
E-10: Line 407 East Wet-Season Sampling for Branchipod

2007-2008 Wet Season Branchiopod Survey Report

for

PG&E Line 407 East Natural Gas Transmission Pipeline

Sacramento, Placer, and Sutter Counties, California

**Ninety-Day Findings Report
USFWS Permit # TE-049693-1**

August 2008



Prepared for:

TRC

Attn: Benjamin Hart

80 Stone Pine Road, Suite 200

Half Moon Bay, CA 94019

Prepared by:



GALLAWAY
CONSULTING, INC.

117 Meyers Street, Suite 110, Chico, CA 95928

Phone (530) 343-8327 Fax (530)343 8312

2007-2008 Wet Season Branchiopod Survey Report

for

PG&E Line 407 Natural Gas Transmission Pipeline

Sacramento, Placer, and Sutter Counties, California

**Ninety-Day Findings Report
USFWS Permit # TE-049693-1**

August 2008

Prepared for:

TRC

Attn: Benjamin Hart

80 Stone Pine Road, Suite 200

Half Moon Bay, CA 94019

Prepared by:



GALLAWAY
CONSULTING, INC.
117 Meyers Street, Suite 110, Chico, CA 95928
Phone (530) 343-8327 Fax (530)343 8312

Table of Contents

	<u>Page</u>
Summary of Findings and Conclusions	1
I. Introduction.....	2
Study Area	2
Purpose of the Survey	2
II. Study Methods.....	4
III. Project Description	4
IV. Habitat Description.....	5
Environmental Setting	5
Vernal Pools.....	5
Vernal Swales	6
Seasonal Wetlands	6
Seasonal Swales.....	6
V. Survey Results	6
Sampling Locations	6
Species Identified and Population Size.....	7
VI. Conclusions and Determinations.....	7
VII. References.....	13
Statement of Surveyors.....	14

List of Figures and Photos

	<u>Page</u>
Figures	
1 Project Location.....	3
Study Area Photographs	9

Attachments

Attachment A – Draft 2007 Delineation of Waters of the U.S. Maps

Attachment B – 2007-08 Wet Season Invertebrate Sampling Results Maps

Appendices

Appendix A – USFWS Approval to Conduct Surveys

Appendix B – USFWS Permit

Appendix C – USFWS Vernal Pool Data Sheets

Appendix D – Copy of CNDDDB Field Survey Forms

Appendix E – Copy of GCI Field Data Sheets

Summary of Findings and Conclusions

Gallaway Consulting, Inc. performed a second wet-season vernal pool branchiopod survey for the Pacific Gas & Electric (PG&E) Line 407 East Natural Gas Transmission Pipeline survey area. Wet and dry-season samplings were conducted in 2006-2007 due to the high potential for occurrence of federally listed vernal pool branchiopods, including vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardii*), and Conservancy fairy shrimp (*B. conservation*). However, low rainfall levels during the 2006-07 wet-season contributed to little or no ponding of the smaller and moderate sized vernal pools causing them to be devoid of invertebrates and basic taxa. Larger pools were able to pond water for sufficient periods of time to support invertebrate life history and several detections of *Lindieriella occidentalis* were recorded. The 2006 dry season sampling results reported 41 separate pools on-site containing several *Branchinecta sp.* eggs; however, the 2006-07 wet-season survey was unable to confirm the dry season findings. In the anticipation that the 2007-2008 wet-season would provide adequate rainfall and ideal conditions for hatching of the eggs, the U.S. Fish and Wildlife Service requested an additional wet-season survey be conducted to confirm the results of the dry-season survey for the presence of vernal pool invertebrates. Surveys for the 2007-08 wet-season were initiated on December 13, 2007 and continued until April 14, 2008 to determine the presence or absence of federally listed vernal pool branchiopods. Within the approximately 1811.2-acre site east of State Highway 99, vernal pools, vernal swales, seasonal wetlands and seasonal swales were sampled in efforts to determine the presence of federally listed vernal pool branchiopods. Surveys of the site found *B. lynchi* within two wetland features and California *Lindieriella* (*Lindieriella occidentalis*), a non-listed species, was found in seven features on-site.

A “complete” survey comprised of one dry-season survey and two consecutive wet-season survey for the PG&E Line 407 East Natural Gas Transmission Pipeline has been performed as outlined in the U.S. Fish and Wildlife Service’s *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods*, 1996.

I. Introduction

Gallaway Consulting, Inc. (GCI) performed a second wet-season survey for federally listed large vernal pool branchiopods for the Pacific Gas and Electric Company (PG&E) Line 407 East Natural Gas Transmission Pipeline (Project) located in Sacramento, Placer and Sutter counties in California's Central Valley (**Figure 1**). GCI conducted a second wet-season survey under contract with TRC Essex (Prime). Surveys were initiated on December 13, 2007 and concluded on April 14, 2008.

Study Area

The survey area for the Project encompasses an approximately 1811.2-acre corridor of rural, urban, and developed land on portions of the Verona, Rio Linda, Roseville, Citrus Heights, Taylor Monument, and Pleasant Grove United States Geological Survey (USGS) 7.5' quadrangles. Urban, commercial, and agricultural structures, as well as agricultural fields and open space, occupy the extent of the survey area. The survey area is located just west of the City of Roseville and north of Sacramento (**Figure 1**). Topography is flat to gently undulating with Project elevation ranging from 15 to 125 feet above sea level. The portion of the Survey area east of the Natomas East Main Drainage is largely comprised of gently sloping grasslands with low-density residential and commercial development and was the focus of the study. The Survey area west of the Natomas East Main Drainage is almost entirely composed of active, irrigated agricultural land used for rice production and did not receive surveys for vernal pool branchiopods.

Purpose of the Survey

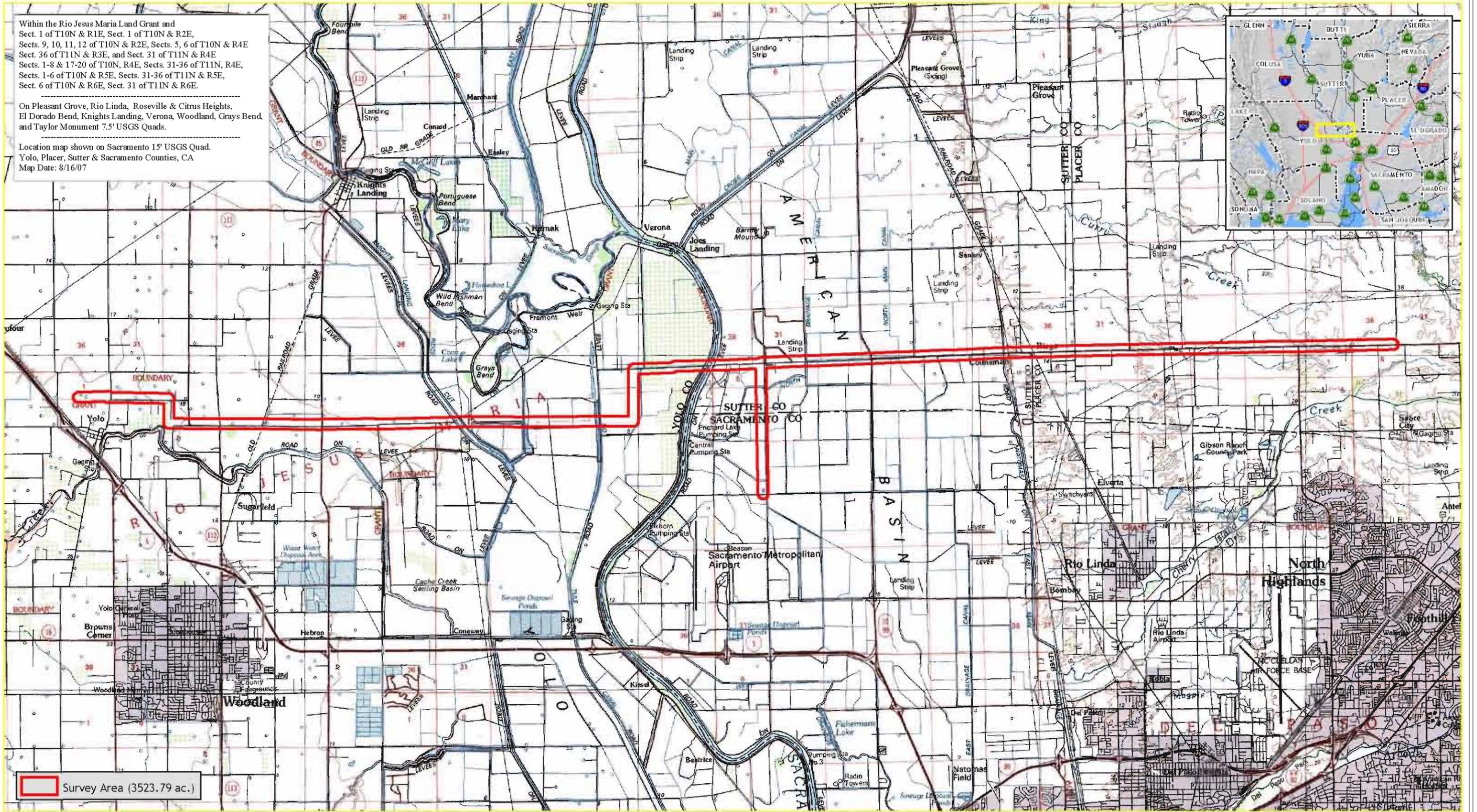
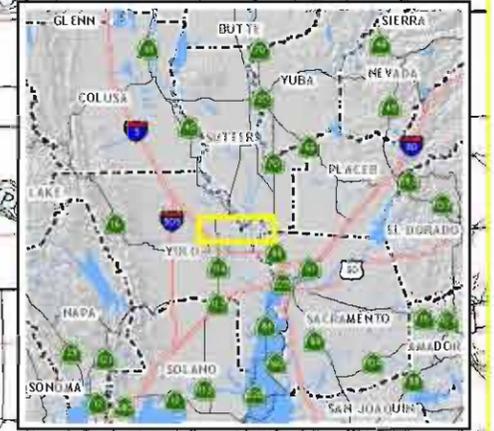
During the 2006-07 wet-season survey conducted for federally listed large vernal pool branchiopods, insufficient precipitation occurred during the season to facilitate ponding of several smaller features to confirm findings of the dry-season sampling performed during the summer of 2006 by Helm Biological Consulting (Brent Helm - TE-795930-4). Therefore, the U.S. Fish and Wildlife Service (USFWS) requested a second wet-season survey be performed to establish the presence/absence peddling of federally listed vernal pool branchiopods within the Project site. In conjunction with the dry-season and wet-season sampling for the 2006-07 year, the 2007-08 wet-season survey fulfills the 2-season minimum sampling requirements of the USFWS *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods, 1996* (Guidelines).

Following receipt of appropriate state and federal permits to install a gas pipeline, the Project may impact jurisdictional wetland features constituting suitable branchiopod habitat within the study area. To determine avoidance measures and potential mitigation necessary to offset any adverse affects to listed species, it is required federally listed vernal pool branchiopod presence/absence be determined on a pool-by-pool basis.

Within the Rio Jesus Maria Land Grant and Sect. 1 of T10N & R1E, Sect. 1 of T10N & R2E, Sects. 9, 10, 11, 12 of T10N & R2E, Sects. 5, 6 of T10N & R4E Sect. 36 of T11N & R3E, and Sect. 31 of T11N & R4E Sects. 1-8 & 17-20 of T10N, R4E, Sects. 31-36 of T11N, R4E, Sects. 1-6 of T10N & R5E, Sects. 31-36 of T11N & R5E, Sect. 6 of T10N & R6E, Sect. 31 of T11N & R6E.

On Pleasant Grove, Rio Linda, Roseville & Citrus Heights, El Dorado Bend, Knights Landing, Verona, Woodland, Grays Bend and Taylor Monument 7.5' USGS Quads.

Location map shown on Sacramento 15' USGS Quad. Yolo, Placer, Sutter & Sacramento Counties, CA
Map Date: 8/16/07



Survey Area (3523.79 ac.)

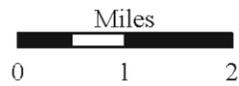


Figure 1

For the purpose of this report, the term branchiopod strictly refers to the three federally listed vernal pool branchiopod species that have the potential to occur within the site: vernal pool fairy shrimp (*Branchinecta lynchi*), Conservancy fairy shrimp (*B. conservatio*), and vernal pool tadpole shrimp (*Lepidurus packardii*). Although other branchiopods were found within the site they were not a target species of this study. Approval to conduct the survey was received from various landowners along the linear Project area upon being contacted by PG&E representative months prior to the survey. Written authorization to conduct wet-season surveys was received November 19, 2007 via e-mail from Michelle Tovar, USFWS (**Appendix A**). The following wet-season report is being submitted in accordance with the conditions of the USFWS Permit TE-049693-1 (**Appendix B**). This document follows the reporting format outlined in the Guidelines (1996).

II. Study Methods

Surveys were conducted according to the Guidelines. Upon receipt of USFWS approval to survey the site (**Appendix A**), surveys were initiated after the first seasonal storm events to determine when pools/swales were inundated over 3 cm. The study period began December 13, 2007 (although pools had not begun ponding over 3 cm) and was completed on April 14, 2007. Once inundated, pools and swales were sampled every two weeks unless no longer inundated. The site contained varying sizes of pools, some of which remained inundated for prolonged periods and others that dried down relatively quickly, or never ponded at all. Pools were evaluated during the site visits and sampled if they contained greater than 3 cm of water. At each site visit, the survey area was traversed on foot at various pullouts along the roadway. Sampling was done with a 0.5-mm mesh, long-handled D-net. A representative sample of each pool/swale's micro-habitats, including the bottom, edges and vertical water column was collected; and netted contents were either examined within the bag of the net, or transferred to a bucket and examined by portions in a 20 cm round white sorting pan. If necessary, a voucher sample of the federally listed branchiopods identified during the survey, were collected and preserved in ethanol. Only sexually mature, identifiable branchiopods were used to make positive observations regarding presence. Jody Gallaway (TE-049693-1), Trish Ladd (TE-049693-1) and Christy Dawson (TE-049693-1) performed the field surveys.

III. Project Description

Introduction

The PG&E Line 407 is part of a project to provide natural gas to communities in the Sacramento River Valley, which is an area of rapid growth. The survey area is composed of a 500-foot buffer on either side of the Project alignment. Due to the large size of the project, it will be distinguished as PG&E Line 407 West (approximately 14 miles in length) and PG&E Line 407 East (approximately 12 miles in length). The PG&E Line 407 West (West Project) will run from a tie-in point with the proposed PG&E Line 406 and existing PG&E Line 172A near Interstate 5 north of the City of Woodland to a tie-in point with the proposed PG&E Line 407 East (East Project) at the corner of Powerline and Riego roads. The East Project then splits, running south

along Powerline Road to West Elverta Road, and east along Riego Road/Baseline Road to Fiddymment Avenue. From the western tie-in, the line will run along the edges of fields and parallel a series of county roads and irrigation canals, crossing Knights Landing Ridge Cut, the Yolo Bypass, the Sacramento River, Natomas East Main Drainage, and Curry Creek before reaching the eastern tie-in (**Figure 1**). This document only pertains to the East Project survey area as the western section is composed of active agricultural fields and does not support potential branchiopod habitat.

IV. Habitat Description

Environmental Setting

A Delineation of Waters of the United States prepared by Gallaway Consulting, Inc. (GCI) in 2006 and was revised on May 3, 8, and 14, and June 21, 2007 by GCI biologists following the Supreme Court ruling in the case of *Rapanos vs. United States*, May 2007 (**Attachment A**). Within the survey area, vernal pools, vernal swales, seasonal wetlands, seasonal swales and roadside ditches were delineated that represent potential habitat for federally listed vernal pool branchiopods. In addition to the delineated wetland features, Helm Biological Consulting also sampled several areas during dry-season sampling that could potentially support branchiopods. Most wetland features occur in annual grasslands, some of which are grazed by cattle, and others are fallow or ungrazed. Man-made ditches are another common feature throughout the survey area, pooling and conveying precipitation along roadsides that were not sampled due to the constant flow of water. Active rice fields and agricultural ditches also occur within the survey area, but were not sampled as they typically hold water during the summer months which are the typical dry down periods necessary to complete the branchiopod life cycle. Following the delineation prepared by GCI, it was discovered during the 2007-08 wet-season sampling that several features on private lands were altered by the landowners either by development or grading activities and were unable to be sampled (see Results section below). One landowner refused access to several features (WF# 83-89), thus preventing sampling from occurring within that area. During the dry season sampling in 2006, several features identified as potential branchiopod habitat by Helm Biological Consulting were found to occur in the floodplain of a drainage where several fish were observed swimming in the potential features. As vernal pool branchiopods have adapted to environments absent of predatory fish, sampling of these features ceased.

Vernal Pools

Within the survey area vernal pools comprise the majority of potential branchiopod habitat. Pools vary considerably in size and depth, which greatly affected the inundation period of the pools. All vernal pools occurred in annual grasslands and typically had grass covered bottoms. Due to a low rainfall year in 2006-07 and the limited amount of precipitation during the later months of the 2007-08 wet-season, smaller pools were either dry upon inspection or only briefly ponded. Larger, deeper pools ponded water for sufficient periods to support vernal pool shrimp life history and *B. lynchi* was identified in two vernal pools (WF# 91 and 92) that were

connected during high ponding events (**Attachment B3**). *L. occidentalis* was also detected in WF# 91 and 92 as well as in vernal pools WF# 44 and 45 (**Attachments B1 & B2**).

Vernal Swales

Vernal swales within the survey area were typically shallow depressions conveying water to lower-lying areas forming standing pools. Swales were often dry at survey visits, though at times did support basic taxa; however, no vernal swales ponded water for a long enough period to support vernal pool branchiopod life cycle.

Seasonal Wetlands

Seasonal wetlands within the survey area varied greatly in size and depth. These features differed from vernal pools in the fact they typically would pond water for longer periods of time inducing the growth of plant species typical of seasonal wetlands. One large seasonal wetland (WF# 48) was conveying water via culverts to the south side of Riego Road where the majority of the water pooled in WF # 44 and 45 (found to contain *L. occidentalis*) or entered an intermittent drainage (OW# 088). *Lindieriella occidentalis* was also found to occur within three seasonal wetlands: WF# 22, HBC4 and HBC6A.

Seasonal Swales

These features varied in size throughout the study area. Seasonal swales are depressions on a slope that typically convey water to seasonal wetlands where water pools for longer periods of time. Seasonal swales contain wetland plants but often do not contain standing water for significant periods of time.

V. Survey Results

Sampling Locations

All sampling was conducted within the approximately 1811.2-acre survey site illustrated in **Attachment A**. **Attachment B** depicts the 2007-08 wet-season sampling results by displaying the features found to contain *B. lynchi* and/or *L. occidentalis*. Please refer to **Attachment A** and **Appendix E** for the maps and corresponding data sheets prepared for the 45 features sampled. As previously mentioned sampling discontinued or was not initiated for several of the features due to restricted access and/or altered features. During the 2007-08 wet-season survey, the following delineated wetland features were not sampled:

- Restricted or denied access: WF# 68, 69, 70, 71, 73, 74, 75, 77, 83-89, 106;
- Did not pond sufficiently: WF# 28, 32, 33, 63, 81;
- Recently tilled or disturbed by development: WF# 1, 3-14, 16, 29/30, 58, 77, 79, 80;
- Flowing water: WF# 33, 48/49, 55, 56, 111, 114, and all “other waters”;
- HBC 1, 2, 2A, 3 are in floodplain of WF18 that supported predatory fish, discontinued sampling;

- Seasonal wetlands in recently disked fallow agricultural fields (WF# 95-105) and all of the irrigation ditches as they contained water during the summer months and were not inundated at the time of the wet-season survey;

Species Identified and Population Size

One species of federally listed vernal pool branchiopods was detected within the survey area. *Branchinecta lynchi* was identified in two vernal pools (WF# 91 and 92) that connected during high ponding events with population numbers in the 10's. *Lindleriella occidentalis* was also found swimming with *B. lynchi* in WF #91 and 92 as well as in WF# 44, 45, 22, HBC4, HBC6A with population numbers ranging from the 10's to 100's. *Branchinecta conservatio* was not identified within the Project site during the two consecutive wet-season sampling.

Non special status invertebrate species encountered in wetland features on the site included copepods, ostracods, corixids, notonectids, dytoid adults and larvae, hydrophilid adults and larvae, ephemeroptera, trichoptera, gastropods, zygopterans, and several types of dipteran larvae.

VI. Conclusions and Determinations

The majority of the precipitation events during the 2007-08 wet-season occurred in the months of January and February. March and April contributed very little precipitation late in the season thus accelerating the drying of most wetland features. The majority of on-site features ponded sufficient amounts of water to support basic vernal pool taxa life cycles; however, only one species of federally listed vernal pool branchiopod was detected. *Branchinecta lynchi* was identified with population numbers estimated in the 10's within two adjoining wetland features. *Lindleriella occidentalis* was also found swimming with *B. lynchi* in the two pools, as well as five other pools and had population numbers ranging from the 10's to 100's.

Though previously conducted dry-season sampling found *Branchinecta* eggs in 41 features within the site and *L. occidentalis* in 21 features, a second wet-season survey was unable to confirm *Branchinecta* sp. presence in all of the features identified in the dry-season sampling. The majority of the *Branchinecta* eggs found during the dry-season sampling occurred in active rice fields that are continuously cultivated and were not inundated during the wet-season survey period. In addition to the active rice fields, dry-season sampling also found high occurrences of *Branchinecta* eggs in irrigation ditches, roadside ditches and large wetland features all of which contained flowing water. During the 2007-08 wet-season survey several of the wetland features had been recently disked by landowners and did not support the hydrology previously present on-site and were not sampled.

As branchiopod eggs are highly resilient and disperse via several methods including flowing water and waterfowl, it's expected that the largest density of eggs will accumulate at the lowest point of a flowing water body or in areas where waterfowl tend to amass (i.e. rice fields). Though it is practicable for *Branchinecta* eggs to be present on-site, eggs will not typically hatch until the appropriate environmental conditions (water temperature, depth, salinity, sufficient oxygen, etc) exist to successfully complete the species life cycle (Erickson & Belk, 1999).

Therefore, it is likely the environmental stimuli necessary to terminate the egg's dormancy period may not be present within this portion of the survey area.

A "complete" survey of the site has been performed due to the completion of two consecutive wet-season surveys, one dry-season survey, and the identification of one of the five federally listed branchiopods during the wet-season survey, per the USFWS Guidelines.

Study Area Photographs



Seasonal wetland (WF# 59). Photo taken by TL on 3/16/08 facing north.



Vernal Pool (WF # 39). Photo taken by JG on 1/28/09 facing southwest.



Potential branchiopod habitat (HBC12). Photo taken by TL on 3/6/08 facing northeast.



Vernal pool (WF# 41). Photo taken by JG on 1/11/08 facing southeast.



Vernal pool (WF# 82). Photo taken by JG on 1/11/08 facing north.



Seasonal wetland area in the vicinity of HBCB. Photo taken by TL on 1/11/08 facing south.
Water is flowing south into WF# 018.



Vernal pool (WF# 45) contains *L. occidentalis*. Photo taken by TL on 1/28/08 facing southeast.
Other water #88 is located just beyond vernal pool.

VII. References

Eriksen, C.H. and D. Belk. 1999. Fairy shrimps of California's puddles, pools, and playas. Mad River Press, Eureka, CA.

Gallaway Consulting, Inc. August 2007. 2006-2007 Wet Season Branchiopod Survey Report for PG&E Line 407 Natural Gas Transmission Pipeline, Sacramento, Placer and Sutter Counties, California.

Helm, B. 1998. The biogeography of eight large branchiopods endemic to California. Pages 124-139 *in* C.W. Witham, E. Bauder, D. Belk, W. Ferren, and R. Ornduff (eds.), Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference. California Native Plant Society, Sacramento, California.

Helm Biological Consulting. April 2007. Dry-season sampling for federally listed large branchiopods at the PG&E line 123 extension/line 407 (phase 1)/metro air park distribution feeder main project.

Merritt, R.W., and K.W. Cummins (eds.). 1996. An introduction to the aquatic insects of North America (3rd ed.). Kendall/Hunt Publishers, Dubuque, IA.

Smith, D.G. 2001. Pennak's freshwater invertebrates of the United States: porifera to crustacea. 4th Edition. John Wiley and Sons, Inc., New York, NY.

Thorp, J.H. and A.P. Covich (eds). 2001. Ecology and classification of North American freshwater invertebrates (2nd ed.). Academic Press. San Diego, CA.

USFWS. 1996. Interim survey guidelines to permittees for recovery permits under Section 10(a)(1)(A) of the Endangered Species Act for the listed vernal pool branchiopods. USFWS Sacramento Field Office, Sacramento, CA.

Statement of Surveyors

“I certify that the information in this survey report and attached exhibits fully and accurately represents my work”.

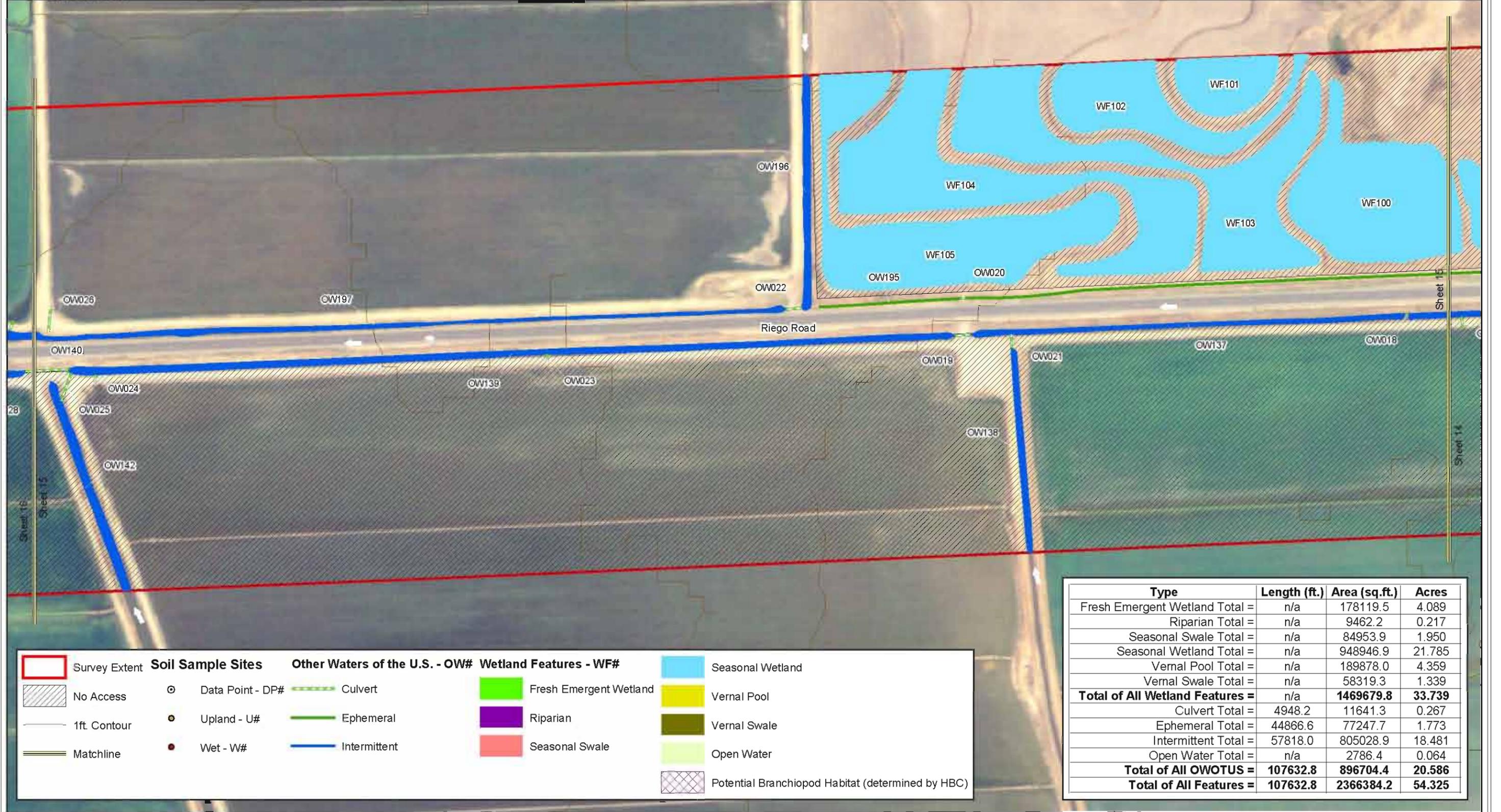
_____ Jody Gallaway (#TE-049693-1)

_____ Trish Ladd (#TE-049693-1)

_____ Christy Dawson (#TE-049693-1)

Attachment A

Draft 2007 Delineation of Waters of the U.S. Maps

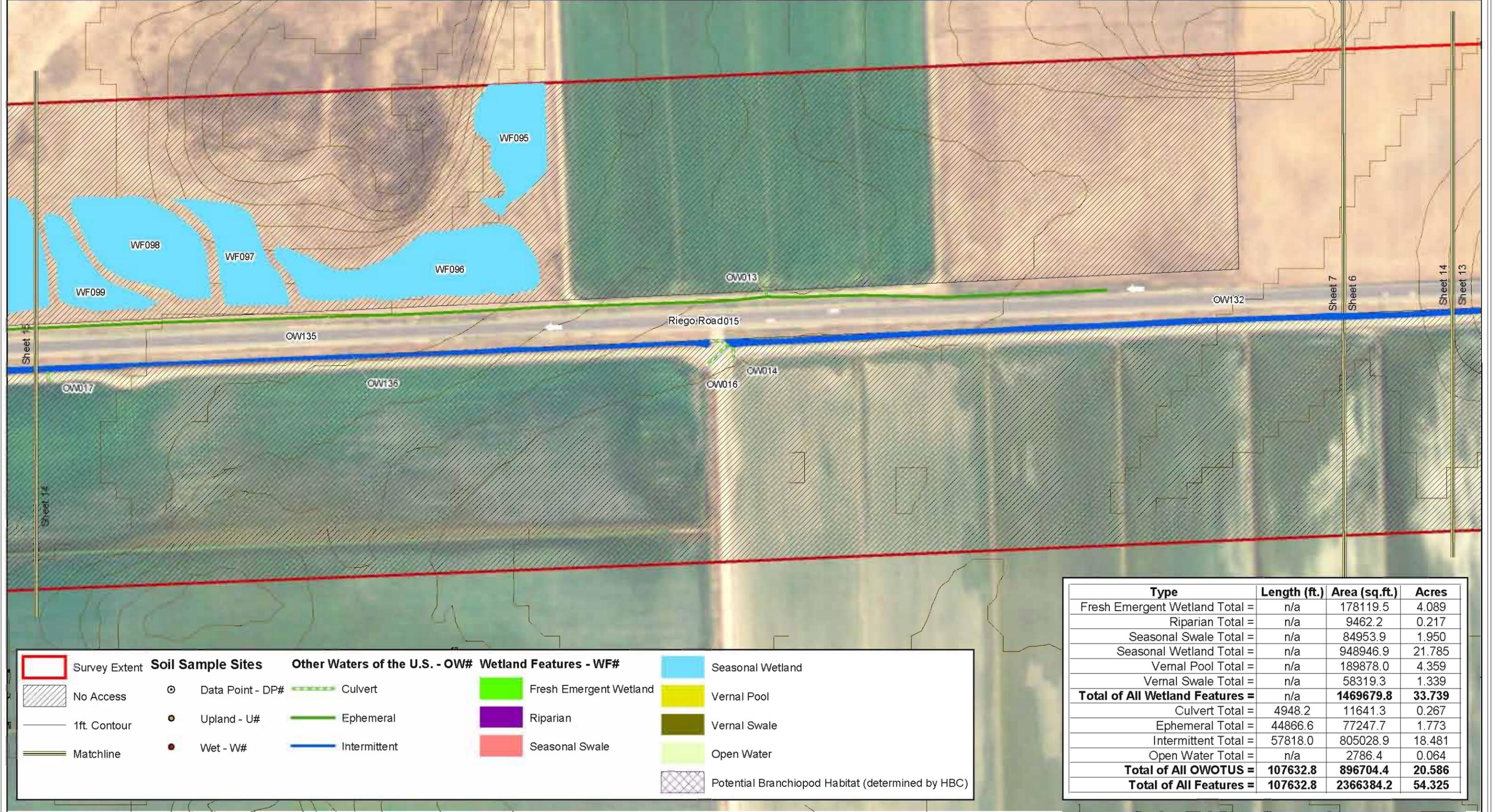


Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions





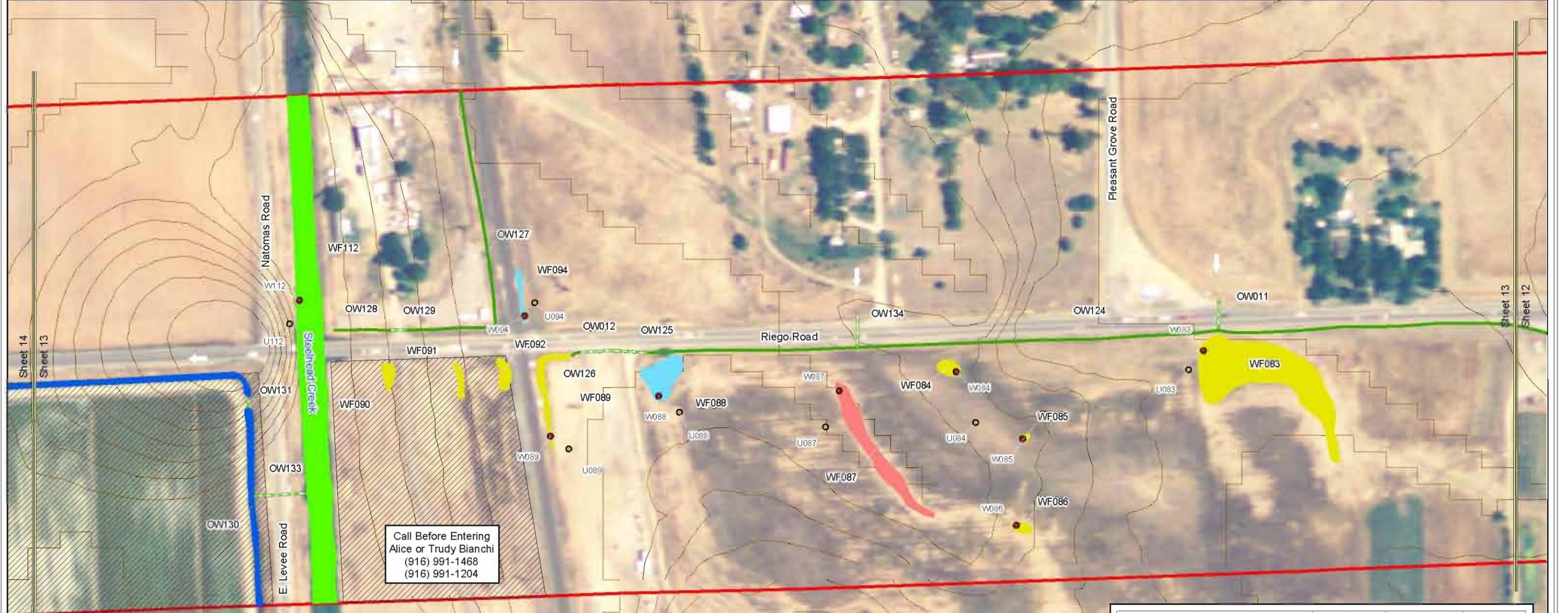
Survey Extent	Soil Sample Sites	Other Waters of the U.S. - OW#	Wetland Features - WF#	Seasonal Wetland
No Access	Data Point - DP#	Culvert	Fresh Emergent Wetland	Vernal Pool
1ft. Contour	Upland - U#	Ephemeral	Riparian	Vernal Swale
Matchline	Wet - W#	Intermittent	Seasonal Swale	Open Water
				Potential Branchiopod Habitat (determined by HBC)

Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions





Call Before Entering
Alice or Trudy Bianchi
(916) 991-1468
(916) 991-1204

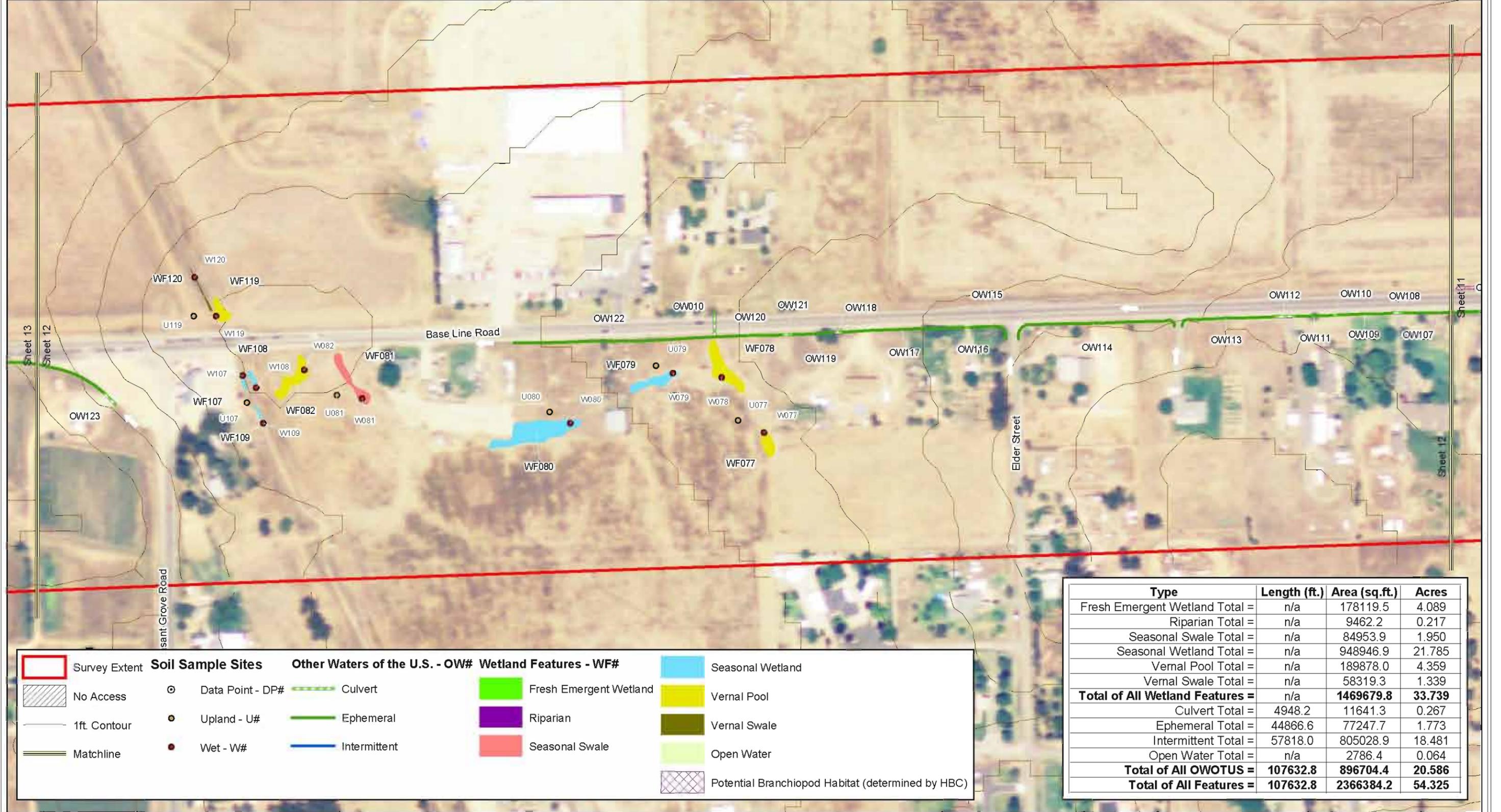
Survey Extent	Soil Sample Sites	Other Waters of the U.S. - OW#	Wetland Features - WF#	Seasonal Wetland
No Access	Data Point - DP#	Culvert	Fresh Emergent Wetland	Vernal Pool
1ft. Contour	Upland - U#	Ephemeral	Riparian	Vernal Swale
Matchline	Wet - W#	Intermittent	Seasonal Swale	Open Water
				Potential Branchiopod Habitat (determined by HBC)

Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SJ, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions:





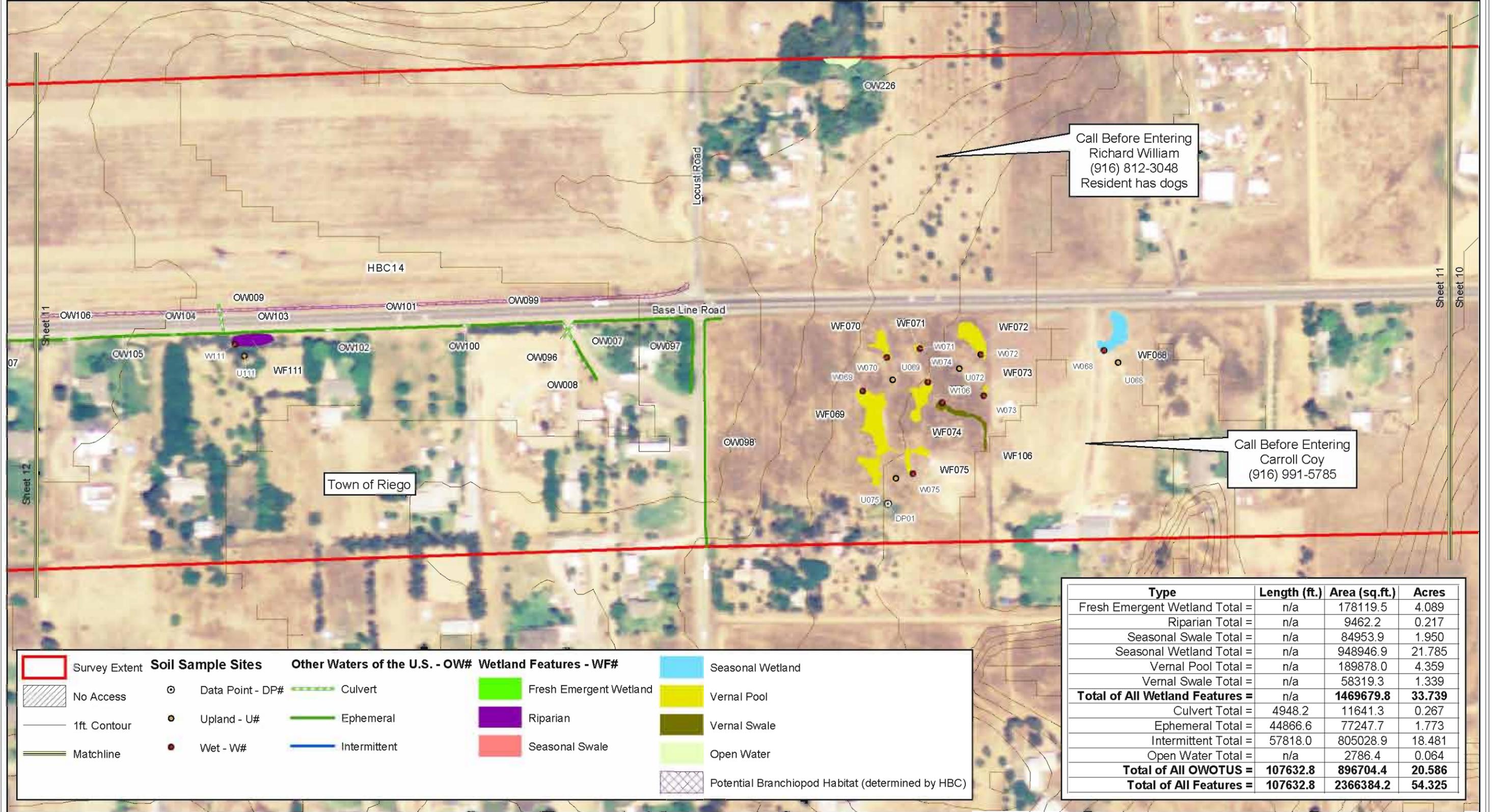
Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325

Survey Extent	Soil Sample Sites	Other Waters of the U.S. - OW#	Wetland Features - WF#	Seasonal Wetland
No Access	Data Point - DP#	Culvert	Fresh Emergent Wetland	Vernal Pool
1ft. Contour	Upland - U#	Ephemeral	Riparian	Vernal Swale
Matchline	Wet - W#	Intermittent	Seasonal Swale	Open Water
				Potential Branchiopod Habitat (determined by HBC)



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions:





Call Before Entering
Richard William
(916) 812-3048
Resident has dogs

Call Before Entering
Carroll Coy
(916) 991-5785

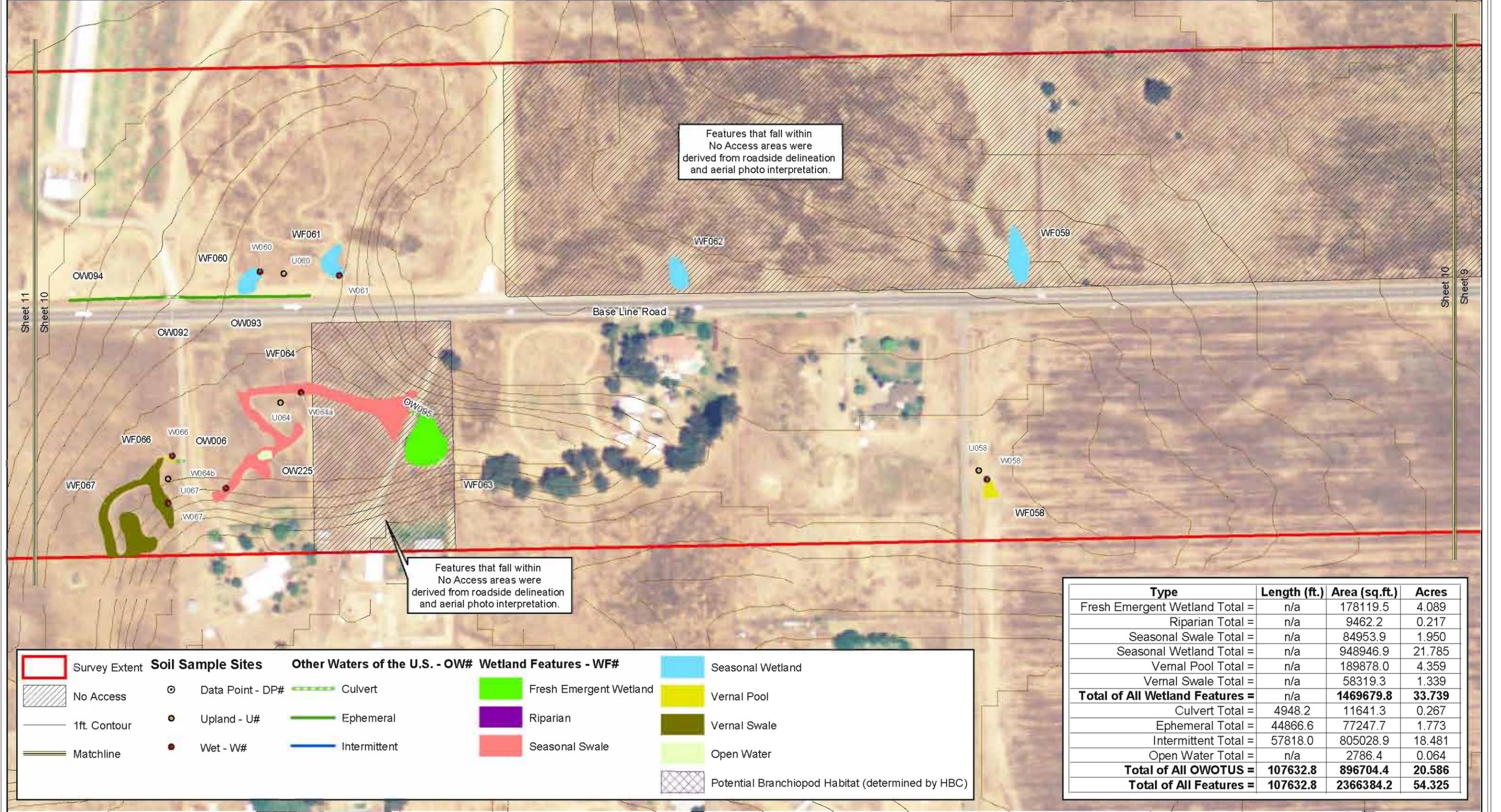
Survey Extent	Soil Sample Sites	Other Waters of the U.S. - OW#	Wetland Features - WF#	Seasonal Wetland
No Access	Data Point - DP#	Culvert	Fresh Emergent Wetland	Vernal Pool
1ft. Contour	Upland - U#	Ephemeral	Riparian	Vernal Swale
Matchline	Wet - W#	Intermittent	Seasonal Swale	Open Water
				Potential Branchiopod Habitat (determined by HBC)

Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions





Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation.

Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation.

Survey Extent	Soil Sample Sites	Other Waters of the U.S. - OW#	Wetland Features - WF#	Seasonal Wetland
No Access	Data Point - DP#	Culvert	Fresh Emergent Wetland	Vernal Pool
1ft. Contour	Upland - U#	Ephemeral	Riparian	Vernal Swale
Matchline	Wet - W#	Intermittent	Seasonal Swale	Open Water
				Potential Branchiopod Habitat (determined by HBC)

Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions





Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation.

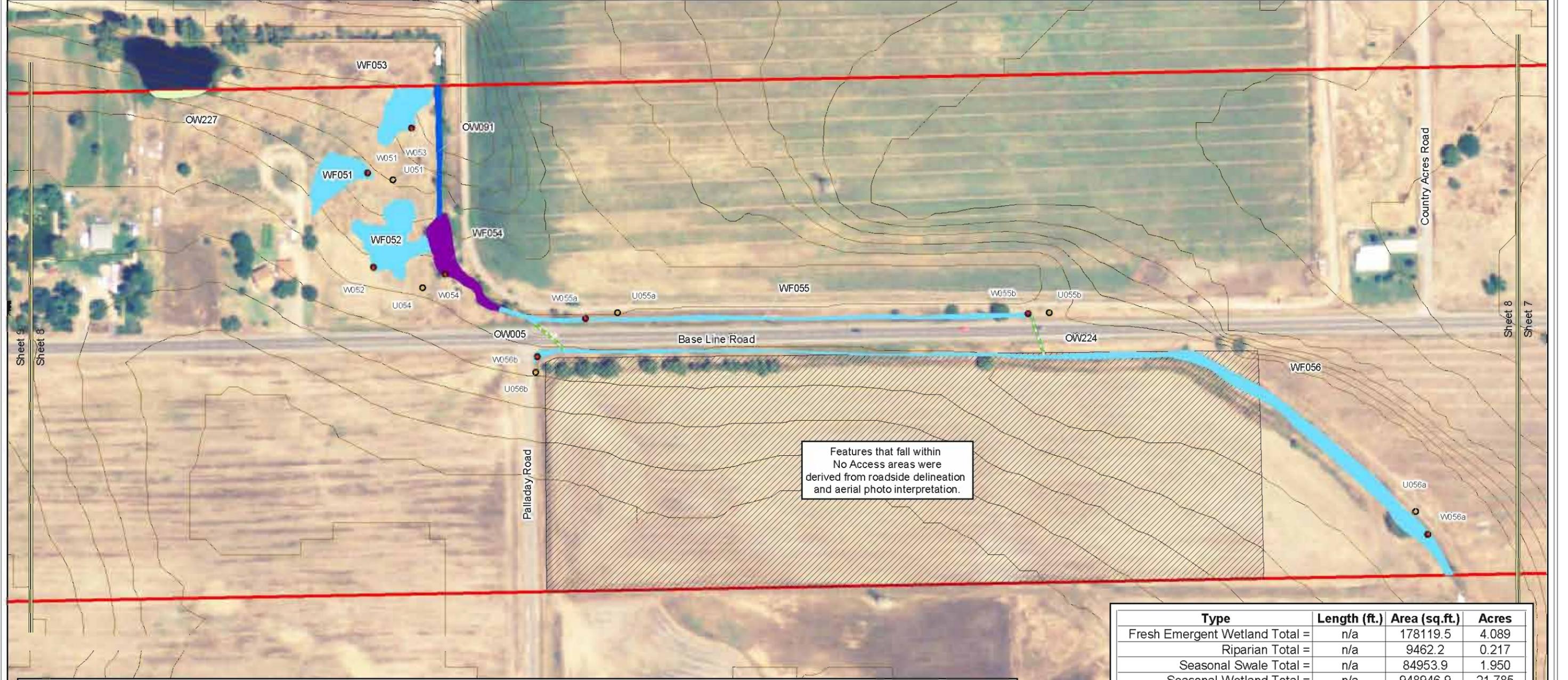
Soil Sample Sites		Other Waters of the U.S. - OW#		Wetland Features - WF#	
	Data Point - DP#		Culvert		Seasonal Wetland
	Upland - U#		Ephemeral		Vernal Pool
	Wet - W#		Intermittent		Vernal Swale
	Survey Extent		Seasonal Swale		Open Water
	No Access		Potential Branchiopod Habitat (determined by HBC)		
	1ft. Contour				
	Matchline				

Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions





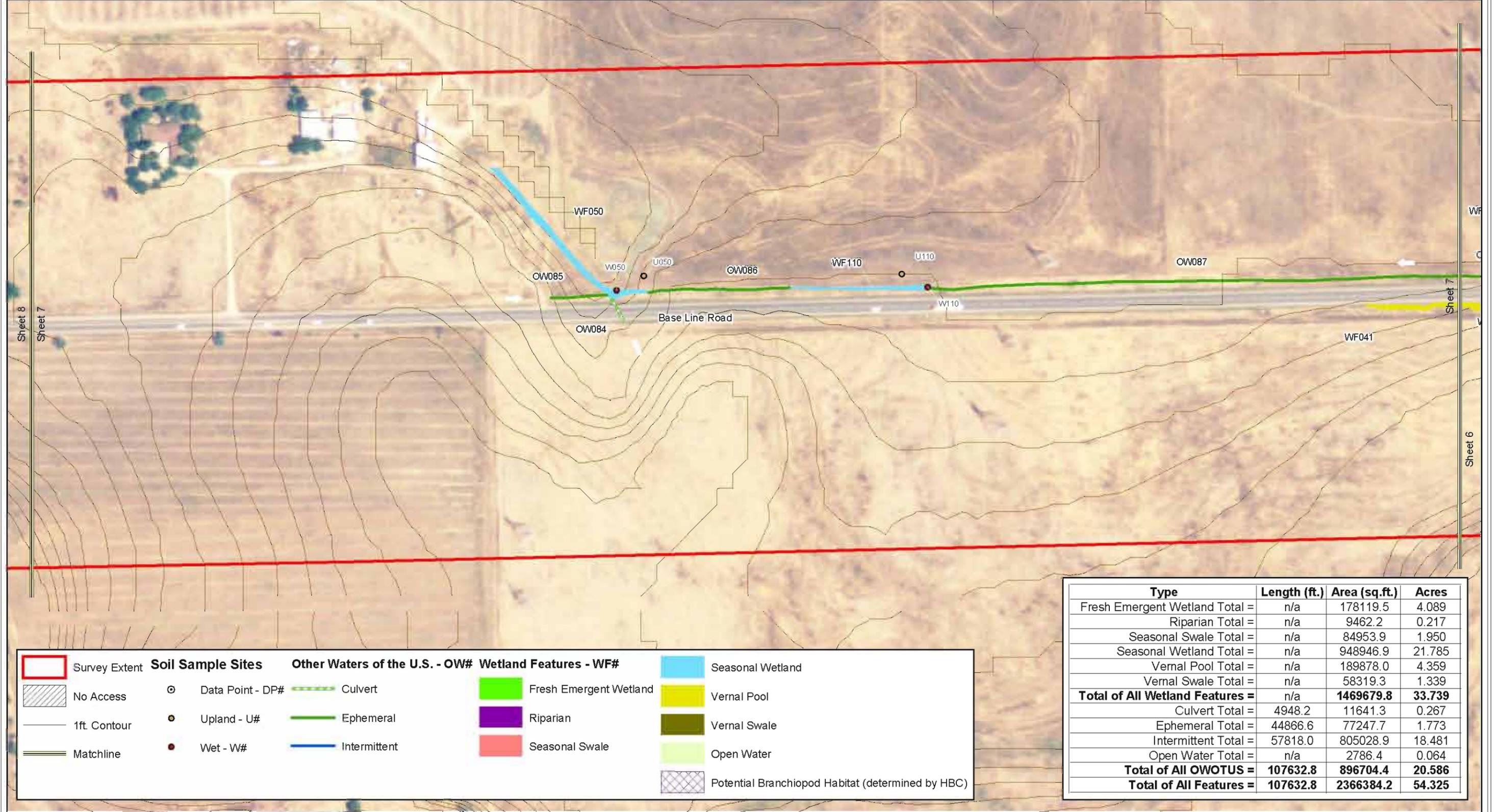
Survey Extent	Soil Sample Sites	Other Waters of the U.S. - OW#	Wetland Features - WF#	Seasonal Wetland
No Access	Data Point - DP#	Culvert	Fresh Emergent Wetland	Vernal Pool
1ft. Contour	Upland - U#	Ephemeral	Riparian	Vernal Swale
Matchline	Wet - W#	Intermittent	Seasonal Swale	Open Water
				Potential Branchiopod Habitat (determined by HBC)

Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions





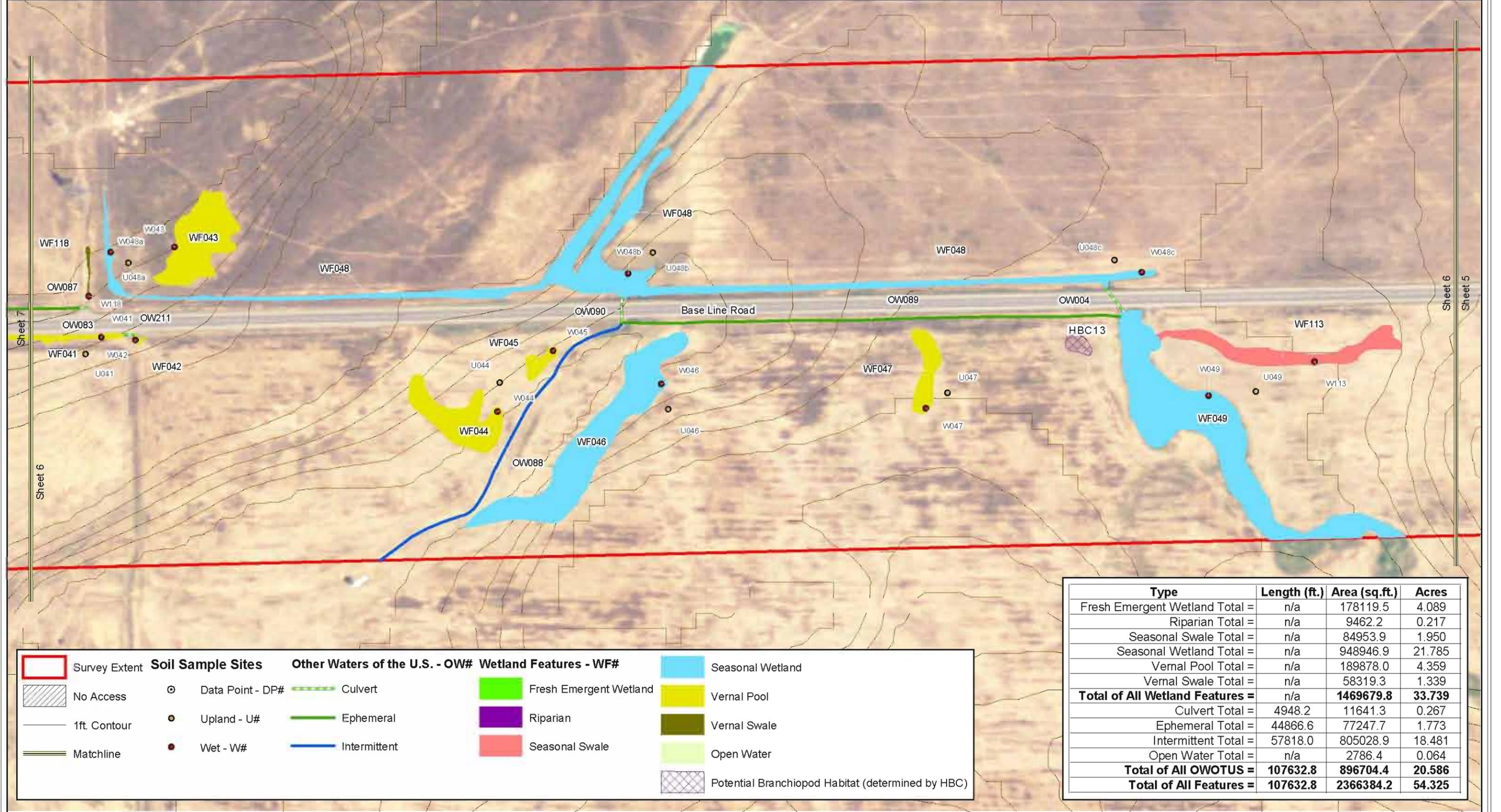
Survey Extent	Soil Sample Sites	Other Waters of the U.S. - OW#	Wetland Features - WF#	Seasonal Wetland
No Access	Data Point - DP#	Culvert	Fresh Emergent Wetland	Vernal Pool
1ft. Contour	Upland - U#	Ephemeral	Riparian	Vernal Swale
Matchline	Wet - W#	Intermittent	Seasonal Swale	Open Water
				Potential Branchiopod Habitat (determined by HBC)

Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions





Type	Length (ft.)	Area (sq.ft.)	Acres
Fresh Emergent Wetland Total =	n/a	178119.5	4.089
Riparian Total =	n/a	9462.2	0.217
Seasonal Swale Total =	n/a	84953.9	1.950
Seasonal Wetland Total =	n/a	948946.9	21.785
Vernal Pool Total =	n/a	189878.0	4.359
Vernal Swale Total =	n/a	58319.3	1.339
Total of All Wetland Features =	n/a	1469679.8	33.739
Culvert Total =	4948.2	11641.3	0.267
Ephemeral Total =	44866.6	77247.7	1.773
Intermittent Total =	57818.0	805028.9	18.481
Open Water Total =	n/a	2786.4	0.064
Total of All OWOTUS =	107632.8	896704.4	20.586
Total of All Features =	107632.8	2366384.2	54.325



The information contained in this figure shall be considered preliminary until written verification by the USACE. Survey Extent derived from 500 ft. buffer of roadway. Features that fall within No Access areas were derived from roadside delineation and aerial photo interpretation. Survey Dates: July 21, 24 - 28, Aug 10 & 25 2006/Surveyors: JG, SI, EA. Date of Aerial: Feb. 2005 (NAIP)/Contours derived from USGS DEM. Map Date: Aug 29, 2006/Revisions

