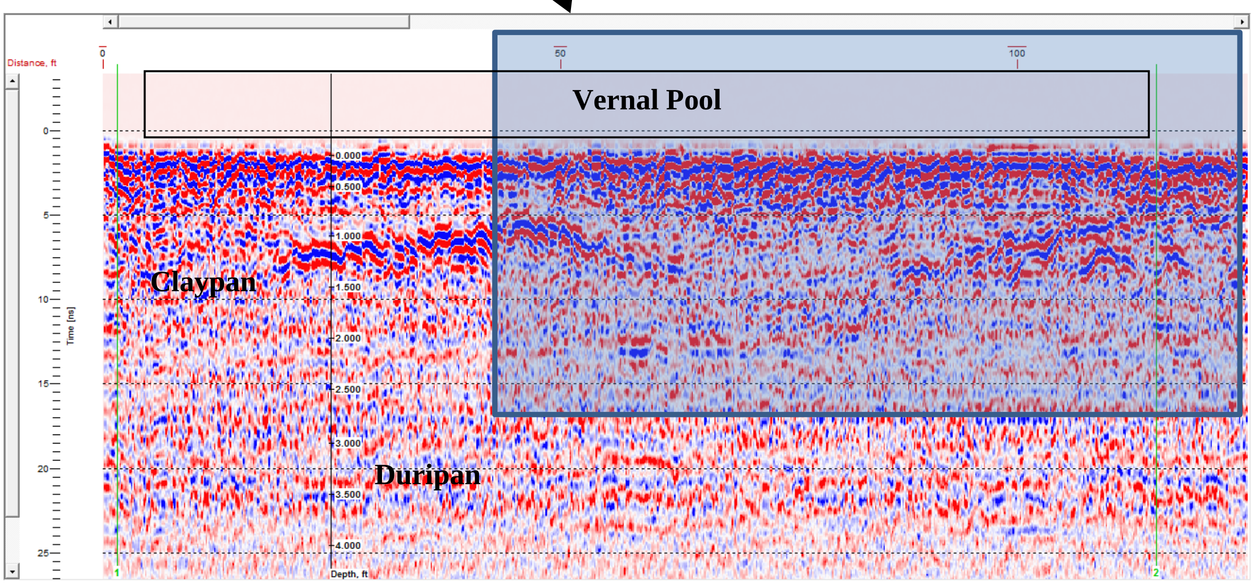
Mourier East Map Showing GPR Transects. GPR Profiles Shown in Appendix are Labelled by Transect Number



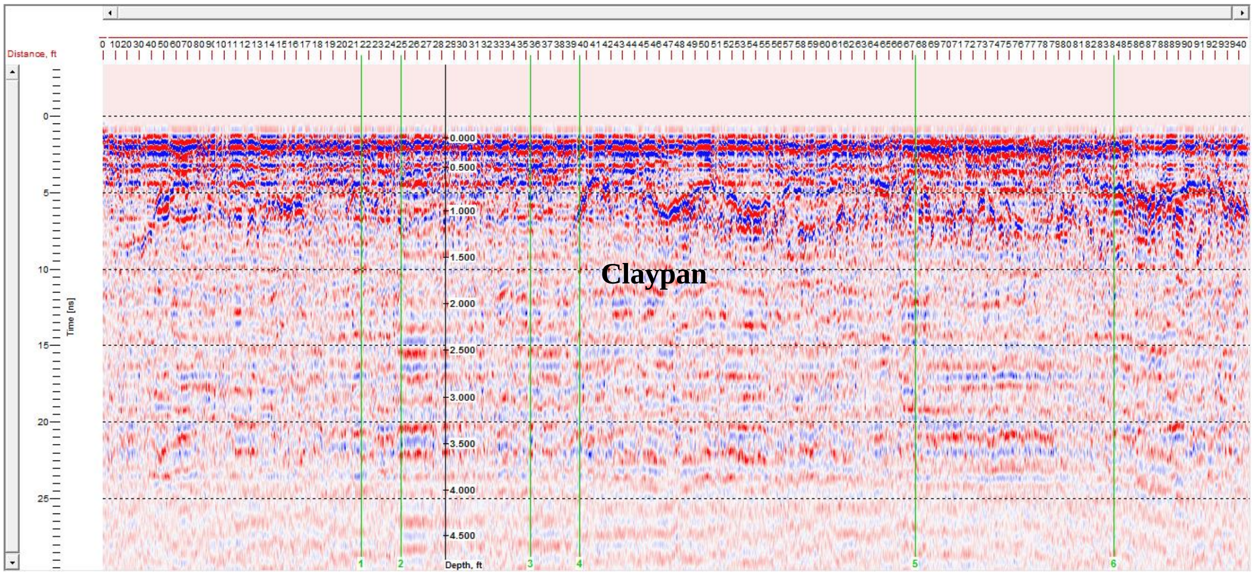
DAT 67 Showing a vernal pool with claypan varying in depth with duripan below. The claypan is distinct due to the variation or wavy variation associated with differences in topography



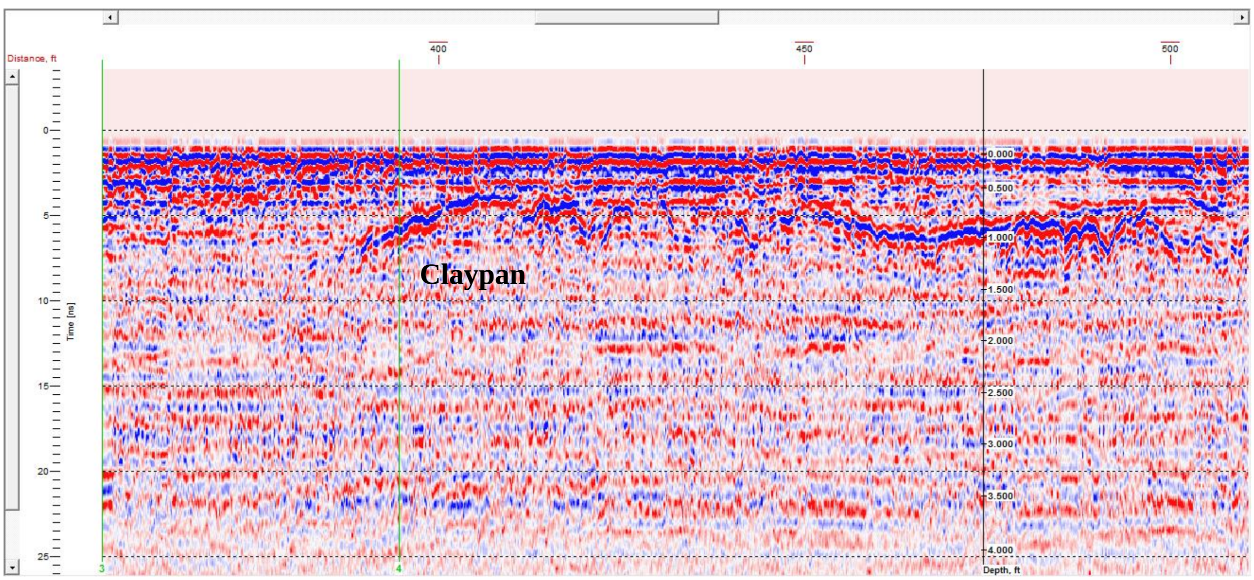
DAT 67 Zoom



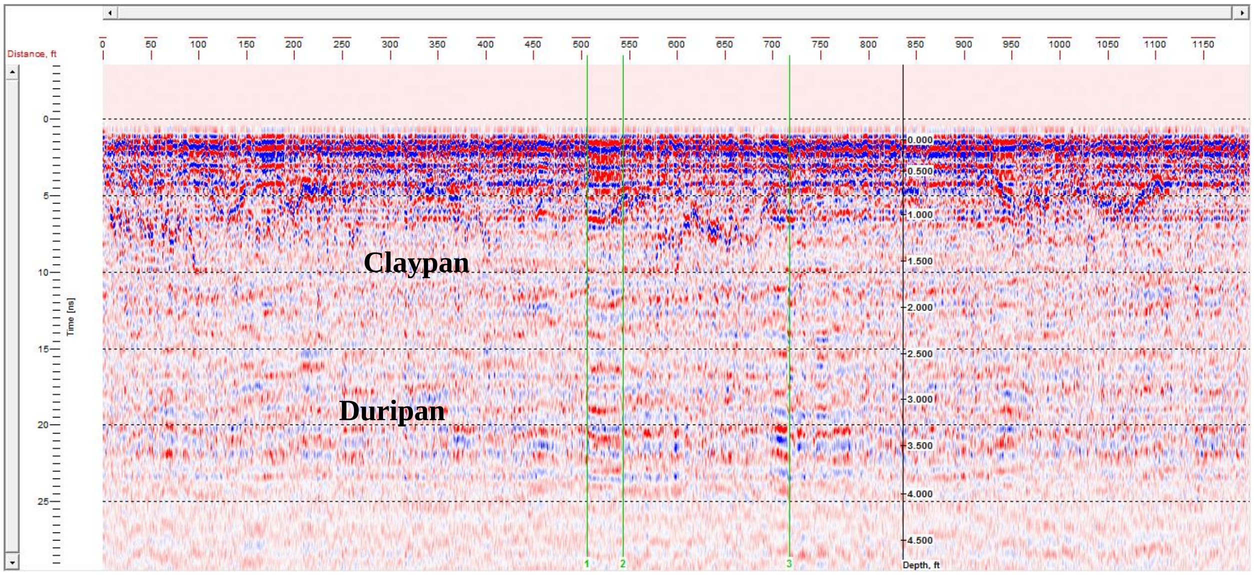
DAT 66 Showing a vernal pool with claypan varying in depth with duripan below. The claypan is distinct due to the variation or wavy variation associated with differences in topography



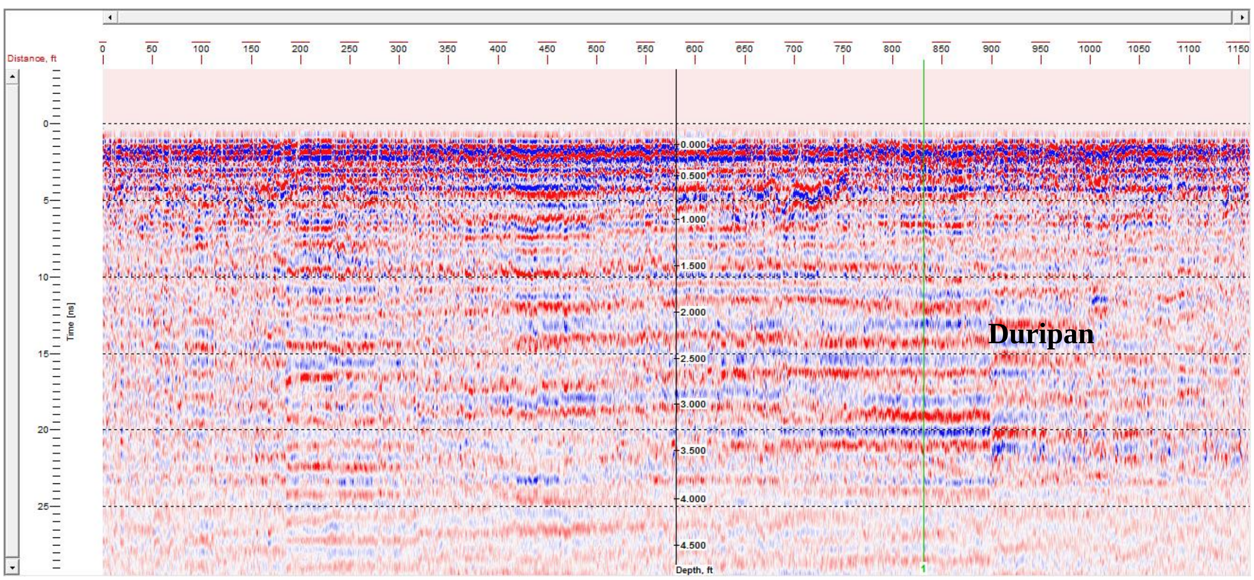
Dat 66 Zoom



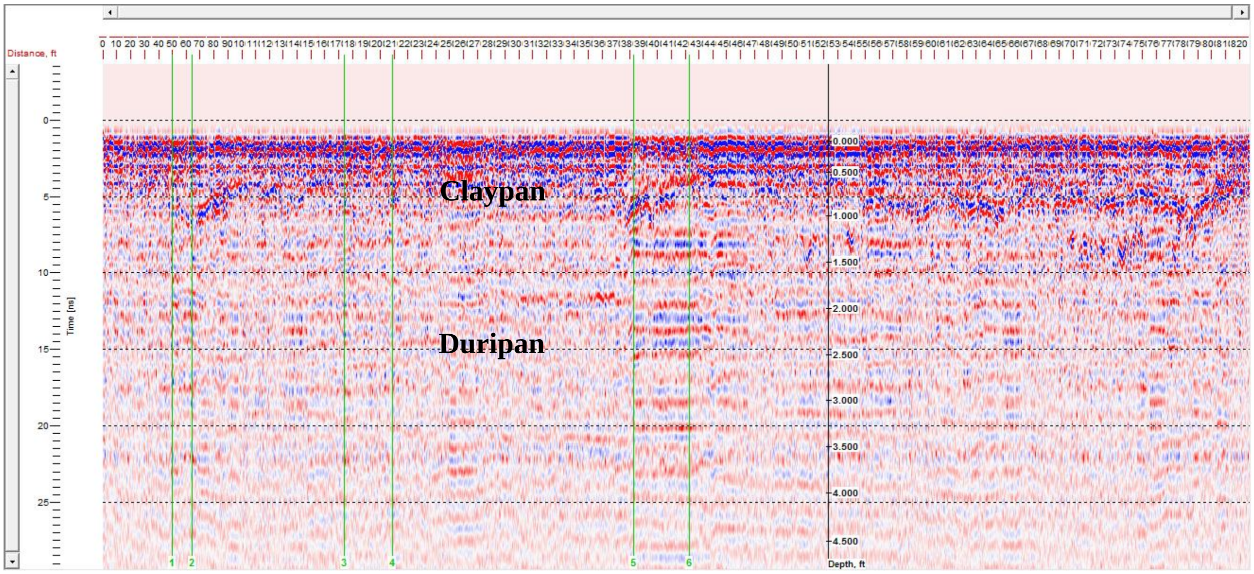
DAT 68 The claypan is distinct due to the variation or wavy variation associated with differences in topography



DAT 65

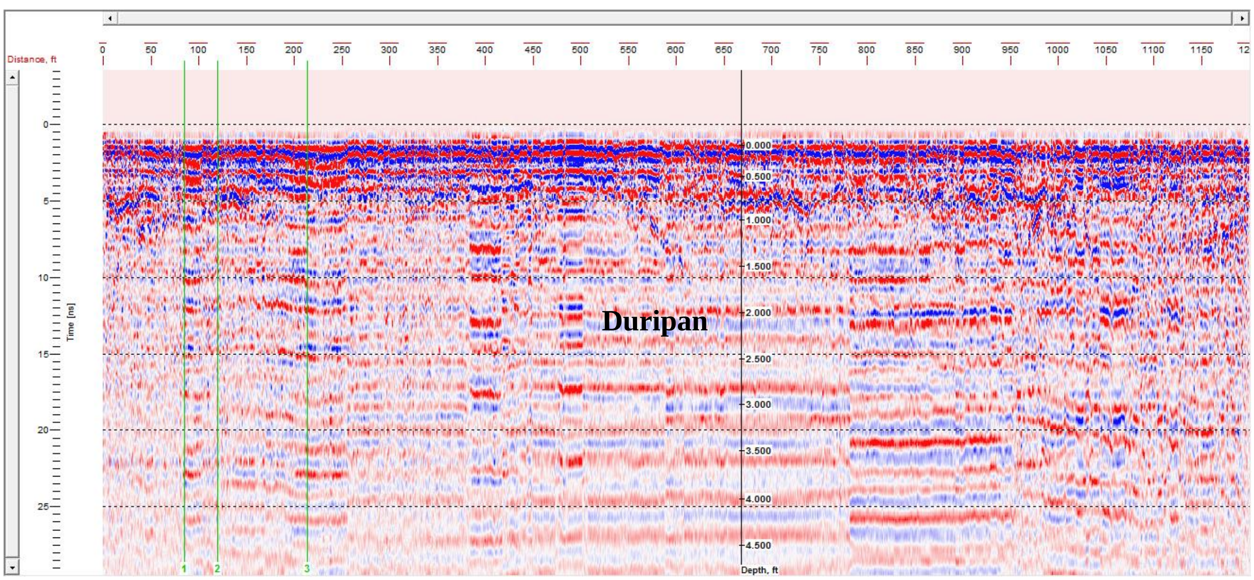


DAT 57



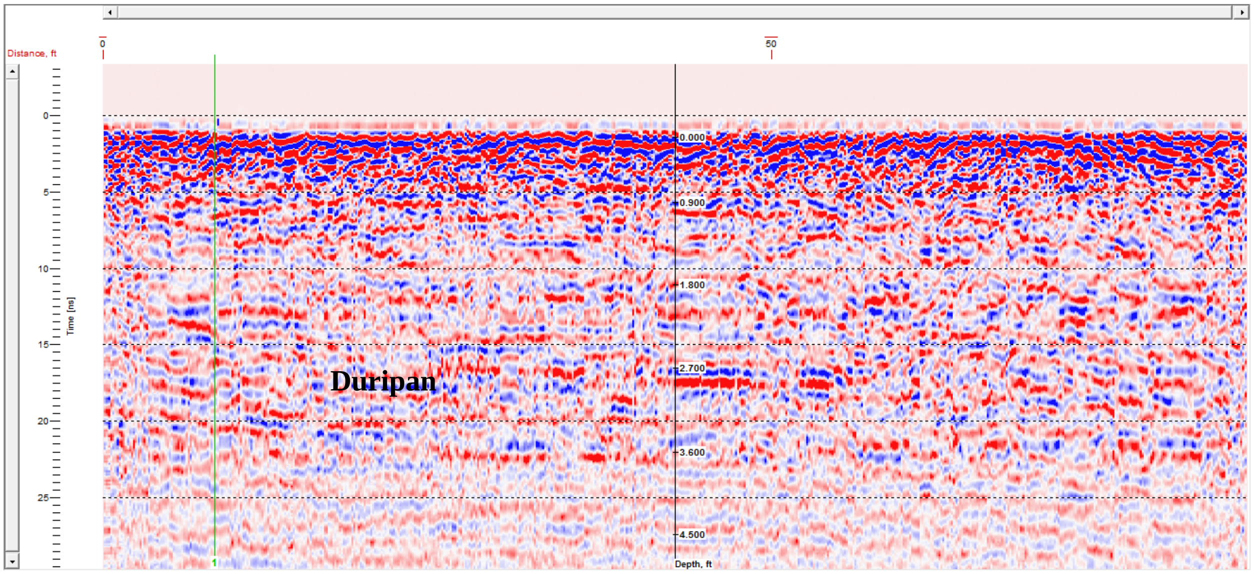
Distance, ft
Time [ns]
Claypan
Duripan
Depth, ft

DAT 60

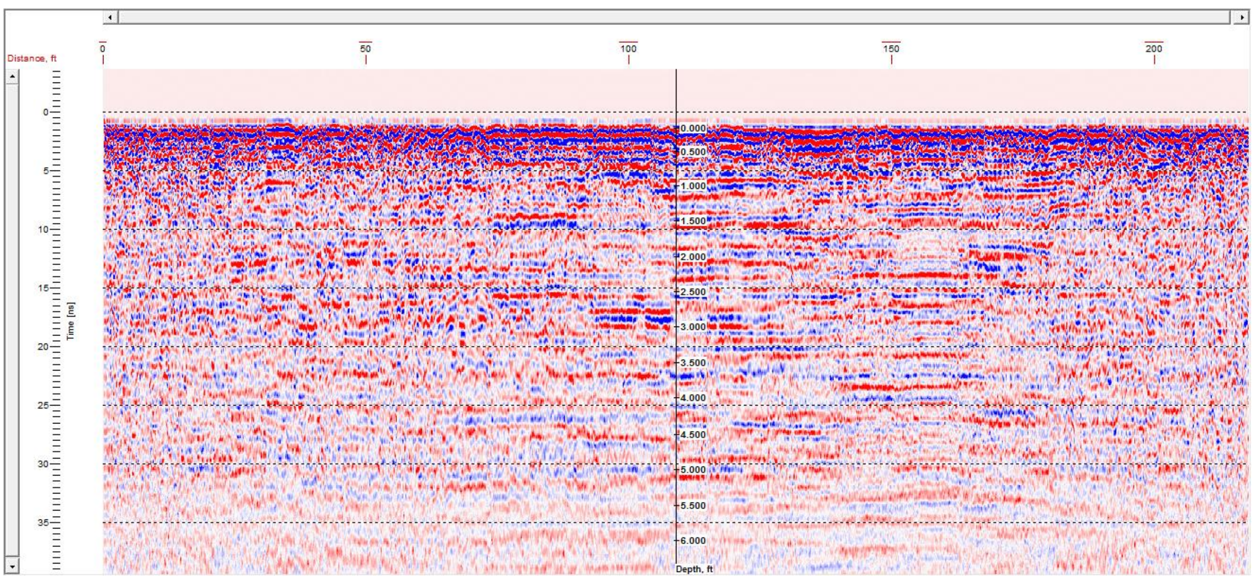


Distance, ft
Time [ns]
Duripan
Depth, ft

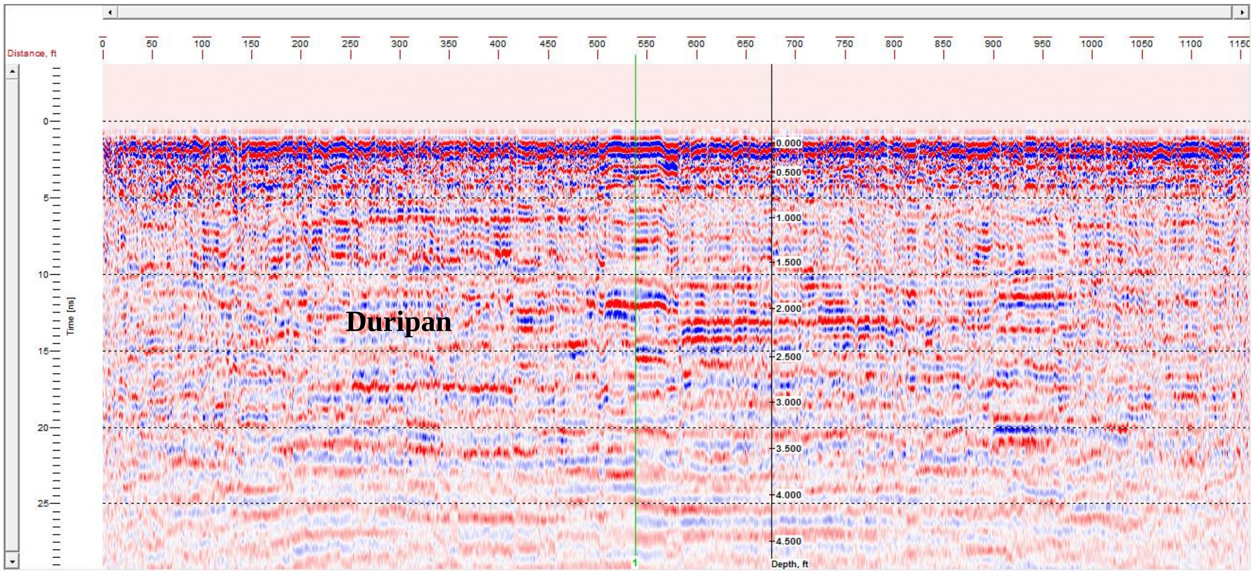
DAT 1 Strong duripan signature and possibly parent rock



DAT 2

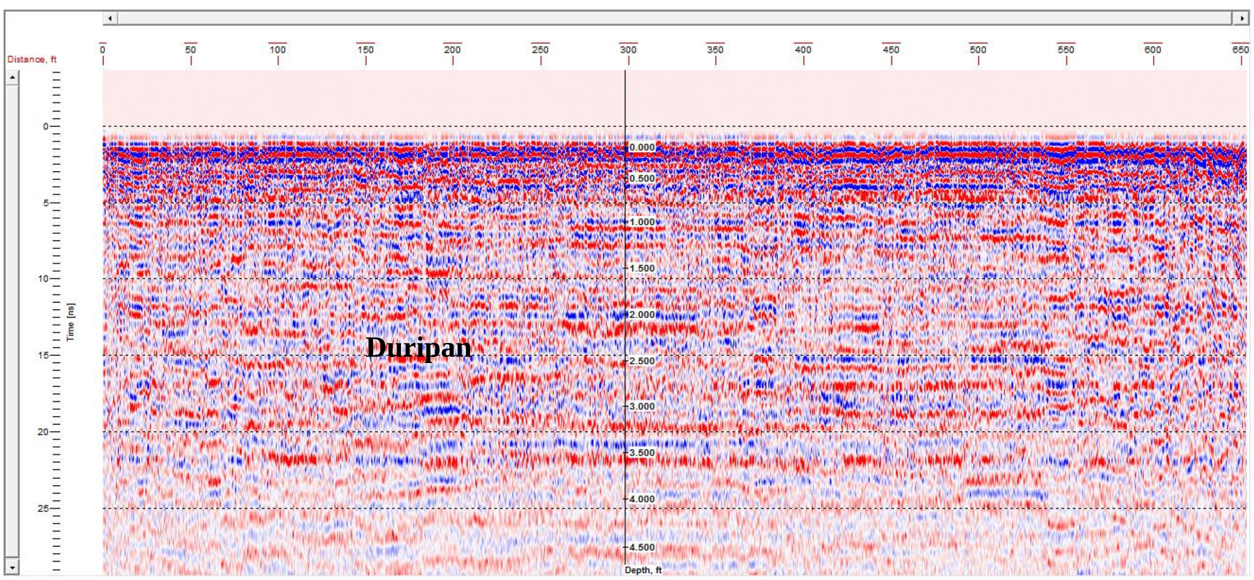


DAT 3



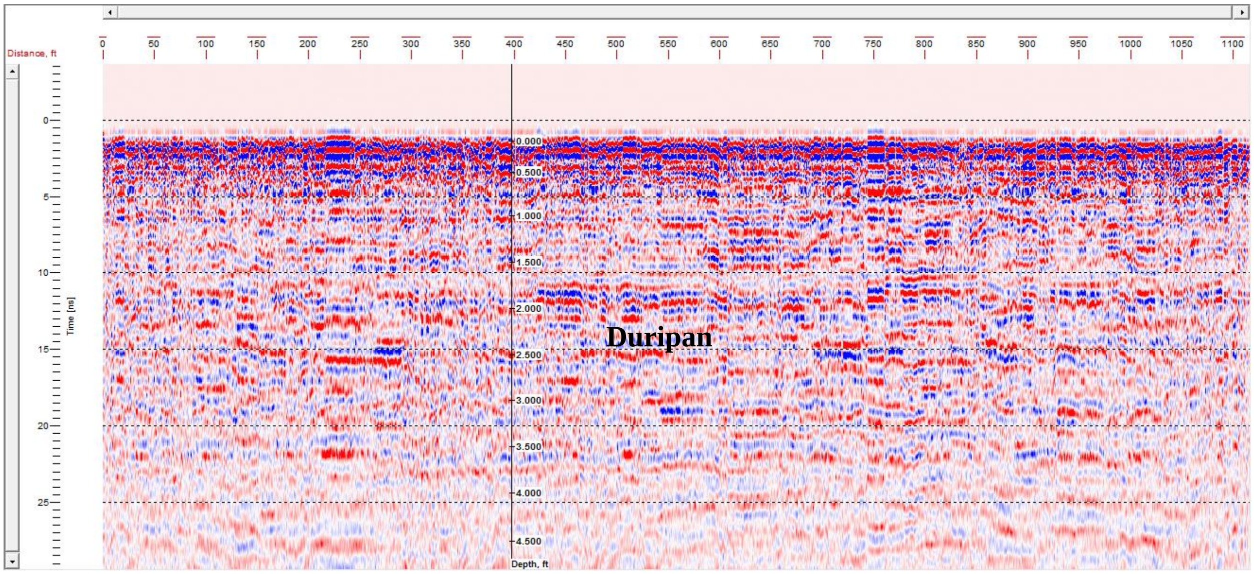
Distance, ft
Time [ns]
Duripan
Depth, ft

DAT 7

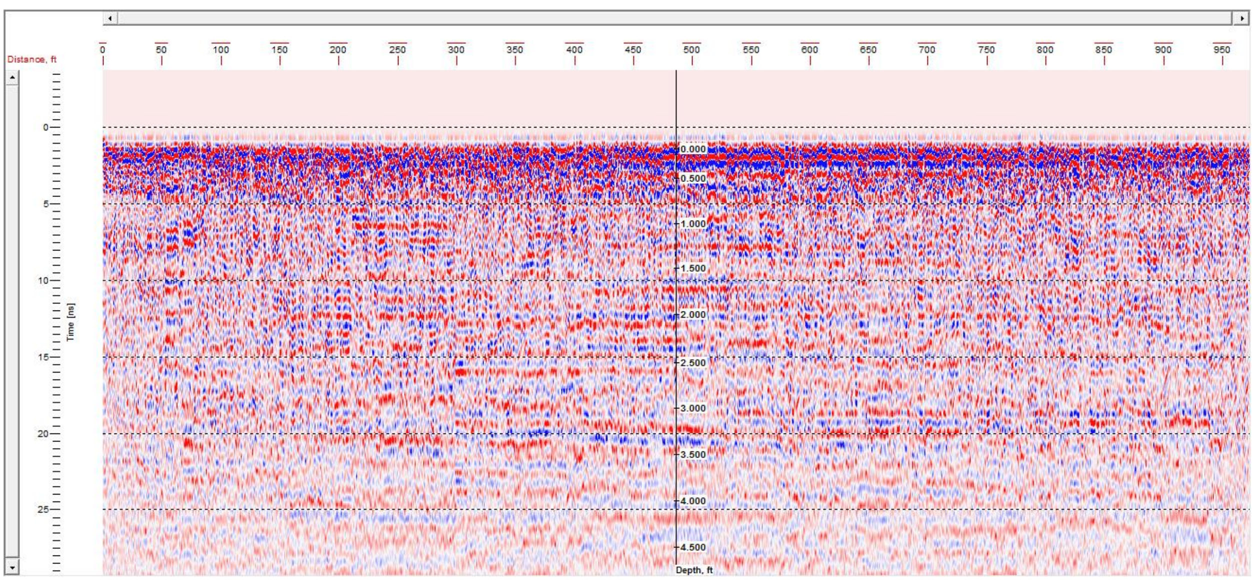


Distance, ft
Time [ns]
Duripan
Depth, ft

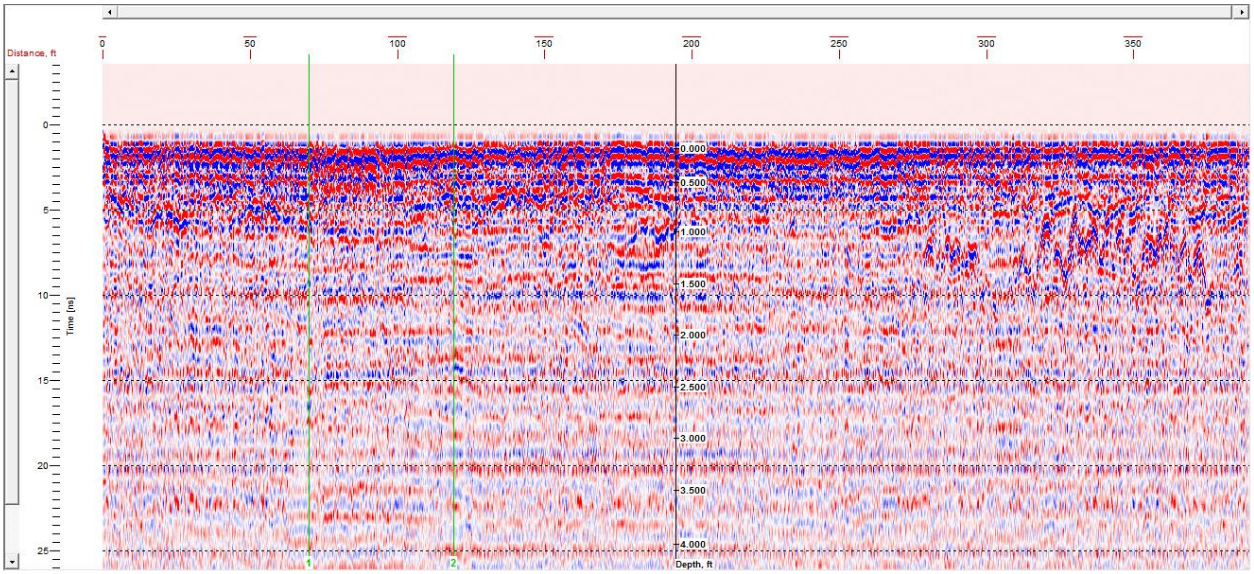
DAT 8


Distance, ft
Time [ns]
Depth, ft
Duripan

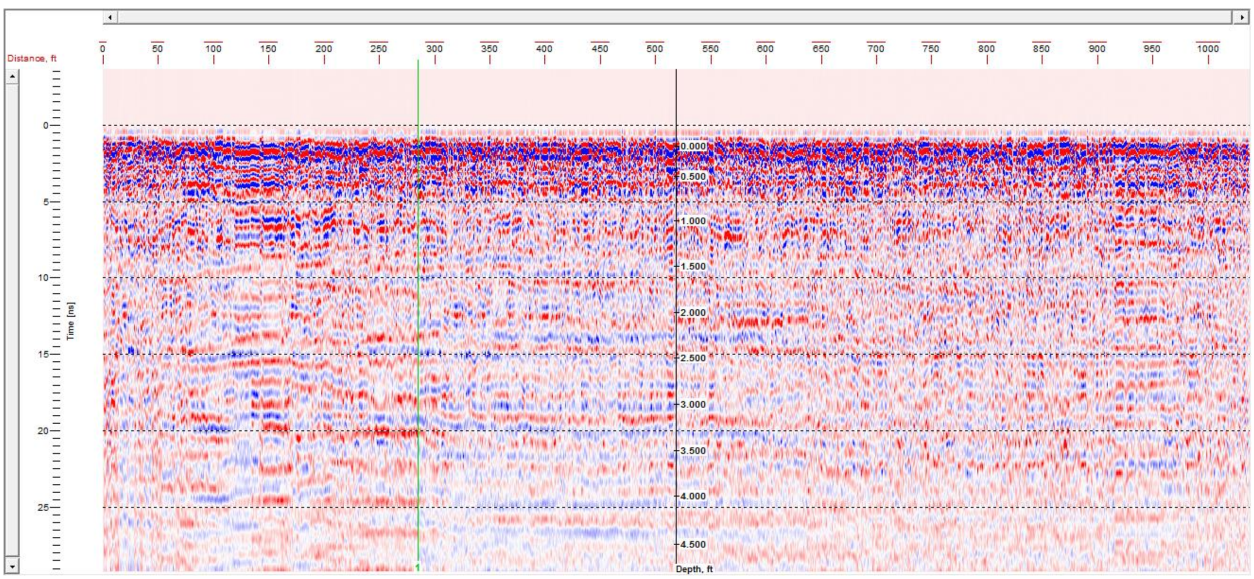
DAT 12


Distance, ft
Time [ns]
Depth, ft

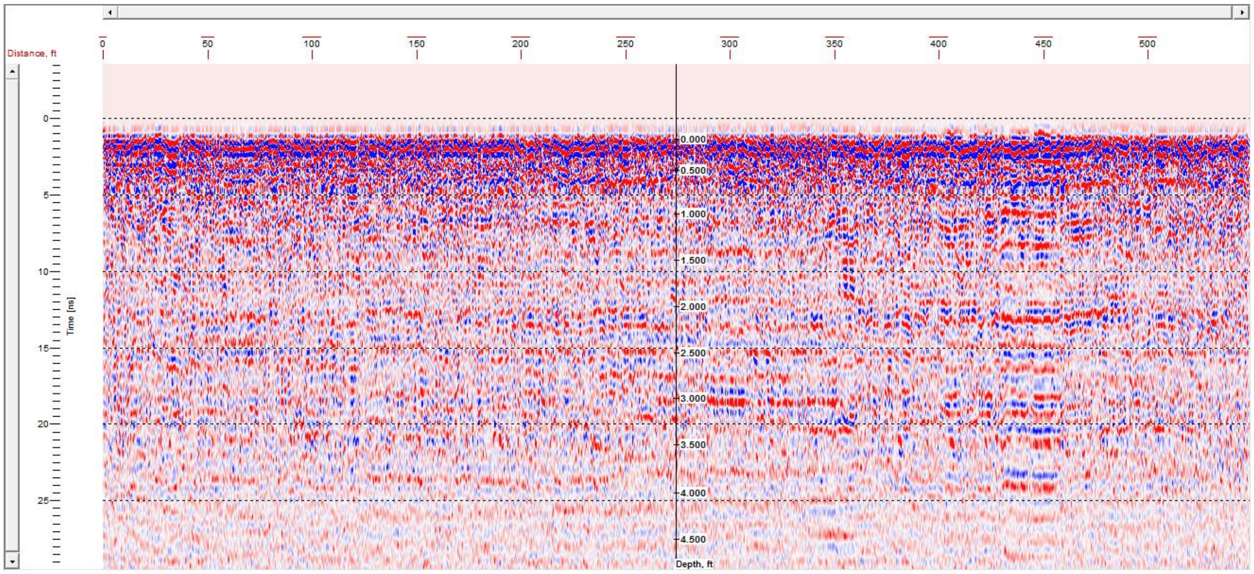
DAT 58



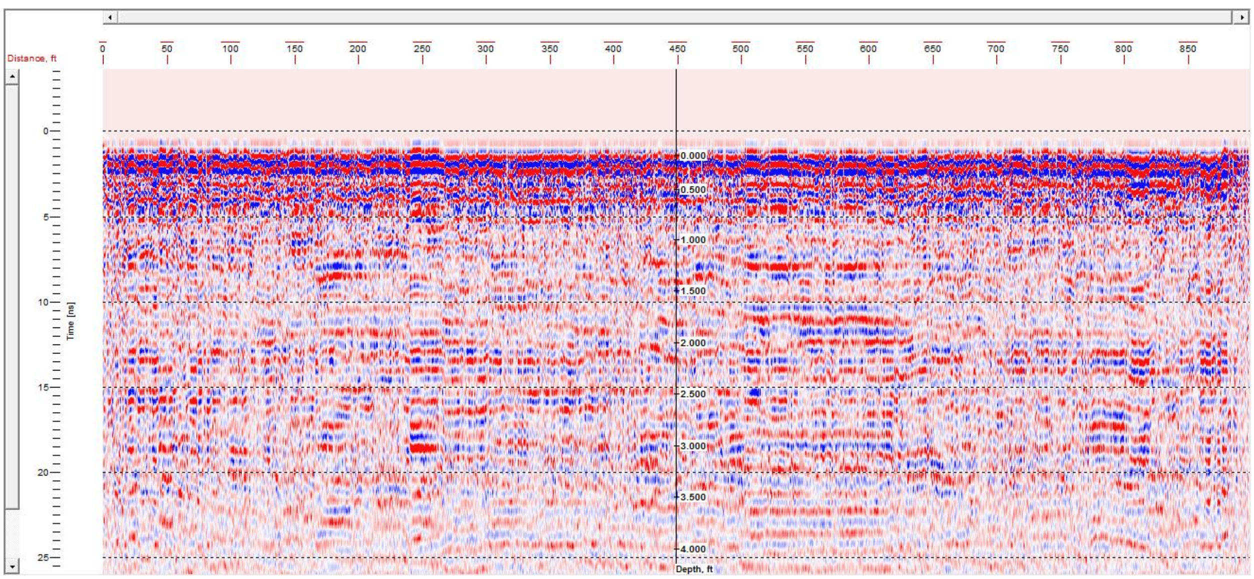
DAT 13



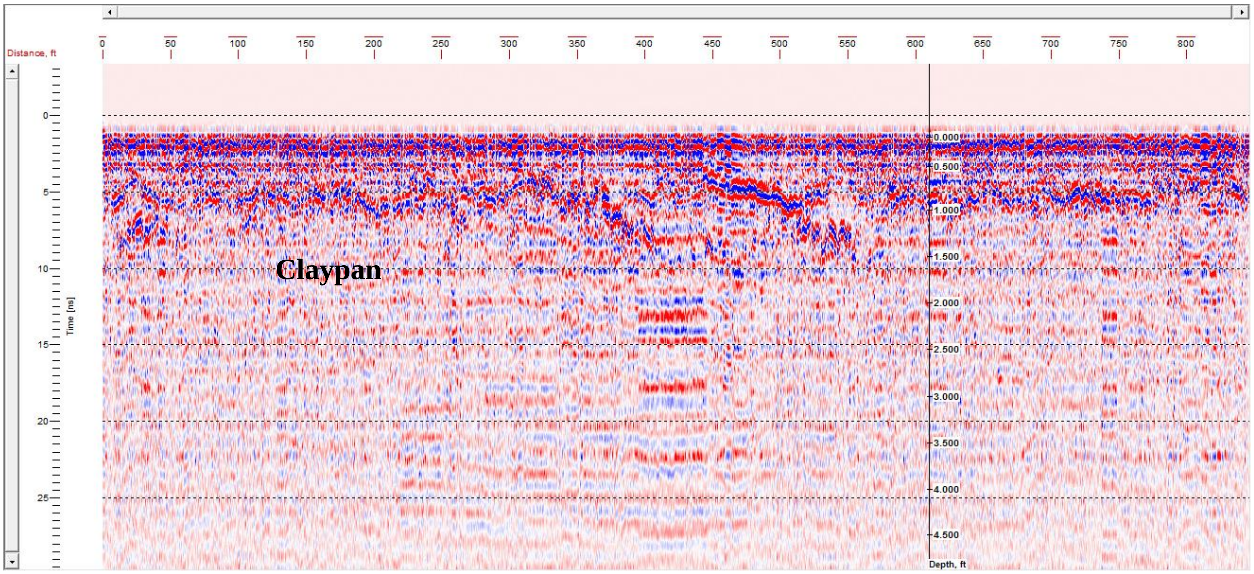
DAT 17



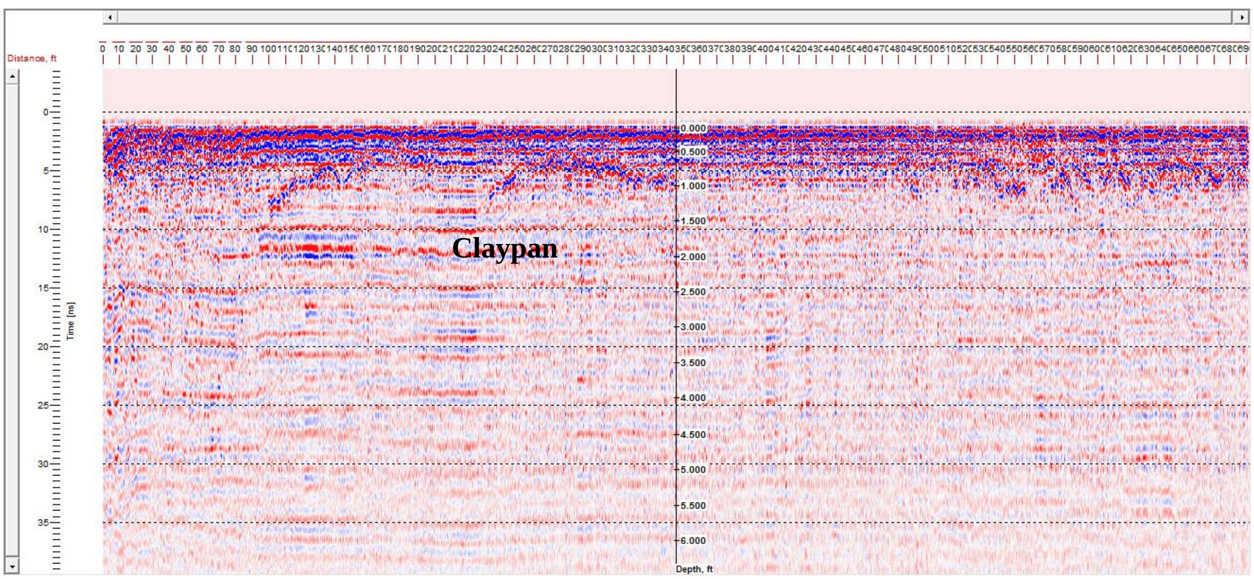
DAT 19



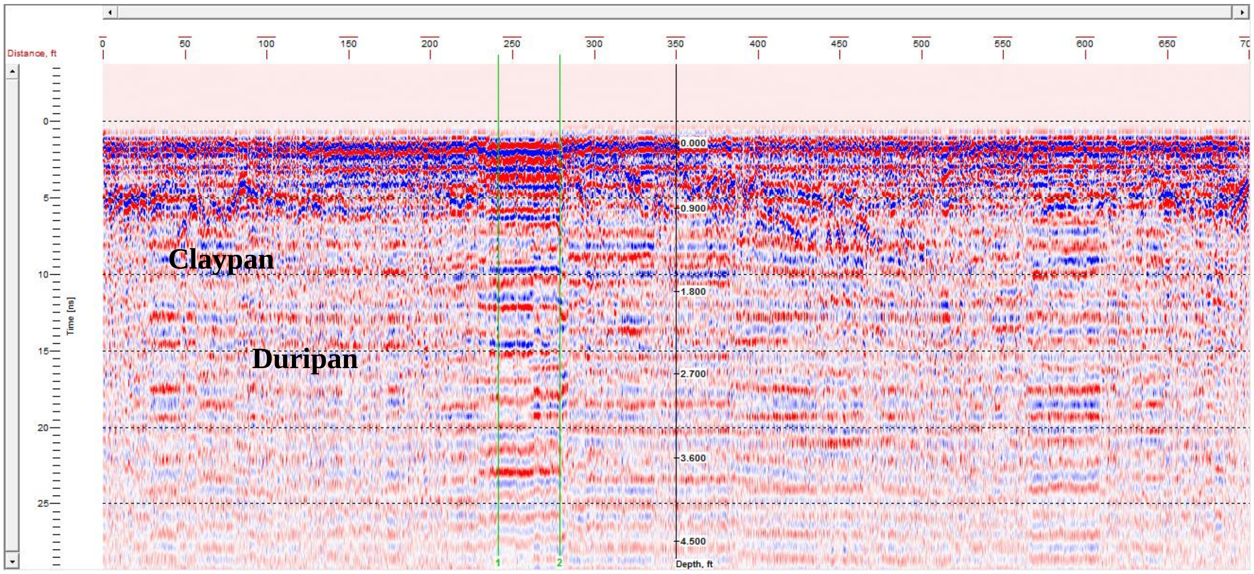
DAT 59


Distance, ft
Time [ms]
Claypan
Depth, ft

DAT 46

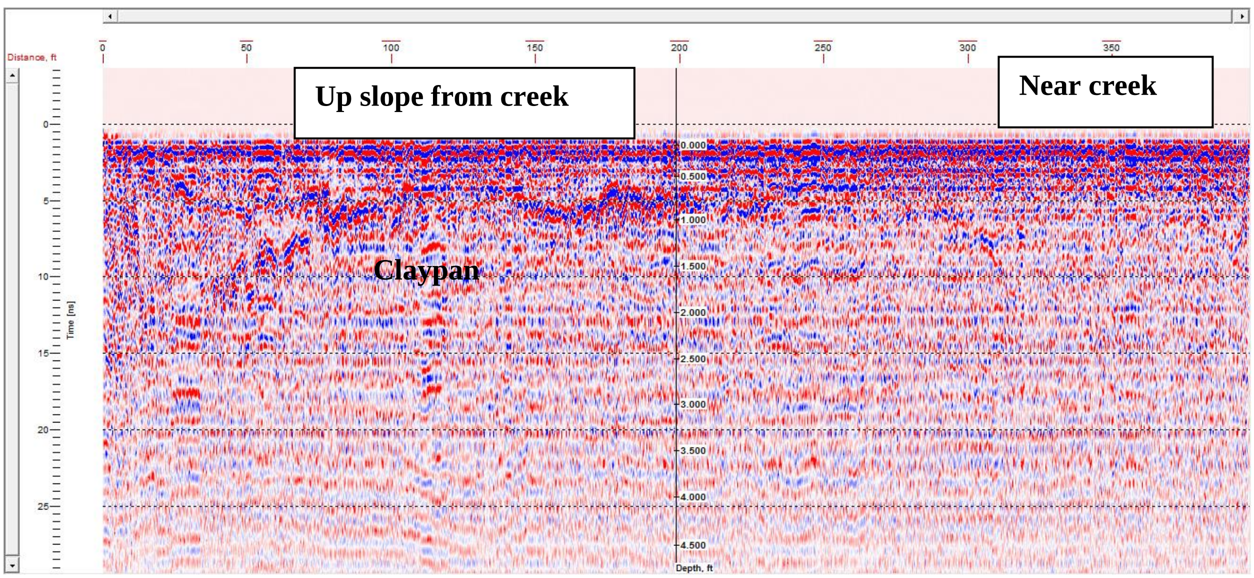

Distance, ft
Time [ms]
Claypan
Depth, ft

DAT 48



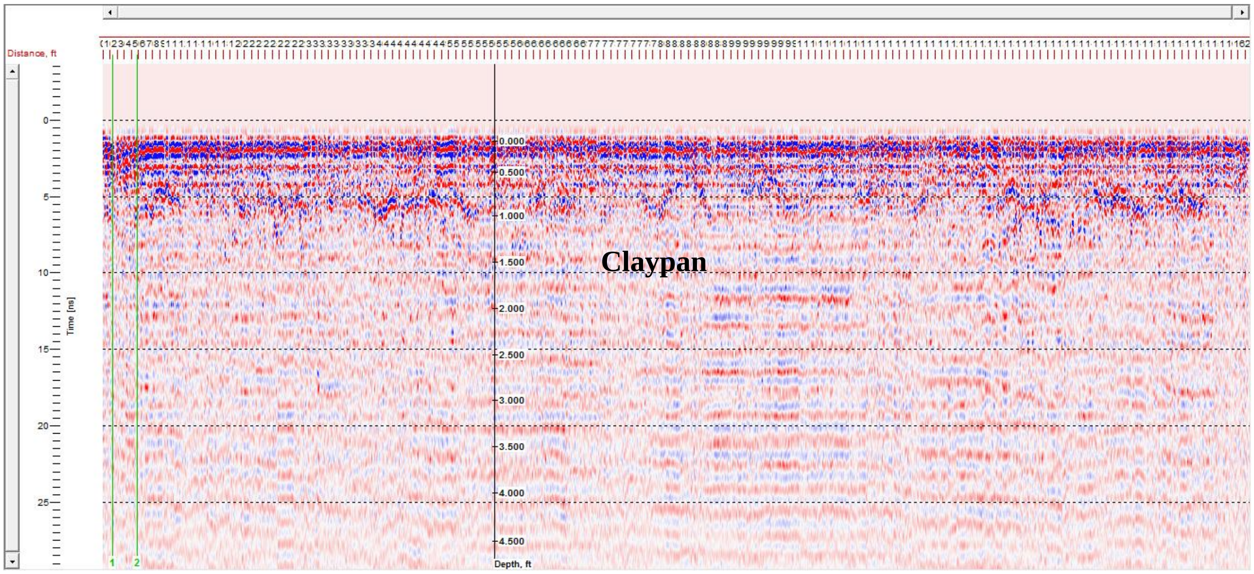
Distance, ft
0
50
100
150
200
250
300
350
400
450
500
550
600
650
Time [ns]
Claypan
Duripan
0.000
0.900
1.800
2.700
3.600
4.500
Depth, ft

DAT 49

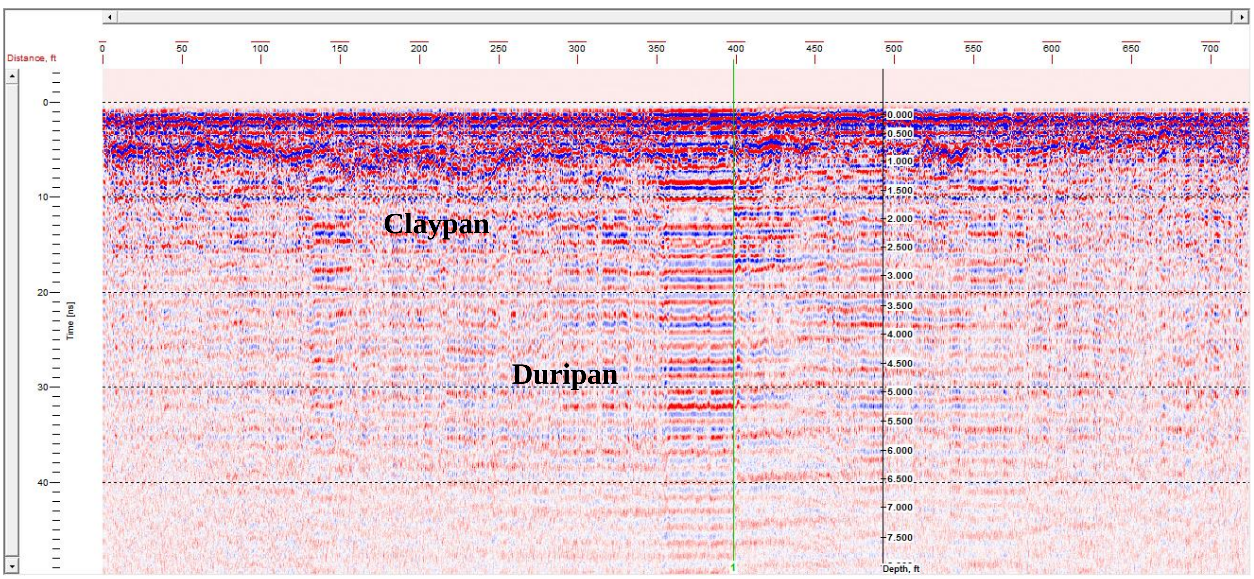


Distance, ft
0
50
100
150
200
250
300
350
Up slope from creek
Near creek
Time [ns]
Claypan
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
4.000
4.500
Depth, ft

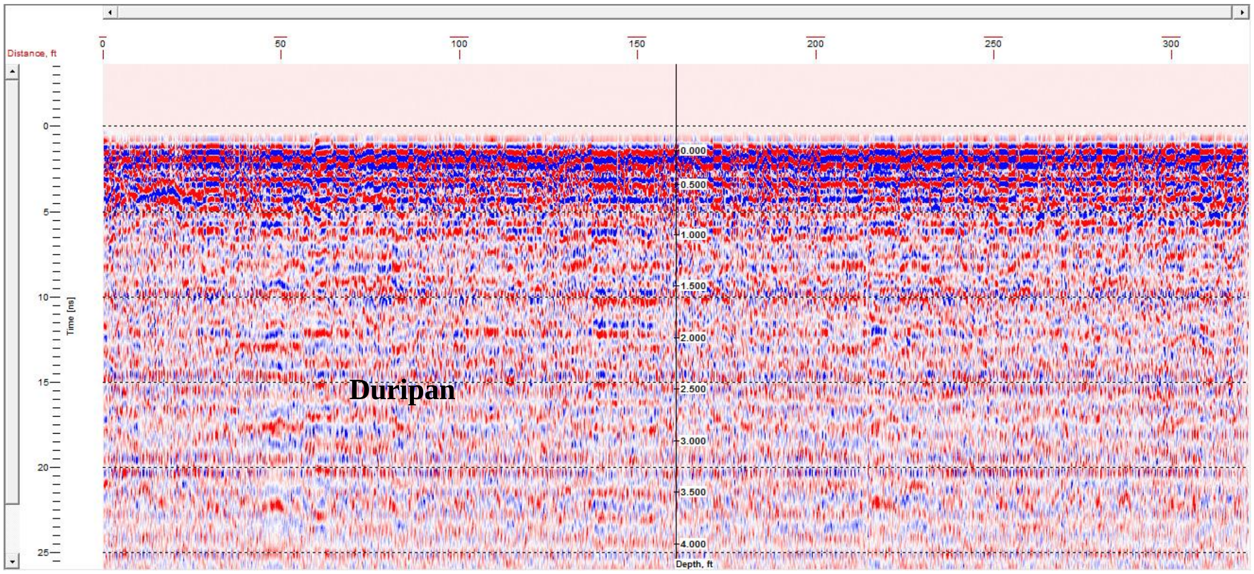
DAT 51


Distance, ft
Time [ns]
Depth, ft
Claypan

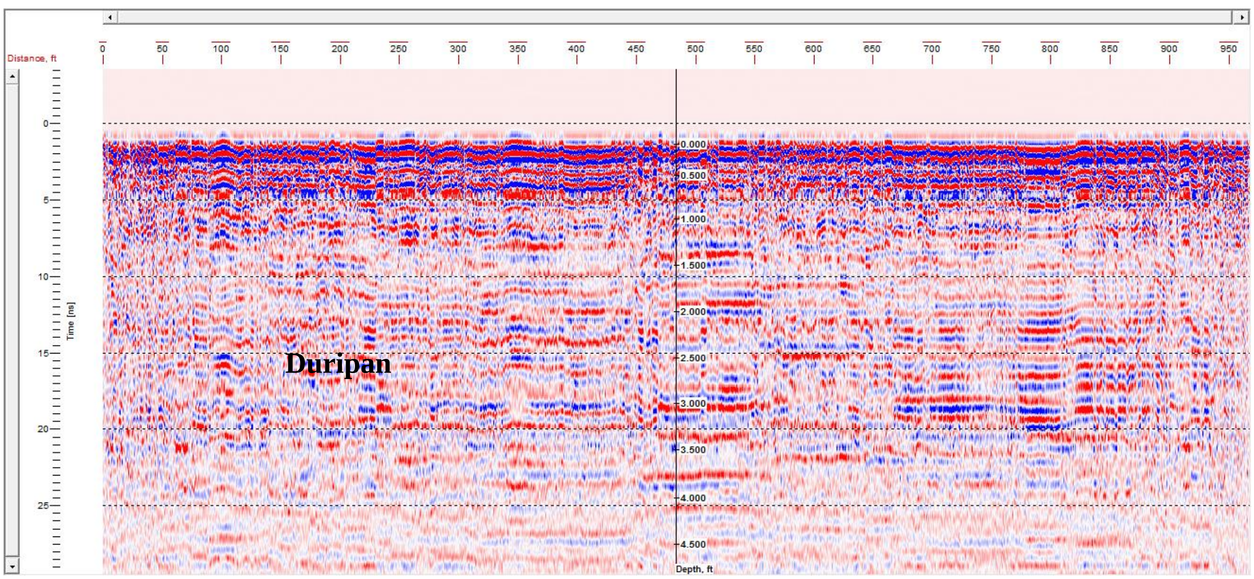
DAT 55


Distance, ft
Time [ns]
Depth, ft
Claypan
Duripan

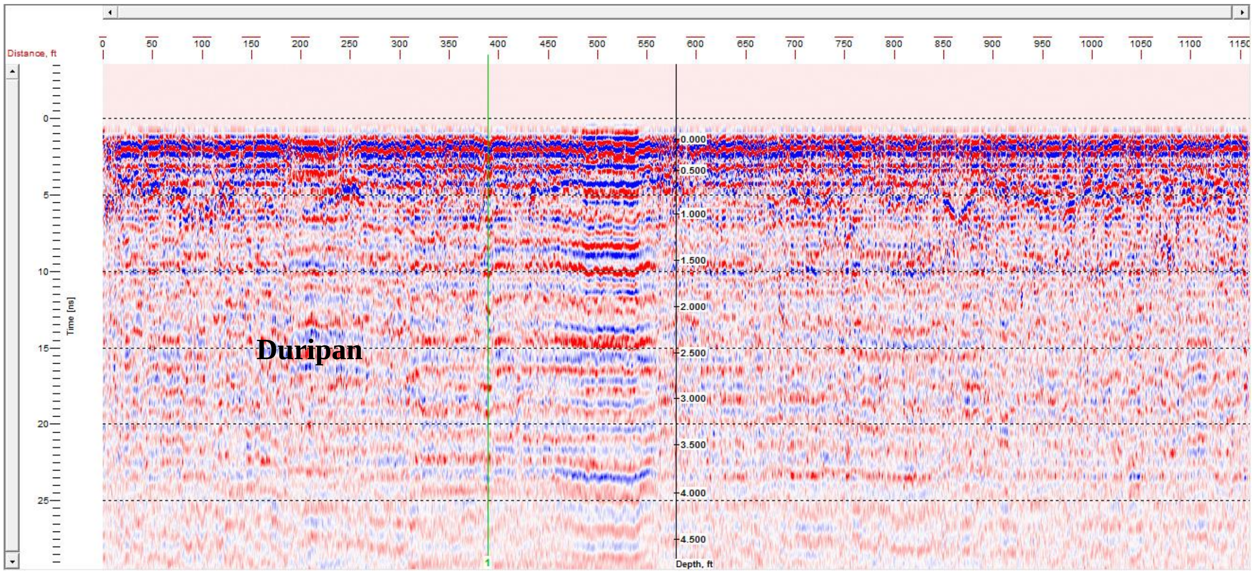
DAT 56


Distance, ft
Time [ns]
Duripan
Depth, ft

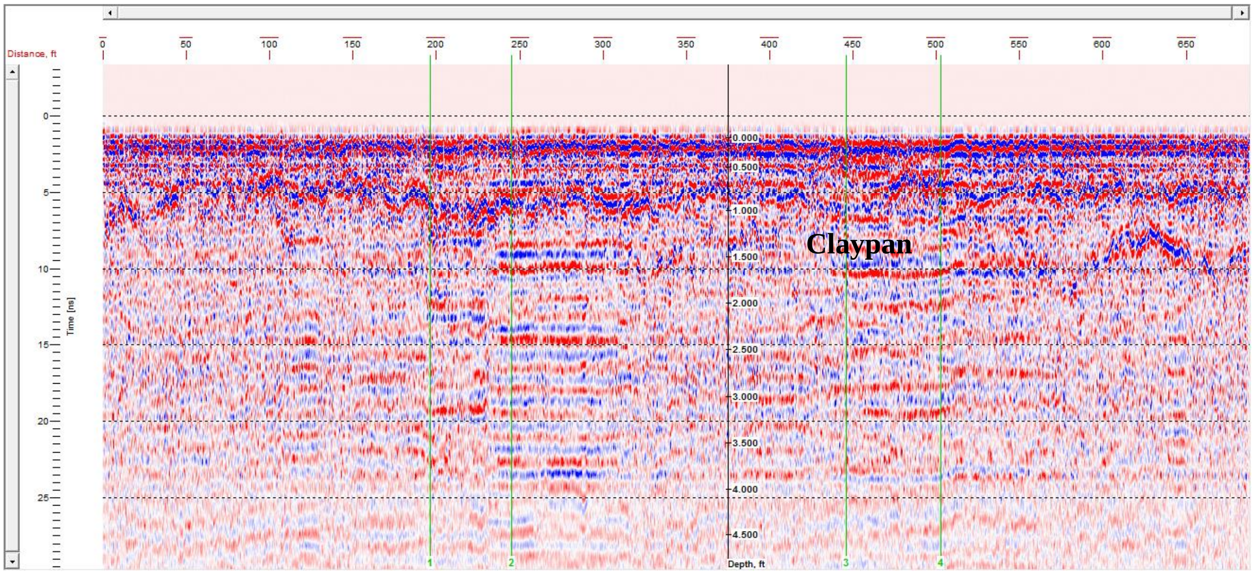
DAT 21


Distance, ft
Time [ns]
Duripan
Depth, ft

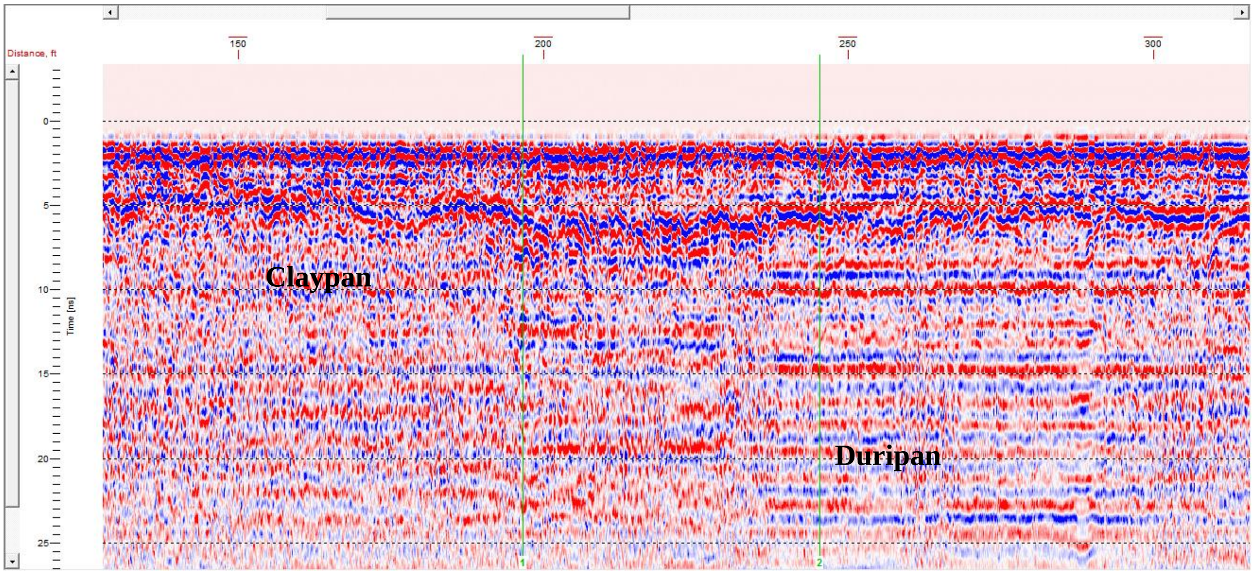
DAT 62


Distance, ft
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
1050
1100
1150
Time [ns]
0
5
10
15
20
25
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
4.000
4.500
Depth, ft
Duripan
1

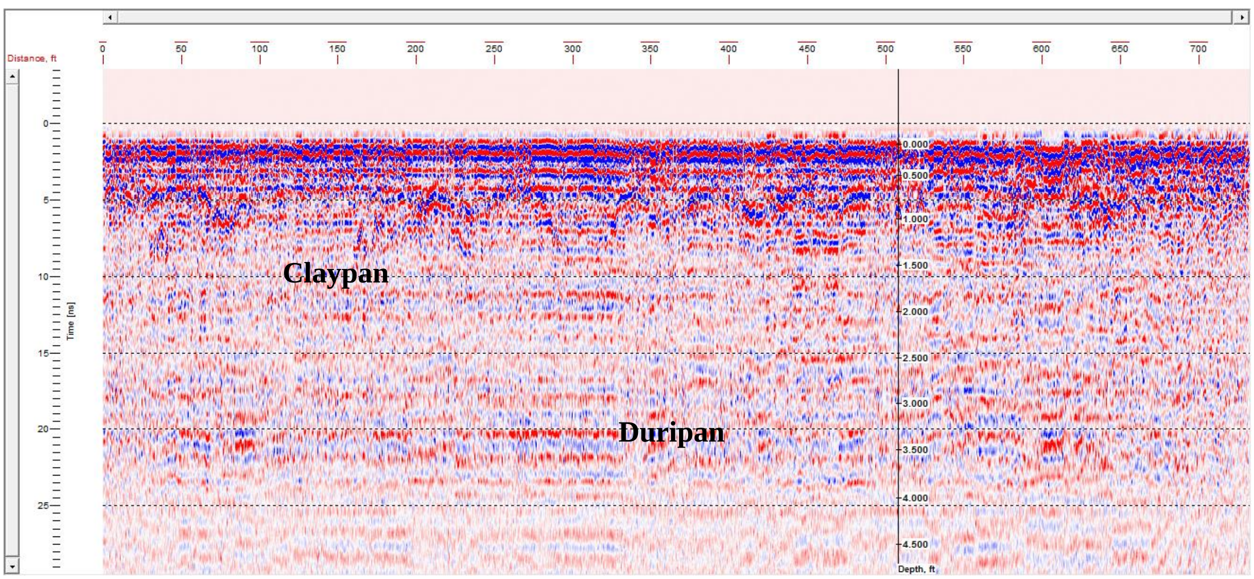
DAT 63


Distance, ft
0
50
100
150
200
250
300
350
400
450
500
550
600
650
Time [ns]
0
5
10
15
20
25
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
4.000
4.500
Depth, ft
Claypan
1
2
3
4

DAT 63 Vernal Pool



DAT 70



ATTACHMENT K

Site and Soil Suitability Report for the Mourier West Property

Site and Soil Suitability to Determine the Hydrological Potential for Restoring Vernal Pool Wetlands at the Mourier West Property, Placer County, California

Prepared for

Brookfield Residential

2271 Lava Ridge Court

Suite 220

Roseville, CA

95661

Prepared by

Institute for Ecohydrology Research

1213 Carriage Drive

Woodland, CA

95776

August 2016

Summary

The Mourier West property in Placer County, California covers 266 acres of farm and pasture land between Sunset Boulevard West to the north and Pleasant Grove Creek to the south. There are 29.21 acres of wetlands including 8.557 acres of vernal pools, 17.742 acres of seasonal wetlands, and 2.893 acres of seasonal swales. This report is a site evaluation to determine the potential for restoring vernal pools on the property.

The Mourier West property was historically a vernal pool wetland landscape according to historical aerial photos from 1947 and parts of the property still have vernal pools and other wetlands. Some of those wetlands were created as a result of the historical land uses including rice farming. The US Army Corps of Engineers developed Guidelines for Wetland Mitigation and Monitoring (2015) including the use of restoration and creation to offset the loss of wetlands, including vernal pools. Those Guidelines recommend conducting a site evaluation that takes a watershed approach to the landscape scale of mitigation and determines the soils are suitable in the case of vernal pools. The report studied the topography and soils of the site and existing wetland resources to evaluate the potential for vernal pool restoration to occur for the purpose of compensatory mitigation.

The current studies conducted detailed topographic surveys and soil surveys using ground-penetrating radar to determine the geophysical structure of the landscape and specifically identify the suitability of the site for vernal pool restoration. The site historically supported more acres of vernal pools wetlands than occur at present although the exact number cannot be determined. The site was found to have an extensive catchment structure that provides upland water input to wetlands down the slope. The uplands have the potential to provide significant water inputs to vernal pools that increase their annual hydroperiod even during below average rainfall years. The soils study determined the site had been graded, and some historical vernal pools were filled in, and the existing vernal pools and seasonal wetlands are remnants of those pools. The soil characteristics of claypan and duripan water restricting soils layers are still intact and can form a seasonal water table that is the hydrological basis for vernal pool functioning.

The 266 acre site could support 26.6 acres based on the US Fish & Wildlife Service 10% density criterion. There are 8.577 acres of existing vernal pools. Therefore, the restoration potential could be 15 to 19 acres of vernal pools based on the site evaluation.

Introduction

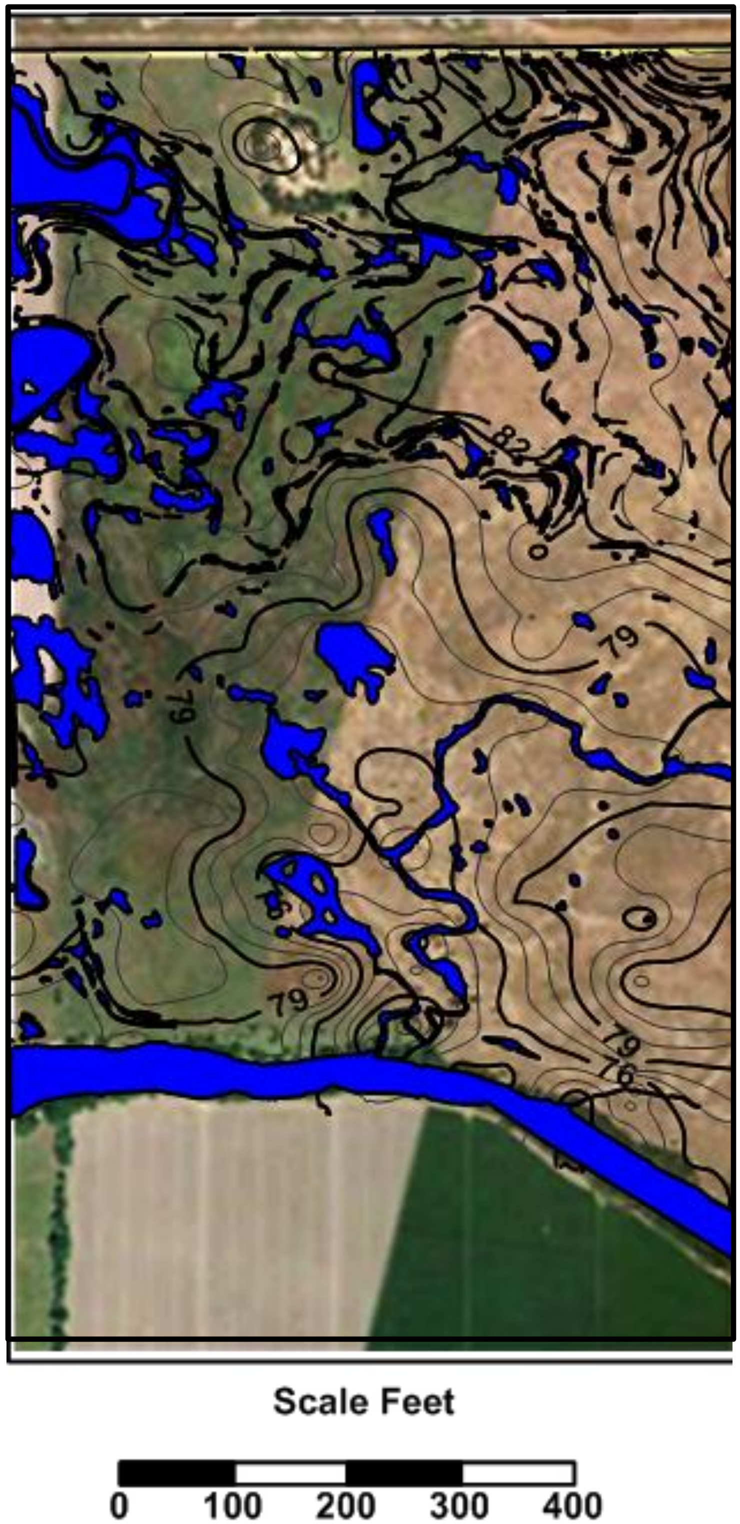
This report is a site evaluation and soil suitability assessment for determining the feasibility of restoring or creating vernal pools and other seasonal wetlands at the Mourier West property, Placer County, California. The Mourier West property covers 266 acres on the south side of Sunset Blvd West, Pleasant Grove, California (Figure 1). The US Army Corps of Engineers' (USACOE) Mitigation and Monitoring Guidelines (December 30, 2015) recommends an assessment of soil suitability for restoring, creating or enhancing wetlands. Also, those guidelines specify taking a watershed approach to developing a wetland mitigation design and plan. This study conducted a site assessment for the potential of restoring or creating vernal pools using existing soil and wetland data and by surveying the surface topography to identify the direction of water flow and subsurface stratigraphy to determine the presence of water-restricting soil layers. The combination of topography and soil water-restricting layers is critical to the formation of a seasonal water table the causes the wetland hydrology.

Background Information and Existing Conditions

Vernal pools are recognized as complex seasonal wetlands due to the structure of the soils and importance of the presence of soil depressions overlaying a shallow water-restricting layer (Hobson and Dahlgren 2001, Smith and Verrill 1998). The water-restricting layers called claypan and hardpan for some specific types of soil horizon are critical in the formation of a seasonal, perched water table (McCarten et al. 2009, Rains et al. 2006). The presence, depth, and topography of the water-restricting layer determine the hydrological functioning of individual vernal pools and their subsurface connectivity. The presence of the water-restricting layer is one requirement for soils in their consideration as potential sites for vernal pool restoration or creation. A USACOE field verified jurisdictional wetland delineation (ECORP 2015) provided information on existing wetlands including vernal pools.

Figure 1 Mourier West Arial Photo Showing the Approximate Property Boundary and Pleasant Grove Creek (Source Google Earth 2015).

Figure 2 Mourier West Site Showing Existing Jurisdictional Wetlands (Source ECORP 2015)



Methods

Information on the soils are mapped for the property (Appendix A) was obtained from Natural Resources Conservation Service Online Soil Survey 2016 (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx). Current and historical aerial photos were viewed on Google Earth Professional (Google Earth Pro 2016). Historical aerial photo from 1947 and a historical 1910 USGS 7.5' topographic map was obtained from National Environmental Title Research.

Field Surveys

Topographic Survey

A Trimble R8 RTK GPS was used to survey the property in order to make high resolution (spatial precision of ±1 cm, elevation ±2 cm) topographic maps. This level of precision is needed to accurately measure relationships between vernal pool elevation gradients, soil horizons and surface and subsurface hydrology. This survey provides a baseline for the overall property upon which more detailed RTK GPS surveys can add to the existing data to develop a vernal pool grading plan. The survey was conducted throughout the property capturing the property boundaries and sufficient data point collection to create an accurate topographic map of the site.

Subsurface Stratigraphy

The GPR was used to conduct a non-destructive survey of the soil profile to evaluate the presence, continuity, and topography of soil horizons that form a water-restricting layer. An MALÅ Geosciences GPR system using an 800 MHz shielded antenna with a cart to measure distance was used to conduct the field surveys The GPR transects, identified as DAT files, ranged in length from about 25 feet to about 1,000 feet. The GPR was set to measure to a depth of five feet on all but one transect. One GPR transect (DAT 2) was set to measure to seven feet below the soil surface as a comparison to confirm the thickness of the water-restricting layers. The antenna sends out a set of energy waves some of which are reflected back to the antenna when they hit a medium of higher density such as soils of different texture (e.g., clay). The GPR takes a sample approximately every two inches (5 cm sampling interval).

Calibration of the water-restricting layers was conducted using hand auger holes along GPR transects to determine the depth to claypan and hardpan.

Results

The NRCS Soil Web survey identified the property as having a combination of Cometa and Fiddyment soil series (Appendix A). The Cometa soil series has a claypan water-restricting soil horizon that is typically present starting at 18 inches below the soil surface and extending to about 29 inches in depth. The Fiddyment soil series has a weak claypan overlaying a hardpan as the water-restricting layers with the claypan typically ranging from 12 to 28 inches below the soil surface and the hardpan occurring from 28 to 35 inches below the surface which are then underlain by bedrock. However, a majority of the site had significant disturbance of the surface soil as part of historical land use practices that included grading and conversion to rice fields. In those areas the soil profile would not be typical for the soil series.

Historical Aerial

Figure 2 is a historical 1947 aerial photo of the Mourier West property showing the property was not yet in rice cultivation, but some surface disturbance had occurred with remnant vernal pool and swale features. That figures also shows the adjacent properties that had been disturbed to a lesser degree than at the Mourier West property. In that aerial photo, the vernal pools and swales are more distinct some of which remain today particularly south and west of the Mourier West property. **Figure 3** is a historic 1942 USGS topographic map of the Mourier West property, and adjacent property shows the topographic relief prior to the cultivation of rice. These historical documents confirm the Mourier West property had vernal pools and swales extending throughout much of the property. The topography indicates there was and existing drainage of shallow swales starting on the southwest corner of the Mourier West property and draining southwest over what is South Brewer Road. The historical aerial photos indicate a series of vernal pool and swale systems outside the Mourier West property that indicates correspondence with the historical topographic drainage patterns. Pleasant Grover Creek south of the Mourier West Property historically will have affected the soils in the area.

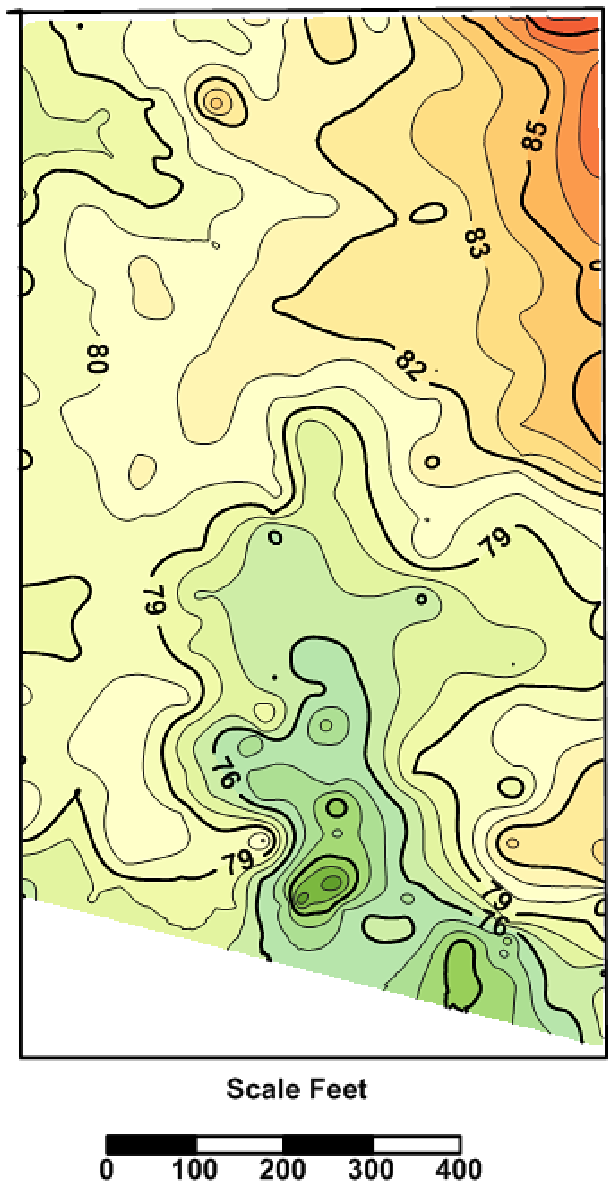
Figure 3 Historical 1947 Aerial Photo of Mourier West Prior to Rice Cultivation. The Site was Partially Graded.

Figure 4 Historical 1993 Aerial Photograph Showing Mourier West Property with Rice Cultivation

Topographic Survey

The GPS survey data were used to develop a digital elevation model (DEM) of the site. Figure 6 shows a color topographic map of the Mourier West property with labeled elevations in two-foot intervals and one-foot contour lines in between. The highest elevation is 88 feet msl at the northeast corner of the property, and the lowest is 73 feet msl is just along the creek edge. The topography does not include the berms that exist from the rice farming grading activities in order to get a continuous site grade.

Figure 6 Digital Elevation Model of the Mourier West Property.



Wetlands occur throughout the site (Figure 7) and they include natural wetlands and remnant natural wetlands as well as seasonal wetland created due to the grading activities from the rice farming. The larger wetlands on the northwest side of the property remained wet in June and July 2016 because they are hydrologically linked with the active rice farming on the Skover property which was inundated during that time. This hydrological connection also resulted in the dominant plant species present being ones adapted to longer periods of inundation such as spike rush (*Eleocharis macrostachya*).

Figure 7 Map Showing Topography and Wetlands

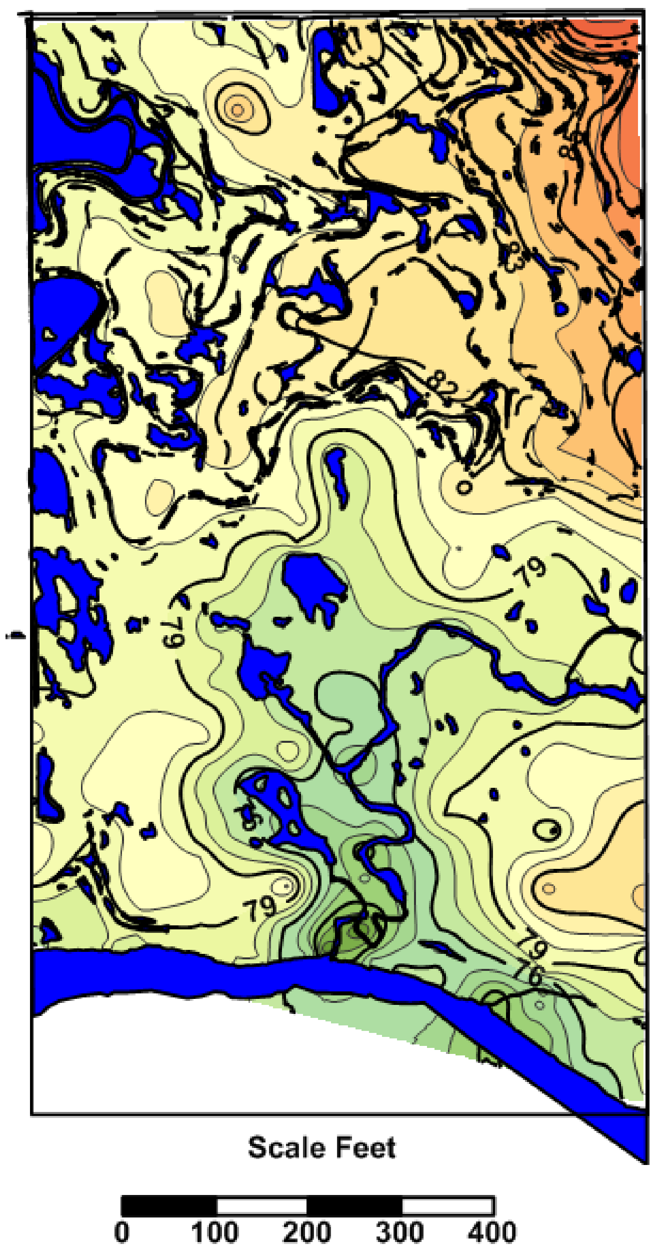
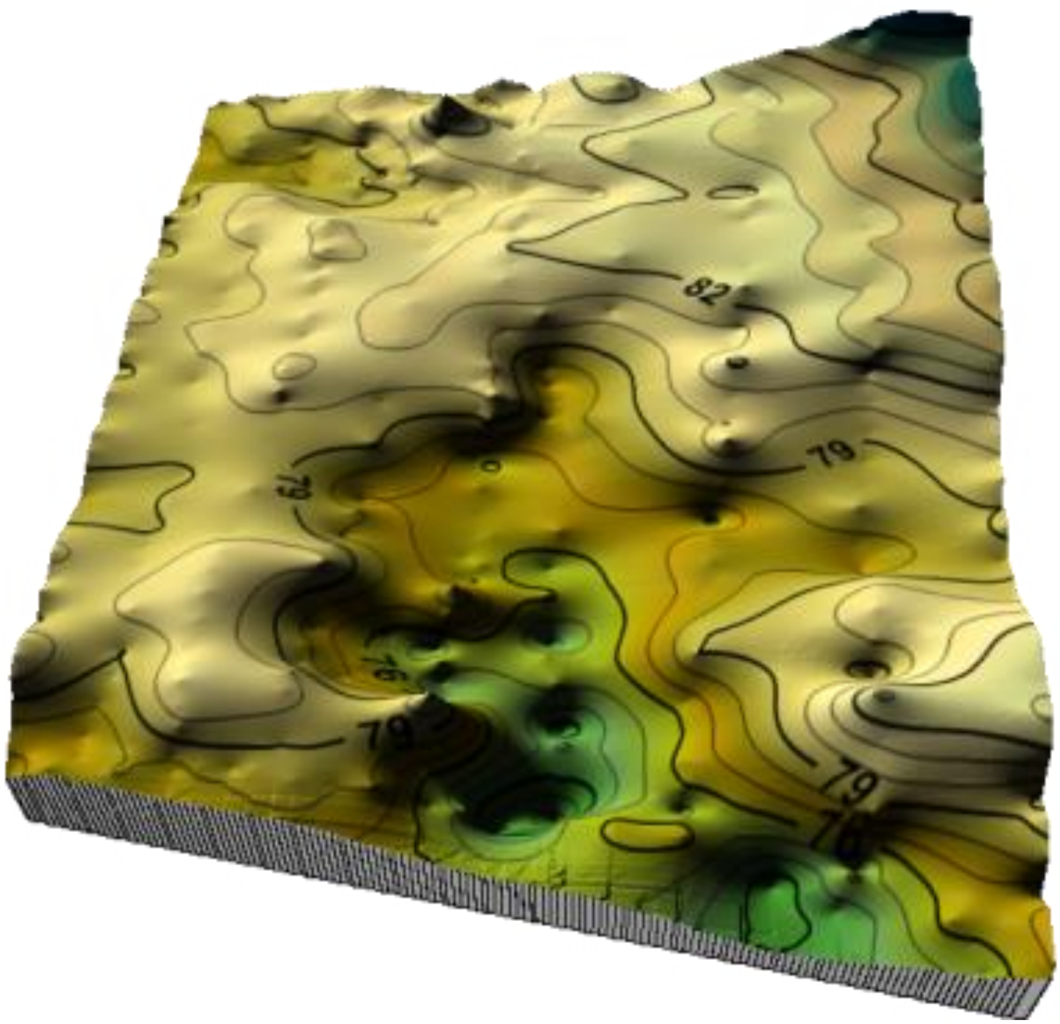


Figure 7 is a 3-dimensional model of the site that gives a better visual perspective of the differences in elevations across the property. From that figure it can be observed there is a general elevation gradient from east to west and a lower elevation basin on the south central part of the property.

Figure 7 A 3-Dimensional Elevation Model of the Mourier West Property



Subsurface Stratigraphy

The GPR survey included 66 transects shown in Appendix B. The GPR data represents the soil profile by showing a change in soil density. The top of each figure gives the distance in feet and scale in feet indicating depth in the soil is generally in the center of each figure. Figure 9A shows a GPR soil profile from a Fiddyment soil series site that includes a vernal pool. In that figure, the blue and red lines indicate the positive and negative parts of the energy wave reflected back to the antenna if there is a change in density of the soil texture then there is an increase in the intensity of the color. In Figure 9, the energy wave leaving the antenna first goes through the air then intercepts the soil surface causing an increase in color intensity. Below the soil surface the next change in density if due to the clay horizon in the soil (claypan) which is followed by the presence of a hardpan or duripan. The distance in feet along each transect is shown at the top of each figure, and depth below the soil surface is indicate by a scale in the middle of each figure.

The GPR soil profile data correspond with changes in the density of the soil. In a typical, undisturbed Fiddyment soil series the soil profile is characterized by an A horizon which is loam, a Bt horizon which is a clay loam or claypan and a Bqm horizon which is a hardpan also called a duripan. Figure 9 and 10 shows the relationship between the color intensities in the GPR data and the soil profile in a vernal pool landscape. The GPR data in the figure are not adjusted for topography, so the soil surface appears flat but in reality, the depression in the landscape where the vernal pool is located is represented as the claypan appearing closer to the soil surface. As the topography changes such as upslope from the vernal pool, the claypan is deeper. The example of a Fiddyment soil series applies to Mourier West site because the site is a mixed soil series of Fiddyment and Cometa (Appendix A). The Fiddyment soils series is distinct due the presence of a duripan (hardpan) which is a mineral (iron-silicate) cemented or indurated soil horizon that has very low water permeability. The clay loam horizon above the duripan also has low water permeability, and therefore, the Fiddyment soil series is one that typically has vernal pools and seasonal wetlands. The Cometa soil lacks a duripan but has a high percent clay horizon or claypan that also has sufficiently low water permeability to form a seasonal water table.

Figure 9 Example of a GPR Soil Profile of a Fiddyment Soil Series Including a Vernal Pool (Sacramento County Site).

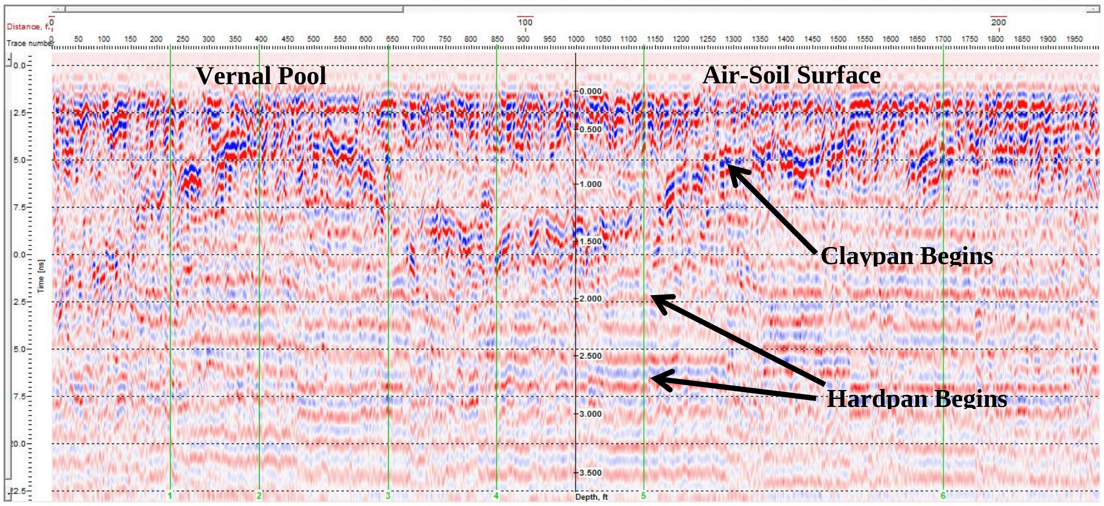
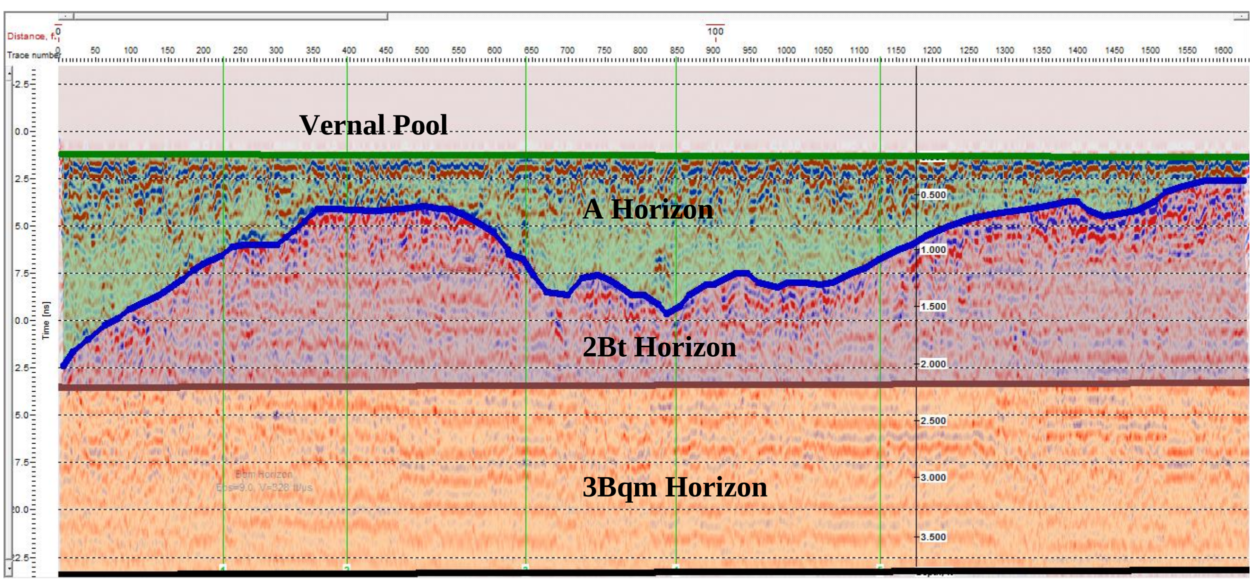
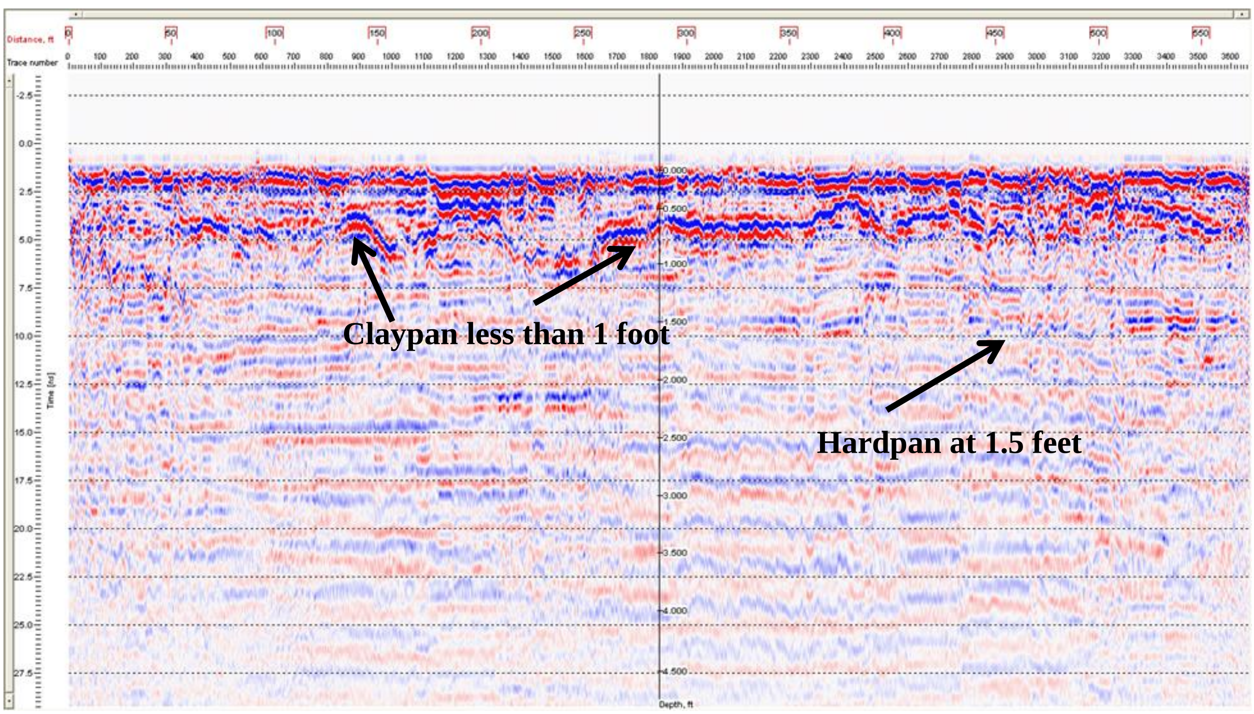


Figure 10 GPR Soil Profile from Figure 9 Showing the Correspondence with the Fiddyment Soil Series Horizons A (Loam), Bt (Clay), and Bqm (Duripan or hardpan).



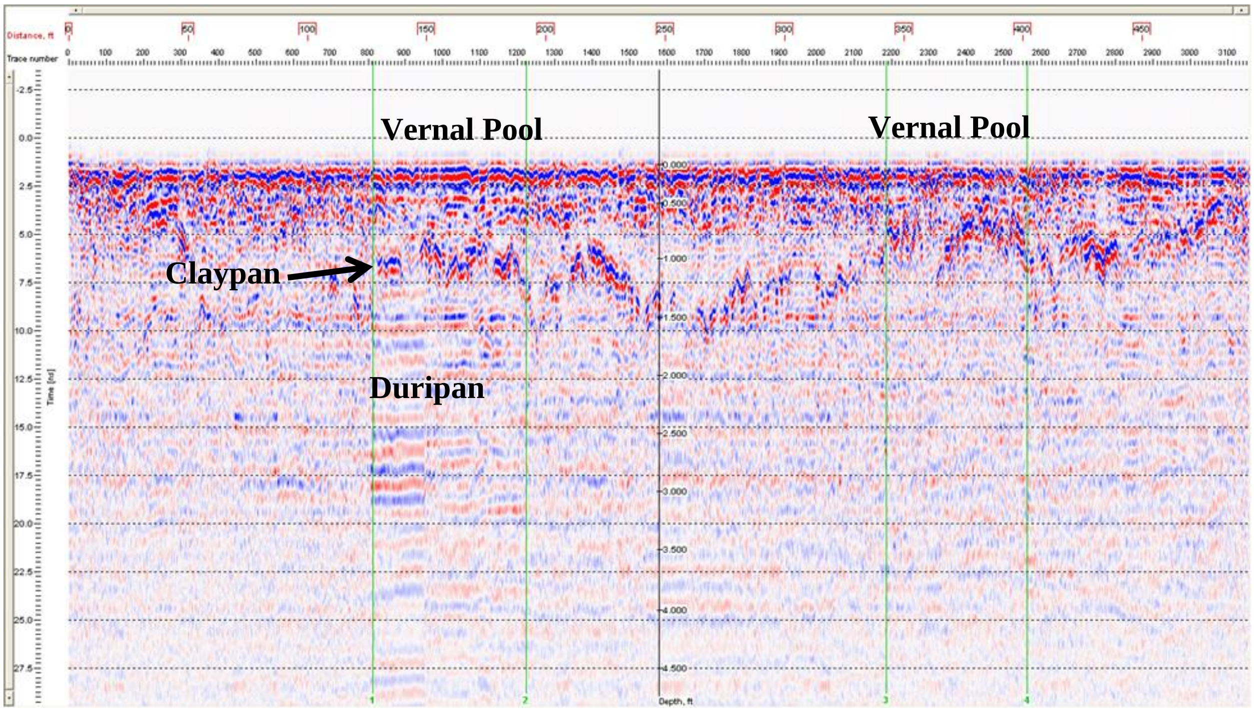
Appendix B shows the 66 GPR soil profiles consistent with both the Cometa and Fiddyment soils. In fact, the GPR profiles indicate that there are areas throughout the site that have a distinct claypan and hardpan. Both claypan and hardpan are common throughout the site, and some areas have a more distinct claypan or duripan. Grading of the site removed much of the loam soils in the upper horizon placing the claypan near the soil surface. A claypan near the soil surface is more difficult to detect in the GPR because of the change in density measured as the energy wave travels from the air above the soil and into the soil which creates a distinct change in medium density GPR signature at the surface and can mask the high clay content near the surface. A claypan or duripan is not always present because the soil has been altered or eroded due to movement of the creek.

Figure 11 Shows the Claypan starting relatively near the soil surface although not within a wetland. Similarly, the hardpan is within 1.5 feet of the surface. This area was graded as part of the historical rice field area where the original loam soil horizon was removed. (Transect DAT 1)



The Mourier West site has numerous small vernal pools and seasonal wetlands. GPR surveys included transects across the vernal pools to gather information on the soil profile in the surrounding uplands and the horizons immediately below the vernal pool basin. Figure 12 shows a transect that included a vernal pool approximately 50 feet in diameter. The claypan beneath the vernal pool is deeper than the uplands. This is unusual because in most natural vernal pools the claypan is typically closer to the surface due to the low topography of the basin and as the topographic elevation increases outside the pool the claypan is observed to decrease in depth. The grading of the landscape probably accounts for this unusual situation where the surface soil was graded, and the soil was pushed into the vernal pool basin in an attempt to make the landscape of equal grade for agricultural purposes.

Figure 12 Shows GPR transect DAT 63 that Includes a vernal pool, which is underlain by a distinct claypan and hardpan.

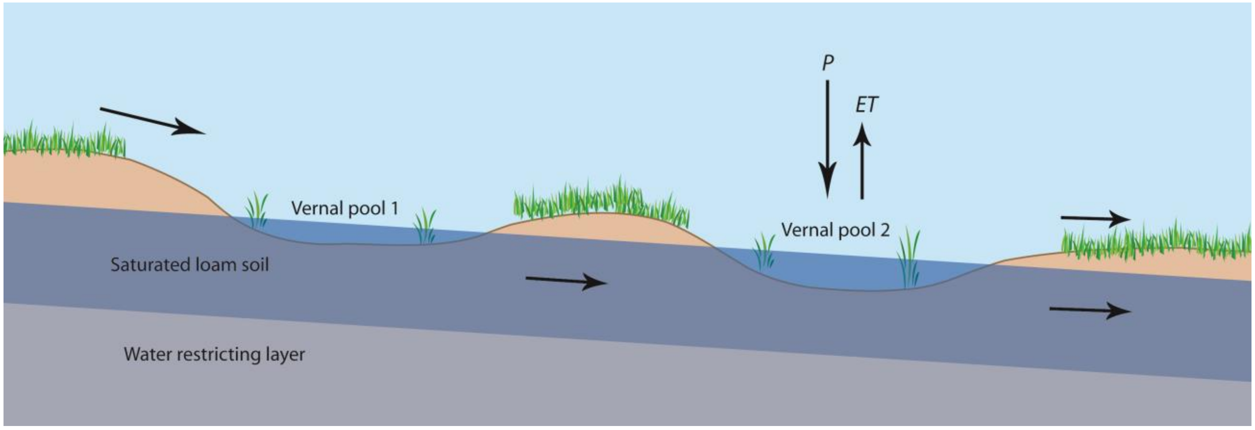


Hydrology

The hydrology of a vernal pool landscape depends on the area of the upland that contributes water to the pools and swales, the slope of the uplands, the depth of soil above the water-restricting layer, discharge out of the pools and swales downslope, and the meteorological variables (McCarten et al. 2016). Figure 13 shows a conceptual cross-section of a vernal pool landscape with subsurface water flow over the water-restricting layer. The larger the contributing upland is to the vernal pool the longer the hydroperiod or period of inundation within the pool. The cascading of vernal pools connected by swales allows for the combined use of upland water inputs and additional water input downslope contributed by direct precipitation. The depth of the soil to the hardpan determines the amount of water needed for the water table to extend above the soil surface creating the pool. Forty to fifty percent of the dry soil is air space and, therefore, requires that amount of water to cause saturation.

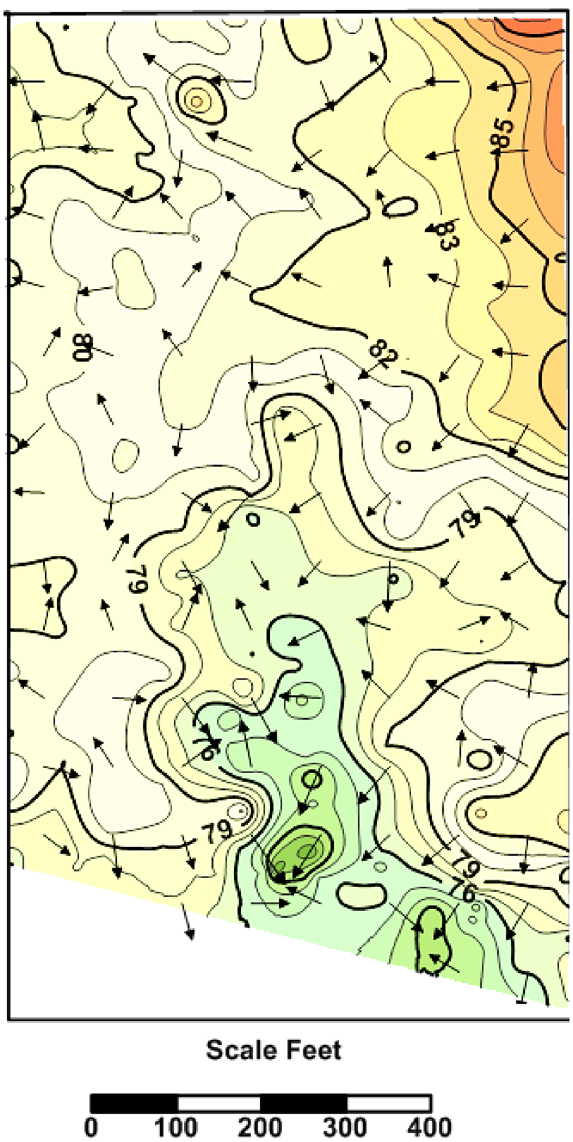
This hydrological process accounts for the hydrological connectivity between the vernal pools on the north west side of the Mourier West property and the inundated rice fields to the west on the Skover property.

Figure 13 Conceptual Cross Section of a Vernal Pool Landscape Showing Water Table and Direction of Flow



The water flow within the vernal pool landscape determines the orientation of the vernal pool swale system. The slope of the landscape determines the rate of flow into the vernal pools. The slope of the hardpan was consistent with the slope of the surface topography in most cases. A vector flow model predicting the direction of surface water flow and the subsurface flow for the site based on topography is shown in Figure 14. The direction of water flow follows the downslope path which indicates the natural direction water would flow for a vernal pool landscape after restoration.

Figure 14 Vector Flow Map Showing Direction of Surface Water Flow and Direction of Subsurface Water Table Flow



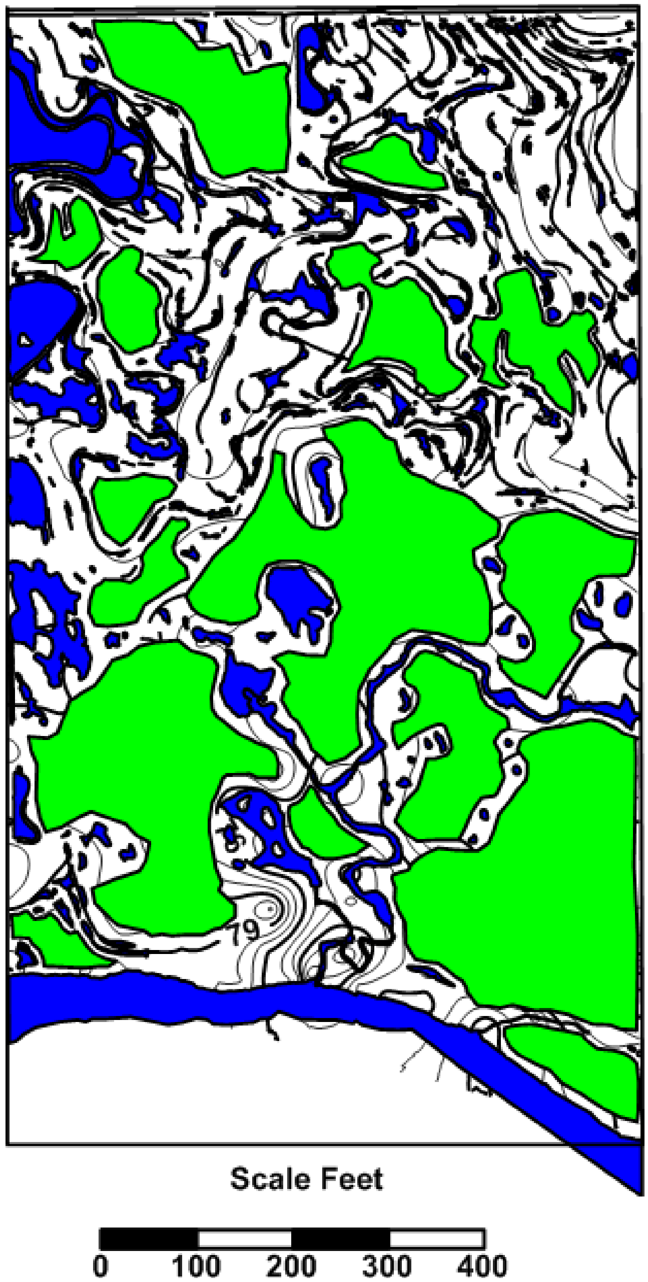
Discussion

The Mourier West property historically supported more vernal pools than occur today due to historical land grading activities that occurred by 1947 (Figure 3). It cannot be determined precisely if all the existing vernal pools and seasonal wetlands were former wetlands or remnants of former wetlands but it is very likely they are remnants. The topography of the landscape and field observations of extensive areas of very shallow depressions indicates there was an extensive vernal pool landscape. One observation was the large vernal pools on the northwest side of the property were still wet in late June. This was due to subsurface hydrological connection with the Skover property rice fields that were flooded in May and remained wet. It is not known how much of those vernal pools would function as wetlands if the rice fields on the Skover property were not inundated.

The site is very suitable for restoration of vernal pools that once occupied the site. It cannot be determined what the vernal pool density was prior to grading, but it could have been up to 15% or more locally in some parts of the property based on looking at some of the historical aerial photos. Using the topography, profiles, and vector flow model and soil profile data 16 polygons were identified as areas having a high potential for vernal pool restoration (Figure 15). These polygons total 91.4 and do not contain existing vernal pools. These areas should be the focus of restoring vernal pools, but vernal pools could be restored in other areas in association with other seasonal wetlands or vernal pools.

Vernal pool restoration could occur on the site by inserting them into the polygons identified in Figure 15 plus other smaller areas could support vernal pools as well. In order to maximize the area of vernal pool restoration the remnant rice field berms should be removed and the soil spread into areas where there are no existing wetlands. This will provide some additional topsoil in areas where the depth to the claypan and hardpan and been reduced. Also, this would provide a contiguous area to create a series of vernal pools swale systems that cascade downslope maximizing the landscape to provide more water into the vernal pools.

Figure 15 Map Showing 16 Polygons including 78 acres of suitable restoration habit. Additional areas of suitable habitat exist in smaller (less than one acre areas) and the remnant rice field mounds are additional areas assuming they can be graded into the landscape.



Vernal Pool Density and Restoration

ECORP identified 8.577 acres of existing vernal pools within the 266-acre property at Mourier West. The standard 10% maximum density used by the US Fish & Wildlife Service would indicate a potential of 26.6 acres of vernal pools could conceptually exist within the property. Subtracting the 8.577 acres of existing vernal pools would allow for 18.97 acres of vernal pool restoration potential. The 91.4 acres of open areas not occupied by vernal pools or other wetlands could potentially support least 15 acres of vernal pools. The ultimate design and density of restored vernal pools would be based on creating a series of cascading vernal pools and swales along the existing elevation gradients. The local densities of vernal pools that naturally occur in as pool-swale-pool systems can have a density of up to 20% within a local catchment while the density across the property is 10% or less. Therefore, a range of 15 acres and potentially up to 19 acres of vernal pool restoration could occur on the site.

The data gathered for this report can be used to develop a more detailed engineering approach to identifying where specific vernal pools and swales could be restored and shown to be hydrologically functional during below average, average and above average rainfall years. Specific areas identified in this report would have additional topographic data collection and soil subsurface surveys to engineer the size, depth and hydrological flow patterns for individual pools.

References

ECORP Consulting 2015. Jurisdictional wetlands delineation for the Mourier West property, Placer County, California.

Hobson, W.A. and R.A. Dahlgren. 2001. Wetland soils of basins and depressions: Case studies of vernal pools. In Wetland Soils: Genesis, Hydrology, Landscapes, and Classification. J.L Richardson and M.J. Vepraskas eds. CRC Press, New York.

McCarten, N., M.C. Rains, and T. Harter. 2009. Ecohydrology of vernal pool wetland ecosystems. American Geophysical Union. San Francisco, CA.

McCarten, N., T. Harter, A. O'Geen, R. Dahlgren, and G. Fogg. 2016. Geophysical Structure and Meteorological Effects on Vernal Pool Wetland Functioning. Hydrological Processes. In press.

Rains, M.C., G.Fogg, T. Harter, R.Dahlgren, R. Williamson. 2006. The role of perched aquifers in hydrological connectivity and biogeochemical processes in vernal pool landscapes, Central Valley, California. Hydrological Processes

NRCS Web Soils Map. 2016.

Smith, D.W. and W.L. Verrill. 1998. Vernal pool landforms and soils of the Central Valley, California. In The Conference on the Ecology, Conservation, and Management of Vernal Pool Ecosystems. California Native Plant Society, Sacramento.

APPENDIX A

NRCS SOIL MAP AND SOIL SERIES DESCRIPTIONS

Map Scale: 1:9,700 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 100 200 400 600

Feet: 0 450 900 1800 2700

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 7, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 2, 2012—Apr 29, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Placer County, California, Western Part (CA620)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
141	Cometa-Fiddyment complex, 1 to 5 percent slopes	385.1	76.3%
142	Cometa-Ramona sandy loams, 1 to 5 percent slopes	0.1	0.0%
146	Fiddyment loam, 1 to 8 percent slopes	56.9	11.3%
147	Fiddyment-Kaseberg loams, 2 to 9 percent slopes	16.1	3.2%
162	Kilaga loam	5.0	1.0%
193	Xerofluvents, occasionally flooded	16.9	3.3%
194	Xerofluvents, frequently flooded	24.3	4.8%
Totals for Area of Interest		**504.4**	**100.0%**

Placer County, California, Western Part

141—Cometa-Fiddyment complex, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: hfzk
Elevation: 20 to 400 feet
Mean annual precipitation: 10 to 23 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Fiddyment and similar soils: 35 percent
Cometa and similar soils: 35 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cometa

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 18 inches: sandy loam
H2 - 18 to 29 inches: clay
H3 - 29 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: CLAYPAN (R017XD093CA)

Description of Fiddyment

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from siltstone

Typical profile

H1 - 0 to 12 inches: loam
H2 - 12 to 28 inches: clay loam
H3 - 28 to 35 inches: indurated
H4 - 35 to 39 inches: weathered bedrock

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 35 inches to duripan; 35 to 39 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: CLAYPAN (R017XD093CA)

Minor Components

Kaseberg

Percent of map unit: 10 percent

San joaquin

Percent of map unit: 10 percent

Ramona

Percent of map unit: 5 percent

Alamo

Percent of map unit: 5 percent

Landform: Depressions

Data Source Information

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 7, Sep 17, 2014

Placer County, California, Western Part

146—Fiddyment loam, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: hfzq
Elevation: 50 to 280 feet
Mean annual precipitation: 19 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Fiddyment and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fiddyment

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from siltstone

Typical profile

H1 - 0 to 12 inches: loam
H2 - 12 to 28 inches: clay loam
H3 - 28 to 35 inches: indurated
H4 - 35 to 39 inches: weathered bedrock

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: 20 to 35 inches to duripan; 35 to 39 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D

Minor Components

Cometa

Percent of map unit: 5 percent

Kaseberg

Percent of map unit: 5 percent

San joaquin

Percent of map unit: 3 percent

Alamo

Percent of map unit: 2 percent
Landform: Depressions

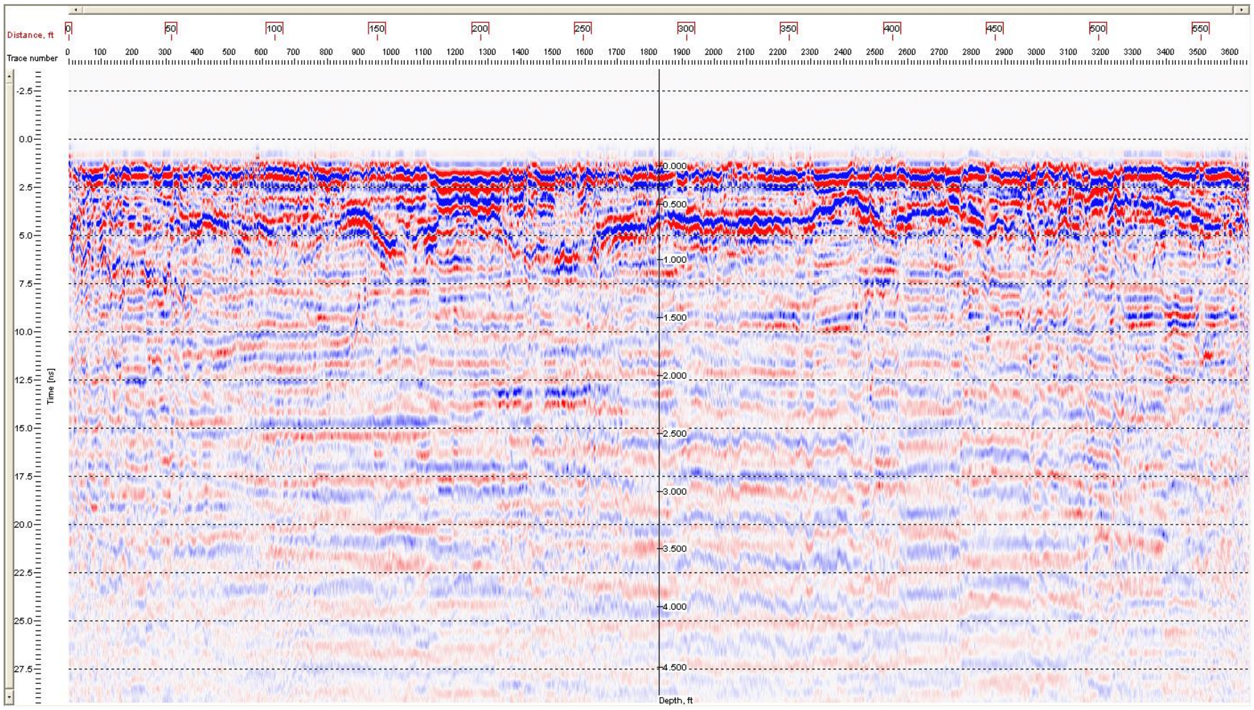
Data Source Information

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 7, Sep 17, 2014

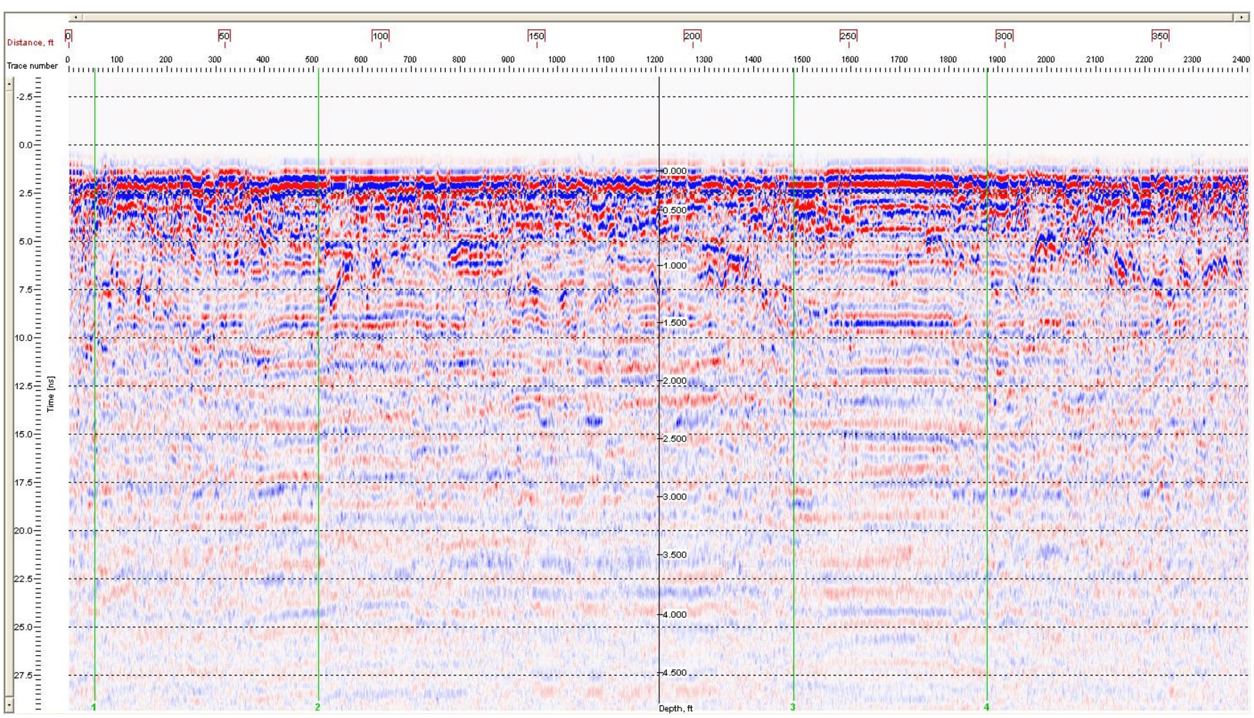
APPENDIX B

GROUND PENETRATING RADAR PROFILES

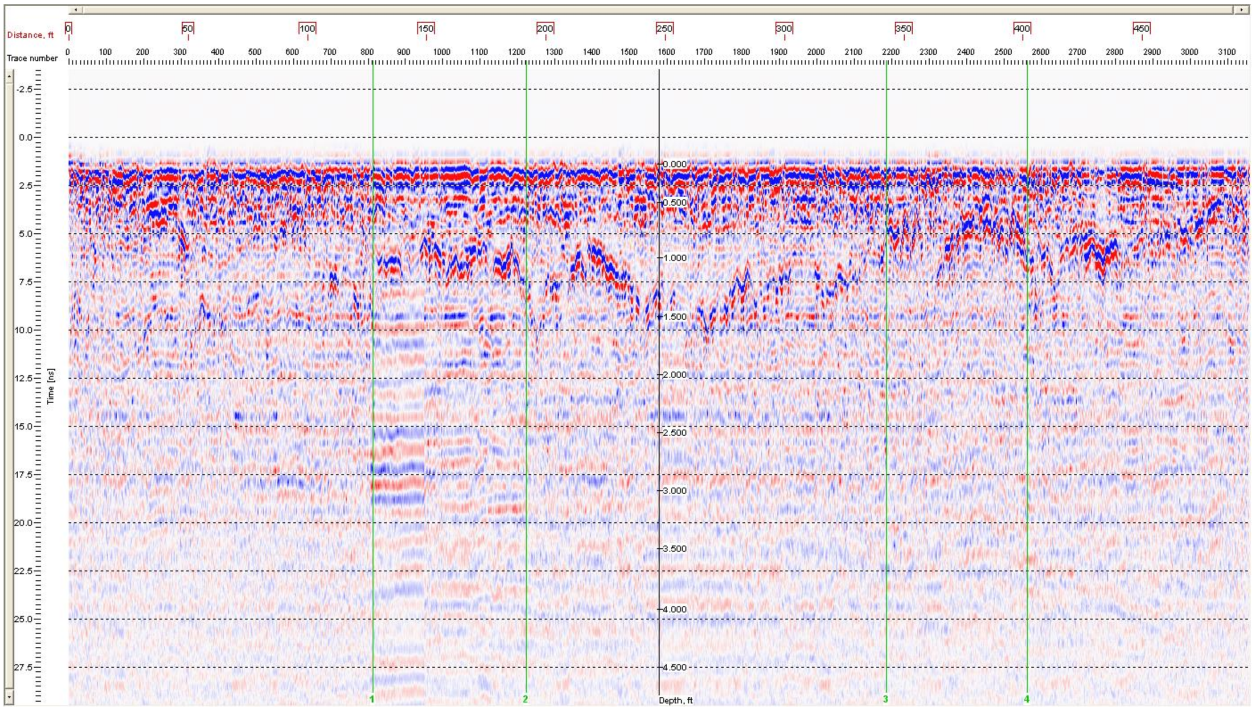
DAT 1



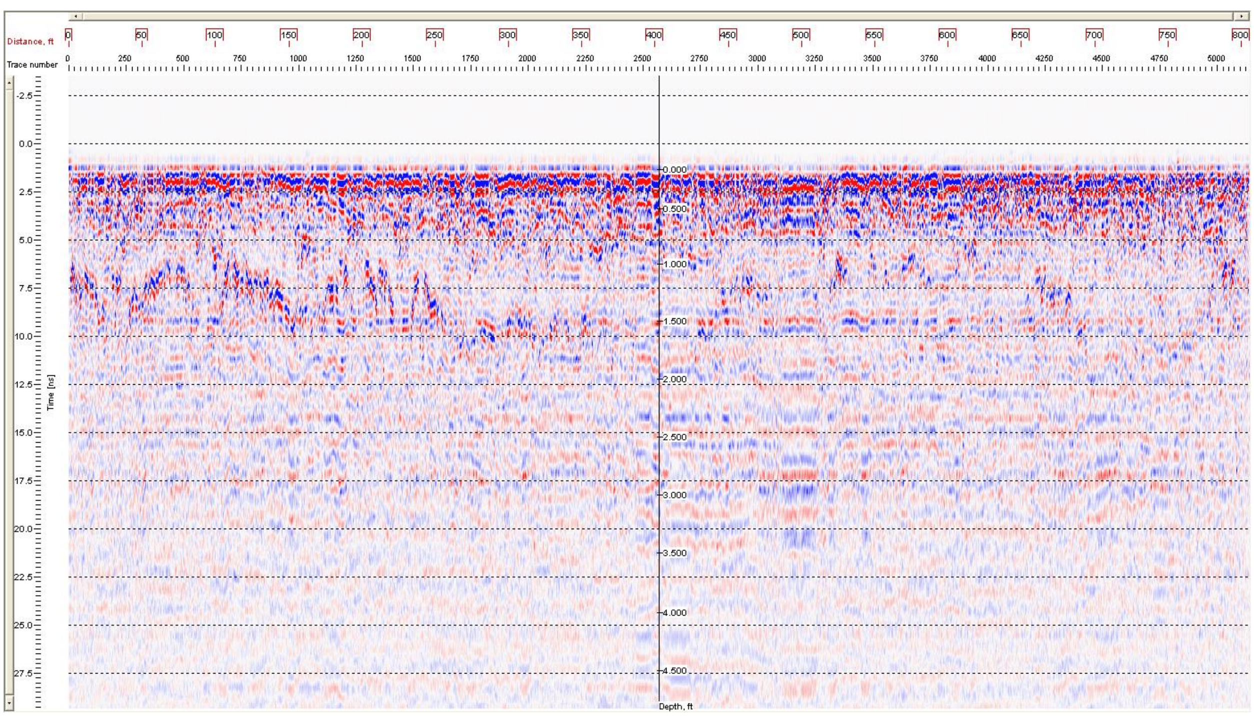
DAT 2



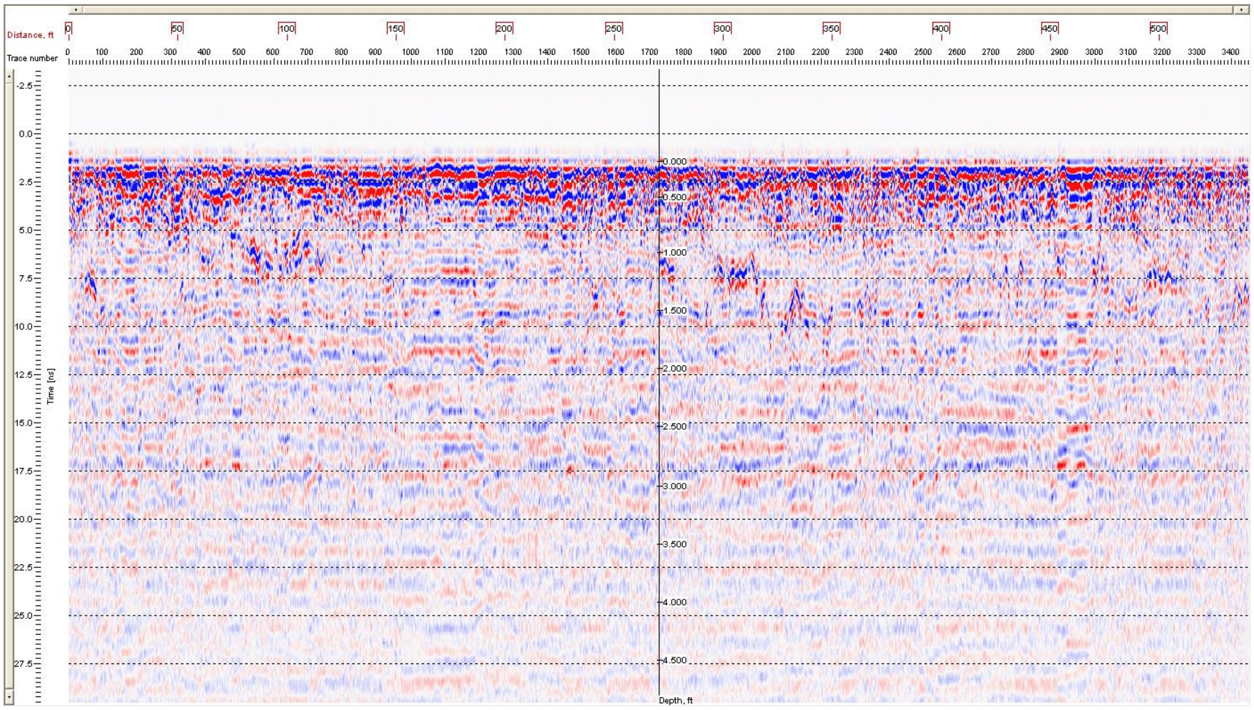
DAT 3



DAT 4

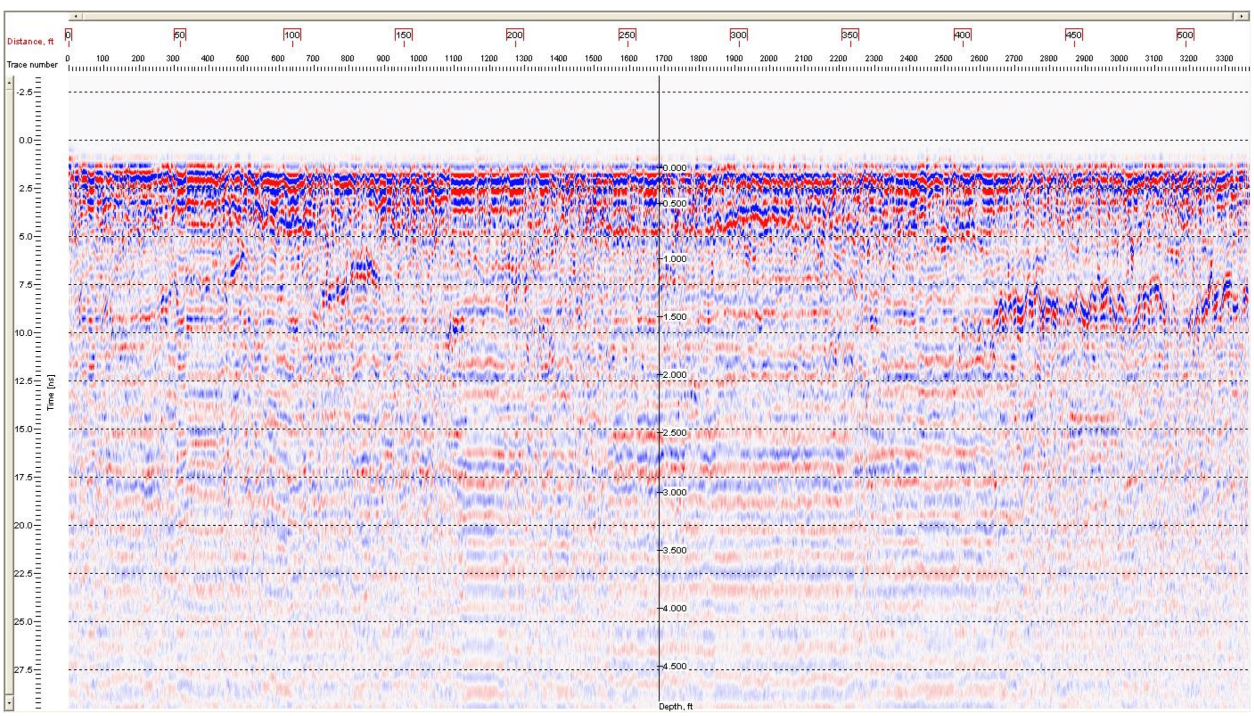


DAT 5



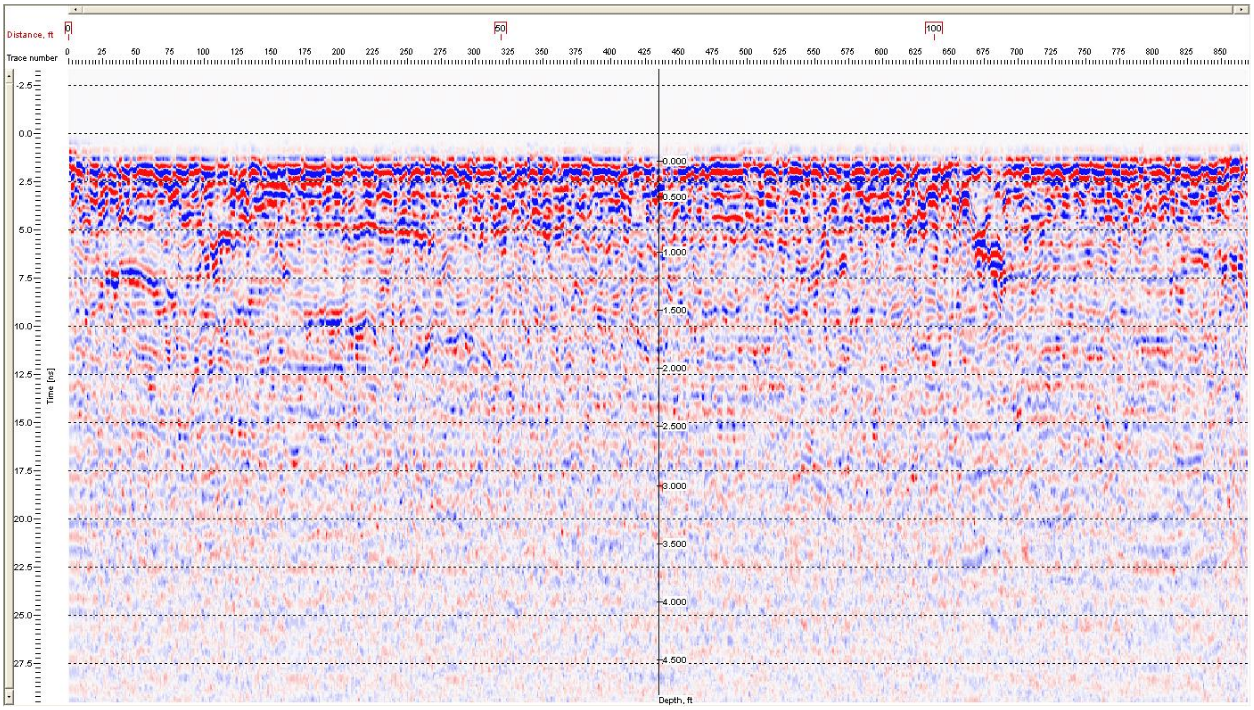
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 6

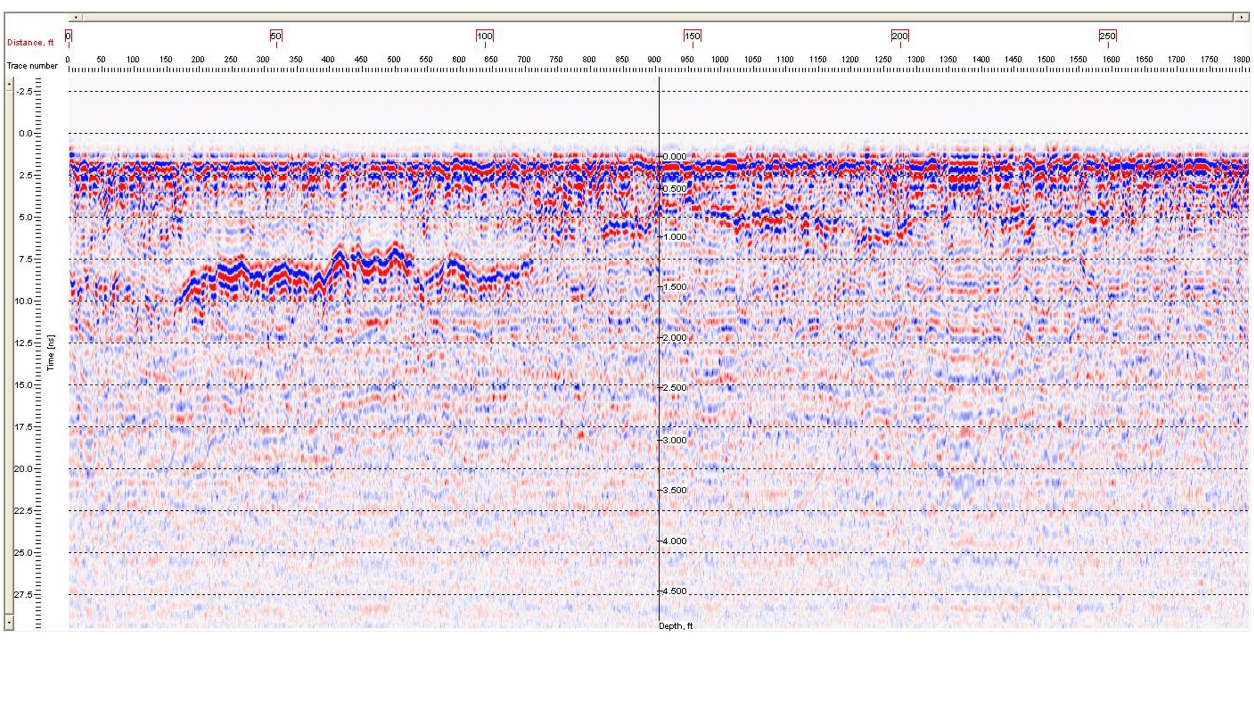


Distance, ft
Trace number
Time [ns]
Depth, ft

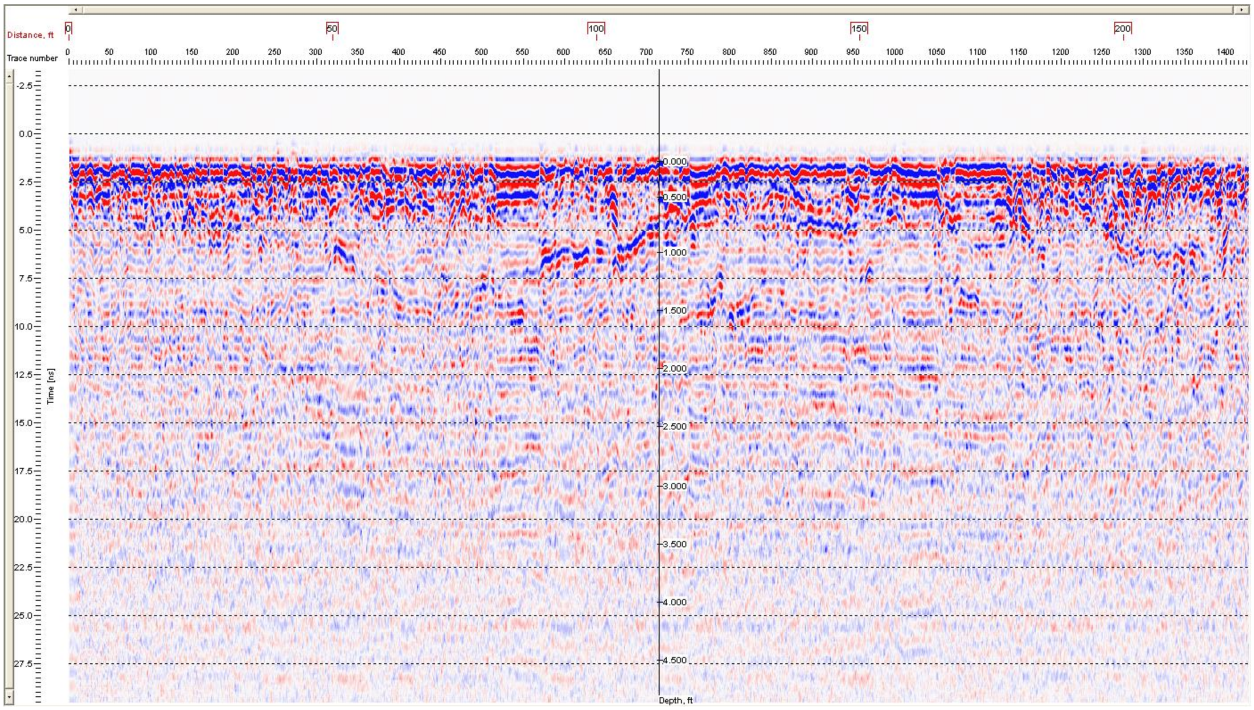
DAT 7


Distance, ft
Trace number
Time [ns]
Depth, ft

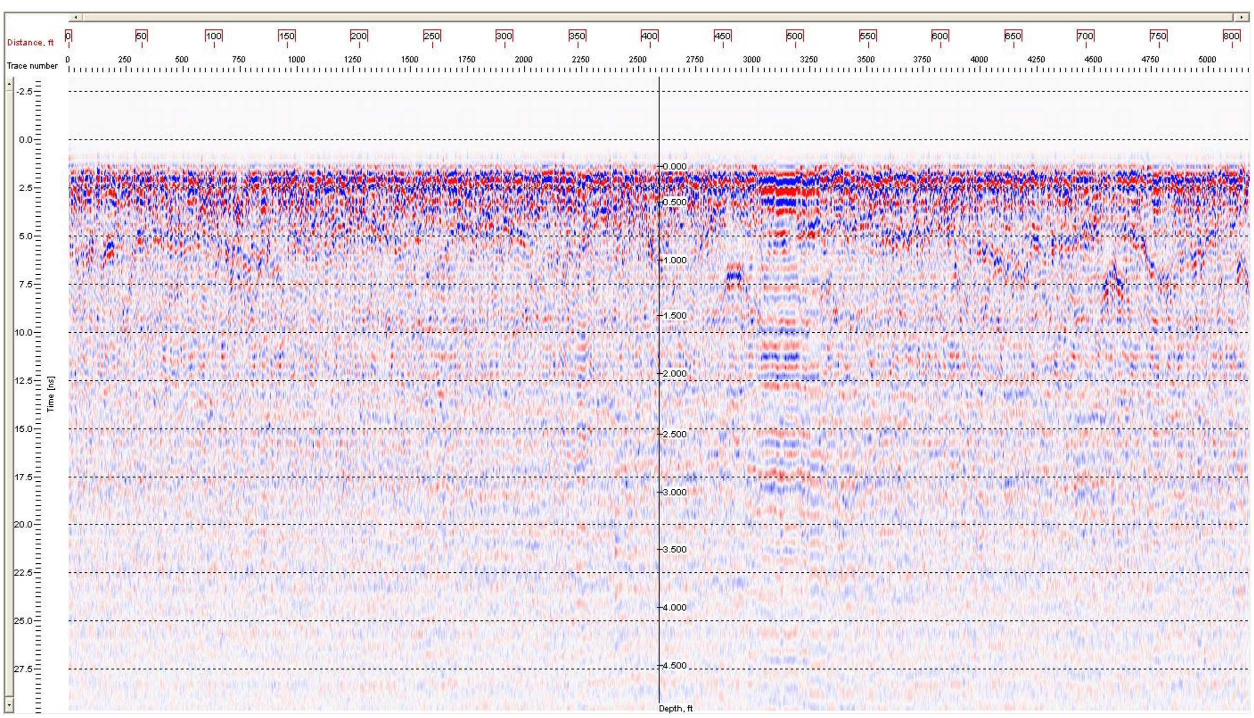
DAT 8


Distance, ft
Trace number
Time [ns]
Depth, ft

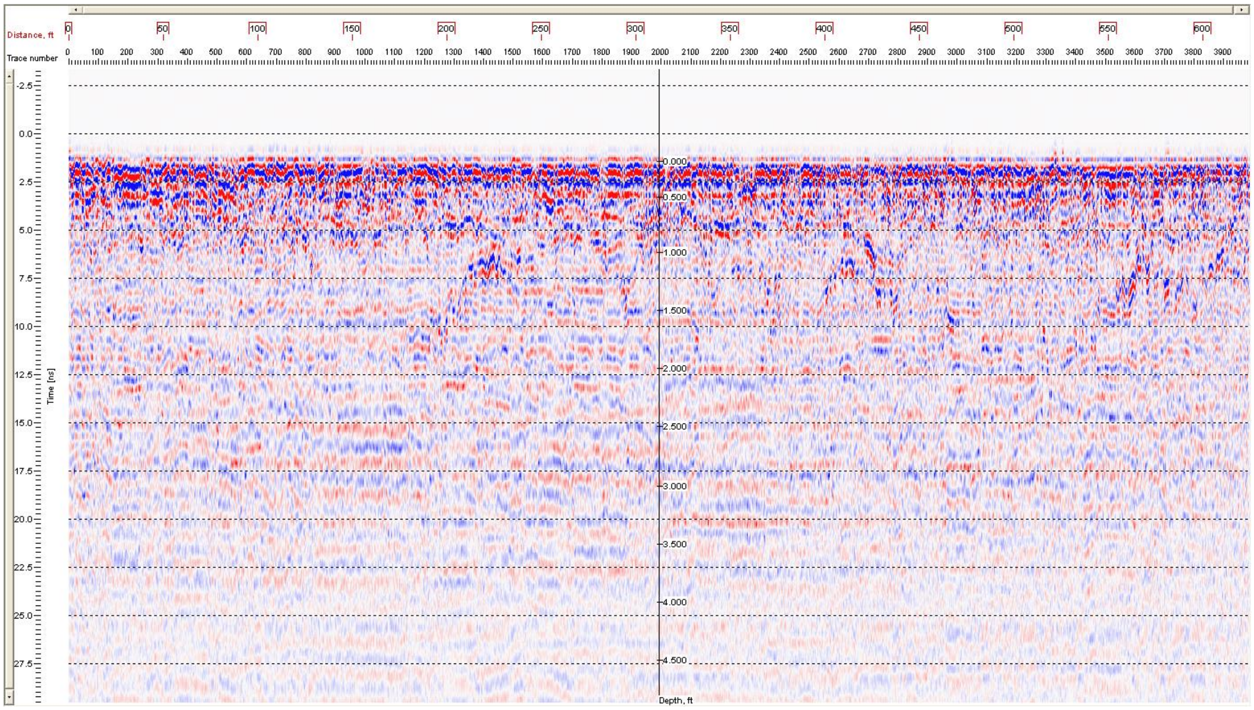
DAT 9


Distance, ft
Trace number
Time [ns]
Depth, ft

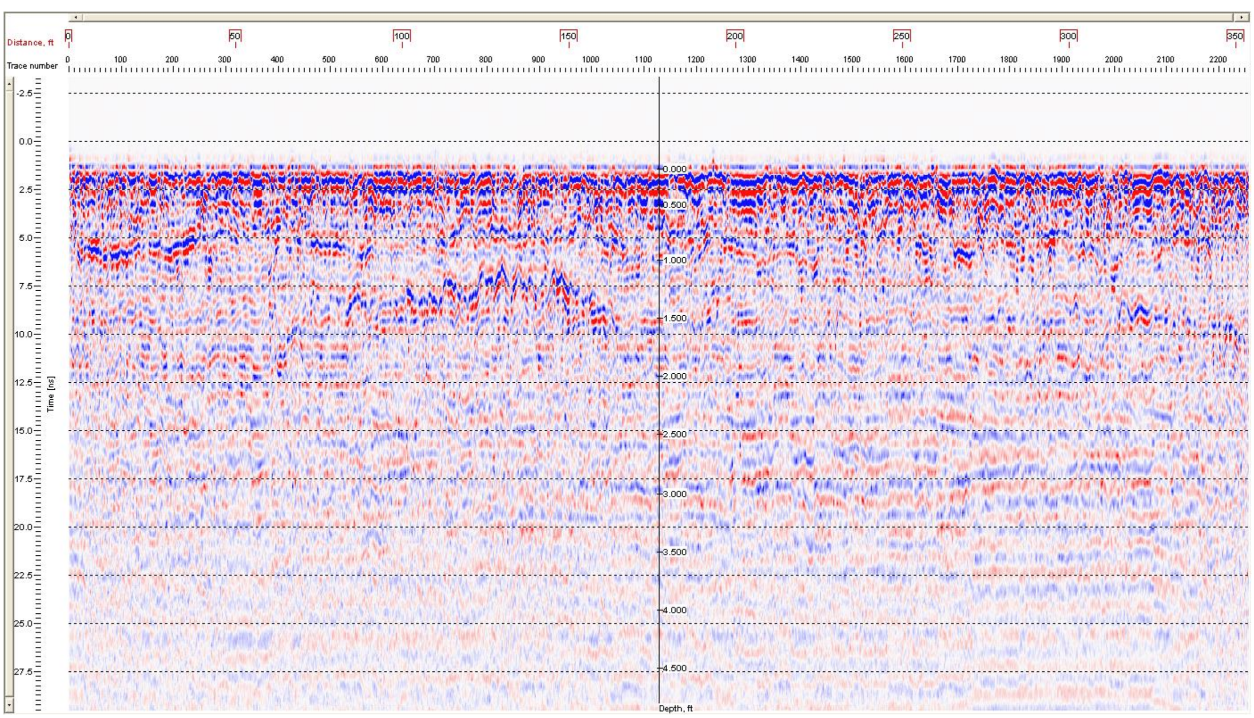
DAT 10


Distance, ft
Trace number
Time [ns]
Depth, ft

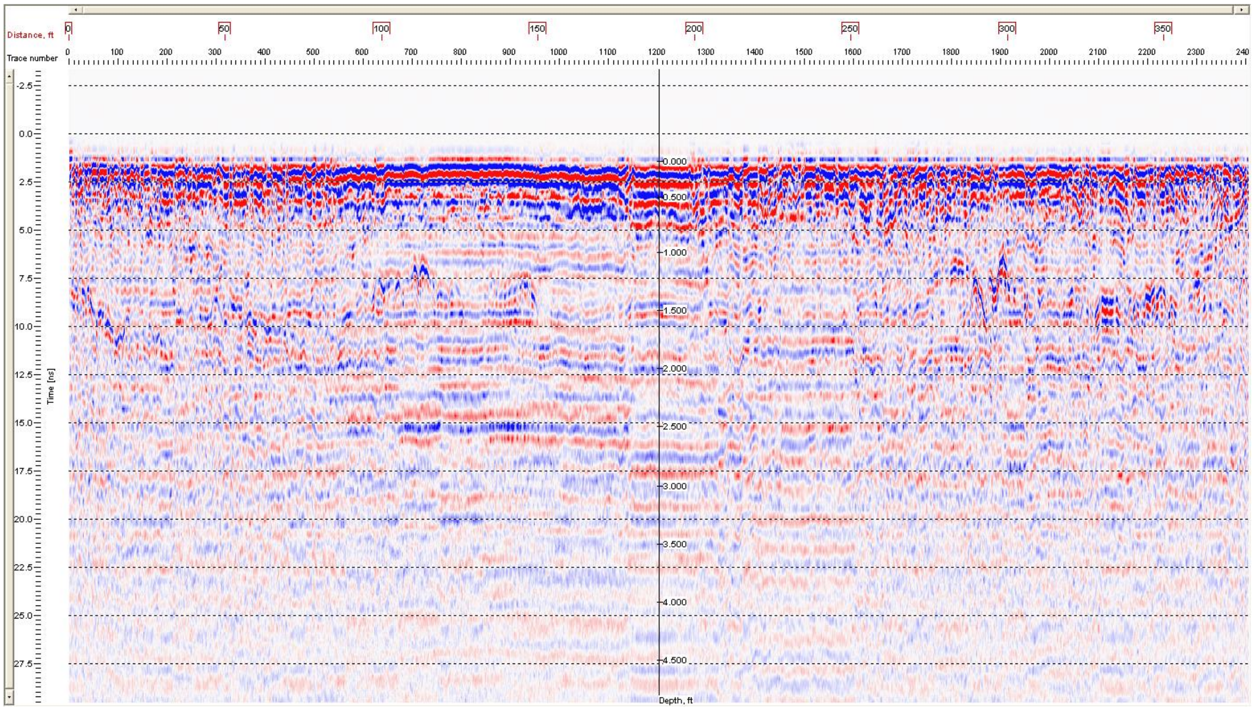
DAT 11


Distance, ft
Trace number
Time [ns]
Depth, ft

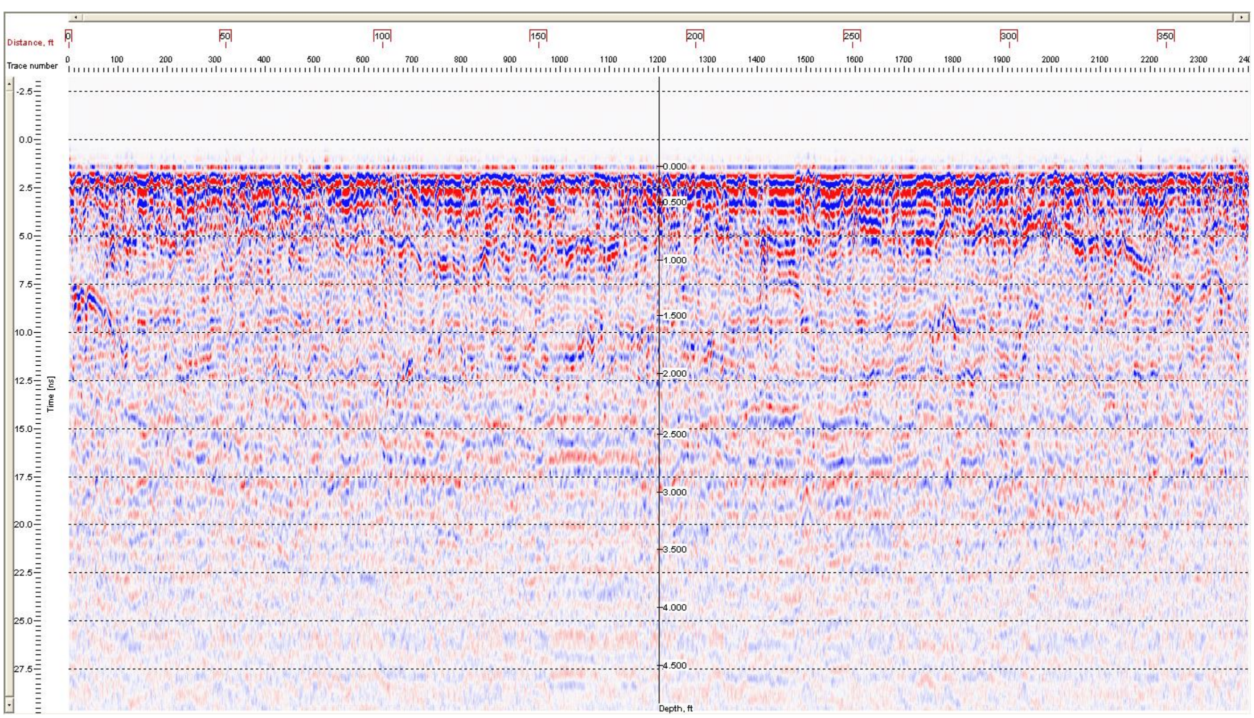
DAT 12


Distance, ft
Trace number
Time [ns]
Depth, ft

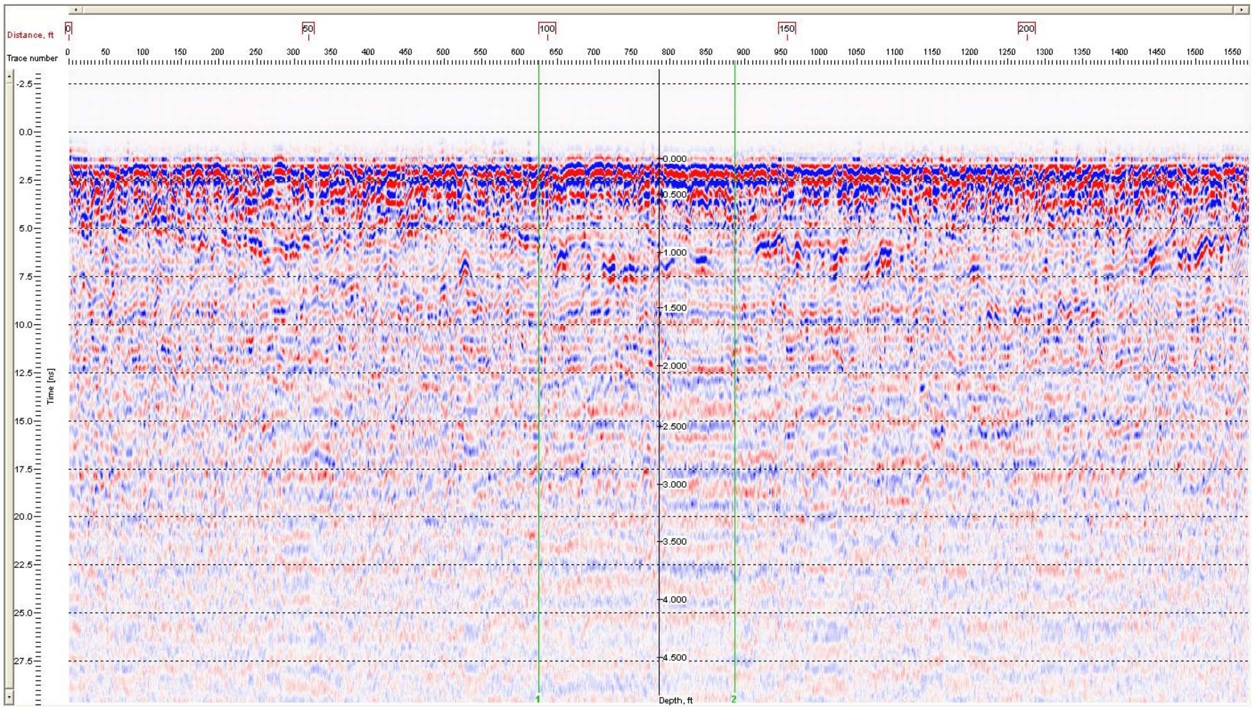
DAT 13


Distance, ft
Trace number
Time [ns]
Depth, ft

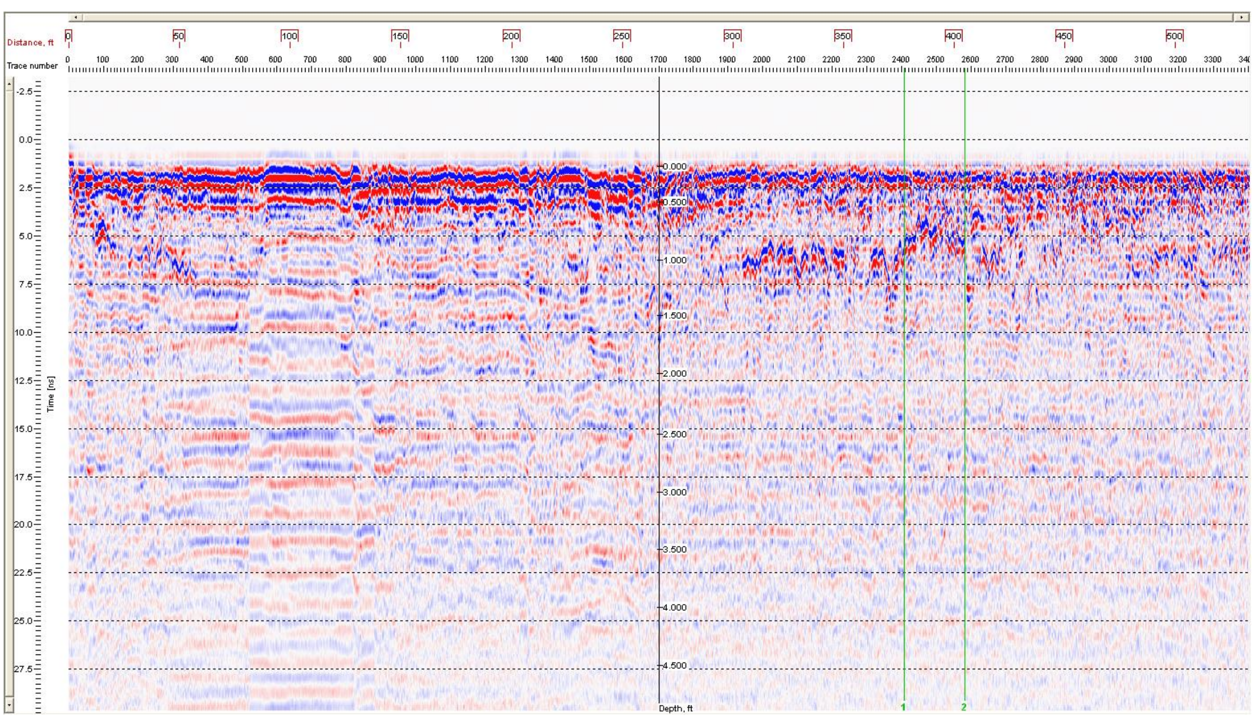
DAT 14


Distance, ft
Trace number
Time [ns]
Depth, ft

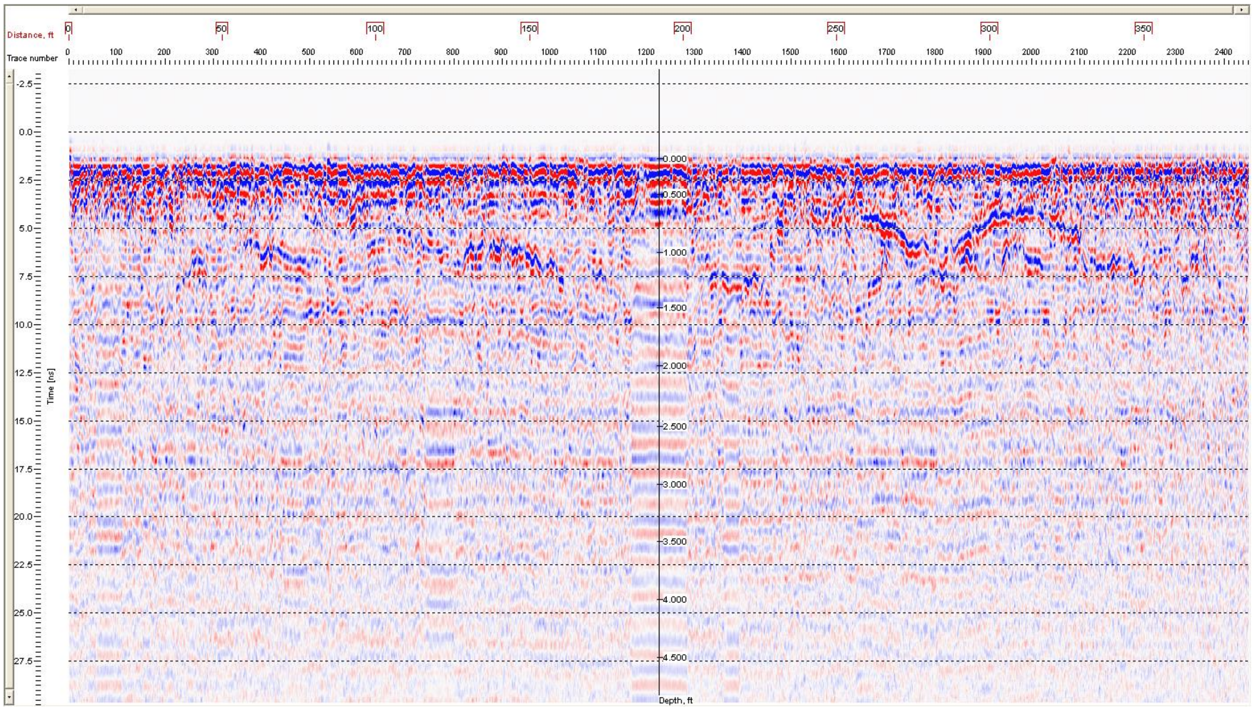
DAT 15


Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 16

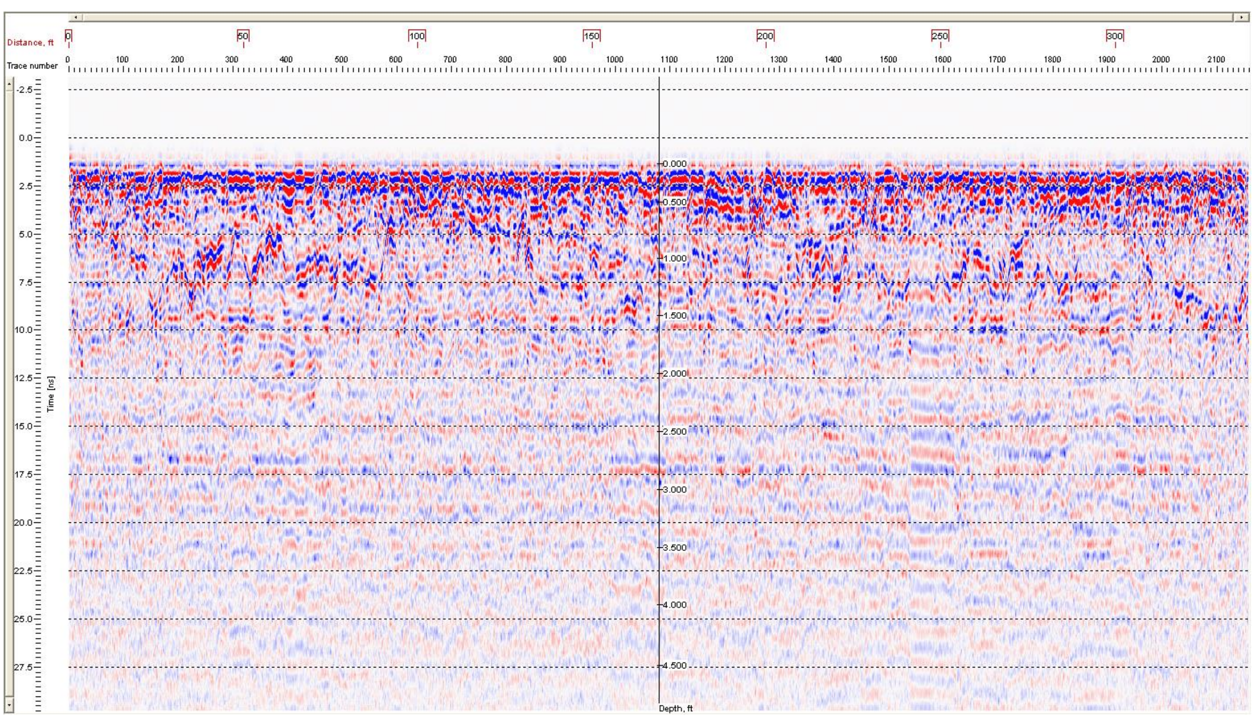

Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 17



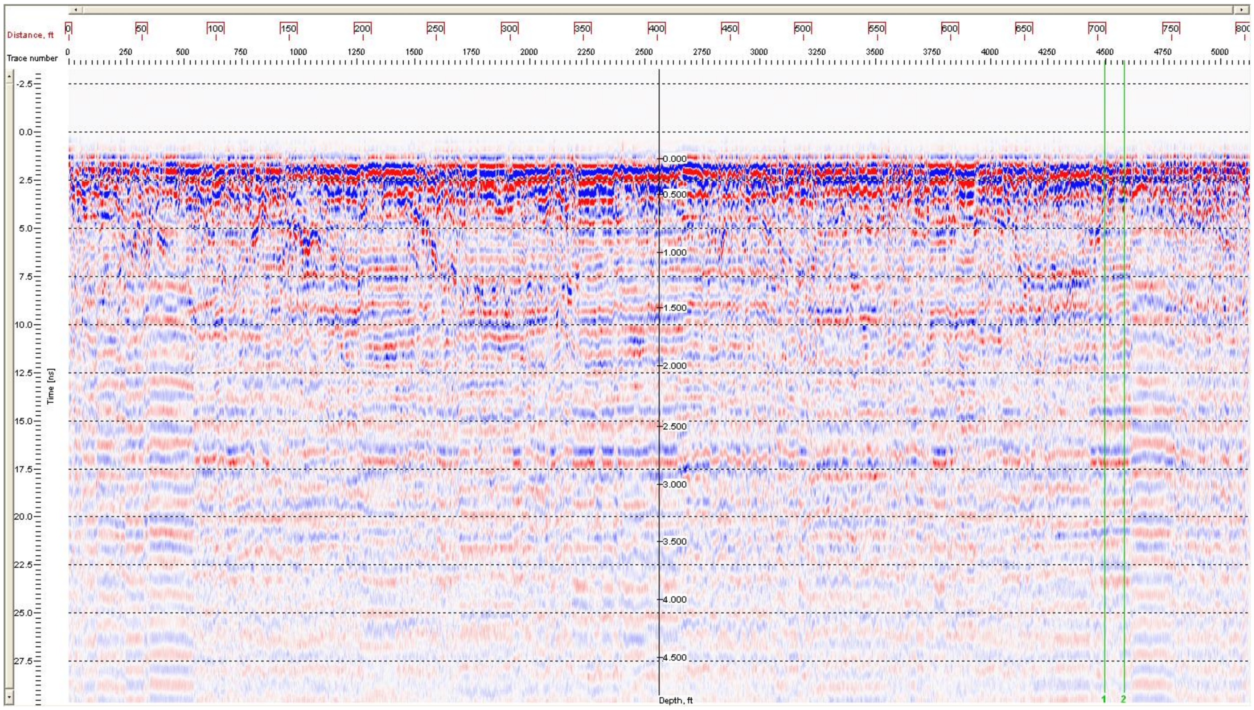
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 18

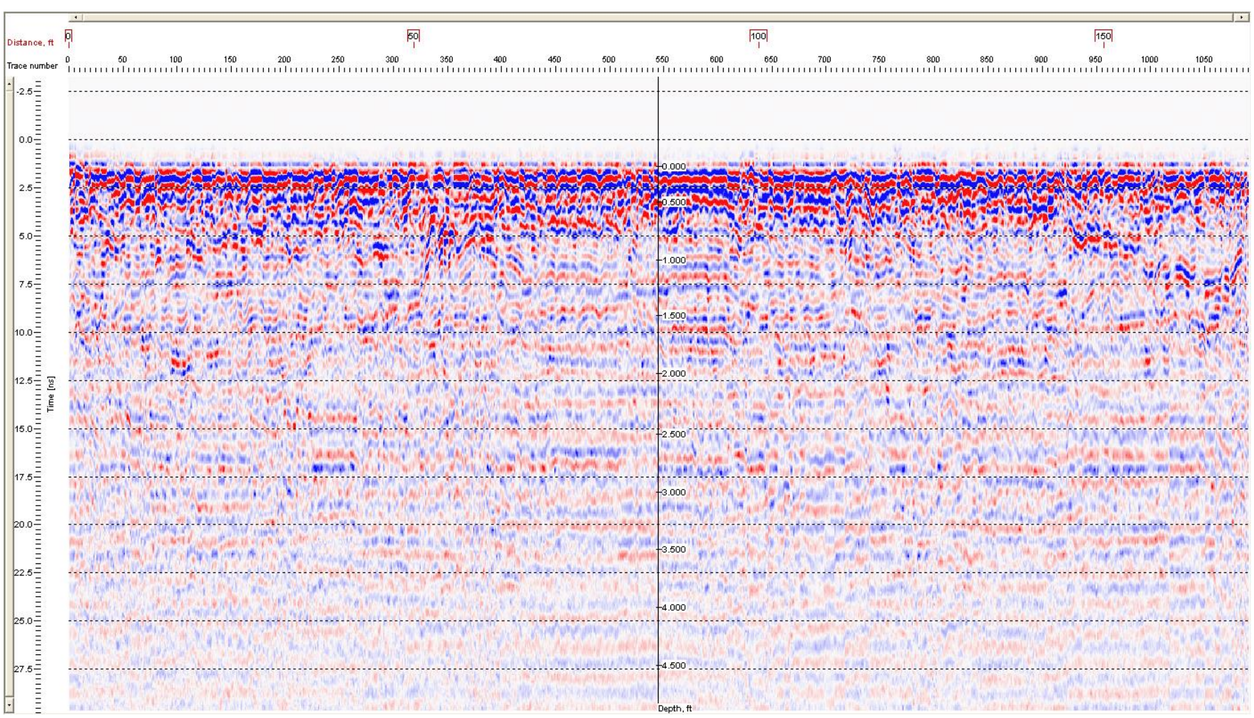


Distance, ft
Trace number
Time [ns]
Depth, ft

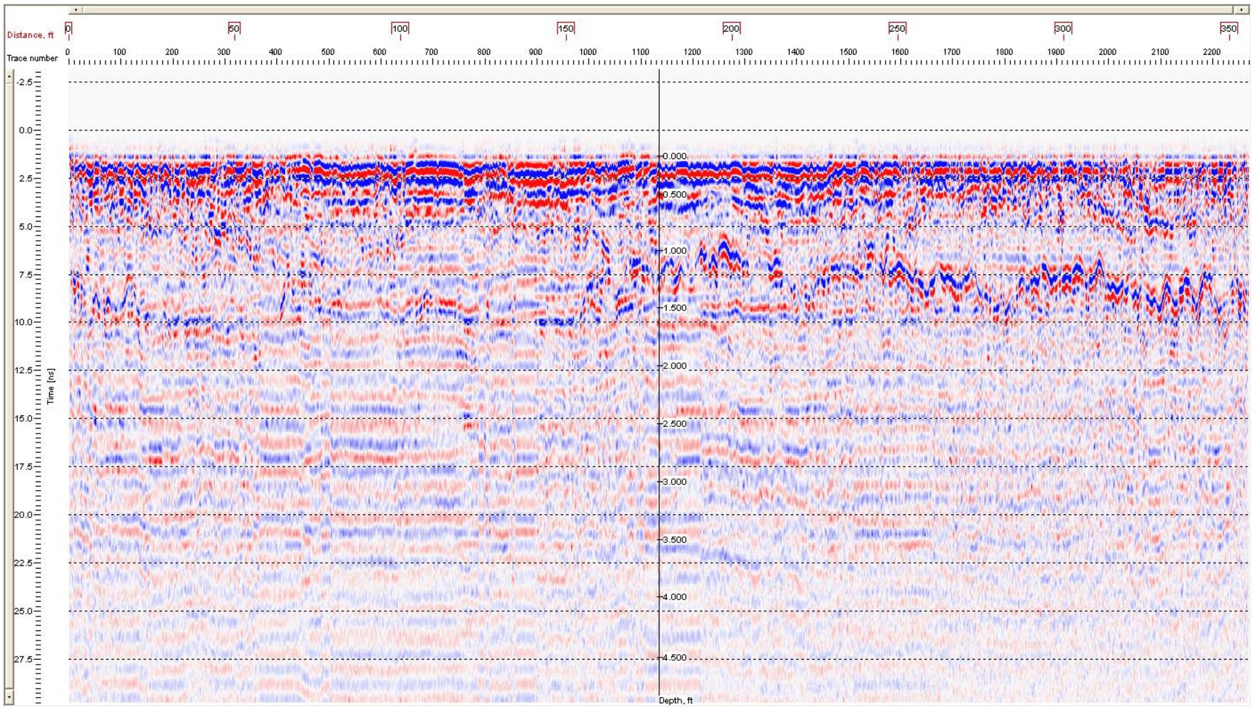
DAT 19


Distance, ft
Trace number
Time [ns]
Depth, ft

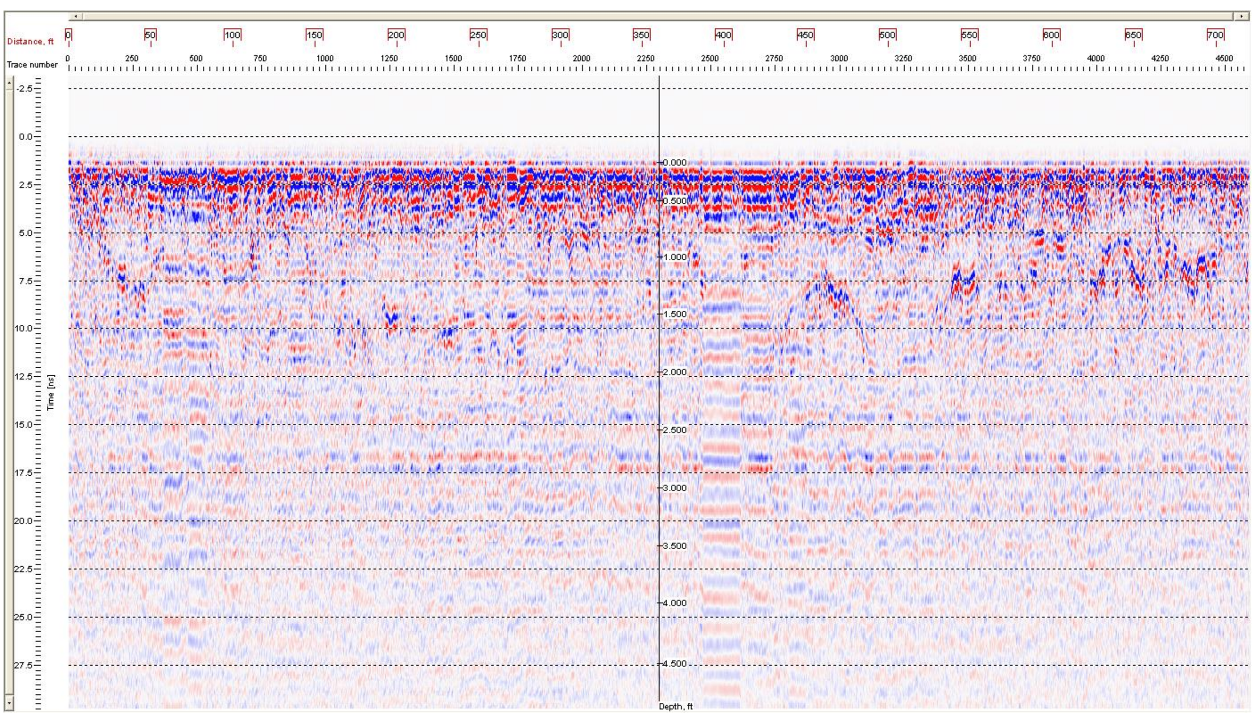
DAT 20


Distance, ft
Trace number
Time [ns]
Depth, ft

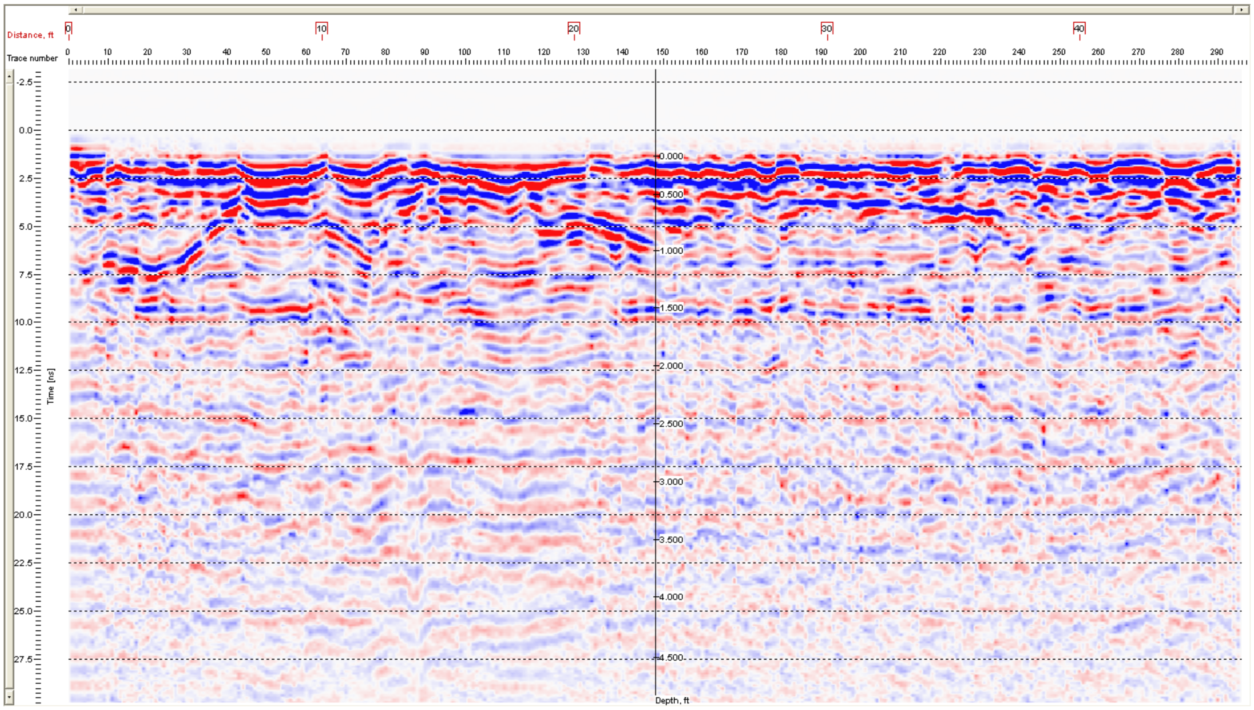
DAT 21


Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 22

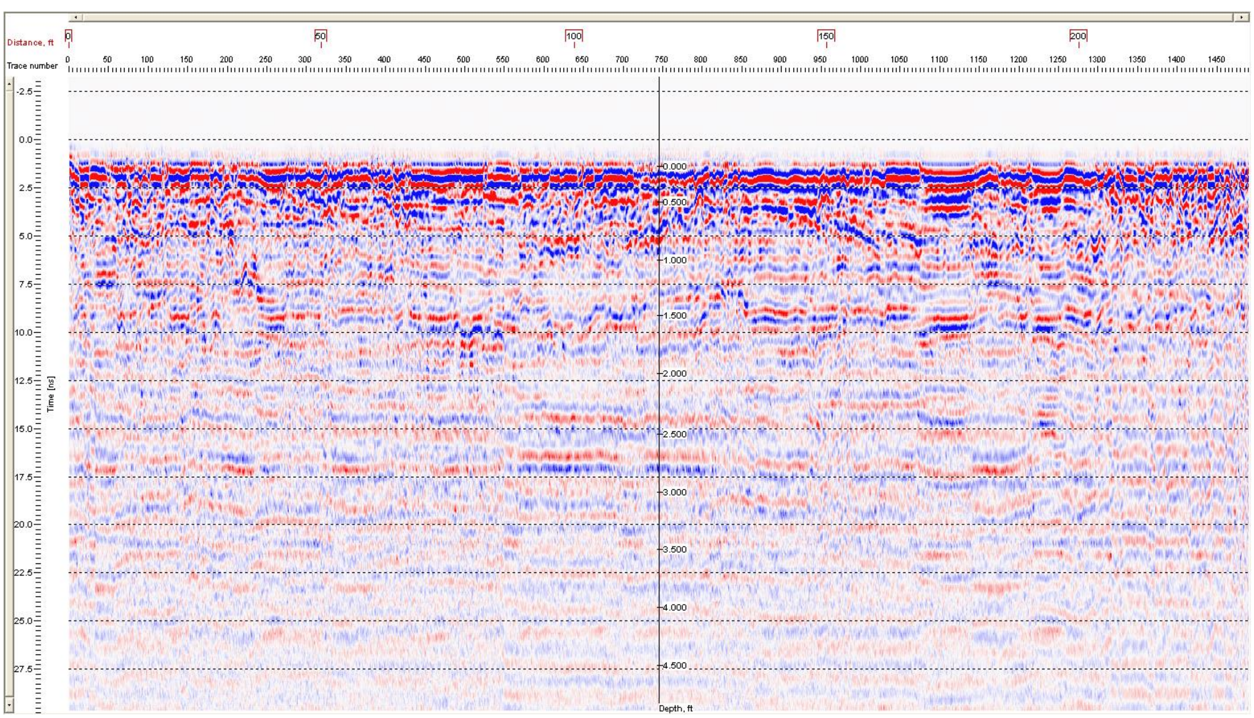

Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 23



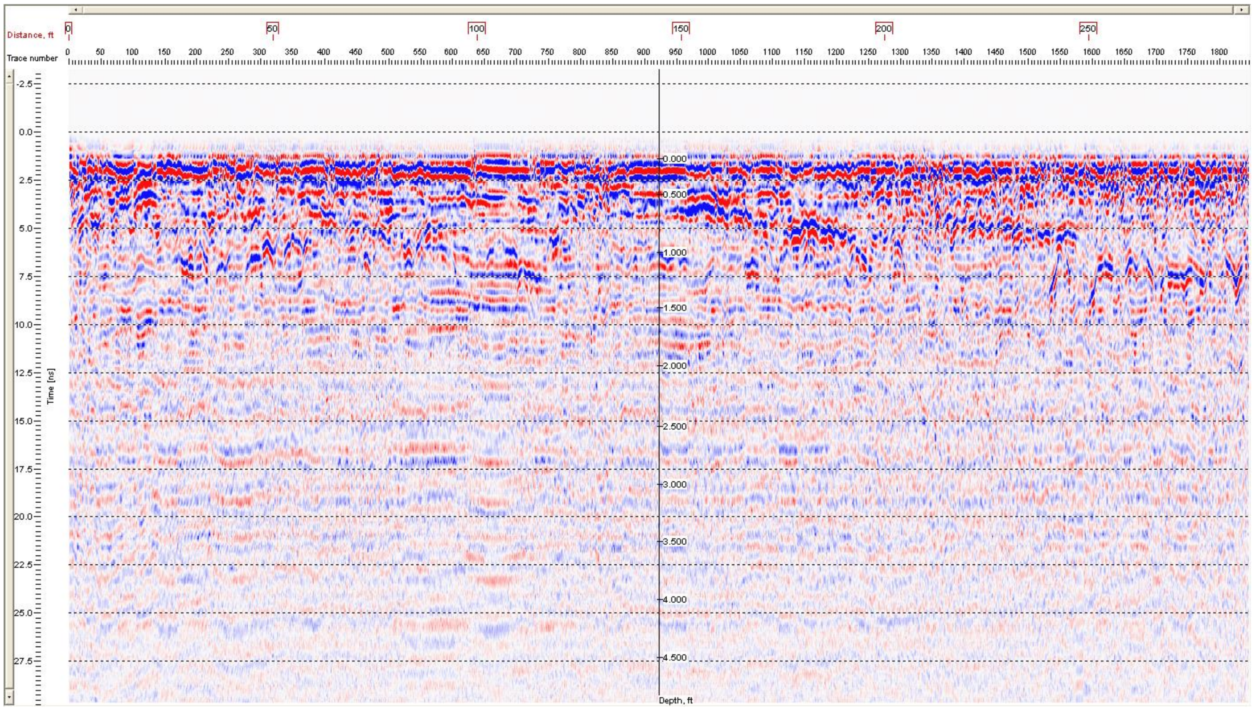
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 24

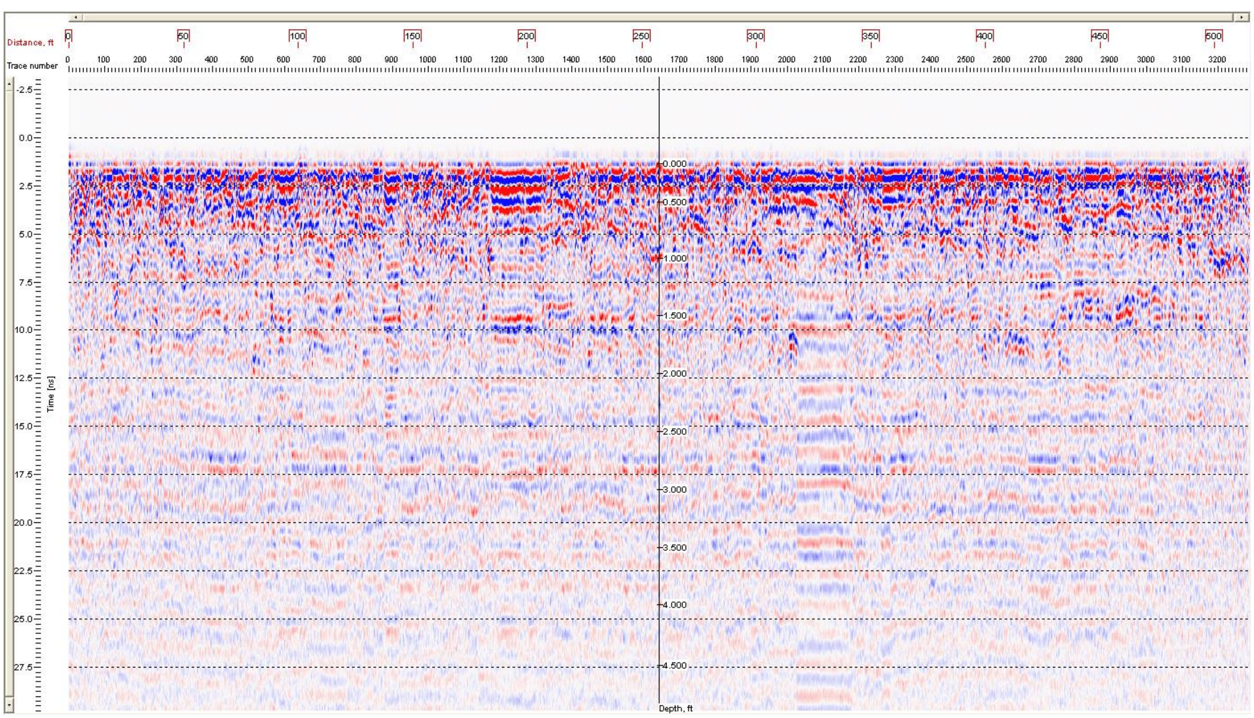


Distance, ft
Trace number
Time [ns]
Depth, ft

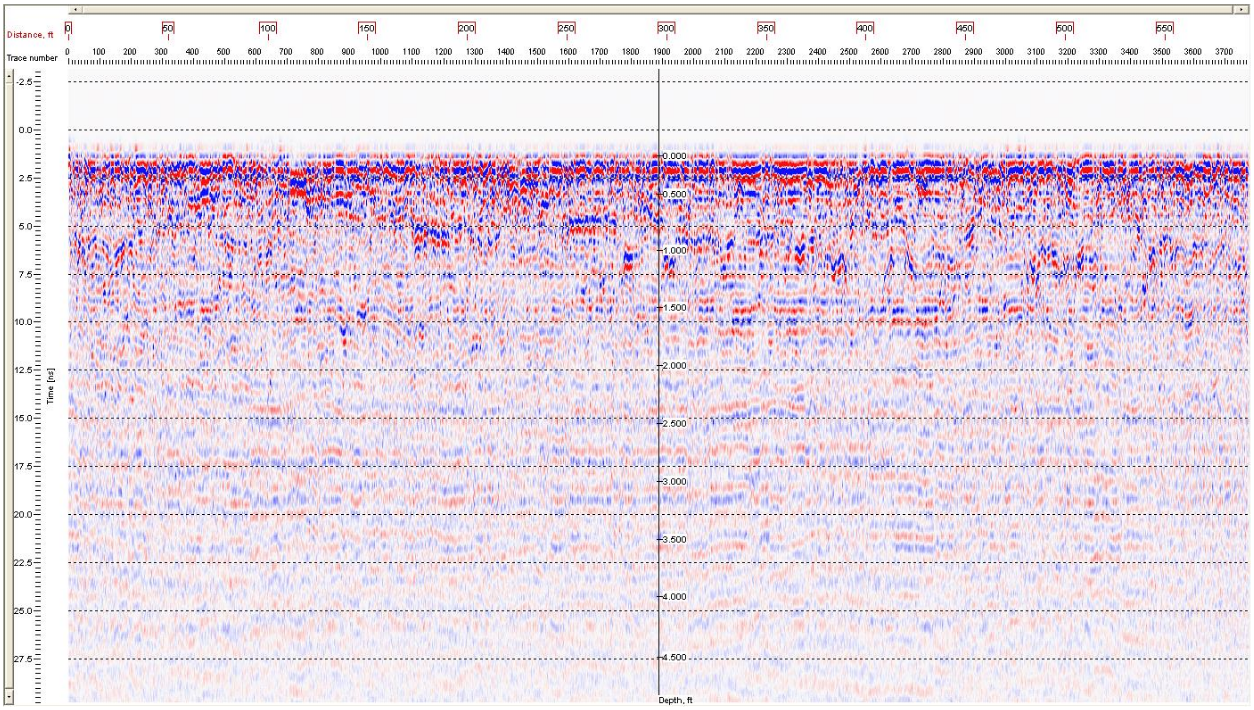
DAT 25


Distance, ft
Trace number
Time [ns]
Depth, ft

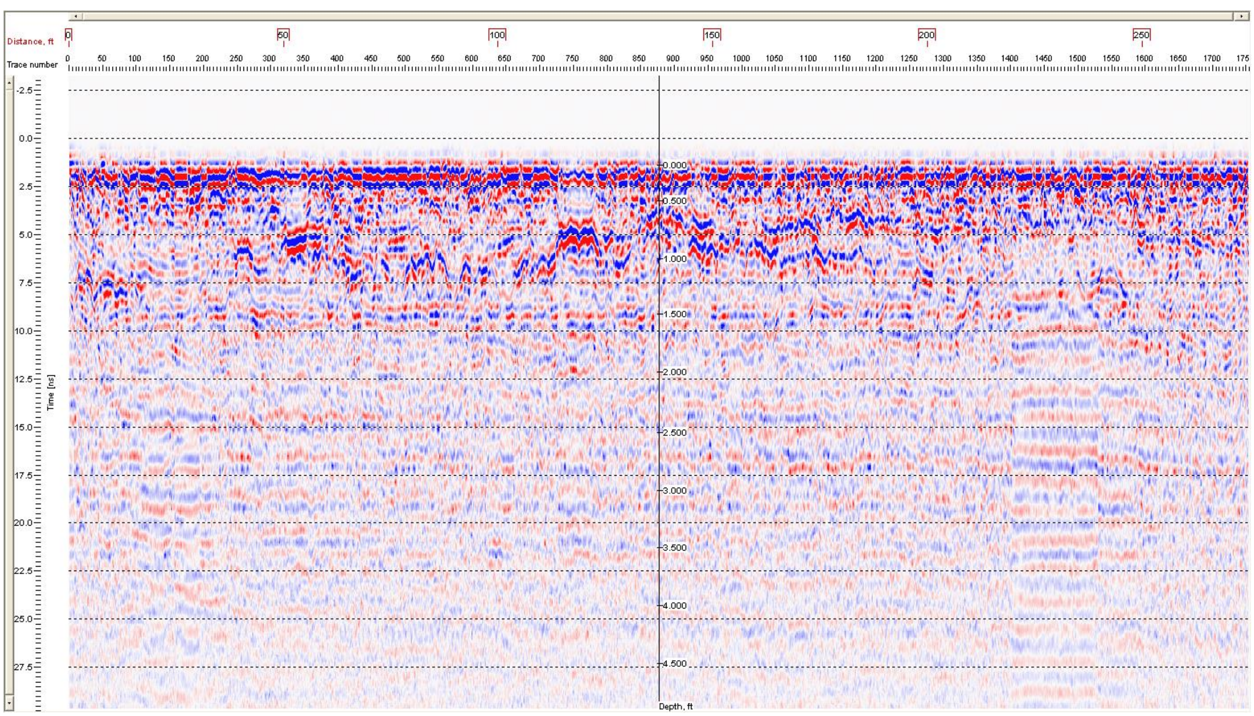
DAT 26


Distance, ft
Trace number
Time [ns]
Depth, ft

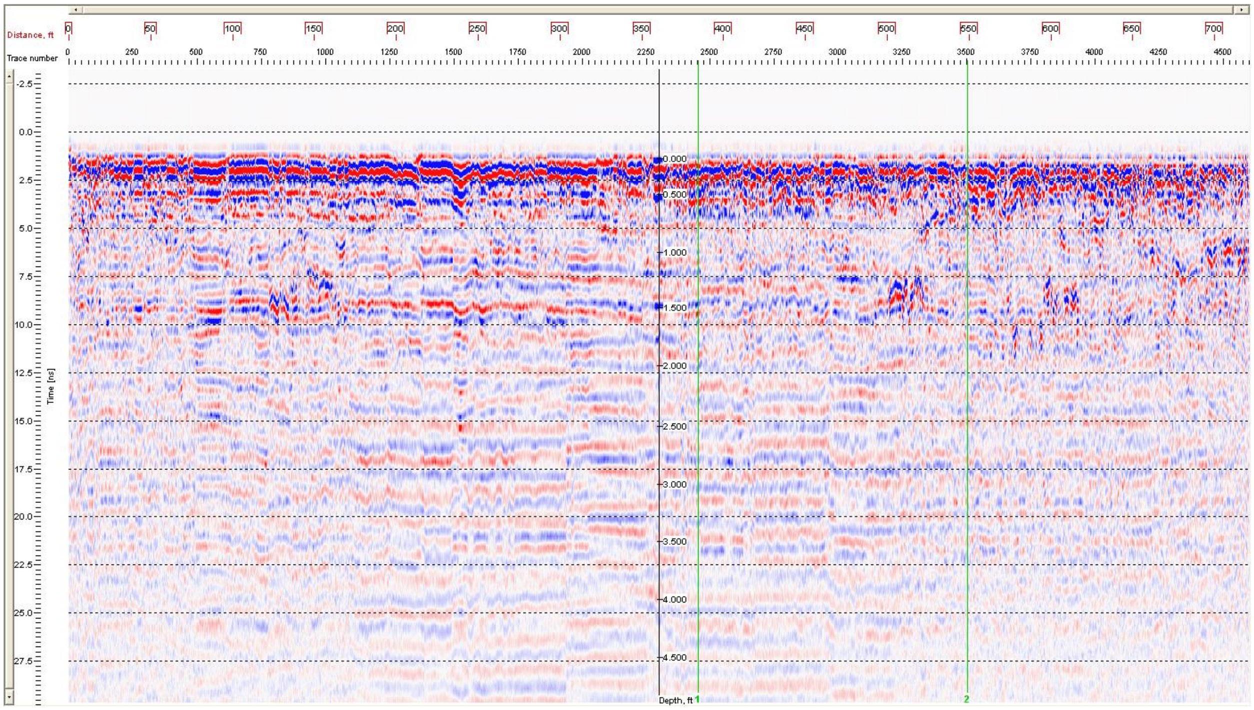
DAT 27


Distance, ft
Trace number
Time [ns]
Depth, ft

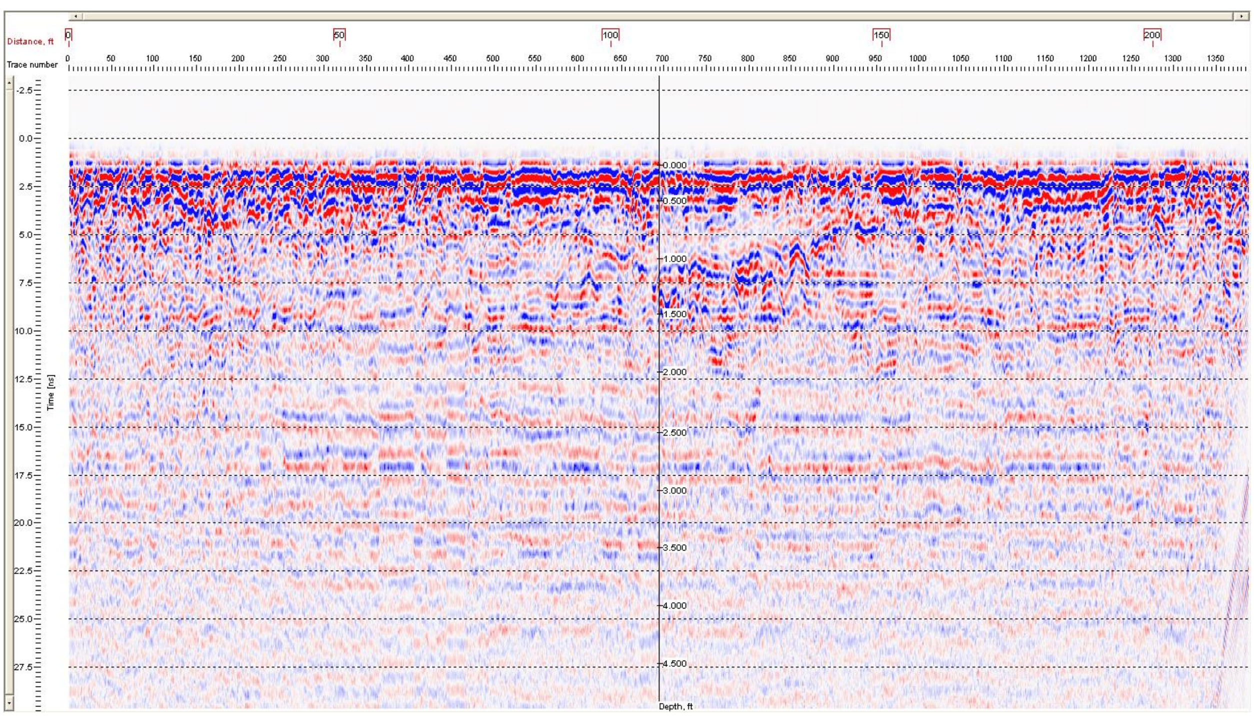
DAT 28


Distance, ft
Trace number
Time [ns]
Depth, ft

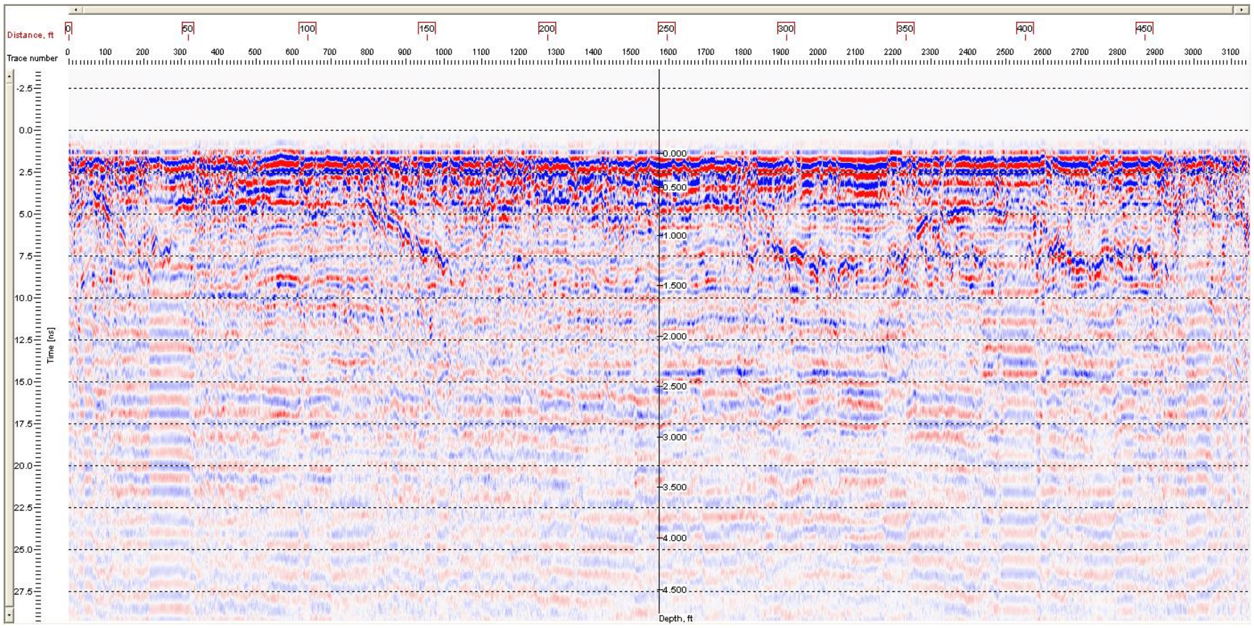
DAT 29



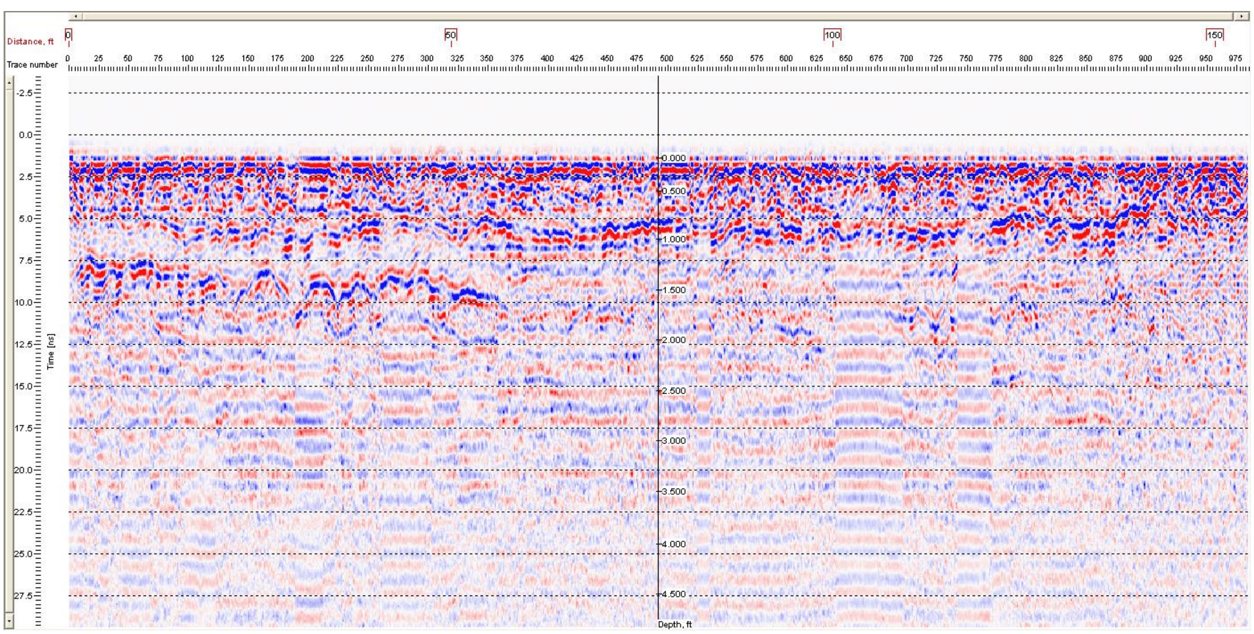
DAT 30



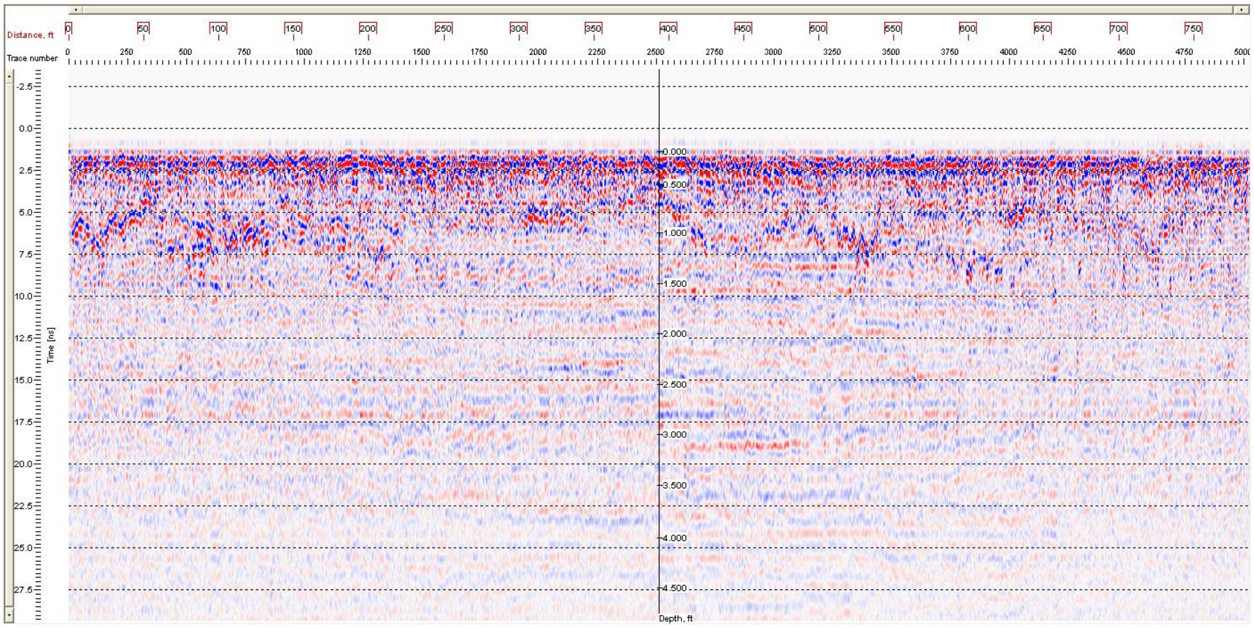
DAT 31


Distance, ft
Trace number
Time [ns]
Depth, ft

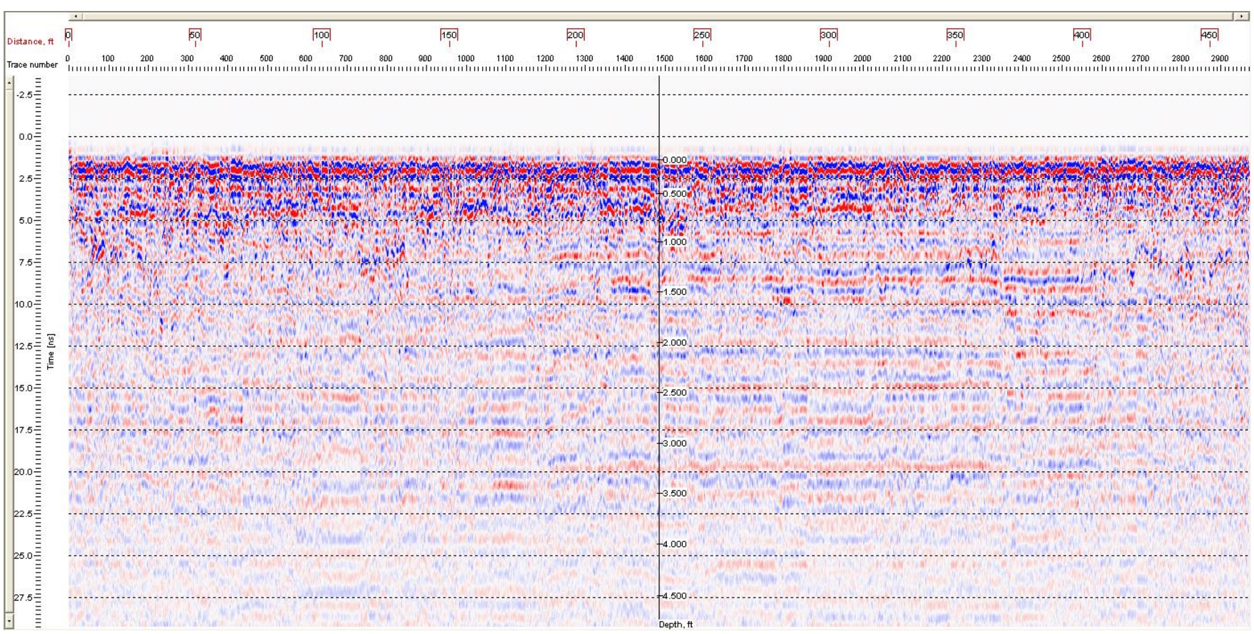
DAT 32


Distance, ft
Trace number
Time [ns]
Depth, ft

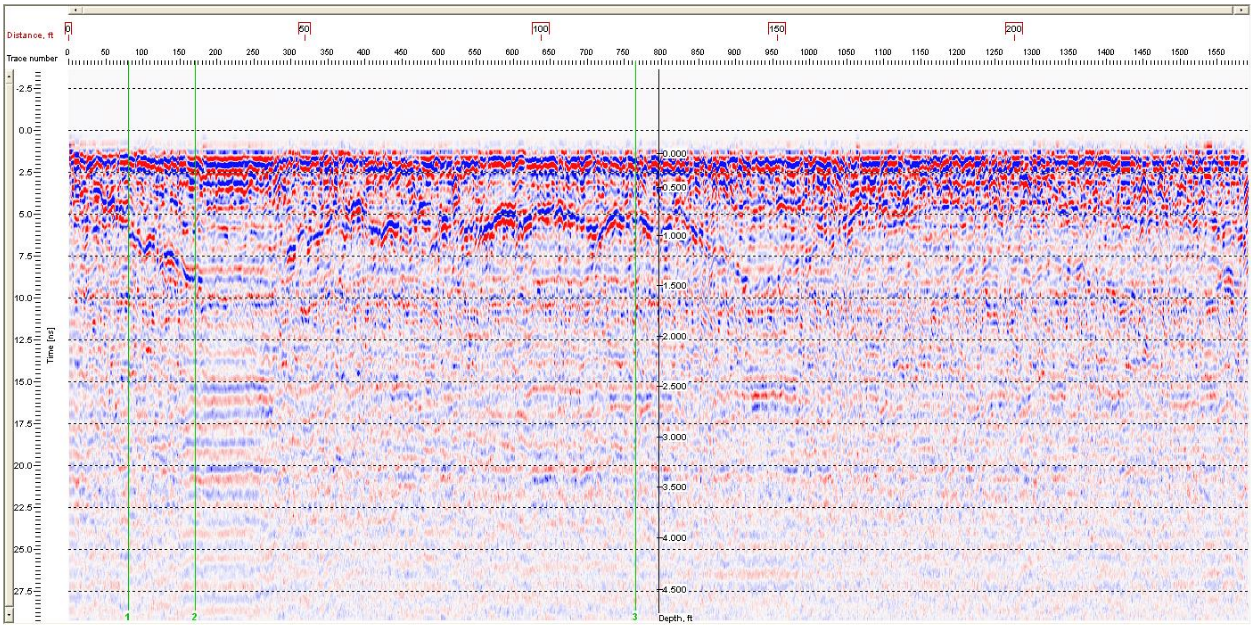
DAT 33


Distance, ft
Trace number
Time [ns]
Depth, ft

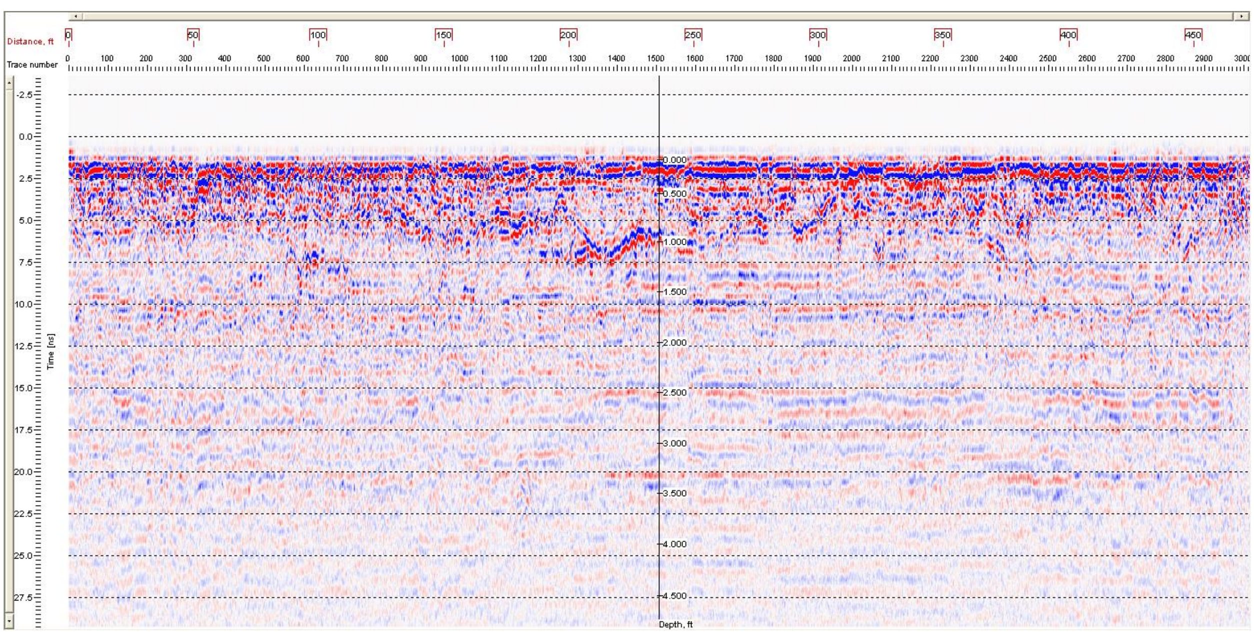
DAT 34


Distance, ft
Trace number
Time [ns]
Depth, ft

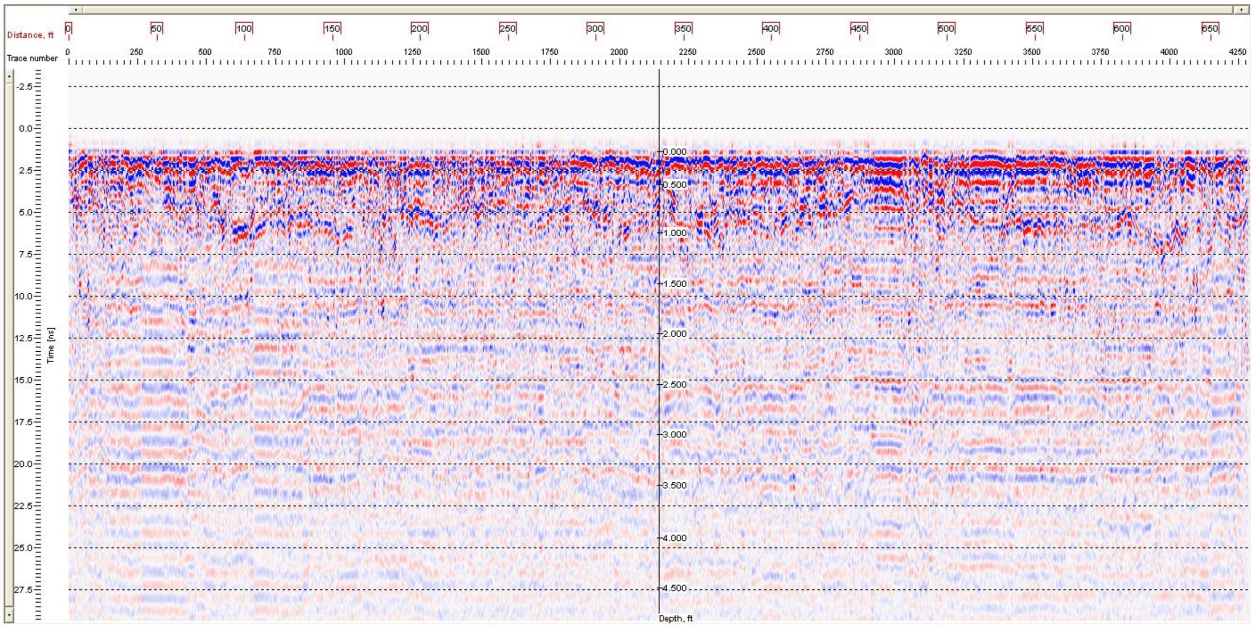
DAT 35


Distance, ft
0 50 100 150 200
Trace number
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550
Time [ns]
-2.5 0.0 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5
0.000 0.500 1.000 1.500 2.000 2.500 3.000 3.500 4.000 4.500
Depth, ft
1 2 3

DAT 36

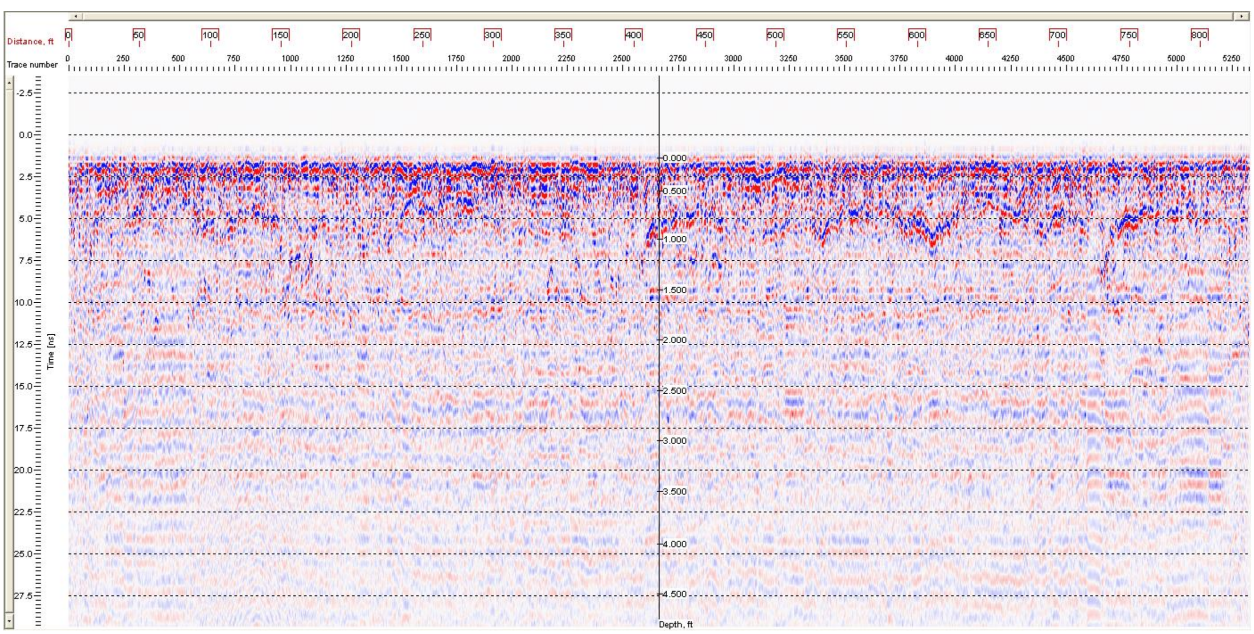

Distance, ft
0 50 100 150 200 250 300 350 400 450
Trace number
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000
Time [ns]
-2.5 0.0 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5
0.000 0.500 1.000 1.500 2.000 2.500 3.000 3.500 4.000 4.500
Depth, ft

DAT 37



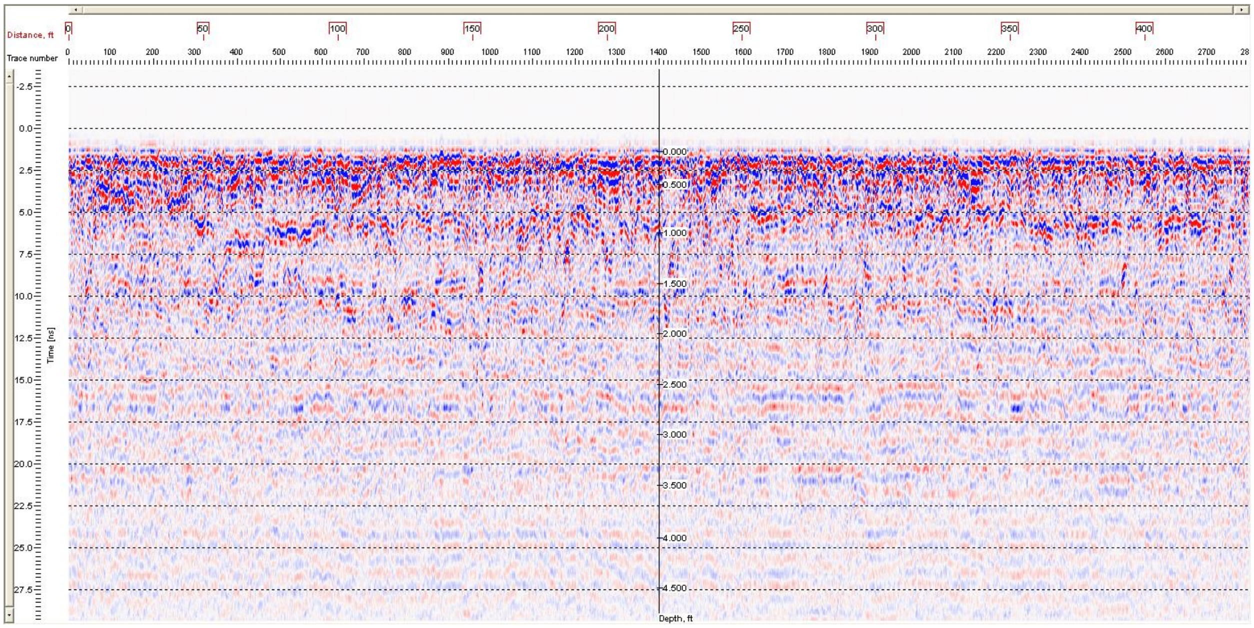
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 38



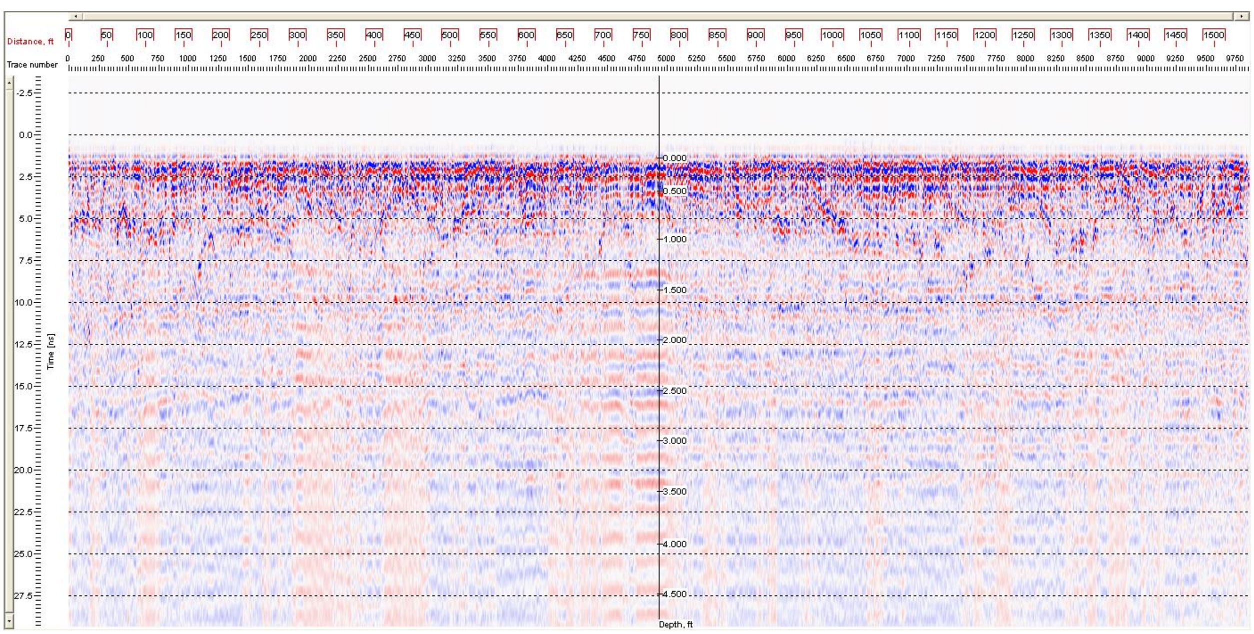
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 39



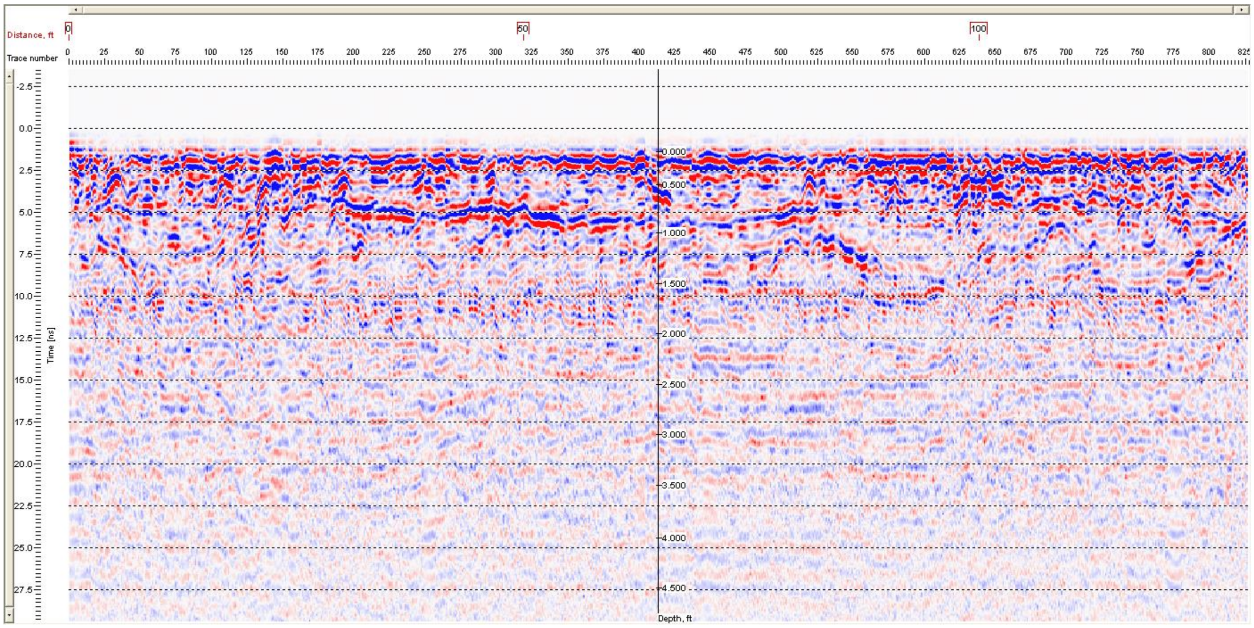
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 40

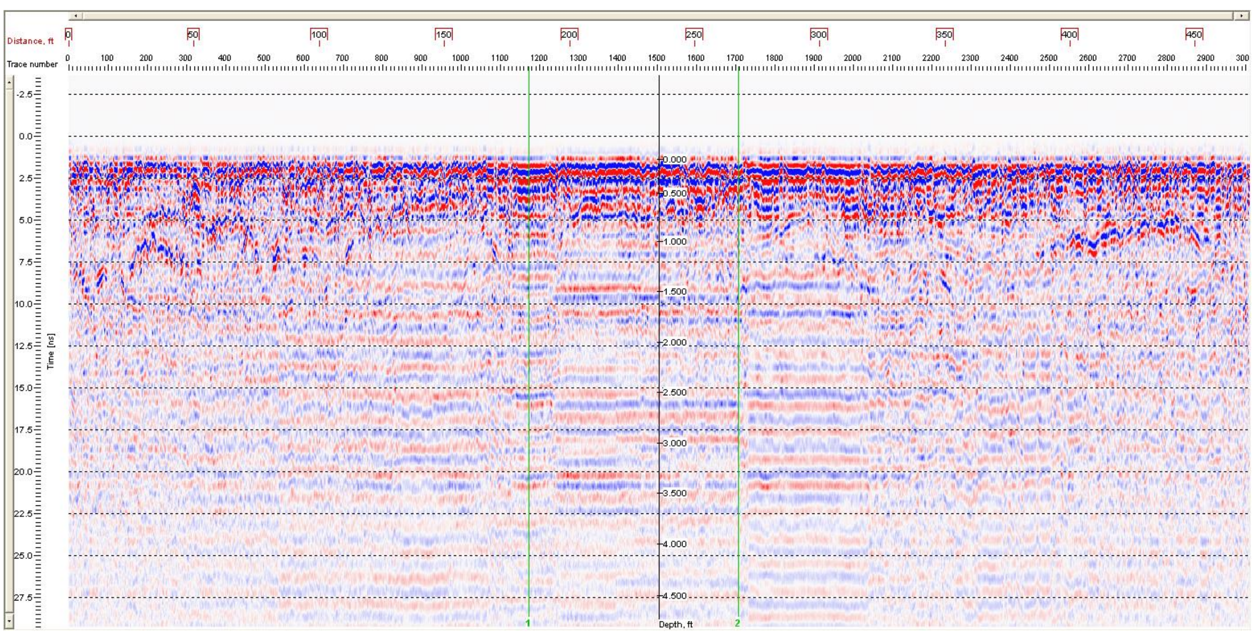


Distance, ft
Trace number
Time [ns]
Depth, ft

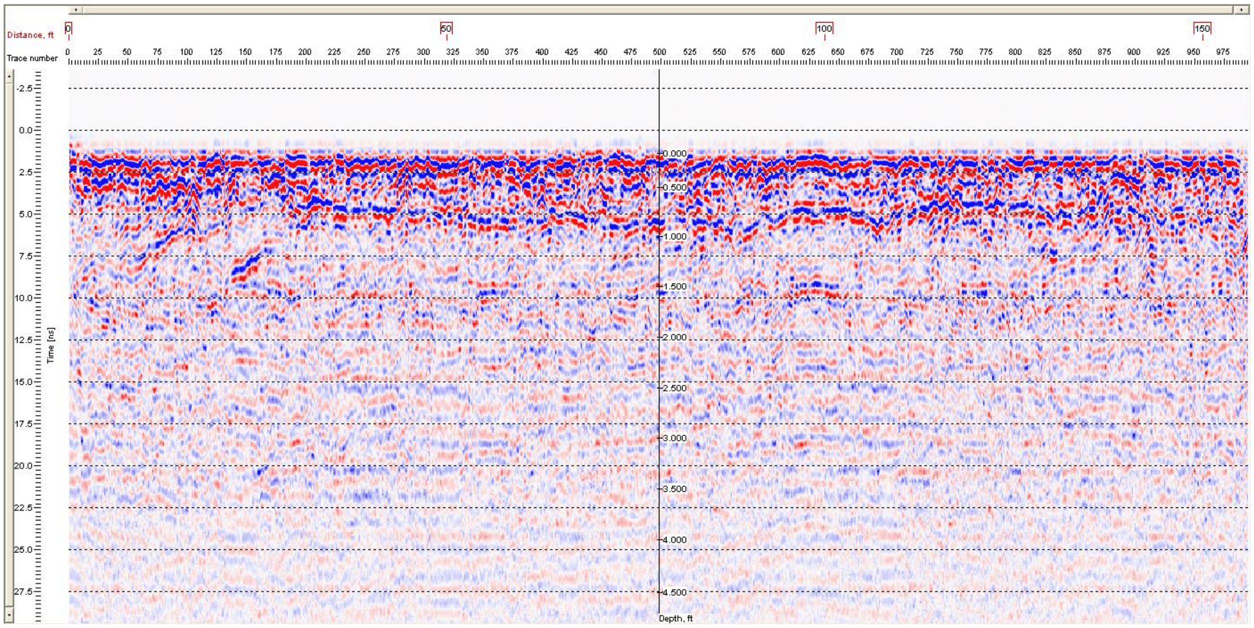
DAT 41


Distance, ft
Trace number
Time [ns]
Depth, ft

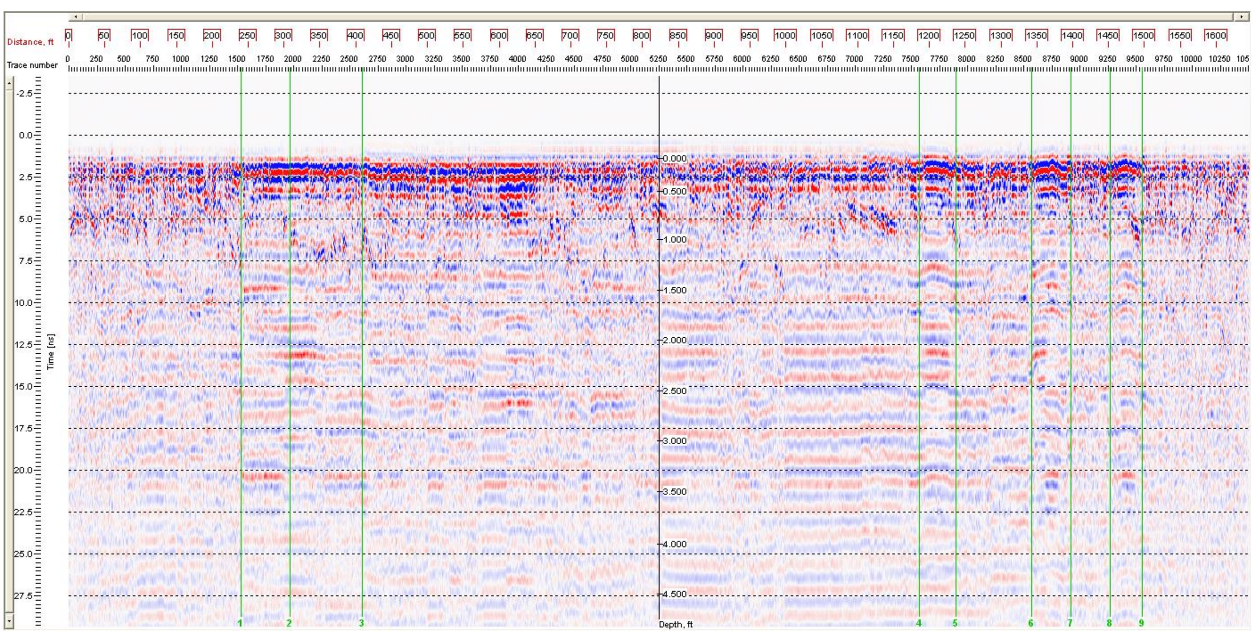
DAT 42


Distance, ft
Trace number
Time [ns]
Depth, ft
1
2

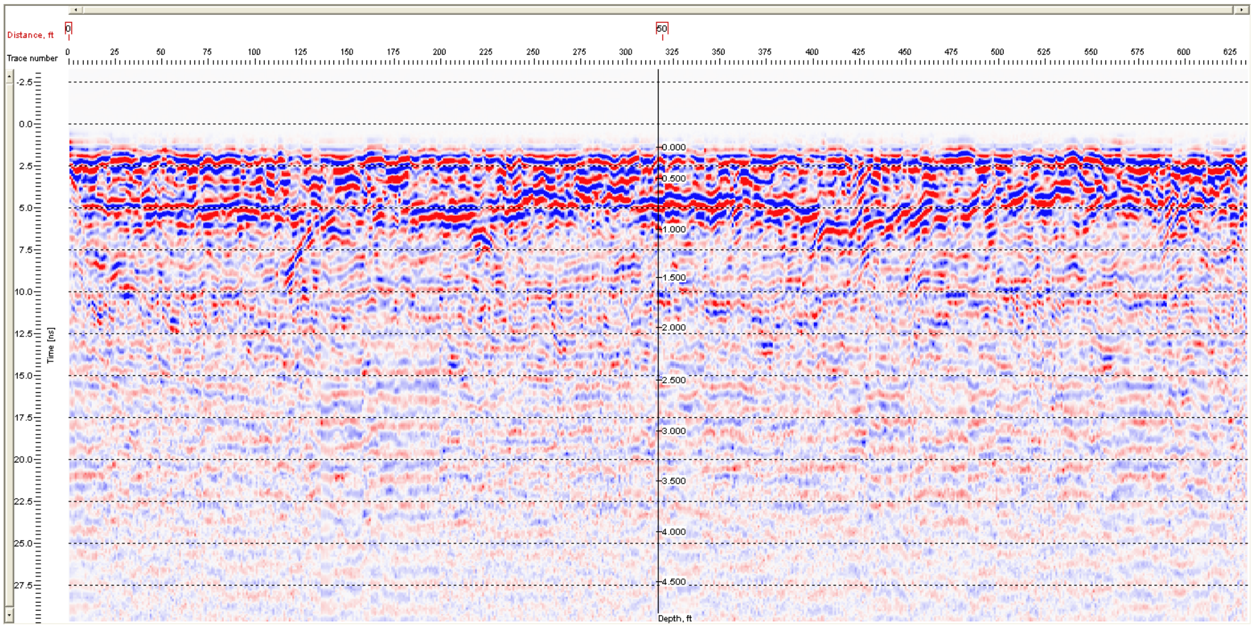
DAT 43


Distance, ft
Trace number
Time [ns]
Depth, ft

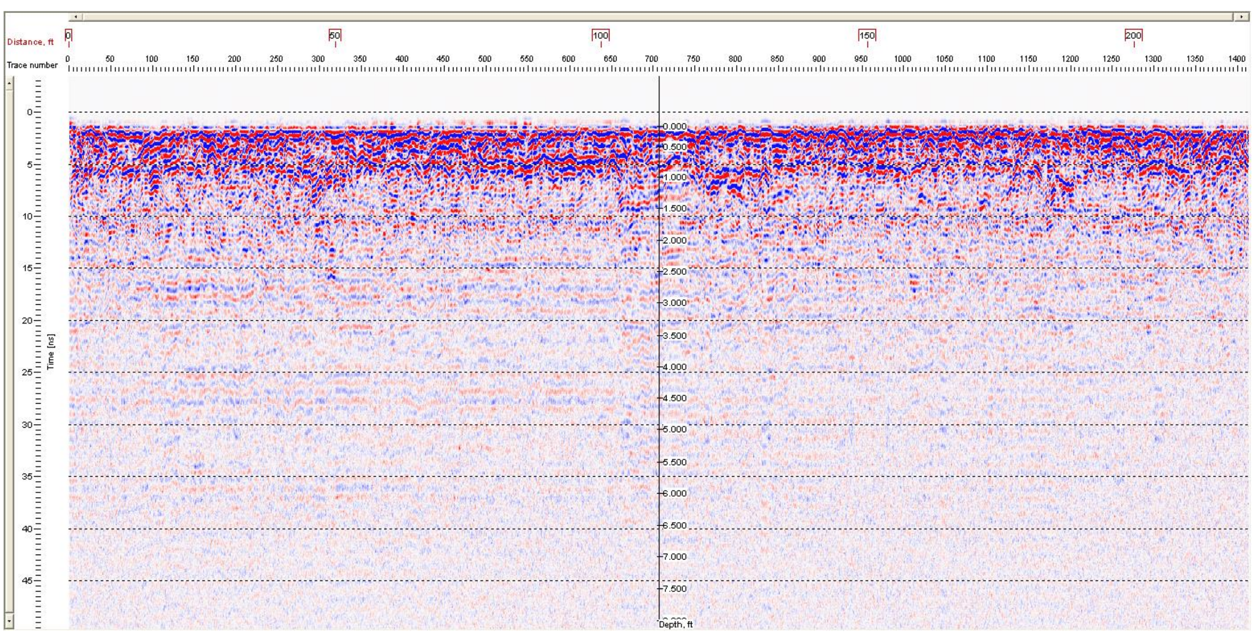
DAT 44


Distance, ft
Trace number
Time [ns]
Depth, ft

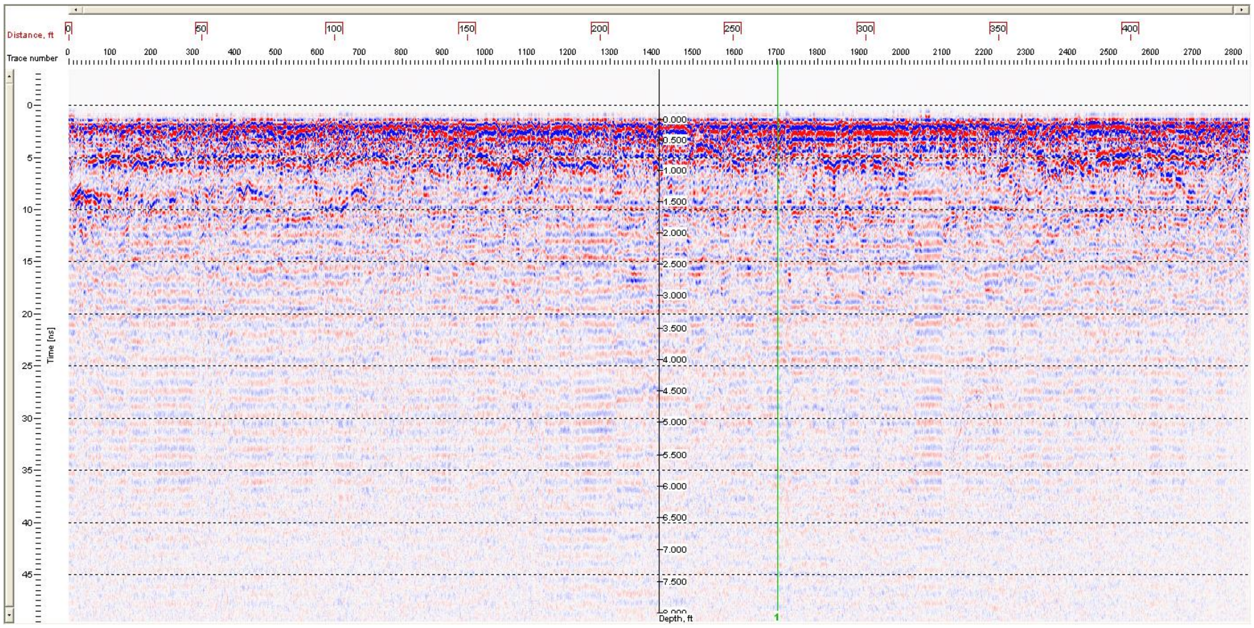
DAT 45


Distance, ft
Trace number
Time [ns]
Depth, ft

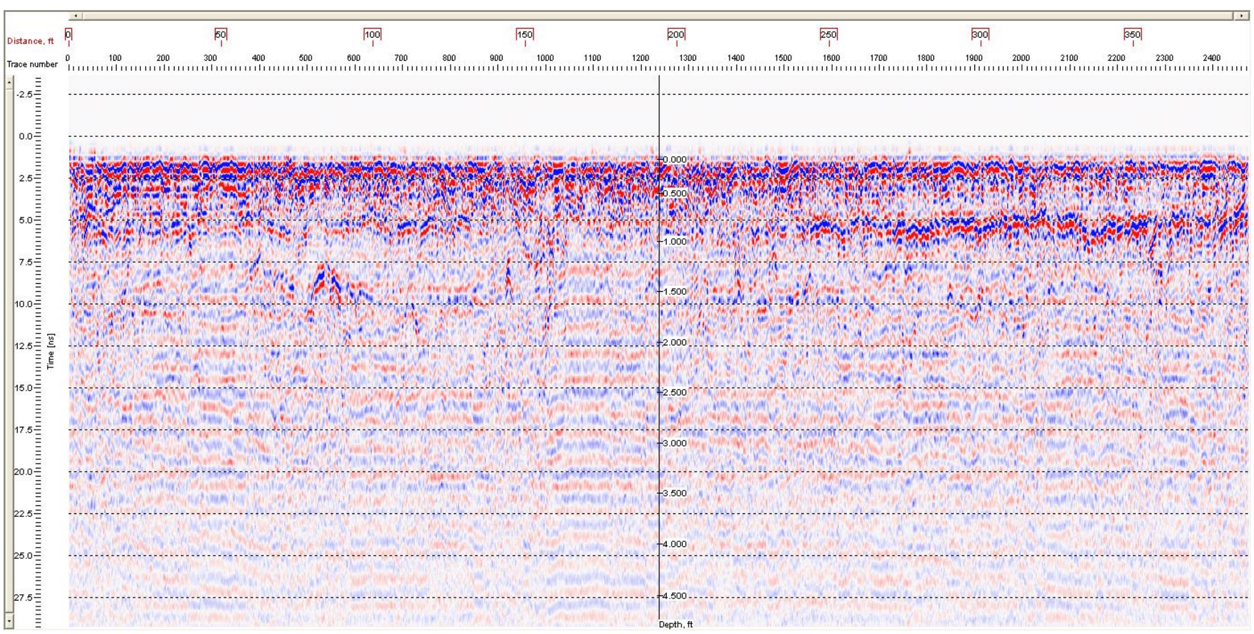
DAT 46


Distance, ft
Trace number
Time [ns]
Depth, ft

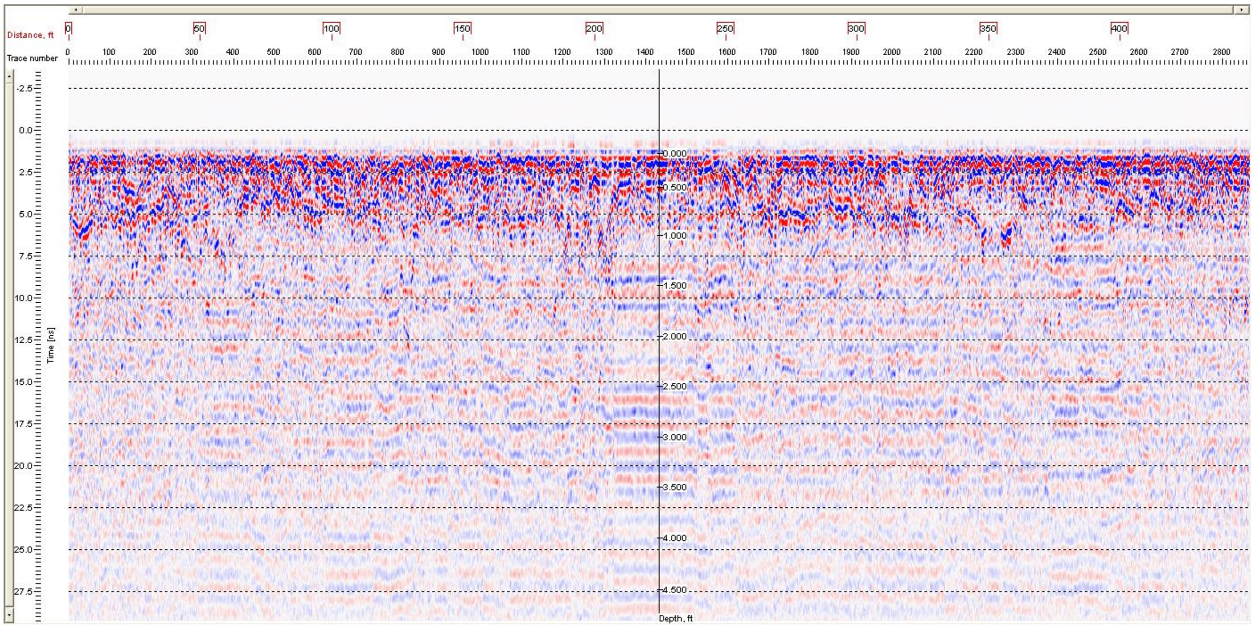
DAT 47


Distance, ft
Trace number
Time [ns]
Depth, ft

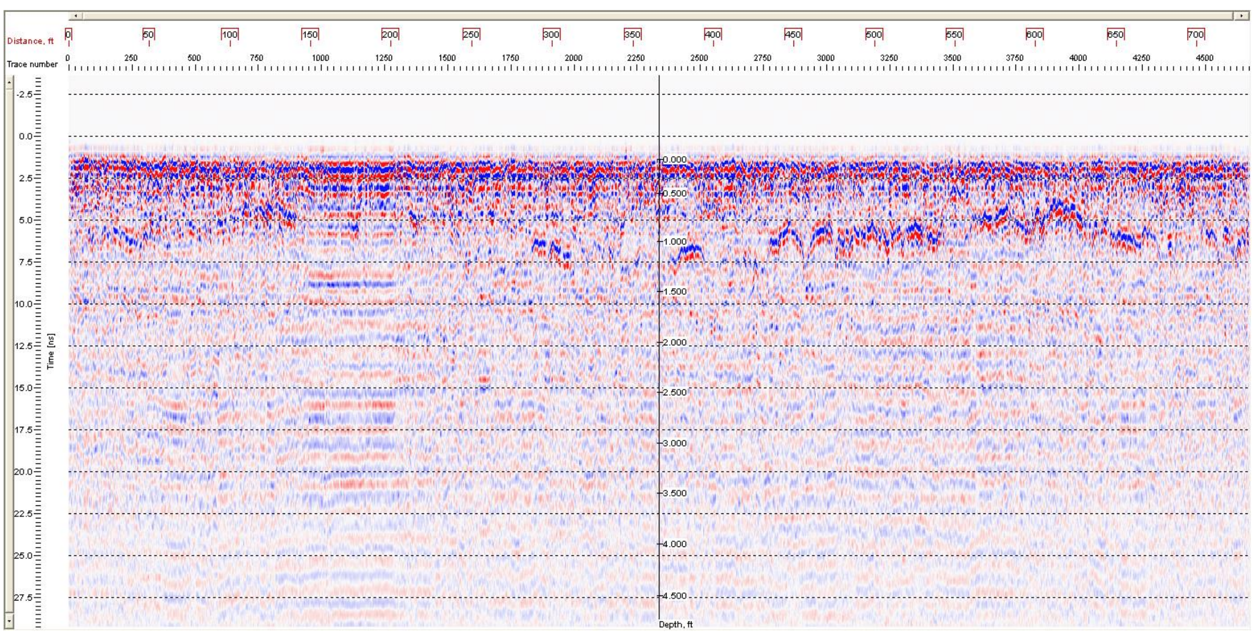
DAT 48


Distance, ft
Trace number
Time [ns]
Depth, ft

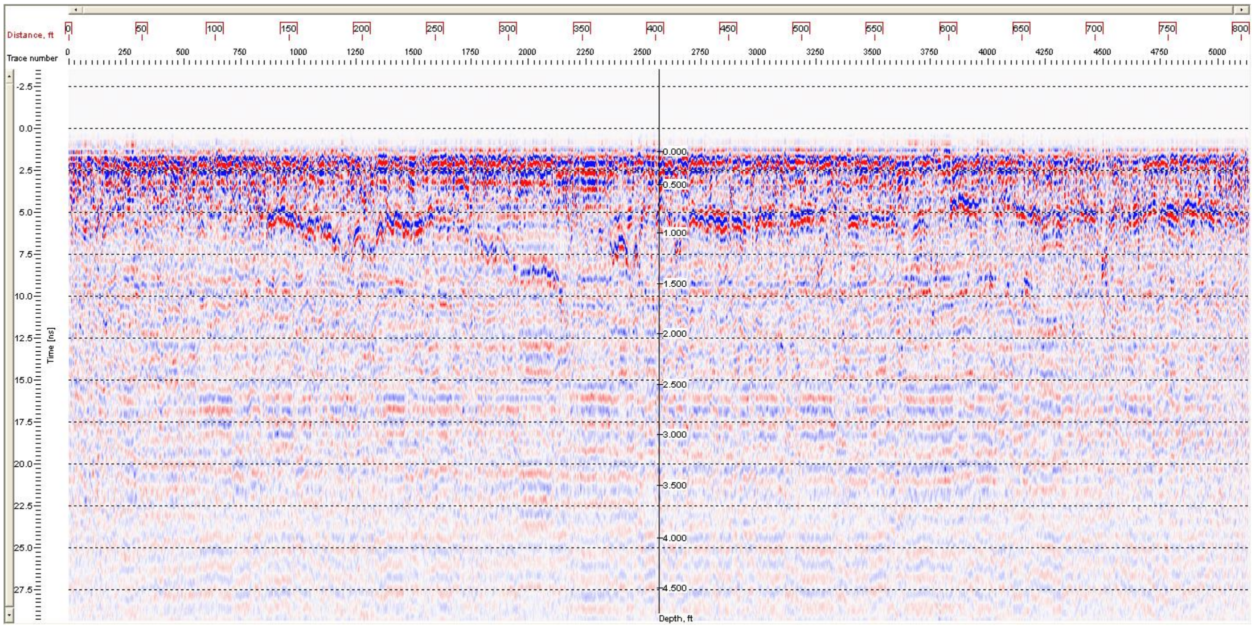
DAT 49


Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 50

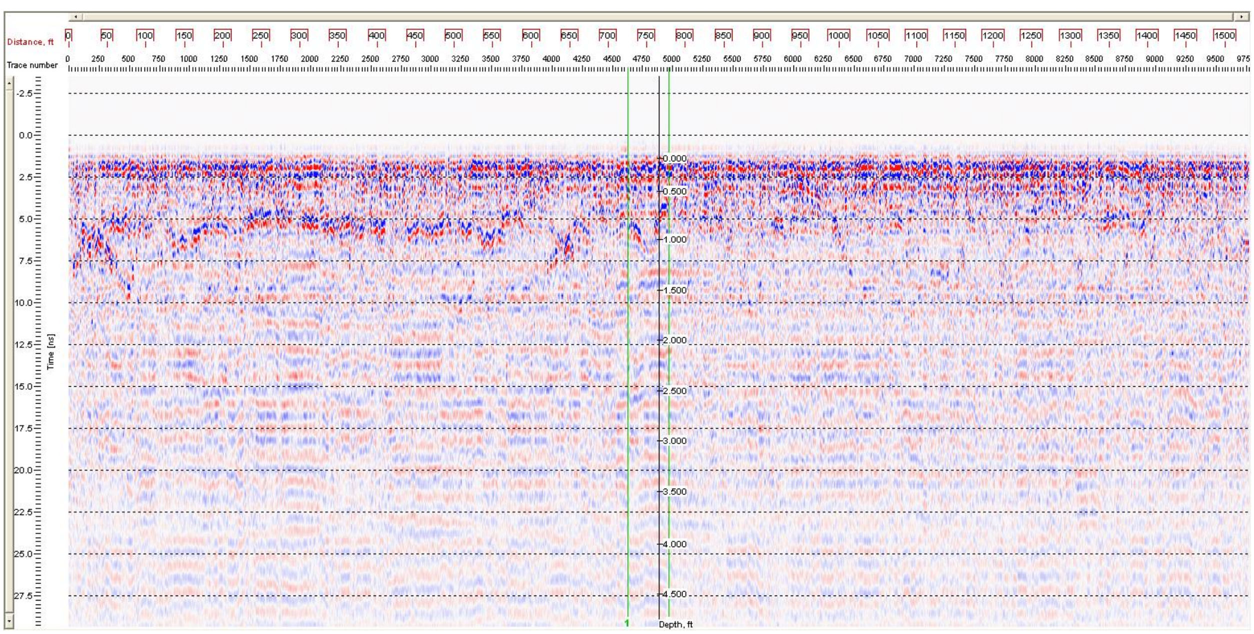

Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 51



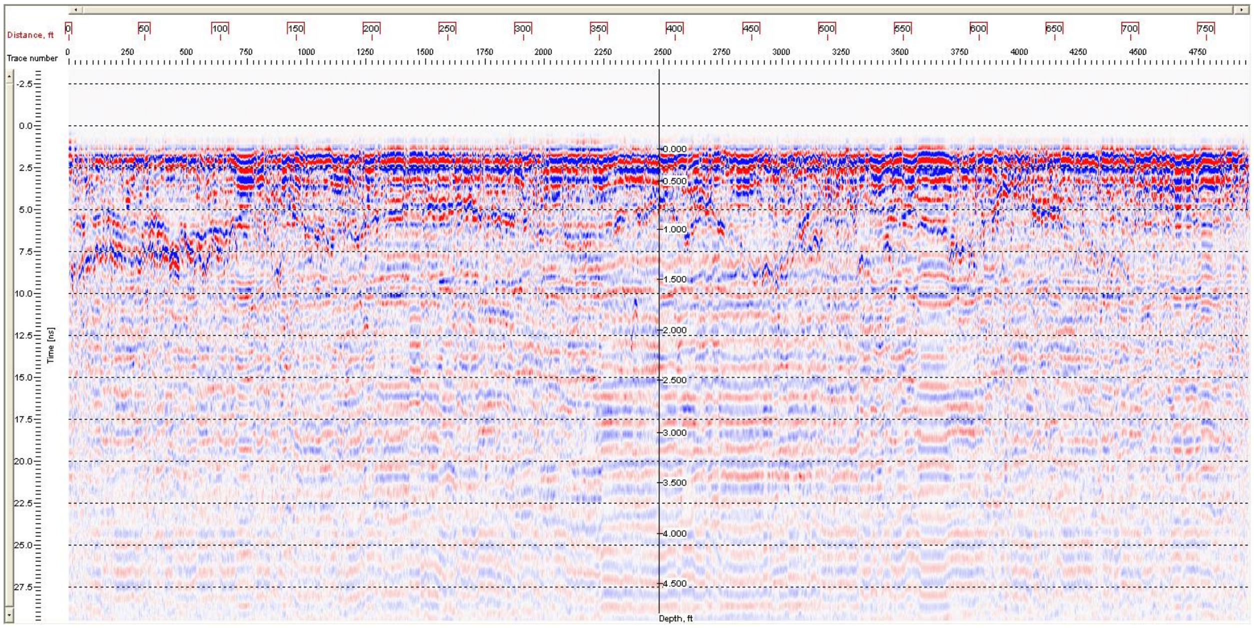
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 52

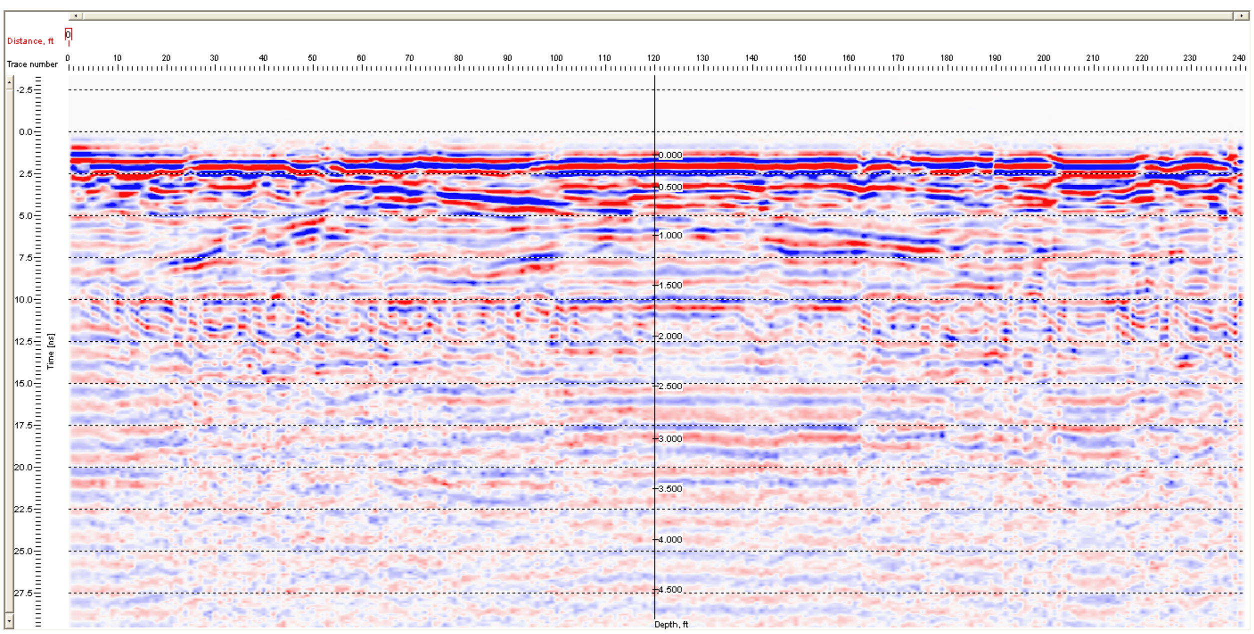


Distance, ft
Trace number
Time [ns]
Depth, ft

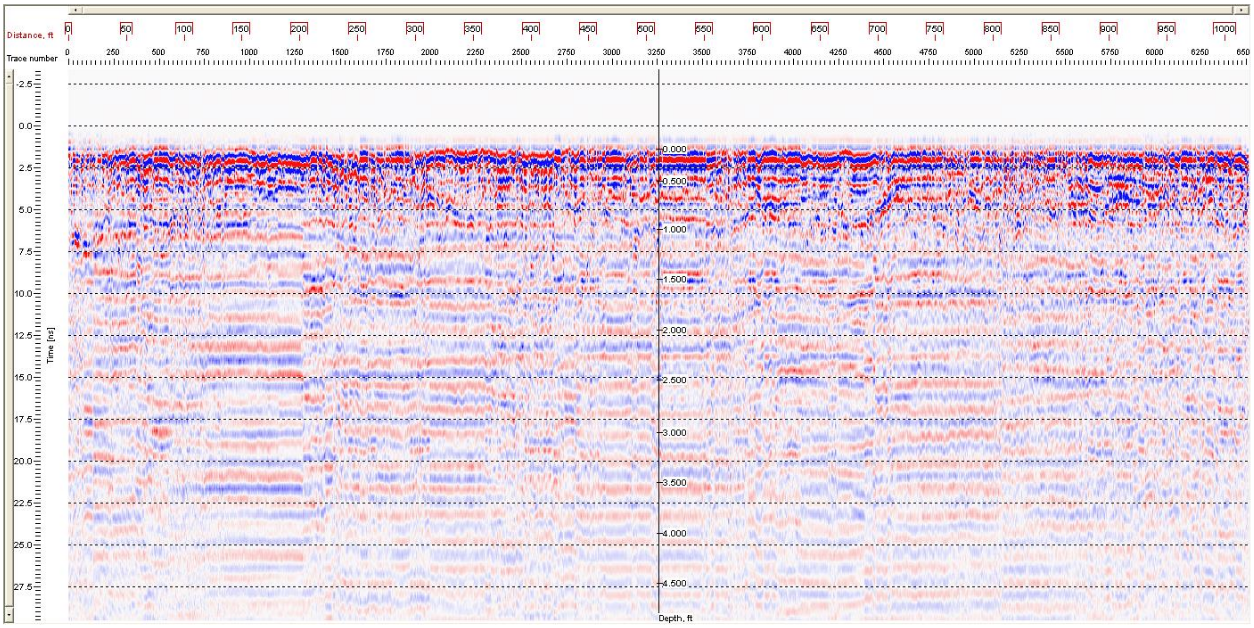
DAT 53


Distance, ft
Trace number
Time [ns]
Depth, ft

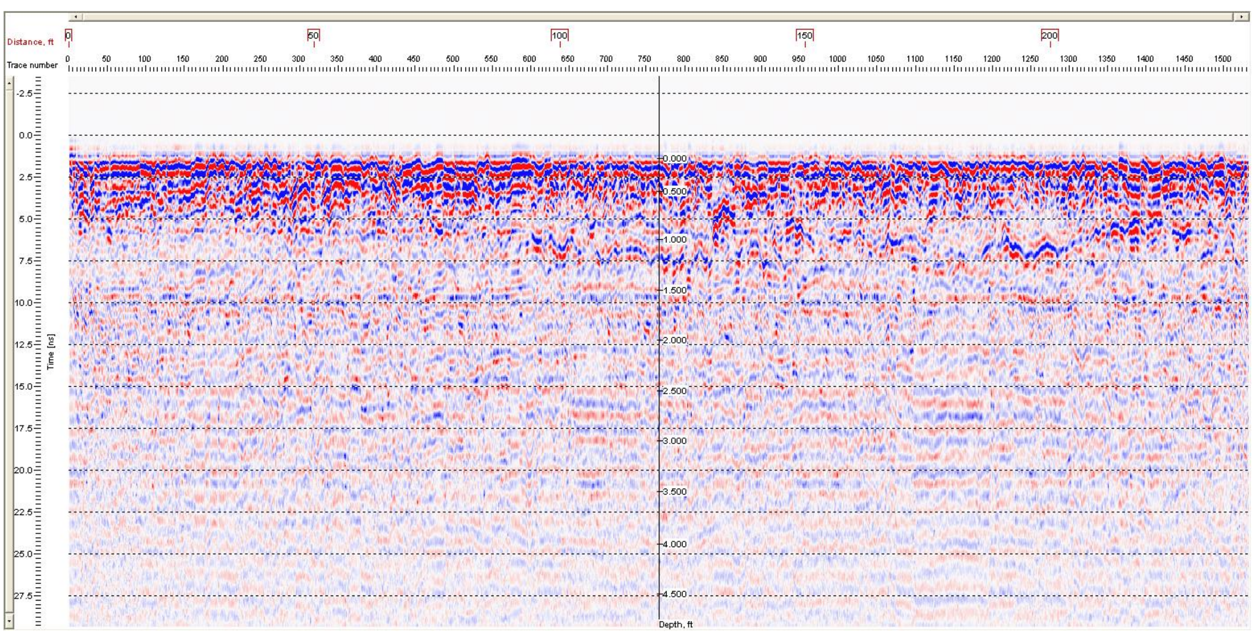
DAT 54


Distance, ft
Trace number
Time [ns]
Depth, ft

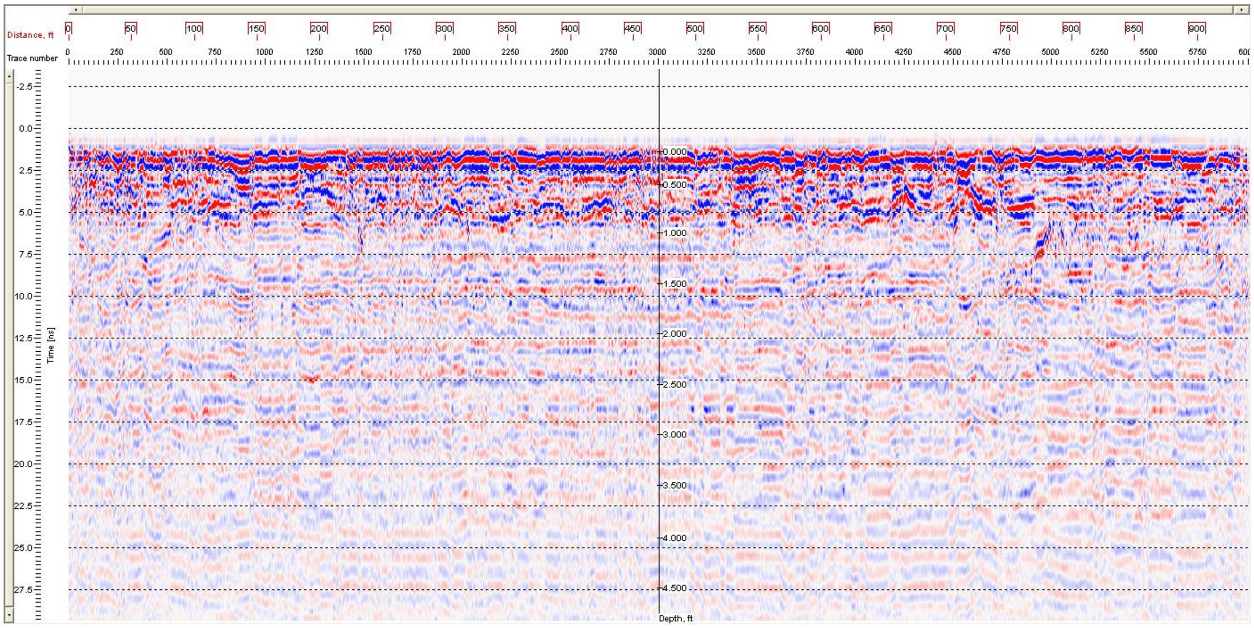
DAT 55


Distance, ft
Trace number
Time [ns]
Depth, ft

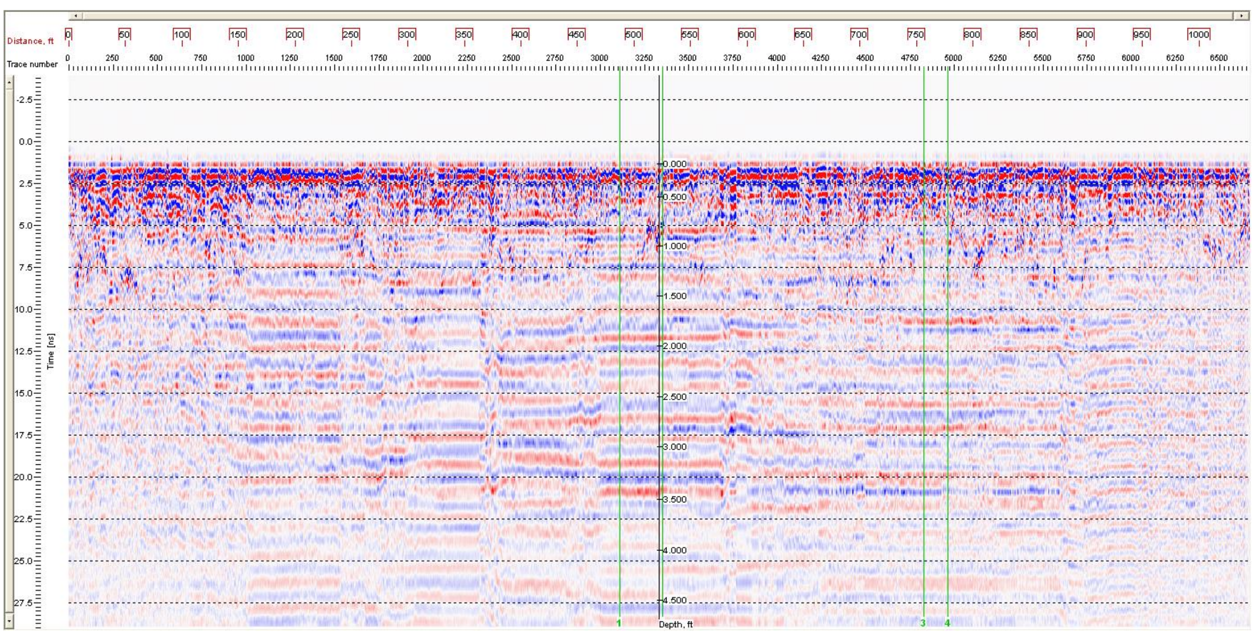
DAT 56


Distance, ft
Trace number
Time [ns]
Depth, ft

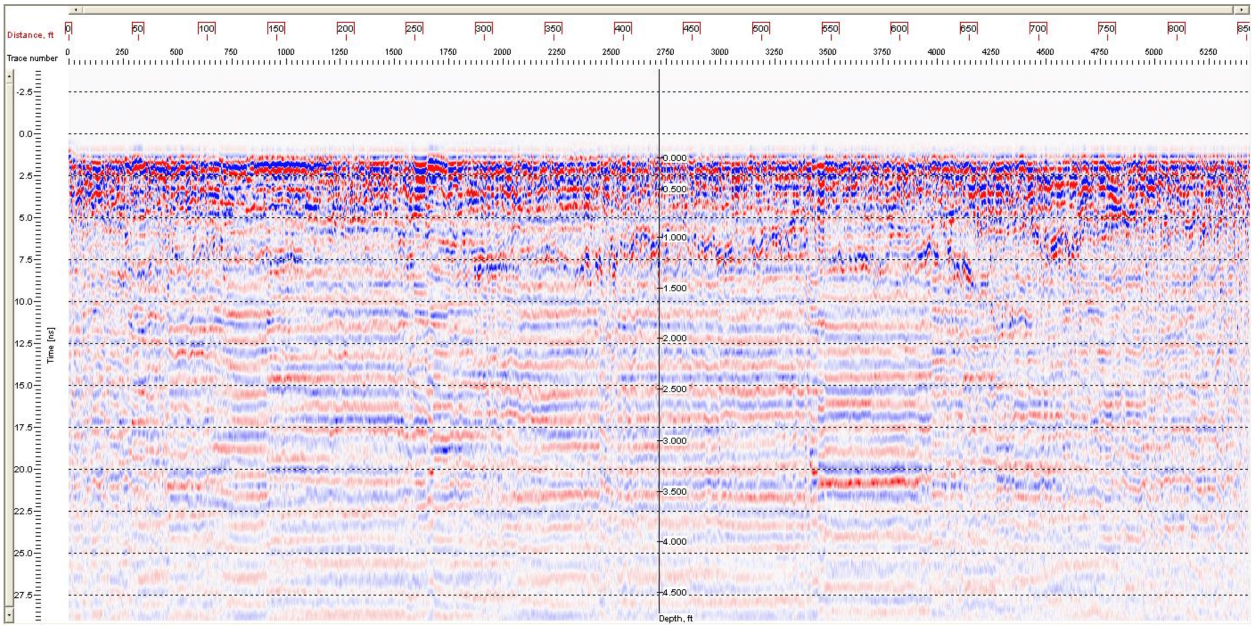
DAT 57



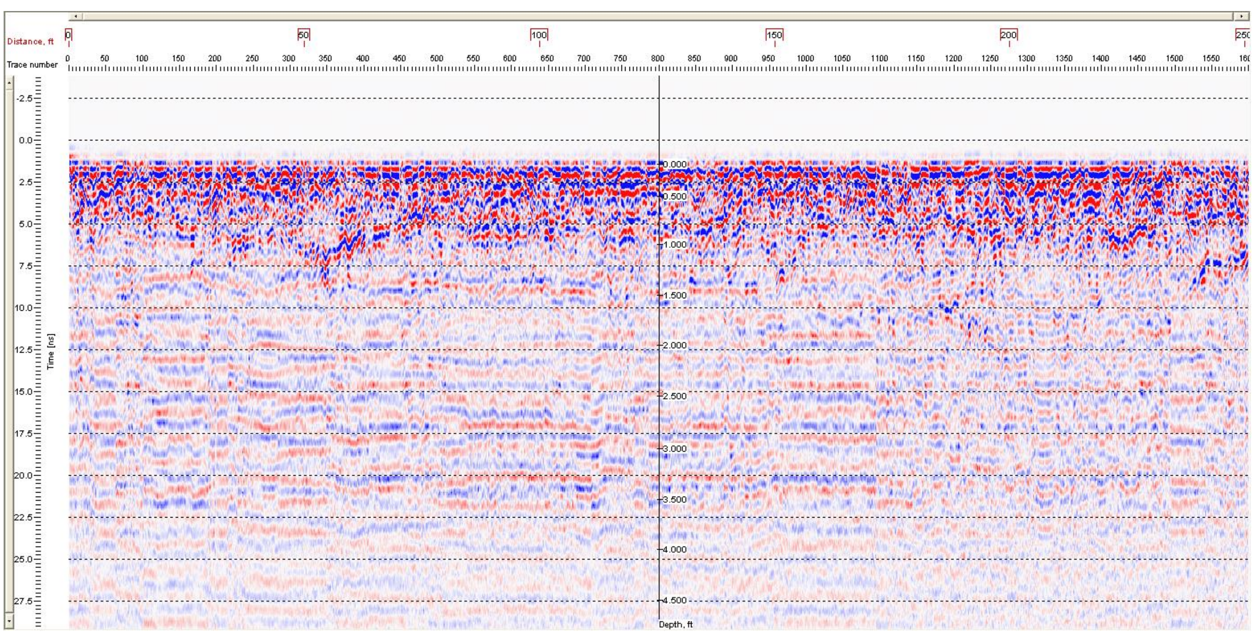
DAT 55B



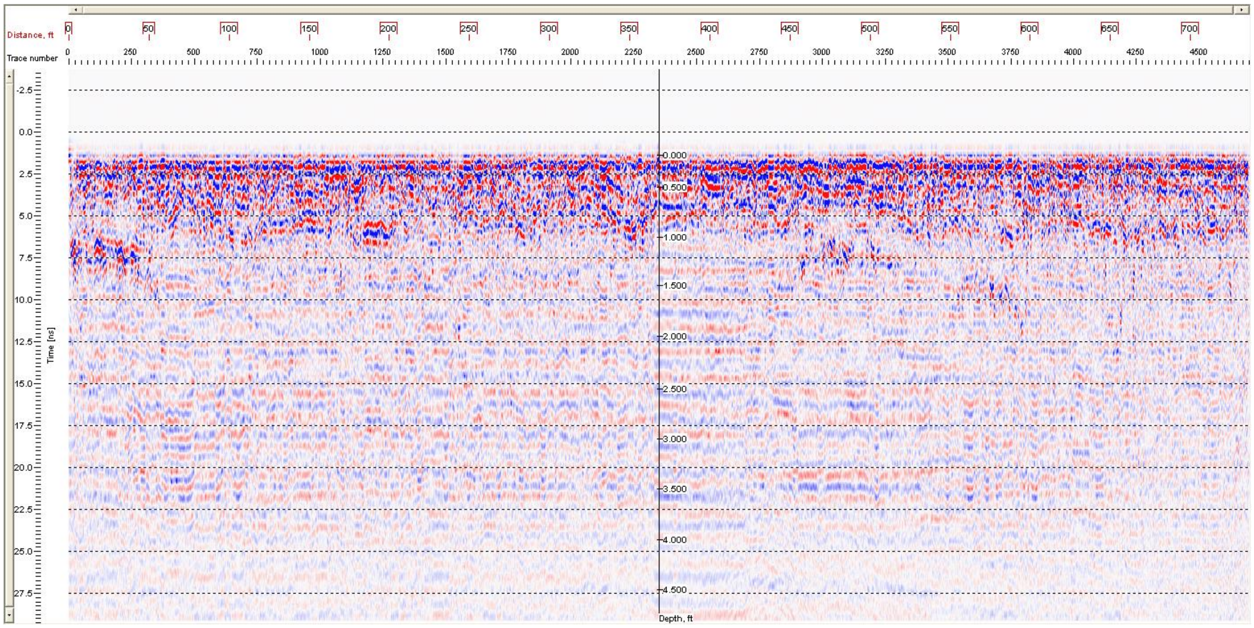
DAT 56B



DAT 57B

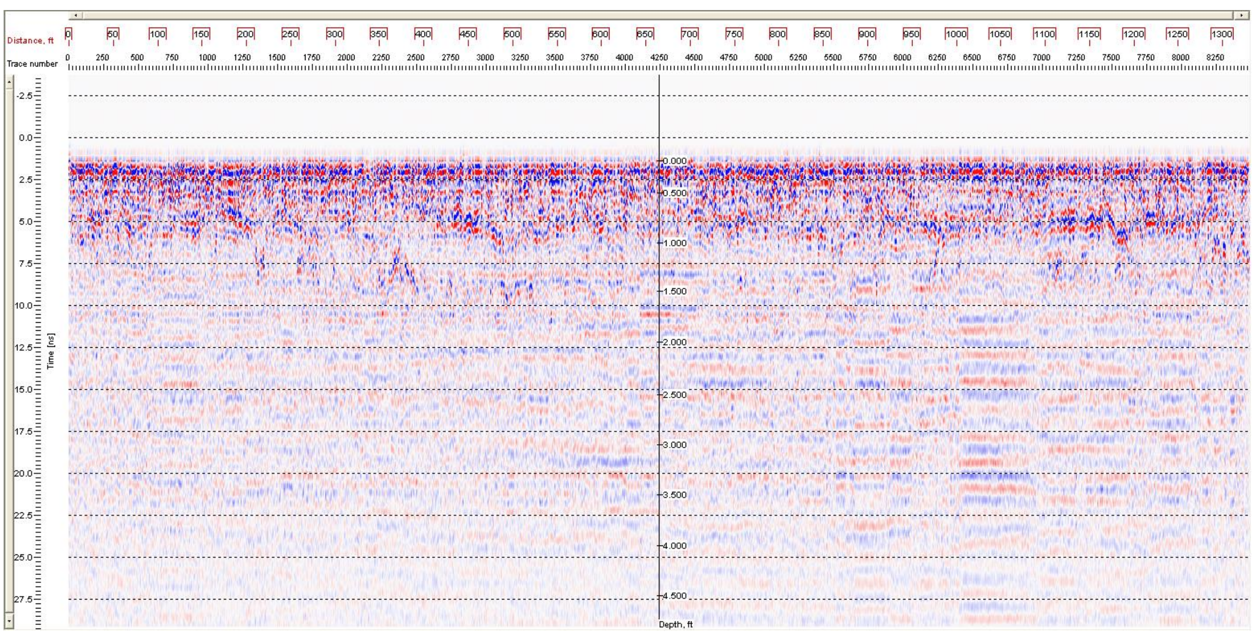


DAT 58



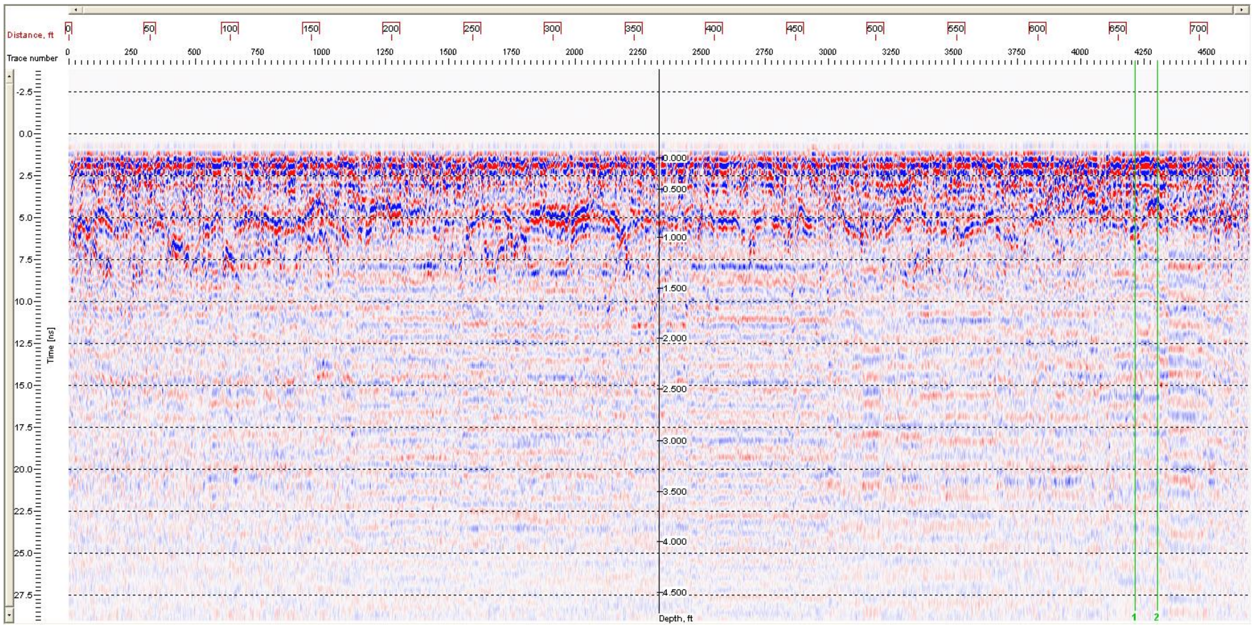
Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 59

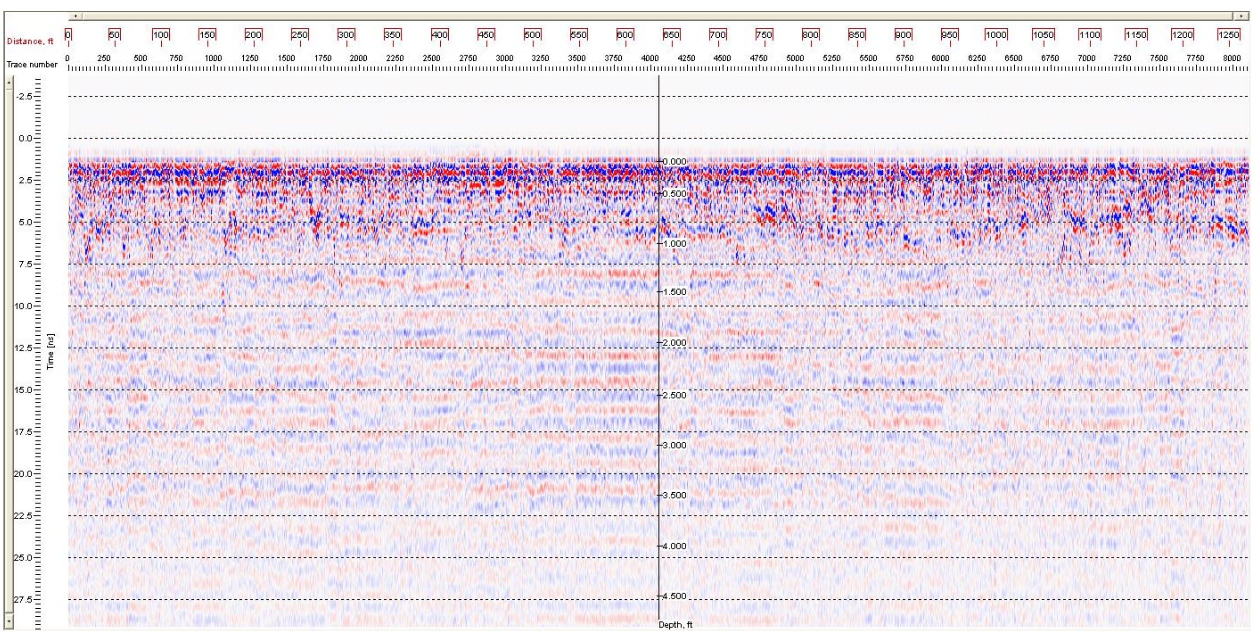


Distance, ft
Trace number
Time [ns]
Depth, ft

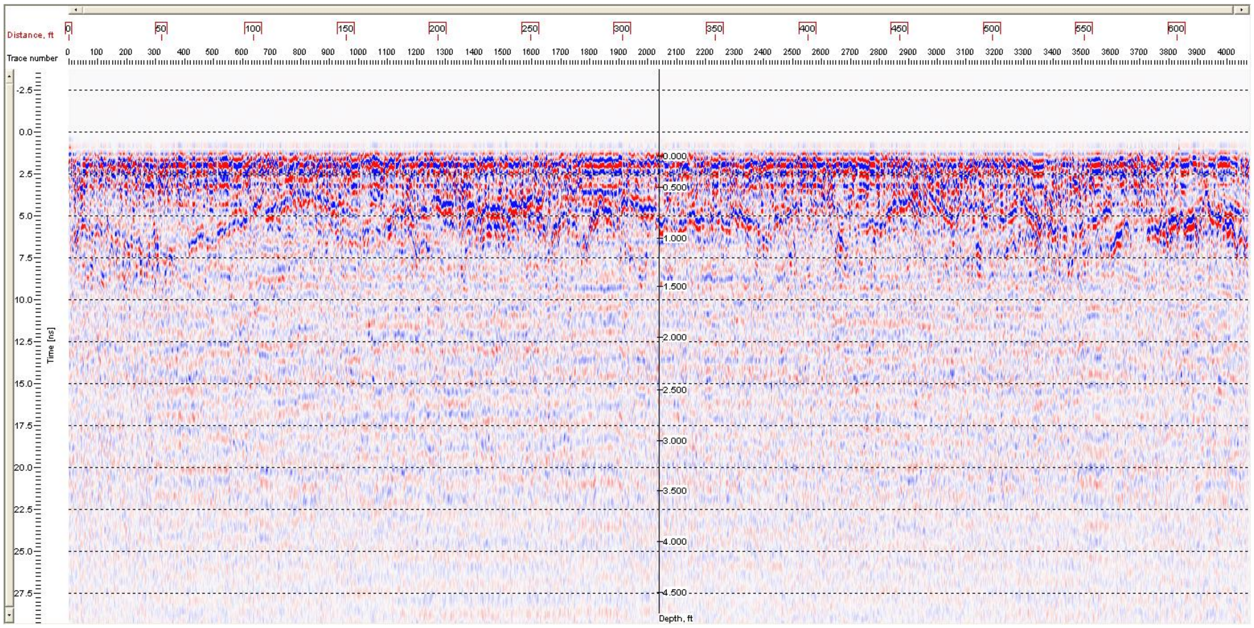
DAT 60


Distance, ft
Trace number
Time [ns]
Depth, ft

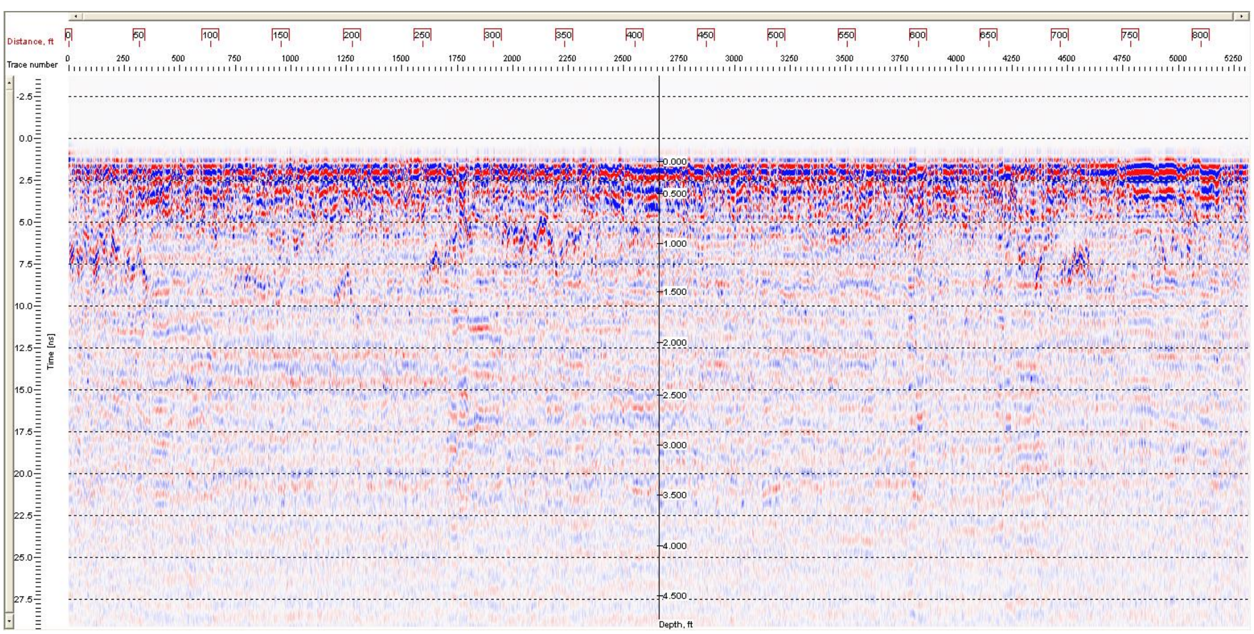
DAT 61


Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 62


Distance, ft
Trace number
Time [ns]
Depth, ft

DAT 63


Distance, ft
Trace number
Time [ns]
Depth, ft

ATTACHMENT L

Example Data Sheets

ECORP Consulting, Inc. VERNAL POOL MONITORING DATA SHEET

Wetland No.: ________________________ Date: ____________________________ % ***Cover*** ~ Vegetation: ______________
Location: ____________________________ Biologist(s): ______________________ Bare Ground: ______________
( ) Constructed ( ) Reference ( ) Trash ( ) Erosion ( ) Tire Marks Rocks: __
Overall Habitat Function: ( ) Excellent ( ) Good ( ) Fair ( ) Poor ( ) Unknown Plant Litter: ______________
Solitary Bee: ( ) Nest ( ) Adult Pollinator on plant species:_________________ Other (specify) _____________: ______________

PLANTS OBSERVED: ***TOTAL:*** ***100%***

⓪①②③④⑤ Achyrachaena mollis
⓪①②③④⑤ Acmispon americanus
⓪①②③④⑤ Aira caryophyllea
⓪①②③④⑤ Alisma triviale
⓪①②③④⑤ Alopecurus saccatus
⓪①②③④⑤ Ammannia coccinea
⓪①②③④⑤ Amsinckia sp.
⓪①②③④⑤ Anagallis arvensis
⓪①②③④⑤ **Anagallis minima**
⓪①②③④⑤ Anthemis cotula
⓪①②③④⑤ Avena barbata
⓪①②③④⑤ Avena fatua
⓪①②③④⑤ Blennosperma nanum
⓪①②③④⑤ Brassica nigra
⓪①②③④⑤ Briza minor
⓪①②③④⑤ Brodiaea spp.
⓪①②③④⑤ Bromus diandrus
⓪①②③④⑤ Bromus hordeaceus
⓪①②③④⑤ Calandria ciliata
⓪①②③④⑤ Callitriche heterophylla
⓪①②③④⑤ **Callitriche marginata**
⓪①②③④⑤ Capsella bursa-pastoris
⓪①②③④⑤ Cardamine oligosperma
⓪①②③④⑤ Carex sp.
⓪①②③④⑤ Castilleja attenuata
⓪①②③④⑤ Castilleja campestris
⓪①②③④⑤ Castilleja exserta
⓪①②③④⑤ Centaurea solstitialis
⓪①②③④⑤ Centaurium tenuiflorum
⓪①②③④⑤ Centromadia fitchii
⓪①②③④⑤ Cerastium glomeratum
⓪①②③④⑤ Cicendia quadrangularis
⓪①②③④⑤ Convolvulus arvensis
⓪①②③④⑤ Cotula coronopifolia
⓪①②③④⑤ **Crassula aquatica**
⓪①②③④⑤ Croton setigerus
⓪①②③④⑤ Crypsis schoenoides
⓪①②③④⑤ Cuscuta howelliana
⓪①②③④⑤ Cynodon dactylon
⓪①②③④⑤ Cynosurus echinatus
⓪①②③④⑤ Cyperus eragrostis
⓪①②③④⑤ Cyperus sp.
⓪①②③④⑤ **Deschampsia danthonioides**
⓪①②③④⑤ Downingia bicornuta
⓪①②③④⑤ Downingia cuspidata
⓪①②③④⑤ Downingia ornatissima
⓪①②③④⑤ Downingia pusilla
⓪①②③④⑤ Downingia spp.
⓪①②③④⑤ Echinochloa crus-galli
⓪①②③④⑤ **Elatine spp.**
⓪①②③④⑤ Eleocharis acicularis
⓪①②③④⑤ **Eleocharis macrostachya**
⓪①②③④⑤ Elymus caput-medusae
⓪①②③④⑤ Epilobium brachycarpum
⓪①②③④⑤ Epilobium campestre
⓪①②③④⑤ Epilobium ciliatum
⓪①②③④⑤ Epilobium cleistogamum
⓪①②③④⑤ Epilobium densiflorum
⓪①②③④⑤ Epilobium sp.
⓪①②③④⑤ Erodium botrys
⓪①②③④⑤ Erodium cicutarium
⓪①②③④⑤ Erodium moschatum
⓪①②③④⑤ Erodium spp.
⓪①②③④⑤ **Eryngium vaseyi**
⓪①②③④⑤ Eschscholzia californica
⓪①②③④⑤ Eschscholzia lobbii
⓪①②③④⑤ Festuca bromoides
⓪①②③④⑤ Festuca microstachys
⓪①②③④⑤ Festuca myuros
⓪①②③④⑤ Festuca perennis
⓪①②③④⑤ Galium sp.
⓪①②③④⑤ Geranium dissectum
⓪①②③④⑤ Geranium molle
⓪①②③④⑤ Geranium spp.
⓪①②③④⑤ Glyceria declinata
⓪①②③④⑤ Gnaphalium palustre
⓪①②③④⑤ Gnaphalium sp.
⓪①②③④⑤ **Gratiola ebracteata**
⓪①②③④⑤ Gratiola heterosepala
⓪①②③④⑤ Helminthothecia echioides
⓪①②③④⑤ Holocarpha virgata
⓪①②③④⑤ Hordeum brachyantherum
⓪①②③④⑤ **Hordeum marinum**
⓪①②③④⑤ Hordeum murinum
⓪①②③④⑤ **Hypochaeris glabra**
⓪①②③④⑤ Isoetes howellii
⓪①②③④⑤ Isoetes nuttallii
⓪①②③④⑤ Isoetes orcuttii
⓪①②③④⑤ Isoetes sp.
⓪①②③④⑤ Juncus balticus
⓪①②③④⑤ Juncus bufonius
⓪①②③④⑤ Juncus capitatus
⓪①②③④⑤ Juncus sp.
⓪①②③④⑤ Juncus uncialis
⓪①②③④⑤ Juncus xiphiodies
⓪①②③④⑤ Lactuca serriola
⓪①②③④⑤ **Lasthenia fremontii**
⓪①②③④⑤ **Lasthenia glaberrima**
⓪①②③④⑤ Lathyrus hirsutus
⓪①②③④⑤ Layia fremontii
⓪①②③④⑤ Legenere limosa
⓪①②③④⑤ **Leontodon saxatilis**
⓪①②③④⑤ Lepidium latifolium
⓪①②③④⑤ Lepidium nitidum
⓪①②③④⑤ Limnanthes alba
⓪①②③④⑤ Limnanthes douglasii
⓪①②③④⑤ Limosella acaulis
⓪①②③④⑤ Logfia gallica
⓪①②③④⑤ Lotus corniculatus
⓪①②③④⑤ Ludwigia peploides
⓪①②③④⑤ Lupinus bicolor
⓪①②③④⑤ **Lythrum hyssopifolia**
⓪①②③④⑤ Marsilea vestita
⓪①②③④⑤ Matricaria discoidea
⓪①②③④⑤ Medicago polymorpha
⓪①②③④⑤ Mentha pulegium
⓪①②③④⑤ Mentha sp.
⓪①②③④⑤ Microseris sp.
⓪①②③④⑤ Mimulus guttatus
⓪①②③④⑤ Mimulus tricolor
⓪①②③④⑤ Montia fontana
⓪①②③④⑤ Navarretia intertexta
⓪①②③④⑤ **Navarretia leucocephala**
⓪①②③④⑤ Navarretia tagetina
⓪①②③④⑤ Paspalum dilatatum
⓪①②③④⑤ Paspalum distichum
⓪①②③④⑤ Persicaria lapathifolia
⓪①②③④⑤ Persicaria punctatum
⓪①②③④⑤ Phalaris lemmonii
⓪①②③④⑤ Phalaris spp.
⓪①②③④⑤ Phyla nodiflora
⓪①②③④⑤ Pilularia americana
⓪①②③④⑤ Plagiobothrys greenei
⓪①②③④⑤ Plagiobothrys nothofulvus
⓪①②③④⑤ **Plagiobothrys stipitatus**
⓪①②③④⑤ Plantago coronopus
⓪①②③④⑤ Plantago elongata
⓪①②③④⑤ Plantago erecta
⓪①②③④⑤ Plantago lanceolata
⓪①②③④⑤ Plantago spp.
⓪①②③④⑤ Poa annua
⓪①②③④⑤ Pogogyne douglasii
⓪①②③④⑤ Pogogyne zizyphoroides
⓪①②③④⑤ Polygonum aviculare ssp. depressum
⓪①②③④⑤ Polygonum spp.
⓪①②③④⑤ **Polypogon maritimus**
⓪①②③④⑤ Polypogon monspeliensis
⓪①②③④⑤ Populus fremontii
⓪①②③④⑤ **Psilocarphus brevissimus**
⓪①②③④⑤ Psilocarphus oregonus
⓪①②③④⑤ Psilocarphus tenellus
⓪①②③④⑤ Ranunculus aquatilis
⓪①②③④⑤ **Ranunculus bonariensis**
⓪①②③④⑤ Ranunculus muricatus
⓪①②③④⑤ Raphanus sp.
⓪①②③④⑤ Rumex conglomeratus
⓪①②③④⑤ Rumex crispus
⓪①②③④⑤ Rumex pulcher
⓪①②③④⑤ Senecio vulgaris
⓪①②③④⑤ Sidalcea calycosa
⓪①②③④⑤ Sidalcea malviflora
⓪①②③④⑤ Sonchus asper
⓪①②③④⑤ Sonchus oleraceus
⓪①②③④⑤ Spergula arvensis
⓪①②③④⑤ Spergularia rubra
⓪①②③④⑤ Stellaria media
⓪①②③④⑤ Trichostema lanceolatum
⓪①②③④⑤ Trifolium depauperatum
⓪①②③④⑤ **Trifolium dubium**
⓪①②③④⑤ Trifolium fucatum
⓪①②③④⑤ Trifolium glomeratum
⓪①②③④⑤ Trifolium hirtum
⓪①②③④⑤ Trifolium sp.
⓪①②③④⑤ Trifolium subterraneum
⓪①②③④⑤ Trifolium variegatum
⓪①②③④⑤ Trifolium willdenovii
⓪①②③④⑤ **Triglochin scilloides**
⓪①②③④⑤ Triphysaria eriantha
⓪①②③④⑤ Triphysaria versicolor
⓪①②③④⑤ Triteleia hyacinthina
⓪①②③④⑤ Typha sp.
⓪①②③④⑤ Verbena bonariensis
⓪①②③④⑤ Veronica anagallis-aquatica
⓪①②③④⑤ Veronica peregrina
⓪①②③④⑤ Vicia sativa
⓪①②③④⑤ Vicia sp.
⓪①②③④⑤ Vicia villosa
⓪①②③④⑤ Xanthium strumarium
⓪①②③④⑤ Zeltnera muehlenbergii
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________
⓪①②③④⑤ ______________________

NOTES / COMMENTS: ____

Modified Braun-Blanquet Cover Scale: 0 = <1%, 1 = 1 - 5%, 2 = 6 - 25%, 3 = 26 - 50%, 4 = 51 - 75%, 5 = 76 - 100%