Merced Integrated Regional Water Management
Drought Grant Proposal

Appendices 3-10 to 3-15

App. #	Document Title	File Name
App. 3-1	Highlands Groundwater Conservation Project - Conceptual Design	Att3_DG_ProJust_2of4
App. 3-2	Highlands Groundwater Conservation Project - Property Information and Acreage of Land on Surface and Groundwater Supply	
App. 3-3	Highlands Groundwater Conservation Project – Water Supply Benefits Analysis	
App. 3-4	Highlands Groundwater Conservation Project – Energy and GHG Emissions Benefits	
App. 3-5	Merced IRWM Plan Ground Recharge Feasibility Study	
App. 3-6	Terms and Conditions of License for Unconstructed Major Project Affecting Lands of the United States	
	United States of America Federal Energy Regulatory Commission Notice of Authorization for Continued Project Operation (pages	
	US Fish and Wildlife Letter Requesting During Drought That Ecosystem Demand Requirements May Not Be Met	
App. 3-7	MID Production Wells Rendered Inoperable During the 2014 Irrigation Season Due To The Drought	
App. 3-8	MID and El Nido Groundwater Level Data	
App. 3-9	Technical Memorandum On Pilot Project Work Plan For Cressey Recharge Basin Assessment Project	
App. 3-10	Hydrogeological Investigation of the Cressey Pilot Project Site	Att3_DG_ProJust_3of4
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App. 3-12	MID Cressey Recharge Basin Initial Study/Proposed Negative Declaration	
App. 3-13	Description of Cressey Recharge Basin Enlargement Project	
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App. 3-15	Cressey Length of Irrigation Season Based on Historical Record	

App. #	Document Title	File Name
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App. 3-17	Groundwater Level Changes in Le Grand	
App. 3-18	Merced IRWM Salt and Nutrient Study (excerpt)	
App. 3-19	LGCSD Water Meter Conservation Project Water Supply Benefits	
App. 3-20	LGCSD Water Meter Conservation Project Energy Usage from 2013-2014 and Reduction in Energy Usage Benefits	
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Merced Integrated Regional Water Management Implementation Grant Proposal

Appendix 3-10

Hydrogeological Investigation of the Cressey Pilot Project Site

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Hydrogeologic Investigation of Merced Irrigation District Property Winton, California

This memorandum report presents the hydrogeologic investigation of the Merced Irrigation District (MID) property, located in Winton, California. The investigation was completed at the request of Integrated Storage Investigations (ISI) staff in Sacramento by Geology and Groundwater Section staff from the Department of Water Resources' (DWR) Central District (CD) office, in cooperation with MID staff and consultants and DWR consultants, Saracino-Kirby-Snow. Spectrum Exploration, Inc., under contract with DWR's ISI program, provided drilling services. Well installation and development occurred in December 2001. Groundwater level monitoring was conducted during December 2001 and January 2002.

Introduction

The project site is in Merced County, California at the southwest corner of Mercedes Avenue and Jones Road in the City of Winton (see Figure 1). The site is approximately 20 acres in size and is owned by MID. The site is currently a tilled agricultural field, most recently used for strawberry cultivation. Almond orchards are present on the north, east, and south sides of the property; and specialty herbs are farmed to the west of the property. Irrigation canals are located adjacent to the project site on the east and northeast. During the period of investigation, these canals were not in use but did contain a minor amount of water along the northeast portion of the site.

The project site is in the Merced Groundwater Basin (DWR 1980) in an area mapped as sand dunes of Holocene Age (Page 1986). These deposits are reported to consist of cross-bedded, well-sorted, medium to coarse sand and some very fine to fine sand and silt. In most places, the sand dune deposits lie above the groundwater table, but their permeability permits recharge from stream runoff, precipitation, or irrigation return (Page 1986).

Purpose and Scope of Work

The purpose of the investigation was to collect geologic and hydrogeologic data from the subsurface to be used for an evaluation of the site as a potential groundwater recharge location.

The original scope of work included the drilling of five exploratory drill holes to a maximum depth of 150 feet below ground surface (bgs) and conversion of three drill holes into multiple-completion monitoring wells. The CD geologist and project cooperators decided in the field that, due to the lithologic variability encountered

during drilling, additional investigation would be beneficial. As a result, three additional drill holes were drilled and one additional well was installed on the northern portion of the site.

Field Activities

Prior to drilling, MID staff and consultants selected the drilling locations and visited the field site to mark the proposed boring and well locations. Additionally, the site boundaries were identified on the ground in preparation for a site visit from Underground Service Alert (USA). USA was notified at least two days prior to the start of field activities to allow sufficient time for operators of public and private utilities to mark their underground services in the vicinity of the site and proposed boring locations.

MID obtained the required soil boring and well installation permits from Merced County Division of Environmental Health prior to, and during, the field activities. An environmental clearance permit for the project was obtained from DWR by Saracino-Kirby-Snow staff prior to the initiation of field activities. CD staff obtained a temporary entry permit from MID in order to perform field activities on the project site.

Drilling activities occurred from December 5, 2001 to December 19, 2001 and included the drilling of eight exploratory drill holes, conversion of four drill holes into observation wells, well development, and groundwater level monitoring. Groundwater level measurements were also collected from onsite wells on January 18, 2002.

Exploratory Drill Holes

Exploratory drill holes B-1 through B-4 and OW-1 through OW-4 were advanced at various locations onsite to depths ranging from 85 to 100 feet bgs by Spectrum Exploration, Inc. (see Figure 2). Drilling was performed using a Central Mining Equipment Company (CME) 750X all-terrain drilling rig utilizing hollow-stem auger drilling methods and 8-inch outside diameter (OD) augers. Soil cores were collected using the CME 5-foot continuous sample tube system. Recovered soil cores were photographed in the core tube and then placed into appropriately labeled core boxes for future reference and analysis. Soil core samples were logged by a CD geologist using the Unified Soil Classification System. Soil colors were described using Munsell Soil Color Charts. A detailed log was recorded for each exploratory drill hole, based on the recovered soil core material and drill rig performance. These logs are included with this report as Appendix A. Drill cuttings were stockpiled adjacent to each drill hole.

Following completion of field work, the soil core boxes were transported offsite by an MID contractor (Geomatrix Consultants) for storage.

Drill holes OW-1 through OW-4 were converted to observation wells, as described below. Drill holes B-1 through B-4 were backfilled. Drill holes B-1 and B-2 were sealed by backfilling with a Portland Type I/II cement slurry from their total depth to approximately 6 to 10 feet bgs while retracting the augers. After allowing the grout to settle, the upper portion of drill hole B-1, from approximately 0 to 9.5 feet bgs, was backfilled with Baroid 3/8-inch Hole Plug (bentonite chips). The upper portion of drill hole B-2, from approximately 0 to 6.5 feet bgs, was filled with excavated soil. Drill holes B-3 and B-4 were sealed by backfilling them with bentonite chips while retracting the augers. The bentonite chips were hydrated with potable water in lifts using 1-inch tremie pipe.

Prior to sealing the drill holes, Merced County Division of Environmental Health staff were notified for inspection purposes. All backfill materials and placement methods used were verbally approved by County Environmental Health staff prior to the drill holes being sealed. County Environmental Health staff visited the site on several occasions to observe drilling and sealing activities.

Well Installation

Dual-completion observation wells, OW-1 through OW-4, were installed in selected borings onsite to total depths ranging from 80 to 100 feet bgs (see Figure 2). Before the drill holes were converted to wells, the pilot holes were reamed with 10-inch OD augers to allow the placement of two well casings. The lower well screen intervals were selected to intersect the regional groundwater table and the upper screen intervals were selected to monitor zones where perched water table conditions may be encountered.

The wells were constructed using 2-inch inside diameter (ID), Schedule 40 polyvinyl chloride (PVC) blank and machine-slotted casing. Machine-slotted screens with 0.010- and 0.020-inch slots and total lengths of 20 to 30 feet were used. RMC Pacific Number 2-/16 and Number 3 sands were used as filter pack material adjacent and above the well screen intervals. Bentonite seals, consisting of bentonite chips, were placed above the filter pack and between the screened intervals. Bentonite seals were hydrated with potable water in lifts during placement. The remaining annular space above the upper seal surrounding the blank casings was backfilled with bentonite chips that were hydrated with potable water in lifts to approximately 2 feet bgs.

A layer of excavated sand, approximately 0.5 foot thick, was placed above the bentonite chips and below the concrete surface seal. Well heads were covered with locking plugs and enclosed in a steel protective vault set approximately 3 feet above ground surface (ags) and encased in a concrete surface seal from 0 to approximately 1.5 feet bgs. The well vaults were secured with a lock supplied by MID. Well construction details are shown in the drill hole logs in Appendix A and tabulated in Table 1.

Prior to placement of the upper well seals, Merced County Division of Environmental Health staff were notified for inspection purposes. All backfill materials and placement methods used were verbally approved by County Environmental Health staff prior to the wells being sealed. County Environmental Health staff visited the site on several occasions to observe drilling and sealing activities.

The wellhead elevations and locations were surveyed by an MID surveyor.

Well Development

Wells with saturated well screen intervals, OW-2B, OW-3B, and OW-4B, were developed using bailing, surging, and pumping methods. All development equipment was steam cleaned and/or cleaned with Alconox and water before it was used onsite. Depth to groundwater and well total depths were measured in each well prior to the start of development and recorded in a field log. Depth to water and well total depths were measured using an electric water level sounder, accurate to 0.01 inch.

Periodically during development, a grab water sample was collected from the wells and the water quality parameters pH, temperature, and electrical conductivity were measured using a calibrated HyDac multiparameter tester. Turbidity readings on the grab water samples were also measured periodically using a calibrated Hach 2100P turbidimeter. All water quality parameter measurements were recorded in a field log.

Following surging and bailing, a Grundfos Rediflo-2 submersible pump was lowered to approximately one foot from the base of the well and used to complete the development. Pumping continued at each well until development water was clear and turbidity measurements were low (<23 nephelometric turbidity units [NTUs]). Following completion of well development, the depth to groundwater and well total depth was measured and recorded in a field log.

Development water was discharged to the ground surface adjacent to each well.

A summary of well development parameter measurements is provided in Table 2.

Groundwater Level Monitoring

Groundwater levels were monitored at onsite well locations periodically during the course of the field work and on January 18, 2002. These measurements are tabulated in Table 3. Additionally, water levels were collected during the project at a domestic well on the northern part of the property. This well's location and elevation were also surveyed by MID.

Findings

A zone of fine to medium sand with some silt layers is present below the majority of the site to depths ranging from approximately 45 to 60 feet bgs (see Plate 1).

Between the depths of 45 feet to a maximum of 95 feet bgs, the subsurface becomes significantly more interbedded as silts and clays become more common, although some continuous sand layers are still present. This interbedded zone is encountered at shallower depths along the east central and southeast portions of the site, as evidenced in drill holes OW-3 at 26 feet and B-4 at 31 feet. At depths ranging from approximately 76 to 95 feet bgs, another primarily sandy zone occurs to the total onsite exploration depth of 103 feet bgs.

A zone of partially cemented "hard pan" silty sand soil was encountered in all of the drill holes, except OW-1, at depths ranging from 2 to 14 feet bgs.

First encountered groundwater was observed in the drill holes at depths ranging from 35 feet bgs in B-4 to 85 feet bgs in drill holes B-1, B-3, and OW-4. The shallowest first encountered groundwater levels were observed in drill holes B-4 (35 feet bgs), OW-1 (60.5 feet bgs), and OW-3 (64.5 feet bgs). These shallow water strikes are probably due to interbedded silt and clay soils at those depths combined with water seepage from an unlined earthen agricultural water canal, located on the east side of Jones Road adjacent to the MID site.

The lower level screen interval for well OW-1, identified as OW-1B, was installed from approximately 61 to 80 feet bgs, based on the presence of multiple water strikes starting at about 60 feet bgs. Based on the presence of little to no water in well OW-1B following installation, this elevated area of groundwater appears to be perched and localized adjacent to the canal area and, therefore, is not representative of the regional groundwater table. The regional groundwater table in the northeast area of the site near well OW-1 appears to begin below approximately 80 feet bgs. Across the remainder of the site, the regional water table is situated at about 76 to 83 feet bgs.

Based on water levels measured on January 18, 2002, groundwater is present beneath the site at measured elevations of about 102 to 103 feet above mean sea level (feet-msl) and flows to the west-southwest at an approximate hydraulic gradient of 0.002 ft/ft.

Conclusions

The lithology data collected as part of this investigation indicates that primarily sandy sediment lies beneath the majority of the site, to an average depth of about 50 feet bgs. The thickest section of this primarily sandy sediment (0–60 feet) occurs on the northern portion of the site in the vicinity of drill hole B-1. An exception to this was found on the east central and southeast portions of the site, where interbedded finer-grained (silt and clay) sediment occurs at shallower depths of about 25 to 30 feet bgs.

Below the upper sandy zone, there is an interbedded zone of clay, silt, and sand. This interbedded zone will act to slow the movement of recharge water to the water

table. Perched water was found within this interbedded zone in drill holes B-4, OW-1, and OW-3 along the eastern side of the site. Observation wells were constructed in multiple locations across the site in the unsaturated zone, within or above this interbedded zone, to detect the presence of future perched water. No perched water was observed in any of the shallow screened wells following installation.

Recommendations

1. Periodic groundwater level monitoring should be performed at all observation wells to further evaluate long-term regional groundwater conditions at the site and to monitor for the presence and magnitude of perched water in the shallow screened wells.

2. MID should continue to use the onsite domestic water well for water level monitoring, since the water level in this well appears to be representative of the regional water table.

3. Groundwater from the observation wells with saturated screen intervals should be sampled to establish baseline water quality beneath the site. Groundwater should be tested for general minerals, metals, inorganic constituents, pesticides, herbicides, and any other chemicals of potential concern.

4. The shallow zone observation wells (OW-1A through OW-4A) and deep zone observation well OW-1B should be developed and sampled (in the future) when sufficient water is present within the well screen intervals.

5. Surface infiltration testing should be performed at the site to evaluate the hydraulic properties of the shallow soil and "hard pan" zone in order to determine if this zone requires any modification or excavation prior to initiating further recharge testing and/or larger scale operations.

6. Because the four observation wells installed as part of this investigation are located on the perimeter of the site, additional observation wells may be needed on the internal portions of the site, depending on where any test pits and/or recharge basins are located.

References Cited

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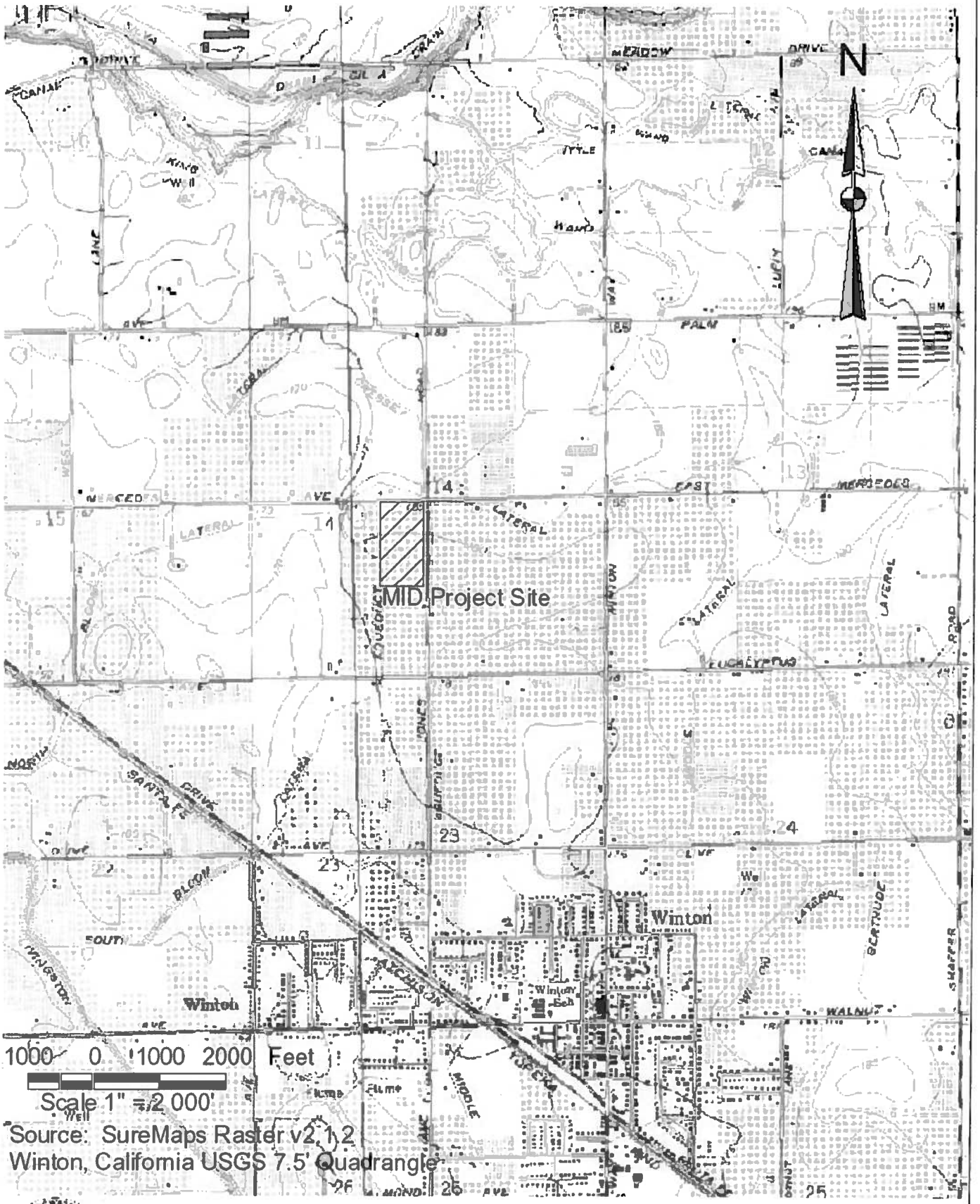
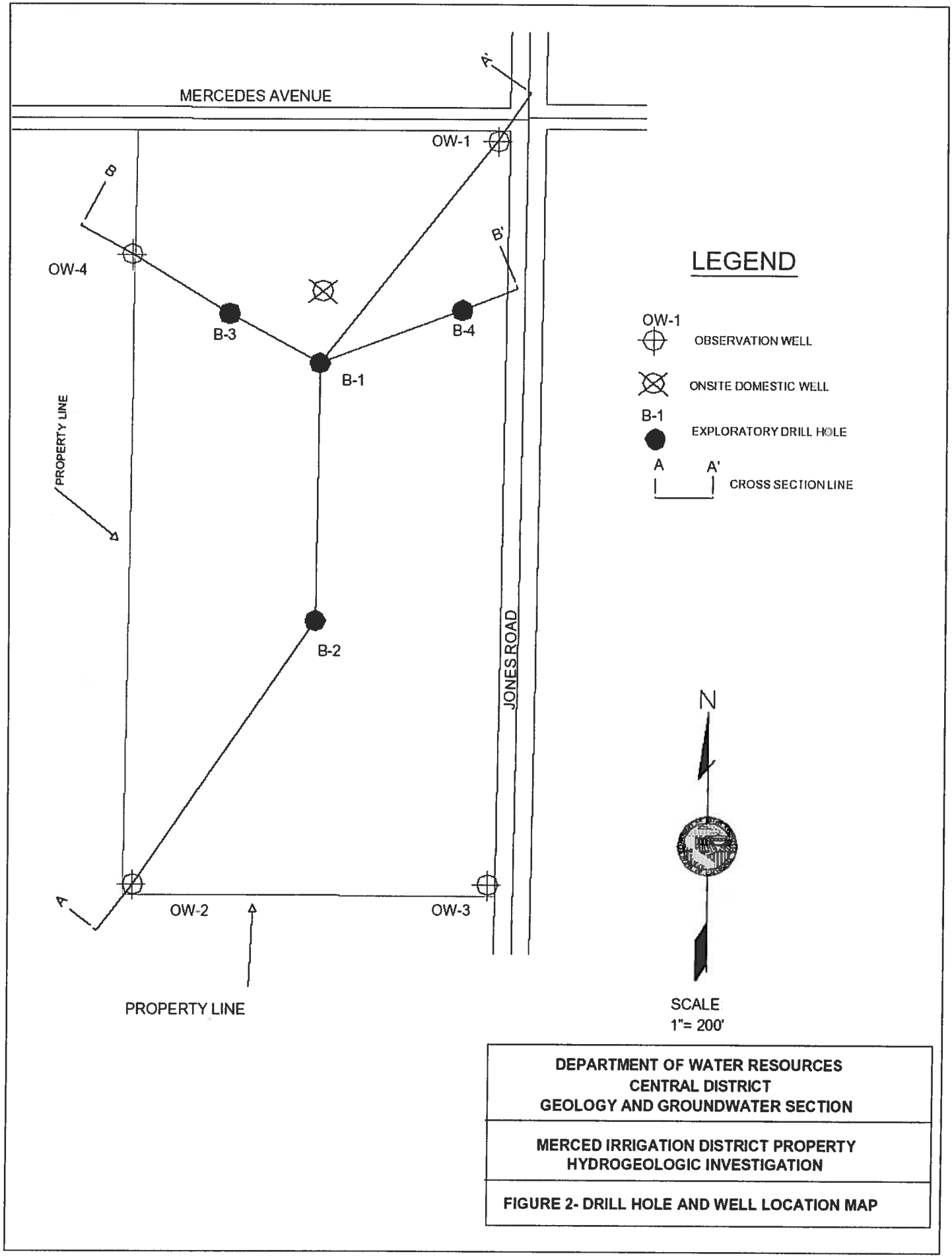
Page, R.W. 1986. Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections. Regional Aquifer-System Analysis. U.S. Geological Survey Professional Paper 1401-C.



Department of Water Resources
Central District
Geology and Groundwater Section

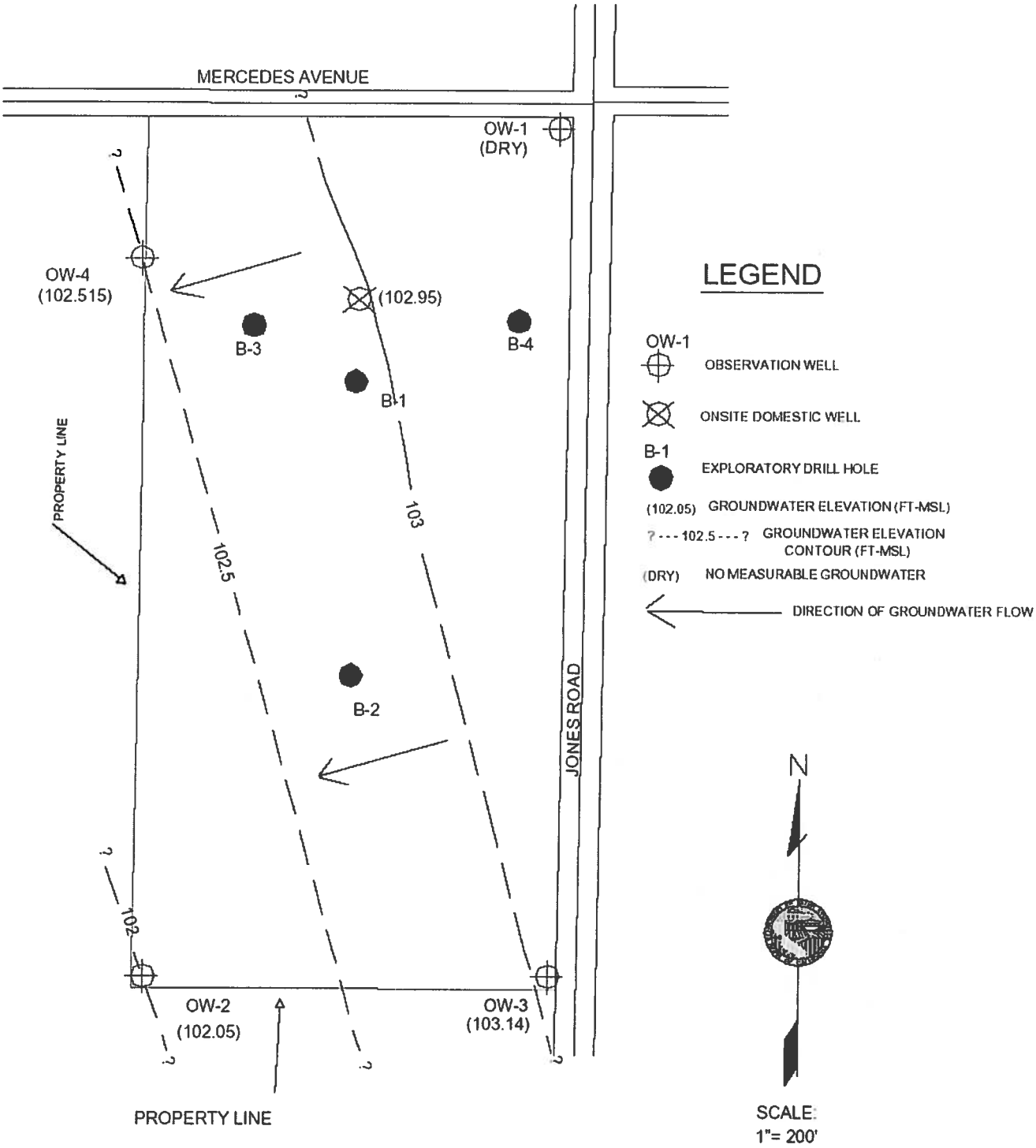
Figure 1 Site Location Map
Merced Irrigation District Property
Winton, California



DEPARTMENT OF WATER RESOURCES
CENTRAL DISTRICT
GEOLOGY AND GROUNDWATER SECTION

MERCED IRRIGATION DISTRICT PROPERTY
HYDROGEOLOGIC INVESTIGATION

FIGURE 2- DRILL HOLE AND WELL LOCATION MAP



DEPARTMENT OF WATER RESOURCES **CENTRAL DISTRICT** **GEOLOGY AND GROUNDWATER SECTION**
MERCED IRRIGATION DISTRICT PROPERTY **HYDROGEOLOGIC INVESTIGATION**
FIGURE 3 - GROUNDWATER ELEVATION CONTOUR MAP - REGIONAL WATER TABLE

Table 1
Observation Well Construction Details
Merced Irrigation District Property
Winton, California

Well #	OW-1A	OW-1B	OW-2A	OW-2B	OW-3A	OW-3B	OW-4A	OW-4B
Installation Date	12/12/2001	12/12/2001	12/10/2001	12/10/2001	12/11/2001	12/11/2001	12/13/2001	12/13/2001
Ground Surface Elev. (ft-msl)	184.77	184.77	178.73	178.73	178.73	178.73	185.40	185.40
Pilot Drill Hole Total Depth (ft)	85	85	90	90	100	100	100	100
Pilot Drill Hole Diam. (in.)	8	8	8	8	8	8	8	8
Final Drill Hole Depth (ft.)	82	82	93	93	90	90	103	103
Final Drill Hole Diam. (in.)	10	10	10	10	10	10	10	10
Surface Protective Casing Type	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Surface Protective Casing Size (in.)	8	8	8	8	8	8	8	8
Well Casing Diam. (in.)	2	2	2	2	2	2	2	2
Top of Casing Elev. (ft-msl)	187.64	187.58	181.95	181.85	181.64	181.52	187.55	187.48
Well Casing Stickup (ft.)	2.87	2.81	3.22	3.12	2.91	2.79	2.15	2.08
Well Casing Type	Schedule 40	Schedule 40	Schedule 40	Schedule 40	Schedule 40	Schedule 40	Schedule 40	Schedule 40
Well Screen Size	20 Slot	10 Slot	10 Slot	10 Slot	10 Slot	10 Slot	10 Slot	10 Slot
Well Screen Length (ft)	18.89	19	18.88	18.9	18.9	18.9	19	29
Top of Well Screen (ft-bgs)	31.24	60.57	27.3	67.39	26.26	67.28	32.84	71.4
Bottom of Well Screen (ft-bgs)	50.13	79.57	46.18	86.29	45.16	86.18	51.84	100.4
Bottom of Well (ft-bgs)	51.13	80.57	47.18	87.29	46.16	87.18	52.84	101.4
Filter Pack Type	# 3 Sand	# 2-/16	# 2-/16	# 2-/16	# 2-/16	# 2-/16	# 2-/16	# 2-/16
Filter Pack Length (ft.)	26	26	26.5	29	27	29	27	38
Top of Filter Pack (ft-bgs)	26	56	21	61	20	61	27	65
Bottom of Filter Pack (ft-bgs)	52	82	47.5	90	47	90	54	103
First Water Encountered (ft-bgs)	60	60	78	78	64.5	64.5	85	85
Depth to Static Water (ft-btoc) - 1/18/02	Dry	Dry	Dry	79.8	Dry	78.38	Dry	84.96
Depth to Static Water (ft-bgs) - 1/18/02	Dry	Dry	Dry	76.68	Dry	75.59	Dry	82.88
Static Water Elev. (ft-msl) - 1/18/02	Dry	Dry	Dry	102.05	Dry	103.14	Dry	102.515

Notes:
ft. = feet
in. = inches
ft-msl = feet - mean sea level
ft-bgs = feet below ground surface
ft-btoc = feet below top of casing

Table 2
Summary of Well Development Parameter Measurements
Merced Irrigation District Property
Winton, California

Well #	Development Date	Time	Purge Volume (gallons)	Flow Rate (gpm)	Well Depth (feet btoc)	Depth to Water (feet btoc)	pH (pH units)	Elec. Conductivity (um/cm)	Temp. (deg. F)	Water Color (visual)	Turbidity (NTU)
OW-2B	12/17/2001	1:30 PM	0		90.6	80.48					
		2:38 PM	10	nm		nm	8.36	665	63.8	brown	high
		3:04 PM	25	1.0		80.60	8.39	643	65.9	clear	14.5
		3:20 PM	40	1.0		80.60	8.13	648	66.9	clear	2.53
		3:31 PM	50	1.0		80.60	8.02	651	66.4	clear	1.35
		3:40 PM			90.56	80.53					
OW-3B	12/17/2001	8:40 AM	0		89.5	78.97					
		9:55 AM	10	nm		81.25	7.78	1900	62.0	brown	high
		11:05 AM	35	nm		84.00	8.27	972	62.0	light brown	>1,000
		11:26 AM	50	nm		nm	8.19	769	66.7	brown	>1,000
		12:02 PM	65	nm		nm	8.13	664	66.0	brown	>1,000
		12:37 PM	75	nm		nm	8.14	642	66.8	light brown	>1,000
		1:09 PM	85	nm		nm	8.13	601	65.4	cloudy brown	197
		1:16 PM	90	nm		81.50	8.13	624	68.4	light brown	586
	12/19/2001	11:48 AM	100	0.7		nm	6.42	571	66.0	cloudy	47.3
		12:19 PM	120	0.7		79.80	6.67	532	66.7	clear	11.7
		1:00 PM	150	1.0		80.14	6.65	506	65.7	clear	6.83
		1:32 PM	180	1.0		80.78	6.70	505	65.7	clear	18.8
		1:55 PM	200	1.0		81.55	6.67	512	66.4	clear	21.9
		2:00 PM			90.4	79.00					
OW-4B	12/19/2001	8:25 AM	0		104.04	85.56					
		10:16 AM	15	0.6		85.90	7.06	551	65.6	light brown	>1,000
		10:27 AM	30	1.5		85.90	6.63	466	66.1	cloudy brown	128
		10:40 AM	50	2.0		85.95	6.50	430	65.6	cloudy to clear	21.4
		10:53 AM	75	2.0		85.95	6.42	422	66.2	clear	5.36
		11:07 AM	100	2.0		85.95	6.46	412	65.8	clear	3.15
		11:10 AM			104.0	85.57					

Note: gpm = gallons per minute
nm = not measured
btoc = below top of casing
um/cm = micromhos per centimeter
deg. F = degrees in Fahrenheit
NTU = nephelometric turbidity units

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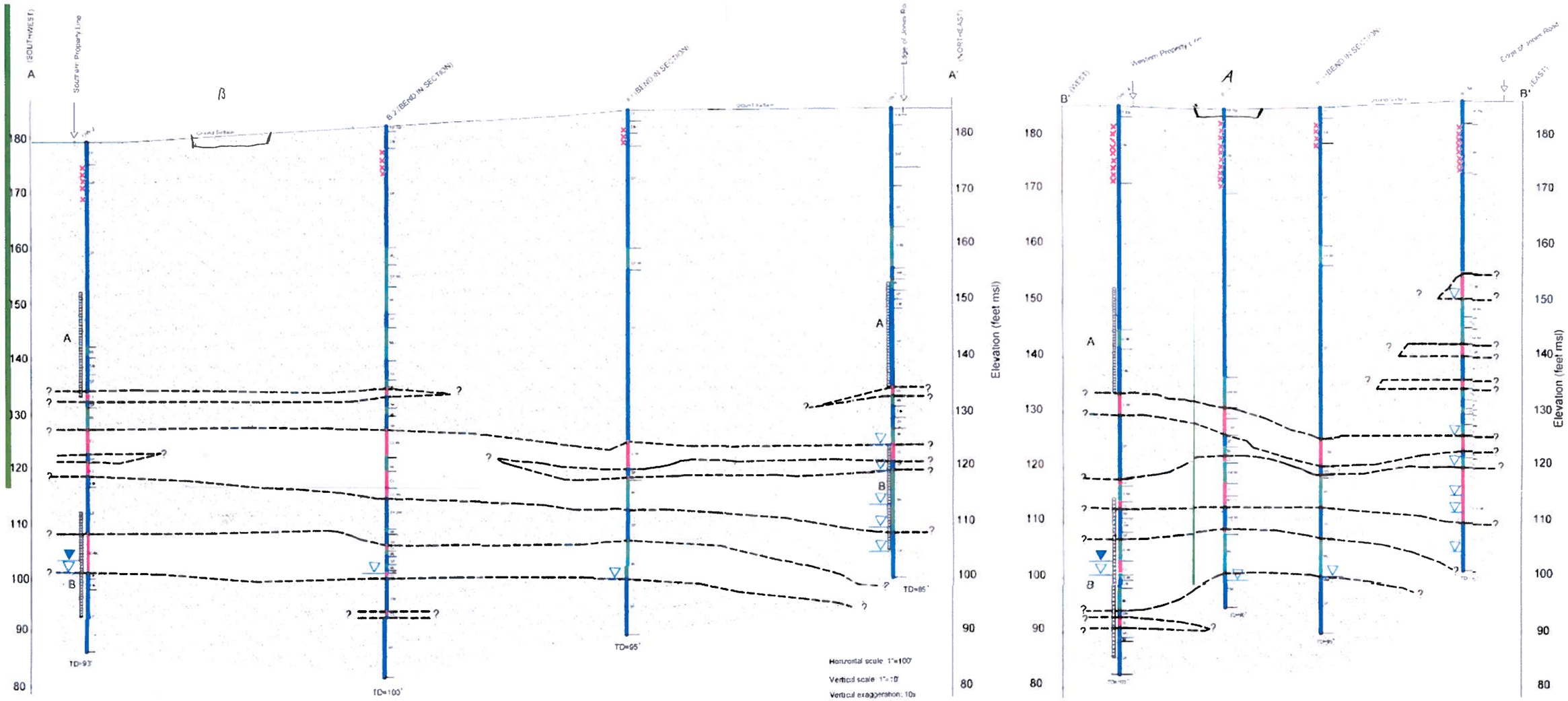
Table 3
Summary of Groundwater Level Measurements
Merced Irrigation District Property
Winton, California

Well ID	Date	Reference Point Elevation (ft-msl)	Depth to Groundwater (feet below reference point)	Groundwater Elevation (ft-msl)
OW-1A	19-Dec-01	187.64	Dry	
shallow screen	18-Jan-02	187.64	Dry	
surface elev. (184.77 ft-msl)				
OW-1B	12-Dec-01	187.575	Dry	
deep screen	13-Dec-01	187.575	Dry	
surface elev. (184.77 ft-msl)	14-Dec-01	187.575	82	105.575
	17-Dec-01	187.575	Dry	
	19-Dec-01	187.575	Dry	
	18-Jan-02	187.575	Dry	
OW-2A	17-Dec-01	181.945	Dry	
shallow screen	18-Jan-02	181.945	Dry	
surface elev. (178.73 ft-msl)				
OW-2B	10-Dec-01	181.85	80.69	101.16
deep screen	11-Dec-01	181.85	80.76	101.09
surface elev. (178.73 ft-msl)	11-Dec-01	181.85	80.7	101.15
	12-Dec-01	181.85	80.76	101.09
	13-Dec-01	181.85	80.65	101.2
	14-Dec-01	181.85	80.55	101.3
	17-Dec-01	181.85	80.48	101.37
	18-Jan-02	181.85	79.8	102.05
OW-3A	17-Dec-01	181.64	Dry	
shallow screen	18-Jan-02	181.64	Dry	
surface elev. (178.73 ft-msl)				
OW-3B	11-Dec-01	181.52	68.87	112.65
deep screen	11-Dec-01	181.52	71.57	109.95
surface elev. (178.73 ft-msl)	12-Dec-01	181.52	77.61	103.91
	13-Dec-01	181.52	78.87	102.65
	14-Dec-01	181.52	78.89	102.63
	17-Dec-01	181.52	78.97	102.55
	19-Dec-01	181.52	78.89	102.63
	18-Jan-02	181.52	78.38	103.14
OW-4A	19-Dec-01	187.55	Dry	
shallow screen	18-Jan-02	187.55	Dry	
surface elev. (185.40 ft-msl)				
OW-4B	13-Dec-01	187.475	85.69	101.785
deep screen	14-Dec-01	187.475	85.66	101.815
surface elev. (185.40 ft-msl)	19-Dec-01	187.475	85.56	101.915
	18-Jan-02	187.475	84.96	102.515
Onsite domestic well	5-Dec-01	186.05	84.21	101.84
surface elev. (185.72 ft-msl)	12-Dec-01	186.05	84.04	102.01
	14-Dec-01	186.05	83.78	102.27
	18-Jan-02	186.05	83.1	102.95

Table 2
Hydrogeologic Summary Table (1)

	Ground Surface Elevation (feet)	Total Depth (feet)	Depth to Perforation Interval (feet)		Depth to Hard Pan (feet)		Hardpan Thickness (feet)	Depth to Impermeable Layer (feet)		Drilling Water Table Depth (feet)	Drilling Water Table Elevation (feet above msl)
			Top	Bottom	Top	Bottom		Top	Bottom		
Borings											
B-1	184	95	NA	NA	2	6.5	4.5	60	65	85	99
B-2	182	100	NA	NA	2.5	4	1.5	47	49	80.5	101.5
B-3	183	90	NA	NA	2	14	12	56	59	85	98
B-4	186		NA	NA	4	13	9	31	35.7	80	106
Well Completions											
OW-1A	185	85	31	50	NA	NA	NA	50.5	52		
OW-1B	185	85	60.5	79.5	NA	NA	NA	45.5	47.5		
OW-2A	180	93	27	48	4	11	7			78	102
OW-2B	180	93	67	86	4	11	7			78	102
OW-3A	183	100	26	45	11	14	3	54	59	80	103
OW-3B	183	100	67	86	11	14	3	54	59	80	103
OW-4A	185	103	33	52	3.5	14	10.5	67.5	71.5	85	100
OW-4B	185	103	71.5	100.5	3.5	14	10.5	67.5	71.5	85	100

Note: (1) Hydrogeologic Investigation of Merced Irrigation District Property, Winton, California, DWR San Joaquin District, 2002



EXPLANATION

MERCED IRRIGATION DISTRICT PROPERTY
HYDROGEOLOGIC INVESTIGATION

PLATE 1 GEOLOGIC CROSS SECTION A - A' AND B - B'

Drawn by S. M. last revised on (03/24/2002)

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-1

Project No.: L 1202 CONJ422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth (ft / m)	Symbol	Description	Depth (ft) / Elev.	Core Run Number	Type	Recovery (%)	Time	
		Ground Surface						
		Sand (SP): red-gray (5YR 5/2); trace non-plastic fines; 100% fine to medium sand; loose; moist.	0.0					
		Silty Sand (SM): brown (7.5YR 5/4); 15% non-plastic fines; 85% fine to medium sand. Partially cemented zone (hard pan?) @ 3 to 6.5'	2.0	1		80	0840	3/8" bentonite chips
		Sand (SP): yellowish brown (10YR 5/6); 100% fine sand; loose; moist.	6.5	2		44	0850	
		Sand (SP): 100% fine to medium sand. Added sand catcher in an attempt to improve sample recovery.	11.0	3		36	0854	Portland Type III Cement
		Sand (SP): yellowish brown (10YR 5/6); 100% fine to medium sand; loose, moist.	16.0	4		15	0900	

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 95'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/5/01

Sheet: 1 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-1

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth (ft) / Elev.	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
21, 22, 23 (7), 24, 25		*Sand (SP):* light yellowish brown (2.5Y 6/3); 100% fine to medium sand; loose; moist.	21.0	5		20	0905	
26 (8), 27, 28, 29 (9)		*Sand (SP) and Silt (ML):* interbedded. SP: brown (7.5YR 5/4); 100% fine to medium sand; FeO stained; trace volcanic gravel clasts to 1.75"; angular to subrounded. ML: compact; blocky structure.	25.0	6		68		
30, 31, 32, 33 (10), 34		*Sand (SP):* light gray (2.5Y 7/2); 100% fine sand; loose; moist; minor FeO staining.	28.6	7		40	0930	Portland Type III Cement
35, 36 (11), 37, 38, 39 (12), 40		*Sand (SP):* yellowish brown (10YR 5/6) to reddish yellow (7.5YR 6/6); 100% fine to medium sand, loose; moist; FeO staining. @ 35 - 40': Drill rig chatter.	35.0	8		52	0935	
			40.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 95'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/5/01

Sheet: 2 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-1

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Depth (ft) / Elev.	Core Run Number	Type	Recovery (%)	Time	
41, 42, 43, 44, 45 (13)		*Sand (SP):* light gray (2.5Y 7/2); 100% fine to medium sand; loose, moist; minor FeO staining.		9		60	0945	
46, 47, 48, 49 (14, 15)		*Sand (SP):* light gray (2.5Y 7/2); 100% fine to medium sand; loose; moist; occasional black silt laminations; minor FeO staining.	45.0	10		60		
50, 51		*Sand (SP):* As above.	50.0					Portland Type I/II Cement
52, 53, 54 (16)		*Sand with Silt (SP-SM):* olive brown (2.5Y 4/4); 10% non-plastic fines; 90% fine sand; loose; very moist; minor FeO staining.	52.0 53.0	11		60	1000	
55, 56, 57, 58, 59, 60 (17, 18)		*Sand (SP):* light gray (2.5Y 7/2); 100% fine to medium sand; loose; moist; occasional FeO staining.	60.0	12		60	1015	

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Drill Method: Hollow-stem auger

Drill Date: 12/5/01

Hole Size: 8 inches to 95'

Datum: mean sea level

Sheet: 3 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-1

Project No.: L 1202 CONJ 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
61, 62, 63, 64, 65 (19)		*Clayey Silt (ML):* yellowish brown (10YR 5/6) to light olive gray (5Y 6/2); 100% low-plasticity fines; trace fine sand; laminated; compact; moist; FeO stained; blocky structure.		13		100	1020	
66, 67 (20)		*Sand (SP):* yellowish brown (10YR 5/6); 100% fine to medium sand; loose; moist.	65.0					
		Clay (CL): 100% low-plasticity fines; moist.	66.5					
68, 69 (21)		*Silt (ML):* yellowish brown (10YR 5/6); 100% low-plasticity fines; trace clay; compact; moist; blocky structure.	67.0	14		70	1040	
70, 71, 72 (22)				15		88	1100	Portland Type I/II Cement
73, 74		*Sand (SP):* yellowish brown (10YR 5/6); 100% fine to medium sand; silt (ML) interbeds common.	72.5					
75, 76 (23)		*Sand (SP):* light gray (2.5Y 7/1); 100% fine to medium sand; loose; moist; black silt laminations common.	75.0	16		66	1110	
77, 78, 79 (24)		*Silt (ML).*	78.5					
80			80.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 95'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/5/01

Sheet: 4 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-1

Project No.: L 1202/CON J 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		*Silt (ML):* yellowish brown (10YR 5/6); 100% non- to low-plasticity fines; locally sandy silt; moist; blocky structure; FeO veining and staining common.		17		100	1115	
25		@ 85': First groundwater encountered.						
26		*Silty Sand (SM):* olive brown (2.5Y 4/4); loose; wet.	85.0 / 85.5					
27		*Sand (SP):* olive gray (5Y 6/2); 100% medium sand; loose; wet.		18		40	1130	Portland Type I/II Cement
28		*Sand with Gravel and Silt (SP-SM)* olive brown (2.5Y 4/4); 10% non-plastic fines; some subrounded gravel to 1- inch diameter; loose; wet.	90.0 / 90.5	19		80		
		@ 90': Flowing sands encountered.						
		Gravelly Sand (SP): mostly fine to medium sand; some subrounded to round gravel clasts; loose; wet.		20		92	1230	
29		@ 91.5': Hard drilling.	95.0					
		Drill hole terminated @ 95 feet.						
30		Target depth reached.						

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 95'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/5/01

Sheet: 5 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-2

Project No.: L 1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

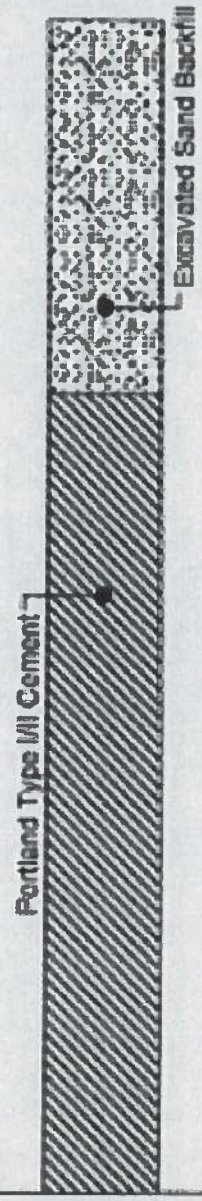
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation / Depth (ft)
0		Ground Surface	
		Sand with Silt (SP-SM): light brown; 10% non-plastic fines; 90% fine to medium sand; loose; moist.	0.0
		Silty Sand (SM): 15% non-plastic fines; 85% fine to medium sand; loose; moist.	1.2
		Hard cemented zone in core starts @ 2.6'	4.2
		Sand with Silt (SP-SM): As above; yellowish orange.	
		Driller notes hard drilling @ 4'	7.2
		Sand (SP): Driller notes hard drilling till 9'. @ 10': olive brown (2.5Y 4/4); 5% non-plastic fines; 95% fine to medium sand; loose; moist.	
		Sand (SP): olive brown (2.5Y 4/4); 100% medium sand; loose, moist; homogeneous. Driller lengthened core barrel to approximately 6" ahead of lead auger in an attempt to increase sample recovery.	15.0
			20.0

SAMPLE

Core Run Number	Type	Recovery (%)	Time
1		54	0825
2		15	0845
3		10	
4		14	0915

Drill Hole Sealing Details



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Drill Method: Hollow-stem auger

Drill Date: 12/6/01

Hole Size: 8 inches to 100'

Datum: mean sea level

Sheet: 1 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-2

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
21, 22		*Sand (SP):* @ 21.4': Silt (ML) interbed; trace clay.						
23, 24 (7)		*Silt (ML):* light gray; 100% non- to low-plasticity fines; trace clay; compact; dry to moist; laminated.	22.0	5		40	0925	
25, 26 (8)		*Sand (SP) and Silt (ML):* interbedded. SP: yellowish brown (10YR 5/6); trace non-plastic fines; 100% fine sand; loose; moist; laminated; FeO stained.	25.0	6		58	0935	
29, 30 (9)		ML: yellowish brown (10YR 5/6); compact; moist; laminated; blocky structure; FeO stained.	29.0					
31, 32, 33 (10)		*Sandy Silt (ML):* pale yellow (2.5Y 7/4); 70% non-plastic fines; 30% fine sand; loose to compact; moist; laminated; FeO stained. @ 32': Hard drilling		7		84	0951	Portland Type III Cement
34, 35, 36 (11)		*Sand (SP):* pale yellow (2.5Y 7/3); 100% fine sand; loose; moist.	34.0					
37, 38, 39 (12), 40		*Sandy Silt (ML):* light gray (2.5Y 7/1); 70% non-plastic fines; 30% fine sand; loose; moist; green mottling common.	36.4	8		64	1020	
			40.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 100'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/6/01

Sheet: 2 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-2

Project No.: L 1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
41, 42		*Silt (ML):* As above; moist; green mottling; FeO stained.						
43, 44, 45	13	*Sand (SP):* light gray (2.5Y 7/2); trace non-plastic fines; 100% fine sand; loose, moist; mottled with green and orange.	42.4	9		78	1045	
46	14	@ 43.5': Silt (ML) interbeds common.	46.0					
47, 48		*Silt (ML):* gray brown (10YR 5/2); 90% non- to low-plasticity fines; trace clay; 10% fine sand; compact; moist; laminated and mottled with green and orange.	47.3	10		60	1100	
49, 50	15	*Clay (CL):* light olive gray (5Y 6/2) 100% low- to medium-plasticity fines; compact; moist; FeO stained; dark gray mottling common.	49.0					
51, 52		*Sand (SP):* trace non-plastic fines; 100% fine sand; loose; moist.	51.0					
53, 54	16	*Silt (ML):* light olive gray (5Y 6/2); 80% non- to low-plasticity fines; 20% fine sand; loose; very moist	52.5	11		50	1115	
55		*Sand (SP):* 100% fine to medium sand; loose; moist.	55.0					
56, 57, 58	17	*Clay (CL) and Silt (ML):* Interbedded. light olive gray (5Y 6/2); 100% low- to medium-plasticity fines; compact; moist; FeO staining, organic matter, and root casts common.		12		94	1125	Portland Type III Cement
59, 60	18		60.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 100'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/6/01

Sheet: 3 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-2

Project No.: L 1202 CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
61, 62, 63, 64, 65	19	*Silt (ML):* light olive brown (2/5Y 5/3); some sandy silt; loose; moist. @ 62': hard cemented nodules; FeO filled root casts and mottling common.	62.5	13		100	1135	
		Silty Clay (CL): 100% non- to low-plasticity fines; compact; moist; FeO filled root casts and mottling.	65.2					
66, 67	20	*Silt (ML) and Clay (CL):* interbedded. compact to loose; moist.	67.5	14		72		
68, 69	21	*Silty Sand (SM):* light olive gray (5Y 5/3); loose; moist; FeO staining common.	68.0					
70, 71, 72	22	*Sand (SP):* yellowish brown (10YR 5/6); 100% fine to medium sand; FeO stained. *Sand (SP):* pale yellow (2.5Y 7/3); 100% fine to medium sand; loose; moist; minor laminations.	70.0	15		66	1215	Portland Type VII Cement
73, 74		*Silt (ML):* light yellowish brown (2.5Y 6/3); 85% non- to low-plasticity fines; 15% fine sand; compact; moist.	72.7					
75	23	*Sand (SP):* 100% fine sand; loose; moist.	74.0					
76, 77		*Silty Clay (CL):* light olive brown (2.5Y 5/4); 100% low-plasticity fines; compact; moist.	76.0	16		77	1225	
78		*Silt (ML).*	77.0					
79	24	*Sand (SP).* pale yellow (2.5Y 6/2).	77.7					
80		*Silt (ML).*	79.4					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Drill Method: Hollow-stem auger

Drill Date: 12/6/01

Hole Size: 8 inches to 100'

Datum: mean sea level

Sheet: 4 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-2

Project No.: L 1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
81		Silty Sand (SM): loose; wet.	80.5 / 81.0					
82 – 25		First groundwater @ 80.5.	81.7					
83		Silty Clay (CL): light yellowish brown (2.5Y 6/4).		17		50	1235	
84		Silty Sand (SM): light olive brown (2.5Y 5/3); loose; wet.						
85 – 26								
86								
87				18		66	1245	
88		Silty Clay (CL): light olive brown (2.5Y 5/3); 100% low-plasticity fines; compact; very moist.	88.0 / 89.0					
89 – 27								
90		Sand (SP): light olive gray (5Y 6/2); 100% fine to medium sand; loose; wet; homogeneous.						
91								
92 – 28				19		88	1307	
93								
94								
95 – 29		Sand (SP): @ 95'; flowing sands encountered.	95.0					
96								
97		Added water in an attempt to control sand and then added bentonite mud to control sand.					1310	
98 – 30								
99		Drill hole terminated @ 100 feet; Target depth reached.						
100			100.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 100'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/5/01

Sheet: 5 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-3

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth (ft / m)	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
0 / 0		Ground Surface						
		Sand with Silt (SP-SM): brown (7.5YR 5/4); 15% non-plastic fines; 85% fine to medium sand; loose; moist.	0.0					
			1.2					
		Silty Sand (SM): reddish gray (5YR 5/2); 30% non-plastic fines; 70% fine to medium sand; compact; moist.		1		42	1430	
		Driller notes hard drilling @ 2'.	5.0					
		Silty Sand (SM): 25% non-plastic fines; 75% fine to medium sand; compact to loose; moist.		2		16	1440	3/8" bentonite chips
		Silty Sand (SM): loose; moist.	10.0					
		Driller notes hard drilling till 14'.		3		16	1448	
		Silty Sand (SM).	14.0					
		Sand (SP): yellowish brown (10YR 5/6); 100% fine to medium sand; loose; moist; FeO stained.	15.3	4		20		
			20.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/13/01 - 12/14/01

Sheet: 1 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-3

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
21, 22, 23 (7), 24, 25		*Sand (SP):* compact to loose; moist. Interbeds of Silt (ML) @ 20 - 21'.		5		36		
26 (8), 27, 28, 29, 30 (9)		*Sand (SP):* light gray (2.5Y 7/2); 100% fine to medium sand; loose; moist.	25.0	6		36		
31, 32, 33 (10), 34, 35		*Sand (SP):* loose; moist.	30.0	7		34		
36 (11), 37, 38, 39, 40 (12)		*Sand (SP):* 100% fine to medium sand; loose; moist; occasional black silt (heavy mineral) laminations.	35.0	8		44		
			40.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/13/01 - 12/14/01

Sheet: 2 of 5

Log of Drill Hole: B-3

State of California
The Resources Agency
Department of Water Resources

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
41, 42, 43, 44	13	*Sand (SP):* loose; moist. @ 42': black silt (heavy mineral) laminations common.		9		46		
45, 46, 47, 48	14	*Sand (SP):* loose; moist; black silt (heavy mineral) cross laminations common.	45.0	10		48		
49, 50, 51, 52, 53	15, 16	*Silty Sand (SM) and Silt (ML):* interbedded. compact to loose; moist; laminations, liesegang banding, and FeO staining common. @ 52.5': Silty Clay (CL) interbed.	48.5	11		60		
54, 55	17	*Silty Clay (CL):* 100% low-plasticity fines; compact; moist; FeO veining common.	54.0					
56, 57, 58		*Clayey Silt (ML):* FeO veins and laminations common.	56.0	12		68		
59, 60	18	*Sand (SP):* Silt (ML) interbeds.	59.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/13/01 - 12/14/01

Sheet: 3 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-3

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
61								
62	19	*Silt (ML):*	61.1					
63		*Silty Clay (CL):* 100% low-plasticity fines; compact; moist; laminated.	62.7	13		78		
64			64.0					
65		Driller notes harder drilling @ 63'.						
66	20	*Silty Sand (SM) and Silt (ML):* Interbedded. compact to loose; moist; laminated.						
67				14		62	1615	
68		*Clay (CL):* 100% low- to medium-plasticity fines; very compact; dry to moist.	67.7					
69	21							
70		Driller notes very hard drilling @ 68'.	70.0					
71		*Silt (ML) and Clay (CL):* Interbedded. compact; moist.						
72	22	*Silty Sand (SM) and Silt (ML):* Interbedded. loose; moist.	72.0	15		68		
73								
74								
75	23							
76		*Silty Clay (CL):* compact.	76.0					
77		*Silt with Sand (ML):* 80% non-plastic fines; 20% fine to medium sand; compact to loose; moist.	77.0	16		92	1630	
78								
79	24							
80			80.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/13/01 - 12/14/01

Sheet: 4 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-3

Project No.: L 1202.CONJ 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 (25, 26, 27, 28, 29, 30)		*Sandy Silt (ML):* olive brown (2.5Y 4/4); 60% non-plastic fines; 40% fine sand; compact to loose; very moist; occasional laminations and FeO stains.		17		70	0735	
		@ 85': First groundwater encountered.	84.0					
		Silty Sand (SM): Sand (SP) interbeds; loose; wet.		18		72	0740	
		@ 90': Flowing sands encountered.	90.0					
		Drill hole terminated @ 90 feet; Target depth reached.						

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/13/01 - 12/14/01

Sheet: 5 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-4

Project No.: L 1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
		Ground Surface						
		Sand with Silt (SP-SM): reddish gray (5Y 5/2); 15% non-plastic fines; 85% fine to medium sand; loose; moist to very moist.	0.0	1		56	1004	
		Silty Sand (SM): brown (7.5YR 5/4); 30% non-plastic fines; 70% fine to medium sand; loose; moist. Driller notes hard drilling @ 4'.	4.0	2		26		3/8" bentonite chips
		Silty Sand (SM): trace clay; loose; moist. Driller notes hard drilling till 13'.	10.0	3		24	1020	
		Sand (SP): olive; 100% fine to medium sand; loose; moist; minor laminations.	13.0	4		34		
			20.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 85'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/14/01

Sheet: 1 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-4

Project No.: L.1202.CON.J 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
21, 22, 23, 24, 25		*Sand (SP)*: gray to white; loose; moist; homogeneous.		5		38		
26, 27, 28, 29, 30		*Sand (SP)*: gray to white; loose; moist.	26.0	6		28	1032	
31		*Sand (SP)*.	30.0					
32, 33, 34, 35		*Clayey Silt (ML)*: 100% non- to low-plasticity fines; compact; moist; blocky structure. @31.7': 100% non-plastic fines; compact to loose; moist; laminated. @ 32.6': very moist.	31.0	7		52		
36, 37, 38, 39		@35': very moist to wet. @35.3': Sand (SP) interbed. *Silty Sand (SM) to Sandy Silt (ML)* interbedded. olive to gray; laminated; loose; moist.	35.7	8		42		
40		*Silt (ML)*. @ 40.7': Grades into Clayey Silt.	39.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 85'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/14/01

Sheet: 2 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-4

Project No.: L.1202.CCNJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
41								
42		*Silty Sand (SM) to Sandy Silt (ML)* interbedded. olive; loose; moist; laminated.	41.0					
43	13			9		60		
44		*Clayey Silt (ML):* olive; very moist; blocky structure; laminated.	44.0					
45								
46	14	*Sand (SP):* gray to white; loose; moist; some laminations.	46.2					
47				10		56		
48								
49	15							
50								
51		*Silty Clay (CL):* olive; 100% non- to low-plasticity fines; compact; moist.	50.5					
52	16	*Silt (ML):* @ 52.4': Sand (SP) interbed. @53': very moist.	52.0	11		68		
53								
54		*Sand (SP):* gray to white; 100% fine to medium sand; loose; moist.	54.0					
55	17	*Silt (ML):* 100% non-plastic fines; compact to loose; very moist.	55.6					
56								
57		*Sand (SP):* loose; moist.	56.6	12		44		
58								
59	18	*Silt (ML):* olive. @ 60': wet.	58.5					
60								

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 85'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/14/01

Sheet: 3 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-4

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Drill Hole Sealing Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
61, 62, 63	19	*Silty Clay (CL):* very moist to wet.	60.5	13		86		
64, 65		*Sand (SP):* loose; very moist to wet; some interbedded Silty Sand (SM).	63.4					
66	20	*Silt (ML):* very moist.	64.5					
67, 68, 69, 70	21	*Silty Clay (CL):* wet. @ 66.7 - 67.2': Silt (ML). @ 70': very moist; heavy FeO mottling.	66.2	14		52		
71, 72, 73, 74, 75, 76	22, 23	*Silt (ML):* olive; 100% non-plastic fines; compact to loose; very moist to wet; laminated. *Clayey Silt (ML):* olive; 100% non- to low-plasticity fines; compact; very moist to wet.	70.4	15		62		
77, 78, 79, 80	24	*Sand (SP):* gray; loose; very moist. @ 80': First "regional" groundwater encountered.	74.0	16		64		
			76.4					
			80.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Drill Method: Hollow-stem auger

Drill Date: 12/14/01

Hole Size: 8 inches to 85'

Datum: mean sea level

Sheet: 4 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: B-4

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Drill Hole Sealing Details
81		Sand (SP): olive; 100% fine to medium sand; loose; wet.						
82 – 25		@ 82': some fine to medium gravel; angular to subrounded; quartz, metamorphic, and mafic volcanic clasts; trace clay nodules.		17		44	1145	
83								
84								
85		@ 85': Flowing sands encountered.						
– 26			85.0					
86		Drill hole terminated @ 85 feet.						
87		Target depth reached.						
88								
– 27								
89								
90								
91								
92 – 28								
93								
94								
95 – 29								
96								
97								
98 – 30								
99								
100								

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8 inches to 85'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/14/01

Sheet: 5 of 5

Log of Drill Hole: OW-1

State of California
The Resources Agency
Department of Water Resources

Project No.: L 1202/DONJ 422

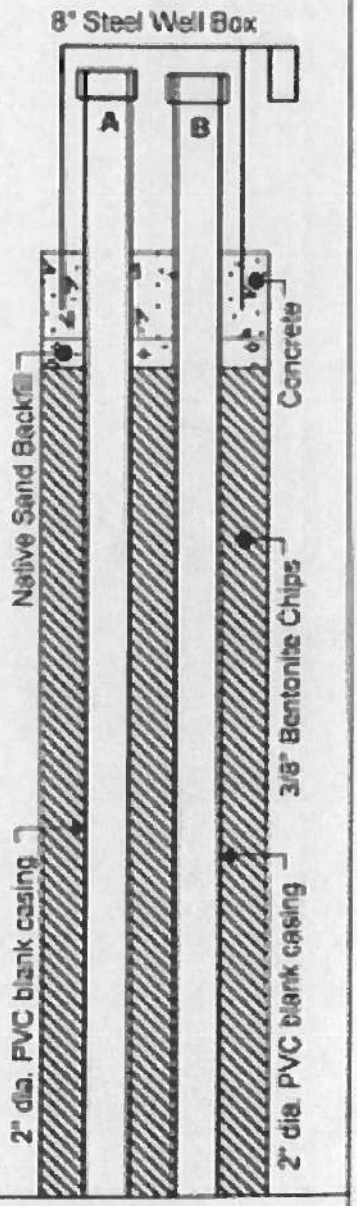
Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
		Ground Surface						8" Steel Well Box
		Sand with Silt (SP-SM): olive brown (2.5Y 4/4); 15% non-plastic fines; 85% fine to medium sand; loose; moist; roots common.	0.0	1		52	1345	
		Silty Sand (SM): red-gray (5YR 5/2); 25% non-plastic fines; 75% fine to medium sand; loose; moist.	3.0	2		36	1350	
		Silty Sand (SM): 30% non- to low-plasticity fines; 70% fine to medium sand; compact to loose; very moist.	10.0	3		28		
		Sand (SP): yellowish brown (10YR 5/6); 100% fine to medium sand; loose; moist.	14.0					



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 85' / 10" to 82'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/11/01 - 12/12/01

Well Installation Date: 12/12/01

Sheet: 1 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-1

Project No.: L 1202 CONJ.#22

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

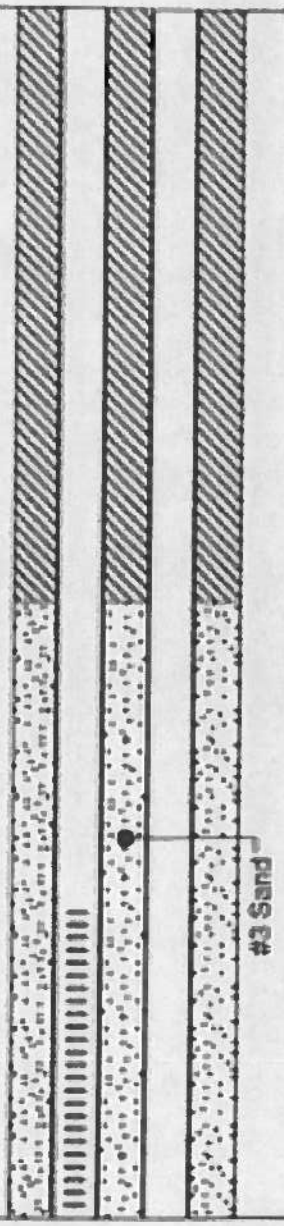
SUBSURFACE PROFILE

Depth	Symbol	Description	Elevation / Depth (ft)
			20.0
		Sand (SP): loose; moist.	21.3
		Silt (ML): yellowish brown (10YR 5/6); 100% non-plastic fines; trace clay; compact; moist; mottled with FeO.	25.0
		Silt with Sand (ML): 75% non-plastic fines; 25% fine sand; loose; moist; cross laminated and FeO stained. @ 27': some interbedded Sand (SP). @ 28': Clayey Silt (ML); 100% low-plasticity fines.	29.0
		Silty Sand (SM).	31.0
		Sandy Silt (ML): some interbedded clay; moist; laminated.	33.0
		Sand (SP): laminated.	34.5
		Silty Sand (SM): 40% non-plastic fines; 60% fine sand; loose; moist.	38.0

SAMPLE

Core Run Number	Type	Recovery (%)	Time
4		30	
5		32	
6		64	
7		66	1430

Well Completion Details



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 85' / 10" to 82'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/11/01 - 12/12/01

Well Installation Date: 12/12/01

Sheet: 2 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-1

Project No.: L 1202 CONJ 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Well Completion Details
37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56		*Sand (SP):* loose; moist; laminated. @ 36.8': Silt (ML) interbed (0.4' thick).		8		50	1440	2" dia. PVC 20 slot screen (31.24 - 50.13')
		Sand (SP): 100% fine to medium sand; loose; moist; cross laminated; FeO stained.	40.0	9		48	1605	
		Sand (SP): 100% fine to medium sand; loose; moist; laminated.	45.0	10		44		
		Sand (SP): moist to very moist.	50.0					
		Silty Clay (CL): 100% non- to low-plasticity fines; compact; moist; laminated with FeO and MnO staining.	50.6	11		58		3/8" Bent. Chips
		Silt (ML):	52.2					
		Silty Sand (SM): some interbeds of Sandy Silt (ML); loose; moist to very moist; laminated; FeO stained.	54.0					
			55.5					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 85' / 10" to 82'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/11/01 - 12/12/01

Well Installation Date: 12/12/01

Sheet: 3 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-1

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

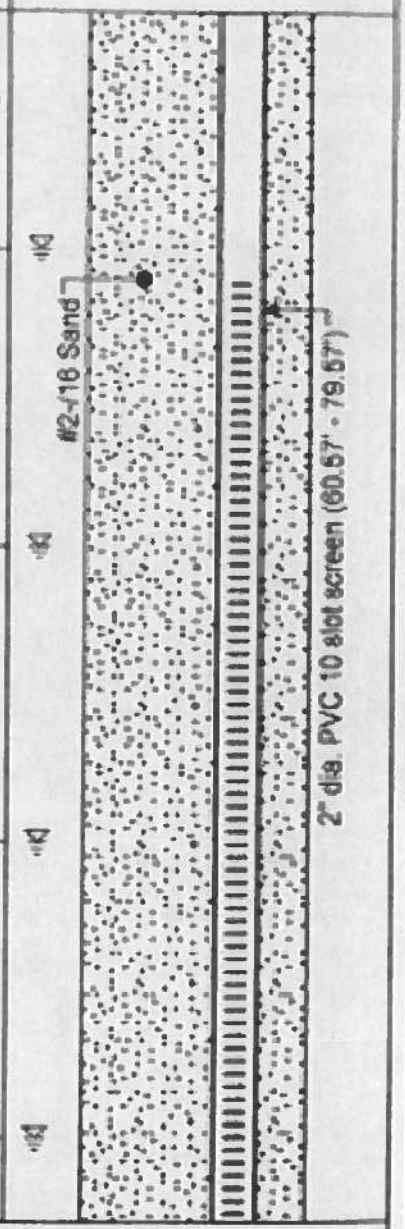
SUBSURFACE PROFILE

Depth	Symbol	Description	Elevation / Depth (ft)
57–58		*Sand (SP):* 100% fine to medium sand; loose; moist to very moist; FeO stained.	
58–61	18	*Sandy Silt (ML):* 70% non-plastic fines; 30% fine sand; loose. @ 60': wet.	58.0
61–64	19	@ 60.5': Clayey Silt (ML); compact; wet. *Silty Clay (CL):* 100% low-plasticity fines; compact; very moist to wet. @ 61.6': moist. @ 62': Silt (ML) interbeds; FeO staining.	61.0
64–66	20	*Sand (SP):* 100% fine to medium sand; loose; wet.	64.0
66–74	21, 22	*Sandy Silt (ML):* 80% non-plastic fines; 20% fine sand; compact to loose; wet. @ 66.2': Clayey Silt (ML); 100% non- to low-plasticity fines; compact; very moist; laminated with FeO. @ 67': Silt (ML); moist. @ 70': Sandy Silt (ML); 80% non-plastic fines; 20% fine sand; compact to loose; wet; laminated with FeO.	65.5
74–76	23	*Silt (ML):* trace clay; wet. @ 75': compact to loose; wet.	74.0

SAMPLE

Core Run Number	Type	Recovery (%)	Time
12		44	1530
13		66	0755
14		50	
15		64	

Well Completion Details



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 85' / 10" to 82'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/11/01 - 12/12/01

Well Installation Date: 12/12/01

Sheet: 4 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-1

Project No.: L.1202.CONJ.422

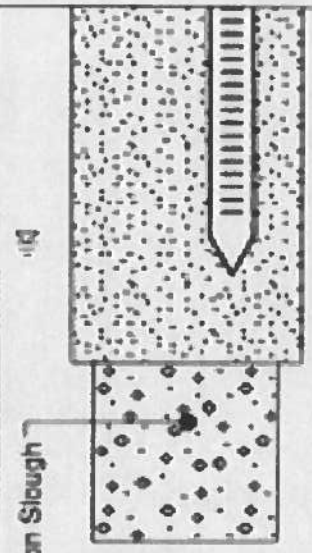
Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
77								
78		*Sand (SP):* very moist to wet; FeO stained to 78'; pale yellow (2.5Y 7/3) below 78'.	77.3	16		80		
79 – 24								
80		*Sand (SP):* 100% fine to medium sand; loose; wet; laminated.	80.0					
81								
82 – 25								
83				17		60	0830	
84		@ 85': Driller notes flowing sands.						
85 – 26			85.0					
86		Drill hole terminated @ 85 feet;						
87		Target depth reached.						
88								
89 – 27								
90								
91								
92 – 28								
93								
94								
95 – 29								
96								



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 85' / 10" to 82'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/11/01 - 12/12/01

Well Installation Date: 12/12/01

Sheet: 5 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-2

Project No.: L 1202 CONJ 422

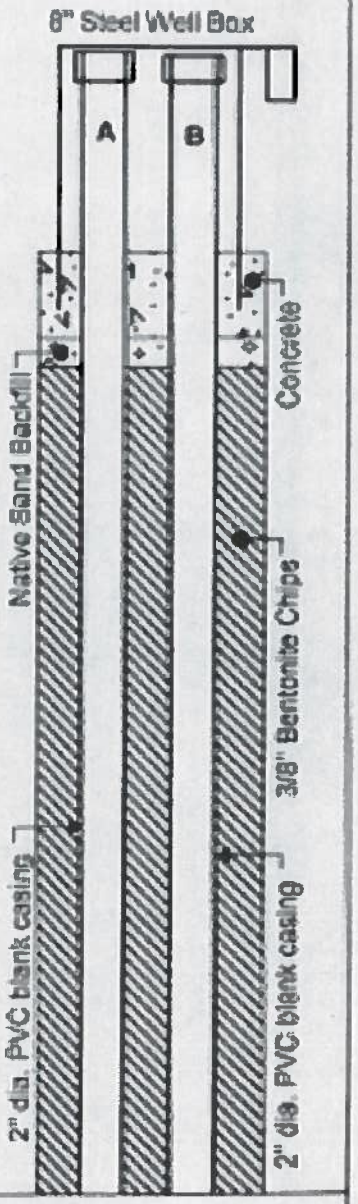
Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (ft / m)	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
		Ground Surface						8" Steel Well Box
		Sand with Silt (SP-SM): red gray (5YR 5/2); 15% non-plastic fines; 85% fine to medium sand; loose; moist; homogeneous. Driller notes hard drilling @ 3'.	0.0	1		60	0834	
		Silty Sand (SM): brown (7.5YR 5/4); 30% non-plastic fines; 70% fine to medium sand; loose; moist; homogeneous. Driller notes hard drilling to 8'.	4.0	2		20	0843	
		Silty Sand (SM). Driller notes hard drilling @ 10-11'.	10.0					
		Sand with Silt (SP-SM): brown (7.5YR 5/4); 10% non-plastic fines; 90% fine to medium sand; loose; moist.	11.0	3		40	0850	
		Sand (SP): yellowish brown (10YR 5/6); 100% fine to medium sand; loose; moist.	14.0					



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 93' / 10" to 93'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/7/01

Well Installation Date: 12/10/01

Sheet: 1 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-2

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
5, 17, 18, 19, 6, 20				4		20	0856	
21, 22, 7, 23, 24		*Sand (SP):* olive brown (2.5Y 4/4); 100% fine to medium sand; loose; moist.	20.0	5		32	0903	
25, 26, 8, 27, 28, 29		*Sand (SP):* white (2.5Y 8/1); 100% fine sand; coarsens to medium sand @ 28'; loose; moist; laminations and FeO stains common. FeO staining pervasive @ 28'.	25.0	6		64	0920	#2-/16 Sand; 2" dia. PVC 10 slot screen (27.3 - 46.18')
9, 30, 31, 32, 10, 33, 34, 35, 36		*Sand (SP):* light gray (2.5Y 7/2); 100% fine to medium sand; loose; moist; laminations common. Drill rig chatter @ 30'. Drill rig chatter @ 35'.	30.0, 34.0	7		54	0926	

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 90' / 10" to 93'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/7/01

Well Installation Date: 12/10/01

Sheet: 2 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-2

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

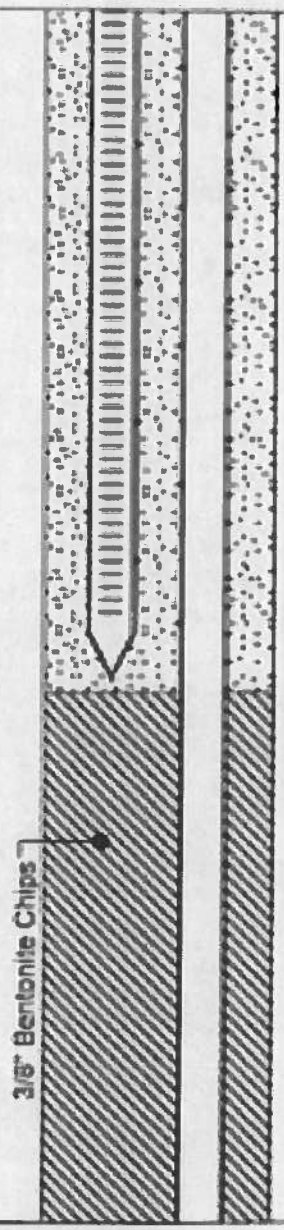
SUBSURFACE PROFILE

Depth	Symbol	Description	Elevation / Depth (ft)
37–38		*Sand (SP):* 100% fine to medium sand; grades to fine sand @ 38.7'; laminations common. Pervasive FeO staining @ 38.5'.	36.7
39–40		*Sandy Silt (ML):* light yellowish brown (2.5Y 6/3); 60% non-plastic fines; 20% fine sand; loose; moist; laminations common.	39.0
41–43		*Silty Sand (SM):* 40% non-plastic fines; 60% fine sand; loose; moist. Interbeds of Silt (ML) and Clay (CL) @ 41-42'. Drill rig chatter @ 42'.	42.3
43–46		*Sand (SP):* 100% fine to medium sand; loose; moist.	
46–47		*Clay (CL):* very moist; laminated.	45.5
48		*Sand (SP).*	47.5
49–52		*Silt (ML):* moist; laminated. @ 51': Sand (SP) interbed (0.2' thick).	48.6
53–56		*Silty Clay (CL):* 100% low-plasticity fines; compact; moist.	52.3

SAMPLE

Core Run Number	Type	Recovery (%)	Time
8		50	0932
9		58	0941
10		92	1000
11		54	1016

Well Completion Details



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 90' / 10" to 93'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/7/01

Well Installation Date: 12/10/01

Sheet: 3 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-2

Project No.: L.1202.CC6U.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

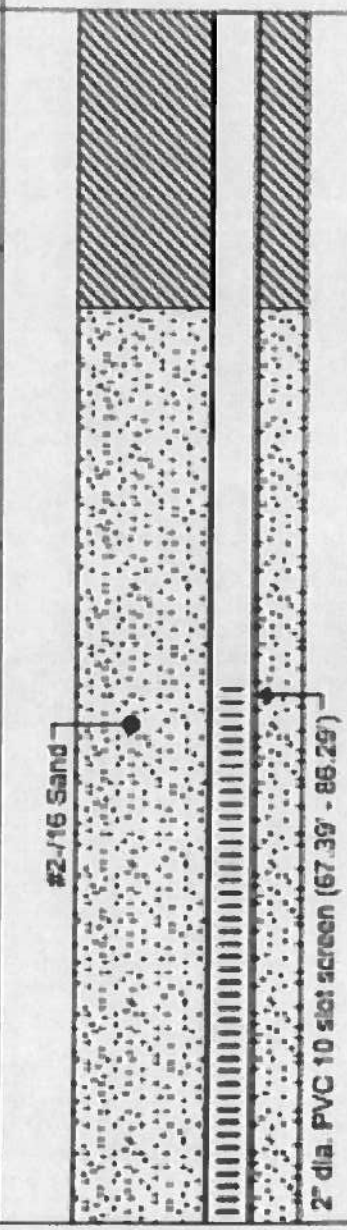
SUBSURFACE PROFILE

Depth	Symbol	Description	Elevation / Depth (ft)
57, 58, 59, 60		*Sand (SP).* @ 57': Silt (ML) interbed. @ 58.2': Silty Sand (SM) to Silt (ML) interbeds. *Silty Clay (CL).*	56.8; 58.5
61, 62, 63, 64, 65, 66, 67, 68, 69, 70		*Silty Sand (SM):* 40% non- to low-plasticity fines; trace clay; 60% fine to medium sand; compact; moist. *Sand with Silt (SP-SM).* *Sand (SP):* 100% fine to medium sand; trace non-plastic fines; loose; moist. @ 65': 100% fine sand. @ 65.5': Grades into 100% fine to medium sand.	60.7; 62.4; 63.0
71, 72, 73, 74, 75, 76		*Clayey Silt (ML):* compact; moist. @ 75': very moist; laminated; occasional Sand (SP) interbeds.	71.0; 76.0

SAMPLE

Core Run Number	Type	Recovery (%)	Time
12		76	
13		74	1025
14		50	1040
15		58	

Well Completion Details



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 90' / 10" to 93'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/7/01

Well Installation Date: 12/10/01

Sheet: 4 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-2

Project No.: L.1202.CONJ.422

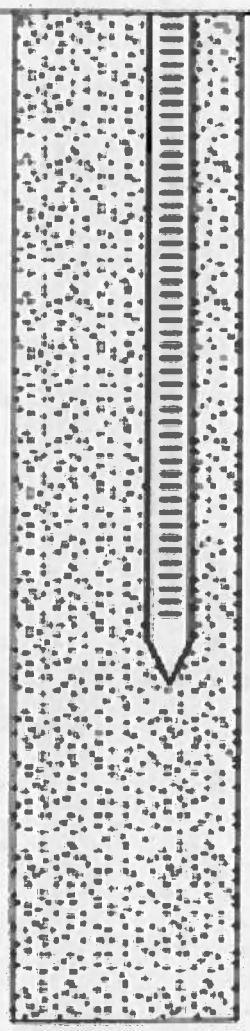
Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bond's

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Well Completion Details
77		Silt (ML).						
78		@ 78': First groundwater encountered.		16		80	1050	
79	24	Sand (SP): 100% fine to medium sand; loose; wet; laminated.	78.0					
80		Silty Sand (SM): 40% non-plastic fines; 60% fine sand; loose; wet.	79.0					
81			81.2					
82	25	Sand (SP): 100% fine to medium sand; loose; wet.		17		42	1105	
83								
84		@ 85': Added water to control flowing sands.						
85	26	Sand (SP): 100% fine to medium sand; loose; wet.	85.0					
86								
87		@ 85 - 87': Silty Sand (SM) interbeds.		18		32	1107	
88	27							
89		@ 90': Flowing sands.						
90		Drill hole terminated @ 90 feet;	90.0					
91		Target depth reached;						
92	28	Drill hole reamed to 93' with 10" augers for well installation.						
93								
94								
95	29							
96								



Hole Diameter = 10"

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 90' / 10" to 93'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/7/01

Well Installation Date: 12/10/01

Sheet: 5 of 5

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-3

Project No.: L.1202.CONJ.422

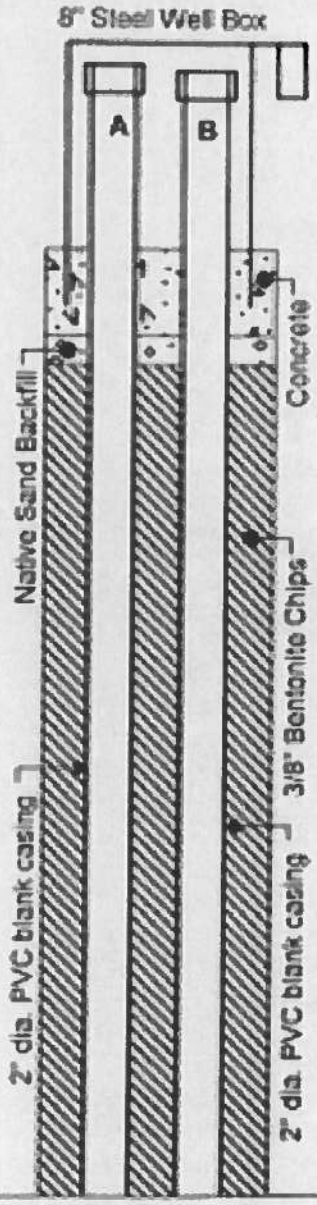
Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (ft / m)	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
		Ground Surface						
		Sand with Silt (SP-SM): olive brown (2.5Y 4/4); 15% non-plastic fines; 85% fine to medium sand; loose; moist.	0.0	1		50	1212	
		Silty Sand (SM): brown (7.5YR 5/4); 30% non-plastic fines; 70% fine to medium sand; loose; moist.	3.0	2		32		
		Silty Sand (SM): 20% non-plastic fines; 80% fine to medium sand; loose; moist. Driller notes hard drilling @ 11 - 14'.	10.0	3		32		
		Sand (SP): light yellowish brown (2.5Y 6/4); trace non-plastic fines; 100% fine to medium sand; loose; moist.	14.0					



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100'/10" to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/10/01

Well Installation Date: 12/11/01

Sheet: 1 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-3

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
5, 17, 18, 19, 6, 20				4		34		
21, 22, 23, 7, 24, 25		*Sand (SP):* trace laminations.	20.0	5		34	1232	
26, 8, 27, 28, 29, 9, 30, 31		*Sand (SP).*	25.0	6		44		#2-/16 Sand; 2" dia. PVC 10 slot screen (28.28 - 45.16')
32, 33, 10, 34, 35, 36		*Silty Clay (CL):* light yellowish brown (2.5Y 6/4); 100% low-plasticity fines; compact; moist; laminated.	26.0					
		Silt (ML): 100% non- to low-plasticity fines; moist; laminated; FeO staining.	27.0					
		Sand (SP): cross laminated.	29.0					
		Sandy Silt (ML): 80% non-plastic fines; 20% fine sand; compact; moist.	31.5	7		48		
		Silty Clay (CL): 100% non- to low-plasticity fines; compact; moist to very moist; laminated.	32.0					
		Sandy Silt (ML).	35.0					
			36.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100'/10" to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/10/01

Well Installation Date: 12/11/01

Sheet: 2 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-3

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
11		*Silty Clay (CL):* 100% non- to low-plasticity fines; compact; moist; laminated and mottled with FeO staining.		8		84	1300	
12		*Clay (CL):* mottled with FeO.	40.0	9		78		
13		*Silt (ML):* laminated. @ 43.1': grades into Sandy Silt. @43.5': very moist. @45-46': Sand (SP) interbeds; very moist.	42.5					
14		*Silty Clay (CL):* blocky structure.	45.2	10		80		
15		*Silt (ML).* very moist.	47.5					
16		@ 52': Silty Clay (CL) interbed.		11		94		3/8" Bentonite Chips
17		*Silty Clay (CL):* some interbedded Silt (ML); compact; very moist; blocky structure.	54.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100'/10" to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/10/01

Well Installation Date: 12/11/01

Sheet: 3 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-3

Project No.: L.1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
57, 58, 59	18	*Clay (CL).*	57.0	12		86		
60, 61, 62, 63, 64	19	*Clayey Silt (ML):* 100% low-plasticity fines; trace fine sand; compact; moist. @ 61': Silt; laminated. @ 63': Sandy Silt. @ 64.5': very moist to wet.	59.3	13		96		
65, 66, 67, 68	20	*Silty Sand (SM):* 25% non- to low-plasticity fines; trace clay; 75% fine to medium sand; compact to loose; moist to very moist; FeO staining.	64.5	14		80	1400	
69, 70, 71, 72	21, 22	*Sand (SP):* 100% fine to medium sand; loose; moist; minor laminations with FeO. Driller notes flowing sands @ 70'. @ 71' - 72': Gravelly Sand (SP) interbeds. *Silty Clay (CL):* 100% low-plasticity fines; compact; moist.	67.9; 72.0	15		50	1415	#2-/16 Sand; 2" dia. PVC 10 slot screen (67.28' - 86.18')
73, 74, 75, 76	23	*Silty Sand (SM):* very moist to wet.	74.0; 75.8					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100'/10" to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/10/01

Well Installation Date: 12/11/01

Sheet: 4 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-3

Project No.: L.1202.CONJ.422

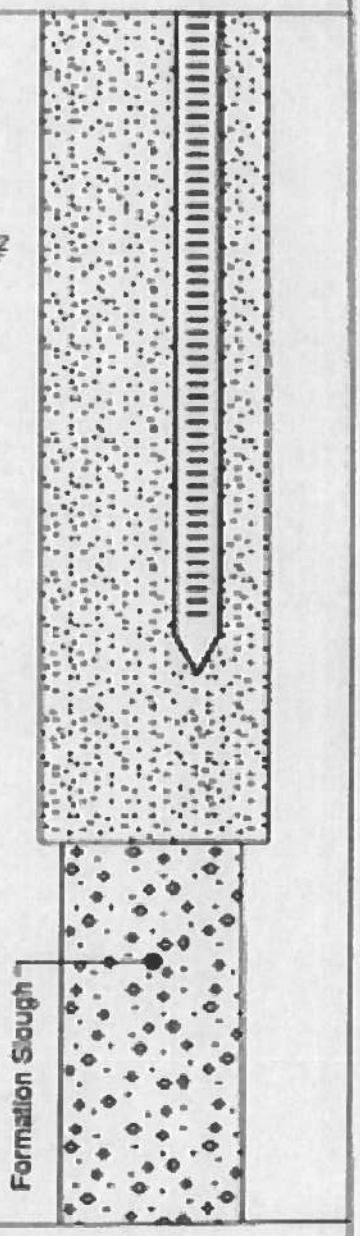
Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96								
24		*Sandy Clay (CL).* 70% low-plasticity fines; 30% fine to medium sand; compact; moist.	76.6	16		74	1425	
		@ 80': First groundwater encountered.	79.5					
		Clayey Sand (SC): 30% non- to low-plasticity fines; 70% fine to medium sand; compact; wet.	81.5					
25		*Silty Sand (SM).*		17		92		
		@ 82-83.5': Silty Sand with Gravel (SM); loose; wet.						
26				18		0	1445	
27								
		Silty Sand (SM): some interbedded Silty Clay (CL); compact to loose; wet.	90.0					
28		Driller notes flowing sands @ 90'.		19		100	1458	
		Clayey Sand (SC): very moist.	94.0					
29		*Sand (SP).*	95.0					



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100'/10" to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/10/01

Well Installation Date: 12/11/01

Sheet: 5 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-3

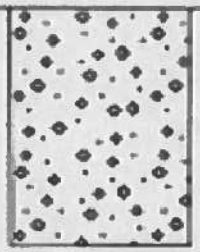
Project No.: L 1202.CONJ.422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	Well Completion Details
97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116								
30		Sand (SP). Driller notes flowing sands @ 100'.	98.5	20		0	1510	 Hole Diameter = 8"
			100.0					
31		Drill hole terminated @ 100 feet. Target depth reached.						
32								
33								
34								
35								

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100'/10" to 90'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/10/01

Well Installation Date: 12/11/01

Sheet: 6 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-4

Project No.: L.1202.CONA422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (ft / m)	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
		Ground Surface						8" Steel Well Box
		Sand with Silt (SP-SM): red gray (5YR 5/2); 15% non-plastic fines; 85% fine to medium sand; loose; moist.	0.0					
		Silty Sand (SM): 25% non-plastic fines; 75% fine to medium sand; loose; moist. Driller notes hard drilling @ 3.5'.	2.0	1		58	1420	
		Silty Sand (SM): yellowish brown (10YR 5/6); 20% non-plastic fines; 80% fine to medium sand; loose; moist. @ 6': a 5" diameter rounded cobble was excavated during the reaming of drill hole to 10".	5.0	2		20	1429	
		Driller notes hard drilling til 9'. *Silty Sand (SM).* Driller notes hard drilling from 11 - 14'.	10.0	3		14	1435	
		Sand (SP): 100% fine to medium sand; trace mafic igneous gravel clast to 2.25" diam.; rounded; loose; moist.	14.0					

Depth scale: ft -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; m 0, 1, 2, 3, 4

Well completion details: A, B; Concrete; Native Sand Backfill; 3/8" Bentonite Chips; 2" dia. PVC blank casing; 2" dia. PVC blank casing

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100' / 10" to 103'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/12/01 - 12/13/01

Well Installation Date: 12/13/01

Sheet: 1 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-4

Project No.: L 1202 CONJ 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
5, 17, 18, 19, 6, 20				4		54	1443	
21, 22, 23, 7, 24		*Sand (SP):* trace gravel; loose; moist.	20.0	5		40		
25, 26, 8, 27, 28, 29		*Sand (SP):* light yellowish brown (2.5Y 6/3); loose; moist.	25.0	6		38		
9, 30, 31, 32, 10, 33, 34		*Sand (SP).*	30.0	7		44		#2-/15 Sand
35, 36			35.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100' / 10" to 103'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/12/01 - 12/13/01

Well Installation Date: 12/13/01

Sheet: 2 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-4

Project No.: L.1202 CONJ 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
11, 37, 38, 39, 12, 40		*Sand (SP):* 100% fine to medium sand; loose; moist; laminations with FeO common.		8		46		2" dia. PVC 10 slot screen (32.84 - 51.84')
41, 42, 13, 43		*Sandy Silt (ML):* 70% non-plastic fines; 30% fine sand; loose; moist; laminations and FeO staining common; clay nodules common; Silty Sand (SM) interbeds common.	40.7	9		64		
44, 45, 46, 14, 47, 48, 49, 15		*Silty Sand (SM):* some interbedded Silt (ML); loose; moist; laminated; FeO staining common.	44.0	10		60		
50, 51, 52		*Silty Sand (SM):* 45% non-plastic fines; 55% fine sand; compact to loose; moist; laminated.	50.0					
16, 53, 54, 55		*Clayey Silt (ML):* 95% non- to low-plasticity fines; 5% fine sand; compact; moist; laminated; some Sandy Silt interbeds.	52.3	11		82		
17, 56			55.8					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100' / 10" to 103'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/12/01 - 12/13/01

Well Installation Date: 12/13/01

Sheet: 3 of 6

Log of Drill Hole: OW-4

State of California
The Resources Agency
Department of Water Resources

Project No.: L 1202 CONJ 422

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
57, 58, 59 – 18		*Sand (SP).*		12		80		3/8" Bentonite Chips
60, 61, 62 – 19, 63, 64		*Sand (SP):* 100% fine to medium sand; loose; moist; black silt (heavy mineral) laminations common; FeO staining common.	60.0	13		54	1540	
65, 66 – 20, 67		*Sand (SP):* 100% fine to medium sand; loose; moist; minor laminations.	65.0					
68		*Silty Clay (CL):* pale yellow (2.5Y 7/3); 100% non- to low-plasticity fines; compact; moist.	67.4	14		54	0750	
69 – 21, 70, 71		*Sandy Silt (ML):* some interbedded Silty Sand (SM).	68.6					#2-/16 Sand
72 – 22		*Silty Clay (CL).*	71.5	16		68	0805	
73, 74		*Sand (SP).*	72.9					
75 – 23, 76		*Silty Sand (SM):* some interbedded Silt (ML). @ 76': moist to very moist.	74.5					
			76.2					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100' / 10" to 103'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/12/01 - 12/13/01

Well Installation Date: 12/13/01

Sheet: 4 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-4

Project No.: L.1202.CONJ.422

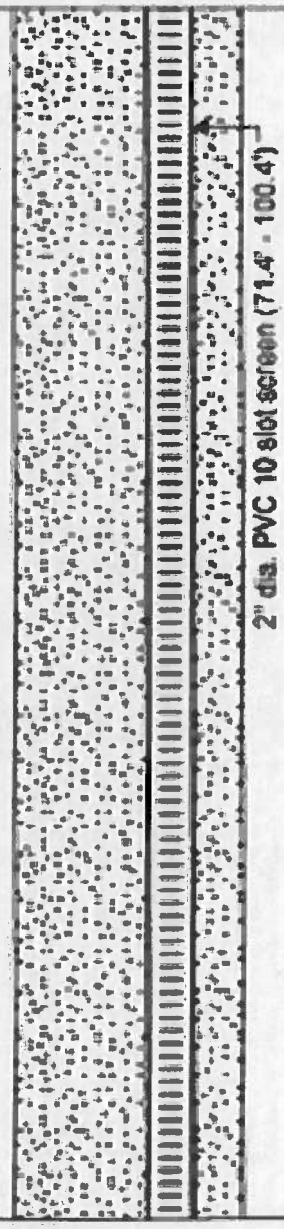
Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
77		*Silty Sand (SM):* @ 76.6': Silty Clay (CL) interbed (0.4' thick).	77.0	16		68		
78		*Sand (SP).*	78.2					
79 – 24		*Sandy Silt (ML).* @ 77.4 - 78': pervasive FeO staining.						
80								
81								
82 – 25		*Silty Clay (CL).* compact; moist. @ 83 - 83.4': Silt (ML) interbed.	82.0	17		78		
83								
84								
85		*Sandy Silt (ML).* First groundwater encountered @ 85'.	84.5					
86 – 26		*Silty Sand (SM):* 40% non-plastic fines; 60% fine sand; loose; wet.	85.5					
87		*Silt (ML):* 90% non-plastic fines; 10% fine sand; loose; wet. @ 90': very moist to wet.	87.0	18		54		
88 – 27								
89								
90								
91		*Silty Sand (SM):* 40% non-plastic fines; 60% fine sand; compact to loose; wet. @ 92': Silt (ML) interbed 0.2' thick.	91.1					
92 – 28			92.2	19		74		
93		*Silty Clay (CL):* compact; moist.						
94		*Sand with Silt (SP-SM):* 15% non-plastic fines; 85% fine to medium sand; loose; wet.	94.0					
95 – 29								
96			95.5					
			96.4					



Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100' / 10" to 103'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/12/01 - 12/13/01

Well Installation Date: 12/13/01

Sheet: 5 of 6

State of California
The Resources Agency
Department of Water Resources

Log of Drill Hole: OW-4

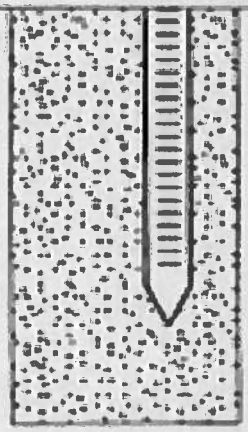
Project No.: L 1202 CONJ A22

Project: Merced Irrigation District

Client: Integrated Storage Investigations Program

Location: Winton, California

Geologist: Chris Bonds

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth	Symbol	Description	Elevation / Depth (ft)	Core Run Number	Type	Recovery (%)	Time	
97, 98, 30, 99, 100, 101, 31, 102, 103		*Sandy Silt (ML):* 60% non-plastic fines; 40% fine to medium sand; loose; wet.		20		58	0855	 Hole Diameter = 10"
		Sand (SP): 100% fine to medium sand; loose; wet.						
104, 105, 32, 106, 107, 108, 33, 109, 110, 111, 34, 112, 113, 114, 115, 35, 116		Drill hole terminated @ 100'; Target depth reached; Drill hole was reamed to 10" diameter to a depth of 103' for well installation.	103.0					

Drilled By: Spectrum Exploration, Inc. with CME 750X all-terrain drilling rig

Hole Size: 8" to 100' / 10" to 103'

Drill Method: Hollow-stem auger

Datum: mean sea level

Drill Date: 12/12/01 - 12/13/01

Well Installation Date: 12/13/01

Sheet: 6 of 6

Merced Integrated Regional Water Management Implementation Grant Proposal

Appendix 3-11

Improvement Plans for MID Cressey Groundwater Recharge Basin

IMPROVEMENT PLANS
FOR
MERCED IRRIGATION DISTRICT
CRESSEY GROUNDWATER RECHARGE BASIN
LYING WITHIN
SECTION 14, T.6S., R.12E., M.D.B.& M.

IMPROVEMENT NOTES:

MID NOTES:

1. THE SIGNATURE OF THE MERCED IRRIGATION DISTRICT (MID) ON DRAWINGS CONSTITUTES MID'S APPROVAL OF THE SAME AS TO THE ENGINEERING ASPECTS THEREOF ONLY AND DOES NOT AUTHORIZE, EXPRESSLY OR IMPLICITLY THE CONSTRUCTION OF ANY ASPECT HEREOF OR THE INTERFERENCE WITH ANY PROPERTY, EQUIPMENT, OR INTEREST OF THE MID. NO SUCH CONSTRUCTION OR INTERFERENCE SHALL OCCUR UNTIL THE MID HAS OBTAINED, BY SEPARATE AGREEMENT SUCH AGREEMENTS AS MID DEEMS NECESSARY FOR THE PROTECTION OF ITS FACILITIES.
2. ALL CONSTRUCTION WITHIN THE MID RIGHT-OF-WAY SHALL BE DONE IN ACCORDANCE WITH THE APPROVED DRAWINGS AND THE CURRENT EDITION OF MID STANDARDS AND CALTRANS STANDARD SPECIFICATIONS, AS APPLICABLE.
3. OMITTED
4. CONTRACTOR SHALL PROVIDE AN ALTERNATE STORM WATER REROUTE DURING CONSTRUCTION UNLESS DETERMINED OTHERWISE BY THE MID ENGINEER.
5. WHERE THE PLANS OR SPECIFICATIONS DESCRIBE PORTIONS OF THE WORK IN GENERAL TERMS BUT NOT IN COMPLETE DETAIL, IT IS UNDERSTOOD THAT ONLY THE BEST GENERAL PRACTICE IS TO PREVAIL AND THAT ONLY MATERIALS AND WORKMANSHIP OF THE FIRST QUALITY ARE TO BE USED.
6. MID STANDARD DETAILS MAY REQUIRE MODIFICATIONS BASED ON FOUND FIELD CONDITIONS SUCH MODIFICATIONS SHALL BE REVIEWED AND APPROVED BY THE MID ENGINEER.
7. CONTRACTOR AGREES TO ASSUME SOLE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
8. CAL-OSHA SAFETY REQUIREMENTS SHALL BE IN EFFECT DURING ALL CONSTRUCTION. SPECIAL SAFETY PRECAUTIONS SHALL BE TAKEN WHEN WORKING IN THE VICINITY OF GAS, OIL, OR ELECTRICAL LINES.
9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLY WITH CALIFORNIA GOVERNMENT CODE 4216, AS APPLICABLE. TO OBTAIN A DIG ALERT IDENTIFICATION NUMBER, CALL 800-227-2600 AT LEAST TWO WORKING DAYS BEFORE DIGGING UNDERGROUND.
10. THE MID WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE OBTAINED IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THE PLANS.
11. CONTRACTOR SHALL BE REQUIRED TO HAVE A PRE-CONSTRUCTION CONFERENCE WITH THE MID ENGINEER, PRIOR TO STARTING ANY WORK WITHIN THE MID RIGHT-OF-WAY.
12. EARTHFILL AND SUBGRADES SHALL BE COMPACTED TO A MINIMUM 90% RELATIVE COMPACTION (ASTM D-1557) WITHIN THE MID RIGHT-OF-WAY, UNLESS DETERMINED OTHERWISE BY THE MID ENGINEER.
13. A SET OF APPROVED PLANS SHALL BE ON THE JOB SITE AT ALL TIMES DURING CONSTRUCTION.
14. ANY DAMAGES TO MID FACILITIES DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED IN A MANNER APPROVED BY THE MID ENGINEER AT THE SOLE COST OF THE CONTRACTOR.
15. ANY WORK WITHIN THE MID RIGHT-OF-WAY SHALL NOT BE DEEMED COMPLETE UNTIL THE MID ENGINEERING DEPARTMENT HAS BEEN PROVIDED WITH A SET OF AS-BUILT PLANS IN AUTO CAD R12 AND HARD COPY FORMATS.
16. CONTACT THE MERCED IRRIGATION DISTRICT ENGINEERING DEPARTMENT AT LEAST TWO WORKING DAYS PRIOR TO ANY CONSTRUCTION AND/OR NECESSARY INSPECTIONS. WORK WITHIN THE MID RIGHT-OF-WAY SHALL PROCEED IN A CONTINUOUS MANNER ONCE STARTED. THE MID ENGINEER SHALL BE NOTIFIED OF ANY WORK STOPPAGES. WHENEVER WORK IS TO RESTART, THE MID ENGINEER SHALL REQUIRE AN ADDITIONAL TWO WORKING DAYS NOTICE. THE MID ENGINEER SHALL ALSO BE CONTACTED A MINIMUM OF TWO WORKING DAYS PRIOR TO ALL CONSTRUCTION SCHEDULED ON A HOLIDAY OR WEEKEND. PHONE: 209-722-5761.
17. TRACER WIRE SHALL BE INSTALLED WITH THE PIPELINE AS DIRECTED BY MID ENGINEER.
18. CONTRACTOR SHALL PROVIDE TEMPORARY ACCESS AT EXISTING ACCESSES/CROSSINGS ETC. DURING CONSTRUCTION
19. NOTIFY AFFECTED PARTIES OF INTENTION TO PROVIDE TEMPORARY ACCESS 24 HOURS PRIOR TO CONSTRUCTION.
20. CONTRACTOR SHALL RETURN CONSTRUCTION SITE TO ORIGINAL OR BETTER CONDITION.
21. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY ANY DRY UTILITY TO BE PROTECTED OR RELOCATED.
22. CONTRACTOR IS RESPONSIBLE TO PUMP ANY REMAINING WATER FROM IRRIGATION FACILITIES AS NECESSARY FOR CONSTRUCTION.
23. ALL MATERIALS SPECIFICATIONS, SHOP DRAWINGS AND/OR CUT SHEETS SHALL BE SUPPLIED TO M.I.D. ENGINEER FOR APPROVAL PRIOR TO ORDERING.
24. DIRT PILE TOP ELEVATION OF 191.0 IS ONLY AN ESTIMATE OF QUANTITY OF DIRT TO BE REMOVED FROM BASIN AREA, SHRINKAGE AND MOISTURE CONTENT NOT TAKEN INTO ACCOUNT. NO IMPORT OR EXPORT OF DIRT.
25. CONTRACTOR IS RESPONSIBLE FOR STORM WATER POLLUTION PREVENTION PLAN (S.W.P.P.P.) & DUST CONTROL PLAN

ABBREVIATIONS USED IN THIS WORK

AB	AGGREGATE BASE	EQUIP	EQUIPMENT	OH	OVERHEAD
ACP	ASBESTOS CEMENT PIPE	EW	EACH WAY	PI	POINT OF INTERSECTION
AC	ASPHALT CONCRETE	EXIST	EXISTING	PL	PROPERTY LINE
APPROX	APPROXIMATE (LY)	EASMT	EASEMENT	PP	POWER POLE
AVG	AVERAGE	FG	FINISH GRADE	PVC	POLYVINYL CHLORIDE PIPE
BC	BEGINNING OF CURVE	FH	FIRE HYDRANT	PRC	POINT OF REVERSE CURVE
BLDG	BUILDING	FIN	FINISH (ED)	PCC	PORTLAND CEMENT CONCRETE
BLK	BLOCK	FL	FLOWLINE	PVMNT	PAVEMENT
BO	BLOWOFF	FM	FORCE MAIN	PUE	PUBLIC UTILITY EASEMENT
BVC	BEGIN VERTICAL CURVE	FLG	FLANGE	R	RADIUS
BM	BENCHMARK	FT	FEET OR FOOT	RET	RETURN
CB	CATCH BASIN	FTG	FOOTING	R/W	RIGHT OF WAY
C&G	CURB & GUTTER	FL	FLOW LINE	ROW	RIGHT OF WAY
(C)	CALCULATED	FOC	FACE OF CURB	RCP	REINFORCED CONCRETE PIPE
CIP	CAST IRON PIPE	FF	FINISH FLOOR	REQ'D	REQUIRED
CIPCP	CAST IN PLACE CONCRETE PIPE	GB	GRADE BREAK	SPEC	SPECIFICATIONS
CR	CURB RETURN	GALV	GALVANIZED	SEC	SECTION
CL	CENTER LINE (OR) CLASS	GRND	GROUND	SF	SQUARE FEET
CMP	CORRUGATED METAL PIPE	G.V.E.	GOLDEN VALLEY ENGINEERING & SURVEYING, INC.	SPD	SPREAD
CMU	CONCRETE MASONRY UNIT			STD	STANDARD
CO	CLEANOUT	HOR	HORIZONTAL	S	SOUTH
CONC	CONCRETE	HP	HIGH POINT	STL	STEEL
CYCM	CUBIC YARD COMPACTED MEASUREMENT	HWS	HIGH WATER STAIN	STA	STATION
DBL	DOUBLE	IRR	IRRIGATION	SS	SANITARY SEWER
DET	DETAIL	ID	INSIDE DIAMETER	SHT	SHEET
DWG	DRAWING	INV	INVERT	SD	STORM DRAIN
DIA	DIAMETER	IP	IRON PIPE	SDFM	STORM DRAIN FORCE MAIN
DIP	DUCTILE IRON PIPE	L	LENGTH	TRANS	TRANSFORMER
DW	DRIVEWAY	LF	LINEAR FEET	TYP	TYPICAL
DIM	DIMENSION	MAN	MANUAL	TEMP	TEMPORARY
ELEC	ELECTRIC	MAX	MAXIMUM	TC	TOP OF CURB
ENGR	ENGINEER	Mc	McCOY	TPE	TREE PLANTING EASEMENT
E	EAST	MECH	MECHANICAL	TELE	TELEPHONE
EVC	END VERTICAL CURVE	MET	METAL	UG	UNDERGROUND
EA	EACH	MID	MERCED IRRIGATION DISTRICT	UIP	UTILITY POLE
EC	END OF CURVE			VCP	VITRIFIED CLAY PIPE
EG	EXISTING GROUND	MIN	MINIMUM	VERT	VERTICAL
ELEV	ELEVATION	MISC	MISCELLANEOUS	WV	WATERVALVE
ELL	ELBOW	NA	NOT APPLICABLE	W/	WITH
E/S	EAST SIDE	N	NORTH	W/O	WITHOUT
EMSNS	ELECTROLIER MOUNTED STREET NAME SIGN	NRCP	NON REINFORCED CONCRETE PIPE	W	WEST
		NTS	NOT TO SCALE	W/S	WEST SIDE
EP	EDGE OF PAVEMENT	OC	ON CENTER	±	PLUS OR MINUS (APPROXIMATE)
		OD	OUTSIDE DIAMETER		

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD THE DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.

UNAUTHORIZED CHANGES & USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

NOTE TO DEVELOPERS AN CONTRACTORS:

THESE IMPROVEMENT PLANS HAVE BEEN PREPARED WITH THE INTENT THAT THE FIRM OF GOLDEN VALLEY ENGINEERING AND SURVEYING, INC. WILL BE PERFORMING THE CONSTRUCTION STAKING FOR THE COMPLETE PROJECT. IF, HOWEVER, ANOTHER ENGINEERING AND/OR SURVEYING FIRM SHOULD BE EMPLOYED TO USE THESE PLANS FOR THE PURPOSE OF CONSTRUCTION STAKING, NOTICE IS HEREBY GIVEN THAT THE FIRM OF GOLDEN VALLEY ENGINEERING AND SURVEYING, INC. WILL NOT ASSUME ANY RESPONSIBILITY FOR ERRORS OR OMISSIONS, IF ANY, WHICH MIGHT OCCUR AND WHICH COULD HAVE BEEN AVOIDED, CORRECTED OR MITIGATED IF THE FIRM OF GOLDEN VALLEY ENGINEERING AND SURVEYING, INC. HAD PERFORMED THE STAKING WORK.

NOTE:

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

CELSOC
CONSULTING ENGINEERS AND LAND SURVEYOR'S OF CALIFORNIA

CELSOC
CONSULTING ENGINEERS AND LAND SURVEYOR'S OF CALIFORNIA

NOTE:

ANY QUANTITIES PROVIDED BY THE ENGINEER ARE ESTIMATES AND APPROXIMATES ONLY AND FURNISHED ONLY TO ASSIST THE CONTRACTOR IN PREPARING HIS PROPOSAL.

THE CONTRACTOR IN PREPARING HIS PROPOSAL SHALL MAKE HIS OWN ESTIMATE OF QUANTITIES BASED ON THE IMPROVEMENT PLANS. ANY DISCREPANCIES BETWEEN THE LISTED QUANTITIES AND THE CONTRACTOR'S QUANTITIES SHALL BROUGHT TO THE ENGINEER'S ATTENTION.

THE OWNER MAY INCREASE OR DECREASE THE AMOUNT OF ANY CLASS OR PORTION OF THE WORK OR OMIT PORTIONS OF THE WORK THAT MAY BE DEEMED NECESSARY OR EXPEDIENT BY THE ENGINEER.

ANY EXISTING UNDERGROUND UTILITIES SHOWN ON THIS DRAWING WERE LOCATED BY VISUAL MEANS OR BY REFERENCE TO RECORD DATA. THE FIRM OF GOLDEN VALLEY ENGINEERING AND SURVEYING, INC. ASSUMES NO LIABILITY FOR THE ACCURACY OR COMPLETENESS OF RECORD DATA.

STAKING NOTE:

ALL IMPROVEMENTS SHALL BE CONSTRUCTED AT THE LOCATIONS SHOWN HEREON BASED ON THE FINAL MAP FOR THIS PROJECT. ALL STATIONING SHOWN HEREON IS FOR REFERENCE ONLY AND IS NOT FOR USE IN LOCATING ANY IMPROVEMENTS FOR CONSTRUCTION.

THE CONTRACTOR SHALL PRESERVE ALL STAKES AND POINTS SET FOR LINES, GRADES, OR MEASUREMENT OF THE WORK IN THEIR PROPER PLACES UNTIL AUTHORIZED TO REMOVE THEM BY THE ENGINEER. MERCED IRRIGATION DISTRICT WILL ONLY PROVIDE ONE SET OF STAKES FOR EACH PHASE OF CONSTRUCTION. ALL EXPENSES INCURRED IN REPLACING STAKES THAT HAVE BEEN REMOVED WITHOUT PROPER AUTHORITY SHALL BE PAID FOR BY THE CONTRACTOR AND MAY BE DEDUCTED FROM PAYMENTS DUE THE CONTRACTOR.

EARTH QUANTITIES:
TOTAL BASIN CUT: 100,148 CUBIC YARDS
TOTAL DIRT PILE FILL: 113,600 CUBIC YARDS
NOTE: DIRT PILE TOP ELEVATION OF 191.0 IS ONLY AN ESTIMATE OF QUANTITY OF DIRT TO BE REMOVED FROM BASIN AREA, SHRINKAGE AND MOISTURE CONTENT NOT TAKEN INTO ACCOUNT. NO IMPORT OR EXPORT OF DIRT.

BENCHMARK
CHISELED SQUARE AT THE NORTHWEST CORNER OF THE CONCRETE WALK OVER SOUTH OF THE WEIR ACROSS CRESSEY LATERAL NORTHWEST OF THE INTERSECTION OF JONES ROAD AND MERCEDES AVENUE.
ELEVATION: 185.00

UTILITY COMPANIES

TELEPHONE – PACIFIC BELL	(209) 549-5842
CABLE TELEVISION – AT & T CABLE	(209) 384-1316
ELECTRIC – PACIFIC GAS & ELECTRIC	(209) 726-6337
MERCED ELECTRIC IRRIGATION DISTRICT.	(209) 722-5761
GAS – PACIFIC GAS & ELECTRIC	(209) 726-6337
IRRIGATION– MERCED IRRIGATION DISTRICT	(209) 722-5761

LOCATION AND DEPTH OF EXISTING SUB-SURFACE STRUCTURES ARE NOT GUARANTEED. OTHER SUB-SURFACE STRUCTURES MAY OR MAY NOT EXIST.
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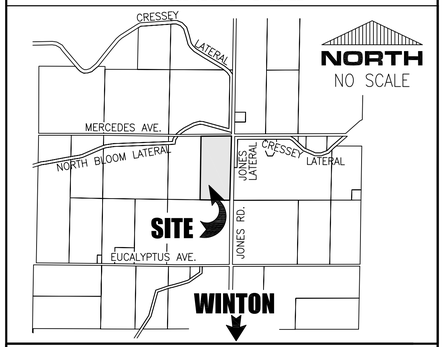
VICINITY MAP



APPROVALS

MERCED IRRIGATION DISTRICT
744 W. 20th. St., Merced, CA 95340 (209)722-5761

HICHAM ELTAL
DEPUTY GENERAL MANAGER, WATER RESOURCES

_____ , 201__
DATE

MERCED IRRIGATION DEPT. NOTES

1 ALL IMPROVEMENTS SHALL BE IN ACCORDANCE WITH MID STANDARD DETAILS AND THESE PLANS IF A CONFLICT BETWEEN MID SPECIFICATIONS AND THESE PLANS EXISTS THE MOST RESTRICTIVE SHALL APPLY.

2 IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO USE RUBBER GASKET JOINTS ON ALL PRECAST PIPES. THE COST FOR RUBBER GASKET RING SHALL BE INCLUDED IN THE UNIT PRICES OF PIPE.

3 AT ALL PIPE ENTRANCES AND EXITS AT CONCRETE STRUCTURES INCLUDING MANHOLES, AN EXPANSIVE WATERSTOP GASKET RING SHALL BE USED AT ALL PIPE TO CONCRETE STRUCTURE CONNECTIONS.

4 ALL REQUIRED AGREEMENTS SHALL BE EXECUTED PRIOR TO COMMENCEMENT OF WORK

REINFORCED CONCRETE PIPE NOTES

SEE M.I.D. DETAIL 593 ON SHEET MID-2

PVC PIPE NOTES

A) PIPELINE 27" AND SMALLER SHALL BE PVC. P.I.P. 51 WITH MINIMUM 48" COVER

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SHEET INDEX

SHEET #	DESCRIPTION
TS	TITLE SHEET
1	OVERALL SITE
2	TOPOGRAPHY, DEMOLITION, GRADING, & DRAINAGE PLAN
3	TOPOGRAPHY, DEMOLITION, GRADING, & DRAINAGE PLAN
4	BASIN SECTIONS
5	DETAILS
MID-1	M.I.D. DETAILS

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SHEET CONTENTS:
TITLESHEET

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MERCED, CA 95340
PHONE: (209) 722-5761
FAX: (209) 722-6421
ATT: BRYAN KELLY

IMPROVEMENT PLANS
FOR
MERCED IRRIGATION DISTRICT
CRESSEY GROUNDWATER RECHARGE BASIN
LYING WITHIN
SECTION 14, T.6S., R.12E., M.D.B.& M.

GOLDEN VALLEY
ENGINEERING & SURVEYING
405 W. 19th Street • P.O. Box 349 • Merced, CA 95340
Phone (209) 722-3200 • Fax (209) 722-3254

DESIGNED: GOLDEN VALLEY ENGINEERING & SURVEYING, INC.
DRAWN BY: STAFF
CHECKED: STAFF
DATE: JANUARY 2011
JOB NO.: 11008

SHEET
TS

W:\land projects\11008 CRESSEY BASIN - MID\dwg\11008-BASIN DIRT PILE PLAN.dwg, 3/21/2011 4:20:45 PM, 1:1

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IMPROVEMENT PLANS FOR MERCED IRRIGATION DISTRICT CRESSEY GROUNDWATER RECHARGE BASIN

LYING WITHIN SECTION 14, T.6S., R.12E., M.D.B.& M.

PREPARED FOR:
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ATT: BRYAN KELLY

SHEET CONTENTS:
OVERALL SITE

DESIGNED: GOLDEN VALLEY ENGINEERING & SURVEYING, INC.
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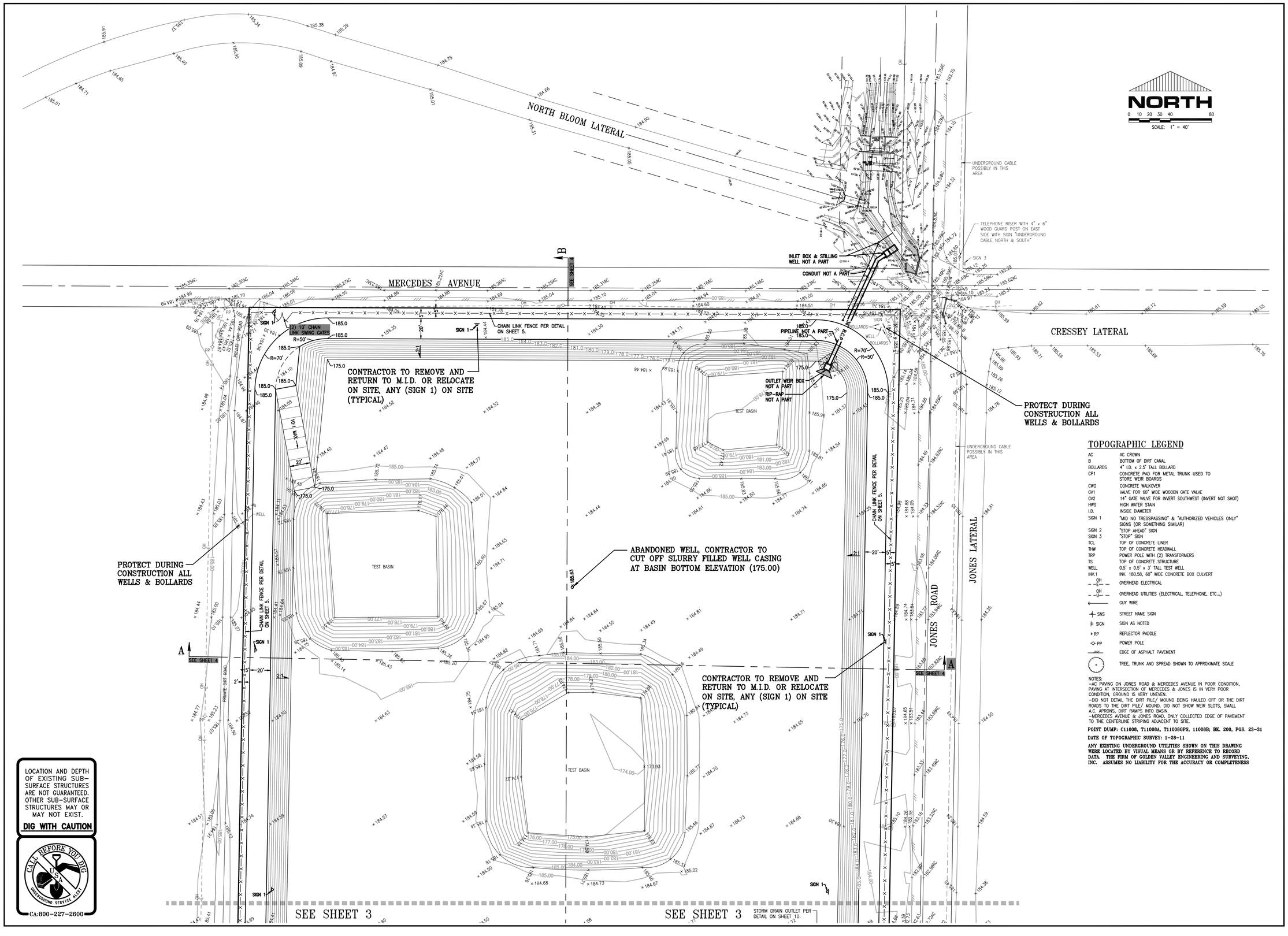
SHEET
1



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DIG WITH CAUTION

CALL BEFORE YOU DIG — USA — UNDERGROUND SERVICE ALERT

CA:800-227-2600

TOPOGRAPHIC LEGEND

AC	AC CROWN
B	BOTTOM OF DIRT CANAL
BOLLARDS	4" I.D. x 2.5' TALL BOLLARD
CP1	CONCRETE PAD FOR METAL TRUNK USED TO STORE WEIR BOARDS
CWO	CONCRETE WALKOVER
GV1	VALVE FOR 60" WIDE WOODEN GATE VALVE
GV2	14" GATE VALVE FOR INVERT SOUTHWEST (INVERT NOT SHOT)
HWS	HIGH WATER STAIN
I.D.	INSIDE DIAMETER
SIGN 1	"MID NO TRESSPASSING" & "AUTHORIZED VEHICLES ONLY" SIGNS (OR SOMETHING SIMILAR)
SIGN 2	"STOP AHEAD" SIGN
SIGN 3	"STOP" SIGN
TCL	TOP OF CONCRETE LINER
THW	TOP OF CONCRETE HEADWALL
TRP	POWER POLE WITH (2) TRANSFORMERS
TS	TOP OF CONCRETE STRUCTURE
WELL	0.5' x 0.5' x 3' TALL TEST WELL
INV.1	INV. 180.58, 60" WIDE CONCRETE BOX CULVERT
OH — E —	OVERHEAD ELECTRICAL
OH — U —	OVERHEAD UTILITIES (ELECTRICAL, TELEPHONE, ETC...)
	GUY WIRE
SNS	STREET NAME SIGN
SIGN	SIGN AS NOTED
RP	REFLECTOR PADDLE
PP	POWER POLE
	EDGE OF ASPHALT PAVEMENT
	TREE, TRUNK AND SPREAD SHOWN TO APPROXIMATE SCALE

NOTES:
-AC PAVING ON JONES ROAD & MERCEDES AVENUE IN POOR CONDITION, PAVING AT INTERSECTION OF MERCEDES & JONES IS IN VERY POOR CONDITION, GROUND IS VERY UNEVEN.
-DID NOT DETAIL THE DIRT PILE/ MOUND BEING HAULED OFF OR THE DIRT ROADS TO THE DIRT PILE/ MOUND. DID NOT SHOW WEIR SLOTS, SMALL A.C. APRONS, DIRT RAMPS INTO BASIN.
-MERCEDES AVENUE & JONES ROAD, ONLY COLLECTED EDGE OF PAVEMENT TO THE CENTERLINE STRIPING ADJACENT TO SITE.

POINT DUMP: C11008, T11008A, T11008GPS, 11008B; BK. 200, PGS. 23-31

DATE OF TOPOGRAPHIC SURVEY: 1-28-11

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IMPROVEMENT PLANS FOR

MERCED IRRIGATION DISTRICT CRESSEY GROUNDWATER RECHARGE BASIN

LYING WITHIN SECTION 14, T.6S., R.12E., M.D.B.& M.

PREPARED FOR:
MERCED IRRIGATION DISTRICT
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MERCED, CA 95340
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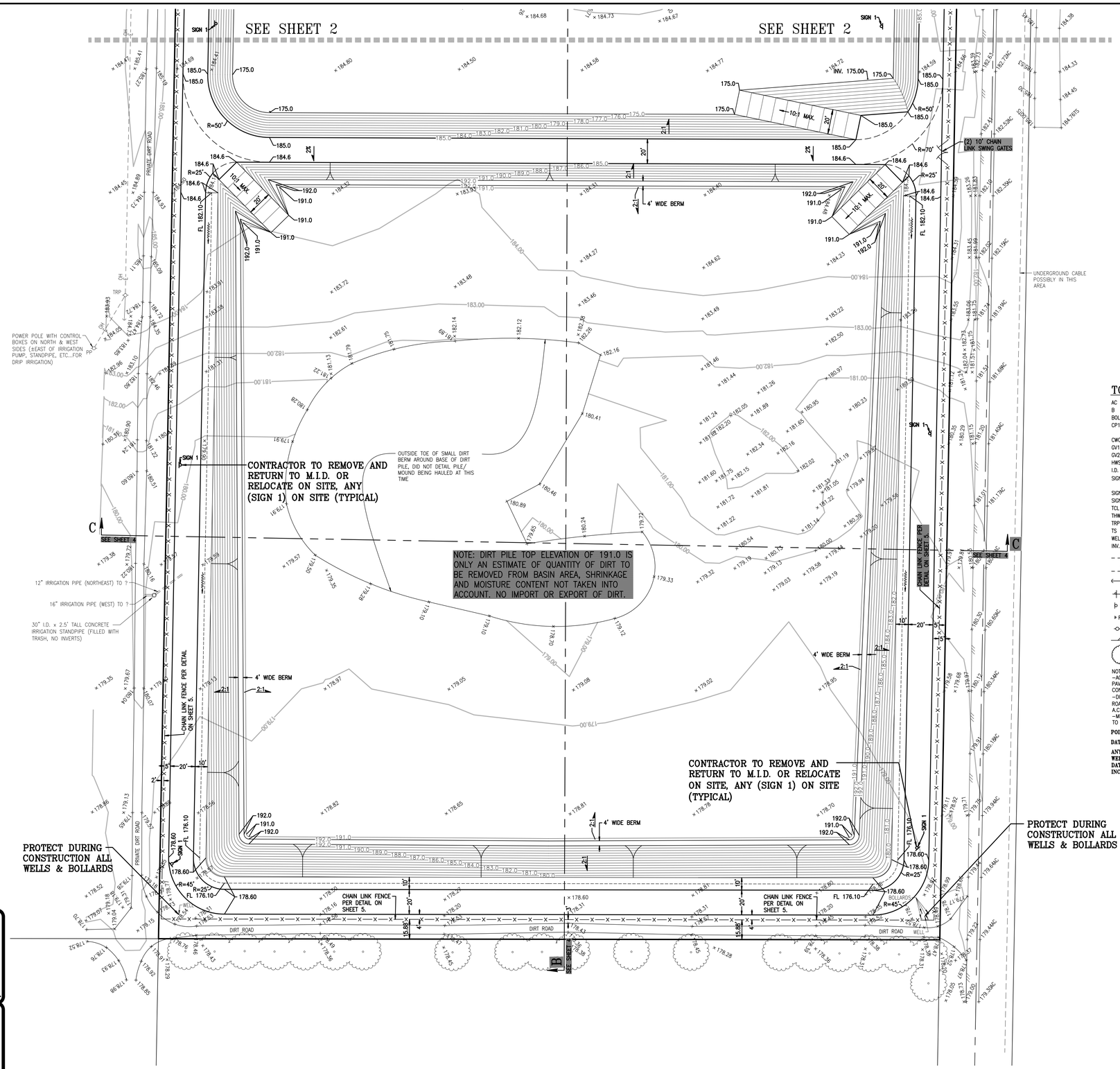
FAX: (209) 722-6421
ATT: BRYAN KELLY

SHEET CONTENTS:
TOPOGRAPHY, DEMOLITION, GRADING, & DRAINAGE PLAN

DESIGNED: GOLDEN VALLEY ENGINEERING & SURVEYING, INC.
DRAWN BY: STAFF
CHECKED: STAFF
DATE: JANUARY 2011
JOB NO.: 11008

SHEET
2



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NORTH

0 10 20 30 40 80

SCALE: 1" = 40'

TOPOGRAPHIC LEGEND

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POINT DUMP: C11008, T11008A, T11008GFS, 11008B; BK. 200, PGS. 23-31

DATE OF TOPOGRAPHIC SURVEY: 1-28-11

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IMPROVEMENT PLANS FOR MERCED IRRIGATION DISTRICT CRESSEY GROUNDWATER RECHARGE BASIN

LYING WITHIN SECTION 14, T.6S., R.12E., M.D.B.& M.

PREPARED FOR:
MERCED IRRIGATION DISTRICT
744 W. 20TH STREET
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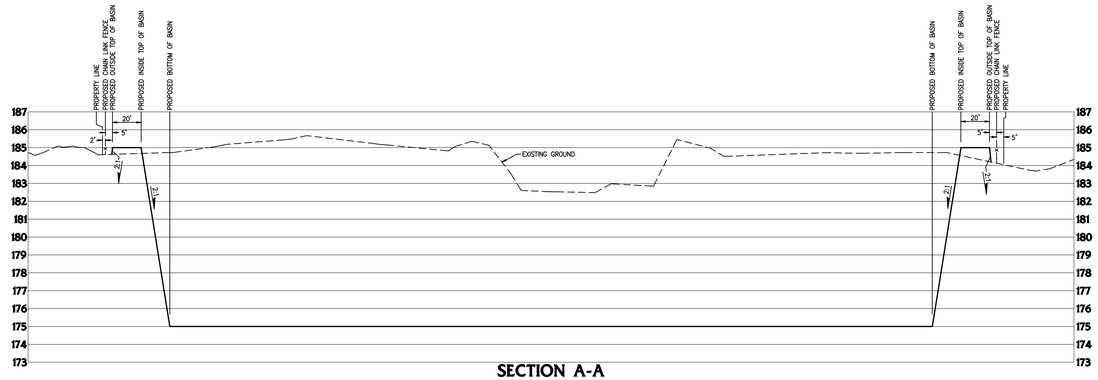
PHONE: (209) 722-5761
FAX: (209) 722-6421
ATT: BRYAN KELLY

SHEET CONTENTS:
TOPOGRAPHY, DEMOLITION, GRADING, & DRAINAGE PLAN

DESIGNED: GOLDEN VALLEY ENGINEERING & SURVEYING, INC.
DRAWN BY: STAFF
CHECKED: STAFF
DATE: JANUARY 2011
JOB NO.: 11008

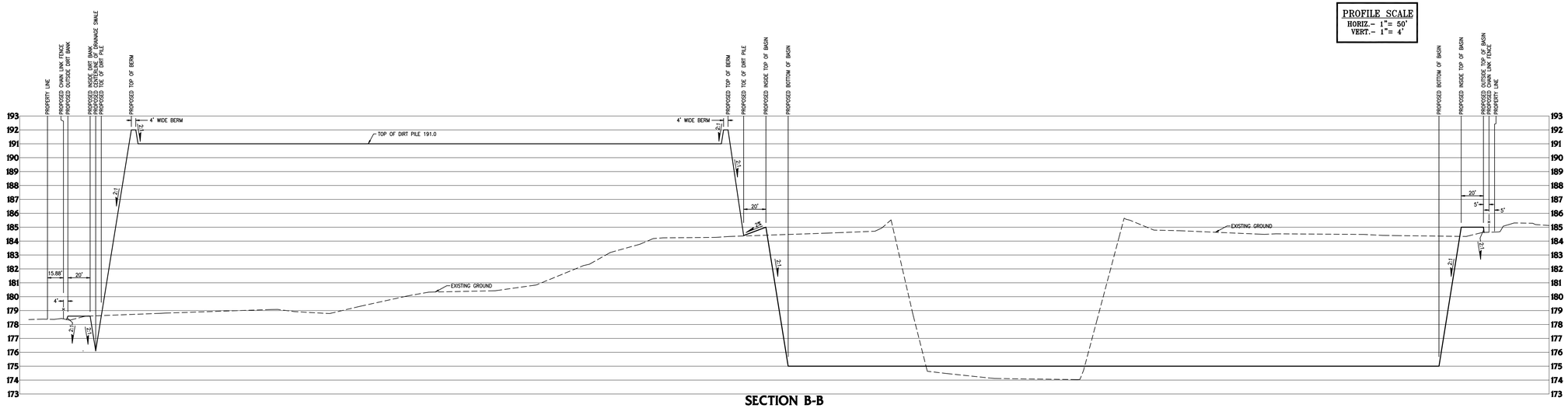
SHEET
3

W:\land projects\11008 CRESSEY BASIN - MID\dwg\11008-BASIN DIRT PILE PLANS.dwg, 3/21/2011 4:19:23 PM, 1:1

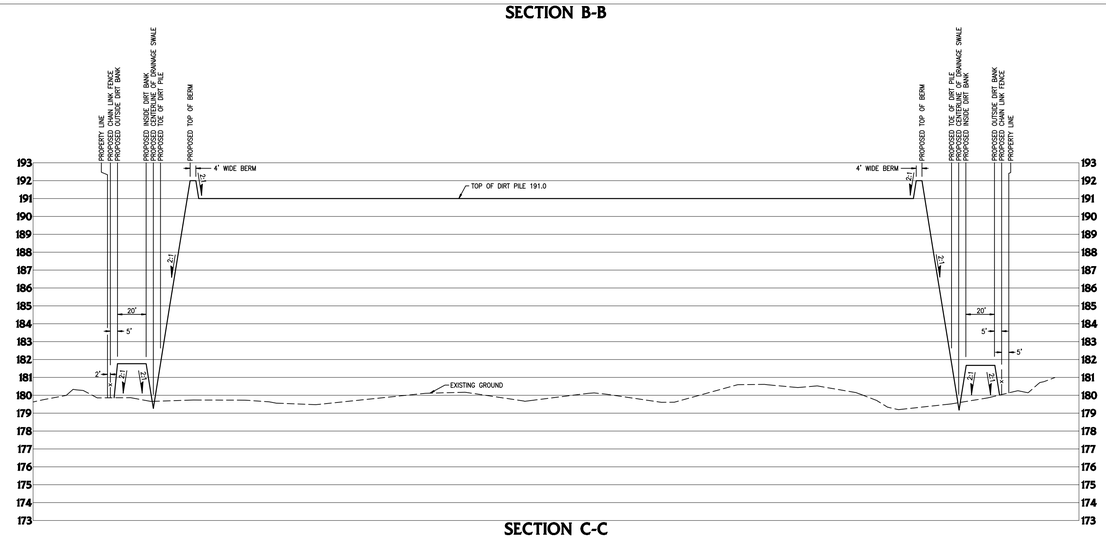


SECTION A-A

PROFILE SCALE
HORIZ.- 1"= 50'
VERT.- 1"= 4'



SECTION B-B



SECTION C-C

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IMPROVEMENT PLANS
FOR
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CRESSEY GROUNDWATER RECHARGE BASIN
LYING WITHIN
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ATT: BRYAN KELLY

SHEET CONTENTS:
BASIN SECTIONS

DESIGNED: GOLDEN VALLEY ENGINEERING & SURVEYING, INC.
DRAWN BY: STAFF
CHECKED: STAFF
DATE: JANUARY 2011
JOB NO.: 11008

SHEET
4

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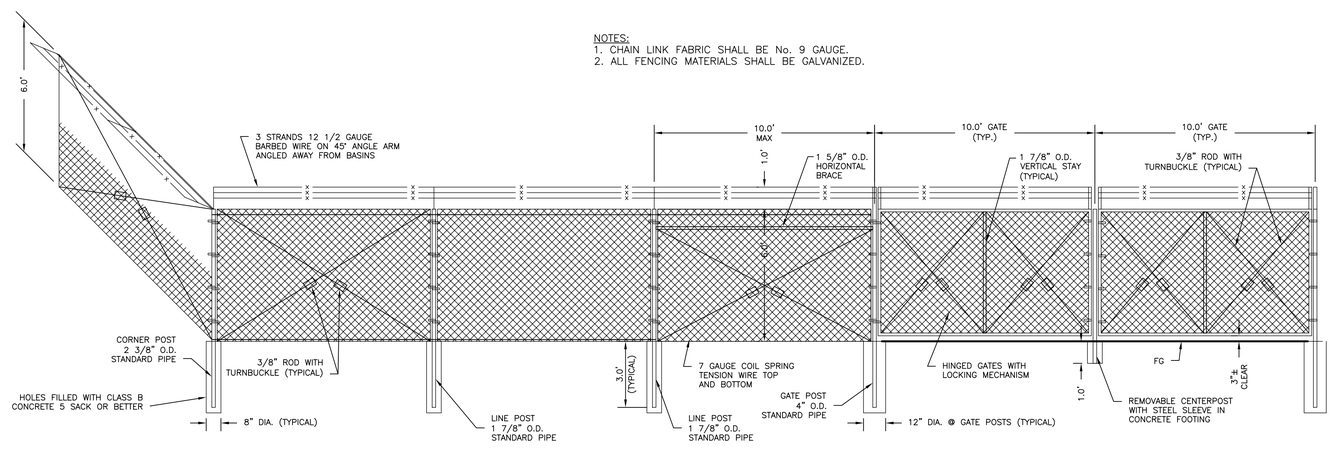

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IMPROVEMENT PLANS
FOR
MERCED IRRIGATION DISTRICT
CRESSEY GROUNDWATER RECHARGE BASIN
LYING WITHIN
SECTION 14, T.6S., R.12E., M.D.B.& M.

PREPARED FOR:
MERCED IRRIGATION DISTRICT
744 W. 20TH STREET
MERCED, CA 95340
PHONE: (209) 722-5761
FAX: (209) 722-6421
ATT: BRYAN KELLY

SHEET CONTENTS:
DETAILS

DESIGNED: GOLDEN VALLEY ENGINEERING & SURVEYING, INC.
DRAWN BY: STAFF
CHECKED: STAFF
DATE: JANUARY 2011
JOB NO.: 11008

SHEET
5

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Merced Integrated Regional Water Management Implementation Grant Proposal

Appendix 3-12

MID Cressey Recharge Basin Initial Study/Proposed Negative Declaration

Merced Irrigation District

Cressey Recharge Basin

Initial Study / Proposed Negative Declaration

Prepared by:
Fremming, Parson & Pecchenino
2816 Park Avenue
Merced, CA 95348
(209) 723-2066
March 31, 2010

z:\job\m009-2009B\ceqa\cressey recharge basin initial study.docx

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References and Resources

The United States of America will hereinafter be referred to as "U.S."

California will hereinafter be referred to as the "State."

Merced County will hereinafter be referred to as the "County," unless otherwise noted.

California Environmental Quality Act will hereinafter be referred to as "CEQA."

Merced Irrigation District will hereinafter be referred to as "M.I.D." or "the District."

The San Joaquin Valley Air Pollution Control District is also referred to as "SJVAPCD".

The Merced County Association of Governments is also referred to as "MCAG".

Specific Urban Development Plan will hereinafter be referred to as "SUDP."

The Merced County General Plan, 2000, is available from the Merced County office at 2222 M. St., Merced, CA, or can be viewed on-line at http://www.co.merced.ca.us/index.asp?nid=436.

The most recent published copy of the *Merced County General Plan Map* can be found at http://www.mcaggis.com/gallery/County/county_gp.pdf. Information used in this Initial Study may not reflect changes made to the General Plan since the publication of this document.

An on-line copy of the *California Agricultural Land Evaluation and Site Assessment Model (1997)* can be found at http://www.consrv.ca.gov/dlrp/LESA/Documents/lesamodl.pdf.

Maps prepared pursuant to the *Farmland Mapping and Monitoring Program of the California Resources Agency* can be found at ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2006/.

Federally protected wetlands (Sec. 404, CWA) are identified via Google Earth utilizing WetlandsData.KMZ available at http://www.fws.gov/wetlands/data/GoogleEarth.html.

A list of cleanup sites and hazardous waste permitted facilities can be found at http://www.envirostor.dtsc.ca.gov/public/.

Project Information

1. **Project Title**

   Cressey Recharge Basin

2. **Lead Agency Name and Address**

   Merced Irrigation District
   744 W. 20th Street
   Merced, CA 95340

3. **Contact Person and Phone Number**

   Bryan Kelly, P.E.
   Senior Engineer, Water Resources
   (209) 722-5761

4. **Project Location**

   The project lies on a 18+ acre parcel on the Southwest corner of Mercedes Avenue and Jones Road north of the community of Winton in Merced County, California.

5. **Project Sponsor's Name and Address**

   Merced Irrigation District
   744 W. 20th Street
   Merced, CA 95340

6. **General Plan Designation**

   General Agriculture

7. **Zoning**

   Agricultural (A-1)

8. **Description of Project**

   The Merced Irrigation District (MID) previously initiated the construction of a pilot groundwater recharge basin to evaluate the suitability for the installation of a full scale recharge basin. Based on successful pilot testing data, a 10+ acre ground water recharge basin will be constructed on the 18 acre site, with the remaining acreage used to stockpile the material from construction of the basin. This recharge basin will be used for recharging the Merced Groundwater Basin, as described in the California Department of Water Resources Bulletin 118-80, with Merced River surface water.

The project is the construction and operation of the complete recharge facility at this location.

9. Surrounding Land Uses and Setting

The project site is situated in an agricultural area. North, south and east properties are tree farms (almonds) and row crops are to the west of the property

10. Other Agencies

The Merced Irrigation District is the lead agency with ultimate responsibility for project approval, which will be in the form of a Board resolution. Other public agencies whose secondary approvals may be required (e.g., permits, financing approval, or participation agreement) are:

Agency	Type of Approval
County of Merced Public Works Pipeline Crossing	Encroachment permit

Proposed Findings

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agricultural Resources	☐ Air Quality
☒ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Hazards & Hazardous Materials	☐ Hydrology/Water Quality	☐ Land Use/Planning
☐ Mineral Resources	☐ Noise	☐ Population/Housing
☐ Public Services	☐ Recreation	☐ Transportation/Traffic
☐ Utilities/Service Systems	☐ Mandatory Findings of Significance	☐ None

DETERMINATION: On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

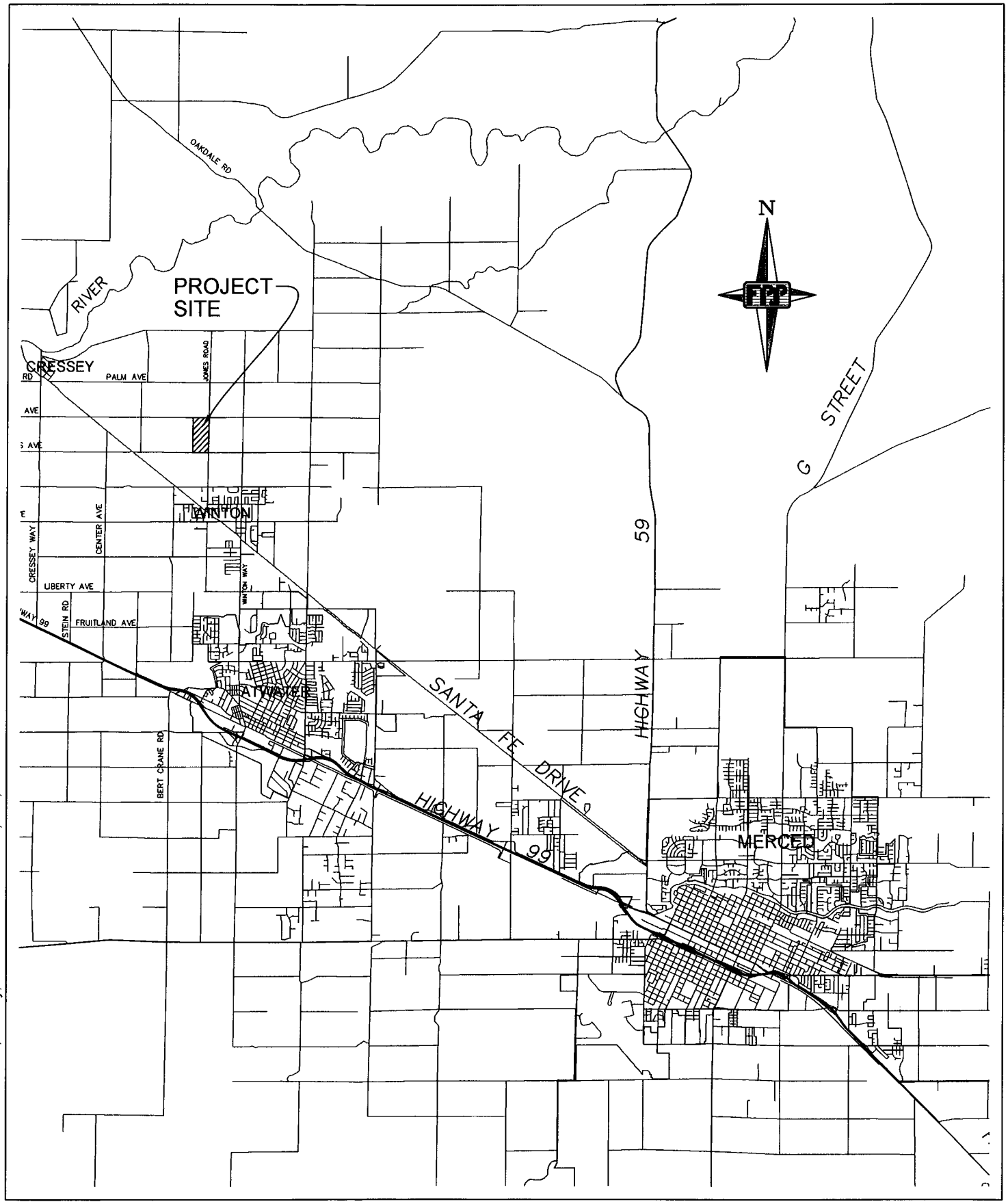
☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project might have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze on the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature	Date
Printed Name	For



Merced County

Figure 1: Vicinity Map

Source: Merced County Planning Dept., MCAG, 2007

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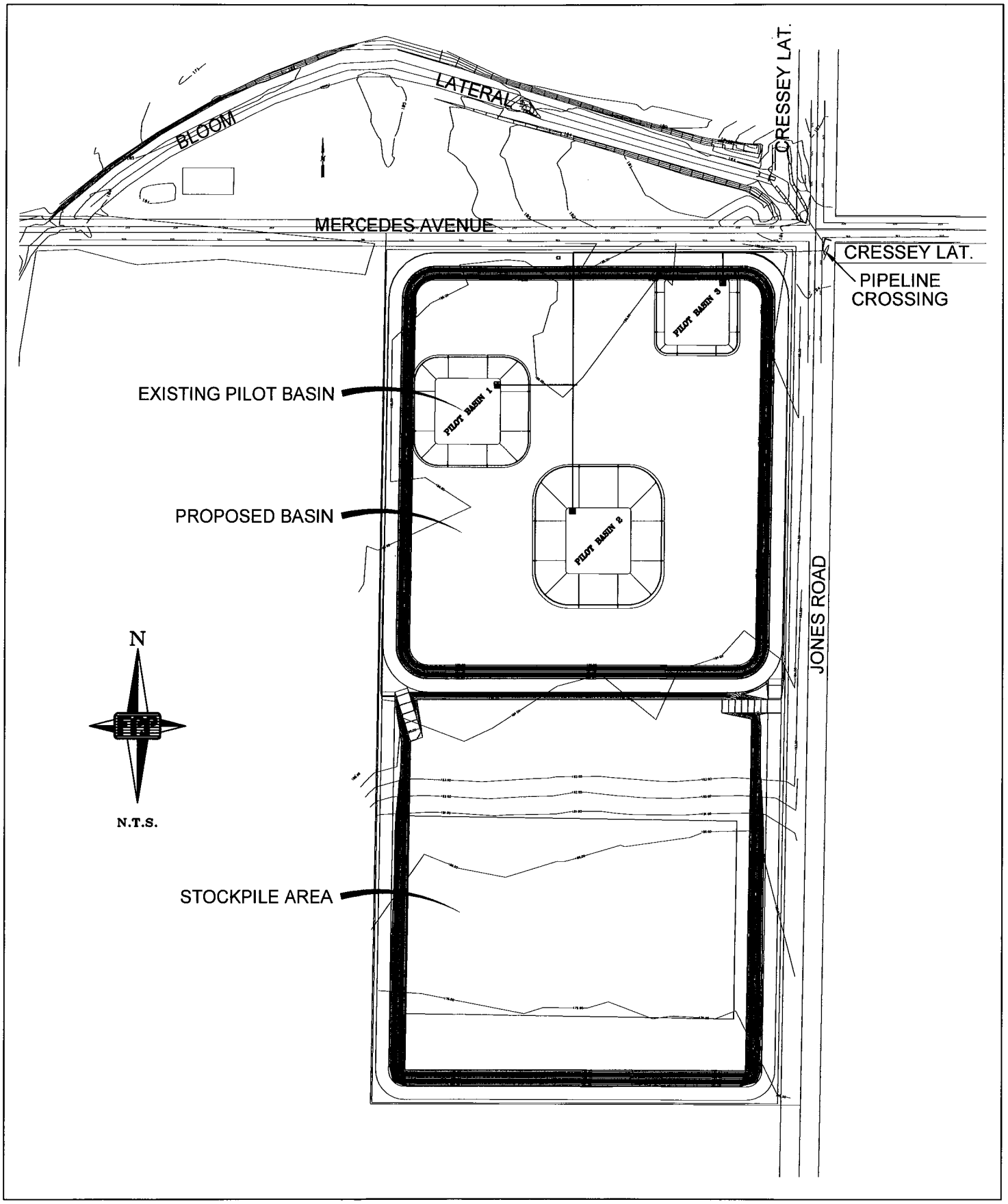

Merced County

Merced Irrigation District
Cressey Pilot Recharge Basin

Figure 2: Site Plan
Source: Fremming, Parson & Pecchenino

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Issues

I. AESTHETICS

DISCUSSION

This environmental issue focuses on the impacts of a project on scenic vistas and the overall appearance of the project in the community context. Issues of light and glare, community view-sheds, architectural compatibility with existing development or a specific site or setting are all part of the issue of "Aesthetics" as addressed within the framework of CEQA.

SETTING

The project site is situated in an agricultural area. North, south and east properties are tree farms (almonds) and row crops are to the west of the property

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒

The project site is not located in or near any designated scenic vistas and therefore would not have a substantial effect on a scenic vista (Merced County General Plan, 2000).

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historical buildings within a state scenic highway?	☐	☐	☐	☒

The project site is not located near or within a state scenic highway and therefore would not result in damaging scenic resources (Merced County General Plan 2000).

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒

The project site currently contains three pilot groundwater recharge basins; and is surrounded by agricultural land. Prior to the installation of the pilot basins the project site was farmed for strawberry production. The proposed project will not substantially degrade the existing visual character or quality of the site or its surroundings.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

The project may include short-term construction lighting. The proposed project will not create a new source of substantial light or glare.

II. AGRICULTURAL RESOURCES

DISCUSSION

This environmental issue focuses on the impact of a project on farmland and agricultural productivity. Environmental concerns focus on the loss of agricultural cropland as inventoried by the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency as well as agricultural zoning and Williamson Act Contract lands. An additional area of concern is the potential changes resulting from a project that could lead to future conversion of agricultural lands to non-agricultural uses.

SETTING

According to the Farmland Mapping and Monitoring Program of the California Resources Agency, the site is designated as "Prime Farmland."

EVALUATION

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

The project site lies within an area that is designated as "Prime Farmland" according to the Farmland Mapping and Monitoring Program, but the existing use is that of recharge basins and the prior use was for strawberry production. The project will not convert prime farmland to non-agricultural use.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒

The project site is not under Williamson Act control.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project involve other changes in the existing environment which, due to their location and nature, could result in conversion of Farmland, to non-agricultural use?	☐	☐	☐	☒

The project site is adjacent to farmland, but will not have an effect that would result in the conversion of Farmland to non-agricultural use.

III. AIR QUALITY

DISCUSSION

This environmental issue focuses on the impacts of a project on air quality. Issues over project consistency with applicable air quality plans, policies and regulations, increases of any pollutant for which the area has been designated as a "non-attainment" area. Additional concerns are over the exposure of sensitive receptors, such as people, to high levels of air pollution or odors.

SETTING

The proposed site is located in Merced County, which is designated a part of the San Joaquin Valley Air Pollution Control District (SJVAPCD).

EVALUATION

Where applicable, the significant criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐

The only potential for conflict with the air quality plan of the SJVAPCD is during the construction phase.

The San Joaquin Valley Air Basin is classified as non-attainment for Ozone and particulate matter (PM_{10}). Any increase in these pollutants is considered to be substantial. Air emissions resulting from trenching and excavation include the use of internal combustion engines and the generation of dust. These emissions would have a less than significant impact on overall air quality.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐

The only conflict with air quality standards will occur during the construction phase as vehicles and equipment generate PM_{10}, i.e. dust. Though temporary and less than significant, standard dust suppression measures will be implemented. The proposed project is not growth inducing and does not signify a prolonged or substantial violation of air quality standards.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors?	☐	☐	☐	☒

The reduction of dust during construction of the basin will be handled through the use of water trucks. This will reduce the construction dust to a level deemed to be less than significant.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐

The proposed project will not expose sensitive receptors to substantial pollutant concentrations. Any emissions of PM_{10} during construction, though temporary and less than significant, will be reduced by standard practices to suppress dust and other air-borne particulate matter.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) Would the project create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

The propose basin is situated in an agricultural area, will not generate ordors and will not affect a substantial number of people.

IV. Biological Resources

Discussion

This environmental issue focuses on the impacts of a project on biological resources such as sensitive plant or animal species or their habitat, or riparian habitat or interference with the normal movements of wildlife species in the vicinity of a project. Additional concerns focus on

consistency of a project with adopted plans, policies and regulations regarding wildlife, habitat conservation planning, local wildlife preservation plans and policies or wetlands.

A *"baseline biological resource assessment"* was conducted by Moore Biological Consultants on December 3. The full report (dated January 9, 2010) is attached at the end of this document.

SETTING

The project site is situated in an agricultural area. North, south and east properties are tree farms (almonds) and row crops are to the west of the property.
The proposed site is not within a Resource Conservation Area or Resource Management Area (Merced County General Plan, 2000).

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project have substantial adverse effect, either directly or indirectly or through habitat modifications, on any species indentified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the California Departments of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒

The project involves the construction of a basin on a site that already contains three pilot basins and the prior use was for strawberry production.
Moore's report reveals that "due to lack of suitable habitat, no special-status plant species are expected to occur at the site" and "The potential for intensive use of habitats at the site by special-status wildlife species is considered extremely low." Additionally, "Swainson's hawk could be disturbed by construction if they nested near the project area during construction" and "burrowing owl could potentially occur in the area"; however, "[the project] would not result in a loss of potential or actual Swainson's hawk foraging habitat or burrowing owl nesting or foraging habitat." (Items in quotations are from Moore's report).

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒

The site and area of the proposed project contains no important riparian habitat or any sensitive natural community as identified by any federal, state or regional agency.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒

The project site does not contain wetlands.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐

"With the exception of Swainson's hawk and burrowing owl, no special-status wildlife species are expected to occur in or near the site on more than a very occasional or transitory basis." (Moore)

Moore recommends:

IV-1 Pre-construction surveys for nesting Swainson's hawks in the project area should be conducted if construction commences between March 1 and September 15. The survey should include all large trees visible from the site. If active nests are found, a qualified biologist should determine the need (if any) for temporal restrictions on construction.

IV-2 Pre-construction surveys for burrowing owls in the project area should be conducted if construction commences between February 1 and August 31. The survey should include the ruderal areas at the site. If occupied burrows are found, a qualified biologist should determine the need (if any) for temporal restrictions on construction."

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) Would the project conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance?	☐	☐	☐	☒

The project site is not within a Resource Conservation Area or Resource Management Area (Merced County General Plan, 2000), nor would it conflict with any known policies protecting biological resources.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

There is no adopted Habitat Conservation Plan or Natural Community Conservation Plan or other approved local, regional, or State habitat conservation plan on or around the proposed development site (Merced County General Plan, 2000). The project would have no effect upon fish or wildlife resources.

V. Cultural Resources

Discussion

This environmental issue focuses on the impacts of a project on cultural resources including, but not limited to, the adverse change to a significant historical or archaeological resource. Other areas of concern include the potential for a project to adversely impact a unique paleontological resource or geologic feature or disturb any human remains.

Setting

The project site is situated in an agricultural area. North, south and east properties are tree farms (almonds) and row crops are to the west of the property

Evaluation

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒

The project area and adjacent areas are not known to contain any historical resource as defined in §15064.5 of the CEQA Guidelines.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒

There is no evidence of potential archaeological resources at the proposed site or in the vicinity. The project would not cause a substantial adverse change pursuant to CEQA guidelines.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

The site and area is not known to contain any known unique paleontological resource or site, or a unique geologic feature.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

The construction proposed as part of the project is not expected to impact any human remains, including those interred outside of formal cemeteries. Any deep trenching or excavation is subject to state rules and regulations concerning the uncovering of cultural resource materials.

VI. GEOLOGY AND SOILS

DISCUSSION

This environmental issue focuses on the impacts of natural geologic or soil conditions on a project as well as the impacts of a project on soil erosion.

SETTING

The project site has little topographic relief and will not involve construction activities that will have any impact on the geologic stability of the area.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Will the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslide?	☐	☐	☐	☒

The project site is not located within an area delineated on the Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist. The Merced County General Plan contains a geologic study that shows the project site is located in an area with relatively low exposure to seismic risk. Since the site is flat, there is no danger of landslides (Merced County General Plan, 2000).

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐

The project area will be managed with the growth of native grasses and weeds, the stock pile area will be maintained with BMP's for erosion control.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒

The site is not located on a geological unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse as identified in the county general plan (Merced County General Plan, 2000).

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (2001), creating substantial risks to life or property?	☐	☐	☐	☒

The proposed site does not contain expansive soil as defined in Table 18-1-B of the Uniform Building Code (2001).

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

The use of septic tanks or alternative wastewater disposal systems are not a part of this project.

VII. HAZARDS AND HAZARDOUS MATERIALS

DISCUSSION

This environmental issue focuses on the impacts of a project with respect to hazards. The creation of new hazardous conditions or activities that will result in people or property being exposed to existing hazards is the primary area of focus under this environmental issue. Hazards include, but are not limited to, hazardous materials, hazards associated with aircraft and airports or wild land fires. An additional concern is the consistency of a project with emergency response plans or emergency evacuation plans.

SETTING

The project site does not have a history of hazardous materials being present or a history of land uses that would involve the use or storage of hazardous materials. The Hazardous Waste site inventory of Merced County and the State Department of Health Services did not reveal the existence of any hazardous conditions on the project site.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒

The project will not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒

The project will not create a significant hazard to the public or the environment through reasonable foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒

The project will not emit hazardous emissions of any kind.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

The project is not located on a site that is included on a list of hazardous waste sites compiled pursuant to Government Code Section 65962.5. The project site is not on the Hazardous Waste and Substances Site List (Cortese List) (California Environmental Protection Agency, 2007).

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒

The project is not located in the vicinity of any airport land use plan.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒

The project is not located within the vicinity of a private airstrip.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
g) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒

The project does not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan within the county.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
h) Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

The proposed site is not susceptible to wild land fires.

VIII. HYDROLOGY AND WATER QUALITY

DISCUSSION

This environmental issue focuses on the impacts of a project on surface and groundwater, including compliance with water quality standards and regulation, depletion of groundwater supplies, pollution or degrading of water quality. Additional concerns include water-related hazards such as flooding, mudflows and similar hazards. This area of environmental concern also addresses potential project impacts on area drainage, including storm water runoff.

SETTING

The project site is situated in an agricultural area. North, south and east properties are tree farms (almonds) and row crops are to the west of the property. The function of the proposed basin is to recharge the ground water.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒

The proposed project will not violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒

The proposed project is designed to recharge the local groundwater table.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☒

The proposed project will not alter drainage patterns of the area, including through the alteration of the course of a stream or river, which would result in substantial erosion or siltation on- or off-site.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☒

The project would not substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) Would the site create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒

The project would not create nor contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional resources of polluted runoff.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
f) Would the project otherwise substantially degrade water quality?	☐	☐	☐	☒

The project would not violate water quality standards.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
g) Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒

The project does not call for the construction of any housing.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
h) Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒

The project does not propose any structures that would impede or redirect flood flows.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
i) Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒

The project would not expose people or structures to flooding.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
j) Would the project be subject to inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

The project area is not susceptible to seiches, tsunamis, or mudflows.

IX. Land Use and Planning

Discussion

This environmental issue focuses on the impacts of a project on adopted land use, habitat conservation or natural community conservation plans. The specific focus of this area of environmental concern is potential conflicts with established plans and policies or the potential for the project to physically divide a community.

Setting

The project site is within Merced County and is designated Agricultural by the General Plan (see Figure 3, page 27). There are no established communities within the vicinity of the project site that would be divided as a result of the project. The project lies adjacent to areas that are zoned Agricultural (see Figure 4, page 28).

Evaluation

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project physically divide an established community?	☐	☐	☐	☒

No change in surrounding land uses will occur as a result of the project.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal programs, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

The project does not involve any change to, or conflict with, applicable land use plans, policies or regulations.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

There are no habitat conservations plans within the general vicinity of the project.

Merced County

- A - Agriculture
- A-R - Agricultural Residential
- CPF - Future Community Park
- NP/NPF - Neighborhood Park/Future Neighborhood Park
- LD - Low Density Residential
- MD - Medium Density Residential
- HD - High Density Residential
- ES/ESF - Elementary School/Future Elementary School
- HS/MSF - High School/Future Middle School
- GC - General Commercial
- NC - Neighborhood Commercial
- IND - Industrial
- MU - Mixed Use
- BP - Business Park
- UR - Urban Reserve

Figure 3: General Plan

Source: Merced County Planning Dept., MCAG, 2007

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Merced County

A-1	- General Agriculture	R-1	- Single-Family Residential
A-R	- Agricultural Residential	R-1-5000	- Single-Family Residential
C-1	- Neighborhood Commercial	R-2	- Two-Family Residential
C-2	- General Commercial	R-3	- Multi-Family Residential
C-3	- Heavy Commercial	R-4	- Multi-Family Residential
M-1	- Light Manufacturing		

Figure 4: Zoning

Source: Merced County Planning Dept., MCAG, 2007

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X. MINERAL RESOURCES

DISCUSSION

This environmental issue focuses on the impacts of a project on known mineral resources of commercial or otherwise documented economic value.

SETTING

The project site is located on land that is listed as having the potential for mineral resources in the area as shown on the maps in the California Department of Conversation Division of Mines and Geology Mineral Land Classification of Merced County, California. The site is located in an area that is not listed as having the potential for sand or gravel resources on Map 21 of the county's General Plan.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?	☐	☐	☐	☒

There are no known mineral resources at the site of the proposed project.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

The project is not located in an area designated on the County General Plan, or by any plan, as a locally important mineral resource recovery site.

XI. NOISE

DISCUSSION

This environmental issue focuses on the impacts of a project with respect to noise or ground-borne vibration. The creation of new noise or ground-borne vibration conditions or activities that will result in people or property being exposed to existing noise or vibrations is the primary area of focus under this environmental issue.

SETTING

The proposed recharge basin facility will not have any equipment that would provide a continues noise at the site. The normal operations at the site would involve the use of farm type equipment to control weeds and rake the bottom of the basin.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐

The Merced County General Plan sets a maximum exterior noise level standard for residences of 65 dBA and an interior noise level standard of 45 dBA.

Noise will be produced during the construction phase of the basin excavation. The short-term nature of the construction noise is not seen as significant and adverse.

Construction activities will be temporary in nature and will only occur during the daytime hours. Construction noise impacts could result in annoyance or sleep disruption for nearby residents if nighttime operations were to occur or if equipment is not properly muffled or maintained. Construction noise will be temporary and will have a less than significant impact.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☐	☒

The basin will not produce vibration or noise.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.	☐	☐	☐	☒

There will be no substantial permanent increase in ambient noise levels.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐

The project will result in the periodic noise increase during construction. The ambient noise generated by the project will not contribute substantially to the noise levels from the adjacent farmlands.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

The project site is not located within two miles of a public airport or public use airport.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

The project site is not located within two miles of a private airstrip.

XII. POPULATION AND HOUSING

DISCUSSION

This environmental issue focuses on the impacts of a project on population and housing including population growth or displacement of human population and housing. Assumptions regarding population growth, housing demand and employment are the primary driving force for local governmental land use decision-making.

SETTING

The proposed recharge basin facility will not have an impact on population or housing through the recharge of the ground water in the area of the basin.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒

The proposed project will not induce substantial unplanned population growth in the area either directly or indirectly.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

The proposed project does not include the development or removal of any residential structures.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

The proposed project does not result in the need to construct housing.

XIII. PUBLIC SERVICES

DISCUSSION

This environmental issue focuses on the impacts of a project on public service facility needs and the potential environmental impacts of developing and/or expanding these facilities. Facility needs can be defined by the need to maintain acceptable levels of service such as response times, or such other community service standard as may apply.

SETTING

The project lies within and is surrounded by agricultural areas.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	☐	☐	☐	☒
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒

Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

The project would not increase the demand for fire and police protection, schools, parks, or other public facilities.

XIV. RECREATION

DISCUSSION

This environmental issue focuses on the impacts of a project on public recreation and facility needs and the potential environmental impacts of developing and/or expanding recreation facilities. Facility needs can be defined by the need to maintain acceptable levels of community recreation service in the area and region.

SETTING

The project lies within and is surrounded by agricultural areas.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

The proposed project will not contribute to the increase use of existing parks or recreational facilities.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

The proposed project does not include recreational facilities nor will it increase demand for recreational facilities.

XV. TRANSPORTATION/TRAFFIC

DISCUSSION

This environmental issue focuses on the impacts of a project on transportation systems including roads and highways, public transportation systems, pedestrian circulation and access, parking, and emergency access. Impacts can be in the form of new hazardous circulation or traffic conditions, conflict with existing plans or policies or creation of an unacceptable traffic level on a transportation system or facility.

SETTING

The proposed project lies in a rural and agricultural area and will not increase the existing traffic level or alter circulation patterns.

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ration on roads, or congestion at intersection)?	☐	☐	☒	☐

The project will generate a temporary and slight increase in traffic during construction.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒

The project has no potential to exceed a level of service standard established by the Merced County Association of Governments (MCAG), the County Congestion Management Agency, for designated roads or highways.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project result in change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒

The project will not affect air traffic patterns.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒

The project will neither create nor alter roadways in a manner that would increase hazards or result in an incompatible use.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) Would the project result in inadequate emergency access?	☐	☐	☐	☒

The project will conform to all applicable County emergency access standards.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
f) Would the project result in inadequate parking capacity?	☐	☐	☐	☒

Parking will not be necessary for the project after construction is complete.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
g) Would the project conflict with adopted policies, plans or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	☒

No traffic will be generated by the project once it becomes operational, traffic patterns will remain similar to or less than the levels for the prior farming operation. The project would not conflict with adopted policies, plans or programs supporting alternative transportation.

XVI. Utilities and Service Systems

Discussion

This environmental issue focuses on the impacts of a project on public utility systems or facilities such as water, wastewater, storm water drainage or other utility or service systems.

Setting

The proposed basin is designed to recharge the ground water. The project will have no direct impact on wastewater treatment facilities or storm drainage systems.

Evaluation

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒

The proposed project has no wastewater treatment requirements.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Would the project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒

The proposed project will not require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities that would cause significant environmental effects.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Would the project require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒

The project will not result in the construction of new storm water drainage facilities.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
d) Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒

The proposed project has sufficient water supplies available and would not require new or expanded entitlements.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
e) Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒

The proposed project will not generate additional demands for wastewater.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
f) Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒

Any disposal of solid waste, such as construction material or removed asphalt, will be minor and short-term.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
h) Would the project comply with federal, state and local statutes and regulations related to solid waste?	☐	☐	☐	☒

The proposed project will comply with all relevant federal, state and local statutes and regulations related to solid waste.

XVII. MANDATORY FINDINGS OF SIGNIFICANCE

EVALUATION

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restricts the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒

The project will not have any impacts on wildlife species, rare or endangered plant species or eliminate major periods of California history or prehistory.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, and the effects of probable future projects)?	☐	☐	☐	☒

On the basis of the analysis of the project and its potential adverse physical environmental impacts, it has been determined that the project does not have impacts that are individually limited but cumulatively considerable.

	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporation	Less than Significant Impact	No Impact
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

A review of the potential environmental effects of the proposed recharge basin facility have resulted in the determination that the project design, location or general characteristics will not result in any substantial adverse effects on human beings either directly or indirectly.

MOORE BIOLOGICAL CONSULTANTS

January 9, 2010

Mr. Garth Pecchenino
Fremming, Parson & Pecchenino, Inc.
2816 Park Avenue
Merced, CA 95348-3375

Subject: MERCED IRRIGATION DISTRICT'S "CRESSEY BASIN PROJECT", MERCED COUNTY, CALIFORNIA: BIOLOGICAL ASSESSMENT

Dear Garth:

Thank you for asking Moore Biological Consultants to conduct a baseline biological resources assessment of the Merced Irrigation District's (MID) Cressey Basin Project (Figures 1, 2 and 3). The focus of our work was to document existing biological resources at the site, conduct a survey to determine presence or absence of waters of the U.S. and wetlands, and search for suitable habitat for or presence of special-status species. This letter report details the methodology and results of our investigation.

Methods:

Prior to the field survey, we conducted a search of California Department of Fish and Game's (CDFG) California Natural Diversity Database (CNDDB, 2009). This information was used to identify special-status species that have been previously documented in the greater project vicinity or have the potential to occur based on presence of suitable habitat and geographical distribution. Since the site is in the west part of the USGS 7.5-minute Winton topographic quadrangle, the CNDDB

10330 Twin Cities Rd., Ste. 30 • Galt, CA 95632
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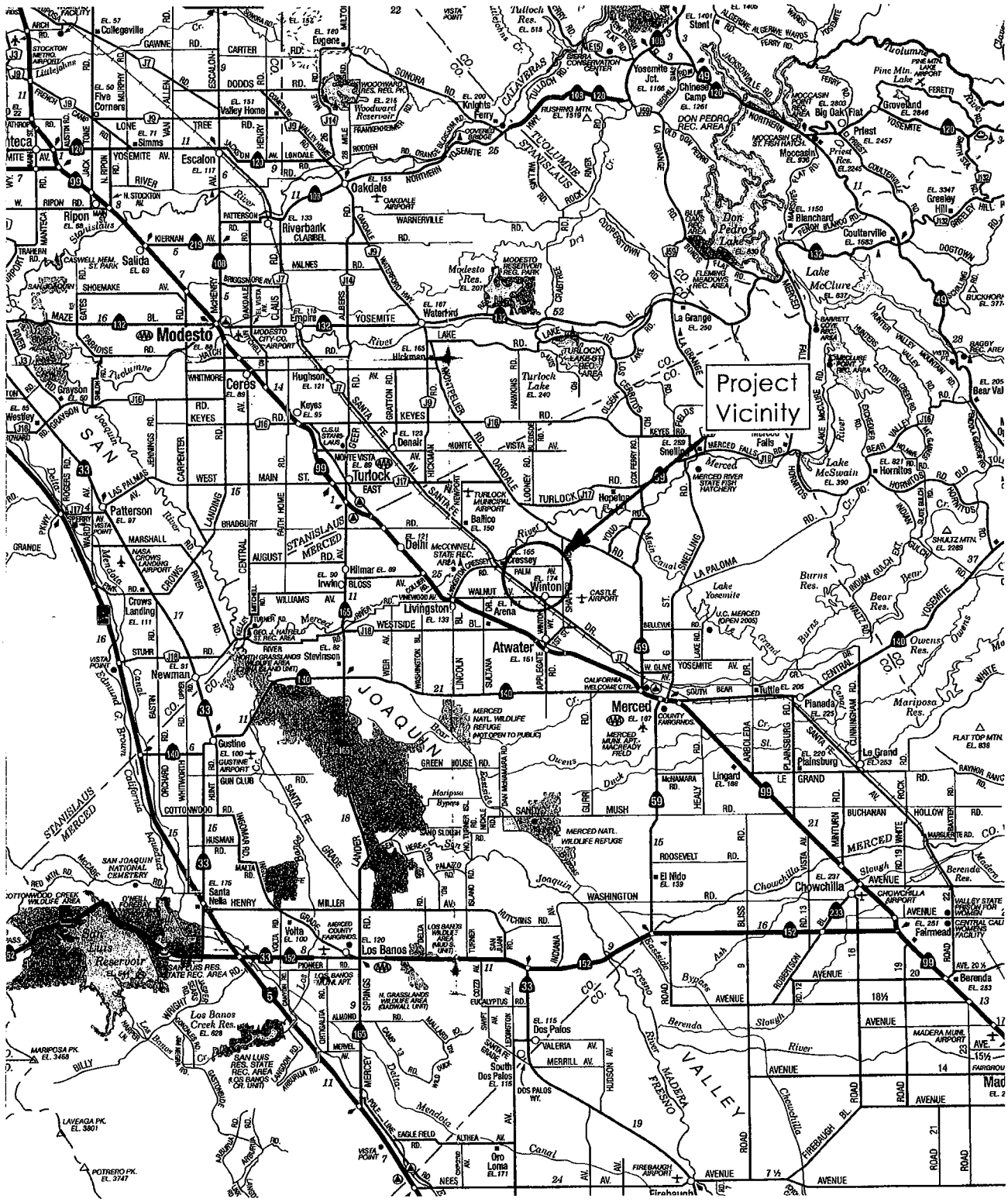

Scale: 1 inch = 9 miles
Source: Calif. State Automobile Association

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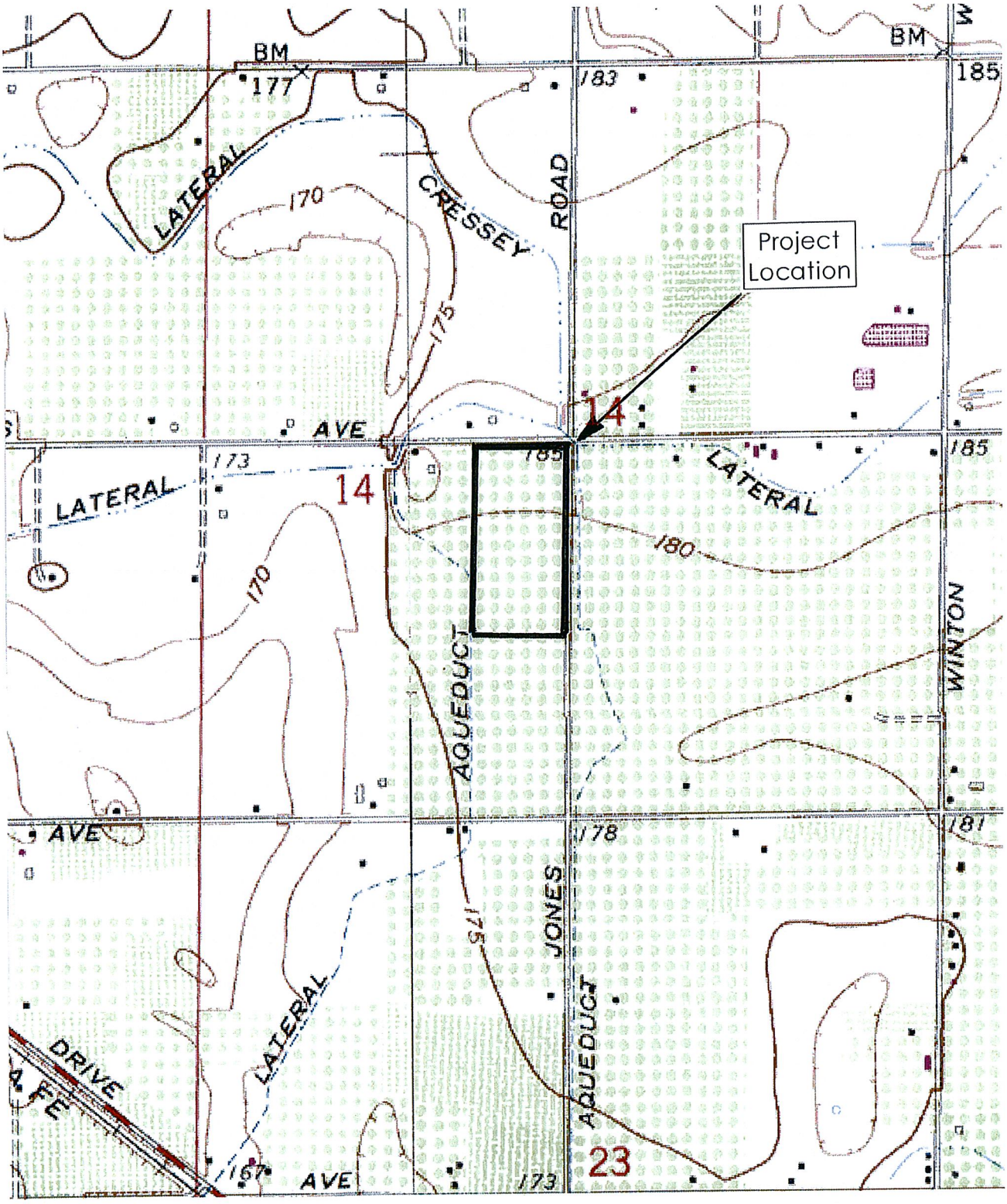
FIGURE 1
PROJECT VICINITY



Scale: 1 inch = 1,000 feet

Source: USGS 7.5-minute Cressey and Winton topographic quadrangles

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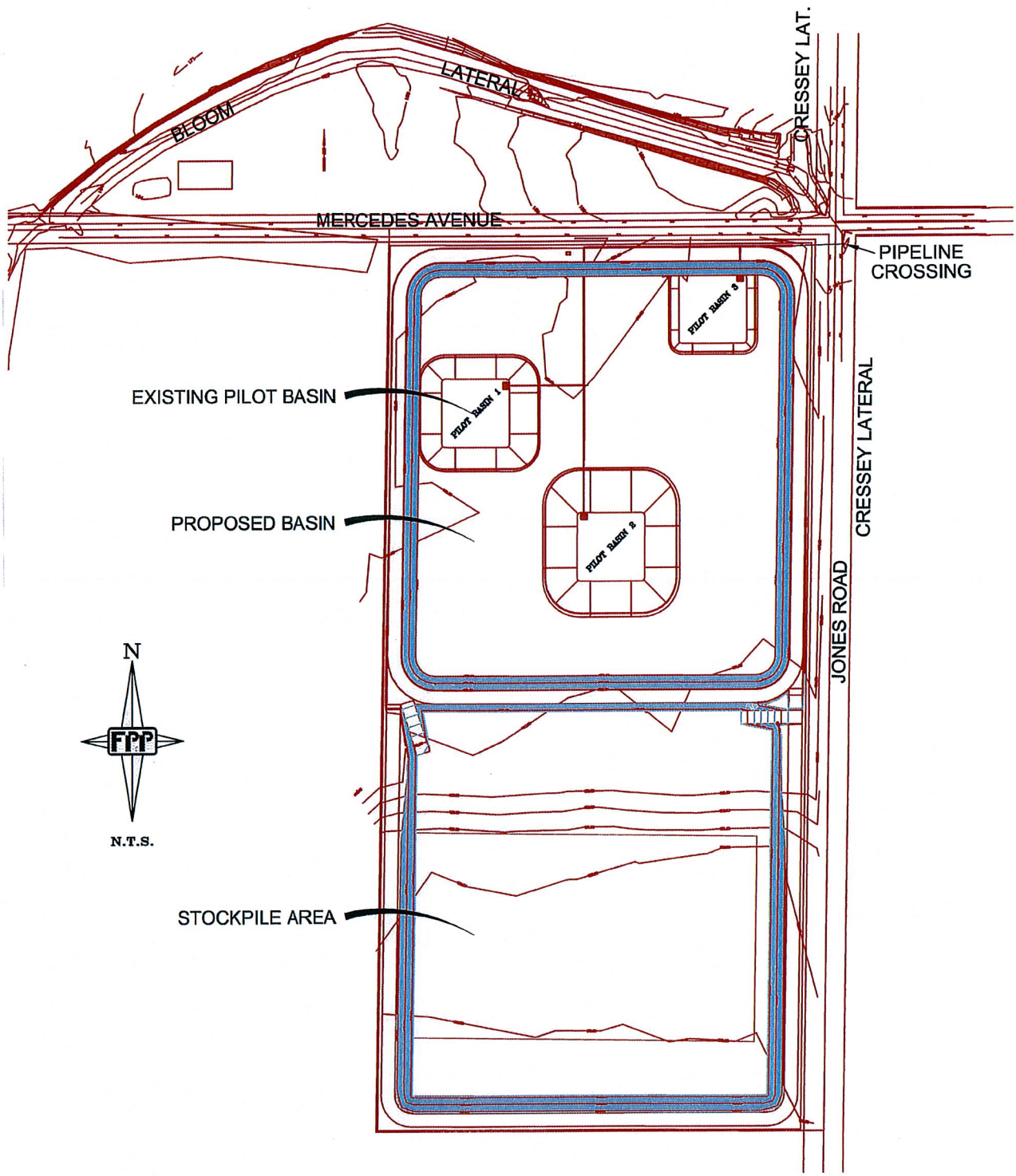
FIGURE 2
PROJECT LOCATION



Scale: 1 inch = 225+/- feet

Source: Fremming, Parson & Pecchenino

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FIGURE 3
SITE LAYOUT

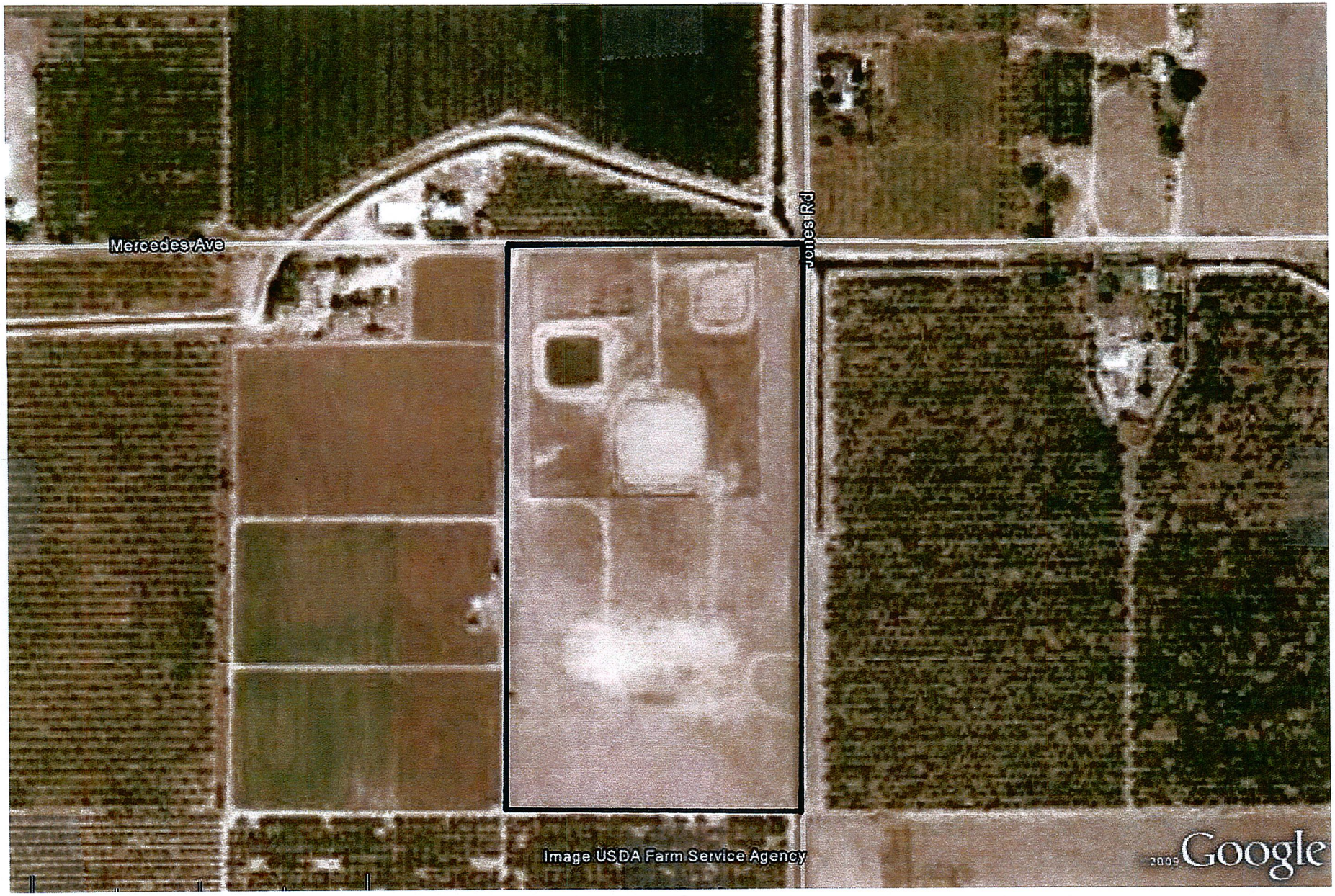
search area encompassed this quadrangle, and the Cressey quadrangle, which are situated to the west of the site. This CNDDB search area is approximately 120 square miles surrounding the site.

A field survey was conducted on December 3, 2009. The survey consisted of driving and walking around the site, making observations and noting habitat conditions, surrounding land uses, and plant and wildlife species. We conducted an assessment of potentially jurisdictional Waters of the U.S. and wetlands as defined by the U.S. Army Corps of Engineers (ACOE, 1987; 2008), and a search for sensitive species, and suitable habitat for sensitive species (e.g., blue elderberry shrubs, vernal pools). Additionally, trees near the site were assessed for potential use by nesting raptors, especially Swainson's hawk (*Buteo swainsoni*). The site and adjacent areas were also searched for burrowing owl (*Athene cunicularia*) or burrows that could be used by burrowing owls.

Results:

GENERAL SETTING: The project site is located just northwest of Winton, in Merced County, California (Figure 1). The site is located in Section 36, in Township 6 South, Range 12 East of the USGS 7.5-minute Winton topographic quadrangle (Figure 2). The site is relatively flat and is at an elevation of approximately 180 feet above mean sea level. Lands surrounding the site are primarily orchards and fields farmed in alfalfa and other grain crops (Figure 4).

VEGETATION: Habitats in the site are highly disturbed by past grading related to the construction and operation of a few pilot recharge basin. The sandy on-site soils are sparsely vegetated with various annual grass and weed species. Filaree (*Erodium* spp.), common mallow (*Malva neglecta*), black mustard (*Brassica nigra*), telegraph weed (*Heterotheca grandiflora*), citronmelon (*Citrullus lanatus*), prickly lettuce (*Lactuca serriola*), pigweed (*Amaranthus albus*), and Bermuda grass (*Cynodon dactylon*) are dominant species in the ruderal habitats at the site.



Source: Google Earth

Scale: 1 inch = 300 feet

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FIGURE 4

8/29/06 AERIAL PHOTOGRAPH

There are no trees or shrubs of any kind at the site. No blue elderberry (*Sambucus mexicana*) shrubs were observed within or adjacent to the site.

WILDLIFE: A limited number of wildlife species were observed at the site. Some of the more common birds observed include mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), and house finch (*Carpodacus mexicanus*). All of these are species commonly found in agricultural areas in the project vicinity.

There are very few large trees near the site that are suitable for nesting raptors and other protected migratory birds, including Swainson's hawk. The only trees beyond small orchard trees near the site are ornamentals associated with residences northwest and northeast of the site. These trees are likely used by nesting songbirds and possibly raptors during some years.

A limited number of mammals common to agricultural and semi-rural areas are expected to use habitats at the site. However, no mammals or sign of mammals (i.e., tracks, scat) was detected in the area during the recent survey. Coyote (*Canis latrans*), raccoon (*Procyon lotor*), black-tailed hare (*Lepus californicus*), striped skunk (*Mephitis mephitis*) and Virginia opossum (*Didelphis virginiana*) are expected to occur in the area on occasion. A number of species of small rodents including mice (*Mus musculus, Reithrodontomys megalotis,* and *Peromyscus maniculatus*) and voles (*Microtus californicus*) also likely occur. No California ground squirrels (*Spermophilus beecheyi*) or ground squirrel burrows were observed in the site.

Based on habitat types present a very limited variety of amphibians and reptiles are expected to use habitats at the site. No reptiles or amphibians were observed during the 2009 survey. Although none were observed, lands in and adjacent to the site provide suitable habitat for species including western fence lizard (*Sceloporus occidentalis*), western whiptail (*Cnemidophorus tigris*), western toad

(*Bufo boreas*), coast horned lizard (*Phrynosoma coronatum*), gopher snake (*Pituophis melanoleucus*), and common garter snake (*Thamnophis sirtalis*).

WATERS OF THE U.S. AND WETLANDS: Waters of the U.S., including wetlands, are broadly defined under 33 Code of Federal Regulations (CFR) 328 to include navigable waterways, many of their tributaries, and adjacent wetlands. State and federal agencies including CDFG and ACOE, and California Regional Water Quality Control Board have jurisdiction over these habitats Jurisdictional wetlands are vegetated areas that meet specific vegetation, soil, and hydrologic criteria defined by the ACOE *Wetlands Delineation Manual* and Regional Supplement (ACOE, 1987; 2008). Waters of the U.S. are drainage features or water bodies as described in 33 CFR 328.4.

No potentially jurisdictional waters of the U.S. or wetlands of any type were observed at the site. There are no areas at the site that appear to have any potential to fall under the jurisdiction of ACOE and/or CDFG. Specifically, no vernal pools, seasonal wetlands, marshes, ponds, or lakes of any type were observed.

The only potentially jurisdictional waters of the U.S. observed on lands adjacent to the site are MID's Bloom Lateral and Cressey Lateral. These laterals derive water from the Merced River to the north of the site and return excess water back to the Merced River several miles west of the site. These laterals have potential to fall under ACOE jurisdiction due to this hydrological connectivity with jurisdictional waters.

SPECIAL-STATUS SPECIES: Special-status species are plants and animals that are legally protected under the state and/or federal Endangered Species Act or other regulations. The Federal Endangered Species Act (FESA) of 1973 declares that all federal departments and agencies shall utilize their authority to conserve endangered and threatened plant and animal species. The California Endangered Species Act (CESA) of 1984 parallels the policies of FESA and

pertains to native California species. Both FESA and CESA prohibit unauthorized "take" (i.e., killing) of listed species, with take broadly defined in both acts to include activities such as harassment, pursuit and possession.

Special-status wildlife species also includes species that are considered rare enough by the scientific community and trustee agencies to warrant special consideration, particularly with regard to protection of isolated populations, nesting or denning locations, communal roosts, and other essential habitat. The federal Migratory Bird Treaty Act and Fish and Game Code of California protect special-status bird species year-round, as well as their eggs and nests during the nesting season. Fish and Game Code of California also provides protection for mammals and fish.

Special-status plants include species that are designated rare, threatened, or endangered and candidate species for listing by the U.S. Fish and Wildlife Service (USFWS). Special-status plants also include species considered rare or endangered under the conditions of Section 15380 of the California Environmental Quality Act (CEQA) Guidelines, such as those plant species identified on Lists 1A, 1B and 2 in the Inventory of Rare and Endangered Vascular Plants of California by the California Native Plant Society (CNPS, 2001). Finally, sensitive plants may include other species that are considered sensitive or of special concern due to limited distribution or lack of adequate information to permit listing or rejection for state or federal status, such as those included on List 3 in the CNPS Inventory.

Table 1 provides a summary of the listing status and habitat requirements of special-status plant and wildlife species that have been documented in the greater project vicinity or for which there is potentially suitable habitat in the project area. This table also includes an assessment of the likelihood of occurrence of each of these species at the site. The evaluation of the potential for occurrence of each species is based on the distribution of regional occurrences (if any), habitat suitability, and field observations.

TABLE 1

SENSITIVE PLANT AND WILDLIFE SPECIES DOCUMENTED OR POTENTIALLY OCCURRING IN THE PROJECT VICINITY

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CNPS List[3]	Habitat	Potential for Occurrence in the Site
Plants						
Succulent owl's clover	*Castilleja campestris ssp. succulenta*	T	E	1B	Vernal pools within the Central Valley	Extremely low: there are no vernal pools or seasonal wetlands in the site. The nearest occurrence of succulent owl's clover in the CNDDB (2009) is located approximately 4 miles southeast of the site.
San Joaquin Valley orcutt grass	*Orcuttia inaequalis*	T	E	1B	Vernal pools within the Central Valley.	Extremely low: there are no vernal pools or seasonal wetlands in the site. There are three occurrences of San Joaquin Valley orcutt grass in the CNDDB (2009) approximately 4 to 6 miles north and northwest of the site.
Wildlife						
Mammals						
Western mastiff bat	*Eumops perotis californicus*	None	SC	N/A	Open, dry habitats with crevices in cliff faces, high buildings, trees and tunnels for roosting.	Very low: there is no suitable habitat in the site for this species. The nearest occurrence of western mastiff bat in the CNDDB (2009) is at a bridge over the Merced River approximately 7 miles northeast of the site.
Pallid bat	*Antrozous pallidus*	None	SC	N/A	Open, dry habitats with rocky areas for roosting.	Very low: there are no rocky areas within the site. The nearest occurrence of pallid bat in the CNDDB (2009) is at a bridge over the Merced River bridge approximately 7 miles northeast of the site.
Western red bat	*Lasiurus blossvelli*	None	SC	N/A	Roosts in trees in forests and woodlands from sea level up through the mixed conifer forests of the Sierra Nevada	Very low: there is no suitable habitat in the site for this species. The nearest occurrence of western red bat in the CNDDB (2008) is at a bridge over the Merced River approximately 7 miles northeast of the site.

TABLE 1

SENSITIVE PLANT AND WILDLIFE SPECIES DOCUMENTED OR POTENTIALLY OCCURRING IN THE PROJECT VICINITY

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CNPS List[3]	Habitat	Potential for Occurrence in the Site
Birds						
Swainson's hawk	*Buteo swainsoni*	None	T	N/A	Nests in tall trees associated with agricultural and riparian habitats. Forages for small mammals in agricultural fields or grassland habitats.	Very low: there are only a few potential nest trees near the site and the ruderal habitats in the site are very marginal, yet potentially suitable Swainson's hawk foraging habitat. The CNDDB (2009) contains only 2 records of nesting Swainson's hawks within the 120 square miles search area; the nearest occurrence is approximately 3.5 miles northeast of the site.
Burrowing owl	*Athene cunicularia*	None	SC	N/A	Annual or perennial grasslands, deserts and scrublands, nests in the burrows of small mammals.	Very low: no burrowing owls, ground squirrels, or ground squirrel burrows were observed in or adjacent to the site. Burrowing owls are not documented in the Winton or Cressey topographic quadrangles (CNDDB, 2009).
Reptiles						
Western pond turtle	*Actinemys marmorata*	None	SC	N/A	Permanent or semi-permanent bodies of water in a variety of habitats; require basking sites such as logs.	Very low: there is no suitable habitat for western pond turtle in the site. The nearest occurrence of this species in the CNDDB (2009) is at a waste water treatment plant approximately 6 miles west of the site.
Invertebrates						
Vernal pool fairy shrimp	*Branchinecta lynchi*	T	None	N/A	Vernal pools and seasonally wet depressions within the Central Valley.	Extremely low: there are no vernal pools or seasonal wetlands in the project site. The site is not within an area designated by the U.S. Fish & Wildlife Service as critical habitat for vernal pool species (USFWS, 2005). The closest record of vernal pool fairy shrimp in the CNDDB (2009) is approximately 5.5 miles east of the site.

TABLE 1

SENSITIVE PLANT AND WILDLIFE SPECIES DOCUMENTED OR POTENTIALLY OCCURRING IN THE PROJECT VICINITY

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CNPS List[3]	Habitat	Potential for Occurrence in the Site
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T	None	N/A	Elderberry shrubs, usually in Central Valley riparian habitats.	Extremely low: there are no blue elderberry shrubs within or adjacent to the site. The CNDDB (2009) lists the closest occurrences of valley elderberry longhorn beetle on the north side of the Merced River, approximately 3 miles northwest of the site There are two other records of valley elderberry longhorn beetle along the Merced River, a few miles further downstream of the first.
Fish						
Hardhead	*Mylopharodon conocephalus*	None	SC	N/A	Clear and deep pools with sand and gravel bottoms with slow water velocity within the San Joaquin/Sacramento River tributaries.	None: the site contains no suitable aquatic habitat for this species. The nearest occurrence within the CNDDB (2009) is located in the Merced River approximately 7 miles northeast of the site.

1 T= Threatened.

2 T = Threatened; E = Endangered; SC=State of California Species of Special Concern.

3 CNPS List 1B species includes plants that are rare, threatened, or endangered in California and elsewhere.

SPECIAL-STATUS PLANTS: Special-status plants generally occur in relatively undisturbed areas within vegetation communities such as vernal pools, seasonal wetlands, marshes, swamps, riparian scrub, and areas with unique soils. Succulent owl's clover (*Castilleja campestris ssp. succulenta*) and San Joaquin Valley orcutt grass (*Orcuttia inaequalis*) are the only special-status plant species recorded in project area in the CNDDB (2009) query. Both of these species occur in vernal pool habitats, which are not present in the site. The ruderal habitats in the site are highly disturbed and are not suitable habitat for special-status plants. Due to lack of suitable habitat, no special-status plant species are expected to occur at the site.

SPECIAL-STATUS WILDLIFE: The potential for intensive use of habitats at the site by special-status wildlife species is considered extremely low. Special-status wildlife species recorded in project area in the CNDDB (2009) query include western mastiff bat (*Eumops perotis californicus*), pallid bat (*Antrozous pallidus*), western red bat (*Lasiurus blossvelli*), Swainson's hawk, western pond turtle (*Actinemys marmorata*), vernal pool fairy shrimp (*Branchinecta lynchi*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and hardhead (*Mylopharodon conocephalus*). Burrowing owl was added to Table 1 because it is widespread in Central Valley agricultural and ruderal habitats.

While the project area may have provided habitat for some of the special-status wildlife species listed in Table 1 at some time in the past, farming and development in surrounding parcels, and construction and maintenance of the pilot recharge basins at the site and have substantially modified natural habitats. Of the wildlife species identified in the CNDDB, Swainson's hawk is the only species that has potential to occur at the site on more than a transitory or very occasional basis. Swainson's hawk could be disturbed by construction if they nested near the project area during construction. Other special-status birds may fly over the area on occasion, but would not be expected to nest at the site. There is no habitat in the project area for the remaining species in Table 1. Finally, although not recorded in the CNDDB within the search area, burrowing

owl is discussed below as it could potentially occur in the area could be disturbed by construction if they nested in or near the project area during construction.

SWAINSON'S HAWK: The Swainson's hawk is a migratory hawk listed by the State of California as a Threatened species. The Migratory Bird Treaty Act and Fish and Game Code of California protect Swainson's hawks year-round, as well as their nests during the nesting season (March 1 through September 15). Swainson's hawk are found in the Central Valley primarily during their breeding season, a population is known to winter in the San Joaquin Valley.

Swainson's hawks prefer nesting sites that provide sweeping views of nearby foraging grounds consisting of grasslands, irrigated pasture, hay, and wheat crops. Most Swainson's hawks are migratory, wintering in Mexico and breeding in California and elsewhere in the western United States. This raptor generally arrives in the Central Valley in mid-March, and begins courtship and nest construction immediately upon arrival at the breeding sites. The young fledge in early July, and most Swainson's hawks leave their breeding territories by late August.

The CNDDB (2009) contains only two records of nesting Swainson's hawk in the 120+/- square mile search area. The ruderal habitats in the site are very marginal, yet potentially suitable Swainson's hawk foraging habitat. There are areas of open grassland and croplands near the site that are more likely to be used by foraging Swainson's hawks. There are no trees in the site, but a few of the relatively larger trees in the overall project area may be used during some years by nesting Swainson's hawks.

BURROWING OWL: The Migratory Bird Treaty Act and Fish and Game Code of California protect burrowing owls year-round, as well as their nests during the nesting season (February 1 through August 31). Burrowing owls are a year-long resident in a variety of grasslands as well as scrub lands that have a low density

of trees and shrubs with low growing vegetation; burrowing owls that nest in the Central Valley may winter elsewhere.

The primary habitat requirement of the burrowing owl is small mammal burrows for nesting. The owl usually nests in abandoned ground squirrel burrows, although they have been known to dig their own burrows in softer soils. In urban areas, burrowing owls often utilize artificial burrows including pipes, culverts, and piles of concrete pieces. This semi-colonial owl breeds from March through August, and is most active while hunting during dawn and dusk. Burrowing owls are not documented in the Winton or Cressey topographic quadrangles (CNDDB, 2009.

No burrowing owls, ground squirrels, or ground squirrel burrows were observed in the site during the recent survey. There is open grassland and cropland to the west to site that could be used by foraging burrowing owls. Although it is considered unlikely, burrowing owls could nest in the project area the future.

Conclusions and Recommendations:

- The site is highly disturbed and sparsely vegtated ruderal habitats that are biologically unremarkable.

- No ditches, wetlands, vernal pools, stock ponds, streams, lakes, or other potentially jurisdictional waters of the U.S. or wetlands of any kind were observed at the site.

- The only potentially jurisdictional waters of the U.S. observed near the site are MID's Bloom Lateral and Cressey Lateral. If the project involves modification to the bank of the Cressey Lateral (i.e., at the tie-in point to pipe water to the new basin), this activity would appear to qualify as an exempt activity under

ACOE's Regulatory Guidance Letter 07-02, which outlines activities in irrigation and drainage ditches that are exempt from Clean Water Act permitting requirements.

- Due to a lack of suitable habitat, the likelihood of occurrence of special-status plants at the site is considered very low.

- With the exception of Swainson's hawk and burrowing owl, no special-status wildlife species are expected to occur in or near the site on more than a very occasional or transitory basis.

- The project involves constructing a single large basin where several small basins now exist. This activity would not result in a loss of potential or actual Swainson's hawk foraging habitat or burrowing owl nesting or foraging habitat.

- Pre-construction surveys for nesting Swainson's hawks in the project area should be conducted if construction commences between March 1 and September 15. The survey should include all large trees visible from the site. If active nests are found, a qualified biologist should determine the need (if any) for temporal restrictions on construction.

- Pre-construction surveys for burrowing owls in the project area should be conducted if construction commences between February 1 and August 31. The survey should include the ruderal areas at the site, and all areas of open grassland visible from the site. If occupied burrows are found, a qualified biologist should determine the need (if any) for temporal restrictions on construction.

Thank you, again, for asking Moore Biological Consultants to assist with the project. Please feel free to call me at (209) 745-1159 with any questions.

Sincerely,

Diane S. Moore, M.S.
Principal Biologist

References and Literature Consulted

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Stockpiled soil in the south part of the site, looking west; 12/03/09.

Existing recharge basin in the northeast part of the site, looking southwest; 12/03/09.

Existing recharge basin in the northwest part of the site, looking east; 12/03/09.

Stockpiled soil in the south part of the site, looking east; 12/03/09.

Merced Integrated Regional Water Management Implementation Grant Proposal

Appendix 3-13

Description of Cressey Recharge Basin Enlargement Project

Cressey Recharge Basin Enlargement Project

The existing Cressey Groundwater Recharge Basin includes is approximately 8 acres in size, and sits on an 18.8 acre parcel. The extension will add approximately 5 acres to the footprint of the existing basin. The site is located at the southwest corner of Mercedes Avenue and Jones Road, north of the town of Winton, in the unincorporated area of Merced County.

The work includes basin excavation, site grading and stockpiling of excess material on site or off haul of excess material. The SCADA system will be upgraded to allow MID to track percolation/groundwater recharge rates in real time. The expected percolation rate is 2.6 AF/Day/AC. This number is based off the observed percolation rate for the basin currently in existence.

The design drawings for the original Cressey Basin provides details of what could be expected for the design of the enlargement project.

Merced Integrated Regional Water Management Implementation Grant Proposal

Appendix 3-14

Cressey Existing Basin Infiltration Rate

Cressey Recharge Basin - Existing Basin Recharge Rate

Applied Area 8 acres

Field	CFS	TransactionDate	Previous Date	Time (days)	AF	Rate (AF/Day)
RB-Cressey	1.89	07/21/2011 16:15	07/21/2011 12:00	0.18	0.499	2.82
RB-Cressey	1.10	07/21/2011 18:15	07/21/2011 16:15	0.08	0.312	3.75
RB-Cressey	9.61	07/22/2011 12:00	07/21/2011 18:15	0.74	1.614	2.18
RB-Cressey	9.61	07/23/2011 06:30	07/22/2011 12:00	0.77	14.692	19.06
RB-Cressey	1.58	07/23/2011 17:00	07/23/2011 06:30	0.44	8.339	19.06
RB-Cressey	9.45	07/24/2011 07:00	07/23/2011 17:00	0.58	1.828	3.13
RB-Cressey	14.49	07/24/2011 16:00	07/24/2011 07:00	0.38	7.029	18.74
RB-Cressey	14.49	07/25/2011 23:59	07/24/2011 16:00	1.33	38.319	28.74
RB-Cressey	0.00	07/26/2011 06:00	07/25/2011 23:59	0.25	7.185	28.74
RB-Cressey	13.86	07/27/2011 12:00	07/26/2011 06:00	1.25	0.000	0.00
RB-Cressey	19.68	07/28/2011 15:00	07/27/2011 12:00	1.13	30.926	27.49
RB-Cressey	25.96	07/29/2011 15:00	07/28/2011 15:00	1.00	39.033	39.03
RB-Cressey	13.20	07/30/2011 11:00	07/29/2011 15:00	0.83	42.908	51.49
RB-Cressey	21.00	07/31/2011 06:00	07/30/2011 11:00	0.79	20.727	26.18
RB-Cressey	12.00	08/01/2011 01:00	07/31/2011 06:00	0.79	32.974	41.65
RB-Cressey	20.88	08/02/2011 00:00	08/01/2011 01:00	0.96	22.809	23.80
RB-Cressey	13.00	08/03/2011 00:31	08/02/2011 00:00	1.02	42.305	41.41
RB-Cressey	8.04	08/03/2011 07:00	08/03/2011 00:31	0.27	6.965	25.78
RB-Cressey	0.30	08/04/2011 06:00	08/03/2011 07:00	0.96	15.282	15.95
RB-Cressey	8.40	08/05/2011 07:00	08/04/2011 06:00	1.04	0.620	0.60
RB-Cressey	13.20	08/06/2011 15:30	08/05/2011 07:00	1.35	22.561	16.66
RB-Cressey	17.16	08/07/2011 00:00	08/06/2011 15:30	0.35	9.272	26.18
RB-Cressey	13.56	08/07/2011 16:00	08/07/2011 00:00	0.67	22.690	34.04
RB-Cressey	13.20	08/08/2011 02:20	08/07/2011 16:00	0.43	11.580	26.89
RB-Cressey	11.40	08/09/2011 15:00	08/08/2011 02:20	1.53	39.999	26.18
RB-Cressey	0.00	08/10/2011 15:00	08/09/2011 15:00	1.00	22.611	22.61
RB-Cressey	17.40	08/11/2011 15:00	08/10/2011 15:00	1.00	0.000	0.00
RB-Cressey	16.80	08/12/2011 14:00	08/11/2011 15:00	0.96	33.073	34.51
RB-Cressey	3.00	08/12/2011 23:00	08/12/2011 14:00	0.38	12.495	33.32
RB-Cressey	10.56	08/13/2011 15:00	08/12/2011 23:00	0.67	3.967	5.95
RB-Cressey	18.10	08/14/2011 12:00	08/13/2011 15:00	0.88	18.327	20.94
RB-Cressey	27.00	08/15/2011 03:00	08/14/2011 12:00	0.63	22.437	35.90
RB-Cressey	4.00	08/15/2011 10:00	08/15/2011 03:00	0.29	15.619	53.55
RB-Cressey	8.70	08/16/2011 13:00	08/15/2011 10:00	1.13	8.925	7.93
RB-Cressey	10.10	08/17/2011 00:30	08/16/2011 13:00	0.48	8.268	17.26
RB-Cressey	9.20	08/18/2011 13:24	08/17/2011 00:30	1.54	30.800	20.03
RB-Cressey	12.40	08/19/2011 15:00	08/18/2011 13:24	1.07	19.464	18.25
RB-Cressey	0.00	08/20/2011 16:00	08/19/2011 15:00	1.04	25.619	24.59
RB-Cressey	11.40	08/21/2011 11:45	08/20/2011 16:00	0.82	0.000	0.00
RB-Cressey	11.40	08/21/2011 15:00	08/21/2011 11:45	0.14	3.062	22.61
RB-Cressey	15.20	08/22/2011 15:00	08/21/2011 15:00	1.00	22.611	22.61
RB-Cressey	11.76	08/23/2011 09:00	08/22/2011 15:00	0.75	22.611	30.15
RB-Cressey	10.10	08/24/2011 11:00	08/23/2011 09:00	1.08	25.269	23.32
RB-Cressey	6.00	08/24/2011 21:00	08/24/2011 11:00	0.42	8.347	20.03
RB-Cressey	12.60	08/25/2011 16:00	08/24/2011 21:00	0.79	9.421	11.90
RB-Cressey	6.50	08/26/2011 14:00	08/25/2011 16:00	0.92	22.908	24.99
RB-Cressey	15.00	08/27/2011 16:00	08/26/2011 14:00	1.08	13.966	12.89
RB-Cressey	6.00	08/28/2011 09:00	08/27/2011 16:00	0.71	21.074	29.75
RB-Cressey	0.00	08/28/2011 23:59	08/28/2011 09:00	0.62	7.429	11.90
RB-Cressey	7.80	08/29/2011 15:00	08/28/2011 23:59	0.63	0.000	0.00
RB-Cressey	7.20	08/30/2011 14:30	08/29/2011 15:00	0.98	15.148	15.47
RB-Cressey	7.20	08/31/2011 14:30	08/30/2011 14:30	1.00	14.280	14.28
RB-Cressey	8.40	09/01/2011 15:30	08/31/2011 14:30	1.04	14.876	14.28
RB-Cressey	8.20	09/02/2011 13:30	09/01/2011 15:30	0.92	15.272	16.66
RB-Cressey	13.60	09/03/2011 14:30	09/02/2011 13:30	1.04	16.942	16.26
RB-Cressey	14.50	09/04/2011 15:30	09/03/2011 14:30	1.04	28.098	26.97
RB-Cressey	14.50	09/05/2011 23:59	09/04/2011 15:30	1.35	38.945	28.76
RB-Cressey	14.50	09/06/2011 23:59	09/05/2011 23:59	1.00	28.759	28.76
RB-Cressey	14.50	09/07/2011 23:59	09/06/2011 23:59	1.00	28.759	28.76
RB-Cressey	0.00	09/08/2011 21:00	09/07/2011 23:59	0.88	25.165	28.76
RB-Cressey	11.80	10/05/2011 16:00	09/08/2011 21:00	26.79	0.000	0.00
RB-Cressey	11.80	10/06/2011 23:59	10/05/2011 16:00	1.33	31.205	23.40
RB-Cressey	11.80	10/07/2011 23:59	10/06/2011 23:59	1.00	23.404	23.40
RB-Cressey	22.01	10/08/2011 22:49	10/07/2011 23:59	0.95	22.250	23.40
RB-Cressey	17.40	10/09/2011 13:30	10/08/2011 22:49	0.61	26.708	43.65
RB-Cressey	16.80	10/10/2011 07:38	10/09/2011 13:30	0.76	26.075	34.51
RB-Cressey	7.68	10/10/2011 11:25	10/10/2011 07:38	0.16	5.253	33.32
RB-Cressey	17.28	10/11/2011 05:00	10/10/2011 11:25	0.73	11.160	15.23
RB-Cressey	7.92	10/11/2011 20:10	10/11/2011 05:00	0.63	21.659	34.27
RB-Cressey	7.92	10/12/2011 23:59	10/11/2011 20:10	1.16	18.217	15.71
RB-Cressey	7.92	10/13/2011 23:59	10/12/2011 23:59	1.00	15.709	15.71
RB-Cressey	7.92	10/14/2011 04:30	10/13/2011 23:59	0.19	2.946	15.71
RB-Cressey	7.44	10/14/2011 11:45	10/14/2011 04:30	0.30	4.745	15.71
RB-Cressey	18.48	10/14/2011 21:00	10/14/2011 11:45	0.39	5.687	14.76
RB-Cressey	18.48	10/15/2011 05:18	10/14/2011 21:00	0.35	12.676	36.65
RB-Cressey	18.00	10/15/2011 13:22	10/15/2011 05:18	0.34	12.320	36.65
RB-Cressey	12.36	10/15/2011 19:00	10/15/2011 13:22	0.23	8.380	35.70
RB-Cressey	12.36	10/16/2011 05:31	10/15/2011 19:00	0.44	10.742	24.51
RB-Cressey	11.76	10/16/2011 16:00	10/16/2011 05:31	0.44	10.708	24.51
RB-Cressey	10.92	10/17/2011 05:40	10/16/2011 16:00	0.57	13.282	23.32
RB-Cressey	11.81	10/17/2011 14:30	10/17/2011 05:40	0.37	7.972	21.66
RB-Cressey	7.80	10/18/2011 05:30	10/17/2011 14:30	0.63	14.640	23.42
RB-Cressey	9.72	10/18/2011 14:00	10/18/2011 05:30	0.35	5.479	15.47
RB-Cressey	9.72	10/19/2011 23:59	10/18/2011 14:00	1.42	27.311	19.28
RB-Cressey	0.00	10/20/2011 12:00	10/19/2011 23:59	0.50	9.640	19.28

Summary

23.29 acre-feet/day ** Average not including 0 inflow time periods
2.91 feet/day

21.92 acre-feet/day ** Average including 0 inflow time periods
2.74 feet/day

Merced Integrated Regional Water Management Implementation Grant Proposal

Appendix 3-15

Cressey Length of Irrigation Season Based on Historical Record

Cressey Basin Enlargement Project - Water Supply Benefits

Maximum Infiltration Rate	2.74	ft/day
Current Basin Size	8	acres
Proposed Basin Increase	5	acres

Water Year	Water Year for X-Axis	Available Recharge Index	MID Season Start Date	MID Season End Date	Annual Data: Current Basin Recharge	Annual Data: Proposed Increase	Annual Data: Proposed Total Recharge
1970	1970	1			0	0	0
1971		1			0	0	0
1972		1			0	0	0
1973		1			0	0	0
1974		1			0	0	0
1975	1975	1			0	0	0
1976		0			0	0	0
1977		0			0	0	0
1978		1			0	0	0
1979		1			0	0	0
1980	1980	1			0	0	0
1981		1			0	0	0
1982		1			0	0	0
1983		1			0	0	0
1984		1			0	0	0
1985	1985	1			0	0	0
1986		1			0	0	0
1987		1			0	0	0
1988		0			0	0	0
1989		0			0	0	0
1990	1990	0	3/26/1990	9/5/1990	0	0	0
1991		0	4/22/1991	10/31/1991	0	0	0
1992		0	4/10/1992	9/22/1992	0	0	0
1993		1	3/29/1993	10/31/1993	4,735	2,959	7,694
1994		1	3/1/1994	10/31/1994	5,348	3,343	8,691
1995	1995	1	3/13/1995	10/31/1995	5,085	3,178	8,264
1996		1	3/15/1996	10/31/1996	5,042	3,151	8,193
1997		1	3/4/1997	10/31/1997	5,283	3,302	8,584
1998		1	3/19/1998	10/31/1998	4,954	3,096	8,050
1999		1	3/2/1999	10/31/1999	5,327	3,329	8,656
2000	2000	1	3/27/2000	10/31/2000	4,779	2,987	7,765
2001		1	3/26/2001	10/15/2001	4,450	2,781	7,231
2002		1	3/18/2002	10/31/2002	4,976	3,110	8,086
2003		1	3/10/2003	10/31/2003	5,151	3,220	8,371
2004		1	3/22/2004	10/15/2004	4,537	2,836	7,373
2005	2005	1	3/21/2005	10/31/2005	4,910	3,069	7,979
2006		1	3/1/2006	10/31/2006	5,348	3,343	8,691
2007		1	3/21/2007	9/30/2007	4,231	2,644	6,875
2008		0	3/24/2008	9/30/2008	0	0	0
2009		1	3/23/2009	10/31/2009	4,866	3,041	7,908
2010	2010	1	3/29/2010	10/30/2010	4,713	2,946	7,658
2011		1	3/14/2011	10/31/2011	5,064	3,165	8,228
2012		1	3/5/2012	10/31/2012	5,261	3,288	8,549
2013		0	3/11/2013	10/31/2013	0	0	0
2014		0	4/18/2014		0	0	0
Average Recharged in Non-critical Year					**4,950**	**3,094**	**8,044**
							8,044