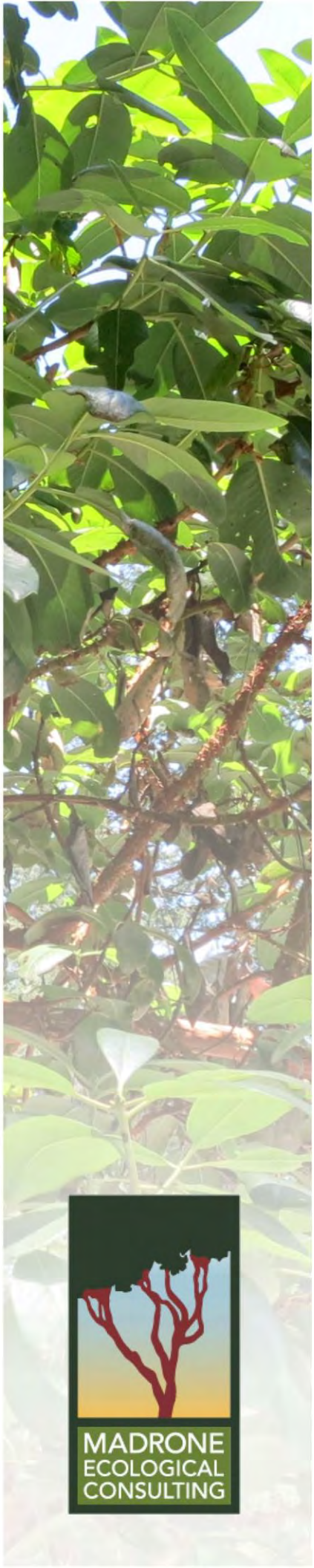

Draft Aquatic Resources Delineation

Revised Pixley Groundwater Bank

Tulare County

December 2016

MADRONE ECOLOGICAL CONSULTING

Prepared for:
South Valley Water Banking Authority
357 East Olive Avenue
Tipton, California 93272

Recommended Citation:
Madrone Ecological Consulting, LLC (Madrone). 2016. *Draft Aquatic Resources Delineation Report for the Revised Pixley Groundwater Bank*. Prepared for South Valley Water Banking Authority. Published December 22, 2016.

CONTENTS

Draft Aquatic Resources Delineation
Revised Pixley Groundwater Bank

Figures

Attachments

1.0 INTRODUCTION

This report presents the draft results of a delineation of aquatic resources within the Revised Pixley Groundwater Bank Study Area (Study Area) conducted by Madrone Ecological Consulting, LLC (Madrone).

The approximately 4,577-acre Study Area is located in Sections 12, 13, and 14; Township 23 South, Range 25 East; Sections 7, 8, 9, 10, 11, 14, 15, 16, 17, and 18, Township 23 South, Range 26 East; MDB&M, Tulare County, California (UTM: 301,930 meters Easting/3,978,883 meters Northing, Zone 11 North). The Study Area is portrayed on the USGS "Sausalito School, California" 7.5-Minute Series Topographic Quadrangle (USGS 1987) (**Figure 1**).

The original Pixley Groundwater Bank Study Area consisted of approximately 4,222 acres, which were delineated by Gibson & Skordal (currently known as Madrone Ecological Consulting), on January 29, 2015, and submitted to the U.S. Army Corps of Engineers (Corps) for verification on March 13, 2015. The Corps issued an approved jurisdictional determination (AJD) on May 27, 2015, (SPK-2015-00265) and verified the presence of approximately 2.040 acres of waters of the United States (Friant-Kern Canal) within the original 4,222-acre Study Area. The Corps also determined that the 3.086 acres of waters identified as "Deer Creek," the 1.122 acres of water identified as "Tail Water Pond/Ditch," and the 9.568 acres of water identified "Irrigation Holding Pond" on the original delineation map dated April 2015 are intrastate isolated waters with no apparent interstate or foreign commerce connection. The original verified delineation map prepared by Gibson & Skordal is provided in **Attachment A**, and the Corps verification letter is included in **Attachment B**.

Since the Corps issued its May 27, 2015, verification the original 4,222-acre Pixley Groundwater Bank Study Area has been expanded to a total of approximately 4,577 acres, which now includes two additional parcels to the west as well as an expanded reach of Deer Creek. **Figure 2** is a Verification Overview Exhibit that illustrates the original Study Area in relation to the Study Area additions (NAIP 2012).

1.1 Contact Information

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Agent

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2.0 METHODOLOGY

Field surveys were conducted on January 29, 2015, by Jim Gibson and Matt Hirkala of Gibson & Skordal (currently known as Madrone Ecological Consulting) within the original 4,222-acre Study Area described above. Madrone senior biologist Matt Hirkala subsequently conducted a

delineation of aquatic resources within the approximately 355 acres of Study Area additions, which included two additional parcels to the west as well as an expanded reach of Deer Creek, on November 1, 2016.

Three-parameter data (vegetation, soils, and hydrology) were collected at each data point, documenting wetland/waters or upland status, as appropriate. The delineation map was prepared in accordance with the *Updated Map and Drawing Standards for the South Pacific Division Regulatory Program* (USACE 2016a). The GPS field data was overlaid on an ortho-rectified aerial photograph flown June 25, 2012 (NAIP 2012).

The delineation was performed in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008a), *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008b), and the Sacramento District's *Minimum Standards for Acceptance of Preliminary Wetlands Delineations* (USACE 2016b). U.S. Army Corps of Engineers (USACE) regulations (33 CFR 328) were used to determine the presence of Waters of the United States other than wetlands. The most recent *National Wetland Plant List* (Lichvar et al. 2016) was used to determine the wetland indicator status of plants observed in the Study Area. The *Jepson eFlora* (Jepson Flora Project 2016) was used for plant nomenclature, except where it conflicted with the nomenclature in the *National Wetland Plant List*, which was given priority on the data sheets.

3.0 EXISTING CONDITIONS

The Study Area, which is located southeast of Pixley in southwestern Tulare County, is situated on level terrain at a median elevation of approximately 100 feet. The concrete-lined Friant-Kern Canal traverses the extreme eastern portion of the Study Area from north to south, and a modified reach of Deer Creek bisects the central part of the site. The majority of the Study Area has been reclaimed for agricultural uses and is crisscrossed by a network of paved and gravel roads. Most of the agricultural lands are irrigated and several ditches and holding ponds are scattered throughout the area.

The Study Area additions consist of fallow and active agricultural lands primarily comprised of irrigated almond (*Prunus dulcis*) and pistachio (*Pistacia vera*) orchards, and their supporting infrastructure. A private residence, barns, and equipment maintenance areas are also present throughout the Study Area additions.

3.1 Terrestrial Plant Communities

3.1.1 Agricultural Lands

The majority of the Study Area supports agricultural lands. Current and recent crops include alfalfa (*Medicago sativa*), almond (*Prunus dulcis*), cotton (*Gossypium hirsutum*), corn (*Zea mays*), pistachio (*Pistacia vera*), sorghum (*Sorghum bicolor ssp. bicolor*), and grape (*Vitus vinifera*).

During the January 29, 2015, field surveys, several of the agricultural fields were disked and devoid of vegetation. During the November 1, 2016, field survey in the Study Area additions, some of the fields were fallow and appear to have been disked last year. As a result, vegetation in these areas was sparse and consisted of rip-gut brome (*Bromus diandrus*), salt-grass (*Distichlis spicata*), fiddle-dock (*Rumex pulcher*), prickly lettuce (*Lactuca serriola*), and other weedy species.

3.1.2 Riparian Woodland

A thin Riparian Woodland parallels Deer Creek which enters the Study Area from the east and exits to the northwest. This part of Deer Creek, which appears to have been straightened prior to 1994, is bracketed by levees and contains a pair diversion structures with wing walls. Most of the streambed lacked vegetation. Woody riparian species observed growing on the banks and levees include eastern cottonwood (*Populus deltoides*), narrow-leaf willow (*Salix exigua*), mule's fat (*Baccharis salicifolia*), Himalayan blackberry (*Rubus armeniacus*), and polished willow (*Salix laevigata*). The herb stratum consisted of stinging nettle (*Urtica dioica*), ripgut brome (*Bromus diandrus*), curly dock (*Rumex crispus*), Douglas' wormwood (*Artemisia douglasiana*), rough cocklebur (*Xanthium strumarium*), wall barley (*Hordeum murinum*), poison-hemlock (*Conium maculata*), and other species.

3.1.3 Ruderal Areas

Ruderal Areas parallel most of the roads and uncultivated boundaries between agricultural fields. Common weedy species include Bermuda grass (*Cynodon dactylon*), Canadian horseweed (*Erigeron canadensis*), cut-leaf filaree (*Erodium cicutarium*), wall barley (*Hordeum murinum*), Johnson grass (*Sorghum halepense*), mallow (*Malva* sp.), and other species.

3.2 Hydrology

Deer Creek flows through the Study Area from east to west. It contains several check structures that allow for the storage and diversion of irrigation water. Deer Creek dead-ends at the Homeland Canal approximately 15 miles downstream. A portion of this feature was mapped as part of the original delineation.

The Friant-Kern Canal flows through the eastern edge of the Study Area. It originates at Millerton Dam on the San Joaquin River and terminates at the Kern River. It transports irrigation water for crops, and this feature was mapped as part of the original delineation.

There are numerous irrigation holding ponds in the Study Area. Water is pumped into the holding ponds from water wells and then distributed into the farm fields for irrigation. Some farm fields have tail water return ponds where irrigation runoff is captured and re-circulated. These irrigation features do not receive or discharge water into any drainage or channel that could be considered a water of the United States. All except one of these features were mapped as part of the original delineation.

Harris Ditch, which was not mapped as part of the original delineation, originates out of Deer Creek along the Avenue 80 alignment. From there it travels about 1.25 miles to the west and

then turns north along the Road 152 alignment. Harris Ditch continues north for approximately ¼ mile before turning west along the Avenue 84 alignment. It extends west along Avenue 84 for approximately 2 miles. At its crossing with Avenue 136, Harris Ditch turns along a southwest alignment and connects to a terminal reservoir between Road 134 and Road 132. There is no network of irrigation ditches feeding off Harris Ditch. There are 14-16 turnouts where water is delivered to on-farm irrigation systems which are farmer owned and operated.

The Study Area is located within the Upper Deer-Upper White Sub-Basin (Hydrologic Unit Code (18030005) and the Lower Deer Creek Watershed (1803000509), (NRCS, 2015) (**Figure 3**).

3.3 National Wetlands Inventory

Several features have been mapped within the Study Area in the National Wetlands Inventory – Version 2 and are portrayed on **Figure 4** (NWI 2016).

3.4 Soils

According to the Natural Resources Conservation Service (NRCS) Soil Survey Database (NRCS 2016), eleven soil mapping units occur within the Study Area (**Figure 5**). Several of the following map units contain hydric components (NRCS 2015).

Akers-Akers, saline-sodic, complex, 0-2% slopes (101)

This soil, which is situated on fan remnants, is associated with irrigated croplands that have leveled and reclaimed with soil amenders. The Akers portion is very deep and well drained with moderate permeability. The saline-sodic Akers component is very deep and well drained with moderately slow permeability. Flooding is very rare for both components. Contained in this unit are the following inclusions: Calgro soils, Tujunga soils, Colpien soils, Tagus, Grangeville soils, Yettem, and Hanford soils as well as unnamed soils with surface layers of sandy loam or loam. This unit contains one unnamed hydric inclusion.

Biggriz-Biggriz, saline-sodic, complex, 0-2% slopes (104)

This soil, which is situated on fan remnants, is associated with irrigated croplands that have been leveled and drained. Both components are very deep, somewhat poorly drained (and artificially drained) with moderately slow permeability. Both components are derived from alluvium from granitic rock, and both rarely flood. Contained in this unit are the following inclusions: Nord soils, Gambogy soils, Garces soils, Lethent soils, Colpien soils, Tujunga soils as well as two undescribed soils. One of which is associated with depressions that pond for more than two weeks. The other possesses a surface layer of clay loam or silt loam. This unit contains one unnamed hydric inclusion.

Calgro-Calgro, saline-sodic, complex, 0-2% slopes (105)

This soil, which is situated on fan remnants, is associated with irrigated croplands that have been leveled and drained. Both components are moderately deep, moderately well drained with moderate permeability above the duripan, which is situated approximately 24 to 25 inches below

the surface. Both components are derived from alluvium from granitic rock, and both very rarely flood. Contained in this unit are the following inclusions: Colpien soils, Grandeville soils, Tujunga soils, Exeter soils as well as two undescribed soils. One of which is associated with depressions that pond for more than two weeks. The other possesses a surface layer of loam. This unit contains one unnamed hydric inclusion.

Centerville clay, 0-2% slopes (106)

This soil, which is situated on fan remnants, is associated with irrigated croplands that have been leveled and reclaimed with soil amenders. This unit is deep, well drained with slow permeability. It is derived from alluvium from granitic rock and very rarely floods. Contained in this unit are the following inclusions: Exeter soils and San Joaquin as well as two undescribed soils. One of which is associated with depressions that pond for more than two weeks, and the other possesses a surface layer of clay loam. This unit contains one unnamed hydric inclusion.

Colpien loam, 0-2% slopes (108)

This soil, which is situated on fan remnants, is associated with irrigated croplands that have been leveled and reclaimed with soil amenders. This unit is very deep, moderately well drained with moderately slow permeability. It is derived from alluvium from granitic rock and rarely floods. Contained in this unit are the following inclusions: Biggriz soils, Gambogy soils, Hanford soils, Akers soils, Nord soils, and Tujunga soil as well as unnamed soils that possess a surface layer of fine sandy loam, silt loam, sandy clay loam, or clay loam.

Crosscreek-Kai association, 0-2% slopes (109)

This soil, which is situated on fan remnants, is associated with irrigated croplands that have been ripped, leveled, and reclaimed with soil amenders. The Crosscreek soil has been formed through the alteration of Kai soils by mechanical and chemical means. The Crosscreek portion is deep and well drained with moderate permeability above the duripan, which is situated approximately 55 to 60 inches below the surface; it very rarely floods. The Kai associate is moderately deep and moderately well drained with moderate permeability in the layers above a duripan that is situated approximately 39 to 46 inches below the surface. Flooding is very rare. Contained in this unit are the following inclusions: Quonal soils, Exeter soils, Calgro soils and Hanford soils as well as two undescribed soils. One of which is associated with depressions that pond for more than two weeks. The other possesses a surface layer of sandy loam. This unit contains one unnamed hydric inclusion.

Exeter loam, 0-2% slopes (114)

This soil, which is situated on fan remnants, is associated with irrigated croplands that have been leveled. This unit is moderately deep to a duripan, moderately well drained with moderately slow permeability above the duripan, which is situated approximately 28 to 46 inches below the surface; it very rarely floods. Contained in this unit are the following inclusions: Hanford soils, Quonal soils, Colpien soils, Calgro soils as well as two unnamed soils. One of which is associated

with depressions that pond for more than two weeks, and the other possesses a surface layer of sandy loam. This unit contains one unnamed hydric inclusion.

Flamen loam, 0-2% slopes (116)
This soil, which is situated on fan remnants, is associated with irrigated croplands that have been leveled. This unit is deep to a duripan, moderately well drained with moderate permeability above the duripan, which is situated approximately 43 to 72 inches below the surface; it very rarely floods. Contained in this unit are the following inclusions: Hanford soils, San Joaquin soils, Centerville soils, Colpien soils, Calgro soils as well as two unnamed soils. One of which is associated with depressions that pond for more than two weeks, and the other possesses a surface layer of sandy loam. This unit contains one unnamed hydric inclusion.

Hanford sandy loam, 0-2% slopes (124)
This soil, which is situated on flood plains and alluvial fans, is associated with irrigated croplands that have been leveled and reclaimed with soil amendments. This unit is very deep, moderately well drained with moderately rapid permeability; it very rarely floods. Contained in this unit are the following inclusions: Tujunga soils, Exeter soils, Calgro, and Yettem soils as well as unnamed soils with a surface layer of loam or fine sandy loam.

Riverwash (134)
This soil, which is situated on flood plains, is found within stream and river channels that are dry most of the year. The surface consists of sand and gravel and supports very little vegetation. This map unit is listed as hydric on the National Hydric Soils List.

Water, perennial (145)
These areas consist of year-round surface waters

3.5 Driving Directions

To access the site from Sacramento, drive south on CA-99 for approximately 227.7 miles before taking Exit 70A towards Avenue 96/Terra Bella. Merge onto Main Street and take the first right onto E. Terra Bella Avenue/County Highway J24 and continue for 1.8 miles. Turn right onto Road 140 and continue for 1 mile before turning left onto Avenue 88. Proceed on Avenue 88 for 1.5 miles; the Study Area is located to the south.

4.0 RESULTS

A total of 26.079 acres of aquatic resources were delineated within the approximately 4,577-acre Study Area (**Table 1**). The Draft Aquatic Resources Delineation map is included in **Attachment C**, data sheets are included in **Attachment D**, and a list of the plant species observed in the Study Area with their wetland indicator status is included in **Attachment E**. The *Aquatic Resources Excel Spreadsheet* is included in **Attachment F**. Representative digital photos of the Study Area taken on January 28, 2015, and November 1, 2016, are included in **Attachment G**. Each of the feature types is described below.

Table 1. Aquatic Resources Delineated within the Study Area

Resource Type	Acreage
Other Waters	
Irrigation Channels	3.156
o Harris Ditch	1.116
o Friant-Kern Canal	2.040
Deer Creek	12.082
Irrigation Holding Ponds	9.719
Tailwater Pond/Ditch	1.122
Total	**26.079**

4.1 Other Waters

4.1.1 Irrigation Channels

4.1.1.1 Friant-Kern Canal

Approximately 2.040 acres of the concrete-lined Friant-Kern Canal passes through the eastern portion of the Study Area. The canal originates at the San Joaquin River where water is diverted for agricultural purposes, and it terminates at the Kings River to the south. This maintained irrigation feature lacked a plant community within the Study Area.

4.1.1.2 Harris Ditch

The two features labeled as ID1 and ID2 on the attached aquatic resources delineation map collectively comprise an irrigation ditch known locally as Harris Ditch. Harris Ditch seasonally conveys water from Deer Creek to a terminal reservoir. Before the terminal reservoir, there are 14-16 turnouts where water is delivered locally to on-farm irrigation systems which are farmer owned and operated. Some water was present in the lowest reaches during the November 1, 2016, field survey as the result of recent rains. This feature possesses a trapezoidal or V-shaped profile, and very little vegetation was present due to on-going maintenance activities. Vegetation, when present, consisted of sprangle-top (*Leptochloa fusca*) and hairy water-clover (*Marsilea vestita*). No data points were taken due to the obvious break with the surrounding uplands.

4.1.2 Deer Creek

Approximately 12.082 acres of Deer Creek channel were mapped within the Study Area. This reach possesses a distinct bed and bank with an ordinary high water mark and the destruction of terrestrial vegetation. Most of the bed supported little to no vegetation and consisted of sand or cobble; the exception was the area at the foot of the check structures, which included riprap, chunks of concrete, and trash. No data points were taken due to the obvious break with the surrounding uplands.

4.1.3 Irrigation Holding Ponds and Tail Water Pond/Ditch

Approximately 9.719 acres of irrigation holding ponds and 1.222 acres of tailwater pond/ditches were mapped within the Study Area. These artificial features were created by excavating or

diking dry land to collect and retain water which is used exclusively for irrigation. No data points were taken within these features due to the obvious break with the surrounding uplands.

5.0 CONCLUSION

The Corps issued an AJD on May 27, 2015, (SPK-2015-00265) and verified the presence of approximately 2.040 acres of waters of the United States (Friant-Kern Canal) within the original 4,222-acre Study Area. The Corps also determined that the 3.086 acres of waters identified as "Deer Creek," the 1.122 acres of water identified as "Tail Water Pond/Ditch," and the 9.568 acres of water identified "Irrigation Holding Pond" on the original delineation map dated April 2015 are intrastate isolated waters with no apparent interstate or foreign commerce connection. The Corps verification letter is included in **Attachment B**.

A request for verification of the 4,577-acre Revised Pixley Groundwater Bank Study Area, which contains approximately 26.079 acres of water features, was submitted to the Corps on November 21, 2016. As of December 22, 2016, the Corps has not issued an AJD; however, it is anticipated that the Corps will classify the new water features (ID1, ID2, IP15, and the expanded reach of Deer Creek) as intrastate isolated waters as they also lack an interstate or foreign commerce connection.

6.0 REFERENCES

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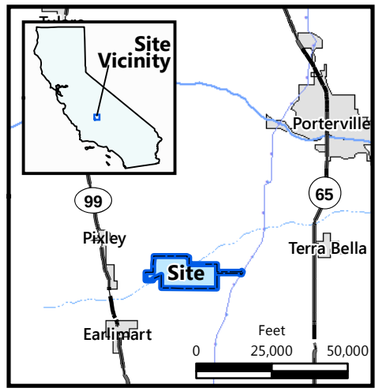
Figures



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Sections 7, 8, 9, 10, 11, 14, 15, 16, 17, and 18, Township 23 South, Range 26 East; MDBM
UTM: 301,930 meters Easting/3,978,883 meters Northing; Zone 11 North

Figure 1
Vicinity Map
Draft Aquatic Resources Delineation

Revised Pixley Groundwater Bank
Tulare County, California

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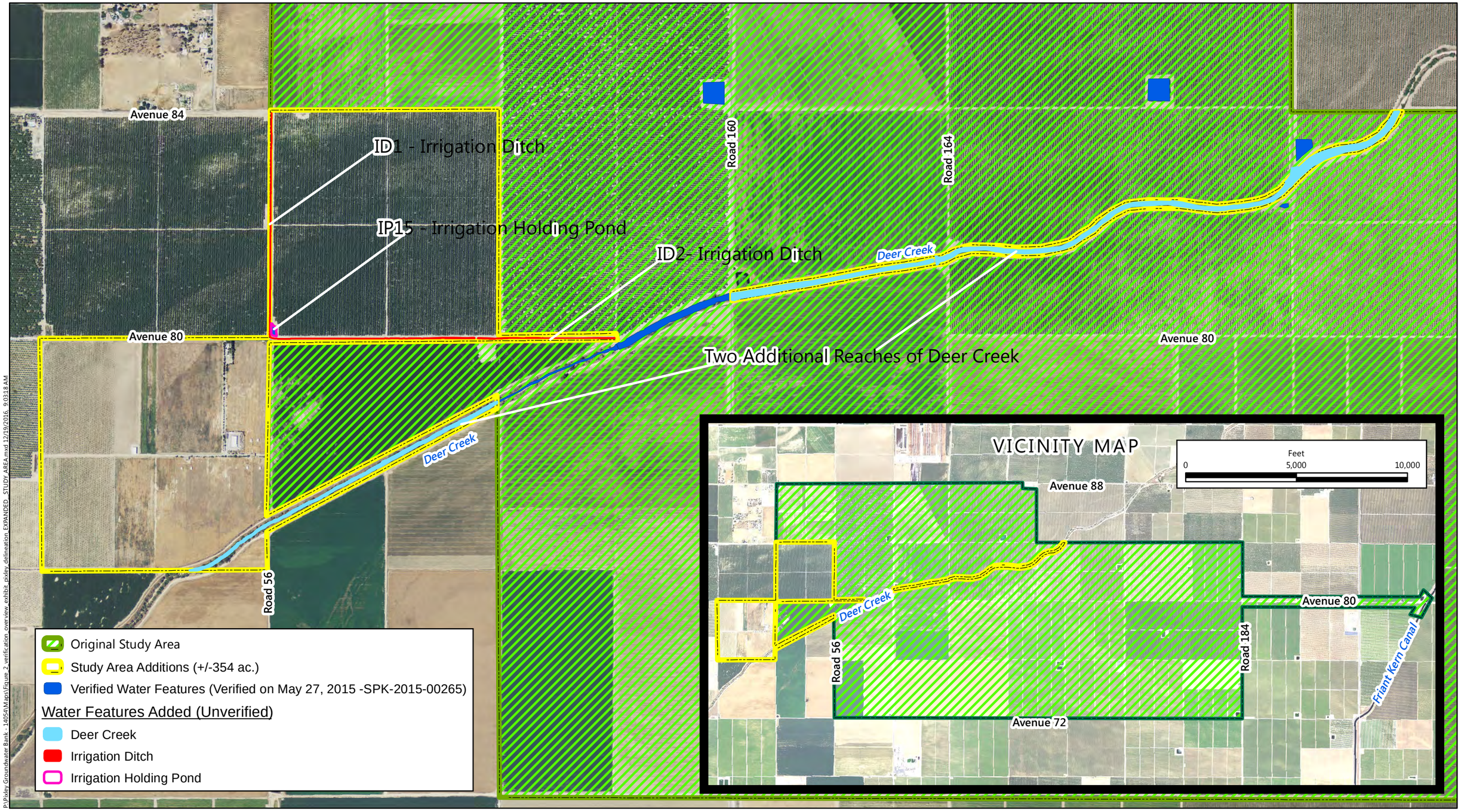

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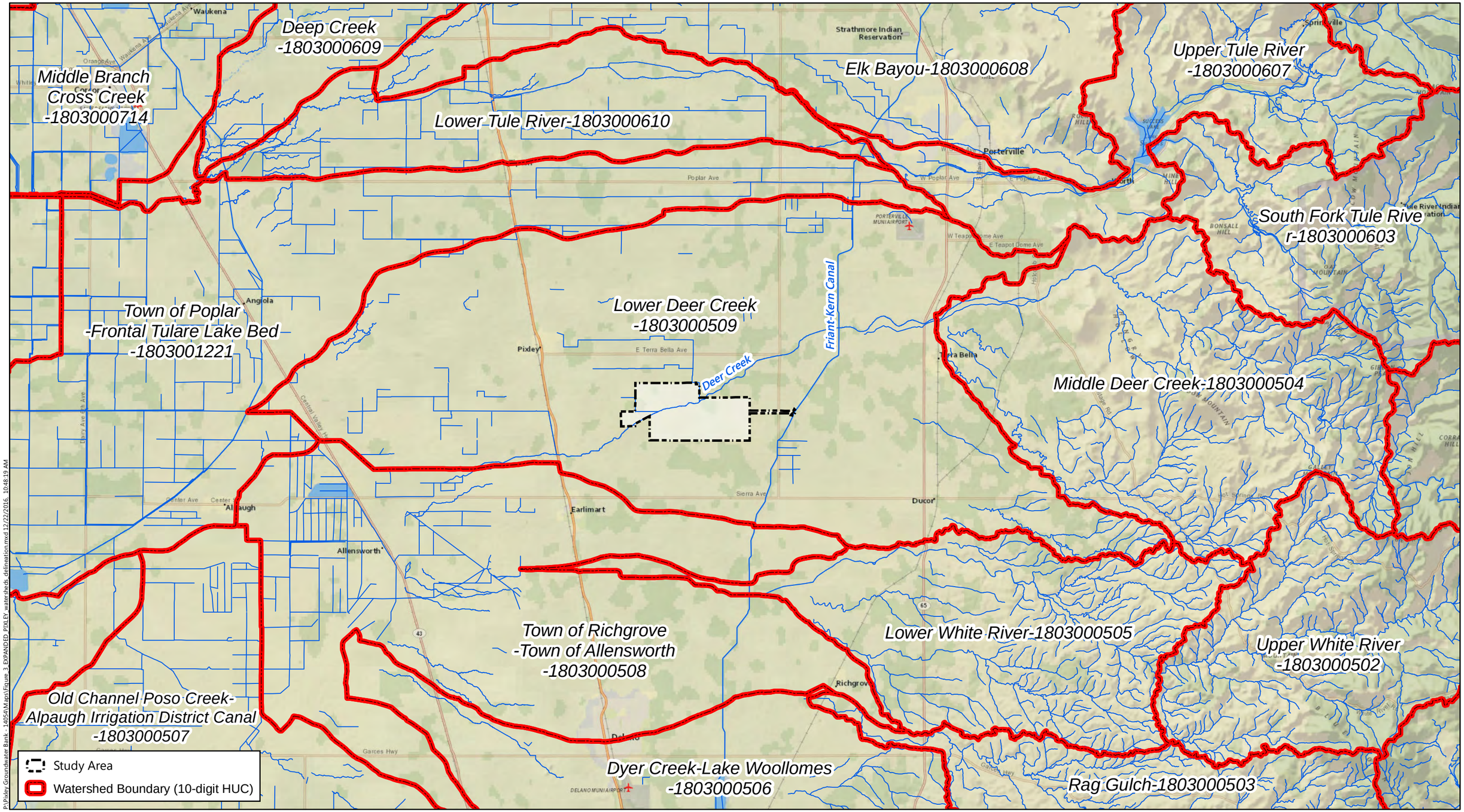
Aerial Source: *USDA, National Agriculture Imagery Program,* June 25, 2012

Figure 2
Verification Overview Exhibit
Draft Aquatic Resources Delineation

Revised Pixley Groundwater Bank
Tulare County, California

MADRONE ECOLOGICAL CONSULTING



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Source: *ESRI Maps*, 2016
Watershed Boundary Source: *NRCS, Watershed Boundary Data Set,* 2013

Figure 3
NRCS Watershed Boundary Exhibit
Draft Aquatic Resources Delineation

Revised Pixley Groundwater Bank
Tulare County, California

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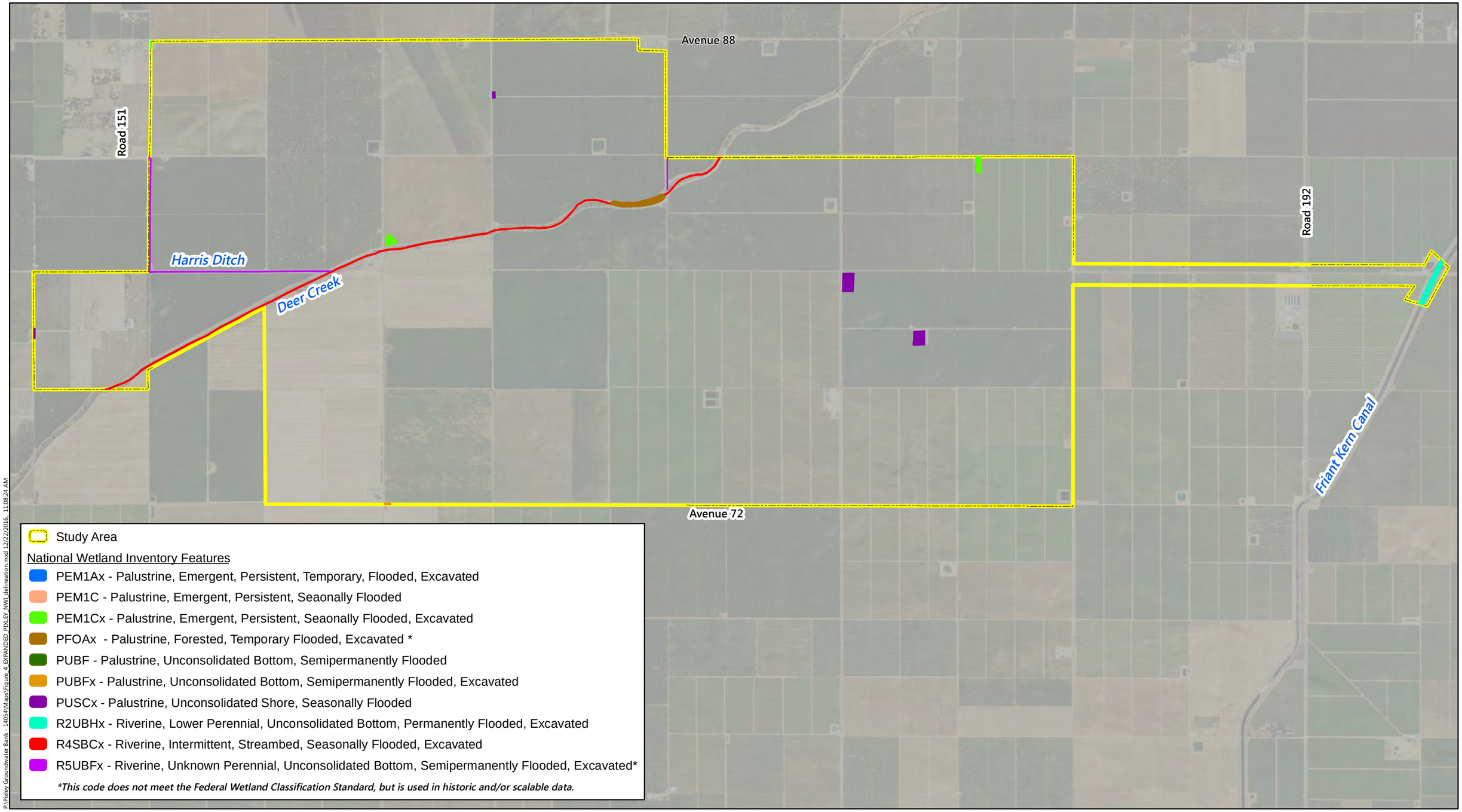

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Wetland Source: *National Wetland Inventory - Version 2,* September 6, 2016
Aerial Source: *USDA, National Agriculture Imagery Program,* June 25, 2012

Figure 4
National Wetland Inventory
Draft Aquatic Resources Delineation

Revised Pixley Groundwater Bank
Tulare County, California

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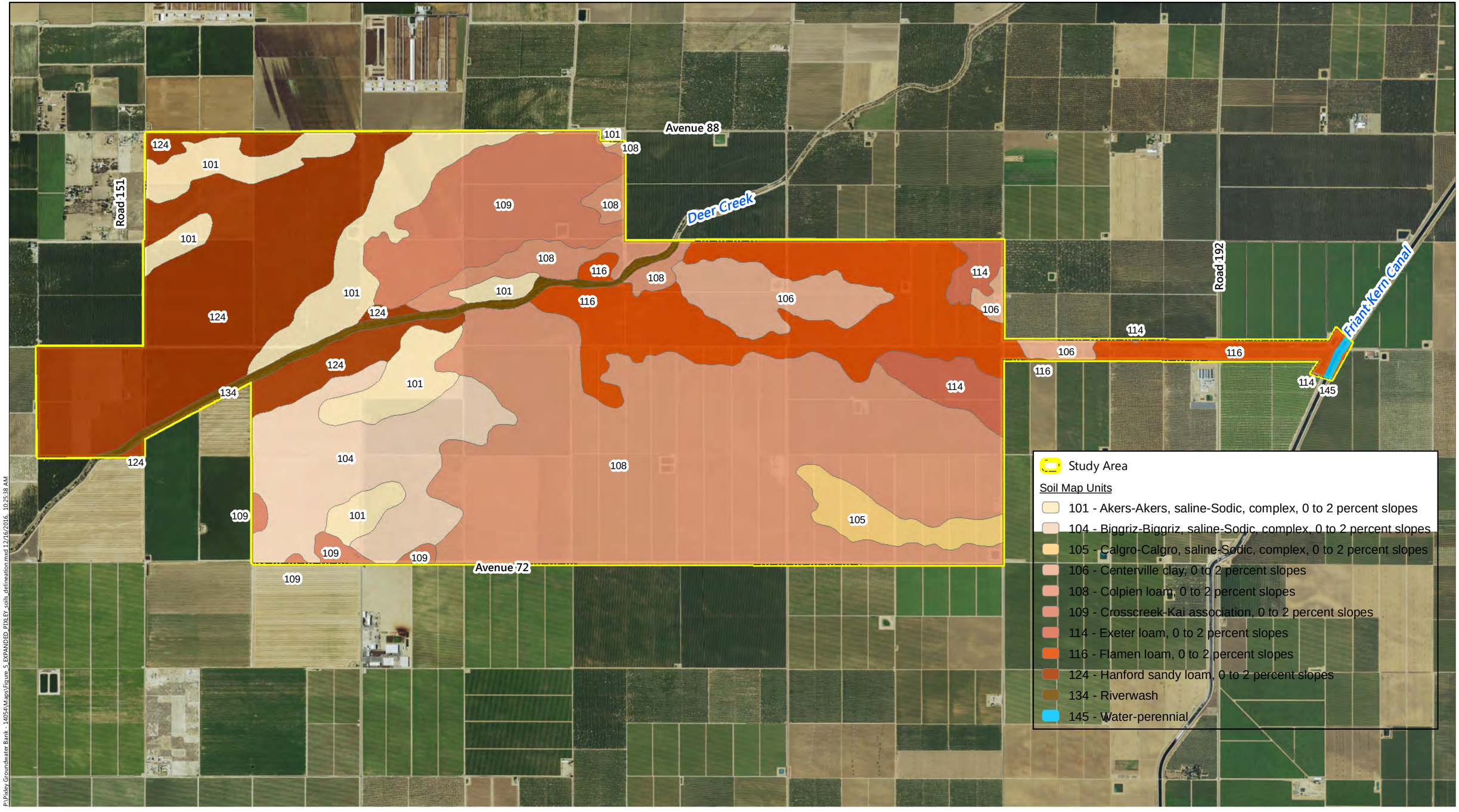

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Aerial Source: *USDA, National Agriculture Imagery Program,* June 18, 2014

Source: *USDA, Web Soil Survey, SSURGO Data for Soil Survey, Tulare County, California, Western Part*, September 30, 2015

Figure 5

NRCS Soils

Draft Aquatic Resources Delineation

Revised Pixley Groundwater Bank
Tulare County, California

MADRONE ECOLOGICAL CONSULTING

Attachments

Attachments

Attachment A. Original Delineation Map
Attachment B. Corps Verification Letter
Attachment C. Draft Aquatic Resources Delineation Map
Attachment D. Arid West Wetland Determination Data Forms
Attachment E. Plant List
Attachment F. Aquatic Resources Excel Spreadsheet
Attachment G. Photos

Attachment A

Original Delineation Map