Central Valley Dairy Representative Monitoring Program Year 1 Annual Report (2012), Phase 1

Part I of IV

April 1, 2013

LUHDORFF & SCALMANINI
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Signature Page

We certify under penalty of law that we have personally examined and are familiar with the information submitted in this document and all attachments and that, based on our inquiry of those individuals immediately responsible for obtaining the information, we believe that the information is true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

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- West Side: ANT, COR, FG2, GOD, MAC, NUN, MOO, TON

Dairy Production Area and Associated Fields

- East Side: MEN, ANC, BET, FG1, COT, SAN, PLS, CAE, ROB
- West Side: ANT, FG2, GOD, MAC and NUN, MOO, TON

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- East Side: MEN, ANC, BET, FG1, BEA, COT, SAN, PLS, CAE, ROB
- West Side: ANT, COR, FG2, GOD, MAC, NUN, MOO, TON

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Acronyms and Nomenclature

AR ratio	application/harvest removal ratio
bgs	below ground surface
CCA	Certified Crop Advisor
CCID	Central California Irrigation District
CEC	cation exchange capacity
CVDRMP	Central Valley Dairy Representative Monitoring Program
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability
CVSC	Central Valley Salinity Coalition
DO	dissolved oxygen
DON	dissolved organic nitrogen
ESC	East Side Canal
ILRP	Irrigated Lands Regulatory Program
MRP	monitoring and reporting program
MW	monitoring well
MWICR	monitoring well installation completion report
MWISP	monitoring well installation and sampling plan
NRCS	Natural Resources Conservation Service
ORP	oxygen reduction potential
PON	particulate organic nitrogen
Porter-Cologne	California's Porter-Cologne Water Quality Control Act
RB5	Central Valley Regional Water Quality Control Board (Region 5)
Regional Board(s)	generic reference to Regional Board(s)
RMP	Representative Monitoring Program
SAR	sodium adsorption ratio
SSURGO	Soil Survey Geographic Database
State Board	State Water Resources Control Board
TDS	total dissolved solids
TID	Turlock Irrigation District
TKN	total Kjeldahl nitrogen (NH_3+NH_4 + organic N)
TN	total nitrogen
UCCE	University of California Cooperative Extension
UN32	synthetic fertilizer with 32% nitrogen content, composed of 45% ammonium nitrate, 35% urea, and 20% water
USDA	US Department of Agriculture
WDRs	Waste Discharge Requirements
WQOs	Water Quality Objectives

Ca	calcium
$CaCO_3$	calcium carbonate
$CaSO_4$ x $2H_2O$	gypsum
Cl	chloride
$CO(NH_2)_2$	urea (46% N)
CO_3^{2-}	carbonate
d	water column above bottom of screen
dh	hydraulic head difference
HCO_3^-	bicarbonate

i	horizontal gradient
i_v	vertical gradient
K	potassium or hydraulic conductivity (context specific)
K_h	hydraulic conductivity (horizontal)
$K_{sat(min)}$	smallest saturated hydraulic conductivity (SSURGO soil property)
K_v	hydraulic conductivity (vertical)
K_2O	potassium oxide
Mg	magnesium
N	nitrogen
Na	sodium
Na_2CO_3	sodium carbonate
$NaHCO_3$	sodium bicarbonate
NH_3	ammonia
NH_4^+	ammonium
$NH_3+NH_4^+$	ammoniacal N
NH_4NO_3	fertilizer ammonium nitrate (34% N)
$(NH_4)_2SO_4$	fertilizer ammonium sulfate (21% N; 24% S)
NO_2^-	nitrite
NO_3^-	nitrate
OH^-	hydroxide
P_2O_5	phosphorus pentoxide
PO_4^{3-}	phosphate
r	recharge rate
S	sulfur
s	monitored source length
SO_4^{2-}	sulfate
v	Darcy velocity of water

<u>Units of Measure</u>

ft	foot
m	meter (1 m = 3.280 839 895 ft)
cm	centimeter (1 cm = 10^{-2} m)
mm	millimeter (1 mm = 10^{-3} m)
ac	acre
ha	hectare (1 ha = 10^4 m^2 = 2.471 053 814 ac)
af	acre foot (1 af = 1,233,481.855 L)
L	liter (10^{-3} m^3) or unit of length
mL	milliliter (1 mL = 10^{-3} L)
gal	gallon
kg	kilogram (1 kg = 10^3 g)
g	gram
mg	milligram (1 mg = 10^{-3} g)
d	day
h	hour
s	second

t	unit of time
cfs	cubic feet per second
gpm	gallons per minute
mV	millivolts
NTU	nephelometric turbidity units

1 EXECUTIVE SUMMARY

This report was prepared on behalf of the Central Valley Dairy Representative Monitoring Program (CVDRMP), a non-profit group of dairy owners and operators organized in 2010 to conduct representative groundwater monitoring on behalf of member dairies. This "Year 1" Report is submitted to satisfy certain regulatory requirements under *Waste Discharge Requirements General Order No. R5-2007-0035 for Existing Milk Cow Dairies* (General Order), adopted by the Central Valley Regional Water Quality Control Board (RB5) on May 3, 2007. Specifically, this report addresses the General Order's Monitoring and Reporting Program (MRP) requirements, as revised in February 2011.

Per the MRP, the Representative Monitoring Program (RMP) examines conditions in first encountered groundwater. This examination is coupled with examinations of dairy operations and management practices, particularly as related to nutrient and salt management, to facilitate the evaluation of cause and effect relationships between subsurface loading of nutrients and salts, and groundwater conditions. Importantly, the RMP was not designed for, and does not address, monitoring and assessment of drinking water sources.

CVDRMP's first Annual Representative Monitoring Report includes 18 dairies in Stanislaus and Merced counties that were selected for the Phase 1 Workplan. Specifically, the Year 1 Report includes water level and chemical information of first encountered groundwater collected during 2012 for purposes of assessing effectiveness of dairy management practices. The report also includes related dairy operations information spanning from planting of summer crops 2011 to harvest of summer crops 2012. As such, it is an initial survey of dairy operations/management practices and groundwater characteristics immediately beneath these dairies and only the first stage in a much larger multi-year effort that includes expanded monitoring, collaboration with expert advisory committees, and field research toward developing improved management practices.

The initial data collection effort demonstrates that the Phase 1 network is performing as designed. It has produced a high-utility data set within only one year of monitoring activities, providing important and insightful information with respect to groundwater levels and chemistry, and field-scale nutrient/salt accounting, and how these relate to site-specific hydrology, farm operations, and management. Much of what has been learned so far provides preliminary confirmation of previous research by the University of California[1], and provides for a strong foundation from which to expand on that knowledge, especially in terms of developing strategies to improve farming practices toward reducing effects on groundwater.

As anticipated, the initial data collected from this effort confirms that first encountered groundwater (i.e., groundwater directly beneath dairy facilities) is affected by historical and/or current dairy farming practices, and suggests that the application of fertilizer (manure and/or commercial fertilizer) to crops is a major contributing source. Effects on groundwater nitrate concentrations appear to be pronounced in areas with sandy soils, but such effects were also recorded in other soil types. Preliminary findings confirm the importance of this program and its ongoing efforts to improve the understanding of the relationship between contemporary farming practices and groundwater impacts. Most importantly, information in this report will help to begin the process of identifying what else might be done by farmers to further refine and modernize practices to cost-effectively reduce these impacts.

[1] Harter et al., 2001a, 2001b, 2002a, 2002b, and 2006; Mathews et al., 2001; Van der Schans et al., 2009. See Section 8 for full references.

By intent and design, the dedicated monitoring wells in the RMP are as sensitive as possible to activities on the surface. The design of these monitoring wells is fundamentally different from that of drinking water wells, and data from the monitoring wells are not indicative of actual impacts to drinking water sources. Furthermore, constituent concentrations in groundwater alone are not a valid indicator of effective versus ineffective agricultural management practices. The RMP addresses this intricacy with a comprehensive data collection and analysis effort including mass loading estimates as well as groundwater level and chemical information. Currently, this program is likely the most comprehensive of its kind in California. This is important because farming and fertilization practices in a wide range of agricultural sectors affect groundwater quality. This has most recently been demonstrated by the California Nitrate Project, Implementation of Senate Bill X2_1, and its report *Addressing Nitrate in California's Drinking Water*[2]. The significance of these issues is also recognized by the RB5's Long-Term Irrigated Lands Regulatory Program (ILRP) and the Central Valley Salinity Coalition (CVSC) with its Central Valley Salinity Alternatives for Long-Term Sustainability initiative (CV-SALTS).

In January 2013, monitoring efforts were expanded from the initial 18 Phase 1 dairies to incorporate 24 additional dairies, including several dairies with numerous pre-existing monitoring wells that have been subject to academic research for many years. CVDRMP now collects data from monitoring wells at 42 Central Valley dairies from Tehama County in the north to Kern County in the south, with 440 wells at 274 well sites.

As CVDRMP expands its monitoring of groundwater levels and chemistry, it will also expand efforts to refine the understanding of how above-ground practices relate to these data. The initial assessment provided here suggests a high level of imprecision associated with field-scale nutrient and salt mass balance computations. This will be addressed with a two-pronged approach, including (i) supplementary examination of existing data sources, and (ii) improved means to quantify mass inputs and outputs. Initial findings show that nutrient and salt management will be critical in addressing groundwater quality in first encountered groundwater beneath dairies. Concurrently, improving the accuracy of nutrient accounting and confidence in application/harvest removal ratios will increase the effectiveness of expanded comparisons and the sensitivity of comparative analyses.

CVDRMP will also focus major efforts in the coming year to further analyze manure retention ponds, including improved measurements and field studies to develop cost-effective mitigation options.

As it was envisioned and designed by its organizers and ultimately approved by the RB5, CVDRMP is a purposeful, multi-year effort that goes beyond monitoring. CVDRMP includes intensive, multidisciplinary expert collaboration, with comprehensive recommendations for improvement developed and delivered no later than 2017.

[2] Harter et al., 2012. *Addressing Nitrate in California's Drinking Water with a Focus on Tulare Lake Basin and Salinas Valley Groundwater*. Report for the State Water Resources Control Board Report to the Legislature. See Section 8 for full reference.

2 INTRODUCTION

This report was prepared for the Central Valley Dairy Representative Monitoring Program (CVDRMP), the administrative body managing the Representative Monitoring Program (RMP). It is referred to as the "Year 1" Report and aims to satisfy the regulatory requirements under *Waste Discharge Requirements General Order No. R5-2007-0035 for Existing Milk Cow Dairies* (General Order), adopted by the Central Valley Regional Water Quality Control Board (RB5) on May 3, 2007 (RB5, 2007). The Year 1 Report is RB5's first annual report and pertains to the 18 Phase 1 RMP dairies in Stanislaus and Merced counties that were selected in the Phase 1 RMP Workplan (LSCE, 2012a). It encompasses the groundwater data collection effort in calendar year 2012 and related dairy operations information spanning from planting of summer crops 2011 to harvest of summer crops 2012.

Background

Legal and Regulatory Background

Division 7 of the Water Code contains California's Porter-Cologne Water Quality Control Act (Porter-Cologne). The Legislature enacted Porter-Cologne in 1969, providing "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made to those waters and total values involved, beneficial and detrimental, economic and social, tangible and intangible." (Wat. Code, § 13000, emphasis added.) The Legislature designated the State Water Resources Control Board (State Board) and nine Regional Water Quality Control Boards (Regional Boards) as the agencies responsible for regulation of water quality under Porter-Cologne. (Id., § 13001.) Each Regional Board is responsible for water quality protection, permitting, inspection, and enforcement within its region. (Id., § 13225(a).)

Porter-Cologne provides two primary tools to Regional Boards to regulate the discharge of waste into waters of the state. The Regional Boards may: (1) issue Waste Discharge Requirements (WDRs) proscribing conditions under which a person may discharge waste (Wat. Code, § 13263), or (2) adopt a waiver of WDRs (Wat. Code, § 13269). As with WDRs, a Regional Board may proscribe conditions for waivers of WDRs. (Id., § 13269.) Porter-Cologne's permitting requirements apply to any "person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the state, other than into a community sewer system." (Id., § 13260(a)(1).)

Sometimes WDRs are issued to an individual discharger who has filed a "report of waste discharge" and requested the permit. (Wat. Code, § 13260.) Other times, a Regional Board may issue general WDRs for a category of dischargers if the Regional Board determines that (i) the discharges are produced by the same or similar operations; (ii) the discharges involve the same or similar types of waste; (iii) the discharges require the same or similar treatment standards; and, (iv) the discharges are more appropriately regulated under general discharge requirements than under individual discharge requirements. (Id., § 13263(i).) The General Order here falls into this category. When issuing WDRs, a Regional Board is required to consider a number of factors, including those specified in Water Code section 13241, which includes economic consideration. (Wat. Code, §§ 13263(a), 13241(d).)

Porter-Cologne further authorizes Regional Boards to conduct investigations and inspections to verify compliance with the act and with the terms of WDRs and waivers. (Wat. Code, § 13267(e).) A Regional Board may also require discharges to furnish technical or monitoring reports. (Id., § 13267(b).) The Year 1 Report, as discussed further below, responds to a monitoring and reporting requirement issued by the RB5 on February 23, 2011.

Besides requiring Regional Boards to issue WDRs, Porter-Cologne also requires each Regional Board to adopt "water quality control plans" or "Basin Plans" for areas within each region. (Wat. Code, § 13240.) Basin Plans are required to conform to the policies set forth in Chapter 1 of Porter-Cologne, including the legislative mandate that activities affecting water quality be regulated to the highest quality that is reasonable considering all of the demands being made and to be made upon the waters. (Id. §§ 13000, 13240.) Further, Basin Plans identify and designate the "beneficial uses" for each water body in the region. (Id., § 13050(j).) Examples of "beneficial uses" for groundwater include municipal supply, agricultural supply, and industrial supply. Basin Plans also establish Water Quality Objectives (WQOs), which are defined to mean, "the limits or levels of water quality constituent or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area." (Wat. Code, § 13050(h).) WQOs may be numeric or narrative standards. Further, Basin Plans are to include a program of implementation to achieve the adopted WQOs. (Id., § 13242.)

When a Regional Board issues WDRs or conditional waivers, it must do so consistent with applicable Basin Plans. (Wat. Code, §§ 13263(a), 13269(a)(1).) However, instantaneous compliance with WQOs is logically not required by Porter-Cologne. (Ibid. as to both cites) Rather, the Regional Board is given discretion to achieve this consistency, including setting of time schedules, for example. (Id., § 13263(c).) RB5 adopted two Basin Plans under Porter-Cologne in 1975. They include the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Sacramento-San Joaquin Basin Plan) and the Water Quality Control Plan for the Tulare Lake Basin (Tulare Lake Basin Plan). Both Basin Plans have been amended several times over the years and are subject to regular review approximately every three years.

Currently, various stakeholders in the Central Valley (including dairy industry representatives) are leading an initiative to develop a Central Valley-wide salt and nitrate management plan. The initiative is referred to as the Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS), and one of its primary objectives is to provide the basis for amendments to the Sacramento-San Joaquin and Tulare Lake Basin Plans to address ongoing salinity and nutrient concerns in the Central Valley Region. The information developed and gathered through this effort will be helpful in developing Basin Plan amendments with respect to nutrient concerns, and the development of long-term plans for addressing such concerns

Procedural and Chronological Background

The General Order defines an existing milk cow dairy as a dairy that (i) was operating as of October 17, 2005, (ii) filed a complete Report of Waste Discharge in response to the RB5's August 8, 2005 Report of Waste Discharge Request Letter, and (iii) has not expanded since October 17, 2005 (i.e., its herd size has not increased by more than 15%). The General Order regulates waste discharges to land at the majority of 1,429 existing dairies[3] of all sizes and imposes significantly more stringent requirements than in the past.

Relative to groundwater monitoring, the General Order and its accompanying Monitoring and Reporting Program (MRP) specify two requirements: (1) monitoring of domestic and agricultural supply wells at dairies, and (2) additional groundwater monitoring. The latter requirement is presently implemented by the Executive Officer by ordering individual dairies to install monitoring wells ("site-by-site approach"). However, the General Order also authorizes the Executive Officer to approve alternative monitoring methods. The Information Sheet (page IS-8) states:

> "In the future, the Executive Officer or Central Valley Water Board may determine that a proposed alternative method of environmental monitoring is appropriate to determine if groundwater protection is being achieved. One suggested alternative has been to allow regional groundwater monitoring as a substitute for groundwater monitoring at individual dairies. Any proposed alternative will require sufficient details for consideration by either the Executive Officer or Central Valley Water Board. The Executive Officer or the Central Valley Water Board must issue a monitoring and reporting program order for any alternative environmental monitoring."

[3] As of January 2010 (personal communication with J.P. Cativiela, Dairy Cares, April 2, 2010).

To further the development of an alternative environmental monitoring method, Dairy Cares (www.dairycares.com) submitted a proposal on October 5, 2009 (Dairy Cares, 2009) to the RB5 Executive Officer for the development of a collaborative plan that would allow a representative groundwater monitoring approach to satisfy the additional groundwater monitoring requirements in lieu of the site-by-site approach of the General Order MRP.

RB5 held a February 4, 2010 stakeholder meeting in Rancho Cordova where Luhdorff and Scalmanini, Consulting Engineers (LSCE) presented an initial outline of the representative groundwater monitoring approach, which was developed based on over a decade of dairy specific and groundwater-related research in the Central Valley and a regional monitoring approach proposed by Dr. Thomas Harter of the University of California Cooperative Extension (UCCE) in September 2008 (Harter, 2008). The monitoring approach was discussed in greater detail at the meeting of RB5's Groundwater Advisory Workgroup in Rancho Cordova on March 9, 2010.

Concurrently, LSCE evaluated dairy farm characteristics along with environmental parameters to determine an area in the Central Valley that is most sensitive to dairy management practices in the *Report of Results* (LSCE, 2010). This area was identified to be in Stanislaus and Merced Counties between the San Joaquin River and Highway 99, and was selected for initiating the RMP based on delineation of those areas in the Central Valley where high groundwater nitrogen and salt concentrations are thought to be substantially attributable to dairy operations and where changes in water quality are most likely to be detected quickly due to adoption of management practices required by the General Order. The analysis included comparison of key information such as:

- Relative dairy farm/milk cow densities and other historical livestock operations data
- Historical average depths to groundwater
- Soil permeability
- Historical recharge to groundwater
- Observed historical groundwater nitrate and total dissolved solids (TDS) concentrations
- Whole farm nitrogen balances submitted to the RB5 in response to the General Order

This work effort recommended that the representative groundwater monitoring be initiated in Stanislaus and Merced Counties (i.e., from the Stanislaus River in the north and the Chowchilla River in the south) between the San Joaquin River and Highway 99 (this area is referred to as the high priority area). Results of this work effort were presented at the April 5, 2010 stakeholder meeting held at the RB5's offices in Rancho Cordova.

Subsequently, two concurrent work efforts ensued. One was the formation of an administrative body to manage the RMP. This occurred on May 17, 2010 with the founding of the CVDRMP. The other effort concerned the modification of the MRP to provide regulatory support for the RMP. The revised General Order MRP was issued by the Central Valley Executive Officer on February 23, 2011 (RB5, 2011a).

Phase 1

On June 16, 2011, CVDRMP submitted the *Public Review Draft Monitoring and Reporting Workplan and Monitoring Well Installation and Sampling Plan Phase 1: Initiation of Representative Groundwater Monitoring Network Design & Monitoring Program, Existing Milk Cow Dairies – Stanislaus and Merced Counties, California* (finalized without changes January 11, 2012 [LSCE, 2012a]), which was followed by a 30-day public review period and subsequent conditional approval on September 9, 2011 (RB5, 2011b). The Phase 1 well installation campaign commenced without delay and was concluded with the installation of 216 nested monitoring wells at 108 well locations in November 2011. The Phase 1 RMP well network also includes 18 pre-existing monitoring wells. The results of this work effort were described in the *Monitoring Well Installation Completion Report Phase 1 Representative Monitoring Program, Existing Milk Cow Dairies – Stanislaus and Merced Counties, California* (LSCE, 2012b).

Groundwater data collection in the Phase 1 network of wells commenced in January 2012. Concurrently, CVDRMP assembled two independent technical advisory committees with members from private industry, the University of California including its Cooperative Extension, and the public sector. The purpose of the Groundwater Technical Advisory Committee (GTAC) is to ensure adequacy of the RMP groundwater data collection effort, soundness of analytical tools, and interpretations.

The purpose of the Multidisciplinary Advisory Committee (MAC) is to provide support in the following areas:

- Identification of existing dairy management practices, which will affect both the extrapolation of RMP findings to non-monitored facilities and the ultimate extent of the RMP;
- Provide insights on innovative methodologies, approaches, and analytical tools (e.g., whole farm nitrogen use efficiency modeling, modeling of nitrogen and salt movement in the root zone, and groundwater modeling) to support the RMP;
- Review and evaluation of results from implemented methodologies, approaches, and analytical tools;
- Identification of potential research needs; and
- Identification of potential solutions in response to findings of the RMP.

Phase 2

On June 6, 2012, CVDRMP submitted the *Public Review Draft Monitoring and Reporting Workplan and Monitoring Well Installation and Sampling Plan, Phase 2: Representative Groundwater Monitoring Network Design & Monitoring Program, Existing Milk Cow Dairies – Central Valley, California* (LSCE, 2012c), which was followed by a 30-day public review period and the *Addendum Monitoring and Reporting Workplan and Monitoring Well Installation and Sampling Plan, Phase 2: Representative Groundwater Monitoring Network Design & Monitoring Program, Existing Milk Cow Dairies – Central Valley, California* (LSCE, 2012d). The RB5 approved the Phase 2 program with the subsequent conditional approval on August 27, 2012. The Phase 2 well installation campaign commenced without delay and was concluded with the installation of 55 nested monitoring wells at 30 well locations in October 2012. The Phase 2 RMP well network also includes 118 pre-existing monitoring well sites. The total current program (Phases 1 and 2) encompasses 42 dairies, 272 well sites, and 440 wells. Groundwater data collection in the Phase 2 network of wells commenced in January 2013.

3 REPRESENTATIVE MONITORING

For purposes of groundwater quality research, California dairy farms have previously been conceptualized to consist of three main management units: the land application areas (i.e., the fields where lagoon liquor and/or solid manure are used to fertilize crops), corrals, and liquid manure holding ponds (RB5, 2007; Harter et al., 2001a; Harter, 2008; van der Schans et al., 2009). This concept has been incorporated into the RMP (LSCE, 2012a).

Representative monitoring aims to identify a causal link between groundwater chemical characteristics and dairy management practices specific to management units. This includes the identification of groundwater chemical changes in response to changing management practices. Necessarily, the focus of the RMP groundwater investigation is on the uppermost zone of first encountered groundwater.

The subsurface loading rate is determined by the product of its two components: the rate of deep percolation (i.e., the amount of infiltrated water reaching first encountered groundwater) and the constituent concentration of the infiltrate. It is a chemical flux that describes a particular management unit's performance. Therefore, the RMP focuses on the identification and evaluation of physical parameters that control subsurface loading. Importantly, in this context, an infinite number of combinations of these two components can result in the same groundwater chemical concentrations in a groundwater sample. For example, high rates of deep percolation can result in relatively low mineral concentrations in groundwater. Similarly, low rates of deep percolation associated with water conservation efforts may result in higher mineral concentrations in groundwater.

Physical parameters directly support the analysis and interpretation of groundwater quality data and the extrapolation of results from the RMP to non-monitored dairy farms. Physical parameters essentially serve as explanatory variables for groundwater chemical characteristics beneath specific management units. As such, these physical parameters are key to the representativeness of the RMP. Some physical parameters are largely independent of dairy operational decisions and management, and they cannot be readily changed by individual dairy farm practices. These parameters are referred to as "static" in this context. Examples are certain soil properties and precipitation; these parameters are important for the assessment of all three management units.

Other physical parameters are subject to change. The total irrigation volume, irrigation rate and duration, application rates of lagoon liquor, solid manure and synthetic fertilizer, and crop types are examples of parameters important in relation to the fields. For corrals, examples of parameters subject to change include ground surface slope (to provide drainage), degree of compaction and maintenance thereof, the excretion rate and the manure removal rate. For liquid manure storage lagoons, examples of parameters subject to change include ultimately (and most directly) the lagoon's seepage rate and the liquor's constituent concentrations (i.e., the components of the chemical flux). The above parameters can be addressed via management practices; therefore, they are referred to as "dynamic" in this context.

Concept of the Source Area of a Well

The concept of the source area of a well is fundamental to the RMP as it relates to the monitoring well design and the interpretation of groundwater chemical characteristics as a result of dairy management practices specific to management units.

The source area of a well is the area which supplies water to the well. The size of the source area depends on many variables, including the well's construction details, the rate and duration of groundwater extraction, physical properties of the aquifer, and hydrologic conditions. Under absence of pumping, the well's source

area essentially becomes a source line, referred to as the monitored source length, s[4]. The monitored source length in recharge dominated hydrologic systems, such as encountered in irrigated agricultural settings, can be conceptualized as follows (Harter et al., 2002):

eq. 1

$$s = d\frac{v}{r}$$

where,

eq. 2

$$v = K\ i$$

s = monitored source length [L]
d = length of screen below water table [L]
v = horizontal flow [L t^{-1}]
r = recharge rate [L t^{-1}]
K = hydraulic conductivity [L t^{-1}]
i = horizontal gradient [L L^{-1}]

Eq. 1 states that s increases linearly with increasing d and q; and it decreases nonlinearly with increasing r. Importantly, when r approaches zero (i.e., no recharge), s becomes infinitely large.

Eq. 1 represents a simplification of the actual system, and the monitored source length is not constant. As water table elevations fluctuate, d changes. Also, v and r are nonsteady. Furthermore, the groundwater flow direction (this is not included in the scalar form of K used in eq. 2) is variable. The single most influential variable on s is the hydraulic conductivity, K. This is due to the wide range of hydraulic conductivities that occur in even relatively homogeneous subsurface materials. The *Handbook of Hydrology* (Maidment, 1993) suggests the following ranges of K [m d^{-1}] for subsurface materials comparable to those investigated at the CVDRMP monitoring sites:

Clays: $10^{-7} – 10^{-4}$
Silts: $10^{-0} – 10^{0}$
Sands (fine to coarse): $10^{-2} – 10^{+3}$

For typical values of d (10 ft), i (0.003), and r (1 ft y^{-1}), below are estimates of monitored source lengths (ft) for a range of K (ft d^{-1}) values (values are shown with one significant figure):

K = 1	s = 10
K = 10	s = 100
K = 50	s = 500
K = 100	s = 1,000
K = 500	s = 5,000

Using the above parameters, the largest primary hydraulic conductivity of clay would result in a source length significantly shorter than 1 foot. A well of this characteristic would yield almost no water and would tend to go dry during purging activities. In practice, it is believed that secondary porosity in clay and silt rich soils, caused by fractures and other heterogeneities, effectively increases the RMP wells' monitored source length. This is supported by the fact that RMP monitoring wells that are constructed in clay and silt rich materials generally exhibit good yield characteristics during purging.

[4] Conceptually, the width of the source area approaches zero when a well is not pumped. However, even monitoring wells are pumped during purging and sample retrieval activities. Also, due to non-steady groundwater flow directions, it is an area that contributes flow to the well. Therefore, the term "source area" will be used in later discussions throughout this document.

Source Area in the Context of the RMP

Groundwater constituents that have been linked to agricultural activity are nitrogen components and general minerals such as potassium, chloride, phosphorous, calcium, and magnesium. These constituents can impart a distinctive agricultural-chemical trademark to groundwater on a regional scale, and elevated concentrations of these constituents have become ubiquitous in shallow groundwater systems in agricultural landscapes, including in the Central Valley. In the absence of a unique identifier (i.e., a constituent present in groundwater that can be directly linked to a specific source), interpretation of groundwater quality data is most successful with consideration of the well's source area. Therefore, RMP monitoring wells positioned downgradient of a management unit are intended to intercept groundwater which originates under the targeted management unit, only.

Monitoring well design options with respect to source areas relate to the placement and length of the well screen. In practice, these options are very limited; the placement of the well screen is based on the occurrence of first encountered groundwater during well construction. Regarding screen length, well screens that are too short tend to produce highly variable groundwater quality results that are difficult to interpret in this context. On the other hand, increasing the screen length has been found to contribute significantly to vertical flow components (both upward and downward) within the well structure that can yield misleading and ambiguous data concerning solute concentrations. Therefore, the length of screen sections in RMP wells is typically kept between 5 and 20 feet.

The RMP attempts to address the above design challenges with nested wells (i.e., two wells in one borehole with relatively short well screens located at different depth intervals). However, the limited monitoring well design options cannot address the full range of environmental conditions.

With regard to management units, the monitored source length for fields is expected to be shorter than the extent of the upgradient management unit because these are the largest management units. In addition, recharge to groundwater from irrigated fields is comparatively high. Well design and groundwater monitoring specific to corrals is more difficult because corrals are typically smaller than the fields, and they are sloped and constructed to reduce infiltration and deep percolation (i.e., recharge to groundwater). The lagoons are often the smallest management unit. However, occurrence of elevated ammoniacal nitrogen in monitoring wells near lagoons can provide a unique identifier.

4 2012 MONITORING PROGRAM

RMP Network and Data Collection

The 2012 RMP consists of 18 dairies and 126 dedicated monitoring well sites (**Table 1**, **Figure 1**). Of these well sites, CVDRMP constructed 108 as nested wells in 2011 (i.e., two wells in one borehole). The remaining 18 well sites were pre-existing, single well facilities that were incorporated into the program for a total of 234 wells (**Tables 2** and **3**) (LSCE, 2012b). The documents from which construction details for pre-existing monitoring wells were excerpted are provided in **Attachment B1**. Wellhead survey reports that were retrieved for these wells did not provide sufficient detail for purposes of incorporation into the RMP. Therefore, they were recently resurveyed (**Attachment B2**). Monitoring well locations are shown on maps of the dairy's production areas and associated field maps (**Map Series**).

Dairies were visited on a monthly schedule to retrieve depth to water measurements in 234 network wells (**Table 4**). Groundwater samples were retrieved on a quarterly schedule for chemical analyses (**Table 5**). The groundwater quality samples are not retrieved from all the wells but rather one per well site. Specifically, at a given well site of two nested wells, a groundwater sample is retrieved from the well that intersects the uppermost portion of first encountered groundwater. In 2012, these were most typically the shallow wells. When groundwater levels decline below the shallow well screen, a sample is retrieved from the deeper well.

Monitoring field activities were carried out by Del-Tech Geotechnical Support. Laboratory analytical services were provided by BC Laboratories. BC Laboratories is certified through the State of California (Department of Health Services Environmental Laboratory Accreditation Program).

Sampling Procedures and Instrumentation

Groundwater Level Measurements

An electrical sounder is used to measure the depth to groundwater from a specified reference point (usually the top, north side of the well casing). Measurements are recorded to the nearest 0.01 foot. Measurements on any one dairy are collected near in time to obtain a data set resembling a "snapshot in time".

During groundwater quality sampling campaigns, a depth to water measurement is obtained prior to sampling a monitoring well. The static water level in conjunction with well construction information is used to calculate the volume of water in the well. This information is used to determine the minimum volume of water to be purged prior to sample collection.

Purging Protocol

Monitoring wells are purged and sampled using dedicated HDPE tubing equipped with stainless steel foot valves. This assembly is used in combination with a centrifugal pump on the surface. Prior to sample collection, the dedicated tubing is disconnected from the pump, and sample bottles are filled with groundwater using the inertial pump process. Using this equipment and process eliminates the need for decontamination because the groundwater sample does not come into contact with equipment shared between wells.

Monitoring wells are purged of three or more wet casing volumes and until indicator parameters (temperature, pH, and specific conductance) have stabilized prior to sample retrieval. Stabilization is defined as consecutive readings at 5-minute intervals (or at intervals of casing volumes) where parameters do not vary by more than 5 percent. Purged groundwater is disposed of by spreading it on the ground at a

reasonable distance from the sampled well to avoid the potential for purge water to enter the well casing again during the purging process.

The following parameters are monitored during the well purging:

- Temperature (°C)
- pH (standard pH-units)
- Specific Conductance (µS/cm)
- Dissolved oxygen (mg/L)
- Oxygen reduction potential (mV)
- Turbidity (NTU)

Visual (color, occurrence of solids), olfactory (odor) and other observations (e.g., wellhead conditions, well access, ground conditions, weather) are noted as appropriate.

Instrumentation and Maintenance

The following equipment is used during purging and sampling activities:

- Purging: dedicated tubing with foot valve, centrifugal/inertial pumping
- Sample retrieval: dedicated tubing with foot valve
- Depth to water:electrical sounder
- Temperature, pH, electrical conductivity: *YSI* multi probe instrumentation (or similar)
- Dissolved oxygen: *YSI* instrumentation (or similar)
- Oxygen reduction potential: *Oakton ORPTestr* (or similar)
- Turbidity: *Orbeco-Hellige* Model 966 turbidity meter (or similar)

Shop and field calibration of instrumentation is conducted following the manufacturer's instructions and guidelines using appropriate standard solutions and procedures and at manufacturer recommended intervals. The electrical sounder and thermometer are factory calibrated and are not field calibrated.

Due to the use of dedicated equipment, there are presently no decontamination procedures in place. If additional analyses are incorporated into the program in the future, procedures for purging, sample retrieval, and decontamination will be adjusted, as needed.

Sample Handling and Recordation

Upon completion of purging activities, groundwater quality samples are collected in laboratory-supplied bottles with or without preservative (depending on analyses to be conducted and recommendation from the analyzing laboratory) according to laboratory instructions. Bottles are labeled with laboratory-supplied labels, immediately placed on ice, and kept in a dark ice chest (at 4 °C) until received by the laboratory. Sample pick-up is coordinated between the field technicians and the laboratory's own courier service under observance of applicable holding times.

A chain-of-custody (COC) form is used to record sample identification numbers, type of samples (matrix), date and time of collection, and analytical tests requested, and blind duplicate samples. In addition, times, dates, and individuals who had possession of the samples are documented to record sample custody. A field sheet is used to document field activities and measurements.

Quality Assurance Procedures

Quality assurance (QA) is an overall management plan used to guarantee the integrity of data collected by the monitoring program. This includes the above guidelines for groundwater level measurements, purging protocol, and sample handling and recordation. Quality control (QC) is a component of QA that includes

analytical measurements used to evaluate the quality of the data. A brief discussion of field QC is followed by a discussion of laboratory QC requirements.

Field Quality Control

"Blind" duplicate field samples (duplicate samples) are collected to assess the precision (i.e., repeatability) of sampling results as influenced by natural variability of constituent concentrations in the sample and laboratory performance. The identified sample and its duplicate sample are retrieved immediately following each other to limit natural variability. The true identity of duplicate samples is not noted on the COC form, rather a unique identifier is provided. The identities of the duplicate samples are recorded on the field sheet, but the sampling locations of the duplicate samples are not be revealed to the laboratory. Duplicate samples are collected from at least 5 percent (1 in 20) of the total number of sample locations (i.e., in these cases two samples are collected from the same sample location).

Laboratory Quality Control

Quality assurance and quality control samples (e.g., spiked samples, blank samples, duplicates) are employed by the laboratory to document the laboratory performance. Results of this testing are provided with each laboratory report.

Review of Laboratory Data Reports

Data validation includes a data completeness check of each laboratory analytical report. Specifically, this review includes:

- Review of data package completeness (ensuring that required QC and analytical results are provided);
- Review of the required reporting summary forms to determine if the QC requirements were met and to determine the effect of exceeded QC requirements on the precision, accuracy, and sensitivity of the data;
- Review of the overall data package to determine if contractual requirements were met; and
- Review of additional QA/QC parameters to determine technical usability of the data.

In addition, the data validation includes a comprehensive review of the following QA/QC parameters:

- Holding times (to assess potential for degradation that may affect accuracy)
- Blanks (to assess potential laboratory contamination)
- Matrix spikes/matrix spike duplicates and laboratory control samples (to assess accuracy of the methods and precision of the method relative to the specific sample matrix)
- Internal standards (to assess method accuracy and sensitivity)
- Compound reporting limits and method detection limits
- Field duplicate relative percent differences

5 RESULTS

Purging Records

Information collected during groundwater purging activities was extracted from the field service provider's field sheets (**Attachment B3**) and compiled in **Table 6**. This table summarizes depth to water measurements retrieved prior to and at the end of purging activities, pumping rates, field parameters (i.e., temperature [T], pH, specific conductance [SC], dissolved oxygen [DO], oxygen reduction potential [ORP], and turbidity), casing volumes (i.e., the volume of water present in the casing calculated based on the depth to water measurement prior to purging, the total well depth, and the inside well diameter), and the removed volume of water (expressed in gallons and in casing volumes).

Purging protocols were generally adhered to and stabilization of indicator parameters (i.e., T, pH, and SC) was achieved prior to sample collection. The following is a list of well-specific items of note.

1. COT-MW1 is a single-casing well and was dry during much of 2012. In December 2012, a small amount of water was present in the well casing; but, due to poor recharge to the well, the well could not be fully purged. A sample was retrieved after purging of approximately one casing volume.
2. COT-MW2 is a single-casing well and was dry in August 2012. In December 2012, this well exhibited poor recharge and could not be fully purged. A sample was retrieved after purging of approximately one casing volume. Analytical results were within those reported for February and May 2012, with the exception of relatively high dissolved oxygen content.
3. In some cases, stabilization of SC was not fully attained prior to retrieving the sample (ANT-MW2s [July], FG1-MW9s and MOO-MW8s [May], and GOD-MW2s and NUN-MW2s [August]). Analytical results were comparable to other sampling campaigns.
4. In one case, stabilization of pH was not fully attained prior to retrieving the sample (MOO-MW1 [May]). Analytical results were comparable to other sampling campaigns.
5. In four cases, less than 2.5 casing volumes were purged (i.e., 2.1-2.4 casing volumes) prior to sample retrieval. However, indicator parameters had stabilized (ROB-MW6s and ROB-MW8s [February], and PLS-MW5s and TON-MW3s [August]) and analytical results were comparable to other sampling campaigns.

The duplicate sample results exhibit high precision of the sampling/analysis process with identical analytical results or very small differences in most cases (**Table 7**). However, exceptions exist, most notably when small concentrations are encountered (i.e., near the reporting limit). Constituents that are frequently present in small concentrations are nitrite, ammoniacal N, and TKN. The importance of the duplicate sample data set is to recognize that imprecisions exist (and are unavoidable); and furthermore, that the integrity of a data set in general and particularly the interpretations of groundwater quality data improve as a monitoring effort continues with repeat samples retrieved from the same sampling points.

During the May 2012 sampling campaign, the field service provider inadvertently identified the reduced suite of constituents on the chain of custody forms instead of the expanded suite of constituents. The lab was subsequently instructed to perform the remaining constituent analyses on the backup sample volume. As a result, some hold times were slightly exceeded (mainly nitrite, TKN, and phosphate). Based on communications with the laboratory, potential imprecisions due to the hold time exceedances are expected to be insignificant in comparison to other sources of imprecisions, such as those specified for each analytical method.

Based on the examination of field activities and laboratory data reports, including the above observations, the groundwater data set is technically usable with the exception of the sample retrieved from COT-MW1 in

December 2012. The technical usability of this sample will be revisited as this well's data record is expanded.

Introduction to Site Specific Data Evaluation

This section describes and evaluates data that are specific to individual dairies and monitoring wells. For each dairy, the following data are summarized and further described below:

- Soil properties
- Field specific information (e.g., crops, irrigation systems, water supply, nutrient inputs and outputs)
- Groundwater levels
- Groundwater chemistry

Infrastructure and management practices pertaining to lagoons and corrals are summarized in **Tables 8** and **9**, respectively.

The groundwater discussions pertain to individual dairies. Therefore, the 3-letter identification of the monitoring wells is not needed, and monitoring well sites are referred to as MW1, MW2, etc. The distinction between shallow and deeper wells at a particular well site is made with the more complete identification MW1s, MW1d, etc.

Key Soil Properties

This section summarizes key soil properties compiled from the USDA NRCS Soil Survey Geographic Database (SSURGO) for the most prevalent soils in the vicinity of the network monitoring wells beneath lagoons, corrals, and fields. Soil properties apply to a 60-inch soil profile and include:

- Predominant soil types
- Clay and organic matter content in percent by weight
- Smallest saturated hydraulic conductivity ($K_{sat(min)}$)
- Plant available water capacity
- Cation exchange capacity (CEC) and salinity
- pH, calcium carbonate ($CaCO_3$) and gypsum ($CaSO_4$ x $2H_2O$) content in percent by weight

Numerical values and ranges included in this summary pertain to the entire 60-inch soil profile, i.e., they may integrate properties of multiple soil horizons. Additional soil information is provided in **Table 11**. The complete set of SSURGO data reports from which this information was extracted, including information for individual soil horizons, is provided in **Attachment B5**.

Fields

This section describes crops, irrigation systems, sources of water supply, and nutrient and salt inputs and outputs. **Table 10** provides a comprehensive compilation of field-scale parameters (i.e., irrigation methods, run lengths, border width, irrigation duration, etc.), liquid inputs, growing periods, crop yields, nutrient inputs and outputs, and mass balances.

Groundwater Levels

This section discusses the depth to groundwater beneath the dairies, water level fluctuations, horizontal groundwater flow patterns and gradients, and vertical gradients. **Table 12** shows the depth to water measurements with the associated dates and times and the calculated water level elevations. For each location of nested wells, this table also shows the hydraulic head differences (dh) and vertical gradients (i_v) between the shallow and deep wells. The hydraulic head difference was calculated as the difference in water level elevations between the shallow and deep wells. Dividing dh by the distance between the midpoints of

the shallow and deep well screens yields an estimate of the vertical gradient. By definition in this context, a positive i_v indicates a downward gradient and a negative i_v indicates an upward gradient.

Groundwater elevation hydrographs are compiled in **Attachments A1** and **A2**. For each well location there is one plot. Plots for nested well locations show two hydrographs, one for the shallow well and one for the deeper nested well. The depth to groundwater below ground surface (bgs) is shown on the left ordinate and the groundwater elevation in feet (NAVD88) is shown on the right ordinate. The wells' screen intervals are delineated with dashed lines.

Maps showing contours of equipotential groundwater elevations for 12 monthly monitoring campaigns are provided in **Attachment A3**. These maps are important as they provide insight into local groundwater flow conditions and temporal changes throughout the year. For each monitoring well site, these maps are used to determine if the well's source area can be attributed to a single management unit with a reasonable degree of confidence.

Groundwater Chemistry

When a well's source area can be attributed to a single management unit, groundwater chemistry at that location is substantially attributed to recharge (i.e., management unit specific subsurface loading) occurring on the investigated management unit. It is important to recognize that the cause-and-effect relationship between source loading and groundwater chemistry is based on the physical linkage of the source area to the well. As such, this relationship is independent of absolute and/or relative proportional constituent concentrations in the groundwater sample, and independent of water chemistry observed at upgradient or crossgradient wells. In the case of lagoons, consideration was given to key constituents, including ammoniacal N, TKN, organic N, nitrate-N, nitrite-N, and elevated concentrations of potassium and bicarbonate. Consideration was also given to elevated concentrations of calcium and magnesium that can occur as a result of sorption/desorption processes due to high concentrations of other anions (e.g., potassium and ammonium).

Groundwater quality data (field measurements and laboratory results) are summarized in **Table 13**. Time series plots for specific conductance and TDS are provided in **Attachment A4**. Time series plots for nitrogen components are provided in **Attachment A5**. Time series plots for general mineral concentrations are provided in **Attachment A6**. Bar charts of proportional cation and anion concentrations, stiff diagrams, and tertiary plots are compiled in **Attachment A7**. Laboratory reports from the quarterly sampling campaigns are compiled in **Attachment B4**.

MEN

Key Soil Properties

1. Soils are sandy loams, slightly saline-alkali (DwA, WdA)
2. Clay content 7-18%
3. Organic matter content 0-3.0%
4. $K_{sat(min)}$ 0.06-0.20 in/hr
5. Available water capacity 5.4-6.6 in
6. CEC 3.8-17 meq/100 g
7. Salinity 4.0-8.0 mS/cm
8. $CaCO_3$ content 0-5%
9. Gypsum content 0%
10. pH 6.6-9.0

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on six of the examined fields (Big 66, Long 35, Little 10, West 28, East 28, and McWharter 40) and alfalfa hay on Ruble 22 and Ruble 25.
2. The examined fields were border irrigated.
3. Irrigation demand was met by TID surface water, lagoon liquor, and rain.
4. TID water: TID quantified water deliveries by estimating the delivery flow rate (6,750 gpm) and the duration of the delivery.
5. Lagoon liquor: Lagoon liquor was removed from the lagoon and mixed with the irrigation water. Details of the flow rate estimates are presently unknown.
6. Tailwater: It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Irrigation events were planned and scheduled according to agricultural guidelines, CCA professional judgment, and field observations.
9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Commercial fertilizers were applied in liquid form and included dilute ammonia (30% N) and an unspecified fertilizer with an NPK ratio of 4-10-10.
3. TID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Canal water was sampled annually.
   b. TN concentrations ranged from 1.56 to 2 mg/L.
   c. P and K results were not available.
   d. EC measurements ranged from 56 to 100 µS/cm.
4. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Lagoon liquor was sampled five times between May 2011 and August 2012. Samples were retrieved between two months and eleven months apart.
   b. TKN concentrations ranged from 286 to 739 mg/L.
   c. Ammoniacal N concentrations ranged from 190 to 493 mg/L.
   d. Organic N accounted for 22 to 69% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 28.3 to 58.5 mg/L.
   f. K concentrations ranged from 417 to 1,250 mg/L.
   g. EC measurements ranged from 4,830 to 11,690 µS/cm.
5. Solid manure: Solid manure was not applied to the examined fields.
6. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field. In the case of alfalfa, it appears that tissue samples were not retrieved at all cuttings.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurred at depths ranging from less than 5 to 10 ft (bgs) beneath the dairy in 2012. Water levels exhibited little variability with only the field wells (i.e., MW6 and MW7) showing distinct water level rises in the summer months (MW7 also shows rising water levels in May).

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1}. Corresponding hydraulic head differences were most typically < |0.10| ft. MW3 exhibited the greatest dh (i.e., |0.56| ft in May 2012). At MW1 through MW4 and MW7, upward vertical gradients were prevalent. The corral well location (MW5) and the field well location (MW6) exhibited mainly downward vertical gradients.

Contours of equipotential water level elevations indicate generally northwestern groundwater flow beneath Field 5 (northeasterly in June and July) and northerly to northeasterly flow beneath the production area and the fields south of the production area. With the exception of June and July, MW 1 and MW2 were down- to crossgradient of the lagoons and settling basins. MW 3 and MW4 were predominantly up- to crossgradient of the corrals and downgradient of the fields. MW5 was predominantly downgradient of the corrals. With the exception of June and July, MW6 was downgradient of Field 5. MW7 was downgradient of Field 2.

Horizontal gradients across the contoured area ranged from approximately 0.5 to 1.5×10^{-3} ft ft^{-1}, with steeper (northeasterly) gradients sometimes observed between MW7 and MW5.

Groundwater Chemistry

MEN-MW1

1. Ammoniacal N concentrations ranged from 0.29 to 6.8 mg/L.
2. TKN concentrations ranged from 1.6 to 10 mg/L.
3. The difference between TKN and ammoniacal N indicates organic N concentrations of approximately 1-3 mg/L.
4. Nitrite-N concentrations were near or below the reporting limit.
5. Nitrate-N concentrations ranged from 22 to 58 mg/L.
6. K concentrations were distinctively elevated (16-68 mg/L).
7. SO_4 concentrations were distinctively elevated (190-250 mg/L).
8. TDS concentrations were significantly higher than in non-lagoon wells (3,000-3,800 mg/L). Na, Cl, and HCO_3 were the main contributors to the elevated salinity.

Groundwater chemistry at this location is indicative of lagoon seepage. Elevated SO_4 concentrations may indicate additional influences from the adjacent field.

MEN-MW2

1. Ammoniacal N concentrations ranged from nondetect to 0.24 mg/L.
2. TKN concentrations ranged from 1.5 to 2.1 mg/L.
3. The difference between TKN and ammoniacal N indicates organic N concentrations of approximately 1-2 mg/L.
4. Nitrite-N concentrations were near or below the reporting limit.
5. Nitrate-N concentrations were relatively low and ranged from 3.0 to 14 mg/L.
6. K concentrations were distinctively elevated (21-25 mg/L).
7. SO_4 concentrations were distinctively elevated (270-290 mg/L)
8. TDS concentrations were significantly higher than in non-lagoon wells (2,600-2,900 mg/L). Na, Cl, and HCO_3 were the main contributors to the elevated salinity.

Groundwater chemistry at this location indicates impacts of lagoon seepage. Elevated SO_4 concentrations may indicate additional impacts from the adjacent field.

MEN-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields, although effects from the adjacent corrals on water chemistry are conceivable. This includes nitrate-N concentrations ranging from 67 to 75 mg/L.

MEN-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields, although effects from the adjacent corrals on water chemistry are conceivable. This includes nitrate-N concentrations ranging from 57 to 77 mg/L.

MEN-MW5

This well's source area cannot be uniquely attributed to the corrals but also likely includes farther upgradient fields south of the corrals. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area including the corrals and the adjacent fields. This includes nitrate-N concentrations ranging from 40 to 54 mg/L and elevated K concentrations (18-20 mg/L).

MEN-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within Field 5. This includes nitrate-N concentrations ranging from 32 to 37 mg/L.

MEN-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within Field 2. This includes nitrate-N concentrations ranging from 61 to 75 mg/L.

ANC

Key Soil Properties

1. Most pertinent soils are loamy sands (DdA, HhA), including slightly saline-alkali properties
2. Clay content 0-15%
3. Organic matter content 0-1.0%
4. $K_{sat(min)}$ 0.06-19.98 in/hr
5. Available water capacity 4.8-7.7 in
6. CEC 1.0-5.0 meq/100 g
7. Salinity 0-8.0 mS/cm
8. $CaCO_3$ content 0-5%
9. Gypsum content 0-5%
10. pH 6.1-9.6

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy planted summer corn (silage) followed by pasture on Field 16. Fields 29-RRD-4 and 30-RRD-2 are planted in almonds.
2. Corn and pasture were border irrigated. Almonds were irrigated with micro-jet sprinklers.
3. Irrigation demand was met by ESC water, Merced River water, and rain.

4. ESC water: Producer used flow meters to quantify irrigation volumes.
5. Merced River water: Producer used flow meters to quantify irrigation volumes.
6. Tailwater: It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations on Field 16 were relatively consistent for a specific crop from planting to harvest. It is unclear if tailwater runoff occurred. Almond irrigations did not create runoff.
8. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
9. Reported irrigation volumes for the almond orchards are considered net irrigation volumes. They reflect the estimated amount of water that was applied to the field and, presumably, infiltrated the soil. Reported irrigation volumes for Fields 16 are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Commercial fertilizers were applied in liquid form and included UN32 (32% N) and an unspecified fertilizer with an NPK ratio of 4-10-10.
3. ESC and Merced River water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. ESC water and River water were sampled annually.
   b. TN concentrations were 0.58 mg/L (ESC) and 0.51-2.14 mg/L (River).
   c. P and K results were not available.
   d. EC measurements were 51-230 µS/cm (ESC) and 54-270 µS/cm (River).
4. Lagoon liquor: Lagoon liquor was not applied to the examined fields.
5. Solid manure: Field-scale application rates were based on constituent concentrations/content on a dry weight basis and mass applied.
   a. Solid manure was sampled once.
   b. TN content was 0.76% on a dry weight basis.
   c. P content was 0.4% on a dry weight basis.
   d. K content was 1.06% on a dry weight basis.
   e. Salt content was not determined.
6. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurred at depths ranging from approximately 10 to 15 ft (bgs) beneath the dairy in 2012. MW2 and MW4 are located on top of the lagoon's berm and, as a result, the depth to water is deeper in these wells. Water levels exhibited little variability with only the upgradient wells at MW7 showing a trend to higher water levels in summer and fall.

Vertical gradients at MW6 and MW7 were very small with absolute values < |0.005| ft ft^{-1}, with one exception. Corresponding hydraulic head differences were < |0.05| ft. At MW5, vertical gradients were slightly greater and frequently ranged from 0.01-0.03 ft ft^{-1}. Corresponding hydraulic head differences were up to 0.53 ft. Downward vertical gradients were prevalent.

Contours of equipotential water level elevations indicate consistent western to northwestern groundwater flow beneath the dairy. MW1 is downgradient of the lagoon, and MW2 and MW4 are crossgradient to downgradient of the lagoon. MW3 is downgradient of the corrals (and also immediately upgradient of the

lagoon). MW5 is downgradient to crossgradient of the corrals. MW6 is upgradient to crossgradient of the corrals, and MW7 is upgradient of the corrals.

Horizontal gradients across the contoured area mostly ranged from 0.5 to 1.5×10^{-3} ft ft^{-1}.

Groundwater Chemistry

ANC-MW1

1. Ammoniacal N concentrations were below the reporting limit.
2. TKN concentrations ranged from 0.39 to 0.54 mg/L.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations ranged from 0.22 to 0.43 mg/L.
5. Nitrate-N concentrations ranged from 6.6 to 8.7 mg/L.
6. TDS concentrations and individual general mineral concentrations were similar to non-lagoon wells.

Groundwater chemistry at this location is not indicative of lagoon seepage.

ANC-MW2

1. Ammoniacal N concentrations were below the reporting limit.
2. TKN concentrations ranged from 0.92 to 0.99 mg/L.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations ranged from below the reporting limit to 0.47 mg/L.
5. Nitrate-N concentrations ranged from 20 to 26 mg/L.
6. TDS concentrations and individual general mineral concentrations were similar to non-lagoon wells.

Groundwater chemistry at this location is not indicative of lagoon seepage.

ANC-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 8.0 to 36 mg/L. Based solely on the proximity of this well to the lagoon, effects of lagoon seepage on its water chemistry are conceivable. However, presently, groundwater chemistry at this location is not indicative of lagoon seepage.

ANC-MW4

1. Ammoniacal N concentrations were below the reporting limit.
2. TKN concentrations ranged from below the reporting limit to 0.24 mg/L.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations in August 2012 (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations ranged from 47 to 59 mg/L.
6. TDS concentrations and individual general mineral concentrations were similar to non-lagoon wells.

Groundwater chemistry at this location is not indicative of lagoon seepage.

ANC-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals, although effects from fertilizer use on nearby irrigated lawn area on water chemistry are conceivable. This includes nitrate-N concentrations ranging from 11 to 18 mg/L. Also, Na, Cl, and HCO_3 concentrations are higher than in the other wells, and the water chemistry at this location exhibits proportionally higher Na concentrations.

ANC-MW6

This well provides up- to crossgradient control for the corrals and its source area cannot be uniquely attributed to one management unit.

ANC-MW7

This well provides upgradient hydraulic control, and its water quality is not reflective of dairy operations.

BET

Key Soil Properties

1. Soils are sands, including slightly saline-alkali properties
2. Clay content 0-15% (0-1% beneath monitored fields)
3. Organic matter content 0-1.0% (0.0-0.1% beneath monitored fields)
4. $K_{sat(min)}$ 0.06-19.98 in/hr (5.95 in/hr beneath monitored fields; 0.06-0.20 in/hr beneath lagoons and settling basins)
5. Available water capacity 2.5-7.3 in (2.5 in beneath monitored fields)
6. CEC 1.0-5.0 meq/100 g
7. Salinity 0-8.0 mS/cm (0 mS/cm beneath monitored fields)
8. $CaCO_3$ content 0-5% (0% beneath monitored fields)
9. Gypsum content 0%
10. pH 6.1-9.6

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough or hay) on the examined fields.
2. The examined fields were border irrigated.
3. Irrigation demand was met by TID surface water, groundwater, lagoon liquor, and rain.
4. <u>TID water:</u> TID water quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently unknown.
5. <u>Groundwater and lagoon liquor:</u> The producer quantified groundwater and lagoon liquor deliveries by estimating the pumping rate in conjunction with the duration of the delivery. Details of the flow rate estimates are presently not known.
6. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest. Applied water stays on the fields. This dairy produces no tailwater runoff.
7. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
8. Reported irrigation volumes are net irrigation volumes. They reflect the estimated amount of water that was applied to the field and, presumably, infiltrated the soil.

Fields – Nutrient and Salt Input/Output

1. <u>Atmospheric deposition</u> of N was accounted for in the mass balances per crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Other sources of nutrients and salts were TID canal water, groundwater, lagoon liquor, solid manure
3. <u>Commercial fertilizers:</u> Commercial fertilizers included ammonium sulfate (21% N), anhydrous ammonia (82% N), and an unspecified commercial fertilizer with an NPK ratio of 27-0-0.

4. TID water: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Canal water was sampled annually.
   b. TN concentrations ranged from 0.5 to 2.39 mg/L.
   c. P and K results were not available.
   d. EC measurements ranged from 50 to 70 µS/cm.
5. Groundwater: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Groundwater was sampled annually.
   b. TN concentrations ranged from 0.5 to 31.4 mg/L.
   c. P and K results were not available.
   d. EC measurements ranged from 603 to 1,730 µS/cm.
6. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Lagoon liquor was sampled ten times between January 2011 and August 2012. Samples were retrieved less than a month to six months apart
   b. TKN concentrations ranged from 39.2 to 426 mg/L.
   c. Ammoniacal N ranged from 2.8 to 246 mg/L.
   d. Organic N accounted for 21 to 93% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 5.5 to 111 mg/L.
   f. K concentrations ranged from 38.8 to 783 mg/L.
   g. EC measurements ranged from 815 to 5,720 µS/cm.
7. Solid manure: Field-scale application rates were based on constituent concentrations/content on a dry weight basis and mass applied.
   a. Solid manure was sampled ten times between April 2011 and September 2012.
   b. TN content ranged from 0.57 to 2.41% on a dry weight basis.
   c. P content ranged from 0.15 to 0.54% on a dry weight basis.
   d. K content ranged from 0.10 to 2.17% on a dry weight basis.
   e. Salt content was not determined.
7. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths ranging from approximately 5 to 15 ft (bgs) beneath the dairy. The MWs in the fields (i.e., MWs 5 through 8) exhibit a characteristic pattern of rising water levels between May and August over the prior winter and spring water levels. These wells also show a characteristic water level decline of approximately 3 feet in December. In MW1, water levels declined in spring to early summer to reach their low in July. MW4 exhibits a slightly more pronounced decline from April to May and maintained relatively stable lower water levels during the summer. Water levels observed in MW2 and MW3 appear as somewhat of a hybrid between those observed in the field MWs, MW1 and MW4. Overall, water levels appear stable.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1}. Corresponding hydraulic head differences were most typically < |0.10| ft. Downward vertical gradients were prevalent across the dairy but most prevalent at the well locations in the field (i.e., at MW5 through MW8). The greatest vertical gradients were exhibited at corral well MW4 (also located adjacent to the fields) ranging up to 0.08 ft ft^{-1} in spring and summer, with dh up to 1.53 ft.

Contours of equipotential water level elevations indicate consistent west-northwestern to northwestern groundwater flow beneath most of the dairy. Water levels in MW4 on the east side of the corrals are often somewhat depressed. This condition, in combination with relatively higher water levels in the MWs on the west side of the corrals suggests northerly flow components beneath the corrals most of the year. Groundwater flow may even converge beneath the production area from the east, south, and west. As a result, MW2 and MW3 are not consistently downgradient of the corrals but also upgradient (mostly during the summer) and crossgradient. MW4, while situated downgradient of the fields and upgradient of the corrals most of the year, apparently has flow contributions from varying directions, particularly during the summer months. MW1 is downgradient to crossgradient of the lagoon. MW 5 through 8 are consistently downgradient of the fields despite variable groundwater flow conditions in the upgradient vicinity of the contoured area.

Horizontal gradients beneath the fields east of the production area ranged from approximately 1 to $3x10^{-3}$ ft ft^{-1}. Gradients beneath the production area tended to be smaller.

Groundwater Chemistry

BET-MW1

1. Ammoniacal N concentrations were near or below the reporting limit.
2. TKN concentrations ranged from 0.29 to 0.66 mg/L.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations ranged from 23 to 57 mg/L.
6. TDS concentrations were relatively low (370-690 mg/L).
7. K concentrations were slightly elevated (12-22 mg/L) but not higher than at several non-lagoon wells.
8. HCO_3 concentrations were low (52-53 mg/L).

Groundwater chemistry at this location does not exhibit typical indications of lagoon seepage. However, it is possible that ammoniacal N is rapidly oxidized to nitrate-N in the coarse-textured subsurface.

BET-MW2

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent dairy fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields to the west and the corrals to the east. This includes nitrate-N concentrations ranging from 28 to 44 mg/L.

BET-MW3

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent dairy fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields to the west and the corrals to the east. This includes nitrate-N concentrations ranging from 53 to 98 mg/L.

BET-MW4

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent dairy fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields to the north and east, and the corrals to the south. This includes nitrate-N concentrations ranging from 31 to 54 mg/L and high K concentrations (270 mg/L).

BET-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 47 to 67 mg/L.

BET-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 18 to 33 mg/L.

BET-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 24 to 35 mg/L.

BET-MW8

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 25 to 30 mg/L.

FG1

Key Soil Properties

1. Soils are sands, sandy loams, loams, including slightly saline-alkali properties
2. Clay content 0-20%
3. Organic matter content 0-6.0%
4. $K_{sat(min)}$ 0.06-19.98 in/hr
5. Available water capacity 4.3-8.6 in
6. CEC 1.0-15 meq/100 g
7. Salinity 0-8.0 mS/cm
8. $CaCO_3$ content 0-2%
9. Gypsum content 0%
10. pH 6.1-8.4

Fields

Crops, Irrigation Systems, and Water Supply

1. In 2011, this dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on three of the examined fields (Fields 2, 3, and 6) and a triple cropping system with two consecutive summer corn (silage) crops followed by winter grain (oats silage soft dough) on the remaining examined fields (Fields 1, 4, 5, and 7). In 2012, all seven fields had two summer corn crops.
2. Summer crops were furrow irrigated. Winter crops were border irrigated.
3. Irrigation demand was met by the Merced River, lagoon liquor, and rain.
4. <u>Merced River water:</u> The producer reported the flow rate of the river pump as 1,346 gpm. The means for flow measurements are presently unknown.
5. <u>Lagoon liquor:</u> The producer quantified water deliveries per lagoon liquor irrigation event. The volume applied is given on a gross basis per field per event. Details of the measurement estimates are presently unknown.
6. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest (except winter crop irrigations on Fields 5 and 6). Applied water stays on the fields except Field 7, where tailwater is routed back to the lagoon. Tailwater runoff was not estimated.

7. Irrigation events were planned and scheduled under consultation of a CCA according to agricultural guidelines, professional judgment, and field observations.
8. Reported irrigation volumes are net irrigation volumes. They reflect the estimated amount of water that was applied to the field and, presumably, infiltrated the soil, with the exception of Field 7. Reported irrigation volumes for Field 7 are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: An unspecified commercial fertilizer with an NPK ratio of 27-0-0 was used.
3. Merced River water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. River water was sampled once in 2011.
    b. TN concentration was 3.3 mg/L.
    c. P and K results were not available.
    d. EC measurement was 685 µS/cm.
4. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. Lagoon liquor was sampled six times between January 2011 and September 2012. Samples were retrieved between three months and seven months apart.
    b. TKN concentrations ranged from 101 to 566 mg/L.
    c. Ammoniacal N concentrations ranged from 61.5 to 333 mg/L.
    d. Organic N accounted for 17 to 55% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
    e. P concentrations ranged from 30.6 to 73.5 mg/L.
    f. K concentrations ranged from 133 to 678 mg/L.
    g. EC measurements ranged from 2,540 to 6,890 µS/cm.
5. Solid manure: Field-scale application rates were estimated based on constituent concentrations/content on a dry weight basis and mass applied.
    a. Solid manure was sampled once in April 2012.
    b. TN content was 2.98% on a dry weight basis.
    c. P content 0.634% on a dry weight basis.
    d. K content was 2.68% on a dry weight basis.
    e. Salt content was not determined.
6. Tailwater: Constituent concentrations were not available.
7. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths ranging from approximately 10 to 20 ft (bgs) beneath the dairy. Monthly and seasonal water level variability was very small in the MW adjacent to the lagoon (i.e., MW1) and downgradient of the corrals (i.e., MW2 and MW3). MW4, MW6, and MW7, all centrally located in the fields, exhibit distinct seasonal water level fluctuations with the highest levels in the summer (i.e., July and August). MWs located nearest the Merced River (MW5, MW8, and MW9) do not exhibit seasonally high summer water levels. However, these wells show more overall water level variability than MW1 through MW3. Overall, water levels appear stable beneath the dairy.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1}. Corresponding hydraulic head differences were most typically < |0.10| ft. Downward vertical gradients were prevalent across the dairy. MW9 is the only field well location where vertical gradients were noticeably greater, frequently ≥ 0.02 ft ft^{-1} (8 months out of the year) and up to 0.07 ft ft^{-1} (dh up to 1.33 ft). MW2s was dry in 2012, MW3s was mostly dry, and MW1s was dry in April.

Contours of equipotential groundwater level elevations indicate groundwater flow from beneath the fields toward the Merced River in western, northern, and eastern directions. MW4, MW6, and MW7 exhibit particularly high water levels in the summer months and suggest radial groundwater flow (i.e., in all cardinal directions) away from the center of the crop land east of the production area. This is most noticeable in July and August. In late December, water levels in the wells nearest the Merced River (i.e., MW5, MW8, and MW9) rose compared to relatively stable levels in the other wells. As a result, contours indicate groundwater flow from the River toward the dairy facility. MW9 is located upgradient of the fields with the exception of July and August. MW4 through MW8 are consistently downgradient of the fields. Groundwater beneath the corrals flows in southwesterly to northwesterly directions and MW2 and MW3 are downgradient of the corrals with a potential exception in May. MW1 is downgradient to crossgradient of the lagoon.

Horizontal gradients between the center of the crop land and the Merced River to the north ranged from approximately $5x10^{-4}$ to $4.4x10^{-3}$ ft ft^{-1}.

Groundwater Chemistry

FG1-MW1

1. Ammoniacal N concentrations were below the reporting limit.
2. TKN concentrations were below the reporting limit.
3. Nitrite-N concentrations were below the reporting limit.
4. Nitrate-N concentrations ranged from 2.7 to 23 mg/L.
5. TDS concentrations and several individual general mineral concentrations were higher than at the field wells.

Groundwater chemistry at this location does not exhibit typical indications of lagoon seepage. However, this well may not be favorably located for purposes of lagoon seepage detection.

FG1-MW2

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals, although a minor influence may be attributable to the fields to the west. This includes nitrate-N concentrations ranging from 35 to 46 mg/L.

FG1-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes low nitrate-N concentrations ranging from 3.4 to 8.3 mg/L.

FG1-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 19 to 33 mg/L.

FG1-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 11 to 47 mg/L.

FG1-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 11 to 14 mg/L.

FG1-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 21 to 39 mg/L.

FG1-MW8

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields, although this location may also affected by high quality recharge from the Merced River. This includes very low nitrate-N very low concentrations that are below the reporting limit.

FG1-MW9

This well provides upgradient hydraulic control and its water chemistry is not reflective of dairy operations. Measurements during purging exhibit consistently lower temperatures than in the other monitoring wells. This may be due to recharging river water.

BEA

Key Soil Properties

1. Soils are sands and loamy sands, including slightly saline-alkali properties
2. Clay content 0-15%
3. Organic matter content 0.0-1.0%
4. $K_{sat(min)}$ 0.06-19.98 in/hr
5. Available water capacity 1.8-7.7 in
6. CEC 1.0-5.0 meq/100 g
7. Salinity 0-8.0 mS/cm
8. $CaCO_3$ content 0-5%
9. Gypsum content 0%
10. pH 6.1-9.6

Fields

Fields are not under investigation at this dairy.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths ranging from approximately 15 to35 ft (bgs) beneath the dairy. Water levels were the highest in winter/spring 2012 and then gradually declined to 17 feet until lowest levels were reached in the summer months. By December, water levels had not recovered back to early-year conditions.

Vertical gradients were small, typically near zero with absolute values $\leq |0.01|$ ft ft^{-1}, and rarely exceeded $|0.02|$ ft ft^{-1}. Corresponding hydraulic head differences were most typically $< |0.20|$ ft. Downward vertical gradients were prevalent at all well locations. The single greatest vertical gradient was exhibited at MW1 (0.36 ft ft^{-1}) in December 2012 (dh = 5.54 ft). MW1s, MW2s, and MW3s were dry during much of the second half of the year.

Contours of equipotential groundwater level elevations indicate predominantly southeasterly groundwater flow beneath the facility such that MW1 is downgradient of the lagoon and settling basins, and MW2 is upgradient of the corrals. MW3 is downgradient of the corrals and MW4 is downgradient to crossgradient to the corrals except in January when it was upgradient.

Horizontal gradients across the contoured area mostly ranged from 3 to $4x10^{-3}$, and were as small as approximately $1x10^{-3}$ ft ft^{-1}.

Groundwater Chemistry

BEA-MW1

1. Ammoniacal N concentrations and TKN were high (7.4-85 and 12-83 mg/L, respectively).
2. The difference between TKN and ammoniacal N indicated organic N concentrations of approximately 4 mg/L in May 2012.
3. Nitrite-N concentrations ranged from 0.083 to 2.0 mg/L.
4. Nitrate-N concentrations ranged from below the reporting limit to 140 mg/L.
5. K concentrations were by far the highest of all monitoring wells (110-120 mg/L).
6. HCO_3 concentrations were by far the highest of all monitoring wells (1,400-1,500 mg/L).

Groundwater chemistry at this location is indicative of lagoon seepage.

BEA-MW2

This well provides upgradient hydraulic control, and its water chemistry is not reflective of dairy operations.

BEA-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 140 to 270 mg/L.

BEA-MW4

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals as influences from adjacent areas appear likely. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals and adjacent areas. This includes nitrate-N concentrations ranging from 6.3 to 19 mg/L.

COT

Key Soil Properties

1. Soils are sands, loamy sands, and loam, including slightly to strongly saline-alkali properties
2. Clay content 0-35%
3. Organic matter content 0.0-1.0%
4. $K_{sat(min)}$ 0.00-19.98 in/hr
5. Available water capacity 1.8-7.7 in
6. CEC 1.0-20 meq/100 g
7. Salinity 0-30.0 mS/cm
8. $CaCO_3$ content 0-5%
9. Gypsum content 0%
10. pH 6.1-9.6

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough or wheat silage). On several fields, sweet potatoes were grown.
2. Sweet potatoes were drip irrigated; other crops were border irrigated.
3. Irrigation demand was met by irrigation well water, cannery wastewater, lagoon liquor, and rain.
4. Irrigation well water and cannery wastewater: The producer used flow meters to quantify irrigation volumes.
5. Lagoon liquor: The producer quantified lagoon liquor deliveries on a per event basis. Details of the estimates are presently unknown.
6. Tailwater: It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
8. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop ranging from less than 5 to 14 lbs/ac.
2. Commercial fertilizers: An unspecified fertilizer with an NPK ratio of 27-0-0 was used.
3. Irrigation well water: Field-scale application rates were estimated based on constituent concentrations and the volume applied. Wells were sampled annually for N, P, K and general minerals.
4. Cannery wastewater: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Cannery wastewater was sampled once in 2012.
   b. TKN was 21.8 mg/L.
   c. P (as P_2O_5) concentration was 22.4 mg/L.
   d. K (as K_2O) concentration was 281 mg/L.
   e. TDS was 1,356 μS/cm.
5. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the net volume applied. Lagoons were sampled multiple times in 2011 and 2012 for TKN, ammoniacal N, nitrate, P, K, EC, and TDS.
6. Compost: Field-scale application rates were estimated based on constituent concentrations/content on a dry weight basis and mass applied. Compost was sampled for constituents including N, P, K, and general minerals.
7. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurred at depths between less than 5 ft (bgs) and approximately 30 ft (bgs). Water levels at MW1 were below its screen for much of the year (mainly during the summer) and displayed little variability during the remainder of the year. In the northeast, MW2, MW3, and MW4 exhibited slightly declining water levels. This is similar to trends observed in the south at MW9 and MW10, although these wells exhibited more pronounced month-to-month fluctuations. At MW5 and MW6, water levels were essentially flat with slightly elevated levels in

summer and fall. The corral wells (MW12 through MW14) and MW11, located adjacent to the North Settling Basin, display more substantial water level fluctuations, particularly a distinct rise of 5 to 10 ft in late summer to fall. MW7, located in the south-central portion of the fields, experienced the most drastic water level fluctuations. Water levels in this well declined almost 10 feet from May to June, stayed depressed through September, and then recovered back to spring levels.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1} at three of the four nested well locations. Corresponding hydraulic head differences were typically < |0.20| ft. Vertical gradients were greater at MW13, ranging from 0.02-0.03 ft ft^{-1} (with dh ranging from 0.38-0.61 ft). Downward vertical gradients were prevalent with the exception of MW14, where very small upward vertical gradients occurred more frequently.

Contours of equipotential groundwater level elevations for January through March indicate northerly groundwater flow beneath the fields that are located south of the corrals. Beneath the corrals and the northern fields, northwesterly flow prevailed at that time. Starting in May, an area of depressed water levels appears beneath the northern part of the corrals. During this time, and lasting through August, MW1 was dry. This is important to recognize, because closed or semi-closed contour lines beneath the corrals during these times are caused by the lack of data at MW1. They do not accurately reflect flow conditions, and southerly flow toward the corrals (as indicated on the corresponding maps) did not occur. This is certain, because MW1 was dry, indicating water levels below an elevation of approximately 83 ft and a consistent gradient toward MW1 in the north.

By June, an area of depressed water levels extended south to beyond MW7, which established a groundwater ridge with a longitudinal north-south axis. This ridge lasted through September with a distinct division of groundwater flow westward and eastward. In October, hydrologic conditions markedly change with the water level rise in MW7 in conjunction with relatively invariable water levels in the other wells. As a result, the south-central area, from October through the end of the year, exhibits a groundwater mound with distinct radial flow components that affect flow beneath the entire dairy.

Horizontal gradients across the contoured area typically ranged from 1 to $2x10^{-3}$ ft ft^{-1}, with steeper gradients occurring east of the groundwater ridge.

MW1 was always downgradient of the fields and MW11 was always downgradient of the North Settling Basin. MW14 was always downgradient of the corrals regardless of groundwater flow direction as this well is centrally located in the corrals. MW12 and MW13 were downgradient of the corrals early in the year (January to April) but appear upgradient from May to October. In December, MW13 was downgradient of the corrals and MW12 was crossgradient. MW2, MW3, MW7, and MW9 were always downgradient of fields regardless of flow directions. MW5 was always downgradient of the fields, but this well is also adjacent to the digester and lagoon. MW6 was downgradient of the fields until October when it appeared crossgradient and later in December downgradient of the corrals. MW4 was downgradient of the fields in the first half of the year when groundwater flow was northwesterly. In the latter half of the year, when flow was northeasterly, this well was downgradient of the lagoon. MW8 and MW10 provide hydraulic control.

Groundwater Chemistry

COT-MW1

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations of 51 mg/L.

COT-MW2

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 75 to 82 mg/L.

COT-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 62 to 83 mg/L.

COT-MW4

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the fields or the lagoon. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields and the footprint of the lagoon. This includes nitrate-N concentrations ranging from 8.6 to 26 mg/L.

COT-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 94 to 100 mg/L. Based solely on the proximity of this well to the lagoon, effects of lagoon seepage on its water chemistry are conceivable. However, presently, groundwater chemistry at this location is not indicative of lagoon seepage.

COT-MW6

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or the fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals and adjacent fields. This includes nitrate-N concentrations ranging from 110 to 120 mg/L.

COT-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 44 to 87 mg/L.

COT-MW8

This well provides hydraulic control and its water chemistry is affected by off-site sources.

COT-MW9

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 23 to 46 mg/L.

COT-MW10

This well provides hydraulic control and its water chemistry is affected by off-site influences.

COT-MW11

1. Ammoniacal N concentrations were below the reporting limit.
2. TKN concentrations ranged from 0.71 to 1.8 mg/L.
3. The difference between TKN and ammoniacal N indicated organic N concentrations of approximately 0.7 to 1.8 mg/L.
4. Nitrite-N concentrations were nondetect.
5. Nitrate-N concentrations ranged from 47 to 82 mg/L.
6. K concentrations were high (29-79 mg/L).

Groundwater chemistry at this location does not exhibit typical indications of lagoon seepage. However, it is possible that ammoniacal N is rapidly oxidized to nitrate-N in the coarse-textured subsurface. Also, it is conceivable that the source area of this well extended beyond the footprint of the North Settling Basin.

COT-MW12

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent dairy fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields to the west and the corrals to the east. This includes nitrate-N concentrations ranging from 35 to 70 mg/L.

COT-MW13

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent dairy fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields to the west and the corrals to the east. This includes nitrate-N concentrations ranging from 3.8 to 49 mg/L.

COT-MW14

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 3.9 to 36 mg/L.

SAN

Key Soil Properties

1. Soils are sands, loamy sands, sandy loams, and silty clay loams, including slightly to strongly saline-alkali properties
2. Clay content 0-60%
3. Organic matter content 0.0-2.0%
4. $K_{sat(min)}$ 0-19.98 in/hr
5. Available water capacity 2.3-9.1 in
6. CEC 1.0-50 meq/100 g
7. Salinity 0-30.0 mS/cm
8. $CaCO_3$ content 0-5%
9. Gypsum content 0%
10. pH 6.1-9.6

Fields

Crops, Irrigation Systems, and Water Supply

Same as COT, but grows alfalfa instead of sweet potatoes on examined fields.

Fields – Nutrient and Salt Input/Output

Same as COT.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths ranging from approximately 10 to 40 ft (bgs) beneath the dairy.

MW6 is surrounded by fields and exhibits the shallowest, most stable water levels (i.e., 10-15 ft, bgs). Seasonal water level fluctuations in the other wells are generally 10 to 15 feet. The two field wells east of MW6 (i.e., MW7 and MW8) exhibit declining water levels early in the year, a distinct water level rise in May followed by slightly declining water levels, and an accelerated decline from July to August followed by

stable water levels through October. Water levels substantially, but not fully, recover later in the year. These overall water level trends are also generally exhibited in the other MWs, but vary in their intensity. Notably, the MWs located adjacent to the corrals do not show rising water levels in May.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1}. Corresponding hydraulic head differences were typically < |0.20| ft. Downward vertical gradients were prevalent across the dairy. Vertical gradients were greater at MW1 (up to 0.04 ft ft^{-1}, with dh up to 0.85 ft). MW2s and MW3s were dry in 2012. MW4s was dry from June to December; MW5s was dry from August to December; and MW8s was dry from August to October.

Contours of equipotential groundwater level elevations indicate generally northeasterly groundwater flow beneath the area from January to May and again in December. From June to October, flow was predominantly to the east beneath the fields. In the southern portion of the fields, particularly between MW6 and MW8, easterly flow is still apparent in December.

Groundwater tended to flow toward the corrals due to relatively low water levels in this area. Water levels in MW2 were typically slightly higher than water levels in the other wells adjacent to the corrals (i.e., MW3 and 4). As a result, none of these wells was clearly and consistently downgradient of the corrals. MW1 was generally downgradient of the fields and upgradient of the lagoon. MW5 through MW8 were downgradient of the fields.

Horizontal gradients across the contoured area ranged from 1 to 2.5×10^{-3} ft ft^{-1}, with steeper gradients sometimes occurring beneath the production area.

Groundwater Chemistry

SAN-MW1

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 35 to 43 mg/L. Based solely on the proximity of this well to the lagoon, effects of lagoon seepage on its water chemistry are conceivable. However, presently, groundwater chemistry at this location is not indicative of lagoon seepage.

SAN-MW2

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent area. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals and adjacent areas. This includes nitrate-N concentrations ranging from 25 to 42 mg/L.

SAN-MW3

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals and adjacent fields. This includes nitrate-N concentrations ranging from 71 to 74 mg/L.

SAN-MW4

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent fields. However, groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals and adjacent fields. This includes nitrate-N concentrations ranging from 72 to 80 mg/L.

SAN-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 20 to 84 mg/L.

SAN-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 34 to 46 mg/L.

SAN-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 34 to 43 mg/L.

SAN-MW8

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 12 to 40 mg/L.

PLS

Key Soil Properties

1. Most pertinent soils are sandy loams (DpA, DrA), including slightly saline-alkali properties
2. Clay content 7-18%
3. Organic matter content 0.0-1.0%
4. $K_{sat(min)}$ 0.06-0.20 in/hr
5. Available water capacity 7.2 in
6. CEC 5.0-10 meq/100 g
7. Salinity 0-8.0 mS/cm
8. $CaCO_3$ content 0%
9. Gypsum content 0%
10. pH 6.6-8.4

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on two of the examined fields (Fields 3 and 4), and a triple cropping system with summer corn (silage), followed by fall sudangrass (silage) and winter grain (oats silage soft dough) on the other two examined fields (Fields 1 and 2).
2. The examined fields were border irrigated.
3. Irrigation demand was met by TID surface water, irrigation well water, lagoon liquor, and rain.
4. <u>TID water:</u> TID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. <u>Irrigation well water and lagoon liquor:</u> The producer quantified water deliveries by estimating the pumping rate (i.e., of the irrigation wells and the lagoon pump) and the duration of the delivery.
6. <u>Tailwater:</u> It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.

8. Irrigation events were planned and scheduled according to agricultural guidelines, CCA professional judgment, and field observations.
9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Commercial fertilizers included anhydrous ammonia applied as a liquid (82% N) and an unspecified fertilizer with an NPK ratio of 4-10-10 (dry application).
3. TID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Canal water was sampled once in 2011.
   b. TN concentration was 1.4 mg/L.
   c. P and K results were not available.
   d. EC was 34 µS/cm.
4. Irrigation well water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Groundwater was sampled once in 2011.
   b. TN concentration was 30.7 mg/L.
   c. P and K results were not available.
   d. EC was 1,440 µS/cm.
5. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Lagoon liquor was sampled five times. One sample was taken in October 2011 and the remaining four samples were taken in December 2012.
   b. TKN concentrations ranged from 95.2 to 330 mg/L.
   c. Ammoniacal N concentrations ranged from 16.8 to 176 mg/L.
   d. Organic N accounted for 23 to 82% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 13.5 to 72 mg/L.
   f. K concentrations ranged from 57 to 373 mg/L.
   g. EC measurements ranged from 1,570 to 5,880 µS/cm.
6. Solid manure: Field-scale application rates were estimated based on constituent concentrations/content on a dry weight basis and mass applied.
   a. Solid manure was sampled three times between October 2011 and September 2012.
   b. TN content ranged from 1.02 to 2.06% on a dry weight basis.
   c. P content ranged from 0.16 to 0.81% on a dry weight basis.
   d. K content ranged from 1.46 to 2.35% on a dry weight basis.
   e. Salt content was not determined.
7. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths ranging from less than 5 to approximately 10 ft (bgs) beneath the dairy. Seasonal water level fluctuations are small (i.e., less than 5 feet) and the highest water levels are observed from July to September.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1} at most well locations (i.e., MW1 through MW5). Downward vertical gradients were prevalent at all well locations. Corresponding hydraulic head differences were typically < |0.10| ft. The well locations in the fields (MW6 and MW7) exhibited greater vertical gradients (commonly ≥ 0.02 ft ft^{-1}). Specifically, at MW6, $i_v \geq 0.03$ ft ft^{-1} in 9 months of the year (up to 0.10 ft ft^{-1}) and at MW7, $i_v \geq 0.03$ ft ft^{-1} in 5 months of the year (up to 0.08 ft ft^{-1}). Corresponding hydraulic head differences were often greater than 1 ft (the largest was 2.03 ft).

Contours of equipotential groundwater level elevations generally indicate southwestern to southeastern groundwater flow beneath the dairy. MW1 and MW2 were down- to crossgradient of the lagoon. MW3 was upgradient of the corrals. MW4 was cross- to downgradient of the corrals, and MW5 was downgradient of the corrals. MW 6 and MW7 were downgradient of the fields.

Horizontal gradients across the contoured area ranged from approximately 0.5 to 1.5×10^{-3}, but were typically smaller than 1×10^{-3} ft ft^{-1}.

Groundwater Chemistry

PLS-MW1

1. Ammoniacal N concentrations were below the reporting limit.
2. TKN concentrations ranged from 1.0 to 1.1 mg/L.
3. The difference between TKN and ammoniacal N indicates that ammoniacal N contributed negligibly to TKN (i.e., TKN essentially reflected organic N concentrations).
4. Nitrite-N concentrations were near or below the reporting limit.
5. Nitrate-N concentrations ranged from 62 to 120 mg/L.
6. TDS concentrations and individual general mineral concentrations were similar to non-lagoon wells.

Groundwater chemistry at this location does not exhibit typical indications of lagoon seepage. However, this well may not be favorably located for purposes of lagoon seepage detection.

PLS-MW2

1. Ammoniacal N concentrations were below the reporting limit.
2. TKN concentrations ranged from 1.1 to 1.2 mg/L.
3. The difference between TKN and ammoniacal N indicates that ammoniacal N contributed negligibly to TKN (i.e., TKN essentially reflected organic N concentrations).
4. Nitrite-N concentrations were near or below the reporting limit.
5. Nitrate-N concentrations ranged from 62 to 120 mg/L.
6. TDS concentrations and individual general mineral concentrations were similar to non-lagoon wells.

Groundwater chemistry at this location does not exhibit typical indications of lagoon seepage. However, this well may not be favorably located for purposes of lagoon seepage detection.

PLS-MW3

This well provides hydraulic control and its water chemistry is not reflective of dairy operations.

PLS-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals, although effects from the adjacent fields on water chemistry are conceivable. This includes high nitrate-N and K concentrations (120-150 and 470-500 mg/L, respectively).

PLS-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 55 to 76 mg/L.

PLS-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 52 to 54 mg/L.

PLS-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 63 to 81 mg/L.

CAE

Key Soil Properties

1. Most pertinent soils are sands and loamy sands (DuA, DeA, HhA), including slightly saline-alkali properties
2. Clay content 0-15%
3. Organic matter content 0.0-1.0%
4. $K_{sat(min)}$ 0.06-19.98 in/hr
5. Available water capacity 2.5-7.7 in
6. CEC 1.0-5.0 meq/100 g
7. Salinity 0-8.0 mS/cm
8. $CaCO_3$ content 0-5%
9. Gypsum content 0%
10. pH 6.1-9.6

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on Field 1. On Fields 2, 3, and 4, a triple cropping system with summer corn (silage), sudan grass (silage) in the fall, and winter grain (oats silage soft dough).
2. The examined fields were border irrigated.
3. Irrigation demand was met by TID surface water, lagoon liquor, and rain.
4. <u>TID water:</u> TID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. <u>Lagoon liquor:</u> The producer quantified lagoon liquor deliveries by estimating the pumping rate in conjunction with the duration of the delivery.
6. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest. Applied water stays on the fields. This dairy produces no tailwater runoff.
7. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
8. Reported irrigation volumes are net irrigation volumes. They reflect the estimated amount of water that was applied to the field and, presumably, infiltrated the soil.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Other sources of nutrients and salts were TID canal water, groundwater, lagoon liquor, solid manure.
3. Commercial fertilizers were not applied to the examined fields.
4. TID water: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Canal water was sampled annually.
   b. TN concentrations was 0.5 mg/L in 2011 and in 2012.
   c. P and K results were not available.
   d. EC measurements ranged from 3 to 24 µS/cm.
5. Groundwater: was not applied to the examined fields.
6. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Lagoon liquor was sampled five times between June 2011 and June 2012. Samples were retrieved two to six months apart.
   b. TKN concentrations ranged from 123 to 610 mg/L.
   c. Ammoniacal N concentrations ranged from 84 to 406 mg/L.
   d. Organic N accounted for 26 to 37% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 36.6 to 57 mg/L.
   f. K concentrations ranged from 299 to 795 mg/L.
   g. EC measurements ranged from 3,080 to 8,750 µS/cm.
8. Solid manure: was not applied to the examined fields.
7. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths ranging from approximately 5 to15 ft (bgs) beneath the dairy. Seasonal water level fluctuations are small (i.e., less than 5 feet). MW5 and MW6, located in the fields, exhibit their highest water levels from June to September, and declining water levels into the winter. In contrast, MW1 (located between the lagoon and the settling basins) and the wells adjacent to the corrals (MW2, MW3, and MW4) exhibit gradually declining water levels from spring to summer, and gradually recovering water levels in fall and winter.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1}. Corresponding hydraulic head differences were most typically < |0.10| ft. Downward vertical gradients were prevalent at most well locations (i.e., not at the lagoon well (MW1) and the corral well (MW3)).

Contours of equipotential groundwater level elevations indicate consistent southwestern groundwater flow beneath the dairy. MW1 was downgradient of the lagoon. MW2 was crossgradient of the corrals, and MW3 was downgradient of the corrals. MW4 and MW5 were downgradient of the fields, and MW6 was upgradient of the fields.

Horizontal gradients across the contoured area ranged from approximately 1 to $2x10^{-3}$ ft ft^{-1}.

Groundwater Chemistry

CAE-MW1

1. Ammoniacal N concentrations were high (87-94 mg/L).
2. TKN concentrations were high (85-95 mg/L).
3. The difference between TKN and ammoniacal N indicates organic N concentrations of approximately 3 mg/L in August 2012).
4. Nitrite-N concentrations ranged from nondetect to 6.5 mg/L.
5. Nitrate-N concentrations ranged from nondetect to 29 mg/L.
6. K concentrations were high (230-340 mg/L).
7. HCO_3 concentrations were high (1,100-1,600 mg/L).
8. This is the only well location were substantially negative ORP conditions were encountered in the well network.

Groundwater chemistry at this location is indicative of lagoon seepage.

CAE-MW2

This well's source area cannot be uniquely attributed to the corrals but appears to extend into the area of the milk barn and surrounding areas. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals and the area immediately north of the corrals. This includes nitrate-N concentrations ranging from 81 to 98 mg/L

CAE-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 52 to 89 mg/L.

CAE-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 77 to 100 mg/L.

CAE-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 35 to 67 mg/L.

CAE-MW6

This well provides hydraulic control and its water chemistry is not reflective of dairy operations.

ROB

Key Soil Properties

1. Soils are sandy loam and loamy sand (DwA, HfA), including slightly saline-alkali properties
2. Clay content 0-18%
3. Organic matter content 0.0-1.0%
4. $K_{sat(min)}$ 0.06-0.20 in/hr
5. Available water capacity 5.4-7.2 in
6. CEC 0.1-9.6 meq/100 g
7. Salinity 0-8.0 mS/cm
8. $CaCO_3$ content 0-5%
9. Gypsum content 0%
10. pH 7.3-9.6

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on two of the examined fields (Pit and ET Vincent). Devin, Goodlowe, and Pump Shop are planted in almonds.
2. Almonds were flood irrigated. The remaining crops were border irrigated.
3. Irrigation demand was met by TID surface water, irrigation well water, lagoon liquor, and rain.
4. TID water: TID quantified water deliveries by estimating the delivery flow rate (15 cfs) and the duration of the delivery.
5. Irrigation well water: The producer quantified irrigation well deliveries by estimating the pumping rate in conjunction with the duration of the delivery.
6. Lagoon liquor: The lagoon water level is gauged and discharges for irrigation are calculated based on water level drop.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Commercial fertilizers included two unspecified liquid commercial fertilizers with NPK ratios of 27-0-0 and 80-0-0.
3. TID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Canal water was sampled once in 2012.
   b. TN concentration was 8 mg/L.
   c. P and K results were not available.
   d. EC was 670 µS/cm.
4. Irrigation well water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. The three irrigation wells were each sampled once in 2012.
   b. TN concentrations ranged from 41.3 to 50.3 mg/L.
   c. P and K results were not available.
   d. EC ranged from 1,270 to 1,350 µS/cm.

14. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Lagoon liquor was sampled three times between March and December 2012. Samples were retrieved between three months and six months apart.
   b. TKN concentrations ranged from 84 to 487 mg/L.
   c. Ammoniacal N concentrations ranged from 33.6 to 330 mg/L.
   d. Organic N accounted for 28 to 60 % of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 17.8 to 60.0 mg/L.
   f. K concentrations ranged from 151 to 494 mg/L.

g. EC measurements ranged from 3,520 to 8,800 µS/cm.

15. Solid manure: Solid manure was not applied to the examined fields.
16. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater typically occurs at depths ranging from approximately 8 to 20 ft (bgs) beneath the dairy. Water levels gradually declined from spring to summer. Except in MW1 and MW2, the lowest water level elevations were observed in September to October with subsequent recovery. MW1 and MW2 exhibit notably steeper water level declines between July and August than the other MWs. In addition, the March water level in MW1 was particularly low.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1} in most wells. Corresponding hydraulic head differences were typically < |0.10| ft. Downward vertical gradients were prevalent except at the corral well location (MW5), where very small upgradient vertical gradients were more common (i_v could only be computed for 7 campaigns as MW5s was dry during the other times). The field well locations MW7 and MW8 exhibited greater vertical gradients. At MW7, i_v ranged from 0.03-0.13 ft ft^{-1} during 6 campaigns with dh up to 2.73 ft. At MW8, i_v ranged from 0.02-0.04 ft ft^{-1} during 5 campaigns with dh up to 0.90 ft.

Contours of equipotential groundwater level elevations indicate predominantly western to northern flow beneath the fields. However, northeastern flow was observed in August beneath the fields and eastern flow was observed in September beneath Goodlow's and Devin's Fields. In December, flow was to the southwest. Beneath the production area, groundwater flow fluctuated predominantly between southwestern and northern directions, and was southeasterly in March when a slight north-south trending groundwater ridge was indicated beneath Pump Shop Field and the western production area in combination with very low water levels in MW5.

With the exception of March, MW1 and MW2 were downgradient of the lagoon or settling basins, MW3 was downgradient of the corrals, MW4 was down- to crossgradient to the corrals, and MW5 mainly provided upgradient hydraulic control for the corrals. With the exception of August, September, and late December, MW6 was downgradient of the fields. MW8 was always downgradient of fields due to its central location (surrounded by fields). MW7 provided cross- and upgradient hydraulic control for the fields during most of the year. However, it was downgradient of the fields during the February and early December sampling campaigns.

Westerly gradients across the contoured area were typically smaller than $1x10^{-3}$ ft ft^{-1}. Northerly gradients were steeper and ranged from approximately 3 to $5x10^{-3}$ ft ft^{-1}. The steepest gradient was observed beneath the corrals in March when flow was easterly ($7x10^{-3}$ ft ft^{-1}).

Groundwater Chemistry

ROB-MW1

1. Ammoniacal N concentrations ranged from nondetect to 1.5 mg/L.
2. TKN concentrations ranged from 0.46 to 0.57 mg/L.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations ranged from 37 to 78 mg/L.

Groundwater chemistry at this location does not exhibit typical indications of lagoon seepage. However, it is possible that ammoniacal N is rapidly oxidized to nitrate-N in the coarse-textured subsurface.

ROB-MW2

1. Ammoniacal N concentrations ranged from below the reporting limit to 0.78 mg/L.
2. TKN concentrations ranged from 1.5 to 1.6 mg/L.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations.
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations ranged from 56 to 160 mg/L.

Groundwater chemistry at this location does not exhibit typical indications of lagoon seepage. However, it is possible that ammoniacal N is rapidly oxidized to nitrate-N in the coarse-textured subsurface.

ROB-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 1.6 to 12 mg/L.

ROB-MW4

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent off-site fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals and adjacent off-site fields. This includes nitrate-N concentrations ranging from 32 to 100 mg/L.

ROB-MW5

This well provides hydraulic control and its water chemistry is not reflective of dairy operations.

ROB-MW6

Due to variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the almond orchard east of the well or the row crops west of the well. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the almond orchard and the row cropped field. This includes nitrate-N concentrations ranging from 52 to 82 mg/L.

ROB-MW7

This well provides mainly hydraulic control and its water chemistry is not reflective of dairy operations.

ROB-MW8

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the almond orchards. This includes nitrate-N concentrations ranging from 43 to 49 mg/L.

ANT

Key Soil Properties

1. Most pertinent soils are loam and clay loam (122, 331)
2. Clay content 18-50%
3. Organic matter content 0.0-2.0%
4. $K_{sat(min)}$ 0.01-2.0 in/hr
5. Available water capacity 6.7-9.6 in
6. CEC 10-37 meq/100 g
7. Salinity 0-16.0 mS/cm
8. $CaCO_3$ content 0-15%
9. Gypsum content 0%
10. pH 6.6-9.0

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn and winter grain (oats) on the examined field (Field 80).
2. The summer crop was furrow irrigated and the winter crop was border irrigated.
3. Irrigation demand was met by CCID surface water, lagoon liquor, and rain.
4. CCID water: CCID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. Lagoon liquor: Lagoon liquor was removed from the lagoon and mixed with the irrigation water. Details of the flow rate estimates are presently not known.
6. Tailwater: It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers were not applied to the examined field.
3. CCID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Canal water was sampled once in 2011.
   b. TN concentration was 0.87 mg/L.
   c. P and K results were not available.
   d. EC measurement was 227 µS/cm.
4. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Lagoon liquor was sampled four times between August 2011 and September 2012. Samples were retrieved between three months and seven months apart.
   b. TKN concentrations ranged from 358 to 694 mg/L.
   c. Ammoniacal N concentrations ranged from 218 to 501 mg/L.
   d. Organic N accounted for 28 to 39 % of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 34.5 to 43.2 mg/L.
   f. K concentrations ranged from 770 to 1,610 mg/L.
   g. EC measurements ranged from 8,610 to 11,260 µS/cm.
5. Solid manure: Solid manure was not applied to the examined fields.
6. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths ranging from approximately 5 to 25 ft (bgs) beneath the dairy. Water levels were the lowest in fall and winter and the highest in July and August. The MWs nearest to the fields (MW1, MW5, and MW6) exhibit clear water level rises from June to July of up to approximately 10 ft. This characteristic is shown to a lesser degree in MW3, and it is most subdued in the MWs farthest away from the fields, i.e., MW2 and MW4. Overall, MW2 and MW4 show the least seasonal water level variability.

At three of the six well locations (MW1, MW2, and MW4), vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and exceeded |0.01| ft ft^{-1} only once (i.e., at MW2, February 2012, i_v = -0.05 ft ft^{-1}). Corresponding hydraulic head differences were typically < |0.10| ft. Downward vertical gradients were prevalent except at the corral well location MW2. The corral well location MW3 (also located adjacent Field 80 West) and the two field well locations (MW5 and MW6) exhibited greater vertical gradients (i_v = 0.02-0.11 ft ft^{-1}) during most of the year, with corresponding hydraulic head differences quite frequently exceeding |1.0| ft and up to 2.90 ft.

Contours of equipotential groundwater level elevations indicate southern to southwestern groundwater flow beneath the fields near MW6, and predominantly southwestern to western flow near MW5. MW6 was consistently downgradient of Field 80 East (possibly also downgradient of Field 80 West in September 2012). MW3 was consistently downgradient of Field 80 West. MW5 was downgradient of Field 80 West but was, at times, also downgradient of a neighboring field to the north that does not belong to the dairy (e.g., in July and October). Groundwater flow beneath the corrals was to the south, and MW2 and MW4 were consistently downgradient of the corrals (although MW2 was also downgradient of the area immediately to the west of the corrals). MW1 is located directly adjacent to the main liquid manure storage lagoon at the base of its eastern berm. This MW appears crossgradient to upgradient of the lagoon most of the time, and also downgradient of the fields.

Horizontal gradients across the contoured area generally ranged from $1.5x10^{-3}$ to $5x10^{-3}$ ft ft^{-1}, and up to $9x10^{-3}$ ft ft^{-1}. Gradients beneath the corrals were typically steeper beneath the corrals than Field 80 West.

Groundwater Chemistry

ANT-MW1

1. Ammoniacal N concentrations were below the reporting limit and similar to concentrations at non-lagoon wells.
2. TKN concentrations ranged from 0.82 to 0.89 mg/L and were higher than at non-lagoon wells (ANT-MW5 had comparable concentrations).
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations ranged from 17 to 28 mg/L.
6. TDS concentrations and individual general mineral concentrations were similar to those observed at non-lagoon wells.

Groundwater chemistry at this location is not indicative of lagoon seepage. However, due to its up- to crossgradient position to the lagoon, this well may not be favorably located for purposes of lagoon seepage detection.

ANT-MW2

This well's source area cannot be uniquely attributed to the corrals but may also include adjacent areas west of the corrals (i.e., heifer hutches). Groundwater chemistry at this location is substantially attributed to

recharge occurring in a source area within the corrals and adjacent areas to their west. This includes nitrate-N concentrations ranging from 53 to 81 mg/L.

ANT-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within Field 80. This includes nitrate-N concentrations ranging from 19 to 38 mg/L.

ANT-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 24 to 34 mg/L.

ANT-MW5

Due to this well's peripheral location and variable groundwater flow direction, its source area cannot be uniquely attributed to Field 80, but was, at times, also downgradient of neighboring non-dairy fields. Therefore, groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within Field 80 and also influenced by adjacent non-dairy fields. This includes nitrate-N concentrations ranging from 18 to 26 mg/L.

ANT-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the fields. This includes nitrate-N concentrations ranging from 18 to 31 mg/L.

COR

Key Soil Properties

1. Most pertinent soils are loam and clay (234, 237)
2. Clay content 18-50%
3. Organic matter content 0.0-1.0%
4. $K_{sat(min)}$ 0.01-0.20 in/hr
5. Available water capacity 6.6 in
6. CEC 10-30 meq/100 g
7. Salinity 8.0-16.0 mS/cm
8. $CaCO_3$ content 0-3%
9. Gypsum content 0%
10. pH 6.6-9.0

Fields

Fields are not under investigation at this dairy.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths less than 10 ft (bgs) beneath the dairy (in some MWs on the order of only 5 ft, bgs). Monthly and seasonal water level variability was very small, and water levels appear stable.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and exceeded |0.01| ft ft^{-1} only on three occasions (i_v = 0.02 ft ft^{-1}). Corresponding hydraulic head differences were typically < |0.10| ft. Downward and upward vertical gradients occurred with approximately equal frequency except at the corral well location MW4 (i_v consistently downward).

Contours of equipotential groundwater level elevations indicate consistent east-northeastern to northeastern groundwater flow. MW1 was consistently downgradient of the lagoon. MW2 and MW3 were consistently upgradient of the corrals. MW4 and MW5 were consistently downgradient of the corrals.

Horizontal gradients across the contoured area were relatively stable and ranged from approximately $7x10^{-4}$ to $1.6x10^{-3}$ ft ft^{-1}.

Groundwater Chemistry

COR-MW1

1. Ammoniacal N concentrations were below the reporting limit and similar to concentrations at non-lagoon wells (COR-MW5 had slightly higher concentrations).
2. TKN concentrations ranged from 0.63 to 0.82 mg/L and were higher than at non-lagoon wells (COR-MW5 had comparable concentrations).
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations were low (1.7-2.7 mg/L).
6. TDS concentrations were higher than in non-lagoon wells. Na, Cl, and HCO_3 were the main contributors to the elevated salinity.

Although ammoniacal N was essentially absent and TN concentrations were low, the presence of organic N in conjunction with clearly elevated salinity, including Na, Cl, and HCO_3,suggests that groundwater at this location may be impacted by lagoon seepage.

COR-MW2

This well provides upgradient hydraulic control and its water chemistry is not reflective of dairy operations.

COR-MW3

This well provides upgradient hydraulic control and its water chemistry is not reflective of dairy operations.

COR-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes low nitrate-N concentrations (2.7-4.6 mg/L).

COR-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals although it may also be affected by areas south of the corrals. This includes low nitrate-N concentrations (2.7-4.6 mg/L).

FG2

Key Soil Properties

1. Soils are clay loam and clay (168, 26, 169)
2. Clay content 27-50%
3. Organic matter content 0.0-2.0%
4. $K_{sat(min)}$ 0.00-0.06 in/hr
5. Available water capacity 6.7-8.6 in
6. CEC 5.0-30 meq/100 g
7. Salinity 0.0-16.0 mS/cm

8. $CaCO_3$ content 0-35%
9. Gypsum content 0-10%
10. pH 6.6-9.0

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on three of its examined fields (Fields 9, 10, and Bambauer). Field 6 was planted in alfalfa from 2008 until fall 2011 (haylage and hay), followed by winter grain (oats silage soft dough), summer corn (silage).
2. Summer crops were furrow irrigated. Winter crops, alfalfa, and sudangrass were border irrigated.
3. Irrigation demand was met by CCID surface water, lagoon liquor, and rain. Tailwater was captured and returned to the head end of the fields.
4. CCID water: CCID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. Lagoon liquor: The producer quantified water deliveries by estimating the pumping rate (i.e., of the lagoon pump) and the duration of the delivery. Details of the flow rate estimates are presently not known.
6. It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Irrigation events were planned and scheduled under consultation of a CCA according to agricultural guidelines, professional judgment, and field observations.
9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Commercial fertilizers included ammonium sulfate (21% N, dry), a liquid fertilizer referred to as 27-0-0-6 (NPK ratio 27-0-0), and an unspecified fertilizer.
3. CCID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. Canal water was sampled once in 2011 and once in 2012.
    b. TN concentrations ranged from 0.96 to 0.97 mg/L.
    c. P and K results were not available.
    d. EC measurements ranged from 278 to 840 µS/cm.
4. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. Lagoon liquor was sampled six times between January 2011 and October 2012. Samples were retrieved between one month and seven months apart.
    b. TKN concentrations ranged from 89.6 to 358 mg/L.
    c. Ammoniacal N concentrations ranged from 42 to 227 mg/L.
    d. Organic N accounted for 25 to 68% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
    e. P concentrations ranged from 24.6 to 43.7 mg/L.

f. K concentrations ranged from 117 to 514 mg/L.
g. EC measurements ranged from 576 to 4,750 µS/cm.

5. Solid manure was not applied to the examined fields.
6. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths of up to approximately 10 ft (bgs) beneath the dairy (in some MWs on the order of only 5 ft, bgs). Monthly and seasonal water level variability was very small (with the exception of a low water level reading at MW5 in October) and water levels appear stable.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1}. Corresponding hydraulic head differences were typically < |0.20| ft. Downward and upward vertical gradients occurred with approximately equal frequency at three well locations (i.e., MW1, MW3, and MW4). At MW2 and MW5, downward vertical gradients were prevalent.

Contours of equipotential groundwater level elevations indicate east-northeastern to northern groundwater flow components beneath the dairy or portions thereof every month. However, this dairy is characterized by non-steady flow directions including flow reversal. Noticeably, measurements in MW4 suggest this vicinity as a location of relatively high water levels compared to the otherwise upgradient MW5. Examples are the months of January, March, July, and October, when groundwater flow occurred to the southwest from MW4 toward MW5. In May and June, relatively high water levels in MW1 contributed to northwesterly groundwater flow from MW1 toward MW3.

Despite the variable groundwater flow directions, MW3 is consistently downgradient of the corrals and MW4 is upgradient of the corrals. MW2 provides upgradient or crossgradient hydraulic control for the corrals and is sometimes downgradient of the fields west of the production area (i.e., Fields 9, 10, and 14). MW5 provides hydraulic control.

MW1 is located directly adjacent to the main liquid manure storage lagoon and Settling Basin No. 2 at the base of its southern berm. This MW appears crossgradient to upgradient of the lagoon most of the time, and MW1 is also downgradient of Field 6.

Horizontal gradients across the contoured area were relatively stable and ranged from approximately $7x10^{-4}$ to $1.4x10^{-3}$ ft ft^{-1} when overall groundwater flow was to the northeast.

Groundwater Chemistry

FG2-MW1

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within Field 6. This includes nitrate-N concentrations ranging from 1.3 to 2.7 mg/L and high sulfate concentrations (1,800-2,100 mg/L). Based solely on the proximity of this well to the lagoon, effects of lagoon seepage on its water chemistry are conceivable. However, presently, groundwater chemistry at this location is not indicative of lagoon seepage.

FG2-MW2

This well provides mainly upgradient and crossgradient hydraulic control. Due to highly variable groundwater flow directions in this well's vicinity, its source area cannot be uniquely attributed to the corrals or adjacent dairy fields. Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the upgradient fields and the corrals. This includes low nitrate-N concentrations (5.2-9.2 mg/L) and high sulfate concentrations (1,000-1,200 mg/L).

FG2-MW3

Despite variable flow directions in the vicinity of this well, groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the corrals. This includes nitrate-N concentrations ranging from 13 to 15 mg/L and high sulfate concentrations (1,800-1,900 mg/L)

FG2-MW4

This well provides mainly upgradient hydraulic control and its water chemistry is not reflective of dairy operations.

FG2-MW5

This well provides upgradient hydraulic control and its water chemistry is not reflective of dairy operations.

GOD

Key Soil Properties

1. Soils are loam and clay (274, 192, 236)
2. Clay content 15-50%
3. Organic matter content 0.0-3.0%
4. $K_{sat(min)}$ 0.00-0.57 in/hr
5. Available water capacity 6.7-10 in
6. CEC 10-30 meq/100 g
7. Salinity 0.0-16.0 mS/cm
8. $CaCO_3$ content 0-10%
9. Gypsum content 0%
10. pH 6.6-9.0

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on four of the examined fields (Fields 2, 3, 4, and 12N). Field 12S was planted in summer sudangrass (silage) and winter grain (oats silage soft dough). Field 1 was planted in corn (silage) in 2011, after which the field was split into two parts, with part A planted in winter grain (oats silage soft dough) followed by summer corn (silage) and part B planted in winter grain (oats silage soft dough) followed by sudangrass (silage). Field 14 was planted in corn in 2001 and subsequently fallowed.
2. Summer crops were furrow irrigated. Winter crops were border irrigated.
3. Irrigation demand was met by CCID surface water, lagoon liquor, and rain.
4. <u>CCID water:</u> CCID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. <u>Lagoon liquor:</u> The producer quantified water deliveries by estimating the pumping rate (i.e., of the irrigation wells and the lagoon pump) and the duration of the delivery. Details of the flow rate estimates are presently not known.
6. It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.

9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Liquid UN32 (32% N).
3. CCID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. Canal water was sampled once in 2011 and twice in 2012.
    b. TN concentrations ranged from 0.5 to 1.65 mg/L.
    c. P and K results were not available.
    d. EC measurements ranged from 306 to 677 µS/cm.
4. Lagoon liquor (including slurry): Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. Lagoon liquor was sampled six times between June 2011 and September 2012. Samples were retrieved between three months and six months apart.
    b. TKN concentrations ranged from 566 to 1,988 mg/L.
    c. Ammoniacal N concentrations ranged from 140 to 675 mg/L.
    d. Organic N accounted for 8 to 79% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
    e. P concentrations ranged from 32.6 to 169 mg/L.
    f. K concentrations ranged from 800 to 3,820 mg/L.
    g. EC measurements ranged from 2,051 to 18,700 µS/cm.
5. Solid manure: Solid manure was not applied to the examined fields.
6. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field. In the case of alfalfa, it appears that tissue samples were not retrieved at all cuttings.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths of up to approximately 10 ft (bgs) beneath the dairy (in some MWs on the order of only 5 ft, bgs). Monthly and seasonal water level variability was very small and water levels appear stable. Water levels in three MWs near the fields (i.e., MW5 through MW7) exhibit slightly more variability; specifically, lower levels were observed in May and October through December.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and exceeded |0.01| ft ft^{-1} only once (i.e., i_v = 0.02 ft ft^{-1} at MW4 in April). Corresponding hydraulic head differences were typically < |0.10| ft. Downward vertical gradients were prevalent at most well locations. Notably, at the field well locations of MW5 and MW7, small upward vertical gradients occurred more frequently than downward vertical gradients.

Contours of equipotential groundwater level elevations indicate consistent eastern to northeastern groundwater flow beneath the monitored fields and the corrals. MW5 was upgradient of the fields. MW2, MW6, and MW7 were downgradient of the fields. MW3 was downgradient of the corrals (crossgradient in May). MW4 was down- to crossgradient to the corrals. Water levels in the MW adjacent to the lagoon, MW1, were often somewhat elevated. This condition permits two fundamentally different interpretations of groundwater flow in the vicinity of the lagoon. Interpretation "A" suggests groundwater flow toward the area of the lagoon with groundwater outflow to the north. This interpretation suggests that MW1 was cross-

to upgradient of the lagoon. Interpretation "B" suggests groundwater mounding beneath the lagoon and resultant flow radially away, thus, identifying the lagoon as a source of groundwater recharge.

Horizontal gradients beneath the fields and corrals were relatively stable and ranged from approximately 1 to $2x10^{-3}$ ft ft^{-1}.

Groundwater Chemistry

GOD-MW1

1. Ammoniacal N concentrations were near or below the reporting limit and similar to concentrations at non-lagoon wells.
2. TKN concentrations ranged from 0.45 to 0.53 mg/L and were similar to non-lagoon wells (except GOD-MW5, where TKN was below the reporting limit in May and August 2012).
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Concentrations of nitrite-N were below the reporting limit.
5. Nitrate-N concentrations were among the lowest (0.89-2.9 mg/L) on this dairy.
6. TDS concentrations and individual general mineral concentrations were similar to non-lagoon wells, with the exception of somewhat elevated HCO_3.

Groundwater chemistry at this location is not indicative of lagoon seepage. However, this well may not be favorably located for purposes of lagoon seepage detection.

GOD-MW2

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient Field 12N. This includes nitrate-N concentrations ranging from 16 to 19 mg/L.

GOD-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the corrals. This includes nitrate-N concentrations ranging from 11 to 33 mg/L.

GOD-MW4

This well provides mainly crossgradient hydraulic control. Its monitored source length cannot be uniquely attributed to the corrals or adjacent non-dairy fields.

GOD-MW5

This well provides upgradient hydraulic control and its water chemistry is not reflective of dairy operations.

GOD-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient Field 12S. This includes nitrate-N concentrations ranging from 14 to 16 mg/L.

GOD-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient Field 12S. This includes low nitrate-N concentrations (1.8-2.9 mg/L).

MAC and NUN

Key Soil Properties

1. Soils are silty clay and clay loam (258, 279)

2. Clay content 18-65%
3. Organic matter content 0.0-2.0%
4. $K_{sat(min)}$ 0.00-0.20 in/hr
5. Available water capacity 8.2-10.2 in
6. CEC 10-50 meq/100 g
7. Salinity 0.0-8.0 mS/cm
8. $CaCO_3$ content 0-10%
9. Gypsum content 0%
10. pH 6.6-8.4

Fields - MAC

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on its two examined fields.
2. Summer crops were furrow irrigated. Winter crops were border irrigated.
3. Irrigation demand was met by CCID surface water, lagoon liquor, and rain.
4. CCID water: CCID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. Lagoon liquor: The producer quantified water deliveries by estimating the pumping rate (i.e., of the lagoon pump) and the duration of the delivery. Details of the flow rate estimates are presently not known.
6. Tailwater: It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Irrigation events were planned and scheduled under consultation of a CCA according to agricultural guidelines, professional judgment, and field observations. Field, crop, irrigation system, and time dependent variables, such as irrigation uniformity, irrigation efficiency, and crop ET are presently not used in irrigation planning.
9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Commercial fertilizers included ammonium sulfate (21% N, dry) and NH_3 (82% N, liquid).
3. CCID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. Canal water was sampled once in 2011 and twice in 2012.
    b. TN concentrations ranged from 0.5 to 1.83 mg/L.
    c. P and K results were not available.
    d. EC concentrations ranged from 282 to 700 µS/cm.
4. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    a. Lagoon liquor was sampled four times between June 2011 and September 2012. Samples were retrieved between three months and nine months apart.

b. TKN concentrations ranged from 269 to 2078 mg/L.
c. Ammoniacal N concentrations ranged from 129 to 381 mg/L.
d. Organic N accounted for 33 to 87% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
e. P concentrations ranged from 34.7 to 75 mg/L.
f. K concentrations ranged from 327 to 1,010 mg/L.
g. EC measurements ranged from 3,850 to 11,820 µS/cm.

5. Solid manure was not used on the examined fields.
6. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Fields - NUN

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on two of the examined fields (Fields 3 and 23), and alfalfa (hay and haylage) on the other two fields (Fields 1 and 2).
2. Summer crops were furrow irrigated. Winter crops and alfalfa were border irrigated.
3. Irrigation demand was met by CCID surface water, lagoon liquor, and rain.
4. CCID water: CCID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. Lagoon liquor: The producer quantified water deliveries by estimating the pumping rate (i.e., of the lagoon pump) and the duration of the delivery. Details of the flow rate estimates are presently not known.
6. Tailwater: It is unclear if tailwater was always routed back to the lagoon or if it may have been a direct source of irrigation supply.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
9. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per field/crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers: Commercial fertilizers included ammonium sulfate (21% N), UN32 (32% N), and an unspecified commercial fertilizer with an NPK ratio of 4-5-0.
3. CCID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    e. Canal water was sampled once in 2011 and twice in 2012.
    f. TN concentrations ranged from <0.5 to 2.03 mg/L.
    g. P and K results were not available.
    h. EC measurements ranged from 287 to 700 µS/cm.
4. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
    h. Lagoon liquor was sampled six times between March 2011 and September 2012. Samples were retrieved between one month and nine months apart.

i. TKN concentrations ranged from 140 to 1,467 mg/L.
j. Ammoniacal N concentrations ranged from 58.8 to 409 mg/L.
k. Organic N accounted for 0 to 76% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
l. P concentrations ranged from 25.5 to 244 mg/L.
m. K concentrations ranged from 36.4 to 965 mg/L.
n. EC measurements ranged from 4,920 to 15,900 µS/cm.

5. Solid manure was not applied to the examined fields.
6. Tailwater: Constituent concentrations were not available.
7. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurs at depths between less than 5 ft (bgs) and up to approximately 10 ft (bgs) beneath these dairies. Groundwater levels on the NUN dairy were generally slightly shallower than on the MAC dairy. Monthly and seasonal water level variability in MWs on the NUN dairy was very small and only slightly larger on the MAC dairy. Water levels appear stable on both dairies.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and exceeded |0.01| ft ft^{-1} only once (i.e., i_v = 0.02 ft ft^{-1} at NUN-MW1 in February). MAC-MW4 was unique with a consistent i_v = 0.01 ft ft^{-1} at every monitoring campaign. Corresponding hydraulic head differences were typically < |0.10| ft and a bit greater at MAC-MW4 (i.e. 0.14-0.28 ft). Downward and upward vertical gradients occurred with approximately equal frequency at most well locations. MAC-MW2 and MW4 were exceptions with consistent downward vertical gradients.

Contours of equipotential groundwater level elevations indicate consistent northern groundwater flow with, possibly, a northeastern flow component between MAC-MW3 and the NUN corrals (contours in this area may be less reflective of actual water level conditions but rather be influenced by so-called boundary effects that can cause bias as a result of the interpolation algorithm's emphasis on existing data points in the [data-poor] periphery of the contoured area). MAC-MW1 and MW2 were downgradient of the MAC lagoon, and NUN-MW1 was essentially crossgradient of the NUN lagoon. NUN-MW2 was down- to crossgradient to the dairy's Field 1 and also downgradient of MAC's Field 3. MAC-MW3 was downgradient of the dairy's Field 2. MAC-MW4 and MW5 appear mostly crossgradient to Field 3 and the MAC corrals. NUN-MW3 and 4 appear mostly crossgradient to the NUN corrals (they were slightly downgradient in early December).

Horizontal gradients across the contoured area were relatively stable and ranged from approximately 1.7 to 3.1 $x10^{-3}$ ft ft^{-1}.

Groundwater Chemistry

MAC-MW1

1. Ammoniacal N concentrations were below the reporting limit and similar to concentrations at non-lagoon wells.
2. TKN concentrations ranged from 0.44 to 0.50 mg/L and were similar or lower than at non-lagoon wells.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were very low (nondetect to 0.10 mg/L) and similar to concentrations at non-lagoon wells.
5. Nitrate-N concentrations ranged from 14 to 20 mg/L and were similar to concentrations at non-lagoon wells.

6. Overall salinity and individual general mineral concentrations were similar or lower than in non-lagoon wells.

Groundwater chemistry at this location is not indicative of lagoon seepage.

MAC-MW2

1. Ammoniacal N concentrations were below the reporting limit and lower than at non-lagoon wells.
2. TKN concentrations ranged from 0.36 to 0.45 mg/L and were lower than at non-lagoon wells.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations ranged from 14 to 26 mg/L and were similar to concentrations at non-lagoon wells.
6. TDS concentrations and individual general mineral concentrations were similar or lower than at non-lagoon wells.

Groundwater chemistry at this location is not indicative of lagoon seepage.

MAC-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within MAC Field 2. This includes nitrate-N concentrations ranging from 32 to 50 mg/L, low concentrations of organic N, and very high TDS (7,800-12,000 mg/L) and SO_4 (4,800-5,600 mg/L) concentrations.

MAC-MW4

This well provides mainly crossgradient hydraulic control. Its monitored source length cannot be clearly attributed to the corrals or MAC Field 3. Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the corrals and/or MAC Field 3. This includes substantial concentrations of ammoniacal N (3.9-12 mg/L) accompanied by similar TKN concentrations indicating that TKN was completely or almost completely made up of ammoniacal N (i.e., very low organic N). Nitrite-N was very low (J-flagged or nondetect) and nitrate-N was low (7.3-8.8 mg/L).

MAC-MW5

As MAC-MW4, this well provides mainly crossgradient hydraulic control. Its monitored source length cannot be clearly attributed to the corrals or MAC Field 3. Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the corrals and/or MAC Field 3. This includes concentrations of ammoniacal N ranging from 0.13 to 7.0 mg/L, and organic N of up to approximately 1 mg/L. Nitrite-N was very low (J-flagged or nondetect) and nitrate-N was low (7.3-8.8 mg/L).

NUN-MW1

1. Ammoniacal N concentrations were below the reporting limit and similar to concentrations at non-lagoon wells.
2. TKN concentrations ranged from 0.50 to 0.59 mg/L and were similar or lower than at non-lagoon wells.
3. The difference between TKN and ammoniacal N indicates low organic N concentrations (i.e., ammoniacal N contributed negligibly to TKN).
4. Nitrite-N concentrations were below the reporting limit.
5. Nitrate-N concentrations were very low (1.2-2.8 mg/L) and similar or lower than at non-lagoon wells.
6. TDS concentrations and individual general mineral concentrations were similar or lower than at non-lagoon wells.

Groundwater chemistry at this location is not indicative of lagoon seepage. However, due to its crossgradient position to the lagoon, this well may not be favorably located for purposes of lagoon seepage detection.

NUN-MW2

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within NUN Field 1 and MAC Field 3. This includes low nitrate-N concentrations (1.6-5.8 mg/L) and low concentrations of organic N.

NUN-MW3

This well provides mainly crossgradient hydraulic control. Its monitored source length cannot be clearly attributed to the corrals or NUN Field 2. Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the corrals and/or NUN Field 2. This includes nitrate-N concentrations ranging from 8.4 to 41 mg/L and low concentrations of organic N.

NUN-MW4

As NUN-MW3, this well provides mainly crossgradient hydraulic control. Its monitored source length cannot be clearly attributed to the corrals or NUN Field 2. Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the corrals and/or NUN Field 2. This includes low nitrate-N concentrations (J-flagged to 6.2 mg/L), low concentrations of organic N, and very high TDS (8,600-11,000 mg/L) and SO_4 (5,300-5,700 mg/L) concentrations.

MOO

Key Soil Properties

1. Most pertinent soils are loam and clay loam (122, 330)
2. Clay content 18-50%
3. Organic matter content 0.0-2.0%
4. $K_{sat(min)}$ 0.01-2.00 in/hr
5. Available water capacity 6.7-9.6 in
6. CEC 10-37 meq/100 g
7. Salinity 0.0-16.0 mS/cm
8. $CaCO_3$ content 0-15%
9. Gypsum content 0%
10. pH 6.6-9.0
11. Bolfar-Columbia Complex (near the river) exhibits generally comparable properties but potentially lower clay content and CEC.

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage or earlage) and winter grain (wheat silage) on the seven examined fields (Fields 248, 250, 258, 259, 260, 262 and 264.
2. Summer crops were furrow irrigated. Winter crops were border irrigated.
3. Irrigation demand was met by CCID surface water, groundwater, lagoon liquor, and rain. Tailwater was captured and returned to the head end of the fields or back to the lagoon.
4. <u>CCID water:</u> CCID quantified water deliveries by estimating the delivery flow rate (2,700 gpm) and the duration of the delivery.

5. Groundwater and lagoon water: The producer quantified water deliveries by estimating the pumping rate of each of the three irrigation wells (1,000 gpm each) and the lagoon pump (1,500 gpm) and the duration of the delivery.
6. Lagoon liquor was pumped from the lagoon and mixed with the irrigation water. When more than one field was irrigated at the same time, deliveries to specific fields were estimated by equally dividing the total pumping rate by the number of fields serviced at one time.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest but the amount of tailwater runoff was variable. Tailwater runoff was not estimated.
8. Tailwater was recycled and returned to the lagoon or the head end of a field, but not necessarily to the field where it originated from.
9. Irrigation events were planned and scheduled under consultation of a CCA according to agricultural guidelines, professional judgment, and field observations.
10. Reported irrigation volumes are considered gross irrigation volumes. They reflect the estimated amount of water that was applied to the field; an unquantified part of this volume left the fields and was not available for infiltration.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Commercial fertilizers were not applied to the examined fields.
3. CCID water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Canal water was sampled once in 2011 and once in 2012.
   b. TN was 1.57 mg/L (available for 2011, only).
   c. P and K results were not available.
   d. EC ranged from 312 to 1,000 µS/cm.
4. Irrigation well water: Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. All three groundwater wells were sampled annually, with one well sampled twice in 2012.
   b. TN concentrations ranged from 8.87 to 29.4 mg/L.
   c. P and K results were not available.
   d. EC measurements ranged from 1,170 to 2,430 µS/cm.
5. Lagoon liquor (including slurry): Field-scale application rates were estimated based on constituent concentrations and the volume applied.
   a. Lagoon liquor was sampled eleven times between November 2010 and September 2012. Samples were retrieved less than a month to three months apart.
   b. TKN concentrations ranged from 67 to 2,033 mg/L.
   c. Ammoniacal N concentrations ranged from 31 to 400 mg/L.
   d. Organic N accounted for 31 to 84% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 3.2 to 54 mg/L.
   f. K concentrations ranged from 44 to 595 mg/L.
   g. EC measurements ranged from 1,610 to 7,000 µS/cm.
9. Solid manure: Solid manure was not applied to the examined fields.
6. Tailwater: Constituent concentrations were not available.
7. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurred at depths between approximately 10 and 25 ft (bgs). Groundwater level fluctuations were very small with some sporadic exceptions (e.g., April measurements in MW1, MW2, and MW4). Many wells display very slightly elevated water levels in the summer. This pattern is somewhat more apparent at the corral wells MW3 and MW5 than at the field wells MW7 and MW8, but the pattern is most noticeable at the field well MW6.

Downward vertical gradients were substantial at the corral well location MW5 and the field well location MW6, ranging between 0.07-0.21 ft ft^{-1} and 0.06-0.34 ft ft^{-1}, respectively, during 11 monitoring campaigns. Corresponding hydraulic head differences ranged from 1.5-6.9 ft. Vertical gradients at the field well locations MW7 and MW8 were typically near zero with absolute values < |0.005| ft ft^{-1}, and did not exceed |0.01| ft ft^{-1}. Corresponding hydraulic head differences were < |0.20| ft. Downward vertical gradients were prevalent at MW7; MW8 exhibited upward vertical gradients.

Contours of equipotential groundwater level elevations indicate consistent northern to northeastern groundwater flow toward the San Joaquin River. MW4 was upgradient of the dairy. MW5 was downgradient of the corrals and MW3 was mainly crossgradient of the corrals. MW1 and MW2 were downgradient of the lagoon and settling basins. MW6 and MW7 were downgradient of the field. MW8 also appears to have been downgradient of the fields. However, due to its peripheral position and the very flat gradient in its vicinity, it is difficult to discern whether this well is truly downgradient of the dairy's fields or possibly crossgradient or affected by neighboring non-dairy fields.

Horizontal gradients exhibited distinct patterns beneath this dairy from gentle gradients beneath the corrals (mostly <0.001ft ft^{-1} and up to 0.0015 ft ft^{-1}) to steeper gradients beneath the lagoon and adjacent field (mostly 0.004 to 0.005 ft ft^{-1}), and back to flatter gradients beneath the fields near the San Joaquin River (<0.001ft ft^{-1}). In May and June, high water levels in the monitoring wells nearest the River suggest groundwater flow reversal, possibly caused by recharge from the stream.

Groundwater Chemistry

MOO-MW1

1. Ammoniacal N concentrations ranged from 0.41 to 1.3 mg/L. These concentrations are relatively low. However, non-lagoon wells did not show detectable levels of ammoniacal N.
2. TKN concentrations ranged from 0.45 to 1.8 mg/L.
3. The difference between TKN and ammoniacal N indicates that ammoniacal N contributed negligibly to TKN in May 2012 and low organic N concentrations in August 2012.
4. This is the only well that had detectable concentrations of nitrite-N (0.37 mg/L in May 2012).
5. Nitrate-N concentrations were relatively low (7.7-15 mg/L).
6. K concentrations were relatively low (3.6-4.0 mg/L) and comparable to concentrations at non-lagoon wells.
7. Na concentrations were elevated (410-440 mg/L) over those observed in non-lagoon wells.
8. HCO_3 concentrations were higher than at any of the other wells (900-940 mg/L).

Although TN concentrations were relatively low, the presence of ammoniacal and organic N in conjunction with elevated concentrations of Na and HCO_3 suggests that groundwater at this location is impacted by lagoon seepage.

MOO-MW2

1. Concentrations of ammoniacal N ranged from below the reporting limit to 0.45 mg/L.
2. TKN concentrations ranged from below the reporting limit to 0.30 mg/L.
3. The difference between TKN and ammoniacal N indicates low concentrations of organic N.

4. Nitrite-N concentrations were nondetect.
5. Nitrate-N concentrations ranged from 32 to 40 mg/L and were higher than at any of the other wells with the exception of MOO-MW7.
6. K concentrations were relatively low (2.7-2.8 mg/L) and comparable to concentrations in other wells.
7. Na concentrations were substantially higher than in any of the other wells (550-570 mg/L).
8. Bicarbonate concentrations were higher than at any of the non-lagoon wells (870-880 mg/L).

Although ammoniacal N and TKN concentrations were rather low, the presence of ammoniacal N in conjunction with elevated concentrations of nitrate-N, Na, and HCO_3 suggests that groundwater at this location is impacted by lagoon seepage.

MOO-MW3

This well provides mainly crossgradient hydraulic control. Its monitored source length cannot be clearly attributed to the corrals or Field 250. Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the corrals and Field 250. This includes nitrate-N concentrations ranging from 10 to 17 mg/L and low concentrations of organic N.

MOO-MW4

This well provides upgradient hydraulic control and its water chemistry is not reflective of dairy operations.

MOO-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient corrals. This includes nitrate-N concentrations ranging from 17 to 19 mg/L.

MOO-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient fields. This includes nitrate-N concentrations ranging from 3.6 to 23 mg/L and low concentrations of organic N.

MOO-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient fields. This includes nitrate-N concentrations ranging from 36 to 48 mg/L and low concentrations of organic N.

MOO-MW8

This well provides mainly crossgradient hydraulic control and the contribution of recharge from dairy fields to its groundwater chemistry cannot be delineated.

TON

Key Soil Properties

1. Most pertinent soils are clay loam (168, 236, 266)
2. Clay content 27-50%
3. Organic matter content 0.0-2.0%
4. $K_{sat(min)}$ 0.00-0.06 in/hr
5. Available water capacity 6.2-8.6 in
6. CEC 5.0-30 meq/100 g
7. Salinity 0.0-16.0 mS/cm
8. $CaCO_3$ content 1-35%
9. Gypsum content 0-10%

10. pH 6.6-9.0

Fields

Crops, Irrigation Systems, and Water Supply

1. This dairy employed a double cropping system with summer corn (silage) and winter grain (oats silage soft dough) on three of the examined fields (Fields 9, 12, and 14), and alfalfa (hay and haylage) on the other two fields (Fields 8 and 10).
2. Summer crops were furrow irrigated. Winter crops and alfalfa were border irrigated.
3. Irrigation demand was met by CCID surface water, groundwater, and lagoon liquor. Tailwater was captured and returned to the head end of the fields.
4. CCID water: CCID quantified water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently not known.
5. Irrigation well water and lagoon water: The producer quantified water deliveries by estimating the pumping rate (i.e., of the irrigation wells and the lagoon pump) and the duration of the delivery. Details of the flow rate estimates are presently not known.
6. Lagoon liquor: Lagoon liquor was pumped from the lagoon and mixed with the irrigation water. When more than one field was irrigated at the same time, deliveries to specific fields were estimated by equally dividing the total pumping rate by the number of fields serviced at one time.
7. Irrigation durations were relatively consistent for a specific field and crop from planting to harvest. However, the amount of tailwater runoff was variable. Runoff coefficients were estimated as follows:
   - Border irrigated oats 10-25%
   - Border irrigated alfalfa 10-25%
   - Furrow irrigated corn 33-50%
8. Tailwater was recycled and returned to the head end of a field, but not necessarily to the field where it originated. Tailwater may have contributed approximately 10% of the irrigation flow based on visual observations in the field.
9. Irrigation events were planned and scheduled according to agricultural guidelines, professional judgment, and field observations.
10. Reported irrigation volumes are considered net irrigation volumes. They reflect the estimated amount of water that was applied to the field and, presumably, infiltrated the soil.

Fields – Nutrient and Salt Input/Output

1. Atmospheric deposition of N was accounted for in the mass balances per crop with a constant value of 7 lbs/ac regardless of the duration of the growing period.
2. Other sources of nutrients and salts were CCID canal water, irrigation well water, lagoon liquor, and solid manure.
3. Commercial fertilizers were not applied to the examined fields.
4. CCID water: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Canal water was sampled in 2011.
   b. TN was 1.19 mg/L.
   c. P and K results were not available.
   d. EC was 299 µS/cm.
5. Irrigation well water: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Groundwater was sampled annually.
   b. TN concentrations ranged from 8.44 to 16.2 mg/L.
   c. P and K results were not available.

   d. EC measurements ranged from 1,120 to 1,890 µS/cm (available for 2011, only).
6. Lagoon liquor: Field-scale application rates were estimated based on constituent concentrations and the net volume applied.
   a. Lagoon liquor was sampled seven times between January 2011 and August 2012. Samples were retrieved less than a month to six months apart.
   b. TKN concentrations ranged from 44.8 to 526 mg/L.
   c. Ammoniacal N concentrations ranged from 11.2 to 381 mg/L.
   d. Organic N accounted for 4 to 75% of TN. It is unclear if organic N concentrations include PON or if they reflect the DON fraction.
   e. P concentrations ranged from 8.3 to 63.6 mg/L.
   f. K concentrations ranged from 51.5 to 740 mg/L.
   g. EC measurements ranged from 2,090 to 9,590 µS/cm.
10. Solid manure: Field-scale application rates were based on constituent concentrations/content on a dry weight basis and mass applied.
   a. Solid manure was sampled five times between March 2011 and October 2012.
   b. TN content ranged from 2.18 to 3.63% on a dry weight basis.
   c. P content ranged from 0.17 to 0.76% on a dry weight basis.
   d. K content ranged from 0.44 to 1.29% on a dry weight basis.
   e. Salt content was not determined.
7. Tailwater: Constituent concentrations were not available.
8. Crop tissue samples: Tissue samples were retrieved at harvest to determine the mass of N, P, K, and total salts leaving the field.
   - In the case of alfalfa, tissue samples were not retrieved at every cutting.
9. Salt contributions from CCID water and groundwater were not included in the mass balances.

Groundwater Levels

Monthly groundwater level measurements indicate that first encountered groundwater occurred at depths between less than 5 ft (bgs) and approximately 20 ft (bgs). The western MWs, including MW1 and MW3 through MW5, exhibit seasonal groundwater declines of 5 to 10 ft. Highest water levels were observed in the spring and lowest water levels were observed in late summer. In MW3 through MW5, substantial recovery occurred between September and October. In MW1, the recovery was more gradual through the end of the year. MW6 exhibits the least water level variability. Water levels in MW7 and MW8 appear similar to levels observed at MW6 with the exception of the lower October measurement.

Vertical gradients were very small, typically near zero with absolute values < |0.005| ft ft^{-1}, and rarely exceeded |0.01| ft ft^{-1}. Corresponding hydraulic head differences were typically < |0.20| ft. Downward vertical gradients were prevalent at MW1, MW3, and MW7; upward vertical gradients were prevalent at MW4, MW5, and MW8; and occurred equally at MW2 and MW6.

Contours of equipotential groundwater level elevations indicate fairly consistent east-northeastern to northeastern groundwater flow beneath most of the dairy. The sump pump, located adjacent to TON-MW8, operates year-round and is triggered by groundwater level fluctuations in the sump. This pump evacuates tile drainage from Fields 14 and 12. Its operation causes a cone of depression and consistent flow toward TON-MW8 from Fields 14 and 12 but also from adjacent non-dairy areas.

During the summer months, northeasterly groundwater flow beneath the production area is unsettled due to the combination of declining water levels in MW1, MW4, and MW5, and stable/slightly rising water levels in MW2.

MW1 was downgradient of the lagoon. MW2, despite being surrounded by two lagoons and a settling basin in the west, north, and east, provided mainly crossgradient hydraulic control and was downgradient of Field

9. MW3 was downgradient of Field 8 and also provided upgradient control to the corrals. MW4 was downgradient of the corrals. MW5 was downgradient of the corrals with the exception of the months of August and September. MW6 was upgradient of Fields 12 and 14. MW7 was down to crossgradient of Field 14, and MW8 was downgradient of Field 14.

Horizontal gradients were relatively stable and ranged from approximately 1 to 2 $x10^{-3}$ ft ft^{-1} during times of unsettled flow across the contoured area.

Groundwater Chemistry

TON-MW1

1. Ammoniacal N concentrations and TKN were high (66-75 and 66-69 mg/L, respectively).
2. The difference between TKN and ammoniacal N indicates organic N concentrations of 2 to 3 mg/L.
3. In May 2012, the presence of nitrite-N at 30 mg/L indicated a dynamic reactive groundwater regimen near the lagoon where ammoniacal N is oxidized to nitrite-N and further oxidized to nitrate-N, which was present at relatively low concentrations of <5 mg/L.
4. K concentrations were by far the highest of all monitoring wells (190-220 mg/L).
5. HCO_3 concentrations were high (1,200-1,300 mg/L).
6. Sulfate concentrations were relatively low compared to the other monitoring wells (54-78 mg/L).

Groundwater chemistry at this location is indicative of lagoon seepage.

TON-MW2

1. Ammoniacal N concentrations ranged from nondetect to 0.13 mg/L and occurred together with low TKN values (0.87-1.2 mg/l).
2. The difference between TKN and ammoniacal N indicates that ammoniacal N contributed negligibly to TKN in August 2012 and an organic N concentration of approximately 1 mg/L in May 2012.
3. Nitrite-N was found during both expanded sampling campaigns and ranged from 0.27 to 0.30 mg/L.
4. Nitrate-N concentrations ranged from 22 to 28 mg/L.
5. K concentrations were distinctively elevated (30-33 mg/L).
6. HCO_3 concentrations were high (1,200-1,300 mg/L).
7. Sulfate concentrations were high compared to MW1 and similar or within the range exhibited at most non-lagoon wells.

Groundwater at this location exhibits a blend of characteristics attributed to both lagoon seepage and deep percolation of the upgradient Field 9.

TON-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient Field 8. This includes nitrate-N concentrations ranging from 26 to 36 mg/L and low concentrations of ammoniacal N and organic N.

TON-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient corrals. This includes nitrate-N concentrations ranging from 26 to 52 mg/L and low concentrations of organic N.

TON-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient corrals. It appears that groundwater chemistry may also be affected, to a smaller degree, by recharge from Field 9. This includes nitrate-N concentrations ranging from 52 to 75 mg/L and low concentrations of organic N.

TON-MW6

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within an upgradient field that does not belong to this dairy. This includes consistently low nitrate-N concentrations (4.2-8.6 mg/L) and low concentrations of organic N.

TON-MW7

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient Field 14, but may also be influenced by an off-site component. This may explain the high variability of salinity (TDS ranges from 740 to 4,200 mg/l) and nitrate-N (ranging from 0.093J to 16 mg/L) at this location.

TON-MW8

Groundwater chemistry at this location is substantially attributed to recharge occurring in a monitored source length within the upgradient Field 14, but is also influenced by an off-site component. Due to the continuous (on demand) operation of the tile pump that causes a cone of depression, and the resulting radial flow toward the tile pump, off-site influence on groundwater chemistry at this location may also be relatively continuous.

6 DISCUSSION OF RESULTS

Soil Properties

The dairies included in the Phase 1 RMP exhibit a wide soil textural range from very sandy, highly permeable soils (essentially dune sand), over a variety of loams (i.e., mixtures of sand, silt, and clay), to clay-rich, low-permeability soils. On both ends of these textural extremes, challenges exist for farmers that directly relate to groundwater chemistry. For example, high infiltration rates and low water holding capacities of sandy soils necessitate frequent irrigations and are conducive to high leaching losses. In contrast, low infiltration rates of clay-rich soils in conjunction with changes of clay mineralogy due to cation exchange processes are addressed with application of soil amendments that contribute to subsurface loading of specific minerals and increased groundwater salinity.

Soil properties in general, and particularly soil texture, strongly influence how land is being farmed. Therefore, soil properties are an important component in the assessment of groundwater chemistry.

Mass Balances

The initial data collection efforts that include estimates of field-scale nutrient and salt mass balances and associated application/harvest removal ratios (AR ratio) are presently subject to large uncertainty[5]. The uncertainty surrounding AR ratios stems predominantly from the lack of accurate information regarding mass inputs and possibly also mass outputs. Below is a list of some apparent sources of inaccuracies on a field scale that contribute to the overall uncertainty.

1. Irrigation district water: Irrigation districts quantify water deliveries by estimating the delivery flow rate and the duration of the delivery. Details of the flow rate estimates are presently unknown. Calibrated weirs (or similarly accurate metering devices) that are maintained in good working order in conjunction with accurate supporting measurements over the duration of the deliveries can help reduce the uncertainty surrounding water deliveries. However, inaccuracies of measurements of the hydraulic head on the weir (e.g., on the order of a few hundredths of a foot), undetected head variability, and other sources of error substantially increase the uncertainty surrounding the water deliveries.
2. River pumps and irrigation well water: Producers estimated groundwater discharge rates from river pumps and on-site irrigation wells. Details of the flow rate estimates are presently unknown. The use of calibrated flow meters would provide the highest accuracy of measurements. If pump specifications and pump performance curves are known, and flow rates are calculated using the results from recent pump tests in conjunction with supporting measurements over the duration of the delivery, uncertainty surrounding pumping rates can be kept small. However, absence of such information and measurements substantially increase the uncertainty surrounding the water deliveries.
3. Lagoon liquor: Lagoon liquor may be removed from the lagoon either via pump or gravity flow. Details of the flow rate estimates are presently unknown. Similar to the above *Items 1* and *2*, there is a potential for substantial inaccuracies. Gaging of lagoon liquor elevations to estimate irrigation flow volumes may be a relatively accurate method, if no other unmetered lagoon in- and outflows occur during the time of irrigation.
4. Total irrigation volume: Tailwater runoff was typically not quantified, nor the amount of tailwater recirculated to the head ditch. Consequently, net irrigation volumes are unknown for fields that produced

[5] The concept of uncertainty is used to describe the degree of goodness of a measurement, experimental result, or analytical/numerical simulation result (Coleman and Steele, 2009). Uncertainty is formally expressed as a range around a variable within which the true value of this variable is believed to reside with a given confidence.

tailwater runoff. This means that the amount of water that stayed on the field and, presumably, infiltrated (i.e., the net irrigation amount), may have been smaller than the reported irrigation volume.

5. Chemical characterization:
   - Irrigation sources such as district water and groundwater were typically sampled annually, sometimes less often. This means that mass loading rates for specific irrigation events were often calculated based on water quality information obtained months prior to or after the irrigation. Lagoon liquor was sampled more frequently; however, the same limitation exists.
   - Irrigation water analyses typically excluded P and K measurements. This introduces a systematic error toward smaller values of the application/harvest removal ratios.
   - Nutrient and salt concentrations were relatively low in surface water and groundwater supply, but these concentrations were highly variable in lagoon liquor with order of magnitude differences between samples. In addition, the proportional occurrence of plant available inorganic N and plant unavailable organic N was highly variable between samples.
   - Salt concentrations (mg/L) were estimated by operators by multiplying EC measurements (µS/cm) by a factor of 0.6 instead of using TDS measurements. This practice can introduce substantial error, particularly when high EC values are encountered. This practice was also followed, at least in some cases, when TDS measurements were available. It is unclear whether reported EC values were temperature adjusted.
6. Plant tissue sampling: The process for collection of crop tissue for analysis was not investigated for purposes of this report. Therefore, the degree to which tissue sample results are suitable for the accurate determination of the total mass removed from the field cannot be assessed. In the case of alfalfa, plant tissue sample analyses were not always available for every cutting.

This initial investigation suggests that the present utility of the AR ratios as a nutrient management tool is questionable. This can be addressed with a two-pronged approach, including supplementary examination of existing data sources (e.g., communication with irrigation districts regarding their water delivery measurements) and improved means to quantify mass inputs and outputs.

Groundwater Chemistry

Fields

Groundwater nitrate-N concentrations beneath the monitored fields ranged from below the reporting limit to almost 100 mg/L (**Figure 6-1**). Grouping the data set by soil type revealed differences. Specifically, the range of nitrate-N concentrations associated with sandy soils was much wider than that associated with clay soils (**Figure 6-2**). Also, the median nitrate-N concentration associated with sandy soils was substantially greater than that associated with clay soils (**Figure 6-3**).

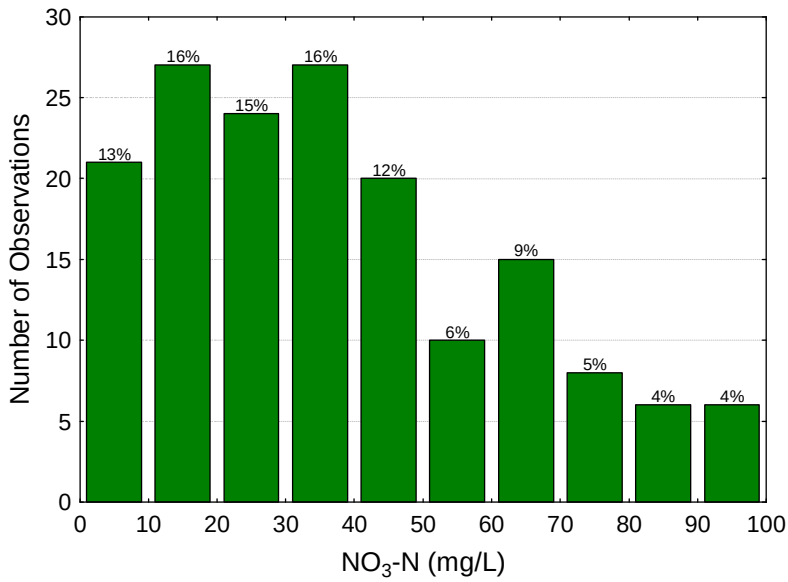

Figure 6-1: Nitrate-N concentrations in monitoring wells downgradient of forage fields, quarterly data 2012, 42 monitoring well locations.

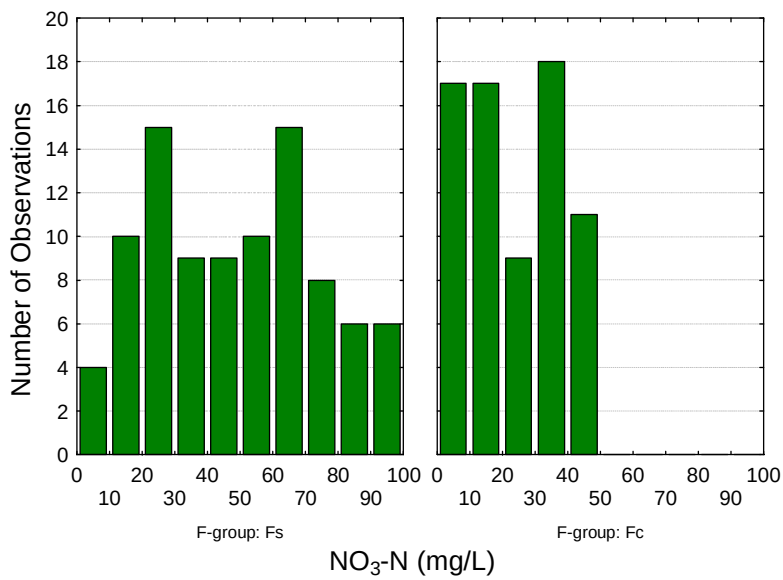

Figure 6-2: Nitrate-N concentrations in monitoring wells downgradient of forage fields on sandy soils (Fs) and clay soils (Fc), quarterly data 2012, 42 monitoring well locations.

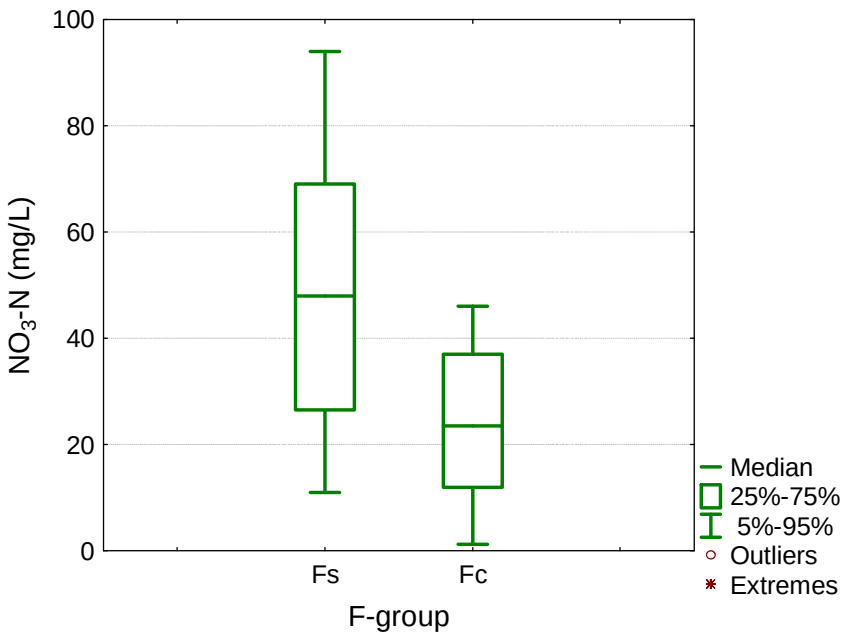

Figure 6-3: Box plots of Nitrate-N concentrations in monitoring wells downgradient of forage fields on sandy soils (Fs) and clay soils (Fc), quarterly data 2012, 42 monitoring well locations.

In contrast, TDS concentrations associated with clay soils exhibited a greater range and median than those associated with sandy soils (**Figure 6-4**).

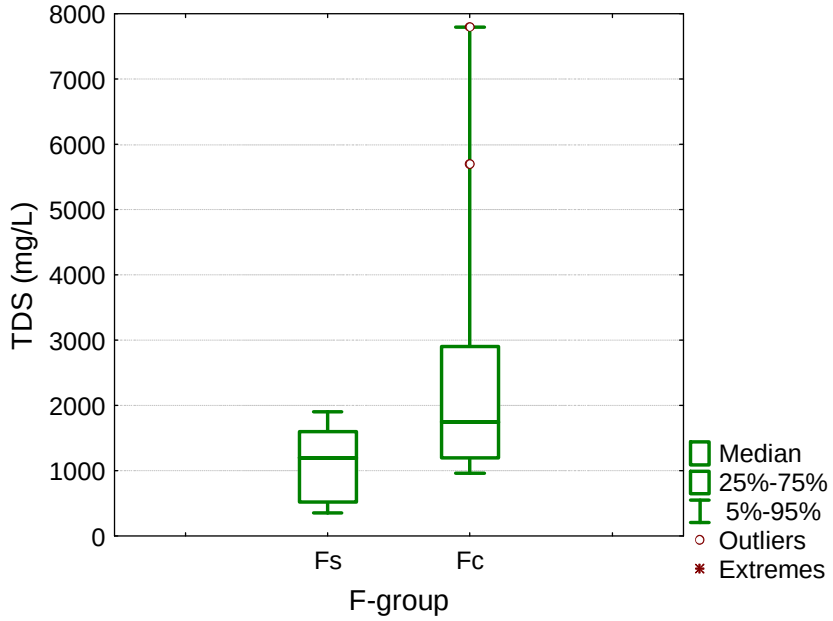

Figure 6-4: Box plots of total dissolved solids concentrations in monitoring wells downgradient of forage fields on sandy soils (Fs) and clay soils (Fc), quarterly data 2012, 42 monitoring well locations.

Lagoons and Corrals

At six of the investigated 18 liquid manure lagoons, groundwater monitoring data indicate lagoon seepage. Three of these lagoons were constructed on sandy soils and three were constructed on clay soils. At five of the 18 lagoons (one on clay soils, four on sandy soils), seepage was not evident based on groundwater

monitoring data. At the remaining seven lagoons (four on clay soils, three on sandy soils), non-steady groundwater flow directions or otherwise unfavorable groundwater flow conditions yielded inconclusive results. It is recognized that the lack of groundwater chemical characteristics indicative of lagoon seepage does not confirm the absence of seepage. Therefore, at these five lagoons plus the seven lagoons with inconclusive results, additional examination, including field exploration, will be necessary to more definitively evaluate their performance.

Groundwater nitrate-N concentrations beneath the monitored corrals ranged from less than 2 to 270 mg/L (**Figure 6-5**). Grouping the data set by soil type revealed differences. Specifically, the range of nitrate-N concentrations associated with sandy soils was much wider than that associated with clay soils (**Figure 6-6**). Also, the median nitrate-N concentration associated with sandy soils was substantially greater than that associated with clay soils (**Figure 6-7**). Groundwater TDS concentrations were similar beneath corrals on sandy soils and clay soils (**Figure 6-8**).

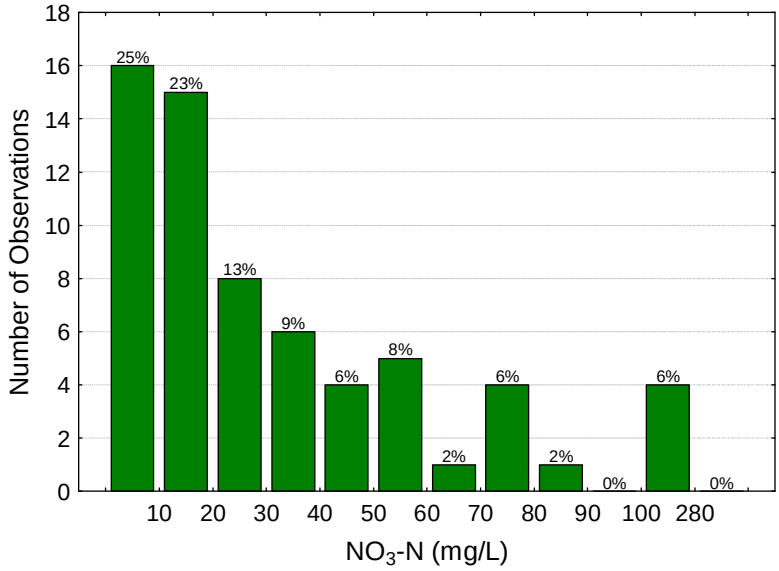

Figure 6-5: Nitrate-N concentrations in monitoring wells downgradient of corrals, quarterly data 2012, 16 monitoring well locations.

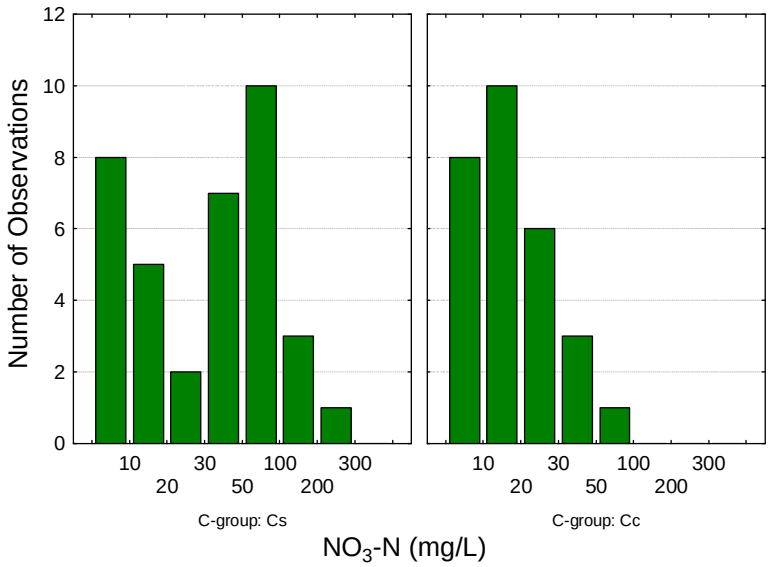

Figure 6-6: Nitrate-N concentrations in monitoring wells downgradient of corrals on sandy soils (Cs) and clay soils (Cc), quarterly data 2012, 16 monitoring well locations.

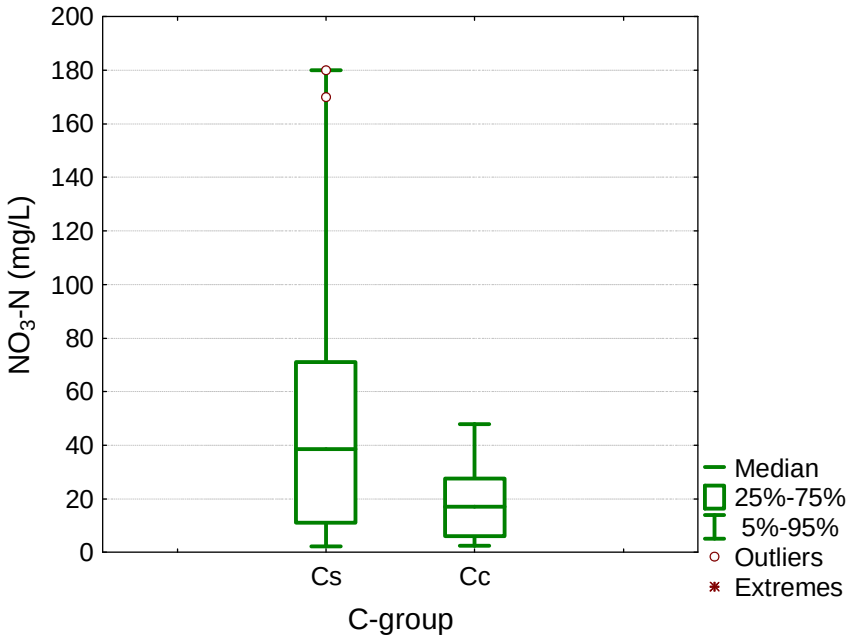

Figure 6-7: Box plots of Nitrate-N concentrations in monitoring wells downgradient of corrals on sandy soils (Cs) and clay soils (Cc), quarterly data 2012, 16 monitoring well locations.

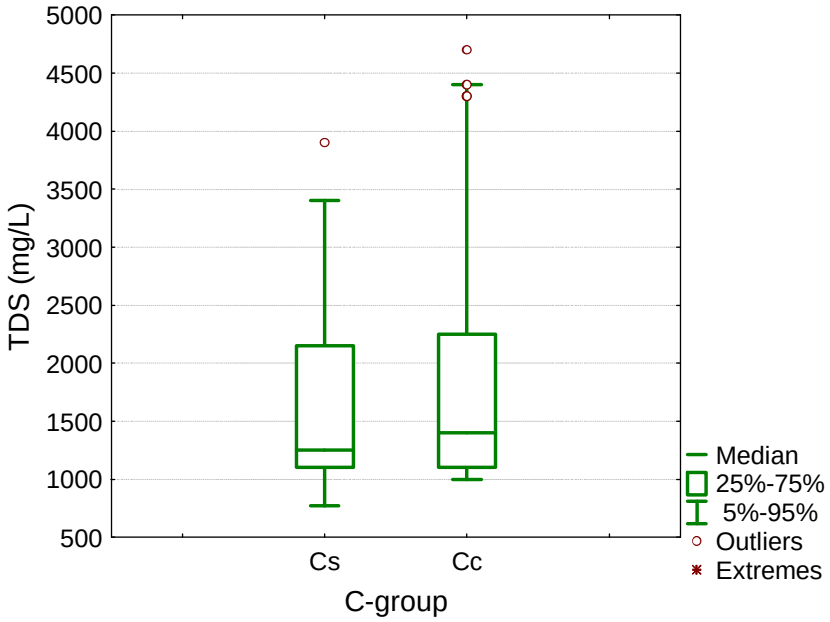

Figure 6-8: Box plots of total dissolved solids concentrations in monitoring wells downgradient of corrals on sandy soils (Cs) and clay soils (Cc), quarterly data 2012, 16 monitoring well locations.

7 SUMMARY

This report provides an initial survey of dairy operations/management practices and groundwater chemistry beneath these dairies. The initial data collection effort demonstrates that the Phase 1 network is performing as designed. It has produced a high-utility data set within only one year of monitoring activities, providing insights with respect to groundwater levels and chemistry, and field-scale nutrient/salt accounting, and how these relate to site-specific hydrology, farm operations, and management. Most notably, these relate to the widespread occurrence of elevated nitrate-N concentrations beneath fields and corrals, and the very approximate nature of field-scale nutrient and salt mass accounting. The initial findings show nutrient and salt management will be critical in addressing groundwater quality in first encountered groundwater beneath dairies. Concurrently, improving the accuracy of nutrient accounting and confidence in application/harvest removal ratios will increase the effectiveness of expanded comparisons and sensitivity of comparative analyses.

With regard to lagoons, the 2012 monitoring effort indicates that additional examination, including field exploration, will be necessary to more definitively evaluate the performance of several of the Phase 1 RMP lagoons. Therefore, CVDRMP will focus major efforts in the coming year to further analyze manure retention ponds, including improved measurements and field studies to develop cost-effective mitigation options.

In January 2013, monitoring efforts were expanded from the initial 18 Phase 1 dairies to incorporate 24 additional dairies, including several dairies with numerous pre-existing monitoring wells that have been subject to academic research for many years. CVDRMP now collects data from monitoring wells at 42 Central Valley dairies from Tehama County in the north to Kern County in the south, with 440 wells at 274 well sites.

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Tables and Figures

Table 1
Monitored Network Dairies – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy Farm	ID	Address	City, State, Zip Code
East Side			
Albert Mendes Dairy	MEN	1100 Ruble Road	Crows Landing, CA 95313
Anchor J. Dairy	ANC	24507 First Avenue	Stevinson, CA 95374
Bettencourt and Marson Dairy	BET	18128 American Avenue	Hilmar, CA 95324
Frank J. Gomes Dairy #1	FG1	5301 North DeAngelis Road	Stevinson, CA 95374
Gallo Cattle Company Bear Creek Dairy	BEA	15751 West Highway 140	Livingston, CA 95334
Gallo Cattle Company Cottonwood Dairy	COT	10561 Highway 140	Atwater, CA 95301
Gallo Cattle Company Santa Rita Dairy	SAN	91 South Bert Crane	Atwater, CA 95301
P. and L. Souza Dairy	PLS	20633 Crane Avenue	Hilmar, CA 95324
Paul Caetano Dairy	CAE	9436 Griffith Avenue	Delhi, CA 95315
Robert Gioletti and Sons Dairy	ROB	118 North Blaker Road	Turlock, CA 95380
West Side			
Antone L. Gomes and Sons Dairy	ANT	515 East Stuhr Road	Newman, CA 95360
Correia Family Dairy Farms	COR	26380 West Fahey Road	Gustine, CA 95322
Frank J. Gomes Dairy #2	FG2	890 Kniebes Road	Gustine, CA 95322
Godinho Dairy	GOD	12710 South Wilson Road	Los Banos, CA 93635
John Machado Dairy	MAC	22495 West China Camp Road	Los Banos, CA 93635
Jose Nunes Dairy	NUN	22484 West China Camp Road	Los Banos, CA 93635
Moonshine Dairy	MOO	22922 Kilburn Road	Crows Landing, CA 95313
Tony L. Lopes Dairy L.P.	TON	27500 Bunker Road	Gustine, CA 95322

Table 2
Well Construction Details – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name	Date Installed	Borehole Diameter (inches)	Borehole Depth (feet, bgs) (a)	--- Screen Intervals --- Well A (Shallow) (feet, bgs)	Well B (Deep) (feet, bgs)	Screen Slot Size (inches)	Surface Seal (feet, bgs)	Fine Sand Transition Seal (feet, bgs) (b)	Bentonite Seal (feet, bgs)	Wellhead Completion
East Side										
MEN										
MEN-MW1	11/01/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(c)
MEN-MW2	11/01/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(c)
MEN-MW3	11/01/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
MEN-MW4	11/01/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
MEN-MW5	11/01/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(c)
MEN-MW6	11/01/11	10	38	5-20	23-38	0.030	0-3	3-4	21-22	(c)
MEN-MW7	11/01/11	10	40	5-20	23-38	0.030	0-3	3-4	21-22	(c)
ANC[1,4]										
ANC-MW1	03/29/94	na	30	15-25	none	0.020	0-5.5	none	5.5-9	(c)
ANC-MW2	03/29/94	na	39	25-35	none	0.020	0-7	none	7-11	(d)
ANC-MW3	03/29/94	na	29	15-25	none	0.020	0-6.5	none	6.5-9.5	(c)
ANC-MW4	03/29/94	na	39	25-35	none	0.020	0-9.5	none	9.5-12	(d)
ANC-MW5	10/28/11	10	45	10-25	28-43	0.030	0-5	5-6	26-27	(c)
ANC-MW6	10/28/11	10	45	10-25	28-43	0.030	0-5	5-6	26-27	(c)
ANC-MW7	10/28/11	10	45	10-25	28.5-43.5	0.030	0-5	5-6	26-27	(c)
BET										
BET-MW1	10/04/11	10	35	10-20	23-33	0.030	0-5	5-6	21-22	(c)
BET-MW2	10/04/11	10	30	4-14	18-28	0.030	0-3	3-4	14-15	(c)
BET-MW3	10/04/11	10	30	5-15	18-28	0.030	0-4	4-5	16-17	(c)
BET-MW4	10/05/11	10	40	5-20	23-38	0.030	0-4	4-5	21-22	(c)
BET-MW5	10/03/11	10	45	10-25	30-45	0.030	0-5	5-6	26-27	(c)
BET-MW6	10/03/11	10	45	10-25	30-45	0.030	0-5	5-6	26-27	(c)
BET-MW7	10/03/11	10	45	10-25	30-45	0.030	0-5	5-6	26-27	(c)
BET-MW8	10/04/11	10	45	10-25	30-45	0.030	0-5	5-6	26-27	(c)
FG1										
FG1-MW1	10/28/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
FG1-MW2	10/27/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
FG1-MW3	10/28/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
FG1-MW4	10/27/11	10	38	5-20	23-38	0.030	0-3	3-4	21-22	(c)
FG1-MW5	10/26/11	10	38	5-20	23-38	0.030	0-3	3-4	21-22	(c)
FG1-MW6	10/26/11	10	38	5-20	23-38	0.030	0-3	3-4	21-22	(c)
FG1-MW7	10/26/11	10	43	5-25	28-43	0.030	0-3	3-4	26-27	(c)
FG1-MW8	10/27/11	10	38	5-20	23-38	0.030	0-3	3-4	21-22	(c)
FG1-MW9	10/27/11	10	40	5-20	23-38	0.030	0-3	3-4	21-22	(c)
BEA										
BEA-MW1	10/21/11	10	38	10-25	28-38	0.030	0-5	5-6	26-27	(c)
BEA-MW2	1024/11	10	38	10-25	28-38	0.030	0-4	4-5	26-27	(c)
BEA-MW3	10/24/11	10	40	10-25	28-38	0.030	0-5	5-6	26-27	(c)
BEA-MW4	10/21/11	10	55	22-37	40-55	0.030	0-5	5-6	38-39	(c)

Table 2
Well Construction Details – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name	Date Installed	Borehole Diameter (inches)	Borehole Depth (feet, bgs) (a)	--- Screen Intervals --- Well A (Shallow) (feet, bgs)	Well B (Deep) (feet, bgs)	Screen Slot Size (inches)	Surface Seal (feet, bgs)	Fine Sand Transition Seal (feet, bgs) (b)	Bentonite Seal (feet, bgs)	Wellhead Completion
COT[2,4]										
COT-MW1	09/21/04	8	30	15-30	none	0.010	0-10	none	10-13	(c)
COT-MW2	09/21/04	8	35	20-35	none	0.010	0-14.5	none	14.5-17.5	(c)
COT-MW3	09/22/04	8	30	15-30	none	0.010	0-10	none	10-13	(c)
COT-MW4	09/21/04	8	25	10-25	none	0.010	0-5	none	5-8	(c)
COT-MW5	09/21/04	8	23	8-23	none	0.010	0-3	none	3-6	(c)
COT-MW6	09/21/04	8	23	8-23	none	0.010	0-3	none	3-6	(c)
COT-MW7	09/22/04	8	25	10-25	none	0.010	0-5	none	5-8	(c)
COT-MW8	09/22/04	8	22	12-22	none	0.010	0-7	none	7-10	(c)
COT-MW9	09/22/04	8	25	10-25	none	0.010	0-5	none	5-8	(c)
COT-MW10	09/22/04	8	20	10-20	none	0.010	0-5	none	5-8	(c)
COT-MW11	10/24/11	10	38	15-25	28-38	0.030	0-4	4-5	26-27	(c)
COT-MW12	10/24/11	10	50	10-30	33-48	0.030	0-5	5-6	31-32	(c)
COT-MW13	10/24/11	10	48	10-30	33-48	0.030	0-5	5-6	31-32	(c)
COT-MW14	10/24/11	10	48	10-30	33-48	0.030	0-5	5-6	31-32	(c)
SAN										
SAN-MW1	10/25/11	10	45	8-23	28-43	0.030	0-5	5-6	26-27	(c)
SAN-MW2	10/25/11	10	43	10-25	28-43	0.030	0-5	5-6	26-27	(c)
SAN-MW3	10/25/11	10	45	10-25	28-43	0.030	0-5	5-6	26-27	(c)
SAN-MW4	10/25/11	10	53	10-30	33-53	0.030	0-5	5-6	31-32	(c)
SAN-MW5	10/26/11	10	55	10-30	33-53	0.030	0-5	5-6	31-32	(c)
SAN-MW6	10/25/11	10	45	10-25	28-43	0.030	0-5	5-6	26-27	(c)
SAN-MW7	10/26/11	10	55	10-30	33-53	0.030	0-5	5-6	31-32	(d)
SAN-MW8	10/26/11	10	45	10-25	28-43	0.030	0-5	5-6	26-27	(d)
PLS										
PLS-MW1	10/06/11	10	29	5-15	18-28	0.030	0-3	3-4	16-17	(c)
PLS-MW2	10/10/11	10	29	5-15	18-28	0.030	0-3	3-4	16-17	(c)
PLS-MW3	10/10/11	10	29	5-15	18-28	0.030	0-3	3-4	16-17	(d)
PLS-MW4	10/06/11	10	32	5-20	25-30	0.030	0-3	3-4	21-22	(c)
PLS-MW5	10/10/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(d)
PLS-MW6	10/06/11	10	40	4.5-19.5	25-40	0.030	0-3	3-4	22-23	(c)
PLS-MW7	10/06/11	10	39	5-20	23-38	0.030	0-3	3-4	21-22	(c)
CAE										
CAE-MW1	10/05/11	10	29	5-15	18-28	0.030	0-3	3-4	16-17	(c)
CAE-MW2	10/05/11	10	29	5-15	18-28	0.030	0-3	3-4	16-17	(c)
CAE-MW3	10/05/11	10	29	5-15	18-28	0.030	0-3	3-4	16-17	(c)
CAE-MW4	10/05/11	10	40	5-20	23-38	0.030	0-4	4-5	21-22	(c)
CAE-MW5	10/10/11	10	40	5-20	23-38	0.030	0-3	3-4	21-22	(c)
CAE-MW6	11/03/11	10	40	5-20	23-38	0.030	0-3	3-4	21-22	(c)

Table 2
Well Construction Details – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name	Date Installed	Borehole Diameter (inches)	Borehole Depth (feet, bgs) (a)	--- Screen Intervals --- Well A (Shallow) (feet, bgs)	Well B (Deep) (feet, bgs)	Screen Slot Size (inches)	Surface Seal (feet, bgs)	Fine Sand Transition Seal (feet, bgs) (b)	Bentonite Seal (feet, bgs)	Wellhead Completion
ROB										
ROB-MW1	11/02/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
ROB-MW2	11/02/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
ROB-MW3	11/02/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
ROB-MW4	11/02/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
ROB-MW5	11/03/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(d)
ROB-MW6	11/02/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(c)
ROB-MW7	11/02/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(c)
ROB-MW8	11/02/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(c)
West Side										
ANT										
ANT-MW1	10/20/11	10	35	8.5-18.5	23-33	0.030	0-5	5-6	21-22	(c)
ANT-MW2	10/12/11	10	50	15-30	33-48	0.030	0-9	9-10	31-32	(c)
ANT-MW3	10/12/11	10	50	15-30	33-48	0.030	0-6	6-7	31-32	(c)
ANT-MW4	10/12/11	10	50	15-30	33-48	0.030	0-6	6-7	31-32	(c)
ANT-MW5	10/12/11	10	53	10-30	33-53	0.030	0-6	6-7	31-32	(c)
ANT-MW6	10/12/11	10	55	10-30	33-53	0.030	0-6	6-7	31-32	(c)
COR										
COR-MW1	10/20/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(c)
COR-MW2	10/20/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
COR-MW3	10/20/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
COR-MW4	10/20/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
COR-MW5	10/20/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(c)
FG2										
FG2-MW1	11/03/11	10	33	5-20	23-33	0.030	0-3	3-4	21-22	(c)
FG2-MW2	10/13/11	10	40	5-20	23-38	0.030	0-3	3-4	21-22	(c)
FG2-MW3	10/13/11	10	43	10-25	28-43	0.030	0-4	4-5	26-27	(c)
FG2-MW4	10/13/11	10	45	10-25	28-43	0.030	0-5	5-6	26-27	(c)
FG2-MW5	11/08/11	10	38	5-20	23-38	0.030	0-3	3-4	21-22	(d)
GOD										
GOD-MW1	10/17/11	10	33	5-20	23-33	0.030	0-3	3-4	21-22	(c)
GOD-MW2	10/17/11	10	43	10-25	28-43	0.030	0-4	4-5	26-27	(c)
GOD-MW3	10/17/11	10	35	5-20	23-33	0.030	0-3	3-4	21-22	(c)
GOD-MW4	10/18/11	10	33	5-20	23-33	0.030	0-3	3-4	21-22	(c)
GOD-MW5	10/17/11	10	45	10-25	28-43	0.030	0-5	5-6	26-27	(c)
GOD-MW6	11/09/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(d)
GOD-MW7	11/09/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(d)
MAC										
MAC-MW1	10/18/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(c)
MAC-MW2	11/19/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(c)
MAC-MW3	10/19/11	10	43	5-25	28-43	0.030	0-3	3-4	26-27	(c)
MAC-MW4	10/18/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(c)
MAC-MW5	10/18/11	10	43	5-25	28-43	0.030	0-3	3-4	26-27	(c)

Table 2
Well Construction Details – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name	Date Installed	Borehole Diameter (inches)	Borehole Depth (feet, bgs) (a)	--- Screen Intervals --- Well A (Shallow) (feet, bgs)	Well B (Deep) (feet, bgs)	Screen Slot Size (inches)	Surface Seal (feet, bgs)	Fine Sand Transition Seal (feet, bgs) (b)	Bentonite Seal (feet, bgs)	Wellhead Completion
NUN										
NUN-MW1	10/19/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(c)
NUN-MW2	10/19/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(c)
NUN-MW3	10/19/11	10	30	5-15	18-28	0.030	0-3	3-4	16-17	(d)
NUN-MW4	10/19/11	10	28	5-15	18-28	0.030	0-3	3-4	16-17	(d)
MOO(3,4)										
MOO-MW1	09/10/03	na	25.5	5-25	none	0.020	0-1	none	1-4	(c)
MOO-MW2	09/09/03	na	30	9-29	none	0.020	0-4	none	4-7	(d)
MOO-MW3	09/09/03	na	25.5	5-25	none	0.020	0-1	none	1-4	(c)
MOO-MW4	09/10/03	na	25.5	5-25	none	0.020	0-1	none	1-4	(c)
MOO-MW5	10/31/11	10	48	10-30	33-48	0.030	0-5	5-6	31-32	(c)
MOO-MW6	10/31/11	10	50	10-30	33-48	0.030	0-5	5-6	31-32	(c)
MOO-MW7	10/31/11	10	40	10-25	28-38	0.030	0-5	5-6	26-27	(c)
MOO-MW8	10/31/11	10	38	10-25	28-38	0.030	0-5	5-6	26-27	(c)
TON										
TON-MW1	10/14/11	10	33	5-20	23-33	0.030	0-3	3-4	21-22	(c)
TON-MW2	10/14/11	10	33	5-20	23-33	0.030	0-3	3-4	21-22	(c)
TON-MW3	10/14/11	10	40	5-20	23-38	0.030	0-3	3-4	21-22	(c)
TON-MW4	10/14/11	10	38	5-20	23-38	0.030	0-3	3-4	21-22	(c)
TON-MW5	10/14/11	10	40	5-20	23-38	0.030	0-3	3-4	21-22	(c)
TON-MW6	10/13/11	10	43	5-25	28-43	0.030	0-3	3-4	26-27	(c)
TON-MW7	10/13/11	10	43	5-25	28-43	0.030	0-3	3-4	26-27	(c)
TON-MW8	10/13/11	10	45	5-25	28-43	0.030	0-3	3-4	26-27	(c)

Nested wells were constructed with 2-inch ID, Schedule 40 PVC ASTM F-480-88A threaded casing and end caps with weep holes.
na = information not available
(a) bgs=below ground surface.
(b) Sand pack (#8) placed from bottom of transition seal to total depth of bore hole (bentonite seal between shallow and deep well screens).
(c) Above-ground completion with steel monument and lockable cover.
(d) Below-ground completion with flush-mounted traffic valve box and steel lid.
(1) ANC-MW1-4: 2-inch ID, Schedule 40 PVC casing with end cap. #3 sand pack from bottom of bentonite seal to bottom of well.
(2) COT-MW1-10: 2-inch ID, Schedule 40 PVC casing with end cap. #2/12 sand pack from bottom of bentonite seal to bottom of well.
(3) MOO-MW1-4: 4-inch ID, Schedule 40 PVC, threaded, with end cap. #3 sand pack from bottom of bentonite seal to bottom of well.
(4) Documents from which construction information was extracted for the wells that were constructed prior to 2011 are provided in Attachment B1.

Table 3
Surveyed Wellhead Coordinates and Reference Point Elevations – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name (a)	Latitude	Longitude	Northing (US State Plane 1983, NAD83 California Zone 3, 0403 (US survey feet))	Easting (US State Plane 1983, NAD83 California Zone 3, 0403 (US survey feet))	Elevation (NAVD88) (US survey feet)
East Side					
MEN					
MEN-MW1s	37°29'04.37653"N	121°00'46.19905"W	1999307.544	6412868.136	60.81
MEN-MW1d	37°29'04.37542"N	121°00'46.19642"W	1999307.431	6412868.347	60.72
MEN-MW2s	37°29'03.12748"N	121°00'46.29846"W	1999181.260	6412859.431	60.87
MEN-MW2d	37°29'03.12875"N	121°00'46.29482"W	1999181.387	6412859.725	60.81
MEN-MW3s	37°28'58.57469"N	121°00'37.07233"W	1998716.729	6413600.517	60.77
MEN-MW3d	37°28'58.57785"N	121°00'37.06922"W	1998717.047	6413600.769	60.67
MEN-MW4s	37°28'57.09967"N	121°00'37.02823"W	1998567.527	6413603.258	60.44
MEN-MW4d	37°28'57.10122"N	121°00'37.02501"W	1998567.682	6413603.518	60.33
MEN-MW5s	37°28'57.85264"N	121°00'29.58834"W	1998640.419	6414203.316	61.10
MEN-MW5d	37°28'57.85587"N	121°00'29.58834"W	1998640.745	6414203.318	61.00
MEN-MW6s	37°29'00.97699"N	121°01'18.30684"W	1998978.021	6410278.446	59.02
MEN-MW6d	37°29'00.97420"N	121°01'18.30540"W	1998977.739	6410278.561	58.95
MEN-MW7s	37°28'42.97837"N	121°00'38.64159"W	1997140.017	6413465.429	59.48
MEN-MW7d	37°28'42.97915"N	121°00'38.63888"W	1997140.095	6413465.647	59.37
ANC					
ANC-MW1	37°20'14.55410"N	120°56'17.69765"W	1945611.757	6434257.495	72.82
ANC-MW2	37°20'09.31043"N	120°56'15.01919"W	1945080.407	6434471.316	80.30
ANC-MW3	37°20'14.21578"N	120°56'11.98070"W	1945575.382	6434719.012	70.75
ANC-MW4	37°20'19.77802"N	120°56'14.56787"W	1946138.915	6434512.712	81.27
ANC-MW5s	37°20'19.72199"N	120°56'03.23254"W	1946128.986	6435428.061	76.91
ANC-MW5d	37°20'19.71964"N	120°56'03.23194"W	1946128.748	6435428.108	76.82
ANC-MW6s	37°20'09.22928"N	120°56'05.00736"W	1945068.431	6435279.808	75.14
ANC-MW6d	37°20'09.22683"N	120°56'05.00827"W	1945068.183	6435279.733	75.03
ANC-MW7s	37°20'08.95047"N	120°55'53.97467"W	1945036.109	6436170.649	75.72
ANC-MW7d	37°20'08.95119"N	120°55'53.97834"W	1945036.183	6436170.353	75.62
BET					
BET-MW1s	37°24'57.67322"N	120°49'04.34644"W	1974104.910	6469350.476	104.15
BET-MW1d	37°24'57.67319"N	120°49'04.34995"W	1974104.908	6469350.193	103.65
BET-MW2s	37°24'48.99221"N	120°49'04.44462"W	1973226.942	6469339.574	105.75
BET-MW2d	37°24'48.99319"N	120°49'04.44734"W	1973227.042	6469339.354	105.45
BET-MW3s	37°24'46.12508"N	120°49'04.47234"W	1972936.968	6469336.352	104.54
BET-MW3d	37°24'46.12831"N	120°49'04.47208"W	1972937.295	6469336.375	104.35
BET-MW4s	37°24'47.72236"N	120°48'49.81599"W	1973094.526	6470519.291	103.58
BET-MW4d	37°24'47.72548"N	120°48'49.81296"W	1973094.840	6470519.537	102.98
BET-MW5s	37°24'42.33034"N	120°48'17.01385"W	1972540.432	6473163.803	110.09
BET-MW5d	37°24'42.33250"N	120°48'17.01739"W	1972540.653	6473163.518	109.89
BET-MW6s	37°24'29.55708"N	120°48'16.70659"W	1971248.468	6473184.386	109.70
BET-MW6d	37°24'29.55431"N	120°48'16.70905"W	1971248.188	6473184.187	109.47

Table 3
Surveyed Wellhead Coordinates and Reference Point Elevations – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name (a)	Latitude	Longitude	Northing (US survey feet)	Easting (US survey feet)	Elevation (NAVD88)
			US State Plane 1983, NAD83 California Zone 3, 0403		
BET-MW7s	37°24'43.72140"N	120°48'00.61016"W	1972676.847	6474487.636	111.71
BET-MW7d	37°24'43.72052"N	120°48'00.61370"W	1972676.759	6474487.350	111.50
BET-MW8s	37°24'30.45138"N	120°48'01.59632"W	1971334.976	6474403.768	111.22
BET-MW8d	37°24'30.44886"N	120°48'01.59857"W	1971334.721	6474403.586	110.97
FG1					
FG1-MW1s	37°21'39.19391"N	120°56'03.29364"W	1954166.707	6435460.424	77.05
FG1-MW1d	37°21'39.19231"N	120°56'03.29132"W	1954166.544	6435460.610	76.75
FG1-MW2s	37°21'50.43167"N	120°56'06.43492"W	1955304.460	6435212.111	80.27
FG1-MW2d	37°21'50.42759"N	120°56'06.43655"W	1955304.048	6435211.978	79.99
FG1-MW3s	37°21'45.59685"N	120°56'06.43259"W	1954815.471	6435210.026	78.33
FG1-MW3d	37°21'45.59843"N	120°56'06.43658"W	1954815.632	6435209.705	78.07
FG1-MW4s	37°21'53.18118"N	120°55'58.06502"W	1955579.409	6435889.075	76.72
FG1-MW4d	37°21'53.18331"N	120°55'58.06184"W	1955579.624	6435889.332	76.38
FG1-MW5s	37°22'13.65888"N	120°55'48.48698"W	1957646.939	6436671.793	75.82
FG1-MW5d	37°22'13.65746"N	120°55'48.48348"W	1957646.793	6436672.074	75.63
FG1-MW6s	37°21'57.77802"N	120°55'46.38535"W	1956039.985	6436834.064	80.07
FG1-MW6d	37°21'57.78101"N	120°55'46.38420"W	1956040.287	6436834.159	79.86
FG1-MW7s	37°21'52.93731"N	120°55'46.55388"W	1955550.463	6436818.212	79.64
FG1-MW7d	37°21'52.93947"N	120°55'46.55249"W	1955550.682	6436818.325	79.36
FG1-MW8s	37°21'52.25861"N	120°55'30.89560"W	1955476.046	6438081.935	78.82
FG1-MW8d	37°21'52.26008"N	120°55'30.89731"W	1955476.196	6438081.798	78.55
FG1-MW9s	37°21'39.10404"N	120°55'34.56333"W	1954146.954	6437779.792	78.53
FG1-MW9d	37°21'39.10312"N	120°55'34.56072"W	1954146.860	6437780.002	78.39
BEA					
BEA-MW1s	37°18'02.44974"N	120°46'29.07644"W	1932069.729	6481753.019	99.70
BEA-MW1d	37°18'02.44928"N	120°46'29.07353"W	1932069.681	6481753.253	99.46
BEA-MW2s	37°18'15.42627"N	120°46'15.35142"W	1933378.933	6482865.745	99.12
BEA-MW2d	37°18'15.42411"N	120°46'15.35402"W	1933378.715	6482865.534	98.90
BEA-MW3s	37°17'56.50989"N	120°46'15.63442"W	1931465.810	6482837.340	95.23
BEA-MW3d	37°17'56.50693"N	120°46'15.63499"W	1931465.510	6482837.293	95.14
BEA-MW4s	37°18'03.80598"N	120°46'06.46321"W	1932201.596	6483580.471	99.47
BEA-MW4d	37°18'03.80477"N	120°46'06.46485"W	1932201.474	6483580.338	99.30
COT					
COT-MW1	37°18'02.53578"N	120°40'21.60812"W	1932007.46	6511443.046	115.61
COT-MW2	37°18'06.37101"N	120°39'20.03806"W	1932386.63	6516418.317	117.10
COT-MW3	37°17'08.76480"N	120°39'18.01781"W	1926560.091	6516571.894	114.87
COT-MW4	37°17'37.51238"N	120°39'37.55603"W	1929470.27	6514997.949	114.49
COT-MW5	37°17'21.35053"N	120°39'48.93533"W	1927837.259	6514075.602	112.27
COT-MW6	37°17'17.57211"N	120°39'52.60098"W	1927455.63	6513778.713	111.33
COT-MW7	37°16'45.34348"N	120°40'12.15353"W	1924198.868	6512192.755	110.29

Table 3
Surveyed Wellhead Coordinates and Reference Point Elevations – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name (a)	Latitude	Longitude	Northing	Easting	Elevation (NAVD88)
			US State Plane 1983, NAD83 California Zone 3, 0403 (US survey feet)		
COT-MW8	37°17'05.18829"N	120°40'49.10262"W	1926211.552	6509210.421	108.77
COT-MW9	37°16'10.72486"N	120°39'54.91354"W	1920695.061	6513579.898	109.57
COT-MW10	37°16'06.81748"N	120°41'05.22506"W	1920310.5	6507895.855	104.80
COT-MW11s	37°17'35.69889"N	120°40'22.23950"W	1929293.283	6511387.020	112.29
COT-MW11d	37°17'35.70166"N	120°40'22.23912"W	1929293.563	6511387.051	112.08
COT-MW12s	37°17'30.04158"N	120°40'26.44469"W	1928721.734	6511046.159	112.65
COT-MW12d	37°17'30.03878"N	120°40'26.44691"W	1928721.452	6511045.979	112.47
COT-MW13s	37°17'22.49160"N	120°40'25.52216"W	1927957.995	6511119.287	115.03
COT-MW13d	37°17'22.48968"N	120°40'25.52389"W	1927957.801	6511119.147	114.44
COT-MW14s	37°17'23.91196"N	120°40'13.88192"W	1928099.919	6512060.176	115.55
COT-MW14d	37°17'23.91283"N	120°40'13.88406"W	1928100.007	6512060.003	115.26
SAN					
SAN-MW1s	37°16'57.69979"N	120°38'31.96060"W	1925435.070	6520292.185	116.23
SAN-MW1d	37°16'57.69833"N	120°38'31.96248"W	1925434.922	6520292.033	116.03
SAN-MW2s	37°17'13.44979"N	120°38'08.71449"W	1927025.228	6522173.147	119.16
SAN-MW2d	37°17'13.44891"N	120°38'08.71063"W	1927025.139	6522173.458	118.91
SAN-MW3s	37°17'09.61524"N	120°38'14.03968"W	1926638.031	6521742.244	118.72
SAN-MW3d	37°17'09.61246"N	120°38'14.04176"W	1926637.751	6521742.076	118.50
SAN-MW4s	37°17'03.21286"N	120°38'11.52487"W	1925990.200	6521944.526	118.83
SAN-MW4d	37°17'03.21149"N	120°38'11.52045"W	1925990.061	6521944.883	118.44
SAN-MW5s	37°17'23.28174"N	120°38'45.95843"W	1928024.159	6519164.980	115.06
SAN-MW5d	37°17'23.27979"N	120°38'45.95885"W	1928023.963	6519164.946	114.91
SAN-MW6s	37°16'24.29376"N	120°39'30.91131"W	1922064.057	6515522.318	110.31
SAN-MW6d	37°16'24.29131"N	120°39'30.90973"W	1922063.808	6515522.446	110.13
SAN-MW7s	37°16'24.10763"N	120°38'53.16526"W	1922040.232	6518573.139	110.67
SAN-MW7d	37°16'24.10632"N	120°38'53.16935"W	1922040.100	6518572.809	110.60
SAN-MW8s	37°16'24.08679"N	120°38'39.40593"W	1922036.387	6519685.245	112.46
SAN-MW8d	37°16'24.08670"N	120°38'39.40262"W	1922036.378	6519685.512	112.27
PLS					
PLS-MW1s	37°22'46.69551"N	120°51'52.64854"W	1960907.405	6455721.738	92.32
PLS-MW1d	37°22'46.69900"N	120°51'52.64773"W	1960907.757	6455721.805	92.08
PLS-MW2s	37°22'44.78284"N	120°51'52.71812"W	1960713.981	6455715.368	90.82
PLS-MW2d	37°22'44.78105"N	120°51'52.72073"W	1960713.800	6455715.157	90.63
PLS-MW3s	37°22'57.17464"N	120°51'43.88895"W	1961964.512	6456432.830	91.23
PLS-MW3d	37°22'57.17756"N	120°51'43.88895"W	1961964.807	6456432.831	91.08
PLS-MW4s	37°22'51.99868"N	120°51'50.09978"W	1961442.964	6455929.535	92.26
PLS-MW4d	37°22'51.99525"N	120°51'50.10178"W	1961442.617	6455929.372	91.85
PLS-MW5s	37°22'48.59661"N	120°51'45.42111"W	1961097.415	6456305.812	90.73
PLS-MW5d	37°22'48.59856"N	120°51'45.41842"W	1961097.610	6456306.030	90.62
PLS-MW6s	37°22'58.58103"N	120°52'06.86794"W	1962113.994	6454578.819	90.09

Table 3
Surveyed Wellhead Coordinates and Reference Point Elevations – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name (a)	Latitude	Longitude	Northing (US survey feet)	Easting (US survey feet)	Elevation (NAVD88) (US survey feet)
			US State Plane 1983, NAD83 California Zone 3, 0403		
PLS-MW6d	37°22'58.58133"N	120°52'06.86607"W	1962114.024	6454578.970	89.79
PLS-MW7s	37°22'52.25902"N	120°51'59.05933"W	1961472.115	6455206.524	91.18
PLS-MW7d	37°22'52.26046"N	120°51'59.05692"W	1961472.261	6455206.719	90.87
CAE					
CAE-MW1s	37°25'22.56002"N	120°48'36.29975"W	1976614.364	6471621.378	108.77
CAE-MW1d	37°25'22.56178"N	120°48'36.29599"W	1976614.541	6471621.681	108.34
CAE-MW2s	37°25'25.49210"N	120°48'47.11463"W	1976913.819	6470750.001	108.10
CAE-MW2d	37°25'25.48954"N	120°48'47.11169"W	1976913.559	6470750.237	107.90
CAE-MW3s	37°25'22.10578"N	120°48'47.16781"W	1976571.342	6470744.565	107.36
CAE-MW3d	37°25'22.10483"N	120°48'47.16401"W	1976571.244	6470744.872	107.26
CAE-MW4s	37°25'26.90864"N	120°48'41.48530"W	1977055.573	6471204.556	109.41
CAE-MW4d	37°25'26.90921"N	120°48'41.48176"W	1977055.629	6471204.841	109.19
CAE-MW5s	37°25'33.89102"N	120°48'26.55485"W	1977757.787	6472411.202	108.50
CAE-MW5d	37°25'33.88872"N	120°48'26.55295"W	1977757.554	6472411.355	108.09
CAE-MW6s	37°25'34.77668"N	120°48'20.27318"W	1977845.704	6472918.177	111.55
CAE-MW6d	37°25'34.77507"N	120°48'20.27286"W	1977845.541	6472918.202	111.42
ROB					
ROB-MW1s	37°29'56.65387"N	120°57'50.61736"W	2004520.998	6427045.630	73.89
ROB-MW1d	37°29'56.65098"N	120°57'50.61587"W	2004520.705	6427045.749	73.59
ROB-MW2s	37°29'53.34001"N	120°57'50.58588"W	2004185.823	6427046.504	74.16
ROB-MW2d	37°29'53.33850"N	120°57'50.58807"W	2004185.671	6427046.327	74.00
ROB-MW3s	37°29'37.87393"N	120°57'50.38848"W	2002621.508	6427054.656	73.42
ROB-MW3d	37°29'37.87531"N	120°57'50.39053"W	2002621.649	6427054.491	73.30
ROB-MW4s	37°29'34.90026"N	120°57'50.29607"W	2002320.715	6427060.612	72.83
ROB-MW4d	37°29'34.89856"N	120°57'50.29786"W	2002320.545	6427060.467	72.64
ROB-MW5s	37°29'39.80214"N	120°57'40.42621"W	2002812.559	6427858.442	74.04
ROB-MW5d	37°29'39.80084"N	120°57'40.42268"W	2002812.426	6427858.726	73.93
ROB-MW6s	37°29'48.26029"N	120°58'19.47210"W	2003683.703	6424716.205	73.11
ROB-MW6d	37°29'48.25807"N	120°58'19.47455"W	2003683.480	6424716.007	72.94
ROB-MW7s	37°29'36.00501"N	120°58'11.41449"W	2002440.941	6425359.293	72.17
ROB-MW7d	37°29'36.00660"N	120°58'11.41749"W	2002441.103	6425359.052	71.89
ROB-MW8s	37°29'46.97593"N	120°58'03.35110"W	2003547.281	6426014.642	72.39
ROB-MW8d	37°29'46.97717"N	120°58'03.35358"W	2003547.408	6426014.443	72.32
West Side					
ANT					
ANT-MW1s	37°20'08.26754"N	121°01'10.69348"W	1945097.037	6410592.902	89.89
ANT-MW1d	37°20'08.26942"N	121°01'10.69239"W	1945097.227	6410592.990	89.78
ANT-MW2s	37°20'00.87264"N	121°01'06.10806"W	1944347.075	6410959.065	89.09
ANT-MW2d	37°20'00.87632"N	121°01'06.11021"W	1944347.449	6410958.894	88.69
ANT-MW3s	37°20'06.98170"N	121°01'02.76616"W	1944963.442	6411232.372	90.32

Table 3
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Central Valley Dairy Representative Monitoring Program

Well Name (a)	Latitude	Longitude	Northing	Easting	Elevation (NAVD88)
			US State Plane 1983, NAD83 California Zone 3, 0403 (US survey feet)		
ANT-MW3d	37°20'06.98423"N	121°01'02.76453"W	1944963.697	6411232.505	90.10
ANT-MW4s	37°20'02.68128"N	121°01'02.91208"W	1944528.569	6411218.182	89.41
ANT-MW4d	37°20'02.67872"N	121°01'02.91084"W	1944528.311	6411218.281	89.28
ANT-MW5s	37°20'15.02400"N	121°01'17.70762"W	1945783.525	6410030.267	92.93
ANT-MW5d	37°20'15.02559"N	121°01'17.70432"W	1945783.684	6410030.534	92.74
ANT-MW6s	37°20'13.71002"N	121°00'59.37003"W	1945642.418	6411510.391	88.07
ANT-MW6d	37°20'13.70878"N	121°00'59.36706"W	1945642.291	6411510.630	87.69
COR					
COR-MW1s	37°07'45.64261"N	120°57'55.18678"W	1869906.064	6426008.066	109.66
COR-MW1d	37°07'45.64322"N	120°57'55.18389"W	1869906.124	6426008.300	109.54
COR-MW2s	37°07'28.38278"N	120°58'08.63525"W	1868165.870	6424910.252	111.92
COR-MW2d	37°07'28.38214"N	120°58'08.63235"W	1868165.804	6424910.487	111.69
COR-MW3s	37°07'22.67617"N	120°58'09.02423"W	1867588.871	6424875.858	113.06
COR-MW3d	37°07'22.67346"N	120°58'09.02507"W	1867588.597	6424875.788	112.90
COR-MW4s	37°07'27.15911"N	120°58'02.36700"W	1868039.571	6425417.274	111.56
COR-MW4d	37°07'27.15704"N	120°58'02.36785"W	1868039.361	6425417.204	111.43
COR-MW5s	37°07'23.56552"N	120°58'02.05758"W	1867675.996	6425440.517	111.83
COR-MW5d	37°07'23.56309"N	120°58'02.05589"W	1867675.750	6425440.653	111.69
FG2					
FG2-MW1s	37°16'35.18080"N	120°58'38.46132"W	1923480.290	6422776.852	81.51
FG2-MW1d	37°16'35.18150"N	120°58'38.46454"W	1923480.362	6422776.592	81.32
FG2-MW2s	37°16'39.32858"N	120°59'07.94912"W	1923912.050	6420395.781	85.44
FG2-MW2d	37°16'39.32585"N	120°59'07.94852"W	1923911.774	6420395.828	85.31
FG2-MW3s	37°16'41.13494"N	120°58'57.21752"W	1924090.256	6421264.053	85.78
FG2-MW3d	37°16'41.13330"N	120°58'57.22188"W	1924090.092	6421263.700	85.34
FG2-MW4s	37°16'29.47398"N	120°58'57.73820"W	1922911.103	6421215.888	87.36
FG2-MW4d	37°16'29.47485"N	120°58'57.73636"W	1922911.191	6421216.038	86.91
FG2-MW5s	37°16'25.04962"N	120°59'07.61392"W	1922467.759	6420415.380	83.56
FG2-MW5d	37°16'25.05188"N	120°59'07.61331"W	1922467.988	6420415.431	83.35
GOD					
GOD-MW1s	37°06'28.48029"N	120°51'43.29542"W	1861968.829	6456093.905	98.17
GOD-MW1d	37°06'28.48317"N	120°51'43.29815"W	1861969.122	6456093.686	98.08
GOD-MW2s	37°06'24.51633"N	120°52'14.90173"W	1861577.944	6453532.077	102.40
GOD-MW2d	37°06'24.51835"N	120°52'14.90554"W	1861578.149	6453531.770	102.30
GOD-MW3s	37°06'25.22493"N	120°52'02.95092"W	1861645.792	6454500.437	101.39
GOD-MW3d	37°06'25.22379"N	120°52'02.95344"W	1861645.677	6454500.233	101.26
GOD-MW4s	37°06'23.97404"N	120°51'55.01312"W	1861516.761	6455142.945	101.65
GOD-MW4d	37°06'23.97541"N	120°51'55.01459"W	1861516.900	6455142.827	101.30
GOD-MW5s	37°06'00.19974"N	120°52'28.96212"W	1859123.128	6452383.265	102.42
GOD-MW5d	37°06'00.20130"N	120°52'28.96149"W	1859123.285	6452383.317	102.16

Table 3
Surveyed Wellhead Coordinates and Reference Point Elevations – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name (a)	Latitude	Longitude	Northing	Easting	Elevation (NAVD88)
			US State Plane 1983, NAD83 California Zone 3, 0403 (US survey feet)		
GOD-MW6s	37°06'13.16388"N	120°52'15.52427"W	1860429.969	6453477.097	100.68
GOD-MW6d	37°06'13.16317"N	120°52'15.52058"W	1860429.896	6453477.396	100.61
GOD-MW7s	37°06'06.99391"N	120°52'15.73766"W	1859806.014	6453457.337	100.43
GOD-MW7d	37°06'06.99293"N	120°52'15.73371"W	1859805.914	6453457.656	100.35
MAC					
MAC-MW1s	37°06'40.11627"N	120°53'43.20962"W	1863184.983	6446385.345	100.43
MAC-MW1d	37°06'40.11813"N	120°53'43.21088"W	1863185.172	6446385.245	100.34
MAC-MW2s	37°06'39.99549"N	120°53'37.43831"W	1863170.797	6446852.773	99.42
MAC-MW2d	37°06'39.99338"N	120°53'37.43697"W	1863170.583	6446852.881	99.16
MAC-MW3s	37°06'51.94922"N	120°53'56.33020"W	1864386.263	6445327.675	98.06
MAC-MW3d	37°06'51.94681"N	120°53'56.33329"W	1864386.020	6445327.423	97.88
MAC-MW4s	37°06'47.67013"N	120°53'42.26644"W	1863948.648	6446464.969	98.51
MAC-MW4d	37°06'47.67187"N	120°53'42.26464"W	1863948.824	6446465.115	98.25
MAC-MW5s	37°06'45.42223"N	120°53'42.34915"W	1863721.327	6446457.309	98.23
MAC-MW5d	37°06'45.41991"N	120°53'42.34926"W	1863721.092	6446457.299	98.06
NUN					
NUN-MW1s	37°07'04.16920"N	120°53'35.56473"W	1865615.058	6447014.807	95.23
NUN-MW1d	37°07'04.17028"N	120°53'35.56627"W	1865615.168	6447014.682	94.96
NUN-MW2s	37°06'55.30484"N	120°53'45.09682"W	1864721.782	6446238.979	97.08
NUN-MW2d	37°06'55.30273"N	120°53'45.09652"W	1864721.569	6446239.003	96.89
NUN-MW3s	37°07'01.75193"N	120°53'35.07530"W	1865370.412	6447053.420	93.92
NUN-MW3d	37°07'01.74927"N	120°53'35.07401"W	1865370.142	6447053.524	93.86
NUN-MW4s	37°06'57.74552"N	120°53'35.27274"W	1864965.275	6447035.726	95.61
NUN-MW4d	37°06'57.74366"N	120°53'35.26960"W	1864965.086	6447035.980	95.54
MOO					
MOO-MW1	37°23'51.20785"N	121°00'52.68231"W	1967636.849	6412171.43	73.96
MOO-MW2	37°23'44.59111"N	121°00'42.88463"W	1966963.304	6412958.349	75.58
MOO-MW3	37°23'42.85525"N	121°01'03.92208"W	1966797.08	6411259.815	76.89
MOO-MW4	37°23'25.47479"N	121°01'06.33814"W	1965040.324	6411055.118	78.20
MOO-MW5s	37°23'38.24581"N	121°00'57.26817"W	1966327.922	6411794.168	77.04
MOO-MW5d	37°23'38.24582"N	121°00'57.26817"W	1966327.923	6411794.168	77.03
MOO-MW6s	37°24'04.55404"N	121°00'39.70096"W	1968980.925	6413226.272	71.52
MOO-MW6d	37°24'04.55611"N	121°00'39.70284"W	1968981.134	6413226.121	71.42
MOO-MW7s	37°24'18.38577"N	121°00'21.05594"W	1970371.675	6414738.233	69.25
MOO-MW7d	37°24'18.38381"N	121°00'21.05809"W	1970371.477	6414738.059	69.16
MOO-MW8s	37°24'14.62122"N	121°00'07.94414"W	1969985.235	6415794.081	69.20
MOO-MW8d	37°24'14.62266"N	121°00'07.94086"W	1969985.380	6415794.347	69.12
TON					
TON-MW1s	37°10'22.93101"N	120°59'00.79604"W	1885483.928	6420911.479	104.77
TON-MW1d	37°10'22.92989"N	120°59'00.79792"W	1885483.949	6420911.291	104.64

Table 3
Surveyed Wellhead Coordinates and Reference Point Elevations – Year 1
Central Valley Dairy Representative Monitoring Program

Well Name (a)	Latitude	Longitude	Northing (US State Plane 1983, NAD83 California Zone 3, 0403 (US survey feet))	Easting (US State Plane 1983, NAD83 California Zone 3, 0403 (US survey feet))	Elevation (NAVD88) (US survey feet)
TON-MW2s	37°10'19.63316"N	120°58'47.06119"W	1884479.922	6421493.662	101.55
TON-MW2d	37°10'19.63630"N	120°58'47.05916"W	1884480.040	6421493.999	101.38
TON-MW3s	37°10'09.40729"N	120°59'17.84529"W	1885431.232	6418969.267	110.28
TON-MW3d	37°10'09.40516"N	120°59'17.84318"W	1885430.957	6418969.244	110.18
TON-MW4s	37°10'23.13052"N	120°59'11.00857"W	1886064.369	6420322.692	107.54
TON-MW4d	37°10'23.12819"N	120°59'11.00887"W	1886064.213	6420322.513	107.25
TON-MW5s	37°10'14.26730"N	120°59'07.16329"W	1885197.814	6419936.024	107.86
TON-MW5d	37°10'14.26884"N	120°59'07.16461"W	1885198.000	6419936.052	107.78
TON-MW6s	37°10'45.45642"N	120°58'35.71193"W	1888108.637	6422818.934	98.66
TON-MW6d	37°10'45.45399"N	120°58'35.70886"W	1888108.389	6422819.181	98.37
TON-MW7s	37°10'58.15668"N	120°58'11.19270"W	1889383.086	6424809.637	100.61
TON-MW7d	37°10'58.15755"N	120°58'11.19004"W	1889383.173	6424809.853	100.29
TON-MW8s	37°10'46.49830"N	120°58'08.98903"W	1888203.083	6424982.053	94.01
TON-MW8d	37°10'46.50023"N	120°58'08.98749"W	1888203.277	6424982.178	93.62

Wellhead surveys conducted by EPIC Land Surveying, Inc.
Horizontal and vertical coordinates are for the top of the PVC well casing (north side, cap off).
(a) "s"=shallow well; "d"=deep well

Table 4
Groundwater Monitoring Activities – Year 1
Central Valley Dairy Representative Monitoring Program

Monitoring Campaign	Monitoring Activity	Field and Laboratory Analyses
Jan	dtw	
Feb	dtw & gwq	field parameters, TDS, nitrate, ammoniacal N
Mar	dtw	
Apr	dtw	
May	dtw & gwq	field parameters, general minerals, nitrate, nitrite, ammoniacal N, TKN
Jun	dtw	
Jul	dtw	
Aug	dtw & gwq	field parameters, general minerals, nitrate, nitrite, ammoniacal N, TKN
Sep	dtw	
Oct	dtw	
Dec (early)	dtw	
Dec (late)	dtw & gwq	field parameters, TDS, nitrate, ammoniacal N

dtw = depth to groundwater measurements; gwq = groundwater quality sampling
Field Parameters = temperature, pH, specific conductance, dissolved oxygen, oxygen reduction potential, turbidity
General Minerals = sodium, potassium, magnesium, calcium, chloride, sulfate, alkalinity suite (bicarbonate, carbonate, and hydroxide alkalinity), phosphate, total dissolved solids
Nitrite analysis may be discontinued in wells where concentrations are negligibly small. TKN analysis may be discontinued in wells where the comparison of TKN and ammonia concentrations indicate negligibly small organic nitrogen concentrations in groundwater.

Table 5
Laboratory Analytical Methods and Reporting Limits – Year 1
Central Valley Dairy Representative Monitoring Program

Constituent	Analytical Method	Reporting Limit (mg/L)
Sodium	EPA 200.7	1.0
Potassium	EPA 200.7	1.0
Magnesium	EPA 200.7	1.0
Calcium	EPA 200.7	1.0
Chloride	EPA 300.0	0.5
Sulfate	EPA 300.0	1.0
Bicarbonate (as CaCO3)	SM2310B	5.0
Carbonate (as CaCO3)	SM2310B	5.0
Hydroxide (as CaCO3)	SM2310B	5.0
Phosphate (as PO4)	EPA 365.4	0.15
Total Dissolved Solids	SM2540C	10
Nitrate-N	EPA 300.0	0.5
Nitrite-N	EPA 353.2	0.4
Ammoniacal-N	EPA 350.1	0.1
Total Kjeldahl Nitrogen-N	EPA 351.2	0.2

Alkalinity, TKN, and phosphate are analyzed from the unfiltered sample. Other constituents are analyzed from the filtered sample. Equivalent analytical methods may be used but reporting limit shall not be greater than shown.

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ANC-MW1	02/12/12	16:43	12.25	0.5	18.7	7.34	1.6	158	2046		1.95	0		
ANC-MW1	02/12/12	16:47		0.5	18.9	7.04	1.7	166	1520			2		
ANC-MW1	02/12/12	16:51		0.5	19.0	7.00	1.7	169	1513			4		
ANC-MW1	02/12/12	16:55		0.5	19.0	7.00	1.7	163	1521			6		
ANC-MW1	02/12/12	16:59	12.36	0.5	19.0	7.00	1.7	164	1518	12		8	4.1	sampled
ANC-MW1	05/11/12	14:48	13.80	0.5	22.2	6.71	1.2	180	1765		1.76	0		
ANC-MW1	05/11/12	14:52		0.5	20.8	6.63	0.6	181	1780			2		
ANC-MW1	05/11/12	14:56		0.5	20.5	6.65	0.9	193	1785			4		
ANC-MW1	05/11/12	15:00	13.87	0.5	20.7	6.63	0.9	201	1792	4		6	3.4	sampled
ANC-MW1	08/16/12	10:36	13.1	0.5	21.3	6.94	0.66	225	1952		1.834368	0		
ANC-MW1	08/16/12	10:40		0.5	20.7	6.86	0.61	225	1975			1.834368		
ANC-MW1	08/16/12	10:44		0.5	20.5	6.85	0.55	223	1979			3.668736		
ANC-MW1	08/16/12	10:48	13.66	0.5	20.9	6.82	0.43	213	1975	11		6	3.3	SAMPLED at 10:48
ANC-MW1	12/06/12	14:43	13.37	1	17.9	7.85	4.20	35	2072		1.77	0		
ANC-MW1	12/06/12	14:45		1	20.2	7.69	1.50	42	1987			2		
ANC-MW1	12/06/12	14:47		1	20.5	7.61	0.98	46	1978			4		
ANC-MW1	12/06/12	14:50	13.41	1	20.6	7.52	1.00	49	1986	3		6	3.4	sampled
ANC-MW2	02/12/12	14:42	17.90	0.5	18.6	7.04	0.7	65	1965		2.47	0		
ANC-MW2	02/12/12	14:44		0.5	19.6	6.82	0.8	92	2403			2.5		
ANC-MW2	02/12/12	14:46		0.5	19.4	6.88	0.8	83	2435			5		
ANC-MW2	02/12/12	14:48	20.10	0.5	19.7	6.84	0.9	85	2424	3		7.5	3.0	sampled
ANC-MW2	05/11/12	14:20	20.85	0.5	23.5	6.93	1.1	135	2439		2.40	0		
ANC-MW2	05/11/12	14:25		0.5	21.6	6.63	0.5	146	2507			2.5		
ANC-MW2	05/11/12	14:30		0.5	22.0	6.63	0.5	149	2500			5		
ANC-MW2	05/11/12	14:35	20.96	0.5	22.4	6.64	0.5	157	2490	86		7.5	3.1	sampled
ANC-MW2	08/16/12	10:52	20.96	0.5	21.3	6.96	0.95	218	2418		2.446368	0		
ANC-MW2	08/16/12	10:56		0.5	20.7	6.85	0.44	219	2497			2.5		
ANC-MW2	08/16/12	11:00		0.5	20.8	6.8	0.58	221	2505			5		
ANC-MW2	08/16/12	11:04	21.12	0.5	20.3	6.8	0.56	221	2511	5		7.5	3.1	SAMPLED at 11:04
ANC-MW2	12/06/12	13:48	20.61	1	21.1	7.71	1.70	28	2194		2.41	0		
ANC-MW2	12/06/12	13:51		1	20.4	7.48	1.00	31	2386			2.5		
ANC-MW2	12/06/12	13:55		1	20.7	7.43	0.98	12	2382			5		
ANC-MW2	12/06/12	14:00	20.77	1	20.6	7.44	0.99	-17	2381	3		7.5	3.1	sampled
ANC-MW3	02/12/12	17:21	10.23	0.5	19.5	7.20	0.20	37	1881		2.45	0		
ANC-MW3	02/12/12	17:26		0.5	20.3	7.17	0.4	50	1805			2.5		
ANC-MW3	02/12/12	17:31		0.5	20.2	7.23	0.4	42	1792			5		
ANC-MW3	02/12/12	17:36	10.25	0.5	20.1	7.24	0.4	35	1789	2		7.5	3.1	sampled
ANC-MW3	05/11/12	14:08	11.59	0.5	23.1	6.97	1.7	135	1909		2.34	0		
ANC-MW3	05/11/12	14:10		0.5	20.8	6.94	1.1	142	1847			2.5		
ANC-MW3	05/11/12	14:12		0.5	20.8	6.94	0.9	145	1840			5		
ANC-MW3	05/11/12	14:14	11.64	0.5	21.0	6.97	0.8	146	1850	3		7.5	3.2	sampled
ANC-MW3	08/16/12	11:08	10.85	0.5	21.9	6.98	0.93	217	2145		2.420256	0		
ANC-MW3	08/16/12	11:10		0.5	21.8	6.98	0.46	214	1949			2.5		
ANC-MW3	08/16/12	11:12		0.5	21.6	6.97	0.36	213	1955			5		
ANC-MW3	08/16/12	11:14	11.11	0.5	21.7	6.98	0.24	213	1963	4		7.5	3.1	SAMPLED at 11:15
ANC-MW3	12/06/12	14:26	10.87	1	19.6	7.81	2.10	61	1412		2.35	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ANC-MW3	12/06/12	14:29		1	21.2	7.59	0.86	64	2064			2.5		
ANC-MW3	12/06/12	14:31		1	21.7	7.54	0.78	61	2099			5		
ANC-MW3	12/06/12	14:33	10.94	1	21.6	7.55	0.70	57	2112	4		7.5	3.2	sampled
ANC-MW4	02/12/12	17:42	20.90	0.5	18.6	6.91	0.9	70	1735		2.08	0		
ANC-MW4	02/12/12	17:46		0.5	19.5	6.72	1.1	102	1676			2		
ANC-MW4	02/12/12	17:50		0.5	19.5	6.73	1.1	119	1670			4		
ANC-MW4	02/12/12	17:54	20.98	0.5	19.5	6.74	1.2	130	1669	15		6	2.9	sampled
ANC-MW4	05/11/12	15:06	21.12	0.5	21.9	6.46	1.0	218	5142		2.06	0		
ANC-MW4	05/11/12	15:10		0.5	20.5	6.42	1.0	223	1547			2		
ANC-MW4	05/11/12	15:14		0.5	20.5	6.43	1.2	221	1552			4		
ANC-MW4	05/11/12	15:18	21.25	0.5	20.6	6.44	1.1	220	1560	16		6	2.9	sampled
ANC-MW4	08/16/12	10:24	20.74	0.5	22	7.21	1	224	1869		2.149344	0		
ANC-MW4	08/16/12	10:26		0.5	20.5	7.11	0.46	228	1265			2		
ANC-MW4	08/16/12	10:28		0.5	20.7	6.97	0.5	224	1270			4		
ANC-MW4	08/16/12	10:30	20.98	0.5	21	6.93	0.38	217	1266	62		6	2.8	SAMPLED at 10:31
ANC-MW4	12/06/12	14:06	21.58	1	17.5	7.99	5.8	36	1033		1.97	0		
ANC-MW4	12/06/12	14:08		1	19.8	8.11	2.3	39	924			2		
ANC-MW4	12/06/12	14:10		1	20.3	8.02	1.8	47	878			4		
ANC-MW4	12/06/12	14:12	21.71	1	20.4	7.98	1.7	52	890	92		6	3.0	sampled
ANC-MW5s	02/12/12	16:17	15.50	0.5	18.4	7.68	1.5	170	3300		2.09	0		
ANC-MW5s	02/12/12	16:21		0.5	18.9	7.78	1.4	165	3305			2		
ANC-MW5s	02/12/12	16:25	DRY	0.5	19.2	7.98	1.4	180	3306			4		
ANC-MW5s	02/12/12	16:29		0.5	19.7	7.89	1.5	177	3227			6		
ANC-MW5s	02/12/12	16:33	27.10	0.5	19.5	7.92	1.5	178	3330	>1,000		8	3.8	sampled
ANC-MW5s	05/11/12	15:47	19.66	0.5	20.2	7.44	1.0	189	3423		1.74	0		
ANC-MW5s	05/11/12	15:31		0.5	20.4	7.56	0.64	179	3604			2		
ANC-MW5s	05/11/12	15:35		0.5	20.1	7.54	0.6	180	3596			4		
ANC-MW5s	05/11/12	15:39	22.36	0.5	19.9	7.52	0.6	181	3590	328		6	3.4	sampled
ANC-MW5S	08/16/12	10:09	18.22	0.5	22	7.38	1.6	249	3063		1.9584	0		
ANC-MW5S	08/16/12	10:12		0.5	20.2	7.36	0.76	246	3549			2		
ANC-MW5S	08/16/12	10:16		0.5	19.8	7.3	0.58	243	3568			4		
ANC-MW5S	08/16/12	10:20	19.52	0.5	20.5	7.29	0.7	232	3550	129		6	3.1	SAMPLED at 10:21
ANC-MW5S	12/06/12	12:50	16.18	1	17.8	7.96	4.8	57	3008		1.98	0		
ANC-MW5S	12/06/12	12:52		1	19.6	7.88	1.4	49	3598			2		
ANC-MW5S	12/06/12	12:54		1	19.9	8.08	1.00	53	3652			4		
ANC-MW5S	12/06/12	12:56	16.29	1	20.1	8.10	1.10	52	3618	91		6	3.0	sampled
ANC-MW6s	02/12/12	15:50	14.05	0.5	19.7	6.96	1.9	177	1930		2.24	0		
ANC-MW6s	02/12/12	15:55		0.5	20.3	6.84	1.9	176	2051			2.5		
ANC-MW6s	02/12/12	16:00		0.5	20.1	6.88	1.9	179	2050			5		
ANC-MW6s	02/12/12	16:05		0.5	20.0	6.90	1.9	183	2035			7.5		
ANC-MW6s	02/12/12	16:10	14.10	0.5	20.0	6.89	2.0	189	2047	4		10	4.5	sampled
ANC-MW6s	05/11/12	13:33	15.00	1.0	22.3	6.67	0.8	163	1947		2.13	0		
ANC-MW6s	05/11/12	13:35		1.0	21.3	6.67	0.7	169	1968			2		
ANC-MW6s	05/11/12	13:37		1.0	20.9	6.60	0.8	178	1974			4		
ANC-MW6s	05/11/12	13:39	15.00	1.0	21.0	6.64	1.0	183	1984	4		6	2.8	sampled
ANC-MW6S	08/16/12	11:20	14.74	1.0	22	6.95	0.83	218	1964		2.270112	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ANC-MW6S	08/16/12	11:22		1.0	21.8	6.82	0.64	218	1963			2		
ANC-MW6S	08/16/12	11:24		1.0	21.7	6.8	0.6	218	1959			4		
ANC-MW6S	08/16/12	11:26	14.81	1.0	22	6.8	0.51	217	1950	2		6	2.6	SAMPLED at 11:27
ANC-MW6S	12/06/12	13:20	14.65	1	21.5	7.84	1.3	58	1685		2.15	0		
ANC-MW6S	12/06/12	13:23		1	22.8	7.59	0.7	62	1747			2		
ANC-MW6S	12/06/12	13:26		1	23.1	7.50	0.7	52	1772			4		
ANC-MW6S	12/06/12	13:30	14.69	1	23.2	7.43	0.8	63	1782	3		6	2.8	sampled
ANC-MW7s	02/12/12	15:25	13.67	0.5	18.7	7.45	1.2	167	1410		2.29	0		
ANC-MW7s	02/12/12	15:30		0.5	20.2	7.24	1.5	165	1422			2.5		
ANC-MW7s	02/12/12	15:35		0.5	20.1	7.26	1.5	162	1404			5		
ANC-MW7s	02/12/12	15:40		0.5	19.5	7.25	1.5	164	1383			7.5		
ANC-MW7s	02/12/12	15:45	13.88	0.5	19.5	7.24	1.6	164	1381	9		10	4.4	sampled
ANC-MW7s	05/11/12	13:20	15.31	0.5	24.0	7.33	2.0	148	1451		2.08	0		
ANC-MW7s	05/11/12	13:22		0.5	20.7	7.08	2.2	154	1374			2		
ANC-MW7s	05/11/12	13:24		0.5	20.4	7.02	2.1	154	1372			4		
ANC-MW7s	05/11/12	13:26	15.38	0.5	21.4	7.05	1.8	151	1364	6		6	2.9	sampled
ANC-MW7S	08/16/12	11:31	12.77	1.0	21.7	7.02	2.1	209	1433		2.498592	0		
ANC-MW7S	08/16/12	11:33		1.0	21	7.01	1.6	207	1303			2.5		
ANC-MW7S	08/16/12	11:35		1.0	21.3	7.02	1.5	205	1295			5		
ANC-MW7S	08/16/12	11:37	13.11	1.0	21.2	7.02	1.5	204	1288	9		7.5	3.0	SAMPLED at 11:38
ANC-MW7S	12/06/12	13:06	14.34	1	19.7	8.35	2.7	55	2652		2.18	0		
ANC-MW7S	12/06/12	13:09		1	20.7	8.15	1.7	62	1341			2		
ANC-MW7S	12/06/12	13:12		1	21.1	8.00	1.9	64	1287			4		
ANC-MW7S	12/06/12	13:15	14.50	1	21.1	7.90	1.9	67	1287	18		6	2.8	sampled
ANT-MW1d	02/09/12	16:00	20.62	0.5	20.2	6.91	1.4	167	2106		2.56	0		
ANT-MW1d	02/09/12	16:05		0.5	20.2	6.87	1.6	175	2136			2.5		
ANT-MW1d	02/09/12	16:10		0.5	20.2	6.88	1.6	174	2139			5		
ANT-MW1d	02/09/12	16:15	20.70	0.5	20.1	6.87	1.6	174	2136	289		7.5	2.9	sampled
ANT-MW1d	05/10/12	11:06	20.03	0.5	19.8	6.95	2.3	236	2224		2.655264	0		
ANT-MW1d	05/10/12	11:09		0.5	19.3	6.91	1.7	234	2233			3		
ANT-MW1d	05/10/12	11:12		0.5	19.1	6.92	1.9	224	2240			6		
ANT-MW1d	05/10/12	11:15	20.05	0.5	19.4	6.93	2.1	222	2236	23		9	3.4	sampled at 11:18
ANT-MW1D	12/10/12	16:00	21.57	0.5	16.5	7.80	1.0	65	1504		2.40	0		
ANT-MW1D	12/10/12	16:03		0.5	17.0	7.18	1.4	84	1500			2.5		
ANT-MW1D	12/10/12	16:06		0.5	19.1	7.24	1.5	87	1544			5		
ANT-MW1D	12/10/12	16:09	21.57	0.5	19.4	7.24	1.5	89	1532	173		7.5	3.1	sampled
ANT-MW1S	08/15/12	10:40	14.01	0.5	21.3	6.78	2.6	236	1951		1.192992	0		
ANT-MW1S	08/15/12	10:42		0.5	20.8	6.78	2.8	233	1900			1		
ANT-MW1S	08/15/12	10:44		0.5	20.6	6.77	3	227	1887			2		
ANT-MW1S	08/15/12	10:46	14	0.5	21	6.72	3	224	1888	1.5		3	2.5	SAMPLED at 10:48
ANT-MW2s	02/09/12	16:26	21.92	0.5	21.2	6.97	1.8	177	3782		1.82	0		
ANT-MW2s	02/09/12	16:30		0.5	21.1	7.02	1.9	180	3099			2		
ANT-MW2s	02/09/12	16:34		0.5	21.1	7.09	1.9	177	2938			4		
ANT-MW2s	02/09/12	16:38		0.5	21.1	7.03	1.7	179	2874			6		
ANT-MW2s	02/09/12	16:42	22.33	0.5	21.1	7.03	1.8	180	2803	170		8	4.4	sampled
ANT-MW2s	05/10/12	9:10	21.17	0.5	21.1	6.88	3.4	290	3884		1.946976	0		

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Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ANT-MW2s	05/10/12	9:12		0.5	20.9	6.94	1.2	263	3998			2		
ANT-MW2s	05/10/12	9:14		0.5	21	6.99	1	250	3539			4		
ANT-MW2s	05/10/12	9:16	22.18	0.5	21.1	6.99	1.4	240	3263	97		6	3.1	sampled at 9:20
ANT-MW2S	08/15/12	11:26	20.7	0.5	21.9	7	1.2	215	3138		2.26848	0		
ANT-MW2S	08/15/12	11:30		0.5	21.7	6.97	1.3	220	2937			2		
ANT-MW2S	08/15/12	11:34		0.5	21.5	6.98	1.5	213	2790			4		
ANT-MW2S	08/15/12	11:38	21.57	0.5	21.5	6.97	1.4	216	2756	14		6	2.6	SAMPLED at 11:40
ANT-MW2S	12/10/12	13:45	25.16	1	20.0	8.06	2.4	107	2307		1.30	0		
ANT-MW2S	12/10/12	13:47		1	22.0	7.45	2.1	116	3355			1.5		
ANT-MW2S	12/10/12	13:49		1	22.7	7.27	1.8	112	3442			3		
ANT-MW2S	12/10/12	13:51	25.25	1	23.3	7.20	1.6	108	3450	80		4.5	3.5	sampled
ANT-MW3s	02/09/12	17:07	21.02	0.5	19.7	6.95	1.9	187	1648		2.02	0		
ANT-MW3s	02/09/12	17:11		0.5	19.8	6.97	1.7	185	1652			2		
ANT-MW3s	02/09/12	17:15		0.5	19.9	6.99	1.7	182	1651			4		
ANT-MW3s	02/09/12	17:19	21.90	0.5	19.9	6.99	1.6	180	1652	152		6	3.0	sampled
ANT-MW3s	05/10/12	9:56	20.38	0.5	20	7.15	2.2	232	1519		2.124864	0		
ANT-MW3s	05/10/12	9:58		0.5	19.8	7.03	1.6	232	1572			2		
ANT-MW3s	05/10/12	10:00		0.5	19.7	7	1.7	228	1579			4		
ANT-MW3s	05/10/12	10:02	21.21	0.5	19.9	7.01	1.7	228	1600	59		6	2.8	sampled at 10:05
ANT-MW3S	08/15/12	12:12	16.53	1.0	21.7	6.87	2	198	2068		3.001248	0		
ANT-MW3S	08/15/12	12:15		1.0	21.4	6.9	2.1	200	2060			3		
ANT-MW3S	08/15/12	12:18		1.0	20.3	6.89	1.9	201	2021			6		
ANT-MW3S	08/15/12	12:21	17.01	1.0	20.3	6.88	2	199	2023	40		9	3.0	SAMPLED at 12:24
ANT-MW3S	12/10/12	14:07	22.87	1	21.2	7.66	2.3	86	2450		1.72	0		
ANT-MW3S	12/10/12	14:09		1	21.2	7.40	2.0	87	1779			2		
ANT-MW3S	12/10/12	14:11		1	21.2	7.33	2.0	90	1715			4		
ANT-MW3S	12/10/12	14:14	23.09	1	21.2	7.29	1.7	92	1739	239		6	3.5	sampled
ANT-MW4s	02/09/12	16:45	21.12	0.5	20.6	6.97	2.0	189	2298		2.07	0		
ANT-MW4s	02/09/12	16:49		0.5	20.6	6.95	1.8	190	2295			2		
ANT-MW4s	02/09/12	16:53		0.5	20.6	6.94	1.8	190	2292			4		
ANT-MW4s	02/09/12	16:57	25.40	0.5	20.5	6.94	1.9	194	2290	990		6	2.9	sampled
ANT-MW4s	05/10/12	9:34	21.09	0.5	20.4	7.01	2	239	2386		2.074272	0		
ANT-MW4s	05/10/12	9:36		0.5	20.5	7.22	1.7	239	2372			2		
ANT-MW4s	05/10/12	9:38		0.5	20.6	6.97	1.8	239	2355			4		
ANT-MW4s	05/10/12	9:40	24.1	0.5	20.7	6.96	1.8	235	2361	267		6	2.9	sampled at 9:43
ANT-MW4S	08/15/12	11:54	20.7	1.0	22.5	6.86	1.5	223	2333		2.518176	0		
ANT-MW4S	08/15/12	11:57		1.0	21.3	6.83	1.5	224	2354			2.5		
ANT-MW4S	08/15/12	12:00		1.0	21.3	6.84	1.4	218	2322			5		
ANT-MW4S	08/15/12	12:03	22.36	1.0	22.1	6.85	1.5	211	2321	95		7.5	3.0	SAMPLED at 12:05
ANT-MW4S	12/10/12	14:20	24.76	1	21.1	7.36	2.8	85	1865		1.48	0		
ANT-MW4S	12/10/12	14:22		1	22.0	7.29	2.1	85	2002			1.5		
ANT-MW4S	12/10/12	14:24		1	22.1	7.29	2.0	86	2008			3		
ANT-MW4S	12/10/12	14:26	25.01	1	22.4	7.30	2.0	83	2020	196		4.5	3.0	sampled
ANT-MW5s	02/09/12	15:40	24.02	0.5	20.6	7.12	1.2	161	1399		1.56	0		
ANT-MW5s	02/09/12	15:44		0.5	20.5	7.02	1.3	171	1395			1.5		
ANT-MW5s	02/09/12	15:48		0.5	20.5	7.00	1.3	172	1397			3		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ANT-MW5s	02/09/12	15:52		0.5	20.5	6.99	1.4	171	1397			4.5		
ANT-MW5s	02/09/12	15:56	24.20	0.5	20.5	6.99	1.4	170	1395	350		6	3.8	sampled
ANT-MW5s	05/10/12	11:33	23.52	0.5	20.2	7.06	1.8	232	1926		1.645056	0		
ANT-MW5s	05/10/12	11:35		0.5	19.8	6.96	1.2	231	1926			2		
ANT-MW5s	05/10/12	11:37		0.5	19.5	6.96	1.3	227	1933			4		
ANT-MW5s	05/10/12	11:39	23.54	0.5	19.6	7.02	1.2	223	1927	55		6	3.6	sampled at 11:41
ANT-MW5S	08/15/12	10:11	18.07	1.0	20.6	6.79	0.9	293	1613		2.593248	0		
ANT-MW5S	08/15/12	10:14		1.0	19.9	6.81	1.5	270	1579			2.5		
ANT-MW5S	08/15/12	10:17		1.0	20.3	6.9	1.4	273	1561			5		
ANT-MW5S	08/15/12	10:20	18.07	1.0	21	6.89	1.3	251	1557	13		7.5	2.9	SAMPLED at 10:23
ANT-MW5S	12/10/12	15:14	25.62	1	18.9	8.02	3.0	52	1843		1.30	0		
ANT-MW5S	12/10/12	15:16		1	20.0	7.47	2.1	68	1736			1.5		
ANT-MW5S	12/10/12	15:18		1	21.4	7.34	2.2	81	1521			3		
ANT-MW5S	12/10/12	15:20	25.74	1	21.8	7.31	1.2	83	1524	567		4.5	3.5	sampled
ANT-MW6s	02/09/12	17:22	18.62	0.5	19.2	7.26	1.1	130	1474		2.36	0		
ANT-MW6s	02/09/12	17:27		0.5	19.1	7.25	1.1	153	1444			2.5		
ANT-MW6s	02/09/12	17:32		0.5	19.1	7.22	1.3	166	1440			5		
ANT-MW6s	02/09/12	17:37	19.00	0.5	19.2	7.21	1.3	170	1434	152		7.5	3.2	sampled
ANT-MW6s	05/10/12	10:39	18.03	0.5	20.3	7.25	2.6	233	1906		2.459424	0		
ANT-MW6s	05/10/12	10:42		0.5	19.8	7.26	1.8	232	1827			2.5		
ANT-MW6s	05/10/12	10:45		0.5	19.4	7.26	1.8	237	1790			5		
ANT-MW6s	05/10/12	10:48	18.2	0.5	19.6	7.29	1.8	229	1779	211		7.5	3.0	sampled at 10:50
ANT-MW6S	08/15/12	11:00	11.6	1.0	20.4	6.94	2.5	219	1996		3.6312	0		
ANT-MW6S	08/15/12	11:04		1.0	19.5	7.13	2.3	225	1987			4		
ANT-MW6S	08/15/12	11:08		1.0	19.3	7.07	2.1	229	1984			8		
ANT-MW6S	08/15/12	11:12	11.7	1.0	19.5	7.06	1.8	229	1960	3		12	3.3	SAMPLED at 11:16
ANT-MW6S	12/10/12	14:37	18.78	1	21.6	7.57	2.1	80	1959		2.34	0		
ANT-MW6S	12/10/12	14:40		1	21.1	7.36	1.6	85	1922			2.5		
ANT-MW6S	12/10/12	14:42		1	21.0	7.37	1.6	85	1904			5		
ANT-MW6S	12/10/12	14:45	19.11	1	20.9	7.38	1.5	86	1894	11		7.5	3.2	sampled
BEA-MW1D	08/16/12	14:10	37.56	0.5	25.6	6.86	2.2	214	3195		0.9	0		
BEA-MW1D	08/16/12	14:12		0.5	25.5	6.86	2	211	3200			1		
BEA-MW1D	08/16/12	14:14		0.5	25.4	6.87	2	212	3212			2		
BEA-MW1D	08/16/12	14:18	38.22	0.5	25.4	6.87	2	210	3109	>1,000		3	3.3	SAMPLED at 14:18
BEA-MW1D	12/09/12	17:34	34.25	1	16.9	7.15	3.2	86	2456		0.97	0		
BEA-MW1D	12/09/12	17:35		1	18.0	6.90	1.7	69	2441			1		
BEA-MW1D	12/09/12	17:36		1	18.0	6.89	1.8	65	2430			2		
BEA-MW1D	12/09/12	17:37	36.52	1	18.0	6.88	2.0	58	2427	>1,000		3	3.1	sampled
BEA-MW1s	02/13/12	10:41	21.86	0.5	19.4	6.86	2.4	194	4023		0.95	0		
BEA-MW1s	02/13/12	10:43		0.5	20.6	6.77	2.1	212	3688			1		
BEA-MW1s	02/13/12	10:47		0.5	20.8	6.74	2.1	211	3680			2		
BEA-MW1s	02/13/12	10:52	23.91	0.5	19.8	6.74	2.0	193	3688	>1,000		3	3.2	sampled
BEA-MW1s	05/14/12	14:50	24.92	0.25	23.8	6.68	2	177	4554		0.598944	0		
BEA-MW1s	05/14/12	14:54		0.25	22.2	6.65	2.1	187	4444			1		
BEA-MW1s	05/14/12	14:59		0.25	22.5	6.65	2	196	4411			2		
BEA-MW1s	05/14/12	15:03	25.22	0.25	22.3	6.65	2	199	4406	>1,000		3	5.0	sampled

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
BEA-MW2D	08/16/12	13:07	32.25	0.25	25.8	8.04	1.2	176	658		2.221152	0		
BEA-MW2D	08/16/12	13:09		0.25	24.2	7.91	1.3	178	503			2		
BEA-MW2D	08/16/12	13:11		0.25	24.4	7.85	1.4	181	496			4		
BEA-MW2D	08/16/12	13:13	32.49	0.25	24.4	7.77	1.9	184	490	189		6	2.7	SAMPLED at 13:13
BEA-MW2D	12/09/12	15:50	29.00	1	18.8	8.16	1.0	145	665		2.63	0		
BEA-MW2D	12/09/12	15:53		1	19.8	7.97	0.6	141	649			3		
BEA-MW2D	12/09/12	15:56		1	20.3	7.97	0.7	135	632			6		
BEA-MW2D	12/09/12	15:59	29.20	1	20.4	7.98	0.7	132	626	165		9	3.4	sampled
BEA-MW2s	02/13/12	9:35	20.04	0.5	17.3	6.57	3.4	280	1886		1.17	0		
BEA-MW2s	02/13/12	9:37		0.5	19.3	7.04	2.9	257	884			1		
BEA-MW2s	02/13/12	9:41		0.5	20.7	6.91	2.7	261	759			2		
BEA-MW2s	02/13/12	9:45	22.05	0.5	21.6	7.05	2.7	254	708	612		3	2.6	sampled
BEA-MW2s	05/14/12	13:58	26.13	0.25	23.2	7.2	3.8	247	658		0.680544	0		
BEA-MW2s	05/14/12	14:02		0.25	22.2	6.95	3.9	250	618			1		
BEA-MW2s	05/14/12	14:06		0.25	22.2	6.94	3.6	242	621			2		
BEA-MW2s	05/14/12	14:10	26.15	0.25	22.2	6.91	3.6	221	625	>1,000		3	4.4	sampled
BEA-MW3D	08/16/12	13:44	33.74	0.5	21.9	7.08	2.3	214	4417		1.153824	0		
BEA-MW3D	08/16/12	13:46		0.5	21.9	7.07	2	215	4420			1		
BEA-MW3D	08/16/12	13:48		0.5	21.8	7.04	1.9	215	4421			2		
BEA-MW3D	08/16/12	13:50	34.02	0.5	21.8	7.03	1.8	216	4426	86		3	2.6	SAMPLED at 13:50
BEA-MW3D	12/09/12	12:21	31.49	1	17.6	7.19	0.7	137	4508		1.41	0		
BEA-MW3D	12/09/12	16:23		1	18.5	7.11	0.7	141	4566			1.5		
BEA-MW3D	12/09/12	16:25		1	18.6	7.10	0.8	141	4482			3		
BEA-MW3D	12/09/12	16:27	32.20	1	18.6	7.09	0.7	140	4479	71		4.5	3.2	sampled
BEA-MW3s	02/13/12	10:22	17.92	0.5	18.7	7.06	2.7	252	3982		1.51	0		
BEA-MW3s	02/13/12	10:25		0.5	20.1	6.91	2.5	256	4504			1.5		
BEA-MW3s	02/13/12	10:29		0.5	20.3	6.90	2.6	254	4660			3		
BEA-MW3s	02/13/12	10:34	18.45	0.5	19.6	6.90	2.6	253	4675	13		4.5	3.0	sampled
BEA-MW3s	05/14/12	14:35	22.59	0.5	23.1	6.79	1.8	191	4871		0.933504	0		
BEA-MW3s	05/14/12	14:37		0.5	21.7	6.81	1.5	201	5404			1		
BEA-MW3s	05/14/12	14:39		0.5	20.6	6.7	1.5	203	5555			2		
BEA-MW3s	05/14/12	14:41	22.77	0.5	21.3	6.73	1.5	193	5510	>1,000		3	3.2	sampled
BEA-MW4D	08/16/12	13:25	29.22	1.0	23	7.28	0.86	204	1937		3.089376	0		
BEA-MW4D	08/16/12	13:28		1.0	23	7.27	0.85	206	1939			3		
BEA-MW4D	08/16/12	13:31		1.0	22.8	7.25	0.78	206	1941			6		
BEA-MW4D	08/16/12	13:34	30.22	1.0	22.5	7.2	0.74	207	1943	37		9	2.9	SAMPLED at 13:34
BEA-MW4D	12/09/12	16:58	32.22	1	18.3	7.77	2.20	123	1849		3.99	0		
BEA-MW4D	12/09/12	17:02		1	18.6	7.59	2.30	126	1870			4		
BEA-MW4D	12/09/12	17:06		1	19.1	7.59	2.90	126	1876			8		
BEA-MW4D	12/09/12	17:10	34.18	1	19.0	7.58	2.60	126	1875	40		12	3.0	sampled
BEA-MW4s	02/13/12	10:00	21.96	0.5	18.4	7.43	2.8	255	1508		2.83	0		
BEA-MW4s	02/13/12	10:03		0.5	20.2	7.43	2.7	244	1915			3		
BEA-MW4s	02/13/12	10:08		0.5	20.1	7.46	2.5	234	1983			6		
BEA-MW4s	02/13/12	10:14	21.92	0.5	19.9	7.51	2.5	233	2059	35		9	3.2	sampled
BEA-MW4s	05/14/12	14:12	29.22	0.5	22.6	7.38	1.6	182	2154		1.741344	0		
BEA-MW4s	05/14/12	14:16		0.5	22.5	7.37	1.5	175	2112			2		

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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
BEA-MW4s	05/14/12	14:20		0.5	22.7	7.37	1.5	171	2102			4		
BEA-MW4s	05/14/12	14:24	30.22	0.5	22.9	7.37	1.4	163	2080	>1,000		6	3.4	sampled
BET-MW1s	02/08/12	13:00	10.00	0.5	19.2	6.38	2.8	308	628		2.06	0		
BET-MW1s	02/08/12	13:05		0.5	19.1	6.22	2.8	310	611			2		
BET-MW1s	02/08/12	13:10		0.5	19.1	6.22	2.9	310	610			4		
BET-MW1s	02/08/12	13:15	10.56	0.5	19.0	6.21	2.9	309	610	20		6	2.9	sampled
BET-MW1s	05/10/12	13:08	13.36	0.5	20.5	6.9	1.8	179	924		1.507968	0		
BET-MW1s	05/10/12	13:12		0.5	19.5	6.15	1.7	192	780			1.5		
BET-MW1s	05/10/12	13:16		0.5	19.5	6.16	1.5	188	766			3		
BET-MW1s	05/10/12	13:20	14.52	0.5	19.4	6.15	1.5	183	760	30		4.5	3.0	sampled
BET-MW1S	08/14/12	13:40	15.69	0.5	20.6	7.97	1.6	38	520		1.127712	0		
BET-MW1S	08/14/12	13:42		0.5	19.7	6.62	1.5	63	524			1		
BET-MW1S	08/14/12	13:44		0.5	19.8	6.7	1.5	64	524			2		
BET-MW1S	08/14/12	13:46	17.25	0.5	19.7	6.72	1.2	64	522	8		3	2.7	SAMPLED at 13:46
BET-MW1S	12/07/12	11:15	12.78	1	18.7	5.31	3.7	211	741		1.60	0		
BET-MW1S	12/07/12	11:17		1	20.7	5.93	1.7	144	516			1.5		
BET-MW1S	12/07/12	11:19		1	21.1	6.04	1.6	110	508			3		
BET-MW1S	12/07/12	11:22	12.83	1	21.3	6.12	1.1	97	501	4		4.5	2.8	sampled
BET-MW2s	02/08/12	13:18	11.38	0.5	18.1	6.30	2.8	306	809		0.97	0		
BET-MW2s	02/08/12	13:20		0.5	18.2	6.26	2.8	306	817			1		
BET-MW2s	02/08/12	13:22		0.5	18.2	6.26	2.5	306	819			2		
BET-MW2s	02/08/12	13:24	11.80	0.5	18.2	6.25	2.6	305	820	15		3	3.1	sampled
BET-MW2s	05/10/12	13:25	13.79	0.5	20.4	6.5	1.7	163	705		0.572832	0		
BET-MW2s	05/10/12	13:27		0.5	19.6	6.48	1.9	172	754			1		
BET-MW2s	05/10/12	13:29		0.5	19.3	6.37	1.2	170	760			2		
BET-MW2s	05/10/12	13:32	14.53	0.5	19.3	6.37	1.2	161	755	12		3	5.2	sampled
BET-MW2S	08/14/12	14:13	12.6	0.5	20.9	6.99	1.2	58	592		0.76704	0		
BET-MW2S	08/14/12	14:15		0.5	21	6.88	1.2	54	626			1		
BET-MW2S	08/14/12	14:17		0.5	21.1	6.74	1.1	54	611			2		
BET-MW2S	08/14/12	14:19	13.6	0.5	21	6.74	1.1	50	610	12		3	3.9	SAMPLED at 14:20
BET-MW2S	12/07/12	11:28	14.09	0.5	20.9	6.60	4.7	64	554		0.52	0		
BET-MW2S	12/07/12	11:19		0.5	21.7	6.36	1.9	67	705			0.5		
BET-MW2S	12/07/12	11:30		0.5	21.8	6.34	1.8	68	713			1		
BET-MW2S	12/07/12	11:31	14.11	0.5	21.9	6.36	2.8	69	722	12		1.5	2.9	sampled
BET-MW3s	02/08/12	13:28	10.07	0.5	18.5	6.20	2.6	305	1074		1.26	0		
BET-MW3s	02/08/12	13:31		0.5	18.8	6.02	2.5	309	1047			1.25		
BET-MW3s	02/08/12	13:34		0.5	18.8	6.09	2.5	309	1025			2.5		
BET-MW3s	02/08/12	13:37		0.5	18.8	6.11	2.6	308	1026			3.75		
BET-MW3s	02/08/12	13:40	10.65	0.5	18.7	6.12	2.5	308	1022	14		5.0	4.0	sampled
BET-MW3s	05/10/12	13:40	12.34	0.5	19.3	6.02	2.6	190	1236		0.891072	0		
BET-MW3s	05/10/12	13:42		0.5	19.5	5.97	2.5	188	1214			1		
BET-MW3s	05/10/12	13:44		0.5	19.3	5.96	2.2	188	1207			2		
BET-MW3s	05/10/12	13:46	14.8	0.5	19.3	5.94	2.1	186	1200	23		3	3.4	sampled
BET-MW3S	08/14/12	14:44	10.9	0.5	21.7	6.81	2.2	63	778		1.12608	0		
BET-MW3S	08/14/12	14:46		0.5	21.5	6.53	2	69	782			1		
BET-MW3S	08/14/12	14:48		0.5	21.1	6.47	2.1	70	790			2		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
BET-MW3S	08/14/12	14:50	12.02	0.5	21	6.45	2.1	75	799	17		3	2.7	SAMPLED at 14:50
BET-MW3S	12/07/12	11:40	12.80	1	21.5	6.62	3.5	59	803		0.82	0		
BET-MW3S	12/07/12	11:41		1	21.7	6.45	2.0	64	821			1		
BET-MW3S	12/07/12	11:42		1	21.9	6.34	1.9	70	820			2		
BET-MW3S	12/07/12	11:43	13.41	1	21.8	6.31	1.8	75	807	6		3	3.7	sampled
BET-MW4s	02/08/12	13:50	8.58	0.5	18.4	6.61	2.7	317	1343		2.39	0		
BET-MW4s	02/08/12	13:55		0.5	19.2	6.62	2.5	315	1499			2.5		
BET-MW4s	02/08/12	14:00		0.5	19.2	6.63	2.6	313	1569			5		
BET-MW4s	02/08/12	14:05		0.5	19.3	6.64	2.6	312	1568			7.5		
BET-MW4s	02/08/12	14:10	9.11	0.5	19.3	6.64	2.6	311	1572	209		10	4.2	sampled
BET-MW4s	05/10/12	12:45	14.15	0.5	19.9	6.67	0.7	190	3036		1.47696	0		
BET-MW4s	05/10/12	12:48		0.5	20.2	6.73	1.1	188	2591			1.5		
BET-MW4s	05/10/12	12:51		0.5	19.9	6.67	1.1	184	2410			3		
BET-MW4s	05/10/12	12:53	18.2	0.5	19.9	6.67	1	180	2402	75		4.5	3.0	sampled
BET-MW4S	08/14/12	12:51	13.26	0.5	22.3	7.08	1	40	2816		1.622208	0		
BET-MW4S	08/14/12	12:54		0.5	21	7.05	1	42	2246			1.5		
BET-MW4S	08/14/12	12:57		0.5	20.6	6.96	1.1	44	2194			3		
BET-MW4S	08/14/12	13:00	16.22	0.5	20.6	6.92	1	43	2176	8		4.5	2.8	SAMPLED at 13:00
BET-MW4S	12/07/12	12:03	10.13	1	21.7	6.88	3.1	74	1396		2.13	0		
BET-MW4S	12/07/12	12:06		1	21.7	6.76	1.0	71	1474			2		
BET-MW4S	12/07/12	12:08		1	21.5	6.71	0.9	68	1588			4		
BET-MW4S	12/07/12	12:10	10.30	1	21.5	6.74	0.7	66	1586	23		6	2.8	sampled
BET-MW5s	02/09/12	11:30	11.00	0.5	20.6	6.81	1.4	169	914		2.73	0		
BET-MW5s	02/09/12	11:37		0.5	20.9	6.82	1.4	168	846			3		
BET-MW5s	02/09/12	11:43		0.5	21.0	6.82	1.3	165	840			6		
BET-MW5s	02/09/12	11:49	11.05	0.5	21.0	6.84	1.3	162	838	26		9	3.3	sampled
BET-MW5s	05/10/12	15:00	11.83	0.5	19.3	6.91	2.2	159	893		2.589984	0		
BET-MW5s	05/10/12	15:05		0.5	19	6.52	2.3	162	899			2.5		
BET-MW5s	05/10/12	15:10		0.5	18.9	6.55	2.1	157	892			5		
BET-MW5s	05/10/12	15:15	12.18	0.5	18.8	6.57	2.1	155	890	16		7.5	2.9	sampled
BET-MW5S	08/14/12	12:24	8.28	1.0	21	7.01	2	40	843		3.169344	0		
BET-MW5S	08/14/12	12:27		1.0	20.2	6.92	1.9	38	862			3		
BET-MW5S	08/14/12	12:30		1.0	20.2	6.96	1.5	36	865			6		
BET-MW5S	08/14/12	12:33	8.35	1.0	20.3	6.95	1.5	32	868	5		9	2.8	SAMPLED at 12:33
BET-MW5S	12/07/12	12:20	12.07	1	21.0	7.36	3.4	66	1306		2.55	0		
BET-MW5S	12/07/12	12:23		1	21.3	7.07	1.1	69	1003			2.5		
BET-MW5S	12/07/12	12:25		1	21.3	6.90	1.1	69	996			5		
BET-MW5S	12/07/12	12:28	12.13	1	21.3	6.79	1.0	71	996	28		7.5	2.9	sampled
BET-MW6s	02/09/12	11:00	11.46	0.5	20.4	6.43	1.3	163	514		2.37	0		
BET-MW6s	02/09/12	11:05		0.5	20.1	6.39	1.2	156	513			2.5		
BET-MW6s	02/09/12	11:10		0.5	20.1	6.40	1.2	150	511			5		
BET-MW6s	02/09/12	11:16	11.50	0.5	20.1	6.40	1.1	152	510	17.5		7.5	3.2	sampled
BET-MW6s	05/10/12	14:42	12.2	0.5	20.3	6.34	2	159	525		2.25216	0		
BET-MW6s	05/10/12	14:47		0.5	19.5	6.3	1.8	157	510			2.5		
BET-MW6s	05/10/12	14:52		0.5	19.5	6.3	1.8	155	510			5		
BET-MW6s	05/10/12	14:57	12.43	0.5	19.4	6.28	1.7	156	506	12		7.5	3.3	sampled

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
BET-MW6S	08/14/12	11:18	7.45	1.0	22	7.37	1.6	60	525		3.02736	0		
BET-MW6S	08/14/12	11:21		1.0	21.2	7.3	1.5	56	503			3		
BET-MW6S	08/14/12	11:24		1.0	20.6	7.29	1.5	59	502			6		
BET-MW6S	08/14/12	11:27	7.5	1.0	20.6	7.3	1.4	64	496	8		9	3.0	SAMPLED at 11:27
BET-MW6S	12/07/12	12:47	12.81	1	19.9	6.57	2.0	88	588		2.15	0		
BET-MW6S	12/07/12	12:49		1	20.5	6.26	0.7	93	666			2		
BET-MW6S	12/07/12	12:52		1	20.6	6.26	1.8	92	682			4		
BET-MW6S	12/07/12	12:55	12.87	1	20.7	6.27	1.5	92	679	18		6	2.8	sampled
BET-MW7s	02/08/12	14:20	12.20	0.5	19.0	6.28	2.5	315	488		2.45	0		
BET-MW7s	02/08/12	14:25		0.5	18.9	5.75	2.5	319	476			2.5		
BET-MW7s	02/08/12	14:30		0.5	18.9	5.79	2.7	320	474			5		
BET-MW7s	02/08/12	14:35		0.5	18.9	5.81	2.7	320	474			7.5		
BET-MW7s	02/08/12	14:40	12.20	0.5	18.9	5.81	2.6	323	473	4		10	4.1	sampled
BET-MW7s	05/10/12	14:00	12.95	0.5	20	6.03	1.6	167	439		2.3256	0		
BET-MW7s	05/10/12	14:05		0.5	19.7	5.88	1.7	180	438			2.5		
BET-MW7s	05/10/12	14:10		0.5	19.6	5.8	1.8	217	438			5		
BET-MW7s	05/10/12	14:15	13	0.5	19.6	5.67	1.9	210	437	8		7.5	3.2	sampled
BET-MW7S	08/14/12	11:51	8.29	1.0	21.9	7.22	1.5	7	356		3.086112	0		
BET-MW7S	08/14/12	11:54		1.0	21.7	7.03	1.4	20	433			3		
BET-MW7S	08/14/12	11:57		1.0	21.3	7.01	1.4	25	432			6		
BET-MW7S	08/14/12	12:00	8.33	1.0	21.4	7.04	1.5	22	450	7		9	2.9	SAMPLED at 12:00
BET-MW7S	12/07/12	12:32	13.11	1	20.4	7.06	2.2	62	897		2.30	0		
BET-MW7S	12/07/12	12:35		1	20.8	6.83	1.3	64	599			2.5		
BET-MW7S	12/07/12	12:38		1	20.8	6.36	1.4	75	595			5		
BET-MW7S	12/07/12	12:40	13.14	1	20.9	6.17	1.3	85	593	20		7.5	3.3	sampled
BET-MW8s	02/09/12	12:14	12.72	0.5	18.9	6.50	2.0	184	584		2.38	0		
BET-MW8s	02/09/12	12:19		0.5	19.4	6.86	2.0	170	498			2.5		
BET-MW8s	02/09/12	12:24		0.5	19.2	6.64	1.6	155	495			5		
BET-MW8s	02/09/12	12:29	12.85	0.5	19.2	6.62	1.5	156	491	26		7.5	3.2	sampled
BET-MW8s	05/10/12	14:22	13.93	0.5	19.6	6.6	1.6	162	536		2.181984	0		
BET-MW8s	05/10/12	14:27		0.5	18.9	6.38	1.6	157	507			2		
BET-MW8s	05/10/12	14:32		0.5	18.7	6.38	1.5	159	503			4		
BET-MW8s	05/10/12	14:37	14.8	0.5	18.7	6.37	1.5	155	500	12		6	2.7	sampled
BET-MW8S	08/14/12	10:51	7.94	1.0	21	7.57	1.4	100	495		3.159552	0		
BET-MW8S	08/14/12	10:54		1.0	21	7.62	1.3	116	489			3		
BET-MW8S	08/14/12	10:57		1.0	20.9	7.33	1.3	73	486			6		
BET-MW8S	08/14/12	11:00	8.02	1.0	20.9	7.3	1	70	485	12		9	2.8	SAMPLED at 11:00
BET-MW8S	12/07/12	13:00	13.99	1	20.6	6.47	2.8	86	628		2.17	0		
BET-MW8S	12/07/12	13:02		1	20.7	6.45	2.2	85	611			2		
BET-MW8S	12/07/12	13:05		1	20.9	6.56	2.6	83	579			4		
BET-MW8S	12/07/12	13:08	14.04	1	21.2	6.53	2.5	84	584	17		6	2.8	sampled
CAE-MW1D	08/14/12	18:51	14.88	1.0	20.6	7.28	0.6	61	2498		2.33376	0		
CAE-MW1D	08/14/12	18:54		1.0	19.7	7.15	0.5	61	2593			2.5		
CAE-MW1D	08/14/12	18:57		1.0	19.5	7.12	0.5	62	2604			5		
CAE-MW1D	08/14/12	19:00	15.1	1.0	19.5	7.1	0.6	64	2699	460		7.5	3.2	SAMPLED at 19:02
CAE-MW1s	02/08/12	13:12	11.40	0.5	19.6	6.80	0.30	-43	3225		0.90	0		

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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
CAE-MW1s	02/08/12	13:14		0.5	20.4	6.83	0.4	-49	3513			1		
CAE-MW1s	02/08/12	13:17		0.5	20.2	6.83	0.4	-51	3693			2		
CAE-MW1s	02/08/12	13:21	11.45	0.5	20.2	6.86	0.5	-52	3818	9.5		3	3.3	sampled
CAE-MW1s	05/10/12	10:40	14.16	0.5	20.6	6.67	0.8	-207	3188		0.45	0		
CAE-MW1s	05/10/12	10:42		0.5	20.7	6.67	0.7	-106	3904			0.5		
CAE-MW1s	05/10/12	10:44		0.5	20.8	6.67	0.6	-110	3910			1		
CAE-MW1s	05/10/12	10:46	15.12	0.5	21.0	6.67	0.6	-113	3919	380		1.5	3.3	sampled
CAE-MW1S	12/04/12	15:42	13.69	0.5	18.8	7.67	2.4	93	1834		0.52	0		
CAE-MW1S	12/04/12	15:46		0.5	20.4	7.53	0.8	91	2121			0.5		
CAE-MW1S	12/04/12	15:49		0.5	21.2	7.53	0.8	90	2143			1		
CAE-MW1S	12/04/12	15:52	13.72	0.5	21.4	7.52	0.7	90	2169	473		1.5	2.9	sampled
CAE-MW2s	02/08/12	12:32	11.53	0.5	18.8	6.65	2.2	246	2445		0.99	0		
CAE-MW2s	02/08/12	12:35		0.5	19.4	6.81	2.0	218	2047			1		
CAE-MW2s	02/08/12	12:38		0.5	19.6	6.79	2.0	203	2036			2		
CAE-MW2s	02/08/12	12:41	13.05	0.5	19.8	6.85	1.7	193	2072	51		3	3.0	sampled
CAE-MW2s	05/10/12	11:20	13.34	0.5	21.1	6.71	1.2	126	1779		0.70	0		
CAE-MW2s	05/10/12	11:22		0.5	19.9	6.72	1.0	115	1928			1		
CAE-MW2s	05/10/12	11:24		0.5	19.9	6.70	1.0	102	1915			2		
CAE-MW2s	05/10/12	11:25	14.12	0.5	19.9	6.69	0.9	98	1910	20		3	4.3	sampled
CAE-MW2S	08/14/12	18:00	14.75	0.5	22.1	6.6	1.1	63	2865		0.46512	0		
CAE-MW2S	08/14/12	18:01		0.5	22	7.05	1	58	2919			0.5		
CAE-MW2S	08/14/12	18:02		0.5	22	7.12	1	59	2940			1		
CAE-MW2S	08/14/12	18:03	15.83	0.5	22	7.16	1	63	2944	42		1.5	3.2	SAMPLED at 18:05
CAE-MW2S	12/04/12	14:57	13.85	0.5	19.1	8.14	3.3	57	2445		0.61	0		
CAE-MW2S	12/04/12	14:59		0.5	21.6	8.08	1.2	58	2703			0.5		
CAE-MW2S	12/04/12	15:00		0.5	22.2	8.11	0.9	61	2747			1		
CAE-MW2S	12/04/12	15:02	13.89	0.5	22.2	8.08	0.7	64	2724	102		1.5	2.5	sampled
CAE-MW3s	02/08/12	12:50	11.20	0.5	20.0	6.95	1.8	193	2668		0.98	0		
CAE-MW3s	02/08/12	12:52		0.5	20.1	6.87	1.8	194	2447			1		
CAE-MW3s	02/08/12	12:55		0.5	20.0	6.84	1.8	194	2382			2		
CAE-MW3s	02/08/12	13:00	12.10	0.5	20.2	6.83	1.7	196	2374	9.5		3	3.1	sampled
CAE-MW3s	05/10/12	11:40	13.61	0.5	19.9	6.82	0.8	125	3133		0.59	0		
CAE-MW3s	05/10/12	11:41		0.5	19.7	6.76	0.6	136	2925			1		
CAE-MW3s	05/10/12	11:42		0.5	19.7	6.74	0.6	143	2838			2		
CAE-MW3s	05/10/12	11:45	14.11	0.5	20.0	6.73	0.6	153	2804	70		3	5.1	sampled
CAE-MW3S	08/14/12	18:48	15.75	0.25	22.2	7.23	0.7	65	4042		0.23664	0		
CAE-MW3S	08/14/12	18:49		0.25	22.1	7.07	0.7	67	3967			1		
CAE-MW3S	08/14/12	18:50		0.25	22.1	7.02	0.8	67	3878			2		
CAE-MW3S	08/14/12	18:51	16.5	0.25	22.3	7	0.7	69	3856	43		3	12.7	SAMPLED at 18:53
CAE-MW3S	12/04/12	15:09	13.53	0.5	20.0	7.97	3.2	77	2975		0.60	0		
CAE-MW3S	12/04/12	15:11		0.5	21.8	7.78	1.7	80	2899			0.5		
CAE-MW3S	12/04/12	15:13		0.5	23.0	7.64	1.3	81	2861			1		
CAE-MW3S	12/04/12	15:15	13.57	0.5	23.5	7.51	0.8	82	2859	6		1.5	2.5	sampled
CAE-MW4s	02/08/12	13:40	12.14	0.5	18.4	7.16	0.7	19	1553		1.82	0		
CAE-MW4s	02/08/12	13:43		0.5	18.5	6.60	0.8	62	1450			2		
CAE-MW4s	02/08/12	13:47		0.5	18.6	6.81	0.8	74	1402			4		

Table 6
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Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
CAE-MW4s	02/08/12	13:52	12.50	0.5	18.6	6.57	0.9	87	1411	9		6	3.3	sampled
CAE-MW4s	05/10/12	10:55	13.67	0.5	20.0	6.47	0.9	-51	1565		1.57	0		
CAE-MW4s	05/10/12	10:58		0.5	19.3	6.38	0.7	7	1423			1.5		
CAE-MW4s	05/10/12	11:02		0.5	19.5	6.38	0.7	53	1455			3		
CAE-MW4s	05/10/12	11:05	13.92	0.5	19.5	6.37	0.6	97	1456	24		4.5	2.9	sampled
CAE-MW4S	08/14/12	19:52	14.59	1.0		7.75	0.9	57	1300		1.421472	0		
CAE-MW4S	08/14/12	19:54		1.0	20.9	6.9	1	73	1325			1.5		
CAE-MW4S	08/14/12	19:56		1.0	20.6	6.8	1	74	1338			3		
CAE-MW4S	08/14/12	19:58	15.55	1.0	20.5	6.82	1	78	1340	57		4.5	3.2	SAMPLED at 20:00
CAE-MW4S	12/04/12	15:23	14.39	1	20.2	7.77	3.0	81	2078		1.46	0		
CAE-MW4S	12/04/12	15:25		1	20.5	7.78	0.7	80	1344			1.5		
CAE-MW4S	12/04/12	15:28		1	20.5	7.63	0.6	84	1325			3		
CAE-MW4S	12/04/12	15:30	14.49	1	20.6	7.55	0.6	87	1324	14		4.5	3.1	sampled
CAE-MW5s	02/08/12	14:02	8.83	0.5	19.7	6.99	1.0	118	1509		2.26	0		
CAE-MW5s	02/08/12	14:06		0.5	19.0	7.10	0.8	119	1588			2.5		
CAE-MW5s	02/08/12	14:10		0.5	19.5	6.91	0.8	106	1422			5		
CAE-MW5s	02/08/12	14:15	9.80	0.5	19.4	6.93	0.7	107	1336	29.5		7.5	3.3	sampled
CAE-MW5s	05/10/12	10:18	9.50	0.5	19.3	6.85	1.3	196	1552		2.15	0		
CAE-MW5s	05/10/12	10:23		0.5	19.6	6.68	0.9	207	1268			2		
CAE-MW5s	05/10/12	10:28		0.5	19.9	6.70	0.9	205	1221			4		
CAE-MW5s	05/10/12	10:33	9.58	0.5	20.0	6.70	0.8	202	1214	15		6	2.8	sampled
CAE-MW5S	08/14/12	17:00	8.2	1.0	21.6	7.34	0.9	70	1259		2.3664	0		
CAE-MW5S	08/14/12	17:03		1.0	20.6	7.08	0.6	72	1137			2.5		
CAE-MW5S	08/14/12	17:06		1.0	20.5	7.06	0.7	73	1111			5		
CAE-MW5S	08/14/12	17:09	10.2	1.0	20.5	7.07	0.7	77	1109	6		7.5	3.2	SAMPLED at 17:10
CAE-MW5S	12/04/12	14:28	10.56	1	20.0	7.73	1.7	73	1067		1.98	0		
CAE-MW5S	12/04/12	14:30		1	21.6	7.60	1.7	76	1194			2		
CAE-MW5S	12/04/12	14:32		1	22.1	7.57	1.6	77	1195			4		
CAE-MW5S	12/04/12	14:35	10.56	1	22.3	7.56	1.5	77	1179	15		6	3.0	sampled
CAE-MW6s	02/09/12	9:57	11.15	0.5	21.7	7.06	1.4	174	2267		1.53	0		
CAE-MW6s	02/09/12	10:00		0.5	21.2	7.05	1.2	163	2113			1.5		
CAE-MW6s	02/09/12	10:04		0.5	21.1	7.04	1.2	153	2043			3		
CAE-MW6s	02/09/12	10:07		0.5	21.1	7.04	1.1	150	2040			4.5		
CAE-MW6s	02/09/12	10:10	11.38	0.5	21.0	7.04	1.1	147	2040	44		6	3.9	sampled
CAE-MW6s	05/10/12	10:00	11.64	0.5	20.1	6.96	1.1	262	1459		1.45	0		
CAE-MW6s	05/10/12	10:03		0.5	19.7	7.29	1.1	230	1515			1.5		
CAE-MW6s	05/10/12	10:06		0.5	19.9	6.99	1.0	235	1551			3		
CAE-MW6s	05/10/12	10:09		0.5	19.9	6.96	0.8	237	1555			4.5		
CAE-MW6s	05/10/12	10:12	11.70	0.5	19.9	6.95	0.6	240	1561	12		6	4.1	sampled
CAE-MW6S	08/14/12	16:20	10.04	1.0	19.6	7.73	1	66	1335		1.707072	0		
CAE-MW6S	08/14/12	16:22		1.0	19.6	7.2	1	76	1587			2		
CAE-MW6S	08/14/12	16:24		1.0	20	7.25	1	71	1588			4		
CAE-MW6S	08/14/12	16:26	10.22	1.0	20	7.24	0.9	70	1585	26		6	3.5	SAMPLED at 16:28
CAE-MW6S	12/04/12	16:14	12.24	1	21.2	7.82	2.3	69	1107		1.35	0		
CAE-MW6S	12/04/12	16:17		1	21.2	7.85	0.7	68	879			1.5		
CAE-MW6S	12/04/12	16:20		1	21.3	7.75	0.6	69	853			3		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
CAE-MW6S	12/04/12	16:23	12.77	1	21.3	7.74	0.5	71	854	117		4.5	3.3	sampled
COR-MW1s	02/10/12	10:27	6.82	0.5	19.0	7.52	1.2	156	2703		1.84	0		
COR-MW1s	02/10/12	10:31		0.5	19.3	7.28	1.4	168	3426			2		
COR-MW1s	02/10/12	10:35		0.5	19.3	7.23	1.4	168	3435			4		
COR-MW1s	02/10/12	10:41	7.00	0.5	19.0	7.26	1.5	170	3408	68		6	3.3	sampled
COR-MW1s	05/11/12	15:00	7.52	0.5	19.4	7.2	0.7	220	3813		1.726656	0		
COR-MW1s	05/11/12	15:03		0.5	19.1	7.13	0.4	226	3585			1.5		
COR-MW1s	05/11/12	15:06		0.5	19.1	7.11	0.5	228	3580			3		
COR-MW1s	05/11/12	15:10	8.7	0.5	19.2	7.08	0.4	229	3572	8		4.5	2.6	sampled
COR-MW1S	08/17/12	9:39	8.16	1.0	21.4	7.36	1.3	213	3734		1.677696	0		
COR-MW1S	08/17/12	9:41		1.0	20.8	7.07	0.65	216	3787			2		
COR-MW1S	08/17/12	9:43		1.0	20.3	6.99	0.63	217	3765			4		
COR-MW1S	08/17/12	9:45	8.74	1.0	20.6	6.98	0.54	216	3751	59		6	3.6	SAMPLED at 9:47
COR-MW1S	12/07/12	13:33	7.81	1	20.6	7.57	0.8	119	3664		1.67	0		
COR-MW1S	12/07/12	13:35		1	20.5	7.46	0.7	122	3669			2		
COR-MW1S	12/07/12	13:37		1	20.6	7.33	0.6	127	3671			4		
COR-MW1S	12/07/12	13:39	8.00	1	20.5	7.29	0.5	130	3679	48		6	3.6	sampled
COR-MW2s	02/10/12	9:03	4.93	0.5	16.6	6.70	2.4	235	2147		1.99	0		
COR-MW2s	02/10/12	9:07		0.5	17.8	7.36	1.8	199	1735			2		
COR-MW2s	02/10/12	9:11		0.5	18.0	7.31	1.8	174	1651			4		
COR-MW2s	02/10/12	9:16	4.96	0.5	17.9	7.33	1.5	162	1640	8		6	3.0	sampled
COR-MW2s	05/11/12	14:45	7.79	0.5	19.5	7.33	0.5	200	1787		1.519392	0		
COR-MW2s	05/11/12	14:48		0.5	19.3	7.32	0.5	206	1772			1.5		
COR-MW2s	05/11/12	14:53		0.5	17.9	7.18	0.7	210	1775			3		
COR-MW2s	05/11/12	14:55	7.8	0.5	17.9	7.2	0.8	210	1774	10		4.5	3.0	sampled
COR-MW2S	08/17/12	9:20	8.87	0.5	21.3	7.29	0.94	219	1503		1.40352	0		
COR-MW2S	08/17/12	9:23		0.5	21	7.18	0.66	217	1499			1.5		
COR-MW2S	08/17/12	9:27		0.5	20.4	7.17	0.62	216	1509			3		
COR-MW2S	08/17/12	9:29	9.45	0.5	21.2	7.14	0.51	212	1497	36		4.5	3.2	SAMPLED at 9:31
COR-MW2S	12/07/12	13:53	7.27	1	20.3	7.70	1.0	127	1759		1.60	0		
COR-MW2S	12/07/12	13:55		1	20.1	7.64	0.8	125	1762			1.5		
COR-MW2S	12/07/12	13:57		1	19.9	7.58	0.7	126	1770			3		
COR-MW2S	12/07/12	13:59	7.41	1	19.8	7.55	0.7	126	1773	31		4.5	2.8	sampled
COR-MW3s	02/10/12	9:23	6.55	0.5	18.2	7.50	1.6	139	1601		1.82	0		
COR-MW3s	02/10/12	9:27		0.5	19.4	7.48	1.3	147	1514			2		
COR-MW3s	02/10/12	9:31		0.5	19.5	7.48	1.3	146	1503			4		
COR-MW3s	02/10/12	9:36	6.55	0.5	19.6	7.47	1.3	144	1498	3.5		6	3.3	sampled
COR-MW3s	05/11/12	14:30	8.63	0.5	20.3	7.5	2.2	196	1653		1.480224	0		
COR-MW3s	05/11/12	14:33		0.5	19.4	7.39	1	197	1642			1.5		
COR-MW3s	05/11/12	14:36		0.5	18.5	7.35		196	1630			3		
COR-MW3s	05/11/12	14:40	8.81	0.5	18.4	7.32	0.4	194	1622	26		4.5	3.0	sampled
COR-MW3S	08/17/12	9:04	9.74	0.5	22.6	7.43	1.1	234	1831		1.364352	0		
COR-MW3S	08/17/12	9:07		0.5	20.6	7.35	0.8	234	1831			1.5		
COR-MW3S	08/17/12	9:10		0.5	20.4	7.28	0.9	233	1834			3		
COR-MW3S	08/17/12	9:13	10.09	0.5	21.1	7.23	0.61	229	1824	95		4.5	3.3	SAMPLED at 9:14
COR-MW3S	12/07/12	14:19	8.23	1	20.6	7.37	1.1	120	2184		1.55	0		

Table 6
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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
COR-MW3S	12/07/12	14:21		1	20.3	7.44	0.8	114	2211			1.5		
COR-MW3S	12/07/12	14:23		1	20.3	7.55	0.7	108	2230			3		
COR-MW3S	12/07/12	14:25	8.50	1	20.2	7.57	0.7	101	2234	16		4.5	2.9	sampled
COR-MW4s	02/10/12	10:06	5.61	0.5	20.8	7.48	1.1	152	1791		1.89	0		
COR-MW4s	02/10/12	10:10		0.5	19.6	7.32	1.5	155	2009			2		
COR-MW4s	02/10/12	10:14		0.5	19.5	7.33	1.5	150	2027			4		
COR-MW4s	02/10/12	10:19	5.67	0.5	19.4	7.29	1.5	147	2009	5.5		6	3.2	sampled
COR-MW4s	05/11/12	15:40	7.65	0.5	20	7.3	0.6	203	2055		1.55856	0		
COR-MW4s	05/11/12	15:43		0.5	20.2	7.3	0.6	204	2062			1.5		
COR-MW4s	05/11/12	15:47		0.5	19.8	7.29	0.6	205	2071			3		
COR-MW4s	05/11/12	15:50	7.92	0.5	19.6	7.28	0.6	208	2088	98		4.5	2.9	sampled
COR-MW4S	08/17/12	9:49	8.85	0.5	22.1	7.4	1.1	210	1918		1.413312	0		
COR-MW4S	08/17/12	9:52		0.5	22.3	7.21	0.85	212	1870			1.5		
COR-MW4S	08/17/12	9:55		0.5	22.4	7.2	0.61	212	1868			3		
COR-MW4S	08/17/12	9:58	9.41	0.5	22.1	7.19	0.57	212	1863	33		4.5	3.2	SAMPLED at 10:00
COR-MW4S	12/07/12	14:53	7.24	1	20.8	7.78	0.6	91	1850		1.63	0		
COR-MW4S	12/07/12	14:55		1	20.9	7.75	0.6	92	1848			2		
COR-MW4S	12/07/12	14:57		1	21.0	7.72	0.5	93	1842			4		
COR-MW4S	12/07/12	14:59	7.89	1	21.0	7.70	0.4	93	1840	8		6	3.7	sampled
COR-MW5s	02/10/12	9:44	6.08	0.5	19.5	7.58	1.8	148	1504		1.91	0		
COR-MW5s	02/10/12	9:48		0.5	19.8	7.46	2.0	153	1499			2		
COR-MW5s	02/10/12	9:52		0.5	20.1	7.40	2.0	152	1525			4		
COR-MW5s	02/10/12	9:57	6.60	0.5	20.2	7.36	1.9	149	1577	26.5		6	3.1	sampled
COR-MW5s	05/11/12	15:22	7.84	0.5	20.2	7.47	1	209	1987		1.625472	0		
COR-MW5s	05/11/12	15:26		0.5	20.6	7.35	0.8	218	1908			1.5		
COR-MW5s	05/11/12	15:30		0.5	20.6	7.3	0.9	207	1880			3		
COR-MW5s	05/11/12	15:34	10.25	0.5	20.5	7.3	0.9	204	1878	370		4.5	2.8	sampled
COR-MW5S	08/17/12	10:04	8.92	0.5	22.3	7.24	0.9	213	1721		1.490016	0		
COR-MW5S	08/17/12	10:07		0.5	22.4	7.19	0.73	214	1717			1.5		
COR-MW5S	08/17/12	10:10		0.5	22.3	7.16	0.66	211	1687			3		
COR-MW5S	08/17/12	10:13	9.55	0.5	22.2	7.15	0.5	211	1677	126		4.5	3.0	SAMPLED at 10:14
COR-MW5S	12/07/12	15:31	7.45	1	20.8	7.53	0.7	99	3263		1.69	0		
COR-MW5S	12/07/12	15:33		1	20.9	7.51	0.7	99	3016			2		
COR-MW5S	12/07/12	15:35		1	21.1	7.49	0.5	101	2763			4		
COR-MW5S	12/07/12	15:37	8.00	1	21.3	7.47	0.5	101	2488	33		6	3.6	sampled
COT-MW1	02/16/12													Well Dry
COT-MW1	05/15/12			0.5										Well Dry
COT-MW1	08/16/12													Well Dry
COT-MW1	12/09/12	15:00	32.52	0.25	16.5	7.44	1.6	155	2001	880		0	1.0	PR; sampled
COT-MW10	02/16/12	13:12	5.14	0.5	19.7	7.33	2.0	222	1176		2.80	0		
COT-MW10	02/16/12	13:18		0.5	19.9	7.12	2.2	219	1105			3		
COT-MW10	02/16/12	13:24		0.5	20.0	7.13	2.2	222	1062			6		
COT-MW10	02/16/12	13:30	5.70	0.5	20.0	7.14	2.3	217	1045	10		9	3.2	sampled
COT-MW10	05/15/12	13:00	10.09		19.5	7.07	1.9	186	1307		2.443104	0		
COT-MW10	05/15/12	13:03			18.5	6.95	1.8	185	1296			2.5		
COT-MW10	05/15/12	13:06			18.9	6.94	2	180	1288			5		

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Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
COT-MW10	05/15/12	13:09	12.09		19.3	6.94	2.1	176	1302	8		7.5	3.1	sampled
COT-MW10	08/16/12	14:51	7.99	1.0	23.1	8.12	2	90	1152		2.33376	0		
COT-MW10	08/16/12	14:54		1.0	23	7.78	1.8	92	1155			2.5		
COT-MW10	08/16/12	14:57		1.0	22.7	7.7	1.7	97	1164			5		
COT-MW10	08/16/12	15:00	9.75	1.0	22.5	7.62	1.6	100	1169	18		7.5	3.2	SAMPLED at 15:00
COT-MW10	12/09/12	13:40	10.15	1	19.9	7.81	1.9	99	1378		2.23	0		
COT-MW10	12/09/12	13:42		1	21.5	7.60	1.4	97	1067			2.5		
COT-MW10	12/09/12	13:45		1	22.0	7.48	1.1	99	1050			5		
COT-MW10	12/09/12	13:47	10.27	1	22.1	7.40	1.0	100	1050	7		7.5	3.4	sampled
COT-MW11d	02/13/12	13:29	23.95	0.5	18.9	6.88	2.9	273	1820		2.68	0		
COT-MW11d	02/13/12	13:35		0.5	19.8	6.78	3.0	258	1667			3		
COT-MW11d	02/13/12	13:41		0.5	19.8	6.80	2.4	249	1657			6		
COT-MW11d	02/13/12	13:47		0.5	19.7	7.02	2.2	239	1662			9		
COT-MW11d	02/13/12	13:53	26.17	0.5	19.7	7.03	2.1	237	1660	9		12	4.5	sampled
COT-MW11d	05/15/12	9:50	25.48	0.5	20.1	6.64	2.5	281	2216		2.46432	0		
COT-MW11d	05/15/12	9:55		0.5	20.4	6.51	2	239	1846			2.5		
COT-MW11d	05/15/12	9:59		0.5	20.8	6.51	2.1	221	1835			5		
COT-MW11d	05/15/12	10:04	25.48	0.5	21	6.51	2	201	1828	8		7.5	3.0	sampled
COT-MW11S	08/16/12	9:58	22.2	0.5	25.9	7.58	2	91	1395		0.75072	0		
COT-MW11S	08/16/12	10:00		0.5	22.6	7.26	1.8	83	1382			1		
COT-MW11S	08/16/12	10:02		0.5	22.6	7.02	1.8	84	1397			2		
COT-MW11S	08/16/12	10:04	23.1	0.5	22.7	6.94	1.7	88	1395	415		3	4.0	SAMPLED at 10:04
COT-MW11S	12/09/12	10:45	19.14	1	17.3	6.23	3.0	269	1584		1.25	0		
COT-MW11S	12/09/12	10:46		1	20.7	6.51	1.3	251	1803			1		
COT-MW11S	12/09/12	10:48		1	22.3	6.75	1.2	239	1982			3		
COT-MW11S	12/09/12	10:50	21.84	1	22.3	6.80	1.3	230	1978	529		5	4.0	sampled
COT-MW12s	02/13/12	14:05	24.44	0.5	19.4	7.13	2.1	237	1473		1.10	0		
COT-MW12s	02/13/12	14:07		0.5	20.1	7.06	2.1	236	1397			1		
COT-MW12s	02/13/12	14:09		0.5	19.7	7.06	2.0	233	1395			2		
COT-MW12s	02/13/12	14:11		0.5	19.7	7.07	2.0	230	1390			3		
COT-MW12s	02/13/12	14:13		0.5	19.8	7.10	1.8	225	1382			4		
COT-MW12s	02/13/12	14:15	26.37	0.5	19.8	7.10	1.7	223	1379	4.5		5	4.5	sampled
COT-MW12s	05/15/12	10:06	26.44	0.25	21.8	6.62	2.1	197	1634		1.103232	0		
COT-MW12s	05/15/12	10:10		0.25	21.5	6.77	1.8	193	1407			1		
COT-MW12s	05/15/12	10:14		0.25	21.1	6.73	1.7	193	1383			2		
COT-MW12s	05/15/12	10:18		0.25	21.4	6.75	1.6	184	1378			3		
COT-MW12s	05/15/12	10:22	26.99	0.25	21.1	6.76	1.6	192	1400	73		4	3.6	sampled at 10:26
COT-MW12S	08/16/12	13:33	23.8	0.25	22.1	7.25	2	79	1415		1.20768	0		
COT-MW12S	08/16/12	13:37		0.25	21.5	7.17	1.7	81	1402			1		
COT-MW12S	08/16/12	13:41		0.25	22.1	7.6	1.6	84	1397			2		
COT-MW12S	08/16/12	13:45	23.83	0.25	22.2	7.67	1.6	87	1394	74		3	2.5	SAMPLED at 13:45
COT-MW12S	12/09/12	11:50	19.06	1	18.7	7.86	3.8	88	1838		1.98	0		
COT-MW12S	12/09/12	11:52		1	19.8	7.55	3.5	91	1671			2		
COT-MW12S	12/09/12	11:54		1	20.6	7.37	3.4	92	1466			4		
COT-MW12S	12/09/12	11:57	19.29	1	21.1	7.30	3.0	92	1372	40		6	3.0	sampled
COT-MW13s	02/13/12	14:48	25.10	0.5	20.9	6.94	1.8	231	2193		1.31	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
COT-MW13s	02/13/12	14:51		0.5	20.8	7.12	1.7	219	2192			1.5		
COT-MW13s	02/13/12	14:54		0.5	21.2	6.99	1.7	220	2209			3		
COT-MW13s	02/13/12	14:57		0.5	21.5	6.97	1.5	217	2195			4.5		
COT-MW13s	02/13/12	15:00	25.28	0.5	21.5	6.99	1.5	215	2197	5.5		6	4.6	sampled
COT-MW13s	02/13/12	15:29	25.16	0.5	20.1	6.98	1.4	212	1362		1.18	0		
COT-MW13s	02/13/12	15:31		0.5	20.2	6.99	1.4	217	1370			1		
COT-MW13s	02/13/12	15:33		0.5	20.5	6.95	1.7	220	1370			2		
COT-MW13s	02/13/12	15:35		0.5	20.5	6.94	1.5	221	1372			3		
COT-MW13s	02/13/12	15:37	26.88	0.5	21.0	6.87	1.7	222	1385	13		4	3.4	sampled
COT-MW13s	05/15/12	10:30	28.02	0.25	23.4	6.71	1.5	203	2077		0.9	0		
COT-MW13s	05/15/12	10:34		0.25	23.4	6.67	1.4	196	2356			1		
COT-MW13s	05/15/12	10:38		0.25	23.4	6.67	1.5	214	2360			2		
COT-MW13s	05/15/12	10:42	28.1	0.25	23.5	6.76	1.5	225	2358	12		3	3.4	sampled
COT-MW13S	08/16/12	12:58	26.19	0.25	22.8	7.13	1.2	67	2031		1.127712	0		
COT-MW13S	08/16/12	13:02		0.25	22.1	6.94	1	78	2015			1		
COT-MW13S	08/16/12	13:06		0.25	22.1	6.88	1.1	80	2012			2		
COT-MW13S	08/16/12	13:10	26.23	0.25	22	6.83	1.1	84	2010	330		3	2.7	SAMPLED at 13:10
COT-MW13S	12/09/12	12:04	21.04	1	20.0	7.76	3.1	85	1493		1.97	0		
COT-MW13S	12/09/12	12:06		1	21.9	7.29	1.2	94	1591			2		
COT-MW13S	12/09/12	12:08		1	22.3	7.14	1.1	101	1603			4		
COT-MW13S	12/09/12	12:10	21.20	1	22.4	7.13	1.1	98	1600	32		6	3.0	sampled
COT-MW14s	02/13/12	15:29	25.16	0.5	20.1	6.98	1.4	212	1362		1.181568	0		
COT-MW14s	02/13/12	15:31		0.5	20.2	6.99	1.4	217	1370			1		
COT-MW14s	02/13/12	15:33		0.5	20.5	6.95	1.7	220	1370			2		
COT-MW14s	02/13/12	15:35		0.5	20.5	6.94	1.5	221	1372			3		
COT-MW14s	02/13/12	15:37	26.88	0.5	21	6.87	1.7	222	1385	13		4	3.4	sampled
COT-MW14s	05/15/12	10:49	27.62	0.5	25.1	6.75	1.5	253	1305		0.804576	0		
COT-MW14s	05/15/12	10:53		0.5	23.4	6.59	1.3	277	1119			1		
COT-MW14s	05/15/12	10:57		0.5	23.2	6.59	1.3	280	1136			2		
COT-MW14s	05/15/12	11:01	27.88	0.5	23.1	6.58	1.2	284	1150	>1,000		3	3.7	sampled
COT-MW14S	08/16/12	12:14	27.6	0.5	22.6	7.69	1.4	96	940		0.78336	0		
COT-MW14S	08/16/12	12:16		0.5	22.5	7.08	1.3	109	1250			1		
COT-MW14S	08/16/12	12:18		0.5	22.5	6.89	1.3	111	1258			2		
COT-MW14S	08/16/12	12:20	27.78	0.5	22.5	6.94	1.2	107	1316	440		3	3.8	SAMPLED at 12:20
COT-MW14S	12/09/12	14:41	22.29	1	19.6	7.95	2.7	94	1239		1.65	0		
COT-MW14S	12/09/12	14:43		1	21.7	7.29	2.0	104	930			2		
COT-MW14S	12/09/12	14:45		1	22.0	7.04	2.2	108	889			4		
COT-MW14S	12/09/12	14:47	22.37	1	22.0	7.02	1.7	108	892	51		6	3.6	sampled
COT-MW2	02/16/12	15:58	24.37	0.5	17.1	7.34	2.2	271	2299		1.54	0		
COT-MW2	02/16/12	16:01		0.5	17.7	7.26	2.1	271	2547			1.5		
COT-MW2	02/16/12	16:05		0.5	17.6	7.27	2.1	272	2589			3		
COT-MW2	02/16/12	16:10	24.40	0.5	17.8	7.26	2.0	271	2596	250		4.5	2.9	sampled
COT-MW2	05/15/12	11:52	25.53	0.5	25.4	7.1	2.6	206	1977		1.43616	0		
COT-MW2	05/15/12	11:55		0.5	22.4	7.13	2.5	189	2472			1.5		
COT-MW2	05/15/12	11:58		0.5	22.9	7.18	2	170	2480			3		
COT-MW2	05/15/12	12:01	25.91	0.5	25.1	7.22	2	170	2483	70		4.5	3.1	sampled

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
COT-MW2	08/16/12										3.12			Well Dry
COT-MW2	12/09/12	14:25		1	17.4	7.79	6.2	143	2416	105		0	1.0	PR; sampled
COT-MW3	02/16/12	15:11	17.45	0.5	17.5	7.50	2.1	256	2795		2.20	0		
COT-MW3	02/16/12	15:15		0.5	18.0	7.31	2.7	258	2721			2		
COT-MW3	02/16/12	15:19		0.5	18.1	7.27	2.7	259	2685			4		
COT-MW3	02/16/12	15:24	17.52	0.5	17.8	7.30	2.6	261	2693	>1,000		6	2.7	sampled
COT-MW3	05/15/12	12:14	20.12	0.5	22.8	7.25	1.6	170	2636		1.976352	0		
COT-MW3	05/15/12	12:18		0.5	21.2	7.17	1.9	181	2582			2		
COT-MW3	05/15/12	12:22		0.5	19.9	7.13	1.7	183	2576			4		
COT-MW3	05/15/12	12:26	25.09	0.5	20.9	7.16	1.6	180	2570	>1,000		6	3.0	sampled
COT-MW3	08/17/12	9:03	19.05	0.5	24.4	7.98	2.8	158	2253		1.93392	0		
COT-MW3	08/17/12	9:07		0.5	22.9	7.77	3.1	152	2274			2		
COT-MW3	08/17/12	9:11		0.5	23	7.81	3	155	2270			4		
COT-MW3	08/17/12	9:15		0.5	23.2	7.83	3	156	2270	>1,000		6	3.1	SAMPLED at 9:15
COT-MW3	12/09/12	13:00	22.63	1	19.4	7.86	3.3	101	2674		1.59	0		
COT-MW3	12/09/12	13:02		1	20.4	7.65	3.3	101	2534			2		
COT-MW3	12/09/12	13:04		1	21.0	7.63	3.4	101	2527			4		
COT-MW3	12/09/12	13:06	22.90	1	21.8	7.62	3.3	102	2540	617		6	3.8	sampled
COT-MW4	02/16/12	15:38	21.42	0.5	17.9	7.25	3.0	266	1809		0.97	0		
COT-MW4	02/16/12	15:40		0.5	18.4	7.12	2.8	267	1778			1		
COT-MW4	02/16/12	15:42		0.5	18.7	7.11	2.8	268	1771			2		
COT-MW4	02/16/12	15:45	21.73	0.5	18.9	7.09	2.7	268	1791	280		3	3.1	sampled
COT-MW4	05/15/12	11:35	22.95	0.5	21.9	7.04	2	186	1836		0.993888	0		
COT-MW4	05/15/12	11:37		0.5	22.2	7.04	2.2	193	1746			1		
COT-MW4	05/15/12	11:39		0.5	21	7.02	2.2	198	1687			2		
COT-MW4	05/15/12	11:41	22.95	0.5	20.7	7.02	2.1	198	1694	29		3	3.0	sampled
COT-MW4	08/17/12	9:34	23	0.5	23.8	7.94	3	90	1664		0.714816	0		
COT-MW4	08/17/12	9:36		0.5	24.9	7.47	3.3	92	1614			1		
COT-MW4	08/17/12	9:38		0.5	24.5	7.43	3.3	92	1610			2		
COT-MW4	08/17/12	9:40	23.27	0.5	24.4	7.41	3.2	91	1607	400		3	4.2	SAMPLED at 9:40
COT-MW4	12/09/12	11:07	24.90	1	20.1	7.56	3.1	159	1947		0.70	0		
COT-MW4	12/09/12	11:08		1	20.8	7.43	3.3	156	1927			1		
COT-MW4	12/09/12	11:09		1	21.1	7.49	3.7	153	1918			2		
COT-MW4	12/09/12	11:11	24.97	1	20.9	7.47	4.3	151	1912	70		3	4.3	sampled
COT-MW5	02/16/12	14:45	17.00	0.5	18.5	7.13	2.8	256	2712		1.16	0		
COT-MW5	02/16/12	14:48		0.5	18.3	7.10	2.5	261	2678			1		
COT-MW5	02/16/12	14:51		0.5	18.4	7.10	2.5	262	2673			2		
COT-MW5	02/16/12	14:54	17.91	0.5	18.3	7.09	2.5	263	2666	418		3	2.6	sampled
COT-MW5	05/15/12	11:19	19.22	0.5	21.8	7.01	1.4	204	2608		1.088544	0		
COT-MW5	05/15/12	11:21		0.5	20.2	6.98	1.5	208	2479			1		
COT-MW5	05/15/12	11:23		0.5	19.7	6.97	1.5	211	2484			2		
COT-MW5	05/15/12	11:25	20.59	0.5	20.5	6.99	1.5	210	2451	40		3	2.8	sampled
COT-MW5	08/16/12	16:51	15.5	0.5	21.5	6.86	1.5	135	2394		1.400256	0		
COT-MW5	08/16/12	16:54		0.5	21	7.07	1.5	115	2378			1.5		
COT-MW5	08/16/12	16:57		0.5	20.9	7.08	1.6	101	2367			3		
COT-MW5	08/16/12	17:00	15.76	0.5	20.9	7.17	1.5	100	2362	37		4.5	3.2	SAMPLED at 17:00

Table 6
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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
COT-MW5	12/09/12	12:41	18.93	1	19.7	7.86	3.4	103	2930		1.23	0		
COT-MW5	12/09/12	12:42		1	20.8	7.47	3.7	111	2707			1.5		
COT-MW5	12/09/12	12:43		1	21.0	7.48	3.5	112	2698			3		
COT-MW5	12/09/12	12:45	19.11	1	21.0	7.40	3.3	114	2694	60		4.5	3.7	sampled
COT-MW6	02/16/12	14:20	16.53	0.5	18.0	7.05	2.7	237	3106		1.25	0		
COT-MW6	02/16/12	14:23		0.5	18.3	6.88	2.2	240	3152			1.5		
COT-MW6	02/16/12	14:26		0.5	18.4	6.88	2.0	241	3114			3		
COT-MW6	02/16/12	14:30	17.00	0.5	18.4	6.89	2.0	242	3095	640		4.5	3.6	sampled
COT-MW6	05/15/12	11:07	18.01	0.5	23.8	6.63	2	238	2012		1.137504	0		
COT-MW6	05/15/12	11:09		0.5	21	6.75	2	246	2981			1.5		
COT-MW6	05/15/12	11:11		0.5	21.1	6.77	1.9	241	3006			3		
COT-MW6	05/15/12	11:13	19.2	0.5	19.8	6.76	1.4	239	3022	326		4.5	4.0	sampled
COT-MW6	08/17/12	10:51	16.25	0.5	23.5	6.96	2	220	3078		1.31376	0		
COT-MW6	08/17/12	10:54		0.5	22	6.9	2	220	3045			1.5		
COT-MW6	08/17/12	10:57		0.5	20.7	6.9	2	220	3045			3		
COT-MW6	08/17/12	11:00	16.88	0.5	20.5	6.9	2.2	220	3040	124		4.5	3.4	SAMPLED at 11:00
COT-MW6	12/09/12	12:24	17.31	1	19.4	7.77	3.0	91	1893		1.46	0		
COT-MW6	12/09/12	12:25		1	19.8	7.37	3.4	102	2359			1.5		
COT-MW6	12/09/12	12:27		1	20.6	7.35	3.5	106	3044			3		
COT-MW6	12/09/12	12:29	17.48	1	20.8	7.28	3.1	110	3066	61		4.5	3.1	sampled
COT-MW7	02/16/12	12:45	11.80	0.5	19.7	7.05	2.5	235	2044		1.88	0		
COT-MW7	02/16/12	12:48		0.5	19.7	6.94	2.5	238	2115			2		
COT-MW7	02/16/12	12:51		0.5	19.5	6.89	2.6	238	2164			4		
COT-MW7	02/16/12	12:55	12.07	0.5	19.7	6.88	2.6	238	2170	88		6	3.2	sampled
COT-MW7	05/15/12	12:33	14.86	0.5	25	7.37	2.3	187	2325		1.620576	0		
COT-MW7	05/15/12	12:35		0.5	25.2	7.36	2.3	184	2328			2		
COT-MW7	05/15/12	12:37		0.5	25.3	7.34	2.1	182	2326			4		
COT-MW7	05/15/12	12:49	18.15	0.5	25.2	7.3	2.1	178	2327	146		6	3.7	sampled
COT-MW7	08/16/12	16:06	20	0.25	27.5	7.4	2	97	1469		0.597312	0		
COT-MW7	08/16/12	16:08		0.25	25	7.25	2	96	1433			0.5		
COT-MW7	08/16/12	16:10		DRY	25.5	7.21	2.1	96	1429			1		
COT-MW7	08/16/12	16:15	22.52	DRY	25.8	7.24	2.1	95	1425	130		1.5	2.5	SAMPLED at 16:15
COT-MW7	12/09/12	13:58	11.39	1	20.0	7.79	3.6	100	1333		2.23	0		
COT-MW7	12/09/12	14:00		1	21.3	7.40	3.6	107	1586			2		
COT-MW7	12/09/12	14:02		1	21.7	7.32	3.4	109	1606			4		
COT-MW7	12/09/12	14:05	11.51	1	21.8	7.28	3.2	110	1617	13		6	2.7	sampled
COT-MW8	02/16/12	13:47	14.87	0.5	20.1	7.19	2.6	242	1751		1.47	0		
COT-MW8	02/16/12	13:50	DRY	0.5	22.0	7.07	2.1	245	1885			1.5		
COT-MW8	02/16/12	13:53	DRY	0.5	20.7	7.05	2.1	248	1876			3		
COT-MW8	02/16/12	13:57	17.30	0.5	21.1	7.04	1.8	247	1874	361		4.5	3.1	sampled
COT-MW8	05/15/12	12:45	16.18	0.5	21.2	7.06	2.2	159	1916		2.085696	0		
COT-MW8	05/15/12	12:47		0.5	21	7.05	2	160	1900			2		
COT-MW8	05/15/12	12:49		0.5	21	7.05	1.6	163	1898			4		
COT-MW8	05/15/12	12:51		0.5	18.9	7.04	1.6	167	1938			6		
COT-MW8	05/15/12	12:53	17.96	0.5	19	7	1.5	169	1936	59		8	3.8	sampled
COT-MW8	08/17/12	10:14	9.2	1.0	25	8.2	2	130	1156		2.39904	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
COT-MW8	08/17/12	10:17		1.0	25	8.02	1.6	124	1238			2.5		
COT-MW8	08/17/12	10:20		1.0	24.6	7.78	1.5	115	1250			5		
COT-MW8	08/17/12	10:23	17.7	1.0	24.3	7.7	1.4	104	1257	18		7.5	3.1	SAMPLED at 10:23
COT-MW8	12/09/12	14:13	14.37	1	20.8	7.79	3.7	103	1442		1.71	0		
COT-MW8	12/09/12	14:15		1	22.4	7.60	3.2	103	1238			2		
COT-MW8	12/09/12	14:17		1	23.3	7.56	3.2	102	1171			4		
COT-MW8	12/09/12	14:19	14.56	1	23.9	7.54	3.0	100	1168	17		6	3.5	sampled
COT-MW9	02/16/12	12:15	8.56	0.5	20.9	7.05	2.8	239	1814		3.09	0		
COT-MW9	02/16/12	12:21		0.5	20.1	6.91	2.4	238	1801			3		
COT-MW9	02/16/12	12:27		0.5	20.0	6.91	2.2	235	1801			6		
COT-MW9	02/16/12	12:33	9.15	0.5	20.2	6.89	2.2	233	1802	10		9	2.9	sampled
COT-MW9	05/15/12	13:22	11.55	1.0	19.2	6.9	2.5	189	1668		2.691168	0		
COT-MW9	05/15/12	13:25		1.0	19.1	6.81	2.2	189	1669			3		
COT-MW9	05/15/12	13:28		1.0	19.3	6.82	2.3	185	1666			6		
COT-MW9	05/15/12	13:31	12.26	1.0	19.5	6.82	2.1	186	1657	8		9	3.3	sampled
COT-MW9	08/16/12	15:26	13.06	1.0	20.8	7.81	2.3	90	1480		2.356608	0		
COT-MW9	08/16/12	15:29		1.0	20.2	7.72	2.2	91	1492			2.5		
COT-MW9	08/16/12	15:32		1.0	20	7.69	2.2	91	1512			5		
COT-MW9	08/16/12	15:35	13.28	1.0	19.9	7.66	2	93	1522	23		7.5	3.2	SAMPLED at 15:36
COT-MW9	12/09/12	13:23	15.27	1	19.2	7.86	3.1	105	2170		2.24	0		
COT-MW9	12/09/12	13:26		1	19.7	7.42	2.5	113	1874			2.5		
COT-MW9	12/09/12	13:27		1	20.3	7.31	2.5	114	1661			5		
COT-MW9	12/09/12	13:30	15.38	1	21.1	7.24	2.5	114	1581	12		7.5	3.3	sampled
FG1-MW1d	02/12/12	12:08	16.30	0.5	18.7	6.99	2.4	198	1405		2.30	0		
FG1-MW1d	02/12/12	12:13		0.5	19.0	7.05	1.6	132	1413			2.5		
FG1-MW1d	02/12/12	12:18		0.5	19.2	7.05	1.4	115	1409			5		
FG1-MW1d	02/12/12	12:23		0.5	19.3	7.11	1.4	108	1408			7.5		
FG1-MW1d	02/12/12	12:28	16.34	0.5	19.3	7.12	1.2	105	1409	4		10	4.3	sampled
FG1-MW1D	08/15/12	17:28	16.08	1.0	19.9	7.72	2.9	95	1278		2.337024	0		
FG1-MW1D	08/15/12	17:31		1.0	19.8	7.4	2.5	88	1282			2.5		
FG1-MW1D	08/15/12	17:34		1.0	19.9	7.53	2.5	92	1276			5		
FG1-MW1D	08/15/12	17:37	16.35	1.0	19.8	7.55	2.6	95	1272	7		7.5	3.2	SAMPLED at 17:39
FG1-MW1s	05/14/12	11:35	16.29	0.5	18.8	6.9	3.4	193	1196		0.362304	0		
FG1-MW1s	05/14/12	11:37		0.5	19.2	6.9	3.8	188	1404			0.5		
FG1-MW1s	05/14/12	11:39		0.5	19	6.9	3.9	191	1426			1		
FG1-MW1s	05/14/12	11:41	16.61	0.5	18.7	6.84	3.6	192	1430	309		1.5	4.1	sampled
FG1-MW1S	12/11/12	13:35	17.03	0.25	17.2	6.48	4.2	258	1933		0.13	0		
FG1-MW1S	12/11/12	13:36		0.25	19.1	6.64	4.1	249	1436			0.25		
FG1-MW1S	12/11/12	13:37		0.25	20.1	6.70	3.6	245	1260			0.50		
FG1-MW1S	12/11/12	13:38	17.68	0.25	20.1	6.59	3.3	246	1216	22		0.75	5.8	sampled
FG1-MW2d	02/12/12	12:30	20.18	0.5	19.9	7.25	1.8	187	1240		1.67	0		
FG1-MW2d	02/12/12	12:34		0.5	21.3	6.90	1.7	168	1197			2		
FG1-MW2d	02/12/12	12:38		0.5	21.3	6.90	1.7	169	1196			4		
FG1-MW2d	02/12/12	12:42		0.5	21.2	6.86	1.5	169	1200			6		
FG1-MW2d	02/12/12	12:46	20.20	0.5	21.2	6.87	1.5	169	1203	420		8	4.8	sampled
FG1-MW2d	05/14/12	12:03	18.04	0.5	21.7	6.72	2.2	176	1353		2.041632	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	(casings)	Comments
FG1-MW2d	05/14/12	12:07		0.5	20.8	6.64	2.7	182	1316			2		
FG1-MW2d	05/14/12	12:11		0.5	20.8	6.63	3.1	183	1317			4		
FG1-MW2d	05/14/12	12:15	20	0.5	21.1	6.63	2.8	186	1320	10		6	2.9	sampled
FG1-MW2D	08/15/12	17:02	19.47	1.0	23.1	7.37	2.2	145	1178		1.783776	0		
FG1-MW2D	08/15/12	17:04		1.0	21.4	7.15	2	130	1160			2		
FG1-MW2D	08/15/12	17:06		1.0	21.2	7.07	2	121	1166			4		
FG1-MW2D	08/15/12	17:08	19.65	1.0	21.2	7.04	2.1	120	1167	15		6	3.4	SAMPLED at 17:10
FG1-MW2D	12/11/12	14:06	20.03	1	19.3	6.98	2.9	237	1741		1.69	0		
FG1-MW2D	12/11/12	14:08		1	20.6	6.78	1.0	240	1403			2		
FG1-MW2D	12/11/12	14:10		1	20.9	6.63	0.8	240	1370			4		
FG1-MW2D	12/11/12	14:12	20.26	1	21.0	6.54	0.9	240	1369	2		6	3.6	sampled
FG1-MW3d	02/12/12	12:50	18.08	0.5	21.1	7.08	2.1	175	2052		2.01	0		
FG1-MW3d	02/12/12	12:54		0.5	21.1	7.04	1.7	180	2050			2		
FG1-MW3d	02/12/12	12:58		0.5	21.5	7.07	1.4	177	2059			4		
FG1-MW3d	02/12/12	13:02	27.15	0.5	21.5	7.15	1.5	173	2072	>1,000		6	3.0	sampled
FG1-MW3d	05/14/12	11:51	21.18		22.1	7.04	2.8	179	1731		2.304384	0		
FG1-MW3d	05/14/12	11:54			21.1	6.98	3.3	178	1732			2.5		
FG1-MW3d	05/14/12	11:57			21.2	6.97	3.3	175	1755			5		
FG1-MW3d	05/14/12	12:00	25.15		21.3	6.97	3.3	173	1783	143		7.5	3.3	sampled
FG1-MW3D	08/15/12	16:35	17.62	1.0	21.4	7.21	2.8	127	1756		2.085696	0		
FG1-MW3D	08/15/12	16:37		1.0	21	7.13	2.8	13	793			2		
FG1-MW3D	08/15/12	16:39		1.0	21.9	7.37	2.7	100	1877			4		
FG1-MW3D	08/15/12	16:41	19.77	1.0	21.8	7.2	2.5	95	1867	70		6	2.9	SAMPLED at 16:43
FG1-MW3D	12/11/12	13:49	18.17	1	19.1	6.78	3.5	243	1433		2.00	0		
FG1-MW3D	12/11/12	13:51		1	20.3	6.48	1.1	249	1922			2		
FG1-MW3D	12/11/12	13:53		1	20.8	6.42	1.3	249	1918			4		
FG1-MW3D	12/11/12	13:55	18.43	1	21.0	6.45	1.1	249	1966	43		6	3.0	sampled
FG1-MW4s	02/12/12	13:14	15.58	0.5	21.4	6.61	2.6	193	614		1.18	0		
FG1-MW4s	02/12/12	13:17		0.5	21.3	6.32	2.8	215	663			1		
FG1-MW4s	02/12/12	13:20		0.5	21.3	6.24	2.7	212	682			2		
FG1-MW4s	02/12/12	13:23		0.5	21.4	6.25	2.7	204	679			3		
FG1-MW4s	02/12/12	13:26	17.42	0.5	21.4	6.23	2.4	201	679	370		4	3.4	sampled
FG1-MW4s	05/14/12	12:20	15.33	0.5	21.7	6.08	2	202	645		1.284384	0		
FG1-MW4s	05/14/12	12:23		0.5	20.8	6.02	2.1	214	626			1.5		
FG1-MW4s	05/14/12	12:26		0.5	21.6	6.11	2.1	203	624			3		
FG1-MW4s	05/14/12	12:29	16.05	0.5	20.9	6	2.4	204	632	57		4.5	3.5	sampled
FG1-MW4S	08/15/12	18:13	11.75	1.0	22.8	7.34	2	94	590		1.80336	0		
FG1-MW4S	08/15/12	18:15		1.0	22.2	6.72	2.1	114	645			2		
FG1-MW4S	08/15/12	18:17		1.0	22	6.54	2	113	642			4		
FG1-MW4S	08/15/12	18:19	11.83	1.0	22	6.5	2	112	635	10		6	3.3	SAMPLED at 18:20
FG1-MW4S	12/11/12	14:19	16.47	1	20.9	6.96	2.2	231	925		1.03	0		
FG1-MW4S	12/11/12	14:20		1	23	6.67	1.9	231	914			1		
FG1-MW4S	12/11/12	14:21		1	23.7	6.40	1.9	239	588			2		
FG1-MW4S	12/11/12	14:23	16.77	1	23.4	6.18	1.8	243	593	19		3	2.9	sampled
FG1-MW5s	02/12/12	14:07	16.22	0.5	20.4	6.86	1.5	187	628		1.02	0		
FG1-MW5s	02/12/12	14:09		0.5	20.3	6.83	1.3	178	608			1		

Table 6
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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
FG1-MW5s	02/12/12	14:11		0.5	20.2	6.85	1.3	171	607			2		
FG1-MW5s	02/12/12	14:13		0.5	20.1	6.83	1.4	167	607			3		
FG1-MW5s	02/12/12	14:15	16.30	0.5	20.2	6.81	1.4	163	607	8.5		4	3.9	sampled
FG1-MW5s	05/14/12	13:03	14.59	0.5	22.1	6.73	2.6	171	750		1.317024	0		
FG1-MW5s	05/14/12	13:06		0.5	20.9	6.68	2.6	166	760			1.5		
FG1-MW5s	05/14/12	13:09		0.5	20.2	6.68	2.8	165	756			3		
FG1-MW5s	05/14/12	13:12	14.61	0.5	20.7	6.68	2.7	162	743	11		4.5	3.4	sampled
FG1-MW5S	08/15/12	19:51	16.92	1.0	20.2	6.99	2.4	109	902		1.041216	0		
FG1-MW5S	08/15/12	19:52		1.0	20.1	6.92	2.4	107	900			1		
FG1-MW5S	08/15/12	19:53		1.0	19.4	6.76	2.5	107	904			2		
FG1-MW5S	08/15/12	19:54	17.2	1.0	19.1	6.75	2.6	107	906	8		3	2.9	SAMPLED at 19:55
FG1-MW5S	12/11/12	15:30	15.85	1	17.3	6.60	3.0	232	552		1.22	0		
FG1-MW5S	12/11/12	15:31		1	18.9	6.36	1	238	802			1		
FG1-MW5S	12/11/12	15:32		1	19.5	6.29	0.8	240	825			2		
FG1-MW5S	12/11/12	15:34	16.06	1	19.7	6.26	0.6	240	825	5.5		3	2.5	sampled
FG1-MW6s	02/12/12	13:48	19.32	0.5	22.3	6.78	1.4	186	375		0.65	0		
FG1-MW6s	02/12/12	13:50		0.5	22.3	6.62	1.6	190	386			1		
FG1-MW6s	02/12/12	13:52		0.5	22.4	6.63	1.6	192	398			2		
FG1-MW6s	02/12/12	13:54	19.40	0.5	22.3	6.62	1.7	192	404	11		3	4.6	sampled
FG1-MW6s	05/14/12	12:47	18.09	0.5	23.4	6.42	2.6	190	581		0.884544	0		
FG1-MW6s	05/14/12	12:50		0.5	23.6	6.42	3	187	479			1		
FG1-MW6s	05/14/12	12:53		0.5	23.2	6.37	3.3	184	470			2		
FG1-MW6s	05/14/12	12:56	18.09	0.5	23.2	6.36	3.3	181	464	10		3	3.4	sampled
FG1-MW6S	08/15/12	19:13	13.97	1.0	26.4	6.7	2.5	117	433		1.392096	0		
FG1-MW6S	08/15/12	19:15		1.0	26.2	6.58	2.4	120	431			1.5		
FG1-MW6S	08/15/12	19:17		1.0	26.2	6.51	2.4	120	430			3		
FG1-MW6S	08/15/12	19:19	14.13	1.0	26	6.45	2.3	122	428	15		4.5	3.2	SAMPLED at 19:20
FG1-MW6S	12/11/12	15:43	19.48	1	17.9	6.55	3.5	236	740		0.49	0		
FG1-MW6S	12/11/12	15:44		1	21.8	6.71	1.9	228	492			0.5		
FG1-MW6S	12/11/12	15:45		1	24.0	6.56	1.2	228	331			1		
FG1-MW6S	12/11/12	15:46	19.71	1	24.6	6.39	1.0	230	327	6.5		1.5	3.1	sampled
FG1-MW7s	02/12/12	13:28	18.82	0.5	21.8	6.49	2.4	197	685		1.35	0		
FG1-MW7s	02/12/12	13:31		0.5	21.3	6.44	2.5	199	629			1.5		
FG1-MW7s	02/12/12	13:34		0.5	21.8	6.50	2.5	198	623			3		
FG1-MW7s	02/12/12	13:37		0.5	21.9	6.47	2.2	193	622			4.5		
FG1-MW7s	02/12/12	13:40	19.20	0.5	21.9	6.47	2.2	189	621	39		6	4.4	sampled
FG1-MW7s	05/14/12	12:33	18.15	0.5	22.7	6.22	2.2	192	814		1.568352	0		
FG1-MW7s	05/14/12	12:36		0.5	22	6.23	2.4	193	819			1.5		
FG1-MW7s	05/14/12	12:39		0.5	22.1	6.22	2.4	190	820			3		
FG1-MW7s	05/14/12	12:42	18.19	0.5	22.2	6.22	2.4	190	819	29		4.5	2.9	sampled
FG1-MW7S	08/15/12	18:45	13.83	1.0	24.8	6.67	2.1	122	505		2.165664	0		
FG1-MW7S	08/15/12	18:47		1.0	24.3	6.34	2	125	511			2		
FG1-MW7S	08/15/12	18:49		1.0	24.2	6.32	2.1	122	513			4		
FG1-MW7S	08/15/12	18:51	13.9	1.0	24.1	6.29	2.1	121	512	8		6	2.8	SAMPLED at 18:53
FG1-MW7S	12/11/12	14:35	18.83	1	21.1	6.55	3.3	241	540		1.35	0		
FG1-MW7S	12/11/12	14:37		1	22.7	6.25	1.2	243	454			1.5		

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Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
FG1-MW7S	12/11/12	14:39		1	22.8	6.03	1.3	245	489			3		
FG1-MW7S	12/11/12	14:41	19.11	1	22.8	5.97	1.5	245	509	55		4.5	3.3	sampled
FG1-MW8s	02/12/12	14:40	18.45	0.5	18.9	7.03	1.9	169	1045		0.61	0		
FG1-MW8s	02/12/12	14:42		0.5	19.2	6.49	1.5	144	1058			1		
FG1-MW8s	02/12/12	14:44		0.5	19.3	6.51	1.5	130	1064			2		
FG1-MW8s	02/12/12	14:46		0.5	19.3	6.50	1.3	119	1060			3		
FG1-MW8s	02/12/12	14:48	18.62	0.5	19.2	6.51	1.4	111	1061	12		4	6.6	sampled
FG1-MW8s	05/14/12	13:21	16.53	0.5	20.7	6.33	2.4	176	1008		0.966144	0		
FG1-MW8s	05/14/12	13:24		0.5	19.8	6.28	3	162	1031			1		
FG1-MW8s	05/14/12	13:27		0.5	20	6.29	2.8	153	1022			2		
FG1-MW8s	05/14/12	13:30	16.58	0.5	20.5	6.29	2.6	147	1014	102		3	3.1	sampled
FG1-MW8S	08/15/12	20:16	18.5	1.0	21.2	6.86	2.5	85	1016		0.60384	0		
FG1-MW8S	08/15/12	20:17		1.0	19.6	6.61	2.6	72	1049			1		
FG1-MW8S	08/15/12	20:18		1.0	19.8	6.55	2.4	62	1047			2		
FG1-MW8S	08/15/12	20:19	19	1.0	19.6	6.53	2.4	60	1045	22		3	5.0	SAMPLED at 20:20
FG1-MW8S	12/11/12	14:51	18.01	1	19.9	6.29	2.8	247	606		0.68	0		
FG1-MW8S	12/11/12	14:53		1	20.2	5.92	2.9	253	982			1		
FG1-MW8S	12/11/12	14:54		1	20.4	5.84	2.9	253	1032			2		
FG1-MW8S	12/11/12	14:56	18.23	1	20.4	5.82	2.7	251	1033	13		3	4.4	sampled
FG1-MW9s	02/12/12	10:40	17.21	0.5	17.7	7.41	0.8	125	750		0.99	0		
FG1-MW9s	02/12/12	14:54		0.5	17.5	7.27	0.8	124	709			1		
FG1-MW9s	02/12/12	14:56		0.5	18.2	7.24	1.1	125	701			2		
FG1-MW9s	02/12/12	14:58		0.5	18.4	7.21	1.2	127	695			3		
FG1-MW9s	02/12/12	15:02	20.12	0.5	18.5	7.20	1.2	127	694	740		4	4.0	sampled
FG1-MW9s	05/14/12	11:14	18.22	0.5	17	6.82	3	254	757		1.406784	0		
FG1-MW9s	05/14/12	11:17		0.5	16.9	6.96	2.3	241	741			1.5		
FG1-MW9s	05/14/12	11:20		0.5	16.6	6.96	2.3	233	721			3		
FG1-MW9s	05/14/12	11:23	20.48	0.5	16.4	6.99	2.3	227	677	>1,000		4.5	3.2	sampled
FG1-MW9S	08/15/12	20:44	15.88	1.0	18.4	7.27	2.5	39	509		1.210944	0		
FG1-MW9S	08/15/12	20:46		1.0	18	7.13	2.5	61	402			1.5		
FG1-MW9S	08/15/12	20:48		1.0	17.8	7.11	2.4	70	400			3		
FG1-MW9S	08/15/12	20:50	21.15	1.0	17.6	7.02	2.3	78	388	80		4.5	3.7	SAMPLED at 20:52
FG1-MW9S	12/11/12	15:08	17.29	1	18.1	6.58	4.1	232	738		0.98	0		
FG1-MW9S	12/11/12	15:09		1	18.2	6.55	1.2	229	457			1		
FG1-MW9S	12/11/12	15:10		1	18.3	6.55	1.2	227	388			2		
FG1-MW9S	12/11/12	15:11	17.50	1	18.5	6.53	1.2	227	382	349		3	3.1	sampled
FG2-MW1s	02/10/12	15:25	5.71	0.5	20.4	7.24	2.7	249	6746		2.66	0		
FG2-MW1s	02/10/12	15:29		0.5	19.6	7.13	2.5	244	6713			2.5		
FG2-MW1s	02/10/12	15:34		0.5	19.5	7.07	2.5	220	6409			5		
FG2-MW1s	02/10/12	15:39	6.65	0.5	19.4	7.07	2.2	209	6248	9		7.5	2.8	sampled
FG2-MW1s	05/10/12	13:52	4.42	0.5	20.9	7.19	1.5	219	5440		2.869056	0		
FG2-MW1s	05/10/12	13:55		0.5	19.9	7.09	1.6	205	5443			3		
FG2-MW1s	05/10/12	13:58		0.5	19.6	7.08	1.7	197	5514			6		
FG2-MW1s	05/10/12	14:01	11.67	0.5	19.5	7.08	1.9	198	5538	150		9	3.1	sampled at 14:04
FG2-MW1S	08/15/12	13:40	10.25	1.0	24.3	7.01	1.9	149	4849		2.87232	0		
FG2-MW1S	08/15/12	13:43		1.0	22.4	6.95	1.3	141	4917			3		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
FG2-MW1S	08/15/12	13:46		1.0	22.1	6.94	1.4	132	4916			6		
FG2-MW1S	08/15/12	13:49	11.9	1.0	22.1	6.92	1.4	130	4902	120		9	3.1	SAMPLED at 13:51
FG2-MW1S	12/06/12	12:31	5.24	1	20.1	7.42	0.5	123	6530		2.74	0		
FG2-MW1S	12/06/12	12:34		1	20.2	7.30	0.6	123	6528			3		
FG2-MW1S	12/06/12	12:37		1	20.2	7.28	0.7	125	6511			6		
FG2-MW1S	12/06/12	12:40	7.00	1	20.4	7.26	1.0	125	6507	140		9	3.3	sampled
FG2-MW2s	02/10/12	16:10	9.22	0.5	19.8	7.35	2.6	240	4155		2.30	0		
FG2-MW2s	02/10/12	16:14		0.5	19.1	7.24	2.7	247	3906			2.5		
FG2-MW2s	02/10/12	16:18		0.5	19.0	7.19	2.7	250	3728			5		
FG2-MW2s	02/10/12	16:23	10.91	0.5	18.9	7.17	2.8	253	3587	216		7.5	3.3	sampled
FG2-MW2s	05/10/12	12:34	8.13	0.5	21.3	7.06	2.4	226	3690		2.475744	0		
FG2-MW2s	05/10/12	12:37		0.5	19.9	7.16	1.3	225	3769			2.5		
FG2-MW2s	05/10/12	12:40		0.5	18.8	7.14	1.2	223	3781			5		
FG2-MW2s	05/10/12	12:43	13.55	0.5	19	7.18	1.3	218	3792	573		7.5	3.0	sampled at 12:45
FG2-MW2S	08/15/12	14:59	9.43	1.0	21.7	6.98	1.3	185	3882		2.811936	0		
FG2-MW2S	08/15/12	15:02		1.0	22.3	7.03	0.5	191	3530			3		
FG2-MW2S	08/15/12	15:05		1.0	21.9	7.04	0.7	196	3516			6		
FG2-MW2S	08/15/12	15:08	12.41	1.0	22.1	7.02	0.8	197	3510	356		9	3.2	SAMPLED at 15:10
FG2-MW2S	12/06/12	11:31	7.70	1	20.9	7.61	0.7	121	3277		2.55	0		
FG2-MW2S	12/06/12	11:34		1	20.9	7.21	0.7	121	3290			2.5		
FG2-MW2S	12/06/12	11:37		1	21.0	7.27	0.8	125	3300			5		
FG2-MW2S	12/06/12	11:40	10.14	1	21.0	7.30	1.0	128	3306	17		7.5	2.9	sampled
FG2-MW3s	02/10/12	15:49	9.70	0.5	20.1	7.22	2.0	214	5641		2.94	0		
FG2-MW3s	02/10/12	15:53		0.5	20.4	7.12	2.1	224	5324			3		
FG2-MW3s	02/10/12	15:57		0.5	20.4	7.08	2.1	227	5331			6		
FG2-MW3s	02/10/12	16:02	10.15	0.5	20.3	7.12	2.2	234	5327	3		9	3.1	sampled
FG2-MW3s	05/10/12	13:22	10.33	0.5	22.5	7.15	1.3	235	5729		2.834784	0		
FG2-MW3s	05/10/12	13:25		0.5	21.1	7.06	1.6	233	2749			3		
FG2-MW3s	05/10/12	13:28		0.5	21.3	7.22	1.5	227	2737			6		
FG2-MW3s	05/10/12	13:31	10.86	0.5	21	7.09	1.6	227	2736	4		9	3.2	sampled at 13:33
FG2-MW3S	08/15/12	14:34	9.85	1.0	22.3	7	0.6	181	5845		3.122016	0		
FG2-MW3S	08/15/12	14:37		1.0	21.3	6.95	0.5	183	5820			3		
FG2-MW3S	08/15/12	14:40		1.0	21.2	6.96	6	185	5813			6		
FG2-MW3S	08/15/12	14:43	10.23	1.0	21.6	6.97	0.5	188	5807	5		9	2.9	SAMPLED at 14:44
FG2-MW3S	12/06/12	11:11	9.93	1	20.1	7.27	1.0	123	5358		2.90	0		
FG2-MW3S	12/06/12	11:14		1	20.0	7.37	1.0	121	5365			3		
FG2-MW3S	12/06/12	11:17		1	19.9	7.42	1.0	121	5370			6		
FG2-MW3S	12/06/12	11:20	10.70	1	19.9	7.44	1.0	120	5374	32		9	3.1	sampled
FG2-MW4s	02/10/12	15:00	10.22	0.5	20.4	7.42	2.5	247	4539		3.06	0		
FG2-MW4s	02/10/12	15:04		0.5	20.5	7.23	2.7	253	4690			3		
FG2-MW4s	02/10/12	15:08		0.5	20.7	7.22	2.7	250	4558			6		
FG2-MW4s	02/10/12	15:13	10.20	0.5	20.7	7.19	2.6	250	4518	4		9	2.9	sampled
FG2-MW4s	05/10/12	14:14	10.8	0.5	20.9	7.23	1.9	216	4623		2.97024	0		
FG2-MW4s	05/10/12	14:17		0.5	20.2	7.22	1.7	216	4574			3		
FG2-MW4s	05/10/12	14:20		0.5	20.2	7.32	1.7	213	4534			6		
FG2-MW4s	05/10/12	14:23	11.9	0.5	20.2	7.31	1.8	213	4512	51		9	3.0	sampled at 14:25

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
FG2-MW4S	08/15/12	14:07	10.28	1.0	22.8	6.96	0.9	162	4241		3.399456	0		
FG2-MW4S	08/15/12	14:10		1.0	22.5	7.04	0.6	168	4230			3		
FG2-MW4S	08/15/12	14:13		1.0	22.4	7.01	0.6	172	4249			6		
FG2-MW4S	08/15/12	14:16	10.82	1.0	22.6	7.01	0.7	172	4308	24		9	2.6	SAMPLED at 14:19
FG2-MW4S	12/06/12	10:46	8.30	1	20.4	7.33	0.7	117	4056		3.29	0		
FG2-MW4S	12/06/12	10:49		1	20.6	7.42	0.7	111	4085			3		
FG2-MW4S	12/06/12	10:52		1	21.0	7.55	0.6	110	4120			6		
FG2-MW4S	12/06/12	10:55	10.24	1	21.3	7.60	0.6	108	4165	43		9	2.7	sampled
FG2-MW5s	02/10/12	14:38	5.91	0.5	21.0	7.38	2.7	249	3239		2.43	0		
FG2-MW5s	02/10/12	14:42		0.5	20.1	7.20	2.8	262	4205			2.5		
FG2-MW5s	02/10/12	14:46		0.5	19.8	7.19	2.8	255	4379			5		
FG2-MW5s	02/10/12	14:51	5.91	0.5	19.7	7.23	2.8	251	4403	18		7.5	3.1	sampled
FG2-MW5s	05/10/12	14:38	6.3	0.5	20.1	7.16	1.5	217	4298		2.3664	0		
FG2-MW5s	05/10/12	14:41		0.5	18.9	7.12	1.6	218	4280			2.5		
FG2-MW5s	05/10/12	14:44		0.5	18.8	7.13	2	220	4268			5		
FG2-MW5s	05/10/12	14:47	6.35	0.5	18.9	7.14	1.8	222	4265	11		7.5	3.2	sampled at 14:49
FG2-MW5S	08/15/12	15:17	4.2	0.5	19.3	7.07	0.6	199	3887		2.769504	0		
FG2-MW5S	08/15/12	15:20		0.5	19	7.04	0.4	201	3888			2.5		
FG2-MW5S	08/15/12	15:23		0.5	18.8	7.03	0.4	200	3902			5		
FG2-MW5S	08/15/12	15:26	4.2	0.5	18.9	7.03	0.5	202	3908	37		7.5	2.7	SAMPLED at 15:28
FG2-MW5S	12/06/12	10:01	5.12	1	19.8	6.97	1.4	146	4190		2.56	0		
FG2-MW5S	12/06/12	12:04		1	19.7	6.99	0.9	141	4260			2.5		
FG2-MW5S	12/06/12	12:07		1	19.6	7.11	0.7	139	4241			5		
FG2-MW5S	12/06/12	12:10	5.13	1	19.6	7.16	0.6	137	4258	9		7.5	2.9	sampled
GOD-MW1s	02/09/12	10:58	8.66	0.5	20.7	7.75	1.5	170	3211		2.39	0		
GOD-MW1s	02/09/12	11:03		0.5	19.9	7.42	1.4	167	3174			2.5		
GOD-MW1s	02/09/12	11:10		0.5	20.4	7.42	1.4	155	3119			5		
GOD-MW1s	02/09/12	11:18	8.90	0.5	20.4	7.43	1.3	155	3114	7		7.5	3.1	sampled
GOD-MW1s	05/09/12	17:23	7.7	0.5	19.9	7.58	1.8	56	2924		2.54592	0		
GOD-MW1s	05/09/12	17:28		0.5	19.6	7.37	1.9	69	3057			2.5		
GOD-MW1s	05/09/12	17:33		0.5	19.6	7.58	1.9	57	3037			5		
GOD-MW1s	05/09/12	17:38	7.77	0.5	19.6	7.4	1.8	63	3025	15		7.5	2.9	sampled
GOD-MW1S	08/20/12	18:00	6.23	1.0	21.4	7.82	0.62	23	2689		2.785824	0		
GOD-MW1S	08/20/12	18:03		1.0	20.9	7.67	0.45	25	2719			3		
GOD-MW1S	08/20/12	18:06		1.0	20.7	7.59	0.57	27	2728			6		
GOD-MW1S	08/20/12	18:09	7.44	1.0	20.6	7.56	0.5	28	2727	12		9	3.2	SAMPLED at 18:10
GOD-MW1S	12/03/12	15:12	9.86	1	19.9	7.07	3.40	97	2275		2.19	0		
GOD-MW1S	12/03/12	15:14		1	20.6	6.99	1.00	94	2914			2		
GOD-MW1S	12/03/12	15:16		1	20.7	7.00	0.72	93	2928			4		
GOD-MW1S	12/03/12	15:18	10.16	1	20.8	7.00	0.96	92	2923	6		6	2.7	sampled
GOD-MW2s	02/09/12	11:46	11.14	0.5	21.8	7.70	1.1	138	2017		2.67	0		
GOD-MW2s	02/09/12	11:50		0.5	22.0	7.76	1.2	141	2937			2.5		
GOD-MW2s	02/09/12	11:55		0.5	22.0	7.74	1.1	135	3264			5		
GOD-MW2s	02/09/12	12:01	11.26	0.5	22.5	7.75	1.1	137	3320	2		7.5	2.8	sampled
GOD-MW2s	05/09/12	16:32	10.8	0.5	22.3	6.97	2	130	2427		2.72544	0		
GOD-MW2s	05/09/12	16:38		0.5	20.7	7.5	2.1	120	3062			3		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
GOD-MW2s	05/09/12	16:44		0.5	20.7	7.55	2	115	3162			6		
GOD-MW2s	05/09/12	16:50	10.92	0.5	20.6	7.59	2	111	3160	5		9	3.3	sampled
GOD-MW2S	08/20/12	16:49	10.23	1.0	21.8	8.16	0.35	35	2700		2.818464	0		
GOD-MW2S	08/20/12	16:52		1.0	21.1	7.94	0.33	35	2866			3		
GOD-MW2S	08/20/12	16:55		1.0	21.1	7.88	0.23	35	2981			6		
GOD-MW2S	08/20/12	16:58	10.43	1.0	21.2	7.85	0.21	34	2305	12		9	3.2	SAMPLED at 17:00
GOD-MW2S	12/03/12	14:42	12.94	1	21.4	7.38	0.90	105	2733		2.38	0		
GOD-MW2S	12/03/12	14:44		1	21.8	7.31	0.74	109	2892			2.5		
GOD-MW2S	12/03/12	14:46		1	21.8	7.28	0.68	111	2959			5		
GOD-MW2S	12/03/12	14:48	12.97	1	21.9	7.25	0.78	109	3038	7		7.5	3.2	sampled
GOD-MW3s	02/09/12	11:25	11.74	0.5	21.0	7.59	1.8	157	2434		1.79	0		
GOD-MW3s	02/09/12	11:29		0.5	21.0	7.48	1.5	161	1780			2		
GOD-MW3s	02/09/12	11:34		0.5	21.1	7.48	1.5	151	1585			4		
GOD-MW3s	02/09/12	11:40	11.85	0.5	21.3	7.45	1.3	147	1549	5		6	3.4	sampled
GOD-MW3s	05/09/12	17:00	11.35	0.5	20.1	7.61	1.9	110	1543		1.85232	0		
GOD-MW3s	05/09/12	17:04		0.5	19.7	7.45	2	115	1623			2		
GOD-MW3s	05/09/12	17:08		0.5	19.7	7.35	2.1	117	1625			4		
GOD-MW3s	05/09/12	17:12	11.41	0.5	19.6	7.32	2.1	122	1620	5		6	3.2	sampled
GOD-MW3S	08/20/12	17:20	11.77	1.0	21.5	7.88	0.54	58	1365		1.783776	0		
GOD-MW3S	08/20/12	17:22		1.0	20.9	7.62	0.63	60	1393			2		
GOD-MW3S	08/20/12	17:24		1.0	20.7	7.57	0.52	60	1400			4		
GOD-MW3S	08/20/12	17:26	12.1	1.0	20.7	7.55	0.6	62	1407	11		6	3.4	SAMPLED at 17:26
GOD-MW3S	12/03/12	14:57	13.40	1	21.4	7.47	1.6	98	1548		1.52	0		
GOD-MW3S	12/03/12	15:00		1	21.7	7.32	1.2	112	1392			1.5		
GOD-MW3S	12/03/12	15:02		1	21.7	7.26	1.1	118	1391			3		
GOD-MW3S	12/03/12	15:04	13.55	1	21.8	7.21	1.0	117	1396	15		4.5	3.0	sampled
GOD-MW4s	02/09/12	10:31	11.32	0.5	18.0	6.67	1.9	245	3447		1.94	0		
GOD-MW4s	02/09/12	10:35		0.5	20.6	7.58	1.7	189	3324			2		
GOD-MW4s	02/09/12	10:40		0.5	20.9	7.66	1.7	172	3295			4		
GOD-MW4s	02/09/12	10:45	11.80	0.5	21.1	7.65	1.5	147	3276	10		6	3.1	sampled
GOD-MW4s	05/09/12	17:44	11.14	0.5	20.2	7.74	1.9	77	3169		1.968192	0		
GOD-MW4s	05/09/12	17:48		0.5	20.6	7.61	1.4	85	3247			2		
GOD-MW4s	05/09/12	17:52		0.5	20.6	7.56	1.8	88	3229			4		
GOD-MW4s	05/09/12	17:56	11.17	0.5	20.2	7.56	1.6	89	3244	7		6	3.0	sampled
GOD-MW4S	08/20/12	18:31	12.16	1.0	22.5	7.93	1	36	2927		1.801728	0		
GOD-MW4S	08/20/12	18:33		1.0	22.4	7.77	0.48	38	2967			2		
GOD-MW4S	08/20/12	18:35		1.0	22.3	7.75	0.36	39	2956			4		
GOD-MW4S	08/20/12	18:37	12.65	1.0	22.3	7.71	0.33	39	2961	33		6	3.3	SAMPLED at 18:38
GOD-MW4S	12/03/12	15:33	13.67	1	21.4	7.25	3.3	99	3270		1.56	0		
GOD-MW4S	12/03/12	15:35		1	22.3	7.24	1.0	98	3001			1.5		
GOD-MW4S	12/03/12	15:37		1	22.7	7.22	1.0	101	3030			3		
GOD-MW4S	12/03/12	15:39	14.07	1	22.8	7.22	0.9	101	3056	22		4.5	2.9	sampled
GOD-MW5s	02/09/12	13:01	6.18	0.5	20.5	7.60	1.2	155	2583		3.46	0		
GOD-MW5s	02/09/12	13:06		0.5	19.8	7.73	1.4	166	2216			3.5		
GOD-MW5s	02/09/12	13:11		0.5	19.7	7.48	1.4	169	2152			7		
GOD-MW5s	02/09/12	13:17	6.27	0.5	19.6	7.48	1.5	168	2135	2		10.5	3.0	sampled

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
GOD-MW5s	05/09/12	18:44	8.57	0.5	19.8	7.67	1.6	117	1802		3.073056	0		
GOD-MW5s	05/09/12	18:50		0.5	19.2	7.45	1.7	124	1987			3		
GOD-MW5s	05/09/12	18:56		0.5	19.2	7.44	1.8	121	2008			6		
GOD-MW5s	05/09/12	19:02	8.65	0.5	19.2	7.41	1.8	123	2012	7		9	2.9	sampled
GOD-MW5S	08/20/12	15:28	6.42	1.0	21.5	8.26	0.72	59	1568		3.423936	0		
GOD-MW5S	08/20/12	15:32		1.0	21.4	8.13	0.61	36	1674			3.5		
GOD-MW5S	08/20/12	15:36		1.0	21.2	7.96	0.56	31	1735			7		
GOD-MW5S	08/20/12	15:40	6.52	1.0	21.1	7.95	0.52	30	1741	8		10.5	3.1	SAMPLED at 15:40
GOD-MW5S	12/03/12	13:45	9.22	1	22.3	7.75	1.0	158	2006		2.97	0		
GOD-MW5S	12/03/12	13:55		1	22.1	7.70	1.0	158	2013			3		
GOD-MW5S	12/03/12	14:00		1	22.2	7.68	1.0	93	2023			6		
GOD-MW5S	12/03/12	14:05	9.29	1	22.0	7.59	0.7	82	2007	3		9	3.0	sampled
GOD-MW6s	02/09/12	12:11	7.07	0.5	23.0	7.67	1.1	144	3632		2.88	0		
GOD-MW6s	02/09/12	12:16		0.5	21.3	7.82	1.4	152	4002			3		
GOD-MW6s	02/09/12	12:21		0.5	21.3	7.47	1.4	149	4009			6		
GOD-MW6s	02/09/12	12:26	8.02	0.5	21.4	7.50	1.4	147	4008	2		9	3.1	sampled
GOD-MW6s	05/09/12	18:08	9.1	0.5	20.1	7.53	1.8	101	3921		2.54592	0		
GOD-MW6s	05/09/12	18:12		0.5	20	7.42	1.9	104	3917			2.5		
GOD-MW6s	05/09/12	18:17		0.5	20	7.43	1.9	106	3912			5		
GOD-MW6s	05/09/12	18:22	9.8	0.5	20	7.4	2	106	3910	103		7.5	2.9	sampled
GOD-MW6S	08/20/12	16:18	6.29	1.0	22.5	7.86	0.25	37	3850		3.004512	0		
GOD-MW6S	08/20/12	16:21		1.0	22	7.73	0.25	38	3794			3		
GOD-MW6S	08/20/12	16:24		1.0	21.8	7.7	0.22	38	3766			6		
GOD-MW6S	08/20/12	16:27	7.14	1.0	21.7	7.66	0.22	39	3763	7		9	3.0	SAMPLED at 16:28
GOD-MW6S	12/03/12	14:27	10.30	1	21.6	7.25	1.40	96	4044		2.35	0		
GOD-MW6S	12/03/12	14:29		1	22.0	7.21	1.00	109	3963			2.5		
GOD-MW6S	12/03/12	14:31		1	22.0	7.19	0.90	110	3967			5		
GOD-MW6S	12/03/12	14:33	10.74	1	21.9	7.16	0.85	110	3969	87		7.5	3.2	sampled
GOD-MW7s	02/09/12	12:35	6.06	0.5	21.6	7.64	1.0	148	4095		3.12	0		
GOD-MW7s	02/09/12	12:40		0.5	21.1	7.54	1.2	151	4195			3		
GOD-MW7s	02/09/12	12:45		0.5	21.1	7.55	1.2	151	4205			6		
GOD-MW7s	02/09/12	12:51	6.50	0.5	21.2	7.53	1.3	151	4194	1		9	2.9	sampled
GOD-MW7s	05/09/12	18:33	9.4	0.5	20	7.51	2.2	106	4246		2.57856	0		
GOD-MW7s	05/09/12	18:38		0.5	20	7.55	2	105	4236			2.5		
GOD-MW7s	05/09/12	18:43		0.5	19.9	7.63	1.8	108	4231			5		
GOD-MW7s	05/09/12	18:48	9.47	0.5	19.9	7.66	1.7	109	4230	83		7.5	2.9	sampled
GOD-MW7S	08/20/12	15:51	5.45	1.0	22	7.79	0.5	17	4017		3.2232	0		
GOD-MW7S	08/20/12	15:54		1.0	21.8	7.76	0.5	18	4034			3.5		
GOD-MW7S	08/20/12	15:57		1.0	21.8	7.75	0.44	23	4011			7		
GOD-MW7S	08/20/12	16:00	6.11	1.0	21.7	7.75	0.35	25	4010	17		10.5	3.3	SAMPLED at 16:00
GOD-MW7S	12/03/12	14:10	9.92	1	21.4	7.17	1.3	120	4100		2.49	0		
GOD-MW7S	12/03/12	14:15		1	21.9	7.22	0.9	114	4124			2.5		
GOD-MW7S	12/03/12	14:17		1	21.8	7.22	0.9	110	4138			5		
GOD-MW7S	12/03/12	14:19	10.05	1	21.8	7.21	0.7	106	4141	6		7.5	3.0	sampled
MAC-MW1s	02/09/12	15:18	7.61	0.5	19.7	7.34	1.1	134	2700		1.63	0		
MAC-MW1s	02/09/12	15:20		0.5	18.9	7.32	1.2	143	2513			2		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
MAC-MW1s	02/09/12	15:24		0.5	19.1	7.40	1.2	118	2599			4		
MAC-MW1s	02/09/12	15:30	8.60	0.5	19.2	7.31	1.2	123	2516	3		6	3.7	sampled
MAC-MW1s	05/11/12	11:48	6.04	0.5	20.1	7.40	0.7	195	2520		1.89	0		
MAC-MW1s	05/11/12	11:50		0.5	19.9	7.34	1.2	207	2525			2		
MAC-MW1s	05/11/12	11:52		0.5	19.1	7.31	0.7	209	2515			4		
MAC-MW1s	05/11/12	11:55	7.90	0.5	19.2	7.32	0.5	209	2509	18		6	3.2	sampled
MAC-MW1S	08/17/12	10:47	6.29	1.0	21.2	7.37	1	213	2421		1.847424	0		
MAC-MW1S	08/17/12	10:49		1.0	21.7	7.23	0.72	214	2417			2		
MAC-MW1S	08/17/12	10:51		1.0	21.7	7.21	0.51	214	2422			4		
MAC-MW1S	08/17/12	10:53	6.42	1.0	22.1	7.18	0.56	215	2423	26		6	3.2	SAMPLED at 10:54
MAC-MW1S	12/03/12	16:55	5.62	1	19.6	6.98	1.8	72	2456		1.96	0		
MAC-MW1S	12/03/12	16:57		1	20.0	6.98	1.3	75	2458			2		
MAC-MW1S	12/03/12	16:59		1	20.5	6.97	0.7	75	2457			4		
MAC-MW1S	12/03/12	17:01	6.09	1	20.6	6.96	0.8	75	2461	1.5		6	3.1	sampled
MAC-MW2s	02/09/12	14:57	6.71	0.5	19.5	7.85	0.4	23	6290		1.79	0		
MAC-MW2s	02/09/12	14:59		0.5	19.8	7.48	0.7	85	3160			2		
MAC-MW2s	02/09/12	15:03		0.5	19.8	7.37	0.7	105	3063			4		
MAC-MW2s	02/09/12	15:08	6.80	0.5	19.9	7.25	0.9	116	2987	5.5		6	3.4	sampled
MAC-MW2s	05/11/12	12:00	5.32	0.5	21.0	7.10	1.0	204	2950		2.02	0		
MAC-MW2s	05/11/12	12:04		0.5	20.5	7.07	0.5	220	2967			2		
MAC-MW2s	05/11/12	12:08		0.5	20.4	7.04	0.6	225	2976			4		
MAC-MW2s	05/11/12	12:12	5.45	0.5	20.2	7.05	0.8	222	2976	12		6	3.0	sampled
MAC-MW2S	08/17/12	10:28	5.11	0.5	22	7.45	1	215	2505		2.06448	0		
MAC-MW2S	08/17/12	10:32		0.5	20.7	7.14	0.84	218	2603			2		
MAC-MW2S	08/17/12	10:36		0.5	20.5	7.06	0.46	219	2624			4		
MAC-MW2S	08/17/12	10:40	5.36	0.5	20.9	7.01	0.6	218	2619	28		6	2.9	SAMPLED at 10:40
MAC-MW2S	12/03/12	16:41	6.05	1	19.3	7.38	4.1	41	3523		1.90	0		
MAC-MW2S	12/03/12	16:43		1	20.7	7.35	1.4	53	2685			2		
MAC-MW2S	12/03/12	16:45		1	20.7	7.13	0.7	61	2644			4		
MAC-MW2S	12/03/12	16:48	6.24	1	20.9	7.06	0.9	64	2641	2		6	3.2	sampled
MAC-MW3s	02/09/12	16:10	5.34	0.5	19.3	7.29	1.4	155	7495		3.70	0		
MAC-MW3s	02/09/12	16:14		0.5	18.7	7.20	1.5	162	9165			4		
MAC-MW3s	02/09/12	16:19		0.5	18.0	7.19	1.5	161	9881			8		
MAC-MW3s	02/09/12	16:25	8.51	0.5	18.3	7.16	1.5	159	9911	105		12	3.2	sampled
MAC-MW3s	05/11/12	10:26	5.00	0.5	19.7	6.88	1.0	267	11,250		3.75	0		
MAC-MW3s	05/11/12	10:33		0.5	18.2	7.11	0.8	254	11,750			4		
MAC-MW3s	05/11/12	10:40		0.5	18.3	7.10	0.8	231	12,010			8		
MAC-MW3s	05/11/12	10:47	9.28	0.5	18.5	7.10	1.0	225	12,150	480		12	3.2	sampled
MAC-MW3S	08/17/12	11:28	5.3	1.0	20.1	7.47	0.66	180	9540		3.707904	0		
MAC-MW3S	08/17/12	11:32		1.0	20.8	7.22	0.78	101	8485			4		
MAC-MW3S	08/17/12	11:36		1.0	20.6	7.13	0.68	121	8866			8		
MAC-MW3S	08/17/12	11:40	6.22	1.0	21.5	7.08	0.68	133	9029	193		12	3.2	SAMPLED at 11:40
MAC-MW3S	12/03/12	15:58	4.94	1	19.6	7.24	1.5	92	8,705		3.76	0		
MAC-MW3S	12/03/12	16:00		1	19.8	7.12	1.0	97	8,449			4		
MAC-MW3S	12/03/12	16:02		1	19.7	7.04	0.9	99	8,241			8		
MAC-MW3S	12/03/12	16:04	6.98	1	19.7	6.97	0.9	100	8,316	4		12	3.2	sampled

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
MAC-MW4s	02/09/12	15:50	6.52	0.5	20.1	7.53	1.3	128	4105		1.74	0		
MAC-MW4s	02/09/12	15:54		0.5	20.1	7.42	1.4	136	3902			2		
MAC-MW4s	02/09/12	15:59		0.5	19.9	7.43	1.4	136	3910			4		
MAC-MW4s	02/09/12	16:05	6.79	0.5	20.0	7.44	1.5	140	3911	4		6	3.4	sampled
MAC-MW4s	05/11/12	10:50	5.65	0.5	20.3	7.34	0.6	213	5077		1.88	0		
MAC-MW4s	05/11/12	10:58		0.5	19.9	7.30	0.7	198	4642			2		
MAC-MW4s	05/11/12	11:06		0.5	19.6	7.30	0.6	191	4558			4		
MAC-MW4s	05/11/12	11:14	5.95	0.5	19.7	7.27	0.5	191	4532	17		6	3.2	sampled
MAC-MW4S	08/17/12	11:16	5.49	1.0	24.2	7.23	0.81	185	4756		1.919232	0		
MAC-MW4S	08/17/12	11:18		1.0	22.6	7.2	0.61	186	4449			2		
MAC-MW4S	08/17/12	11:20		1.0	22	7.18	0.8	185	4400			4		
MAC-MW4S	08/17/12	11:22	5.91	1.0	22.7	7.17	0.57	181	4340	7		6	3.1	SAMPLED at 11:22
MAC-MW4S	12/03/12	16:11	4.62	1	20.0	7.09	1.4	84	4522		2.05	0		
MAC-MW4S	12/03/12	16:14		1	20.9	7.03	0.7	89	4102			2		
MAC-MW4S	12/03/12	16:17		1	21.0	6.98	0.9	91	4055			4		
MAC-MW4S	12/03/12	16:20	4.84	1	21.1	6.96	1.2	91	4042	35		6	2.9	sampled
MAC-MW5s	02/09/12	15:33	5.90	0.5	19.9	7.52	1.1	123	2991		3.46	0		
MAC-MW5s	02/09/12	15:37		0.5	19.8	7.60	1.1	130	4301			3.5		
MAC-MW5s	02/09/12	15:42		0.5	19.9	7.60	1.3	128	4425			7		
MAC-MW5s	02/09/12	15:48	6.00	0.5	19.9	7.61	1.2	127	4505	10		10.5	3.0	sampled
MAC-MW5s	05/11/12	11:20	4.80	0.5	19.6	7.35	0.9	179	4504		3.64	0		
MAC-MW5s	05/11/12	11:28		0.5	19.7	7.55	0.4	181	4388			4		
MAC-MW5s	05/11/12	11:36		0.5	19.7	7.57	0.4	183	4310			8		
MAC-MW5s	05/11/12	11:44	5.12	0.5	19.7	7.57	0.5	180	4297	26		12	3.3	sampled
MAC-MW5S	08/17/12	10:57	4.66	1.0	21.3	7.44	0.91	204	4011		3.66384	0		
MAC-MW5S	08/17/12	11:01		1.0	21.3	7.38	0.6	203	4093			4		
MAC-MW5S	08/17/12	11:05		1.0	21.5	7.35	0.55	200	4085			8		
MAC-MW5S	08/17/12	11:09	5.17	1.0	22.2	7.33	0.42	195	4082	672		12	3.3	SAMPLED at 11:09
MAC-MW5S	12/03/12	16:26	4.07	1	20.7	6.97	1.3	87	4302		3.76	0		
MAC-MW5S	12/03/12	16:29		1	21.3	7.01	1.0	91	4288			4		
MAC-MW5S	12/03/12	16:32		1	21.4	7.05	0.8	92	4283			8		
MAC-MW5S	12/03/12	16:35	4.18	1	21.4	7.05	0.8	84	4280	6		12	3.2	sampled
MEN-MW1s	02/07/12	17:28	7.12	0.5	17.5	7.11	1.5	137	5258		1.73	0		
MEN-MW1s	02/07/12	17:31		0.5	17.6	6.93	1.6	146	5435			2		
MEN-MW1s	02/07/12	17:35		0.5	18.3	6.95	1.6	148	5476			4		
MEN-MW1s	02/07/12	17:39	9.35	0.5	18.5	6.93	1.4	151	5339	480		6	3.5	sampled
MEN-MW1s	05/08/12	15:56	12.02	0.5	22.0	7.13	2.1	120	4991		1.41	0		
MEN-MW1s	05/08/12	15:59		0.5	19.5	6.93	1.8	140	5100			1.5		
MEN-MW1s	05/08/12	16:02		0.5	19.5	6.91	1.8	149	5168			3		
MEN-MW1s	05/08/12	16:05	13.70	0.5	19.5	6.88	2.1	156	5221	882		4.5	3.2	sampled at 16:08
MEN-MW1S	08/14/12	8:46	10.01	1.0	21.9	6.7	1.3	265	5653		1.687488	0		
MEN-MW1S	08/14/12	8:48		1.0	20.8	6.73	1.7	248	5954			2		
MEN-MW1S	08/14/12	8:50		1.0	20.4	6.69	1.6	244	6111			4		
MEN-MW1S	08/14/12	8:52	11.98	1.0	20.7	6.65	1.5	239	6146	504		6	3.6	SAMPLED at 8:54
MEN-MW1S	12/06/12	10:28	9.20	1	18.4	6.31	2.3	127	4016		1.39	0		
MEN-MW1S	12/06/12	10:30		1	19.9	6.31	1.4	111	4668			1.5		

Table 6
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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
MEN-MW1S	12/06/12	10:32		1	20.3	6.44	1.0	104	4734			3		
MEN-MW1S	12/06/12	10:35	9.22	1	20.4	6.55	1.1	98	4729	225		4.5	3.2	sampled
MEN-MW2s	02/07/12	17:15	7.04	0.5	16.3	7.28	1.6	138	4300		1.71	0		
MEN-MW2s	02/07/12	17:18		0.5	17.0	7.11	1.6	145	4330			2		
MEN-MW2s	02/07/12	17:22		0.5	17.2	7.14	1.6	148	4306			4		
MEN-MW2s	02/07/12	17:26	12.05	0.5	17.7	7.16	1.7	149	4320	225		6	3.5	sampled
MEN-MW2s	05/08/12	15:03	11.90	1.5	20.9	7.08	1.9	176	4670		1.46	0		
MEN-MW2s	05/08/12	15:04		1.5	19.2	7.04	2.0	185	4700			1.5		
MEN-MW2s	05/08/12	15:05		1.5	20.2	7.04	5.5	186	4617			3		
MEN-MW2s	05/08/12	15:06	15.10	1.5	20.1	7.05	5.8	188	4620	654		4.5	3.1	sampled at 15:13
MEN-MW2S	08/14/12	9:07	10.81	1.0	22.5	7.05	1	168	4557		1.6728	0		
MEN-MW2S	08/14/12	9:09		1.0	21.8	7.03	1.5	171	4519			2		
MEN-MW2S	08/14/12	9:11		1.0	21.5	7	1.4	174	4537			4		
MEN-MW2S	08/14/12	9:13	13.8	1.0	21.5	6.98	1	177	4460	735		6	3.6	SAMPLED at 9:15
MEN-MW2S	12/06/12	10:41	9.15	1	19.4	7.09	3.8	76	4507		1.36	0		
MEN-MW2S	12/06/12	10:43		1	20.5	7.08	1.7	74	4320			1.5		
MEN-MW2S	12/06/12	10:45		1	20.9	7.10	0.9	73	4296			3		
MEN-MW2S	12/06/12	10:47	9.19	1	21.0	7.10	0.9	71	4297	254		4.5	3.3	sampled
MEN-MW3s	02/07/12	16:08	6.85	0.5	16.6	6.95	2.1	190	2579		1.8	0		
MEN-MW3s	02/07/12	16:11		0.5	17.1	6.88	1.8	190	2785			2		
MEN-MW3s	02/07/12	16:15		0.5	17.0	7.16	1.8	177	2835			4		
MEN-MW3s	02/07/12	16:20	7.02	0.5	17.2	6.95	1.7	177	2845	85		6	3.3	sampled
MEN-MW3s	05/08/12	17:31	9.41	0.5	20.0	6.95	2.1	201	3043		1.58	0		
MEN-MW3s	05/08/12	17:34		0.5	18.5	6.81	1.8	207	3017			1.5		
MEN-MW3s	05/08/12	17:37		0.5	18.3	6.83	1.8	210	3025			3		
MEN-MW3s	05/08/12	17:40	9.56	0.5	17.8	6.87	1.8	214	3061	48		4.5	2.8	sampled at 17:43
MEN-MW3S	08/14/12	10:44	9.55	0.5	21.7	6.81	0.8	212	2919		1.537344	0		
MEN-MW3S	08/14/12	10:47		0.5	20.5	6.81	0.7	215	2929			1.5		
MEN-MW3S	08/14/12	10:50		0.5	21.2	6.78	0.9	220	2967			3		
MEN-MW3S	08/14/12	10:53	9.82	0.5	21.3	6.76	0.7	222	2976	29		4.5	2.9	SAMPLED at 10:55
MEN-MW3S	12/06/12	11:25	9.23	1	19.5	7.70	4.0	58	1774		1.41	0		
MEN-MW3S	12/06/12	11:27		1	20.0	7.41	0.8	67	2697			1.5		
MEN-MW3S	12/06/12	11:29		1	20.2	7.30	0.9	68	2732			3		
MEN-MW3S	12/06/12	11:31	9.25	1	20.2	7.25	0.6	69	2741	34		4.5	3.2	sampled
MEN-MW4s	02/07/12	15:51	6.32	0.5	16.4	7.14	2.0	189	1984		1.87	0		
MEN-MW4s	02/07/12	15:54		0.5	16.9	6.96	2.1	193	2398			2		
MEN-MW4s	02/07/12	15:58		0.5	17.3	6.95	2.2	192	2424			4		
MEN-MW4s	02/07/12	16:02	11.51	0.5	16.6	6.97	2.2	190	2407	>1,000		6	3.2	sampled
MEN-MW4s	05/08/12	17:49	9.73	1.0	19.2	7.08	1.9	227	2300		1.66	0		
MEN-MW4s	05/08/12	17:51		1.0	18.5	7.23	2.0	224	2271			2		
MEN-MW4s	05/08/12	17:53		1.0	18.3	7.15	1.8	233	2302			4		
MEN-MW4s	05/08/12	17:55	11.84	1.0	18.2	7.03	1.6	231	2302	56		6	3.6	sampled at 17:58
MEN-MW4S	08/14/12	11:08	9.41	1.0	22.5	6.95	1.1	214	2242		1.653216	0		
MEN-MW4S	08/14/12	11:10		1.0	21.4	6.93	0.7	216	2274			2		
MEN-MW4S	08/14/12	11:12		1.0	20.8	6.88	0.8	217	2285			4		
MEN-MW4S	08/14/12	11:14	11.72	1.0	21.2	6.86	0.7	220	2272	32		6	3.6	SAMPLED at 11:18

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
MEN-MW4S	12/06/12	11:39	8.87	1	19.2	7.34	2.4	77	2380		1.46	0		
MEN-MW4S	12/06/12	11:41		1	20.2	7.34	1.1	76	2055			1.5		
MEN-MW4S	12/06/12	11:43		1	20.5	7.34	1.0	76	1987			3		
MEN-MW4S	12/06/12	11:45	8.89	1	20.6	7.31	1.2	76	1984	7		4.5	3.1	sampled
MEN-MW5s	02/07/12	15:30	7.72	0.5	17.1	7.31	2.8	192	1995		1.55	0		
MEN-MW5s	02/07/12	15:35		0.5	17.4	7.07	1.8	195	1869			1.5		
MEN-MW5s	02/07/12	15:39		0.5	17.8	7.03	1.8	194	1809			3		
MEN-MW5s	02/07/12	15:43	8.61	0.5	17.9	7.05	1.8	192	1791	33		4.5	2.9	sampled
MEN-MW5s	05/08/12	17:05	10.64	0.5	21.1	7.08	2.1	199	1955		1.21	0		
MEN-MW5s	05/08/12	17:08		0.5	19.7	7.00	2.3	205	1958			1.5		
MEN-MW5s	05/08/12	17:11		0.5	19.6	6.99	3.1	207	1963			3		
MEN-MW5s	05/08/12	17:16	10.66	0.5	19.5	6.97	2.6	208	1962	9		4.5	3.7	sampled at 17:18
MEN-MW5S	08/14/12	10:25	10.42	0.5	21.1	6.94	1	209	1908		1.32192	0		
MEN-MW5S	08/14/12	10:28		0.5	22.1	6.89	1	209	1914			1.5		
MEN-MW5S	08/14/12	10:31		0.5	20.8	6.88	0.7	209	1909			3		
MEN-MW5S	08/14/12	10:34	10.55	0.5	21.6	6.88	0.6	207	1908	2		4.5	3.4	SAMPLED at 10:37
MEN-MW5S	12/06/12	11:12	10.10	1	19.2	7.61	4.6	59	2252		1.16	0		
MEN-MW5S	12/06/12	11:13		1	20.7	7.54	1.5	67	1717			1		
MEN-MW5S	12/06/12	11:15		1	21.0	7.46	1.0	71	1702			2		
MEN-MW5S	12/06/12	11:17	10.16	1	21.0	7.42	1.1	72	1701	9		3	2.6	sampled
MEN-MW6s	02/07/12	16:54	5.79	0.5	16.2	7.10	1.6	173	3039		3.02	0		
MEN-MW6s	02/07/12	16:57		0.5	16.8	7.02	1.5	178	3035			3		
MEN-MW6s	02/07/12	17:00		0.5	16.8	7.01	1.5	179	3041			6		
MEN-MW6s	02/07/12	17:04	6.92	0.5	17.1	7.00	1.6	179	3057	12		9	3.0	sampled
MEN-MW6s	05/08/12	16:15	10.76	1.5	19.0	7.05	2.3	159	3116		2.76	0		
MEN-MW6s	05/08/12	16:17		1.5	17.8	6.95	2.4	171	3157			3		
MEN-MW6s	05/08/12	16:19		1.5	17.7	6.92	2.2	178	3219			6		
MEN-MW6s	05/08/12	16:21	11.15	1.5	17.9	6.91	1.7	183	3224	17		9	3.3	sampled at 16:26
MEN-MW6S	08/14/12	9:33	9.01	1.0	21.2	7.02	1.1	201	2849		2.91312	0		
MEN-MW6S	08/14/12	9:36		1.0	18.9	6.88	1	204	3064			3		
MEN-MW6S	08/14/12	9:39		1.0	18.5	6.87	1	206	3133			6		
MEN-MW6S	08/14/12	9:42	10.1	1.0	18.8	6.83	1	205	3138	2		9	3.1	SAMPLED at 9:44
MEN-MW6S	12/06/12	12:02	8.70	1	18.4	7.93	3.3	62	2573		2.55	0		
MEN-MW6S	12/06/12	12:05		1	19.0	7.72	1.2	70	2778			2.5		
MEN-MW6S	12/06/12	12:07		1	19.0	7.62	1.3	73	2836			5		
MEN-MW6S	12/06/12	12:10	8.75	1	19.0	7.53	0.7	76	2889	5		7.5	2.9	sampled
MEN-MW7s	02/07/12	16:28	4.26	0.5	16.4	7.21	1.2	140	2712		3.09	0		
MEN-MW7s	02/07/12	16:31		0.5	17.2	7.16	1.4	156	2563			3		
MEN-MW7s	02/07/12	16:35		0.5	17.5	7.15	1.4	157	2530			6		
MEN-MW7s	02/07/12	16:40	4.4	0.5	17.6	7.15	1.5	159	2521	22		9	2.9	sampled
MEN-MW7s	05/08/12	16:43	5.21	1.0	20.6	7.07	3.2	181	2642		3.28	0		
MEN-MW7s	05/08/12	16:47		1.0	19.5	7.08	1.7	187	2671			3.5		
MEN-MW7s	05/08/12	16:51		1.0	18.6	7.08	1.6	192	2689			7		
MEN-MW7s	05/08/12	16:55	5.25	1.0	18.6	7.07	1.6	196	2696	63		10.5	3.2	sampled at 16:57
MEN-MW7S	08/14/12	10:05	5.7	1.0	19.1	7.22	1	201	2807		3.164448	0		
MEN-MW7S	08/14/12	10:08		1.0	18.9	7.2	1	201	2817			3		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
MEN-MW7S	08/14/12	10:11		1.0	19.2	7.17	1	202	2820			6		
MEN-MW7S	08/14/12	10:14	5.82	1.0	19.6	7.14	1	204	2804	10		9	2.8	SAMPLED at 10:17
MEN-MW7S	12/06/12	10:55	6.96	1	19.5	7.46	4.4	64	3598		2.65	0		
MEN-MW7S	12/06/12	10:58		1	19.6	7.41	1.6	66	2435			3		
MEN-MW7S	12/06/12	11:01		1	19.3	7.31	0.8	67	2486			6		
MEN-MW7S	12/06/12	11:05	7.02	1	19.4	7.32	0.9	67	2501	3		9	3.4	sampled
MOO-MW1	02/26/12	13:46	13.15	5.0	17.4	6.81	0.8	161	3224		6.50	0		
MOO-MW1	02/26/12	13:47		5.0	18.0	7.02	0.7	97	2908			6.5		
MOO-MW1	02/26/12	13:48		5.0	18.1	7.03	0.6	85	2893			13		
MOO-MW1	02/26/12	13:49	14.10	5.0	18.2	7.04	0.6	73	2888	240		19.5	3.0	sampled
MOO-MW1	05/11/12	11:16	15.00	1.5	20.6	7.16	1.7	180	2896		5.48	0		
MOO-MW1	05/11/12	11:19		1.5	19.5	7.01	1.0	172	2900			5.48		
MOO-MW1	05/11/12	11:22		1.5	19.2	7.00	0.9	161	2912			10.97		
MOO-MW1	05/11/12	11:25	15.05	1.5	20.2	7.58	0.8	129	2900	5		16.45	3.0	sampled
MOO-MW1	08/14/12	14:08	13.4	2.0	22.5	6.91	0.8	181	3021		8.532096	0		
MOO-MW1	08/14/12	14:13		2.0	21.3	7	0.8	169	3090			8.532096		
MOO-MW1	08/14/12	14:18		2.0	22.1	7.16	0.7	154	3093			17.064192		
MOO-MW1	08/14/12	14:23	13.44	2.0	21.3	7.18	0.8	143	3106	2		25.596288	3.0	SAMPLED at 14:25
MOO-MW1	12/10/12	12:00	14.85	1	20.2	7.79	1.6	70	2851		7.44	0		
MOO-MW1	12/10/12	12:07		1	21.0	7.46	1.4	59	2752			7.5		
MOO-MW1	12/10/12	12:14		1	20.1	7.46	0.6	57	2725			15		
MOO-MW1	12/10/12	12:21	15.12	1	20.0	7.40	0.6	54	2725	26		22.5	3.0	sampled
MOO-MW2	02/26/12	14:42	17.90	5.0	17.9	7.15	0.7	131	3370		7.12	0		
MOO-MW2	02/26/12	14:44		5.0	18.8	7.00	0.7	132	3485			7		
MOO-MW2	02/26/12	14:46	DRY	5.0	18.8	7.00	0.5	130	3480			14		
MOO-MW2	02/26/12	14:48	DRY	5.0	18.7	6.96	0.5	127	3491	340		21	2.9	sampled at 15:00
MOO-MW2	05/11/12	11:35	20.63	1.5	22.2	7.02	1.7	177	3609		5.56	0		
MOO-MW2	05/11/12	11:38		1.5	20.5	7.01	0.9	179	3285			5.5		
MOO-MW2	05/11/12	11:41		1.5	21.0	7.02	0.9	173	3225			11		
MOO-MW2	05/11/12	11:44	25.44	1.5	20.6	7.01	1.3	174	3220	29		16.5	3.0	sampled
MOO-MW2	08/14/12	15:17	21.02	2.0	22.7	7.01	1.3	169	3790		6.155904	0		
MOO-MW2	08/14/12	15:20		2.0	22.4	7.06	0.9	171	3573			6		
MOO-MW2	08/14/12	15:23		2.0	22.5	7.05	1	166	3693			12		
MOO-MW2	08/14/12	15:26	25.46	2.0	23	7.07	2	168	3698	121		18	2.9	SAMPLED at 15:28
MOO-MW2	12/10/12	10:50	21.51	1	19.9	7.88	2.7	90	2617		4.99	0		
MOO-MW2	12/10/12	10:55		1	18.8	7.70	3.4	94	2392			5		
MOO-MW2	12/10/12	11:00		1	18.4	7.42	1.6	94	2455			10		
MOO-MW2	12/10/12	11:05	22.72	1	18.5	7.37	0.7	96	2512	173		15	3.0	sampled
MOO-MW3	02/26/12	15:47	12.02	5.0	16.8	7.20	1.1	162	2258		10.43	0		
MOO-MW3	02/26/12	15:49		5.0	17.4	7.06	0.8	155	2274			10.5		
MOO-MW3	02/26/12	15:51		5.0	17.5	7.05	0.8	157	2298			21		
MOO-MW3	02/26/12	15:53	15.11	5.0	17.4	7.06	0.7	160	2306	80		31.5	3.0	sampled at 15:55
MOO-MW3	05/11/12	11:55	13.58	2	20.9	7.10	1.9	168	2322		9.78	0		
MOO-MW3	05/11/12	12:00		2	19.6	7.06	1.0	164	2315			10		
MOO-MW3	05/11/12	12:05		2	19.8	7.02	1.0	163	2326			20		
MOO-MW3	05/11/12	12:10	13.83	2	19.8	7.01	1.0	159	2331	8		30	3.1	sampled

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
MOO-MW3	08/14/12	15:49	11.55	2.0	21.1	7.17	1.8	184	2480		11.058432	0		
MOO-MW3	08/14/12	15:54		2.0	21.4	7.09	1.4	186	2423			11		
MOO-MW3	08/14/12	16:00		2.0	21.4	7.09	1.6	179	2484			22		
MOO-MW3	08/14/12	16:06	11.6	2.0	21.1	7.12	1.7	179	2485	2		33	3.0	SAMPLED at 16:09
MOO-MW3	12/10/12	10:20	13.52	1	14.9	7.63	2.1	141	2065		9.45	0		
MOO-MW3	12/10/12	10:29		1	18.1	7.43	0.6	138	2195			9.5		
MOO-MW3	12/10/12	10:38		1	18.8	7.40	0.6	129	2197			19		
MOO-MW3	12/10/12	10:47	13.97	1	19.2	7.38	0.6	122	2192	18		28.5	3.0	sampled
MOO-MW4	02/26/12	16:40	12.57	5.0	17.9	7.12	1.0	176	2345		9.22	0		
MOO-MW4	02/26/12	16:42		5.0	18.1	7.09	0.8	166	2422			9		
MOO-MW4	02/26/12	16:44		5.0	18.4	7.05	0.8	162	2420			18		
MOO-MW4	02/26/12	16:46	13.92	5.0	18.5	7.07	0.9	159	2423	115		27	2.9	sampled at 16:47
MOO-MW4	05/11/12	12:36	13.11	3	22.0	7.16	1.8	165	2230		9.24	0		
MOO-MW4	05/11/12	12:39		3	20.5	7.10	1.0	168	2225			9		
MOO-MW4	05/11/12	12:42		3	20.6	7.15	0.9	168	2231			18		
MOO-MW4	05/11/12	12:45	13.45	3	21.0	7.17	0.9	168	2236	9		27	2.9	sampled
MOO-MW4	08/14/12	16:17	12.15	2.0	21.6	7.12	0.8	176	2643		10.007424	0		
MOO-MW4	08/14/12	16:22		2.0	20.5	7.2	1.3	180	2489			10		
MOO-MW4	08/14/12	16:27		2.0	20.4	7.18	1.4	187	2487			20		
MOO-MW4	08/14/12	16:33	12.3	2.0	20.5	7.17	1.3	184	2485	10		30	3.0	SAMPLED at 16:35
MOO-MW4	12/10/12	13:08	14.29	1	19.8	7.90	1.4	96	2289		8.10	0		
MOO-MW4	12/10/12	13:17		1	19.9	7.74	1.0	98	1985			8		
MOO-MW4	12/10/12	13:25		1	20.1	7.73	0.6	97	1833			16		
MOO-MW4	12/10/12	13:33	14.50	1	20.2	7.70	0.6	96	1856	14		24	3.0	sampled
MOO-MW5s	02/09/12	14:10	11.96	0.5	20.5	7.47	1.4	197	2125		3.35	0		
MOO-MW5s	02/09/12	14:17		0.5	19.9	7.23	1.3	180	2150			3.5		
MOO-MW5s	02/09/12	14:24		0.5	19.9	7.23	1.3	176	2152			7		
MOO-MW5s	02/09/12	14:32		0.5	19.9	7.22	1.2	172	2150			10.5		
MOO-MW5s	02/09/12	14:40	12.55	0.5	19.9	7.24	1.1	169	2151	48		14	4.2	sampled
MOO-MW5s	05/11/12	12:19	14.35	1	20.2	7.14	1.1	155	2220		3.10	0		
MOO-MW5s	05/11/12	12:22		1	20.0	7.07	0.65	162	2220			3		
MOO-MW5s	05/11/12	12:25		1	19.7	7.05	0.7	159	2215			6		
MOO-MW5s	05/11/12	12:28	14.44	1	20.0	7.13	0.7	156	2216	54		9	2.9	sampled
MOO-MW5S	08/14/12	14:48	12.87	1.0	21.8	7.16	1.1	158	2398		3.32928	0		
MOO-MW5S	08/14/12	14:52		1.0	20.4	7.04	0.9	163	2401			3.5		
MOO-MW5S	08/14/12	14:56		1.0	20.4	7.12	1	165	2406			7		
MOO-MW5S	08/14/12	15:00	13.25	1.0	21.3	7.13	0.7	160	2396	39		10.5	3.2	SAMPLED at 15:03
MOO-MW5S	12/10/12	10:02	14.03	1	11.8	6.55	3.3	189	1655		3.01	0		
MOO-MW5S	12/10/12	10:05		1	15.4	6.94	1.3	181	1893			3		
MOO-MW5S	12/10/12	10:08		1	17.4	7.15	0.5	172	2033			6		
MOO-MW5S	12/10/12	10:12	14.13	1	17.7	7.30	0.5	164	2074	86		9	3.0	sampled
MOO-MW6s	02/09/12	13:07	19.17	0.5	20.6	7.08	1.3	190	2047		2.35	0		
MOO-MW6s	02/09/12	13:12		0.5	20.3	7.06	1.1	168	2191			2.5		
MOO-MW6s	02/09/12	13:17		0.5	20.5	7.06	1.1	163	2219			5		
MOO-MW6s	02/09/12	13:22		0.5	20.4	7.06	1.1	163	2230			7.5		
MOO-MW6s	02/09/12	13:27	21.85	0.5	20.4	7.06	1.0	160	2232	>1,000		10	4.3	sampled

Table 6
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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
MOO-MW6s	05/11/12	10:58	23.35	0.5	21.1	7.00	1.6	169	2515		1.77	0		
MOO-MW6s	05/11/12	11:02		0.5	20.4	6.85	0.9	173	2233			2		
MOO-MW6s	05/11/12	11:06		0.5	20.6	6.95	0.8	166	2370			4		
MOO-MW6s	05/11/12	11:10	26.88	0.5	20.7	6.99	0.7	173	2400	>1,000		6	3.4	sampled
MOO-MW6S	08/14/12	13:38	22.52	1.0	22	6.96	1.1	207	2132		2.402304	0		
MOO-MW6S	08/14/12	13:41		1.0	20.9	6.9	1.1	209	2130			2.5		
MOO-MW6S	08/14/12	13:44		1.0	21.5	6.84	1.1	208	2148			5		
MOO-MW6S	08/14/12	13:47	24.73	1.0	20.9	6.83	1.1	210	2141	498		7.5	3.1	SAMPLED at 13:49
MOO-MW6S	12/10/12	12:30	22.83	1	21.5	8.25	2.2	107	2154		1.76	0		
MOO-MW6S	12/10/12	12:30		1	21.3	7.54	1.5	117	2129			2		
MOO-MW6S	12/10/12	12:34		1	21.2	7.43	1.7	114	2092			4		
MOO-MW6S	12/10/12	12:36	23.00	1	21.3	7.40	1.6	108	2098	835		6	3.4	sampled
MOO-MW7s	02/09/12	12:50	18.06	0.5	20.0	8.23	0.6	76	2753		1.67	0		
MOO-MW7s	02/09/12	12:54		0.5	20.5	7.28	0.9	130	2920			1.5		
MOO-MW7s	02/09/12	12:58		0.5	20.3	7.19	1.1	137	2947			3		
MOO-MW7s	02/09/12	13:02	21.10	0.5	20.1	7.16	1.1	134	2969	166		4.5	2.7	sampled
MOO-MW7s	05/11/12	10:42	20.60	0.5	20.2	7.03	2.7	166	2695		1.43	0		
MOO-MW7s	05/11/12	10:44		0.5	2.1	6.94	1.9	165	3018			1.5		
MOO-MW7s	05/11/12	10:46		0.5	19.9	7.06	1.8	158	3015			3		
MOO-MW7s	05/11/12	10:48		0.5	19.8	7.13	1.9	157	3023			4.5		
MOO-MW7s	05/11/12	10:50	22.55	0.5	19.6	7.10	1.8	155	3042	>1,000		6	4.2	sampled
MOO-MW7S	08/14/12	13:18	22.02	0.5	20.7	7.06	2.2	202	3176		1.37904	0		
MOO-MW7S	08/14/12	13:21		0.5	19.9	7.04	1.8	205	3256			1.5		
MOO-MW7S	08/14/12	13:24		0.5	19.9	7.03	1.5	213	3381			3		
MOO-MW7S	08/14/12	13:27	23.32	0.5	19.8	7.03	1.4	214	3391	938		4.5	3.3	SAMPLED at 13:29
MOO-MW7S	12/10/12	11:49	20.92	1	20.0	7.62	2.5	86	2089		1.20	0		
MOO-MW7S	12/10/12	11:50		1	20.5	7.37	1.6	86	2788			1.5		
MOO-MW7S	12/10/12	11:52		1	20.5	7.35	1.5	83	2926			3		
MOO-MW7S	12/10/12	11:53	21.11	1	20.6	7.35	1.2	79	2976	37		4.5	3.8	sampled
MOO-MW8s	02/09/12	12:27	18.75	0.5	20.0	7.12	2.2	185	2751		1.31	0		
MOO-MW8s	02/09/12	12:30		0.5	19.5	7.15	2.1	184	2511			1.5		
MOO-MW8s	02/09/12	12:34		0.5	19.5	7.15	1.8	182	2516			3		
MOO-MW8s	02/09/12	12:37		0.5	19.4	7.16	1.7	180	2510			4.5		
MOO-MW8s	02/09/12	12:40	21.17	0.5	19.5	7.14	1.8	186	2518	80		6	4.6	sampled
MOO-MW8s	05/11/12	10:29	20.70	0.5	20.5	7.60	2.1	125	2062		1.11	0		
MOO-MW8s	05/11/12	10:31		0.5	19.4	7.09	2.1	138	2072			1		
MOO-MW8s	05/11/12	10:33		0.5	19.5	7.05	2.1	139	1952			2		
MOO-MW8s	05/11/12	10:35	22.10	0.5	19.7	7.07	2.1	141	1810	>1,000		3	2.7	sampled
MOO-MW8S	08/14/12	12:59	21.08	0.5	22.8	6.97	3.1	168	1566		1.192992	0		
MOO-MW8S	08/14/12	13:01		0.5	20.4	7.33	3	178	1298			1		
MOO-MW8S	08/14/12	13:03		0.5	19.7	7.31	3	176	1244			2		
MOO-MW8S	08/14/12	13:05	22.15	0.5	19.8	7.28	2.9	180	1235	108		3	2.5	SAMPLED at 13:07
MOO-MW8S	12/10/12	11:35	20.83	1	19.2	8.10	3.5	82	2472		0.97	0		
MOO-MW8S	12/10/12	11:36		1	19.9	7.71	2.5	83	1233			1		
MOO-MW8S	12/10/12	11:37		1	20.3	7.66	2.6	84	1061			2		
MOO-MW8S	12/10/12	11:38	21.23	1	23.3	7.61	2.5	85	1031	101		3	3.1	sampled

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
NUN-MW1s	02/09/12	14:31	6.74	0.5	21.0	7.40	1.0	134	6733		1.75	0		
NUN-MW1s	02/09/12	14:34		0.5	20.7	7.40	1.2	136	6675			2		
NUN-MW1s	02/09/12	14:39		0.5	20.2	7.37	1.2	134	6669			4		
NUN-MW1s	02/09/12	14:45	6.98	0.5	20.4	7.36	1.1	132	6638	6.5		6	3.4	sampled
NUN-MW1s	05/11/12	13:00	7.65	0.5	20.5	7.30	0.9	201	6895		1.60	0		
NUN-MW1s	05/11/12	13:05		0.5	19.9	7.27	0.5	200	7185			1.5		
NUN-MW1s	05/11/12	13:10		0.5	19.9	7.27	0.5	201	7212			3		
NUN-MW1s	05/11/12	13:15	8.70	0.5	20.0	7.25	0.7	201	7200	22		4.5	2.8	sampled
NUN-MW1S	08/17/12	12:15	7.55	1.0	22.1	7.33	0.8	161	6133		1.716864	0		
NUN-MW1S	08/17/12	12:17		1.0	21.5	7.26	0.5	162	6320			2		
NUN-MW1S	08/17/12	12:19		1.0	21.3	7.17	0.65	165	6438			4		
NUN-MW1S	08/17/12	12:21	7.96	1.0	21.4	7.16	0.48	165	6470	7		6	3.5	SAMPLED at 12:23
NUN-MW1S	12/04/12	13:39	7.15	1	19.9	7.68	0.8	112	6305		1.68	0		
NUN-MW1S	12/04/12	13:41		1	19.9	7.55	0.9	115	6483			2		
NUN-MW1S	12/04/12	13:43		1	19.9	7.52	0.9	117	6505			4		
NUN-MW1S	12/04/12	13:45	7.40	1	20.1	7.45	1.1	120	6514	5		6	3.6	sampled
NUN-MW2s	02/09/12	13:25	8.00	0.5	19.8	7.65	1.5	181	3939		3.26	0		
NUN-MW2s	02/09/12	13:31		0.5	18.9	7.55	1.3	169	3935			3.5		
NUN-MW2s	02/09/12	13:37		0.5	18.9	7.47	1.3	151	3840			7		
NUN-MW2s	02/09/12	13:43	8.60	0.5	18.9	7.45	1.1	130	3833	1		10.5	3.2	sampled
NUN-MW2s	05/11/12	13:26	7.97	0.5	18.6	7.34	0.8	173	4552		3.26	0		
NUN-MW2s	05/11/12	13:33		0.5	18.4	7.38	0.7	184	4145			3.5		
NUN-MW2s	05/11/12	13:40		0.5	18.4	7.38	0.7	190	3995			7		
NUN-MW2s	05/11/12	13:47	11.50	0.5	18.6	7.30	0.7	193	3987	22		10.5	3.2	sampled
NUN-MW2S	08/17/12	11:48	7.92	1.0	21.8	7.32	0.74	151	5129		3.324384	0		
NUN-MW2S	08/17/12	11:52		1.0	20.6	7.32	0.6	151	4746			3.5		
NUN-MW2S	08/17/12	11:56		1.0	20.9	7.27	0.4	151	4112			7		
NUN-MW2S	08/17/12	12:00	8.66	1.0	21.6	7.23	0.39	152	3892	8		10.5	3.2	SAMPLED at 12:02
NUN-MW2S	12/04/12	13:07	7.20	1	20.8	7.13	1.9	143	4250		3.39	0		
NUN-MW2S	12/04/12	13:11		1	20.9	7.20	1.5	142	4152			3.5		
NUN-MW2S	12/04/12	13:15		1	21.4	7.27	1.5	140	4139			7		
NUN-MW2S	12/04/12	13:19	7.55	1	21.5	7.29	1.6	137	4132	7		10.5	3.1	sampled
NUN-MW3s	02/09/12	14:10	5.37	0.5	20.8	7.32	1.2	148	9809		1.60	0		
NUN-MW3s	02/09/12	14:13		0.5	20.6	7.11	1.0	141	7176			1.5		
NUN-MW3s	02/09/12	14:17		0.5	20.6	7.15	0.9	136	6976			3		
NUN-MW3s	02/09/12	14:22	5.40	0.5	21.2	7.21	0.9	132	6850	27.5		4.5	2.8	sampled
NUN-MW3s	05/11/12	12:44	5.92	0.5	21.9	7.01	0.9	207	7474		1.51	0		
NUN-MW3s	05/11/12	12:47		0.5	19.9	7.09	0.7	208	7501			1.5		
NUN-MW3s	05/11/12	12:50		0.5	19.7	7.09	0.7	208	7526			3		
NUN-MW3s	05/11/12	12:53	11.86	0.5	19.7	7.11	0.8	210	7533	25		4.5	3.0	sampled
NUN-MW3S	08/17/12	12:29	5.22	1.0	24.2	7.3	0.81	169	6893		1.695648	0		
NUN-MW3S	08/17/12	12:31		1.0	24.2	7.09	0.51	132	6838			2		
NUN-MW3S	08/17/12	12:33		1.0	24	7.05	0.55	137	6824			4		
NUN-MW3S	08/17/12	12:35	8.14	1.0	23.7	7.02	0.68	143	6817	77		6	3.5	SAMPLED at 12:37
NUN-MW3S	12/04/12	14:03	5.60	1	20.1	7.38	0.2	124	6709		1.56	0		
NUN-MW3S	12/04/12	14:05		1	20.4	7.20	0.6	125	6812			1.5		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
NUN-MW3S	12/04/12	14:07		1	20.7	7.17	0.8	127	6844			3		
NUN-MW3S	12/04/12	14:09	5.72	1	20.9	7.13	1.0	129	6852	6		4.5	2.9	sampled
NUN-MW4s	02/09/12	13:52	7.12	0.5	20.3	7.46	1.2	131	8745		1.30	0		
NUN-MW4s	02/09/12	13:54		0.5	19.7	7.22	1.4	136	8722			1.5		
NUN-MW4s	02/09/12	13:58		0.5	19.9	7.21	1.4	136	8719			3		
NUN-MW4s	02/09/12	14:03	10.70	0.5	20.2	7.21	1.5	137	8715	243		4.5	3.5	sampled
NUN-MW4s	05/11/12	12:30	7.12	0.5	22.1	7.13	0.4	201	9785		1.30	0		
NUN-MW4s	05/11/12	12:33		0.5	19.7	7.10	0.4	208	11,730			1.5		
NUN-MW4s	05/11/12	12:36		0.5	19.7	7.08	0.5	208	11,940			3		
NUN-MW4s	05/11/12	12:40	12.10	0.5	19.6	7.07	0.7	210	12,100	305		4.5	3.5	sampled
NUN-MW4S	08/17/12	12:41	6.24	0.5	23.8	7.21	1	168	11220		1.543872	0		
NUN-MW4S	08/17/12	12:44		0.5	23.2	7.12	0.926	169	11400			1.5		
NUN-MW4S	08/17/12	12:47		0.5	23.5	7.1	0.66	167	11650			3		
NUN-MW4S	08/17/12	12:50	9.2	0.5	23.8	7.08	0.59	165	11820	262		4.5	2.9	SAMPLED at 12:51
NUN-MW4S	12/04/12	14:28	6.94	1	19.7	7.15	0.5	129	9,384		1.33	0		
NUN-MW4S	12/04/12	14:30		1	19.7	7.19	0.6	129	9,574			1.5		
NUN-MW4S	12/04/12	14:32		1	19.8	7.21	0.6	130	9,785			3		
NUN-MW4S	12/04/12	14:34	7.14	1	19.8	7.27	0.5	130	9,990	202		4.5	3.4	sampled
PLS-MW1d	05/10/12	19:28	11.03	0.5	17.7	6.81	0.6	200	2113		1.00	0		
PLS-MW1d	05/10/12	19:34		0.5	17.8	6.67	0.6	198	2065			1		
PLS-MW1d	05/10/12	19:40		0.5	17.8	6.65	0.2	198	2047			2		
PLS-MW1d	05/10/12	19:45	12.59	0.5	17.7	6.62	0.2	194	2041	32		3	3.0	sampled
PLS-MW1s	02/08/12	16:37	10.90	0.5	17.9	7.07	1.3	160	2295		0.98	0		
PLS-MW1s	02/08/12	16:39		0.5	18.0	7.05	1.4	161	2421			1		
PLS-MW1s	02/08/12	16:43		0.5	18.3	6.99	1.4	162	2710			2		
PLS-MW1s	02/08/12	16:48	15.30	0.5	19.2	7.02	1.5	164	2817	79		3	3.1	sampled
PLS-MW1S	08/15/12	11:27	9.4	1.0	22.4	7.35	0.8	114	2309		1.224	0		
PLS-MW1S	08/15/12	11:28		1.0	21.3	7.36	0.8	112	2045			1		
PLS-MW1S	08/15/12	11:29		1.0	20.9	7.06	0.9	112	2069			2		
PLS-MW1S	08/15/12	11:30	14.8	1.0	20.8	7.04	0.9	110	2064	10		3	2.5	SAMPLED at 11:32
PLS-MW1S	12/11/12	10:54	12.57	1	17.0	6.96	3.5	240	4548		0.71	0		
PLS-MW1S	12/11/12	10:56		1	18.9	7.00	1.0	235	2435			1		
PLS-MW1S	12/11/12	10:57		1	19.2	6.81	0.8	236	2368			2		
PLS-MW1S	12/11/12	10:58	12.62	1	17.9	6.62	1.1	235	2355	164		3	4.2	sampled
PLS-MW2s	02/08/12	17:05	9.65	0.5	17.1	7.24	2.0	176	2397		1.12	0		
PLS-MW2s	02/08/12	17:07		0.5	17.5	6.97	1.9	177	2288			1		
PLS-MW2s	02/08/12	17:11		0.5	17.6	6.91	1.9	170	2350			2		
PLS-MW2s	02/08/12	17:16	9.95	0.5	17.5	6.90	1.8	170	2365	766		3	2.7	sampled
PLS-MW2s	05/10/12	17:45	10.35	0.5	18.8	7.10	6.6	220	2308		1.11	0		
PLS-MW2s	05/10/12	17:47		0.5	17.6	6.83	7.1	227	2345			1		
PLS-MW2s	05/10/12	17:49		0.5	17.6	6.79	6.6	229	2358			2		
PLS-MW2s	05/10/12	17:51		0.5	17.6	6.77	6.7	229	2378			3		
PLS-MW2s	05/10/12	17:53	10.81	0.5	17.7	6.99	6.5	223	2413	190		4	3.6	sampled
PLS-MW2S	08/15/12	12:07	8.2	1.0	21.4	7.1	5.5	110	2212		1.35456	0		
PLS-MW2S	08/15/12	12:09		1.0	21	7.09	5	111	2256			2		
PLS-MW2S	08/15/12	12:11		1.0	21	7.07	4.5	111	2300			4		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
PLS-MW2S	08/15/12	12:13	9	1.0	20.3	7.06	4.1	113	2324	480		6	4.4	SAMPLED at 12:15
PLS-MW2S	12/11/12	11:13	11.29	1	16.7	6.85	2.6	229	2431		0.86	0		
PLS-MW2S	12/11/12	11:14		1	18.6	6.72	1.5	232	2241			1		
PLS-MW2S	12/11/12	11:15		1	19.0	6.59	0.9	234	2316			2		
PLS-MW2S	12/11/12	11:16	11.37	1	18.9	6.49	0.8	235	2353	469		3	3.5	sampled
PLS-MW3s	02/08/12	15:18	8.39	0.5	18.7	7.35	1.6	158	1588		1.19	0		
PLS-MW3s	02/08/12	15:20		0.5	18.4	6.98	1.4	154	1438			1		
PLS-MW3s	02/08/12	15:23		0.5	18.6	6.96	1.2	135	1381			2		
PLS-MW3s	02/08/12	15:27	10.20	0.5	18.8	7.01	1.1	126	1353	20		3	2.5	sampled
PLS-MW3s	05/10/12	16:54	11.10	0.5	17.6	6.57	3.5	280	1428		1.03	0		
PLS-MW3s	05/10/12	16:56		0.5	17.6	6.76	3.4	264	1404			1		
PLS-MW3s	05/10/12	16:58		0.5	17.6	6.71	3.7	250	1398			2		
PLS-MW3s	05/10/12	17:00	11.57	0.5	17.8	6.85	3.2	234	1389	160		3	2.9	sampled
PLS-MW3S	08/15/12	13:28	8.85	0.5	21.3	7.55	2.9	101	1235		1.302336	0		
PLS-MW3S	08/15/12	13:31		0.5	21.1	7.49	2.5	101	1229			1.5		
PLS-MW3S	08/15/12	13:34		0.5	20.6	7.25	2.6	101	1219			3		
PLS-MW3S	08/15/12	13:37	10.47	0.5	20.3	7.18	2.6	102	1219	123		4.5	3.5	SAMPLED at 13:38
PLS-MW3S	12/11/12	10:07	10.79	1	19.9	6.79	4.3	278	1481		0.80	0		
PLS-MW3S	12/11/12	10:08		1	18.3	6.38	1.1	278	1327			1		
PLS-MW3S	12/11/12	10:09		1	19.6	6.15	1.2	277	1328			2		
PLS-MW3S	12/11/12	10:10	10.87	1	19.9	6.06	1.0	276	1322	14		3	3.8	sampled
PLS-MW4s	02/08/12	15:37	10.26	0.5	19.0	6.90	1.2	139	4350		2.13	0		
PLS-MW4s	02/08/12	15:41		0.5	19.1	6.91	1.5	143	5057			2		
PLS-MW4s	02/08/12	15:45		0.5	19.2	6.90	1.5	145	5231			4		
PLS-MW4s	02/08/12	15:50	11.56	0.5	19.0	7.02	1.7	151	5230	17		6	2.8	sampled
PLS-MW4s	05/10/12	19:00	10.78	0.5	18.3	6.70	1.6	200	4970		2.04	0		
PLS-MW4s	05/10/12	19:04		0.5	18.5	6.63	1.5	201	5467			2		
PLS-MW4s	05/10/12	19:08		0.5	18.5	6.61	1.5	199	5543			4		
PLS-MW4s	05/10/12	19:12	13.65	0.5	18.6	6.62	1.4	192	5612	32		6	2.9	sampled
PLS-MW4S	08/15/12	10:49	8.88	1.0	23.6	7.14	1.3	110	4858		2.353344	0		
PLS-MW4S	08/15/12	10:52		1.0	22.2	7.05	1.3	111	5010			2.5		
PLS-MW4S	08/15/12	10:55		1.0	21	7.03	1.1	110	5051			5		
PLS-MW4S	08/15/12	10:58	9.77	1.0	20.9	7.01	1	114	5055	22		7.5	3.2	SAMPLED at 11:00
PLS-MW4S	12/11/12	10:37	12.13	1	17.0	6.94	3.1	241	3225		1.82	0		
PLS-MW4S	12/11/12	10:39		1	19.6	6.49	1.2	252	5367			2		
PLS-MW4S	12/11/12	10:41		1	20.1	6.39	0.8	254	5332			4		
PLS-MW4S	12/11/12	10:43	12.20	1	19.8	6.30	0.7	254	5346	24		6	3.3	sampled
PLS-MW5s	02/08/12	16:08	8.93	0.5	18.8	7.20	1.9	171	3130		1.04	0		
PLS-MW5s	02/08/12	16:10		0.5	20.0	7.14	2.0	170	2261			1		
PLS-MW5s	02/08/12	16:14		0.5	20.3	7.10	1.6	159	1971			2		
PLS-MW5s	02/08/12	16:20	11.99	0.5	20.1	6.98	1.5	161	1931	>1,000		3	2.9	sampled
PLS-MW5s	05/10/12	17:25	9.62	0.5	18.9	6.84	7.6	240	1810		0.97	0		
PLS-MW5s	05/10/12	17:27		0.5	19.0	7.01	6.8	241	1806			1		
PLS-MW5s	05/10/12	17:29		0.5	19.0	6.95	6.5	241	1811			2		
PLS-MW5s	05/10/12	17:31	9.85	0.5	19.0	6.90	6.4	241	1814	743		3	3.1	sampled
PLS-MW5S	08/15/12	12:55	7.67	1.0	22.6	7.37	5.5	102	1689		1.245216	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
PLS-MW5S	08/15/12	12:56		1.0	20.9	7.13	5.3	106	1661			1		
PLS-MW5S	08/15/12	12:57		1.0	20.6	7.11	5.3	105	1655			2		
PLS-MW5S	08/15/12	12:58	12.6	1.0	20.6	7.09	5	106	1642	76		3	2.4	SAMPLED at 13:00
PLS-MW5S	12/11/12	11:42	10.88	1	16.8	7.05	2.7	227	2214		0.72	0		
PLS-MW5S	12/11/12	11:43		1	19.4	6.81	0.9	224	1993			1		
PLS-MW5S	12/11/12	11:44		1	20.5	6.65	0.8	231	1996			2		
PLS-MW5S	12/11/12	11:45	10.95	1	20.7	6.55	0.5	233	1991	564		3	4.2	sampled
PLS-MW6s	02/08/12	14:56	8.06	0.5	19.5	7.56	0.9	127	2217		2.29	0		
PLS-MW6s	02/08/12	14:59		0.5	19.4	7.55	1.1	123	2248			2		
PLS-MW6s	02/08/12	15:03		0.5	19.0	7.60	1.2	124	2249			4		
PLS-MW6s	02/08/12	15:08	8.23	0.5	18.8	7.65	1.2	130	2251	52		6	2.6	sampled
PLS-MW6s	05/10/12	18:20	8.74	0.5	19.2	7.28	2.6	161	2256		2.18	0		
PLS-MW6s	05/10/12	18:25		0.5	18.5	7.24	2.3	163	2306			2		
PLS-MW6s	05/10/12	18:30		0.5	18.6	7.23	2.2	163	2304			4		
PLS-MW6s	05/10/12	18:35	9.02	0.5	18.1	7.22	2.2	165	2300	21		6	2.8	sampled
PLS-MW6S	08/15/12	9:19	5.8	1.0	20.8	6.84	2	103	2025		2.66016	0		
PLS-MW6S	08/15/12	9:22		1.0	20.5	6.85	1.9	94	2028			3		
PLS-MW6S	08/15/12	9:25		1.0	20.5	6.85	1.8	95	2019			6		
PLS-MW6S	08/15/12	9:28	8.9	1.0	20.6	6.88	1.9	93	2017	12		9	3.4	SAMPLED at 9:30
PLS-MW6S	12/11/12	10:24	9.25	1	15.3	6.76	2.0	251	1528		2.10	0		
PLS-MW6S	12/11/12	10:25		1	19.3	6.57	1.0	251	2373			2		
PLS-MW6S	12/11/12	10:26		1	20.3	6.61	0.9	251	2426			4		
PLS-MW6S	12/11/12	10:27	9.31	1	20.6	6.60	0.7	249	2393	81		6	2.9	sampled
PLS-MW7s	02/08/12	17:28	9.60	0.5	17.2	7.28	2.1	171	2371		2.11	0		
PLS-MW7s	02/08/12	17:32		0.5	17.8	7.09	2.0	169	2299			2		
PLS-MW7s	02/08/12	17:37		0.5	17.8	7.08	2.0	162	2308			4		
PLS-MW7s	02/08/12	17:52	10.30	0.5	17.6	7.04	1.8	157	2312	21		6	2.8	sampled
PLS-MW7s	05/10/12	18:40	9.89	0.5	17.0	7.02	3.0	182	2218		2.06	0		
PLS-MW7s	05/10/12	18:44		0.5	17.5	6.81	2.9	188	2227			2		
PLS-MW7s	05/10/12	18:48		0.5	17.4	6.80	3.0	188	2230			4		
PLS-MW7s	05/10/12	18:52	11.40	0.5	17.4	6.80	3.1	180	2222	10		6	2.9	sampled
PLS-MW7S	08/15/12	9:59	8.19	1.0	19.6	7.15	2.5	131	1995		2.335392	0		
PLS-MW7S	08/15/12	10:02		1.0	18.7	7.31	2.4	123	2057			2.5		
PLS-MW7S	08/15/12	10:05		1.0	18.8	7.12	2.2	112	2062			5		
PLS-MW7S	08/15/12	10:08	9.13	1.0	18.6	7.1	2.2	110	2064	15		7.5	3.2	SAMPLED at 10:10
PLS-MW7S	12/11/12	12:00	10.96	1	17.6	6.95	3.7	229	2016		1.88	0		
PLS-MW7S	12/11/12	12:02		1	18.6	6.73	1.0	231	2125			2		
PLS-MW7S	12/11/12	12:04		1	18.8	6.61	0.7	232	2118			4		
PLS-MW7S	12/11/12	12:06	11.03	1	18.9	6.52	0.7	231	2128	24		6	3.2	sampled
ROB-MW1D	08/13/12	12:10	25.4	1.0	22.4	6.92	2.5	172	1302		3.975552	0		
ROB-MW1D	08/13/12	12:14		1.0	20.9	6.86	2.3	180	1131			4		
ROB-MW1D	08/13/12	12:18		1.0	20.5	6.95	2.3	214	1137			8		
ROB-MW1D	08/13/12	12:22	25.42	1.0	20.8	6.94	2.2	219	1139	4		12	3.0	SAMPLED at 12:25
ROB-MW1s	02/07/12	13:41	11.30	0.5	18.1	6.74	1.6	165	3086		1.14	0		
ROB-MW1s	02/07/12	13:44		0.5	18.1	6.69	1.6	165	2999			1		
ROB-MW1s	02/07/12	13:47		0.5	18.3	6.68	1.5	167	2964			2		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ROB-MW1s	02/07/12	13:51	12.22	0.5	18.4	6.66	1.5	168	2985	851		3	2.6	sampled
ROB-MW1s	05/08/12	12:33	14.13	0.5	21.6	7.13	3.3	181	925		1.00	0		
ROB-MW1s	05/08/12	12:35		0.5	19.9	7.04	2.9	185	978			1		
ROB-MW1s	05/08/12	12:37		0.5	19.6	6.86	2.8	185	956			2		
ROB-MW1s	05/08/12	12:39	15.40	0.5	18.5	6.85	2.7	185	921	156		3	3.0	sampled
ROB-MW1S	12/04/12	13:10	15.20	1	19.7	7.78	3.5	84	2037		0.51	0		
ROB-MW1S	12/04/12	13:11		1	20.5	7.39	2.4	97	2558			0.5		
ROB-MW1S	12/04/12	13:13		1	20.6	7.32	2.2	99	2742			1		
ROB-MW1S	12/04/12	13:15	15.24	1	20.7	7.27	2.1	98	2766	77		1.5	2.9	sampled
ROB-MW2D	08/13/12	12:34	22.7	1.0	21.9	6.6	2.6	189	2414		1.450848	0		
ROB-MW2D	08/13/12	12:36		1.0	20.8	6.5	2.5	188	2545			1.5		
ROB-MW2D	08/13/12	12:38		1.0	20.3	6.51	2.5	186	2583			3		
ROB-MW2D	08/13/12	12:40	23.2	1.0	20.6	6.5	2.3	185	2588	85		4.5	3.1	SAMPLED at 12:42
ROB-MW2s	02/07/12	13:20	11.70	0.5	18.3	6.82	1.2	151	2908		1.01	0		
ROB-MW2s	02/07/12	13:23		0.5	18.5	6.74	1.4	159	3160			1		
ROB-MW2s	02/07/12	13:26		0.5	19.3	6.75	1.5	165	3315			2		
ROB-MW2s	02/07/12	13:30	12.85	0.5	19.2	6.79	1.4	124	3374	367		3	3.0	sampled
ROB-MW2s	05/08/12	12:52	14.32	0.5	21.3	6.61	3.1	207	2636		0.89	0		
ROB-MW2s	05/08/12	12:54		0.5	19.4	6.61	2.9	212	2712			1		
ROB-MW2s	05/08/12	12:56		0.5	19.5	6.58	2.8	215	2732			2		
ROB-MW2s	05/08/12	12:58	14.80	0.5	19.4	6.57	3.3	216	2750	>1,000		3	3.4	sampled
ROB-MW2S	12/04/12	13:19	15.79	1	19.9	7.69	3.6	86	3035		0.34	0		
ROB-MW2S	12/04/12	13:20		1	21.2	7.54	1.7	92	2968			0.5		
ROB-MW2S	12/04/12	13:22		1	21.0	7.50	1.6	90	2963			1		
ROB-MW2S	12/04/12	13:24	15.88	1	21.1	7.47	1.6	89	2947	93		1.5	4.4	sampled
ROB-MW3s	02/07/12	13:07	10.65	0.5	18.0	7.08	1.8	229	1876		1.33	0		
ROB-MW3s	02/07/12	13:10		0.5	18.8	6.99	1.7	211	1750			1.5		
ROB-MW3s	02/07/12	13:13		0.5	19.0	7.00	1.7	200	1743			3		
ROB-MW3s	02/07/12	13:15	10.70	0.5	19.1	7.01	1.6	191	1743	5		4.5	3.4	sampled
ROB-MW3s	05/08/12	13:19	11.96	0.5	20.6	6.81	2.1	187	2059		1.25	0		
ROB-MW3s	05/08/12	13:22		0.5	19.5	6.98	1.9	188	2034			1.5		
ROB-MW3s	05/08/12	13:25		0.5	19.4	6.96	2.2	188	2037			3		
ROB-MW3s	05/08/12	13:27	12.07	0.5	19.5	6.97	2.0	186	2020	3		4.5	3.6	sampled
ROB-MW3S	08/13/12	12:53	15.65	0.5	21.8	6.96	2	182	1972		0.631584	0		
ROB-MW3S	08/13/12	12:55		0.5	21.3	6.94	1.6	175	1979			1		
ROB-MW3S	08/13/12	12:57		0.5	20.7	6.93	1.6	171	1979			2		
ROB-MW3S	08/13/12	12:59	15.81	0.5	21.4	6.93	1.7	163	1968	15		3	4.7	SAMPLED at 13:01
ROB-MW3S	12/04/12	12:46	16.52	1	20.7	7.53	4.1	112	2358		0.37	0		
ROB-MW3S	12/04/12	12:47		1	21.0	7.51	2.4	114	1849			0.5		
ROB-MW3S	12/04/12	12:49		1	21.1	7.42	2.2	114	1774			1		
ROB-MW3S	12/04/12	12:50	16.55	1	21.2	7.38	2.3	113	1774	10		1.5	4.1	sampled
ROB-MW4s	02/07/12	12:50	10.70	0.5	18.1	6.96	1.8	242	2400		1.18	0		
ROB-MW4s	02/07/12	12:52		0.5	18.8	6.80	1.8	232	2426			1		
ROB-MW4s	02/07/12	12:55		0.5	19.2	6.81	1.7	220	2421			2		
ROB-MW4s	02/07/12	12:58	10.39	0.5	19.4	6.81	1.7	215	2413	7.5		3	2.5	sampled
ROB-MW4s	05/08/12	13:37	11.42	0.5	21.1	6.94	2.0	195	2936		1.24	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ROB-MW4s	05/08/12	13:40		0.5	20.3	6.79	1.8	206	3086			1.5		
ROB-MW4s	05/08/12	13:43		0.5	19.9	6.75	2.0	216	3093			3		
ROB-MW4s	05/08/12	13:46	11.78	0.5	19.6	6.74	1.9	221	3076	4		4.5	3.6	sampled
ROB-MW4S	08/13/12	13:22	14.45	0.5	24.3	6.83	1.5	186	3007		0.631584	0		
ROB-MW4S	08/13/12	13:24		0.5	23.8	6.75	1.6	186	3403			1		
ROB-MW4S	08/13/12	13:26		0.5	23.8	6.73	1.7	186	3577			2		
ROB-MW4S	08/13/12	13:28	14.47	0.5	24	6.67	1.6	184	3607	25		3	4.7	SAMPLED at 13:30
ROB-MW4S	12/04/12	12:31	16.10	0.5	20.1	7.37	2.5	116	2405		0.29	0		
ROB-MW4S	12/04/12	12:32		0.5	22.0	7.21	1.1	123	2510			0.5		
ROB-MW4S	12/04/12	12:33		0.5	22.5	7.16	1.1	123	2496			1		
ROB-MW4S	12/04/12	12:35	16.36	0.5	22.6	7.12	0.8	121	2512	2		1.5	5.2	sampled
ROB-MW5D	08/13/12	13:48	16.1	1.0	21.3	6.83	2	182	2402		1.907808	0		
ROB-MW5D	08/13/12	13:50		1.0	20.7	6.72	2	184	2435			2		
ROB-MW5D	08/13/12	13:52		1.0	20.8	6.72	2.2	187	2441			4		
ROB-MW5D	08/13/12	13:54	16.2	1.0	21.2	6.67	2	190	2421	9		6	3.1	SAMPLED at 13:56
ROB-MW5D	12/04/12	12:10	16.44	1	19.7	6.50	1.6	163	2275		1.72	0		
ROB-MW5D	12/04/12	12:12		1	20.7	6.46	0.8	146	2245			2		
ROB-MW5D	12/04/12	12:14		1	20.9	6.41	0.8	143	2240			4		
ROB-MW5D	12/04/12	12:16	16.70	1	20.9	6.45	0.8	139	2237	5		6	3.5	sampled
ROB-MW5s	02/07/12	12:28	10.52	0.5	18.5	6.67	1.7	241	2385		0.73	0		
ROB-MW5s	02/07/12	12:30		0.5	18.7	6.77	1.5	224	2279			1		
ROB-MW5s	02/07/12	12:32		0.5	19.0	6.77	1.5	215	2260			2		
ROB-MW5s	02/07/12	12:34	10.57	0.5	19.3	6.77	1.3	203	2257	30.5		3	4.1	sampled
ROB-MW5s	05/08/12	14:01	12.20	0.5	21.5	6.75	2.3	208	2346		0.59	0		
ROB-MW5s	05/08/12	14:03		0.5	19.8	6.73	2.5	220	2370			1		
ROB-MW5s	05/08/12	14:05		0.5	20.1	6.75	2.6	221	2392			2		
ROB-MW5s	05/08/12	14:07	12.28	0.5	19.8	6.75	2.5	238	2401	39		3	5.1	sampled
ROB-MW6s	02/07/12	14:51	12.01	0.5	18.0	7.17	1.3	191	1979		2.64	0		
ROB-MW6s	02/07/12	14:54		0.5	17.9	6.93	1.3	188	2130			2		
ROB-MW6s	02/07/12	14:57		0.5	17.9	6.97	1.2	182	2127			4		
ROB-MW6s	02/07/12	15:00	12.02	0.5	18.1	6.93	1.1	182	2131	6		6	2.3	sampled
ROB-MW6s	05/08/12	11:38	13.83	1.5	21.3	7.00	6.6	193	1966		2.38	0		
ROB-MW6s	05/08/12	11:40		1.5	19.3	6.99	5.6	195	1976			2.5		
ROB-MW6s	05/08/12	11:42		1.5	19.2	6.98	5.6	195	1970			5		
ROB-MW6s	05/08/12	11:44	13.83	1.5	18.9	6.96	5.7	199	1985	3		7.5	3.2	sampled
ROB-MW6S	08/13/12	11:26	16.63	1.0	20.4	6.81	5.5	176	2369		1.95024	0		
ROB-MW6S	08/13/12	11:28		1.0	18.8	6.78	5.2	164	2405			2		
ROB-MW6S	08/13/12	11:30		1.0	19.3	6.74	4.9	159	2419			4		
ROB-MW6S	08/13/12	11:32	16.65	1.0	19.5	6.72	4.9	152	2410	12		6	3.1	SAMPLED at 11:34
ROB-MW6S	12/04/12	14:10	16.54	1	20.2	7.80	3.1	71	1699		1.90	0		
ROB-MW6S	12/04/12	14:12		1	19.8	7.57	0.8	76	2060			2		
ROB-MW6S	12/04/12	14:14		1	19.7	7.52	0.6	74	2074			4		
ROB-MW6S	12/04/12	14:18	16.56	1	19.7	7.49	0.6	73	2083	8		6	3.2	sampled
ROB-MW7s	02/07/12	14:28	10.73	0.5	18.0	7.07	1.7	182	2020		2.87	0		
ROB-MW7s	02/07/12	14:31		0.5	18.3	7.14	1.7	186	1954			3		
ROB-MW7s	02/07/12	14:35		0.5	18.6	7.08	1.8	196	1911			6		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
ROB-MW7s	02/07/12	14:40	10.82	0.5	18.6	7.01	1.8	201	1887	2		9	3.1	sampled
ROB-MW7s	05/08/12	10:56	11.48	1.5	17.7	7.58	4.4	168	1450		2.81	0		
ROB-MW7s	05/08/12	10:58		1.5	17.7	7.23	3.3	164	1522			3		
ROB-MW7s	05/08/12	11:00		1.5	17.9	7.17	3.8	164	1548			6		
ROB-MW7s	05/08/12	11:02	11.51	1.5	17.7	7.16	3.5	166	1554	8		9	3.2	sampled
ROB-MW7S	08/13/12	11:05	16.31	1.0	23.6	6.94	3.5	248	880		2.03184	0		
ROB-MW7S	08/13/12	11:07		1.0	23.8	6.95	3.3	217	908			2		
ROB-MW7S	08/13/12	11:09		1.0	21.6	7.04	3.5	204	999			4		
ROB-MW7S	08/13/12	11:11	16.4	1.0	21.2	7	3.2	166	1025	9.5		6	3.0	SAMPLED at 11:13
ROB-MW7S	12/04/12	13:55	15.84	1	19.4	7.69	4.8	69	1892		2.03	0		
ROB-MW7S	12/04/12	13:57		1	20.6	7.70	1.3	71	1527			2		
ROB-MW7S	12/04/12	14:00		1	21.1	7.74	1.2	73	1410			4		
ROB-MW7S	12/04/12	14:02	15.87	1	21.2	7.72	1.2	75	1397	11		6	3.0	sampled
ROB-MW8s	02/07/12	14:04	10.34	0.5	18.6	6.95	1.5	177	2338		2.87	0		
ROB-MW8s	02/07/12	14:07		0.5	19.1	6.95	1.6	181	2105			2		
ROB-MW8s	02/07/12	14:11		0.5	19.3	6.96	1.6	183	2080			4		
ROB-MW8s	02/07/12	14:15	10.61	0.5	19.1	6.96	1.6	183	2074	284		6	2.1	sampled
ROB-MW8s	05/08/12	12:06	12.27	1.5	20.6	6.98	3.7	189	2108		2.70	0		
ROB-MW8s	05/08/12	12:08		1.5	19.9	6.93	3.3	190	2156			3		
ROB-MW8s	05/08/12	12:10		1.5	20.0	6.95	4.5	187	2139			6		
ROB-MW8s	05/08/12	12:12	12.37	1.5	19.5	6.92	3.1	186	2153	13		9	3.3	sampled
ROB-MW8S	08/13/12	11:50	17.79	1.0	20.9	6.96	3.3	164	2116		1.77072	0		
ROB-MW8S	08/13/12	11:52		1.0	20.1	6.86	3	156	2124			2		
ROB-MW8S	08/13/12	11:54		1.0	19.8	6.85	3	153	2140			4		
ROB-MW8S	08/13/12	11:56	17.97	1.0	19.7	6.81	3	147	2123	18		6	3.4	SAMPLED at 11:59
ROB-MW8S	12/04/12	13:39	15.60	1	20.2	7.77	3.2	83	2395		2.01	0		
ROB-MW8S	12/04/12	13:41		1	19.7	7.65	1.1	83	2179			2		
ROB-MW8S	12/04/12	13:43		1	19.7	7.57	1.1	83	2164			4		
ROB-MW8S	12/04/12	13:45	15.71	1	19.7	7.51	0.8	82	2162	21		6	3.0	sampled
SAN-MW1d	02/13/12	14:00	23.53	0.5	16.9	7.27	1.0	125	2793		3.54	0		
SAN-MW1d	02/13/12	14:04		0.5	17.4	7.09	1.2	157	2836			3.5		
SAN-MW1d	02/13/12	14:09		0.5	17.5	7.11	1.2	176	2897			7		
SAN-MW1d	02/13/12	14:14	23.53	0.5	17.8	7.13	1.0	138	2914	146		10.6	3.0	sampled
SAN-MW1d	05/15/12	12:57	23.53	0.5	16.9	7.27	1	125	2793		3.40272	0		
SAN-MW1d	05/15/12	13:04		0.5	17.4	7.09	1.2	157	2836			3.5		
SAN-MW1d	05/15/12	13:11		0.5	17.5	7.11	1.2	176	2897			7		
SAN-MW1d	05/15/12	13:18	23.53	0.5	17.8	7.13	1	138	2914	146		10.5	3.1	sampled
SAN-MW1D	08/17/12	13:21	30.03	1.0	22.5	7.31	1	189	2675		2.524704	0		
SAN-MW1D	08/17/12	13:24		1.0	21.1	7.23	1.1	189	2600			2.5		
SAN-MW1D	08/17/12	13:27		1.0	21.2	7.19	0.98	190	2594			5		
SAN-MW1D	08/17/12	13:30	30.27	1.0	21.3	7.1	0.97	191	2587	189		7.5	3.0	SAMPLED at 13:30
SAN-MW1D	12/09/12	12:26	29.19	1	18.5	7.70	2.5	126	2711		2.61	0		
SAN-MW1D	12/09/12	12:29		1	18.5	7.46	2.5	126	2682			3		
SAN-MW1D	12/09/12	12:32		1	18.5	7.38	2.4	127	2661			6		
SAN-MW1D	12/09/12	12:35	29.20	1	18.5	7.32	2.4	127	2623	123		9	3.4	sampled
SAN-MW1s	02/13/12										0			Well Dry

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
SAN-MW2d	02/13/12	12:36	29.26	0.5	17.0	7.07	2.1	239	2094			0		
SAN-MW2d	02/13/12	12:40		0.5	17.0	7.07	2.1	225	2008			2.5		
SAN-MW2d	02/13/12	12:45		0.5	16.8	7.05	2.0	222	2006			5		
SAN-MW2d	02/13/12	12:51	29.36	0.5	16.6	7.15	2.0	217	2004	>1,000		7.5	2.9	sampled
SAN-MW2d	05/15/12	12:07	31.23	0.5	20.1	7.01	4.1	263	2049		2.247264	0		
SAN-MW2d	05/15/12	12:11		0.5	19	6.94	4.5	250	2043			2.5		
SAN-MW2d	05/15/12	12:15		0.5	19	7.01	4.1	238	1946			5		
SAN-MW2d	05/15/12	12:19	31.55	0.5	19.2	7	4	230	1939	650		7.5	3.3	sampled
SAN-MW2D	08/17/12	15:12	40.66	0.5	21.6	7.05	3.8	198	1716		0.8	0		
SAN-MW2D	08/17/12	15:14		0.5	21.9	7.01	3.8	199	1717			1		
SAN-MW2D	08/17/12	15:16		0.5	22.2	6.99	3.9	200	1717			2		
SAN-MW2D	08/17/12	15:18	40.7	0.5	22.8	6.97	3.9	201	1719	781		3	3.8	SAMPLED at 15:18
SAN-MW2D	12/09/12	11:53	34.85	1	16.6	7.28	4.6	154	1919		1.66	0		
SAN-MW2D	12/09/12	11:55		1	17.5	7.22	4.4	155	1689			2		
SAN-MW2D	12/09/12	11:57		1	17.7	7.17	4.6	152	1672			4		
SAN-MW2D	12/09/12	11:59	35.05	1	17.8	7.16	4.1	150	1671	520		6	3.6	sampled
SAN-MW2s	02/13/12										0			Well Dry
SAN-MW3d	02/13/12	13:06	30.36	0.5	17.4	7.02	2.6	217	1948			0		
SAN-MW3d	02/13/12	13:10		0.5	18.9	6.91	2.5	220	1901			2.5		
SAN-MW3d	02/13/12	13:15		0.5	18.8	6.90	2.5	224	1862			5		
SAN-MW3d	02/13/12	13:21	30.45	0.5	18.8	6.92	2.5	227	1861	80		7.5	3.1	sampled
SAN-MW3d	05/15/12	12:21	32.13	0.5	22	7.08	3.1	230	1865		2.133024	0		
SAN-MW3d	05/15/12	12:26		0.5	21.6	7.02	2.7	210	1866			2.5		
SAN-MW3d	05/15/12	12:31		0.5	21.2	7	2.5	209	1877			5		
SAN-MW3d	05/15/12	12:36	32.24	0.5	21.1	7	2.2	205	1872	56		7.5	3.5	sampled
SAN-MW3D	08/17/12	14:15	41.85	0.25	23.1	7.1	1.8	208	1856		0.605472	0		
SAN-MW3D	08/17/12	14:17		0.25	24.4	7.04	1.8	210	1844			0.5		
SAN-MW3D	08/17/12	14:19		0.25	24.6	6.97	1.9	211	1825			1		
SAN-MW3D	08/17/12	14:21	42.05	0.25	23.2	6.97	2.1	211	1817	226		1.5	2.5	SAMPLED at 14:22
SAN-MW3D	12/09/12	11:55	36.43	1	19.6	7.75	4.0	127	1731		1.43	0		
SAN-MW3D	12/09/12	11:57		1	19.6	7.57	3.8	127	1726			1.5		
SAN-MW3D	12/09/12	11:59		1	19.7	7.40	3.9	128	1726			3		
SAN-MW3D	12/09/12	12:01	36.66	1	19.8	7.27	3.7	129	1725	200		4.5	3.1	sampled
SAN-MW3s	02/13/12										0			Well Dry
SAN-MW4d	02/13/12	13:32	29.72	0.5	17.6	7.20	2.6	230	1765			0		
SAN-MW4d	02/13/12	13:37		0.5	18.1	6.84	2.7	243	1751			4		
SAN-MW4d	02/13/12	13:42		0.5	18.3	6.82	2.7	247	1752			8		
SAN-MW4d	02/13/12	13:48	30.11	0.5	17.7	6.83	2.7	251	1740	383		12	2.9	sampled
SAN-MW4d	05/15/12	12:36	31.2	0.5	20.2	6.9	3.8	214	1964		3.90048	0		
SAN-MW4d	05/15/12	12:44		0.5	20.9	6.88	3.5	221	1965			4		
SAN-MW4d	05/15/12	12:52		0.5	20.6	6.89	3.2	218	1966			8		
SAN-MW4d	05/15/12	13:00	31.53	0.5	20.5	6.88	3	215	1969	53		12	3.1	sampled
SAN-MW4D	08/17/12	14:38	41.88	1.0	21	7.1	1.7	203	1679		2.2848	0		
SAN-MW4D	08/17/12	14:41		1.0	21.1	7.07	1.1	200	1684			2.5		
SAN-MW4D	08/17/12	14:44		1.0	21.5	7	0.98	198	1692			5		
SAN-MW4D	08/17/12	14:47	41.96	1.0	21.7	6.98	0.93	195	1695	212		7.5	3.3	SAMPLED at 14:47

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	(casings)	Comments
SAN-MW4D	12/09/12	13:28	36.15	1	18.1	7.57	1.2	148	1763		3.09	0		
SAN-MW4D	12/09/12	13:31		1	18.5	7.20	0.8	141	1720			3		
SAN-MW4D	12/09/12	13:34		1	18.5	7.43	1.0	132	1723			6		
SAN-MW4D	12/09/12	13:37	37.69	1	18.7	7.18	1.1	134	1713	74		9	2.9	sampled
SAN-MW4s	02/13/12										0			Well Dry
SAN-MW5D	08/17/12	13:40	38.22	0.5	21.3	7.02	5.1	203	2178			0		
SAN-MW5D	08/17/12	13:45		0.5	20.1	6.95	4.7	206	2140			2.5		
SAN-MW5D	08/17/12	13:50		0.5	20.1	6.92	4.4	207	2133			5		
SAN-MW5D	08/17/12	13:55	39.11	0.5	20.6	6.92	5.3	209	2133	115		7.5	2.9	SAMPLED at 13:56
SAN-MW5D	12/09/12	10:46	30.33	1	18.1	7.63	5.3	125	1968		3.73	0		
SAN-MW5D	12/09/12	10:50		1	18.1	7.39	5.2	127	1955			4		
SAN-MW5D	12/09/12	10:54		1	18.1	7.29	5.3	129	1953			8		
SAN-MW5D	12/09/12	10:58	30.40	1	18.1	7.17	5.4	129	1956	104		12	3.2	sampled
SAN-MW5s	02/16/12	9:55	25.33	0.5	14.7	6.87	2.7	254	1963		1.19	0		
SAN-MW5s	02/16/12	9:57		0.5	16.6	6.97	2.7	251	1840			1		
SAN-MW5s	02/16/12	10:00		0.5	16.6	6.98	2.8	251	1835			2		
SAN-MW5s	02/16/12	10:03	28.83	0.5	16.7	7.03	2.8	247	1828	>1,000		3	2.5	sampled
SAN-MW5s	05/15/12	15:35	26.99	0.5	20.6	7.1	3.1	201	1950		1.0	0		
SAN-MW5s	05/15/12	15:37		0.5	20.6	7.08	2.9	204	1944			1		
SAN-MW5s	05/15/12	15:39		0.5	20.5	7.05	2.9	206	1939			2		
SAN-MW5s	05/15/12	15:41	27.65	0.5	20.5	7.04	3	207	1937	>1,000		3	3.1	sampled
SAN-MW6D	08/17/12	12:45	14.47	1.0	24.8	7.32	2.8	120	1999		5.1408	0		
SAN-MW6D	08/17/12	12:50		1.0	22.3	7.22	3.1	111	1971			5		
SAN-MW6D	08/17/12	12:55		1.0	23.4	7.21	2.8	108	1605			10		
SAN-MW6D	08/17/12	13:00	16.75	1.0	21.7	7.27	2.8	107	1813	238		15	2.9	SAMPLED at 13:00
SAN-MW6s	02/16/12	11:31	13.81	0.5	20.6	7.05	2.5	246	1797		2.41	0		
SAN-MW6s	02/16/12	11:40		0.5	21.6	6.99	2.6	246	1827			2.5		
SAN-MW6s	02/16/12	11:49		0.5	22.1	7.00	2.6	242	1840			5		
SAN-MW6s	02/16/12	11:58	14.45	0.5	22.0	7.01	2.5	235	1844	225		7.5	3.1	sampled
SAN-MW6s	05/15/12	13:33	15.75	0.5	21.4	6.9	3	173	1870		2.304384	0		
SAN-MW6s	05/15/12	13:38		0.5	20.8	6.88	2.9	175	1875			2.5		
SAN-MW6s	05/15/12	13:43		0.5	21.1	6.9	2.7	173	1867			5		
SAN-MW6s	05/15/12	13:48	15.99	0.5	21.5	6.9	2.7	172	1859	153		7.5	3.3	sampled
SAN-MW6S	12/09/12	11:17	16.39	1	20.5	7.48	2.4	141	1697		1.99	0		
SAN-MW6S	12/09/12	11:19		1	21.3	7.24	2.3	143	1723			2		
SAN-MW6S	12/09/12	11:21		1	21.1	7.15	1.9	142	1756			4		
SAN-MW6S	12/09/12	11:23	17.70	1	21.0	7.20	1.8	138	1780	202		6	3.0	sampled
SAN-MW7D	08/17/12	12:28	28.4	1.0	18.9	7.51	2	130	1639		3.94944	0		
SAN-MW7D	08/17/12	12:32		1.0	18.8	7.26	2.2	130	1635			4		
SAN-MW7D	08/17/12	12:36		1.0	18.7	7.18	2.2	127	1639			8		
SAN-MW7D	08/17/12	12:40	28.43	1.0	18.9	7.12	2.1	124	1638	26		12	3.0	SAMPLED at 12:40
SAN-MW7s	02/16/12	11:04	14.81	0.5	20.2	6.97	2.8	243	1702		2.51	0		
SAN-MW7s	02/16/12	11:10		0.5	20.0	6.90	2.3	246	1708			2.5		
SAN-MW7s	02/16/12	11:16		0.5	20.1	6.90	2.4	250	1716			5		
SAN-MW7s	02/16/12	11:22	16.71	0.5	20.3	6.91	2.4	251	1719	643		7.5	3.0	sampled
SAN-MW7s	05/15/12	13:59	14.88	0.5	22.1	6.8	2.5	180	1770		2.66016	0		

Table 6
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Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
SAN-MW7s	05/15/12	14:04		0.5	19.4	6.78	2.6	177	1816			2.5		
SAN-MW7s	05/15/12	14:09		0.5	19	6.78	2.6	170	1846			5		
SAN-MW7s	05/15/12	14:14	15.29	0.5	20.2	6.79	2.6	167	1823	494		7.5	2.8	sampled
SAN-MW7S	12/09/12	10:03	21.47	0.5	16.8	7.03	1.1	141	1756		0.63	0		
SAN-MW7S	12/09/12	10:05		0.5	17.9	6.99	0.7	141	1756			1		
SAN-MW7S	12/09/12	10:07		0.5	17.9	7.12	0.9	139	1759			2		
SAN-MW7S	12/09/12	10:09	21.50	0.5	17.9	7.11	0.9	138	1759	30		3	4.8	sampled
SAN-MW8D	08/17/12	12:01	29.1	1.0	20.6	6.35	1.6	241	1452		2.21952	0		
SAN-MW8D	08/17/12	12:04		1.0	19.9	7.04	1.6	210	1463			2.5		
SAN-MW8D	08/17/12	12:07		1.0	19.5	7.11	1.5	197	1470			5		
SAN-MW8D	08/17/12	12:10	30.16	1.0	19.3	7.18	1.4	184	1475	21		7.5	3.4	SAMPLED at 12:10
SAN-MW8s	02/16/12	10:40	16.56	0.5	19.6	7.45	2.9	261	1596		1.43	0		
SAN-MW8s	02/16/12	10:43		0.5	19.1	6.96	2.1	252	1682			1.5		
SAN-MW8s	02/16/12	10:46		0.5	19.2	6.95	2.0	244	1679			3		
SAN-MW8s	02/16/12	10:50	19.56	0.5	19.3	6.91	2.0	242	1673	603		4.5	3.1	sampled
SAN-MW8s	05/15/12	14:26	21.17	0.5	21	6.74	2	172	1664		1.344768	0		
SAN-MW8s	05/15/12	14:29		0.5	22.8	6.8	1.6	229	1651			1.5		
SAN-MW8s	05/15/12	14:32		0.5	20.6	6.69	1.7	225	1656			3		
SAN-MW8s	05/15/12	14:35	21.61	0.5	20.8	6.7	1.7	220	1660	>1,000		4.5	3.3	sampled
SAN-MW8S	12/09/12	9:29	23.70	1	18.2	7.87	2.5	99	1520		1.06	0		
SAN-MW8S	12/09/12	9:30		1	18.5	7.71	2.5	104	1502			1		
SAN-MW8S	12/09/12	9:31		1	18.7	7.57	2.4	108	1497			2		
SAN-MW8S	12/09/12	9:32	23.72	1	18.3	7.64	2.3	112	1505	50		3	2.8	sampled
TON-MW1s	02/10/12	12:46	7.58	0.5	21.0	7.20	2.8	247	4113		2.66	0		
TON-MW1s	02/10/12	12:50		0.5	20.1	7.07	2.8	242	3772			2.5		
TON-MW1s	02/10/12	12:54		0.5	20.2	7.04	2.5	227	3776			5		
TON-MW1s	02/10/12	12:59	7.80	0.5	20.9	7.03	2.4	228	3776	6.5		7.5	2.8	sampled
TON-MW1s	05/10/12	15:52	7.84	0.5	21.4	7.07	1.7	222	3981		2.62	0		
TON-MW1s	05/10/12	15:55		0.5	19.9	6.95	1.9	222	4027			3		
TON-MW1s	05/10/12	15:58		0.5	19.9	6.97	1.7	221	4029			6		
TON-MW1s	05/10/12	16:01	8.00	0.5	19.8	6.99	1.8	219	4027	7		9	3.4	sampled
TON-MW1S	08/16/12	11:08	11.55	1.0	20.6	6.96	0.9	238	4034		2.066112	0		
TON-MW1S	08/16/12	11:10		1.0	20.1	6.94	0.9	240	4030			2		
TON-MW1S	08/16/12	11:12		1.0	20.1	6.93	0.9	238	4025			4		
TON-MW1S	08/16/12	11:14	11.89	1.0	20.2	6.94	1	236	4024	32		6	2.9	SAMPLED at 11:17
TON-MW1S	12/07/12	13:24	9.10	1	20.4	7.25	0.6	137	3825		2.42	0		
TON-MW1S	12/07/12	13:27		1	20.4	7.21	0.5	137	3827			2.5		
TON-MW1S	12/07/12	13:30		1	20.4	7.16	0.5	135	3830			5		
TON-MW1S	12/07/12	13:33	9.61	1	20.2	7.12	0.5	135	3832	17		7.5	3.1	sampled
TON-MW2s	02/10/12	12:28	5.64	0.5	21.2	7.31	2.8	245	3662		2.90	0		
TON-MW2s	02/10/12	12:32		0.5	20.2	7.17	2.9	258	4612			3		
TON-MW2s	02/10/12	12:36		0.5	20.3	7.17	2.9	259	4595			6		
TON-MW2s	02/10/12	12:41	5.77	0.5	20.4	7.15	3.0	257	4568	9.5		9	3.1	sampled
TON-MW2s	05/10/12	17:26	6.56	0.5	22.1	7.11	1.9	211	4961		2.75	0		
TON-MW2s	05/10/12	17:28		0.5	20.4	7.10	1.9	215	4919			3		
TON-MW2s	05/10/12	17:30		0.5	19.8	7.10	1.9	216	4910			6		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
TON-MW2s	05/10/12	17:32	6.74	0.5	19.7	7.09	1.8	217	4890	3		9	3.3	sampled
TON-MW2S	08/16/12	10:47	5.7	1.0	20.8	7.04	1.7	299	4576		3.058368	0		
TON-MW2S	08/16/12	10:50		1.0	20.7	7.16	1	269	4580			3		
TON-MW2S	08/16/12	10:53		1.0	20.6	7.17	0.8	264	4709			6		
TON-MW2S	08/16/12	10:56	5.89	1.0	20.7	7.06	0.9	252	4335	24		9	2.9	SAMPLED at 10:59
TON-MW2S	12/06/12	15:01	7.57	1	19.7	7.32	0.7	93	4705		2.58	0		
TON-MW2S	12/06/12	15:04		1	19.8	7.30	0.5	100	4652			2.5		
TON-MW2S	12/06/12	15:07		1	19.8	7.29	0.5	102	4648			5		
TON-MW2S	12/06/12	15:10	7.80	1	19.8	7.26	0.5	106	4627	48		7.5	2.9	sampled
TON-MW3s	02/10/12	13:45	8.13	0.5	20.0	7.27	2.4	236	2907		2.51	0		
TON-MW3s	02/10/12	13:49		0.5	19.8	7.24	2.5	240	2579			2.5		
TON-MW3s	02/10/12	13:53		0.5	19.8	7.22	2.5	228	2578			5		
TON-MW3s	02/10/12	13:58	8.25	0.5	19.9	7.21	2.6	232	2578	2.5		7.5	3.0	sampled
TON-MW3s	05/10/12	16:35	10.77	0.5	19.7	7.25	1.2	206	2994		2.08	0		
TON-MW3s	05/10/12	16:37		0.5	19.1	7.16	1.7	210	2964			2		
TON-MW3s	05/10/12	16:39		0.5	19.3	7.18	1.7	212	2963			4		
TON-MW3s	05/10/12	16:41	11.12	0.5	19.4	7.13	1.8	213	2912	28		6	2.9	sampled
TON-MW3S	08/16/12	12:01	16.51	0.5	21.4	7.1	0.9	210	3167		1.2648	0		
TON-MW3S	08/16/12	12:03		0.5	20.4	7.07	1.3	214	3027			1		
TON-MW3S	08/16/12	12:05		0.5	20.4	7.05	1.3	217	3000			2		
TON-MW3S	08/16/12	12:07	16.68	0.5	20.4	7.06	1.4	217	3001	6		3	2.4	SAMPLED at 12:09
TON-MW3S	12/06/12	16:19	11.32	1	19.5	7.53	0.8	100	2955		1.99	0		
TON-MW3S	12/06/12	16:21		1	19.8	7.40	0.6	100	2910			2		
TON-MW3S	12/06/12	16:23		1	19.8	7.28	0.5	102	2857			4		
TON-MW3S	12/06/12	16:25	11.52	1	19.9	7.25	0.5	104	2845	28		6	3.0	sampled
TON-MW4s	02/10/12	13:06	9.26	0.5	21.8	7.14	2.6	233	3802		2.21	0		
TON-MW4s	02/10/12	13:10		0.5	21.5	7.41	2.6	240	3633			2		
TON-MW4s	02/10/12	13:14		0.5	21.4	7.14	2.6	243	3569			4		
TON-MW4s	02/10/12	13:19	9.30	0.5	21.2	7.13	2.7	243	3544	5.5		6	2.7	sampled
TON-MW4s	05/10/12	16:13	9.75	0.5	21.2	7.00	1.8	190	4094		2.13	0		
TON-MW4s	05/10/12	16:15		0.5	20.5	7.03	1.3	197	3989			2		
TON-MW4s	05/10/12	16:17		0.5	20.2	7.01	1.3	201	3941			4		
TON-MW4s	05/10/12	16:19	9.83	0.5	20.3	7.03	1.4	204	3928	18		6	2.8	sampled
TON-MW4S	08/16/12	11:36	18.41	0.5	23	6.98	1.9	216	3943		0.796416	0		
TON-MW4S	08/16/12	11:38		0.5	20.4	6.99	0.5	217	3922			1		
TON-MW4S	08/16/12	11:40		0.5	20.3	7	0.4	219	3921			2		
TON-MW4S	08/16/12	11:42	18.45	0.5	20.3	7	0.5	220	3923	44		3	3.8	SAMPLED at 11:45
TON-MW4S	12/07/12	12:56	12.81	1	19.9	7.54	1.1	139	3805		1.63	0		
TON-MW4S	12/07/12	12:58		1	19.9	7.40	1.0	138	3788			2		
TON-MW4S	12/07/12	13:00		1	20.0	7.31	0.8	138	3602			4		
TON-MW4S	12/07/12	13:02	13.01	1	20.0	7.28	0.7	137	3607	24		6	3.7	sampled
TON-MW5s	02/10/12	13:24	8.67	0.5	20.7	7.24	2.4	231	3277		2.31	0		
TON-MW5s	02/10/12	13:28		0.5	20.8	7.15	2.4	234	3172			2.5		
TON-MW5s	02/10/12	13:33		0.5	20.9	7.16	2.3	231	3158			5		
TON-MW5s	02/10/12	13:38	9.55	0.5	20.7	7.14	2.4	236	3151	5.5		7.5	3.2	sampled
TON-MW5s	05/10/12	16:52	9.60	0.5	20.6	7.10	1.5	215	3453		2.15	0		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
TON-MW5s	05/10/12	16:54		0.5	20.2	7.07	1.5	217	3437			2		
TON-MW5s	05/10/12	16:56		0.5	21.2	7.24	1.8	213	3402			4		
TON-MW5s	05/10/12	16:58	9.78	0.5	20.9	7.11	1.7	215	3394	38		6	2.8	sampled
TON-MW5S	08/16/12	12:33	14.1	1.0	23	7.13	1.3	215	3342		1.605888	0		
TON-MW5S	08/16/12	12:35		1.0	21.5	6.96	0.5	216	3402			2		
TON-MW5S	08/16/12	12:37		1.0	21.3	6.95	0.5	216	3390			4		
TON-MW5S	08/16/12	12:39	15.16	1.0	21.4	6.94	0.6	216	3386	5		6	3.7	SAMPLED at 12:42
TON-MW5S	12/06/12	15:44	11.43	1	19.3	7.27	0.5	101	3160		1.86	0		
TON-MW5S	12/06/12	15:46		1	21.0	7.30	0.5	100	3160			2		
TON-MW5S	12/06/12	15:48		1	21.2	7.30	0.6	102	3162			4		
TON-MW5S	12/06/12	15:50	15.21	1	21.4	7.37	0.7	102	3169	12		6	3.2	sampled
TON-MW6s	02/10/12	11:06	8.33	0.5	19.2	7.75	2.7	244	2847		3.24	0		
TON-MW6s	02/10/12	11:10		0.5	19.0	7.43	2.7	253	2841			3		
TON-MW6s	02/10/12	11:15		0.5	19.4	7.49	2.5	246	2781			6		
TON-MW6s	02/10/12	11:21	8.64	0.5	19.7	7.55	2.4	237	2767	12		9	2.8	sampled
TON-MW6s	05/10/12	17:46	8.99	0.5	19.5	7.86	1.9	260	1934		3.14	0		
TON-MW6s	05/10/12	17:48		0.5	18.6	7.60	1.8	261	2177			3		
TON-MW6s	05/10/12	17:50		0.5	18.8	7.59	1.7	253	2343			6		
TON-MW6s	05/10/12	17:52	9.20	0.5	18.5	7.57	1.8	253	2476	15		9	2.9	sampled
TON-MW6S	08/16/12	13:12	10.05	1.0	20.6	7.42	1	206	3040		3.1824	0		
TON-MW6S	08/16/12	13:15		1.0	19.8	7.42	1.1	206	3008			3		
TON-MW6S	08/16/12	13:18		1.0	19.8	7.38	0.8	207	3007			6		
TON-MW6S	08/16/12	13:21	10.15	1.0	19.9	7.38	1	207	3018	3		9	2.8	SAMPLED at 13:23
TON-MW6S	12/06/12	14:16	10.96	1	18.7	8.12	0.7	97	2156		2.81	0		
TON-MW6S	12/06/12	14:19		1	19.5	8.10	0.7	96	2171			3		
TON-MW6S	12/06/12	14:22		1	19.8	8.09	0.7	95	2180			6		
TON-MW6S	12/06/12	14:25	11.15	1	19.8	8.09	0.7	95	2184	220		9	3.2	sampled
TON-MW7s	02/10/12	12:00	8.42	0.5	20.1	7.53	2.6	257	3220		3.23	0		
TON-MW7s	02/10/12	12:04		0.5	20.8	7.90	2.5	247	1908			3		
TON-MW7s	02/10/12	12:08		0.5	21.3	7.97	2.5	232	1504			6		
TON-MW7s	02/10/12	12:13	8.73	0.5	21.9	7.97	2.4	229	1389	20		9	2.8	sampled
TON-MW7s	05/10/12	17:25	6.14	0.5	20.3	8.11	1.1	220	1218		3.60	0		
TON-MW7s	05/10/12	17:29		0.5	20.5	8.01	1.3	220	1228			4		
TON-MW7s	05/10/12	17:33		0.5	20.2	7.99	1.3	218	1218			8		
TON-MW7s	05/10/12	17:37	6.95	0.5	20.4	7.97	1.4	218	1208	6		12	3.3	sampled
TON-MW7S	08/16/12	14:32	8.21	1.0	22.8	7.22	0.7	187	1979		3.448416	0		
TON-MW7S	08/16/12	14:36		1.0	22.8	7.7	1.1	188	1795			3.5		
TON-MW7S	08/16/12	14:40		1.0	22.1	7.7	0.7	187	1832			7		
TON-MW7S	08/16/12	14:44	8.81	1.0	21.7	7.65	0.7	190	1845	7		10.5	3.0	SAMPLED at 14:46
TON-MW7S	12/07/12	11:11	9.07	1	22.9	7.43	0.8	127	1162		3.12	0		
TON-MW7S	12/07/12	11:14		1	22.9	7.62	0.6	123	1166			3		
TON-MW7S	12/07/12	11:17		1	22.7	7.85	0.5	114	1168			6		
TON-MW7S	12/07/12	11:20	9.15	1	22.8	7.95	0.5	110	1169	20		9	2.9	sampled
TON-MW8s	02/10/12	11:40	9.71	0.5	20.5	7.31	2.8	270	4829		2.94	0		
TON-MW8s	02/10/12	11:44		0.5	19.4	7.21	2.8	272	5700			3		
TON-MW8s	02/10/12	11:48		0.5	19.3	7.16	2.8	270	5832			6		

Table 6
Summary of Monitoring Well Purging Records – Year 1
Central Valley Dairy Representative Monitoring Program

Well ID	Date	Time	DTW	Pumping Rate (gpm)	T (°C)	pH	DO (mg/L)	ORP (mV)	SC (µS/cm)	Turb (NTU)	Calculated Single Casing Volume (gal)	Purged Cumulative Volume (gal)	Purged Cumulative Volume (casings)	Comments
TON-MW8s	02/10/12	11:53	11.65	0.5	19.3	7.16	2.7	267	5834	277		9	3.1	sampled
TON-MW8s	05/10/12	17:08	10.14	0.5	19.8	7.14	1.9	245	6451		2.87	0		
TON-MW8s	05/10/12	17:11		0.5	19.1	7.11	1.9	249	6299			3		
TON-MW8s	05/10/12	17:15		0.5	19.6	7.14	1.6	249	6510			6		
TON-MW8s	05/10/12	17:17	12.80	0.5	19.0	7.29	1.9	252	6641	751		9	3.1	sampled
TON-MW8S	08/16/12	13:50	12.22	1.0	21.2	7.06	0.9	208	6714		2.924544	0		
TON-MW8S	08/16/12	13:53		1.0	20.6	7.13	0.6	212	5969			3		
TON-MW8S	08/16/12	13:56		1.0	19.8	7.04	0.7	214	6095			6		
TON-MW8S	08/16/12	13:59	13.19	1.0	20.5	7.04	0.5	213	6036	28		9	3.1	SAMPLED at 14:05
TON-MW8S	12/07/12	12:01	9.80	1	19.4	7.34	0.9	118	5705		2.92	0		
TON-MW8S	12/07/12	12:04		1	19.2	7.32	0.8	120	5700			3		
TON-MW8S	12/07/12	12:07		1	18.9	7.30	0.7	123	5690			6		
TON-MW8S	12/07/12	12:10	12.35	1	18.8	7.27	0.7	127	5697	53		9	3.1	sampled

PR=poor recharge

Table 7
Laboratory Results for Field Duplicate Samples – Year 1
Central Valley Dairy Representative Monitoring Program

Well	Date	TDS	NO3	NO2	NH3 + NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Duplicate Label
MEN-MW1s	12/6/2012	3,000	38		0.59												
MEN-MW1s	12/6/2012	2900	38		0.57												Field Duplicate
MEN-MW7s	5/8/2012	1,600	62	<0.05*	0.063	1.3*	310	3.3	57	150	270	140	0.10J*	510*	<8.2*	<8.2*	
MEN-MW7s	5/8/2012	1600	62	ND	0.045	1.3	310	3.5	57	170	280	140	0.17	550	ND	ND	Duplicate #1
ANC-MW3	8/16/2012	1,300	55	0.031J	<0.05	0.24	260	6.9	31	130	230	150	0.43	380	<8.2	<8.2	
ANC-MW3	8/16/2012	1300	55	0.031	0.025	0.25	260	6.8	31	130	230	150	0.43	380	ND	ND	Duplicate #4
ANC-MW4	5/11/2012	1,000	33	<0.05*	<0.05	0.15J*	120	8.6	48	130	140	110	1.5*	360*	<8.2*	<8.2*	
ANC-MW4	5/11/2012	1000	33	ND	ND	0.14	130	8.8	49	130	140	110	1.5	400	ND	ND	Duplicate 4
ANC-MW5s	12/6/2012	2,200	11		<0.050												
ANC-MW5s	12/6/2012	2200	11		ND												Field Duplicate
BET-MW8s	5/10/2012	470	27	<0.05*	<0.05	0.55*	26	3.5	12	51	27	18	6.0*	75*	<4.1*	<4.1*	
BET-MW8s	5/10/2012	470	26	ND	ND	0.63	26	3.5	12	51	27	19	5.8	75	ND	ND	Duplicate #3
FG1-MW1d	8/15/2012	850	2.7	0.023J	0.025J	0.15J	170	5.1	39	87	120	110	0.14J	460	<8.2	<8.2	
FG1-MW1d	8/15/2012	850	2.4	0.024	0.034	0.16	170	5	40	88	110	110	0.17	460	ND	ND	Duplicate #1
FG1-MW2d	5/14/2012	840	37	0.092*	0.029J	0.20*	80	7.9	51	110	130	66	2.3*	270*	<8.2*	<8.2*	
FG1-MW2d	5/14/2012	840	39	0.083	0.052	0.18	81	7.9	51	110	130	66	2.3	260	ND	ND	Duplicate #6
BEA-MW2d	8/16/2012	360	0.38	0.026J	0.027J	0.43	50	7.0	14	37	6.6	41	0.12J	200	<4.1	<4.1	
BEA-MW2d**	8/16/2012	370	0.35	0.076	0.037	0.17	52	7	13	35	6.4	42	0.16	200	ND	ND	Duplicate #5
COT-MW4	12/9/2012	1,200	25		<0.050												
COT-MW4	12/9/2012	1200	24		ND												Field Duplicate #7
SAN-MW1d	5/15/2012	1,800	35	<0.05*	<0.05	0.41*	470	5.2	28	46	140	140	0.46*	840*	<8.2*	<8.2*	
SAN-MW1d	5/15/2012	1800	37	ND	0.025	0.33	510	5.1	29	92	140	150	0.62	960	ND	ND	Duplicate #7
SAN-MW4d	8/17/2012	1,200	76	<0.05	0.044J	0.60	130	5.2	49	160	73	94	0.78	400	<8.2	<8.2	

Table 7
Laboratory Results for Field Duplicate Samples – Year 1
Central Valley Dairy Representative Monitoring Program

Well	Date	TDS	NO3	NO2	NH3 + NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Duplicate Label
SAN-MW4d	8/17/2012	1200	76	ND	ND	0.51	120	5	50	160	74	94	0.78	410	ND	ND	Dup #7
CAE-MW3s	12/4/2012	2,100	89		0.033J												
CAE-MW3s	12/4/2012	2000	97		ND												Field Duplicate #2s
ROB-MW3s	12/4/2012	1,200	1.6		0.028J												
ROB-MW3S	12/4/2012	1200	1.4		0.032												ROB Field Duplicate #1s
ANT-MW6s	8/15/2012	1,200	29	<0.05	<0.05	0.40	120	94	100	73	170	140	<0.15	520	<8.2	<8.2	
ANT-MW6s	8/15/2012	1200	29	ND	0.028	0.45	120	98	110	76	170	140	ND	520	ND	ND	Duplicate #2
FG2-MW2s	8/15/2012	2,500	9.2	0.027J	0.025J	0.48	350	13	180	170	300	1,000	0.44	550	<8.2	<8.2	
FG2-MW2s	8/15/2012	2500	9.1	0.028	0.025	0.41	340	12	180	170	300	1000	0.46	550	ND	ND	Duplicate #3
FG2-MW5s	12/6/2012	3,100	19		<0.050												
FG2-MW5s**	12/6/2012	3100	19		ND												Field Duplicate #4
NUN-MW2s	12/4/2012	3,000	1.6		<0.050												
NUN-MW2s	12/4/2012	3000	1.8		ND												Field Duplicate 3s
TON-MW2s	5/10/2012	2,700	22	0.30*	0.13	1.2*	670	33	190	56	610	270	1.2*	1,300*	<8.2*	<8.2*	
TON-MW2s	5/10/2012	2900	22	0.22	0.038	1.1	670	32	190	95	610	270	1.8	1400	ND	ND	Duplicate #2
TON-MW3s	8/16/2012	1,800	36	0.017J	<0.05	0.34	420	1.7	99	93	370	210	0.18	750	<8.2	<8.2	
TON-MW3s	8/16/2012	1800	33	0.018	ND	0.54	410	2	95	92	350	200	0.17	750	ND	ND	Duplicate#6

All concentrations in mg/L. Field duplicates were inadvertently not collected in February 2012.
*analyzed out of hold time (also applicable to accompanying duplicate sample)
**uncertain duplicate Well ID

Table 8
Infrastructure and Management Practices, Liquid Manure Lagoons and Settling Basins – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Lagoon ID	Year of Construction	Construction Records	Mechanical Separator	Earthen Depth (ft)	Minimum Waste Depth (ft)	Method of Cleaning	Comment
MEN	Pond 1	1970's	none	no	15	5	dilution/agitation	a, b
	Pond 2	1990's	none		8	1	dewatered/excavation	a, c
	Pond 3	1990's	none		6	3	dilution/agitation	a, c
	Pond 4	1990's	none		12	6	dilution/agitation	a, c
ANC	WWS 1	1993	yes	yes	13	3	pumped out during irrigation	a
	WWS 2	1993	yes		13	3	pumped out during irrigation	a
BET	WWS	2000	yes	no	14	2	agitation	a, b
	SSB North	2000	yes		4	0	excavation	a
	SSB South	2000	yes		4	0	excavation	a
FG1	WWS 1	1979	none	yes	14	<1	agitation during irrigation; annual excavation for sand removal	a, c
BEA	WWS	2001	TBD	no	TBD	4-11 free	dilution and pumped out	a
	SSB1	2001	TBD		6	<1	excavation	e
	SSB2	2001	TBD		6	<1	excavation	e
	Horseshoe	2001	TBD		6	<1	excavation	e
COT	WWS	2003	TBD	yes	24	4-11 free	none	a
	Digester	2003	TBD		24	4-11 free	none	a
	North SSB	1980's	TBD		10	3-6 free	dilution and pumped out	a
	South SSB	1980's	TBD		10	3-6 free	dilution and pumped out	a
SAN	WWS	2001	TBD	no	25	4-11 free	dilution and pumped out	a
	SSB1	2001	TBD		5	<1	excavation	a
	SSB2	2001	TBD		5	<1	excavation	a
	SSB3	2001	TBD		5	<1	excavation	a
	SSB4	2001	TBD		5	<1	excavation	a
PLS	SSB	1980's	none	yes	13	4	auger removes solids from basin; additional cleaning only if auger breaks	a, d
	WWS	1960's	none		15	2	dilution/agitation; excavated once	a
CAE	WWS	1998	yes	no	15	1	none	a
	SSB 1	2004	none		7	3	excavation	e
	SSB 2	2004	yes		7	3	excavation	e
ROB	WW1	1975	none	no	11	TBD	agitation	a
	WW2	2003	yes		11	TBD	agitation	a
	SSB1	1993	none		4	<1	dried out annually; excavation	a
	SSB2	1993	none		4	<1	dried out annually; excavation	a
ANT	WW1	~2002	TBD	yes	15	TBD	pumped out during irrigation	a
	WW2	~1980	TBD		15	TBD	pumped out during irrigation	a
	SSB1	~1990	TBD		14	TBD	none in 2011/12	a
	SSB2	~1990	TBD		14	TBD	none in 2011/12	a
COR	WWS	2001	none	no	9	TBD	none	a
	SSB	2001	none		9	TBD	excavation	a

Table 8
Infrastructure and Management Practices, Liquid Manure Lagoons and Settling Basins – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Lagoon ID	Year of Construction	Construction Records	Mechanical Separator	Earthen Depth (ft)	Minimum Waste Depth (ft)	Method of Cleaning	Comment
FG2	SSB 1	1970	none	no	12	8	excavation	a
	SSB 2	2003	none		12	8	has not required cleaning	a
	WWS	2002	none		11	1	pump and excavation	a
GOD	WWS	2005	yes	no	13	2-3	regular agitation during irrigation events with slurry removal using tankers on a 3-year cycle	a, b
	SSB 1	2005	yes		12	8-10	top crust of separated solids is typically excavated 3 times per year	a, b
	SSB 2	2005	yes		12	8-10	top crust of separated solids is typically excavated 3 times per year	a, b
MAC	WWS	1979	none	yes	17	5-6	dilution/agitation	a, b
NUN	WWS 1	1981	none	yes	8	1	agitation	a
	WWS 2	1986	yes		8	<1	agitation and pumped into slurry trucks	a
MOO	WWS 1	2003	yes	no	9	4	dilution/agitation	a
	SSB 1	2003	yes		9	0	slurry tankers/excavation	a
	SSB 2	2003	yes		9	0	slurry tankers/excavation	a
TON	WWS 1	1972	none	no	13	3	agitation	a, c
	WWS 2	1990	none		8	3	excavation	a, c
	SSB	2000	yes		14	4	excavation	a, c

(a) Berms well maintained and in good condition
(b) Minimal weeds and/or signs of erosion
(c) Additional weed control needed
(d) Minimal weeds and/or rodent holes
(e) In-ground basin, well maintained
free = freeboard; TBD = to be determined

Table 9
Infrastructure and Management Practices, Corrals – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Corral ID	Slope	Ponding	Maintenance and Manure Removal	Comments
MEN	Open Cow Corrals	fair	yes	manure removal in spring and fall using front end loader	-
	Open Heifer Corrals	fair	yes	same	-
ANC	Exercise Pens	good	no	manure removal in fall using scraper and front end loader; fill dirt added as necessary	cows are in freestalls Nov-Mar
	Open Cow Corrals	fair	yes	manure removal in spring and fall using scraper and front end loader; fill dirt added as necessary	same
	Open Heifer Corrals	fair	yes	same	same
BET	Exercise Pens	good	no	manure removal in spring and fall using scraper and front end loader; fill dirt added as necessary	cows locked out during wet season
	Open Cow Corrals	good	yes	same	cows locked out during wet season; minor ponding
	Open Heifer Corrals	good	yes	same	same
FG1	Exercise Pens	good	yes	manure scraped monthly into piles using scraper; removed in fall using front end loader; fill dirt added as necessary	cows locked out during wet season; slight ponding after heavy rain
	Open Cow Corrals	good	yes	same	slight ponding after heavy rain
	Open Heifer Corrals	fair	yes	same	slight ponding after heavy rain
BEA	Corrals	good	no	sloped 1.5 - 3.0%; manure removal in spring and fall using scraper and front end loader; fill dirt added and compacted as necessary	some ponding at bottom of slope near drains
COT	Corrals	good	no	sloped 1.5 - 3.0%; manure removal in spring and fall using scraper and front end loader; fill dirt added and compacted as necessary	some ponding at bottom of slope near drains
SAN	Corrals	good	no	sloped 1.5 - 3.0%; manure removal in spring and fall using scraper and front end loader; fill dirt added and compacted as necessary	some ponding at bottom of slope near drains
PLS	Open Cow Corrals	fair	yes	manure scraped monthly into piles using box spreader/drag scaper; removed in spring and fall (or more frequently) using front end loader; fill dirt added and compacted as necessary	ponding in drainage areas and near corral drains after storm events
	Open Heifer Corrals	fair	yes	same	ponding in drainage areas and near corral drains after storm events; most signifcant on west side of dairy
CAE	Exercise Pens	fair	no	manure removal in spring and fall using scraper and front end loader; harrowed, graded and sloped on an annual basis; fill dirt applied as necessary	cows locked out of exercise pens during wet season
	Open Cow Corrals	fair	yes	same	minor ponding near corral drains
	Open Heifer Corrals	fair	yes	same	same

Table 9
Infrastructure and Management Practices, Corrals – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Corral ID	Slope	Ponding	Maintenance and Manure Removal	Comments
ROB	Corrals	good	no	manure removal throughout dry season (mainly May-October) as needed with scraper; spring tooth used 2-3 times per week during dry season	cows locked out during wet season
ANT	Corrals	TBD	TBD	manure removed annually using scraper	-
COR	Exercise Pens	good	no	manure removal June & October using scraper and front end loader; fill compost used to re-grade as necessary	-
	Open Cow Corrals	good	no	same	cows locked out during wet season
	Open Heifer Corrals	good	no	same	same
FG2	Exercise Pens	good	yes	manure scraped monthly into a pile using scraper; removed using front end loader in fall; fill dirt added two times per year as needed	cows locked out during wet season; some ponding
	Open Cow Corrals	fair	yes	same	same
	Open Heifer Corrals	fair	yes	same	same
GOD	Exercise Pens	good	no	manure removal every ~two months during dry season using scraper and front end loader; uses laser scraping equipment to avoid removal of dirt; very good slope maintenance; fill dirt added as necessary	cows locked in freestalls during wet season
	Open Cow Corrals	good	no	same	same
MAC	Exercise Pens	fair	yes	relatively flat; eastern corrals moderatly sloped to the south; western corrals moderately sloped to the west; manure removal every ~two months during dry season using scraper and front end loader	cows locked in freestalls during wet season; some ponding
	Open Cow Corrals	fair	yes	same	same
NUN	Exercise Pens	good	yes	manure removal in spring and fall using scraper and front end loader; fill dirt added in fall	cows locked out of exercise pens during wet season; some ponding
	Open Cow Corrals	good	no	same	-
	Open Heifer Corrals	good	yes	same	some ponding
MOO	Exercise Pens	good	no	scraped regularly during summer months to maintain slope integrity; manure removal in spring and fall using scraper and front end loader	cows locked out of exercise pens during wet season
	Open Cow Corrals	good	no	same	some ponding occuring following storm events
	Open Heifer Corrals	good	no	same	same
TON	Exercise Pens	good	no	manure removal in spring and fall or more frequently using Carryall scraper; fill dirt added as necessary	cows locked out of exercise pens during wet season
	Open Cow Corrals	good	yes	same	slight ponding near diversion points
	Open Heifer Corrals	fair	yes	same	slight ponding near diversion points

Table 10
Fields, Crops, Irrigation and Fertilization – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Field	Crop	Date of Planting (a)	Date of Harvest	Growing Period (days)	Irrigation Method	Run Length (ft)	Width or Spacing (ft) (b)	Furrows or Borders per Set	Sets per Field	Irrigation per Set (hrs)	Rain (in)	Irrigation Depth (in)	Liquid Manure Depth (in)	Total Liquid Supply (in)	Crop Yield As-Is (ton/ac)	Crop Water Content (%)	Crop Yield dry (ton/ac)	Solid Manure (y/n)	Synthetic Fertilizer (y/n)	- Nutrient Input (lbs/ac) (c) - N	P	K	Total Salt	Nutrient Output (lbs/ac) (c) (Harvest Removal) N	P	K	Total Salt	Mass Balance (lbs/ac) (Input-Output) N	P	K	Total Salt	Mass Ratio (Input/Output) N	P	K	Total Salt
MEN	Long 35 (Field 1)	corn silage	06/11/11	10/18/11	129	border	2,525	560	1	1	8	1.1	23.9	2.5	27.4	36.6	68	11.6	n	y	397	57	659	1,971	234	51	424	1,295	163	5	235	677	1.7	1.1	1.6	1.5
MEN	Long 35 (Field 1)	oats silage soft dough	11/08/11	04/26/12	170	border	2,525	560	1	1	8	4.8	3.0	0.6	8.4	22.2	72	6.2	n	n	99	5	90	957	213	53	369	1,225	-114	-49	-278	-268	0.5	0.1	0.2	0.8
MEN	Long 35 (Field 1)	corn silage	05/24/12	09/22/12	121	border	2,525	560	1	1	8	0.2	32.4	2.0	34.6	32.0	70	9.6	n	y	212	48	279	2,594	147	38	365	1,837	65	9	-86	757	1.4	1.2	0.8	1.4
MEN	McWharters 40 (Field 2)	corn silage	06/10/11	10/17/11	129	border	1,275	637	1	2	3.5	1.1	32.8	0.7	34.6	28.5	69	9.0	n	y	125	34	176	879	171	40	285	953	-46	-6	-109	-74	0.7	0.9	0.6	0.9
MEN	McWharters 40 (Field 2)	oats silage soft dough	11/09/11	04/26/12	169	border	1,275	637	1	2	3.5	4.8	3.0	0.6	8.3	17.0	74	4.5	n	n	88	4	79	843	129	27	235	1,105	-42	-23	-156	-262	0.7	0.1	0.3	0.8
MEN	McWharters 40 (Field 2)	corn silage	05/26/12	09/18/12	115	border	1,275	637	1	2	3.5	0.2	24.9	2.0	27.1	29.0	70	8.7	n	y	226	47	287	2,624	174	41	278	882	52	7	8	1,742	1.3	1.2	1.0	3.0
MEN	East 28 (Field 3)	corn silage	05/26/11	09/20/11	117	border	1,230	485	1	2	3.5	1.2	34.1	0.0	35.2	36.8	68	11.8	n	y	90	28	28	260	258	74	523	1,790	-168	-46	-495	-1,530	0.3	0.4	0.1	0.1
MEN	East 28 (Field 3)	oats silage soft dough	11/07/11	04/27/12	172	border	1,230	485	1	2	3.5	4.8	3.7	0.0	8.5	18.0	77	4.2	n	n	9	-	-	51	104	22	191	860	-96	-	-	-810	0.1	-	-	0.1
MEN	East 28 (Field 3)	corn silage	05/23/12	09/12/12	112	border	1,230	485	1	2	3.5	0.2	31.7	0.0	31.9	34.0	70	10.2	n	y	92	28	28	431	156	41	388	1,952	-64	-13	-360	-1,521	0.6	0.7	0.1	0.2
MEN	West 28 (Field 4)	corn silage	06/15/11	10/10/11	117	border	1,230	485	1	2	3.5	1.1	34.1	0.4	35.6	34.9	69	10.8	n	y	93	33	139	519	230	56	328	1,081	-137	-23	-188	-562	0.4	0.6	0.4	0.5
MEN	West 28 (Field 4)	oats silage soft dough	11/09/11	04/24/12	167	border	1,230	485	1	2	3.5	4.4	3.7	0.0	8.1	21.0	77	4.9	n	n	9	-	-	51	122	25	223	1,004	-113	-	-	-953	0.1	-	-	0.1
MEN	West 28 (Field 4)	corn silage	05/23/12	09/12/12	112	border	1,230	485	1	2	3.5	0.2	31.7	2.4	34.2	26.0	70	7.8	n	y	372	45	365	3,869	156	36	250	790	216	8	116	3,079	2.4	1.2	1.5	4.9
MEN	Big 66 (Field 5)	corn silage	06/09/11	10/14/11	127	border	1,140	639	1	4	4	1.1	25.3	2.6	29.0	35.4	71	10.4	n	y	384	54	609	2,230	219	42	269	1,202	165	11	340	1,028	1.8	1.3	2.3	1.9
MEN	Big 66 (Field 5)	oats silage soft dough	11/10/11	04/26/12	168	border	1,140	639	1	4	4	4.8	5.4	0.3	10.5	21.0	70	6.4	n	n	57	2	48	560	248	50	290	1,306	-190	-48	-242	-746	0.2	0.0	0.2	0.4
MEN	Big 66 (Field 5)	corn silage	05/24/12	09/21/12	120	border	1,140	639	1	4	4	0.2	29.8	2.0	32.0	35.0	70	10.5	n	y	214	48	281	2,589	196	49	378	1,106	18	-1	-97	1,483	1.1	1.0	0.7	2.3
MEN	Little 10 (Field 4)	corn silage	06/09/11	10/10/11	123	border	700	635	1	1	3.5	1.1	31.3	2.2	34.6	19.5	68	6.2	n	y	339	50	533	1,980	137	39	277	948	202	11	257	1,032	2.5	1.3	1.9	2.1
MEN	Little 10 (Field 4)	oats silage soft dough	11/08/11	04/24/12	168	border	700	635	1	1	3.5	4.4	7.5	0.0	11.9	21.0	72	5.9	n	n	10	-	-	101	202	50	349	1,159	-191	-	-	-1,058	0.1	-	-	0.1
MEN	Little 10 (Field 4)	corn silage	05/26/12	09/12/12	109	border	700	635	1	1	3.5	0.2	36.5	2.6	39.3	29.0	70	8.7	n	y	260	54	350	3,231	174	41	278	882	86	13	71	2,350	1.5	1.3	1.3	3.7
MEN	Ruble 22 (Field 5)	alfalfa hay	01/01/11	10/01/11	273	border	780	568	1	2	3	7.1	31.2	0.0	38.3	8.0	10	7.2	n	n	18	-	-	237	515	43	463	1,771	-497	-	-	-1,533	0.0	-	-	0.1
MEN	Ruble 22 (Field 5)	alfalfa hay	01/01/12	10/04/12	277	border	780	568	1	2	3	4.6	31.2	0.0	35.8	8.0	10	7.2	n	n	21	-	-	424	515	43	463	1,771	-494	-	-	-1,347	0.0	-	-	0.2
MEN	Ruble 25 (Field 5)	alfalfa hay	01/01/11	10/01/11	273	border	780	671	1	2	3	7.1	29.2	0.0	36.3	8.0	10	7.2	n	n	17	-	-	223	518	43	466	1,781	-501	-	-	-1,558	0.0	-	-	0.1
MEN	Ruble 25 (Field 5)	alfalfa hay	01/01/12	10/04/12	277	border	780	671	1	2	3	4.6	29.2	0.0	33.8	8.0	10	7.2	n	n	18	-	-	341	518	43	466	1,781	-500	-	-	-1,440	0.0	-	-	0.2
ANC	Field 16 Van Ranch	corn silage	07/19/11	11/09/11	113	border	1,200	104	3	4	12	0.9	24.0	0.0	24.9	13.6	66	4.6	y	y	101	56	146	166	117	30	144	454	-16	26	2	-287	0.9	1.9	1.0	0.4
ANC	Field 16 Van Ranch	pasture	12/01/11	08/19/12	262	border	1,200	104	3	4	12	3.7	87.5	0.0	91.2	3.5	8	3.3	n	n	18	-	-	2,735	239	27	222	786	-221	-	-	1,949	0.1	-	-	3.5
ANC	Field 29 RRD-4	almonds	02/01/11	10/01/11	242	MJS	n/a	n/a	n/a	n/a	n/a	4.5	18.4	0.0	22.9	0.0	8	0.0	n	n	9	-	-	135	0.1	0.01	0.1	0.6	9	-	-	134	101	-	-	241
ANC	Field 29 RRD-4	almonds	02/01/12	10/01/12	243	MJS	n/a	n/a	n/a	n/a	n/a	2.8	33.3	0.0	36.1	0.0	8	0.0	y	y	264	49	130	1,224	0.1	0.01	0.1	0.6	264	49	130	1,223	2,932	4,920	1,003	2,185
ANC	Field 30 RRD-2	almonds	02/01/11	10/01/11	242	MJS	n/a	n/a	n/a	n/a	n/a	4.5	17.4	0.0	21.9	0.0	8	0.0	n	n	9	-	-	127	0.1	0.01	0.1	0.5	9	-	-	127	113	-	-	236
ANC	Field 30 RRD-2	almonds	02/01/12	10/01/12	243	MJS	n/a	n/a	n/a	n/a	n/a	2.8	29.9	0.0	32.7	0.0	8	0.0	y	y	240	45	118	1,097	0.1	0.01	0.1	0.5	240	45	118	1,096	3,002	4,470	911	2,031
BET	Field 1	corn silage	05/22/11	09/24/11	125	border	1,250	205	1	6	2.5	1.4	46.2	4.0	51.6	25.3	64	9.0	y	y	209	53	269	647	111	60	243	799	98	-7	26	-152	1.9	0.9	1.1	0.8
BET	Field 1	oats silage soft dough	10/31/11	04/06/12	158	border	1,250	205	1	6	2.5	4.8	13.5	0.2	18.4	11.9	68	3.8	n	n	40	2	13	155	179	31	238	823	-138	-29	-225	-669	0.2	0.1	0.1	0.2
BET	Field 1	corn silage	05/05/12	09/06/12	124	border	1,250	205	1	6	2.5	0.2	81.0	4.0	85.2	27.6	68	8.9	n	y	184	20	138	1,306	127	50	259	817	57	-30	-122	489	1.4	0.4	0.5	1.6
BET	Field 2	corn silage	05/23/11	09/27/11	127	border	1,290	215	1	6	1.75	1.4	46.0	6.6	54.0	30.0	70	9.0	y	y	246	63	332	852	108	41	324	997	138	22	7	-145	2.3	1.5	1.0	0.9
BET	Field 2	oats silage soft dough	11/02/11	04/05/12	155	border	1,290	215	1	6	1.75	4.8	9.9	0.0	14.7	12.2	69	3.8	y	n	210	65	307	115	149	34	230	960	61	31	78	-845	1.4	1.9	1.3	0.1
BET	Field 2	corn silage	05/24/12	09/06/12	105	border	1,290	215	1	6	1.75	0.2	54.2	3.5	57.9	27.7	69	8.7	n	y	130	19	130	1,186	161	61	238	759	-31	-42	-108	426	0.8	0.3	0.5	1.6
BET	Field 3	corn silage	05/24/11	09/23/11	122	border	1,275	212	1	6	1.5	1.4	49.7	5.2	56.3	26.2	69	8.1	y	y	201	38	130	790	126	33	262	748	76	5	-132	42	1.6	1.2	0.5	1.1
BET	Field 3	oats silage soft dough	11/03/11	04/05/12	154	border	1,275	212	1	6	1.5	4.8	8.9	0.7	14.4	12.2	69	3.8	y	n	158	19	74	148	148	34	228	955	10	-15	-155	-807	1.1	0.5	0.3	0.2
BET	Field 3	corn silage	05/09/12	09/03/12	117	border	1,275	212	1	6	1.5	0.2	50.1	4.0	54.3	27.0	67	8.8	y	y	205	26	134	1,120	162	49	233	746	43	-22	-98	374	1.3	0.5	0.6	1.5
BET	Field 6	corn silage	05/22/11	09/21/11	122	border	1,250	202	1	3	1.5	1.4	46.9	4.6	52.9	26.0	61	10.2	y	y	196	38	118	717	125	47	218	832	71	-10	-101	-115	1.6	0.8	0.5	0.9
BET	Field 6	oats silage soft dough	11/01/11	04/09/12	160	border	1,250	202	1	3	1.5	4.8	8.5	0.8	14.1	13.4	50	6.7	n	n	73	12	74	145	325	56	475	1,546	-251	-44	-401	-1,401	0.2	0.2	0.2	0.1
BET	Field 6	corn silage	05/08/12	09/07/12	122	border	1,250	202	1	3	1.5	0.2	49.3	3.8	53.4	34.8	67	11.4	y	y	182	26	133	1,135	257	70	362	1,232	-75	-43	-228	-96	0.7	0.4	0.4	0.9

Table 10
Fields, Crops, Irrigation and Fertilization – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Field	Crop	Date of Planting (a)	Date of Harvest	Growing Period (days)	Irrigation Method	Run Length (ft)	Width or Spacing (ft) (b)	Furrows or Borders per Set	Sets per Field	Irrigation per Set (hrs)	Rain (in)	Irrigation Depth (in)	Liquid Manure Depth (in)	Total Liquid Supply (in)	Crop Yield As-Is (ton/ac)	Crop Water Content (%)	Crop Yield dry (ton/ac)	Solid Manure (y/n)	Synthetic Fertilizer (y/n)	- Nutrient Input (lbs/ac) (c) - N	P	K	Total Salt	Nutrient Output (lbs/ac) (c) (Harvest Removal) N	P	K	Total Salt	Mass Balance (lbs/ac) (Input-Output) N	P	K	Total Salt	Mass Ratio (Input/Output) N	P	K	Total Salt
BET	Field 7	corn silage	05/23/11	09/26/11	126	border	1,290	215	1	6	1.6	1.4	47.8	6.1	55.4	26.1	64	9.4	y	y	214	42	152	845	115	62	251	826	99	-20	-99	19	1.9	0.7	0.6	1.0
BET	Field 7	oats silage soft dough	11/02/11	04/05/12	155	border	1,290	215	1	6	1.6	4.8	9.6	0.9	15.3	13.1	66	4.4	y	n	170	21	89	163	126	31	223	2,337	44	-10	-133	-2,174	1.4	0.7	0.4	0.1
BET	Field 7	corn silage	05/08/12	09/04/12	119	border	1,290	215	1	6	1.6	0.2	58.9	3.7	62.8	28.3	67	9.2	y	y	178	25	127	1,095	170	51	243	781	8	-26	-117	314	1.0	0.5	0.5	1.4
BET	Field 8	corn silage	05/24/11	09/22/11	121	border	1,275	212	1	6	1.6	1.4	36.9	3.3	41.7	25.1	61	9.8	y	y	166	31	79	557	121	46	211	804	46	-15	-132	-247	1.4	0.7	0.4	0.7
BET	Field 8	oats silage soft dough	11/09/11	04/05/12	148	border	1,275	212	1	6	1.6	4.5	8.2	0.7	13.3	12.1	66	4.1	y	n	153	18	68	136	116	29	206	2,162	37	-11	-138	-2,026	1.3	0.6	0.3	0.1
BET	Field 8	corn silage	05/08/12	09/05/12	120	border	1,275	212	1	6	1.6	0.2	44.3	3.6	48.1	29.6	69	9.3	y	y	176	25	133	1,093	172	65	255	811	4	-40	-122	282	1.0	0.4	0.5	1.3
BET	Field 12	corn silage	05/23/11	09/23/11	123	border	1,275	213	1	6	2.5	1.4	47.7	6.0	55.1	28.7	69	8.9	y	y	206	39	132	869	138	36	287	821	68	2	-156	48	1.5	1.1	0.5	1.1
BET	Field 12	oats silage soft dough	11/01/11	04/09/12	160	border	1,275	213	1	6	2.5	4.8	6.4	1.0	12.2	12.1	50	6.0	y	n	162	23	99	110	292	51	428	1,392	-131	-28	-328	-1,282	0.6	0.5	0.2	0.1
BET	Field 12	corn silage	05/07/12	09/07/12	123	border	1,275	213	1	6	2.5	0.2	89.1	4.0	93.3	25.2	67	8.2	y	y	186	26	131	1,182	187	50	262	893	-1	-25	-131	289	1.0	0.5	0.5	1.3
BET	Field 13	corn silage	05/24/11	09/28/11	127	border	1,320	201	1	3	1.5	1.4	37.6	2.5	41.5	28.8	70	8.7	y	y	153	27	53	510	104	39	311	955	49	-12	-257	-445	1.5	0.7	0.2	0.5
BET	Field 13	oats silage soft dough	11/08/11	04/09/12	153	border	1,320	201	1	3	1.5	4.5	5.9	0.0	10.3	13.2	50	6.6	y	n	107	8	9	65	320	56	469	1,525	-213	-48	-460	-1,460	0.3	0.1	0.0	0.0
BET	Field 13	corn silage	05/09/12	09/08/12	122	border	1,320	201	1	3	1.5	0.2	32.3	3.3	35.8	29.0	67	9.5	y	y	172	25	132	1,058	215	58	302	1,028	-43	-33	-170	30	0.8	0.4	0.4	1.0
BET	Field 14	corn silage	05/30/11	09/28/11	121	border	1,325	140	1	9	1.1	1.3	40.8	3.6	45.7	30.0	65	10.5	y	y	173	14	39	696	168	65	312	1,073	6	-52	-273	-377	1.0	0.2	0.1	0.6
BET	Field 14	oats hay	11/10/11	05/07/12	179	border	1,325	140	1	9	1.1	6.0	4.1	0.0	10.0	2.9	9	2.7	y	n	190	64	305	30	74	17	115	305	116	47	189	-275	2.6	3.8	2.6	0.1
BET	Field 14	corn silage	06/05/12	09/25/12	112	border	1,325	140	1	9	1.1	0.0	44.8	4.0	48.8	25.1	67	8.2	y	y	209	63	283	812	166	35	186	678	43	28	97	134	1.3	1.8	1.5	1.2
BET	Field 21	corn silage	06/10/11	10/03/11	115	border	1,715	206	1	4	2	0.2	50.1	7.6	57.9	25.4	69	7.8	y	y	217	22	77	1,208	142	42	208	869	74	-20	-131	339	1.5	0.5	0.4	1.4
BET	Field 21	oats hay	11/07/11	05/07/12	182	border	1,715	206	1	4	2	6.0	11.2	1.7	18.9	3.3	13	2.8	y	n	212	32	158	227	73	18	103	400	140	14	54	-174	2.9	1.8	1.5	0.6
BET	Field 21	corn silage	06/10/12	10/03/12	115	border	1,715	206	1	4	2	0.0	87.7	5.9	93.7	25.6	67	8.4	y	y	242	28	109	1,270	184	51	204	756	58	-24	-95	514	1.3	0.5	0.5	1.7
BET	Field 23	corn silage	06/11/11	10/03/11	114	border	952	220	1	2	2.75	0.2	46.3	6.6	53.0	31.9	69	9.8	y	y	206	18	67	1,074	178	53	261	1,090	28	-35	-195	-16	1.2	0.3	0.3	1.0
BET	Field 23	oats hay	11/08/11	05/07/12	181	border	952	220	1	2	2.75	6.0	9.7	0.9	16.5	2.8	13	2.4	y	n	177	21	86	166	63	16	89	345	114	5	-4	-179	2.8	1.3	1.0	0.5
BET	Field 23	corn silage	06/10/12	10/04/12	116	border	952	220	1	2	2.75	0.0	62.3	4.7	67.1	25.1	66	8.5	y	y	238	26	94	1,005	161	45	226	734	77	-20	-133	272	1.5	0.6	0.4	1.4
FG1	Field 1	corn silage	05/28/11	08/08/11	72	furrow	1,318	-	100	4	12	1.9	21.9	2.0	25.8	36.0	75	9.1	n	y	108	18	160	2,735	232	65	254	-	-125	-47	-94	-	0.5	0.3	0.6	-
FG1	Field 1	corn silage	08/09/11	11/08/11	91	furrow	1,318	-	100	4	12	0.9	22.3	0.9	24.0	16.7	84	2.7	n	n	45	8	67	2,365	107	18	100	-	-62	-10	-33	-	0.4	0.4	0.7	-
FG1	Field 1	oats silage soft dough	11/05/11	04/06/12	153	border	1,318	332	1	3	12	3.6	4.9	1.4	10.0	17.3	72	4.9	n	n	190	23	148	1,458	131	30	174	526	60	-6	-26	932	1.5	0.8	0.9	2.8
FG1	Field 1	corn silage	04/11/12	08/01/12	112	furrow	1,318	-	100	4	12	1.1	29.0	9.7	39.8	25.7	75	6.5	n	y	400	123	471	8,009	123	41	185	785	277	82	286	7,224	3.2	3.0	2.5	10.2
FG1	Field 1	corn silage	08/02/12	11/16/12	106	furrow	1,318	-	100	4	12	0.1	11.0	0.0	11.1	-	-	-	n	n	15	-	-	1,025	108	36	161	686	-92	-	-	340	0.1	-	-	1.5
FG1	Field 2	corn silage	05/28/11	09/06/11	101	furrow	1,708	-	100	5	12	1.9	22.1	3.1	27.1	35.3	72	9.8	n	y	135	28	245	3,126	211	43	301	-	-76	-15	-56	-	0.6	0.7	0.8	-
FG1	Field 2	oats silage soft dough	11/05/11	04/07/12	154	border	1,708	409	1	3	12	3.6	5.6	2.0	11.2	18.0	71	5.3	n	n	262	33	195	1,706	205	43	309	1,100	57	-10	-115	606	1.3	0.8	0.6	1.6
FG1	Field 2	corn silage	04/11/12	08/07/12	118	furrow	1,708	-	100	5	12	1.1	25.2	7.8	34.1	31.1	69	9.5	y	y	801	204	807	6,769	248	50	224	919	552	154	584	5,850	3.2	4.1	3.6	7.4
FG1	Field 2	corn silage	08/08/12	11/19/12	103	furrow	1,708	-	100	5	12	0.1	10.1	0.0	10.1	19.0	69	5.8	n	n	15	-	-	937	152	30	137	563	-138	-	-	374	0.1	-	-	1.7
FG1	Field 3	corn silage	05/28/11	08/13/11	77	furrow	1,738	-	100	4	12	1.9	22.0	3.4	27.2	21.6	84	3.4	n	y	141	31	265	3,206	134	22	121	-	8	9	144	-	1.1	1.4	2.2	-
FG1	Field 3	oats silage soft dough	11/06/11	04/07/12	153	furrow	1,738	-	100	4	12	3.3	9.2	3.5	16.0	14.1	72	3.9	n	n	452	58	331	2,789	186	28	245	843	266	30	87	1,946	2.4	2.1	1.4	3.3
FG1	Field 3	corn silage	04/28/12	08/24/12	118	border	1,738	437	1	2	12	0.2	39.1	13.6	52.9	27.8	74	7.1	n	y	543	165	666	11,275	228	39	267	990	315	126	399	10,285	2.4	4.2	2.5	11.4
FG1	Field 3	corn silage	08/25/12	11/19/12	86	furrow	1,738	-	100	4	12	0.1	4.2	0.0	4.3	19.6	74	5.0	n	n	10	-	-	388	161	27	188	698	-151	-	-	-310	0.1	-	-	0.6
FG1	Field 4	corn silage	05/28/11	08/08/11	72	furrow	1,600	-	100	6	12	1.9	24.4	3.2	29.4	64.7	72	18.3	n	y	140	29	253	3,375	436	103	520	-	-296	-73	-267	-	0.3	0.3	0.5	-
FG1	Field 4	corn silage	08/09/11	11/08/11	91	furrow	1,600	-	100	6	12	0.9	12.5	0.0	13.4	18.5	81	3.4	n	n	16	-	-	1,162	129	20	106	-	-113	-	-	-	0.1	-	-	-
FG1	Field 4	oats silage soft dough	11/07/11	04/08/12	153	border	1,600	628	1	2	12	3.2	18.0	5.3	26.6	16.2	77	3.7	n	n	687	88	510	4,721	149	35	246	901	538	53	265	3,819	4.6	2.5	2.1	5.2
FG1	Field 4	corn silage	04/28/12	08/18/12	112	furrow	1,600	-	100	6	12	0.2	24.8	9.3	34.3	40.8	76	9.7	n	y	402	125	483	7,782	269	41	335	1,093	133	84	148	6,688	1.5	3.1	1.4	7.1
FG1	Field 4	corn silage	08/19/12	11/21/12	94	furrow	1,600	-	100	6	12	0.1	8.7	0.0	8.8	-	-	-	n	n	14	-	-	814	129	20	161	525	-116	-	-	288	0.1	-	-	1.5
FG1	Field 5	corn silage	05/28/11	08/13/11	77	furrow	1,164	-	100	4	12	1.9	20.6	3.0	25.5	33.8	72	9.5	n	y	132	28	239	2,960	172	40	195	-	-40	-13	44	-	0.8	0.7	1.2	-
FG1	Field 5	corn silage	08/14/11	11/08/11	86	furrow	1,164	-	100	4	12	0.9	12.5	0.0	13.4	16.8	84	2.6	n	n	16	-	-	1,162	106	17	94	-	-89	-	-	-	0.2	-	-	-
FG1	Field 5	oats silage soft dough	11/08/11	04/09/12	153	border	1,164	485	1	2	10-21	3.2	10.2	3.9	17.3	14.8	78	3.3	n	n	502	64	383	3,325	154	31	210	818	349	33	173	2,508	3.3	2.1	1.8	4.1
FG1	Field 5	corn silage	04/28/12	08/19/12	113	furrow	1,164	-	100	4	12	0.2	23.7	8.7	32.6	40.8	74	10.6	n	y	385	120	460	7,401	302	65	384	1,289	83	55	76	6,112	1.3	1.8	1.2	5.7
FG1	Field 5	corn silage	08/20/12	11/20/12	92	furrow	1,164	-	100	4	12	0.1	3.5	0.0	3.6	-	-	-	n	n	10	-	-	323	179	39	228	766	-170	-	-	-442	0.1	-	-	0.4

Table 10
Fields, Crops, Irrigation and Fertilization – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Field	Crop	Date of Planting (a)	Date of Harvest	Growing Period (days)	Irrigation Method	Run Length (ft)	Width or Spacing (ft) (b)	Furrows or Borders per Set	Sets per Field	Irrigation per Set (hrs)	Rain (in)	Irrigation Depth (in)	Liquid Manure Depth (in)	Total Liquid Supply (in)	Crop Yield As-Is (ton/ac)	Crop Water Content (%)	Crop Yield dry (ton/ac)	Solid Manure (y/n)	Synthetic Fertilizer (y/n)	- Nutrient Input (lbs/ac) (c) - N	P	K	Total Salt	Nutrient Output (lbs/ac) (c) (Harvest Removal) N	P	K	Total Salt	Mass Balance (lbs/ac) (Input-Output) N	P	K	Total Salt	Mass Ratio (Input/Output) N	P	K	Total Salt
FG1	Field 6	corn silage	05/28/11	09/18/11	113	furrow	1,073	-	100	2	12	1.9	28.8	6.6	37.3	33.5	72	9.4	n	y	230	60	524	4,973	170	40	193	-	60	21	332	-	1.4	1.5	2.7	-
FG1	Field 6	oats silage soft dough	11/09/11	04/09/12	152	border	534	1,073	1	2	6-9	3.2	9.1	3.7	16.1	11.2	71	3.3	n	n	487	61	382	3,339	128	27	193	685	359	35	190	2,654	3.8	2.3	2.0	4.9
FG1	Field 6	corn silage	04/28/12	08/18/12	112	furrow	1,073	-	100	2	12	0.2	20.2	5.9	26.3	40.8	73	10.9	n	y	273	85	300	5,147	294	57	375	1,142	-21	28	-76	4,004	0.9	1.5	0.8	4.5
FG1	Field 6	corn silage	08/19/12	11/21/12	94	furrow	1,073	-	100	2	12	0.1	3.1	0.0	3.1	33.7	73	9.0	n	n	9	-	-	285	242	47	310	942	-233	-	-	-658	0.0	-	-	0.3
FG1	Field 7	corn silage	05/28/11	08/19/11	83	furrow	2,134	-	100	6	12	1.9	18.4	2.5	22.7	33.9	72	9.5	n	y	116	22	195	2,561	156	42	288	-	-40	-19	-93	-	0.7	0.5	0.7	-
FG1	Field 7	corn silage	08/20/11	11/08/11	80	furrow	2,134	-	100	6	12	0.9	6.0	0.6	7.5	18.4	84	2.9	n	n	26	5	44	752	116	18	102	-	-90	-13	-59	-	0.2	0.3	0.4	-
FG1	Field 7	oats silage soft dough	11/10/11	04/06/12	148	border	2,134	434	1	3	20-30	3.2	8.6	3.7	15.6	11.8	56	5.1	n	n	484	62	359	2,932	148	36	259	866	335	26	100	2,066	3.3	1.7	1.4	3.4
FG1	Field 7	corn silage	04/28/12	08/24/12	118	furrow	2,134	-	100	6	12	0.2	27.9	12.3	40.5	29.6	67	9.9	y	y	735	211	872	10,860	219	36	231	847	516	176	642	10,013	3.4	5.9	3.8	12.8
FG1	Field 7	corn silage	08/25/12	11/11/12	78	furrow	2,134	-	100	6	12	0.1	10.1	0.0	10.2	-	-	-	n	n	15	-	-	940	130	21	137	503	-116	-	-	437	0.1	-	-	1.9
COT	CW-05N	oats silage soft dough	11/06/10	03/06/11	120	border	-	-	-	-	-	4.9	0.0	11.6	16.5	3.1	10	2.7	n	n	512	330	844	5	122	-	100	-	390	-	743	-	4.2	-	8.4	-
COT	CW-05N	sweet potato	05/01/11	08/15/11	106	drip	-	-	-	-	-	2.3	0.7	0.0	3.0	15.0	70	4.5	n	n	17	-	1	142	203	-	241	-	-186	-	-240	-	0.1	-	0.0	-
COT	CW-06	sweet potato	05/01/11	08/15/11	106	drip	-	-	-	-	-	2.3	104.3	0.0	106.6	11.0	75	2.8	y	n	1,031	-	106	7,802	128	-	302	-	903	-	-196	-	8.1	-	0.4	-
COT	CW-07	sweet potato	04/15/11	08/06/11	113	drip	-	-	-	-	-	2.3	0.0	0.0	2.3	9.5	75	2.4	y	n	19	18	72	-	68	-	115	-	-49	-	-43	-	0.3	-	0.6	-
COT	CW-08E	wheat silage	10/05/10	03/21/11	167	border	-	-	-	-	-	7.8	0.0	3.1	10.8	5.0	10	4.5	n	n	161	107	276	2	269	-	221	-	-108	-	54	-	0.6	-	1.2	-
COT	CW-08E	corn silage	06/10/11	10/25/11	137	border	-	-	-	-	-	1.5	19.8	5.3	26.5	16.8	70	5.0	n	n	455	135	423	3,298	403	-	335	-	53	-	89	-	1.1	-	1.3	-
COT	CW-10	corn silage	04/01/11	08/18/11	139	border	-	-	-	-	-	2.6	40.2	24.9	67.6	11.1	37	6.9	n	n	1,405	716	1,903	7,191	190	-	82	-	1,215	-	1,821	-	7.4	-	23.2	-
COT	CW-13	oats silage soft dough	01/28/11	04/02/11	64	border	-	-	-	-	-	7.2	-	-	7.2	8.0	77	1.8	-	-	5	-	-	-	73	-	137	-	-69	-	-	-	0.1	-	-	-
COT	CW-13	corn silage	04/17/11	09/10/11	146	border	-	-	-	-	-	2.3	33.1	1.8	37.2	10.4	37	6.5	y	y	312	50	179	5,270	187	-	50	-	125	-	129	-	1.7	-	3.6	-
COT	CW-15	sweet potato	05/01/11	08/15/11	106	drip	-	-	-	-	-	2.3	0.0	0.0	2.3	9.8	75	2.4	y	n	10	12	46	-	131	-	288	-	-121	-	-242	-	0.1	-	0.2	-
COT	CW-16	wheat silage	01/01/11	04/02/11	91	border	-	-	-	-	-	9.2	-	-	9.2	8.6	59	3.5	-	-	7	-	-	-	144	-	252	-	-137	-	-	-	0.0	-	-	-
COT	CW-16	corn silage	05/01/11	09/28/11	150	border	-	-	-	-	-	2.3	33.6	14.2	50.1	6.4	37	4.1	n	y	831	413	1,062	6,567	108	-	89	-	723	-	973	-	7.7	-	11.9	-
COT	CW-17	wheat silage	01/01/11	05/01/11	120	border	-	-	-	-	-	9.5	1.9	2.3	13.6	5.3	10	4.8	n	n	136	76	265	1	213	-	175	-	-77	-	89	-	0.6	-	1.5	-
COT	CW-17	corn silage	05/04/11	10/17/11	166	border	-	-	-	-	-	3.4	30.9	6.1	40.4	6.4	70	1.9	n	n	353	117	310	5,644	99	-	80	-	254	-	230	-	3.6	-	3.9	-
COT	CW-21	corn silage	04/01/11	09/28/11	180	border	-	-	-	-	-	2.6	22.0	4.7	29.3	10.0	37	6.3	n	y	140	60	243	838	175	-	145	-	-35	-	98	-	0.8	-	1.7	-
COT	CW-26	corn silage	05/28/11	11/01/11	157	border	-	-	-	-	-	2.7	18.5	5.5	26.7	22.8	64	8.2	n	y	204	71	416	707	216	-	193	-	-12	-	223	-	0.9	-	2.2	-
SAN	SR-08S	sweet potato	04/26/11	09/29/11	156	drip	-	-	-	-	-	2.3	11.2	0.0	13.5	16.9	76	4.0	n	n	85	-	14	1,986	106	-	135	-	-20	-	-121	-	0.8	-	0.1	-
SAN	SR-10	alfalfa	10/23/10	10/20/11	362	border	-	-	-	-	-	19.6	14.9	0.0	34.5	8.3	66	2.8	y	n	160	30	133	2,922	725	-	430	-	-565	-	-297	-	0.2	-	0.3	-
SAN	SR-13N	sweet potato	04/26/11	09/29/11	156	drip	-	-	-	-	-	2.3	13.6	0.0	15.9	17.6	76	4.2	n	n	141	-	-	3,153	108	-	148	-	32	-	-	-	1.3	-	-	-
SAN	SR-13S	sweet potato	04/26/11	09/29/11	156	drip	-	-	-	-	-	2.3	11.6	0.0	13.9	17.6	78	3.9	n	n	122	-	-	-	119	-	133	-	3	-	-	-	1.0	-	-	-
SAN	SR-14N	alfalfa	10/23/10	07/02/11	252	border	-	-	-	-	-	18.5	12.6	0.0	31.1	14.5	67	4.8	y	n	108	58	230	668	228	-	172	-	6	-	181	-	1.1	-	4.0	-
SAN	SR-14S	alfalfa	10/23/10	10/26/11	368	border	-	-	-	-	-	19.6	30.8	0.0	50.4	23.2	71	6.7	y	n	201	89	381	1,127	329	-	263	-	-128	-	118	-	0.6	-	1.4	-
SAN	SR-18N	oats silage soft dough	01/30/11	04/06/11	66	border	-	-	-	-	-	7.2	3.2	0.8	11.2	6.1	65	2.1	n	n	78	40	242	1	72	-	60	-	6	-	181	-	1.1	-	4.0	-
SAN	SR-18N	corn silage	04/10/11	09/16/11	159	border	-	-	-	-	-	2.3	23.7	7.9	33.9	11.9	41	7.0	n	y	483	177	610	2,833	194	-	82	-	290	-	528	-	2.5	-	7.4	-
SAN	SR-18S	corn silage	05/01/11	10/12/11	164	border	-	-	-	-	-	3.4	26.5	5.4	35.3	34.6	64	12.5	n	y	330	98	352	2,720	336	-	296	-	-6	-	56	-	1.0	-	1.2	-

Table 10
Fields, Crops, Irrigation and Fertilization – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Field	Crop	Planting (a)	Date of Harvest	Growing Period (days)	Irrigation Method	Run Length (ft)	Width or Spacing (ft) (b)	Furrows or Borders per Set	Sets per Field	Irrigation per Set (hrs)	Rain (in)	Irrigation Depth (in)	Liquid Manure Depth (in)	Total Liquid Supply (in)	Crop Yield As-Is (ton/ac)	Crop Water Content (%)	Crop Yield dry (ton/ac)	Solid Manure (y/n)	Synthetic Fertilizer (y/n)	- Nutrient Input (lbs/ac) (c) - N	P	K	Total Salt	Nutrient Output (lbs/ac) (c) (Harvest Removal) N	P	K	Total Salt	Mass Balance (lbs/ac) (Input-Output) N	P	K	Total Salt	Mass Ratio (Input/Output) N	P	K	Total Salt
PLS	Field 1	corn silage	05/28/11	09/08/11	103	border	626	215	2	3	3.5	1.9	24.3	6.0	32.1	35.4	68	11.3	n	y	325	54	335	2,970	191	63	424	1,337	134	-9	-89	1,633	1.7	0.9	0.8	2.2
PLS	Field 1	sudangrass silage	09/09/11	11/10/11	62	border	626	215	1	6	3.25	1.1	5.8	1.2	8.1	15.1	76	3.7	n	n	58	11	68	692	205	32	235	1,729	-147	-21	-167	-1,037	0.3	0.3	0.3	0.4
PLS	Field 1	oats silage soft dough	11/15/11	04/30/12	167	border	626	215	1	6	3.25	3.9	5.3	1.8	11.0	18.5	74	4.7	n	n	114	20	106	1,514	139	35	291	817	-25	-15	-185	697	0.8	0.6	0.4	1.9
PLS	Field 1	corn silage	05/03/12	08/25/12	114	border	626	215	2	3	3.5	0.2	26.6	1.2	28.0	46.1	75	11.6	n	y	177	55	112	1,951	350	74	553	1,539	-173	-19	-441	412	0.5	0.7	0.2	1.3
PLS	Field 2	corn silage	05/24/11	09/08/11	107	border	1,286	154	2	2	3	1.9	49.8	4.1	55.8	28.2	71	8.1	n	y	310	37	230	3,006	152	39	321	1,013	158	-2	-91	1,993	2.0	0.9	0.7	3.0
PLS	Field 2	sudangrass silage	09/09/11	11/10/11	62	border	1,286	154	1	4	2	0.9	8.3	0.7	9.9	15.1	75	3.8	n	n	40	7	42	447	232	37	265	1,551	-192	-30	-224	-1,104	0.2	0.2	0.2	0.3
PLS	Field 2	oats silage soft dough	11/16/11	04/30/12	166	border	1,286	154	1	4	2	3.9	1.3	2.2	7.4	15.0	62	5.7	n	n	135	25	130	1,646	165	45	248	900	-30	-20	-119	746	0.8	0.6	0.5	1.8
PLS	Field 2	corn silage	05/03/12	08/30/12	119	border	1,286	154	2	2	3	0.2	28.7	2.2	31.1	26.3	73	7.1	n	y	236	66	171	2,764	166	37	259	788	70	30	-88	1,976	1.4	1.8	0.7	3.5
PLS	Field 3	corn silage	06/15/11	09/27/11	104	border	558	176	2	11	1.25	0.1	19.6	1.8	21.6	28.9	71	8.4	n	y	173	16	101	944	133	50	330	909	40	-34	-229	35	1.3	0.3	0.3	1.0
PLS	Field 3	oats silage soft dough	11/15/11	04/23/12	160	border	558	176	1	22	1.5	3.8	0.8	0.7	5.3	11.0	66	3.8	y	n	268	42	352	640	119	24	174	671	149	18	178	-31	2.3	1.7	2.0	1.0
PLS	Field 3	corn silage	05/03/12	09/06/12	126	border	558	176	2	11	1.25	0.2	22.3	0.7	23.3	26.3	70	7.9	n	y	146	49	83	1,425	142	32	211	737	4	18	-127	688	1.0	1.6	0.4	1.9
PLS	Field 4	corn silage	06/16/11	09/08/11	84	border	408	212	2	3	2	0.1	18.3	1.4	19.8	31.0	72	8.7	n	y	153	12	76	725	217	48	371	1,220	-64	-35	-296	-495	0.7	0.3	0.2	0.6
PLS	Field 4	oats silage soft dough	11/15/11	04/20/12	157	border	408	212	1	6	1	3.8	1.3	2.2	7.3	22.0	74	5.8	n	n	135	25	130	1,646	194	40	331	1,001	-59	-15	-201	645	0.7	0.6	0.4	1.6
PLS	Field 4	corn silage	05/03/12	09/04/12	124	border	408	212	2	3	2	0.2	25.5	2.2	28.0	29.8	75	7.6	n	y	234	66	171	2,636	178	42	286	857	55	25	-115	1,780	1.3	1.6	0.6	3.1
CAE	Field 1	corn silage	05/10/11	08/29/11	111	border	1,290	255	1	4	2	2.2	59.3	3.4	64.9	29.9	65	10.6	n	n	213	40	346	2,427	179	54	329	1,016	34	-14	17	1,411	1.2	0.7	1.1	2.4
CAE	Field 1	oats silage soft dough	11/08/11	04/09/12	153	border	1,290	255	1	4	2	5.2	22.2	1.2	28.6	15.9	65	5.6	n	n	176	16	217	1,354	124	35	281	835	51	-20	-64	518	1.4	0.4	0.8	1.6
CAE	Field 1	corn silage	05/11/12	08/30/12	111	border	1,290	255	1	4	2	0.2	59.3	3.4	62.9	29.4	68	9.5	n	n	332	28	420	2,791	276	41	276	935	56	-13	143	1,856	1.2	0.7	1.5	3.0
CAE	Field 2	corn silage	05/10/11	08/29/11	111	border	662	334	1	2	1	2.2	48.1	4.4	54.7	30.3	65	10.5	n	n	247	52	423	2,871	200	48	315	903	47	4	107	1,968	1.2	1.1	1.3	3.2
CAE	Field 2	sudangrass silage	09/10/11	11/03/11	54	border	662	334	1	2	1	1.1	18.0	1.5	20.6	11.1	68	3.6	n	n	187	21	256	1,851	153	31	211	1,016	34	-10	45	835	1.2	0.7	1.2	1.8
CAE	Field 2	oats silage soft dough	11/08/11	04/09/12	153	border	662	334	1	2	1	4.5	18.0	1.7	24.2	16.2	64	5.8	n	n	231	23	300	1,966	136	39	349	899	95	-16	-49	1,067	1.7	0.6	0.9	2.2
CAE	Field 2	corn silage	05/11/12	08/30/12	111	border	662	334	1	2	1	0.2	48.1	4.4	52.7	29.8	62	11.4	n	n	427	37	546	3,619	304	36	334	1,204	123	1	212	2,415	1.4	1.0	1.6	3.0
CAE	Field 3	corn silage	05/10/11	08/29/11	111	border	700	318	1	4	1	2.2	46.8	3.4	52.4	29.5	66	10.1	n	n	211	39	343	2,371	171	53	336	1,009	39	-14	7	1,362	1.2	0.7	1.0	2.4
CAE	Field 3	sudangrass silage	09/10/11	11/03/11	54	border	700	318	1	4	1	1.1	17.6	1.1	19.8	10.8	73	2.9	n	n	142	16	191	1,395	125	24	154	768	16	-8	38	627	1.1	0.7	1.2	1.8
CAE	Field 3	oats silage soft dough	11/08/11	04/09/12	153	border	700	318	1	4	1	4.5	17.6	1.4	23.4	15.7	65	5.5	n	n	192	19	249	1,640	123	35	277	824	69	-16	-28	816	1.6	0.5	0.9	2.0
CAE	Field 3	corn silage	05/11/12	08/30/12	111	border	700	318	1	4	1	0.2	46.8	3.4	50.4	29.0	71	8.5	n	n	329	28	417	2,766	255	41	313	986	73	-13	103	1,780	1.3	0.7	1.3	2.8
CAE	Field 4	corn silage	05/11/11	08/29/11	110	border	387	398	1	1	0.75	2.2	45.4	3.8	51.4	30.5	65	10.6	n	n	235	44	386	2,644	202	49	318	910	34	-5	69	1,734	1.2	0.9	1.2	2.9
CAE	Field 4	sudangrass silage	09/10/11	11/03/11	54	border	387	398	1	1	0.75	1.1	17.0	1.3	19.4	11.2	68	3.6	n	n	158	18	215	1,561	155	31	213	1,023	4	-14	2	537	1.0	0.6	1.0	1.5
CAE	Field 4	oats silage soft dough	11/08/11	04/09/12	153	border	387	398	1	1	0.75	4.5	17.0	2.0	23.5	16.3	64	5.9	n	n	273	27	357	2,318	137	39	352	905	137	-12	5	1,412	2.0	0.7	1.0	2.6
CAE	Field 4	corn silage	05/11/12	08/30/12	111	border	387	398	1	1	0.75	0.2	45.4	3.8	49.5	30.0	62	11.5	n	n	368	31	469	3,109	306	36	336	1,213	62	-5	132	1,896	1.2	0.9	1.4	2.6
ROB	Devin's	almond, in shell	01/01/12	09/15/12	258	flood	1,266	-	-	-	12.5	4.6	52.2	0.0	56.8	0.9	15	0.8	n	y	210	-	-	5,083	315	157	157	-	-105	-	-	-	0.7	-	-	-
ROB	ET Vincent	oats silage soft dough	11/10/11	04/28/12	170	border	586	402	1	3	1.25	4.8	6.1	1.5	12.3	17.0	45	9.4	n	n	105	7	51	1,827	211	49	393	0.02	-106	-42	-342	1,827	0.5	0.1	0.1	91,354
ROB	ET Vincent	corn silage	05/25/12	09/20/12	118	border	586	402	1	3	1.25	0.2	48.6	0.5	49.2	25.4	67	8.3	n	y	265	5	56	5,440	167	34	275	0.02	98	-30	-219	5,440	1.6	0.1	0.2	272,010
ROB	Goodlowe's	almond, in shell	01/01/12	09/15/12	258	flood	1,244	-	-	-	15	4.6	64.0	0.0	68.6	0.9	15	0.8	n	y	230	-	-	6,151	315	157	157	-	-85	-	-	-	0.7	-	-	-
ROB	Pit	oats silage soft dough	11/10/11	04/28/12	170	border	1,285	273	1	2	2.65	4.8	7.1	1.3	13.2	-	-	-	n	n	113	6	45	1,932	120	31	232	0.01	-7	-24	-187	1,932	0.9	0.2	0.2	193,161
ROB	Pit	corn silage	05/25/12	09/20/12	118	border	1,285	273	1	2	2.65	0.2	47.1	0.5	47.8	25.0	67	8.3	n	y	343	5	55	6,091	215	36	268	0.02	128	-31	-213	6,090	1.6	0.1	0.2	304,525
ROB	Shop Pump (d)	almond, in shell	01/01/12	09/15/12	258	flood	1,015	-	-	-	4	4.6	73.6	0.0	78.2	0.9	15	0.8	n	y	556	-	-	9,993	315	157	157	-	241	-	-	-	1.8	-	-	-
ANT	The 80	corn silage	06/24/11	10/15/11	113	furrow	~1,100	-	60	~60	3	1.1	24.2	1.9	27.2	26.0	73.3	6.9	n	n	232	-	-	-	191	-	-	-	41	-	-	-	1.2	-	-	-
ANT	The 80	oats silage soft dough	10/31/11	04/27/12	179	border	~1,101	- - - entire field - - -			-	5.1	9.6	1.7	16.4	18.2	71.7	5.1	n	n	243	-	-	-	174	-	-	-	69	-	-	-	1.4	-	-	-
ANT	The 80	corn silage	05/14/12	09/07/12	116	furrow	~1,102	-	60	~60	3	0.2	45.6	1.3	47.1	22.7	74	5.9	n	n	131	-	-	-	132	-	-	-	-1	-	-	-	1.0	-	-	-

Table 10
Fields, Crops, Irrigation and Fertilization – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Field	Crop	Date of Planting (a)	Date of Harvest	Growing Period (days)	Irrigation Method	Run Length (ft)	Width or Spacing (ft) (b)	Furrows or Borders per Set	Sets per Field	Irrigation per Set (hrs)	Rain (in)	Irrigation Depth (in)	Liquid Manure Depth (in)	Total Liquid Supply (in)	Crop Yield As-Is (ton/ac)	Crop Water Content (%)	Crop Yield dry (ton/ac)	Solid Manure (y/n)	Synthetic Fertilizer (y/n)	- Nutrient Input (lbs/ac) (c) - N	P	K	Total Salt	Nutrient Output (lbs/ac) (c) (Harvest Removal) N	P	K	Total Salt	Mass Balance (lbs/ac) (Input-Output) N	P	K	Total Salt	Mass Ratio (Input/Output) N	P	K	Total Salt
FG2	Bambauer (Field 14)	corn silage	05/01/11	09/03/11	125	furrow	2,332	-	100	4	12	2.3	43.4	0.0	45.7	27.0	72	7.6	n	y	68	-	-	1,639	155	35	164	-	-87	-	-	-	0.4	-	-	-
FG2	Bambauer (Field 14)	oats silage soft dough	11/21/11	04/20/12	151	border	2,332	180	1	6	12	3.4	0.0	3.6	7.1	10.7	72	3.0	n	y	312	29	305	2,334	113	16	156	543	199	13	149	1,792	2.8	1.8	2.0	4.3
FG2	Bambauer (Field 14)	corn silage	04/28/12	09/25/12	150	furrow	2,332	-	100	4	12	0.2	39.6	11.5	51.3	28.4	72	7.8	n	y	310	64	304	9,788	213	34	269	1,055	97	30	35	8,732	1.5	1.9	1.1	9.3
FG2	Field 10	corn silage	04/30/11	08/30/11	122	furrow	2,584	-	100	6	12	2.3	31.6	5.1	39.1	25.3	70	7.6	n	y	208	45	422	3,499	106	38	218	-	101	7	203	-	2.0	1.2	1.9	-
FG2	Field 10	oats silage soft dough	11/16/11	04/25/12	161	border	2,584	180	1	7	12	3.9	0.0	0.0	3.9	13.0	73	3.5	n	y	60	-	-	-	101	16	140	640	-42	-	-	-	0.6	-	-	-
FG2	Field 10	corn silage	04/11/12	08/22/12	133	furrow	2,584	-	100	6	12	1.1	29.6	13.2	43.8	24.7	72	6.8	n	y	343	73	349	10,342	185	30	235	919	158	44	114	9,423	1.9	2.5	1.5	11.3
FG2	Field 6	alfalfa hay	01/01/11	04/06/11	95	border	1,422	180	1	9	10	4.1	0.0	0.0	4.1	0.7	68	0.2	n	n	7	-	-	-	15	3	18	-	-8	-	-	-	0.5	-	-	-
FG2	Field 6	alfalfa haylage	01/01/11	08/12/11	223	border	1,422	180	1	9	10	6.4	20.9	1.6	28.9	11.1	66	3.8			56	14	133	1,518	259	24	201	-	-202	-10	-68	-	0.2	0.6	0.7	-
FG2	Field 6	oats silage soft dough	11/13/11	04/19/12	158	border	1,422	180	1	9	10	3.8	0.0	0.0	3.8	13.6	72	3.8	n	y	60	-	-	-	144	20	198	691	-84	-	-	-	0.4	-	-	-
FG2	Field 6	corn silage	04/11/12	08/31/12	142	furrow	1,422	-	100	9	12	1.1	17.1	4.3	22.4	21.5	74	5.6	n	y	160	24	114	4,219	146	26	219	792	14	-2	-106	3,427	1.1	0.9	0.5	5.3
FG2	Field 6	sudangrass silage	09/01/12	10/31/12	60	border	1,422	180	1	9	10	0.0	5.7	0.0	5.7	10.1	70	3.0	n	n	8	-	-	649	111	18	121	-	-102	-	-	-	0.1	-	-	-
FG2	Field 9	corn silage	04/18/11	08/29/11	133	furrow	2,496	-	100	3	12	2.3	34.7	5.1	42.1	24.6	68	8.0	n	y	209	45	423	3,622	189	38	237	-	20	6	187	-	1.1	1.2	1.8	-
FG2	Field 9	oats silage soft dough	11/15/11	04/20/12	157	furrow	2,496	-	100	3	12	3.8	0.0	6.9	10.7	22.2	71	6.4	n	y	621	68	694	5,415	298	39	409	1,169	323	29	285	4,246	2.1	1.8	1.7	4.6
FG2	Field 9	corn silage	04/11/12	08/22/12	133	border	2,496	180	1	4	12	1.1	40.2	12.4	53.6	28.4	71	8.3	n	y	330	69	328	11,135	233	34	250	1,067	97	35	79	10,068	1.4	2.0	1.3	10.4
FG2	Field 9	sudangrass silage	08/23/12	10/30/12	68	border	2,496	180	1	4	12	0.0	7.0	8.0	14.9	10.7	70	3.2	n	n	170	44	211	5,006	118	19	128	-	52	25	83	-	1.4	2.3	1.6	-
GOD	Field 1	corn silage	06/22/11	10/13/11	113	furrow	1,050	-	84	8	12	1.4	44.0	1.3	46.7	24.5	68	7.9	n	n	314	23	522	2,864	147	33	196	-	167	-11	326	-	2.1	0.7	2.7	-
GOD	Field 1A	oats silage soft dough	10/30/11	04/27/12	180	border	1,050	210	1	8	5-8	4.0	4.5	1.1	9.6	12.0	78	2.7	n	n	223	11	250	1,431	127	18	197	631	96	-7	54	800	1.8	0.6	1.3	2.3
GOD	Field 1A	corn silage	05/25/12	09/26/12	124	furrow	1,050	-	84	8	12	0.2	27.6	0.7	28.5	24.0	73	6.4	n	y	236	7	195	4,215	163	29	235	936	73	-22	-41	3,279	1.4	0.2	0.8	4.5
GOD	Field 1B	oats silage soft dough	10/30/11	04/27/12	180	border	1,050	210	1	8	5-8	4.0	4.5	1.1	9.6	17.3	78	3.9	n	n	223	11	250	1,433	184	27	284	912	39	-15	-34	521	1.2	0.4	0.9	1.6
GOD	Field 1B	sudangrass silage	05/25/12	10/03/12	131	border	1,050	210	1	8	5-8	0.2	27.7	0.7	28.6	12.0	79	2.6	n	y	236	7	195	4,224	86	10	110	523	150	-3	84	3,701	2.7	0.7	1.8	8.1
GOD	Field 2	corn silage	06/22/11	10/11/11	111	furrow	975	-	84	3	12	1.4	44.0	1.3	46.7	24.5	75	6.2	n	n	314	23	522	2,865	176	27	201	-	138	-4	321	-	1.8	0.8	2.6	-
GOD	Field 2	oats silage soft dough	10/30/11	04/27/12	180	border	975	210	1	3	5-8	4.0	6.5	1.1	11.6	12.0	74	3.1	n	n	224	11	250	1,617	113	19	209	643	111	-8	42	973	2.0	0.6	1.2	2.5
GOD	Field 2	corn silage	05/25/12	09/26/12	124	furrow	975	-	84	3	12	0.2	49.0	0.7	49.9	24.0	73	6.4	n	y	240	7	195	6,117	163	29	235	936	76	-22	-41	5,181	1.5	0.2	0.8	6.5
GOD	Field 3	corn silage	06/22/11	10/13/11	113	furrow	1,400	-	68	1	12	1.4	44.0	1.3	46.7	24.6	68	7.9	n	n	314	23	522	2,864	147	33	197	-	167	-11	326	-	2.1	0.7	2.7	-
GOD	Field 3	oats silage soft dough	10/30/11	04/24/12	177	border	1,400	170	1	1	5-8	4.0	6.4	1.1	11.4	12.0	76	2.9	n	n	224	11	250	1,604	149	20	185	-	75	-9	66	-	1.5	0.6	1.4	-
GOD	Field 3	corn silage	05/25/12	09/26/12	124	furrow	1,400	-	68	1	12	0.2	48.0	0.7	48.9	24.0	73	6.4	n	y	239	7	195	6,028	163	29	235	936	76	-22	-40	5,092	1.5	0.2	0.8	6.4
GOD	Field 4	corn silage	06/22/11	10/11/11	111	furrow	1,450	-	64	2	12	1.4	44.0	1.3	46.7	24.5	76	5.8	n	n	314	23	522	2,864	172	21	191	-	142	2	331	-	1.8	1.1	2.7	-
GOD	Field 4	oats silage soft dough	10/30/11	04/27/12	180	border	1,450	160	1	2	5-8	4.0	7.6	1.1	12.7	12.0	78	2.7	n	n	224	11	250	1,714	127	18	197	631	97	-7	53	1,083	1.8	0.6	1.3	2.7
GOD	Field 4	corn silage	05/25/12	09/26/12	124	furrow	1,450	-	64	2	12	0.2	55.6	0.7	56.5	24.0	73	6.4	n	y	241	7	195	6,713	163	29	235	936	78	-22	-41	5,777	1.5	0.2	0.8	7.2
GOD	Field 12N	corn silage	06/22/11	10/11/11	111	furrow	1,210	-	84	5	12	1.4	44.2	1.3	46.9	24.6	75	6.2	n	n	315	23	524	2,875	177	27	202	-	138	-4	322	-	1.8	0.8	2.6	-
GOD	Field 12N	oats silage soft dough	10/30/11	04/24/12	177	border	1,210	210	1	5	5-8	4.0	4.4	1.1	9.4	12.0	75	3.0	n	n	224	11	251	1,424	101	20	212	682	123	-8	39	742	2.2	0.6	1.2	2.1
GOD	Field 12N	corn silage	05/25/12	09/26/12	124	furrow	1,210	-	84	5	12	0.2	27.5	0.7	28.4	24.1	73	6.4	n	y	235	7	195	4,190	164	29	236	939	71	-22	-41	3,251	1.4	0.2	0.8	4.5
GOD	Field 12S	sudangrass silage	06/22/11	10/18/11	118	border	1,228	210	1	7	5-8	1.4	44.0	1.1	46.5	7.5	70	2.3	n	n	214	15	344	2,807	83	14	90	-	131	2	254	-	2.6	1.1	3.8	-
GOD	Field 12S	oats silage soft dough	10/30/11	04/24/12	177	border	1,228	210	1	7	5-8	4.0	5.5	1.1	10.6	12.0	75	3.0	n	n	217	11	250	1,526	101	21	211	679	116	-10	39	847	2.2	0.5	1.2	2.2
GOD	Field 12S	sudangrass silage	05/25/12	10/03/12	131	border	1,228	210	1	7	5-8	0.2	37.7	0.7	38.6	5.0	79	1.1	n	y	231	7	195	5,122	36	4	46	219	195	3	149	4,903	6.4	1.7	4.2	23.4
GOD	Field 14	corn silage	06/22/11	10/11/11	111	furrow	1,260	-	72	6	12	26.0	44.0	0.0	70.0	24.5	75	6.2	n	n	12	-	-	1,831	176	27	201	-	-164	-	-	-	0.1	-	-	-
MAC	Field 2	corn silage	05/28/11	09/29/11	124	furrow	1,350	-	96	6	12	0.7	34.7	3.9	39.3	26.0	72	7.3	n	n	246	38	312	3,351	148	30	234	-	98	8	78	-	1.7	1.3	1.3	-
MAC	Field 2	oats silage soft dough	11/10/11	04/09/12	151	border	1,350	60	4	6	12	3.1	3.4	0.8	7.2	16.0	67	5.3	n	y	228	13	56	812	154	40	288	1,194	74	-27	-232	-381	1.5	0.3	0.2	0.7
MAC	Field 2	corn silage	05/25/12	09/11/12	109	furrow	1,350	-	96	6	12	0.2	29.6	1.5	31.3	21.0	60	8.5	n	n	343	12	346	5,241	197	46	332	-	145	-34	14	-	1.7	0.3	1.0	-

Table 10
Fields, Crops, Irrigation and Fertilization – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Field	Crop	Date of Planting (a)	Date of Harvest	Growing Period (days)	Irrigation Method	Run Length (ft)	Width or Spacing (ft) (b)	Furrows or Borders per Set	Sets per Field	Irrigation per Set (hrs)	Rain (in)	Irrigation Depth (in)	Liquid Manure Depth (in)	Total Liquid Supply (in)	Crop Yield As-Is (ton/ac)	Crop Water Content (%)	Crop Yield dry (ton/ac)	Solid Manure (y/n)	Synthetic Fertilizer (y/n)	- Nutrient Input (lbs/ac) (c) - N	P	K	Total Salt	Nutrient Output (lbs/ac) (c) (Harvest Removal) N	P	K	Total Salt	Mass Balance (lbs/ac) (Input-Output) N	P	K	Total Salt	Mass Ratio (Input/Output) N	P	K	Total Salt
MAC	Field 3	corn silage	05/28/11	09/29/11	124	furrow	1,350	-	96	3	12	0.7	34.7	4.5	39.9	26.0	72	7.3	n	n	288	45	367	3,707	148	30	234	-	140	15	133	-	1.9	1.5	1.6	-
MAC	Field 3	oats silage soft dough	11/10/11	04/09/12	151	border	1,350	60	4	3	12	3.1	3.5	0.8	7.4	16.0	67	5.3	n	y	228	13	56	827	154	40	288	1,194	74	-27	-232	-367	1.5	0.3	0.2	0.7
MAC	Field 3	corn silage	05/25/12	09/11/12	109	furrow	1,350	-	96	3	12	0.2	30.0	1.5	31.7	21.0	60	8.5	n	n	343	12	346	5,273	197	46	332	-	145	-34	14	-	1.7	0.3	1.0	-
NUN	Field 1	alfalfa haylage	10/15/10	11/18/11	399	border	1,226	60	3	3	12	8.4	36.9	1.6	46.9	22.0	79	4.7	n	y	191	91	158	3,223	458	35	299	-	-267	56	-141	-	0.4	2.6	0.5	-
NUN	Field 1	alfalfa hay	10/15/11	04/05/12	173	border	1,226	60	3	3	12	3.3	67.1	0.0	70.4	7.0	10	6.3	n	n	10	-	-	6,372	557	38	376	1,533	-547	-	-	4,840	0.0	-	-	4.2
NUN	Field 2	alfalfa haylage	10/15/10	11/18/11	399	border	1,188	60	3	6	12	8.4	36.9	1.6	46.9	22.0	79	4.7	n	y	191	91	159	3,225	458	35	299	-	-267	56	-141	-	0.4	2.6	0.5	-
NUN	Field 2	alfalfa hay	10/15/11	04/05/12	173	border	1,188	60	3	6	12	3.3	44.8	0.0	48.1	7.0	10	6.3	n	n	7	-	-	-	557	38	376	1,533	-550	-	-	-	0.0	-	-	-
NUN	Field 2	alfalfa haylage	10/15/11	10/03/12	354	border	1,188	60	3	6	12	4.2	10.6	0.0	14.8	3.0	36	1.9	n	n	7	-	-	-	141	13	133	444	-134	-	-	-	0.0	-	-	-
NUN	Field 23	corn silage	05/13/11	09/17/11	127	furrow	1,255	-	130	8	12	1.5	34.0	0.0	35.4	26.0	72	7.4	n	n	11	-	-	1326	104	36	197.6	-	99	-	-	1,893	1.8	-	-	-
NUN	Field 23	oats silage soft dough	10/25/11	04/24/12	182	border	1,255	60	3	15	12	4.0	11.3	0.0	15.3	11.0	67	3.7	n	n	9	-	-	431	79	21	108	1,835	-70	-	-	-1,404	0.1	-	-	0.2
NUN	Field 23	corn silage	05/26/12	09/29/12	126	furrow	1,255	-	130	8	12	0.2	27.5	0.0	27.7	22.0	71	6.5	n	y	227	-	-	2,619	128	31	163	726	99	-	-	1,893	1.8	-	-	3.6
NUN	Field 3	corn silage	05/13/11	09/17/11	127	furrow	1,169	-	130	12	12	1.5	40.1	1.6	43.1	26.0	76	6.4	n	n	131	16	159	3,348	120	31	213	-	11	-15	-55	-	1.1	0.5	0.7	-
NUN	Field 3	oats silage soft dough	10/11/11	05/04/12	206	border	1,169	60	3	21	12	4.0	11.1	0.0	15.1	11.0	67	3.7	n	n	9	-	-	417	79	21	108	1,835	-70	-	-	-1,418	0.1	-	-	0.2
NUN	Field 3	corn silage	06/06/12	09/29/12	115	furrow	1,169	-	130	12	12	0.0	26.1	4.9	30.9	22.0	71	6.5	n	y	317	28	250	7,297	128	31	163	726	189	-3	87	6,571	2.5	0.9	1.5	10.1
MOO	Field 248	corn silage	06/12/11	10/20/11	130	furrow	1,165	-	122	2	12	1.1	28.7	7.6	37.4	25.8	66	8.8	n	n	368	13	264	3,847	196	31	263	984	173	-18	2	2,863	1.9	0.4	1.0	3.9
MOO	Field 248	wheat silage	11/08/11	05/09/12	183	border	1,165	297	1	2	9	4.8	10.4	3.9	19.1	20.8	65	7.2	n	n	335	32	312	4,615	245	33	225	1,289	89	-2	88	3,326	1.4	1.0	1.4	3.6
MOO	Field 248	corn silage	06/01/12	10/01/12	122	furrow	1,165	-	122	2	12	0.2	29.1	5.2	34.4	21.3	65	7.4	n	n	256	33	397	7,444	179	38	277	759	77	-6	119	6,685	1.4	0.9	1.4	9.8
MOO	Field 250	corn silage	06/13/11	10/22/11	131	furrow	1,570	-	121	2	12	1.1	26.9	7.1	35.1	22.4	66	7.6	n	n	368	13	272	3,729	170	27	228	854	198	-13	44	2,875	2.2	0.5	1.2	4.4
MOO	Field 250	wheat silage	11/08/11	05/14/12	188	border	1,570	342	1	2	9.5	4.8	10.3	2.5	17.6	17.5	65	6.1	n	n	218	20	197	3,606	206	28	188	1,082	12	-8	9	2,524	1.1	0.7	1.0	3.3
MOO	Field 250	corn silage	05/29/12	09/29/12	123	furrow	1,570	-	121	2	12	0.2	26.7	3.8	30.6	19.0	65	6.6	n	n	202	24	314	6,340	160	34	247	676	42	-10	67	5,663	1.3	0.7	1.3	9.4
MOO	Field 252	corn silage	06/23/11	10/27/11	126	furrow	1,155	-	115	3	7	1.1	27.2	6.8	35.1	18.5	66	6.2	n	n	264	9	164	3,130	133	26	192	677	131	-17	-28	2,453	2.0	0.3	0.9	4.6
MOO	Field 252	wheat silage	11/14/11	05/10/12	178	border	1,155	445	1	2	10	4.7	4.6	2.8	12.1	17.0	65	5.9	n	n	233	22	220	2,590	200	27	183	1,051	33	-5	37	1,539	1.2	0.8	1.2	2.5
MOO	Field 252	earlage	06/01/12	10/01/12	122	furrow	1,155	-	115	3	7	0.2	26.2	4.5	30.8	5.8	34	3.8	n	n	226	28	349	6,624	103	21	56	185	123	7	293	6,439	2.2	1.4	6.2	35.9
MOO	Field 256	corn silage	06/10/11	10/03/11	115	furrow	1,555	-	138	4	11	0.2	26.6	7.3	34.1	22.5	64	8.0	n	n	298	10	193	3,341	162	31	220	827	136	-21	-27	2,513	1.8	0.3	0.9	4.0
MOO	Field 256	wheat silage	11/11/11	05/09/12	180	border	1,555	465	1	3	12	4.8	6.9	1.0	12.7	15.4	65	5.3	n	n	99	8	83	2,054	181	25	166	952	-82	-16	-83	1,102	0.5	0.3	0.5	2.2
MOO	Field 256	earlage	05/31/12	10/01/12	123	furrow	1,555	-	138	4	11	0.2	27.2	4.8	32.1	7.9	34	5.2	n	n	239	30	371	6,949	139	28	76	250	100	2	295	6,699	1.7	1.1	4.9	27.8
MOO	Field 260	corn silage	06/13/11	10/12/11	121	furrow	1,055	-	141	1	14	1.1	24.5	11.1	36.7	27.6	69	8.6	n	n	377	13	223	4,035	188	33	204	911	190	-21	19	3,124	2.0	0.4	1.1	4.4
MOO	Field 260	wheat silage	11/08/11	05/09/12	183	border	1,055	354	1	1	24	4.8	12.3	4.0	21.1	18.0	65	6.3	n	n	340	32	315	4,991	213	29	195	1,117	127	3	121	3,874	1.6	1.1	1.6	4.5
MOO	Field 260	corn silage	05/29/12	09/29/12	123	furrow	1,055	-	141	1	14	0.2	28.6	9.3	38.1	23.8	65	8.3	n	n	425	57	658	9,775	200	43	309	846	225	14	349	8,929	2.1	1.3	2.1	11.6
MOO	Field 254	corn silage	06/11/11	10/14/11	125	furrow	1,435	-	86	3	7	1.1	29.3	9.3	39.7	27.8	69	8.7	n	n	291	9	154	3,595	189	33	206	919	102	-24	-52	2,676	1.5	0.3	0.7	3.9
MOO	Field 254	wheat silage	11/09/11	05/10/12	183	border	1,435	440	1	2	10	4.8	14.7	2.3	21.8	16.9	65	5.9	n	n	201	18	179	4,137	199	27	182	1,047	1	-9	-4	3,090	1.0	0.7	1.0	4.0
MOO	Field 254	earlage	06/02/12	10/02/12	122	furrow	1,435	-	86	3	7	0.2	27.2	5.6	32.9	8.1	34	5.3	n	n	282	35	439	7,541	142	29	77	254	140	6	362	7,287	2.0	1.2	5.7	29.6
MOO	Field 258	corn silage	06/12/11	10/20/11	130	furrow	1,300	-	160	3	8	1.1	23.3	8.0	32.4	25.0	64	8.9	n	n	343	9	165	7,696	180	35	245	921	163	-26	-80	6,775	1.9	0.3	0.7	8.4
MOO	Field 258	wheat silage	11/09/11	05/13/12	186	border	1,300	350	1	3	10	4.8	6.0	2.0	12.8	17.0	62	6.4	n	n	189	16	157	2,797	197	20	214	1,136	-8	-4	-57	1,662	1.0	0.8	0.7	2.5
MOO	Field 258	corn silage	06/05/12	10/05/12	122	furrow	1,300	-	160	3	8	0.0	27.3	3.9	31.1	27.5	72	7.7	n	n	312	24	293	10,381	170	33	280	852	142	-9	12	9,529	1.8	0.7	1.0	12.2
MOO	Field 259	corn silage	06/15/11	10/21/11	128	furrow	1,745	-	90	5	11	1.1	20.6	7.1	28.8	26.1	66	8.9	n	n	375	11	225	6,382	199	31	266	998	177	-20	-42	5,384	1.9	0.4	0.8	6.4
MOO	Field 259	wheat silage	11/17/11	05/14/12	179	border	1,745	380	1	3	12	4.7	9.0	2.3	16.0	15.9	62	6.0	n	n	252	19	184	4,420	184	19	200	1,062	68	0	-16	3,357	1.4	1.0	0.9	4.2
MOO	Field 259	corn silage	06/07/12	10/07/12	122	furrow	1,745	-	90	5	11	0.0	27.6	4.0	31.6	26.3	72	7.4	n	n	253	22	212	8,990	163	32	268	815	90	-9	-56	8,175	1.6	0.7	0.8	11.0
MOO	Field 262	corn silage	06/03/11	10/12/11	131	furrow	1,920	-	121	4	8	1.9	26.3	5.8	34.0	26.4	69	8.3	n	n	331	8	156	8,302	179	32	195	870	152	-23	-39	7,432	1.8	0.3	0.8	9.5
MOO	Field 262	wheat silage	11/15/11	05/12/12	179	border	1,920	430	1	3	11	4.7	10.8	3.4	18.9	13.7	62	5.1	n	n	232	15	151	4,661	159	16	172	913	73	-2	-21	3,747	1.5	0.9	0.9	5.1
MOO	Field 262	corn silage	06/06/12	10/06/12	122	furrow	1,920	-	121	4	8	0.0	27.1	3.7	30.7	25.3	72	7.1	n	n	306	23	286	10,246	157	30	258	783	149	-7	28	9,463	2.0	0.8	1.1	13.1

Table 10
Fields, Crops, Irrigation and Fertilization – Year 1
Central Valley Dairy Representative Monitoring Program

Dairy	Field	Crop	Date of Planting (a)	Date of Harvest	Growing Period (days)	Irrigation Method	Run Length (ft)	Width or Spacing (ft) (b)	Furrows or Borders per Set	Sets per Field	Irrigation per Set (hrs)	Rain (in)	Irrigation Depth (in)	Liquid Manure Depth (in)	Total Liquid Supply (in)	Crop Yield As-Is (ton/ac)	Crop Water Content (%)	Crop Yield dry (ton/ac)	Solid Manure (y/n)	Synthetic Fertilizer (y/n)	- Nutrient Input (lbs/ac) (c) - N	P	K	Total Salt	Nutrient Output (lbs/ac) (c) (Harvest Removal) N	P	K	Total Salt	Mass Balance (lbs/ac) (Input-Output) N	P	K	Total Salt	Mass Ratio (Input/Output) N	P	K	Total Salt
MOO	Field 264	corn silage	06/14/11	10/22/11	130	furrow	1,705	-	141	3	7	1.1	25.2	6.4	32.7	25.6	64	9.1	n	n	320	9	163	6,673	184	36	251	941	136	-27	-87	5,732	1.7	0.2	0.7	7.1
MOO	Field 264	wheat silage	11/16/11	05/14/12	180	border	1,705	375	1	3	12	4.7	9.3	1.1	15.1	14.2	62	5.3	n	n	129	9	89	3,015	164	17	178	945	-35	-8	-90	2,070	0.8	0.5	0.5	3.2
MOO	Field 264	corn silage	06/08/12	10/07/12	121	furrow	1,705	-	141	3	7	0.0	27.2	3.7	30.9	25.0	72	7.0	n	n	255	21	199	8,903	155	30	255	775	100	-9	-57	8,128	1.6	0.7	0.8	11.5
TON	Field 8	alfalfa haylage	n/a	n/a	n/a	border	1,550	137	2-3	3	12	n/a	n/a	n/a	n/a	3.6	53	1.7	n	n	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TON	Field 8	alfalfa hay	01/01/11	11/10/11	313	border	1,550	137	2-3	3	12	7.3	38.5	13.8	59.6	8.0	10	7.2	n	n	811	134	943	8,479	691	55	457	2,080	120	79	486	6,399	1.2	2.4	2.1	4.1
TON	Field 8	alfalfa hay	n/a	n/a	n/a	border	1,550	137	2-3	3	12	n/a	n/a	n/a	n/a	5.8	10	5.2	n	n	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TON	Field 8	alfalfa haylage	01/01/12	10/20/12	293	border	1,550	137	2-3	3	12	3.6	49.6	3.6	56.8	6.2	68	2.0	n	n	184	7	42	1,017	507	42	455	1,740	-322	-35	-413	-723	0.4	0.2	0.1	0.6
TON	Field 9	corn silage	05/15/11	09/18/11	126	furrow	1,550	30 in	184	5	10	2.3	38.1	5.7	46.1	27.3	75	6.8	n	n	268	43	236	2,572	147	33	240	949	120	9	-5	1,623	1.8	1.3	1.0	2.7
TON	Field 9	oats silage soft dough	11/01/11	04/02/12	153	border	1,550	115	3-4	5	12	3.7	12.4	0.0	16.1	14.1	71	4.1	n	n	42	-	-	-	205	31	267	1,078	-164	-	-	-	0.2	-	-	-
TON	Field 9	corn silage	05/16/12	09/07/12	114	furrow	1,550	30 in	184	5	10	0.2	40.0	4.3	44.5	17.7	78	4.0	n	n	391	22	453	3,235	117	18	188	609	274	5	265	2,626	3.3	1.3	2.4	5.3
TON	Field 10	alfalfa haylage	n/a	n/a	n/a	border	1,650	137	3-4	6	12	n/a	n/a	n/a	n/a	10.3	59	4.2	n	n	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TON	Field 10	alfalfa hay	01/01/11	11/08/11	311	border	1,650	137	3-4	6	12	7.4	38.2	8.7	54.2	5.8	10	5.2	n	n	477	79	524	4,953	693	73	864	2,417	-216	6	-339	2,536	0.7	1.1	0.6	2.0
TON	Field 10	alfalfa haylage	n/a	n/a	n/a	border	1,650	137	3-4	6	12	n/a	n/a	n/a	n/a	15.4	70	4.6	y	n	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TON	Field 10	alfalfa hay	01/01/12	10/03/12	276	border	1,650	137	3-4	6	12	3.6	40.9	5.3	49.8	2.5	10	2.3	n	n	315	19	267	2,485	485	41	238	1,483	-170	-22	29	1,002	0.6	0.5	1.1	1.7
TON	Field 12	corn silage	06/01/11	09/22/11	113	furrow	1,300	30 in	184	5	9	1.9	39.0	14.4	55.3	23.3	70	7.0	n	n	628	131	767	7,880	168	37	266	1,076	460	94	502	6,804	3.7	3.6	2.9	7.3
TON	Field 12	oats silage soft dough	11/01/11	04/06/12	157	border	1,300	115	3-4	5	12	3.7	6.6	2.2	12.5	12.6	59	5.2	n	n	264	15	330	2,881	174	40	290	1,131	90	-25	41	1,750	1.5	0.4	1.1	2.5
TON	Field 12	corn silage	05/04/12	09/01/12	120	furrow	1,300	30 in	184	5	9	0.2	36.1	3.1	39.4	20.7	78	4.6	y	n	390	20	327	2,259	132	21	219	719	258	0	108	1,540	3.0	1.0	1.5	3.1
TON	Field 14	corn silage	06/01/11	10/16/11	137	furrow	1,800	30 in	138	8	12	2.4	45.9	8.5	56.8	24.7	72	6.9	n	n	378	56	292	3,357	148	33	247	982	230	23	45	2,375	2.6	1.7	1.2	3.4
TON	Field 14	oats silage soft dough	11/01/11	04/09/12	160	border	1,800	115	3-4	8	12	3.7	11.1	1.2	16.0	8.2	61	3.2	n	n	168	8	183	1,596	124	21	154	739	44	-13	29	856	1.4	0.4	1.2	2.2
TON	Field 14	corn silage	05/04/12	09/03/12	122	furrow	1,800	30 in	138	8	12	0.2	33.5	2.0	35.7	17.0	64	6.2	n	n	211	10	194	1,429	146	27	187	718	65	-17	6	710	1.4	0.4	1.0	2.0

(a) In case of alfalfa, the date indicates the beginning of the reporting period, not the planting date.
(b) Unless specified as inches for select furrow irrigated fields.
(c) Mass values that were not available or reported as zero values are shown as dashes to indicate a missing mass balance component.
(d) Irrigation method and run length applicable to Shop portion of the field.
MJS = micro jet sprinklers
n/a = not applicable

Table 11
Soil Properties at Monitoried Dairies – Year 1
Central Valley Dairy Representative Monitoring Program

		Physical Soil Properties									Chemical Soil Properties					
	Map Unit	Percent Passing Sieve Number 4	10	40	200	Clay	Organic Matter	$K_{sat(min)}$	Available Water Capacity 60 inch profile		Cation Exchange Capacity	pH	Salinity	$CaCO_3$	$CaSO_4$ $2H_2O$	SAR
Soil Survey Map Unit Name	Symbol	4.76 mm	1.68 mm	0.42 mm	0.074 mm	(%)	(%)	(in/hr)	(in/in)	(in)	(meq/100g)	(pH-units)	(mS/cm)	(%)	(%)	-
MEN [Eastern Stanislaus Area, California (CA644)]																
Dinuba Sandy Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	DwA	100	95-100	69-100	33-85	7-18	0.0-1.0	0.06-0.20	0.07-0.11	5.4	3.8-9.6	7.4-9.0	4.0-8.0	0	0	0-5
Waukena Sandy Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	WdA	100	95-100	69-81	33-43	10-18	0.0-3.0	0.06-0.20	0.10-0.12	6.6	7.2-17	6.6-8.4	4.0-8.0	0-5	0	0-20
ANC [Merced Area, California (CA648)]																
Delhi Loamy Sand, 0 to 3 percent slopes	DdA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.8	1.0-5.0	6.1-7.8	0	0	0	0
Dinuba Sandy Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	DrA	100	95-100	70-85	35-60	7-18	0.0-1.0	0.06-0.20	0.10-0.13	7.2	5.0-10	7.9-8.4	4.0-8.0	0	0	0-5
Hilmar Loamy Sand, Slightly Saline-Alkali, 0 to 3 percent slopes	HhA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.7	1.0-5.0	7.3-9.6	4.0-8.0	0-5	0	0-5
Waukena Fine Sandy Loam, Strongly Saline-Alkali, 0 to 1 percent slopes	WcA	100	95-100	50-90	30-50	8-30	0.0-1.0	0.06-0.20	0.06-0.15	6.1	5.0-20	7.8-9.6	4.0-30.0	0-5	0	5-20
BET [Merced Area, California (CA648)]																
Delhi Sand, 0 to 3 percent slopes	DfA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Delhi Sand, Silty Substratum, 0 to 3 percent slopes	DgA	100	100	40-80	5-50	0-15	0.0-1.0	1.98-5.95	0.05-0.15	6.3	1.0-5.0	6.1-7.8	0	0	0	0
Dello Sand, 0 to 1 percent slopes	DkA	100	100	50-70	5-20	0-7	0.0-1.0	5.95-19.98	0.06-0.08	4.2	1.0-5.0	6.6-8.4	0.0-2.0	0	0	0
Dello Sand, Slightly Saline-Alkali, 0 to 1 percent slopes	DoA	100	100	50-70	5-20	0-7	0.0-1.0	5.95-19.98	0.06-0.08	4.2	1.0-5.0	6.6-8.4	4.0-8.0	0	0	0-5
Dune Land, 0 to 3 percent slopes	DuA	100	100	50-80	0-25	0-1	0.0-0.1	5.95-19.98	0.03-0.05	2.5	-	-	0	0	0	0
Dune Land, 3 to 8 percent slopes	DuB	100	100	50-80	0-25	0-1	0.0-0.1	5.95-19.98	0.03-0.05	2.5	-	-	0	0	0	0
Hilmar Sand, 0 to 3 percent slopes	HoA	100	100	40-100	5-85	0-15	0.0-1.0	0.06-0.20	0.05-0.17	7.3	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0

Table 11
Soil Properties at Monitoried Dairies – Year 1
Central Valley Dairy Representative Monitoring Program

		Physical Soil Properties									Chemical Soil Properties					
	Map Unit	Percent Passing Sieve Number 4	10	40	200	Clay	Organic Matter	$K_{sat(min)}$	Available Water Capacity	60 inch profile	Cation Exchange Capacity	pH	Salinity	$CaCO_3$	$CaSO_4$ $2H_2O$	SAR
Soil Survey Map Unit Name	Symbol	4.76 mm	1.68 mm	0.42 mm	0.074 mm	(%)	(%)	(in/hr)	(in/in)	(in)	(meq/100g)	(pH-units)	(mS/cm)	(%)	(%)	-
FG1 [Merced Area, California (CA648)]																
Delhi Sand, 0 to 3 percent slopes	DfA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Delhi Sand, 3 to 8 percent slopes	DfB	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Dinuba Sandy Loam, 0 to 1 percent slopes	DpA	100	95-100	70-85	35-60	7-18	0.0-1.0	0.06-0.20	0.10-0.13	7.2	5.0-10	6.6-8.4	0.0-4.0	0	0	0
Grangeville Loam, 0 to 1 percent slopes	GbA	100	95-100	60-100	35-80	8-20	0.0-6.0	0.57-1.98	0.12-0.17	8.6	5.0-15	6.1-8.4	0.0-2.0	0-2	0	0
Grangeville Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	GcA	100	95-100	60-100	35-80	8-20	0.0-6.0	0.57-1.98	0.12-0.17	8.6	5.0-15	6.6-8.4	4.0-8.0	0-2	0	0-5
Hanford Fine Sandy Loam, Channeled, 0 to 8 percent slopes	HcB	100	95-100	60-90	30-50	8-18	0.0-1.0	1.98-5.95	0.08-0.12	6.3	5.0-10	6.6-7.3	0	0	0	0
- Columbia	HcB	100	95-100	60-90	30-50	8-18	0.0-2.0	1.98-5.95	0.08-0.12	6.3	5.0-10	6.1-7.8	0	0	0	0
Hanford Fine Sandy Loam, Moderately Deep and Deep Over Sand, 0 to 1 percent slopes	HbA	85-100	75-100	40-75	5-50	0-18	0.0-1.0	1.98-5.95	0.04-0.15	6.2	5.0-10	6.6-7.3	0	0	0	0
Riverwash	Rf	80-100	75-100	30-70	0-20	0-5	0.0-0.1	5.95-19.98	0.03-0.06	2.9	- - -	- - -	0	0	0	0
BEA [Merced Area, California (CA648)]																
Delhi Sand, 3 to 8 percent slopes	DfB	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Delhi Loamy Sand, 0 to 3 percent slopes	DdA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.8	1.0-5.0	6.1-7.8	0	0	0	0
Dello Sand, Slightly Saline-Alkali, 0 to 1 percent slopes	DoA	100	100	50-70	5-20	0-7	0.0-1.0	5.95-19.98	0.06-0.08	4.2	1.0-5.0	6.6-8.4	4.0-8.0	0	0	0-5
Hilmar Loamy Sand, Slightly Saline-Alkali, 0 to 3 percent slopes	HhA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.7	1.0-5.0	7.3-9.6	4.0-8.0	0-5	0	0-5

Table 11
Soil Properties at Monitoried Dairies – Year 1
Central Valley Dairy Representative Monitoring Program

Soil Survey Map Unit Name	Map Unit Symbol	Percent Passing Sieve Number 4 4.76 mm	10 1.68 mm	40 0.42 mm	200 0.074 mm	Clay (%)	Organic Matter (%)	$K_{sat(min)}$ (in/hr)	Available Water Capacity (in/in)	60 inch profile (in)	Cation Exchange Capacity (meq/100g)	pH (pH-units)	Salinity (mS/cm)	$CaCO_3$ (%)	$CaSO_4$ $2H_2O$ (%)	SAR -
		Physical Soil Properties									Chemical Soil Properties					
BEA [Merced Area, California (CA648)] - Continued																
Hilmar Loamy Sand, Poorly Drained, Slightly Saline-Alkali, 0 to 1 percent slopes	HfA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	1.8	1.0-5.0	7.3-9.6	4.0-8.0	0-5	0	0-5
Hilmar Sand, Slightly Saline-Alkali, 0 to 3 percent slopes	HpA	100	100	40-100	5-85	0-15	0.0-1.0	0.06-0.20	0.05-0.17	7.3	1.0-5.0	7.3-9.6	4.0-8.0	0-5	0	0
COT [Merced Area, California (CA648)]																
Delhi Sand, 0 to 3 percent slopes	DfA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Delhi Sand, 3 to 8 percent slopes	DfB	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Dello Sand, 0 to 1 percent slopes	DkA	100	100	50-70	5-20	0-7	0.0-1.0	5.95-19.98	0.06-0.08	4.2	1.0-5.0	6.6-8.4	0.0-2.0	0	0	0
Dello Sand, Slightly Saline-Alkali, 0 to 1 percent slopes	DoA	100	100	50-70	5-20	0-7	0.0-1.0	5.95-19.98	0.06-0.08	4.2	1.0-5.0	6.6-8.4	4.0-8.0	0	0	0-5
Dune Land, 3 to 8 percent slopes	DuB	100	100	50-80	0-25	0-1	0.0-0.1	5.95-19.98	0.03-0.05	2.5	-	-	0	0	0	0
Fresno Loam, Poorly Drained Variant, Strongly Saline-Alkali, 0 to 1 percent slopes	FoA	100	95-100	60-95	35-65	10-35	0.0-1.0	0	0.00-0.12	2.3	5.0-20	7.8-9.6	4.0-30.0	0-5	0	0-20
Hilmar Sand, 0 to 3 percent slopes	HoA	100	100	40-100	5-85	0-15	0.0-1.0	0.06-0.20	0.05-0.17	7.3	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0
Hilmar Sand, Poorly Drained, 0 to 1 percent slopes	HkA	100	100	40-100	5-85	0-15	0.0-1.0	0.06-0.20	0.05-0.17	7.3	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0
Hilmar Sand, Poorly Drained, Moderately Saline-Alkali, 0 to 1 percent slopes	HmA	100	100	40-100	5-85	0-15	0.0-1.0	0.06-0.20	0.05-0.17	7.3	1.0-5.0	7.3-9.6	8.0-16.0	0-5	0	0-10
Hilmar Loamy Sand, 0 to 3 percent slopes	HgA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.7	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0
Hilmar Loamy Sand, Poorly Drained, Slightly Saline-Alkali, 0 to 1 percent slopes	HfA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	1.8	1.0-5.0	7.3-9.6	4.0-8.0	0-5	0	0-5

Table 11
Soil Properties at Monitoried Dairies – Year 1
Central Valley Dairy Representative Monitoring Program

		Physical Soil Properties									Chemical Soil Properties					
	Map Unit	Percent Passing Sieve Number 4	10	40	200	Clay	Organic Matter	$K_{sat(min)}$	Available Water Capacity 60 inch profile		Cation Exchange Capacity	pH	Salinity	$CaCO_3$	$CaSO_4$ $2H_2O$	SAR
Soil Survey Map Unit Name	Symbol	4.76 mm	1.68 mm	0.42 mm	0.074 mm	(%)	(%)	(in/hr)	(in/in)	(in)	(meq/100g)	(pH-units)	(mS/cm)	(%)	(%)	-
SAN [Merced Area, California (CA648)]																
Atwater Loamy Sand, 0 to 3 percent slopes	AfA	100	100	50-75	15-50	2-18	0.0-1.0	1.98-5.95	0.07-0.13	5.8	1.0-10	6.1-7.3	0	0	0	0
Delhi Loamy Fine Sand, 0 to 3 percent slopes	DbA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.8	1.0-5.0	6.1-7.8	0	0	0	0
Delhi Loamy Sand, 0 to 3 percent slopes	DdA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.8	1.0-5.0	6.1-7.8	0	0	0	0
Fresno Loam, Strongly Saline-Alkali, 0 to 1 percent slopes	FsA	100	95-100	60-95	35-65	10-35	0.0-1.0	0	0.00-0.12	2.3	5.0-20	7.8-9.6	4.0-30.0	0-5	0	0-20
Fresno Loam, Moderately Saline-Alkali, 0 to 1 percent slopes	FrA	100	95-100	60-95	35-65	10-35	0.0-1.0	0	0.00-0.12	2.3	5.0-20	7.8-9.6	4.0-16.0	0-5	0	0-20
Fresno Loam, Poorly Drained Variant, Moderately Saline-Alkali, 0 to 1 percent slopes	FnA	100	95-100	60-95	35-65	10-35	0.0-1.0	0	0.00-0.12	2.3	5.0-20	7.8-9.6	4.0-16.0	0-5	0	0-20
Hilmar Sand, 0 to 3 percent slopes	HoA	100	100	40-100	5-85	0-15	0.0-1.0	0.06-0.20	0.05-0.17	7.3	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0
Hilmar Loamy Sand, 0 to 3 percent slopes	HgA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.7	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0
Hilmar Loamy Sand, Slightly Saline-Alkali, 0 to 3 percent slopes	HhA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.7	1.0-5.0	7.3-9.6	4.0-8.0	0-5	0	0-5
Landlow Silty Clay Loam, 0 to 1 percent slopes	LeA	100	95-100	90-100	80-95	30-60	0.0-2.0	0.00-0.06	0.13-0.17	9.1	25-50	6.6-8.4	0.0-4.0	0-5	0	0
Landlow Silty Clay Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	LfA	100	95-100	95-100	80-95	30-60	0.0-2.0	0.00-0.06	0.09-0.17	7.5	25-50	7.4-9.0	4.0-8.0	0-5	0	0-5
Lewis Silty Clay Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	LoA	100	95-100	60-100	50-95	15-60	0.0-1.0	0	0.00-0.18	3.1	10-50	7.9-9.6	0.0-16.0	1-5	0	0-20

Table 11
Soil Properties at Monitoried Dairies – Year 1
Central Valley Dairy Representative Monitoring Program

		Physical Soil Properties									Chemical Soil Properties					
	Map Unit	Percent Passing Sieve Number 4	10	40	200	Clay	Organic Matter	$K_{sat(min)}$	Available Water Capacity 60 inch profile		Cation Exchange Capacity	pH	Salinity	$CaCO_3$	$CaSO_4$ $2H_2O$	SAR
Soil Survey Map Unit Name	Symbol	4.76 mm	1.68 mm	0.42 mm	0.074 mm	(%)	(%)	(in/hr)	(in/in)	(in)	(meq/100g)	(pH-units)	(mS/cm)	(%)	(%)	-
SAN [Merced Area, California (CA648)] - Continued																
Snelling Sandy Loam, 0 to 3 percent slopes	SnA	90-100	75-100	50-90	25-50	5-30	0.0-1.0	0.20-0.57	0.08-0.18	8.4	5.0-20	6.1-8.4	0.0-2.0	0	0	0
Snelling Sandy Loam, 3 to 8 percent slopes	SnB	90-100	75-100	40-90	25-50	5-30	0.0-1.0	0.20-0.57	0.08-0.18	8.4	5.0-20	6.1-8.4	0.0-2.0	0	0	0
PLS [Merced Area, California (CA648)]																
Delhi Sand, 0 to 3 percent slopes	DfA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Dinuba Sandy Loam, 0 to 1 percent slopes	DpA	100	95-100	70-85	35-60	7-18	0.0-1.0	0.06-0.20	0.10-0.13	7.2	5.0-10	6.6-8.4	0.0-4.0	0	0	0
Dinuba Sandy Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	DrA	100	95-100	70-85	35-60	7-18	0.0-1.0	0.06-0.20	0.10-0.13	7.2	5.0-10	7.9-8.4	4.0-8.0	0	0	0-5
Hilmar Sand, 0 to 3 percent slopes	HoA	100	100	40-100	5-85	0-15	0.0-1.0	0.06-0.20	0.05-0.17	7.3	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0
Hilmar Loamy Sand, 0 to 3 percent slopes	HgA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.7	1.0-5.0	7.3-9.6	2.0-4.0	0-5	0	0
CAE [Merced Area, California (CA648)]																
Delhi Sand, 0 to 3 percent slopes	DfA	100	100	40-80	5-35	0-5	0.0-1.0	5.95-19.98	0.05-0.10	4.3	1.0-5.0	6.1-7.8	0	0	0	0
Delhi Loamy Sand, Silty Substratum, 0 to 3 percent slopes	DeA	100	100	40-80	5-50	0-15	0.0-1.0	1.98-5.95	0.05-0.15	6.4	1.0-5.0	6.1-7.8	0	0	0	0
Dune Land, 0 to 3 percent slopes	DuA	100	100	50-80	0-25	0-1	0.0-0.1	5.95-19.98	0.03-0.05	2.5	-	-	0	0	0	0
Dello Sand, 0 to 1 percent slopes	DkA	100	100	50-70	5-20	0-7	0.0-1.0	5.95-19.98	0.06-0.08	4.2	1.0-5.0	6.6-8.4	0.0-2.0	0	0	0
Hilmar Loamy Sand, Slightly Saline-Alkali, 0 to 3 percent slopes	HhA	100	100	50-100	15-85	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.7	1.0-5.0	7.3-9.6	4.0-8.0	0-5	0	0-5

Table 11
Soil Properties at Monitoried Dairies – Year 1
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Soil Survey Map Unit Name	Map Unit Symbol	Percent Passing Sieve Number 4 4.76 mm	10 1.68 mm	40 0.42 mm	200 0.074 mm	Clay (%)	Organic Matter (%)	$K_{sat(min)}$ (in/hr)	Available Water Capacity (in/in)	60 inch profile (in)	Cation Exchange Capacity (meq/100g)	pH (pH-units)	Salinity (mS/cm)	$CaCO_3$ (%)	$CaSO_4$ $2H_2O$ (%)	SAR -
		Physical Soil Properties									Chemical Soil Properties					
ROB [Eastern Stanislaus Area, California (CA644)]																
Dinuba Sandy Loam, Slightly Saline-Alkali, 0 to 1 percent slopes	DwA	100	95-100	69-100	33-85	7-18	0.0-1.0	0.06-0.20	0.07-0.11	5.4	3.8-9.6	7.4-9.0	4.0-8.0	0	0	0-5
Hilmar Sandy Loam, 0 to 1 percent slopes	HfA	100	100	72-95	5-77	0-15	0.0-1.0	0.06-0.20	0.06-0.17	7.2	0.1-7.6	7.3-9.6	0.0-8.0	0-5	0	0
ANT [Stanislaus County, California, Western Part (CA642)]																
Pedcat Clay Loam, 0 to 2 percent slopes	331	100	100	75-100	50-95	27-50	0.0-1.0	0.01-0.06	0.09-0.16	6.7	10-37	6.6-9.0	0.0-16.0	1-15	0	0-50
Vernalis Loam, 0 to 2 percent slopes	122	100	95-100	80-100	55-80	18-30	0.5-2.0	0.60-2.00	0.14-0.18	9.6	15-24	6.6-8.4	0.0-2.0	0-5	0	0-5
Vernalis-Zacharias Complex, 0 to 2 percent slopes, Rarely Flooded	126	100	95-100	80-100	55-85	18-35	0.5-2.0	0.20-0.60	0.14-0.18	10	15-28	6.6-8.4	0.0-2.0	0-5	0	0-5
- Zacharias	126	85-100	75-100	60-90	50-80	25-35	0.0-2.0	0.20-0.60	0.13-0.19	9.7	17-27	6.1-7.8	0	1-2	0	0
COR [Merced County, California, Western Part (CA647)]																
Chinvar Loam	153	40-100	35-100	25-95	15-75	10-30	0.0-3.0	0.57-1.98	0.07-0.16	7.4	5.0-20	7.4-8.4	0.0-8.0	0-3	0	5-13
Pedcat Loam, 0 to 2 percent slopes	234	100	100	75-100	50-95	18-50	0.0-1.0	0.00-0.06	0.09-0.14	6.6	10-30	6.1-9.0	8.0-16.0	0-3	0	13-60
Pedcat Clay, 0 to 2 percent slopes, Severley Eroded	237	100	100	75-100	50-95	30-50	0.0-1.0	0.06-0.20	0.09-0.13	6.6	15-30	7.9-9.0	8.0-16.0	0-3	0	13-60
Pedcat Clay Loam, Leveled, 0 to 2 percent slope	236	100	100	75-100	50-95	27-50	0.0-1.0	0.00-0.06	0.09-0.16	6.7	15-30	6.6-9.0	8.0-16.0	0-3	0	13-60
FG2 [Merced County, California, Western Part (CA647)]																
Dos Amigos Clay Loam, Partially Drained	168	100	95-100	85-100	50-95	30-50	0.0-2.0	0.00-0.06	0.09-0.20	8.6	5.0-30	7.9-8.4	0.0-16.0	20-35	0-10	0
Dos Amigos Clay, Partially Drained	169	100	95-100	85-100	50-95	30-50	0.0-2.0	0.00-0.06	0.09-0.17	8.3	5.0-30	7.9-8.4	0.0-16.0	20-35	0-10	0
Pedcat Clay Loam, Leveled, 0 to 2 percent slopes	236	100	100	75-100	50-95	27-50	0.0-1.0	0.00-0.06	0.09-0.16	6.7	15-30	6.6-9.0	8.0-16.0	0-3	0	13-60

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Soil Survey Map Unit Name	Map Unit Symbol	Percent Passing Sieve Number 4 4.76 mm	10 1.68 mm	40 0.42 mm	200 0.074 mm	Clay (%)	Organic Matter (%)	$K_{sat(min)}$ (in/hr)	Available Water Capacity (in/in)	60 inch profile (in)	Cation Exchange Capacity (meq/100g)	pH (pH-units)	Salinity (mS/cm)	$CaCO_3$ (%)	$CaSO_4$ $2H_2O$ (%)	SAR -
		Physical Soil Properties									Chemical Soil Properties					
GOD [Merced County, California, Western Part (CA647)]																
Henmel Clay Loam, Partially Drained	192	100	100	60-100	35-95	15-45	0.0-3.0	0.06-0.20	0.10-0.19	9.3	10-25	7.9-9.0	0.0-2.0	0-5	0	0-10
Pedcat Clay Loam, Leveled, 0 to 2 percent slopes	236	100	100	75-100	50-95	27-50	0.0-1.0	0.00-0.06	0.09-0.16	6.7	15-30	6.6-9.0	8.0-16.0	0-3	0	13-60
Woo Loam, 0 to 2 percent slopes	274	80-100	75-100	65-95	50-75	18-35	0.5-2.0	0.20-0.57	0.14-0.19	10	10-15	6.6-8.4	0.0-2.0	1-10	0	0
MAC and NUN [Merced County, California, Western Part (CA647)]																
Trulae Silty Clay, Partially Drained	258	90-100	90-100	80-100	65-95	30-65	0.0-2.0	0.00-0.06	0.12-0.16	8.2	20-50	7.9-8.4	4.0-8.0	0-10	0	0-50
Woo Clay Loam, Wet, 0 to 2 percent slopes	279	100	95-100	75-100	50-90	18-45	0.0-2.0	0.06-0.20	0.14-0.19	10.2	10-25	6.6-8.4	0.0-4.0	1-10	0	0
MOO [Stanislaus County, California, Western Part (CA642)]																
Bolfar-Columbia Complex, 0 to 2 percent slopes, Rarely Flooded	245	100	100	60-100	35-80	18-35	0.0-2.0	0.20-0.60	0.12-0.17	8.5	5.0-28	7.4-8.4	0.0-4.0	0-2	0	0
- Columbia	245	100	95-100	40-95	5-50	0-18	0.0-2.0	0.60-2.00	0.05-0.15	7.1	0.0-16	6.1-8.4	0	0	0	0
Columbia Fine Sandy Loam, Channeled, Partially Drained, 0 to 2 percent slopes, Frequently Flooded	153	100	100	80-95	35-50	8-18	0.0-2.0	2.00-6.00	0.10-0.12	6.6	5.0-16	6.1-7.8	0	0	0	0
Dos Palos-Bolfar Complex, 0 to 2 percent slopes, Occasionally Flooded	170	100	100	80-100	50-95	30-60	0.0-3.0	0.06-0.20	0.09-0.15	7.4	5.2-52	7.4-8.4	0.0-4.0	1-15	0	0
- Bolfar	170	100	100	80-100	35-80	18-35	0.0-2.0	0.20-0.60	0.12-0.17	8.8	5.0-28	7.4-8.4	0.0-4.0	0-2	0	0
Elsalado Loam, 0 to 2 percent slopes	274	95-100	90-100	75-90	35-65	8-18	0.0-1.0	0.60-2.00	0.14-0.16	9	6.2-15	7.4-8.4	0.0-2.0	1-15	0	1-5
Pedcat Clay Loam, 0 to 2 percent slopes, Rarely Flooded	330	100	100	75-100	50-95	27-50	0.0-1.0	0.01-0.06	0.09-0.16	6.7	10-37	6.6-9.0	0.0-16.0	1-15	0	0-50
Vernalis Loam, 0 to 2 percent slopes	122	100	95-100	80-100	55-80	18-30	0.5-2.0	0.60-2.00	0.14-0.18	9.6	15-24	6.6-8.4	0.0-2.0	0-5	0	0-5
Vernalis Clay Loam, 0 to 2 percent slopes	125	100	95-100	80-100	55-85	18-35	0.5-2.0	0.20-0.60	0.14-0.18	10	15-28	6.6-8.4	0.0-2.0	0-5	0	0-5

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		Physical Soil Properties									Chemical Soil Properties					
	Map Unit	Percent Passing Sieve Number 4	10	40	200	Clay	Organic Matter	$K_{sat(min)}$	Available Water Capacity 60 inch profile		Cation Exchange Capacity	pH	Salinity	$CaCO_3$	$CaSO_4$ $2H_2O$	SAR
Soil Survey Map Unit Name	Symbol	4.76 mm	1.68 mm	0.42 mm	0.074 mm	(%)	(%)	(in/hr)	(in/in)	(in)	(meq/100g)	(pH-units)	(mS/cm)	(%)	(%)	-
TON [Merced County, California, Western Part (CA647)]																
Deldota Clay, Partially Drained	167	100	95-100	90-100	75-95	30-50	0.0-3.0	0.06-0.20	0.15-0.18	9.9	2.0-7.0	7.4-8.4	0.0-2.0	20-40	1-20	0
Dos Amigos Clay Loam, Partially Drained	168	100	95-100	85-100	50-95	30-50	0.0-2.0	0.00-0.06	0.09-0.20	8.6	5.0-30	7.9-8.4	0.0-16.0	20-35	0-10	0
Pedcat Loam, 0 to 2 percent slopes	234	100	100	75-100	50-95	18-50	0.0-1.0	0.00-0.06	0.09-0.12	6.6	10-30	6.1-9.0	8.0-16.0	0-3	0	13-60
Pedcat Clay Loam, Leveled, 0 to 2 percent slopes	236	100	100	75-100	50-95	27-50	0.0-1.0	0.00-0.06	0.09-0.16	6.7	15-30	6.6-9.0	8.0-16.0	0-3	0	13-60
Volta Clay Loam	265	100	100	90-100	70-95	27-50	0.0-1.0	0	0.00-0.17	6	15-25	7.4-9.0	0.0-8.0	1-10	0	0-30
Volta Clay Loam, Partially Drained	266	100	100	90-100	70-95	30-50	0.0-1.0	0	0.00-0.17	6.2	15-25	7.4-9.0	0.0-8.0	1-10	0	0-30

Data Source: USDA NRCS Soil Survey Geographic Database (SSURGO)
With the exception of Ksat(min), numerical values and ranges pertain to a 60-inch soil profile and may integrate properties of multiple soil horizons.
Detailed parameter descriptions are provided in **Attachment B5**.

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
MEN-MW1s	1/29/2012	8:57	8.77	52.04	0.22	0.02
MEN-MW1s	2/7/2012	17:25	7.12	53.69	-0.05	-0.00
MEN-MW1s	3/5/2012	15:40	8.66	52.15	-0.01	-0.00
MEN-MW1s	4/5/2012	13:12	8.25	52.56	-0.01	-0.00
MEN-MW1s	5/8/2012	15:56	9.05	51.76	-0.06	-0.00
MEN-MW1s	6/18/2012	9:48	9.15	51.66	-0.06	-0.00
MEN-MW1s	7/9/2012	10:01	8.75	52.06	-0.06	-0.00
MEN-MW1s	8/14/2012	7:56	7.36	53.45	0.09	0.01
MEN-MW1s	9/17/2012	11:11	8.12	52.69	0.00	0.00
MEN-MW1s	10/19/2012	11:11	8.44	52.37	0.00	0.00
MEN-MW1s	12/6/2012	10:24	9.20	51.61	-0.02	-0.00
MEN-MW1s	12/28/2012	10:08	6.65	54.16	0.01	0.00
MEN-MW1d	1/29/2012	9:00	8.90	51.82		
MEN-MW1d	2/7/2012	17:26	6.98	53.74		
MEN-MW1d	3/5/2012	15:41	8.56	52.16		
MEN-MW1d	4/5/2012	13:12	8.15	52.57		
MEN-MW1d	5/8/2012	15:58	8.90	51.82		
MEN-MW1d	6/18/2012	9:47	9.00	51.72		
MEN-MW1d	7/9/2012	10:00	8.60	52.12		
MEN-MW1d	8/14/2012	7:57	7.36	53.36		
MEN-MW1d	9/17/2012	11:10	8.03	52.69		
MEN-MW1d	10/19/2012	11:11	8.35	52.37		
MEN-MW1d	12/6/2012	10:24	9.09	51.63		
MEN-MW1d	12/28/2012	10:09	6.57	54.15		
MEN-MW2s	1/29/2012	9:07	8.89	51.98	-0.06	-0.00
MEN-MW2s	2/7/2012	17:11	7.04	53.83	-0.08	-0.01
MEN-MW2s	3/5/2012	15:43	8.55	52.32	0.04	0.00
MEN-MW2s	4/5/2012	13:18	8.21	52.66	0.01	0.00
MEN-MW2s	5/8/2012	15:03	8.54	52.33	-0.12	-0.01
MEN-MW2s	6/18/2012	9:51	9.13	51.74	-0.04	-0.00
MEN-MW2s	7/9/2012	10:04	8.72	52.15	-0.08	-0.01
MEN-MW2s	8/14/2012	7:59	7.25	53.62	0.11	0.01
MEN-MW2s	9/17/2012	11:13	8.12	52.75	0.03	0.00
MEN-MW2s	10/19/2012	11:08	8.32	52.55	-0.03	-0.00
MEN-MW2s	12/6/2012	10:20	9.15	51.72	-0.06	-0.00
MEN-MW2s	12/28/2012	10:12	6.75	54.12	-0.02	-0.00
MEN-MW2d	1/29/2012	9:10	8.77	52.04		
MEN-MW2d	2/7/2012	17:12	6.90	53.91		
MEN-MW2d	3/5/2012	15:44	8.53	52.28		
MEN-MW2d	4/5/2012	13:19	8.16	52.65		
MEN-MW2d	5/8/2012	15:03	8.36	52.45		
MEN-MW2d	6/18/2012	9:50	9.03	51.78		
MEN-MW2d	7/9/2012	10:03	8.58	52.23		
MEN-MW2d	8/14/2012	8:00	7.30	53.51		
MEN-MW2d	9/17/2012	11:13	8.09	52.72		
MEN-MW2d	10/19/2012	11:08	8.23	52.58		
MEN-MW2d	12/6/2012	10:20	9.03	51.78		
MEN-MW2d	12/28/2012	10:13	6.67	54.14		
MEN-MW3s	1/29/2012	9:14	8.70	52.07	-0.08	-0.01
MEN-MW3s	2/7/2012	16:05	6.85	53.92	-0.10	-0.01
MEN-MW3s	3/5/2012	15:47	8.19	52.58	-0.04	-0.00
MEN-MW3s	4/5/2012	13:58	7.90	52.87	-0.03	-0.00
MEN-MW3s	5/8/2012	17:30	8.24	52.53	-0.56	-0.04
MEN-MW3s	6/18/2012	9:55	9.16	51.61	-0.03	-0.00
MEN-MW3s	7/9/2012	10:07	8.20	52.57	-0.06	-0.00
MEN-MW3s	8/14/2012	8:26	8.48	52.29	-0.13	-0.01
MEN-MW3s	9/17/2012	11:16	8.96	51.81	-0.08	-0.01
MEN-MW3s	10/19/2012	10:40	8.41	52.36	-0.12	-0.01
MEN-MW3s	12/6/2012	10:16	9.23	51.54	-0.09	-0.01
MEN-MW3s	12/28/2012	10:24	7.78	52.99	-0.15	-0.01
MEN-MW3d	1/29/2012	9:15	8.52	52.15		
MEN-MW3d	2/7/2012	16:06	6.65	54.02		
MEN-MW3d	3/5/2012	15:48	8.05	52.62		
MEN-MW3d	4/5/2012	13:59	7.77	52.90		
MEN-MW3d	5/8/2012	17:33	7.58	53.09		
MEN-MW3d	6/18/2012	9:54	9.03	51.64		
MEN-MW3d	7/9/2012	10:06	8.04	52.63		
MEN-MW3d	8/14/2012	8:27	8.25	52.42		
MEN-MW3d	9/17/2012	11:16	8.78	51.89		
MEN-MW3d	10/19/2012	10:40	8.19	52.48		
MEN-MW3d	12/6/2012	10:16	9.04	51.63		
MEN-MW3d	12/28/2012	10:25	7.53	53.14		
MEN-MW4s	1/29/2012	9:20	8.02	52.42	-0.07	-0.01
MEN-MW4s	2/7/2012	15:47	6.32	54.12	-0.01	-0.00
MEN-MW4s	3/5/2012	15:50	7.80	52.64	-0.02	-0.00
MEN-MW4s	4/5/2012	13:53	7.44	53.00	-0.02	-0.00
MEN-MW4s	5/8/2012	17:49	7.63	52.81	-0.07	-0.01
MEN-MW4s	6/18/2012	9:58	8.73	51.71	-0.02	-0.00
MEN-MW4s	7/9/2012	10:11	7.71	52.73	0.00	0.00
MEN-MW4s	8/14/2012	8:23	7.67	52.77	0.01	0.00
MEN-MW4s	9/17/2012	11:18	8.50	51.94	0.01	0.00
MEN-MW4s	10/19/2012	10:43	7.81	52.63	-0.06	-0.00
MEN-MW4s	12/6/2012	10:12	8.87	51.57	-0.01	-0.00
MEN-MW4s	12/28/2012	10:28	7.46	52.98	0.00	0.00
MEN-MW4d	1/29/2012	9:21	7.84	52.49		
MEN-MW4d	2/7/2012	15:48	6.20	54.13		
MEN-MW4d	3/5/2012	15:52	7.67	52.66		
MEN-MW4d	4/5/2012	13:54	7.31	53.02		
MEN-MW4d	5/8/2012	17:50	7.45	52.88		
MEN-MW4d	6/18/2012	9:57	8.60	51.73		
MEN-MW4d	7/9/2012	10:11	7.60	52.73		
MEN-MW4d	8/14/2012	8:24	7.57	52.76		
MEN-MW4d	9/17/2012	11:18	8.40	51.93		
MEN-MW4d	10/19/2012	10:43	7.64	52.69		
MEN-MW4d	12/6/2012	10:12	8.75	51.58		
MEN-MW4d	12/28/2012	10:29	7.35	52.98		
MEN-MW5s	1/29/2012	9:24	8.19	52.91	-0.02	-0.00
MEN-MW5s	2/7/2012	15:26	7.72	53.38	0.02	0.00
MEN-MW5s	3/5/2012	15:55	8.61	52.49	0.00	0.00
MEN-MW5s	4/5/2012	14:02	8.47	52.63	-0.02	-0.00
MEN-MW5s	5/8/2012	17:05	9.79	51.31	0.00	0.00
MEN-MW5s	6/18/2012	10:01	9.75	51.35	0.00	0.00
MEN-MW5s	7/9/2012	10:16	8.81	52.29	-0.01	-0.00
MEN-MW5s	8/14/2012	8:18	9.10	52.00	0.00	0.00
MEN-MW5s	9/17/2012	11:20	9.88	51.22	0.00	0.00
MEN-MW5s	10/19/2012	10:47	9.65	51.45	0.01	0.00
MEN-MW5s	12/6/2012	10:09	10.10	51.00	0.00	0.00
MEN-MW5s	12/28/2012	10:19	9.12	51.98	0.00	0.00
MEN-MW5d	1/29/2012	9:25	8.07	52.93		
MEN-MW5d	2/7/2012	15:27	7.64	53.36		
MEN-MW5d	3/5/2012	15:56	8.51	52.49		
MEN-MW5d	4/5/2012	14:03	8.35	52.65		
MEN-MW5d	5/8/2012	17:06	9.69	51.31		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
MEN-MW5d	6/18/2012	10:00	9.65	51.35		
MEN-MW5d	7/9/2012	10:15	8.70	52.30		
MEN-MW5d	8/14/2012	8:19	9.00	52.00		
MEN-MW5d	9/17/2012	11:20	9.78	51.22		
MEN-MW5d	10/19/2012	10:47	9.56	51.44		
MEN-MW5d	12/6/2012	10:09	10.00	51.00		
MEN-MW5d	12/28/2012	10:20	9.02	51.98		
MEN-MW6s	1/29/2012	9:27	8.70	50.32	0.00	0.00
MEN-MW6s	2/7/2012	16:50	5.79	53.23	-0.02	-0.00
MEN-MW6s	3/5/2012	15:58	8.45	50.57	0.01	0.00
MEN-MW6s	4/5/2012	13:28	7.77	51.25	0.01	0.00
MEN-MW6s	5/8/2012	16:15	7.36	51.66	0.01	0.00
MEN-MW6s	6/18/2012	10:08	5.44	53.58	-0.06	-0.00
MEN-MW6s	7/9/2012	10:29	4.83	54.19	0.01	0.00
MEN-MW6s	8/14/2012	8:05	6.45	52.57	-0.05	-0.00
MEN-MW6s	9/17/2012	11:27	7.19	51.83	-0.02	-0.00
MEN-MW6s	10/19/2012	11:03	6.91	52.11	0.00	0.00
MEN-MW6s	12/6/2012	9:58	8.70	50.32	0.01	0.00
MEN-MW6s	12/28/2012	10:33	6.24	52.78	0.02	0.00
MEN-MW6d	1/29/2012	9:28	8.63	50.32		
MEN-MW6d	2/7/2012	16:51	5.70	53.25		
MEN-MW6d	3/5/2012	16:00	8.39	50.56		
MEN-MW6d	4/5/2012	13:29	7.71	51.24		
MEN-MW6d	5/8/2012	16:16	7.30	51.65		
MEN-MW6d	6/18/2012	10:07	5.31	53.64		
MEN-MW6d	7/9/2012	10:28	4.77	54.18		
MEN-MW6d	8/14/2012	8:06	6.33	52.62		
MEN-MW6d	9/17/2012	11:27	7.10	51.85		
MEN-MW6d	10/19/2012	11:03	6.84	52.11		
MEN-MW6d	12/6/2012	9:58	8.64	50.31		
MEN-MW6d	12/28/2012	10:34	6.19	52.76		
MEN-MW7s	1/29/2012	9:30	4.34	55.14	0.09	0.00
MEN-MW7s	2/7/2012	16:25	4.26	55.22	-0.01	-0.00
MEN-MW7s	3/5/2012	16:03	6.38	53.10	-0.01	-0.00
MEN-MW7s	4/5/2012	13:44	5.86	53.62	-0.01	-0.00
MEN-MW7s	5/8/2012	16:43	3.09	56.39	-0.02	-0.00
MEN-MW7s	6/18/2012	10:04	6.97	52.51	-0.02	-0.00
MEN-MW7s	7/9/2012	10:23	6.02	53.46	-0.03	-0.00
MEN-MW7s	8/14/2012	8:14	3.81	55.67	-0.01	-0.00
MEN-MW7s	9/17/2012	11:23	6.12	53.36	-0.04	-0.00
MEN-MW7s	10/19/2012	10:51	5.52	53.96	-0.02	-0.00
MEN-MW7s	12/6/2012	10:01	6.96	52.52	-0.03	-0.00
MEN-MW7s	12/28/2012	10:16	5.17	54.31	-0.03	-0.00
MEN-MW7d	1/29/2012	9:32	4.32	55.05		
MEN-MW7d	2/7/2012	16:26	4.14	55.23		
MEN-MW7d	3/5/2012	16:05	6.26	53.11		
MEN-MW7d	4/5/2012	13:45	5.74	53.63		
MEN-MW7d	5/8/2012	16:45	2.96	56.41		
MEN-MW7d	6/18/2012	10:03	6.84	52.53		
MEN-MW7d	7/9/2012	10:22	5.88	53.49		
MEN-MW7d	8/14/2012	8:15	3.69	55.68		
MEN-MW7d	9/17/2012	11:23	5.97	53.40		
MEN-MW7d	10/19/2012	10:51	5.39	53.98		
MEN-MW7d	12/6/2012	10:01	6.82	52.55		
MEN-MW7d	12/28/2012	10:17	5.03	54.34		
ANC-MW1	1/30/2012	14:13	12.58	60.24		
ANC-MW1	2/12/2012	16:41	12.25	60.57		
ANC-MW1	3/5/2012	9:25	13.19	59.63		
ANC-MW1	4/5/2012	16:23	13.05	59.77		
ANC-MW1	5/11/2012	14:48	13.43	59.39		
ANC-MW1	6/18/2012	11:41	12.85	59.97		
ANC-MW1	7/9/2012	13:49	11.66	61.16		
ANC-MW1	8/16/2012	10:01	12.98	59.84		
ANC-MW1	9/17/2012	12:56	13.03	59.79		
ANC-MW1	10/19/2012	13:55	13.05	59.77		
ANC-MW1	12/6/2012	12:30	13.37	59.45		
ANC-MW1	12/28/2012	12:56	13.15	59.67		
ANC-MW2	1/30/2012	14:16	19.85	60.45		
ANC-MW2	2/12/2012	17:03	20.26	60.04		
ANC-MW2	3/5/2012	9:28	20.80	59.50		
ANC-MW2	4/5/2012	16:18	20.34	59.96		
ANC-MW2	5/11/2012	14:20	20.68	59.62		
ANC-MW2	6/18/2012	11:44	20.00	60.30		
ANC-MW2	7/9/2012	13:46	Q/M			
ANC-MW2	8/16/2012	9:58	20.38	59.92		
ANC-MW2	9/17/2012	12:54	20.23	60.07		
ANC-MW2	10/19/2012	13:52	20.00	60.30		
ANC-MW2	12/6/2012	12:32	20.61	59.69		
ANC-MW2	12/28/2012	13:00	20.16	60.14		
ANC-MW3	1/30/2012	14:20	10.00	60.75		
ANC-MW3	2/12/2012	17:19	10.23	60.52		
ANC-MW3	3/5/2012	9:31	10.73	60.02		
ANC-MW3	4/5/2012	16:38	10.74	60.01		
ANC-MW3	5/11/2012	14:08	10.93	59.82		
ANC-MW3	6/18/2012	11:47	10.21	60.54		
ANC-MW3	7/9/2012	13:44	10.40	60.35		
ANC-MW3	8/16/2012	9:55	10.43	60.32		
ANC-MW3	9/17/2012	12:51	10.30	60.45		
ANC-MW3	10/19/2012	13:50	10.22	60.53		
ANC-MW3	12/6/2012	12:38	10.87	59.88		
ANC-MW3	12/28/2012	12:48	10.58	60.17		
ANC-MW4	1/30/2012	14:09	20.70	60.57		
ANC-MW4	2/12/2012	17:40	20.90	60.37		
ANC-MW4	3/5/2012	9:21	21.23	60.04		
ANC-MW4	4/5/2012	16:31	21.12	60.15		
ANC-MW4	5/11/2012	15:06	21.00	60.27		
ANC-MW4	6/18/2012	11:39	20.82	60.45		
ANC-MW4	7/9/2012	13:52	20.58	60.69		
ANC-MW4	8/16/2012	10:05	20.48	60.79		
ANC-MW4	9/17/2012	12:59	20.84	60.43		
ANC-MW4	10/19/2012	13:57	21.10	60.17		
ANC-MW4	12/6/2012	12:35	21.58	59.69		
ANC-MW4	12/28/2012	12:52	21.45	59.82		
ANC-MW5s	1/30/2012	14:00	15.39	61.52	0.45	0.02
ANC-MW5s	2/12/2012	16:13	15.50	61.41	0.09	0.00
ANC-MW5s	3/5/2012	9:19	15.98	60.93	0.04	0.00
ANC-MW5s	4/5/2012	16:41	16.21	60.70	0.04	0.00
ANC-MW5s	5/11/2012	15:47	17.65	59.26	-0.21	-0.01
ANC-MW5s	6/18/2012	11:51	15.70	61.21	0.22	0.01
ANC-MW5s	7/9/2012	13:55	15.82	61.09	0.35	0.02
ANC-MW5s	8/16/2012	10:07	16.30	60.61	0.53	0.03
ANC-MW5s	9/17/2012	13:03	15.53	61.38	-0.07	-0.00
ANC-MW5s	10/19/2012	14:00	15.45	61.46	0.31	0.02

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
ANC-MW5s	12/6/2012	12:46	16.18	60.73	0.45	0.02
ANC-MW5s	12/28/2012	13:03	16.16	60.75	0.12	0.01
ANC-MW5d	1/30/2012	14:03	15.75	61.07		
ANC-MW5d	2/12/2012	16:14	15.50	61.32		
ANC-MW5d	3/5/2012	9:18	15.93	60.89		
ANC-MW5d	4/5/2012	16:41	16.16	60.66		
ANC-MW5d	5/11/2012	15:48	17.35	59.47		
ANC-MW5d	6/18/2012	11:50	15.83	60.99		
ANC-MW5d	7/9/2012	13:55	16.08	60.74		
ANC-MW5d	8/16/2012	10:07	16.74	60.08		
ANC-MW5d	9/17/2012	13:02	15.37	61.45		
ANC-MW5d	10/19/2012	14:00	15.67	61.15		
ANC-MW5d	12/6/2012	12:46	16.54	60.28		
ANC-MW5d	12/28/2012	13:04	16.19	60.63		
ANC-MW6s	1/30/2012	14:30	13.72	61.42	0.01	0.00
ANC-MW6s	2/12/2012	15:47	14.05	61.09	0.00	0.00
ANC-MW6s	3/5/2012	9:38	14.73	60.41	-0.02	-0.00
ANC-MW6s	4/5/2012	17:01	14.05	61.09	0.59	0.03
ANC-MW6s	5/11/2012	13:33	14.73	60.41	0.01	0.00
ANC-MW6s	6/18/2012	11:58	13.78	61.36	0.01	0.00
ANC-MW6s	7/9/2012	13:41	13.83	61.31	0.01	0.00
ANC-MW6s	8/16/2012	9:50	13.89	61.25	0.04	0.00
ANC-MW6s	9/17/2012	12:49	13.85	61.29	0.01	0.00
ANC-MW6s	10/19/2012	13:42	13.22	61.92	0.00	0.00
ANC-MW6s	12/6/2012	12:40	14.65	60.49	0.04	0.00
ANC-MW6s	12/28/2012	12:47	14.33	60.81	0.02	0.00
ANC-MW6d	1/30/2012	14:33	13.62	61.41		
ANC-MW6d	2/12/2012	15:48	13.94	61.09		
ANC-MW6d	3/5/2012	9:37	14.60	60.43		
ANC-MW6d	4/5/2012	17:00	14.53	60.50		
ANC-MW6d	5/11/2012	13:35	14.63	60.40		
ANC-MW6d	6/18/2012	11:57	13.68	61.35		
ANC-MW6d	7/9/2012	13:41	13.73	61.30		
ANC-MW6d	8/16/2012	9:50	13.82	61.21		
ANC-MW6d	9/17/2012	12:49	13.75	61.28		
ANC-MW6d	10/19/2012	13:42	13.11	61.92		
ANC-MW6d	12/6/2012	12:40	14.58	60.45		
ANC-MW6d	12/28/2012	12:48	14.24	60.79		
ANC-MW7s	1/30/2012	14:40	13.13	62.59	0.01	0.00
ANC-MW7s	2/12/2012	15:20	13.67	62.05	0.01	0.00
ANC-MW7s	3/5/2012	9:35	14.30	61.42	-0.02	-0.00
ANC-MW7s	4/5/2012	16:49	14.53	61.19	0.02	0.00
ANC-MW7s	5/11/2012	13:20	14.95	60.77	0.00	0.00
ANC-MW7s	6/18/2012	11:55	13.48	62.24	0.00	0.00
ANC-MW7s	7/9/2012	13:39	12.69	63.03	0.01	0.00
ANC-MW7s	8/16/2012	9:45	12.39	63.33	0.00	0.00
ANC-MW7s	9/17/2012	12:47	13.10	62.62	0.00	0.00
ANC-MW7s	10/19/2012	13:40	12.19	63.53	0.01	0.00
ANC-MW7s	12/6/2012	12:42	14.34	61.38	-0.02	-0.00
ANC-MW7s	12/28/2012	12:43	14.27	61.45	-0.02	-0.00
ANC-MW7d	1/30/2012	14:42	13.04	62.58		
ANC-MW7d	2/12/2012	15:21	13.58	62.04		
ANC-MW7d	3/5/2012	9:34	14.18	61.44		
ANC-MW7d	4/5/2012	16:49	14.45	61.17		
ANC-MW7d	5/11/2012	13:21	14.85	60.77		
ANC-MW7d	6/18/2012	11:54	13.38	62.24		
ANC-MW7d	7/9/2012	13:38	12.60	63.02		
ANC-MW7d	8/16/2012	9:46	12.29	63.33		
ANC-MW7d	9/17/2012	12:47	13.00	62.62		
ANC-MW7d	10/19/2012	13:40	12.10	63.52		
ANC-MW7d	12/6/2012	12:42	14.22	61.40		
ANC-MW7d	12/28/2012	12:44	14.15	61.47		
BET-MW1s	1/29/2012	9:58	10.05	94.10	0.00	0.00
BET-MW1s	2/8/2012	12:56	10.00	94.15	-0.10	-0.01
BET-MW1s	3/5/2012	14:12	10.67	93.48	0.00	0.00
BET-MW1s	4/5/2012	12:50	10.37	93.78	0.02	0.00
BET-MW1s	5/10/2012	13:08	13.36	90.79	0.04	0.00
BET-MW1s	6/18/2012	13:59	14.93	89.22	0.05	0.00
BET-MW1s	7/11/2012	9:21	16.18	87.97	0.02	0.00
BET-MW1s	8/14/2012	10:44	15.69	88.46	0.01	0.00
BET-MW1s	9/18/2012	8:55	14.74	89.41	-0.02	-0.00
BET-MW1s	10/19/2012	12:57	13.80	90.35	-0.01	-0.00
BET-MW1s	12/7/2012	11:09	13.80	90.35	-0.01	-0.00
BET-MW1s	12/28/2012	14:16	12.38	91.77	-0.01	-0.00
BET-MW1d	1/29/2012	9:58	9.55	94.10		
BET-MW1d	2/8/2012	12:57	9.40	94.25		
BET-MW1d	3/5/2012	14:13	10.17	93.48		
BET-MW1d	4/5/2012	12:51	9.89	93.76		
BET-MW1d	5/10/2012	13:09	12.90	90.75		
BET-MW1d	6/18/2012	13:58	14.48	89.17		
BET-MW1d	7/11/2012	9:20	15.70	87.95		
BET-MW1d	8/14/2012	10:44	15.20	88.45		
BET-MW1d	9/18/2012	8:55	14.22	89.43		
BET-MW1d	10/19/2012	12:57	13.29	90.36		
BET-MW1d	12/7/2012	11:09	13.29	90.36		
BET-MW1d	12/28/2012	14:17	11.87	91.78		
BET-MW2s	1/29/2012	10:02	11.42	94.33	-0.02	-0.00
BET-MW2s	2/8/2012	13:14	11.38	94.37	0.00	0.00
BET-MW2s	3/5/2012	14:15	11.89	93.86	0.00	0.00
BET-MW2s	4/5/2012	12:53	11.43	94.32	0.00	0.00
BET-MW2s	5/10/2012	13:25	13.79	91.96	0.00	0.00
BET-MW2s	6/18/2012	13:56	14.85	90.90	0.00	0.00
BET-MW2s	7/11/2012	9:17	13.85	91.90	-0.01	-0.00
BET-MW2s	8/14/2012	10:46	12.60	93.15	-0.07	-0.00
BET-MW2s	9/18/2012	8:52	13.40	92.35	-0.03	-0.00
BET-MW2s	10/19/2012	13:03	13.27	92.48	0.00	0.00
BET-MW2s	12/7/2012	11:04	13.27	92.48	0.00	0.00
BET-MW2s	12/28/2012	14:09	13.78	91.97	0.00	0.00
BET-MW2d	1/29/2012	10:04	11.10	94.35		
BET-MW2d	2/8/2012	13:15	11.08	94.37		
BET-MW2d	3/5/2012	14:16	11.59	93.86		
BET-MW2d	4/5/2012	12:55	11.13	94.32		
BET-MW2d	5/10/2012	13:26	13.49	91.96		
BET-MW2d	6/18/2012	13:55	14.55	90.90		
BET-MW2d	7/11/2012	9:17	13.54	91.91		
BET-MW2d	8/14/2012	10:46	12.23	93.22		
BET-MW2d	9/18/2012	8:52	13.07	92.38		
BET-MW2d	10/19/2012	13:03	12.97	92.48		
BET-MW2d	12/7/2012	11:04	12.97	92.48		
BET-MW2d	12/28/2012	14:10	13.48	91.97		
BET-MW3s	1/29/2012	10:06	10.10	94.44	0.01	0.00
BET-MW3s	2/8/2012	13:24	10.07	94.47	0.02	0.00

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
BET-MW3s	3/5/2012	14:19	10.70	93.84	-0.01	-0.00
BET-MW3s	4/5/2012	12:58	10.22	94.32	0.02	0.00
BET-MW3s	5/10/2012	13:40	12.34	92.20	0.03	0.00
BET-MW3s	6/18/2012	13:53	13.35	91.19	0.02	0.00
BET-MW3s	7/11/2012	9:15	12.20	92.34	-0.01	-0.00
BET-MW3s	8/14/2012	10:50	10.90	93.64	-0.01	-0.00
BET-MW3s	9/18/2012	8:50	11.31	93.23	-0.03	-0.00
BET-MW3s	10/19/2012	13:06	11.73	92.81	0.01	0.00
BET-MW3s	12/7/2012	11:00	11.73	92.81	0.01	0.00
BET-MW3s	12/28/2012	14:06	12.52	92.02	0.00	0.00
BET-MW3d	1/29/2012	10:06	9.92	94.43		
BET-MW3d	2/8/2012	13:25	9.90	94.45		
BET-MW3d	3/5/2012	14:20	10.50	93.85		
BET-MW3d	4/5/2012	13:00	10.05	94.30		
BET-MW3d	5/10/2012	13:42	12.18	92.17		
BET-MW3d	6/18/2012	13:52	13.18	91.17		
BET-MW3d	7/11/2012	9:15	12.00	92.35		
BET-MW3d	8/14/2012	10:52	10.70	93.65		
BET-MW3d	9/18/2012	8:50	11.09	93.26		
BET-MW3d	10/19/2012	13:06	11.55	92.80		
BET-MW3d	12/7/2012	11:00	11.55	92.80		
BET-MW3d	12/28/2012	14:07	12.33	92.02		
BET-MW4s	1/29/2012	9:50	9.19	94.39	-0.28	-0.02
BET-MW4s	2/8/2012	13:46	8.58	95.00	-0.20	-0.01
BET-MW4s	3/5/2012	14:22	10.19	93.39	0.01	0.00
BET-MW4s	4/5/2012	13:10	8.52	95.06	1.53	0.08
BET-MW4s	5/10/2012	12:45	14.15	89.43	1.17	0.06
BET-MW4s	6/18/2012	14:06	13.70	89.88	1.30	0.07
BET-MW4s	7/11/2012	9:26	14.77	88.81	1.06	0.06
BET-MW4s	8/14/2012	10:40	13.26	90.32	1.13	0.06
BET-MW4s	9/18/2012	9:00	13.37	90.21	1.00	0.06
BET-MW4s	10/19/2012	12:50	11.50	92.08	-0.19	-0.01
BET-MW4s	12/7/2012	10:57	11.50	92.08	-0.19	-0.01
BET-MW4s	12/28/2012	14:22	9.88	93.70	-0.09	-0.00
BET-MW4d	1/29/2012	9:51	8.31	94.67		
BET-MW4d	2/8/2012	13:47	7.78	95.20		
BET-MW4d	3/5/2012	14:23	9.60	93.38		
BET-MW4d	4/5/2012	13:11	9.45	93.53		
BET-MW4d	5/10/2012	12:45	14.72	88.26		
BET-MW4d	6/18/2012	14:05	14.40	88.58		
BET-MW4d	7/11/2012	9:26	15.23	87.75		
BET-MW4d	8/14/2012	10:40	13.79	89.19		
BET-MW4d	9/18/2012	9:00	13.77	89.21		
BET-MW4d	10/19/2012	12:50	10.71	92.27		
BET-MW4d	12/7/2012	10:57	10.71	92.27		
BET-MW4d	12/28/2012	14:23	9.19	93.79		
BET-MW5s	1/29/2012	10:08	10.62	99.47	0.00	0.00
BET-MW5s	2/9/2012	11:25	11.00	99.09	0.02	0.00
BET-MW5s	3/5/2012	14:26	10.16	99.93	0.00	0.00
BET-MW5s	4/5/2012	13:15	11.59	98.50	-0.01	-0.00
BET-MW5s	5/10/2012	15:00	11.83	98.26	0.00	0.00
BET-MW5s	6/18/2012	14:16	10.83	99.26	0.00	0.00
BET-MW5s	7/11/2012	9:30	9.07	101.02	0.01	0.00
BET-MW5s	8/14/2012	10:36	8.28	101.81	0.02	0.00
BET-MW5s	9/18/2012	9:05	9.38	100.71	0.00	0.00
BET-MW5s	10/19/2012	13:13	9.67	100.42	0.00	0.00
BET-MW5s	12/7/2012	10:54	9.67	100.42	0.00	0.00
BET-MW5s	12/28/2012	14:26	12.43	97.66	0.00	0.00
BET-MW5d	1/29/2012	10:09	10.42	99.47		
BET-MW5d	2/9/2012	11:26	10.82	99.07		
BET-MW5d	3/5/2012	14:27	9.96	99.93		
BET-MW5d	4/5/2012	13:16	11.38	98.51		
BET-MW5d	5/10/2012	15:01	11.63	98.26		
BET-MW5d	6/18/2012	14:16	10.63	99.26		
BET-MW5d	7/11/2012	9:30	8.88	101.01		
BET-MW5d	8/14/2012	10:36	8.10	101.79		
BET-MW5d	9/18/2012	9:05	9.18	100.71		
BET-MW5d	10/19/2012	13:13	9.47	100.42		
BET-MW5d	12/7/2012	10:54	9.47	100.42		
BET-MW5d	12/28/2012	14:28	12.23	97.66		
BET-MW6s	1/29/2012	10:11	11.10	98.60	0.00	0.00
BET-MW6s	2/9/2012	10:56	11.46	98.24	0.00	0.00
BET-MW6s	3/5/2012	14:31	10.23	99.47	0.00	0.00
BET-MW6s	4/5/2012	13:20	12.10	97.60	0.00	0.00
BET-MW6s	5/10/2012	14:42	12.20	97.50	-0.01	-0.00
BET-MW6s	6/18/2012	14:19	10.82	98.88	0.01	0.00
BET-MW6s	7/11/2012	9:34	8.57	101.13	0.00	0.00
BET-MW6s	8/14/2012	10:26	7.45	102.25	0.01	0.00
BET-MW6s	9/18/2012	9:08	9.62	100.08	-0.01	-0.00
BET-MW6s	10/19/2012	13:22	10.09	99.61	0.01	0.00
BET-MW6s	12/7/2012	10:50	10.09	99.61	0.01	0.00
BET-MW6s	12/28/2012	14:32	13.35	96.35	0.00	0.00
BET-MW6d	1/29/2012	10:11	10.87	98.60		
BET-MW6d	2/9/2012	10:57	11.23	98.24		
BET-MW6d	3/5/2012	14:33	10.00	99.47		
BET-MW6d	4/5/2012	13:22	11.87	97.60		
BET-MW6d	5/10/2012	14:44	11.96	97.51		
BET-MW6d	6/18/2012	14:18	10.60	98.87		
BET-MW6d	7/11/2012	9:34	8.34	101.13		
BET-MW6d	8/14/2012	10:27	7.23	102.24		
BET-MW6d	9/18/2012	9:08	9.38	100.09		
BET-MW6d	10/19/2012	13:22	9.87	99.60		
BET-MW6d	12/7/2012	10:50	9.87	99.60		
BET-MW6d	12/28/2012	14:33	13.12	96.35		
BET-MW7s	1/29/2012	10:14	11.96	99.75	-0.05	-0.00
BET-MW7s	2/9/2012	14:16	12.20	99.51	0.01	0.00
BET-MW7s	3/5/2012	14:36	11.34	100.37	0.00	0.00
BET-MW7s	4/5/2012	13:28	12.82	98.89	-0.57	-0.03
BET-MW7s	5/10/2012	14:00	12.95	98.76	0.03	0.00
BET-MW7s	6/18/2012	14:24	11.33	100.38	0.03	0.00
BET-MW7s	7/11/2012	9:40	11.28	100.43	0.06	0.00
BET-MW7s	8/14/2012	10:30	8.29	103.42	-0.01	-0.00
BET-MW7s	9/18/2012	9:14	9.77	101.94	0.09	0.00
BET-MW7s	10/19/2012	13:18	10.61	101.10	-0.03	-0.00
BET-MW7s	12/7/2012	10:47	10.61	101.10	-0.03	-0.00
BET-MW7s	12/28/2012	14:37	13.65	98.06	0.00	0.00
BET-MW7d	1/29/2012	10:15	11.70	99.80		
BET-MW7d	2/9/2012	14:17	12.00	99.50		
BET-MW7d	3/5/2012	14:38	11.13	100.37		
BET-MW7d	4/5/2012	13:30	12.04	99.46		
BET-MW7d	5/10/2012	14:01	12.77	98.73		
BET-MW7d	6/18/2012	14:23	11.15	100.35		
BET-MW7d	7/11/2012	9:40	11.13	100.37		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
BET-MW7d	8/14/2012	10:31	8.07	103.43		
BET-MW7d	9/18/2012	9:14	9.65	101.85		
BET-MW7d	10/19/2012	13:18	10.37	101.13		
BET-MW7d	12/7/2012	10:47	10.37	101.13		
BET-MW7d	12/28/2012	14:38	13.44	98.06		
BET-MW8s	1/29/2012	10:17	12.39	98.83	0.06	0.00
BET-MW8s	2/9/2012	12:09	12.72	98.50	0.10	0.00
BET-MW8s	3/5/2012	14:40	11.73	99.49	0.07	0.00
BET-MW8s	4/5/2012	13:33	13.49	97.73	0.06	0.00
BET-MW8s	5/10/2012	14:22	13.93	97.29	0.04	0.00
BET-MW8s	6/18/2012	14:28	10.47	100.75	0.11	0.01
BET-MW8s	7/11/2012	9:37	9.50	101.72	0.10	0.00
BET-MW8s	8/14/2012	10:24	7.94	103.28	0.11	0.01
BET-MW8s	9/18/2012	9:11	10.52	100.70	0.06	0.00
BET-MW8s	10/19/2012	13:27	11.30	99.92	0.04	0.00
BET-MW8s	12/7/2012	10:43	11.30	99.92	0.04	0.00
BET-MW8s	12/28/2012	14:42	14.64	96.58	0.04	0.00
BET-MW8d	1/29/2012	10:17	12.20	98.77		
BET-MW8d	2/9/2012	12:10	12.57	98.40		
BET-MW8d	3/5/2012	14:41	11.55	99.42		
BET-MW8d	4/5/2012	13:35	13.30	97.67		
BET-MW8d	5/10/2012	14:22	13.72	97.25		
BET-MW8d	6/18/2012	14:27	10.33	100.64		
BET-MW8d	7/11/2012	9:37	9.35	101.62		
BET-MW8d	8/14/2012	10:24	7.80	103.17		
BET-MW8d	9/18/2012	9:11	10.33	100.64		
BET-MW8d	10/19/2012	13:27	11.09	99.88		
BET-MW8d	12/7/2012	10:43	11.09	99.88		
BET-MW8d	12/28/2012	14:43	14.43	96.54		
FG1-MW1s	1/30/2012	12:25	16.44	60.61	0.00	0.00
FG1-MW1s	2/12/2012	12:00	16.62	60.43	-0.02	-0.00
FG1-MW1s	3/5/2012	12:56	16.31	60.74	0.01	0.00
FG1-MW1s	4/5/2012	15:40	Dry			
FG1-MW1s	5/14/2012	11:35	15.58	61.47	0.00	0.00
FG1-MW1s	6/18/2012	12:38	16.20	60.85	-0.01	-0.00
FG1-MW1s	7/9/2012	14:15	16.30	60.75	-0.02	-0.00
FG1-MW1s	8/15/2012	16:22	16.37	60.68	0.01	0.00
FG1-MW1s	9/17/2012	13:14	16.53	60.52	0.00	0.00
FG1-MW1s	10/20/2012	10:49	15.28	61.77	2.00	0.15
FG1-MW1s	12/11/2012	13:31	17.03	60.02	0.00	0.00
FG1-MW1s	12/28/2012	11:49	16.88	60.17	-0.03	-0.00
FG1-MW1d	1/30/2012	12:27	16.14	60.61		
FG1-MW1d	2/12/2012	12:01	16.30	60.45		
FG1-MW1d	3/5/2012	12:55	16.02	60.73		
FG1-MW1d	4/5/2012	15:42	16.52	60.23		
FG1-MW1d	5/14/2012	11:36	15.28	61.47		
FG1-MW1d	6/18/2012	12:37	15.89	60.86		
FG1-MW1d	7/9/2012	14:15	15.98	60.77		
FG1-MW1d	8/15/2012	16:22	16.08	60.67		
FG1-MW1d	9/17/2012	13:14	16.23	60.52		
FG1-MW1d	10/20/2012	10:49	16.98	59.77		
FG1-MW1d	12/11/2012	13:31	16.73	60.02		
FG1-MW1d	12/28/2012	11:50	16.55	60.20		
FG1-MW2s	1/30/2012	12:37	Dry			
FG1-MW2s	2/12/2012	12:25	Dry			
FG1-MW2s	3/5/2012	13:01	Dry			
FG1-MW2s	4/5/2012	15:30	Dry			
FG1-MW2s	5/14/2012	12:03	Dry			
FG1-MW2s	6/18/2012	12:42	Dry			
FG1-MW2s	7/9/2012	14:21	Dry			
FG1-MW2s	8/15/2012	16:25	Dry			
FG1-MW2s	9/17/2012	13:20	Dry			
FG1-MW2s	10/20/2012	10:54	Dry			
FG1-MW2s	12/11/2012	13:26	Dry			
FG1-MW2s	12/28/2012	11:56	Dry			
FG1-MW2d	1/30/2012	12:40	20.04	59.95		
FG1-MW2d	2/12/2012	12:26	20.18	59.81		
FG1-MW2d	3/5/2012	13:00	19.81	60.18		
FG1-MW2d	4/5/2012	15:33	20.21	59.78		
FG1-MW2d	5/14/2012	12:04	17.89	62.10		
FG1-MW2d	6/18/2012	12:41	19.85	60.14		
FG1-MW2d	7/9/2012	14:20	19.38	60.61		
FG1-MW2d	8/15/2012	16:25	19.47	60.52		
FG1-MW2d	9/17/2012	13:20	19.80	60.19		
FG1-MW2d	10/20/2012	10:54	19.02	60.97		
FG1-MW2d	12/11/2012	13:26	20.03	59.96		
FG1-MW2d	12/28/2012	11:57	19.72	60.27		
FG1-MW3s	1/30/2012	12:31	17.55	60.78	0.61	0.05
FG1-MW3s	2/12/2012	12:46	Dry			
FG1-MW3s	3/5/2012	12:58	17.50	60.83	0.49	0.04
FG1-MW3s	4/5/2012	15:35	Dry			
FG1-MW3s	5/14/2012	11:50	16.53	61.80	0.01	0.00
FG1-MW3s	6/18/2012	12:40	Dry			
FG1-MW3s	7/9/2012	14:18	Dry			
FG1-MW3s	8/15/2012	16:29	Dry			
FG1-MW3s	9/17/2012	13:17	Dry			
FG1-MW3s	10/20/2012	10:52	Dry			
FG1-MW3s	12/11/2012	13:29	Dry			
FG1-MW3s	12/28/2012	11:53	17.54	60.79	0.62	0.05
FG1-MW3d	1/30/2012	12:33	17.90	60.17		
FG1-MW3d	2/12/2012	12:47	18.08	59.99		
FG1-MW3d	3/5/2012	12:57	17.73	60.34		
FG1-MW3d	4/5/2012	15:37	18.15	59.92		
FG1-MW3d	5/14/2012	11:51	16.28	61.79		
FG1-MW3d	6/18/2012	12:39	17.33	60.74		
FG1-MW3d	7/9/2012	14:18	17.48	60.59		
FG1-MW3d	8/15/2012	16:29	17.62	60.45		
FG1-MW3d	9/17/2012	13:17	17.78	60.29		
FG1-MW3d	10/20/2012	10:52	17.27	60.80		
FG1-MW3d	12/11/2012	13:29	18.17	59.90		
FG1-MW3d	12/28/2012	11:54	17.90	60.17		
FG1-MW4s	1/30/2012	12:45	16.45	60.27	0.00	0.00
FG1-MW4s	2/12/2012	13:10	15.58	61.14	0.99	0.06
FG1-MW4s	3/5/2012	12:51	16.13	60.59	-0.04	-0.00
FG1-MW4s	4/5/2012	15:24	16.59	60.13	0.00	0.00
FG1-MW4s	5/14/2012	12:20	14.93	61.79	-0.01	-0.00
FG1-MW4s	6/18/2012	12:46	14.35	62.37	-0.01	-0.00
FG1-MW4s	7/9/2012	14:23	11.88	64.84	-0.23	-0.01
FG1-MW4s	8/15/2012	16:20	11.75	64.97	-0.11	-0.01
FG1-MW4s	9/17/2012	13:23	16.44	60.28	-0.02	-0.00
FG1-MW4s	10/20/2012	10:57	14.25	62.47	1.99	0.11
FG1-MW4s	12/11/2012	13:22	16.47	60.25	0.00	0.00
FG1-MW4s	12/28/2012	12:15	16.28	60.44	-0.01	-0.00

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
FG1-MW4d	1/30/2012	12:47	16.11	60.27		
FG1-MW4d	2/12/2012	13:11	16.23	60.15		
FG1-MW4d	3/5/2012	12:49	15.75	60.63		
FG1-MW4d	4/5/2012	15:25	16.25	60.13		
FG1-MW4d	5/14/2012	12:22	14.58	61.80		
FG1-MW4d	6/18/2012	12:45	14.00	62.38		
FG1-MW4d	7/9/2012	14:23	11.31	65.07		
FG1-MW4d	8/15/2012	16:20	11.30	65.08		
FG1-MW4d	9/17/2012	13:23	16.08	60.30		
FG1-MW4d	10/20/2012	10:57	15.90	60.48		
FG1-MW4d	12/11/2012	13:22	16.13	60.25		
FG1-MW4d	12/28/2012	12:16	15.93	60.45		
FG1-MW5s	1/30/2012	13:13	16.05	59.77	-0.01	-0.00
FG1-MW5s	2/12/2012	14:00	16.22	59.60	0.00	0.00
FG1-MW5s	3/5/2012	13:13	16.10	59.72	0.02	0.00
FG1-MW5s	4/5/2012	15:20	16.22	59.60	-0.01	-0.00
FG1-MW5s	5/14/2012	13:03	14.43	61.39	-0.01	-0.00
FG1-MW5s	6/18/2012	12:59	16.35	59.47	-0.01	-0.00
FG1-MW5s	7/9/2012	14:38	16.67	59.15	0.02	0.00
FG1-MW5s	8/15/2012	16:10	16.92	58.90	-0.03	-0.00
FG1-MW5s	9/17/2012	13:40	16.70	59.12	0.02	0.00
FG1-MW5s	10/20/2012	11:11	14.83	60.99	0.01	0.00
FG1-MW5s	12/11/2012	12:51	15.85	59.97	0.00	0.00
FG1-MW5s	12/28/2012	12:00	14.05	61.77	0.01	0.00
FG1-MW5d	1/30/2012	13:15	15.85	59.78		
FG1-MW5d	2/12/2012	14:01	16.03	59.60		
FG1-MW5d	3/5/2012	13:12	15.93	59.70		
FG1-MW5d	4/5/2012	15:21	16.02	59.61		
FG1-MW5d	5/14/2012	13:03	14.23	61.40		
FG1-MW5d	6/18/2012	12:58	16.15	59.48		
FG1-MW5d	7/9/2012	14:38	16.50	59.13		
FG1-MW5d	8/15/2012	16:10	16.70	58.93		
FG1-MW5d	9/17/2012	13:40	16.53	59.10		
FG1-MW5d	10/20/2012	11:11	14.65	60.98		
FG1-MW5d	12/11/2012	12:51	15.66	59.97		
FG1-MW5d	12/28/2012	12:01	13.87	61.76		
FG1-MW6s	1/30/2012	13:23	19.52	60.55	0.00	0.00
FG1-MW6s	2/12/2012	13:43	19.32	60.75	-0.01	-0.00
FG1-MW6s	3/5/2012	13:09	19.00	61.07	-0.01	-0.00
FG1-MW6s	4/5/2012	15:15	19.57	60.50	-0.02	-0.00
FG1-MW6s	5/14/2012	12:47	17.88	62.19	0.01	0.00
FG1-MW6s	6/18/2012	12:53	18.76	61.31	-0.02	-0.00
FG1-MW6s	7/9/2012	14:35	16.18	63.89	0.03	0.00
FG1-MW6s	8/15/2012	16:13	13.97	66.10	0.08	0.00
FG1-MW6s	9/17/2012	13:36	19.74	60.33	-0.01	-0.00
FG1-MW6s	10/20/2012	11:09	18.16	61.91	-0.01	-0.00
FG1-MW6s	12/11/2012	12:54	19.48	60.59	0.00	0.00
FG1-MW6s	12/28/2012	12:05	19.25	60.82	0.02	0.00
FG1-MW6d	1/30/2012	13:25	19.31	60.55		
FG1-MW6d	2/12/2012	13:44	19.10	60.76		
FG1-MW6d	3/5/2012	13:08	18.78	61.08		
FG1-MW6d	4/5/2012	15:17	19.34	60.52		
FG1-MW6d	5/14/2012	12:47	17.68	62.18		
FG1-MW6d	6/18/2012	12:52	18.53	61.33		
FG1-MW6d	7/9/2012	14:34	16.00	63.86		
FG1-MW6d	8/15/2012	16:13	13.84	66.02		
FG1-MW6d	9/17/2012	13:36	19.52	60.34		
FG1-MW6d	10/20/2012	11:09	17.94	61.92		
FG1-MW6d	12/11/2012	12:54	19.27	60.59		
FG1-MW6d	12/28/2012	12:06	19.06	60.80		
FG1-MW7s	1/30/2012	12:55	18.69	60.95	0.00	0.00
FG1-MW7s	2/12/2012	13:23	18.82	60.82	0.01	0.00
FG1-MW7s	3/5/2012	13:06	17.42	62.22	-0.02	-0.00
FG1-MW7s	4/5/2012	15:10	18.70	60.94	0.03	0.00
FG1-MW7s	5/14/2012	12:33	17.49	62.15	-0.01	-0.00
FG1-MW7s	6/18/2012	12:50	17.65	61.99	-0.02	-0.00
FG1-MW7s	7/9/2012	14:27	15.11	64.53	0.07	0.00
FG1-MW7s	8/15/2012	16:16	13.83	65.81	0.08	0.00
FG1-MW7s	9/17/2012	13:27	18.52	61.12	0.01	0.00
FG1-MW7s	10/20/2012	11:02	17.23	62.41	0.05	0.00
FG1-MW7s	12/11/2012	13:00	18.83	60.81	-0.01	-0.00
FG1-MW7s	12/28/2012	12:11	18.67	60.97	0.00	0.00
FG1-MW7d	1/30/2012	12:57	18.41	60.95		
FG1-MW7d	2/12/2012	13:24	18.55	60.81		
FG1-MW7d	3/5/2012	13:05	17.12	62.24		
FG1-MW7d	4/5/2012	15:11	18.45	60.91		
FG1-MW7d	5/14/2012	12:34	17.20	62.16		
FG1-MW7d	6/18/2012	12:49	17.35	62.01		
FG1-MW7d	7/9/2012	14:26	14.90	64.46		
FG1-MW7d	8/15/2012	16:17	13.63	65.73		
FG1-MW7d	9/17/2012	13:27	18.25	61.11		
FG1-MW7d	10/20/2012	11:02	17.00	62.36		
FG1-MW7d	12/11/2012	13:00	18.54	60.82		
FG1-MW7d	12/28/2012	12:12	18.39	60.97		
FG1-MW8s	1/30/2012	13:05	18.29	60.53	0.00	0.00
FG1-MW8s	2/12/2012	14:36	18.45	60.37	0.02	0.00
FG1-MW8s	3/5/2012	13:20	17.80	61.02	0.00	0.00
FG1-MW8s	4/5/2012	15:05	18.30	60.52	0.00	0.00
FG1-MW8s	5/14/2012	13:21	16.28	62.54	0.01	0.00
FG1-MW8s	6/18/2012	13:02	18.48	60.34	0.01	0.00
FG1-MW8s	7/9/2012	14:30	18.77	60.05	0.00	0.00
FG1-MW8s	8/15/2012	16:05	18.50	60.32	-0.01	-0.00
FG1-MW8s	9/17/2012	13:30	18.83	59.99	0.02	0.00
FG1-MW8s	10/20/2012	11:06	16.70	62.12	-0.01	-0.00
FG1-MW8s	12/11/2012	12:57	18.01	60.81	0.02	0.00
FG1-MW8s	12/28/2012	12:16	17.02	61.80	-0.01	-0.00
FG1-MW8d	1/30/2012	13:08	18.02	60.53		
FG1-MW8d	2/12/2012	14:37	18.20	60.35		
FG1-MW8d	3/5/2012	13:19	17.53	61.02		
FG1-MW8d	4/5/2012	15:07	18.03	60.52		
FG1-MW8d	5/14/2012	13:21	16.02	62.53		
FG1-MW8d	6/18/2012	13:01	18.22	60.33		
FG1-MW8d	7/9/2012	14:30	18.50	60.05		
FG1-MW8d	8/15/2012	16:06	18.22	60.33		
FG1-MW8d	9/17/2012	13:30	18.58	59.97		
FG1-MW8d	10/20/2012	11:06	16.42	62.13		
FG1-MW8d	12/11/2012	12:57	17.76	60.79		
FG1-MW8d	12/28/2012	12:17	16.74	61.81		
FG1-MW9s	1/30/2012	13:36	16.95	61.58	0.27	0.02
FG1-MW9s	2/12/2012	14:50	17.21	61.32	0.21	0.01
FG1-MW9s	3/5/2012	13:28	14.91	63.62	1.13	0.06
FG1-MW9s	4/5/2012	15:00	17.19	61.34	0.22	0.01

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
FG1-MW9s	5/14/2012	11:14	14.68	63.85	0.93	0.05
FG1-MW9s	6/18/2012	12:34	16.28	62.25	0.81	0.05
FG1-MW9s	7/9/2012	14:12	15.82	62.71	1.33	0.07
FG1-MW9s	8/15/2012	16:00	15.88	62.65	1.19	0.07
FG1-MW9s	9/17/2012	13:10	17.38	61.15	0.34	0.02
FG1-MW9s	10/20/2012	10:45	15.78	62.75	0.44	0.02
FG1-MW9s	12/11/2012	12:45	17.29	61.24	0.11	0.01
FG1-MW9s	12/28/2012	12:20	16.63	61.90	-0.12	-0.01
FG1-MW9d	1/30/2012	13:38	17.08	61.31		
FG1-MW9d	2/12/2012	14:51	17.28	61.11		
FG1-MW9d	3/5/2012	13:27	15.90	62.49		
FG1-MW9d	4/5/2012	15:02	17.27	61.12		
FG1-MW9d	5/14/2012	11:15	15.47	62.92		
FG1-MW9d	6/18/2012	12:33	16.95	61.44		
FG1-MW9d	7/9/2012	14:11	17.01	61.38		
FG1-MW9d	8/15/2012	16:01	16.93	61.46		
FG1-MW9d	9/17/2012	13:10	17.58	60.81		
FG1-MW9d	10/20/2012	10:45	16.08	62.31		
FG1-MW9d	12/11/2012	12:45	17.26	61.13		
FG1-MW9d	12/28/2012	12:21	16.37	62.02		
BEA-MW1s	1/30/2012	13:00	21.85	77.85	-0.08	-0.01
BEA-MW1s	2/13/2012	10:37	21.86	77.84	0.11	0.01
BEA-MW1s	3/5/2012	11:30	21.91	77.79	0.15	0.01
BEA-MW1s	4/9/2012	11:34	22.21	77.49	0.23	0.01
BEA-MW1s	5/14/2012	14:50	24.03	75.67	0.30	0.02
BEA-MW1s	6/21/2012	18:20	Dry			
BEA-MW1s	7/11/2012	10:35	Dry			
BEA-MW1s	8/16/2012	12:38	Dry			
BEA-MW1s	9/20/2012	12:33	Dry			
BEA-MW1s	10/20/2012	11:49	Dry			
BEA-MW1s	12/9/2012	15:48	Dry			
BEA-MW1s	12/31/2012	13:30	Q/M			
BEA-MW1d	1/30/2012	13:02	21.53	77.93		
BEA-MW1d	2/13/2012	10:38	21.73	77.73		
BEA-MW1d	3/5/2012	11:32	21.82	77.64		
BEA-MW1d	4/9/2012	11:33	22.20	77.26		
BEA-MW1d	5/14/2012	14:51	24.09	75.37		
BEA-MW1d	6/21/2012	18:21	29.87	69.59		
BEA-MW1d	7/11/2012	10:35	31.86	67.60		
BEA-MW1d	8/16/2012	12:38	34.58	64.88		
BEA-MW1d	9/20/2012	12:33	34.77	64.69		
BEA-MW1d	10/20/2012	11:49	34.68	64.78		
BEA-MW1d	12/9/2012	15:48	34.25	65.21		
BEA-MW1d	12/31/2012	13:31	32.88	66.58		
BEA-MW2s	1/30/2012	13:08	19.59	79.53	0.27	0.02
BEA-MW2s	2/13/2012	9:30	20.04	79.08	0.34	0.02
BEA-MW2s	3/5/2012	11:34	20.55	78.57	0.57	0.04
BEA-MW2s	4/9/2012	11:16	20.19	78.93	1.61	0.10
BEA-MW2s	5/14/2012	13:58	23.03	76.09	0.82	0.05
BEA-MW2s	6/21/2012	18:14	Dry			
BEA-MW2s	7/11/2012	10:22	Dry			
BEA-MW2s	8/16/2012	12:50	Dry			
BEA-MW2s	9/20/2012	12:48	Dry			
BEA-MW2s	10/20/2012	11:35	Dry			
BEA-MW2s	12/9/2012	15:58	Dry			
BEA-MW2s	12/31/2012	13:15	Dry			
BEA-MW2d	1/30/2012	13:08	19.64	79.26		
BEA-MW2d	2/13/2012	9:31	20.16	78.74		
BEA-MW2d	3/5/2012	11:35	20.90	78.00		
BEA-MW2d	4/9/2012	11:15	21.58	77.32		
BEA-MW2d	5/14/2012	13:59	23.63	75.27		
BEA-MW2d	6/21/2012	18:15	29.40	69.50		
BEA-MW2d	7/11/2012	10:22	31.52	67.38		
BEA-MW2d	8/16/2012	12:51	31.49	67.41		
BEA-MW2d	9/20/2012	12:48	30.69	68.21		
BEA-MW2d	10/20/2012	11:35	30.05	68.85		
BEA-MW2d	12/9/2012	15:58	29.00	69.90		
BEA-MW2d	12/31/2012	13:16	28.15	70.75		
BEA-MW3s	1/30/2012	13:14	17.30	77.93	0.22	0.01
BEA-MW3s	2/13/2012	10:19	17.92	77.31	-0.06	-0.00
BEA-MW3s	3/5/2012	11:37	18.55	76.68	0.04	0.00
BEA-MW3s	4/9/2012	11:30	19.02	76.21	0.08	0.01
BEA-MW3s	5/14/2012	14:35	21.48	73.75	0.13	0.01
BEA-MW3s	6/21/2012	18:08	Dry			
BEA-MW3s	7/11/2012	10:31	Q/M			
BEA-MW3s	8/16/2012	12:41	Dry			
BEA-MW3s	9/20/2012	12:39	Dry			
BEA-MW3s	10/20/2012	11:43	Dry			
BEA-MW3s	12/9/2012	15:55	Dry			
BEA-MW3s	12/31/2012	13:40	Dry			
BEA-MW3d	1/30/2012	13:15	17.43	77.71		
BEA-MW3d	2/13/2012	10:20	17.77	77.37		
BEA-MW3d	3/5/2012	11:39	18.50	76.64		
BEA-MW3d	4/9/2012	11:29	19.01	76.13		
BEA-MW3d	5/14/2012	14:36	21.52	73.62		
BEA-MW3d	6/21/2012	18:10	26.96	68.18		
BEA-MW3d	7/11/2012	10:31	29.63	65.51		
BEA-MW3d	8/16/2012	12:41	33.03	62.11		
BEA-MW3d	9/20/2012	12:39	33.00	62.14		
BEA-MW3d	10/20/2012	11:43	32.82	62.32		
BEA-MW3d	12/9/2012	15:55	31.49	63.65		
BEA-MW3d	12/31/2012	13:41	29.57	65.57		
BEA-MW4s	1/30/2012	13:28	20.73	78.74	-0.01	-0.00
BEA-MW4s	2/13/2012	9:56	21.96	77.51	-0.05	-0.00
BEA-MW4s	3/5/2012	11:41	26.58	72.89	0.12	0.01
BEA-MW4s	4/9/2012	11:26	25.60	73.87	-0.07	-0.00
BEA-MW4s	5/14/2012	14:12	28.63	70.84	-0.11	-0.01
BEA-MW4s	6/21/2012	18:05	32.02	67.45	-0.12	-0.01
BEA-MW4s	7/11/2012	10:27	35.22	64.25	0.17	0.01
BEA-MW4s	8/16/2012	12:47	37.65	61.82	0.09	0.00
BEA-MW4s	9/20/2012	12:43	36.66	62.81	0.11	0.01
BEA-MW4s	10/20/2012	11:39	35.77	63.70	0.16	0.01
BEA-MW4s	12/9/2012	15:51	32.22	67.25	0.00	0.00
BEA-MW4s	12/31/2012	13:36	30.88	68.59	0.00	0.00
BEA-MW4d	1/30/2012	13:30	20.55	78.75		
BEA-MW4d	2/13/2012	9:57	21.74	77.56		
BEA-MW4d	3/5/2012	11:43	26.53	72.77		
BEA-MW4d	4/9/2012	11:25	25.36	73.94		
BEA-MW4d	5/14/2012	14:14	28.35	70.95		
BEA-MW4d	6/21/2012	18:06	31.73	67.57		
BEA-MW4d	7/11/2012	10:27	35.22	64.08		
BEA-MW4d	8/16/2012	12:47	37.57	61.73		
BEA-MW4d	9/20/2012	12:43	36.60	62.70		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
BEA-MW4d	10/20/2012	11:39	35.76	63.54		
BEA-MW4d	12/9/2012	15:51	32.05	67.25		
BEA-MW4d	12/31/2012	13:37	30.71	68.59		
COT-MW1	1/30/2012	10:40	30.35	83.64		
COT-MW1	2/16/2012	11:45	Dry			
COT-MW1	3/5/2012	11:55	30.49	83.50		
COT-MW1	4/9/2012	12:47	30.63	83.36		
COT-MW1	5/15/2012	11:45	Dry			
COT-MW1	6/21/2012	17:44	Dry			
COT-MW1	7/11/2012	10:47	Dry			
COT-MW1	8/16/2012	11:00	Dry			
COT-MW1	9/20/2012	13:04	29.81	84.18		
COT-MW1	10/20/2012	12:02	29.75	84.24		
COT-MW1	12/9/2012	10:02	31.43	84.18		
COT-MW1	12/31/2012	13:55	31.09	84.52		
COT-MW2	1/30/2012	10:41	24.61	90.76		
COT-MW2	2/16/2012	15:55	24.37	91.00		
COT-MW2	3/5/2012	11:57	24.32	91.05		
COT-MW2	4/9/2012	12:50	24.31	91.06		
COT-MW2	5/15/2012	11:52	25.00	90.37		
COT-MW2	6/21/2012	17:50	25.96	89.41		
COT-MW2	7/11/2012	11:32	27.15	88.22		
COT-MW2	8/16/2012	11:04	Dry			
COT-MW2	9/20/2012	13:38	28.90	86.47		
COT-MW2	10/20/2012	12:29	28.77	86.60		
COT-MW2	12/9/2012	10:09	31.21	85.89		
COT-MW2	12/31/2012	14:09	30.82	86.28		
COT-MW3	1/30/2012	10:43	17.39	95.39		
COT-MW3	2/16/2012	15:08	17.45	95.33		
COT-MW3	3/5/2012	12:00	17.36	95.42		
COT-MW3	4/9/2012	12:55	18.10	94.68		
COT-MW3	5/15/2012	12:14	18.79	93.99		
COT-MW3	6/21/2012	17:38	18.08	94.70		
COT-MW3	7/11/2012	11:37	19.55	93.23		
COT-MW3	8/16/2012	11:08	19.05	93.73		
COT-MW3	9/20/2012	13:41	19.00	93.78		
COT-MW3	10/20/2012	12:35	20.10	92.68		
COT-MW3	12/9/2012	9:35	22.63	92.24		
COT-MW3	12/31/2012	14:23	22.35	92.52		
COT-MW4	1/30/2012	10:47	21.29	91.19		
COT-MW4	2/16/2012	15:34	21.42	91.06		
COT-MW4	3/5/2012	12:05	20.71	91.77		
COT-MW4	4/9/2012	12:42	21.12	91.36		
COT-MW4	5/15/2012	11:35	21.29	91.19		
COT-MW4	6/21/2012	17:10	21.64	90.84		
COT-MW4	7/11/2012	11:25	22.12	90.36		
COT-MW4	8/16/2012	11:40	23.00	89.48		
COT-MW4	9/20/2012	13:33	22.88	89.60		
COT-MW4	10/20/2012	12:27	22.65	89.83		
COT-MW4	12/9/2012	10:14	24.90	89.59		
COT-MW4	12/31/2012	14:05	24.71	89.78		
COT-MW5	1/30/2012	10:50	16.64	93.03		
COT-MW5	2/16/2012	14:41	17.00	92.67		
COT-MW5	3/5/2012	12:06	16.57	93.10		
COT-MW5	4/9/2012	12:37	16.70	92.97		
COT-MW5	5/15/2012	11:19	17.41	92.26		
COT-MW5	6/21/2012	17:07	16.77	92.90		
COT-MW5	7/11/2012	11:18	16.23	93.44		
COT-MW5	8/16/2012	11:33	15.50	94.17		
COT-MW5	9/20/2012	13:29	15.20	94.47		
COT-MW5	10/20/2012	12:24	15.21	94.46		
COT-MW5	12/9/2012	10:19	18.93	93.34		
COT-MW5	12/31/2012	14:20	18.74	93.53		
COT-MW6	1/30/2012	10:51	16.24	92.98		
COT-MW6	2/16/2012	14:16	16.53	92.69		
COT-MW6	3/5/2012	12:08	16.36	92.86		
COT-MW6	4/9/2012	12:35	16.73	92.49		
COT-MW6	5/15/2012	11:07	17.24	91.98		
COT-MW6	6/21/2012	17:05	17.20	92.02		
COT-MW6	7/11/2012	11:16	16.48	92.74		
COT-MW6	8/16/2012	11:30	16.16	93.06		
COT-MW6	9/20/2012	13:27	15.95	93.27		
COT-MW6	10/20/2012	12:21	15.18	94.04		
COT-MW6	12/9/2012	10:22	17.31	94.02		
COT-MW6	12/31/2012	14:15	17.06	94.27		
COT-MW7	1/30/2012	10:55	12.19	96.17		
COT-MW7	2/16/2012	12:41	11.80	96.56		
COT-MW7	3/5/2012	12:11	12.35	96.01		
COT-MW7	4/9/2012	13:03	11.98	96.38		
COT-MW7	5/15/2012	12:33	13.42	94.94		
COT-MW7	6/21/2012	16:57	21.26	87.10		
COT-MW7	7/11/2012	11:41	22.09	86.27		
COT-MW7	8/16/2012	11:22	19.69	88.67		
COT-MW7	9/20/2012	13:45	19.54	88.82		
COT-MW7	10/20/2012	12:40	9.75	98.61		
COT-MW7	12/9/2012	9:41	11.39	98.90		
COT-MW7	12/31/2012	14:34	11.30	98.99		
COT-MW8	1/30/2012	10:56	14.01	93.46		
COT-MW8	2/16/2012	13:43	14.87	92.60		
COT-MW8	3/5/2012	12:12	15.31	92.16		
COT-MW8	4/9/2012	13:08	15.34	92.13		
COT-MW8	5/15/2012	12:45	11.12	96.35		
COT-MW8	6/21/2012	16:54	11.97	95.50		
COT-MW8	7/11/2012	11:50	12.84	94.63		
COT-MW8	8/16/2012	11:19	9.20	98.27		
COT-MW8	9/20/2012	13:54	9.00	98.47		
COT-MW8	10/20/2012	12:58	9.11	98.36		
COT-MW8	12/9/2012	9:55	14.37	94.40		
COT-MW8	12/31/2012	14:47	14.64	94.13		
COT-MW9	1/30/2012	10:59	10.62	97.26		
COT-MW9	2/16/2012	12:11	8.56	99.32		
COT-MW9	3/5/2012	12:14	8.80	99.08		
COT-MW9	4/9/2012	13:15	12.23	95.65		
COT-MW9	5/15/2012	13:22	11.01	96.87		
COT-MW9	6/21/2012	17:00	13.05	94.83		
COT-MW9	7/11/2012	11:59	14.72	93.16		
COT-MW9	8/16/2012	11:11	13.06	94.82		
COT-MW9	9/20/2012	13:49	13.55	94.33		
COT-MW9	10/20/2012	12:46	13.72	94.16		
COT-MW9	12/9/2012	9:46	15.27	94.30		
COT-MW9	12/31/2012	14:30	14.75	94.82		
COT-MW10	1/30/2012	11:02	6.84	96.33		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
COT-MW10	2/16/2012	13:09	5.14	98.03		
COT-MW10	3/5/2012	12:18	5.44	97.73		
COT-MW10	4/9/2012	13:12	7.28	95.89		
COT-MW10	5/15/2012	13:00	7.32	95.85		
COT-MW10	6/21/2012	16:50	9.00	94.17		
COT-MW10	7/11/2012	11:55	11.04	92.13		
COT-MW10	8/16/2012	11:14	7.99	95.18		
COT-MW10	9/20/2012	13:52	9.11	94.06		
COT-MW10	10/20/2012	12:51	10.23	92.94		
COT-MW10	12/9/2012	9:50	10.15	94.65		
COT-MW10	12/31/2012	14:42	9.51	95.29		
COT-MW11s	1/30/2012	11:04	23.83	88.46	-0.02	-0.00
COT-MW11s	2/13/2012	13:25	24.12	88.17	0.04	0.00
COT-MW11s	3/5/2012	12:21	24.24	88.05	0.12	0.01
COT-MW11s	4/9/2012	12:01	25.66	86.63	0.10	0.01
COT-MW11s	5/15/2012	9:49	25.38	86.91	0.13	0.01
COT-MW11s	6/21/2012	17:22	24.75	87.54	0.12	0.01
COT-MW11s	7/11/2012	10:52	Dry			
COT-MW11s	8/16/2012	11:44	22.20	90.09	0.62	0.05
COT-MW11s	9/20/2012	13:09	21.13	91.16	0.22	0.02
COT-MW11s	10/20/2012	12:06	18.64	93.65	0.16	0.01
COT-MW11s	12/9/2012	10:41	19.14	93.15	0.21	0.02
COT-MW11s	12/31/2012	14:00	18.86	93.43	0.39	0.03
COT-MW11d	1/30/2012	11:07	23.60	88.48		
COT-MW11d	2/13/2012	13:26	23.95	88.13		
COT-MW11d	3/5/2012	12:25	24.15	87.93		
COT-MW11d	4/9/2012	12:00	25.55	86.53		
COT-MW11d	5/15/2012	9:50	25.30	86.78		
COT-MW11d	6/21/2012	17:22	24.66	87.42		
COT-MW11d	7/11/2012	10:51	23.48	88.60		
COT-MW11d	8/16/2012	11:44	22.61	89.47		
COT-MW11d	9/20/2012	13:09	21.14	90.94		
COT-MW11d	10/20/2012	12:06	18.59	93.49		
COT-MW11d	12/9/2012	10:41	19.14	92.94		
COT-MW11d	12/31/2012	14:01	19.04	93.04		
COT-MW12s	1/30/2012	11:14	24.10	88.55	-0.03	-0.00
COT-MW12s	2/13/2012	14:00	24.44	88.21	0.00	0.00
COT-MW12s	3/5/2012	12:27	25.09	87.56	-0.01	-0.00
COT-MW12s	4/9/2012	12:06	26.79	85.86	0.17	0.01
COT-MW12s	5/15/2012	10:06	26.27	86.38	-0.06	-0.00
COT-MW12s	6/21/2012	17:24	25.47	87.18	0.31	0.02
COT-MW12s	7/11/2012	10:54	24.87	87.78	0.28	0.01
COT-MW12s	8/16/2012	11:48	23.80	88.85	0.06	0.00
COT-MW12s	9/20/2012	13:12	20.13	92.52	0.17	0.01
COT-MW12s	10/20/2012	12:09	18.24	94.41	0.10	0.00
COT-MW12s	12/9/2012	10:37	19.06	93.59	0.00	0.00
COT-MW12s	12/31/2012	14:54	19.42	93.23	0.01	0.00
COT-MW12d	1/30/2012	11:15	23.89	88.58		
COT-MW12d	2/13/2012	14:01	24.26	88.21		
COT-MW12d	3/5/2012	12:30	24.90	87.57		
COT-MW12d	4/9/2012	12:05	26.78	85.69		
COT-MW12d	5/15/2012	10:07	26.03	86.44		
COT-MW12d	6/21/2012	17:25	25.60	86.87		
COT-MW12d	7/11/2012	10:54	24.97	87.50		
COT-MW12d	8/16/2012	11:48	23.68	88.79		
COT-MW12d	9/20/2012	13:12	20.12	92.35		
COT-MW12d	10/20/2012	12:09	18.16	94.31		
COT-MW12d	12/9/2012	10:37	18.88	93.59		
COT-MW12d	12/31/2012	14:55	19.25	93.22		
COT-MW13s	1/30/2012	11:17	25.33	89.70	0.45	0.02
COT-MW13s	2/13/2012	14:43	25.10	89.93	0.52	0.03
COT-MW13s	3/5/2012	12:33	26.15	88.88	0.45	0.02
COT-MW13s	4/9/2012	12:13	27.49	87.54	0.59	0.03
COT-MW13s	5/15/2012	10:30	27.63	87.40	0.39	0.02
COT-MW13s	6/21/2012	17:27	27.08	87.95	0.61	0.03
COT-MW13s	7/11/2012	10:57	25.72	89.31	0.54	0.03
COT-MW13s	8/16/2012	11:52	26.19	88.84	0.38	0.02
COT-MW13s	9/20/2012	13:17	24.08	90.95	0.38	0.02
COT-MW13s	10/20/2012	12:11	20.68	94.35	0.43	0.02
COT-MW13s	12/9/2012	10:33	21.04	93.99	0.46	0.02
COT-MW13s	12/31/2012	14:51	21.32	93.71	0.47	0.02
COT-MW13d	1/30/2012	11:19	25.19	89.25		
COT-MW13d	2/13/2012	14:44	25.03	89.41		
COT-MW13d	3/5/2012	12:39	26.01	88.43		
COT-MW13d	4/9/2012	12:12	27.49	86.95		
COT-MW13d	5/15/2012	10:32	27.43	87.01		
COT-MW13d	6/21/2012	17:28	27.10	87.34		
COT-MW13d	7/11/2012	10:57	25.67	88.77		
COT-MW13d	8/16/2012	11:52	25.98	88.46		
COT-MW13d	9/20/2012	13:17	23.87	90.57		
COT-MW13d	10/20/2012	12:11	20.52	93.92		
COT-MW13d	12/9/2012	10:33	20.91	93.53		
COT-MW13d	12/31/2012	14:52	21.20	93.24		
COT-MW14s	1/30/2012	11:24	25.30	90.25	-0.03	-0.00
COT-MW14s	2/13/2012	15:25	26.16	89.39	-1.02	-0.05
COT-MW14s	3/5/2012	12:41	25.94	89.61	-0.04	-0.00
COT-MW14s	4/9/2012	12:28	27.08	88.47	0.08	0.00
COT-MW14s	5/15/2012	10:49	27.47	88.08	-0.03	-0.00
COT-MW14s	6/21/2012	17:30	27.93	87.62	0.02	0.00
COT-MW14s	7/11/2012	11:11	27.25	88.30	-0.01	-0.00
COT-MW14s	8/16/2012	11:59	27.60	87.95	-0.04	-0.00
COT-MW14s	9/20/2012	13:21	25.39	90.16	0.07	0.00
COT-MW14s	10/20/2012	12:16	22.45	93.10	-0.04	-0.00
COT-MW14s	12/9/2012	10:28	22.29	93.26	-0.01	-0.00
COT-MW14s	12/31/2012	15:05	22.26	93.29	-0.02	-0.00
COT-MW14d	1/30/2012	11:28	24.98	90.28		
COT-MW14d	2/13/2012	15:26	24.85	90.41		
COT-MW14d	3/5/2012	12:45	25.61	89.65		
COT-MW14d	4/9/2012	12:27	26.87	88.39		
COT-MW14d	5/15/2012	10:50	27.15	88.11		
COT-MW14d	6/21/2012	17:30	27.66	87.60		
COT-MW14d	7/11/2012	11:11	26.95	88.31		
COT-MW14d	8/16/2012	11:59	27.27	87.99		
COT-MW14d	9/20/2012	13:21	25.17	90.09		
COT-MW14d	10/20/2012	12:16	22.12	93.14		
COT-MW14d	12/9/2012	10:28	21.99	93.27		
COT-MW14d	12/31/2012	15:06	21.95	93.31		
SAN-MW1s	1/30/2012	11:45	22.36	93.87	-0.06	-0.00
SAN-MW1s	2/13/2012	13:55	23.52	92.71	0.21	0.01
SAN-MW1s	3/5/2012	12:55	23.46	92.77	0.76	0.04
SAN-MW1s	4/9/2012	13:51	24.90	91.33	0.84	0.04
SAN-MW1s	5/15/2012	12:57	23.70	92.53	0.85	0.04
SAN-MW1s	6/21/2012	16:08	Dry			

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
SAN-MW1s	7/11/2012	12:24	Dry			
SAN-MW1s	8/16/2012	11:47	Dry			
SAN-MW1s	9/20/2012	14:29	Dry			
SAN-MW1s	10/20/2012	13:24	Dry			
SAN-MW1s	12/9/2012	9:10	Dry			
SAN-MW1s	12/31/2012	15:24	Dry			
SAN-MW1d	1/30/2012	11:46	22.10	93.93		
SAN-MW1d	2/13/2012	13:56	23.53	92.50		
SAN-MW1d	3/5/2012	12:56	24.02	92.01		
SAN-MW1d	4/9/2012	13:50	25.54	90.49		
SAN-MW1d	5/15/2012	12:58	24.35	91.68		
SAN-MW1d	6/21/2012	16:08	27.30	88.73		
SAN-MW1d	7/11/2012	12:24	28.00	88.03		
SAN-MW1d	8/16/2012	11:47	29.73	86.30		
SAN-MW1d	9/20/2012	14:29	30.00	86.03		
SAN-MW1d	10/20/2012	13:24	30.11	85.92		
SAN-MW1d	12/9/2012	9:10	29.19	86.84		
SAN-MW1d	12/31/2012	15:25	28.03	88.00		
SAN-MW2s	1/30/2012	11:50	Dry			
SAN-MW2s	2/13/2012	12:31	Dry			
SAN-MW2s	3/5/2012	12:59	Dry			
SAN-MW2s	4/9/2012	14:29	Dry			
SAN-MW2s	5/15/2012	12:07	Dry			
SAN-MW2s	6/21/2012	16:17	Dry			
SAN-MW2s	7/11/2012	12:36	Dry			
SAN-MW2s	8/16/2012	11:30	Dry			
SAN-MW2s	9/20/2012	14:48	Dry			
SAN-MW2s	10/20/2012	13:42	Dry			
SAN-MW2s	12/9/2012	9:05	Dry			
SAN-MW2s	12/31/2012	15:45	Dry			
SAN-MW2d	1/30/2012	11:52	29.29	89.62		
SAN-MW2d	2/13/2012	12:32	29.26	89.65		
SAN-MW2d	3/5/2012	13:01	30.42	88.49		
SAN-MW2d	4/9/2012	14:28	30.96	87.95		
SAN-MW2d	5/15/2012	12:08	31.23	87.68		
SAN-MW2d	6/21/2012	16:18	34.16	84.75		
SAN-MW2d	7/11/2012	12:35	34.89	84.02		
SAN-MW2d	8/16/2012	11:30	40.09	78.82		
SAN-MW2d	9/20/2012	14:48	40.13	78.78		
SAN-MW2d	10/20/2012	13:42	40.09	78.82		
SAN-MW2d	12/9/2012	9:05	34.85	84.06		
SAN-MW2d	12/31/2012	15:46	33.14	85.77		
SAN-MW3s	1/30/2012	11:55	Dry			
SAN-MW3s	2/13/2012	13:00	Dry			
SAN-MW3s	3/5/2012	13:05	Dry			
SAN-MW3s	4/9/2012	14:06	Dry			
SAN-MW3s	5/15/2012	12:21	Dry			
SAN-MW3s	6/21/2012	16:15	Dry			
SAN-MW3s	7/11/2012	12:29	Dry			
SAN-MW3s	8/16/2012	11:37	Dry			
SAN-MW3s	9/20/2012	14:40	Dry			
SAN-MW3s	10/20/2012	13:34	Dry			
SAN-MW3s	12/9/2012	9:17	Dry			
SAN-MW3s	12/31/2012	15:38	Dry			
SAN-MW3d	1/30/2012	12:10	29.87	88.63		
SAN-MW3d	2/13/2012	13:01	30.36	88.14		
SAN-MW3d	3/5/2012	13:06	31.62	86.88		
SAN-MW3d	4/9/2012	14:05	32.16	86.34		
SAN-MW3d	5/15/2012	12:21	32.13	86.37		
SAN-MW3d	6/21/2012	16:15	35.82	82.68		
SAN-MW3d	7/11/2012	12:29	36.19	82.31		
SAN-MW3d	8/16/2012	11:37	41.49	77.01		
SAN-MW3d	9/20/2012	14:40	41.59	76.91		
SAN-MW3d	10/20/2012	13:34	41.55	76.95		
SAN-MW3d	12/9/2012	9:17	36.43	82.07		
SAN-MW3d	12/31/2012	15:39	34.39	84.11		
SAN-MW4s	1/30/2012	12:12	30.14	88.69	0.00	0.00
SAN-MW4s	2/13/2012	13:29	30.11	88.72	0.00	0.00
SAN-MW4s	3/5/2012	13:10	30.86	87.97	0.04	0.00
SAN-MW4s	4/9/2012	14:10	30.48	88.35	0.06	0.00
SAN-MW4s	5/15/2012	12:36	31.56	87.27	0.03	0.00
SAN-MW4s	6/21/2012	16:11	Dry			
SAN-MW4s	7/11/2012	12:32	Dry			
SAN-MW4s	8/16/2012	11:34	Dry			
SAN-MW4s	9/20/2012	14:44	Dry			
SAN-MW4s	10/20/2012	13:38	Dry			
SAN-MW4s	12/9/2012	9:14	Dry			
SAN-MW4s	12/31/2012	15:30	Dry			
SAN-MW4d	1/30/2012	12:18	29.75	88.69		
SAN-MW4d	2/13/2012	13:30	29.72	88.72		
SAN-MW4d	3/5/2012	13:11	30.51	87.93		
SAN-MW4d	4/9/2012	14:09	30.15	88.29		
SAN-MW4d	5/15/2012	12:47	31.20	87.24		
SAN-MW4d	6/21/2012	16:12	35.66	82.78		
SAN-MW4d	7/11/2012	12:31	36.08	82.36		
SAN-MW4d	8/16/2012	11:34	41.10	77.34		
SAN-MW4d	9/20/2012	14:44	41.18	77.26		
SAN-MW4d	10/20/2012	13:38	41.21	77.23		
SAN-MW4d	12/9/2012	9:14	36.15	82.29		
SAN-MW4d	12/31/2012	15:31	33.90	84.54		
SAN-MW5s	1/30/2012	12:20	26.05	89.01	0.00	0.00
SAN-MW5s	2/16/2012	9:51	25.53	89.53	0.02	0.00
SAN-MW5s	3/5/2012	13:15	27.10	87.96	0.03	0.00
SAN-MW5s	4/9/2012	13:57	28.00	87.06	0.11	0.00
SAN-MW5s	5/15/2012	15:35	26.85	88.21	0.08	0.00
SAN-MW5s	6/21/2012	16:00	26.85	88.21	0.08	0.00
SAN-MW5s	7/11/2012	12:20	27.00	88.06	0.05	0.00
SAN-MW5s	8/16/2012	11:42	Dry			
SAN-MW5s	9/20/2012	14:34	Dry			
SAN-MW5s	10/20/2012	13:29	Dry			
SAN-MW5s	12/9/2012	9:20	Dry			
SAN-MW5s	12/31/2012	15:29	Dry			
SAN-MW5d	1/30/2012	12:25	25.90	89.01		
SAN-MW5d	2/16/2012	9:52	25.40	89.51		
SAN-MW5d	3/5/2012	13:16	26.98	87.93		
SAN-MW5d	4/9/2012	13:56	27.96	86.95		
SAN-MW5d	5/15/2012	15:36	26.78	88.13		
SAN-MW5d	6/21/2012	16:00	26.78	88.13		
SAN-MW5d	7/11/2012	12:20	26.90	88.01		
SAN-MW5d	8/16/2012	11:43	37.90	77.01		
SAN-MW5d	9/20/2012	14:34	38.00	76.91		
SAN-MW5d	10/20/2012	13:29	38.14	76.77		
SAN-MW5d	12/9/2012	9:20	30.33	84.58		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
SAN-MW5d	12/31/2012	15:29	29.54	85.37		
SAN-MW6s	1/30/2012	12:27	13.20	97.11	0.02	0.00
SAN-MW6s	2/16/2012	11:28	13.81	96.50	0.02	0.00
SAN-MW6s	3/5/2012	13:20	15.06	95.25	0.07	0.00
SAN-MW6s	4/9/2012	13:34	14.63	95.68	0.03	0.00
SAN-MW6s	5/15/2012	13:33	14.48	95.83	-0.01	-0.00
SAN-MW6s	6/21/2012	16:36	14.48	95.83	-0.01	-0.00
SAN-MW6s	7/11/2012	12:08	14.94	95.37	0.02	0.00
SAN-MW6s	8/16/2012	11:51	14.47	95.84	0.21	0.01
SAN-MW6s	9/20/2012	14:13	14.59	95.72	0.16	0.01
SAN-MW6s	10/20/2012	13:11	15.32	94.99	0.08	0.00
SAN-MW6s	12/9/2012	9:24	16.39	93.92	0.03	0.00
SAN-MW6s	12/31/2012	15:14	15.70	94.61	0.01	0.00
SAN-MW6d	1/30/2012	12:30	13.04	97.09		
SAN-MW6d	2/16/2012	11:29	13.65	96.48		
SAN-MW6d	3/5/2012	13:22	14.95	95.18		
SAN-MW6d	4/9/2012	13:33	14.48	95.65		
SAN-MW6d	5/15/2012	13:33	14.29	95.84		
SAN-MW6d	6/21/2012	16:40	14.29	95.84		
SAN-MW6d	7/11/2012	12:08	14.78	95.35		
SAN-MW6d	8/16/2012	11:51	14.50	95.63		
SAN-MW6d	9/20/2012	14:13	14.57	95.56		
SAN-MW6d	10/20/2012	13:11	15.22	94.91		
SAN-MW6d	12/9/2012	9:24	16.24	93.89		
SAN-MW6d	12/31/2012	15:15	15.53	94.60		
SAN-MW7s	1/30/2012	12:37	14.33	96.34	0.00	0.00
SAN-MW7s	2/16/2012	11:00	14.81	95.86	0.01	0.00
SAN-MW7s	3/5/2012	13:26	17.91	92.76	0.11	0.00
SAN-MW7s	4/9/2012	13:39	18.88	91.79	0.07	0.00
SAN-MW7s	5/15/2012	13:59	13.90	96.77	0.45	0.02
SAN-MW7s	6/21/2012	16:30	19.76	90.91	-0.06	-0.00
SAN-MW7s	7/11/2012	12:12	20.11	90.56	-0.03	-0.00
SAN-MW7s	8/16/2012	11:54	28.40	82.27	0.07	0.00
SAN-MW7s	9/20/2012	14:18	28.50	82.17	0.08	0.00
SAN-MW7s	10/20/2012	13:16	28.88	81.79	0.03	0.00
SAN-MW7s	12/9/2012	9:27	21.47	89.20	-0.03	-0.00
SAN-MW7s	12/31/2012	15:19	20.70	89.97	0.05	0.00
SAN-MW7d	1/30/2012	12:40	14.26	96.34		
SAN-MW7d	2/16/2012	11:01	14.75	95.85		
SAN-MW7d	3/5/2012	13:27	17.95	92.65		
SAN-MW7d	4/9/2012	13:38	18.88	91.72		
SAN-MW7d	5/15/2012	14:00	14.28	96.32		
SAN-MW7d	6/21/2012	16:32	19.63	90.97		
SAN-MW7d	7/11/2012	12:12	20.01	90.59		
SAN-MW7d	8/16/2012	11:54	28.40	82.20		
SAN-MW7d	9/20/2012	14:18	28.51	82.09		
SAN-MW7d	10/20/2012	13:16	28.84	81.76		
SAN-MW7d	12/9/2012	9:27	21.37	89.23		
SAN-MW7d	12/31/2012	15:19	20.68	89.92		
SAN-MW8s	1/30/2012	12:43	16.12	96.34	-0.10	-0.01
SAN-MW8s	2/16/2012	10:35	16.56	95.90	0.04	0.00
SAN-MW8s	3/5/2012	13:29	17.30	95.16	0.02	0.00
SAN-MW8s	4/9/2012	13:44	20.78	91.68	0.19	0.01
SAN-MW8s	5/15/2012	14:29	17.06	95.40	0.29	0.02
SAN-MW8s	6/21/2012	16:22	20.00	92.46	-0.02	-0.00
SAN-MW8s	7/11/2012	12:15	20.81	91.65	0.02	0.00
SAN-MW8s	8/16/2012	11:58	Dry			
SAN-MW8s	9/20/2012	14:23	Dry			
SAN-MW8s	10/20/2012	13:19	Dry			
SAN-MW8s	12/9/2012	9:30	23.70	88.76	-0.01	-0.00
SAN-MW8s	12/31/2012	15:21	22.51	89.95	0.07	0.00
SAN-MW8d	1/30/2012	12:45	15.83	96.44		
SAN-MW8d	2/16/2012	10:36	16.41	95.86		
SAN-MW8d	3/5/2012	13:30	17.13	95.14		
SAN-MW8d	4/9/2012	13:43	20.78	91.49		
SAN-MW8d	5/15/2012	14:30	17.16	95.11		
SAN-MW8d	6/21/2012	16:23	19.79	92.48		
SAN-MW8d	7/11/2012	12:14	20.64	91.63		
SAN-MW8d	8/16/2012	11:58	29.10	83.17		
SAN-MW8d	9/20/2012	14:23	29.25	83.02		
SAN-MW8d	10/20/2012	13:19	29.39	82.88		
SAN-MW8d	12/9/2012	9:30	23.50	88.77		
SAN-MW8d	12/31/2012	15:21	22.39	89.88		
PLS-MW1s	1/30/2012	11:50	10.83	81.49	-0.04	-0.00
PLS-MW1s	2/8/2012	16:32	10.90	81.42	0.00	0.00
PLS-MW1s	3/5/2012	14:10	11.45	80.87	-0.02	-0.00
PLS-MW1s	4/5/2012	14:07	11.48	80.84	-0.04	-0.00
PLS-MW1s	5/10/2012	19:28	11.03	81.29	0.01	0.00
PLS-MW1s	6/18/2012	13:29	10.95	81.37	-0.03	-0.00
PLS-MW1s	7/9/2012	15:16	9.55	82.77	0.10	0.01
PLS-MW1s	8/15/2012	9:03	9.40	82.92	-0.01	-0.00
PLS-MW1s	9/20/2012	15:50	10.33	81.99	0.09	0.01
PLS-MW1s	10/19/2012	14:56	11.03	81.29	0.00	0.00
PLS-MW1s	12/11/2012	9:50	12.57	79.75	0.01	0.00
PLS-MW1s	12/28/2012	13:32	12.79	79.53	0.01	0.00
PLS-MW1d	1/30/2012	11:52	10.55	81.53		
PLS-MW1d	2/8/2012	16:33	10.66	81.42		
PLS-MW1d	3/5/2012	14:11	11.19	80.89		
PLS-MW1d	4/5/2012	14:09	11.20	80.88		
PLS-MW1d	5/10/2012	19:30	10.80	81.28		
PLS-MW1d	6/18/2012	13:28	10.68	81.40		
PLS-MW1d	7/9/2012	15:15	9.41	82.67		
PLS-MW1d	8/15/2012	9:03	9.15	82.93		
PLS-MW1d	9/20/2012	15:50	10.18	81.90		
PLS-MW1d	10/19/2012	14:56	10.79	81.29		
PLS-MW1d	12/11/2012	9:50	12.34	79.74		
PLS-MW1d	12/28/2012	13:33	12.56	79.52		
PLS-MW2s	1/30/2012	11:57	9.55	81.27	0.05	0.00
PLS-MW2s	2/8/2012	17:00	9.65	81.17	0.03	0.00
PLS-MW2s	3/5/2012	14:13	10.23	80.59	0.05	0.00
PLS-MW2s	4/5/2012	14:12	10.20	80.62	0.04	0.00
PLS-MW2s	5/10/2012	17:45	9.67	81.15	0.01	0.00
PLS-MW2s	6/18/2012	13:32	9.51	81.31	0.06	0.00
PLS-MW2s	7/9/2012	15:12	8.16	82.66	0.03	0.00
PLS-MW2s	8/15/2012	9:00	8.20	82.62	-0.01	-0.00
PLS-MW2s	9/20/2012	15:47	9.09	81.73	0.10	0.01
PLS-MW2s	10/19/2012	15:00	9.70	81.12	0.01	0.00
PLS-MW2s	12/11/2012	9:48	11.24	79.58	0.06	0.00
PLS-MW2s	12/28/2012	13:35	11.49	79.33	0.02	0.00
PLS-MW2d	1/30/2012	12:00	9.41	81.22		
PLS-MW2d	2/8/2012	17:01	9.49	81.14		
PLS-MW2d	3/5/2012	14:14	10.09	80.54		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
PLS-MW2d	4/5/2012	14:14	10.05	80.58		
PLS-MW2d	5/10/2012	17:46	9.49	81.14		
PLS-MW2d	6/18/2012	13:31	9.38	81.25		
PLS-MW2d	7/9/2012	15:12	8.00	82.63		
PLS-MW2d	8/15/2012	9:00	8.00	82.63		
PLS-MW2d	9/20/2012	15:47	9.00	81.63		
PLS-MW2d	10/19/2012	15:00	9.52	81.11		
PLS-MW2d	12/11/2012	9:48	11.11	79.52		
PLS-MW2d	12/28/2012	13:36	11.32	79.31		
PLS-MW3s	1/30/2012	11:30	N/M			
PLS-MW3s	2/8/2012	15:13	8.39	82.84	0.00	0.00
PLS-MW3s	3/5/2012	13:52	9.33	81.90	0.00	0.00
PLS-MW3s	4/5/2012	14:30	9.40	81.83	0.03	0.00
PLS-MW3s	5/10/2012	16:54	9.38	81.85	0.00	0.00
PLS-MW3s	6/18/2012	13:21	9.06	82.17	0.02	0.00
PLS-MW3s	7/9/2012	14:58	8.44	82.79	-0.20	-0.02
PLS-MW3s	8/15/2012	8:55	7.72	83.51	0.00	0.00
PLS-MW3s	9/20/2012	15:23	8.14	83.09	0.10	0.01
PLS-MW3s	10/19/2012	14:45	9.45	81.78	0.02	0.00
PLS-MW3s	12/11/2012	10:04	10.79	80.44	0.01	0.00
PLS-MW3s	12/28/2012	13:24	10.70	80.53	0.01	0.00
PLS-MW3d	1/30/2012	11:30	N/M			
PLS-MW3d	2/8/2012	15:14	8.24	82.84		
PLS-MW3d	3/5/2012	13:53	9.18	81.90		
PLS-MW3d	4/5/2012	14:32	9.28	81.80		
PLS-MW3d	5/10/2012	16:55	9.23	81.85		
PLS-MW3d	6/18/2012	13:20	8.93	82.15		
PLS-MW3d	7/9/2012	14:57	8.09	82.99		
PLS-MW3d	8/15/2012	8:55	7.57	83.51		
PLS-MW3d	9/20/2012	15:23	8.09	82.99		
PLS-MW3d	10/19/2012	14:45	9.32	81.76		
PLS-MW3d	12/11/2012	10:04	10.65	80.43		
PLS-MW3d	12/28/2012	13:25	10.56	80.52		
PLS-MW4s	1/30/2012	12:04	10.08	82.18	0.01	0.00
PLS-MW4s	2/8/2012	15:33	10.26	82.00	0.00	0.00
PLS-MW4s	3/5/2012	14:08	10.93	81.33	0.01	0.00
PLS-MW4s	4/5/2012	14:20	10.94	81.32	0.00	0.00
PLS-MW4s	5/10/2012	19:00	10.78	81.48	-0.02	-0.00
PLS-MW4s	6/18/2012	13:26	10.63	81.63	0.03	0.00
PLS-MW4s	7/9/2012	15:09	9.12	83.14	0.18	0.01
PLS-MW4s	8/15/2012	9:06	8.88	83.38	-0.04	-0.00
PLS-MW4s	9/20/2012	15:41	9.41	82.85	0.27	0.02
PLS-MW4s	10/19/2012	14:50	10.69	81.57	-0.02	-0.00
PLS-MW4s	12/11/2012	9:53	12.13	80.13	-0.01	-0.00
PLS-MW4s	12/28/2012	13:30	12.26	80.00	0.00	0.00
PLS-MW4d	1/30/2012	12:06	9.68	82.17		
PLS-MW4d	2/8/2012	15:34	9.85	82.00		
PLS-MW4d	3/5/2012	14:07	10.53	81.32		
PLS-MW4d	4/5/2012	14:21	10.53	81.32		
PLS-MW4d	5/10/2012	19:01	10.35	81.50		
PLS-MW4d	6/18/2012	13:25	10.25	81.60		
PLS-MW4d	7/9/2012	15:09	8.89	82.96		
PLS-MW4d	8/15/2012	9:06	8.43	83.42		
PLS-MW4d	9/20/2012	15:41	9.27	82.58		
PLS-MW4d	10/19/2012	14:50	10.26	81.59		
PLS-MW4d	12/11/2012	9:53	11.71	80.14		
PLS-MW4d	12/28/2012	13:31	11.85	80.00		
PLS-MW5s	1/30/2012	12:10	N/M			
PLS-MW5s	2/8/2012	16:02	8.93	81.80	0.01	0.00
PLS-MW5s	3/5/2012	14:18	9.58	81.15	-0.10	-0.01
PLS-MW5s	4/5/2012	14:26	9.72	81.01	0.01	0.00
PLS-MW5s	5/10/2012	17:25	9.39	81.34	-0.05	-0.00
PLS-MW5s	6/18/2012	13:36	9.43	81.30	-0.02	-0.00
PLS-MW5s	7/9/2012	15:21	8.30	82.43	-0.08	-0.01
PLS-MW5s	8/15/2012	8:50	7.67	83.06	-1.02	-0.08
PLS-MW5s	9/20/2012	15:55	8.44	82.29	-0.26	-0.02
PLS-MW5s	10/19/2012	15:04	9.43	81.30	0.01	0.00
PLS-MW5s	12/11/2012	9:44	10.88	79.85	0.00	0.00
PLS-MW5s	12/28/2012	13:43	11.08	79.65	-0.02	-0.00
PLS-MW5d	1/30/2012	12:12	N/M			
PLS-MW5d	2/8/2012	16:03	8.83	81.79		
PLS-MW5d	3/5/2012	14:19	9.37	81.25		
PLS-MW5d	4/5/2012	14:27	9.62	81.00		
PLS-MW5d	5/10/2012	17:26	9.23	81.39		
PLS-MW5d	6/18/2012	13:35	9.30	81.32		
PLS-MW5d	7/9/2012	15:21	8.11	82.51		
PLS-MW5d	8/15/2012	8:50	6.54	84.08		
PLS-MW5d	9/20/2012	15:55	8.07	82.55		
PLS-MW5d	10/19/2012	15:04	9.33	81.29		
PLS-MW5d	12/11/2012	9:44	10.77	79.85		
PLS-MW5d	12/28/2012	13:44	10.95	79.67		
PLS-MW6s	1/30/2012	11:35	7.95	82.14	0.87	0.04
PLS-MW6s	2/8/2012	14:52	8.06	82.03	1.21	0.06
PLS-MW6s	3/5/2012	13:55	8.89	81.20	0.04	0.00
PLS-MW6s	4/5/2012	13:59	8.12	81.97	1.73	0.08
PLS-MW6s	5/10/2012	18:20	8.74	81.35	0.67	0.03
PLS-MW6s	6/18/2012	13:40	8.47	81.62	1.16	0.06
PLS-MW6s	7/9/2012	15:00	5.87	84.22	1.80	0.09
PLS-MW6s	8/15/2012	9:12	5.80	84.29	2.03	0.10
PLS-MW6s	9/20/2012	15:30	6.55	83.54	0.23	0.01
PLS-MW6s	10/19/2012	15:10	7.82	82.27	1.20	0.06
PLS-MW6s	12/11/2012	10:00	9.25	80.84	1.11	0.05
PLS-MW6s	12/28/2012	13:49	8.69	81.40	1.31	0.06
PLS-MW6d	1/30/2012	11:37	8.52	81.27		
PLS-MW6d	2/8/2012	14:53	8.97	80.82		
PLS-MW6d	3/5/2012	13:56	8.63	81.16		
PLS-MW6d	4/5/2012	14:02	9.55	80.24		
PLS-MW6d	5/10/2012	18:22	9.11	80.68		
PLS-MW6d	6/18/2012	13:39	9.33	80.46		
PLS-MW6d	7/9/2012	15:00	7.37	82.42		
PLS-MW6d	8/15/2012	9:12	7.53	82.26		
PLS-MW6d	9/20/2012	15:30	6.48	83.31		
PLS-MW6d	10/19/2012	15:10	8.72	81.07		
PLS-MW6d	12/11/2012	10:00	10.06	79.73		
PLS-MW6d	12/28/2012	13:50	9.70	80.09		
PLS-MW7s	1/30/2012	11:41	9.29	81.89	0.55	0.03
PLS-MW7s	2/8/2012	17:23	9.60	81.58	1.01	0.06
PLS-MW7s	3/5/2012	13:59	11.78	79.40	0.08	0.00
PLS-MW7s	4/5/2012	13:55	10.37	80.81	1.17	0.06
PLS-MW7s	5/10/2012	18:40	9.89	81.29	-0.34	-0.02
PLS-MW7s	6/18/2012	13:43	10.00	81.18	1.25	0.07
PLS-MW7s	7/9/2012	15:03	8.43	82.75	1.11	0.06
PLS-MW7s	8/15/2012	9:09	8.19	82.99	1.45	0.08

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_v, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_v
PLS-MW7s	9/20/2012	15:34	8.68	82.50	0.33	0.02
PLS-MW7s	10/19/2012	15:17	9.50	81.68	0.31	0.02
PLS-MW7s	12/11/2012	9:57	10.96	80.22	0.27	0.02
PLS-MW7s	12/28/2012	13:56	10.91	80.27	0.24	0.01
PLS-MW7d	1/30/2012	11:43	9.53	81.34		
PLS-MW7d	2/8/2012	17:24	10.30	80.57		
PLS-MW7d	3/5/2012	14:00	11.55	79.32		
PLS-MW7d	4/5/2012	13:57	11.23	79.64		
PLS-MW7d	5/10/2012	18:41	9.24	81.63		
PLS-MW7d	6/18/2012	13:42	10.94	79.93		
PLS-MW7d	7/9/2012	15:03	9.23	81.64		
PLS-MW7d	8/15/2012	9:10	9.33	81.54		
PLS-MW7d	9/20/2012	15:34	8.70	82.17		
PLS-MW7d	10/19/2012	15:17	9.50	81.37		
PLS-MW7d	12/11/2012	9:57	10.92	79.95		
PLS-MW7d	12/28/2012	13:57	10.84	80.03		
CAE-MW1s	1/29/2012	10:33	11.48	97.29	-0.03	-0.00
CAE-MW1s	2/8/2012	13:08	11.40	97.37	-0.01	-0.00
CAE-MW1s	3/5/2012	14:45	12.40	96.37	-0.03	-0.00
CAE-MW1s	4/5/2012	12:19	11.85	96.92	-0.02	-0.00
CAE-MW1s	5/10/2012	10:40	14.16	94.61	0.01	0.00
CAE-MW1s	6/20/2012	14:34	14.66	94.11	-0.03	-0.00
CAE-MW1s	7/11/2012	9:53	15.38	93.39	-0.03	-0.00
CAE-MW1s	8/14/2012	16:02	15.30	93.47	0.01	0.00
CAE-MW1s	9/18/2012	9:29	15.26	93.51	0.00	0.00
CAE-MW1s	10/19/2012	13:50	14.80	93.97	-0.02	-0.00
CAE-MW1s	12/4/2012	14:18	13.69	95.08	0.00	0.00
CAE-MW1s	12/28/2012	15:00	13.29	95.48	-0.02	-0.00
CAE-MW1d	1/29/2012	10:34	11.02	97.32		
CAE-MW1d	2/8/2012	13:09	10.96	97.38		
CAE-MW1d	3/5/2012	14:47	11.94	96.40		
CAE-MW1d	4/5/2012	12:21	11.40	96.94		
CAE-MW1d	5/10/2012	10:41	13.74	94.60		
CAE-MW1d	6/20/2012	14:35	14.20	94.14		
CAE-MW1d	7/11/2012	9:53	14.92	93.42		
CAE-MW1d	8/14/2012	16:02	14.88	93.46		
CAE-MW1d	9/18/2012	9:29	14.83	93.51		
CAE-MW1d	10/19/2012	13:50	14.35	93.99		
CAE-MW1d	12/4/2012	14:18	13.26	95.08		
CAE-MW1d	12/28/2012	15:01	12.84	95.50		
CAE-MW2s	1/29/2012	10:37	11.55	96.55	-0.05	-0.00
CAE-MW2s	2/8/2012	12:29	11.53	96.57	0.00	0.00
CAE-MW2s	3/5/2012	14:49	11.76	96.34	0.00	0.00
CAE-MW2s	4/5/2012	12:15	12.19	95.91	-0.02	-0.00
CAE-MW2s	5/10/2012	11:20	13.34	94.76	0.01	0.00
CAE-MW2s	6/20/2012	14:26	13.90	94.20	0.03	0.00
CAE-MW2s	7/11/2012	9:47	14.43	93.67	0.04	0.00
CAE-MW2s	8/14/2012	16:07	14.75	93.35	0.05	0.00
CAE-MW2s	9/18/2012	9:23	14.77	93.33	0.00	0.00
CAE-MW2s	10/19/2012	13:45	14.57	93.53	0.00	0.00
CAE-MW2s	12/4/2012	14:12	13.85	94.25	0.01	0.00
CAE-MW2s	12/28/2012	14:56	13.39	94.71	0.00	0.00
CAE-MW2d	1/29/2012	10:38	11.30	96.60		
CAE-MW2d	2/8/2012	12:30	11.33	96.57		
CAE-MW2d	3/5/2012	14:52	11.56	96.34		
CAE-MW2d	4/5/2012	12:16	11.97	95.93		
CAE-MW2d	5/10/2012	11:21	13.15	94.75		
CAE-MW2d	6/20/2012	14:27	13.73	94.17		
CAE-MW2d	7/11/2012	9:47	14.27	93.63		
CAE-MW2d	8/14/2012	16:07	14.60	93.30		
CAE-MW2d	9/18/2012	9:23	14.57	93.33		
CAE-MW2d	10/19/2012	13:45	14.37	93.53		
CAE-MW2d	12/4/2012	14:12	13.66	94.24		
CAE-MW2d	12/28/2012	14:57	13.19	94.71		
CAE-MW3s	1/29/2012	10:44	11.22	96.14	0.00	0.00
CAE-MW3s	2/8/2012	12:46	11.20	96.16	-0.03	-0.00
CAE-MW3s	3/5/2012	14:53	11.71	95.65	0.00	0.00
CAE-MW3s	4/5/2012	12:10	11.70	95.66	-0.03	-0.00
CAE-MW3s	5/10/2012	11:40	13.61	93.75	0.04	0.00
CAE-MW3s	6/20/2012	14:23	14.53	92.83	0.03	0.00
CAE-MW3s	7/11/2012	9:45	15.50	91.86	0.98	0.08
CAE-MW3s	8/14/2012	16:04	15.75	91.61	-0.03	-0.00
CAE-MW3s	9/18/2012	9:20	15.42	91.94	-0.01	-0.00
CAE-MW3s	10/19/2012	13:40	14.99	92.37	-0.01	-0.00
CAE-MW3s	12/4/2012	14:15	13.53	93.83	-0.02	-0.00
CAE-MW3s	12/28/2012	14:50	12.99	94.37	-0.02	-0.00
CAE-MW3d	1/29/2012	10:45	11.12	96.14		
CAE-MW3d	2/8/2012	12:47	11.07	96.19		
CAE-MW3d	3/5/2012	14:57	11.61	95.65		
CAE-MW3d	4/5/2012	12:12	11.57	95.69		
CAE-MW3d	5/10/2012	11:41	13.55	93.71		
CAE-MW3d	6/20/2012	14:24	14.46	92.80		
CAE-MW3d	7/11/2012	9:45	16.38	90.88		
CAE-MW3d	8/14/2012	16:05	15.62	91.64		
CAE-MW3d	9/18/2012	9:20	15.31	91.95		
CAE-MW3d	10/19/2012	13:40	14.88	92.38		
CAE-MW3d	12/4/2012	14:15	13.41	93.85		
CAE-MW3d	12/28/2012	14:51	12.87	94.39		
CAE-MW4s	1/29/2012	10:47	12.12	97.29	0.00	0.00
CAE-MW4s	2/8/2012	13:35	12.14	97.27	-0.01	-0.00
CAE-MW4s	3/5/2012	14:58	12.37	97.04	-0.01	-0.00
CAE-MW4s	4/5/2012	12:25	12.78	96.63	0.01	0.00
CAE-MW4s	5/10/2012	10:55	13.67	95.74	0.05	0.00
CAE-MW4s	6/20/2012	14:31	14.00	95.41	0.01	0.00
CAE-MW4s	7/11/2012	9:50	14.45	94.96	0.05	0.00
CAE-MW4s	8/14/2012	16:00	14.59	94.82	-0.08	-0.00
CAE-MW4s	9/18/2012	9:26	14.79	94.62	0.03	0.00
CAE-MW4s	10/19/2012	13:56	14.76	94.65	0.00	0.00
CAE-MW4s	12/4/2012	14:09	14.39	95.02	0.00	0.00
CAE-MW4s	12/28/2012	15:07	13.97	95.44	0.01	0.00
CAE-MW4d	1/29/2012	10:47	11.90	97.29		
CAE-MW4d	2/8/2012	13:36	11.91	97.28		
CAE-MW4d	3/5/2012	14:59	12.14	97.05		
CAE-MW4d	4/5/2012	12:27	12.57	96.62		
CAE-MW4d	5/10/2012	10:55	13.50	95.69		
CAE-MW4d	6/20/2012	14:32	13.79	95.40		
CAE-MW4d	7/11/2012	9:50	14.28	94.91		
CAE-MW4d	8/14/2012	16:00	14.29	94.90		
CAE-MW4d	9/18/2012	9:26	14.60	94.59		
CAE-MW4d	10/19/2012	13:56	14.54	94.65		
CAE-MW4d	12/4/2012	14:09	14.17	95.02		
CAE-MW4d	12/28/2012	15:08	13.76	95.43		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
CAE-MW5s	1/29/2012	10:49	8.73	99.77	0.00	0.00
CAE-MW5s	2/8/2012	13:58	8.83	99.67	0.00	0.00
CAE-MW5s	3/5/2012	15:03	8.90	99.60	0.03	0.00
CAE-MW5s	4/5/2012	12:30	9.55	98.95	-0.01	-0.00
CAE-MW5s	5/10/2012	10:18	9.50	99.00	0.04	0.00
CAE-MW5s	6/20/2012	14:41	8.26	100.24	-0.58	-0.03
CAE-MW5s	7/11/2012	9:58	8.22	100.28	0.04	0.00
CAE-MW5s	8/14/2012	16:10	8.20	100.30	0.04	0.00
CAE-MW5s	9/18/2012	9:34	9.14	99.36	0.05	0.00
CAE-MW5s	10/19/2012	14:00	9.71	98.79	0.01	0.00
CAE-MW5s	12/4/2012	14:24	10.56	97.94	0.04	0.00
CAE-MW5s	12/28/2012	15:13	10.30	98.20	0.01	0.00
CAE-MW5d	1/29/2012	10:50	8.32	99.77		
CAE-MW5d	2/8/2012	13:59	8.42	99.67		
CAE-MW5d	3/5/2012	15:05	8.52	99.57		
CAE-MW5d	4/5/2012	12:31	9.13	98.96		
CAE-MW5d	5/10/2012	10:20	9.13	98.96		
CAE-MW5d	6/20/2012	14:42	7.27	100.82		
CAE-MW5d	7/11/2012	9:58	7.85	100.24		
CAE-MW5d	8/14/2012	16:11	7.83	100.26		
CAE-MW5d	9/18/2012	9:34	8.78	99.31		
CAE-MW5d	10/19/2012	14:00	9.31	98.78		
CAE-MW5d	12/4/2012	14:24	10.19	97.90		
CAE-MW5d	12/28/2012	15:14	9.90	98.19		
CAE-MW6s	1/29/2012	10:53	11.00	100.55	-0.02	-0.00
CAE-MW6s	2/9/2012	9:50	11.15	100.40	0.01	0.00
CAE-MW6s	3/5/2012	15:08	11.47	100.08	0.03	0.00
CAE-MW6s	4/5/2012	12:36	11.82	99.73	0.01	0.00
CAE-MW6s	5/10/2012	10:00	11.64	99.91	0.02	0.00
CAE-MW6s	6/20/2012	14:44	9.83	101.72	0.03	0.00
CAE-MW6s	7/11/2012	10:00	9.85	101.70	0.02	0.00
CAE-MW6s	8/14/2012	16:13	10.04	101.51	0.01	0.00
CAE-MW6s	9/18/2012	9:37	10.98	100.57	0.03	0.00
CAE-MW6s	10/19/2012	14:05	11.55	100.00	0.00	0.00
CAE-MW6s	12/4/2012	14:21	12.74	98.81	0.00	0.00
CAE-MW6s	12/28/2012	15:18	12.55	99.00	0.02	0.00
CAE-MW6d	1/29/2012	10:53	10.85	100.57		
CAE-MW6d	2/9/2012	9:51	11.03	100.39		
CAE-MW6d	3/5/2012	15:10	11.37	100.05		
CAE-MW6d	4/5/2012	12:37	11.70	99.72		
CAE-MW6d	5/10/2012	10:00	11.53	99.89		
CAE-MW6d	6/20/2012	14:45	9.73	101.69		
CAE-MW6d	7/11/2012	10:00	9.74	101.68		
CAE-MW6d	8/14/2012	16:14	9.92	101.50		
CAE-MW6d	9/18/2012	9:37	10.88	100.54		
CAE-MW6d	10/19/2012	14:05	11.42	100.00		
CAE-MW6d	12/4/2012	14:21	12.61	98.81		
CAE-MW6d	12/28/2012	15:19	12.44	98.98		
ROB-MW1s	1/29/2012	11:32	11.86	62.03	-0.02	-0.00
ROB-MW1s	2/7/2012	13:38	11.30	62.59	-0.02	-0.00
ROB-MW1s	3/5/2012	16:11	11.00	62.89	0.17	0.01
ROB-MW1s	4/5/2012	12:40	Dry			
ROB-MW1s	5/8/2012	12:33	12.19	61.70	0.00	0.00
ROB-MW1s	6/18/2012	9:12	11.83	62.06	-0.02	-0.00
ROB-MW1s	7/9/2012	9:29	Dry			
ROB-MW1s	8/13/2012	10:32	Dry			
ROB-MW1s	9/17/2012	10:43	Dry			
ROB-MW1s	10/19/2012	10:15	17.97	55.92	0.01	0.00
ROB-MW1s	12/4/2012	11:55	15.20	58.69	0.01	0.00
ROB-MW1s	12/28/2012	9:20	14.98	58.91	0.71	0.05
ROB-MW1d	1/29/2012	11:32	11.54	62.05		
ROB-MW1d	2/7/2012	13:39	10.98	62.61		
ROB-MW1d	3/5/2012	16:12	10.87	62.72		
ROB-MW1d	4/5/2012	12:41	18.44	55.15		
ROB-MW1d	5/8/2012	12:34	11.89	61.70		
ROB-MW1d	6/18/2012	9:11	11.51	62.08		
ROB-MW1d	7/9/2012	9:28	19.10	54.49		
ROB-MW1d	8/13/2012	10:33	25.24	48.35		
ROB-MW1d	9/17/2012	10:43	18.98	54.61		
ROB-MW1d	10/19/2012	10:15	17.68	55.91		
ROB-MW1d	12/4/2012	11:55	14.91	58.68		
ROB-MW1d	12/28/2012	9:21	15.39	58.20		
ROB-MW2s	1/29/2012	11:36	12.47	61.69	-0.06	-0.00
ROB-MW2s	2/7/2012	13:17	11.70	62.46	0.00	0.00
ROB-MW2s	3/5/2012	16:15	12.65	61.51	0.14	0.01
ROB-MW2s	4/5/2012	12:35	14.14	60.02	0.52	0.04
ROB-MW2s	5/8/2012	12:52	12.47	61.69	0.00	0.00
ROB-MW2s	6/18/2012	9:10	12.32	61.84	0.01	0.00
ROB-MW2s	7/9/2012	9:26	14.93	59.23	0.18	0.01
ROB-MW2s	8/13/2012	10:35	Dry			
ROB-MW2s	9/17/2012	10:41	Dry			
ROB-MW2s	10/19/2012	10:12	Dry			
ROB-MW2s	12/4/2012	11:57	15.79	58.37	0.03	0.00
ROB-MW2s	12/28/2012	9:56	15.79	58.37	-0.02	-0.00
ROB-MW2d	1/29/2012	11:37	12.25	61.75		
ROB-MW2d	2/7/2012	13:18	11.54	62.46		
ROB-MW2d	3/5/2012	16:16	12.63	61.37		
ROB-MW2d	4/5/2012	12:36	14.50	59.50		
ROB-MW2d	5/8/2012	12:53	12.31	61.69		
ROB-MW2d	6/18/2012	9:09	12.17	61.83		
ROB-MW2d	7/9/2012	9:25	14.95	59.05		
ROB-MW2d	8/13/2012	10:36	21.41	52.59		
ROB-MW2d	9/17/2012	10:41	19.52	54.48		
ROB-MW2d	10/19/2012	10:12	18.61	55.39		
ROB-MW2d	12/4/2012	11:57	15.66	58.34		
ROB-MW2d	12/28/2012	9:57	15.61	58.39		
ROB-MW3s	1/29/2012	11:40	10.65	62.77	0.02	0.00
ROB-MW3s	2/7/2012	13:00	10.65	62.77	-0.01	-0.00
ROB-MW3s	3/5/2012	16:19	11.20	62.22	1.62	0.12
ROB-MW3s	4/5/2012	12:25	10.77	62.65	-0.02	-0.00
ROB-MW3s	5/8/2012	13:19	11.13	62.29	0.02	0.00
ROB-MW3s	6/18/2012	9:17	12.09	61.33	-0.04	-0.00
ROB-MW3s	7/9/2012	9:34	12.36	61.06	0.01	0.00
ROB-MW3s	8/13/2012	10:39	14.93	58.49	0.01	0.00
ROB-MW3s	9/17/2012	10:48	17.49	55.93	-0.04	-0.00
ROB-MW3s	10/19/2012	9:57	18.18	55.24	0.03	0.00
ROB-MW3s	12/4/2012	12:00	16.52	56.90	0.01	0.00
ROB-MW3s	12/28/2012	9:50	14.92	58.50	-0.29	-0.02
ROB-MW3d	1/29/2012	11:41	10.55	62.75		
ROB-MW3d	2/7/2012	13:01	10.52	62.78		
ROB-MW3d	3/5/2012	16:20	12.70	60.60		
ROB-MW3d	4/5/2012	12:26	10.63	62.67		
ROB-MW3d	5/8/2012	13:19	11.03	62.27		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
ROB-MW3d	6/18/2012	9:16	11.93	61.37		
ROB-MW3d	7/9/2012	9:33	12.25	61.05		
ROB-MW3d	8/13/2012	10:40	14.82	58.48		
ROB-MW3d	9/17/2012	10:48	17.33	55.97		
ROB-MW3d	10/19/2012	9:57	18.09	55.21		
ROB-MW3d	12/4/2012	12:00	16.41	56.89		
ROB-MW3d	12/28/2012	9:51	14.51	58.79		
ROB-MW4s	1/29/2012	11:22	10.12	62.71	0.05	0.00
ROB-MW4s	2/7/2012	12:47	10.70	62.13	-0.70	-0.05
ROB-MW4s	3/5/2012	16:23	11.62	61.21	0.74	0.06
ROB-MW4s	4/5/2012	12:20	9.87	62.96	-0.03	-0.00
ROB-MW4s	5/8/2012	13:37	10.29	62.54	0.00	0.00
ROB-MW4s	6/18/2012	9:21	11.50	61.33	-0.03	-0.00
ROB-MW4s	7/9/2012	9:37	11.26	61.57	0.04	0.00
ROB-MW4s	8/13/2012	10:42	14.03	58.80	0.01	0.00
ROB-MW4s	9/17/2012	10:51	16.58	56.25	0.03	0.00
ROB-MW4s	10/19/2012	9:53	17.59	55.24	0.00	0.00
ROB-MW4s	12/4/2012	12:02	16.10	56.73	0.02	0.00
ROB-MW4s	12/28/2012	9:46	14.71	58.12	-0.07	-0.01
ROB-MW4d	1/29/2012	11:23	9.98	62.66		
ROB-MW4d	2/7/2012	12:48	9.81	62.83		
ROB-MW4d	3/5/2012	16:24	12.17	60.47		
ROB-MW4d	4/5/2012	12:22	9.65	62.99		
ROB-MW4d	5/8/2012	13:38	10.10	62.54		
ROB-MW4d	6/18/2012	9:20	11.28	61.36		
ROB-MW4d	7/9/2012	9:36	11.11	61.53		
ROB-MW4d	8/13/2012	10:43	13.85	58.79		
ROB-MW4d	9/17/2012	10:51	16.42	56.22		
ROB-MW4d	10/19/2012	9:53	17.40	55.24		
ROB-MW4d	12/4/2012	12:02	15.93	56.71		
ROB-MW4d	12/28/2012	9:47	14.45	58.19		
ROB-MW5s	1/29/2012	11:28	10.61	63.43	-0.02	-0.00
ROB-MW5s	2/7/2012	12:23	10.52	63.52	0.01	0.00
ROB-MW5s	3/5/2012	16:29	Dry			
ROB-MW5s	4/5/2012	12:54	10.99	63.05	-0.01	-0.00
ROB-MW5s	5/8/2012	14:01	11.40	62.64	-0.02	-0.00
ROB-MW5s	6/18/2012	9:27	12.23	61.81	-0.02	-0.00
ROB-MW5s	7/9/2012	9:40	12.42	61.62	-0.03	-0.00
ROB-MW5s	8/13/2012	10:50	Dry			
ROB-MW5s	9/17/2012	10:56	Dry			
ROB-MW5s	10/19/2012	10:08	Dry			
ROB-MW5s	12/4/2012	12:05	Dry			
ROB-MW5s	12/28/2012	9:27	14.19	59.85	-0.19	-0.01
ROB-MW5d	1/29/2012	11:28	10.48	63.45		
ROB-MW5d	2/7/2012	12:24	10.42	63.51		
ROB-MW5d	3/5/2012	16:30	19.16	54.77		
ROB-MW5d	4/5/2012	12:55	10.87	63.06		
ROB-MW5d	5/8/2012	14:02	11.27	62.66		
ROB-MW5d	6/18/2012	9:26	12.10	61.83		
ROB-MW5d	7/9/2012	9:39	12.28	61.65		
ROB-MW5d	8/13/2012	10:51	15.31	58.62		
ROB-MW5d	9/17/2012	10:55	16.16	57.77		
ROB-MW5d	10/19/2012	10:08	18.29	55.64		
ROB-MW5d	12/4/2012	12:05	16.44	57.49		
ROB-MW5d	12/28/2012	9:28	13.89	60.04		
ROB-MW6s	1/29/2012	11:45	12.05	61.06	0.04	0.00
ROB-MW6s	2/7/2012	14:48	12.01	61.10	0.07	0.00
ROB-MW6s	3/5/2012	16:36	14.56	58.55	0.21	0.01
ROB-MW6s	4/5/2012	12:03	12.38	60.73	0.04	0.00
ROB-MW6s	5/8/2012	11:38	13.61	59.50	0.09	0.00
ROB-MW6s	6/18/2012	9:37	15.00	58.11	0.07	0.00
ROB-MW6s	7/9/2012	9:50	14.50	58.61	0.09	0.00
ROB-MW6s	8/13/2012	10:20	16.25	56.86	0.19	0.01
ROB-MW6s	9/17/2012	11:03	17.33	55.78	0.11	0.01
ROB-MW6s	10/19/2012	10:26	18.77	54.34	0.02	0.00
ROB-MW6s	12/4/2012	11:47	16.54	56.57	0.00	0.00
ROB-MW6s	12/28/2012	9:30	14.88	58.23	-0.01	-0.00
ROB-MW6d	1/29/2012	11:47	11.92	61.02		
ROB-MW6d	2/7/2012	14:49	11.91	61.03		
ROB-MW6d	3/5/2012	16:38	14.60	58.34		
ROB-MW6d	4/5/2012	12:03	12.25	60.69		
ROB-MW6d	5/8/2012	11:39	13.53	59.41		
ROB-MW6d	6/18/2012	9:36	14.90	58.04		
ROB-MW6d	7/9/2012	9:49	14.42	58.52		
ROB-MW6d	8/13/2012	10:21	16.27	56.67		
ROB-MW6d	9/17/2012	11:03	17.27	55.67		
ROB-MW6d	10/19/2012	10:26	18.62	54.32		
ROB-MW6d	12/4/2012	11:47	16.37	56.57		
ROB-MW6d	12/28/2012	9:31	14.70	58.24		
ROB-MW7s	1/29/2012	11:50	10.75	61.42	0.39	0.02
ROB-MW7s	2/7/2012	14:25	10.73	61.44	0.29	0.01
ROB-MW7s	3/5/2012	16:41	11.08	61.09	0.16	0.01
ROB-MW7s	4/5/2012	11:55	10.20	61.97	1.22	0.06
ROB-MW7s	5/8/2012	10:56	11.07	61.10	1.77	0.09
ROB-MW7s	6/18/2012	9:34	12.93	59.24	0.93	0.05
ROB-MW7s	7/9/2012	9:45	13.20	58.97	1.18	0.06
ROB-MW7s	8/13/2012	10:15	15.85	56.32	2.73	0.13
ROB-MW7s	9/17/2012	11:00	17.32	54.85	0.64	0.03
ROB-MW7s	10/19/2012	10:20	17.49	54.68	0.24	0.01
ROB-MW7s	12/4/2012	11:50	15.84	56.33	-0.09	-0.00
ROB-MW7s	12/28/2012	9:41	15.64	56.53	0.16	0.01
ROB-MW7d	1/29/2012	11:51	10.86	61.03		
ROB-MW7d	2/7/2012	14:26	10.74	61.15		
ROB-MW7d	3/5/2012	16:43	10.96	60.93		
ROB-MW7d	4/5/2012	11:57	11.14	60.75		
ROB-MW7d	5/8/2012	10:56	12.56	59.33		
ROB-MW7d	6/18/2012	9:33	13.58	58.31		
ROB-MW7d	7/9/2012	9:44	14.10	57.79		
ROB-MW7d	8/13/2012	10:16	18.30	53.59		
ROB-MW7d	9/17/2012	11:00	17.68	54.21		
ROB-MW7d	10/19/2012	10:20	17.45	54.44		
ROB-MW7d	12/4/2012	11:50	15.47	56.42		
ROB-MW7d	12/28/2012	9:42	15.52	56.37		
ROB-MW8s	1/29/2012	11:54	10.47	61.92	0.16	0.01
ROB-MW8s	2/7/2012	14:00	10.34	62.05	0.52	0.03
ROB-MW8s	3/5/2012	16:55	10.48	61.91	-0.14	-0.01
ROB-MW8s	4/5/2012	12:11	11.02	61.37	0.44	0.02
ROB-MW8s	5/8/2012	12:06	11.33	61.06	0.46	0.02
ROB-MW8s	6/18/2012	9:04	12.57	59.82	0.17	0.01
ROB-MW8s	7/9/2012	9:21	13.33	59.06	0.47	0.02
ROB-MW8s	8/13/2012	10:27	17.05	55.34	0.90	0.04
ROB-MW8s	9/17/2012	10:36	18.09	54.30	0.08	0.00
ROB-MW8s	10/19/2012	9:48	17.90	54.49	-0.05	-0.00

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
ROB-MW8s	12/4/2012	11:52	15.60	56.79	-0.15	-0.01
ROB-MW8s	12/28/2012	9:37	15.14	57.25	-0.09	-0.00
ROB-MW8d	1/29/2012	11:54	10.56	61.76		
ROB-MW8d	2/7/2012	14:01	10.79	61.53		
ROB-MW8d	3/5/2012	16:59	10.27	62.05		
ROB-MW8d	4/5/2012	12:12	11.39	60.93		
ROB-MW8d	5/8/2012	12:07	11.72	60.60		
ROB-MW8d	6/18/2012	9:05	12.67	59.65		
ROB-MW8d	7/9/2012	9:20	13.73	58.59		
ROB-MW8d	8/13/2012	10:28	17.88	54.44		
ROB-MW8d	9/17/2012	10:36	18.10	54.22		
ROB-MW8d	10/19/2012	9:48	17.78	54.54		
ROB-MW8d	12/4/2012	11:52	15.38	56.94		
ROB-MW8d	12/28/2012	9:38	14.98	57.34		
ANT-MW1s	1/30/2012	10:45	20.38	69.51	0.02	0.00
ANT-MW1s	2/9/2012	15:56	20.70	69.19	0.03	0.00
ANT-MW1s	3/5/2012	10:08	16.68	73.21	0.01	0.00
ANT-MW1s	4/9/2012	10:12	17.84	72.05	0.02	0.00
ANT-MW1s	5/10/2012	11:05	20.13	69.76	0.01	0.00
ANT-MW1s	6/18/2012	11:19	19.63	70.26	0.01	0.00
ANT-MW1s	7/9/2012	11:38	13.35	76.54	-0.04	-0.00
ANT-MW1s	8/15/2012	9:58	13.89	76.00	0.02	0.00
ANT-MW1s	9/17/2012	12:31	14.88	75.01	0.04	0.00
ANT-MW1s	10/19/2012	13:30	Q/M			
ANT-MW1s	12/10/2012	13:24	Dry			
ANT-MW1s	12/31/2012	8:19	Dry			
ANT-MW1d	1/30/2012	10:47	20.29	69.49		
ANT-MW1d	2/9/2012	15:57	20.62	69.16		
ANT-MW1d	3/5/2012	10:09	16.58	73.20		
ANT-MW1d	4/9/2012	10:11	17.75	72.03		
ANT-MW1d	5/10/2012	11:06	20.03	69.75		
ANT-MW1d	6/18/2012	11:18	19.53	70.25		
ANT-MW1d	7/9/2012	11:37	13.20	76.58		
ANT-MW1d	8/15/2012	9:59	13.80	75.98		
ANT-MW1d	9/17/2012	12:31	14.81	74.97		
ANT-MW1d	10/19/2012	13:30	24.42	65.36		
ANT-MW1d	12/10/2012	13:24	21.57	68.21		
ANT-MW1d	12/31/2012	8:20	23.16	66.62		
ANT-MW2s	1/30/2012	10:11	20.68	68.41	0.00	0.00
ANT-MW2s	2/9/2012	16:23	21.92	67.17	-0.88	-0.05
ANT-MW2s	3/5/2012	9:56	18.85	70.24	0.03	0.00
ANT-MW2s	4/9/2012	9:43	19.95	69.14	0.02	0.00
ANT-MW2s	5/10/2012	9:10	21.17	67.92	-0.02	-0.00
ANT-MW2s	6/18/2012	10:59	22.10	66.99	0.05	0.00
ANT-MW2s	7/9/2012	11:21	19.33	69.76	-0.03	-0.00
ANT-MW2s	8/15/2012	9:29	19.20	69.89	-0.05	-0.00
ANT-MW2s	9/17/2012	12:15	22.00	67.09	0.01	0.00
ANT-MW2s	10/19/2012	13:10	24.52	64.57	0.01	0.00
ANT-MW2s	12/10/2012	13:40	25.16	63.93	-0.02	-0.00
ANT-MW2s	12/31/2012	8:03	25.94	63.15	-0.03	-0.00
ANT-MW2d	1/30/2012	10:14	20.28	68.41		
ANT-MW2d	2/9/2012	16:24	20.64	68.05		
ANT-MW2d	3/5/2012	9:57	18.48	70.21		
ANT-MW2d	4/9/2012	9:44	19.57	69.12		
ANT-MW2d	5/10/2012	9:11	20.75	67.94		
ANT-MW2d	6/18/2012	10:58	21.75	66.94		
ANT-MW2d	7/9/2012	11:20	18.90	69.79		
ANT-MW2d	8/15/2012	9:30	18.75	69.94		
ANT-MW2d	9/17/2012	12:15	21.61	67.08		
ANT-MW2d	10/19/2012	13:10	24.13	64.56		
ANT-MW2d	12/10/2012	13:40	24.74	63.95		
ANT-MW2d	12/31/2012	8:06	25.51	63.18		
ANT-MW3s	1/30/2012	10:33	20.73	69.59	0.23	0.01
ANT-MW3s	2/9/2012	17:02	21.02	69.30	0.26	0.01
ANT-MW3s	3/5/2012	10:04	17.28	73.04	-0.28	-0.02
ANT-MW3s	4/9/2012	9:53	18.22	72.10	0.67	0.04
ANT-MW3s	5/10/2012	9:56	20.38	69.94	0.52	0.03
ANT-MW3s	6/18/2012	11:05	19.14	71.18	0.66	0.04
ANT-MW3s	7/9/2012	11:27	16.69	73.63	0.16	0.01
ANT-MW3s	8/15/2012	9:41	15.01	75.31	1.21	0.07
ANT-MW3s	9/17/2012	12:20	18.91	71.41	1.00	0.06
ANT-MW3s	10/19/2012	13:14	22.61	67.71	0.50	0.03
ANT-MW3s	12/10/2012	13:37	22.87	67.45	0.45	0.02
ANT-MW3s	12/31/2012	8:10	24.53	65.79	0.21	0.01
ANT-MW3d	1/30/2012	10:36	20.74	69.36		
ANT-MW3d	2/9/2012	17:03	21.06	69.04		
ANT-MW3d	3/5/2012	14:05	16.78	73.32		
ANT-MW3d	4/9/2012	9:52	18.67	71.43		
ANT-MW3d	5/10/2012	9:57	20.68	69.42		
ANT-MW3d	6/18/2012	11:04	19.58	70.52		
ANT-MW3d	7/9/2012	11:27	16.63	73.47		
ANT-MW3d	8/15/2012	9:42	16.00	74.10		
ANT-MW3d	9/17/2012	12:20	19.69	70.41		
ANT-MW3d	10/19/2012	13:14	22.89	67.21		
ANT-MW3d	12/10/2012	13:37	23.10	67.00		
ANT-MW3d	12/31/2012	8:11	24.52	65.58		
ANT-MW4s	1/30/2012	10:22	20.77	68.64	0.01	0.00
ANT-MW4s	2/9/2012	16:41	21.12	68.29	0.03	0.00
ANT-MW4s	3/5/2012	10:00	18.70	70.71	0.06	0.00
ANT-MW4s	4/9/2012	9:50	19.68	69.73	0.03	0.00
ANT-MW4s	5/10/2012	9:34	21.09	68.32	0.04	0.00
ANT-MW4s	6/18/2012	11:02	20.68	68.73	0.03	0.00
ANT-MW4s	7/9/2012	11:25	19.11	70.30	0.00	0.00
ANT-MW4s	8/15/2012	9:37	18.37	71.04	0.20	0.01
ANT-MW4s	9/17/2012	12:17	21.50	67.91	0.18	0.01
ANT-MW4s	10/19/2012	13:12	24.22	65.19	0.01	0.00
ANT-MW4s	12/10/2012	13:33	24.76	64.65	0.03	0.00
ANT-MW4s	12/31/2012	8:13	25.65	63.76	0.01	0.00
ANT-MW4d	1/30/2012	10:25	20.65	68.63		
ANT-MW4d	2/9/2012	16:42	21.02	68.26		
ANT-MW4d	3/5/2012	10:01	18.63	70.65		
ANT-MW4d	4/9/2012	9:49	19.58	69.70		
ANT-MW4d	5/10/2012	9:35	21.00	68.28		
ANT-MW4d	6/18/2012	11:01	20.58	68.70		
ANT-MW4d	7/9/2012	11:24	18.98	70.30		
ANT-MW4d	8/15/2012	9:38	18.44	70.84		
ANT-MW4d	9/17/2012	12:17	21.55	67.73		
ANT-MW4d	10/19/2012	13:12	24.10	65.18		
ANT-MW4d	12/10/2012	13:33	24.66	64.62		
ANT-MW4d	12/31/2012	8:14	25.53	63.75		
ANT-MW5s	1/30/2012	10:52	23.83	69.10	0.35	0.02
ANT-MW5s	2/9/2012	15:36	24.02	68.91	0.39	0.02

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
ANT-MW5s	3/5/2012	10:14	22.10	70.83	0.28	0.01
ANT-MW5s	4/9/2012	10:06	21.74	71.19	1.21	0.05
ANT-MW5s	5/10/2012	11:33	23.52	69.41	1.09	0.05
ANT-MW5s	6/18/2012	11:15	22.95	69.98	1.24	0.05
ANT-MW5s	7/9/2012	11:43	14.34	78.59	2.90	0.13
ANT-MW5s	8/15/2012	9:59	17.71	75.22	2.41	0.10
ANT-MW5s	9/17/2012	12:27	21.45	71.48	1.21	0.05
ANT-MW5s	10/19/2012	13:22	24.25	68.68	1.38	0.06
ANT-MW5s	12/10/2012	13:27	25.62	67.31	-0.29	-0.01
ANT-MW5s	12/31/2012	8:47	26.44	66.49	0.34	0.01
ANT-MW5d	1/30/2012	10:54	23.99	68.75		
ANT-MW5d	2/9/2012	15:37	24.22	68.52		
ANT-MW5d	3/5/2012	10:15	22.19	70.55		
ANT-MW5d	4/9/2012	10:05	22.76	69.98		
ANT-MW5d	5/10/2012	11:34	24.42	68.32		
ANT-MW5d	6/18/2012	11:14	24.00	68.74		
ANT-MW5d	7/9/2012	11:42	17.05	75.69		
ANT-MW5d	8/15/2012	10:00	19.93	72.81		
ANT-MW5d	9/17/2012	12:27	22.47	70.27		
ANT-MW5d	10/19/2012	13:22	25.44	67.30		
ANT-MW5d	12/10/2012	13:27	25.14	67.60		
ANT-MW5d	12/31/2012	8:48	26.59	66.15		
ANT-MW6s	1/30/2012	10:58	18.45	69.62	0.40	0.02
ANT-MW6s	2/9/2012	17:19	18.62	69.45	0.49	0.02
ANT-MW6s	3/5/2012	10:21	15.02	73.05	-0.28	-0.01
ANT-MW6s	4/9/2012	9:59	15.72	72.35	0.93	0.04
ANT-MW6s	5/10/2012	10:39	18.03	70.04	0.74	0.03
ANT-MW6s	6/18/2012	11:10	16.30	71.77	0.67	0.03
ANT-MW6s	7/9/2012	11:33	8.81	79.26	2.57	0.11
ANT-MW6s	8/15/2012	9:46	10.85	77.22	2.42	0.11
ANT-MW6s	9/17/2012	12:23	15.71	72.36	1.55	0.07
ANT-MW6s	10/19/2012	13:17	19.62	68.45	0.39	0.02
ANT-MW6s	12/10/2012	13:30	18.78	69.29	1.34	0.06
ANT-MW6s	12/31/2012	8:52	20.22	67.85	1.15	0.05
ANT-MW6d	1/30/2012	11:01	18.47	69.22		
ANT-MW6d	2/9/2012	17:20	18.73	68.96		
ANT-MW6d	3/5/2012	10:22	14.36	73.33		
ANT-MW6d	4/9/2012	9:58	16.27	71.42		
ANT-MW6d	5/10/2012	10:40	18.39	69.30		
ANT-MW6d	6/18/2012	11:09	16.59	71.10		
ANT-MW6d	7/9/2012	11:33	11.00	76.69		
ANT-MW6d	8/15/2012	9:47	12.89	74.80		
ANT-MW6d	9/17/2012	12:23	16.88	70.81		
ANT-MW6d	10/19/2012	13:17	19.63	68.06		
ANT-MW6d	12/10/2012	13:30	19.74	67.95		
ANT-MW6d	12/31/2012	8:53	20.99	66.70		
COR-MW1s	1/30/2012	16:10	6.65	103.01	-0.02	-0.00
COR-MW1s	2/10/2012	10:23	6.82	102.84	0.00	0.00
COR-MW1s	3/5/2012	10:40	6.51	103.15	0.00	0.00
COR-MW1s	4/9/2012	11:22	6.20	103.46	-0.01	-0.00
COR-MW1s	5/11/2012	15:00	7.52	102.14	0.00	0.00
COR-MW1s	6/20/2012	11:16	7.47	102.19	-0.01	-0.00
COR-MW1s	7/11/2012	15:30	8.77	100.89	-0.02	-0.00
COR-MW1s	8/17/2012	8:40	7.82	101.84	-0.01	-0.00
COR-MW1s	9/18/2012	10:28	8.18	101.48	0.02	0.00
COR-MW1s	10/19/2012	9:39	9.00	100.66	0.00	0.00
COR-MW1s	12/7/2012	13:37	7.84	101.82	0.03	0.00
COR-MW1s	12/31/2012	10:48	7.02	102.64	-0.01	-0.00
COR-MW1d	1/30/2012	16:10	6.51	103.03		
COR-MW1d	2/10/2012	10:24	6.70	102.84		
COR-MW1d	3/5/2012	10:41	6.39	103.15		
COR-MW1d	4/9/2012	11:23	6.07	103.47		
COR-MW1d	5/11/2012	15:01	7.40	102.14		
COR-MW1d	6/20/2012	11:17	7.34	102.20		
COR-MW1d	7/11/2012	15:29	8.63	100.91		
COR-MW1d	8/17/2012	8:40	7.69	101.85		
COR-MW1d	9/18/2012	10:28	8.08	101.46		
COR-MW1d	10/19/2012	9:39	8.88	100.66		
COR-MW1d	12/7/2012	13:37	7.75	101.79		
COR-MW1d	12/31/2012	10:49	6.89	102.65		
COR-MW2s	1/30/2012	16:15	6.10	105.82	0.00	0.00
COR-MW2s	2/10/2012	8:59	4.93	106.99	0.01	0.00
COR-MW2s	3/5/2012	10:43	5.67	106.25	-0.01	-0.00
COR-MW2s	4/9/2012	11:28	5.85	106.07	-0.01	-0.00
COR-MW2s	5/11/2012	14:45	7.79	104.13	-0.01	-0.00
COR-MW2s	6/20/2012	11:22	6.89	105.03	0.01	0.00
COR-MW2s	7/11/2012	15:06	7.94	103.98	0.10	0.01
COR-MW2s	8/17/2012	8:44	8.50	103.42	0.00	0.00
COR-MW2s	9/18/2012	10:23	7.25	104.67	0.01	0.00
COR-MW2s	10/19/2012	9:35	8.81	103.11	0.02	0.00
COR-MW2s	12/7/2012	13:33	7.27	104.65	0.01	0.00
COR-MW2s	12/31/2012	10:35	6.80	105.12	-0.01	-0.00
COR-MW2d	1/30/2012	16:15	5.87	105.82		
COR-MW2d	2/10/2012	9:00	4.71	106.98		
COR-MW2d	3/5/2012	10:44	5.43	106.26		
COR-MW2d	4/9/2012	11:29	5.61	106.08		
COR-MW2d	5/11/2012	14:46	7.55	104.14		
COR-MW2d	6/20/2012	11:23	6.67	105.02		
COR-MW2d	7/11/2012	15:06	7.81	103.88		
COR-MW2d	8/17/2012	8:44	8.27	103.42		
COR-MW2d	9/18/2012	10:23	7.03	104.66		
COR-MW2d	10/19/2012	9:35	8.60	103.09		
COR-MW2d	12/7/2012	13:33	7.05	104.64		
COR-MW2d	12/31/2012	10:36	6.56	105.13		
COR-MW3s	1/30/2012	16:20	7.25	105.81	0.01	0.00
COR-MW3s	2/10/2012	9:20	6.55	106.51	0.00	0.00
COR-MW3s	3/5/2012	10:46	7.22	105.84	0.00	0.00
COR-MW3s	4/9/2012	11:33	6.77	106.29	0.00	0.00
COR-MW3s	5/11/2012	14:30	8.63	104.43	-0.02	-0.00
COR-MW3s	6/20/2012	11:26	7.10	105.96	0.00	0.00
COR-MW3s	7/11/2012	15:01	8.09	104.97	-0.01	-0.00
COR-MW3s	8/17/2012	8:49	9.34	103.72	0.07	0.01
COR-MW3s	9/18/2012	10:20	7.81	105.25	-0.01	-0.00
COR-MW3s	10/19/2012	9:32	9.57	103.49	-0.03	-0.00
COR-MW3s	12/7/2012	13:30	8.23	104.83	-0.04	-0.00
COR-MW3s	12/31/2012	10:32	7.76	105.30	0.01	0.00
COR-MW3d	1/30/2012	16:20	7.10	105.80		
COR-MW3d	2/10/2012	9:21	6.39	106.51		
COR-MW3d	3/5/2012	10:47	7.06	105.84		
COR-MW3d	4/9/2012	11:34	6.61	106.29		
COR-MW3d	5/11/2012	14:31	8.45	104.45		
COR-MW3d	6/20/2012	11:27	6.94	105.96		
COR-MW3d	7/11/2012	15:00	7.92	104.98		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
COR-MW3d	8/17/2012	8:49	9.25	103.65		
COR-MW3d	9/18/2012	10:20	7.64	105.26		
COR-MW3d	10/19/2012	9:32	9.38	103.52		
COR-MW3d	12/7/2012	13:30	8.03	104.87		
COR-MW3d	12/31/2012	10:33	7.61	105.29		
COR-MW4s	1/30/2012	16:30	6.19	105.37	0.01	0.00
COR-MW4s	2/10/2012	10:02	5.61	105.95	0.01	0.00
COR-MW4s	3/5/2012	10:50	6.14	105.42	0.00	0.00
COR-MW4s	4/9/2012	11:13	5.73	105.83	0.14	0.01
COR-MW4s	5/11/2012	15:40	7.65	103.91	0.03	0.00
COR-MW4s	6/20/2012	11:10	6.63	104.93	0.22	0.02
COR-MW4s	7/11/2012	15:14	7.22	104.34	0.21	0.02
COR-MW4s	8/17/2012	8:36	8.54	103.02	0.02	0.00
COR-MW4s	9/18/2012	10:31	7.30	104.26	0.03	0.00
COR-MW4s	10/19/2012	9:41	8.75	102.81	0.03	0.00
COR-MW4s	12/7/2012	13:28	7.24	104.32	0.02	0.00
COR-MW4s	12/31/2012	10:40	6.74	104.82	0.00	0.00
COR-MW4d	1/30/2012	16:30	6.07	105.36		
COR-MW4d	2/10/2012	10:03	5.49	105.94		
COR-MW4d	3/5/2012	10:51	6.01	105.42		
COR-MW4d	4/9/2012	11:14	5.74	105.69		
COR-MW4d	5/11/2012	15:41	7.55	103.88		
COR-MW4d	6/20/2012	11:10	6.72	104.71		
COR-MW4d	7/11/2012	15:14	7.30	104.13		
COR-MW4d	8/17/2012	8:36	8.43	103.00		
COR-MW4d	9/18/2012	10:31	7.20	104.23		
COR-MW4d	10/19/2012	9:41	8.65	102.78		
COR-MW4d	12/7/2012	13:28	7.13	104.30		
COR-MW4d	12/31/2012	10:41	6.61	104.82		
COR-MW5s	1/30/2012	16:40	6.49	105.34	-0.01	-0.00
COR-MW5s	2/10/2012	9:40	6.08	105.75	-0.02	-0.00
COR-MW5s	3/5/2012	10:55	6.47	105.36	0.20	0.02
COR-MW5s	4/9/2012	11:09	6.08	105.75	-0.02	-0.00
COR-MW5s	5/11/2012	15:22	7.84	103.99	0.00	0.00
COR-MW5s	6/20/2012	11:07	6.63	105.20	-0.01	-0.00
COR-MW5s	7/11/2012	15:19	7.19	104.64	-0.02	-0.00
COR-MW5s	8/17/2012	8:30	8.67	103.16	0.00	0.00
COR-MW5s	9/18/2012	10:35	7.34	104.49	0.00	0.00
COR-MW5s	10/19/2012	9:43	8.83	103.00	0.00	0.00
COR-MW5s	12/7/2012	13:25	7.45	104.38	-0.01	-0.00
COR-MW5s	12/31/2012	10:43	6.94	104.89	0.01	0.00
COR-MW5d	1/30/2012	16:40	6.34	105.35		
COR-MW5d	2/10/2012	9:41	5.92	105.77		
COR-MW5d	3/5/2012	10:57	6.53	105.16		
COR-MW5d	4/9/2012	11:10	5.92	105.77		
COR-MW5d	5/11/2012	15:22	7.70	103.99		
COR-MW5d	6/20/2012	11:08	6.48	105.21		
COR-MW5d	7/11/2012	15:19	7.03	104.66		
COR-MW5d	8/17/2012	8:30	8.53	103.16		
COR-MW5d	9/18/2012	10:35	7.20	104.49		
COR-MW5d	10/19/2012	9:43	8.69	103.00		
COR-MW5d	12/7/2012	13:25	7.30	104.39		
COR-MW5d	12/31/2012	10:44	6.81	104.88		
FG2-MW1s	1/30/2012	9:34	5.59	75.92	-0.11	-0.01
FG2-MW1s	2/10/2012	15:21	5.71	75.80	-0.10	-0.01
FG2-MW1s	3/5/2012	10:57	6.11	75.40	-0.07	-0.00
FG2-MW1s	4/9/2012	10:41	6.92	74.59	-0.15	-0.01
FG2-MW1s	5/10/2012	13:52	4.42	77.09	0.17	0.01
FG2-MW1s	6/20/2012	9:42	4.39	77.12	-0.02	-0.00
FG2-MW1s	7/9/2012	12:11	4.61	76.90	0.08	0.01
FG2-MW1s	8/15/2012	13:36	4.40	77.11	0.17	0.01
FG2-MW1s	9/20/2012	11:57	5.00	76.51	0.11	0.01
FG2-MW1s	10/19/2012	12:51	5.32	76.19	-0.03	-0.00
FG2-MW1s	12/6/2012	10:31	5.24	76.27	-0.05	-0.00
FG2-MW1s	12/31/2012	9:15	5.24	76.27	-0.05	-0.00
FG2-MW1d	1/30/2012	9:35	5.29	76.03		
FG2-MW1d	2/10/2012	15:22	5.42	75.90		
FG2-MW1d	3/5/2012	10:58	5.85	75.47		
FG2-MW1d	4/9/2012	10:40	6.58	74.74		
FG2-MW1d	5/10/2012	13:53	4.40	76.92		
FG2-MW1d	6/20/2012	9:43	4.18	77.14		
FG2-MW1d	7/9/2012	12:10	4.50	76.82		
FG2-MW1d	8/15/2012	13:37	4.38	76.94		
FG2-MW1d	9/20/2012	11:58	4.92	76.40		
FG2-MW1d	10/19/2012	12:51	5.10	76.22		
FG2-MW1d	12/6/2012	10:31	5.00	76.32		
FG2-MW1d	12/31/2012	9:16	5.00	76.32		
FG2-MW2s	1/30/2012	9:40	9.03	76.41	0.11	0.01
FG2-MW2s	2/10/2012	16:06	9.22	76.22	0.01	0.00
FG2-MW2s	3/5/2012	10:46	8.58	76.86	0.03	0.00
FG2-MW2s	4/9/2012	10:34	9.43	76.01	0.04	0.00
FG2-MW2s	5/10/2012	12:34	8.13	77.31	0.02	0.00
FG2-MW2s	6/20/2012	9:33	7.41	78.03	0.00	0.00
FG2-MW2s	7/9/2012	12:01	7.39	78.05	0.00	0.00
FG2-MW2s	8/15/2012	13:13	6.07	79.37	0.00	0.00
FG2-MW2s	9/20/2012	11:44	6.88	78.56	0.01	0.00
FG2-MW2s	10/19/2012	12:45	8.48	76.96	0.00	0.00
FG2-MW2s	12/6/2012	10:25	7.70	77.74	0.98	0.05
FG2-MW2s	12/31/2012	8:55	7.70	77.74	0.98	0.05
FG2-MW2d	1/30/2012	9:40	9.01	76.30		
FG2-MW2d	2/10/2012	16:07	9.10	76.21		
FG2-MW2d	3/5/2012	10:49	8.48	76.83		
FG2-MW2d	4/9/2012	10:33	9.34	75.97		
FG2-MW2d	5/10/2012	12:34	8.02	77.29		
FG2-MW2d	6/20/2012	9:34	7.28	78.03		
FG2-MW2d	7/9/2012	12:00	7.26	78.05		
FG2-MW2d	8/15/2012	13:14	5.94	79.37		
FG2-MW2d	9/20/2012	11:44	6.76	78.55		
FG2-MW2d	10/19/2012	12:45	8.35	76.96		
FG2-MW2d	12/6/2012	10:25	8.55	76.76		
FG2-MW2d	12/31/2012	8:56	8.55	76.76		
FG2-MW3s	1/30/2012	9:48	9.65	76.13	0.00	0.00
FG2-MW3s	2/10/2012	15:45	9.70	76.08	0.00	0.00
FG2-MW3s	3/5/2012	10:53	9.58	76.20	0.74	0.04
FG2-MW3s	4/9/2012	10:38	10.38	75.40	-0.38	-0.02
FG2-MW3s	5/10/2012	13:22	10.33	75.45	-0.02	-0.00
FG2-MW3s	6/20/2012	9:36	9.64	76.14	-0.01	-0.00
FG2-MW3s	7/9/2012	12:06	9.12	76.66	0.00	0.00
FG2-MW3s	8/15/2012	13:17	8.57	77.21	-0.01	-0.00
FG2-MW3s	9/20/2012	11:47	8.96	76.82	0.31	0.02
FG2-MW3s	10/19/2012	12:48	9.59	76.19	0.00	0.00
FG2-MW3s	12/6/2012	10:28	9.93	75.85	-0.99	-0.06
FG2-MW3s	12/31/2012	9:05	9.93	75.85	-0.99	-0.06

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
FG2-MW3d	1/30/2012	9:49	9.21	76.13		
FG2-MW3d	2/10/2012	15:46	9.26	76.08		
FG2-MW3d	3/5/2012	10:54	9.88	75.46		
FG2-MW3d	4/9/2012	10:37	9.56	75.78		
FG2-MW3d	5/10/2012	13:23	9.87	75.47		
FG2-MW3d	6/20/2012	9:37	9.19	76.15		
FG2-MW3d	7/9/2012	12:05	8.68	76.66		
FG2-MW3d	8/15/2012	13:18	8.12	77.22		
FG2-MW3d	9/20/2012	11:48	8.83	76.51		
FG2-MW3d	10/19/2012	12:48	9.15	76.19		
FG2-MW3d	12/6/2012	10:28	8.50	76.84		
FG2-MW3d	12/31/2012	9:06	8.50	76.84		
FG2-MW4s	1/30/2012	10:03	10.05	77.31	0.00	0.00
FG2-MW4s	2/10/2012	14:56	10.22	77.14	-0.01	-0.00
FG2-MW4s	3/5/2012	11:01	8.11	79.25	0.04	0.00
FG2-MW4s	4/9/2012	10:46	10.61	76.75	-0.02	-0.00
FG2-MW4s	5/10/2012	14:14	10.80	76.56	-0.01	-0.00
FG2-MW4s	6/20/2012	9:46	10.12	77.24	0.02	0.00
FG2-MW4s	7/9/2012	12:15	9.63	77.73	0.04	0.00
FG2-MW4s	8/15/2012	13:25	8.17	79.19	-0.02	-0.00
FG2-MW4s	9/20/2012	11:51	8.67	78.69	0.27	0.02
FG2-MW4s	10/19/2012	12:55	10.06	77.30	0.02	0.00
FG2-MW4s	12/6/2012	10:36	8.85	78.51	-0.10	-0.01
FG2-MW4s	12/31/2012	9:21	8.85	78.51	-0.10	-0.01
FG2-MW4d	1/30/2012	10:05	9.60	77.31		
FG2-MW4d	2/10/2012	14:57	9.76	77.15		
FG2-MW4d	3/5/2012	11:02	7.70	79.21		
FG2-MW4d	4/9/2012	10:45	10.14	76.77		
FG2-MW4d	5/10/2012	14:15	10.34	76.57		
FG2-MW4d	6/20/2012	9:47	9.69	77.22		
FG2-MW4d	7/9/2012	12:15	9.22	77.69		
FG2-MW4d	8/15/2012	13:26	7.70	79.21		
FG2-MW4d	9/20/2012	11:52	8.49	78.42		
FG2-MW4d	10/19/2012	12:55	9.63	77.28		
FG2-MW4d	12/6/2012	10:36	8.30	78.61		
FG2-MW4d	12/31/2012	9:22	8.30	78.61		
FG2-MW5s	1/30/2012	10:07	9.65	73.91	-0.23	-0.01
FG2-MW5s	2/10/2012	14:34	5.91	77.65	0.00	0.00
FG2-MW5s	3/5/2012	11:09	5.43	78.13	0.01	0.00
FG2-MW5s	4/9/2012	10:52	6.83	76.73	0.03	0.00
FG2-MW5s	5/10/2012	14:38	6.30	77.26	0.01	0.00
FG2-MW5s	6/20/2012	9:23	6.85	76.71	-0.01	-0.00
FG2-MW5s	7/9/2012	12:20	6.74	76.82	0.02	0.00
FG2-MW5s	8/15/2012	12:56	3.83	79.73	0.04	0.00
FG2-MW5s	9/20/2012	11:40	4.13	79.43	0.08	0.00
FG2-MW5s	10/19/2012	13:00	11.11	72.45	0.13	0.01
FG2-MW5s	12/6/2012	10:21	5.12	78.44	0.01	0.00
FG2-MW5s	12/31/2012		N/M			
FG2-MW5d	1/30/2012	10:08	9.21	74.14		
FG2-MW5d	2/10/2012	14:35	5.70	77.65		
FG2-MW5d	3/5/2012	11:10	5.23	78.12		
FG2-MW5d	4/9/2012	10:51	6.65	76.70		
FG2-MW5d	5/10/2012	14:38	6.10	77.25		
FG2-MW5d	6/20/2012	9:24	6.63	76.72		
FG2-MW5d	7/9/2012	12:19	6.55	76.80		
FG2-MW5d	8/15/2012	12:57	3.66	79.69		
FG2-MW5d	9/20/2012	11:40	4.00	79.35		
FG2-MW5d	10/19/2012	13:00	11.03	72.32		
FG2-MW5d	12/6/2012	10:21	4.92	78.43		
FG2-MW5d	12/31/2012		N/M			
GOD-MW1s	1/30/2012	15:33	8.71	89.46	0.02	0.00
GOD-MW1s	2/9/2012	10:54	8.66	89.51	0.02	0.00
GOD-MW1s	3/5/2012	9:15	7.21	90.96	0.19	0.01
GOD-MW1s	4/9/2012	13:43	7.06	91.11	0.01	0.00
GOD-MW1s	5/9/2012	17:23	7.70	90.47	-0.01	-0.00
GOD-MW1s	6/20/2012	13:24	7.05	91.12	0.01	0.00
GOD-MW1s	7/11/2012	13:28	8.19	89.98	-0.02	-0.00
GOD-MW1s	8/20/2012	15:10	6.23	91.94	0.04	0.00
GOD-MW1s	9/20/2012	9:18	7.12	91.05	-0.05	-0.00
GOD-MW1s	10/19/2012	10:52	9.12	89.05	0.04	0.00
GOD-MW1s	12/3/2012	13:27	9.86	88.31	0.02	0.00
GOD-MW1s	12/31/2012	12:07	9.70	88.47	0.02	0.00
GOD-MW1d	1/30/2012	15:33	8.64	89.44		
GOD-MW1d	2/9/2012	10:56	8.59	89.49		
GOD-MW1d	3/5/2012	9:16	7.31	90.77		
GOD-MW1d	4/9/2012	13:44	6.98	91.10		
GOD-MW1d	5/9/2012	17:24	7.60	90.48		
GOD-MW1d	6/20/2012	13:25	6.97	91.11		
GOD-MW1d	7/11/2012	13:28	8.08	90.00		
GOD-MW1d	8/20/2012	15:11	6.18	91.90		
GOD-MW1d	9/20/2012	9:18	6.98	91.10		
GOD-MW1d	10/19/2012	10:52	9.07	89.01		
GOD-MW1d	12/3/2012	13:27	9.79	88.29		
GOD-MW1d	12/31/2012	12:08	9.63	88.45		
GOD-MW2s	1/30/2012	15:40	10.99	91.41	0.01	0.00
GOD-MW2s	2/9/2012	11:42	11.14	91.26	-0.02	-0.00
GOD-MW2s	3/5/2012	9:19	10.71	91.69	-0.02	-0.00
GOD-MW2s	4/9/2012	13:24	10.23	92.17	-0.11	-0.01
GOD-MW2s	5/9/2012	16:32	10.80	91.60	0.01	0.00
GOD-MW2s	6/20/2012	13:41	10.15	92.25	0.01	0.00
GOD-MW2s	7/11/2012	13:17	11.11	91.29	-0.03	-0.00
GOD-MW2s	8/20/2012	15:18	10.23	92.17	0.02	0.00
GOD-MW2s	9/20/2012	9:27	11.12	91.28	0.01	0.00
GOD-MW2s	10/19/2012	10:41	12.22	90.18	0.03	0.00
GOD-MW2s	12/3/2012	13:33	12.94	89.46	0.01	0.00
GOD-MW2s	12/31/2012	11:58	12.90	89.50	0.02	0.00
GOD-MW2d	1/30/2012	15:40	10.90	91.40		
GOD-MW2d	2/9/2012	11:43	11.02	91.28		
GOD-MW2d	3/5/2012	9:20	10.59	91.71		
GOD-MW2d	4/9/2012	13:25	10.02	92.28		
GOD-MW2d	5/9/2012	16:33	10.71	91.59		
GOD-MW2d	6/20/2012	13:42	10.06	92.24		
GOD-MW2d	7/11/2012	13:17	10.98	91.32		
GOD-MW2d	8/20/2012	15:18	10.15	92.15		
GOD-MW2d	9/20/2012	9:27	11.03	91.27		
GOD-MW2d	10/19/2012	10:41	12.15	90.15		
GOD-MW2d	12/3/2012	13:33	12.85	89.45		
GOD-MW2d	12/31/2012	11:59	12.82	89.48		
GOD-MW3s	1/30/2012	15:43	11.55	89.84	0.02	0.00
GOD-MW3s	2/9/2012	11:21	11.74	89.65	0.03	0.00
GOD-MW3s	3/5/2012	9:22	11.81	89.58	0.04	0.00
GOD-MW3s	4/9/2012	13:31	10.61	90.78	0.00	0.00

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
GOD-MW3s	5/9/2012	17:00	11.35	90.04	0.00	0.00
GOD-MW3s	6/20/2012	13:36	11.17	90.22	0.03	0.00
GOD-MW3s	7/11/2012	13:20	12.06	89.33	-0.05	-0.00
GOD-MW3s	8/20/2012	15:14	11.77	89.62	0.04	0.00
GOD-MW3s	9/20/2012	9:22	12.33	89.06	0.05	0.00
GOD-MW3s	10/19/2012	10:48	12.96	88.43	0.00	0.00
GOD-MW3s	12/3/2012	13:30	13.40	87.99	0.02	0.00
GOD-MW3s	12/31/2012	12:02	13.28	88.11	-0.01	-0.00
GOD-MW3d	1/30/2012	15:43	11.44	89.82		
GOD-MW3d	2/9/2012	11:22	11.64	89.62		
GOD-MW3d	3/5/2012	9:23	11.72	89.54		
GOD-MW3d	4/9/2012	13:32	10.48	90.78		
GOD-MW3d	5/9/2012	17:00	11.22	90.04		
GOD-MW3d	6/20/2012	13:37	11.07	90.19		
GOD-MW3d	7/11/2012	13:20	11.88	89.38		
GOD-MW3d	8/20/2012	15:14	11.68	89.58		
GOD-MW3d	9/20/2012	9:22	12.25	89.01		
GOD-MW3d	10/19/2012	10:48	12.83	88.43		
GOD-MW3d	12/3/2012	13:30	13.29	87.97		
GOD-MW3d	12/31/2012	12:03	13.14	88.12		
GOD-MW4s	1/30/2012	0:00	11.93	89.72	0.00	0.00
GOD-MW4s	2/9/2012	10:28	11.32	90.33	-0.06	-0.00
GOD-MW4s	3/5/2012	9:25	11.42	90.23	-0.01	-0.00
GOD-MW4s	4/9/2012	13:36	11.25	90.40	0.01	0.00
GOD-MW4s	5/9/2012	17:44	11.14	90.51	0.00	0.00
GOD-MW4s	6/20/2012	13:31	11.63	90.02	-0.01	-0.00
GOD-MW4s	7/11/2012	13:24	12.23	89.42	0.24	0.02
GOD-MW4s	8/20/2012	15:06	12.16	89.49	-0.01	-0.00
GOD-MW4s	9/20/2012	9:14	12.74	88.91	0.05	0.00
GOD-MW4s	10/19/2012	10:55	13.08	88.57	0.07	0.00
GOD-MW4s	12/3/2012	13:24	13.67	87.98	0.01	0.00
GOD-MW4s	12/31/2012	12:12	13.51	88.14	-0.02	-0.00
GOD-MW4d	1/30/2012	15:50	11.58	89.72		
GOD-MW4d	2/9/2012	10:29	10.91	90.39		
GOD-MW4d	3/5/2012	9:26	11.06	90.24		
GOD-MW4d	4/9/2012	13:37	10.91	90.39		
GOD-MW4d	5/9/2012	17:45	10.79	90.51		
GOD-MW4d	6/20/2012	13:32	11.27	90.03		
GOD-MW4d	7/11/2012	13:24	12.12	89.18		
GOD-MW4d	8/20/2012	15:07	11.80	89.50		
GOD-MW4d	9/20/2012	9:14	12.44	88.86		
GOD-MW4d	10/19/2012	10:55	12.80	88.50		
GOD-MW4d	12/3/2012	13:24	13.33	87.97		
GOD-MW4d	12/31/2012	12:13	13.14	88.16		
GOD-MW5s	1/30/2012	15:55	6.12	96.30	0.00	0.00
GOD-MW5s	2/9/2012	12:58	6.18	96.24	0.00	0.00
GOD-MW5s	3/5/2012	9:30	4.39	98.03	-0.02	-0.00
GOD-MW5s	4/9/2012	13:08	5.06	97.36	0.00	0.00
GOD-MW5s	5/9/2012	18:44	8.57	93.85	-0.06	-0.00
GOD-MW5s	6/20/2012	12:47	6.28	96.14	-0.04	-0.00
GOD-MW5s	7/11/2012	13:01	7.30	95.12	-0.19	-0.01
GOD-MW5s	8/20/2012	15:28	6.42	96.00	0.00	0.00
GOD-MW5s	9/20/2012	9:41	6.94	95.48	0.04	0.00
GOD-MW5s	10/19/2012	10:30	9.14	93.28	-0.07	-0.00
GOD-MW5s	12/3/2012	13:41	9.22	93.20	-0.05	-0.00
GOD-MW5s	12/31/2012	12:30	9.38	93.04	-0.06	-0.00
GOD-MW5d	1/30/2012	15:55	5.86	96.30		
GOD-MW5d	2/9/2012	12:59	5.92	96.24		
GOD-MW5d	3/5/2012	9:31	4.11	98.05		
GOD-MW5d	4/9/2012	13:09	4.80	97.36		
GOD-MW5d	5/9/2012	18:44	8.25	93.91		
GOD-MW5d	6/20/2012	12:48	5.98	96.18		
GOD-MW5d	7/11/2012	13:01	6.85	95.31		
GOD-MW5d	8/20/2012	15:28	6.16	96.00		
GOD-MW5d	9/20/2012	9:41	6.72	95.44		
GOD-MW5d	10/19/2012	10:30	8.81	93.35		
GOD-MW5d	12/3/2012	13:41	8.91	93.25		
GOD-MW5d	12/31/2012	12:32	9.06	93.10		
GOD-MW6s	1/30/2012	16:00	6.84	93.84	-0.03	-0.00
GOD-MW6s	2/9/2012	12:09	7.07	93.61	-0.03	-0.00
GOD-MW6s	3/5/2012	9:33	5.79	94.89	0.02	0.00
GOD-MW6s	4/9/2012	13:18	6.58	94.10	-0.03	-0.00
GOD-MW6s	5/9/2012	18:08	9.10	91.58	-0.15	-0.01
GOD-MW6s	6/20/2012	13:14	6.24	94.44	-0.02	-0.00
GOD-MW6s	7/11/2012	13:13	7.41	93.27	-0.04	-0.00
GOD-MW6s	8/20/2012	15:21	6.29	94.39	-0.06	-0.00
GOD-MW6s	9/20/2012	9:33	6.87	93.81	-0.25	-0.01
GOD-MW6s	10/19/2012	10:38	9.76	90.92	-0.01	-0.00
GOD-MW6s	12/3/2012	13:35	10.30	90.38	-0.06	-0.00
GOD-MW6s	12/31/2012	12:20	10.25	90.43	-0.03	-0.00
GOD-MW6d	1/30/2012	16:00	6.74	93.87		
GOD-MW6d	2/9/2012	12:10	6.97	93.64		
GOD-MW6d	3/5/2012	9:35	5.74	94.87		
GOD-MW6d	4/9/2012	13:19	6.48	94.13		
GOD-MW6d	5/9/2012	18:09	8.88	91.73		
GOD-MW6d	6/20/2012	13:15	6.15	94.46		
GOD-MW6d	7/11/2012	13:13	7.30	93.31		
GOD-MW6d	8/20/2012	15:21	6.16	94.45		
GOD-MW6d	9/20/2012	9:33	6.55	94.06		
GOD-MW6d	10/19/2012	10:38	9.68	90.93		
GOD-MW6d	12/3/2012	13:35	10.17	90.44		
GOD-MW6d	12/31/2012	12:21	10.15	90.46		
GOD-MW7s	1/30/2012	16:05	5.79	94.64	0.04	0.00
GOD-MW7s	2/9/2012	12:31	6.06	94.37	0.04	0.00
GOD-MW7s	3/5/2012	9:43	3.51	96.92	0.24	0.01
GOD-MW7s	4/9/2012	13:12	5.14	95.29	0.00	0.00
GOD-MW7s	5/9/2012	18:33	9.40	91.03	-0.07	-0.00
GOD-MW7s	6/20/2012	13:08	5.31	95.12	0.09	0.00
GOD-MW7s	7/11/2012	13:09	6.27	94.16	0.06	0.00
GOD-MW7s	8/20/2012	15:24	5.45	94.98	0.07	0.00
GOD-MW7s	9/20/2012	9:36	6.00	94.43	0.05	0.00
GOD-MW7s	10/19/2012	10:33	9.83	90.60	0.00	0.00
GOD-MW7s	12/3/2012	13:38	9.92	90.51	0.04	0.00
GOD-MW7s	12/31/2012	12:25	9.89	90.54	0.03	0.00
GOD-MW7d	1/30/2012	16:05	5.75	94.60		
GOD-MW7d	2/9/2012	12:32	6.02	94.33		
GOD-MW7d	3/5/2012	9:45	3.67	96.68		
GOD-MW7d	4/9/2012	13:13	5.06	95.29		
GOD-MW7d	5/9/2012	18:34	9.25	91.10		
GOD-MW7d	6/20/2012	13:09	5.32	95.03		
GOD-MW7d	7/11/2012	13:09	6.25	94.10		
GOD-MW7d	8/20/2012	15:24	5.44	94.91		
GOD-MW7d	9/20/2012	9:37	5.97	94.38		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
GOD-MW7d	10/19/2012	10:33	9.75	90.60		
GOD-MW7d	12/3/2012	13:38	9.88	90.47		
GOD-MW7d	12/31/2012	12:26	9.84	90.51		
MAC-MW1s	1/30/2012	15:05	6.87	93.56	0.01	0.00
MAC-MW1s	2/9/2012	15:14	7.61	92.82	-0.01	-0.00
MAC-MW1s	3/5/2012	10:07	4.96	95.47	0.00	0.00
MAC-MW1s	4/9/2012	12:40	7.51	92.92	0.00	0.00
MAC-MW1s	5/11/2012	11:48	6.04	94.39	0.00	0.00
MAC-MW1s	6/20/2012	12:25	6.74	93.69	0.01	0.00
MAC-MW1s	7/11/2012	14:35	7.66	92.77	-0.02	-0.00
MAC-MW1s	8/17/2012	10:29	6.28	94.15	-0.02	-0.00
MAC-MW1s	9/20/2012	10:43	6.95	93.48	-0.02	-0.00
MAC-MW1s	10/19/2012	10:00	5.68	94.75	-0.01	-0.00
MAC-MW1s	12/3/2012	15:44	5.62	94.81	-0.01	-0.00
MAC-MW1s	12/31/2012	11:11	6.15	94.28	-0.01	-0.00
MAC-MW1d	1/30/2012	15:05	6.79	93.55		
MAC-MW1d	2/9/2012	15:15	7.51	92.83		
MAC-MW1d	3/5/2012	10:08	4.87	95.47		
MAC-MW1d	4/9/2012	12:41	7.42	92.92		
MAC-MW1d	5/11/2012	11:49	5.95	94.39		
MAC-MW1d	6/20/2012	12:26	6.66	93.68		
MAC-MW1d	7/11/2012	14:35	7.55	92.79		
MAC-MW1d	8/17/2012	10:29	6.17	94.17		
MAC-MW1d	9/20/2012	10:43	6.84	93.50		
MAC-MW1d	10/19/2012	10:00	5.58	94.76		
MAC-MW1d	12/3/2012	15:44	5.52	94.82		
MAC-MW1d	12/31/2012	11:12	6.05	94.29		
MAC-MW2s	1/30/2012	15:10	6.04	93.38	0.04	0.00
MAC-MW2s	2/9/2012	14:53	6.71	92.71	0.01	0.00
MAC-MW2s	3/5/2012	10:10	3.66	95.76	0.02	0.00
MAC-MW2s	4/9/2012	12:44	6.56	92.86	0.03	0.00
MAC-MW2s	5/11/2012	12:00	5.32	94.10	0.04	0.00
MAC-MW2s	6/20/2012	12:31	3.98	95.44	0.03	0.00
MAC-MW2s	7/11/2012	14:32	5.00	94.42	0.07	0.01
MAC-MW2s	8/17/2012	10:31	5.05	94.37	0.03	0.00
MAC-MW2s	9/20/2012	10:47	5.74	93.68	0.01	0.00
MAC-MW2s	10/19/2012	9:57	5.23	94.19	0.03	0.00
MAC-MW2s	12/3/2012	15:47	6.05	93.37	0.06	0.00
MAC-MW2s	12/31/2012	11:06	6.22	93.20	0.02	0.00
MAC-MW2d	1/30/2012	15:10	5.82	93.34		
MAC-MW2d	2/9/2012	14:54	6.46	92.70		
MAC-MW2d	3/5/2012	10:10	3.42	95.74		
MAC-MW2d	4/9/2012	12:45	6.33	92.83		
MAC-MW2d	5/11/2012	12:01	5.10	94.06		
MAC-MW2d	6/20/2012	12:32	3.75	95.41		
MAC-MW2d	7/11/2012	14:31	4.81	94.35		
MAC-MW2d	8/17/2012	10:31	4.82	94.34		
MAC-MW2d	9/20/2012	10:47	5.49	93.67		
MAC-MW2d	10/19/2012	9:57	5.00	94.16		
MAC-MW2d	12/3/2012	15:47	5.85	93.31		
MAC-MW2d	12/31/2012	11:07	5.98	93.18		
MAC-MW3s	1/30/2012	15:15	6.10	91.96	0.08	0.00
MAC-MW3s	2/9/2012	16:05	5.34	92.72	0.20	0.01
MAC-MW3s	3/5/2012	10:12	4.55	93.51	0.05	0.00
MAC-MW3s	4/9/2012	12:19	6.51	91.55	0.02	0.00
MAC-MW3s	5/11/2012	10:26	5.00	93.06	-0.09	-0.00
MAC-MW3s	6/20/2012	12:12	6.50	91.56	0.01	0.00
MAC-MW3s	7/11/2012	14:49	7.48	90.58	0.00	0.00
MAC-MW3s	8/17/2012	10:20	5.28	92.78	-0.02	-0.00
MAC-MW3s	9/20/2012	10:29	5.81	92.25	0.00	0.00
MAC-MW3s	10/19/2012	10:07	5.75	92.31	-0.15	-0.01
MAC-MW3s	12/3/2012	15:55	4.94	93.12	-0.04	-0.00
MAC-MW3s	12/31/2012	11:24	4.48	93.58	-0.06	-0.00
MAC-MW3d	1/30/2012	15:15	6.00	91.88		
MAC-MW3d	2/9/2012	16:06	5.36	92.52		
MAC-MW3d	3/5/2012	10:13	4.42	93.46		
MAC-MW3d	4/9/2012	12:20	6.35	91.53		
MAC-MW3d	5/11/2012	10:27	4.73	93.15		
MAC-MW3d	6/20/2012	12:13	6.33	91.55		
MAC-MW3d	7/11/2012	14:49	7.30	90.58		
MAC-MW3d	8/17/2012	10:20	5.08	92.80		
MAC-MW3d	9/20/2012	10:29	5.63	92.25		
MAC-MW3d	10/19/2012	10:07	5.42	92.46		
MAC-MW3d	12/3/2012	15:55	4.72	93.16		
MAC-MW3d	12/31/2012	11:25	4.24	93.64		
MAC-MW4s	1/30/2012	15:20	6.01	92.50	0.20	0.01
MAC-MW4s	2/9/2012	15:45	6.52	91.99	0.17	0.01
MAC-MW4s	3/5/2012	10:15	4.65	93.86	0.28	0.01
MAC-MW4s	4/9/2012	12:25	6.78	91.73	0.20	0.01
MAC-MW4s	5/11/2012	10:50	5.65	92.86	0.19	0.01
MAC-MW4s	6/20/2012	12:18	6.01	92.50	0.21	0.01
MAC-MW4s	7/11/2012	14:43	7.26	91.25	0.14	0.01
MAC-MW4s	8/17/2012	10:24	5.44	93.07	0.17	0.01
MAC-MW4s	9/20/2012	10:32	5.96	92.55	0.17	0.01
MAC-MW4s	10/19/2012	10:04	5.15	93.36	0.20	0.01
MAC-MW4s	12/3/2012	15:52	4.62	93.89	0.24	0.01
MAC-MW4s	12/31/2012	11:19	5.32	93.19	0.21	0.01
MAC-MW4d	1/30/2012	15:20	5.95	92.30		
MAC-MW4d	2/9/2012	15:46	6.43	91.82		
MAC-MW4d	3/5/2012	10:16	4.67	93.58		
MAC-MW4d	4/9/2012	12:26	6.72	91.53		
MAC-MW4d	5/11/2012	10:52	5.58	92.67		
MAC-MW4d	6/20/2012	12:19	5.96	92.29		
MAC-MW4d	7/11/2012	14:43	7.14	91.11		
MAC-MW4d	8/17/2012	10:24	5.35	92.90		
MAC-MW4d	9/20/2012	10:32	5.87	92.38		
MAC-MW4d	10/19/2012	10:04	5.09	93.16		
MAC-MW4d	12/3/2012	15:52	4.60	93.65		
MAC-MW4d	12/31/2012	11:20	5.27	92.98		
MAC-MW5s	1/30/2012	15:25	5.23	93.00	-0.02	-0.00
MAC-MW5s	2/9/2012	15:30	5.90	92.33	-0.03	-0.00
MAC-MW5s	3/5/2012	10:19	3.87	94.36	-0.07	-0.00
MAC-MW5s	4/9/2012	12:30	6.03	92.20	0.01	0.00
MAC-MW5s	5/11/2012	11:20	4.80	93.43	-0.03	-0.00
MAC-MW5s	6/20/2012	12:20	5.21	93.02	-0.02	-0.00
MAC-MW5s	7/11/2012	14:40	6.18	92.05	0.08	0.00
MAC-MW5s	8/17/2012	10:27	4.65	93.58	0.02	0.00
MAC-MW5s	9/20/2012	10:37	4.98	93.25	0.01	0.00
MAC-MW5s	10/19/2012	10:02	4.28	93.95	0.00	0.00
MAC-MW5s	12/3/2012	15:49	4.07	94.16	-0.04	-0.00
MAC-MW5s	12/31/2012	11:15	4.70	93.53	0.01	0.00
MAC-MW5d	1/30/2012	15:25	5.04	93.02		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
MAC-MW5d	2/9/2012	15:31	5.70	92.36		
MAC-MW5d	3/5/2012	10:21	3.63	94.43		
MAC-MW5d	4/9/2012	12:31	5.87	92.19		
MAC-MW5d	5/11/2012	11:21	4.60	93.46		
MAC-MW5d	6/20/2012	12:21	5.02	93.04		
MAC-MW5d	7/11/2012	14:40	6.09	91.97		
MAC-MW5d	8/17/2012	10:27	4.50	93.56		
MAC-MW5d	9/20/2012	10:37	4.82	93.24		
MAC-MW5d	10/19/2012	10:02	4.11	93.95		
MAC-MW5d	12/3/2012	15:49	3.86	94.20		
MAC-MW5d	12/31/2012	11:16	4.54	93.52		
NUN-MW1s	1/30/2012	14:30	7.76	87.47	0.01	0.00
NUN-MW1s	2/9/2012	14:29	6.74	88.49	0.31	0.02
NUN-MW1s	3/5/2012	9:50	6.79	88.44	-0.03	-0.00
NUN-MW1s	4/9/2012	11:58	7.47	87.76	-0.02	-0.00
NUN-MW1s	5/11/2012	13:00	7.65	87.58	-0.03	-0.00
NUN-MW1s	6/20/2012	11:52	7.50	87.73	-0.05	-0.00
NUN-MW1s	7/11/2012	13:47	8.00	87.23	-0.01	-0.00
NUN-MW1s	8/17/2012	11:50	6.94	88.29	0.00	0.00
NUN-MW1s	9/20/2012	10:03	7.19	88.04	0.12	0.01
NUN-MW1s	10/19/2012	10:18	6.55	88.68	-0.03	-0.00
NUN-MW1s	12/4/2012	13:07	7.15	88.08	-0.03	-0.00
NUN-MW1s	12/31/2012	11:30	5.87	89.36	0.01	0.00
NUN-MW1d	1/30/2012	14:30	7.50	87.46		
NUN-MW1d	2/9/2012	14:30	6.78	88.18		
NUN-MW1d	3/5/2012	9:51	6.49	88.47		
NUN-MW1d	4/9/2012	11:59	7.18	87.78		
NUN-MW1d	5/11/2012	13:01	7.35	87.61		
NUN-MW1d	6/20/2012	11:53	7.18	87.78		
NUN-MW1d	7/11/2012	13:47	7.72	87.24		
NUN-MW1d	8/17/2012	11:50	6.67	88.29		
NUN-MW1d	9/20/2012	10:03	7.04	87.92		
NUN-MW1d	10/19/2012	10:18	6.25	88.71		
NUN-MW1d	12/4/2012	13:07	6.85	88.11		
NUN-MW1d	12/31/2012	11:31	5.61	89.35		
NUN-MW2s	1/30/2012	14:40	8.02	89.06	0.03	0.00
NUN-MW2s	2/9/2012	13:21	8.00	89.08	0.00	0.00
NUN-MW2s	3/5/2012	9:54	7.62	89.46	-0.03	-0.00
NUN-MW2s	4/9/2012	12:05	8.12	88.96	-0.02	-0.00
NUN-MW2s	5/11/2012	13:26	7.97	89.11	-0.03	-0.00
NUN-MW2s	6/20/2012	12:05	7.98	89.10	0.02	0.00
NUN-MW2s	7/11/2012	13:58	8.26	88.82	0.07	0.00
NUN-MW2s	8/17/2012	11:56	7.58	89.50	-0.01	-0.00
NUN-MW2s	9/20/2012	10:05	7.92	89.16	0.05	0.00
NUN-MW2s	10/19/2012	10:15	7.58	89.50	-0.01	-0.00
NUN-MW2s	12/4/2012	13:09	7.20	89.88	0.23	0.01
NUN-MW2s	12/31/2012	11:25	6.94	90.14	-0.02	-0.00
NUN-MW2d	1/30/2012	14:40	7.86	89.03		
NUN-MW2d	2/9/2012	13:22	7.81	89.08		
NUN-MW2d	3/5/2012	9:55	7.40	89.49		
NUN-MW2d	4/9/2012	12:06	7.91	88.98		
NUN-MW2d	5/11/2012	13:27	7.75	89.14		
NUN-MW2d	6/20/2012	12:06	7.81	89.08		
NUN-MW2d	7/11/2012	13:57	8.14	88.75		
NUN-MW2d	8/17/2012	11:55	7.38	89.51		
NUN-MW2d	9/20/2012	10:05	7.78	89.11		
NUN-MW2d	10/19/2012	10:15	7.38	89.51		
NUN-MW2d	12/4/2012	13:09	7.24	89.65		
NUN-MW2d	12/31/2012	11:26	6.73	90.16		
NUN-MW3s	1/30/2012	14:50	5.91	88.01	-0.01	-0.00
NUN-MW3s	2/9/2012	14:06	5.37	88.55	0.05	0.00
NUN-MW3s	3/5/2012	9:58	5.04	88.88	-0.02	-0.00
NUN-MW3s	4/9/2012	12:04	5.76	88.16	0.01	0.00
NUN-MW3s	5/11/2012	12:44	5.92	88.00	0.03	0.00
NUN-MW3s	6/20/2012	11:47	5.75	88.17	0.00	0.00
NUN-MW3s	7/11/2012	13:50	6.16	87.76	-0.03	-0.00
NUN-MW3s	8/17/2012	11:47	4.79	89.13	0.01	0.00
NUN-MW3s	9/20/2012	10:00	5.09	88.83	-0.03	-0.00
NUN-MW3s	10/19/2012	10:21	6.38	87.54	-0.12	-0.01
NUN-MW3s	12/4/2012	13:03	5.60	88.32	-0.01	-0.00
NUN-MW3s	12/31/2012	11:38	4.48	89.44	0.00	0.00
NUN-MW3d	1/30/2012	14:50	5.84	88.02		
NUN-MW3d	2/9/2012	14:07	5.36	88.50		
NUN-MW3d	3/5/2012	10:00	4.96	88.90		
NUN-MW3d	4/9/2012	12:05	5.71	88.15		
NUN-MW3d	5/11/2012	12:45	5.89	87.97		
NUN-MW3d	6/20/2012	11:48	5.69	88.17		
NUN-MW3d	7/11/2012	13:50	6.07	87.79		
NUN-MW3d	8/17/2012	11:47	4.74	89.12		
NUN-MW3d	9/20/2012	10:00	5.00	88.86		
NUN-MW3d	10/19/2012	10:21	6.20	87.66		
NUN-MW3d	12/4/2012	13:03	5.53	88.33		
NUN-MW3d	12/31/2012	11:39	4.42	89.44		
NUN-MW4s	1/30/2012	15:00	7.04	88.57	0.01	0.00
NUN-MW4s	2/9/2012	13:49	7.12	88.49	-0.02	-0.00
NUN-MW4s	3/5/2012	10:03	6.56	89.05	-0.06	-0.00
NUN-MW4s	4/9/2012	11:52	7.20	88.41	-0.02	-0.00
NUN-MW4s	5/11/2012	12:30	7.12	88.49	0.00	0.00
NUN-MW4s	6/20/2012	11:42	6.90	88.71	-0.03	-0.00
NUN-MW4s	7/11/2012	13:54	7.34	88.27	-0.04	-0.00
NUN-MW4s	8/17/2012	11:42	5.60	90.01	0.04	0.00
NUN-MW4s	9/20/2012	9:56	5.91	89.70	-0.04	-0.00
NUN-MW4s	10/19/2012	10:26	6.77	88.84	-0.11	-0.01
NUN-MW4s	12/4/2012	13:00	6.94	88.67	0.00	0.00
NUN-MW4s	12/31/2012	11:42	5.94	89.67	0.03	0.00
NUN-MW4d	1/30/2012	15:00	6.98	88.56		
NUN-MW4d	2/9/2012	13:50	7.03	88.51		
NUN-MW4d	3/5/2012	10:05	6.43	89.11		
NUN-MW4d	4/9/2012	11:53	7.11	88.43		
NUN-MW4d	5/11/2012	12:30	7.05	88.49		
NUN-MW4d	6/20/2012	11:43	6.80	88.74		
NUN-MW4d	7/11/2012	13:53	7.23	88.31		
NUN-MW4d	8/17/2012	11:42	5.57	89.97		
NUN-MW4d	9/20/2012	9:56	5.80	89.74		
NUN-MW4d	10/19/2012	10:26	6.59	88.95		
NUN-MW4d	12/4/2012	13:00	6.87	88.67		
NUN-MW4d	12/31/2012	11:43	5.90	89.64		
MOO-MW1	1/30/2012	9:06	13.15	60.81		
MOO-MW1	2/26/2012	13:42	13.15	60.81		
MOO-MW1	3/5/2012	14:47	13.28	60.68		
MOO-MW1	4/5/2012	15:03	19.40	54.56		
MOO-MW1	5/11/2012	11:16	14.70	59.26		
MOO-MW1	6/18/2012	10:32	14.79	59.17		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
MOO-MW1	7/9/2012	10:56	14.09	59.87		
MOO-MW1	8/14/2012	12:28	13.18	60.78		
MOO-MW1	9/17/2012	11:51	13.13	60.83		
MOO-MW1	10/19/2012	11:45	14.35	59.61		
MOO-MW1	12/10/2012	9:48	14.85	59.11		
MOO-MW1	12/28/2012	11:04	14.87	59.09		
MOO-MW2	1/30/2012	9:12	18.68	56.90		
MOO-MW2	2/26/2012	14:39	17.90	57.68		
MOO-MW2	3/5/2012	14:49	18.30	57.28		
MOO-MW2	4/5/2012	15:14	14.03	61.55		
MOO-MW2	5/11/2012	11:35	20.28	55.30		
MOO-MW2	6/18/2012	10:30	20.58	55.00		
MOO-MW2	7/9/2012	10:54	20.14	55.44		
MOO-MW2	8/14/2012	12:20	19.73	55.85		
MOO-MW2	9/17/2012	11:48	19.02	56.56		
MOO-MW2	10/19/2012	11:56	20.42	55.16		
MOO-MW2	12/10/2012	9:50	21.51	54.07		
MOO-MW2	12/28/2012	11:00	21.23	54.35		
MOO-MW3	1/30/2012	8:36	11.77	65.12		
MOO-MW3	2/26/2012	15:43	12.02	64.87		
MOO-MW3	3/5/2012	14:56	12.14	64.75		
MOO-MW3	4/5/2012	14:48	12.67	64.22		
MOO-MW3	5/11/2012	11:55	13.02	63.87		
MOO-MW3	6/18/2012	10:25	12.85	64.04		
MOO-MW3	7/9/2012	10:46	12.04	64.85		
MOO-MW3	8/14/2012	12:11	11.06	65.83		
MOO-MW3	9/17/2012	11:45	11.19	65.70		
MOO-MW3	10/19/2012	11:40	12.40	64.49		
MOO-MW3	12/10/2012	9:58	13.52	63.37		
MOO-MW3	12/28/2012	10:52	13.81	63.08		
MOO-MW4	1/30/2012	8:56	12.32	65.88		
MOO-MW4	2/26/2012	16:36	12.57	65.63		
MOO-MW4	3/5/2012	15:00	12.45	65.75		
MOO-MW4	4/5/2012	14:31	12.91	65.29		
MOO-MW4	5/11/2012	12:36	12.55	65.65		
MOO-MW4	6/18/2012	10:20	12.90	65.30		
MOO-MW4	7/9/2012	10:40	11.93	66.27		
MOO-MW4	8/14/2012	12:01	11.37	66.83		
MOO-MW4	9/17/2012	11:40	12.20	66.00		
MOO-MW4	10/19/2012	11:28	12.92	65.28		
MOO-MW4	12/10/2012	9:55	14.29	63.91		
MOO-MW4	12/28/2012	11:25	14.18	64.02		
MOO-MW5s	1/30/2012	8:45	12.11	64.93	1.53	0.07
MOO-MW5s	2/26/2012	14:06	11.96	65.08	1.59	0.08
MOO-MW5s	3/5/2012	14:53	12.53	64.51	1.66	0.08
MOO-MW5s	4/5/2012	14:56	13.10	63.94	1.63	0.08
MOO-MW5s	5/11/2012	12:19	13.48	63.56	0.03	0.00
MOO-MW5s	6/18/2012	10:24	13.36	63.68	2.02	0.10
MOO-MW5s	7/9/2012	10:44	12.95	64.09	3.66	0.18
MOO-MW5s	8/14/2012	12:14	12.10	64.94	4.39	0.21
MOO-MW5s	9/17/2012	11:43	11.60	65.44	3.91	0.19
MOO-MW5s	10/19/2012	11:33	12.70	64.34	3.25	0.16
MOO-MW5s	12/10/2012	10:00	14.03	63.01	2.36	0.12
MOO-MW5s	12/28/2012	10:55	14.30	62.74	2.13	0.10
MOO-MW5d	1/30/2012	8:48	13.63	63.40		
MOO-MW5d	2/26/2012	14:07	13.54	63.49		
MOO-MW5d	3/5/2012	14:52	14.18	62.85		
MOO-MW5d	4/5/2012	14:57	14.72	62.31		
MOO-MW5d	5/11/2012	12:20	13.50	63.53		
MOO-MW5d	6/18/2012	10:23	15.37	61.66		
MOO-MW5d	7/9/2012	10:43	16.60	60.43		
MOO-MW5d	8/14/2012	12:15	16.48	60.55		
MOO-MW5d	9/17/2012	11:43	15.50	61.53		
MOO-MW5d	10/19/2012	11:33	15.94	61.09		
MOO-MW5d	12/10/2012	10:00	16.38	60.65		
MOO-MW5d	12/28/2012	10:56	16.42	60.61		
MOO-MW6s	1/30/2012	9:24	20.00	51.52	1.95	0.10
MOO-MW6s	2/9/2012	13:03	19.17	52.35	2.80	0.14
MOO-MW6s	3/5/2012	15:03	19.90	51.62	2.23	0.11
MOO-MW6s	4/5/2012	15:22	20.89	50.63	1.72	0.08
MOO-MW6s	5/11/2012	10:58	22.73	48.79	0.35	0.02
MOO-MW6s	6/18/2012	10:36	22.42	49.10	1.86	0.09
MOO-MW6s	7/9/2012	11:01	21.72	49.80	4.08	0.20
MOO-MW6s	8/14/2012	12:33	18.88	52.64	6.92	0.34
MOO-MW6s	9/17/2012	11:55	20.85	50.67	4.09	0.20
MOO-MW6s	10/19/2012	12:12	22.30	49.22	2.41	0.12
MOO-MW6s	12/10/2012	9:45	22.83	48.69	1.15	0.06
MOO-MW6s	12/28/2012	11:09	22.02	49.50	1.61	0.08
MOO-MW6d	1/30/2012	9:27	21.85	49.57		
MOO-MW6d	2/9/2012	13:04	21.87	49.55		
MOO-MW6d	3/5/2012	15:05	22.03	49.39		
MOO-MW6d	4/5/2012	15:23	22.51	48.91		
MOO-MW6d	5/11/2012	10:59	22.98	48.44		
MOO-MW6d	6/18/2012	10:35	24.18	47.24		
MOO-MW6d	7/9/2012	11:00	25.70	45.72		
MOO-MW6d	8/14/2012	12:34	25.70	45.72		
MOO-MW6d	9/17/2012	11:55	24.84	46.58		
MOO-MW6d	10/19/2012	12:12	24.61	46.81		
MOO-MW6d	12/10/2012	9:45	23.88	47.54		
MOO-MW6d	12/28/2012	11:10	23.53	47.89		
MOO-MW7s	1/30/2012	9:33	17.79	51.46	0.06	0.00
MOO-MW7s	2/9/2012	12:46	18.06	51.19	0.06	0.00
MOO-MW7s	3/5/2012	15:10	18.73	50.52	-0.01	-0.00
MOO-MW7s	4/5/2012	15:35	19.18	50.07	0.07	0.00
MOO-MW7s	5/11/2012	10:42	19.52	49.73	0.05	0.00
MOO-MW7s	6/18/2012	10:39	19.78	49.47	0.04	0.00
MOO-MW7s	7/9/2012	11:06	19.96	49.29	0.06	0.00
MOO-MW7s	8/14/2012	12:42	19.85	49.40	0.05	0.00
MOO-MW7s	9/17/2012	11:59	19.55	49.70	0.06	0.00
MOO-MW7s	10/19/2012	12:05	20.17	49.08	0.09	0.01
MOO-MW7s	12/10/2012	9:42	20.92	48.33	0.05	0.00
MOO-MW7s	12/28/2012	11:13	21.11	48.14	0.04	0.00
MOO-MW7d	1/30/2012	9:37	17.76	51.40		
MOO-MW7d	2/9/2012	12:57	18.03	51.13		
MOO-MW7d	3/5/2012	15:11	18.63	50.53		
MOO-MW7d	4/5/2012	15:36	19.16	50.00		
MOO-MW7d	5/11/2012	10:43	19.48	49.68		
MOO-MW7d	6/18/2012	10:38	19.73	49.43		
MOO-MW7d	7/9/2012	11:05	19.93	49.23		
MOO-MW7d	8/14/2012	12:43	19.81	49.35		
MOO-MW7d	9/17/2012	11:58	19.52	49.64		
MOO-MW7d	10/19/2012	12:05	20.17	48.99		
MOO-MW7d	12/10/2012	9:42	20.88	48.28		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_V, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_V
MOO-MW7d	12/28/2012	11:14	21.06	48.10		
MOO-MW8s	1/30/2012	9:44	18.54	50.66	-0.18	-0.01
MOO-MW8s	2/9/2012	12:24	18.75	50.45	-0.16	-0.01
MOO-MW8s	3/5/2012	15:15	18.99	50.21	-0.11	-0.01
MOO-MW8s	4/5/2012	15:39	19.32	49.88	-0.11	-0.01
MOO-MW8s	5/11/2012	10:29	20.00	49.20	-0.09	-0.01
MOO-MW8s	6/18/2012	10:42	20.26	48.94	-0.08	-0.01
MOO-MW8s	7/9/2012	11:09	20.18	49.02	-0.07	-0.00
MOO-MW8s	8/14/2012	12:45	19.49	49.71	-0.06	-0.00
MOO-MW8s	9/17/2012	12:01	19.57	49.63	-0.10	-0.01
MOO-MW8s	10/19/2012	12:00	20.55	48.65	-0.09	-0.01
MOO-MW8s	12/10/2012	9:39	20.83	48.37	-0.04	-0.00
MOO-MW8s	12/28/2012	11:17	21.05	48.15	-0.04	-0.00
MOO-MW8d	1/30/2012	9:46	18.28	50.84		
MOO-MW8d	2/9/2012	12:25	18.51	50.61		
MOO-MW8d	3/5/2012	15:16	18.80	50.32		
MOO-MW8d	4/5/2012	15:40	19.13	49.99		
MOO-MW8d	5/11/2012	10:30	19.83	49.29		
MOO-MW8d	6/18/2012	10:41	20.10	49.02		
MOO-MW8d	7/9/2012	11:08	20.03	49.09		
MOO-MW8d	8/14/2012	12:46	19.35	49.77		
MOO-MW8d	9/17/2012	12:01	19.39	49.73		
MOO-MW8d	10/19/2012	12:00	20.38	48.74		
MOO-MW8d	12/10/2012	9:39	20.71	48.41		
MOO-MW8d	12/28/2012	11:18	20.93	48.19		
TON-MW1s	1/30/2012	16:33	7.53	97.24	-0.21	-0.01
TON-MW1s	2/10/2012	12:42	7.58	97.19	0.00	0.00
TON-MW1s	3/5/2012	12:05	6.53	98.24	0.00	0.00
TON-MW1s	4/9/2012	10:24	7.04	97.73	0.01	0.00
TON-MW1s	5/10/2012	15:52	7.84	96.93	0.02	0.00
TON-MW1s	6/20/2012	10:26	9.56	95.21	0.00	0.00
TON-MW1s	7/9/2012	12:44	11.43	93.34	0.03	0.00
TON-MW1s	8/16/2012	10:11	11.24	93.53	0.00	0.00
TON-MW1s	9/20/2012	11:14	12.13	92.64	0.01	0.00
TON-MW1s	10/19/2012	12:12	11.45	93.32	0.06	0.00
TON-MW1s	12/6/2012	14:11	9.10	95.67	0.03	0.00
TON-MW1s	12/31/2012	9:59	7.95	96.82	-0.01	-0.00
TON-MW1d	1/30/2012	16:34	7.19	97.45		
TON-MW1d	2/10/2012	12:43	7.45	97.19		
TON-MW1d	3/5/2012	12:04	6.40	98.24		
TON-MW1d	4/9/2012	10:25	6.92	97.72		
TON-MW1d	5/10/2012	15:53	7.73	96.91		
TON-MW1d	6/20/2012	10:27	9.43	95.21		
TON-MW1d	7/9/2012	12:43	11.33	93.31		
TON-MW1d	8/16/2012	10:12	11.11	93.53		
TON-MW1d	9/20/2012	11:14	12.01	92.63		
TON-MW1d	10/19/2012	12:12	11.38	93.26		
TON-MW1d	12/6/2012	14:11	9.00	95.64		
TON-MW1d	12/31/2012	10:00	7.81	96.83		
TON-MW2s	1/30/2012	16:37	6.73	94.82	-0.01	-0.00
TON-MW2s	2/10/2012	12:24	5.64	95.91	-0.02	-0.00
TON-MW2s	3/5/2012	12:02	5.56	95.99	-0.03	-0.00
TON-MW2s	4/9/2012	10:52	6.68	94.87	0.03	0.00
TON-MW2s	5/10/2012	17:26	6.56	94.99	0.01	0.00
TON-MW2s	6/20/2012	10:49	7.32	94.23	0.01	0.00
TON-MW2s	7/9/2012	12:47	6.85	94.70	0.02	0.00
TON-MW2s	8/16/2012	9:40	4.66	96.89	0.01	0.00
TON-MW2s	9/20/2012	11:11	5.03	96.52	0.03	0.00
TON-MW2s	10/19/2012	12:29	10.58	90.97	-0.18	-0.01
TON-MW2s	12/6/2012	14:13	7.57	93.98	-0.02	-0.00
TON-MW2s	12/31/2012	10:06	6.87	94.68	-0.01	-0.00
TON-MW2d	1/30/2012	16:40	6.55	94.83		
TON-MW2d	2/10/2012	12:25	5.45	95.93		
TON-MW2d	3/5/2012	12:01	5.36	96.02		
TON-MW2d	4/9/2012	10:53	6.54	94.84		
TON-MW2d	5/10/2012	17:27	6.40	94.98		
TON-MW2d	6/20/2012	10:50	7.16	94.22		
TON-MW2d	7/9/2012	12:47	6.70	94.68		
TON-MW2d	8/16/2012	9:40	4.50	96.88		
TON-MW2d	9/20/2012	11:11	4.89	96.49		
TON-MW2d	10/19/2012	12:29	10.23	91.15		
TON-MW2d	12/6/2012	14:13	7.38	94.00		
TON-MW2d	12/31/2012	10:07	6.69	94.69		
TON-MW3s	1/30/2012	16:44	9.83	100.45	0.02	0.00
TON-MW3s	2/10/2012	13:41	8.13	102.15	-0.02	-0.00
TON-MW3s	3/5/2012	11:58	9.58	100.70	0.02	0.00
TON-MW3s	4/9/2012	10:38	9.44	100.84	0.01	0.00
TON-MW3s	5/10/2012	16:35	10.77	99.51	0.02	0.00
TON-MW3s	6/20/2012	10:38	12.63	97.65	0.02	0.00
TON-MW3s	7/9/2012	12:56	13.60	96.68	0.02	0.00
TON-MW3s	8/16/2012	10:18	15.75	94.53	0.00	0.00
TON-MW3s	9/20/2012	11:07	16.01	94.27	0.03	0.00
TON-MW3s	10/19/2012	12:34	7.15	103.13	-0.22	-0.01
TON-MW3s	12/6/2012	14:05	11.32	98.96	0.00	0.00
TON-MW3s	12/31/2012	9:48	9.17	101.11	0.01	0.00
TON-MW3d	1/30/2012	16:45	9.75	100.43		
TON-MW3d	2/10/2012	13:42	8.01	102.17		
TON-MW3d	3/5/2012	11:57	9.50	100.68		
TON-MW3d	4/9/2012	10:39	9.35	100.83		
TON-MW3d	5/10/2012	16:35	10.69	99.49		
TON-MW3d	6/20/2012	10:39	12.55	97.63		
TON-MW3d	7/9/2012	12:56	13.52	96.66		
TON-MW3d	8/16/2012	10:19	15.65	94.53		
TON-MW3d	9/20/2012	11:07	15.94	94.24		
TON-MW3d	10/19/2012	12:34	6.83	103.35		
TON-MW3d	12/6/2012	14:05	11.22	98.96		
TON-MW3d	12/31/2012	9:49	9.08	101.10		
TON-MW4s	1/30/2012	16:47	8.98	98.56	-0.01	-0.00
TON-MW4s	2/10/2012	13:02	9.26	98.28	-0.05	-0.00
TON-MW4s	3/5/2012	11:49	8.82	98.72	-0.01	-0.00
TON-MW4s	4/9/2012	10:29	8.88	98.66	0.01	0.00
TON-MW4s	5/10/2012	16:13	9.75	97.79	-0.01	-0.00
TON-MW4s	6/20/2012	10:31	15.03	92.51	-0.02	-0.00
TON-MW4s	7/9/2012	12:40	16.28	91.26	0.01	0.00
TON-MW4s	8/16/2012	10:14	17.92	89.62	-0.01	-0.00
TON-MW4s	9/20/2012	10:58	18.11	89.43	0.18	0.01
TON-MW4s	10/19/2012	12:31	9.93	97.61	-0.19	-0.01
TON-MW4s	12/6/2012	14:00	12.81	94.73	-0.05	-0.00
TON-MW4s	12/31/2012	9:55	9.95	97.59	-0.01	-0.00
TON-MW4d	1/30/2012	16:50	8.68	98.57		
TON-MW4d	2/10/2012	13:03	8.92	98.33		
TON-MW4d	3/5/2012	11:48	8.52	98.73		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_v, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_v
TON-MW4d	4/9/2012	10:30	8.60	98.65		
TON-MW4d	5/10/2012	16:14	9.45	97.80		
TON-MW4d	6/20/2012	10:32	14.72	92.53		
TON-MW4d	7/9/2012	12:39	16.00	91.25		
TON-MW4d	8/16/2012	10:15	17.62	89.63		
TON-MW4d	9/20/2012	10:58	18.00	89.25		
TON-MW4d	10/19/2012	12:31	9.45	97.80		
TON-MW4d	12/6/2012	14:00	12.47	94.78		
TON-MW4d	12/31/2012	9:56	9.65	97.60		
TON-MW5s	1/30/2012	16:52	8.65	99.21	-0.09	-0.00
TON-MW5s	2/10/2012	13:20	8.67	99.19	0.00	0.00
TON-MW5s	3/5/2012	11:54	7.98	99.88	-0.02	-0.00
TON-MW5s	4/9/2012	10:45	8.37	99.49	-0.04	-0.00
TON-MW5s	5/10/2012	16:52	9.60	98.26	-0.02	-0.00
TON-MW5s	6/20/2012	10:42	13.33	94.53	0.02	0.00
TON-MW5s	7/9/2012	12:53	13.20	94.66	-0.01	-0.00
TON-MW5s	8/16/2012	10:23	12.96	94.90	0.00	0.00
TON-MW5s	9/20/2012	11:01	13.13	94.73	-0.01	-0.00
TON-MW5s	10/19/2012	12:22	7.77	100.09	-0.09	-0.00
TON-MW5s	12/6/2012	14:09	11.43	96.43	0.00	0.00
TON-MW5s	12/31/2012	9:52	9.47	98.39	-0.01	-0.00
TON-MW5d	1/30/2012	16:55	8.48	99.30		
TON-MW5d	2/10/2012	13:21	8.59	99.19		
TON-MW5d	3/5/2012	11:53	7.88	99.90		
TON-MW5d	4/9/2012	10:46	8.25	99.53		
TON-MW5d	5/10/2012	16:55	9.50	98.28		
TON-MW5d	6/20/2012	10:43	13.27	94.51		
TON-MW5d	7/9/2012	12:52	13.11	94.67		
TON-MW5d	8/16/2012	10:24	12.88	94.90		
TON-MW5d	9/20/2012	11:01	13.04	94.74		
TON-MW5d	10/19/2012	12:22	7.60	100.18		
TON-MW5d	12/6/2012	14:09	11.35	96.43		
TON-MW5d	12/31/2012	9:53	9.38	98.40		
TON-MW6s	1/30/2012	16:55	9.00	89.66	-0.21	-0.01
TON-MW6s	2/10/2012	11:00	8.33	90.33	0.06	0.00
TON-MW6s	3/5/2012	12:09	9.80	88.86	-0.25	-0.01
TON-MW6s	4/9/2012	10:15	9.97	88.69	-0.28	-0.01
TON-MW6s	5/10/2012	17:46	8.99	89.67	-0.17	-0.01
TON-MW6s	6/20/2012	10:18	8.23	90.43	0.15	0.01
TON-MW6s	7/9/2012	13:02	7.42	91.24	0.62	0.03
TON-MW6s	8/16/2012	9:49	8.70	89.96	0.29	0.01
TON-MW6s	9/20/2012	11:19	8.98	89.68	0.26	0.01
TON-MW6s	10/19/2012	12:20	6.98	91.68	0.10	0.00
TON-MW6s	12/6/2012	14:20	10.96	87.70	-0.19	-0.01
TON-MW6s	12/31/2012	10:10	10.58	88.08	-0.23	-0.01
TON-MW6d	1/30/2012	17:03	8.50	89.87		
TON-MW6d	2/10/2012	11:01	8.10	90.27		
TON-MW6d	3/5/2012	12:08	9.26	89.11		
TON-MW6d	4/9/2012	10:16	9.40	88.97		
TON-MW6d	5/10/2012	17:47	8.53	89.84		
TON-MW6d	6/20/2012	10:19	8.09	90.28		
TON-MW6d	7/9/2012	13:02	7.75	90.62		
TON-MW6d	8/16/2012	9:50	8.70	89.67		
TON-MW6d	9/20/2012	11:19	8.95	89.42		
TON-MW6d	10/19/2012	12:20	6.79	91.58		
TON-MW6d	12/6/2012	14:20	10.48	87.89		
TON-MW6d	12/31/2012	10:11	10.06	88.31		
TON-MW7s	1/30/2012	17:05	7.65	92.96	0.00	0.00
TON-MW7s	2/10/2012	11:57	8.42	92.19	0.02	0.00
TON-MW7s	3/5/2012	12:21	8.62	91.99	0.00	0.00
TON-MW7s	4/9/2012	10:00	8.85	91.76	0.02	0.00
TON-MW7s	5/10/2012	17:25	6.14	94.47	-0.01	-0.00
TON-MW7s	6/20/2012	10:09	6.51	94.10	0.02	0.00
TON-MW7s	7/9/2012	13:12	8.47	92.14	-0.10	-0.00
TON-MW7s	8/16/2012	9:59	7.07	93.54	0.00	0.00
TON-MW7s	9/20/2012	11:26	7.66	92.95	0.01	0.00
TON-MW7s	10/19/2012	12:14	13.11	87.50	0.24	0.01
TON-MW7s	12/6/2012	14:14	9.07	91.54	0.00	0.00
TON-MW7s	12/31/2012	10:16	8.81	91.80	0.00	0.00
TON-MW7d	1/30/2012	17:07	7.33	92.96		
TON-MW7d	2/10/2012	11:58	8.12	92.17		
TON-MW7d	3/5/2012	12:20	8.30	91.99		
TON-MW7d	4/9/2012	10:00	8.55	91.74		
TON-MW7d	5/10/2012	17:25	5.81	94.48		
TON-MW7d	6/20/2012	10:10	6.21	94.08		
TON-MW7d	7/9/2012	13:12	8.05	92.24		
TON-MW7d	8/16/2012	10:00	6.75	93.54		
TON-MW7d	9/20/2012	11:26	7.35	92.94		
TON-MW7d	10/19/2012	12:14	13.03	87.26		
TON-MW7d	12/6/2012	14:14	8.75	91.54		
TON-MW7d	12/31/2012	10:17	8.49	91.80		
TON-MW8s	1/30/2012	17:09	9.79	84.22	-0.15	-0.01
TON-MW8s	2/10/2012	11:36	9.71	84.30	-0.15	-0.01
TON-MW8s	3/5/2012	12:17	9.80	84.21	-0.11	-0.01
TON-MW8s	4/9/2012	10:07	9.71	84.30	-0.09	-0.00
TON-MW8s	5/10/2012	17:08	10.14	83.87	-0.12	-0.01
TON-MW8s	6/20/2012	10:13	10.00	84.01	-0.10	-0.00
TON-MW8s	7/9/2012	13:08	9.90	84.11	-0.08	-0.00
TON-MW8s	8/16/2012	9:53	9.78	84.23	-0.16	-0.01
TON-MW8s	9/20/2012	11:22	10.09	83.92	0.21	0.01
TON-MW8s	10/19/2012	12:10	14.51	79.50	0.10	0.00
TON-MW8s	12/6/2012	14:17	9.80	84.21	-0.04	-0.00
TON-MW8s	12/31/2012	10:20	9.74	84.27	-0.14	-0.01
TON-MW8d	1/30/2012	17:11	9.25	84.37		
TON-MW8d	2/10/2012	11:37	9.17	84.45		
TON-MW8d	3/5/2012	12:16	9.30	84.32		
TON-MW8d	4/9/2012	10:08	9.23	84.39		
TON-MW8d	5/10/2012	17:10	9.63	83.99		
TON-MW8d	6/20/2012	10:14	9.51	84.11		
TON-MW8d	7/9/2012	13:08	9.43	84.19		
TON-MW8d	8/16/2012	9:54	9.23	84.39		
TON-MW8d	9/20/2012	11:22	9.91	83.71		
TON-MW8d	10/19/2012	12:10	14.22	79.40		
TON-MW8d	12/6/2012	14:17	9.37	84.25		
TON-MW8d	12/31/2012	10:21	9.21	84.41		

Table 12
Depth-to-Water Measurements (in feet below the top of PVC casing), Calculated Groundwater Elevations (NAVD88), Hydraulic Head Differences (dh), and Vertical Gradients (i_v, positive downward)

Well ID	Date	Time	DTW	GWE	dh	i_v	Well ID	Date	Time	DTW	GWE	dh	i_v

The vertical gradient is calculated based on the hydraulic head difference and the distance between the midpoints of the shallow and deep well screens.
DTW Notes: Dry = Well was dry; N/M = No measurement made; Q/M = Questionable measurement

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
MEN-MW1s	2/7/2012	18.5	6.93	1.4	151	480	5,339	3,600	58		0.29														9	
MEN-MW1s	5/8/2012	19.5	6.88	2.1	156	882	5,221	3,100	41	<0.05*	0.40	1.6*	760	16	87	210	860	250	3.7*	980*	<8.2*	<8.2*	980	0.98	7	a
MEN-MW1s	8/14/2012	20.7	6.65	1.5	239	504	6,146	3,800	22	0.082	6.8	10	770	68	150	340	970	190	0.61	1,500	<8.2	<8.2	1,500	1.03	9	
MEN-MW1s	12/6/2012	20.4	6.55	1.1	98	225	4,729	3,000	38		0.59														7	
MEN-MW2s	2/7/2012	17.7	7.16	1.7	149	225	4,320	2,900	4.4		0.24														10	
MEN-MW2s	5/8/2012	20.1	7.05	5.8	188	654	4,620	2,700	3.0	<0.05*	0.23	1.5*	740	21	56	170	780	290	5.2*	870*	<8.2*	<8.2*	870	1.00	8	a
MEN-MW2s	8/14/2012	21.5	6.98	1.0	177	735	4,460	2,700	4.0	0.11	0.13	2.1	680	25	60	200	730	270	0.37	920	<8.2	<8.2	920	1.01	9	
MEN-MW2s	12/6/2012	21.0	7.10	0.9	71	254	4,297	2,600	14		<0.050														7	
MEN-MW3s	2/7/2012	17.2	6.95	1.7	177	85	2,845	2,000	75		0.070														10	
MEN-MW3s	5/8/2012	17.8	6.87	1.8	214	48	3,061	2,100	70	<0.05*	0.091	2.7*	290	5.9	77	230	340	91	18*	690*	<8.2*	<8.2*	690	0.99	8	a
MEN-MW3s	8/14/2012	21.3	6.76	0.7	222	29	2,976	1,900	68	1.0	0.044J	2.5	280	5.9	73	220	320	100	18	700	<8.2	<8.2	700	0.96	8	
MEN-MW3s	12/6/2012	20.2	7.25	0.6	69	34	2,741	1,800	67		0.027J														7	
MEN-MW4s	2/7/2012	16.6	6.97	2.2	190	>1,000	2,407	1,600	77		0.064														11	
MEN-MW4s	5/8/2012	18.2	7.03	1.6	231	56	2,302	1,600	69	<0.05*	0.076	2.0*	220	6.5	48	180	220	75	7.9*	440*	16*	<8.2*	456	1.03	9	a
MEN-MW4s	8/14/2012	21.2	6.86	0.7	220	32	2,272	1,400	63	0.66	<0.05	1.9	220	6.8	46	170	230	83	8.6	490	<8.2	<8.2	490	0.96	9	
MEN-MW4s	12/6/2012	20.6	7.31	1.2	76	7.0	1,984	1,300	57		<0.050														8	
MEN-MW5s	2/7/2012	17.9	7.05	1.8	192	33	1,791	1,100	40		0.038J														9	
MEN-MW5s	5/8/2012	19.5	6.97	2.6	208	9.0	1,962	1,200	52	0.019J*	0.051	0.74*	140	18	36	170	220	60	0.19*	370*	<8.2*	<8.2*	370	0.97	7	a
MEN-MW5s	8/14/2012	21.6	6.88	0.6	207	2.0	1,908	1,200	54	0.10	<0.05	0.87	140	20	34	170	210	64	0.26	380	<8.2	<8.2	380	0.96	7	
MEN-MW5s	12/6/2012	21.0	7.42	1.1	72	9.0	1,701	1,000	50		<0.050														6	
MEN-MW6s	2/7/2012	17.1	7.00	1.6	179	12	3,057	2,000	32		0.052														16	
MEN-MW6s	5/8/2012	17.9	6.91	1.7	183	17	3,224	1,800	33	<0.05*	0.058	1.2*	390	4.7	59	200	430	140	0.088J*	690*	<8.2*	<8.2*	690	1.02	14	a
MEN-MW6s	8/14/2012	18.8	6.83	1.0	205	2.0	3,138	1,900	34	0.45	<0.05	1.3	380	4.7	56	210	410	140	0.13J	740	<8.2	<8.2	740	1.00	15	
MEN-MW6s	12/6/2012	19.0	7.53	0.7	76	5.0	2,889	1,800	37		<0.050														13	
MEN-MW7s	2/7/2012	17.6	7.15	1.5	159	22	2,521	1,600	75		0.052														17	
MEN-MW7s	5/8/2012	18.6	7.07	1.6	196	63	2,696	1,600	62	<0.05*	0.063	1.3*	310	3.3	57	150	270	140	0.10J*	510*	<8.2*	<8.2*	510	1.02	18	a
MEN-MW7s	8/14/2012	19.6	7.14	1.0	204	10	2,804	1,800	68	0.55	<0.05	1.5	350	3.3	52	150	310	150	0.22	560	<8.2	<8.2	560	0.97	18	
MEN-MW7s	12/6/2012	19.4	7.32	0.9	67	3.0	2,501	1,600	61		<0.050														15	
ANC-MW1	2/12/2012	19.0	7.00	1.7	164	12	1,518	990	6.6		<0.05														13	
ANC-MW1	5/11/2012	20.7	6.63	0.9	201	4.0	1,792	1,100	6.8	0.22*	<0.05	0.39*	250	3.7	39	88	210	100	0.41*	520*	<8.2*	<8.2*	520	0.98	11	a
ANC-MW1	8/16/2012	20.9	6.82	0.4	213	11	1,975	1,300	8.0	0.43	0.026J	0.54	270	4.2	47	100	260	130	0.31	570	<8.2	<8.2	570	0.94	12	
ANC-MW1	12/6/2012	20.6	7.52	1.0	49	3.0	1,986	1,200	8.7		<0.050														11	
ANC-MW2	2/12/2012	19.7	6.84	0.9	85	3.0	2,424	1,600	20		0.025J														14	
ANC-MW2	5/11/2012	22.4	6.64	0.5	157	86	2,490	1,600	23	0.048J*	0.033J	0.99*	330	5.9	50	150	380	220	0.55*	440*	<8.2*	<8.2*	440	1.01	14	a

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
ANC-MW2	8/16/2012	20.3	6.80	0.6	221	5.0	2,511	1,600	26	0.47	0.027J	0.92	330	6.2	51	150	410	240	0.56	450	<8.2	<8.2	450	0.95	14	
ANC-MW2	12/6/2012	20.6	7.44	1.0	-17	3.0	2,381	1,400	20		<0.050														14	
ANC-MW3	2/12/2012	20.1	7.24	0.4	35	2.0	1,789	1,200	47		<0.05														14	
ANC-MW3	5/11/2012	21.0	6.97	0.8	146	3.0	1,850	1,200	48	0.036J*	<0.05	0.092J*	230	6.4	31	130	210	130	0.45*	400*	<8.2*	<8.2*	400	0.96	14	a
ANC-MW3	8/16/2012	21.7	6.98	0.2	213	4.0	1,963	1,300	55	0.031J	<0.05	0.24	260	6.9	31	130	230	150	0.43	380	<8.2	<8.2	380	0.97	14	
ANC-MW3	12/6/2012	21.6	7.55	0.7	57	4.0	2,112	1,300	59		<0.050														14	
ANC-MW4	2/12/2012	19.5	6.74	1.2	130	15	1,669	1,100	8.0		<0.05														14	
ANC-MW4	5/11/2012	20.6	6.44	1.1	220	16	1,560	1,000	33	<0.05*	<0.05	0.15J*	120	8.6	48	130	140	110	1.5*	360*	<8.2*	<8.2*	360	1.00	14	a
ANC-MW4	8/16/2012	21.0	6.93	0.4	217	62	1,266	820	36	<0.05	<0.05	0.15J	140	6.5	33	90	150	110	1.1	230	<8.2	<8.2	230	0.98	14	
ANC-MW4	12/6/2012	20.4	7.98	1.7	52	92	890	550	29		<0.050														13	
ANC-MW5s	2/12/2012	19.5	7.92	1.5	178	>1,000	3,330	2,100	18		0.029J														12	
ANC-MW5s	5/11/2012	19.9	7.52	0.6	181	328	3,590	2,300	16	<0.05*	0.029J	0.74*	770	3.8	16	28	450	270	1.8*	920*	<8.2*	<8.2*	920	0.96	9	a
ANC-MW5s	8/16/2012	20.5	7.29	0.7	232	129	3,550	2,200	11	0.53	0.026J	0.79	840	3.5	15	24	450	300	1.3	980	<8.2	<8.2	980	0.99	11	
ANC-MW5s	12/6/2012	20.1	8.10	1.1	52	91	3,618	2,200	11		<0.050														11	
ANC-MW6s	2/12/2012	20.0	6.89	2.0	189	4.0	2,047	1,400	33		0.035J														13	
ANC-MW6s	5/11/2012	21.0	6.64	1.0	183	4.0	1,984	1,300	38	0.080*	0.046J	1.2*	260	11	36	100	250	140	22*	350*	<8.2*	<8.2*	350	0.96	12	a
ANC-MW6s	8/16/2012	22.0	6.80	0.5	217	2.0	1,950	1,300	38	0.74	0.052	1.3	280	11	36	100	270	130	25	410	<8.2	<8.2	410	0.92	13	
ANC-MW6s	12/6/2012	23.2	7.43	0.8	63	3.0	1,782	1,100	28		<0.050														12	
ANC-MW7s	2/12/2012	19.5	7.24	1.6	164	9.0	1,381	920	36		<0.05														13	
ANC-MW7s	5/11/2012	21.4	7.05	1.8	151	6.0	1,364	870	44	<0.05*	<0.05	<0.2*	140	2.8	28	100	130	67	0.47*	260*	<8.2*	<8.2*	260	1.00	12	a
ANC-MW7s	8/16/2012	21.2	7.02	1.5	204	9.0	1,288	820	37	<0.05	<0.05	0.070J	140	2.7	27	95	170	68	0.50	260	<8.2	<8.2	260	0.93	14	
ANC-MW7s	12/6/2012	21.1	7.90	1.9	67	18	1,287	780	27		<0.050														12	
BET-MW1s	2/8/2012	19.0	6.21	2.9	309	20	610	490	36		0.055														12	
BET-MW1s	5/10/2012	19.4	6.15	1.5	183	30	760	690	57	<0.05*	0.055	0.29*	30	22	21	64	30	22	3.1*	53*	<4.1*	<4.1*	53	1.04	8	a
BET-MW1s	8/14/2012	19.7	6.72	1.2	64	8.0	522	410	31	0.014J	<0.05	0.66	23	12	14	43	30	18	3.3	52	<4.1	<4.1	52	1.01	6	
BET-MW1s	12/7/2012	21.3	6.12	1.1	97	4.0	501	370	23		0.038J														9	
BET-MW2s	2/8/2012	18.2	6.25	2.6	305	15	820	700	44		<0.05														5	
BET-MW2s	5/10/2012	19.3	6.37	1.2	161	12	755	630	39	0.010J*	0.026J	0.35*	48	20	18	59	51	28	6.6*	100*	<4.1*	<4.1*	100	1.00	2	a
BET-MW2s	8/14/2012	21.0	6.74	1.1	50	12	610	480	29	<0.05	<0.05	0.54	35	5.3	16	52	35	18	6.5	110	<4.1	<4.1	110	0.95	4	
BET-MW2s	12/7/2012	21.9	6.36	2.8	69	12	722	560	28		<0.050														2	
BET-MW3s	2/8/2012	18.7	6.12	2.5	308	14	1,022	710	82		<0.05														6	
BET-MW3s	5/10/2012	19.3	5.94	2.1	186	23	1,200	1,100	98	0.010J*	0.025J	0.45*	30	37	38	110	52	61	4.2*	56*	<8.2*	<8.2*	56	0.99	4	a
BET-MW3s	8/14/2012	21.0	6.45	2.1	75	17	799	670	63*	<0.05	<0.05	0.62	24	24	22	67	24	33	4.9	68	<4.1	<4.1	68	0.92	6	a
BET-MW3s	12/7/2012	21.8	6.31	1.8	75	6.0	807	640	53*		<0.050														4	a
BET-MW4s	2/8/2012	19.3	6.64	2.6	311	209	1,572	820	31		<0.05														13	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----						
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
BET-MW4s	5/10/2012	19.9	6.67	1.0	180	75	2,402	1,900	54	0.022J*	<0.05	1.1*	110	270	56	140	200	110	7.1*	580*	<8.2*	<8.2*	580	0.99	8	a
BET-MW4s	8/14/2012	20.6	6.92	1.0	43	8.0	2,176	1,400	52	0.12	<0.05	1.4	100	270	41	100	200	110	6.6	500	<8.2	<8.2	500	0.90	9	
BET-MW4s	12/7/2012	21.5	6.74	0.7	66	23	1,586	1,000	42		<0.050														12	
BET-MW5s	2/9/2012	21.0	6.84	1.3	162	26	838	700	51		<0.05														16	
BET-MW5s	5/10/2012	18.8	6.57	2.1	155	16	890	790	58	0.013J*	<0.05	0.40*	31	3.2	34	88	43	44	0.48*	110*	<4.1*	<4.1*	110	1.02	15	a
BET-MW5s	8/14/2012	20.3	6.95	1.5	32	5.0	868	680	47	0.015J	<0.05	0.43	33	2.9	29	79	50	36	0.43	120	<4.1	<4.1	120	0.99	19	
BET-MW5s	12/7/2012	21.3	6.79	1.0	71	28	996	840	67*		<0.050														15	a
BET-MW6s	2/9/2012	20.1	6.40	1.1	152	17.5	510	410	18		<0.05														15	
BET-MW6s	5/10/2012	19.4	6.28	1.7	156	12	506	410	19	<0.05*	<0.05	0.45*	26	13	13	46	27	14	4.3*	110*	<4.1*	<4.1*	110	1.02	14	a
BET-MW6s	8/14/2012	20.6	7.30	1.4	64	8.0	496	370	21	0.010J	<0.05	1.0	26	22	11	39	24	17	6.0	98	<4.1	<4.1	98	0.97	19	
BET-MW6s	12/7/2012	20.7	6.27	1.5	92	18	679	560	33		<0.050														14	
BET-MW7s	2/8/2012	18.9	5.81	2.6	323	4.0	473	380	28		<0.05														15	
BET-MW7s	5/10/2012	19.6	5.67	1.9	210	8.0	437	450	25	<0.05*	<0.05	0.57*	30	4.9	9.4	36	28	22	2.9*	38*	<4.1*	<4.1*	38	1.03	14	a
BET-MW7s	8/14/2012	21.4	7.04	1.5	22	7.0	450	350	24	<0.05	<0.05	1.2	30	18	7.5	29	25	18	6.0	45	<4.1	<4.1	45	0.99	19	
BET-MW7s	12/7/2012	20.9	6.17	1.3	85	20	593	520	35		<0.050														14	
BET-MW8s	2/9/2012	19.2	6.62	1.5	156	26	491	440	25		0.026J														14	
BET-MW8s	5/10/2012	18.7	6.37	1.5	155	12	500	470	27	<0.05*	<0.05	0.55*	26	3.5	12	51	27	18	6.0*	75*	<4.1*	<4.1*	75	1.00	13	a
BET-MW8s	8/14/2012	20.9	7.30	1.0	70	12	485	400	30	<0.05	<0.05	0.90	27	18	9.1	40	28	16	6.9	66	<4.1	<4.1	66	0.91	19	
BET-MW8s	12/7/2012	21.2	6.53	2.5	84	17	584	480	30		<0.050														13	
FG1-MW1d	2/12/2012	19.3	7.12	1.2	105	4.0	1,409	1,000	8.6		0.026J														14	
FG1-MW1s	5/14/2012	18.7	6.84	3.6	192	309	1,430	920	23	<0.05*	0.026J	<0.2*	160	3.3	34	100	100	75	1.3*	440*	<8.2*	<8.2*	440	1.00	2	a
FG1-MW1d	8/15/2012	19.8	7.55	2.6	95	7.0	1,272	850	2.7	0.023J	0.025J	0.15J	170	5.1	39	87	120	110	0.14J	460	<8.2	<8.2	460	1.00	14	
FG1-MW1s	12/11/2012	20.1	6.59	3.3	246	22	1,216	780	14		<0.050														0	
FG1-MW2d	2/12/2012	21.2	6.87	1.5	169	420	1,203	810	40		<0.05														9	
FG1-MW2d	5/14/2012	21.1	6.63	2.8	186	10	1,320	840	37	0.092*	0.029J	0.20*	80	7.9	51	110	130	66	2.3*	270*	<8.2*	<8.2*	270	1.02	12	a
FG1-MW2d	8/15/2012	21.2	7.04	2.1	120	15	1,167	780	35	0.13	0.027J	0.27	74	8.1	46	100	120	62	2.4	270	<8.2	<8.2	270	0.96	10	
FG1-MW2d	12/11/2012	21.0	6.54	0.9	240	2.0	1,369	890	46		<0.050														9	
FG1-MW3d	2/12/2012	21.5	7.15	1.5	173	>1,000	2,072	1,300	7.2		<0.05														11	
FG1-MW3d	5/14/2012	21.3	6.97	3.3	173	143	1,783	1,100	3.4	<0.05*	<0.05	<0.2*	180	10	57	150	170	59	0.56*	650*	<8.2*	<8.2*	650	1.05	13	a
FG1-MW3d	8/15/2012	21.8	7.20	2.5	95	70	1,867	1,200	7.2	0.016J	0.026J	0.28	210	10	71	170	230	68	0.37	740	<8.2	<8.2	740	1.02	12	
FG1-MW3d	12/11/2012	21.0	6.45	1.1	249	43	1,966	1,100	8.3		0.026J														11	
FG1-MW4s	2/12/2012	21.4	6.23	2.4	201	370	679	530	33		<0.05														6	
FG1-MW4s	5/14/2012	20.9	6.00	2.4	204	57	632	480	26	<0.05*	0.036J	3.1*	35	13	19	53	32	30	8.9*	120*	<4.1*	<4.1*	120	1.00	7	a
FG1-MW4s	8/15/2012	22.0	6.50	2.0	112	10	635	510	29	0.065	0.041J	1.6	38	15	22	59	57	35	11	120	<4.1	<4.1	120	0.95	10	
FG1-MW4s	12/11/2012	23.4	6.18	1.8	243	19	593	420	19		0.026J														5	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
FG1-MW5s	2/12/2012	20.2	6.81	1.4	163	8.5	607	390	11		0.026J														6	
FG1-MW5s	5/14/2012	20.7	6.68	2.7	162	11	743	490	17	<0.05*	0.037J	0.20*	66	5.7	23	54	53	26	<0.15*	210*	<4.1*	<4.1*	210	1.02	8	a
FG1-MW5s	8/15/2012	19.1	6.75	2.6	107	8.0	906	620	47	0.075	0.033J	0.68	62	25	30	76	61	34	<0.15	190	<4.1	<4.1	190	1.00	6	
FG1-MW5s	12/11/2012	19.7	6.26	0.6	240	5.5	825	530	27		<0.050														7	
FG1-MW6s	2/12/2012	22.3	6.62	1.7	192	11	404	290	14		<0.05														3	
FG1-MW6s	5/14/2012	23.2	6.36	3.3	181	10	464	340	13	<0.05*	0.033J	0.28*	39	2.9	17	29	28	12	2.1*	120*	<4.1*	<4.1*	120	1.04	4	a
FG1-MW6s	8/15/2012	26.0	6.45	2.3	122	15	428	300	14	0.012J	0.027J	0.62	32	4.9	18	31	44	17	3.1	91	<4.1	<4.1	91	1.01	8	
FG1-MW6s	12/11/2012	24.6	6.39	1.0	230	6.5	327	220	11		<0.050														3	
FG1-MW7s	2/12/2012	21.9	6.47	2.2	189	39	621	470	26		0.031J														8	
FG1-MW7s	5/14/2012	22.2	6.22	2.4	190	29	819	630	39	0.025J*	0.035J	0.49*	45	3.9	29	70	45	41	5.2*	140*	<4.1*	<4.1*	140	1.01	9	a
FG1-MW7s	8/15/2012	24.1	6.29	2.1	121	8.0	512	410	21	0.027J	0.030J	1.1	31	8.9	17	45	36	32	7.6	110	<4.1	<4.1	110	0.93	13	
FG1-MW7s	12/11/2012	22.8	5.97	1.5	245	55	509	400	21		<0.050														8	
FG1-MW8s	2/12/2012	19.2	6.51	1.4	111	12	1,061	680	<0.1		0.22														3	
FG1-MW8s	5/14/2012	20.5	6.29	2.6	147	102	1,014	620	0.077J	<0.05*	0.18	<0.2*	110	2.4	34	62	78	81	0.29*	340*	<8.2*	<8.2*	340	1.00	5	a
FG1-MW8s	8/15/2012	19.6	6.53	2.4	60	22	1,045	680	0.094J	0.012J	0.25	0.35	110	2.3	45	73	86	93	<0.15	390	<8.2	<8.2	390	1.00	3	
FG1-MW8s	12/11/2012	20.4	5.82	2.7	251	13	1,033	600	0.049J		0.11														3	
FG1-MW9s	2/12/2012	18.5	7.20	1.2	127	740	694	470	0.16		0.026J														4	
FG1-MW9s	5/14/2012	16.4	6.99	2.3	227	>1,000	677	420	0.54	<0.05*	0.042J	0.51*	84	1.0	20	42	13	20	6.5*	320*	<4.1*	<4.1*	320	1.00	7	a
FG1-MW9s	8/15/2012	17.6	7.02	2.3	78	80	388	270	<0.2	0.010J	0.026J	0.26	35	0.60J	18	32	16	11	0.78	190	<4.1	<4.1	190	1.03	6	
FG1-MW9s	12/11/2012	18.5	6.53	1.2	227	349	382	240	<0.10		<0.050														4	
BEA-MW1s	2/13/2012	19.8	6.74	2.0	193	>1,000	3,688	2,000	30		42														4	
BEA-MW1s	5/14/2012	22.3	6.65	2.0	199	>1,000	4,406	3,300	140	2.0*	7.4	12*	340	110	150	410	260	250	67*	1,400*	<8.2*	<8.2*	1,400	0.96	2	a
BEA-MW1d	8/16/2012	25.4	6.87	2.0	210	>1,000	3,109	1,700	0.21J	0.083	85	83	250	120	87	220	150	49	7.0	1,500	<8.2	<8.2	1,500	1.08	4	
BEA-MW1d	12/9/2012	18.0	6.88	2.0	58	>1,000	2,427	1,500	0.11J		25														5	
BEA-MW2s	2/13/2012	21.6	7.05	2.7	254	612	708	460	12		0.044J														7	
BEA-MW2s	5/14/2012	22.2	6.91	3.6	221	>1,000	625	490	9.0	<0.05*	0.074	2.0*	26	5.5	16	100	17	20	38*	290*	<4.1*	<4.1*	290	0.89	4	a
BEA-MW2d	8/16/2012	24.4	7.77	1.9	184	189	490	360	0.38	0.026J	0.027J	0.43	50	7.0	14	37	6.6	41	0.12J	200	<4.1	<4.1	200	1.06	8	
BEA-MW2d	12/9/2012	20.4	7.98	0.7	132	165	626	450	<0.10		0.058														10	
BEA-MW3s	2/13/2012	19.6	6.90	2.6	253	13	4,675	3,400	170		0.032J														8	
BEA-MW3s	5/14/2012	21.3	6.73	1.5	193	>1,000	5,510	3,900	270	<0.05*	0.053	1.9*	560	37	160	360	710	320	5.7*	670*	<8.2*	<8.2*	670	0.95	4	a
BEA-MW3d	8/16/2012	21.8	7.03	1.8	216	86	4,426	3,100	180	0.53	0.048J	1.4	650	12	81	260	630	210	0.52	710	<8.2	<8.2	710	0.98	6	
BEA-MW3d	12/9/2012	18.6	7.09	0.7	140	71	4,479	2,900	140		0.030J														7	
BEA-MW4s	2/13/2012	19.9	7.51	2.5	233	35	2,059	1,300	6.3		0.028J														17	
BEA-MW4s	5/14/2012	22.9	7.37	1.4	163	>1,000	2,080	1,400	7.5	<0.05*	0.047J	1.4*	390	12	21	49	200	110	9.9*	680*	<8.2*	<8.2*	680	0.96	10	a
BEA-MW4d	8/16/2012	22.5	7.20	0.7	207	37	1,943	1,300	19	0.47	0.029J	0.60	260	11	39	120	220	130	0.23	570	<8.2	<8.2	570	0.96	19	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
BEA-MW4d	12/9/2012	19.0	7.58	2.6	126	40	1,875	1,200	12		0.026J														24	
COT-MW1	12/9/2012	16.5	7.44	1.6	155	880	2,001	1,400	51		<0.050														1	b
COT-MW2	2/16/2012	17.8	7.26	2.0	271	250	2,596	1,800	75		0.025J														11	
COT-MW2	5/15/2012	25.1	7.22	2.0	170	70	2,483	1,800	82	<0.05*	0.046J	1.0*	320	7.1	58	160	100	230	1.1*	650*	<8.2*	<8.2*	650	1.01	10	a
COT-MW2	12/9/2012	17.4	7.79	6.2	143	105	2,416	1,700	76		<0.050														6	b
COT-MW3	2/16/2012	17.8	7.30	2.6	261	>1,000	2,693	1,800	71		0.030J														15	
COT-MW3	5/15/2012	20.9	7.16	1.6	180	>1,000	2,570	1,800	80	<0.05*	0.039J	0.92*	480	4.2	21	72	110	180	14*	740*	<8.2*	<8.2*	740	0.95	13	a
COT-MW3	8/17/2012	23.2	7.83	3.0	156	>1,000	2,270	1,800	83	<0.05	<0.05	0.37	490	4.1	21	72	110	160	0.18	720	<8.2	<8.2	720	1.00	13	
COT-MW3	12/9/2012	21.8	7.62	3.3	102	617	2,540	1,700	62		<0.050														10	
COT-MW4	2/16/2012	18.9	7.09	2.7	268	280	1,791	1,200	26		0.030J														11	
COT-MW4	5/15/2012	20.7	7.02	2.1	198	29	1,694	1,100	20	<0.05*	0.036J	0.26*	280	6.7	23	72	100	95	0.21*	590*	<8.2*	<8.2*	590	0.99	11	a
COT-MW4	8/17/2012	24.4	7.41	3.2	91	400	1,607	1,200	8.6	<0.05	<0.05	0.33	310	6.4	23	73	100	84	0.096J	700	<8.2	<8.2	700	1.00	9	
COT-MW4	12/9/2012	20.9	7.47	4.3	151	70	1,912	1,200	25		<0.050														8	
COT-MW5	2/16/2012	18.3	7.09	2.5	263	418	2,666	1,900	97		0.031J														7	
COT-MW5	5/15/2012	20.5	6.99	1.5	210	40	2,451	1,700	95	<0.05*	0.036J	0.52*	210	8.1	79	210	150	190	0.62*	610*	<8.2*	<8.2*	610	0.97	7	a
COT-MW5	8/16/2012	20.9	7.17	1.5	100	37	2,362	1,800	100	<0.05	<0.05	0.54	220	7.8	82	220	140	210	0.40	620	<8.2	<8.2	620	0.99	8	
COT-MW5	12/9/2012	21.0	7.40	3.3	114	60	2,694	1,900	94		<0.050														7	
COT-MW6	2/16/2012	18.4	6.89	2.0	242	640	3,095	2,100	120		0.037J														8	
COT-MW6	5/15/2012	19.8	6.76	1.4	239	326	3,022	2,000	120	<0.05*	0.040J	0.52*	230	14	100	240	350	190	2.1*	460*	<8.2*	<8.2*	460	0.97	8	a
COT-MW6	8/17/2012	20.5	6.90	2.2	220	124	3,040	2,000	120	<0.05	<0.05	0.29	240	14	98	260	340	230	0.65	500	<8.2	<8.2	500	0.97	9	
COT-MW6	12/9/2012	20.8	7.28	3.1	110	61	3,066	2,000	110		<0.050														8	
COT-MW7	2/16/2012	19.7	6.88	2.6	238	88	2,170	1,500	87		0.091														15	
COT-MW7	5/15/2012	25.2	7.30	2.1	178	146	2,327	1,100	44	<0.05*	0.11	0.96*	120	49	42	110	120	120	17*	330*	<8.2*	<8.2*	330	0.95	13	a
COT-MW7	8/16/2012	25.8	7.24	2.1	95	130	1,425	1,100	45	<0.05	<0.05	1.1	120	52	41	110	110	100	16	360	<8.2	<8.2	360	0.96	7	
COT-MW7	12/9/2012	21.8	7.28	3.2	110	13	1,617	1,100	53		<0.050														16	
COT-MW8	2/16/2012	21.1	7.04	1.8	247	361	1,874	1,400	96		0.033J														9	
COT-MW8	5/15/2012	19.0	7.00	1.5	169	59	1,936	1,300	100	<0.05*	0.042J	0.64*	100	3.0	83	160	120	98	5.5*	320*	<8.2*	<8.2*	320	1.01	13	a
COT-MW8	8/17/2012	24.3	7.70	1.4	104	18	1,257	950	64	<0.05	<0.05	0.88	90	3.2	59	110	80	72	5.8	300	<8.2	<8.2	300	0.99	15	
COT-MW8	12/9/2012	23.9	7.54	3.0	100	17	1,168	800	42		0.026J														10	
COT-MW9	2/16/2012	20.2	6.89	2.2	233	10	1,802	1,200	43		0.037J														18	
COT-MW9	5/15/2012	19.5	6.82	2.1	186	8.0	1,657	1,200	38	<0.05*	0.036J	0.42*	140	3.4	44	160	95	130	0.96*	470*	<8.2*	<8.2*	470	1.01	16	a
COT-MW9	8/16/2012	19.9	7.66	2.0	93	23	1,522	1,200	46	<0.05	<0.05	0.52	150	2.9	41	150	110	130	1.2	440	<8.2	<8.2	440	0.97	14	
COT-MW9	12/9/2012	21.1	7.24	2.5	114	12	1,581	1,000	23		<0.050														12	
COT-MW10	2/16/2012	20.0	7.14	2.3	217	10	1,045	640	7.4		0.034J														17	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
COT-MW10	5/15/2012	19.3	6.94	2.1	176	8.0	1,302	860	17	<0.05*	0.036J	0.19J*	130	1.8	37	95	140	81	6.0*	330*	<8.2*	<8.2*	330	0.99	15	a
COT-MW10	8/16/2012	22.5	7.62	1.6	100	18	1,169	870	17	<0.05	<0.05	0.44	110	1.9	39	100	91	93	8.4	380	<8.2	<8.2	380	0.96	14	
COT-MW10	12/9/2012	22.1	7.40	1.0	100	7.0	1,050	670	9.5		<0.050														13	
COT-MW11d	2/13/2012	19.7	7.03	2.1	237	9.0	1,660	1,200	65		0.038J														16	
COT-MW11d	5/15/2012	21.0	6.51	2.0	201	8.0	1,828	1,300	82	<0.05*	0.043J	0.71*	120	29	58	160	130	46	24*	390*	<8.2*	<8.2*	390	0.98	14	a
COT-MW11s	8/16/2012	22.7	6.94	1.7	88	415	1,395	1,100	47	<0.05	0.034J	1.8	140	79	32	110	85	32	100	410	<8.2	<8.2	410	0.91	5	
COT-MW11s	12/9/2012	22.3	6.80	1.3	230	529	1,978	1,400	63		<0.050														8	
COT-MW12s	2/13/2012	19.8	7.10	1.7	223	4.5	1,379	980	41		0.030J														8	
COT-MW12s	5/15/2012	21.1	6.76	1.6	192	73	1,400	960	35	<0.05*	<0.05	0.60*	110	8.2	38	140	67	41	2.4*	460*	<8.2*	<8.2*	460	1.04	8	a
COT-MW12s	8/16/2012	22.2	7.67	1.6	87	74	1,394	1,100	70	<0.05	<0.05	0.74	79	10	46	180	100	45	2.6	340	<8.2	<8.2	340	1.05	8	
COT-MW12s	12/9/2012	21.1	7.30	3.0	92	40	1,372	880	49		0.038J														13	
COT-MW13s	2/13/2012	21.5	6.99	1.5	222	13	2,197	1,500	12		0.68														7	
COT-MW13s	5/15/2012	23.5	6.76	1.5	225	12	2,358	1,500	3.8	0.020J*	0.82	0.85*	130	7.6	77	260	340	91	2.0*	620*	<8.2*	<8.2*	620	1.04	4	a
COT-MW13s	8/16/2012	22.0	6.83	1.1	84	330	2,010	1,400	38	20	0.98	1.7	120	8.3	68	240	240	82	2.0	490	<8.2	<8.2	490	1.03	6	
COT-MW13s	12/9/2012	22.4	7.13	1.1	98	32	1,600	1,100	49		0.65														11	
COT-MW14s	2/13/2012	21.0	6.87	1.7	222	13	1,385	930	30		0.032J														7	
COT-MW14s	5/15/2012	23.1	6.58	1.2	284	>1,000	1,150	770	23	<0.05*	0.026J	0.89*	75	6.1	38	110	68	23	12*	390*	<8.2*	<8.2*	390	0.99	5	a
COT-MW14s	8/16/2012	22.5	6.94	1.2	107	440	1,316	920	36	0.038J	<0.05	0.27	83	6.7	45	140	120	36	0.18	420	<8.2	<8.2	420	0.96	5	
COT-MW14s	12/9/2012	22.0	7.02	1.7	108	51	892	580	3.9		<0.050														10	
SAN-MW1d	2/13/2012	17.8	7.13	1.0	138	146	2,914	2,000	38		0.031J														21	
SAN-MW1d	5/15/2012	17.8	7.13	1.0	138	146	2,914	1,800	35	<0.05*	<0.05	0.41*	470	5.2	28	46	140	140	0.46*	840*	<8.2*	<8.2*	840	0.96	20	a
SAN-MW1d	8/17/2012	21.3	7.10	1.0	191	189	2,587	1,700	41	<0.05	0.026J	0.46	480	4.7	30	96	140	150	0.052J	910	<8.2	<8.2	910	1.00	15	
SAN-MW1d	12/9/2012	18.5	7.32	2.4	127	123	2,623	1,700	43		<0.050														15	
SAN-MW2d	2/13/2012	16.6	7.15	2.0	217	>1,000	2,004	1,200	32		0.026J														15	
SAN-MW2d	5/15/2012	19.2	7.00	4.0	230	650	1,939	1,200	25	<0.05*	<0.05	0.45*	180	4.9	46	130	120	79	3.3*	570*	<8.2*	<8.2*	570	1.00	13	a
SAN-MW2d	8/17/2012	22.8	6.97	3.9	201	781	1,719	1,200	37	<0.05	0.026J	0.45	150	4.4	43	150	110	110	<0.15	540	<8.2	<8.2	540	0.94	4	
SAN-MW2d	12/9/2012	17.8	7.16	4.1	150	520	1,671	1,100	42		<0.050														9	
SAN-MW3d	2/13/2012	18.8	6.92	2.5	227	80	1,861	1,100	74		0.027J														14	
SAN-MW3d	5/15/2012	21.1	7.00	2.2	205	56	1,872	1,200	74	<0.05*	<0.05	0.33*	130	4.4	52	170	88	120	2.4*	400*	<8.2*	<8.2*	400	1.01	12	a
SAN-MW3d	8/17/2012	23.2	6.97	2.1	211	226	1,817	1,200	71	<0.05	0.056	0.31	110	4.2	55	180	100	120	<0.15	420	<8.2	<8.2	420	0.98	3	
SAN-MW3d	12/9/2012	19.8	7.27	3.7	129	200	1,725	1,200	72		<0.050														8	
SAN-MW4d	2/13/2012	17.7	6.83	2.7	251	383	1,740	1,200	74		0.028J														24	
SAN-MW4d	5/15/2012	20.5	6.88	3.0	215	53	1,969	1,300	80	<0.05*	<0.05	0.78*	110	19	63	170	100	85	7.2*	420*	<8.2*	<8.2*	420	1.00	23	a
SAN-MW4d	8/17/2012	21.7	6.98	0.9	195	212	1,695	1,200	76	<0.05	0.044J	0.60	130	5.2	49	160	73	94	0.78	400	<8.2	<8.2	400	1.02	13	
SAN-MW4d	12/9/2012	18.7	7.18	1.1	134	74	1,713	1,200	72		<0.050														18	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
SAN-MW5s	2/16/2012	16.7	7.03	2.8	247	>1,000	1,828	1,200	20		0.031J														6	
SAN-MW5s	5/15/2012	20.5	7.04	3.0	207	>1,000	1,937	1,200	26	<0.05*	<0.05	1.5*	170	6.9	61	150	120	170	4.9*	560*	<8.2*	<8.2*	560	1.00	4	a
SAN-MW5d	8/17/2012	20.6	6.92	5.3	209	115	2,133	1,500	84	<0.05	0.036J	0.17J	160	5.2	68	210	140	200	<0.15	440	<8.2	<8.2	440	1.01	17	
SAN-MW5d	12/9/2012	18.1	7.17	5.4	129	104	1,956	1,400	69		0.025J														24	
SAN-MW6s	2/16/2012	22.0	7.01	2.5	235	225	1,844	1,200	34		0.031J														13	
SAN-MW6s	5/15/2012	21.5	6.90	2.7	172	153	1,859	1,300	38	<0.05*	0.033J	0.45*	160	8.3	55	170	130	160	2.2*	500*	<8.2*	<8.2*	500	1.02	12	a
SAN-MW6d	8/17/2012	21.7	7.27	2.8	107	238	1,813	1,300	46	<0.05	0.030J	0.48	160	11	57	190	160	190	1.4	470	<8.2	<8.2	470	1.01	30	
SAN-MW6s	12/9/2012	21.0	7.20	1.8	138	202	1,780	1,200	38		<0.050														10	
SAN-MW7s	2/16/2012	20.3	6.91	2.4	251	643	1,719	1,200	37		0.041J														16	
SAN-MW7s	5/15/2012	20.2	6.79	2.6	167	494	1,823	1,300	34	<0.05*	0.029J	0.93*	140	1.6	71	180	110	120	4.4*	610*	<8.2*	<8.2*	610	1.03	16	a
SAN-MW7d	8/17/2012	18.9	7.12	2.1	124	26	1,638	1,200	43	<0.05	0.025J	0.49	150	3.5	47	160	81	120	<0.15	570	<8.2	<8.2	570	0.96	25	
SAN-MW7s	12/9/2012	17.9	7.11	0.9	138	30	1,759	1,200	37		<0.050														9	
SAN-MW8s	2/16/2012	19.3	6.91	2.0	242	603	1,673	1,100	40		0.038J														10	
SAN-MW8s	5/15/2012	20.8	6.70	1.7	220	>1,000	1,660	1,200	34	<0.05*	<0.05	0.83*	140	1.9	52	160	100	100	10*	540*	<8.2*	<8.2*	540	1.00	9	a
SAN-MW8d	8/17/2012	19.3	7.18	1.4	184	21	1,475	1,000	15	<0.05	0.028J	0.35	210	2.3	30	100	71	100	<0.15	610	<8.2	<8.2	610	0.96	15	
SAN-MW8s	12/9/2012	18.3	7.64	2.3	112	50	1,505	980	12		<0.050														2	
PLS-MW1s	2/8/2012	19.2	7.02	1.5	164	79	2,817	2,000	120		0.040J														6	
PLS-MW1d	5/10/2012	17.7	6.62	0.2	194	32	2,041	1,400	62	<0.05*	<0.05	1.0*	190	3.6	75	150	180	130	0.44*	440*	<8.2*	<8.2*	440	1.05	19	a
PLS-MW1s	8/15/2012	20.8	7.04	0.9	110	10	2,064	1,500	68	0.27	0.035J	1.1	210	4.3	78	180	210	180	0.17	490	<8.2	<8.2	490	1.01	7	
PLS-MW1s	12/11/2012	17.9	6.62	1.1	235	164	2,355	1,600	83		0.037J														4	
PLS-MW2s	2/8/2012	17.5	6.90	1.8	170	766	2,365	1,600	66		<0.05														7	
PLS-MW2s	5/10/2012	17.7	6.99	6.5	223	190	2,413	1,600	67	0.024J*	<0.05	1.2*	200	2.5	94	210	240	160	2.3*	550*	<8.2*	<8.2*	550	1.04	7	a
PLS-MW2s	8/15/2012	20.3	7.06	4.1	113	480	2,324	1,700	71	0.17	0.049J	1.1	210	2.2	97	210	270	190	0.16	570	<8.2	<8.2	570	0.99	8	
PLS-MW2s	12/11/2012	18.9	6.49	0.8	235	469	2,353	1,600	68		0.029J														5	
PLS-MW3s	2/8/2012	18.8	7.01	1.1	126	20	1,353	920	34		0.040J														6	
PLS-MW3s	5/10/2012	17.8	6.85	3.2	234	160	1,389	940	38	<0.05*	<0.05	1.4*	66	3.3	46	190	57	65	0.98*	440*	<8.2*	<8.2*	440	1.12	5	a
PLS-MW3s	8/15/2012	20.3	7.18	2.6	102	123	1,219	910	40*	0.025J	0.044J	1.4	63	3.2	43	160	55	63	0.27	430	<8.2	<8.2	430	1.00	7	a
PLS-MW3s	12/11/2012	19.9	6.06	1.0	276	14	1,322	890	41		0.030J														4	
PLS-MW4s	2/8/2012	19.0	7.02	1.7	151	17	5,230	3,800	120		11														12	
PLS-MW4s	5/10/2012	18.6	6.62	1.4	192	32	5,612	3,900	140	12*	12	14*	410	500	150	310	700	310	0.36J*	960*	<8.2*	<8.2*	960	1.05	12	a
PLS-MW4s	8/15/2012	20.9	7.01	1.0	114	22	5,055	4,000	140*	<0.05	9.6	12	410	470	140	310	690	320	0.23	1,100	<8.2	<8.2	1,100	0.99	14	a
PLS-MW4s	12/11/2012	19.8	6.30	0.7	254	24	5,346	3,800	150		8.5														11	
PLS-MW5s	2/8/2012	20.1	6.98	1.5	161	>1,000	1,931	1,300	76		0.047J														6	
PLS-MW5s	5/10/2012	19.0	6.90	6.4	241	743	1,814	1,200	69	<0.05*	0.058	1.5*	130	5.7	60	170	150	51	6.0*	400*	<8.2*	<8.2*	400	1.04	5	a
PLS-MW5s	8/15/2012	20.6	7.09	5.0	106	76	1,642	1,200	74*	0.40	0.038J	1.6	130	4.8	55	160	150	54	0.27	380	<8.2	<8.2	380	1.00	7	a

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
PLS-MW5s	12/11/2012	20.7	6.55	0.5	233	564	1,991	1,300	55		0.042J														4	
PLS-MW6s	2/8/2012	18.8	7.65	1.2	130	52	2,251	1,600	52		<0.05														14	
PLS-MW6s	5/10/2012	18.1	7.22	2.2	165	21	2,300	1,500	52	<0.05*	<0.05	0.84*	420	4.2	47	98	150	120	0.72*	680*	<8.2*	<8.2*	680	1.13	13	a
PLS-MW6s	8/15/2012	20.6	6.88	1.9	93	12	2,017	1,500	54	0.70	0.031J	0.90	340	4.2	46	100	160	130	0.31	650	<8.2	<8.2	650	0.98	16	
PLS-MW6s	12/11/2012	20.6	6.60	0.7	249	81	2,393	1,600	52		0.039J														13	
PLS-MW7s	2/8/2012	17.6	7.04	1.8	157	21	2,312	1,600	81		0.034J														12	
PLS-MW7s	5/10/2012	17.4	6.80	3.1	180	10	2,222	1,500	69	<0.05*	<0.05	1.6*	210	3.8	75	190	160	160	0.40*	560*	<8.2*	<8.2*	560	1.04	12	a
PLS-MW7s	8/15/2012	18.6	7.10	2.2	110	15	2,064	1,600	69	0.29	0.033J	1.7	220	3.6	71	190	180	190	0.29	560	<8.2	<8.2	560	0.99	14	
PLS-MW7s	12/11/2012	18.9	6.52	0.7	231	24	2,128	1,500	63		0.030J														11	
CAE-MW1s	2/8/2012	20.2	6.86	0.5	-52	9.5	3,818	2,300	0.44		94														6	
CAE-MW1s	5/10/2012	21.0	6.67	0.6	-113	380	3,919	2,100	<0.5	6.5*	87	85*	190	340	130	190	220	32	2.6*	1,600*	<8.2*	<8.2*	1,600	1.10	3	a
CAE-MW1d	8/14/2012	19.5	7.10	0.6	64	460	2,699	1,400	29	<0.05	92	95	100	230	56	130	110	49	3.0	1,100	<8.2	<8.2	1,100	0.99	14	
CAE-MW1s	12/4/2012	21.4	7.52	0.7	90	473	2,169	1,200	24		89														3	
CAE-MW2s	2/8/2012	19.8	6.85	1.7	193	51	2,072	1,500	81		0.15														5	
CAE-MW2s	5/10/2012	19.9	6.69	0.9	98	20	1,910	1,500	81*	0.014J*	0.19	1.2*	110	220	34	94	120	140	3.6*	290*	<8.2*	<8.2*	290	1.00	3	a
CAE-MW2s	8/14/2012	22.0	7.16	1.0	63	42	2,944	2,000	94	0.71	0.026J	2.6	180	620	13	34	180	180	2.2	520	<8.2	<8.2	520	1.02	2	
CAE-MW2s	12/4/2012	22.2	8.08	0.7	64	102	2,724	2,000	98		0.052														3	
CAE-MW3s	2/8/2012	20.2	6.83	1.7	196	9.5	2,374	1,800	73		0.086														5	
CAE-MW3s	5/10/2012	20.0	6.73	0.6	153	70	2,804	2,200	52	0.91*	0.071	4.3*	140	390	62	140	210	160	1.9*	720*	<8.2*	<8.2*	720	1.02	3	a
CAE-MW3s	8/14/2012	22.3	7.00	0.7	69	43	3,856	2,700	78	0.61	0.047J	4.6	190	660	70	170	360	240	1.3	840	<8.2	<8.2	840	1.05	1	
CAE-MW3s	12/4/2012	23.5	7.51	0.8	82	6.0	2,859	2,100	89		0.033J														3	
CAE-MW4s	2/8/2012	18.6	6.57	0.9	87	9.0	1,411	1,000	100		0.050														10	
CAE-MW4s	5/10/2012	19.5	6.37	0.6	97	24	1,456	1,300	93	0.18*	0.061	4.2*	64	46	42	150	61	78	30*	200*	<8.2*	<8.2*	200	1.00	9	a
CAE-MW4s	8/14/2012	20.5	6.82	1.0	78	57	1,340	1,100	77	0.18	0.046J	4.5	64	40	37	140	44	61	29	240	<8.2	<8.2	240	1.01	8	
CAE-MW4s	12/4/2012	20.6	7.55	0.6	87	14	1,324	1,200	87		0.029J														8	
CAE-MW5s	2/8/2012	19.4	6.93	0.7	107	29.5	1,336	990	67		<0.05														13	
CAE-MW5s	5/10/2012	20.0	6.70	0.8	202	15	1,214	920	56	0.049J*	<0.05	1.1*	60	3.6	42	140	18	69	1.0*	340*	<8.2*	<8.2*	340	1.03	12	a
CAE-MW5s	8/14/2012	20.5	7.07	0.7	77	6.0	1,109	780	35	0.099	<0.05	1.3	50	7.5	38	140	15	57	1.8	350	<8.2	<8.2	350	1.12	14	
CAE-MW5s	12/4/2012	22.3	7.56	1.5	77	15	1,179	880	47		<0.050														11	
CAE-MW6s	2/9/2012	21.0	7.04	1.1	147	44	2,040	1,500	40		0.032J														11	
CAE-MW6s	5/10/2012	19.9	6.95	0.6	240	12	1,561	1,100	36	<0.05*	<0.05	1.2*	140	15	54	120	120	78	1.2*	420*	<8.2*	<8.2*	420	1.06	10	a
CAE-MW6s	8/14/2012	20.0	7.24	0.9	70	26	1,585	1,100	33	0.57	0.038J	1.7	92	36	59	150	120	78	1.8	440	<8.2	<8.2	440	1.06	12	
CAE-MW6s	12/4/2012	21.3	7.74	0.5	71	117	854	610	29		<0.050														10	
ROB-MW1s	2/7/2012	18.4	6.66	1.5	168	851	2,985	2,000	68		1.5														6	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
ROB-MW1s	5/8/2012	18.5	6.85	2.7	185	156	921	620	37	<0.05*	0.051	0.57*	57	27	22	68	38	27	10*	190*	<4.1*	<4.1*	190	1.00	5	a
ROB-MW1d	8/13/2012	20.8	6.94	2.2	219	4.0	1,139	850	39	0.024J	<0.05	0.46	63	5.7	30	120	76	44	3.6	230	<8.2	<8.2	230	1.07	4	
ROB-MW1s	12/4/2012	20.7	7.27	2.1	98	77	2,766	2,100	78		0.13														2	
ROB-MW2s	2/7/2012	19.2	6.79	1.4	124	367	3,374	2,300	160		0.11														5	
ROB-MW2s	5/8/2012	19.4	6.57	3.3	216	>1,000	2,750	1,800	98	<0.05*	0.78	1.6*	120	160	73	210	200	65	26*	580*	<8.2*	<8.2*	580	0.98	4	a
ROB-MW2d	8/13/2012	20.6	6.50	2.3	185	85	2,588	1,600	56	0.044J	0.20	1.5	130	23	81	290	220	45	5.9	720	<8.2	<8.2	720	1.06	8	
ROB-MW2s	12/4/2012	21.1	7.47	1.6	89	93	2,947	2,200	140		0.027J														1	
ROB-MW3s	2/7/2012	19.1	7.01	1.6	191	5.0	1,743	1,100	3.0		0.053														6	
ROB-MW3s	5/8/2012	19.5	6.97	2.0	186	3.0	2,020	1,300	12	0.019J*	0.040J	1.2*	110	15	66	190	270	39	2.5*	530*	<8.2*	<8.2*	530	1.01	6	a
ROB-MW3s	8/13/2012	21.4	6.93	1.7	163	15	1,968	1,200	2.3	0.015J	<0.05	1.0	100	14	65	190	260	32	3.0	540	<8.2	<8.2	540	1.03	2	
ROB-MW3s	12/4/2012	21.2	7.38	2.3	113	10	1,774	1,200	1.6		0.028J														0	
ROB-MW4s	2/7/2012	19.4	6.81	1.7	215	7.5	2,413	1,600	89		0.036J														6	
ROB-MW4s	5/8/2012	19.6	6.74	1.9	221	4.0	3,076	2,000	93	0.086*	0.032J	1.1*	170	4.7	100	290	430	130	0.31*	400*	<8.2*	<8.2*	400	1.02	7	a
ROB-MW4s	8/13/2012	24.0	6.67	1.6	184	25	3,607	2,400	100	0.21	0.027J	1.6	200	4.9	120	330	490	180	0.25	510	<8.2	<8.2	510	1.01	3	
ROB-MW4s	12/4/2012	22.6	7.12	0.8	121	2.0	2,512	1,800	32		<0.050														1	
ROB-MW5s	2/7/2012	19.3	6.77	1.3	203	30.5	2,257	1,500	58		0.038J														4	
ROB-MW5s	5/8/2012	19.8	6.75	2.5	238	39	2,401	1,600	52	<0.05*	0.047J	1.1*	130	19	83	240	170	63	11*	740*	<8.2*	<8.2*	740	1.00	3	a
ROB-MW5d	8/13/2012	21.2	6.67	2.0	190	9.0	2,421	1,500	58	0.76	0.027J	1.4	130	7.4	87	240	170	66	9.2	670	<8.2	<8.2	670	1.04	12	
ROB-MW5d	12/4/2012	20.9	6.45	0.8	139	5.0	2,237	1,600	82		0.034J														11	
ROB-MW6s	2/7/2012	18.1	6.93	1.1	182	6.0	2,131	1,500	64		0.031J														15	
ROB-MW6s	5/8/2012	18.9	6.96	5.7	199	3.0	1,985	1,100	27	<0.05*	3.6	4.2*	97	100	48	180	170	35	1.0*	570*	<8.2*	<8.2*	570	1.06	13	a
ROB-MW6s	8/13/2012	19.5	6.72	4.9	152	12	2,410	1,500	55	0.028J	7.9	9.3	110	100	54	200	220	40	0.50J	580	<8.2	<8.2	580	0.99	10	
ROB-MW6s	12/4/2012	19.7	7.49	0.6	73	8.0	2,083	1,400	51		4.4														10	
ROB-MW7s	2/7/2012	18.6	7.01	1.8	201	2.0	1,887	1,500	79		<0.05														16	
ROB-MW7s	5/8/2012	17.7	7.16	3.5	166	8.0	1,554	1,100	55	0.32*	0.063	0.50*	97	14	36	140	190	50	5.8*	200*	<8.2*	<8.2*	200	1.00	16	a
ROB-MW7s	8/13/2012	21.2	7.00	3.2	166	9.5	1,025	670	35	0.071	<0.05	0.59	58	11	28	100	41	44	5.9	240	<4.1	<4.1	240	1.06	11	
ROB-MW7s	12/4/2012	21.2	7.72	1.2	75	11	1,397	990	58		<0.050														11	
ROB-MW8s	2/7/2012	19.1	6.96	1.6	183	284	2,074	1,400	43		0.065														17	
ROB-MW8s	5/8/2012	19.5	6.92	3.1	186	13	2,153	1,200	45	<0.05*	0.056	0.47*	120	2.6	74	170	160	88	0.14J*	540*	<8.2*	<8.2*	540	0.98	16	a
ROB-MW8s	8/13/2012	19.7	6.81	3.0	147	18	2,123	1,300	49	<0.05	0.035J	0.48	120	2.5	78	230	160	98	0.27	570	<8.2	<8.2	570	1.08	10	
ROB-MW8s	12/4/2012	19.7	7.51	0.8	82	21	2,162	1,500	47		<0.050														12	
ANT-MW1d	2/9/2012	20.1	6.87	1.6	174	289	2,136	1,400	28		<0.05														14	
ANT-MW1d	5/10/2012	19.4	6.93	2.1	222	23	2,236	1,300	27	0.019J*	0.026J	0.82*	150	5.1	100	85	190	120	0.085J*	490*	<8.2*	<8.2*	490	0.98	15	a
ANT-MW1s	8/15/2012	21.0	6.72	3.0	224	1.5	1,888	1,100	24	0.015J	0.031J	0.89	130	4.0	85	130	170	130	<0.15	530	<8.2	<8.2	530	0.97	6	
ANT-MW1d	12/10/2012	19.4	7.24	1.5	89	173	1,532	970	17		<0.050														13	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
ANT-MW2s	2/9/2012	21.1	7.03	1.8	180	170	2,803	1,800	61		<0.05														10	
ANT-MW2s	5/10/2012	21.1	6.99	1.4	240	97	3,263	1,700	64	0.011J*	<0.05	0.13J*	210	3.8	180	120	400	210	0.39*	500*	<8.2*	<8.2*	500	0.99	11	a
ANT-MW2s	8/15/2012	21.5	6.97	1.4	216	14	2,756	1,600	53	0.011J	<0.05	<0.2	180	3.6	160	150	320	210	<0.15	580	<8.2	<8.2	580	0.99	13	
ANT-MW2s	12/10/2012	23.3	7.20	1.6	108	80	3,450	2,100	81		<0.050														7	
ANT-MW3s	2/9/2012	19.9	6.99	1.6	180	152	1,652	1,100	25		<0.05														10	
ANT-MW3s	5/10/2012	19.9	7.01	1.7	228	59	1,600	960	19	0.011J*	<0.05	0.12J*	110	4.7	71	92	150	120	0.23*	360*	<8.2*	<8.2*	360	1.00	11	a
ANT-MW3s	8/15/2012	20.3	6.88	2.0	199	40	2,023	1,200	38	<0.05	<0.05	0.37	130	6.9	100	130	190	150	<0.15	500	<8.2	<8.2	500	0.97	16	
ANT-MW3s	12/10/2012	21.2	7.29	1.7	92	239	1,739	1,100	30		<0.050														9	
ANT-MW4s	2/9/2012	20.5	6.94	1.9	194	990	2,290	1,600	34		<0.05														10	
ANT-MW4s	5/10/2012	20.7	6.96	1.8	235	267	2,361	1,400	27	<0.05*	<0.05	0.13J*	150	2.7	160	98	190	150	0.60*	710*	<8.2*	<8.2*	710	1.00	11	a
ANT-MW4s	8/15/2012	22.1	6.85	1.5	211	95	2,321	1,400	28	<0.05	<0.05	0.079J	130	2.4	180	95	210	160	<0.15	720	<8.2	<8.2	720	0.99	13	
ANT-MW4s	12/10/2012	22.4	7.30	2.0	83	196	2,020	1,500	24		<0.050														7	
ANT-MW5s	2/9/2012	20.5	6.99	1.4	170	350	1,395	950	18		<0.05														8	
ANT-MW5s	5/10/2012	19.6	7.02	1.2	223	55	1,927	1,200	26	0.019J*	<0.05	0.67*	120	3.7	100	120	150	100	0.27*	570*	<8.2*	<8.2*	570	1.00	9	a
ANT-MW5s	8/15/2012	21.0	6.89	1.3	251	13	1,557	920	18	<0.05	0.029J	0.89	110	3.1	85	88	130	110	<0.15	430	<8.2	<8.2	430	1.03	14	
ANT-MW5s	12/10/2012	21.8	7.31	1.2	83	567	1,524	900	22		<0.050														7	
ANT-MW6s	2/9/2012	19.2	7.21	1.3	170	152	1,434	980	18		0.030J														13	
ANT-MW6s	5/10/2012	19.6	7.29	1.8	229	211	1,779	1,100	31	<0.05*	<0.05	0.28*	100	90	88	52	130	120	0.31*	380*	<8.2*	<8.2*	380	1.03	14	a
ANT-MW6s	8/15/2012	19.5	7.06	1.8	229	3.0	1,960	1,200	29	<0.05	<0.05	0.40	120	94	100	73	170	140	<0.15	520	<8.2	<8.2	520	0.97	21	
ANT-MW6s	12/10/2012	20.9	7.38	1.5	86	11	1,894	1,200	27		<0.050														13	
COR-MW1s	2/10/2012	19.0	7.26	1.5	170	68	3,408	2,200	2.7		0.035J														10	
COR-MW1s	5/11/2012	19.2	7.08	0.4	229	8.0	3,572	2,100	1.7	<0.05*	<0.05	0.82*	560	2.9	82	79	560	210	1.7*	720*	<8.2*	<8.2*	720	1.01	9	a
COR-MW1s	8/17/2012	20.6	6.98	0.5	216	59	3,751	2,300	1.9	<0.05	0.026J	0.63	560	2.7	92	100	690	250	0.26	800	<8.2	<8.2	800	0.91	9	
COR-MW1s	12/7/2012	20.5	7.29	0.5	130	48	3,679	2,300	1.7		<0.050														9	
COR-MW2s	2/10/2012	17.9	7.33	1.5	162	8.0	1,640	1,000	6.5		<0.05														12	
COR-MW2s	5/11/2012	17.9	7.20	0.8	210	10	1,774	1,000	5.7	<0.05*	<0.05	<0.2*	160	2.9	62	120	210	180	0.093J*	360*	<8.2*	<8.2*	360	1.05	9	a
COR-MW2s	8/17/2012	21.2	7.14	0.5	212	36	1,497	920	6.4	<0.05	<0.05	0.081J	160	2.9	56	110	200	170	<0.15	330	<8.2	<8.2	330	1.06	8	
COR-MW2s	12/7/2012	19.8	7.55	0.7	126	31	1,773	1,100	4.0		<0.050														10	
COR-MW3s	2/10/2012	19.6	7.47	1.3	144	3.5	1,498	940	2.0		<0.05														10	
COR-MW3s	5/11/2012	18.4	7.32	0.4	194	26	1,622	920	1.3	<0.05*	<0.05	<0.2*	180	2.1	49	82	190	150	0.11J*	340*	<8.2*	<8.2*	340	1.04	8	a
COR-MW3s	8/17/2012	21.1	7.23	0.6	229	95	1,824	1,100	0.66	<0.05	<0.05	0.076J	210	2.7	66	120	280	200	<0.15	400	<8.2	<8.2	400	1.03	7	
COR-MW3s	12/7/2012	20.2	7.57	0.7	101	16	2,234	1,400	0.38		<0.050														9	
COR-MW4s	2/10/2012	19.4	7.29	1.5	147	5.5	2,009	1,200	4.6		<0.05														11	
COR-MW4s	5/11/2012	19.6	7.28	0.6	208	98	2,088	1,200	4.1	0.017J*	0.028J	<0.2*	240	2.1	67	84	260	190	<0.15*	400*	<8.2*	<8.2*	400	1.03	9	a
COR-MW4s	8/17/2012	22.1	7.19	0.6	212	33	1,863	1,100	4.1	0.042J	<0.05	0.11J	240	2.3	65	110	260	200	0.053J	430	<8.2	<8.2	430	1.05	8	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
COR-MW4s	12/7/2012	21.0	7.70	0.4	93	8.0	1,840	1,100	2.7		<0.050														9	
COR-MW5s	2/10/2012	20.2	7.36	1.9	149	26.5	1,577	1,000	2.9		0.066														11	
COR-MW5s	5/11/2012	20.5	7.30	0.9	204	370	1,878	1,100	2.2	<0.05*	0.058	0.67*	220	16	52	99	220	170	1.7*	410*	<8.2*	<8.2*	410	1.06	9	a
COR-MW5s	8/17/2012	22.2	7.15	0.5	211	126	1,677	1,000	2.4	0.014J	0.055	0.20	240	10	54	110	240	170	0.088J	400	<8.2	<8.2	400	1.12	8	
COR-MW5s	12/7/2012	21.3	7.47	0.5	101	33	2,488	1,600	7.8		0.24														9	
FG2-MW1s	2/10/2012	19.4	7.07	2.2	209	9.0	6,248	4,000	2.7		0.029J														16	
FG2-MW1s	5/10/2012	19.5	7.08	1.9	198	150	5,538	4,500	1.3	<0.05*	<0.05	0.31*	620	3.5	240	350	470	2,100	0.71*	410*	<8.2*	<8.2*	410	0.98	17	a
FG2-MW1s	8/15/2012	22.1	6.92	1.4	130	120	4,902	3,700	2.0	0.048J	0.030J	0.53	530	3.7	190	340	470	1,800	0.17	480	<8.2	<8.2	480	0.92	17	
FG2-MW1s	12/6/2012	20.4	7.26	1.0	125	140	6,507	5,700	2.7		<0.050														17	
FG2-MW2s	2/10/2012	18.9	7.17	2.8	253	216	3,587	2,700	5.7		<0.05														13	
FG2-MW2s	5/10/2012	19.0	7.18	1.3	218	573	3,792	2,900	5.2	<0.05*	0.025J	0.30*	400	8.8	200	180	260	1,200	1.5*	490*	<8.2*	<8.2*	490	1.01	14	a
FG2-MW2s	8/15/2012	22.1	7.02	0.8	197	356	3,510	2,500	9.2	0.027J	0.025J	0.48	350	13	180	170	300	1,000	0.44	550	<8.2	<8.2	550	0.95	16	
FG2-MW2s	12/6/2012	21.0	7.30	1.0	128	17	3,306	2,400	7.0		<0.050														14	
FG2-MW3s	2/10/2012	20.3	7.12	2.2	234	3.0	5,327	4,300	15		0.036J														17	
FG2-MW3s	5/10/2012	21.0	7.09	1.6	227	4.0	2,736	4,700	13	0.017J*	<0.05	0.22*	660	2.3	360	200	600	1,800	<0.15*	610*	<8.2*	<8.2*	610	1.01	17	a
FG2-MW3s	8/15/2012	21.6	6.97	0.5	188	5.0	5,807	4,400	13	0.023J	0.027J	0.40	630	2.5	370	210	630	1,900	0.22	640	<8.2	<8.2	640	0.96	18	
FG2-MW3s	12/6/2012	19.9	7.44	1.0	120	32	5,374	4,300	13		<0.050														17	
FG2-MW4s	2/10/2012	20.7	7.19	2.6	250	4.0	4,518	3,600	16		<0.05														17	
FG2-MW4s	5/10/2012	20.2	7.31	1.8	213	51	4,512	3,300	18	0.023J*	0.027J	0.26*	590	2.8	190	170	440	1,200	0.23*	560*	<8.2*	<8.2*	560	1.00	16	a
FG2-MW4s	8/15/2012	22.6	7.01	0.7	172	24	4,308	2,900	29	0.027J	<0.05	0.46	510	1.5	180	160	470	1,000	0.11J	630	<8.2	<8.2	630	0.92	19	
FG2-MW4s	12/6/2012	21.3	7.60	0.6	108	43	4,165	2,900	33		<0.050														18	
FG2-MW5s	2/10/2012	19.7	7.23	2.8	251	18	4,403	3,400	23		<0.05														14	
FG2-MW5s	5/10/2012	18.9	7.14	1.8	222	11	4,265	3,000	27	<0.05*	0.030J	0.64*	490	1.4	210	140	430	950	0.092J*	660*	<8.2*	<8.2*	660	0.97	13	a
FG2-MW5s	8/15/2012	18.9	7.03	0.5	202	37	3,908	2,300	18	0.67	0.034J	1.1	380	0.93J	180	130	380	620	0.23	750	<8.2	<8.2	750	0.95	16	
FG2-MW5s	12/6/2012	19.6	7.16	0.6	137	9.0	4,258	3,100	19		<0.050														14	
GOD-MW1s	2/9/2012	20.4	7.43	1.3	155	7.0	3,114	2,100	2.9		0.081														13	
GOD-MW1s	5/9/2012	19.6	7.40	1.8	63	15	3,025	2,200	1.6	<0.05*	<0.05	0.45*	570	2.0	80	65	310	340	0.45*	910*	<8.2*	<8.2*	910	1.02	14	a
GOD-MW1s	8/20/2012	20.6	7.56	0.5	28	12	2,727	1,900	1.5	0.012J	0.043J	0.53	560	1.8	69	56	340	320	0.38	880	<8.2	<8.2	880	0.97	16	
GOD-MW1s	12/3/2012	20.8	7.00	1.0	92	6.0	2,923	1,900	0.89		<0.050														12	
GOD-MW2s	2/9/2012	22.5	7.75	1.1	137	2.0	3,320	2,300	19		<0.05														15	
GOD-MW2s	5/9/2012	20.6	7.59	2.0	111	5.0	3,160	2,400	18	0.019J*	<0.05	0.25*	490	1.4	110	100	440	630	0.39*	440*	<8.2*	<8.2*	440	0.99	16	a
GOD-MW2s	8/20/2012	21.2	7.85	0.2	34	12	2,305	2,200	17	0.020J	0.034J	0.31	480	1.0	100	96	460	680	0.49	410	<8.2	<8.2	410	0.93	16	
GOD-MW2s	12/3/2012	21.9	7.25	0.8	109	7.0	3,038	2,100	16		<0.050														14	
GOD-MW3s	2/9/2012	21.3	7.45	1.3	147	5.0	1,549	1,000	11		<0.05														10	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----						
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
GOD-MW3s	5/9/2012	19.6	7.32	2.1	122	5.0	1,620	1,100	17	<0.05*	<0.05	0.52*	180	2.3	60	110	180	160	0.42*	390*	<8.2*	<8.2*	390	1.05	11	a
GOD-MW3s	8/20/2012	20.7	7.55	0.6	62	11	1,407	1,000	33	<0.05	0.042J	0.61	170	1.9	49	91	110	150	0.42	390	<8.2	<8.2	390	0.98	10	
GOD-MW3s	12/3/2012	21.8	7.21	1.0	117	15	1,396	940	30		<0.050														9	
GOD-MW4s	2/9/2012	21.1	7.65	1.5	147	10	3,276	2,200	19		<0.05														11	
GOD-MW4s	5/9/2012	20.2	7.56	1.6	89	7.0	3,244	2,400	20	0.011J*	<0.05	0.27*	680	2.0	44	44	320	480	0.77*	770*	<8.2*	<8.2*	770	0.99	11	a
GOD-MW4s	8/20/2012	22.3	7.71	0.3	39	33	2,961	2,200	25	0.044J	0.042J	0.40	630	1.2	35	35	340	490	0.79	720	<8.2	<8.2	720	0.89	10	
GOD-MW4s	12/3/2012	22.8	7.22	0.9	101	22	3,056	2,000	20		<0.050														8	
GOD-MW5s	2/9/2012	19.6	7.48	1.5	168	2.0	2,135	1,400	5.5		<0.05														20	
GOD-MW5s	5/9/2012	19.2	7.41	1.8	123	7.0	2,012	1,400	4.6	<0.05*	<0.05	<0.2*	180	1.5	110	120	290	300	0.21*	370*	<8.2*	<8.2*	370	1.03	18	a
GOD-MW5s	8/20/2012	21.1	7.95	0.5	30	8.0	1,741	1,300	5.4	0.014J	0.031J	0.13J	150	1.5	100	110	310	290	0.14J	320	<8.2	<8.2	320	0.94	20	
GOD-MW5s	12/3/2012	22.0	7.59	0.7	82	3.0	2,007	1,400	4.8		<0.050														17	
GOD-MW6s	2/9/2012	21.4	7.50	1.4	147	2.0	4,008	2,900	14		0.025J														18	
GOD-MW6s	5/9/2012	20.0	7.40	2.0	106	103	3,910	3,000	16	0.010J*	<0.05	0.24*	610	1.8	140	130	610	860	0.52*	450*	<8.2*	<8.2*	450	0.98	16	a
GOD-MW6s	8/20/2012	21.7	7.66	0.2	39	7.0	3,763	2,800	16	0.013J	0.029J	0.41	640	1.4	140	130	640	920	0.32	460	<8.2	<8.2	460	0.96	18	
GOD-MW6s	12/3/2012	21.9	7.16	0.9	110	87	3,969	2,700	15		<0.050														14	
GOD-MW7s	2/9/2012	21.2	7.53	1.3	151	1.0	4,194	3,000	2.5		<0.05														19	
GOD-MW7s	5/9/2012	19.9	7.66	1.7	109	83	4,230	3,400	2.9	<0.05*	<0.05	0.11J*	650	1.4	160	120	640	1,100	0.53*	430*	<8.2*	<8.2*	430	0.95	15	a
GOD-MW7s	8/20/2012	21.7	7.75	0.4	25	17	4,010	3,200	2.5	0.057	0.053	0.26	670	1.1	170	130	670	1,200	0.27	430	<8.2	<8.2	430	0.94	19	
GOD-MW7s	12/3/2012	21.8	7.21	0.7	106	6.0	4,141	2,900	1.8		<0.050														15	
MAC-MW1s	2/9/2012	19.2	7.31	1.2	123	3.0	2,516	1,600	14		<0.05														9	
MAC-MW1s	5/11/2012	19.2	7.32	0.5	209	18	2,509	1,500	15	<0.05*	<0.05	0.44*	370	2.7	55	71	250	220	0.81*	570*	<8.2*	<8.2*	570	1.00	11	a
MAC-MW1s	8/17/2012	22.1	7.18	0.6	215	26	2,423	1,600	17	0.10	0.049J	0.50	400	3.1	54	96	280	250	0.59	630	<8.2	<8.2	630	0.99	10	
MAC-MW1s	12/3/2012	20.6	6.96	0.8	75	1.5	2,461	1,600	20		<0.050														11	
MAC-MW2s	2/9/2012	19.9	7.25	0.9	116	5.5	2,987	2,000	26		0.026J														10	
MAC-MW2s	5/11/2012	20.2	7.05	0.8	222	12	2,976	1,800	14	0.012J*	<0.05	0.36*	490	1.6	72	53	250	140	0.34*	940*	<8.2*	<8.2*	940	1.01	11	a
MAC-MW2s	8/17/2012	20.9	7.01	0.6	218	28	2,619	1,600	17	0.021J	<0.05	0.45	500	1.7	79	75	270	160	0.34	880	<8.2	<8.2	880	1.08	11	
MAC-MW2s	12/3/2012	20.9	7.06	0.9	64	2.0	2,641	1,700	18		<0.050														10	
MAC-MW3s	2/9/2012	18.3	7.16	1.5	159	105	9,911	11,000	32		0.065														21	
MAC-MW3s	5/11/2012	18.5	7.10	1.0	225	480	12,150	12,000	33	0.048J*	<0.05	1.1*	2,100	5.8	460	500	720	5,600	3.1*	470*	<8.2*	<8.2*	470	1.04	21	a
MAC-MW3s	8/17/2012	21.5	7.08	0.7	133	193	9,029	8,200	50	0.15	0.034J	1.1	1,500	7.5	340	540	480	4,800	0.40	400	<8.2	<8.2	400	0.96	21	
MAC-MW3s	12/3/2012	19.7	6.97	0.9	100	4.0	8,316	7,800	48		<0.050														22	
MAC-MW4s	2/9/2012	20.0	7.44	1.5	140	4.0	3,911	2,600	7.7		9.2														20	
MAC-MW4s	5/11/2012	19.7	7.27	0.5	191	17	4,532	3,000	8.8	0.027J*	10	9.9*	750	37	84	66	550	600	3.7*	810*	<8.2*	<8.2*	810	0.99	21	a
MAC-MW4s	8/17/2012	22.7	7.17	0.6	181	7.0	4,340	2,900	7.3	<0.05	12	13	880	48	98	80	600	620	5.4	920	<8.2	<8.2	920	1.07	21	
MAC-MW4s	12/3/2012	21.1	6.96	1.2	91	35	4,042	2,700	7.9		3.9														22	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
MAC-MW5s	2/9/2012	19.9	7.61	1.2	127	10	4,505	3,100	17		7.0														20	
MAC-MW5s	5/11/2012	19.7	7.57	0.5	180	26	4,297	2,900	17	0.53*	0.61	0.65*	810	3.1	61	47	490	580	0.95*	850*	<8.2*	<8.2*	850	0.97	21	a
MAC-MW5s	8/17/2012	22.2	7.33	0.4	195	672	4,082	2,700	20	<0.05	0.35	1.3	880	3.2	54	45	510	580	0.83	870	<8.2	<8.2	870	0.99	21	
MAC-MW5s	12/3/2012	21.4	7.05	0.8	84	6.0	4,280	2,900	22		0.13														22	
NUN-MW1s	2/9/2012	20.4	7.36	1.1	132	6.5	6,638	5,100	2.8		0.032J														9	
NUN-MW1s	5/11/2012	20.0	7.25	0.7	201	22	7,200	5,100	1.3	0.015J*	<0.05	0.59*	1,300	2.1	180	130	780	2,000	0.34*	770*	<8.2*	<8.2*	770	0.98	9	a
NUN-MW1s	8/17/2012	21.4	7.16	0.5	165	7.0	6,470	4,700	1.2	<0.05	<0.05	0.50	1,300	2.8	170	120	800	1,900	0.28	790	<8.2	<8.2	790	0.98	9	
NUN-MW1s	12/4/2012	20.1	7.45	1.1	120	5.0	6,514	4,700	2.2		<0.050														9	
NUN-MW2s	2/9/2012	18.9	7.45	1.1	130	1.0	3,833	2,900	5.8		0.033J														19	
NUN-MW2s	5/11/2012	18.6	7.30	0.7	193	22	3,987	2,800	4.3	0.031J*	<0.05	0.55*	610	1.7	110	98	380	1,000	0.29*	540*	<8.2*	<8.2*	540	0.95	19	a
NUN-MW2s	8/17/2012	21.6	7.23	0.4	152	8.0	3,892	2,800	3.7	0.015J	0.025J	0.63	690	2.1	130	120	420	1,100	0.30	520	<8.2	<8.2	520	1.03	19	
NUN-MW2s	12/4/2012	21.5	7.29	1.6	137	7.0	4,132	3,000	1.6		<0.050														20	
NUN-MW3s	2/9/2012	21.2	7.21	0.9	132	27.5	6,850	5,400	8.4		0.036J														9	
NUN-MW3s	5/11/2012	19.7	7.11	0.8	210	25	7,533	5,400	12	0.010J*	<0.05	1.0*	1,300	1.9J	130	180	860	2,100	1.5*	670*	<8.2*	<8.2*	670	0.93	9	a
NUN-MW3s	8/17/2012	23.7	7.02	0.7	143	77	6,817	5,100	41	0.064	0.047J	1.3	1,400	3.1	140	220	780	2,000	0.21	710	<8.2	<8.2	710	1.03	10	
NUN-MW3s	12/4/2012	20.9	7.13	1.0	129	6.0	6,852	5,100	19		<0.050														9	
NUN-MW4s	2/9/2012	20.2	7.21	1.5	137	243	8,715	11,000	1.6J		<0.05														8	
NUN-MW4s	5/11/2012	19.6	7.07	0.7	210	305	12,100	10,000	0.76J	<0.05*	<0.05	0.91*	2,200	3.1J	270	400	870	5,300	2.3*	560*	<8.2*	<8.2*	560	0.94	8	a
NUN-MW4s	8/17/2012	23.8	7.08	0.6	165	262	11,820	10,000	6.2	0.084	<0.05	0.69	2,500	4.5J	320	470	880	5,700	0.32	570	<8.2	<8.2	570	1.02	9	
NUN-MW4s	12/4/2012	19.8	7.27	0.5	130	202	9,990	8,600	1.9		<0.050														8	
MOO-MW1	2/26/2012	18.2	7.04	0.6	73	240	2,888	1,900	14		0.41														14	
MOO-MW1	5/11/2012	20.2	7.58	0.8	129	5.0	2,900	1,900	15	0.37*	0.42	0.45*	440	3.6	140	92	290	270	0.14J*	900*	<8.2*	<8.2*	900	1.08	12	a
MOO-MW1	8/14/2012	21.3	7.18	0.8	143	2.0	3,106	1,900	7.7	<0.05	1.3	1.8	410	4.0	130	83	310	280	0.10J	940	<8.2	<8.2	940	0.97	14	
MOO-MW1	12/10/2012	20.0	7.40	0.6	54	26	2,725	1,800	9.8		0.77														12	
MOO-MW2	2/26/2012	18.7	6.96	0.5	127	340	3,491	2,300	40		0.050														11	
MOO-MW2	5/11/2012	20.6	7.01	1.3	174	29	3,220	2,300	38	<0.05*	<0.05	0.13J*	550	2.7	110	95	370	300	0.35*	870*	<8.2*	<8.2*	870	1.03	9	a
MOO-MW2	8/14/2012	23.0	7.07	2.0	168	121	3,698	2,300	40	<0.05	<0.05	0.30	570	2.8	110	99	440	350	0.094J	880	<8.2	<8.2	880	0.97	9	
MOO-MW2	12/10/2012	18.5	7.37	0.7	96	173	2,512	1,700	32		0.45														7	
MOO-MW3	2/26/2012	17.4	7.06	0.7	160	80	2,306	1,600	16		<0.05														16	
MOO-MW3	5/11/2012	19.8	7.01	1.0	159	8.0	2,331	1,600	13	<0.05*	0.026J	0.20*	250	2.1	150	92	230	260	0.19*	690*	<8.2*	<8.2*	690	1.05	15	a
MOO-MW3	8/14/2012	21.1	7.12	1.7	179	2.0	2,485	1,500	17	<0.05	<0.05	0.28	250	2.2	150	96	250	280	0.089J	690	<8.2	<8.2	690	1.01	16	
MOO-MW3	12/10/2012	19.2	7.38	0.6	122	18	2,192	1,400	10		<0.050														14	
MOO-MW4	2/26/2012	18.5	7.07	0.9	159	115	2,423	1,600	9.4		<0.05														13	
MOO-MW4	5/11/2012	21.0	7.17	0.9	168	9.0	2,236	1,500	12	<0.05*	<0.05	0.16J*	210	1.9	170	60	210	240	0.16*	640*	<8.2*	<8.2*	640	1.06	13	a

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
MOO-MW4	8/14/2012	20.5	7.17	1.3	184	10	2,485	1,500	11	0.049J	<0.05	0.33	210	2.1	180	89	230	270	0.26	750	<8.2	<8.2	750	1.02	14	
MOO-MW4	12/10/2012	20.2	7.70	0.6	96	14	1,856	1,200	13		<0.050														11	
MOO-MW5s	2/9/2012	19.9	7.24	1.1	169	48	2,151	1,400	18		<0.05														20	
MOO-MW5s	5/11/2012	20.0	7.13	0.7	156	54	2,216	1,500	17	<0.05*	<0.05	0.11J*	190	1.5	160	85	230	250	0.43*	580*	<8.2*	<8.2*	580	1.05	19	a
MOO-MW5s	8/14/2012	21.3	7.13	0.7	160	39	2,396	1,400	19	0.012J	<0.05	0.16J	180	1.4	150	93	250	270	0.15	620	<8.2	<8.2	620	0.94	20	
MOO-MW5s	12/10/2012	17.7	7.30	0.5	164	86	2,074	1,400	17		<0.050														18	
MOO-MW6s	2/9/2012	20.4	7.06	1.0	160	>1,000	2,232	1,400	18		0.045J														12	
MOO-MW6s	5/11/2012	20.7	6.99	0.7	173	>1,000	2,400	1,400	23	<0.05*	<0.05	0.97*	190	4.6	130	110	240	210	5.4*	540*	<8.2*	<8.2*	540	1.03	9	a
MOO-MW6s	8/14/2012	20.9	6.83	1.1	210	498	2,141	1,300	3.6	<0.05	<0.05	0.61	140	3.5	100	160	190	200	0.18	680	<8.2	<8.2	680	0.96	13	
MOO-MW6s	12/10/2012	21.3	7.40	1.6	108	835	2,098	1,400	12		<0.050														9	
MOO-MW7s	2/9/2012	20.1	7.16	1.1	134	166	2,969	2,200	36		<0.05														9	
MOO-MW7s	5/11/2012	19.6	7.10	1.8	155	>1,000	3,042	2,100	42	<0.05*	<0.05	0.43*	320	13	160	150	340	420	1.1*	650*	<8.2*	<8.2*	650	1.02	7	a
MOO-MW7s	8/14/2012	19.8	7.03	1.4	214	938	3,391	2,200	48	<0.05	<0.05	0.54	340	7.2	170	150	370	460	0.18	740	<8.2	<8.2	740	0.95	7	
MOO-MW7s	12/10/2012	20.6	7.35	1.2	79	37	2,976	2,100	43		<0.050														6	
MOO-MW8s	2/9/2012	19.5	7.14	1.8	186	80	2,518	1,700	22		<0.05														8	
MOO-MW8s	5/11/2012	19.7	7.07	2.1	141	>1,000	1,810	1,200	15	<0.05*	<0.05	0.46*	220	4.9	82	85	150	200	2.6*	530*	<8.2*	<8.2*	530	1.03	7	a
MOO-MW8s	8/14/2012	19.8	7.28	2.9	180	108	1,235	740	4.6	<0.05	<0.05	0.13J	150	3.4	44	45	72	98	0.16	400	<8.2	<8.2	400	1.01	7	
MOO-MW8s	12/10/2012	23.3	7.61	2.5	85	101	1,031	650	2.9		<0.050														6	
TON-MW1s	2/10/2012	20.9	7.03	2.4	228	6.5	3,776	2,200	3.3		73														15	
TON-MW1s	5/10/2012	19.8	6.99	1.8	219	7.0	4,027	2,000	3.6	30*	68	66*	350	190	140	73	400	54	<0.75*	1,200*	<8.2*	<8.2*	1,200	1.03	15	a
TON-MW1s	8/16/2012	20.2	6.94	1.0	236	32	4,024	2,000	0.64	<0.05	66	69	370	200	140	71	440	78	0.080J	1,300	<8.2	<8.2	1,300	1.02	11	
TON-MW1s	12/7/2012	20.2	7.12	0.5	135	17	3,832	2,000	0.63		75														13	
TON-MW2s	2/10/2012	20.4	7.15	3.0	257	9.5	4,568	3,000	23		0.13														16	
TON-MW2s	5/10/2012	19.7	7.09	1.8	217	3.0	4,890	2,700	22	0.30*	0.13	1.2*	670	33	190	56	610	270	1.2*	1,300*	<8.2*	<8.2*	1,300	0.96	15	a
TON-MW2s	8/16/2012	20.7	7.06	0.9	252	24	4,335	2,900	28	0.27	0.034J	0.87	710	30	170	92	640	300	1.6	1,200	<8.2	<8.2	1,200	1.00	17	
TON-MW2s	12/6/2012	19.8	7.26	0.5	106	48	4,627	2,900	28		<0.050														14	
TON-MW3s	2/10/2012	19.9	7.21	2.6	232	2.5	2,578	1,700	29		<0.05														14	
TON-MW3s	5/10/2012	19.4	7.13	1.8	213	28	2,912	1,700	31	0.015J*	<0.05	0.41*	370	1.4	97	54	310	180	0.12J*	650*	<8.2*	<8.2*	650	0.97	12	a
TON-MW3s	8/16/2012	20.4	7.06	1.4	217	6.0	3,001	1,800	36	0.017J	<0.05	0.34	420	1.7	99	93	370	210	0.18	750	<8.2	<8.2	750	0.96	7	
TON-MW3s	12/6/2012	19.9	7.25	0.5	104	28	2,845	1,800	26		0.12														11	
TON-MW4s	2/10/2012	21.2	7.13	2.7	243	5.5	3,544	2,300	26		0.035J														12	
TON-MW4s	5/10/2012	20.3	7.03	1.4	204	18	3,928	2,300	28	<0.05*	<0.05	0.32*	460	2.8	130	120	630	340	0.15*	570*	<8.2*	<8.2*	570	0.96	12	a
TON-MW4s	8/16/2012	20.3	7.00	0.5	220	44	3,923	2,400	48	<0.05	0.029J	0.46	520	2.7	140	150	590	320	0.15	750	<8.2	<8.2	750	1.00	4	
TON-MW4s	12/7/2012	20.0	7.28	0.7	137	24	3,607	2,200	52		<0.050														9	
TON-MW5s	2/10/2012	20.7	7.14	2.4	236	5.5	3,151	2,100	52		0.029J														13	

Table 13
Groundwater Quality

		-------Field Measurements-------																			----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	ORP	Turb	SC	TDS	NO3	NO2	NH3+ NH4	TKN	Na	K	Mg	Ca	Cl	SO4	PO4	HCO3	CO3	OH	Total	CAB	HI	Q
TON-MW5s	5/10/2012	20.9	7.11	1.7	215	38	3,394	1,700	54	0.012J*	<0.05	0.33*	410	2.3	120	71	380	210	<0.15*	660*	<8.2*	<8.2*	660	0.97	12	a
TON-MW5s	8/16/2012	21.4	6.94	0.6	216	5.0	3,386	2,100	75	<0.05	<0.05	0.78	390	2.8	130	130	370	240	0.15	770	<8.2	<8.2	770	0.95	8	
TON-MW5s	12/6/2012	21.4	7.37	0.7	102	12	3,169	2,000	69		<0.050														10	
TON-MW6s	2/10/2012	19.7	7.55	2.4	237	12	2,767	1,900	6.5		0.033J														18	
TON-MW6s	5/10/2012	18.5	7.57	1.8	253	15	2,476	1,500	5.6	<0.05*	<0.05	<0.2*	370	4.0	62	53	320	330	1.3*	410*	<8.2*	<8.2*	410	0.98	18	a
TON-MW6s	8/16/2012	19.9	7.38	1.0	207	3.0	3,018	1,800	8.6	0.20	0.025J	0.27	470	6.5	74	60	410	370	1.9	560	<8.2	<8.2	560	0.95	18	
TON-MW6s	12/6/2012	19.8	8.09	0.7	95	220	2,184	1,300	4.2		<0.050														16	
TON-MW7s	2/10/2012	21.9	7.97	2.4	229	20	1,389	810	0.85		0.025J														18	
TON-MW7s	5/10/2012	20.4	7.97	1.4	218	6.0	1,208	680	0.30	<0.05*	<0.05	<0.2*	210	1.0	18	14	91	75	0.50*	330*	37*	<8.2*	367	0.99	21	a
TON-MW7s	8/16/2012	21.7	7.65	0.7	190	7.0	1,845	1,000	5.6	0.26	<0.05	0.30	290	2.0	38	29	210	130	0.67	480	<8.2	<8.2	480	0.92	20	
TON-MW7s	12/7/2012	22.8	7.95	0.5	110	20	1,169	740	0.093J		0.15														18	
TON-MW8s	2/10/2012	19.3	7.16	2.7	267	277	5,834	4,300	17		0.037J														17	
TON-MW8s	5/10/2012	19.0	7.29	1.9	252	751	6,641	4,200	16	<0.05*	<0.05	0.45*	780	3.8	290	210	1,100	1,300	1.5*	610*	<8.2*	<8.2*	610	0.96	17	a
TON-MW8s	8/16/2012	20.5	7.04	0.5	213	28	6,036	3,900	17	<0.05	0.025J	0.58	800	4.5	250	190	960	1,200	0.70	710	<8.2	<8.2	710	0.96	17	
TON-MW8s	12/7/2012	18.8	7.27	0.7	127	53	5,697	3,900	24		<0.050														17	

Values in mg/L except temperature (T) in degrees Celsius, pH in standard pH-units, oxygen reduction potential (ORP) in millivolts, turbidity (Turb) in nephelometric turbidity units, specific conductance (microsiemens per centimeter. Nitrate, nitrite, ammoniacal-N, and total kjeldahl nitrogen are reported as nitrogen. Sulfate is reported as sulfate; total phosphate is reported as phosphate.
CAB, Cation-Anion Balance
HI, hydraulic information prior to purging: wet screen length in feet.
Q, qualifiers (a) sample holding time was exceeded where indicated with an *; (b) complete purge of 3 casing volumes not attained.

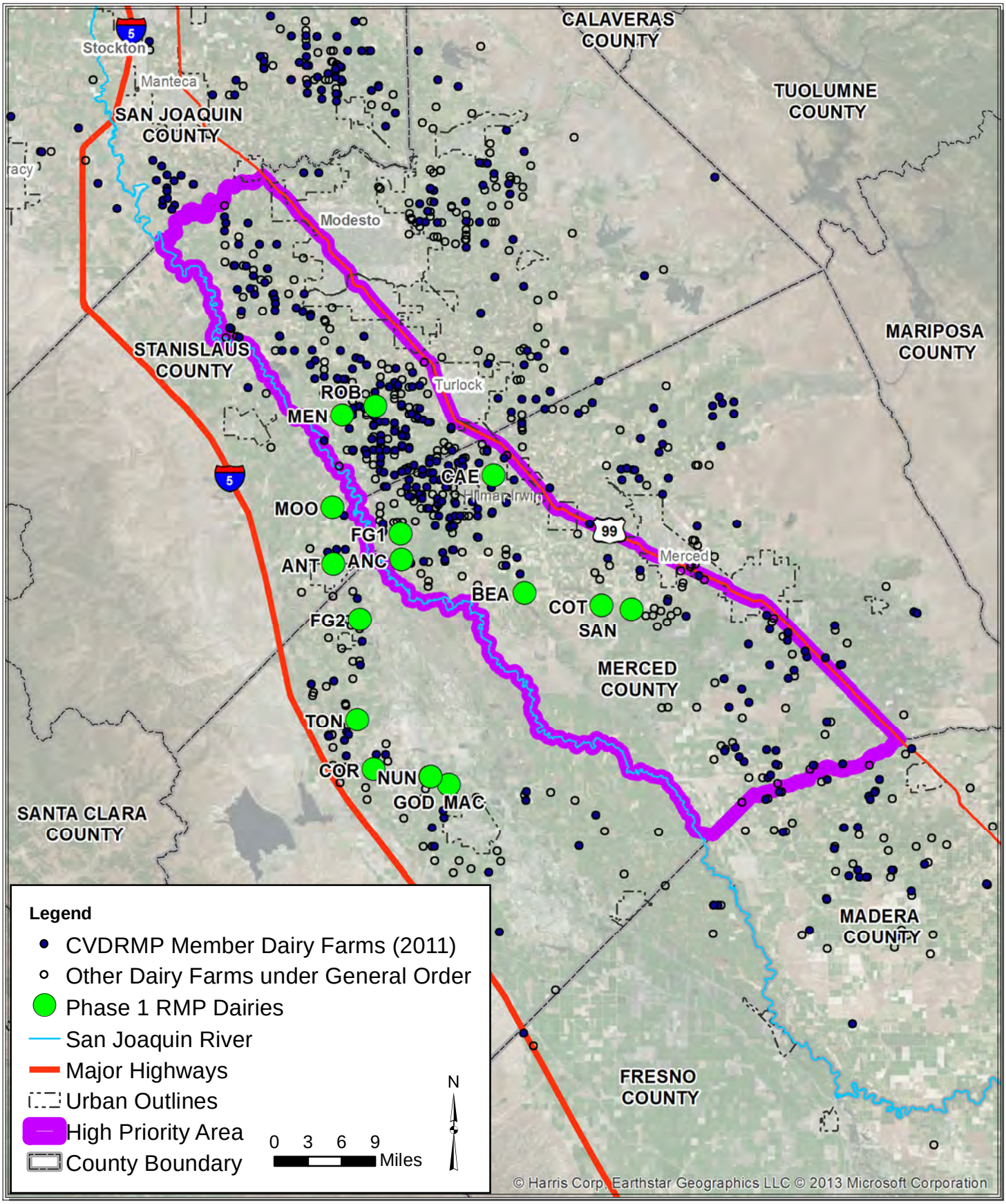

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Figure 1
Location Map, Phase 1 RMP Dairies
Central Valley Representative Monitoring Program
Year 1 Annual Report

Map Series

Dairy Production Area

- East Side: MEN, ANC, BET, FG1, BEA, COT, SAN, PLS, CAE, ROB
- West Side: ANT, COR, FG2, GOD, MAC, NUN, MOO, TON

Dairy Production Area and Associated Fields

- East Side: MEN, ANC, BET, FG1, COT, SAN, PLS, CAE, ROB
- West Side: ANT, FG2, GOD, MAC and NUN, MOO, TON

Soil Characteristics (NRCS – SSURGO) of Dairy Production Area and Associated Fields

- East Side: MEN, ANC, BET, FG1, BEA, COT, SAN, PLS, CAE, ROB
- West Side: ANT, COR, FG2, GOD, MAC, NUN, MOO, TON

Legend

- 1-Pipe Monitoring Well
- 2-Pipe Monitoring Well
- Ag Well
- Domestic Well
- Unknown Well
- Dairy Production Area
- Soil Characteristic Units
- Box, Irrigation Control
- Box, Mixing
- Capped
- Drain
- Drop Box
- Flow Meter
- Flush Return Inlet Pipe
- Mechanical Separator
- Microjet Irrigation Filter & Pump
- Pump
- Pump, Floating
- Pump, Portable
- Pump, Tailwater
- Pump, Tile Drain
- Pump, Wastewater
- Stand Pipe
- TID Inlet
- Tank, Flush
- Tank, Water Storage
- Valve
- B- Berms/Levees
- C- Canal, Concrete
- C- Canal, Earthen
- Culvert
- D- Ditch, Concrete
- D- Ditch, Concrete - Community
- D- Ditch, Earthen
- D- Ditch, Earthen - Community
- Flow Direction, Irrigation Flow
- Flow Direction, Surface Drainage
- Flow Direction, Tailwater Flow
- Pipeline, Freshwater
- Pipeline, Irrigation
- Pipeline, Tailwater
- Pipeline, Tailwater/Tile Drain
- Pipeline, Tile Drain
- Pipeline, Wastewater
- Setback/Physical Barrier
- Animal Housing/Shade
- Calf Barn
- Calf Hutches
- Milk Barn
- Corral
- Hay Barn
- Commodity Barn
- Shed/Shop
- Other Structure
- Feed Storage (Roofed)
- Feed Storage (on Concrete)
- Feed Storage (on Earth)
- Field
- Field, Tiled
- Earthen Tailwater Pond
- Dry Scrape Alley
- Manure Stacking Area (on Concrete)
- Manure Stacking Area (on Earth)
- Solids Settling Basin
- Flush Lane
- Liquid Manure Storage
- Earthen Stacking Area
- Equipment Storage
- Concrete Processing Pit
- Concrete Sand Trap
- Digester
- Weir Box

Field Crop Data on "Dairy Production Area and Associated Fields" map series are shown in black lettering on maps and organized as shown below:

CROP | Lagoon Liquor Applied (Y/N)? | Solid Manure Applied (Y/N)? | Synthetic Fertilizer Applied (Y/N)? | Irrigation Depth (inches) | N applied (lbs/acre) | Dry Yield (tons/acre) | N Application/Removal Ratio

A – Alfalfa	AH – Alfalfa Hay	CE – Corn Ears	CS – Corn Silage
L – Almonds	LS – Almonds in Shell	O – Oat Silage	OH – Oat Hay
P – Pasture	S – Sudangrass	PS – Sweet Potato	WS – Wheat Silage

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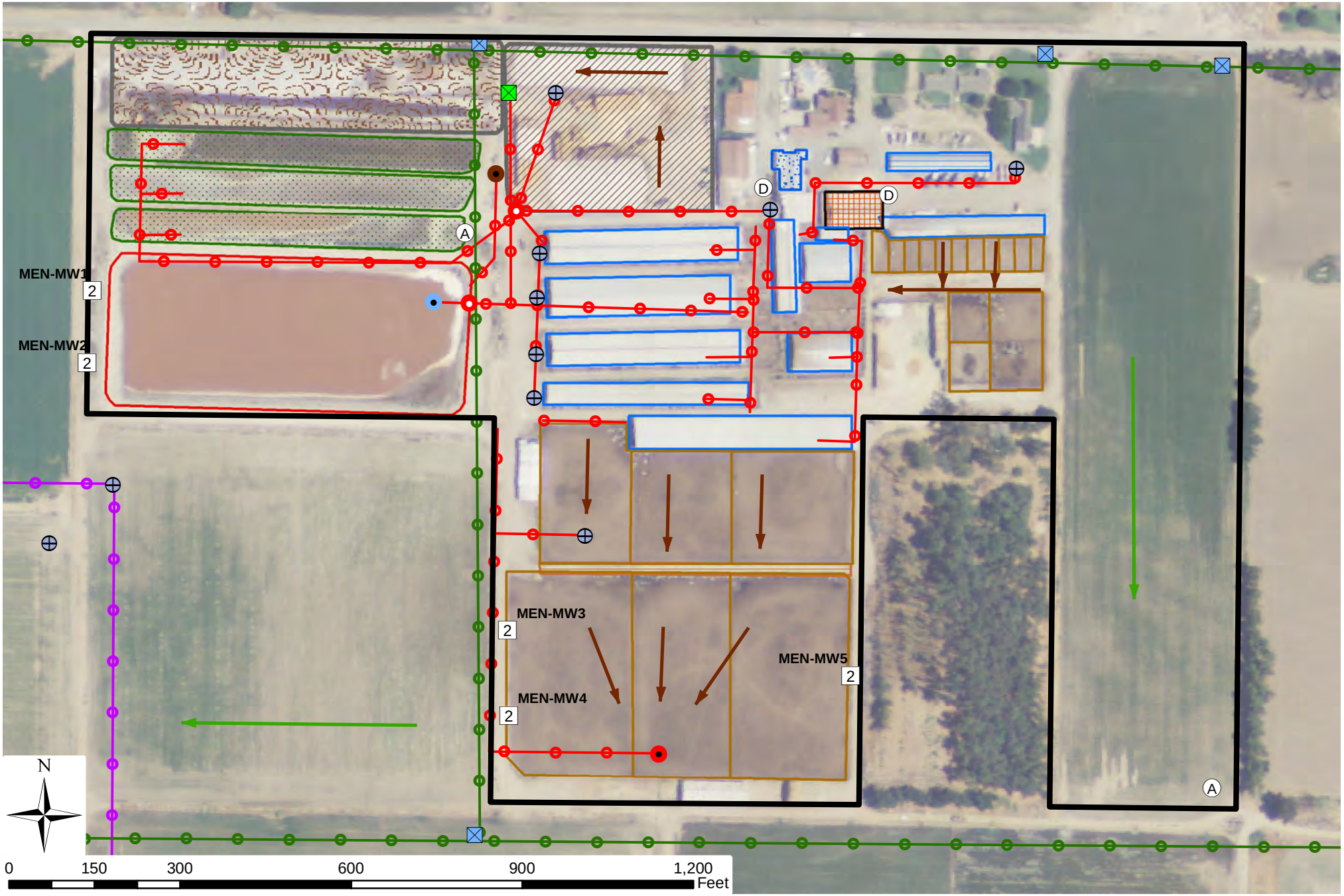
Map Series
Dairy Production Area

- East Side: MEN, ANC, BET, FG1, BEA, COT, SAN, PLS, CAE, ROB
- West Side: ANT, COR, FG2, GOD, MAC, NUN, MOO, TON



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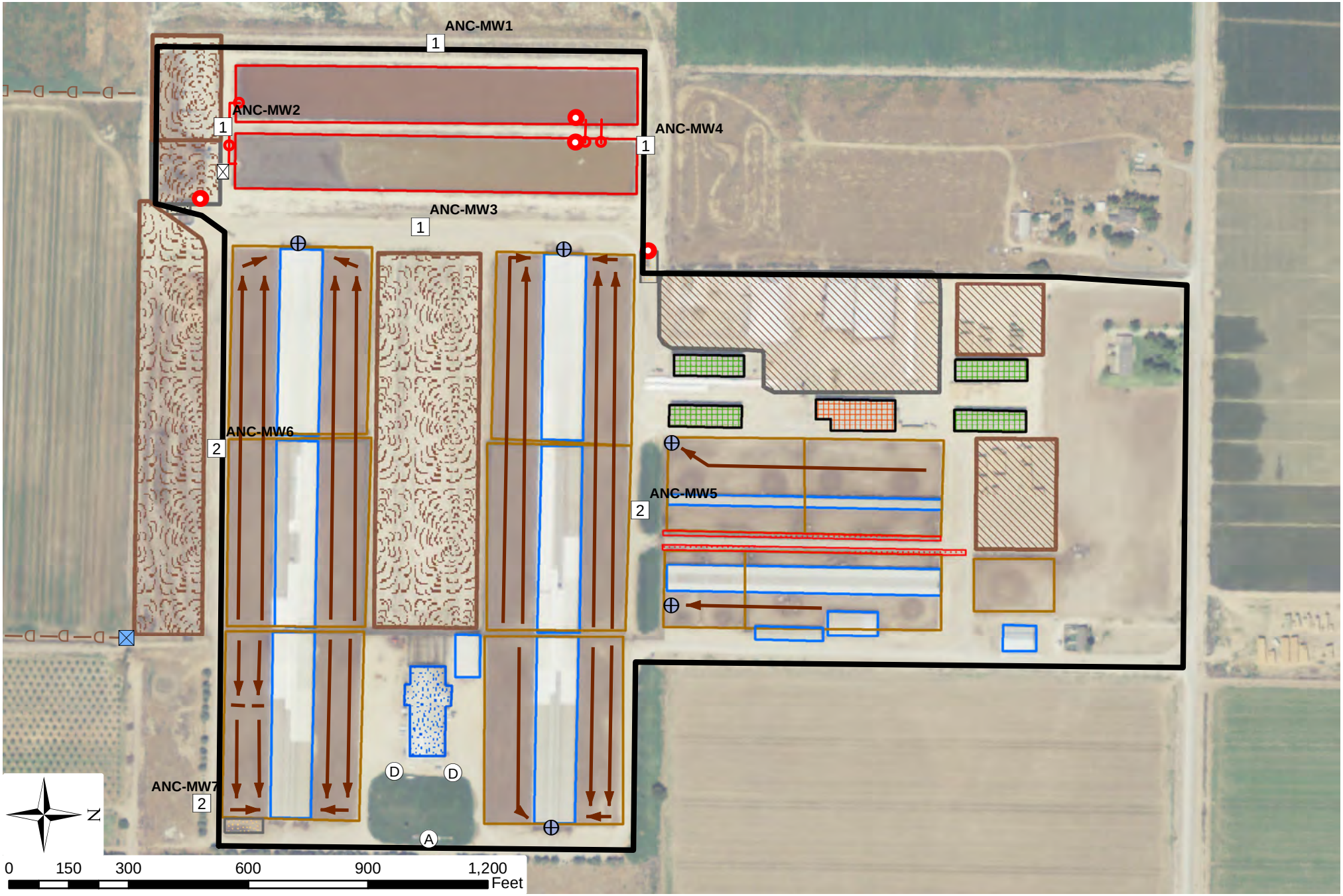
Dairy Production Area
MEN - Year 1
Central Valley Dairy Representative Monitoring Program



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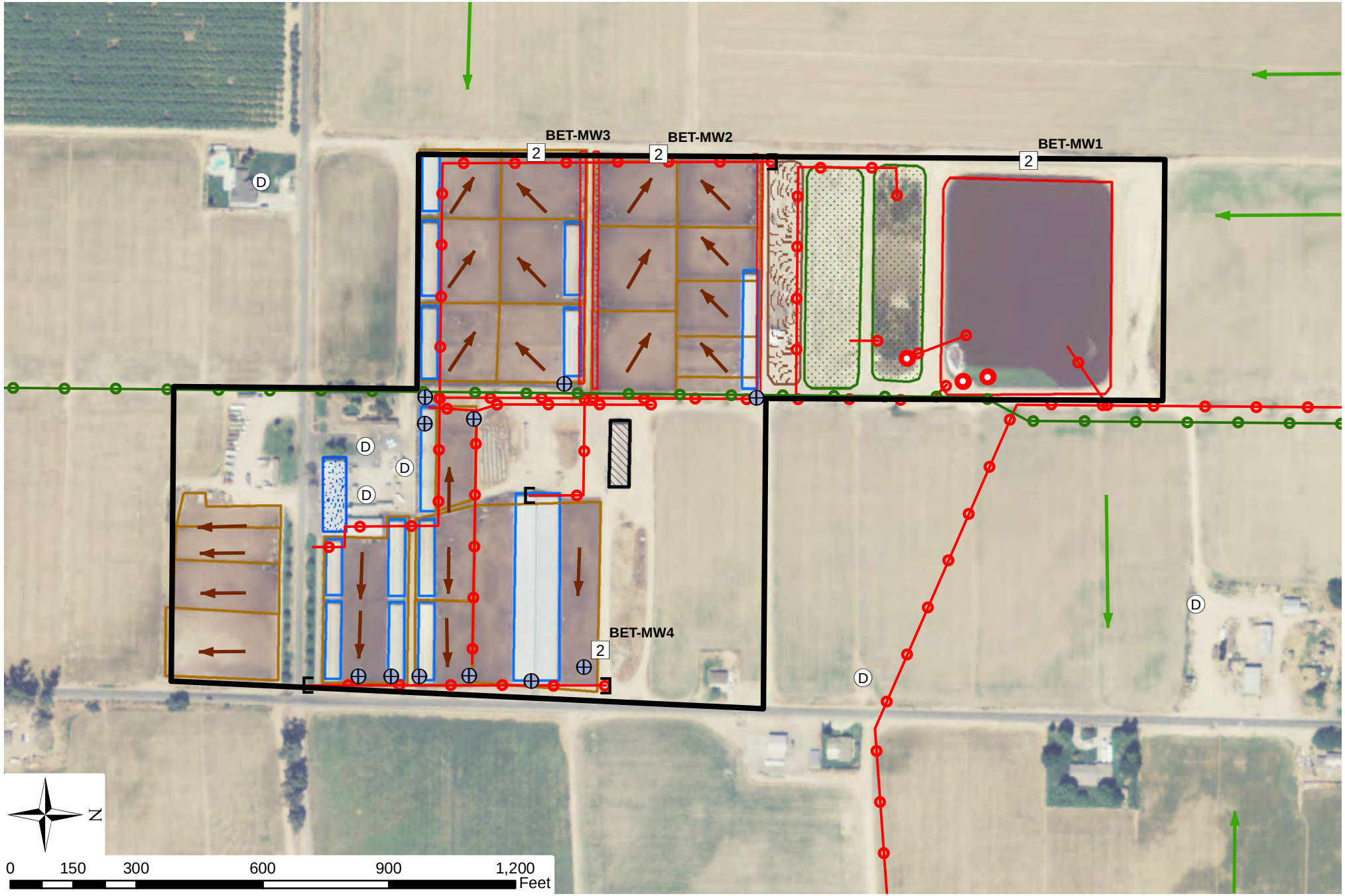
Dairy Production Area
ANC - Year 1
Central Valley Dairy Representative Monitoring Program



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Dairy Production Area
BET - Year 1
Central Valley Dairy Representative Monitoring Program

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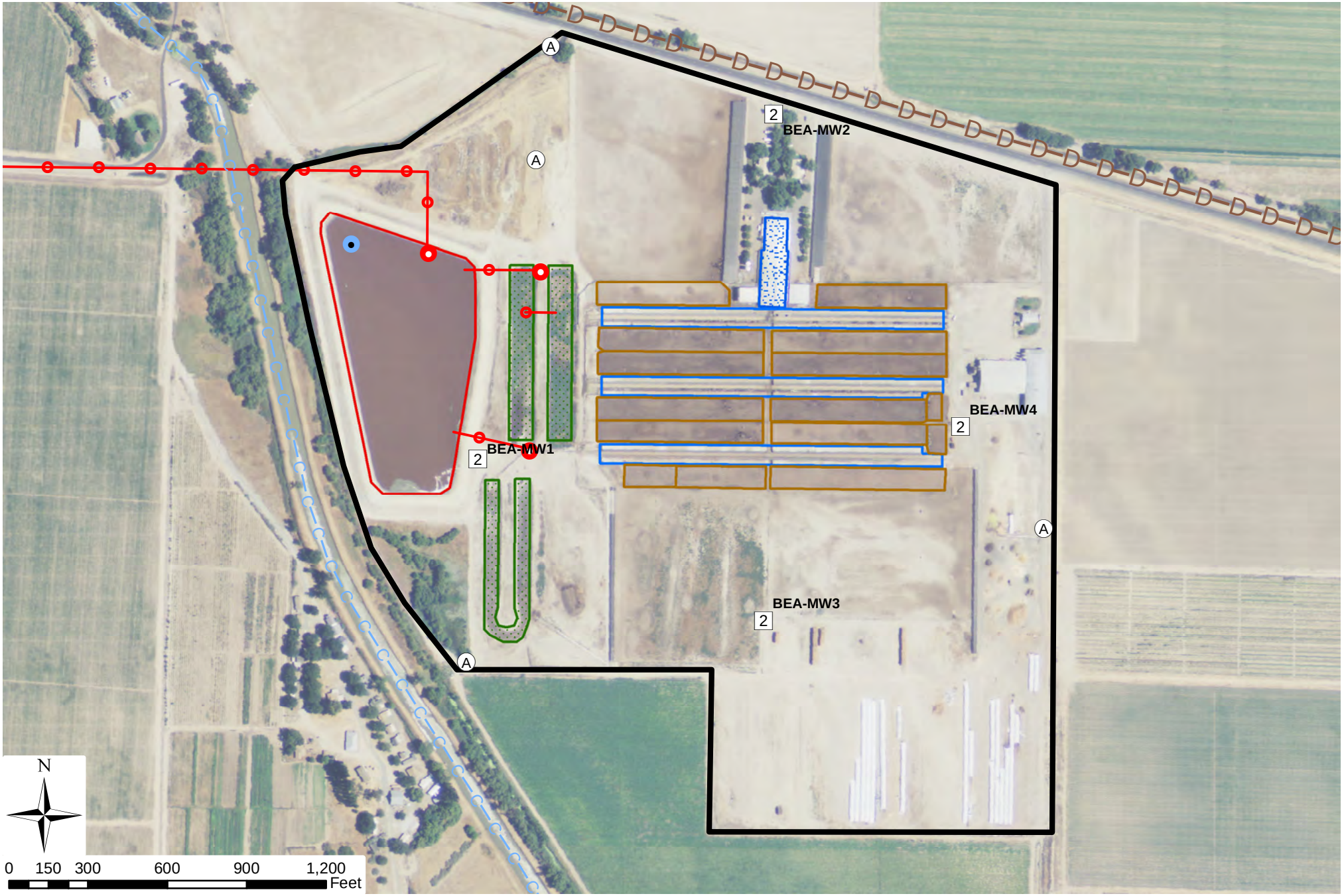
Dairy Production Area
FG1 - Year 1
Central Valley Dairy Representative Monitoring Program



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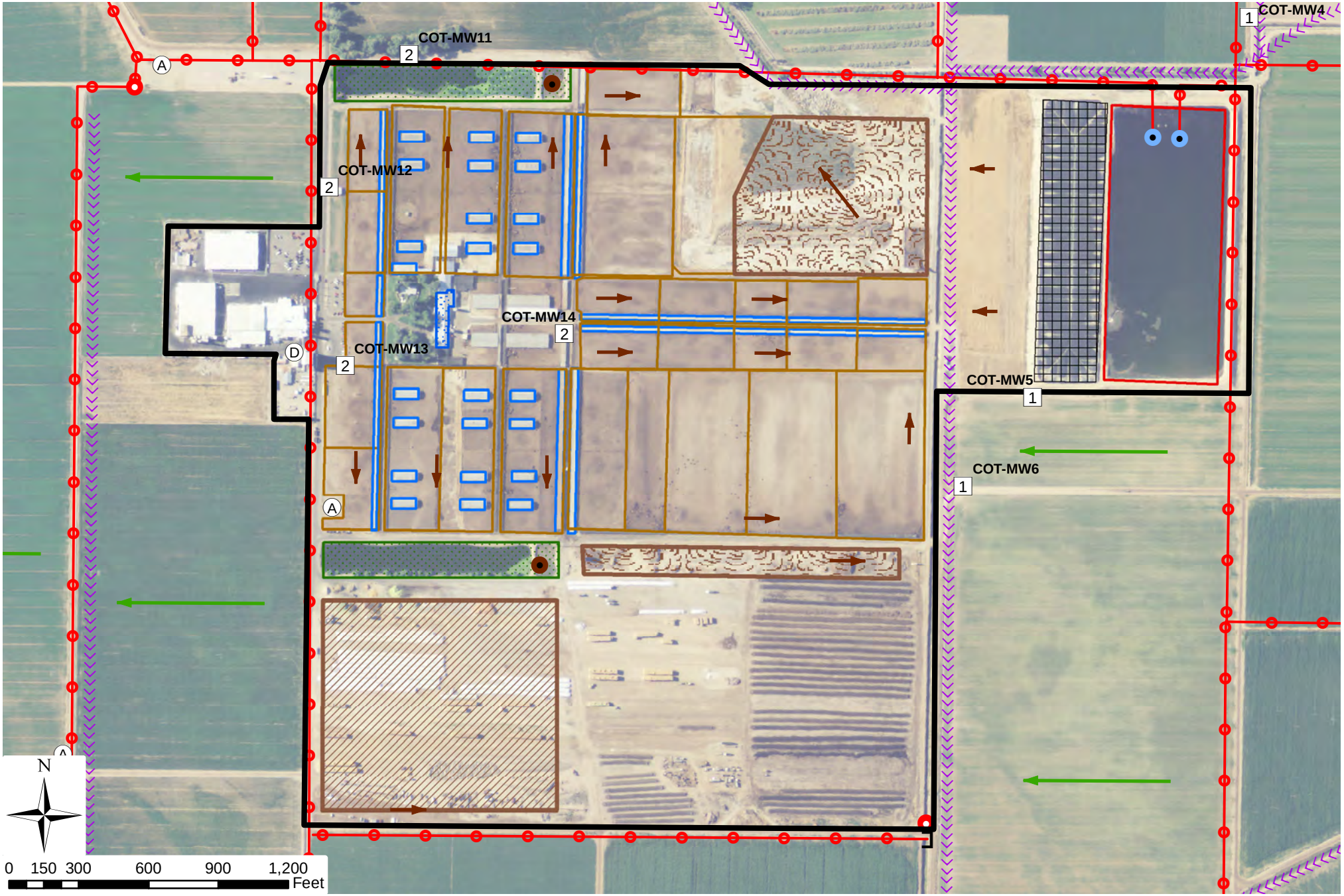
Dairy Production Area
BEA - Year 1
Central Valley Dairy Representative Monitoring Program



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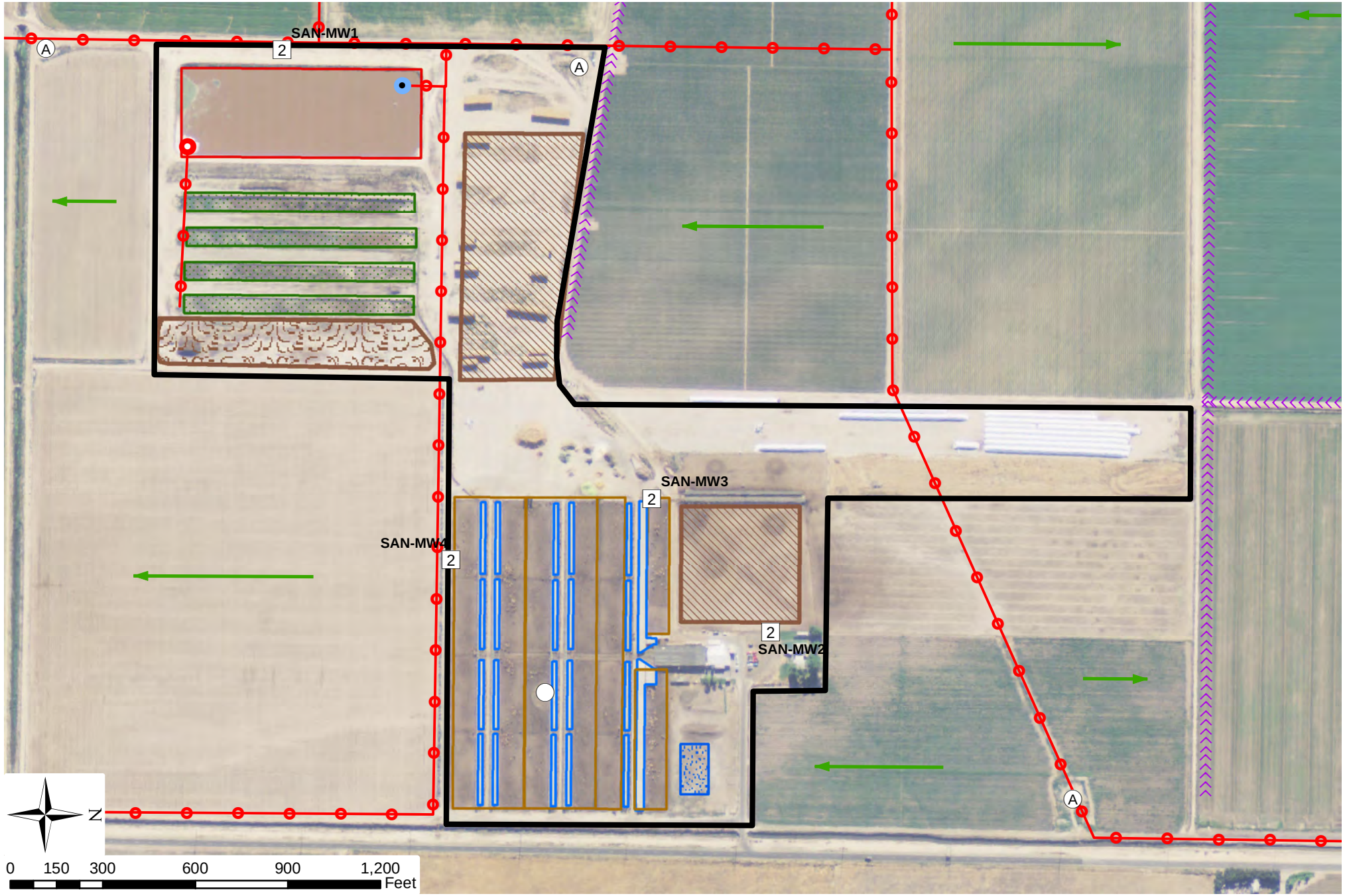
Dairy Production Area
COT - Year 1
Central Valley Dairy Representative Monitoring Program



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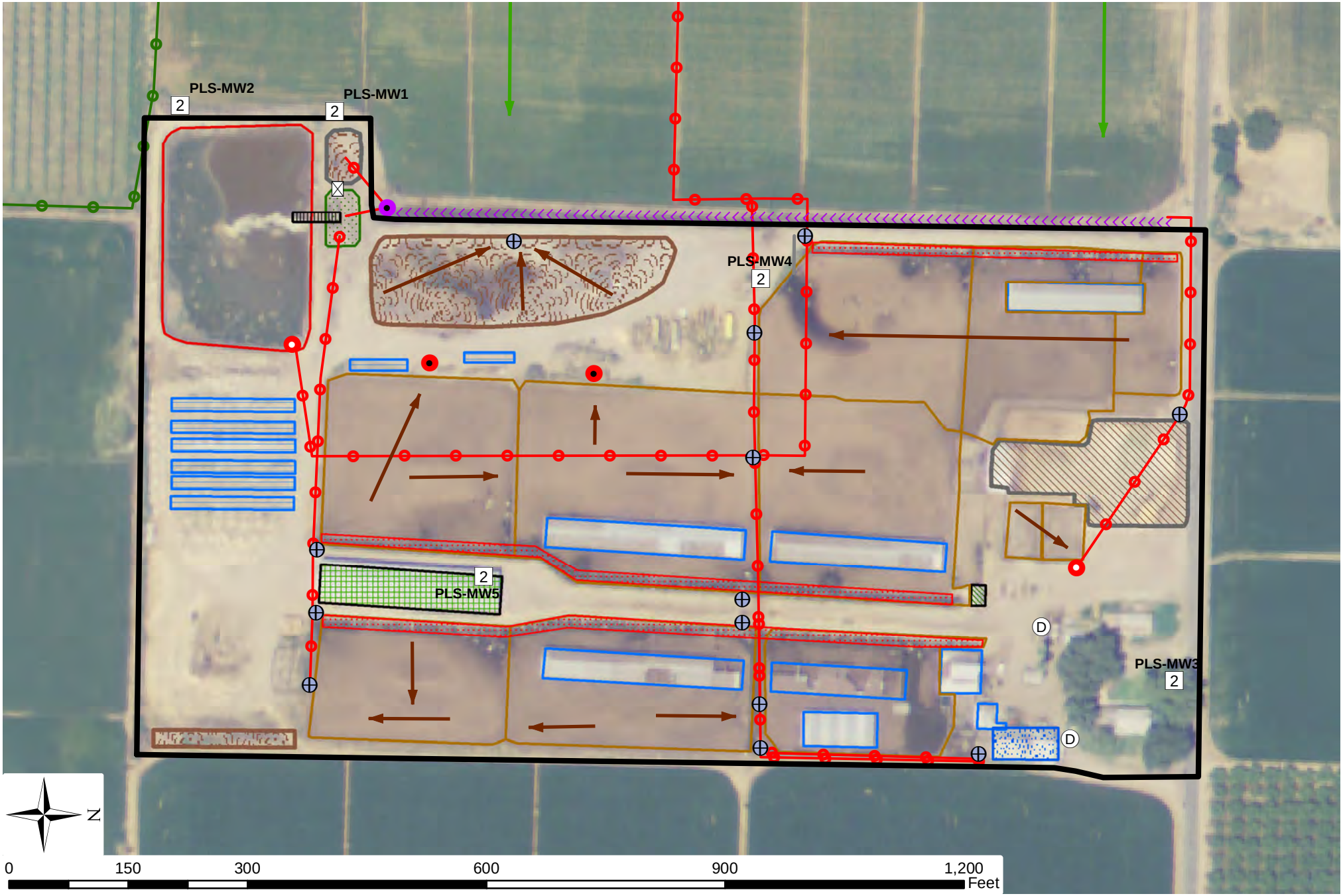
Dairy Production Area
SAN - Year 1
Central Valley Dairy Representative Monitoring Program



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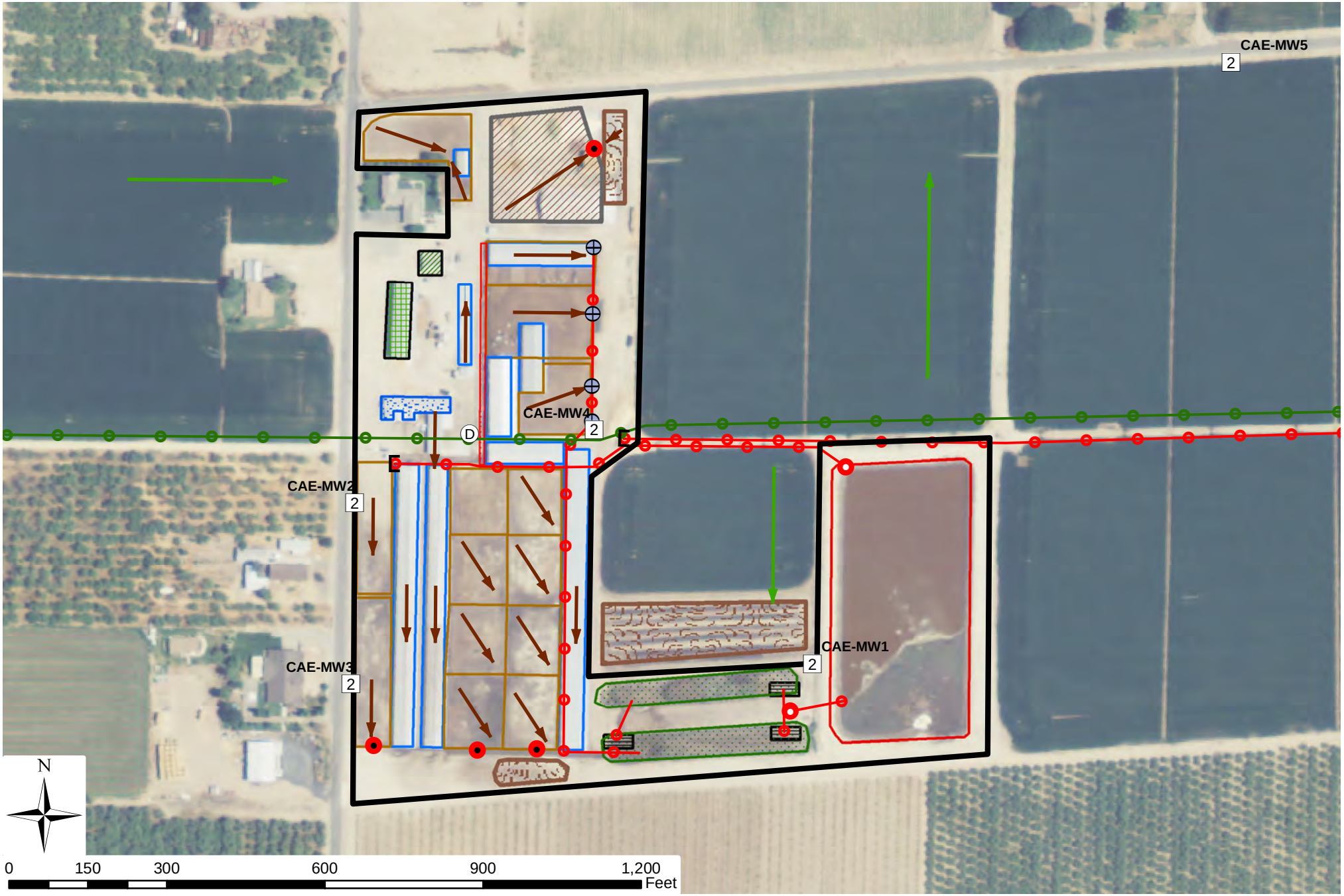
Dairy Production Area
PLS - Year 1
Central Valley Dairy Representative Monitoring Program



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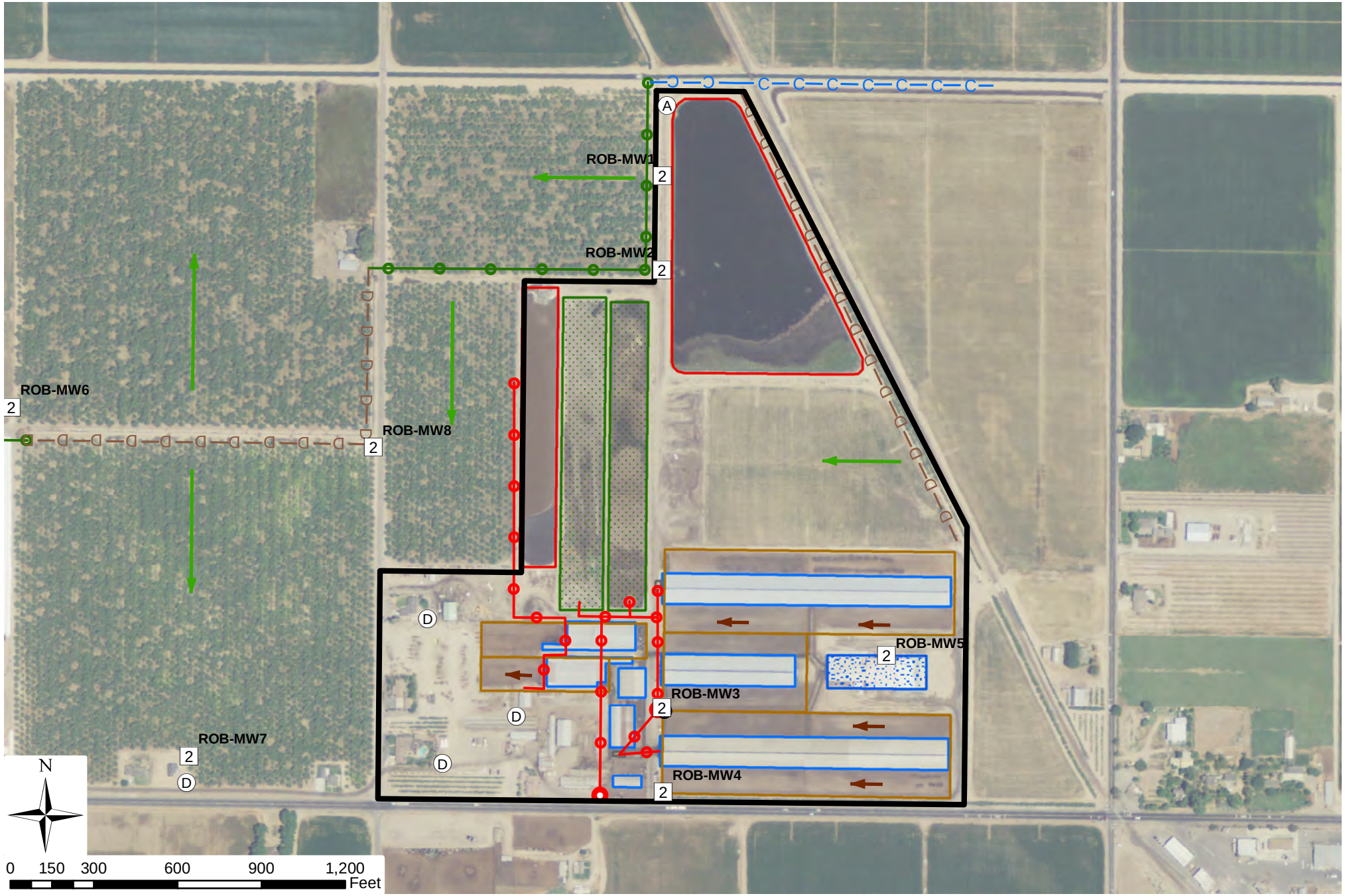
Dairy Production Area
CAE - Year 1
Central Valley Dairy Representative Monitoring Program



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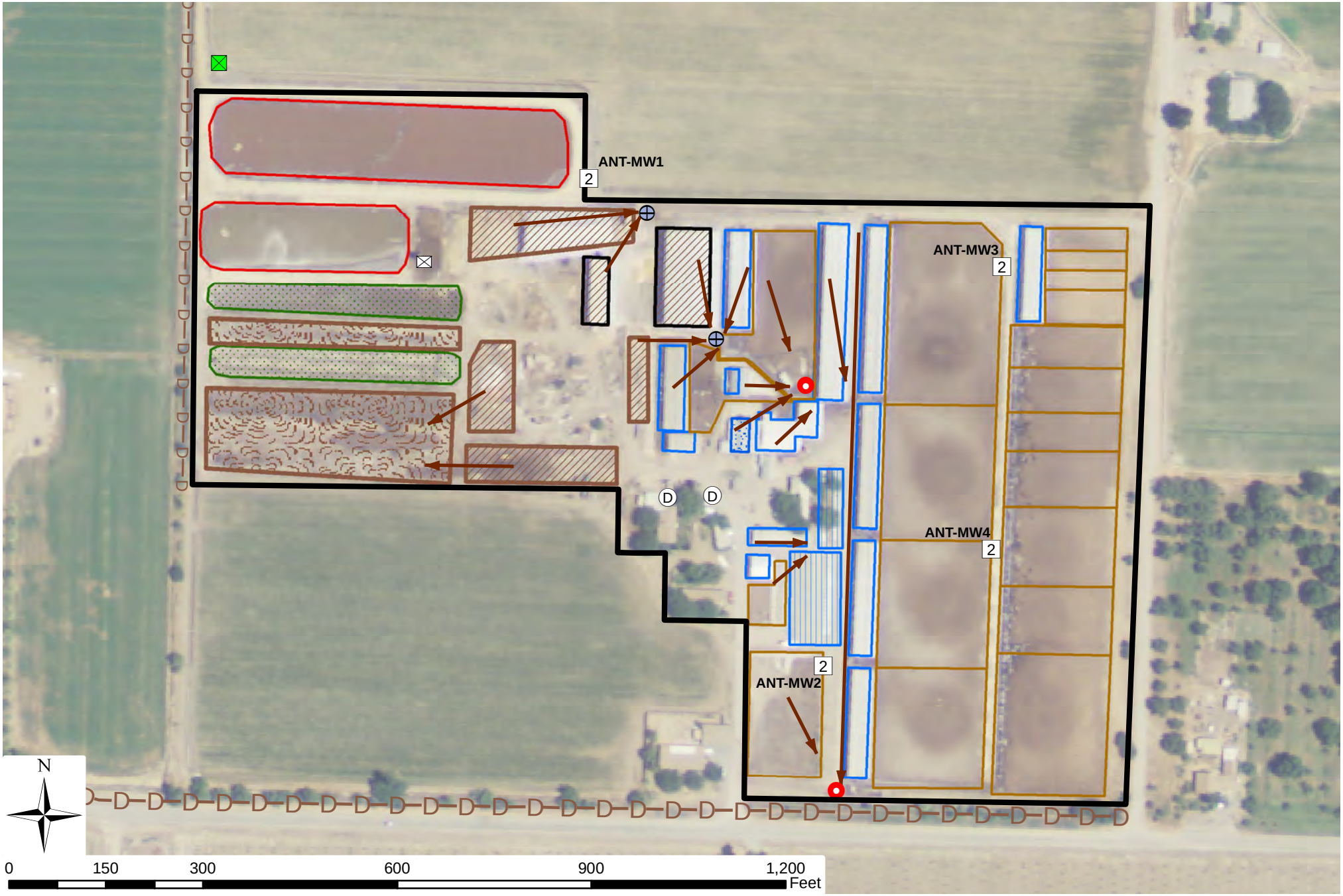
Dairy Production Area
ROB - Year 1
Central Valley Dairy Representative Monitoring Program



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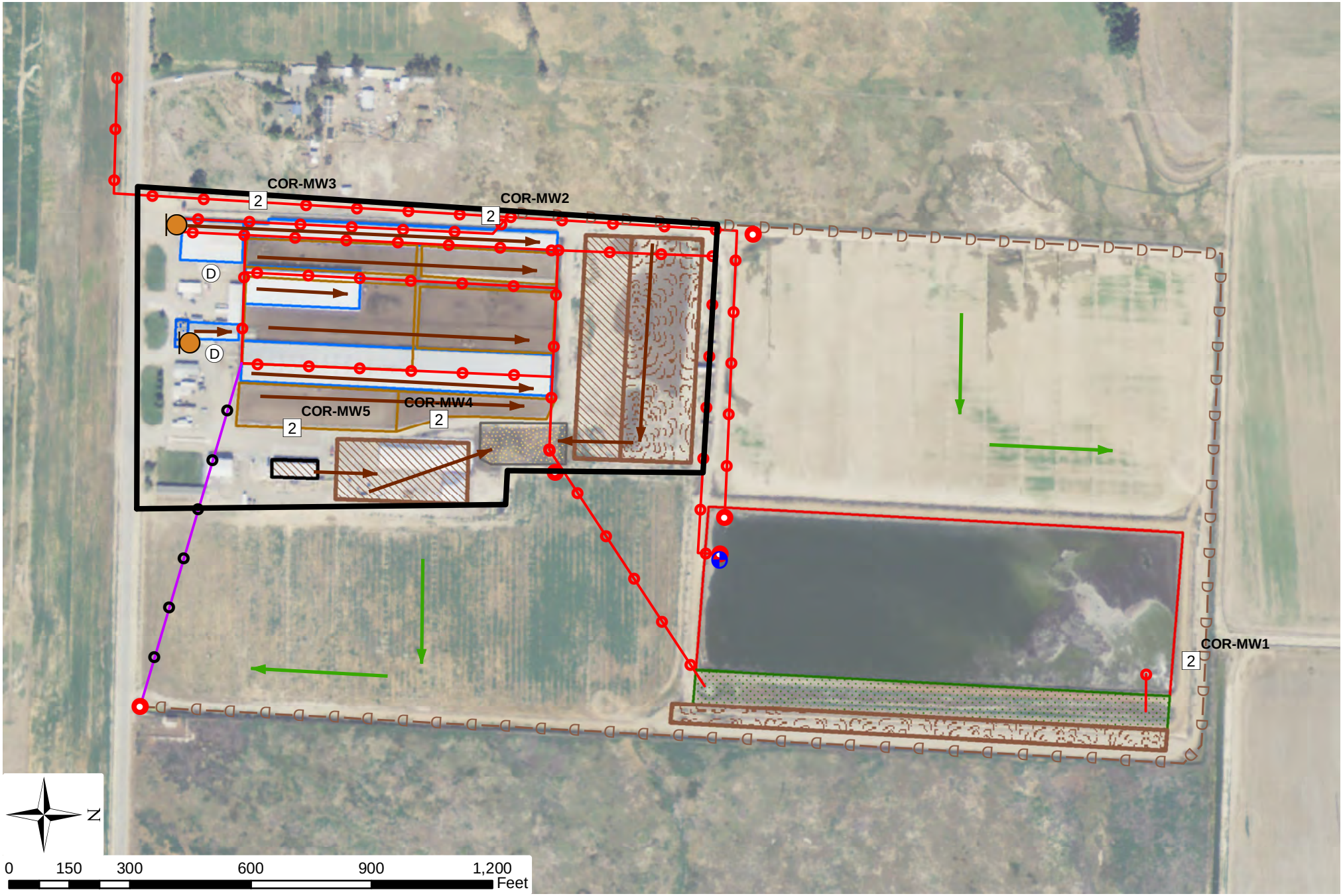
Dairy Production Area
ANT - Year 1
Central Valley Dairy Representative Monitoring Program



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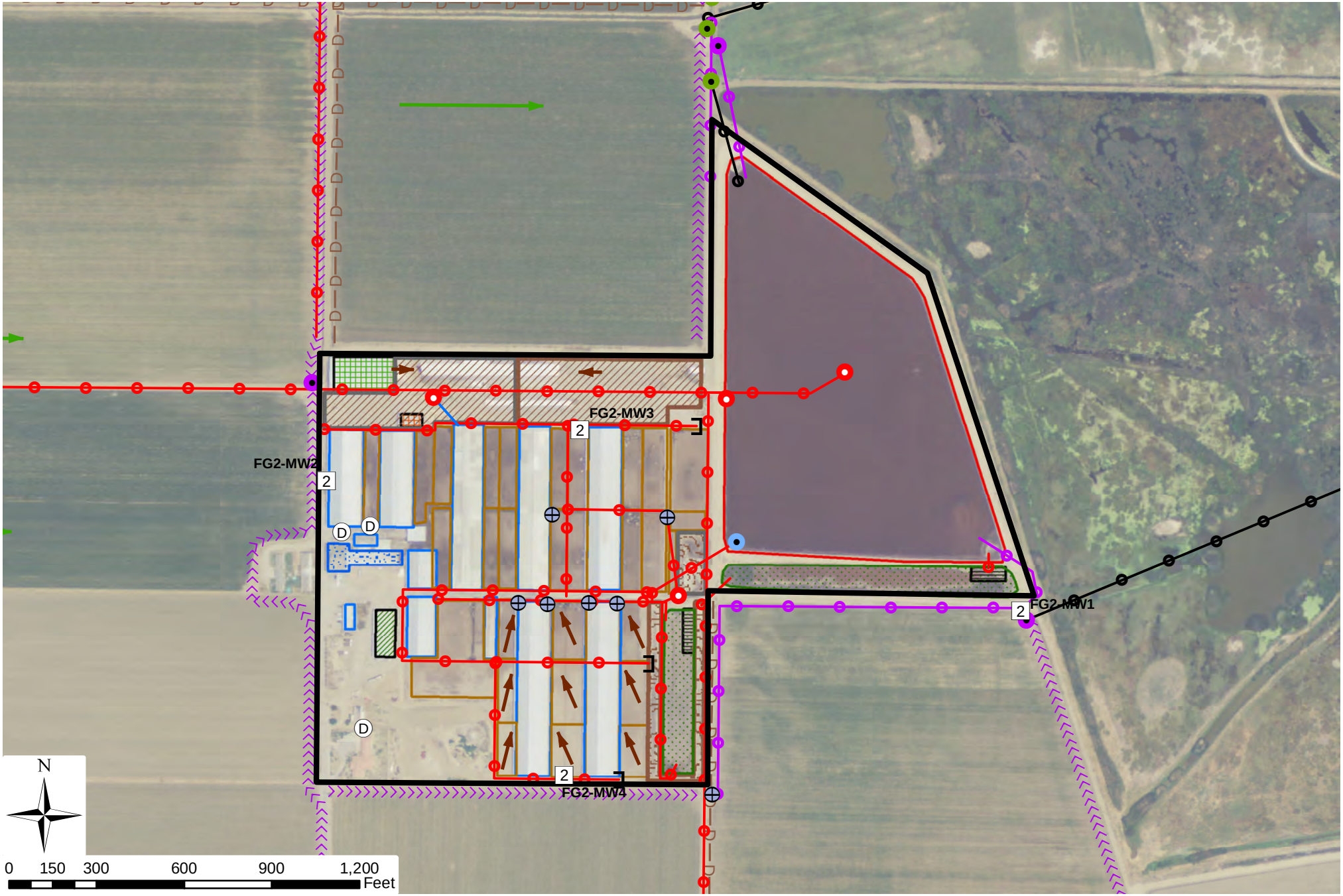
Dairy Production Area
COR - Year 1
Central Valley Dairy Representative Monitoring Program



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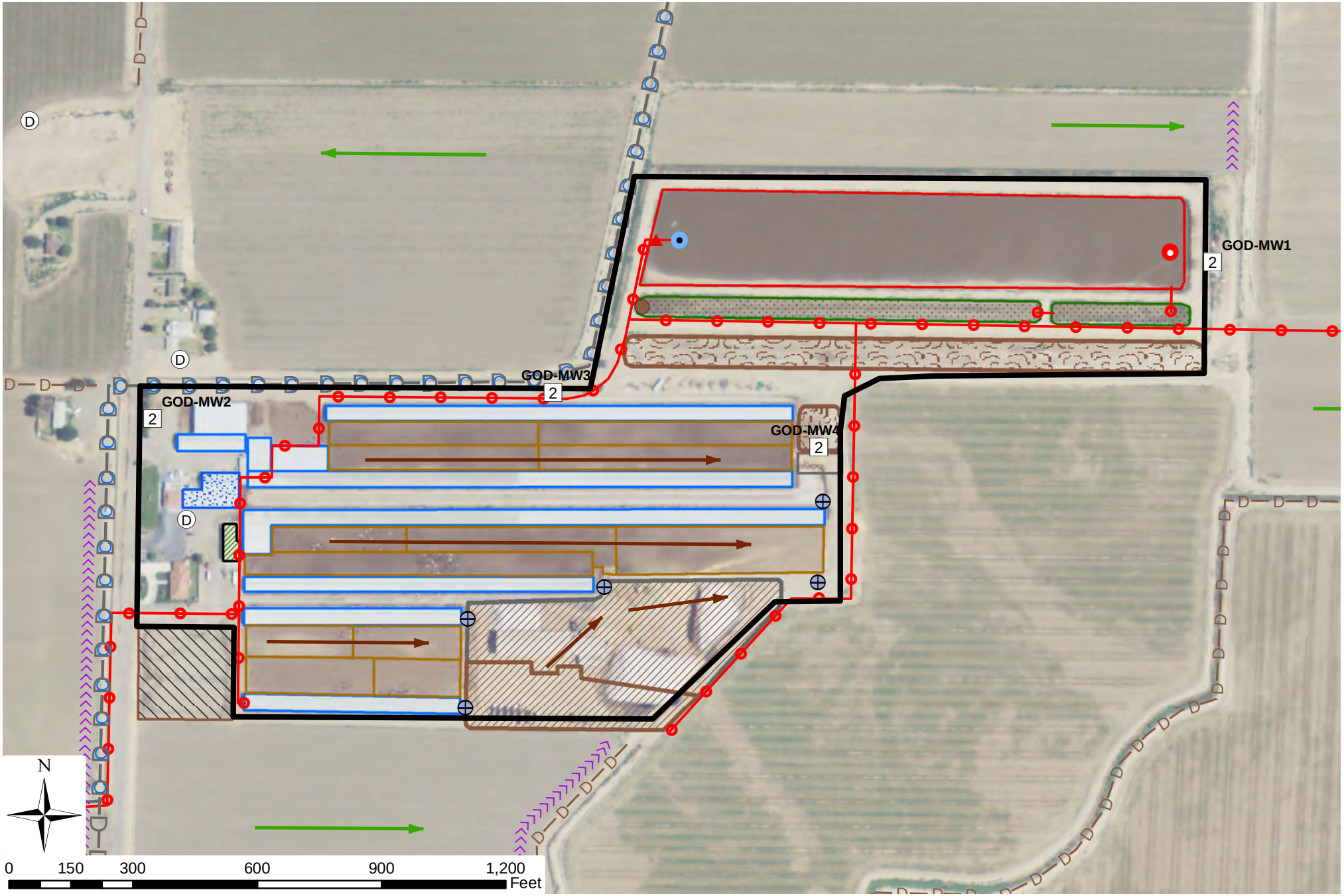
Dairy Production Area
FG2 - Year 1
Central Valley Dairy Representative Monitoring Program



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Dairy Production Area
GOD - Year 1
Central Valley Dairy Representative Monitoring Program

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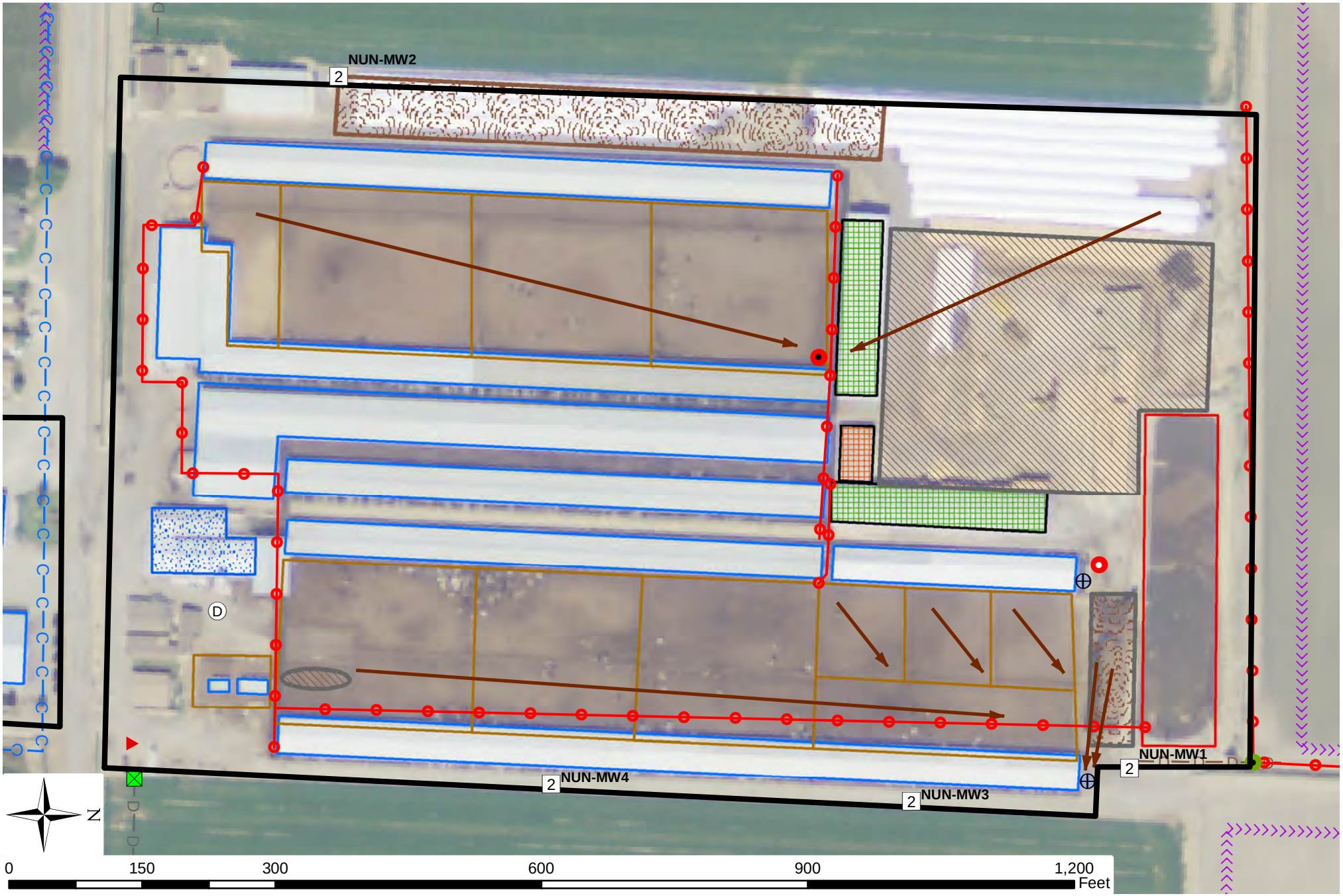
Dairy Production Area
MAC - Year 1
Central Valley Dairy Representative Monitoring Program



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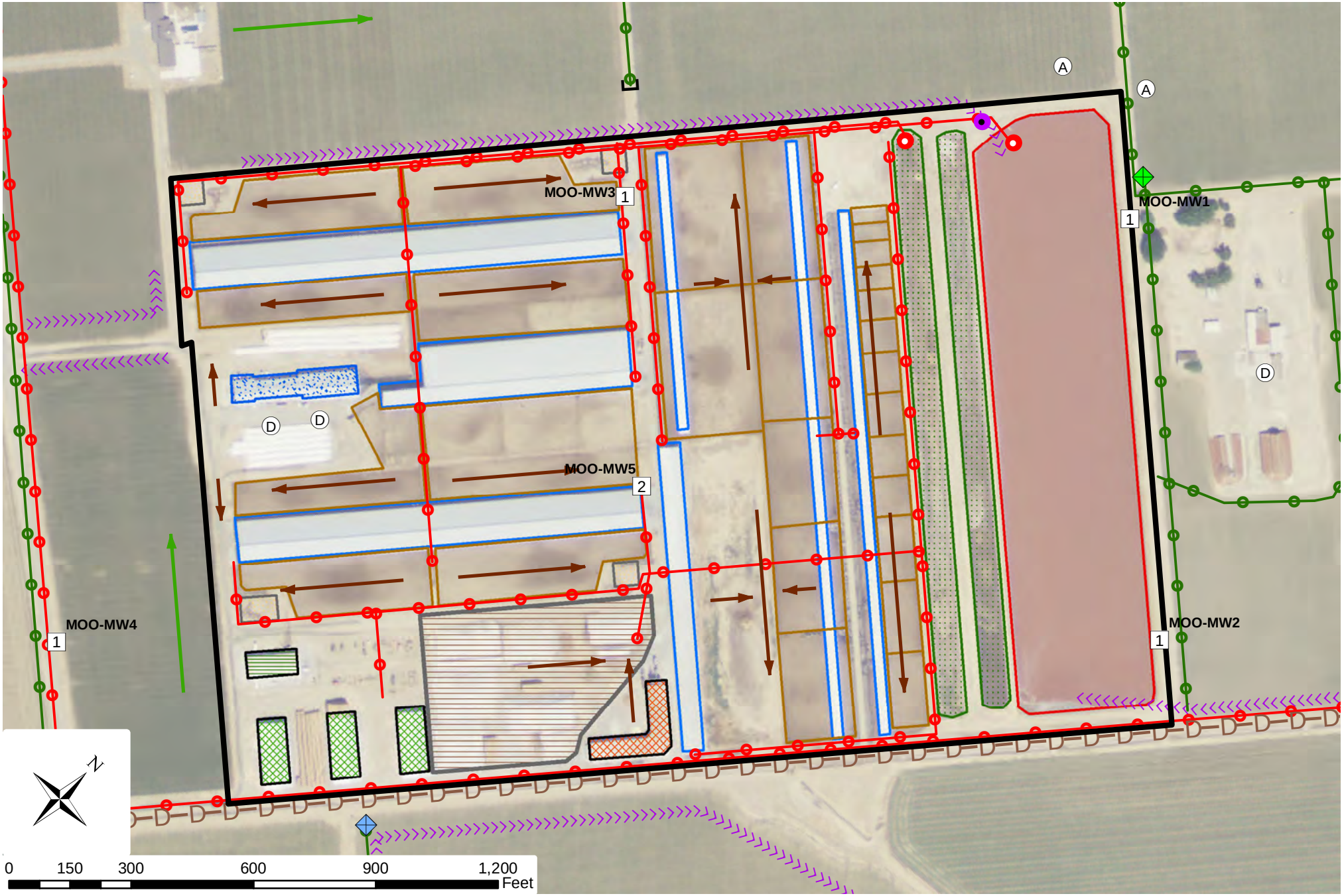
Dairy Production Area
NUN - Year 1
Central Valley Dairy Representative Monitoring Program



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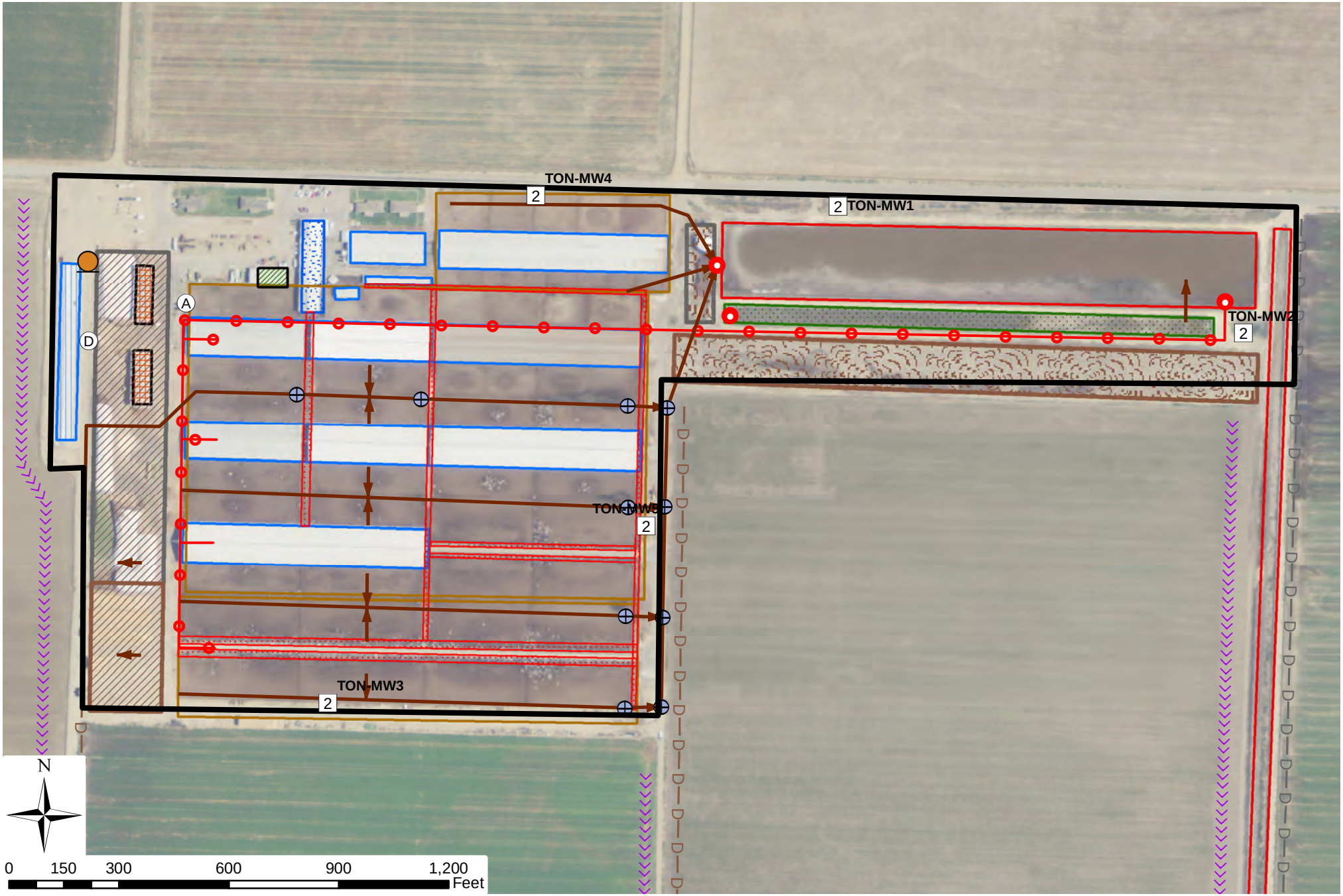
Dairy Production Area
MOO - Year 1
Central Valley Dairy Representative Monitoring Program



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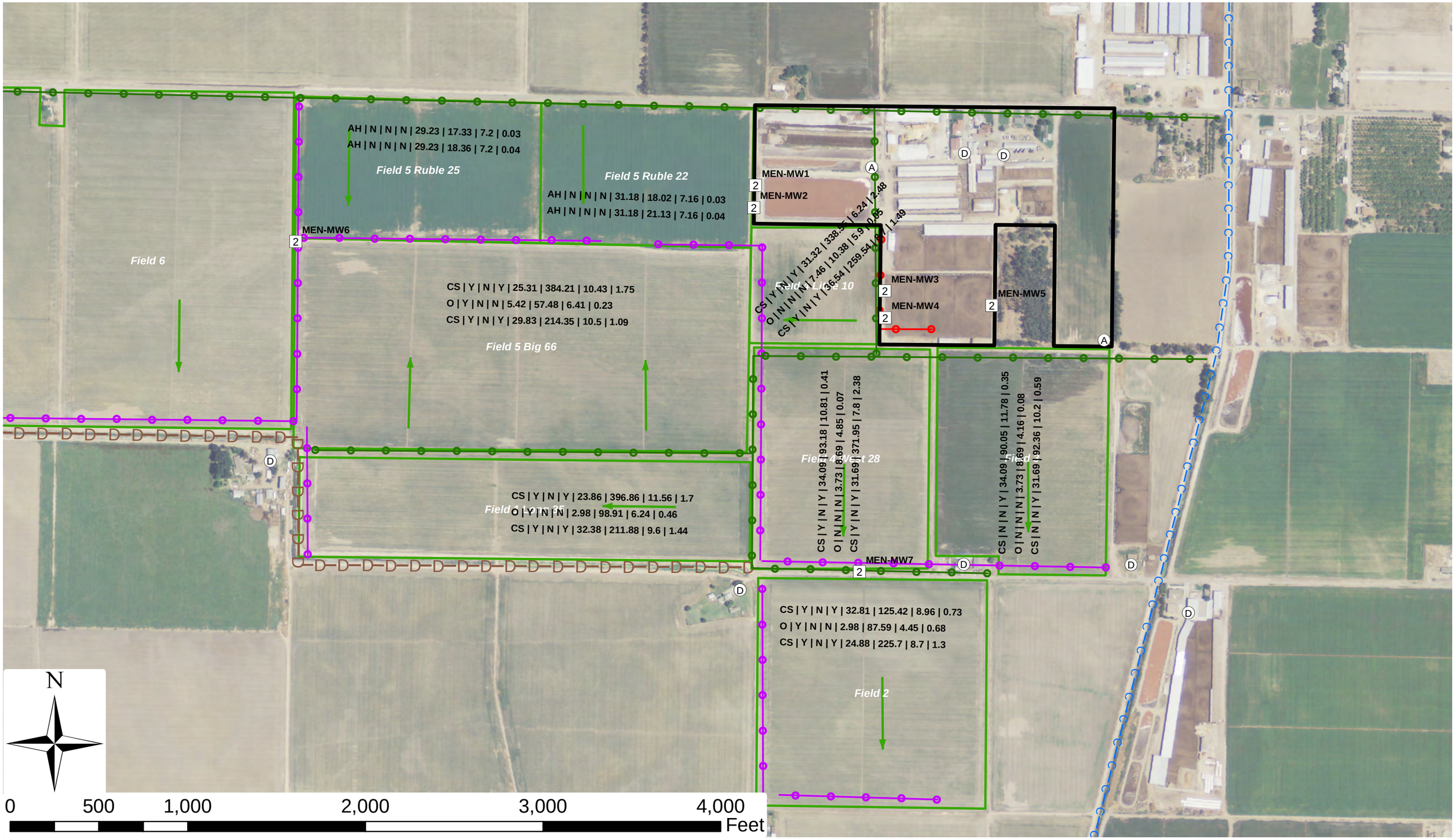
Dairy Production Area
TON - Year 1
Central Valley Dairy Representative Monitoring Program

Map Series
Dairy Production Area and Associated Fields

- East Side: MEN, ANC, BET, FG1, COT, SAN, PLS, CAE, ROB
- West Side: ANT, FG2, GOD, MAC and NUN, MOO, TON



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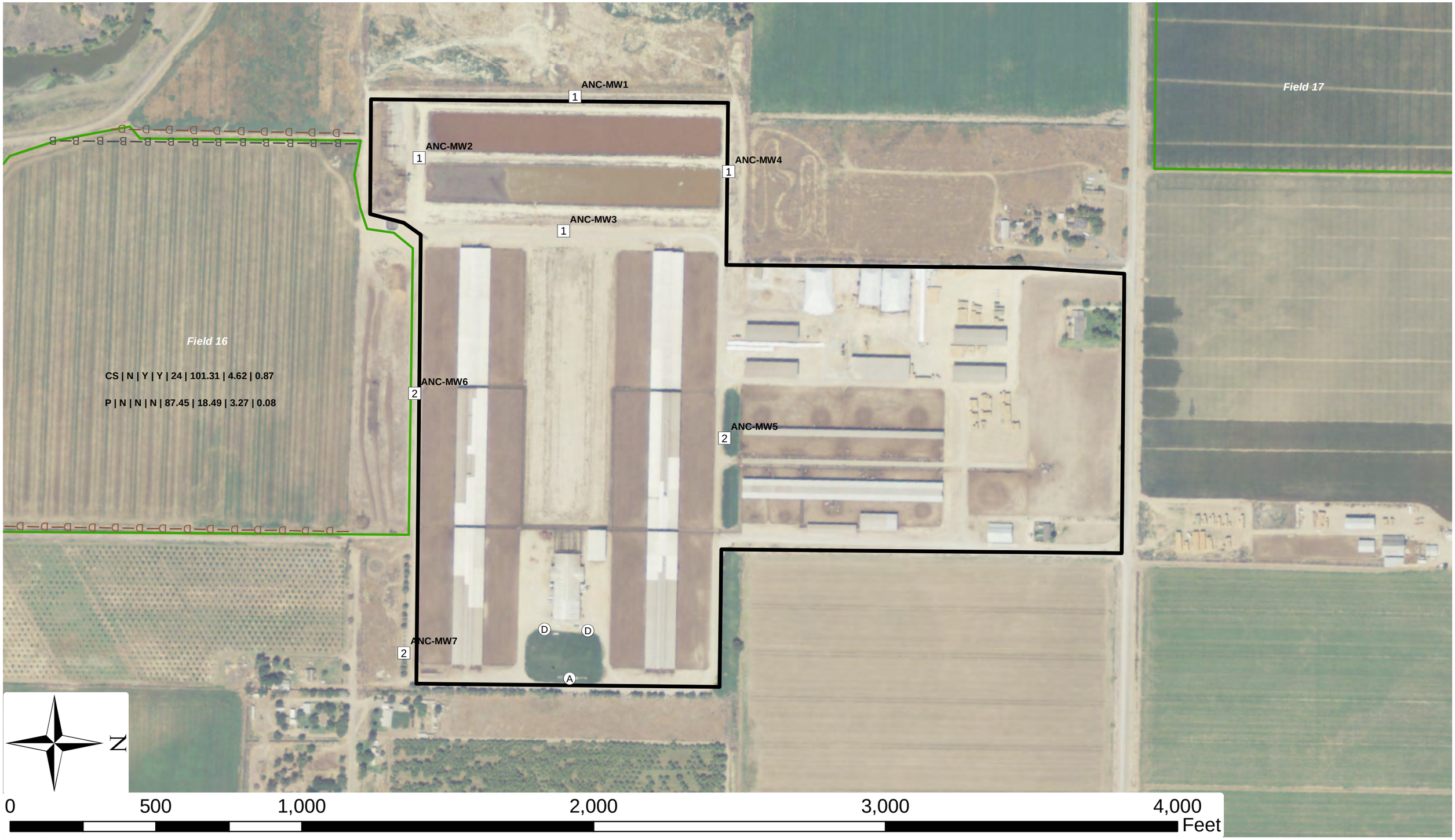
Dairy Production Area and Associated Fields
MEN - Year 1
Central Valley Dairy Representative Monitoring Program



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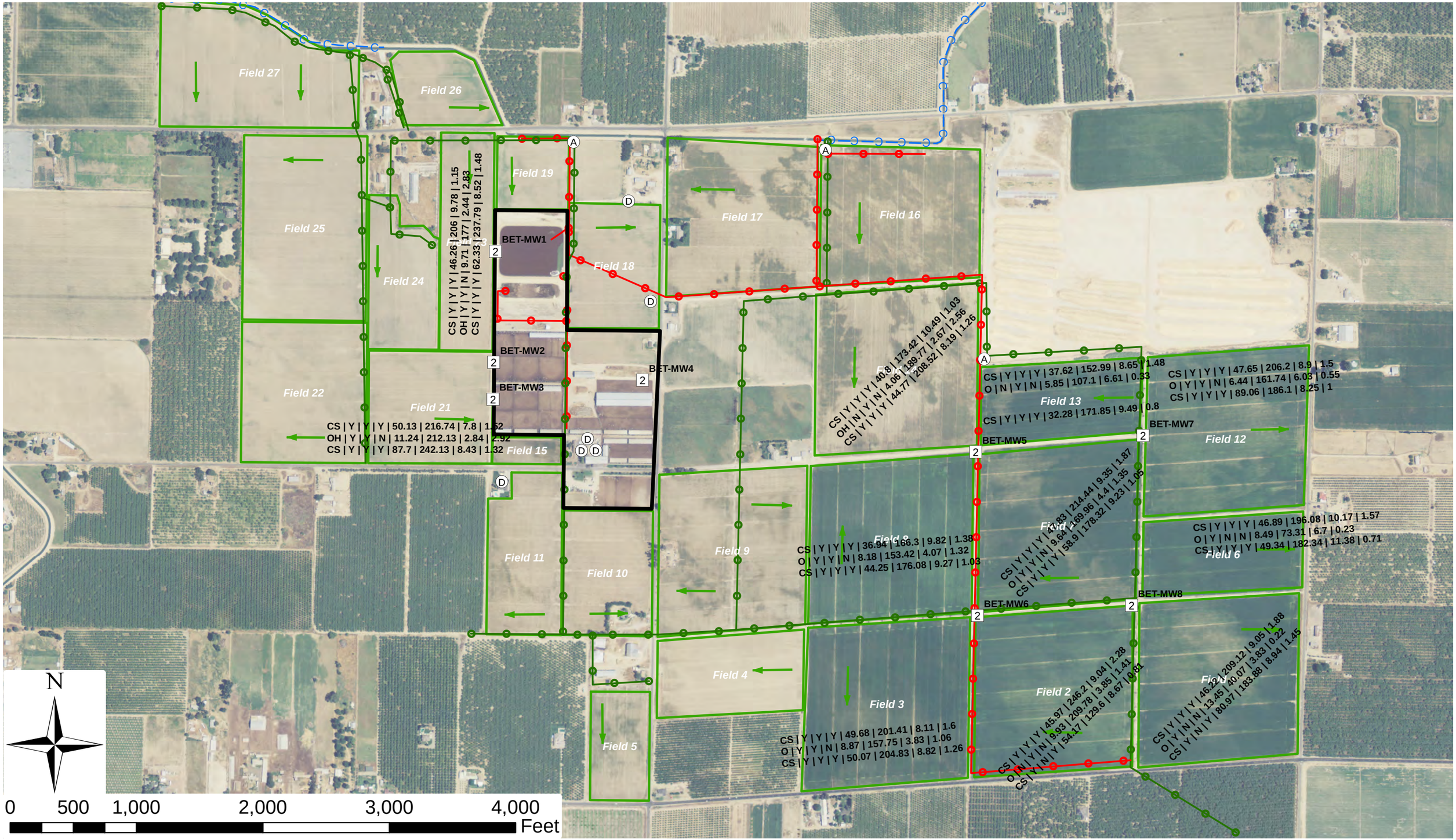
Dairy Production Area and Associated Fields
ANC - Year 1
Central Valley Dairy Representative Monitoring Program



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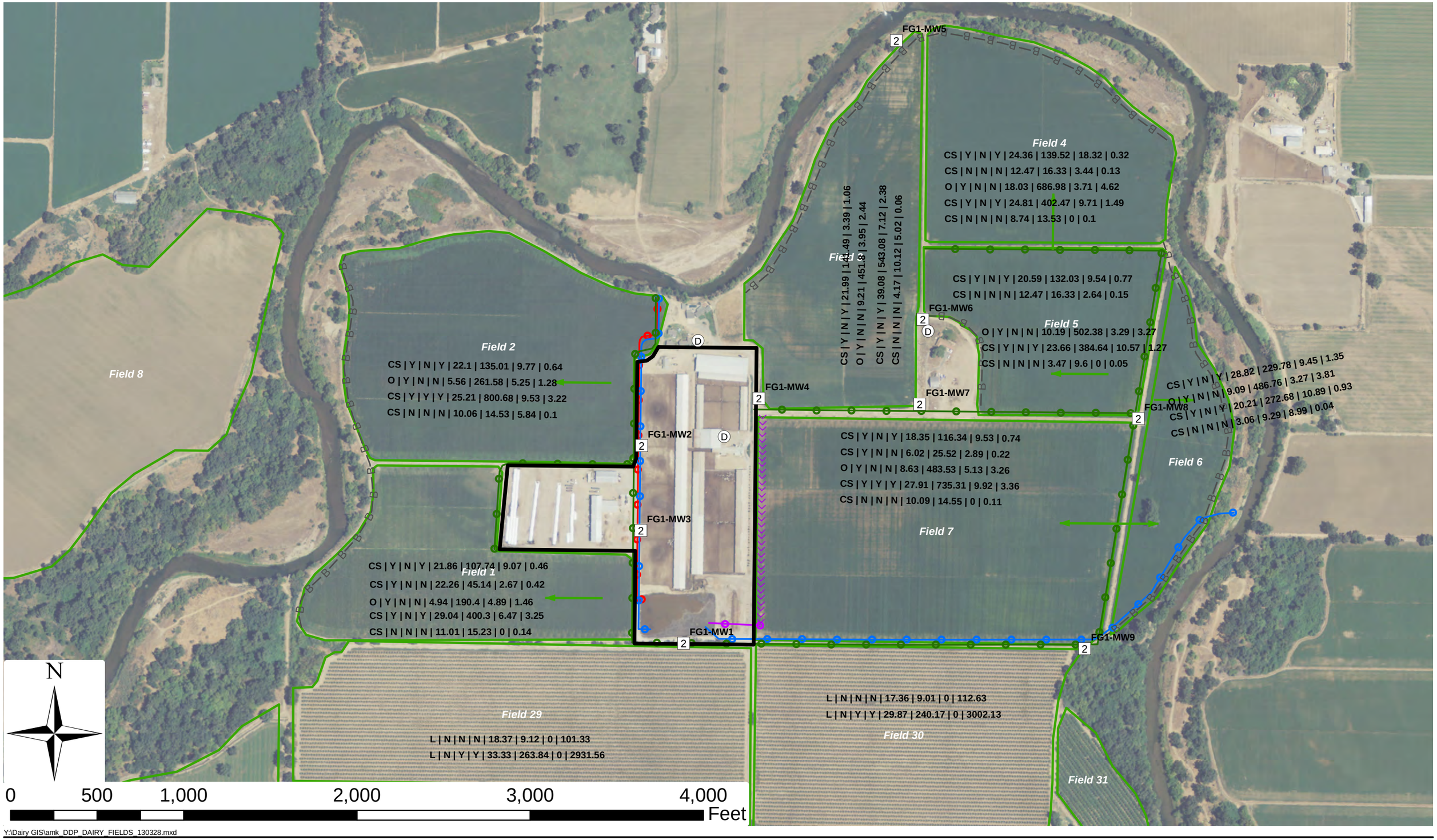
Dairy Production Area and Associated Fields
BET - Year 1
Central Valley Dairy Representative Monitoring Program



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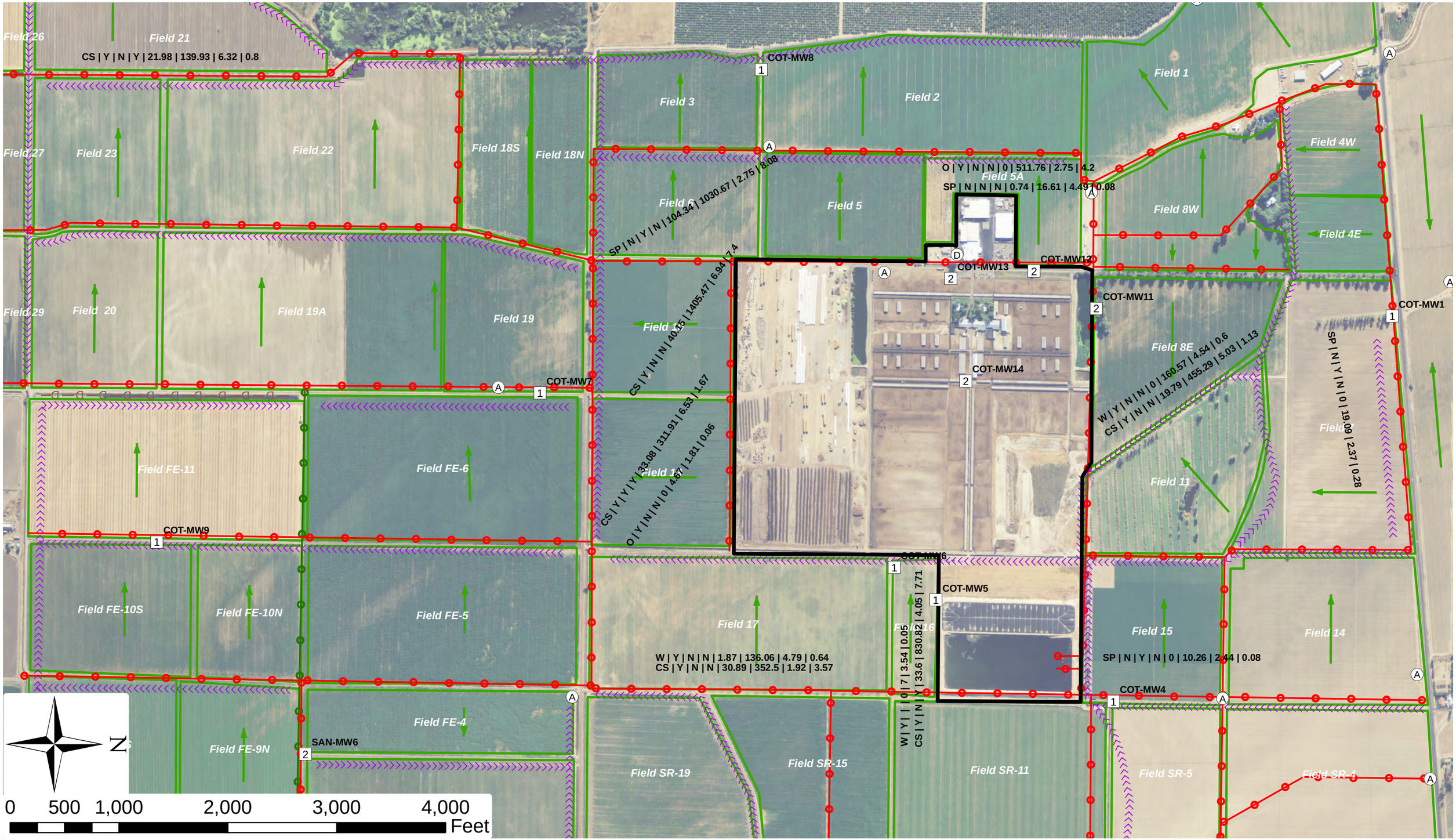
Dairy Production Area and Associated Fields
FG1 - Year 1
Central Valley Dairy Representative Monitoring Program



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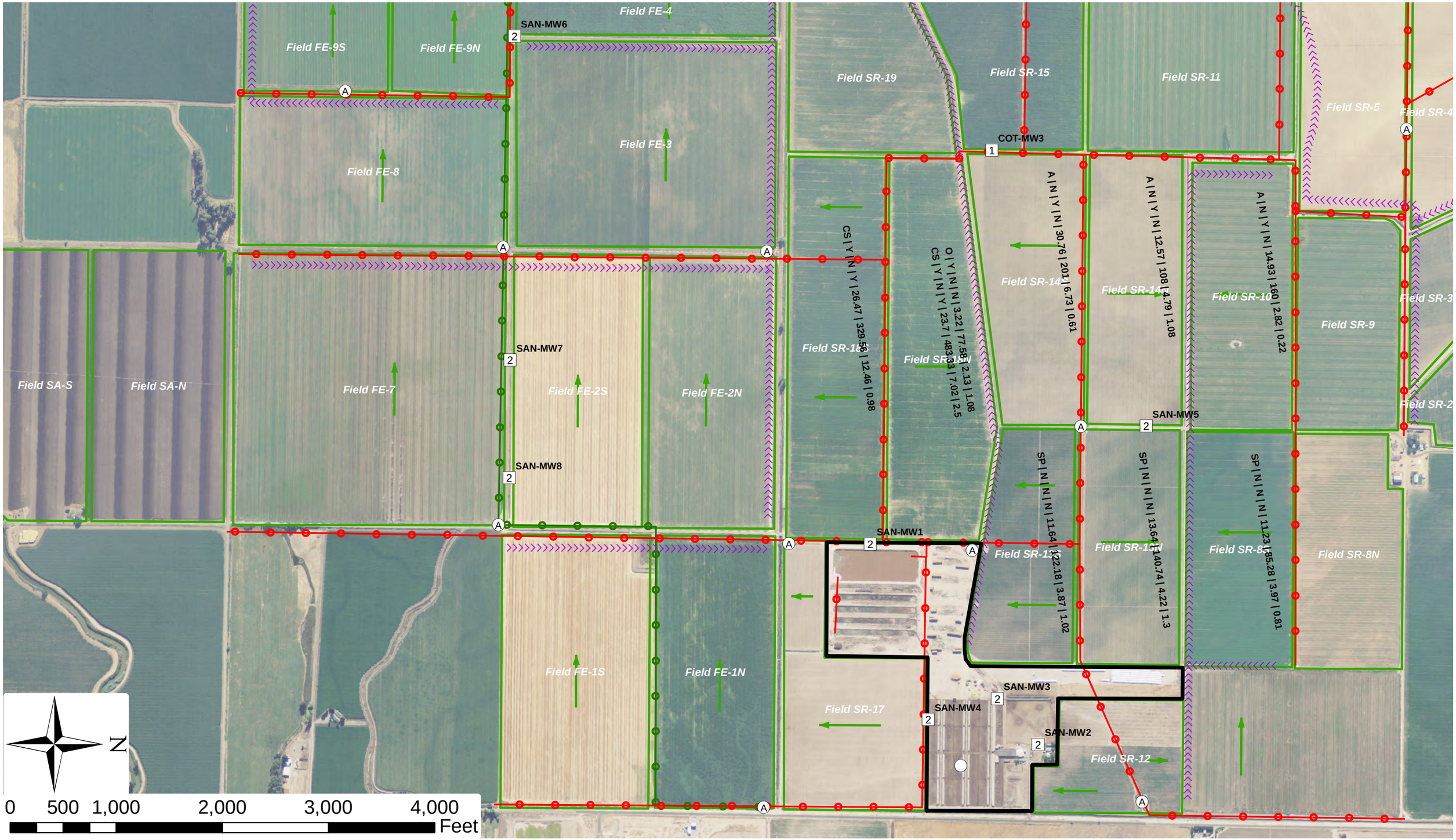
Dairy Production Area and Associated Fields
COT - Year 1
Central Valley Dairy Representative Monitoring Program



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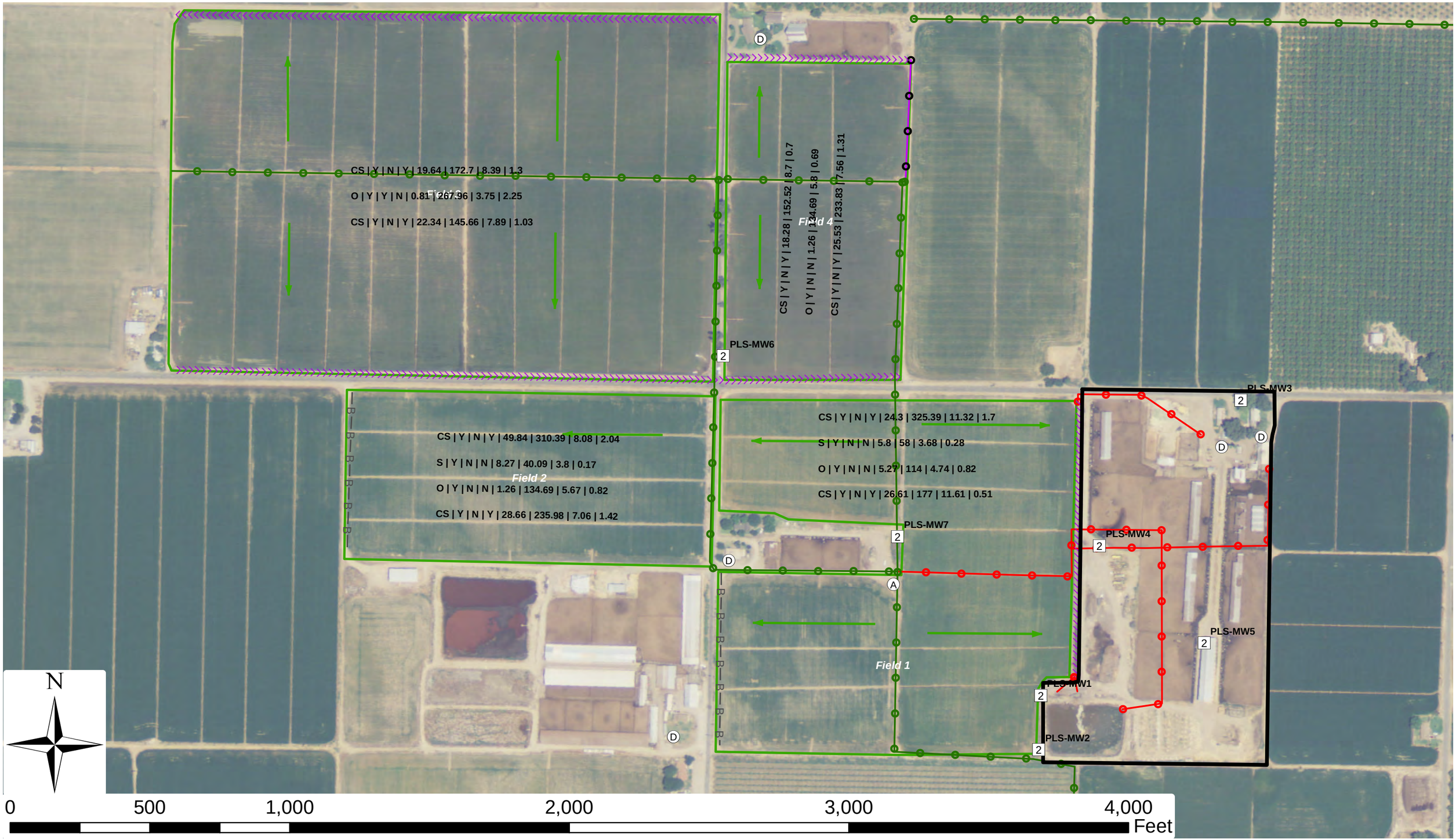
Dairy Production Area and Associated Fields
SAN - Year 1
Central Valley Dairy Representative Monitoring Program



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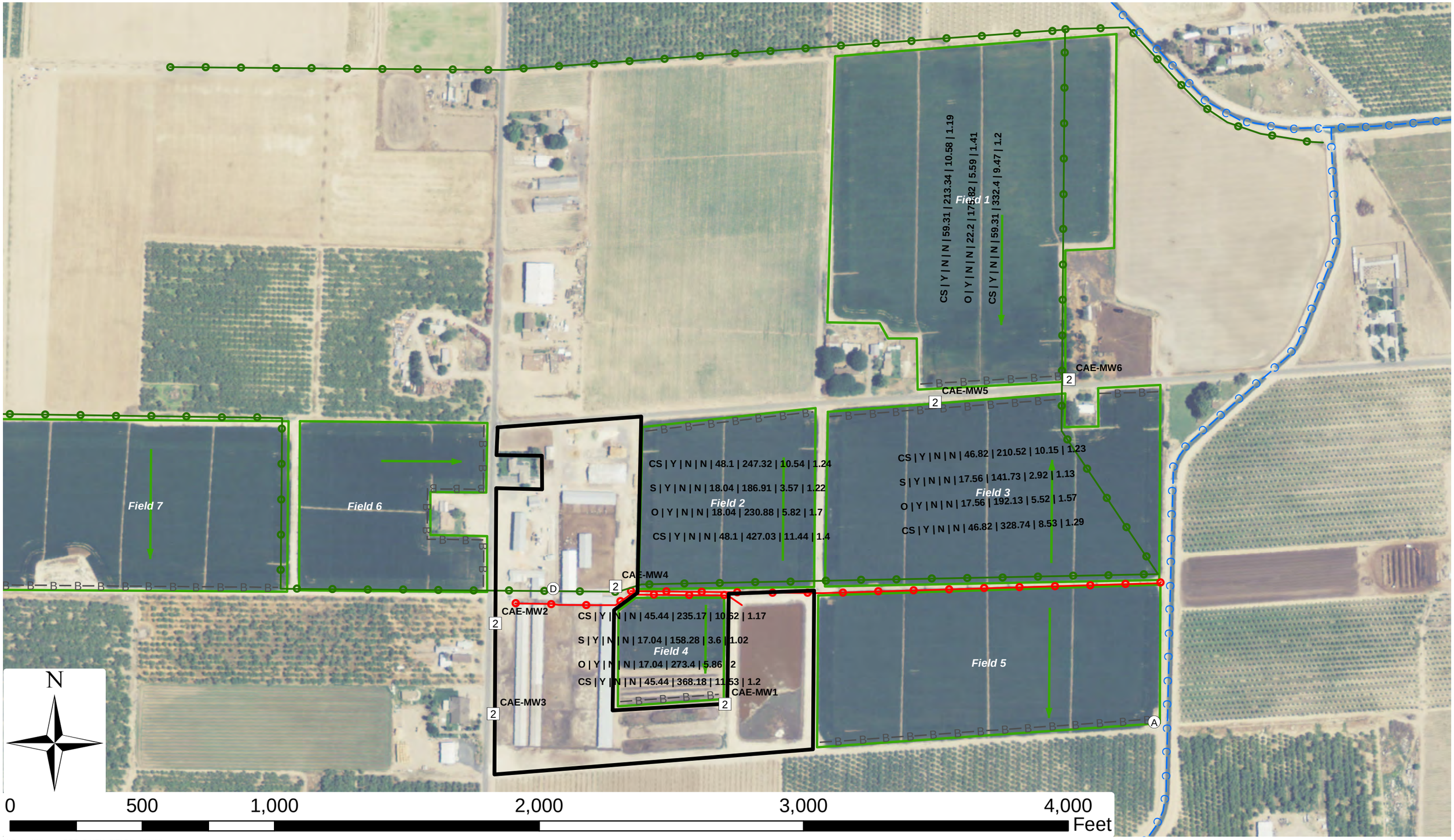
Dairy Production Area and Associated Fields
PLS - Year 1
Central Valley Dairy Representative Monitoring Program



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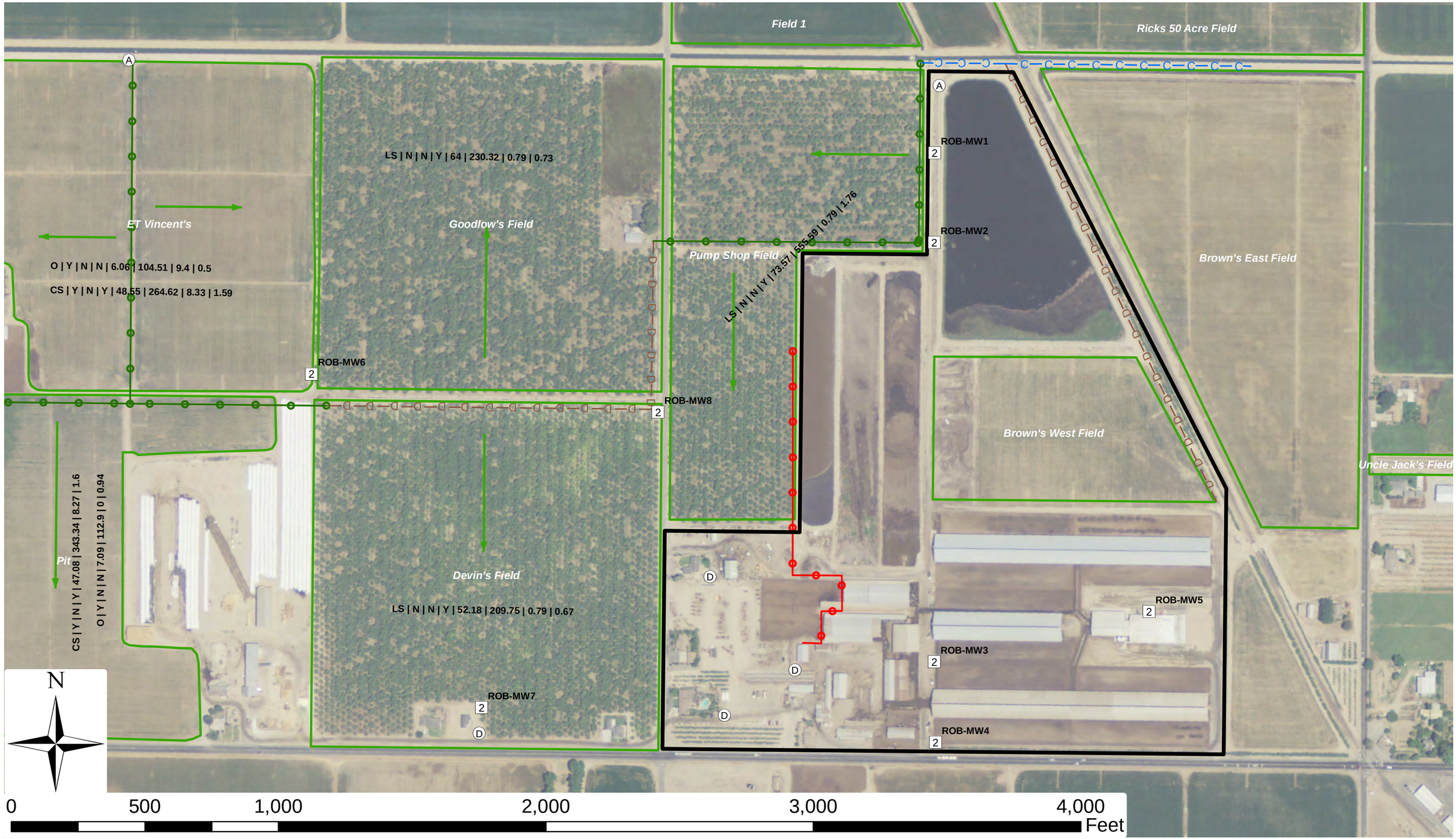
Dairy Production Area and Associated Fields
CAE - Year 1
Central Valley Dairy Representative Monitoring Program



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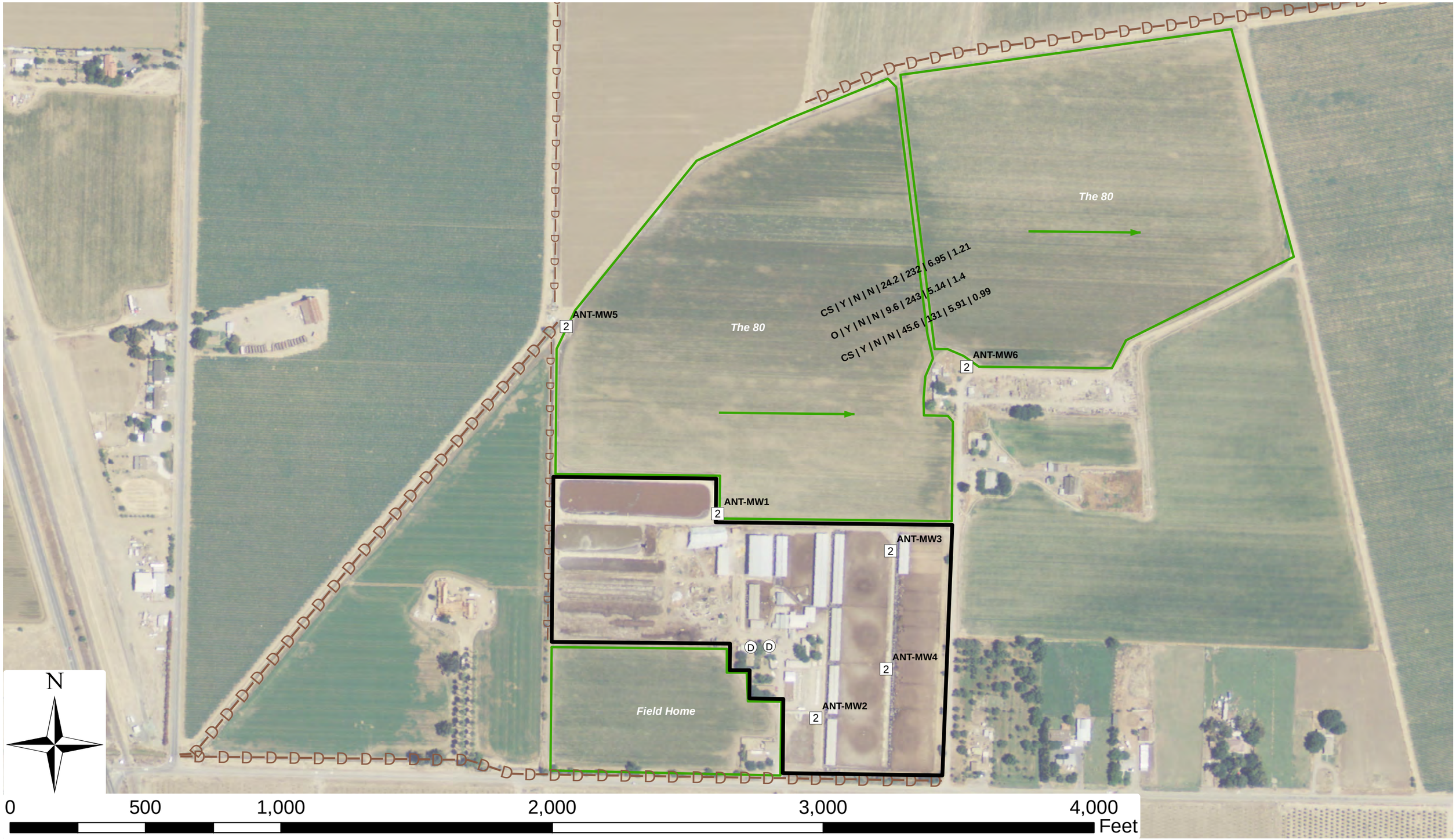
Dairy Production Area and Associated Fields
ROB - Year 1
Central Valley Dairy Representative Monitoring Program



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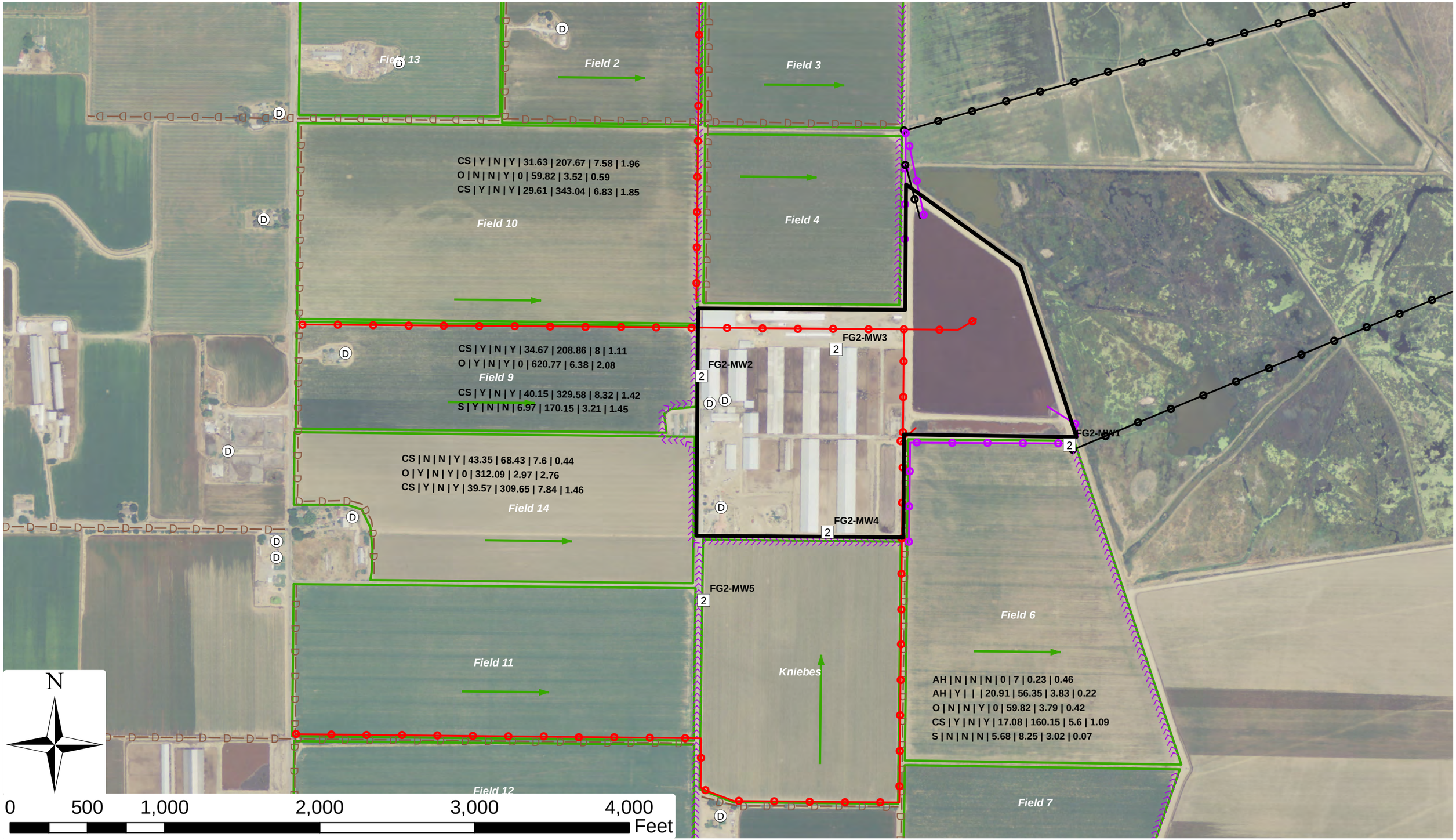
Dairy Production Area and Associated Fields
ANT - Year 1
Central Valley Dairy Representative Monitoring Program



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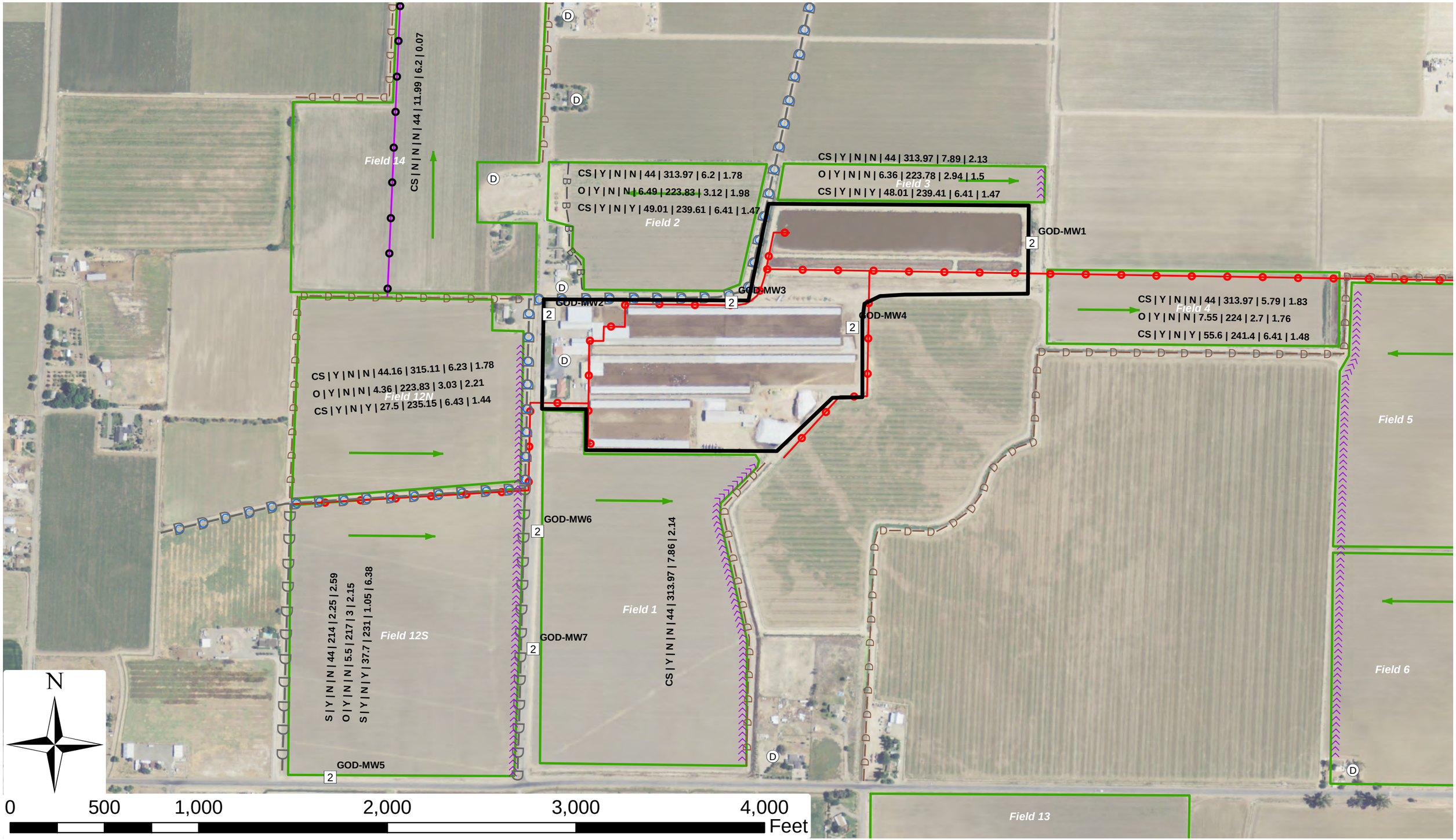
Dairy Production Area and Associated Fields
FG2 - Year 1
Central Valley Dairy Representative Monitoring Program



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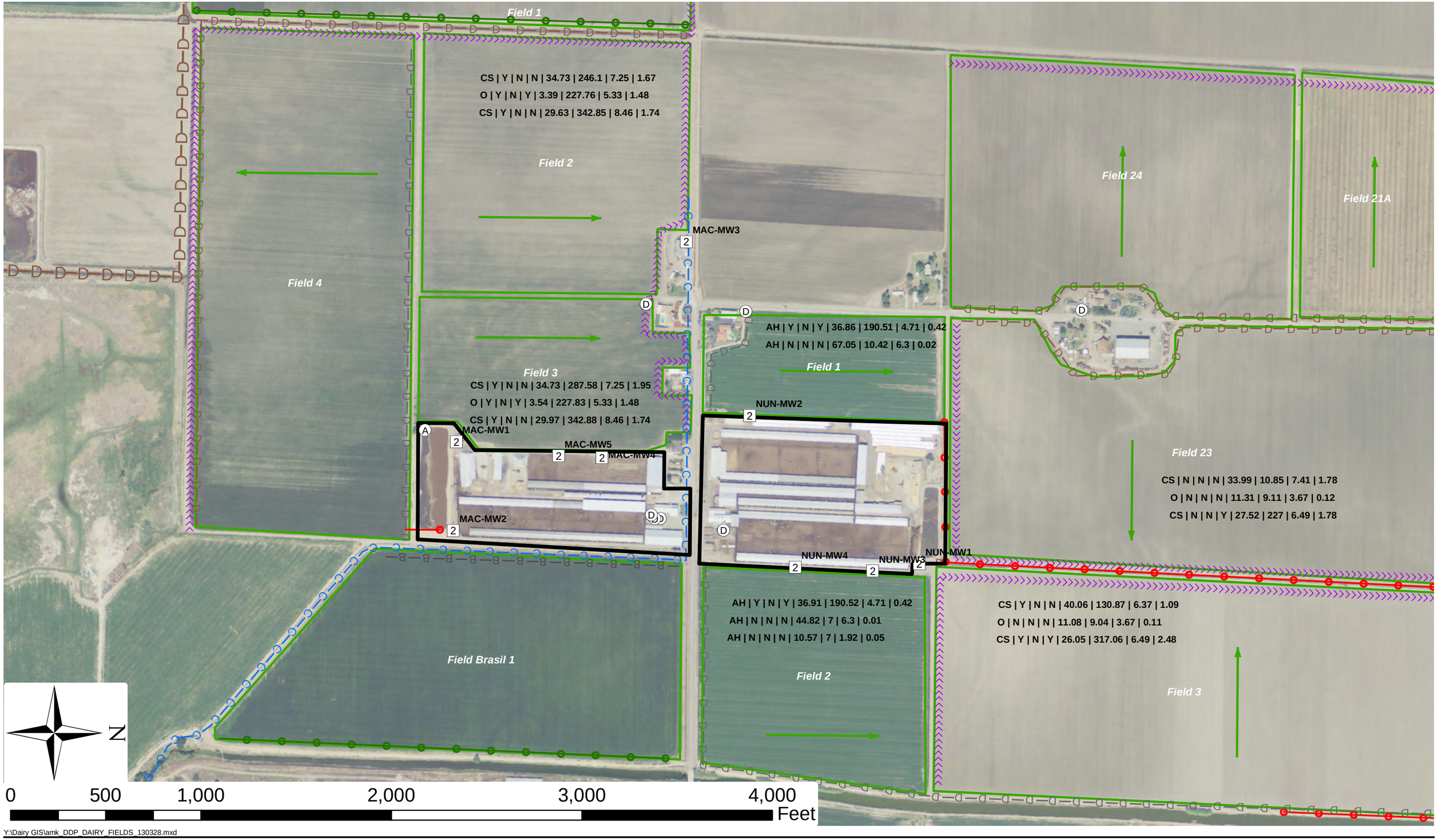
Dairy Production Area and Associated Fields
GOD - Year 1
Central Valley Dairy Representative Monitoring Program



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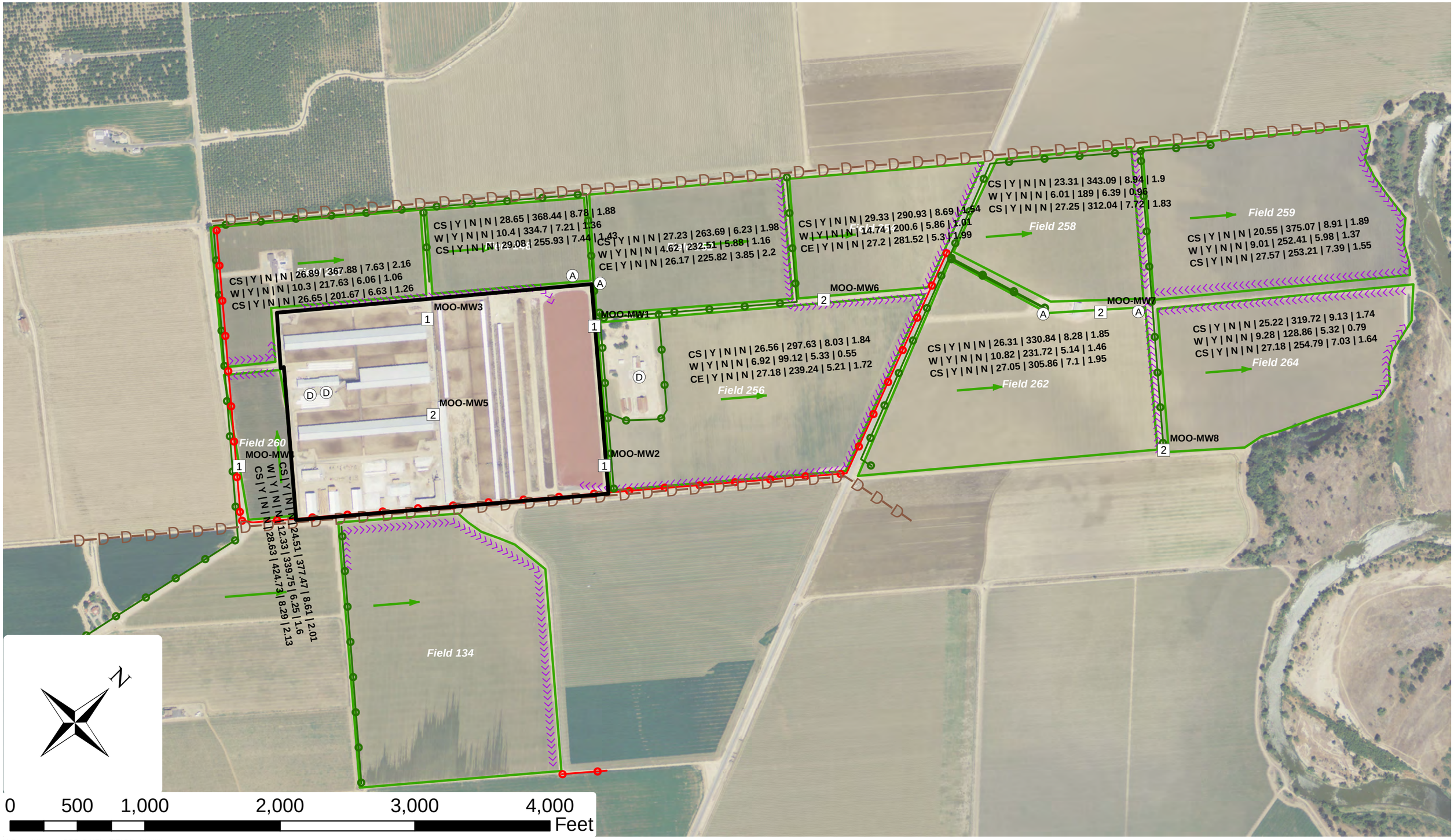
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Dairy Production Area and Associated Fields
MAC/NUN - Year 1
Central Valley Dairy Representative Monitoring Program



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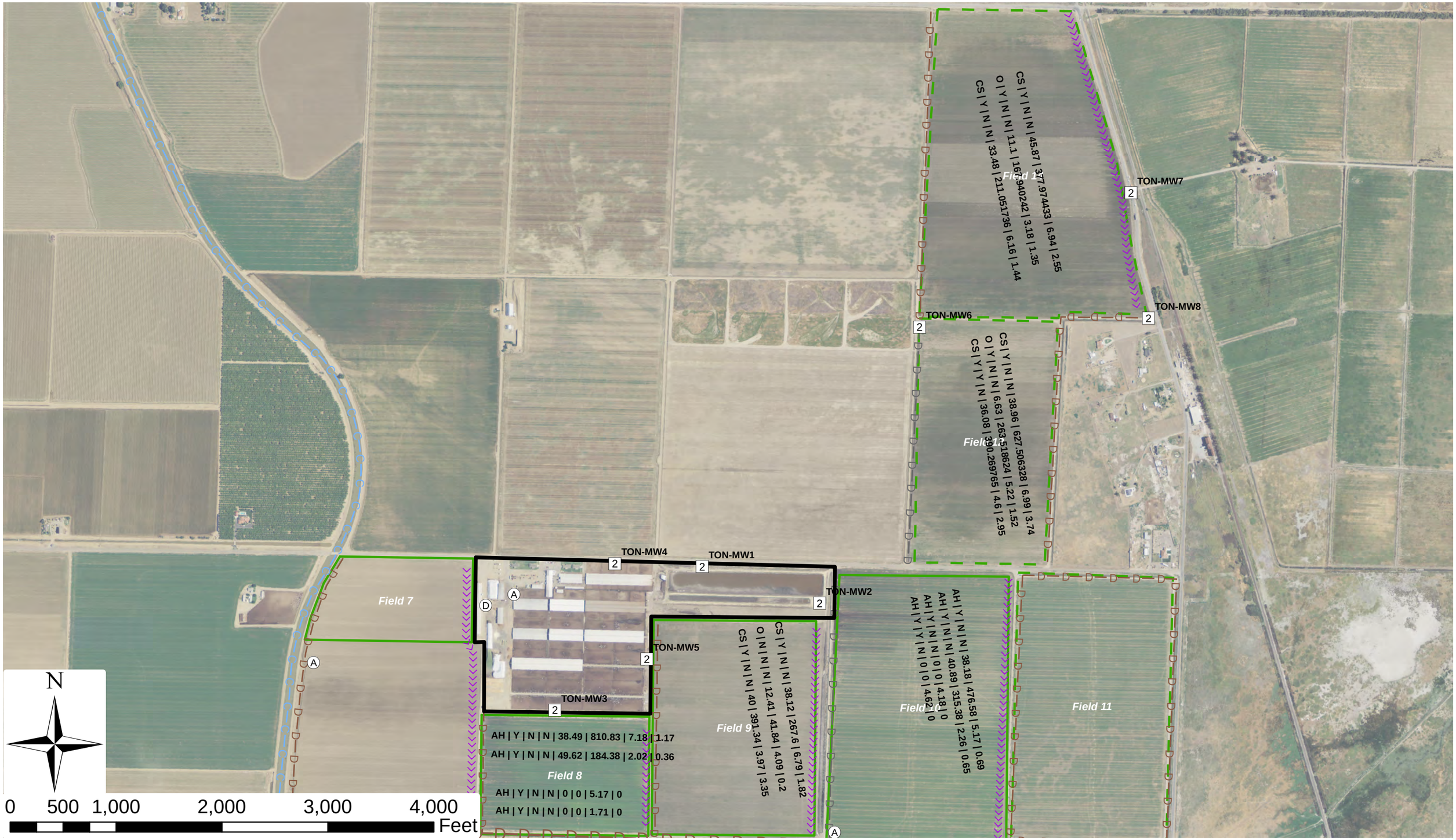
CONSULTING ENGINEERS

Dairy Production Area and Associated Fields
MOO - Year 1
Central Valley Dairy Representative Monitoring Program



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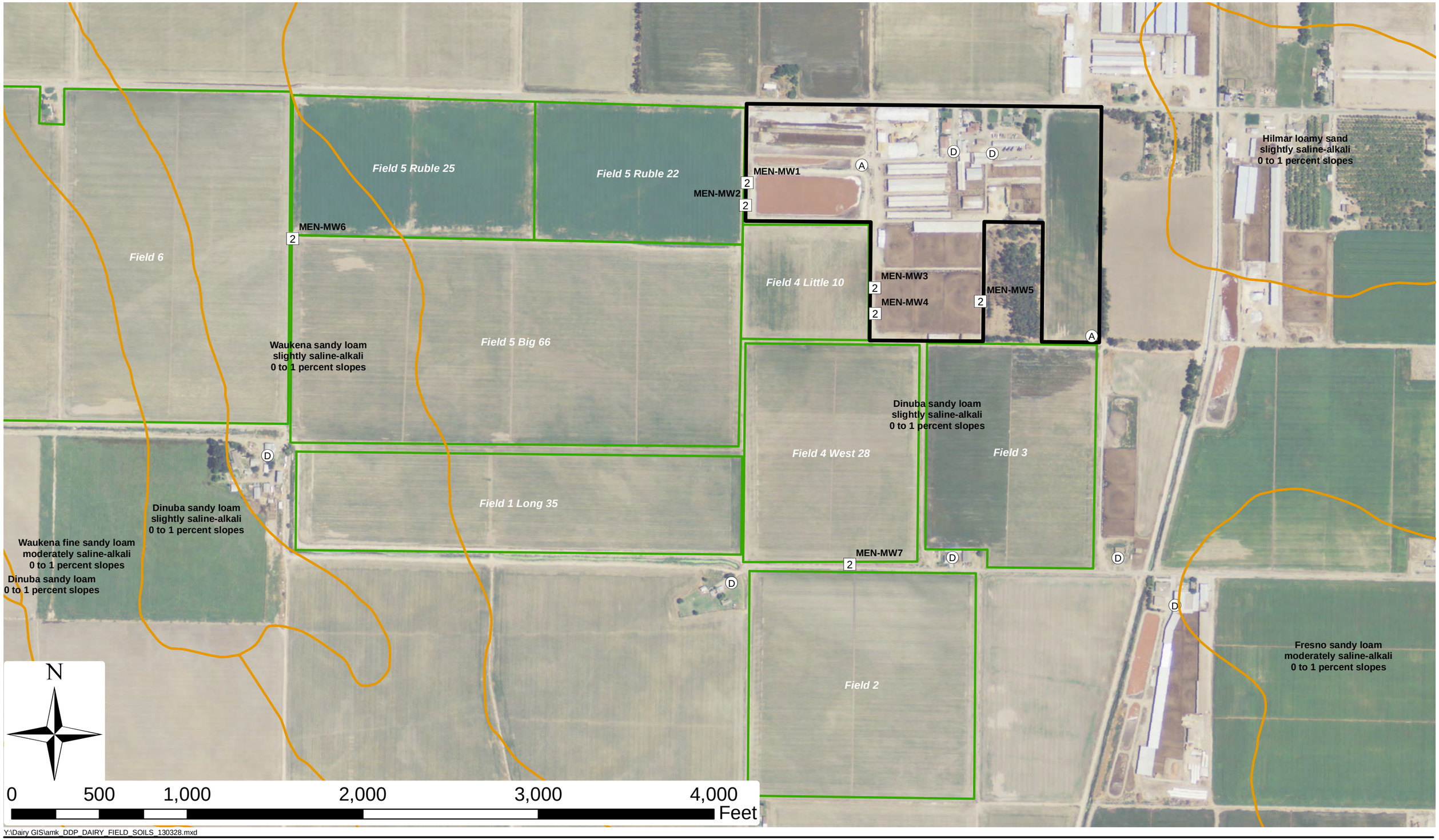
Dairy Production Area and Associated Fields
TON - Year 1
Central Valley Dairy Representative Monitoring Program

Map Series
Soil Characteristics (NRCS – SSURGO) of Dairy Production Areas and Associated Fields

- East Side: MEN, ANC, BET, FG1, BEA, COT, SAN, PLS, CAE, ROB
- West Side: ANT, COR, FG2, GOD, MAC, NUN, MOO, TON



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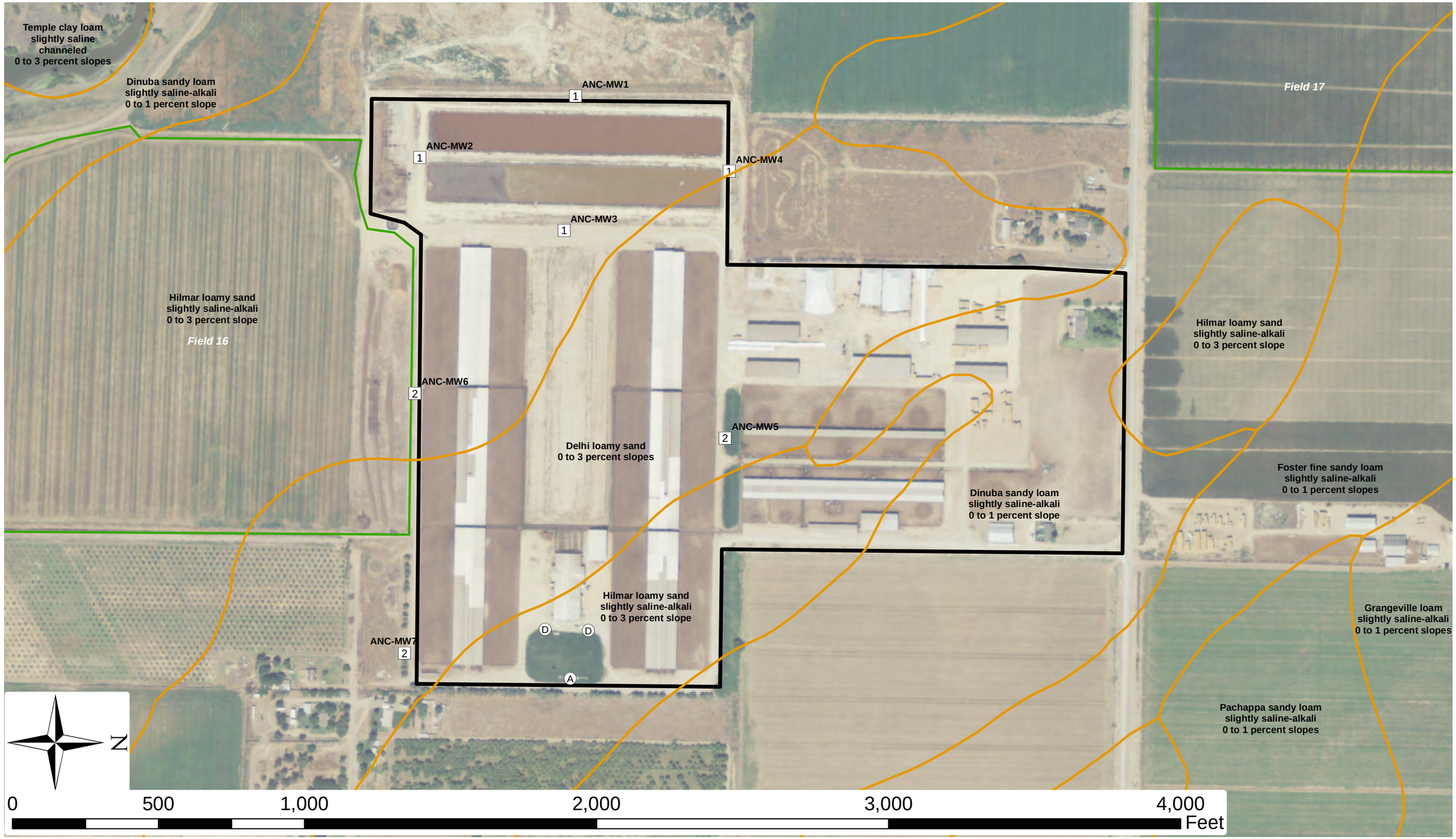
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
MEN - Year 1
Central Valley Dairy Representative Monitoring Program



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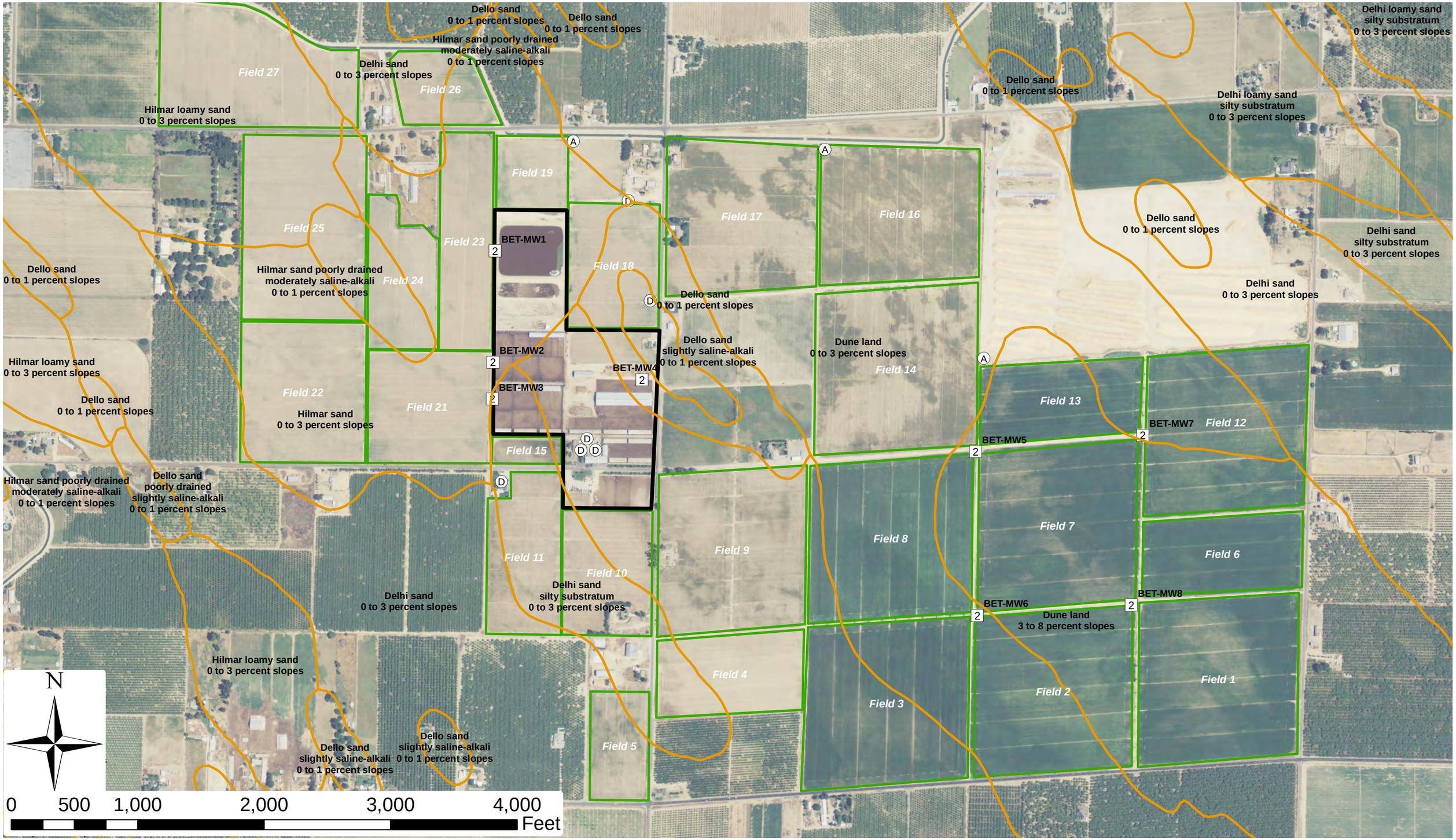
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
ANC - Year 1
Central Valley Dairy Representative Monitoring Program



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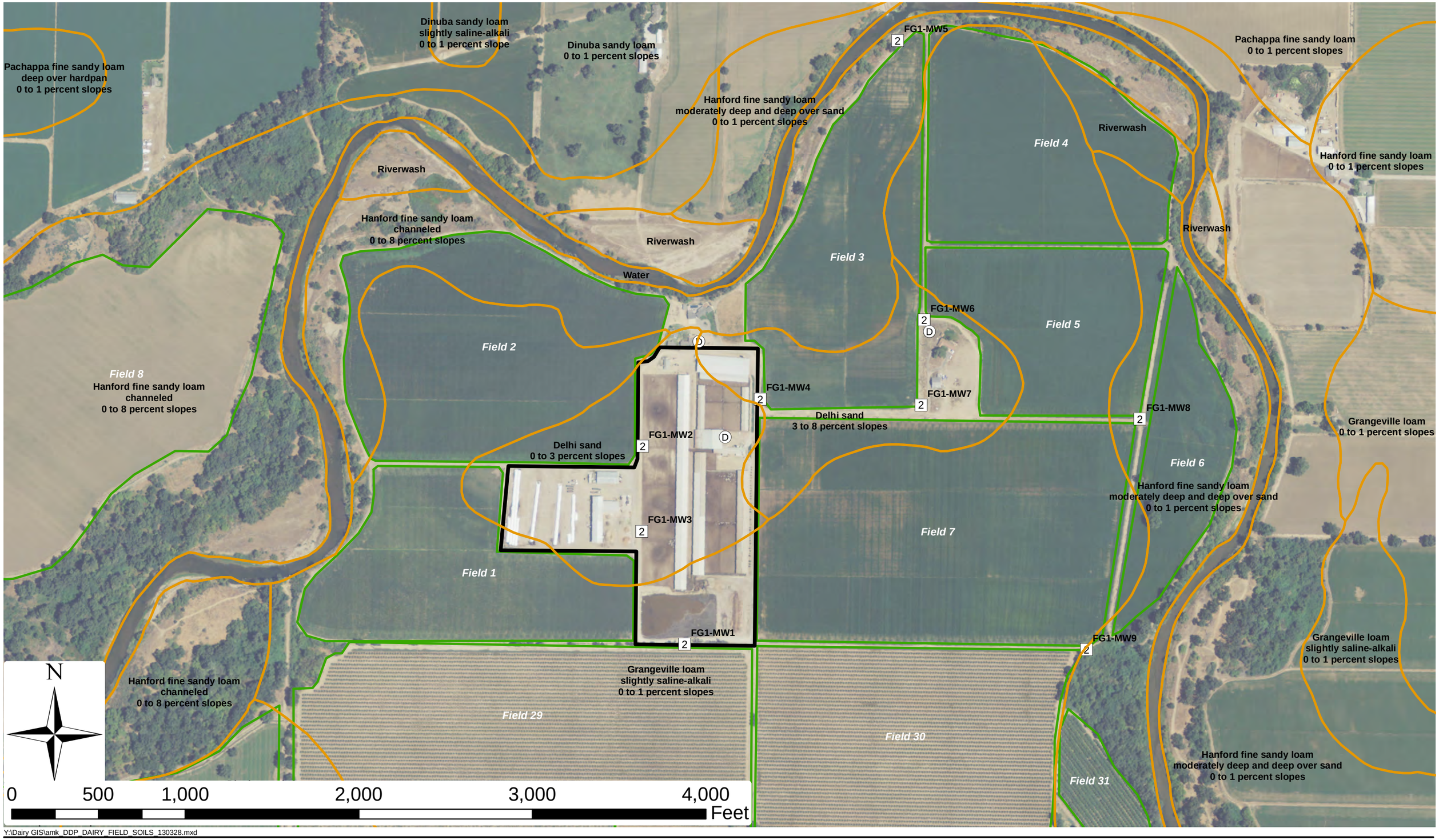
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
BET - Year 1
Central Valley Dairy Representative Monitoring Program



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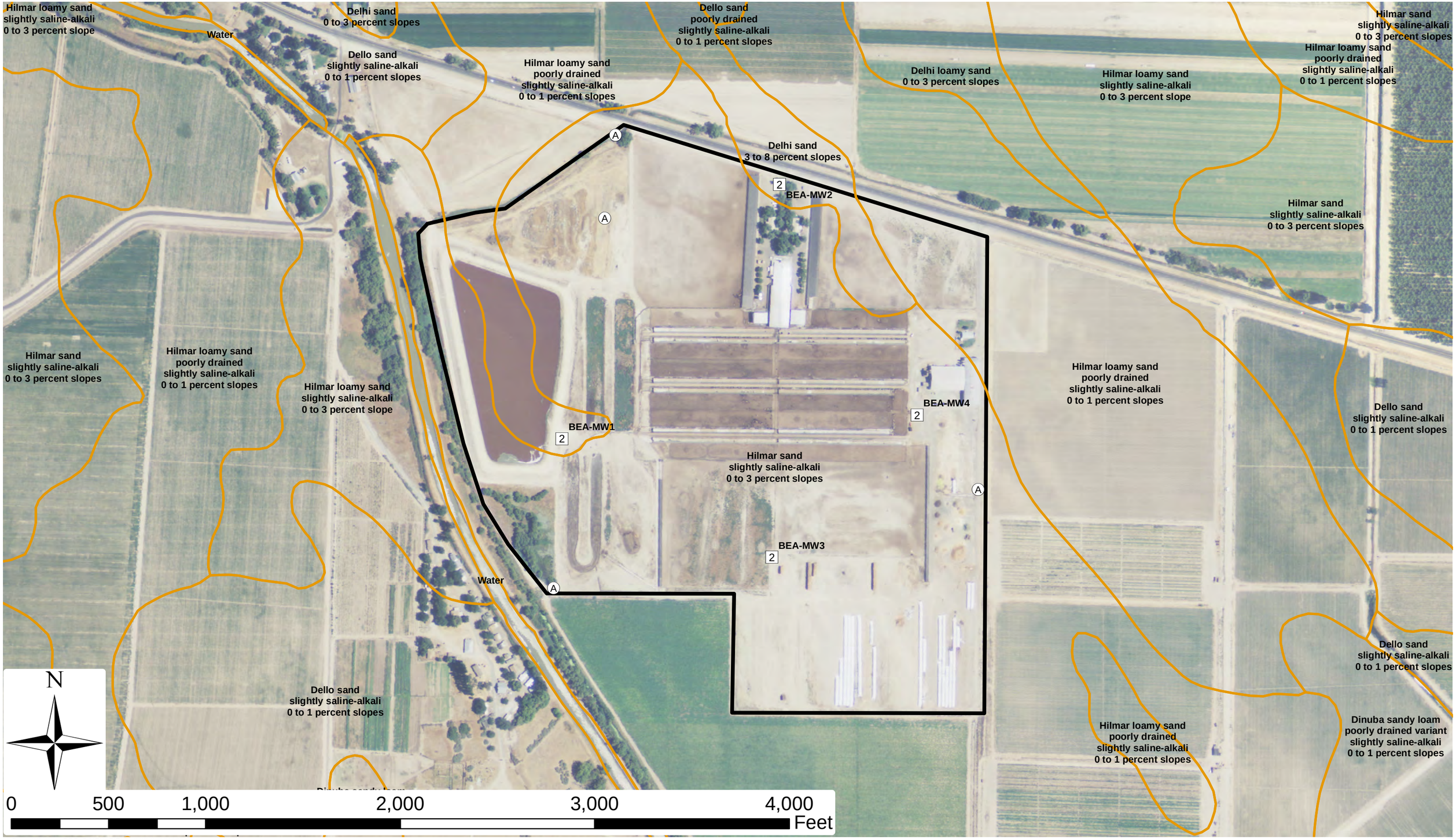
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
FG1 - Year 1
Central Valley Dairy Representative Monitoring Program



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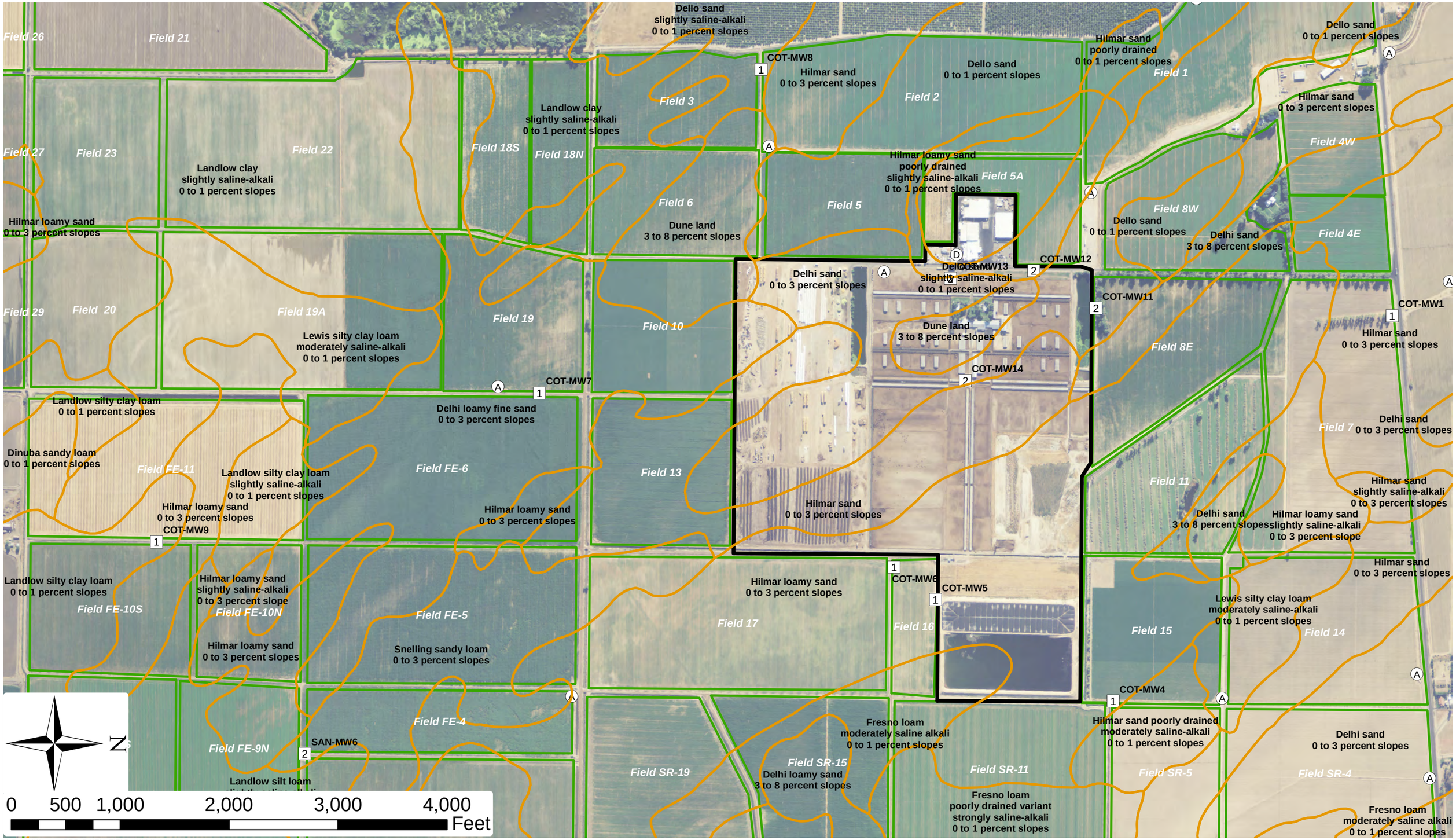
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
BEA - Year 1
Central Valley Dairy Representative Monitoring Program



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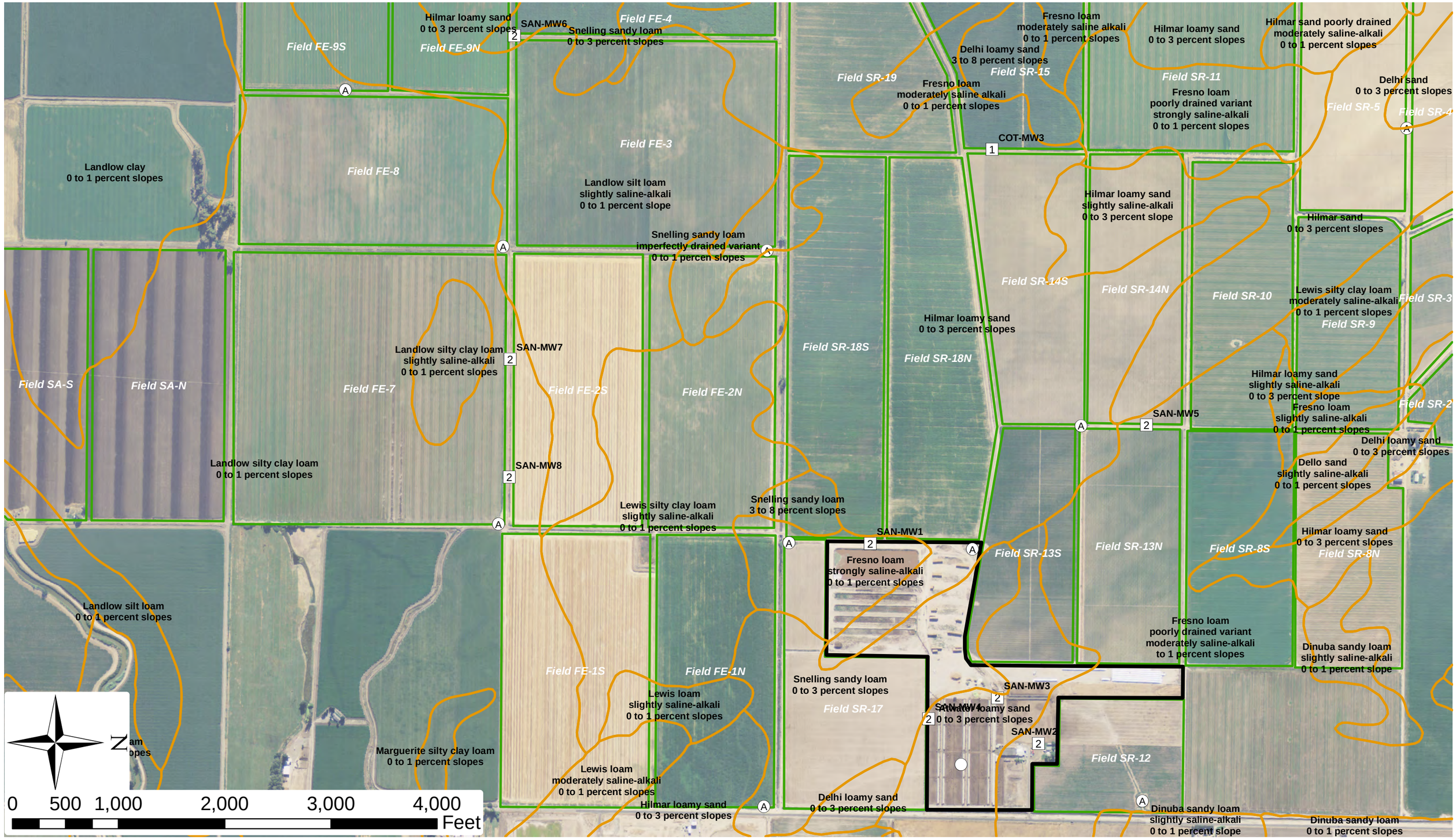
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
COT - Year 1
Central Valley Dairy Representative Monitoring Program



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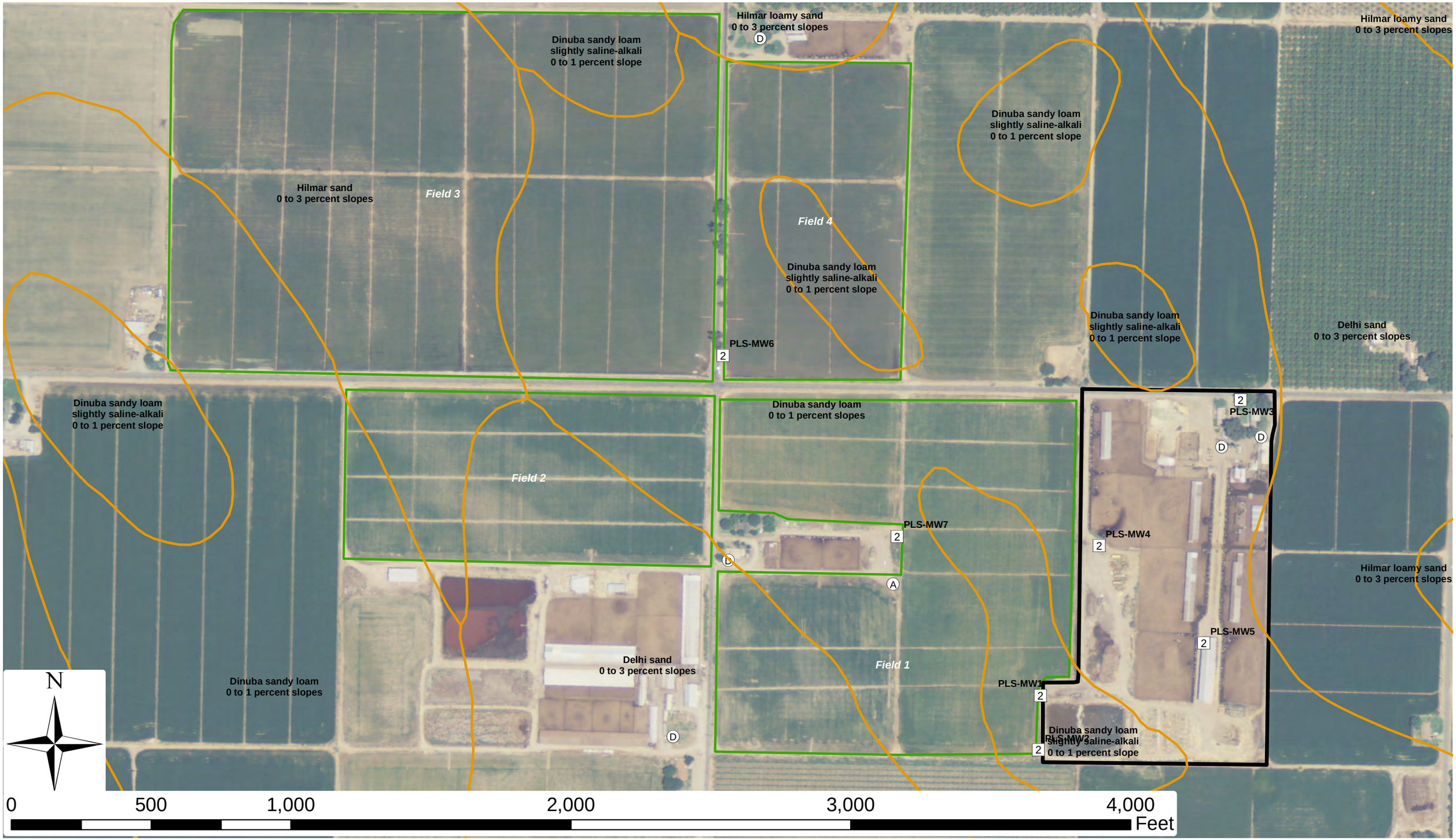
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
SAN - Year 1
Central Valley Dairy Representative Monitoring Program



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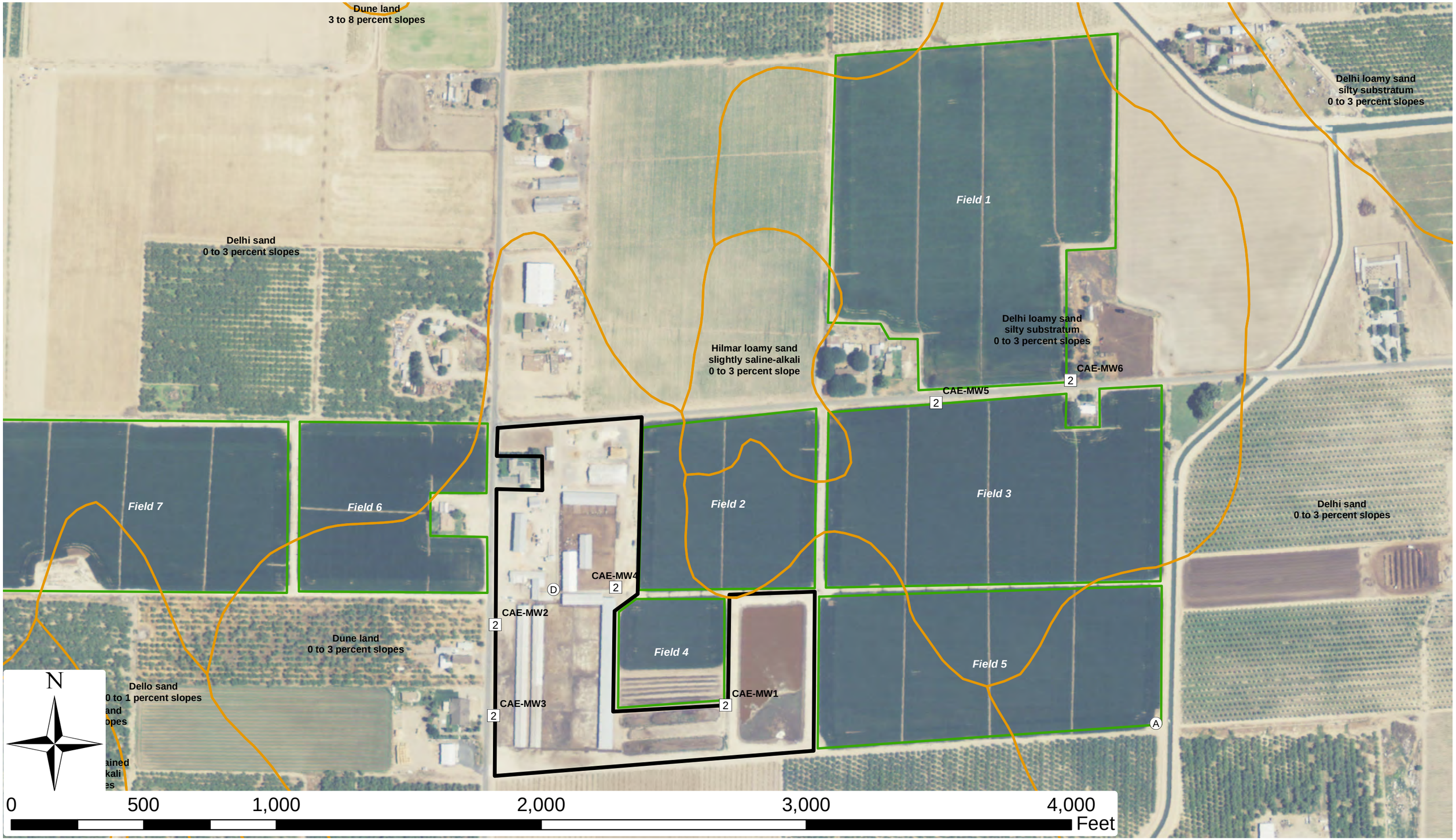
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
PLS - Year 1
Central Valley Dairy Representative Monitoring Program



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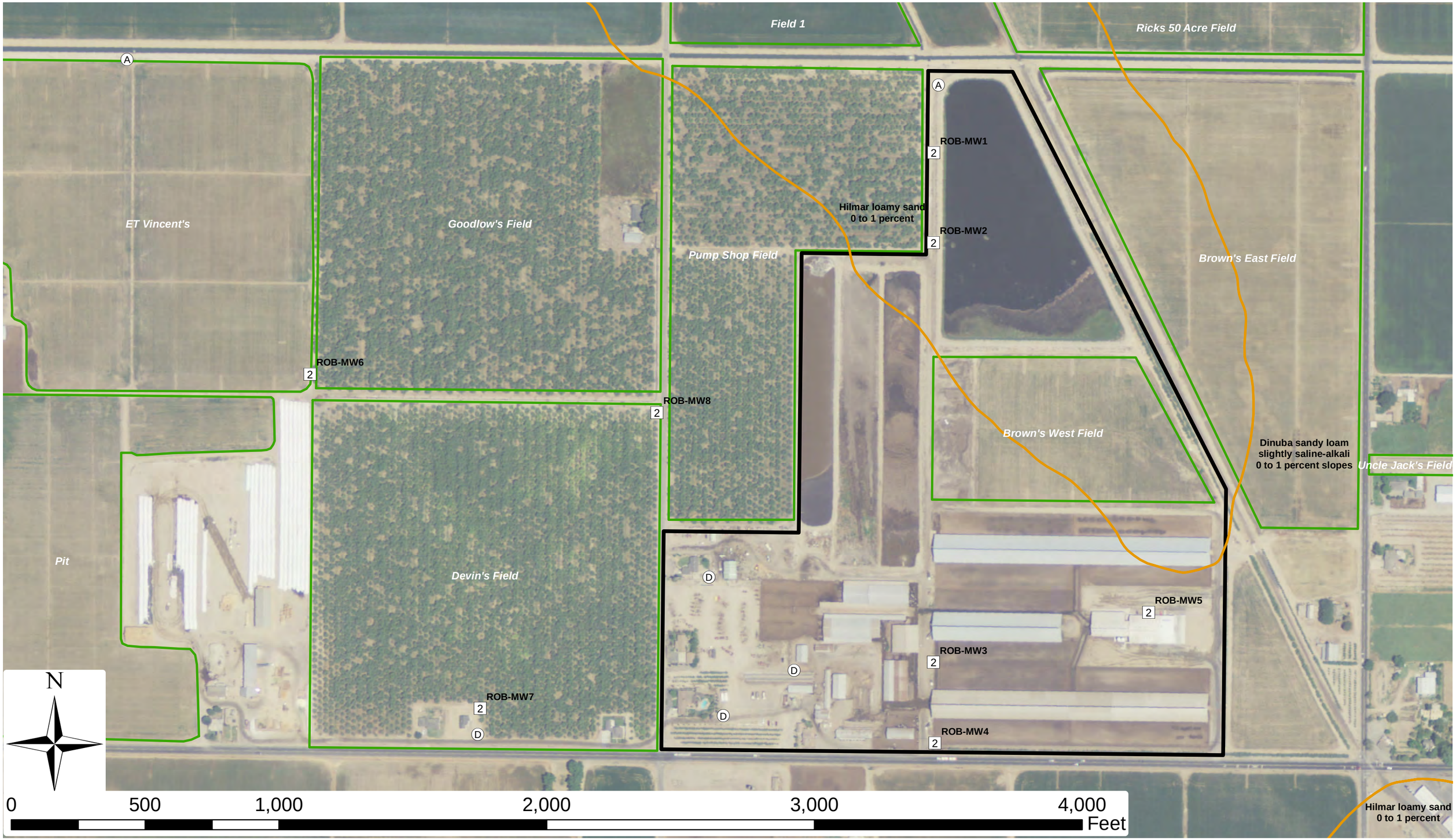
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
CAE - Year 1
Central Valley Dairy Representative Monitoring Program



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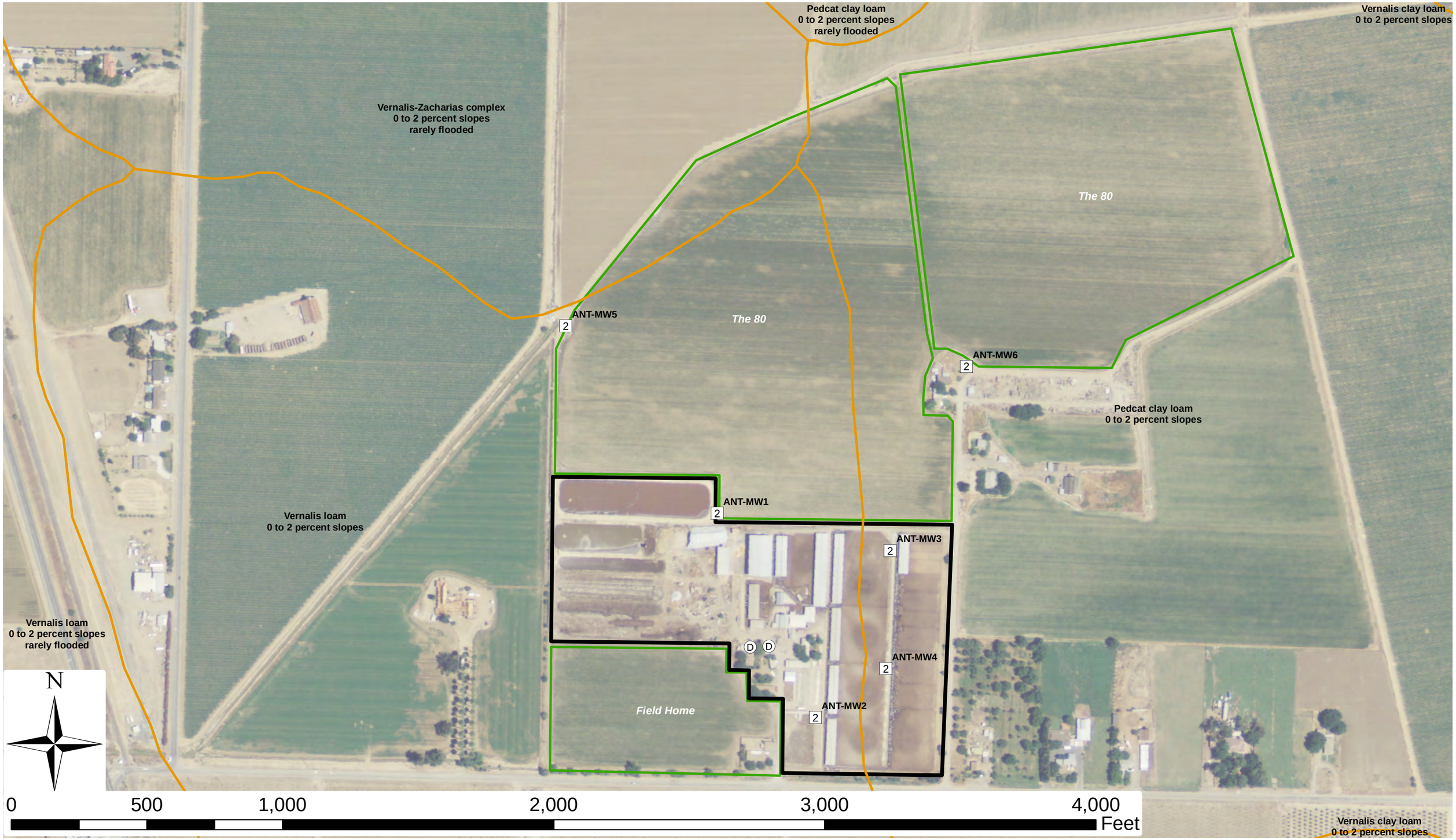
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
ROB - Year 1
Central Valley Dairy Representative Monitoring Program



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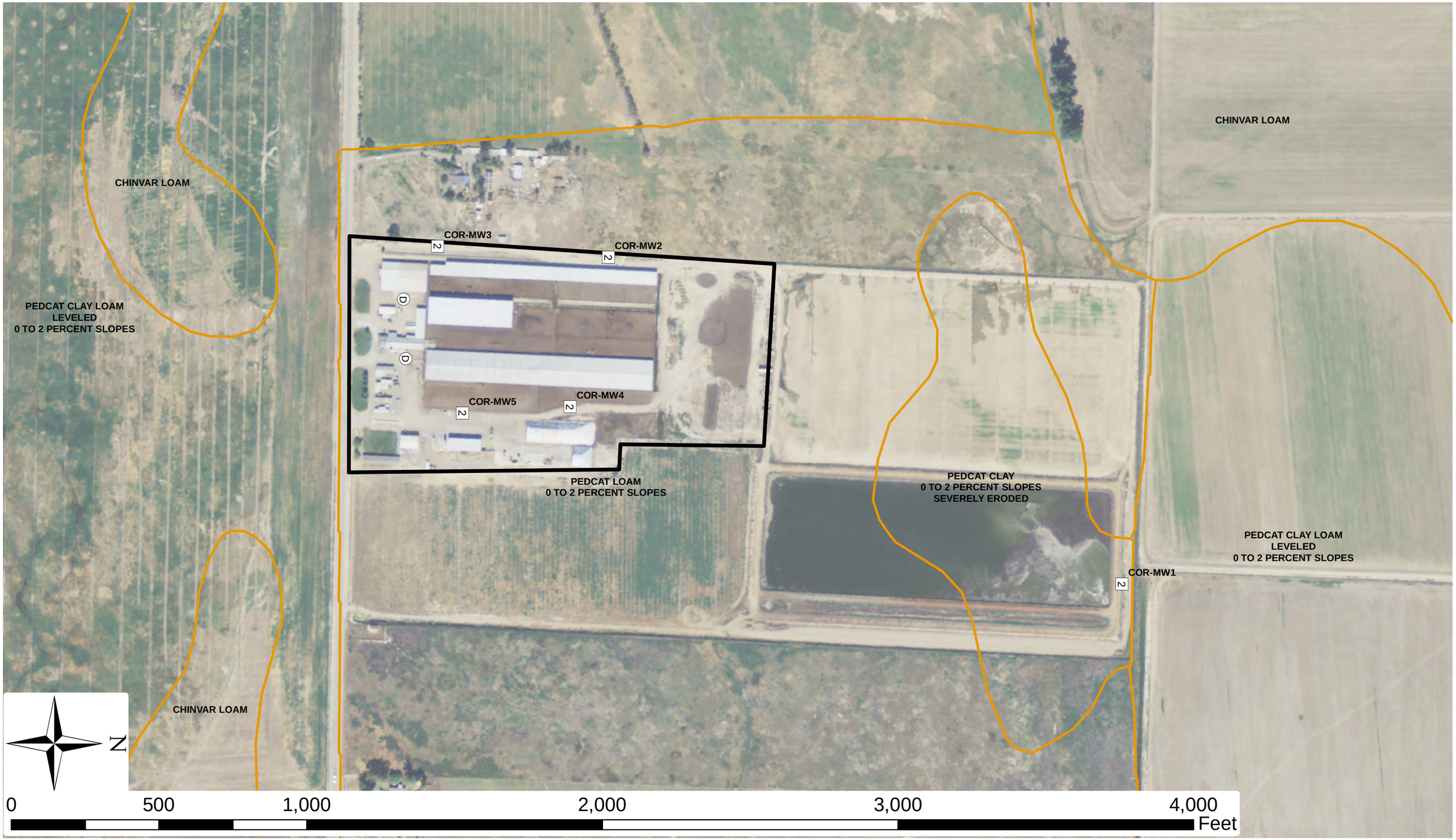
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
ANT - Year 1
Central Valley Dairy Representative Monitoring Program



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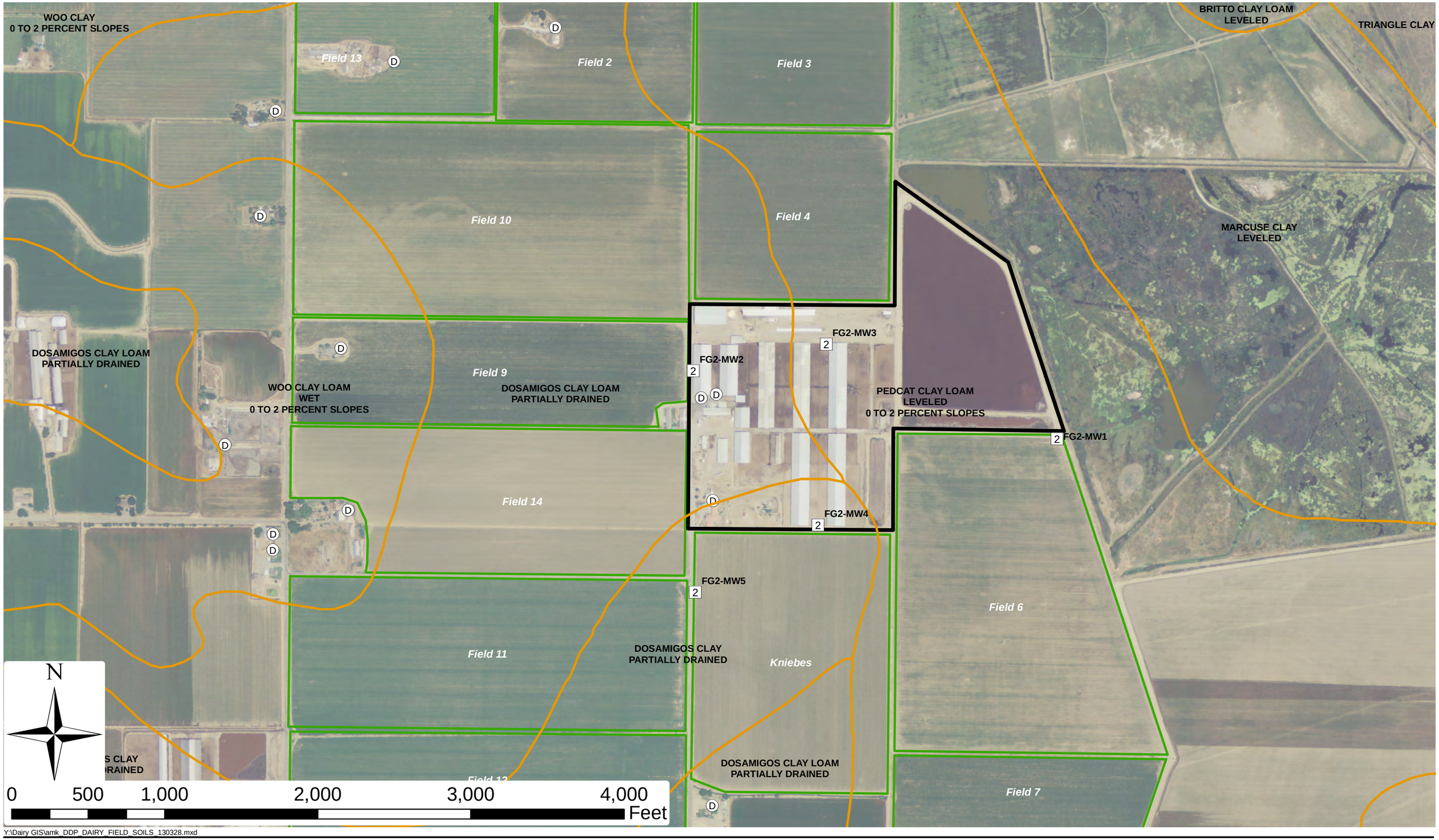
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
COR - Year 1
Central Valley Dairy Representative Monitoring Program



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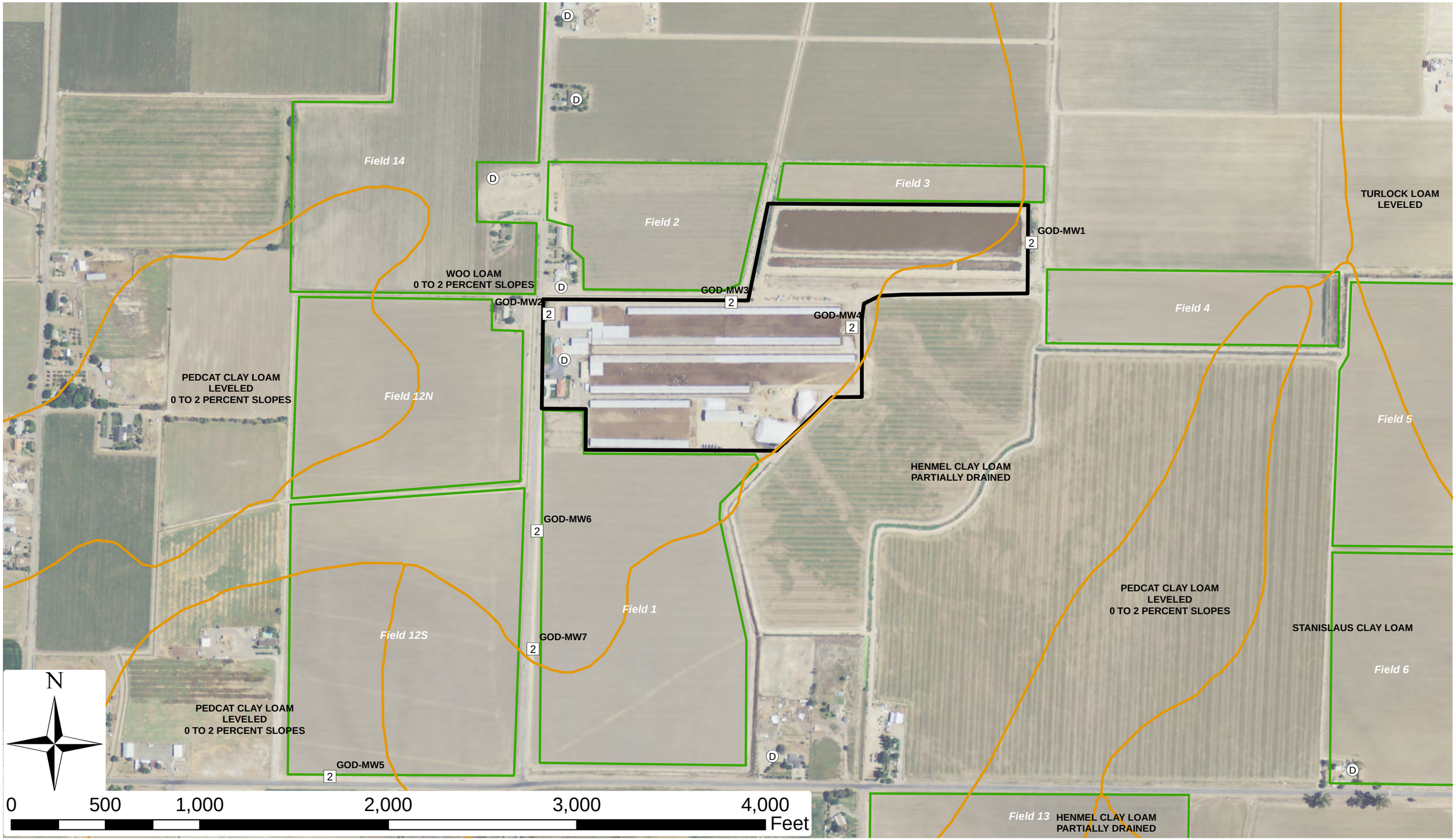
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
FG2 - Year 1
Central Valley Dairy Representative Monitoring Program



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Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
GOD - Year 1
Central Valley Dairy Representative Monitoring Program

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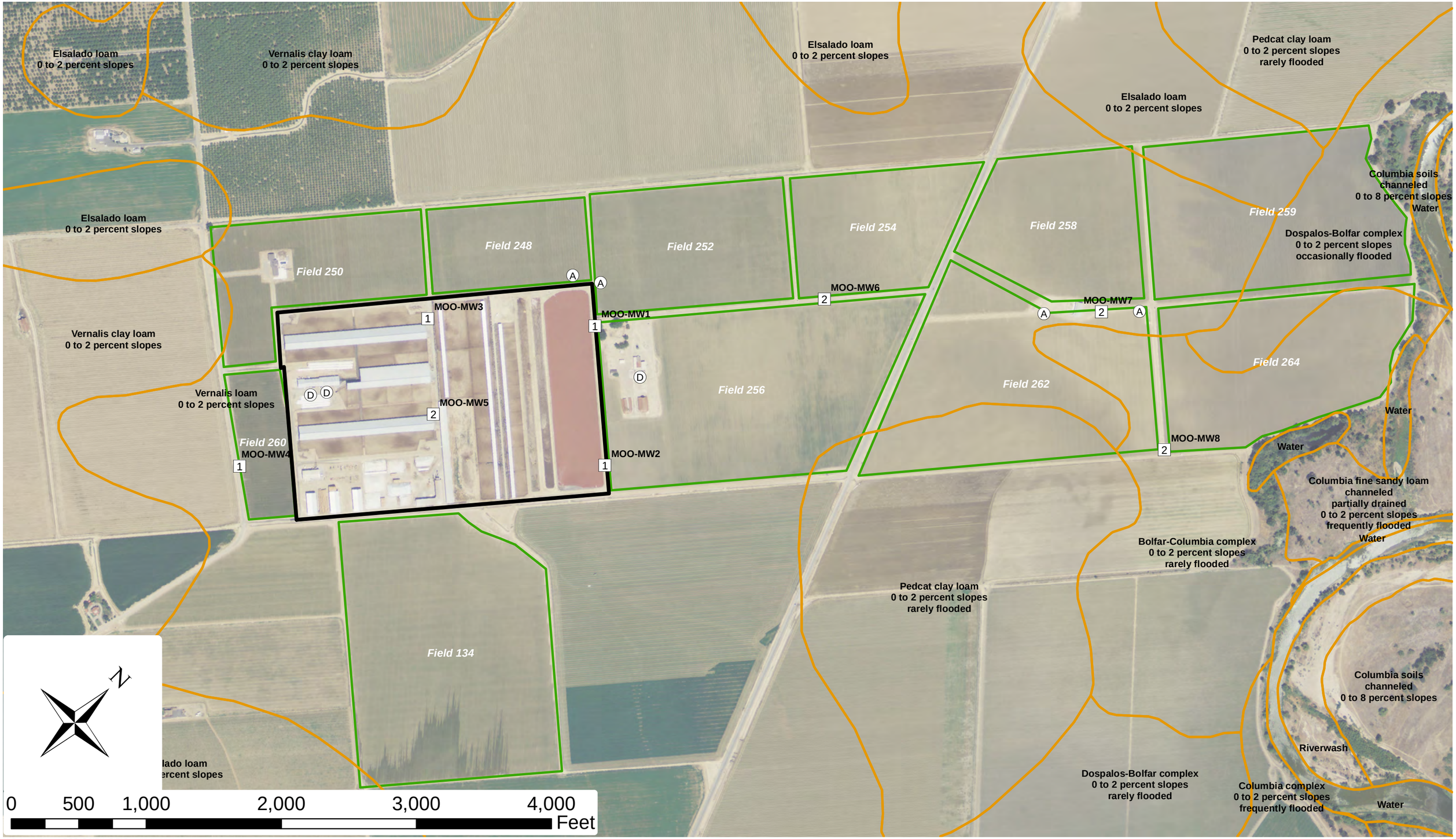
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
MAC/NUN - Year 1
Central Valley Dairy Representative Monitoring Program



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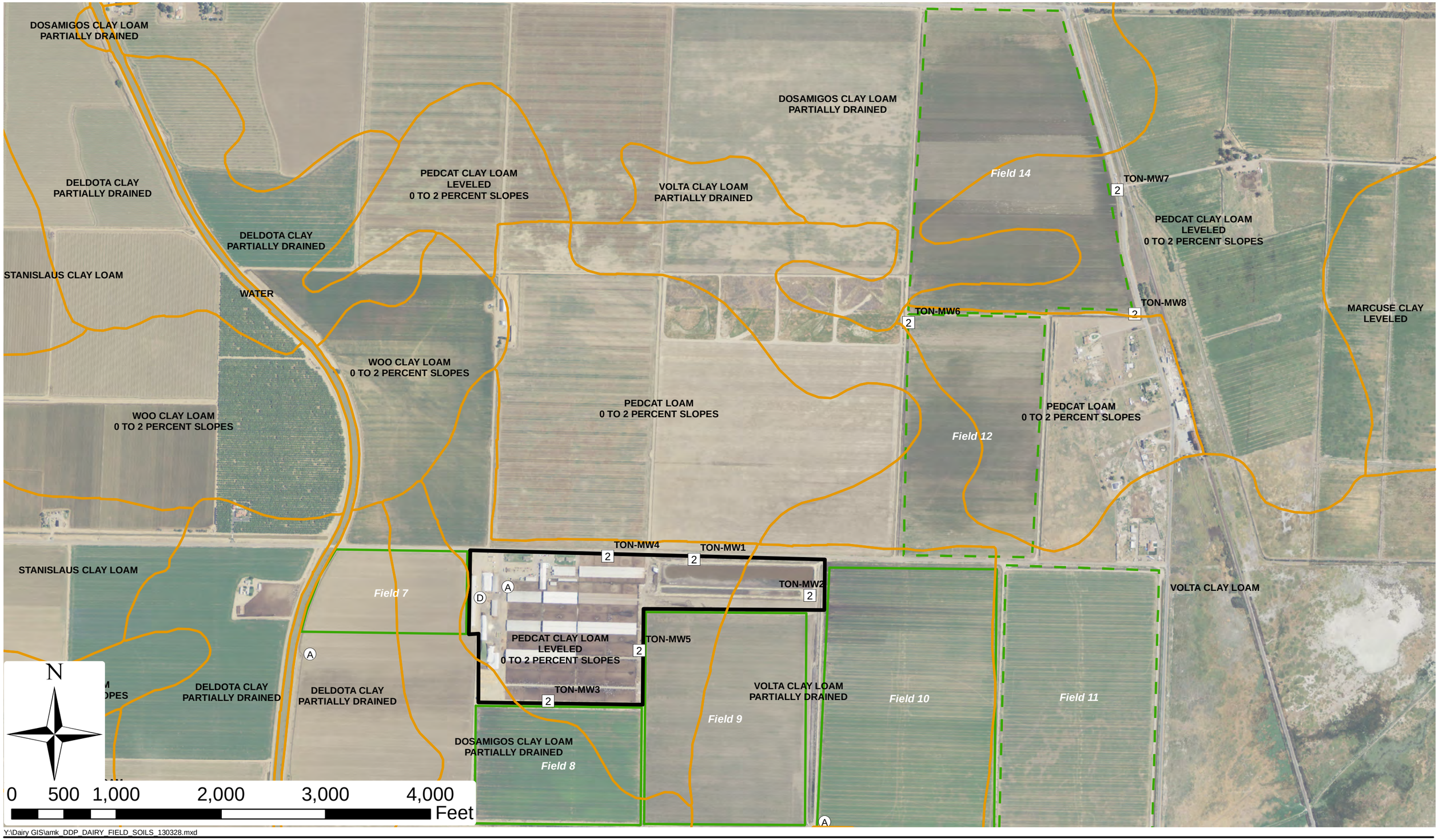
Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
MOO - Year 1
Central Valley Dairy Representative Monitoring Program



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Soil Characteristics (NRCS - SSURGO) of Dairy Production Area and Associated Fields
TON - Year 1
Central Valley Dairy Representative Monitoring Program