LOCATION OF AREAS POTENTIALLY SUBJECT TO U.S. ARMY CORPS OF ENGINEERS JURISDICTION

F I N A L R E P O R T

WETLAND/U. S. WATERS DELINEATION

FOR THE

STANFORD UNIVERSITY CENTRAL CAMPUS

SANTA CLARA COUNTY, CALIFORNIA

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SUMMARY

Results of the reconnaissance-level survey identified the presence of potentially regulated jurisdictional wetlands/waters within the Stanford University Central Campus survey boundaries, located between Junipero Serra Boulevard on the south, Sand Hill Road on the west, El Camino Real on the north, and Stanford Avenue on the east, on the Stanford University Campus, Santa Clara County, California.

The determination of potential jurisdictional wetlands/waters regulated by the US Army Corps of Engineers (Corps) described in this report included the review of a topographical map prepared by Stanford University and onsite characteristics observed in the field. Based on the results of field surveys conducted by Olberding Environmental Inc. from July 24 through December 6, 2001, wetland/water features were identified within the Stanford University Central Campus survey boundary. This formal jurisdictional delineation report was prepared with the assistance of Corps Regulatory personnel from the San Francisco District office. On November 14, the Corps performed an initial evaluation of potential wetlands/waters on campus, distinguishing features regulated by the Corps from those not regulated or exempt. This document has incorporated the results of that evaluation with recent field information obtained during focused surveys conducted in the winter of 2001.

Areas identified as potential wetlands were dominated by vegetation commonly associated with wetland plant communities and contained soils associated with saturated or hydric conditions. In addition to wetland vegetation and soils indicators, hydrological indicators were readily visible in the form of flowing and/or ponded water and oxidized rhizospheres in the upper 12 inches of the soil profile. Identification of potential Awaters@ included the presence of a defined bed and bank and the absence of wetland vegetation in the channel. For the purpose of this delineation all areas within a ditch or channel and located below the plain of ordinary high water (OHW) are described as waters.

Results of this survey determined that **42.49** acres of potential jurisdictional wetlands/waters occur within the study boundary of the Stanford University Central Campus.

1.0 INTRODUCTION

1.1 Scope

At the request of Stanford University, Olberding Environmental, Inc. conducted an investigation as to the presence and geographic extent of possible wetland areas and/or other types of waters of the United States potentially subject to Corps of Engineers regulation under the Clean Water Act within the project boundary of the Stanford University Campus. The placement of fill material in areas identified as jurisdictional waters is subject to the permit requirements of the Corps, under Section 404 of the Clean Water Act (1972).

1.2 Location

This report represents the findings of a jurisdictional delineation conducted on the Stanford University Central Campus (Central Campus). The Central Campus wetland analysis study area consisted of the primary campus bounded by Junipero Serra Boulevard on the south, Sand Hill Road on the west, El Camino Real on the north, and Stanford Avenue on the east. The survey area includes all the land on the campus that is undeveloped and includes grasslands and drainages. Attachment 1, Figure 1 depicts the regional location of Stanford University in Santa Clara County. Attachment 1, Figure 2 consists of a vicinity map of the Central Campus. Attachment 1, Figure 3 identifies the location of the property on the USGS 7.5 Quadrangle Map for Palo Alto.

1.3 Site Description

Stanford University Central Campus site contains intensive residential, commercial and educational development, recreational space, open space, roadways, walking paths, constructed drainage ditches and creek corridors. Many areas have been graded to convey storm water runoff from Stanford University and the surrounding residential community. Storm drain ditches were observed to exhibit straight to meandering channels with three to10 foot wide bottoms. The banks of the ditches are graded between 2:1 to 3:1 slope and the bottom may be between two to four feet below the surrounding topography. Banks adjacent to the channels may be found barren, covered by upland grass species, covered by wetland vegetation, or supporting riparian vegetation. The primary source of hydrology within the Central Campus is storm water and irrigation runoff. Some of the channel bottoms support sparse to moderate amounts of wetland vegetation. Adjacent land uses to the drainage channels includes campus buildings, parking lots, bike paths, landscape, and roadways. Some of the drainage ditches cross beneath roadways and are culverted at these locations.

The undeveloped lands located on the north and south sides of Palm Avenue consist of bare ground and grassland habitat in association with oaks (*Quercus* sp.), eucalyptus (*Eucalyptus* sp.) and miscellaneous ornamental trees. The ground was observed to vary in elevation and support depressions, that in some locations contained wetland characteristics.

2.0 METHODOLOGY

2.1 Overview

The determination of wetlands at the Central Campus involved four phases of evaluation that included: a topographic mapping exercise, preliminary site investigation, Corps consultation in the field, and data gathering associated with the preparation of this report.

A preliminary jurisdictional analysis was conducted in the office using a color topographical map of the project site dated July 24, 2001. This map contained information specific to campus drainage including subsurface drains, inlets to the subsurface drains and above ground drainage features. Additionally, the Palo Alto 7.5-minute quadrangle map representing the project site and the Soils Survey of Santa Clara County were reviewed for additional drainage or topographic information. All areas within the defined project boundary were reviewed for topographical low points on the available maps. The topographical low points were marked on the maps so the potential depressions could be referenced in the field when conducting ground truth surveys. This process allowed a focused field survey of the Central Campus where known topographic low points occurred that could potentially contain wetlands.

An initial on-site investigation of the topographic depressions that were mapped in the office was conducted on August 17, 2001. Wetland biologists Jeff Olberding and Julia Curlette visually inspected the topographic low points and determined if these areas could potentially support wetlands. It was determined that many of the depressions represented on the topographic maps did not support wetlands and the number of potential wetlands features were narrower than anticipated by the previous mapping exercise. Those areas that did not support potential wetlands were eliminated from future surveys. Thus, a refined number of depressional features were determined to potentially support wetlands and would require data points to determine the official status under Corps regulations.

A second field survey was conducted with assistance from Mr. Clyde Davis of the Corps' Regulatory Branch on November 14, 2001. The purpose of this Corps consultation and reconnaissance survey was to evaluate potential wetlands/waters on campus, distinguishing features regulated by the Corps from those not regulated or exempt.

The third and final survey conducted by Olberding Environmental, Inc. was performed on December 3 - 6, 2001. The areas identified as potential wetlands/waters during the previous site investigation were delineated using Corps= methodology. The existing land forms as well as associated vegetation, hydrology, and soil conditions were recorded at the potential wetland/waters at the Central Campus site. Potential jurisdictional areas were identified on field maps and compared to available aerial photography and topographical maps which included:

< U. S. *Geological Survey Quadrangle Map for Palo Alto, CA*;

< Soils information in the *Soil Survey of Santa Clara County, California* (1968, SCS);

< Historic Topographical Map, provided by Stanford University, dated March 1951.

The extent or boundary of wetland habitats was further defined using the 1987 "Corps Wetlands Delineation Manual" (1987 Manual)[1] routine on-site wetland determination protocol currently in use by the Corps, published Corps of Engineers regulatory guidance letters, and San Francisco District regulatory policy.

[1] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual." U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. 100 pp. plus appendices.

2.2 Corps Definition of Wetlands/Waters

Pursuant to the 1987 Manual, key criteria for determining the presence of wetlands are:

a) the presence of inundated or saturated soil conditions resulting from permanent or periodic inundation by ground water or surface water; and

b) a prevalence of vegetation typically adapted for life in saturated soil conditions (hydrophytic vegetation).

Explicit in the definition is the consideration of three environmental parameters: hydrology, soil, and vegetation. Positive wetland indicators of all three parameters are normally present in wetlands. The assessment of all three parameters enhances the technical accuracy, consistency, and credibility of wetland determination and is required per the1987 Corps Manual.

Aquatic habitats other than wetlands that are considered to be waters of the United States were also investigated as part of this study. Their landward extent was defined following the definitions provided in the Corps of Engineers regulations [33 CFR '328.4(a)(b) and (c)]:

(a) *Territorial Seas*. The limit of jurisdiction in the territorial seas is measured from the baseline in a seaward direction a distance of three nautical miles.

(b) *Tidal Waters of the United States*. The landward limits of jurisdiction in tidal waters:

(1) Extends to the high tide line, or

(2) When adjacent non-tidal waters of the United States are present, the jurisdiction extends to the limits identified in (c) below.

(c) *Non-Tidal Waters of the United States*. The limits of jurisdiction in non-tidal waters:

(1) In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark (OHW), or

(2) When adjacent wetlands are present, the jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands.

(3) When the water of the United States consists only of wetlands, the jurisdiction extends to the limit of the wetlands.

Tributary waters and their impoundments are under the regulatory jurisdiction of the Corps and extend to the ordinary high water (OHW) mark on opposing channel banks. Tributary waters include rivers, streams and seasonal drainage channels. The OHW mark is typically indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in character of soil, destruction of vegetation, exposed roots on the bank, deposition of leaf litter and other debris materials or lower limit of moss growth on channel banks.

Areas meeting the regulatory definition of "Waters of the United States" (jurisdictional waters) are subject to the jurisdiction of the Corps. The Corps under provisions of Section 404 of the Clean Water Act (1972), has jurisdiction over "Waters of the U.S." These waters may include all waters used or potentially used for interstate commerce. This includes all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the
U. S.,@ tributaries of waters otherwise defined as "Waters of the U. S.,@ the territorial seas, and wetlands adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3).

Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328).

Stanford University Central Campus was also reviewed to assess the potential for qualifying for Section 10 jurisdiction as a navigable water of the United States. Navigable waters of the U.S. are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR 329, Section 329.4). Section 10 jurisdiction extends to the lateral extent of the ordinary high water marks on opposing channel banks. Ultimately, the determination of navigability is made by the division engineer (33 CFR, Part 329, Section 329.14).

2.3 Data Collection for Potential Jurisdictional Wetlands/Waters

Data was collected for the determination of wetlands on August 17, November 14, and December 3-6, 2001, as outlined in the methods section. Specific data point information on vegetation, soils and hydrology was gathered on December 3 - 6, 2001 by Olberding Environmental. The purpose of this jurisdictional investigation was to identify and delineate potential jurisdictional waters, including wetlands. Surveys were conducted within and adjacent to the specified survey boundaries. The Central Campus area was examined for topographic features, drainages, alterations to site hydrology and areas of recent disturbance in the refined survey area.

A total of twenty-two (22) sample points were established within the project boundaries of the Central Campus area. This included eleven (11) transect lines consisting of both an upland and wetland representative sample point. Attachment 1, Figure 5 includes locations of the sample points. Sample points were not taken at every location reviewed due to the similarity between encountered jurisdictional features. Furthermore, sample points were not taken in areas that did not meet any of the three wetland parameters at the time of the December survey.

Data was collected on vegetation, soils, and hydrology using wetland determination protocol as described in the 1987 Manual. Both upland and wetland data were collected to distinguish wetland boundaries from the adjacent upland. On each transect, a sample point was sited in an area exhibiting wetland characteristics while a second sample point was sited slightly up slope of the first point in an upland position that defined the transitional break between wetland and upland.

Data including the approximate location and extent of jurisdictional wetlands/waters, were transferred onto 1"= 40' scale topographical map of the Central Campus in the field. A combination of reference maps were used for the final determination of the wetland boundaries. Additionally, field measurements were taken to assist in determining the size of drainage swales, and other waters meeting the jurisdictional criteria. The final border determination for seasonal wetlands and isolated seasonal wetlands was achieved by using the topographical maps in coordination with the field measurements. Stanford University assisted

in the digitization of the delineated areas on topographic maps. The total acreage for each wetland feature was determined by Auto-Cad mapping software. Information obtained at the sample point locations was recorded on modified Corps data sheets included in this report (Attachment 3). Photographs were also taken for selected sample points that represented the project area. (See Attachment 4).

3.0 TECHNICAL FINDINGS

The following discussion reports the hydrology, soil and vegetation conditions observed at the Central Campus site during the course of the investigation. A general observation of the Central Campus site found positive evidence of wetland conditions.

3.1 Hydrology Conditions

The 1987 Manual states that the diagnostic environmental characteristics indicative of wetland hydrology conditions are: "the area is inundated either permanently or periodically at mean water depths less than or equal to 6.6 feet, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation" (1987 Manual, p. 14). According to the Manual, indicators of hydrologic conditions that occur in wetlands may include:

Table 1
Hydrology Indicators

Primary Indicators	Secondary Indicators
Watermarks	Oxidized Rhizospheres Associated with Living Roots
Drift Lines	Water-Stained Leaves
Water-Borne Sediment Deposits	FAC-Neutral Test
Drainage Patterns Within Wetlands (With Caution)	Local Soil Survey Data

Department of the Army, U.S. Army Corps of Engineers, Washington, D.C., *Memorandum - Subject: Clarification and Interpretation of the 1987 Manual*, dated March 8, 1992 provides further clarification that:

> "Areas which are seasonally inundated and/or saturated to the surface for a consecutive number of days for more than 12.5 percent of the growing season are wetlands, provided the soil and vegetation parameters are met. Areas wet between 5 percent and 12.5 percent of the growing season in most years (see Table 5, page 36 of the 1987 Manual) may or may not be wetlands. Areas saturated to the surface for less than 5 percent of the growing season are non-wetlands. Wetland hydrology exists if field indicators are present as described herein and in the enclosed data sheet."

Each of the twenty-two (22) sample points were examined for positive field indicators of wetland hydrology. During the December 2001survey, primary indicators were not commonly observed in the

Central Campus area. At several potential wetland locations, primary indicators were observed such as inundation, saturation, watermarks, sediment deposits and waterlines. Secondary indicators of hydrology were also observed at the potential wetlands. Secondary indicators included the presence of oxidized rhizospheres in the upper 12 inches of the soil profile.

3.2 Soils Conditions

The Corps' 1987 Manual states that the diagnostic environmental characteristics indicative of wetland soil conditions are met where "soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions" (1987 Manual, p. 14). According to the Manual, indicators of soils developed under reducing conditions may include:

1. Organic soils (Histosols);
2. Histic epipedons;
3. Sulfidic material;
4. Aquic or peraquic moisture regime;
5. Reducing soil conditions;
6. Soil colors (chroma of 2 or less);
7. Soil appearing on hydric soils list; and
8. Iron and manganese concretions.

According to the most recent version of the National Technical Committee for Hydric Soils, the criteria to be used by the Corps for what constitutes current hydric soil/wetland soil conditions for the soils found at the site are:

1. Minimum Saturation at 12" to the surface: 14 consecutive days during the growing season.

2. Minimum Inundation (Flooded or Ponded): Soils that are frequently "ponded" for long duration ($\exists$ 15 to 30 consecutive days) or very long duration (> 30 consecutive days) during the growing season, or soils that are frequently "flooded" for long duration or very long duration during the growing season.

Where possible, the top 20 inches of the soil profile was examined for hydric characteristics. Such characteristics include the presence of organic soils (Histisols), histic epipedons, aquic or peraquic moisture regime, presence of soil on hydric soil list, mottling indicated by the presence of gleyed or bright spots of color within the soil horizons observed. Mottling of soils usually indicates poor aeration and lack of good drainage. A Munsell soil color charts (Kollmorgen Instr. Corp. 1990) were reviewed to obtain the soil color matrix for each soil sample. The last digit of the Munsell Soil Notation refers to the chroma of the sample. This notation consists of numbers beginning with 0 for neutral grays and increasing at equal intervals to a maximum of about 20. Chroma values of the soil matrix which are one (1) or less, or of two (2) or less when mottling is present, are typical of soils which have developed under anaerobic conditions.

In sandy soils, such as alluvial deposits in the bottom of drainage channels, hydric soil indicators include high organic matter content in the surface horizon and streaking of subsurface horizons by organic matter. All soil colors indicated in this report were taken under clear, sunny skies using moistened soil samples.

Soil mapping of Santa Clara County by the Natural Resources Conservation Service (NRCS) identifies eleven primary soil types within the Stanford University Central Campus site. The NRCS provided general soils information for the project area (see Attachment 5). The soils mapped included the following types:

Cropley clay, 0 to 2 percent slopes.

Cropley clay soils consist of well drained, fine textured, soils, underlain by mixed, mostly sedimentary alluvium. This soil series is found on nearly level alluvial fans and average approximately one percent slope. The surface soils in the Cropley series are very dark grey, neutral clay or clay loam. The soils exhibit good drainage, slow permeability, and very slow runoff. The soil colors observed at the surface are between 10YR 3/1 and 10YR 2/1.There is approximately 10 percent inclusion of the Clearlake soil series within the mapped Cropley associations. The Clearlake soils are found in depressions and are identified locally as hydric.

Gaviota-Los Gatos Complex, 15 to 30 percent slopes.

Gaviota-Los Gatos soils are intermixed and not feasible to map separately. They exhibit good drainage, moderately rapid to moderately slow permeability, and medium to rapid runoff. This soil complex occupies the ridges and slopes on moderately steep uplands under grass and woodland cover. The Gaviota soils are pale brown with colors between 10YR 6/3 to 10YR 3/3, while the Los Gatos soils are brown with colors of 7.5YR 5/4.

Pleasanton loam, 0 to 2 percent slopes.

Pleasanton loams are well drained soils, having moderately fine textured sub soils, and are underlain by old gravely sedimentary alluvium. The soils are formed on nearly level to moderately steep fans and terraces. The soils exhibit good drainage, moderately slow permeability, and very slow runoff. The soil colors commonly observed for this series are greyish brown 10YR 5/2 and very dark greyish brown 10YR 3/2.

Pleasanton gravelly loam, 0 to 2 percent slopes.

The Pleasanton gravelly loams are well drained soils, having moderately fine textured sub soils, undelain by old gravely sedimentary alluvium. The soils are formed on nearly level to moderately steep fans and terraces. The soils exhibit good drainage, moderately slow permeability, and very slow runoff. The soil colors commonly observed for this series are greyish brown 10YR 5/2 and very dark greyish brown 10YR 3/2.

Pleasanton gravelly loam, 2 to 9 percent slopes.

The Pleasanton gravelly loams are well drained soils, having moderately fine textured sub soils, underlain by old gravely sedimentary alluvium. The soils are formed on nearly level to moderately steep fans and terraces. The soils exhibit good drainage, moderately slow permeability, and slow to medium runoff. The soil colors commonly observed for this series are greyish brown 10YR 5/2 and very dark greyish brown 10YR 3/2.

Rincon clay loam, 2 to 9 percent slopes.

The Rincon clay loam soils consist of well drained soils having fine textured subsoils, and are underlain by old sedimentary alluvium. They are formed on older, nearly level to moderately sloping alluvial fans. The soils exhibit good drainage, slow permeability, and slow to medium runoff. The soils colors are represented by dark grey 10YR 4/1 clay loams and very dark grey 10YR 3/1 clay loams.
Saratoga-Positas loams, 9 to 15 percent slopes. (Saratoga loam)

The Saratoga loam consists of well drained soils having moderately fine textures. The group is underlain by old gravelly mixed alluvium. This series consists of intermixed soils that occur on gently to moderately

sloping terraces. This complex exhibits good drainage and moderately slow to very slow permeability. The Saratoga soils are also characterized by intermixing with other soil series. The surface soils are represented by brown 7.5YR 5/2 loams to dark brown 7.5YR 3/2.

San Ysidro loam 0 to 2 percent slopes.

San Ysidro loam series consist of moderately well drained soils, that have a claypan subsoil. The underlying materials consists of old alluvium. These soils are found on nearly level to strongly sloping fans and terraces. The soils exhibit moderately well drainage, very slow permeability, and ponded runoff characteristics. The San Ysidro soils also are characterized by light brownish gray loams that are 10YR 6/2 to dark grayish brown 10YR 4/2.

San Ysidro loam 2 to 9 percent slopes.

San Ysidro loam series consist of moderately well drained soils and have a claypan subsoil. The underlying materials consists of old alluvium. These soils are found on nearly level to strongly sloping fans and terraces. The soils exhibit moderately well drainage, slow permeability, and slow to medium runoff characteristics. The San Ysidro soils also are characterized by light brownish gray loams that are 10YR 6/2 to dark grayish brown 10YR 4/2.

Yolo silt clay loam, 0 to 2 percent slopes.

Yolo silt clay loam soils consist of well drained, medium and moderately fine textured soils, and are underlain by sedimentary alluvium. They are formed on nearly level to moderately sloping alluvial plains and fans. The soils also exhibit good drainage, moderately slow permeability, and very slow runoff. The surface soils are grayish brown 10YR 5/2 to very dark grayish brown 10YR 3/2.

Zamora clay loam, 2 to 9 percent slopes.

The Zamora clay loam soils are well drained soils having moderately fine textured subsoils, and are underlain by alluvium of mixed origin. They are formed on nearly level to moderately sloping alluvial fans. The soils exhibit good drainage, moderately slow permeability, and slow to medium runoff. The surface soils are observed to exhibit dark grayish brown colors of 10YR 4/2 to very dark grayish brown of 10YR 3/2.

Review of the local and national listing of hydric soils did not identify the soils listed above as being hydric soils. It is important to note, however, that although a soil for a particular site may be classified as a hydric soil by the SCS listing, it can nevertheless fail to be hydric and presently exhibit wetland soil characteristics if it has become effectively drained (Corps 1987). The converse
is also possible when a soil is not listed as hydric, but site drainage conditions bring about wetland soil characteristics.

A total of twenty-two (22) soil pits were dug by shovel to a maximum depth of twenty (20) inches at locations representative of various surface hydrology conditions within the study area (Attachment No. 1, Figure 5). The soils found at the twenty-two (22) sites were classified as having or not having indicators of wetland soil conditions using the methodology in the Corps'1987 Manual.

Hydric soils were recorded as occurring at several sample points located in topographic depressions within the Central Campus area. The soil material at these sample points had Munsell soil colors that most closely resembled lower chroma soil colors such as 10YR 3/1 and 10YR 3/2. Mottle colors observed in

association with these low chomas resembled 10 YR 4/4 and 10 YR 4/6. When present, mottles occurred throughout the entire soil profile with the mottle abundance common and the contrast prominent in most sample points. The observation of a dark chroma at the wetland data point in contrast to a lighter chroma in the upland sample point was used to determine the wetland upland boundary.

Mottling was observed at several sample point locations and could be used to distinguish the upland soil from the wetland soils where soil chroma of the uplands and the wetlands were similar. It could be determined that a sample point had hydric soil when mottles were observed in the wetland position and absent from the comparable upland soil pit. The presence of mottling is an indication of innundation for a period long enough to establish hydric conditions in the soils.

The upland areas typically exhibited lighter soil colors such as 10 YR 3/3 and 10 YR 3/2 (without mottles). In areas where a dark chroma soil without mottles was observed, such as 10 YR 3/1, and the corresponding upland area demonstrated a soil color such as 10 YR 3/3, it was determined that the soil was hydric.

3.3 Vegetation Conditions

The 1987 Manual states that the diagnostic environmental characteristics indicating wetland vegetation conditions are met when the prevalent vegetation (more than 50%) consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions described above. In addition, hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions. Indicators of vegetation associated with wetlands include:

1. more than 50% of the dominant species are rated as Obligate ("OBL"), Facultative Wet ("FACW") or Facultative ("FAC") on lists of plant species that occur in wetlands;[2]

2. visual observations of plant species growing in areas of prolonged inundation or soil saturation; and

3. reports in the technical literature indicating the prevalent vegetation is commonly found in saturated soils" (1987 Manual).

[2] Reed, P.B. 1988. National List of Plant Species That Occur in Wetlands: California (Region 0). Biological Report 88(26.10) May 1988. National Ecology Research Center, National Wetlands Inventory, U.S. Fish and Wildlife Service, St. Petersburg, FL.

Table 2
Wetland Plant Indicator Status Categories

Indicator Category	Symbol	Frequency of Occurrence
OBLIGATE	OBL	greater than 99%
FACULTATIVE WETLAND	FACW	67 - 99%
FACULTATIVE	FAC	34 - 66%
FACULTATIVE UPLAND	FACU	1 - 33%
UPLAND	UPL	less than 1%
* Based upon information contained in Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987).		

It is important to note that, although there is a high probability that one would expect to find obligate, facultative wet and facultative plants growing in wetlands, there is also a significant possibility that the obligate, facultative wet, and facultative species will occur in areas that do not exhibit wetland soil and/or wetland hydrology conditions.

The dominant plant taxa observed in the potential jurisdictional wetland sampling locations were curly dock (*Rumex crispus*-FACW-), Italian rye grass (*Lolium multiflorum*-FAC), bristly ox-tongue (*Picris echioides*-FAC) and Mediterranean barley (*Hordeum marinum*-FAC). In areas lacking positive hydrologic indicators the dominant vegetation included red-stemmed filaree (*Erodium cicutarium*-UPL), dove geranium (*Geranium molle*-UPL), soft chess (*Bromus hordeaceous*), and wild oat (*Avena fatua*-UPL). Areas dominated by wetland vegetation included sample point locations positioned in the bottom of the topographical depressions in isolated seasonal wetlands (See Attachment No. 3). Attachment 2 provides information concerning the plant wetland indicator status for those species found at the sample areas. Plants observed at each of the sample sites were identified to species level using standard floras appropriate for California, wherever necessary.

3.3.1 *Annual Grassland*

The annual grassland habitat is found on approximately 50 percent of the Central Campus site. The vegetation in the annual grassland habitat consists of species typical to highly disturbed habitats and are overall non-native weed species. The dominant grassland species consisted of wild oat (*Avena fatua*), rip-gut brome (*Bromus diandrus*), Mediterranean barley (*Hordeum murinum* var. *gussoneanum*) and annual rye grass (*Lolium multiflorum*). The forb species present consisted of annual weeds such as cut-leaf geranium (*Geranium dissectum*), prickly lettuce (*Lactuca serriola*), field bind weed (*Convolvulus arvensis*). The plants form an intermittent cover over the ground and vary in height between a few inches and one- two feet tall. Bare land without vegetation and landscape plants often borders the annual grassland habitat.

3.4 Wetland/Drainage Feature Classification

For the purpose of this delineation report, the various wetland and drainage features were classified into five categories to further define the specific potential wetland characteristics exhibited in the field. The

following categories are described in detail below:

< Seasonal Wetland
< Isolated Seasonal Wetland
< Constructed Drainage Ditch
< Constructed Drainage Channel
< Active Creek Channel

3.4.1 Seasonal Wetlands

Seasonal wetlands are those wetland features that exhibit wetland vegetation, hydrology and soils and are adjacent or connected to a drainage ditch, roadside ditch or drainage channel. The seasonal wetland may consist of a shallow depression that holds water for a long enough period of time to establish wetland characteristics. The shape of the seasonal wetland may vary dramatically and include linear, oval, or variously bordered polygon features. The seasonal wetland is distinct from isolated seasonal wetland because it has connectivity with another wetland or drainage feature. Lake Lagunita, Wetland #10, falls into the category of a seasonal wetland as it is ephemeral in nature, supports a dominance of wetland plants and is connected to a perennial creek. Lake Lagunita is an artificially operated feature, which Stanford fills by diverting water from San Francisquito Creek in years of sufficient rainfall, and/or with pumped groundwater in the late winter/early spring, and drains in late June. The Museum Way mitigation area, Verified Wetland #1, is also classified as a seasonal wetland based on previously conduced wetland delineation work.

3.4.2 Isolated Seasonal Wetland

The isolated seasonal wetland is a feature that demonstrates wetland vegetation, hydrology and soil characteristics, but is not adjacent to or connected to any other wetland or drainage feature such as a drainage ditch, channel, or creek. The isolated seasonal wetland area has no outlet into or out of it=s border. As described above for the seasonal wetland, the isolated seasonal wetland may consist of a shallow depression that holds water for a long enough period of time to establish wetland characteristics. The shape of the isolated seasonal wetland may also vary dramatically and include linear, oval, or variously bordered polygon features. There are ten isolated seasonal wetland features in the Central Campus area and consist of Wetlands #1 - #9 and #11.

3.4.3 Constructed Drainage Ditch

Drainage ditches on the Central Campus consist of small constructed features that convey storm water from the broad surface areas within the University to the larger engineered drainage system. The ditches average between 1 to 4 feet wide and are no deeper than 2 feet. The ditch areas may or may not be vegetated with wetland species. These ditches can follow roadways and are also found crossing open space areas in the northern portion of the Central Campus. The drainage ditches generally empty to larger constructed drainage channels, or underground to the storm drain conveyance system. There are nine drainage ditches located within the Central Campus area and consist of Drainage Ditch #3 through #11.

3.4.4 Constructed Drainage Channel

Drainage channels are constructed features that are characterized by deeply incised channels that often support riparian habitat or other forms of aquatic vegetation. The vegetation within the drainage channel may occur along the banks and consist of native and non-native tree and herb species. The bed within the

drainage channel averages 2 to 4 feet wide and the banks are between 3 to 4 feet deep. The drainage channels generally empty into large underground culvert pipe structures that convey water downstream to tributaries such as San Francisquito and Matadero Creek. There are six drainage channels located within the Central Campus area and consist of Drainage Channels #1, #2, #12, #13, #17 and #18.

3.4.5 Active Creek Channel (Natural Drainage)

Natural drainages are distinguished by their non-linear channels and are identifiable as historic drainage channels and are mapped by the USGS on quadrangle maps. The natural drainages are defined by an incised bed and bank, a meandering alignment, and an active channel. San Francisquito Creek is a natural drainage channel that supports native riparian and channel vegetation. Additionally, drainages #14, #15, and #16 are extensions of natural channels.

The following two tables summarize the drainage or wetland feature by number and provides an average width, linear foot measurement, square foot, acreage and vegetation type where applicable.

Table 3
Stanford University Central Campus Drainage Features

Drainage Feature	Average Width in Feet	Linear Feet	Square Feet	Acres	Vegetation
1	7	1613.45	11294	0.259	Riparian vegetation on banks of channel
2	8	2467.61	19741	0.453	Non-vegetated channel
3	15	273.33	4100	0.09	Non-vegetated channel
4	3	392.49	1177.5	0.03	Sparse herbaceous vegetation in channel
5	3	407.12	1221.4	0.03	Non-vegetated channel
6	2.5	334.87	837.18	0.02	Herbaceous vegetation in channel
7	7	540.70	3784.9	0.09	Riparian vegetation on banks of channel
8	2.5	420.77	1051.9	0.02	Non-vegetated channel
9	4	315.76	1263	0.03	Landscape trees on banks and herbaceous vegetation in channel
10	7	220.21	1541.5	0.04	Herbaceous vegetation in channel
11	4	170.49	681.96	0.02	Herbaceous vegetation in channel
12	4.5	2221.87	9998.4	0.23	Non-vegetated channel, riparian over story on banks

13	6.5	584.30	3798	0.09	Non-vegetated channel, riparian over story on banks
14	6	289.89	1739.3	0.04	Riparian and herbaceous vegetation in channel
15	8	3021.75	24174	0.555	Non-native herbaceous grasses and forbs in channel
16	5	2321.60	11608	0.266	Non-vegetated channel
17	3	1780.98	5342.9	0.123	Non-vegetated channel
18	8	2600.0	20,800	0.48	Herbaceous vegetation in channel
San Francisquito Creek	120	2100	262,566	6.025	Riparian and herbaceous vegetation in channel
TOTAL		**22,077.19**	**386,721**	**8.891**	

Table 4
Stanford University Central Campus - Seasonal and Isolated Wetlands

Potential Wetland Number	Potential Wetland Area in Square Feet	Acreage of Wetland
1	29440.56	0.676
2	2985.82	0.069
3	7155.38	0.164
4	77	0.002
5	2388.24	0.055
6	3948.41	0.091
7	1869.63	0.043
8	467.99	0.011
9	2104.98	0.048
10	1513642.03	34.748
11	17277.51	0.397
VW-1	37271.37	0.856
TOTAL	**1618628.92**	**37.159**

4.0 AREAS POTENTIALLY REGULATED BY THE CORPS OF ENGINEERS

4.1 Areas Potentially Subject to Regulation (Wetlands/Waters of the U.S.)

The EPA and Corps regulations define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (40 C.F.R. ' 230.3(t); 33 C.F.R. ' 328.3(b)).

The term "waters of the United States" are defined in 40 C.F.R. ' 328.3(a) as:

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(2) All interstate waters including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
   (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
   (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
   (iii) Which are used or could be used for industrial purpose by industries in interstate commerce.

(4) All impoundments of waters otherwise defined as waters of the United States under the definition;

(5) Tributaries of waters identified in paragraphs [1-4] of this section;

(6) The territorial sea; and

(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs [1-6] of this section (40 CFR ' 230.3(s); 33 CFR ' 328.3(a)).

Table 5
Wetland Determination by Sample Point

Data Point Identification No.	Criteria Met Yes/No For:			Wetland(Y)/Non-Wetland(N)
	Vegetation	Hydrology	Soils	
1-A	N	N	N	N
1-B	Y	Y	Y	Y
2-A	N	N	N	N
2-B	Y	N	Y	Y
3-A	N	N	N	N
3-B	Y	Y	N	Y
4-A	N	N	N	N
4-B	Y	N	Y	Y
5-A	N	N	N	N
5-B	Y	Y	Y	Y
6-A	Y	N	N	N
6-B	Y	Y	Y	Y
7-A	N	N	N	N
7-B	N	Y	Y	Y
8-A	N	N	N	N
8-B	Y	Y	Y	Y
9-A	N	N	N	N
9-B	Y	Y	Y	Y
10-A	N	N	Y	N
10-B	Y	Y	Y	Y
11-A	N	N	N	N
11-B	Y	Y	Y	Y

Source: Delineation Data Sheets, Olberding Environmental, Inc. 2001

4.1.1 *Potential Wetlands*

A total of **35.604** acres of jurisdictional wetlands were identified within the Stanford University Central Campus area. The majority of the wetland area is composed of the basin that forms Wetland 10 **(**Lake Lagunita**)** while a small portion of the total is represented by Verified Wetland #1, the mitigation wetland, along Museum Way. The wetland/nonwetland boundary for these areas was based on the change in the vegetative community, presence of hydrological indicators, and hydric soils. This information was compared with the locations of topographical depressions and the distribution of similar plant communities encountered. Attachment 1, Figure 5 indicate those areas potentially regulated by the Corps as jurisdictional wetlands.

4.1.2 *Potential Other Waters*

A total of **6.886** acres of jurisdictional waters were identified within the Stanford University Central Campus area. Overall, field characteristics of the ordinary high water OHW mark within the banks of Drainage Ditch #14, #15, #16 and San Francisquito Creek were readily apparent. The location of the OHW mark was obtained through general observation of indicators which included a natural line scoured on the bank and the absence of vegetation growth on the lower bank.

4.1.3 *Section 10 Navigable Waters*

Based on the description above, there are no other waters within the survey area that would meet the regulatory definition of navigable waters.

Table 6
Corps Jurisdictional Wetlands/Waters

Feature	Jurisdictional Criteria	Acreage
Lake Lagunita, Wetland #10	Seasonal wetland filled by natural drainage	34.748
Verified Wetland #1	Mitigation Site	0.856
Drainage Feature #14	Natural Drainage	0.04
Drainage Feature #15	Natural Drainage	0.555
Drainage Feature #16	Natural Drainage	0.266
San Francisquito Creek	Natural Drainage	6.025
Total		**42.49**

4.2 Areas Potentially Excluded From Regulation Under Section 404

4.2.1 *Discretionary Exemptions*[3],[4]

A number of exemptions from Section 404 Clean Water Act regulation exist for waters of the United States. These exemptions fall into two basic categories: (1) discretionary and (2) non-discretionary.

According to the preamble discussion of the Corps regulations in the November 13, 1986 *Federal Register*, certain areas which may meet the technical definition of a wetland are generally not regulated. Such areas include:

(a) Non-tidal drainage and irrigation ditches excavated on dryland.

(b) Artificially irrigated areas which would revert to upland if the irrigation ceased.

(c) Artificial lakes or ponds created by excavating and/or diking dryland to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.

(d) Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dryland to retain water for primarily aesthetic reasons.

(e) Water filled depressions created in dryland incidental to construction activity and pits excavated in dryland for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States (see 33 CFR 328.3(a)).

4.2.2 *Application of Discretionary Exemptions*

Based on the above discretionary exemptions, it appears that item (a) would apply to the drainage ditches #1-13, #17 and #18 in the Central Campus area. These are non-tidal drainage ditches constructed by excavation on dry land for the sole purpose of draining stormwater from the adjacent residential community and Stanford University Campus. This is evident based on a review of historic maps that include a topographical map from March of 1951, Stanford University records, and field investigations. Review of these documents clearly illustrate that natural drainages did not exist at these locations.

Drainage Ditches. The drainage ditches #1-13, #17 and #18 qualify for discretionary exemption based on

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[3] Fed. Reg. 41206, 41217 (Nov. 13, 1986). It should be noted that the Corps reserves the right on a case-by-case basis to determine that a particular waterbody within these categories of waters is a water of the United States. EPA also has the right, in those instances where it is the agency making the jurisdictional determination, to decide on a case-by-case basis if any of these waters are waters of the United States. However, the preamble discussion of EPA's regulations indicates that EPA, like the Corps, does not generally consider areas such as those described above to be waters of the United States. See 53 Fed. Reg. 20764, 20765 (June 6, 1988).

[4] No exemptions apply under Section 10 of the Rivers and Harbors Act.

the following factors:

1. Is non-tidal;
2. Was excavated on dry land;
3. Does not extend or reroute former flows that passed through a natural drainage course or basin (having a definable bed and bank) which existed at the time of the passage of the Clean Water Act.
4. Is used exclusively for drainage.

4.2.3 *Isolated Waters*

The U.S. Supreme Court has recently ruled that isolated, non-navigable wetlands and other waters are not subject to federal regulation even if they provide habitat for migratory birds and endangered species. Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers (hereinafter SWANCC) (No. 99-1178). The Corps has attempted to define isolated as Anot having hydrological connectivity to other jurisdictional features.@ Based on this determination, the Court has eliminated the need to secure fill permits from the Corps under Section 404 of the Clean Water Act when isolated wetlands are encountered. Nevertheless, the decision is by no means a blanket repeal of Section 404. Every landowner=s on-the-ground situation is unique, and must be analyzed individually. In the aftermath of this decision, each landowner must still carefully assess its situation to determine whether its property contains features which qualify as Awaters of the U.S.@ It is therefore recommended that a jurisdictional delineation be verified by the Corps rather than making an assumption regarding the potential regulation of a specific wetland/water feature.

The RWQCB has indicated that they intend to continue regulation of isolated wetlands under the Porter-Cologne Act (Water Code Section 13260). Their interpretation of the Court ruling indicates that the SWANCC decision has no bearing on the RWQCB=s regulation of Awaters of the state@ and as such they will continue to issue waste discharge requirements (WDRs) in lieu of a Section 401 Certification which is required when the Corps issues a Section 404 permit.

The wetland areas #1 - #9, and #11 were determined to be isolated waters and under this definition are not regulated by the Corps as wetlands. These areas are exempt from the Corps regulations but may be regulated by the RWQCB.

Table 7
Acreage of Wetlands Exempted From Corps Regulation

Landform	Exemption Criteria	Acres
Drainage Ditch #1	Constructed Drainage Channel	0.259
Drainage Ditch #2	Constructed Drainage Channel	0.453
Drainage Ditch #3	Constructed Drainage Ditch	0.09
Drainage Ditch #4	Constructed Drainage Ditch	0.03
Drainage Ditch #5	Constructed Drainage Ditch	0.03

Drainage Ditch #6	Constructed Drainage Ditch	0.02
Drainage Ditch #7	Constructed Drainage Ditch	0.09
Drainage Ditch #8	Constructed Drainage Ditch	0.02
Drainage Ditch #9	Constructed Drainage Ditch	0.03
Drainage Ditch #10	Constructed Drainage Ditch	0.04
Drainage Ditch #11	Constructed Drainage Ditch	0.02
Drainage Ditch #12	Constructed Drainage Channel	0.23
Drainage Ditch #13	Constructed Drainage Channel	0.09
Drainage Ditch #17	Constructed Drainage Channel	0.12
Drainage Ditch #18	Constructed Drainage Channel	0.48
Wetland #1	Isolated Seasonal Wetland, Settling Basin	0.676
Wetland #2	Isolated Seasonal Wetland	0.069
Wetland #3	Isolated Seasonal Wetland	0.164
Wetland #4	Isolated Seasonal Wetland	0.002
Wetland #5	Isolated Seasonal Wetland	0.055
Wetland #6	Isolated Seasonal Wetland	0.091
Wetland #7	Isolated Seasonal Wetland	0.043
Wetland #8	Isolated Seasonal Wetland	0.011
Wetland #9	Isolated Seasonal Wetland	0.048
Wetland #11	Isolated Seasonal Wetland	0.397
TOTAL		**3.558**

5.0 LITERATURE CITED

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ATTACHMENTS

ATTACHMENT 1 FIGURES

Figure 1 Regional Map

Figure 2 Vicinity Map

Figure 3 USGS 7.5 Minute Quadrangle Map

Figure 4 Historic Topographical Map

Figure 5 Jurisdictional Waters Map

ATTACHMENT 2 PLANT LIST

LIST OF PLANT SPECIES FOUND AT THE PROJECT SITE AND THEIR WETLAND INDICATOR STATUS [1]

SCIENTIFIC NAME [2]	COMMON NAME	NWI INDICATOR STATUS [3]
Amsinkia mensezii	Fiddle-neck	UPL
Avena fatua	Wild Oat	NI
Brassica nigra	Black Mustard	UPL
Bromus diandrus	Ripgut Grass	UPL
Bomus hordeaceous	Soft chess	FACU-
Centaurea solstitialis	Yellow Star-thistle	UPL
Cynodon dactylon	Bermuda Grass	FAC
Cyperus esculentus	Chufa	FACW
Echinochloa crus-galli	Rough Barnyard Grass	FACW
Erodium cicutarium	Red-Stemmed Filaree	UPL
Hordeum marinum	Mediterranean Barley	FAC
Geranium molle	Dove Geranium	UPL
Lactuca seriola	Prickly lettuce	FAC
Lolium multiflorum	Annual Ryegrass	FAC*
Lythrum hyssopifolia	Loosestrife	FACW
Malvella leprosa	Alkali Mallow	FAC
Medicago polymorpha	Bur Clover	UPL
Picris echioides	Bristly Ox-tongue	FAC*
Plantago lanceolata	English Plantain	FAC-
Poa annua	Annual Bluegrass	FACW-
Polygonum coccineum	Smartweed	OBL
Polygonum arvensis	Field Knotweed	FAC
Stellaria media	Chickweed	FACU
Rumex crispus	Curly Dock	FACW-
Trifolium dubium	Hop Clover	UPL

SCIENTIFIC NAME [2]	COMMON NAME	NWI INDICATOR STATUS [3]
Typha latifolia	Cattails	OBL
Vulpia myuros	Six-week broame grass	FACU

[1] Source: Olberding Environmental, Inc. (2001).
[2] Reed, P.B. 1988. National List of Plant Species That Occur in Wetlands: California (Region O). Biological Report 88(26.10) May 1988. National Ecology Research Center, National Wetlands Inventory, U.S. Fish and Wildlife Service, St. Petersburg, FL.
[3]

Wetland Indicator Category	Expected Range of Occurrence in Wetlands
(OBL) Obligate	>99%
(FACW) Facultative wetland	67 - 99%
(FAC) Facultative	34 - 66%
(FACU) Facultative upland	1 - 33%

ATTACHMENT 3 DATA SHEETS

ATTACHMENT 4 SITE PHOTOGRAPHS

ATTACHMENT 5 NRCS SOILS DATA