APPENDIX J

Hydrogeological Assessment Summary for CEQA

SETTING AND HYDROGEOLOGIC TECHNICAL REPORT

for the

AZEVEDO DAIRY#4 -EXPANSION PROJECT

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Revision 0

NV5

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLES

FIGURES

1 GENERAL INFORMATION

On behalf of the Azevedo Dairy #4 and Environmental Planning Partners, Inc., NV5 prepared the following Setting and Hydrogeologic Technical Report for California Environmental Quality Act (CEQA). This report documents existing hydrogeologic conditions at the Azevedo Dairy #4 related to the proposed dairy expansion project. NV5 prepared this report to comply with Merced County and CEQA requirements and to support the Draft Environmental Impact Report (DEIR) for the proposed expansion project.

The existing Azevedo Dairy#4 Expansion Project is located on approximately 16 acres of the existing farm (APN 074-110-026, totaling 78.2 acres) in unincorporated Merced County. The expansion project site is composed of the consolidation of the dairy and a separate heifer facility into one facility. The existing dairy cropland application area consists of 61± acres located on a portion of the consolidation and expansion project. The Azevedo Heifer Ranch, a separate heifer facility at 511 West Roosevelt on 10 acres (APN 074-110-033, totaling 80 Acres) is also owned by the applicant, and is located along West Roosevelt Road. It is currently used to house heifers from several dairies in the vicinity. The heifer facility parcel includes approximately 70 acres of cropland for manure application from the heifer facility. See Figure 1.

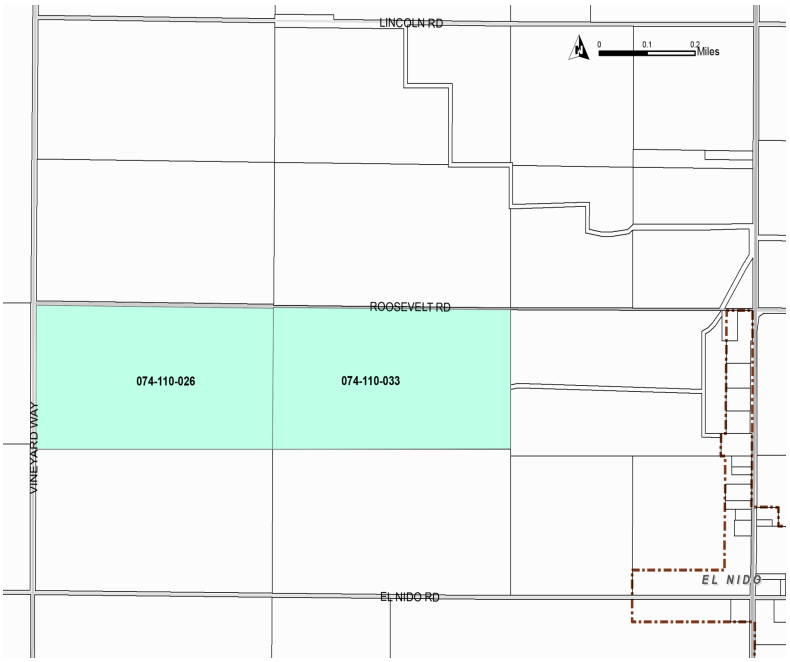


FIGURE 1. PROJECT SITE APNS LOCATION MAP - AZEVEDO DAIRY #4 EXPANSION -

The project's location is within the Central Valley of California Region. This hydrogeologic assessment was completed based on desktop review of existing data collected primarily from the Conditional Use Permit documents (CUP20-005), previous dairy assessments and the November 2019 Merced Groundwater Subbasin Groundwater Sustainability Plan (GSP) completed as a requirement of the 2015 Sustainable Groundwater Management Act (SGMA). The existing dairy is currently operating under the Central Valley Regional Water Quality Regional Water Quality Control Board (CVRWQCB) General Order for Existing Milk Cow Dairies (Order No. R5-2013-0122).

El Nido Rural Center

2 PHYSICAL SETTING AND CONDITIONS

2.1 PROPOSED MODIFICATIONS

As established in the Initial Study and Notice of Preparation (dated February 3, 2021) for the CUP20-005, Azevedo proposes to merge the existing heifer facility with the existing dairy operations, and to expand the existing dairy so that the modified dairy would house 4,000 animals. This would represent an increase of 2,270 animals from existing numbers. The proposed project would include construction of supporting buildings and features at the dairy facility, including three new shade barns, a new feed storage area, a new manure storage area, and a new mechanical manure separator. One new wastewater storage pond, a settling basin, and associated wastewater pumps and pipelines would be constructed at the dairy site, and the existing wastewater pond would be decommissioned. No physical changes to the heifer facility would occur. With construction of the proposed facilities, approximately 26 acres of cropped acreage would be converted to active dairy facilities. After merging the heifer facility, the dairy operations would include the solid settling basin and two wastewater ponds, referenced as SSB and WWS1 and WWS2. The second pond (WWS2) is located on the heifer lot on the northeast corner of the property. The total gross acres for the new expansion project will be 158.2 acres with 105 acres that will continue to be cropped with dairy feed crops. See Figures 2 and 3 for a depiction of this facility's layout.

The existing combined herd from the dairy and heifer ranch is approximately 1,730 animals with 370 milk cows, 61 dry cows, and 1,299 support stock. The proposed expansion would increase the herd size to a total of 4,000 animals, with approximately 2,500 milk cows, 500 dry cows, and 1,000 support stock. Refer to Section 4 for additional details regarding the existing herd and ranch features as well as details related to the proposed dairy expansion and hydrologic impacts.

2.2 SURROUNDING LAND USE

There are several offsite single-family residences associated with other off-site agricultural operations surrounding the project site and located within the windshed of the dairy and heifer facility (defined as an area of 1,320 feet upwind to 2,640 downwind of the periphery of the animal facility).

The El Nido Rural Center boundary is located approximately a half mile east of existing active heifer facilities, and approximately one mile from existing dairy facilities. See Figure 1. Modifications to land use would consist of agricultural and ancillary uses consistent with the 2030 Merced County General Plan and would not affect the analysis contained herein.

Location	Land Use	General Plan	Zoning
ON-SITE	Dairy / Agriculture / Residences/ Heifer Facility	Agricultural	General Agricultural A-1
NORTH	Agriculture/ Animal Confinement Facility / Residences	Agricultural	General Agricultural A-1
EAST	Agriculture / Residences	Agricultural	General Agricultural A-1
SOUTH	Agriculture / Residences	Agricultural	General Agricultural A-1
WEST	Agriculture/ Animal Confinement Facility / Residences / Poultry Facility	Agricultural	General Agriculture A-1

FIGURE 2. AZEVEDO DAIRY #4 EXPANSION –PROPOSED LAYOUT OF DAIRY AND HEIFER RANCH

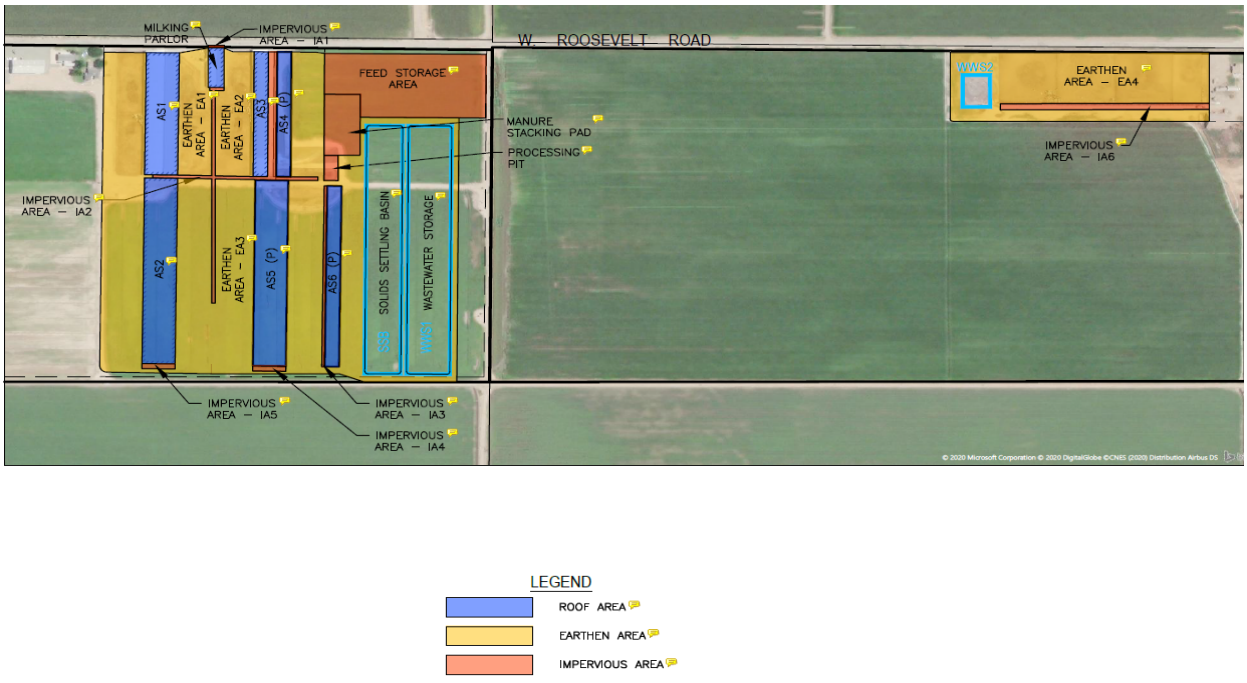


FIGURE 3. LAND APPLICATION AREA - AZEVEDO DAIRY #4 EXPANSION

2.3 PROJECT SETTING AND PHYSIOGRAPHY

The project site lies within the San Joaquin Valley and the larger Central Valley of California. The topography of the site is nearly flat with surface elevations ranging from 120 to 130 feet above mean sea level (MSL).

As depicted on Figure 1, the community of El Nido is close to the facility. The Chowchilla Canal Bypass, which flows parallel to the San Joaquin River, is located approximately four miles south and southwest of the site. The project site is located near the Grassland Ecological Area and the Merced National Wildlife Refuge is approximately six miles northwest of the dairy facilities.

2.4 GEOLOGY

REGIONAL GEOLOGY

The Azevedo Dairy #4 lies within the Great Central Valley, California. The Central Valley is composed primarily of alluvial deposits from erosion of the Sierra Nevada Mountains located to the east and the Coastal Ranges located to the west. In addition to the alluvial deposits that comprise the majority of the geology within the Central Valley, lacustrine[1] and marsh deposits also exist. Lacustrine deposits are composed of fine grained material (clay and silt interbedded with sands and conglomerates) and

[1] Lacustrine means "of a lake" or "relating to a lake."

were formed during a time when lakes and marshes existed within the Valley. Geologic units located east of the San Joaquin River (the location of the Azevedo Dairy #4 Expansion project) consist of high amounts of silica, volcanic, and granitic grains, which reflect its origin from the igneous pluton of the Sierra Nevada Mountains.

The Cross-Section Alignment Map and Cross-Section C-C' on Figures 4 and 5 were taken from the Merced Subbasin GSP to convey the hydrogeology description presented herein. The selected Cross-Section C-C' is a transect of the earth through El Nido area to the east and San Joaquin River to the west. The Cross-Section depicts the geologic sequence found within Merced Subbasin from surface to over 1,000 feet below ground surface (bgs). The geologic formation from deepest to most shallow with referenced formation symbols as follows:

- Basement Complex (pTm),
- Ione Formation (Tce),
- Valley Springs Formation (Tcmo),
- Mehrten Formation (Tm),
- Continental deposits and Older alluvium (QTc, Tulare Formation - Corcoran or E-clay (QI) and Qoa)
- Flood basin deposits and Younger Alluvium (Qb and Qya).

The basement complex is the bedrock on which valley sediments were deposited. The Ione Formation, deltaic in nature, is composed of claystone and sandstones with a small percentage of conglomerates. The Valley Springs Formation, alluvial in nature, is composed of rhyolitic sandstones, siltstones, and claystones. The Mehrten Formation, which is alluvial in nature, is composed of andesitic conglomerates, sandstones, siltstones, and claystones. The Continental Deposits and Tulare Formation, which is lacustrine in nature, is composed of claystone, sandstone and gravels that were alternately deposited in oxidizing and reducing environments. Within these deposits is the Corcoran Clay (CC) Member, a prominent aquitard that is found primarily to the east of Los Banos. Lastly, Quaternary river and flood plain deposits, consisting of clays, silts, sands, and gravels, overlie the formations and are considered the parent material for the majority of soil deposits in the area.

FIGURE 4. CROSS-SECTION ALIGNMENT NEAR EL NIDO TAKEN FROM THE GSP

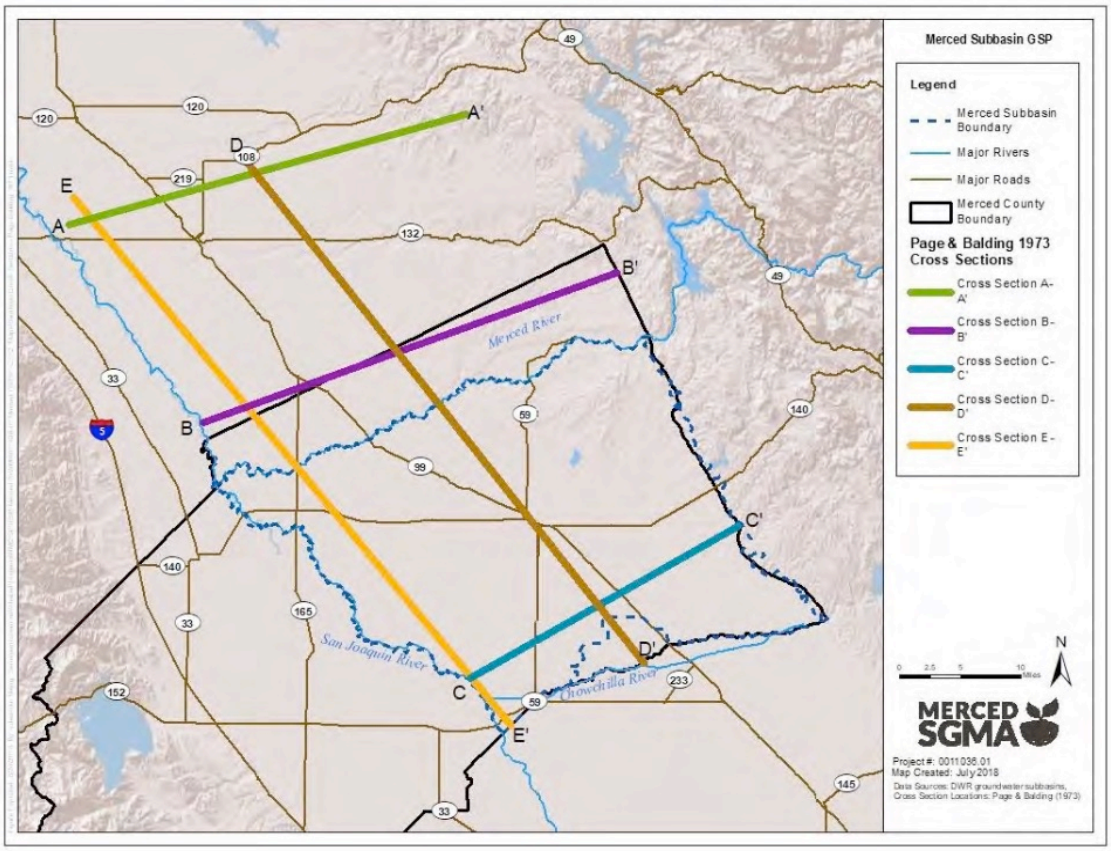
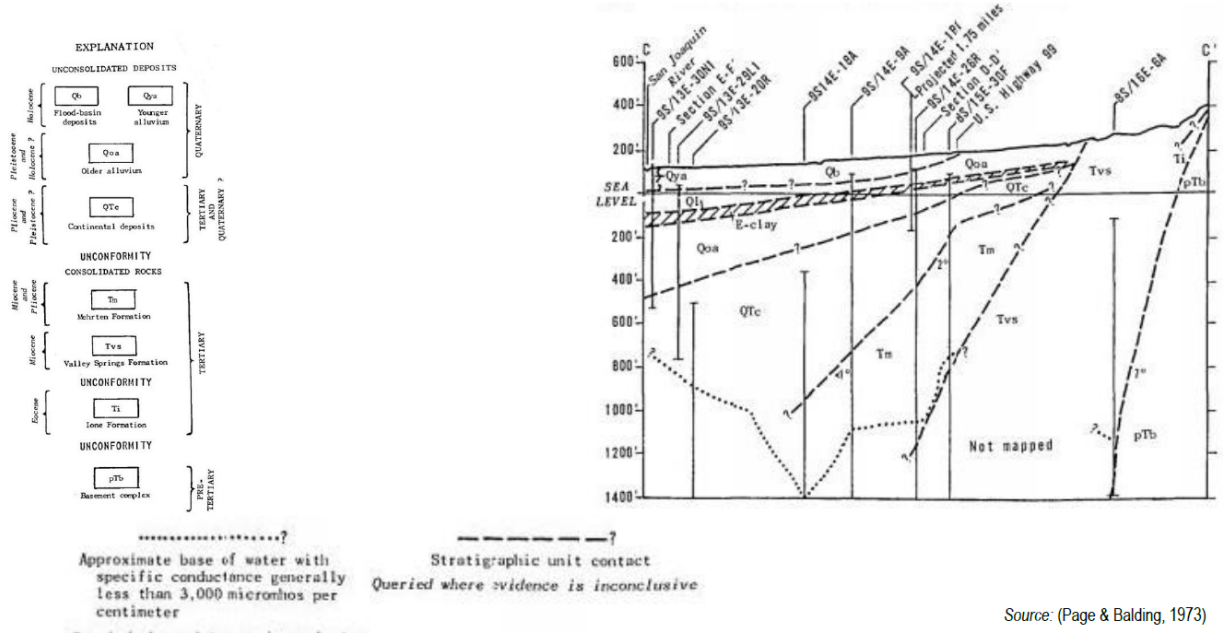


FIGURE 5. CROSS-SECTION C-C' NEAR EL NIDO TAKEN FROM THE GSP



Source: (Page & Balding, 1973)

Also as depicted on Figure 5 Cross-section, geologic faulting in the area has been identified east of El Nido. In addition, surface structural impact has been demonstrated by the excessive subsidence observed as an undesirable result of the groundwater overdraft over the last several decades, especially in the El Nido area.

SITE SPECIFIC SOILS AND GEOLOGY

Predominant soils in the area of the proposed Azevedo Dairy #4 Expansion as classified by the Natural Resources Conservation Service (NRCS) consist of loams to sandy loams. Soil groups are Fresno loam, Hanford fine sandy loam, and Pachappa fine sandy loam.

Near surface geology at the Site consists of Alluvium, Modesto Formation Alluvium underlain by Tulare Formation clay deposits. The domestic well log on site and the referenced cross section above in Figure 5 indicate that interbedded clay, sandy clay, and sand deposits dominate the near surface geology in proximity to the facility. Gravel lenses 5 to 10 feet in thickness exist beneath the site. Somewhat continuous sand deposits and continuous clay beds varying in thickness from 50 to 100 exist at depths ranging from 300 feet bgs are considered to be part of the Corcoran Clay (CC).

2.5 HYDROGEOLOGY

REGIONAL HYDROGEOLOGY

Regional groundwater in Merced County is composed of four subbasins of the San Joaquin Hydrologic Region: the Turlock, the Merced, the Chowchilla, and the Delta-Mendota. The Turlock, Merced, and Chowchilla subbasins are bounded to the east by crystalline rocks of the Sierra Nevada Mountains, and to the west by the San Joaquin River. The project site lies within the Merced Subbasin, bounded on the north and south by the Turlock and the Chowchilla subbasins. The Chowchilla basin is at the southern and eastern edge of the facility.

The subbasins in Merced County contain bodies of fresh water within each basin. The subbasins are each split into three different water bodies depending upon depth and geology: an unconfined aquifer, a semi-confined aquifer, and a confined aquifer. Differentiation between the unconfined, semi-confined, and confined aquifers is due to existence of the CC within the Tulare Formation. As depicted on Figure 5, the CC is considered a significant aquitard throughout the area. Water bodies above the CC are unconfined. Water bodies within the clay are semi-confined, and water bodies below the CC are typically confined.

AREA AND SITE-SPECIFIC HYDROGEOLOGY

The Azevedo Dairy #4 site lies in the Merced subbasin of the San Joaquin hydrologic region. Historically groundwater flow in the Merced Subbasin is generally to the west, towards the San Joaquin River for shallow groundwater. Groundwater follows the dip of the crystalline and sedimentary units. In general, groundwater depths are shallowest near San Joaquin River and increase to the east as surface elevation increases. As referenced in the GSP, ground water elevations have decreased significantly over the last two decades as shown by the depressed water levels which have had undesirable impacts from area dewatering resulting in groundwater flow direction changes, water wells going dry and land subsidence.

The water level information specific to hydrogoeology is separated into three principal aquifers 1) unconfined groundwater above the CC, 2) confined groundwater below the CC and 3) semiconfined groundwater outside of the area where the CC does not exist.

Area knowledge and DWR hydrographs indicate that groundwater may exist within sand units found less than 100 feet bgs. First encountered groundwater is anticipated to be found in unconfined aquifers within laterally extensive sands units or as isolated perched units, significantly above the reported levels.

As referenced in the GSP, historical groundwater levels are shown on Figures 6 and 7 which indicate the decline in groundwater elevations. As depicted on Figure 6 Fall 2017 groundwater elevations bell the CC, cones of groundwater depression are documented with the red colored contour intervals. As depicted on Figure 7, data from 11 wells located Above CC Principal Aquifer, the average groundwater level decline was 1.3 feet per year (ft/yr) from 1996-2015. Based on data from 15 wells in the Below CC Principal Aquifer, average groundwater level decline was 2.4 ft/yr from 1996-2015.

Note that there are no monitoring wells for water level monitoring in the El Nido area and due to the very limited water level and water quality information in the area, the first project proposed on the implementation schedule of the GSP is a nested monitoring well in the El Nido Area for a budget of $400K.

Area groundwater beneficial use is for domestic and irrigation purposes. Land use in the surrounding area is mainly agriculture; a poultry farm is located west of the existing dairy facility and several dairies are located in proximity. Two domestic wells and one irrigation well exist on-site and are used presently. Based on one of the well logs on site, the proposed project total irrigation needs would be met by groundwater supplies from the principal aquifer below the CC.

FIGURE 6. FALL 2017 GROUNDWATER ELEVATION, PRINCIPAL AQUIFER: BELOW CORCORAN CLAY

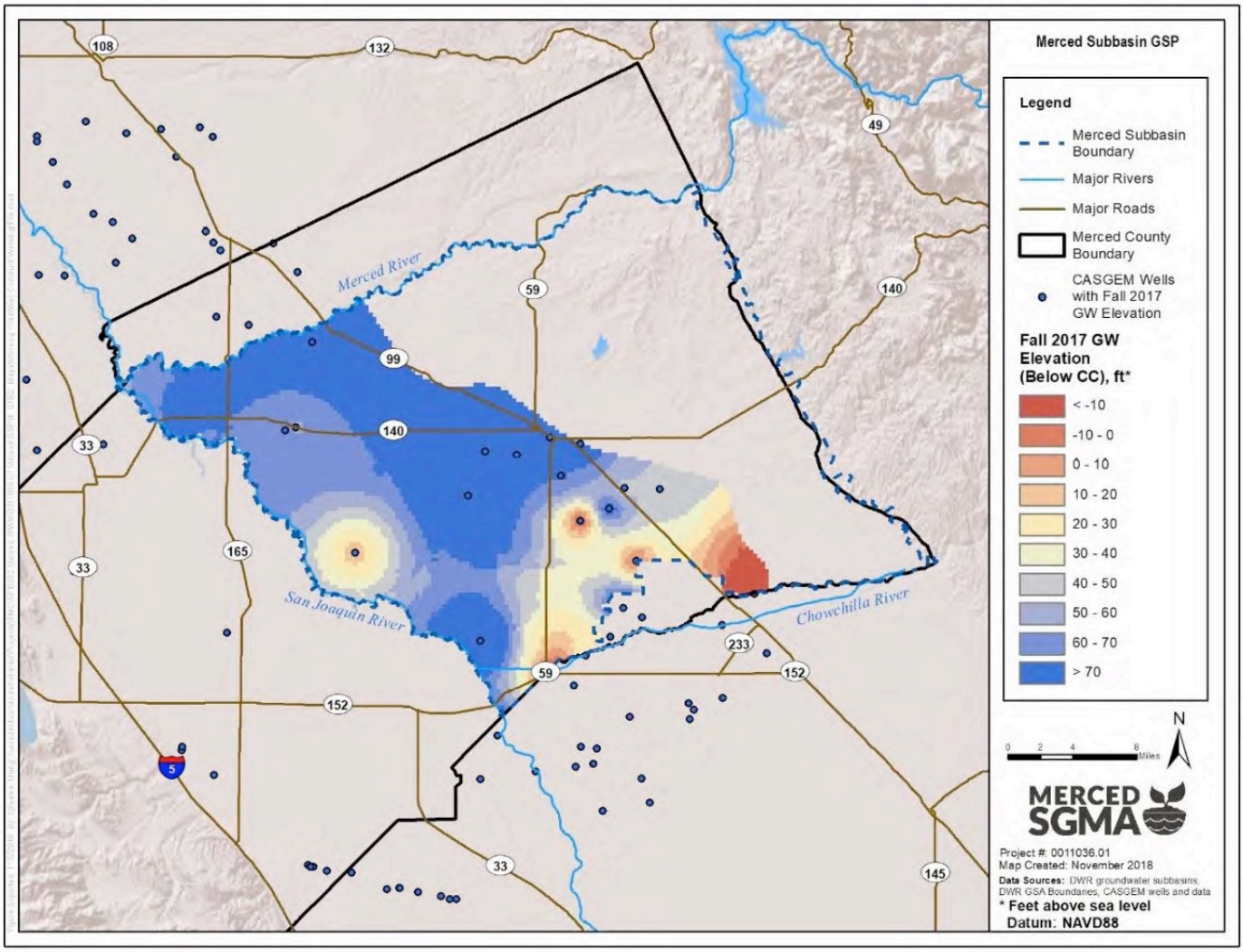
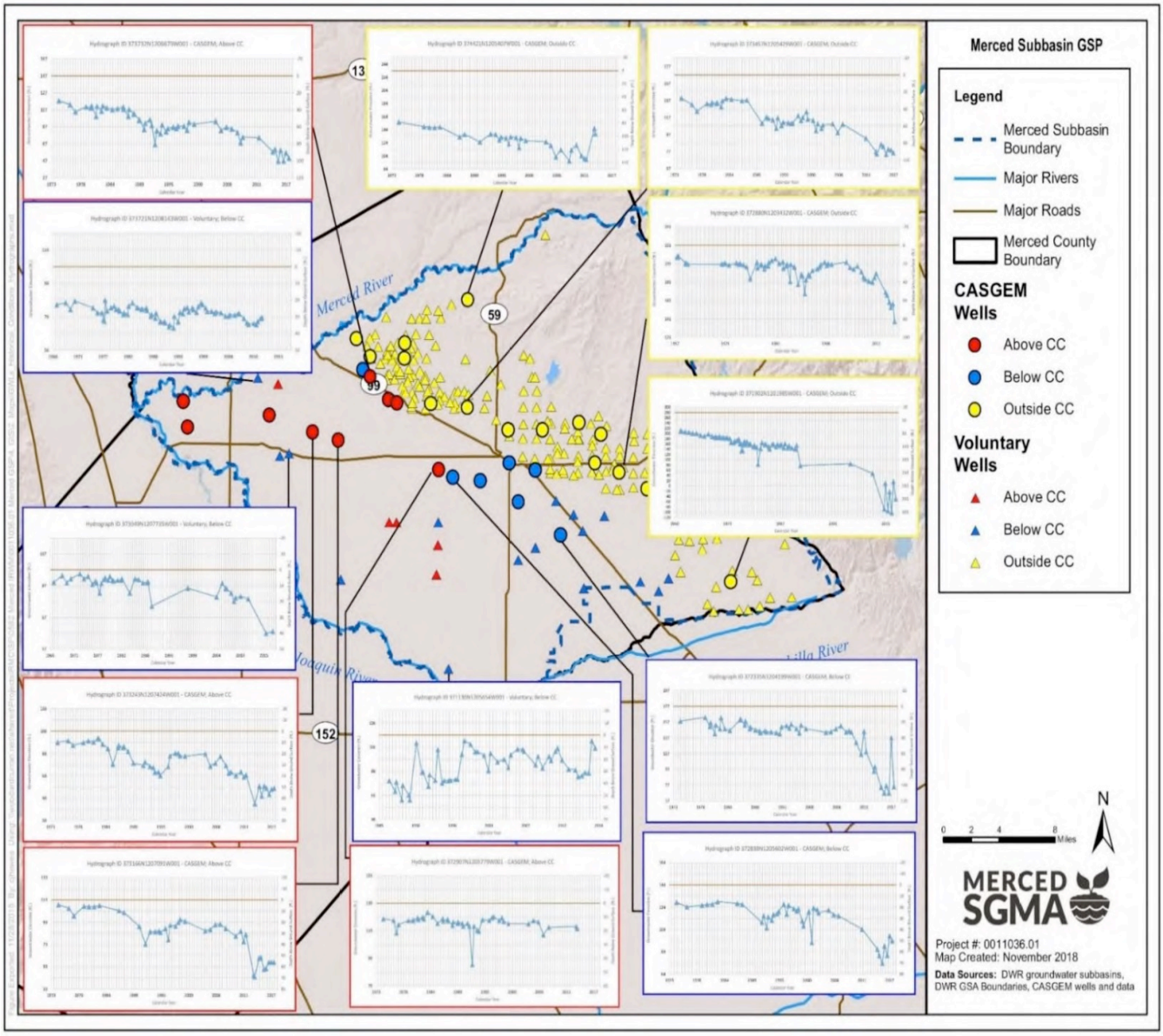


FIGURE 1. DWR HYDROGRAPHS FOR SELECTED WELLS IN THE MERCED SUBBASIN TAKEN FROM THE GSP



2.6 GROUNDWATER QUALITY SUMMARY

The Merced Groundwater Subbasin GSP describes groundwater in the area as characterized by calcium-magnesium bicarbonate type water in the interior of the subbasin, sodium bicarbonate to the west and calcium-sodium bicarbonate to the south. Sodium chloride and calcium-sodium chloride type waters exist in small areas in the southwest area of the subbasin. Total dissolved solids (TDS) values range from 100 to 3,600 milligrams per liter (mg/L) across the subbasin with typical values ranging from 200 to 400 mg/L. Localized areas of high hardness, iron, nitrate, and chloride are found in this subbasin. Nitrate, Arsenic, TDS, and Sodium are parameters of interest in the El Nido area.

Water quality testing for the dairy facility was completed pursuant to the General Order for Existing Milk Cow Dairies for the past decade. A summary from 2016 through 2019 is provided on Table 1. Concentration of nitrate as nitrogen ranged from non-detect to 8.7 mg/L, and detections were not reported above the California Title 22 Primary Maximum Contaminant Limit (MCL) of 10 mg/L. Electrical Conductance ranged from 0.54 to 2.59 dS/m, with four detections above the Title 22 Secondary MCL of 0.9 dS/m.

TABLE 1 - HISTORIC DOMESTIC AND IRRIGATION WELL WATER QUALITY - AZEVEDO DAIRY #4

		Nitrate as Nitrogen (mg/L)	Electrical Conductance (dS/m)	Total Nitrogen (mg/L)
Water Quality Standard		**10†**	**0.90‡**	**10†**
Well	**Date**			
Domestic Well House	10/5/2016	<0.1	0.58	NA
Domestic Well Corrals	10/5/2016	8.7	**2.59**	NA
Domestic Well Milk Barn	10/5/2016	3.8	**1.67**	NA
Domestic Well House	10/24/2017	<0.1	0.80	NA
Domestic Well Corrals	10/24/2017	<0.1	0.64	NA
Domestic Well Milk Barn	10/24/2017	<0.1	0.8	NA
Domestic Well Milk Barn	12/3/2018	<0.1	0.87	NA
Domestic Well House	12/3/2018	<0.1	0.87	NA
Domestic Well Milk Barn	12/11/2019	<0.1	**0.91**	NA
Domestic Well House	12/11/2019	<0.1	**0.91**	NA
Irrigation Well	7/18/2016	<0.2	0.71	<0.2
Irrigation Well	11/20/2017	1.5	0.68	NA
Irrigation Well	8/15/2018	0.4	0.56	NA
Irrigation Well	9/3/2019	0.5	0.54	<1.0

†: California Title 22 Section 64431 Primary Maximum Contaminant Limit, ‡: California Title 22 Section 64449 Secondary Maximum Contaminant Limit, **Bold**: Water Quality Standard exceedance.

2.7 FLOODING

The Flood Insurance Rate Maps (FIRM 2008) from the Federal Emergency Management Agency (FEMA) provides specific information for the facility. According to the FEMA map, the project site is in Flood Zone X. Areas within the FEMA designation Zone X are defined as an area outside the FEMA designated 100-year and 500-year flood.

2.8 IMPAIRED SURFACE WATERS

The CVRWQCB maintains and updates the impaired water bodies list for Central Valley. This list is required by the Clean Water Act Section 303(d) list and 305(b) report. The CVRWQCB requires that Total Maximum Daily Load (TMDL) goals are used to address long-term impairments to surface waters. Refer to Section 3.3 for more details.

3 REGULATORY BACKGROUND

3.1 FEDERAL LAWS AND REGULATIONS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY CLEAN WATER ACT

Federal, state, and local regulations were implemented to protect the quality of surface water and groundwater resources. The primary federal laws for protection of water quality are the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). Federal and state regulations based on this underlying legislation range from establishing maximum contaminant levels to setting anti-degradation policies.

The primary regulatory program for implementing water quality standards is the federal National Pollutant Discharge Elimination System (NPDES) Program. The United States Environmental Protection Agency (EPA) delegated NPDES enforcement and administration to the State of California. Under the Federal Concentrated Animal Feeding Operations (CAFO) program, owners and operators ("dischargers") of dairies are required to apply for and receive an NPDES permit if the dairy is a Large CAFO and discharges or proposes to discharge pollutants to the waters of the Unites States.

The CVRWQCB administers the federal NPDES program in the Central Valley. The CVRWQCB adopted the General Waste Discharge Requirements and General NPDES Permit for Existing Milk Cow Dairy Concentrated Animal Feeding Operations within the Central Valley Region, Revised Order No. R5-2011-0091, in December 2011. The CAFO Order was written to follow the format of the 2007 General Order for Existing Milk Cow Dairies and Individual Waste Discharge Requirements (discussed under California Laws and Regulations, NPDES Program and the General Order for Existing Milk Cow Dairies and Individual Waste Discharge Requirements below), as closely as possible, while incorporating requirements of the Federal CAFO rule. The CAFO Order will serve as a NPDES permit for those existing milk cow dairies that are classified as CAFOs.

FEDERAL EMERGENCY MANAGEMENT AGENCY

FEMA is the federal agency that oversees floodplains and manages the National Flood Insurance Program (NFIP), adopted under the National Flood Insurance Act of 1968. FEMA's regulations establish requirements for floodplain management. FEMA prepares Flood Insurance Rate Maps denoting the regulatory floodplain to assist communities such as Merced County with land use and floodplain management decisions in order to meet the requirements of the NFIP.

3.2 CALIFORNIA LAWS AND REGULATIONS

California's primary water law is the Porter-Cologne Water Quality Control Act (Porter Cologne). The regulations that implement Porter Cologne are contained in the California Code of Regulations (CCR). The water quality control programs, plans, and policies that affect the operations of animal confinement facilities include the NPDES program, regional water quality control plans, storm water protection plans, and the TMDL program.

NPDES PROGRAM AND THE GENERAL ORDER FOR EXISTING MILK COW DAIRIES AND INDIVIDUAL WASTE DISCHARGE REQUIREMENTS

In general, the Waste Discharge Requirements (WDR) Program regulates point discharges that are exempt pursuant to Chapter 1, Article 1, Subsection 20090 of Title 27 Division 2 of the California Code of Regulations and not subject to the Federal Water Pollution Control Act. In California, the permitting authorities for WDRs are the Regional Water Quality Control Boards (RWQCB). The CVRWQCB has jurisdiction over the project site. In May 2007, the CVRWQCB adopted Waste Discharge Requirements General Order R5-2007-0035 for Existing Milk Cow Dairies (2007 General Order). In October 2013, the CVRWQCB adopted changes to the Order through the Reissued Waste Discharge Requirements General Order for Existing Milk Cow Dairies R5-2013-0122 (General Order or Dairy Order), which rescinded and replaced the 2007 General Order. The General Order implements the State laws and regulations relevant to confined animal facilities. The General Order is not a NPDES Permit and does not authorize discharges of pollutants to surface water that are subject to NPDES permit requirements of the Clean Water Act. The General Order serves as general WDRs for discharges of waste from existing milk cow dairies and is intended to be compatible with the EPA's regulations for CAFOs discussed above. Under the General Order Waste Discharge Permit Program, Animal Feeding Operations are prohibited from discharging waste into surface water or into groundwater that is directly connected to surface water.

The General Order only applies to owners and operators of existing milk cow dairies (dischargers) in the Central Valley Region. For the purposes of the General Order, existing milk cow dairies are those that were operating as of October 17, 2005 and filed a Report of Waste Discharge (ROWD). Dairies that did not file a 2005 ROWD, new dairies, and existing dairies expanding the mature cow number established under the 2005 ROWD by greater than 15 percent may not be covered under the General Order and would be required to obtain coverage under Individual WDRs. Individual WDRs

were not issued by the RWQCB since 2009. All dairies covered under the General Order are required to:

- Comply with all provisions of the General Order,
- Submit a Waste Management Plan (WMP) for the production area,
- Develop and implement a Nutrient Management Plan (NMP) for all land application areas,
- Monitor wastewater, soil, crops, manure, surface water discharges, and storm water discharges,
- Monitor surface water and groundwater,
- Keep records for the production and land application areas, and
- Submit annual monitoring reports.

The NMP and WMP describe the regulatory requirements for the facility, and together they serve as the primary tool to prevent groundwater contamination and poor operations. The General Order establishes a schedule for dischargers to develop and implement their WMP and NMP, and requires them to make facility modifications as necessary to protect surface water, improve storage capacity, and improve the facility's nitrogen balance before all infrastructure changes are completed. In addition, Best Management Practices (BMP) intended to minimize surface water discharges and subsurface discharges at dairies are required. The General Order also requires each dairy to fully implement a WMP and a NMP as of the date of this technical study. In compliance with the requirements of the CVRWQCB, the proponents of the Azevedo Dairy #4 completed the required components of the WMP and NMP of the General Order.

In November 2012, a Court of Appeals in Sacramento found that the General Order violated the State Water Resources Control Board (SWRCB) antidegradation policy (Asociacion de Gente Unida Por El Agua v. Central Valley Regional Water Quality Control Board (2012) 210 Cal.App.4th 125). The environmental group that challenged the General Order argued the poor drinking water quality in the Central Valley was due to waste discharge from dairy farms. The court found that the General Order's monitoring system of taking samples from domestic and agricultural supply wells is insufficient to detect groundwater degradation in a timely manner, and that the General Order contains no remediation measures in the event groundwater monitoring determines that degradation occurred. The case resulted in revisions to the General Order through the Reissued Dairy General Order.

The Reissued Dairy General Order enhanced 2007 General Order requirements on existing milk cow dairies. The Reissued Dairy General Order recognizes that some of the necessary improvements to existing dairies have already occurred. Improvements

may include recycling flush water, grading, establishing setbacks, installing flow meters, exporting manure, leasing, or purchasing land, etc. The dairy operator may be able to make some of these improvements relatively quickly while some improvements may require more time to implement. The General Order requires dairy operators to make any necessary interim facility modifications first to prevent discharges to surface water, improve storage capacity, and improve the facility's nitrogen balance before completing any necessary infrastructure changes.

The 2007 General Order includes a provision that requires compliance with Monitoring and Reporting Program No. R5-2007-0035. With the Reissued Dairy General Order, the Monitoring and Reporting Program (MRP) was updated (Monitoring and Reporting Program R5-2013-0122). Based on an evaluation of the threat to water quality at each dairy, the CVRWQCB may require the installation of monitoring wells to comply with the General Order MRP. The Monitoring and Reporting Program requires:

- Periodic inspections of the production area and land application areas,
- Monitoring of manure, process wastewater, crops, and soil,
- Recording of operation and maintenance activities,
- Groundwater monitoring,
- Storm water monitoring,
- Monitoring of surface water and discharges to surface water,
- Annual reporting,
- Annual reporting of groundwater monitoring,
- Annual storm water reporting,
- Noncompliance reporting, and
- Discharge reporting.

The General Order and Individual WDRs also established the ability for individual dairies to participate in a Groundwater Representative Monitoring Program (RMP) as an alternative to an individual requirement for groundwater monitoring. Each dairy must notify the CVRWQCB about its decision to join the RMP. Dairies that do not notify the CVRWQCB or do not intend to join an RMP will be held to individual monitoring requirements set forth in the regulations. The Azevedo Dairy #4 joined the RMP efforts; however, in the future, they could be treated as an individual discharger required to have an individual WDR and a separate groundwater monitoring system.

The RMP establishes a regional monitoring plan for the member dairies of the Central Valley Dairy Representative Monitoring Program (Dairy Cares). The RMP was developed in accordance with General Order requirements and with review by the CVRWQCB. The regional monitoring network is established by installing individual monitoring well networks at dairies with hydrogeologic and land use characteristics

typical of the area. Groundwater monitoring results for these dairies is then extrapolated to other member dairies of the RMP, theoretically removing the need to install monitoring well networks on an individual basis. Phase I of the RMP was completed during 2011 and consisted of installing monitoring well networks at 18 dairies within the Highway 99 and Interstate 5 corridor of Stanislaus and Merced County. The Phase II workplan proposed further monitoring networks in San Joaquin, Fresno, Kings, and Tulare counties, and completed the public review process in July 2012. Monitoring efforts of 42 newly selected dairies were initiated in 2013. The RMP currently monitors 443 monitoring wells at 42 representative dairies to cover their 1,100+ dairy members. Annual reports are submitted to the CVRWQCB.

The Year 1 (2012) Report initial findings for the Central Valley Dairy Representative Monitoring Program (CVDRMP) included 18 dairies in the Stanislaus and Merced Counties. The summary of findings for the first encountered groundwater quality indicated that high nitrate and TDS concentrations are widespread beneath application fields and dairy facilities, with higher nitrate concentrations found in coarse sandy soils and higher TDS concentrations in silt or clay soils. Loading rates of salts to individual fields were tracked and additional refinement in this tracking will increase the effectiveness of the analysis of the data derived from the monitoring program. Additional examination of the dairies, including field assessment, was recommended to more accurately determine the performance of dairy lagoons.

The Year 2 (2013) report expanded the dairy network to 42 total dairies from Tehama County to Kern County. The monitoring data indicated that application of fertilizer to crops (either manure or commercial fertilizer) may be a major source for impacts observed in first encountered groundwater. Elevated nitrate concentrations observed in the 2012 Report were observed in the 2013 Reporting period as well, especially for coarse-grained soil, but was also observed in other soil types. Groundwater data collection efforts for 2013 observed groundwater responses to irrigation events. As part of the continued monitoring effort, the CVDRMP proposed to refine the well network in the central area, continue collecting automated data from 10 wells at 4 dairies, continue collecting lagoon seepage testing data with memoranda submitted to the CVRWQCB, complete subsurface hydrogeologic investigation in the central area around lagoons at 12 dairies, collect age date samples from groundwater in the dairy network, and continue to suggest a framework to improve nutrient management for dairies to minimize farming effects to the environment.

The Year 3 (2014) report confirmed that the 42 dairies used for monitoring are representative of a range of site conditions and farming practices observed in Central Valley dairies. The findings for January 2012 through December 2014 confirmed that

first encountered groundwater was affected by historic and current dairy farming practices and indicates that crop fields are the primary source of nutrient emissions to groundwater. Assessment of lagoon effects on groundwater is limited as the CVDRMP determined that groundwater monitoring provides more qualitative assessment for lagoon and crop field nutrient loading. CVDRMP continues to work towards development of evidence-based industry recommendations to improve groundwater protection.

The Year 4 (2015) report provides cumulative data collected from January 2012 through December 2015 and confirms findings are consistent with previous studies. The data confirms that first encountered groundwater is affected by current and/or historic dairy practices and indicates that crop fields are the primary source of contaminant migration. In addition to the regulatory monitoring, the program initiated an investigation of lagoon seepage and testing was completed during the winters of 2013/2014 and 2014/2015. Based on data collected to date, the report indicates that most dairies likely will not be able to meet CVRWQCB standards for groundwater protection. The RMP teamed with University of California researchers to determine a path to improve nutrient management and determine Nitrogen Use Efficiency (NUE). While the concept of NUE is universal, actions to achieve optimal NUE will be site-specific. The report determined seven major findings: 1) Groundwater monitoring with respect to lagoon performance is not especially useful and can only be used in a qualitative approach, i.e., water quality can indicate impacts but cannot provide seepage rates, etc., 2) Improvements to NUE aim to reduce subsurface nutrient contamination; however, water quality does not necessarily reflect the improved NUE, 3) Whole-lagoon seepage rates ranged from 0 to 2.2 mm/day with mean seepage of 1.1 mm/day and median seepage of 0.7 mm/day. Ten of the seventeen lagoons reported seepage rates of less than 0.8 mm/day. The results are consistent with academic research and confirms that small seepage rates and a narrow range of seepage rates were observed across fine and coarse sediments, likely due to the presence of a low hydraulic conductivity sludge layer, 4) Nitrogen loading rates strongly indicate that nitrogen emissions originate from croplands and not lagoons, 5) Management measures for lagoons tend to be common-sense based but the effectiveness of such measures lack quantitative evaluation and data, 6) While the injection of liquid manure into irrigation systems is conceptually similar to the use of synthetic fertilizers, there does not appear to be a method or technology to make real-time adjustments to maintain a constant application rate of nitrogen, 7) The methodology for application ratio calculation is very sensitive and inaccuracies of +/- 15% can yield a great variance in application ratios and may explain year over year field-specific variabilities.

The Year 5 (2016) report confirmed the continued observed impacts to shallow groundwater from the previous reports. The RMP continued to implement research projects for investigations of different portions of dairy components. In 2016, the RMP launched NUE research projects in Merced, Madera and Fresno Counties. Key findings for the 2016 report were similar to the 2015 report key findings, emphasizing that groundwater monitoring, while a useful tool to determine the extent of contamination, is not beneficial for determining point source or management for pollution sources.

The Year 6 (2017) report provides cumulative data collected from January 2012 through December 2017 and confirms the continued observed impacts to shallow groundwater due to historical and/or current farming practices. In addition to the regulatory monitoring, the program continues the voluntary investigation of lagoons, croplands, and earthen floored animal housing. In summer of 2017, the RMP launched a two-year NUE research project in Tulare County. Key findings for the 2017 report emphasize that groundwater monitoring alone is not suitable for evaluation of on-farm management practices or for recommendation of solutions and/or upgrades. Furthermore, many annual reports do not attempt to explain groundwater quality based on management practices or to infer the adequacy of these management practices in protecting groundwater based on groundwater quality. The RMP is developing recommendations for management practices, solutions, and upgrades to help reduce subsurface nitrogen and salt emissions. The RMP made steady progress toward developing industry recommendations to meet the April 1, 2019 schedule mandated by the 2013 General Order.

The Year 8 (2019) report provides cumulative data collected from January 2012 through December 2019, the RMP observations confirm that first encountered groundwater is affected by historical and/or current dairy farming practices. With few exceptions, nitrate-N concentrations beneath lagoons, animal housing, and crop fields are greater than 10 mg/L. From quarterly observations (first quarter 2012 to the third quarter 2019) collected from CVDRMP's dedicated monitoring wells indicate the following groundwater TN concentration trends:

a. 34% (88 data sets) increasing,
b. 26% (63 data sets) decreasing,
c. 41% stable conditions (106 data sets).

The 2019 mean TN concentration across all dairies was 46 mg/L; it was the highest in light soils and in shallow groundwater (55 and 49 mg/L, respectively); and 33 mg/L in both deep groundwater and heavy soils.

Of the three management units, the 2012-2019 TN concentration increase in wells associated with fields was similar to the Comprehensive (All) subgroup (11 mg/L compared to 13 mg/L). This is consistent with the fact that field wells contribute the largest subset of data points. Groundwater near lagoons exhibited the greatest concentration increase over the 8-year monitoring period (30 mg/L; p=0.02).

Luhdorff and Scalmanini, as part of the Dairy RMP program, published an extensive report related to earthen liquid dairy lagoons. The report compiled groundwater quality data from the RMP network from 2012 through 2016, data from whole-lagoon seepage testing, lagoon liquor quality, and perimeter soil borings around lagoons and groundwater quality and geophysical surveys. Conclusions were provided for seepage rates and nitrogen mass emissions, salinity effects on soils and groundwater and utility of concentration-based assessment of lagoons. The report determined that a majority of nitrogen loading was related to cropland and not lagoon operations. Salinity effects tended to be near the lagoons in most cases and little to no impact was observed at a distance of 50 to 150 feet from the lagoon perimeter. Furthermore, the RMP concluded field work associated with its Corral Subsurface Hydrogeology.

In accordance with Provision 29 of the General Order, all dairies must comply with Title 27. As explained in the General Order Information Sheet, the Title 27 design standards for ponds were determined to not be protective of groundwater quality, and there are technologies available which can provide greater groundwater protection. Because Section 13360 of the California Water Code (CWC) requires that WDRs not specify the design, location, type of construction, or particular manner in which compliance may be had with the requirements, the General Order cannot specify any particular pond design. However, the General Order establishes performance standards for new wastewater ponds that are more stringent than Title 27 to provide increased groundwater protection.

The Azevedo Dairy #4 was previously regulated under the 2007 General Order with 2011 revisions, which was replaced by the Reissued Dairy General Order (R5-2013-0122). Since the proposed expansion would increase the mature cow number established under the WDR by greater than 15 percent, the proposed expansion may require a new individual WDR. Significant operational and reporting requirements will be required as part of the individual WDR process. Nutrient management practices required by the individual WDR will continue as follows:

- Discharge reporting.
- Groundwater monitoring,
- Wastewater sampling and application monitoring,
- Irrigation application monitoring,

- Facility and land application visual inspections,
- Crop nitrogen/phosphorus uptake monitoring, and
- Field specific nutrient budgeting.

REGIONAL WATER QUALITY CONTROL PLAN

Individual RWQCBs regulate animal confinement facilities, including dairies and other types of facilities, by developing and enforcing a Basin Plan that identifies beneficial uses of waters in the region and establishes policies to protect those uses. Agriculture and dairies are designated as beneficial uses of water resources in the Basin Plan.

The RWQCB regulates dairies under the provisions of Article 1, Subchapter 2, Chapter 7, Division 2, Title 27 of the California Code of Regulations, and the Porter Cologne Water Quality Control Act. The Basin Plan for the Sacramento-San Joaquin Valley (Basin Plan) developed by the Central Valley RWQCB generally regulates agriculture practices.

One mechanism used to protect water quality is for RWQCBs to issue WDRs that specify waste management practices and impose reporting requirements as discussed above. The CVRWQCB regulates some animal confinement facilities under individual WDRs depending upon site-specific conditions and regulatory assessment, as described above. Planning documents related to these permits include a Nutrient Management Plan and Waste Management Plan.

NUTRIENT MANAGEMENT PLAN AND WASTE MANAGEMENT PLAN

The NMP/WMP planning process is used to implement best management practices for dairies. The NMP/WMP are planning documents used to describe facility operations, develop wastewater disposal options, and outline mitigation measures for each dairy. These documents are required to be revised as appropriate for the operation. Specific elements related to the number and type of animals dictate the size of a facility, fresh/flush water needs, and wastewater generation. Nitrogen and salt balance calculations based on the herd description, housing requirements (i.e., flush freestalls or dry lots), acreage available for land application, and crop nutrient removal rates are made to determine the nitrogen and salt uptake for the proposed cropping pattern. On-

site wastewater plans, storage elements, and storm water planning may be modified based on the calculations contained in the NMP/WMP.

As mandated by the ACO, a NMP/WMP in place of a Comprehensive Nutrient Management Plan (CNMP)[2] for the Azevedo Dairy #4 facility was prepared pursuant to the requirements of the CVRWQCB (see Appendix L of the Environmental Impact Report for the expansion Project). The NMP and WMP for the proposed dairy expansion, referenced, were used for the evaluation in this technical study. To establish a baseline, the referenced NMP and WMP were used to represent existing conditions.

CALIFORNIA STATEWIDE SUSTAINABLE GROUNDWATER MANAGEMENT ACT

The Sustainable Groundwater Management Act (SGMA) was signed into law on September 16, 2014 and is a package of three groundwater laws. The law was then amended in 2015 and these changes were effective as of January 1, 2016.

The SGMA allows customized groundwater sustainability plans (GSP) to be designed by groundwater sustainability agencies (GSA) to manage groundwater resources while being sensitive to local economic and environmental needs. GSAs were formed and GSPs are due by January 31, 2020 for basins in critical overdraft and by January 31, 2022 for all other basins. Water management and land management agencies in Merced Subbasin have formed three Groundwater Sustainability Agencies (GSAs): the Merced Irrigation-Urban Groundwater Sustainability Agency (MIUGSA), the Merced Subbasin Groundwater Sustainability Agency (MSGSA), and the Turner Island Water District Groundwater Sustainability Agency (TIWD – GSA#1). The Azevedo Dairy #4 location is included in the jurisdiction of the MIUGSA, which was formed in 2017. Once the GSPs program elements are implemented, the GSAs will be responsible for submitting an annual report summarizing groundwater elevation data, groundwater extraction, groundwater recharge (from surface water supply used or available for use), total water use, and change in groundwater storage. As part of the annual reporting effort, individuals who are outside groundwater adjudication boundaries and within medium or high priority basins and who use more than 2 acre-feet (651,702 gallons) per year of groundwater may be required to track their usage and provide an annual report to their respective GSA and SWRCB.

[2] Since adoption of the ACO, the CVRWQCB required the preparation of a NMP and WMP, which would serve in place of the CNMP as allowed by Merced County Code Chapter 18.64.060 K.

After implementation of the GSPs, the SWRCB will be authorized to intervene if local agencies prove unable or unwilling to correct groundwater management problems. The goal of the implementation of the GSPs is to help avoid chronic lowering of groundwater levels, avoid significant and unreasonable groundwater storage reduction, seawater intrusion, water quality degradation or land subsidence, and avoid surface water depletions that have adverse impacts on surface water beneficial uses. Sustainable groundwater management, with successful implementation of GSPs, should be reached by 2040 for basins in critical overdraft and by 2042 for other basins.

IRRIGATED LANDS REGULATORY PROGRAM

A range of pollutants can be found in runoff from irrigated lands, such as pesticides, fertilizers, salts, pathogens, and sediment. The Irrigated Lands Regulatory Program (ILRP) of the CVRWQCB regulates discharges from irrigated agricultural lands. Its purpose is to prevent agricultural discharges from impairing the surface waters that receive the discharges. To protect these waters, RWQCBs issued conditional waivers of WDRs to growers that contain conditions requiring water quality monitoring of receiving waters and corrective actions when impairments are found. The development of the Long-term Irrigated Lands Regulatory Program General Orders, which will protect both surface water and groundwater, are underway, and the following Orders were adopted by the RWQCB in preparation of this report:

- Eastern San Joaquin River Watershed General Order (Order R5-2012-0116-09) – includes revisions through February 28, 2020. This Order provides WDRs and MRP for discharges from irrigated lands within the eastern San Joaquin River watershed.
- Grassland Drainage Area General Order (Order R5-2015-0095 -04) includes revisions through February 28, 2020. This program regulated discharge to groundwater in the Grassland Drainage Area and is similar to other IRLP orders.
- Individual Discharger General Order (Order R5-2013-0100) - adopted in July 2013. This Order regulates waste discharges from irrigated lands for individuals who are not enrolled under WDRs administered by a third-party.
- Tulare Lake Basin Area General Order (Order R5-2013-0120 - 08) – adopted in September 2013 and includes revisions through February 28, 2020. This Order provides WDRs and MRP for discharges from irrigated lands within the Tulare Lake Basin.
- Western San Joaquin River Watershed General Order (Order R5-2014-0002-09) includes revisions through February 28, 2020. This Order provides WDRs and MRP for discharges from irrigated lands within the western San Joaquin River Watershed.

- San Joaquin County and Delta Area General Order (Order No. R5-2014-0029 - 05) includes revisions through February 28, 2020.

In implementing the ILRP, the CVRWQCB allowed growers to combine resources by forming water quality coalitions. The coalition groups work directly with their member growers to assist in complying with CVRWQCB requirements by conducting surface water monitoring and preparing regional plans to address water quality problems. Of the estimated 35,000 growers in the Central Valley, there are approximately 25,000 landowners/operators who are part of one of eight water quality coalition groups. If growers do not obtain regulatory coverage with payment of a membership fee for their waste discharges as a part of a Coalition Group, they must file a ROWD and filing fee with the CVRWQCB to obtain a grower-specific permit. The Conditional Waiver requires that coalition groups comply with General Order WDRs, implement Monitoring and Reporting Program plans, and submit periodic monitoring reports and monitoring data. When there were two or more exceedances of the same pollutant at the same site within a three-year period, Management Plans must be prepared and implemented.

There is significant overlap between the ILRP and the Dairy Programs with regard to regulatory requirements, monitoring, and best management practices. The Azevedo Dairy #4 is not anticipated or likely to be regulated under the ILRP program. If site conditions change (i.e., the Dairy Program regulations no longer apply, or if project area cropland is not included in the dairy's NMP) and a regulatory assessment warrants action under the ILRP, the farm could potentially participate in the East San Joaquin Water Quality Coalition by paying a membership fee. This Coalition represents all member dischargers as the monitoring and reporting entity for the Eastern San Joaquin River Watershed General Order (Order R5-2012-0116-09).

CENTRAL VALLEY SALINITY ALTERNATIVES FOR LONG TERM SUSTAINABILITY (CV-SALTS) ALONG WITH THE NITRATE CONTROL PROGRAM (NCP)

CVSALTS is a collaborative stakeholder driven and management effort to develop sustainable salinity and nitrate management planning. In 2020 and 2021, initiatives were made through the IRLP coalitions, the CVRMP, and private WDR holders to fund the 20 year salinity study. Policies and study results will be used for future comprehensive regulatory and programmatic management approaches. The impact to individuals within the Dairy Order will be addressed after the study. The CVRMP is paying the fee for participation in the CV-SALTS Salt Control Program on behalf of its members.

The Nitrate Control Plan (NCP) collaboratives were developed in Merced County within the 2020 Priority 1 subbasins (Turlock and Chowchilla). The collaboratives were charged with developing and implementing action plans to provide safe drinking water, reducing nitrate impacts and restoring groundwater quality. Azevedo Dairy #4 area will be included with the Merced Subbasin addition in 2022.

TMDL AND IMPACTED WATERWAYS NEAR THE PROJECT SITE

Under Section 303(d) or §303(d) of the CWA, states are required to identify and list water bodies that do not meet applicable water quality standards. Such water bodies receive a ranking for the establishment of TMDL for all listed water contaminants that do not meet water quality standards. States are required to establish a TMDL for these water bodies that will lead to achieving the applicable water quality standards, and to allocate the TMDL among all contributing sources. The assessment of sources may indicate that a water body is impaired because of nutrient or pathogen problems attributable to animal manure or wastewater, or because a watershed has more manure generated than there is land available for application. The TMDLs will be implemented through NPDES permits, nonpoint source control programs, and other local and state requirements.

Several streams or rivers in this area of Merced County have §303(d) listing. Bear Creek is located more than four miles north of the project site and is listed as impaired under §303(d). Additional referenced surface water bodies (i.e. Chowchilla Canal Bypass) are more than three miles southwest from the site.

3.3 CALIFORNIA DEPARTMENT OF WATER RESOURCES FLOOD MANAGEMENT

The California Department of Water Resources Division of Floodplain Management constructs and operates regional scale flood protection systems in partnership with federal and local agencies, and provides technical, financial, and emergency response assistance related to flooding. The DWR prepared non-regulatory Best Available Maps showing 100, 200, and 500-year floodplains using data compiled from various sources intended to support community-based planning and flood risk management. The 100-year areas are similar to those of FEMA maps, with some additional areas and localized differences.

3.4 MERCED COUNTY

ANIMAL CONFINEMENT ORDINANCE

The Merced County Animal Confinement Ordinance regulates the design, construction, and operation of animal confinement facilities within the county. Because the ACO is regulatory rather than permissive, all existing and proposed animal confinement facilities within the county are required to comply with the terms of the ACO, including Azevedo Dairy #4 projects. The Merced County ACO is included as article 4 of Title 18 Zoning of the Merced County Code.

Merced County regulations under the ACO maintain water quality standards that are consistent with the CVRWQCB Basin Plan. The Merced County ACO addresses potential impacts to water quality primarily through preparation and implementation of a CNMP. If a site-specific CNMP is followed and if best management practices are used, nitrogen loading and salt loading to groundwater will be minimized. Since adoption of the ACO, the CVRWQCB required the preparation of a NMP and WMP as described above, which would serve in place of the CNMP as allowed by County Code Chapter 18.64.060.

The Merced County ACO contains additional provisions to protect water quality. For example, ACO require that all wastewater or storm water that comes into contact with manure be maintained on the project site, or applied to other sites only upon written approval of the landowner. ACO requires that off-site property owners accepting wastewater (liquid manure) complete written agreements to accept responsibility for proper land application. As per the ACO notification of Merced County Division of Environmental Health (DEH) for any off-site discharge of wastewater and application of manure at agronomic rates. For the permanent closure of an animal confinement facility, ACO requires that DEH to review and approve specific collection of soil samples from underneath existing ponds to be abandoned after liquid and solids are removed. Permits must be obtained from DEH prior to construction and an inspection must be performed prior to use of a newly constructed pond or basin. Portions of the ACO that specifically apply to protection of water quality (see the appendices of the Environmental Impact Report for the Azevedo Dairy #4 Project for the full text of the ACO or web search

< http://www.qcode.us/codes/mercedcounty/>).

To address potential impacts to water resources, the EIR prepared for the ACO contains mitigation measures to be implemented during environmental review of animal

confinement facility projects such as the proposed project. Mitigation measures adopted as policy in the EIR for the ACO include:

- Measures to reduce groundwater contamination; and,
- Measures to reduce the risk of contamination of surface waters during flood events.

These mitigation measures as contained in the EIR for the ACO, are incorporated as study protocols for this technical study and serve as the basis for mitigation measures identified in this document.

MERCED COUNTY WELL ORDINANCE

The Merced County Code Chapter 9.28, *Wells* contains Water Well Standards (Chapter 9.28.060) that would minimize the potential for contaminated water to enter the well and contaminate groundwater. The standards include well setback distances from potential sources of contamination and pollution, and standards for construction as set forth below:

Merced County Code, Chapter 9.28.060 - Water Well Standards

C. Well Construction

1. Well location. All wells shall be so constructed as to prevent the entrance of surface water and contaminated groundwater into the well or into the producing aquifer, and shall be separated a safe distance from potential sources of contamination and pollution. The following minimum horizontal distances shall be maintained for all wells furnishing potable water for human consumption:

Minimum Well Distance from:	Domestic Well	Public Well
Septic tank or sewer line	50 feet	100 feet
Leach line or disposal field	100 feet	150 feet
Seepage pit or cesspool	150 feet	200 feet
Areas of intense animal confinement	100 feet	150 feet
Agricultural wells	300 feet	300 feet
Unlined canals, surface water course, or drainage retention ponds	100 feet	100 feet

2. Casing perforations. All wells supplying water for human consumption shall be constructed with a fifty (50) foot minimum

continuous, unperforated casing, except in areas where the only potable water is at a depth of less than fifty (50) feet. In such instances, the depth to the first perforations in the well may be reduced to less than fifty (50) feet below ground surface if prior approval is granted by the Health Officer. In no case shall the depth of the annular seal or the depth of the first perforations be reduced to less than twenty (20) feet below ground surface.

a. Corcoran clay. All wells penetrating Corcoran clay shall be constructed in a manner such as to prevent the intermixing of waters above and below the Corcoran clay layer. There shall be no perforations above and below the Corcoran clay layer in the same casing.

3. Gravel packing. In gravel packed wells that furnish water for human consumption, the gravel packing shall not extend above fifty (50) feet below ground surface, except in areas where the only potable water is at a depth of less than fifty (50) feet. In such instances, the gravel packing shall not extend more than five (5) feet above the first perforations.

4. Well seals. All wells shall have a sanitary seal, surface seal and an annular seal. An access opening in the well cap, well casing, or pump base for the purpose of disinfecting the well or measuring the water level shall be protected with a threaded, watertight plug or cap. Wells requiring air vents shall be installed in an approved manner.

a. Annular seal. On all wells the annular space between the well casing and the wall of the drilled hole shall be effectively sealed with cement grout or other approved sealant material to protect against contamination or pollution by surface or shallow subsurface waters. The annular seal shall begin no more than twenty (20) feet above the most shallow perforation. The following minimum annular seal depths shall be required.

Type of Well	Depth of Annular Seal Below Ground Surface
Domestic wells	50 feet
Public wells	50 feet
Dairy wells	50 feet
Industrial wells	50 feet
Agricultural wells	50 feet
Cathodic protection wells	20 feet
Observation and monitoring wells	20 feet

MERCED COUNTY GENERAL PLAN

The Water Element of the Merced County General Plan contains goals and policies pertaining to protection of water resources in Merced County. Those policies that are relevant to the project site are presented below:

- **Policy W-2.4: Agricultural and Urban Practices to Minimize Water Contamination**
  Encourage agriculture and urban practices to comply with the requirements of the Regional Water Quality Control Board for irrigated lands and confined animal facilities, which mandate agricultural practices that minimize erosion and the generation of contaminated runoff to ground or surface waters by providing assistance and incentives.
- **Policy W-2.5: Septic Tank Regulation**
  Enforce septic tank and onsite system regulations of the Regional Water Quality Control Board to protect the water quality of surface water bodies and groundwater quality.
- **Policy W-2.6: Wellhead Protection Program**
  Enforce the wellhead protection program to protect the quality of existing and future groundwater supplies by monitoring the construction, deepening, and destruction of all wells within the County.
- **Policy W-3.13: Agricultural Water Reuse**
  Promote and facilitate using reclaimed wastewater for agricultural irrigation, in accordance with Title 22 and guidelines published by the State Department of Public Health.

These policies were considered in the evaluation of the proposed project and the formulation of appropriate mitigation measures below.

MERCED COUNTY ZONING CODE

Merced County is responsible for implementing FEMA floodplain management regulations. The Zoning Code Section 18.26.050, Provisions for Flood Hazard Reduction (Flood Ordinance) contains specific requirements limiting and discouraging development in various flood zones, as designated on FIRMs. The County's Flood Ordinance defines areas of special flood hazard as Zones A, AO, AE, or AH. For areas in a special flood hazard zone, no development may occur on the site until all relevant requirements of the Flood Ordinance are satisfied. These requirements as set forth in the Zoning Code include construction standards for both occupied and non-occupied structures, utilities, mobile homes, and for non-residential structures. These standards include anchoring structures to prevent flotation, collapse or movement, raising structures above the base flood elevation or otherwise flood proofing them, constructing adequate drainage paths around structures to guide floodwaters around and away from proposed structures, providing a determination of the base flood elevation as determined by a licensed engineer, and drafting all subdivision plans so

that they identify the flood hazard area and elevation of the base flood, and provide an update to the elevation of proposed structures and pads.

REGULATORY COMPLIANCE AUDIT

The Merced County Community and Economic Development Department requests regulatory compliance audits of expanding dairies from the Division of Environmental Health as part of the Conditional Use Permit (CUP) evaluation process prior to project approval.

On April 15, 2020, as part of the Preliminary Application Review (PAR) of Conditional Use Permit No. CUP 20-005, DEH provided standard comments regarding the Haz-Mat Program and required hazardous waste business plan (HMBP) and compliance with the Merced ACO. According to DEH, the applicant has filed a HMBP with DEH (Cronk, Brent, DEH, March 22, 2021).

Additional PAR comments were provided by DEH on April 21, 2020. The comments identified several issues requiring applicant attention, including documentation of well abandonment for an old irrigation well (abandoned in 2015) and an old domestic well (failed well in 2016), and destruction of these wells in accordance with DEH permit requirements. The applicant is currently working with DEH to resolve these procedural issues separate from the CUP application for the dairy expansion.

The DEH staff performed an inspection and audit of the Azevedo Dairy #4 on November 23, 2020. The dairy inspection evaluated the facility for compliance with the Merced County Animal Confinement Ordinance (ACO) (Merced County Code Chapter 18.64). The DEH staff reviewed and approved the proposed WMP and NMP, revisions completed and signed on March 13, 2020 and January 3, 2020, respectively. The DEH found the facility in compliance with the ACO as referenced in their letter on December 18, 2020.

4 EXISTING AND PROPOSED DAIRY CONDITIONS

4.1 EXISTING AND PROPOSED PROJECT OPERATIONS AND NMP & WMP SUMMARY

The NMP and WMP for the existing dairy operations dated September 21, 2018 and March 22, 2012 respectively, were used to establish a baseline of existing conditions. The heifer ranch NMP is dated January 3, 2020. The project applicant prepared the proposed NMP/WMP, both dated March 2020, as required by the CVRWQCB General Order for Existing Milk Cow Dairies. A professional engineer registered in the State of California and a Certified Crop Advisor completed the required elements of the NMP and WMP.

At the existing dairy, animal wastes from feed alleys and other concrete-surfaced areas are flushed with recycled water and scraped to an on-site waste management system that consists of wastewater storage for land application. Solid manure within pen areas at the dairy and heifer ranch are scraped approximately 2 times per year and removed from the site as material accumulates. Currently, approximately 1,250 tons of dry solid manure is exported or applied to off-site fields not owned by Azevedo Dairy #4. At the existing heifer ranch, approximately 1,625 tons of dry solid manure is exported or applied to off-site fields.

Wastewater is mixed with irrigation water supplied by groundwater from a farm irrigation well or Merced Irrigation District (MID) canal surface water and applied to cropland. At the existing dairy, stormwater runoff from impervious surfaces is routed to the wastewater pond. Stormwater from all roofed areas is routed to a wastewater pond. Receiving fields are graded to guide excess applied wastewater to an existing tailwater return or retention system. Most collected tailwater is retained by berms.

Stormwater runoff from impervious areas on the existing and proposed dairy expansion would continue to be directed to the wastewater management system. Animal wastes from barns and other concrete-surfaced areas of the facility would continue to be flushed to the on-site waste management system, except for solid manure within corral areas, which would continue to be scraped and removed 2 times per year.

With the proposed expansion, dry manure would be composted on site, or used for bedding or sold and hauled off site weekly for use as fertilizer and soil amendments. As reported in the NMP, exported corral solids applied to agricultural fields not owned by the project applicant would increase from the combined 2,875 tons (dairy 1,250 and heifer 1,625 tons) to 25,000 tons.

The existing liquid waste management system consists of one wastewater treatment/storage pond at the dairy, and pipelines and irrigation facilities to apply the wastewater to irrigated crops on the remainder of the project site. One new wastewater storage pond, a settling basin, and associated wastewater pumps and pipelines would be constructed at the dairy site, and the existing wastewater pond would be decommissioned. After merging the heifer facility, the dairy operations would include the solid settling basin and two wastewater ponds, referenced as SSB and WWS1 and WWS2. The second pond (WWS2) is located on the heifer lot on the northeast corner of the property.

According to the General Order, nitrogen application rates shall not result in total nitrogen applied to the land application areas exceeding 1.4 times the nitrogen that will be removed from the field in the harvested portion of the crop, unless plant tissue sampling identifies a need to increase fertilizer application of a specific crop. The whole farm nitrogen balance is a ratio that reflects the total nitrogen generated by the operation minus losses and exports, divided by the nitrogen removed by crops. The General Order requires that if the whole farm nitrogen balance is greater than 1.65, a review must be made of nitrogen inputs and outputs at the facility to identify how to reduce inputs to meet the standard.

field nutrient balance ratio =
nitrogen applied (from irrigation/fertilizer/manure) ÷ total N removed by crops

whole farm nitrogen balance =
(N stored + N imported + atmospheric N – N exported) ÷ total N removed by crops

Under existing conditions as reported in the two NMPs, total annual gross nitrogen generated by the two facilities combined (141,096.9 and 95,321.4 pounds/year for the dairy facility and heifer facility, respectively) is estimated at 236,418.3 pounds/year. Nitrogen exports currently total 76,092 pounds/year (52,000 + 24,092 pounds/year for the dairy facility and heifer facility, respectively). After ammonia losses, existing operations at the dairy facility and heifer facility reflect a whole farm nitrogen balance ratio of 1.62 and 1.4, respectively.

With implementation of the proposed expansion as reported by the March 2020 proposed conditions NMP, total annual gross nitrogen generated by the expanded facility would increase to 1,029,195.6 pounds/year. A total of 668,040 pounds/year of nitrogen would be removed through nitrogen exports as solid manure. After ammonia losses, the whole farm balance ratio will be 1.37. The net volume of nitrogen exported

would increase as referenced over existing conditions and reduce the whole farm nitrogen value.

Based on a normal precipitation year, there are currently 11,289 gallons per day of wastewater (approximately 4 million gallons per year) generated by the existing dairy herd. The proposed expanded dairy and heifer ranch would generate approximately 131,567 gallons/day of wastewater (approximately 45 million gallons/year). There would be a 41 million gallon per year increase in wastewater generated with the proposed dairy expansion. This increase in water use is related to an increase in milk cows per string, pipeline wash water and milkbarn/parlor wash water. Wastewater would be mixed with irrigation water and applied to crops.

The irrigation water demand of the existing farming operations is estimated by multiplying the croppable acres by the estimated average irrigation demand per acre. The existing NMP estimates an irrigation demand of over 5 feet of water for cropped oat, sudan and corn silage. As reported in the existing conditions NMP, there are approximately 131 acres currently single and double-cropped with oats silage – soft dough sudan and corn silage, for a total irrigation demand of approximately 655 acre-ft, or 213 million gallons of water annually.

The estimated wastewater component of the total irrigation demand is estimated at less than 2 percent of total water volume, not accounting for pond evaporation and evapotranspiration. The estimated wastewater component was determined by calculating the percentage of total irrigation water demand, 213 million gallons, provided by the wastewater generated per year in this case 4 million gallons per year.

Note that under proposed conditions, total land application area would be reduced from 131 acres to 105 acres. This decrease in acres is due to converted land to active dairy facilities.

The proposed NMP estimates an irrigation demand of up to 5 feet of water for cropped oat, corn, and sudan grass silage. As reported in the proposed conditions NMP, there are approximately 105 acres proposed to be double-cropped with a combination of oat soft dough, sudan and corn silage, for a total irrigation demand of approximately 525 acre-ft, or 170 million gallons of water annually.

The estimated wastewater component of the total irrigation demand is estimated to be 26 percent of total water volume, not accounting for pond evaporation and evapotranspiration. The estimated wastewater component was determined by calculating the percentage of total irrigation water demand provided by the wastewater generated per year, in this case 45 million gallons per year.

In summary, the proposed NMP/WMP establishes the following required facility improvements for the herd and potential areas of sensitivity under the proposed expansion[3]:

- Proposed nutrient application rates meet required agronomic rates of 1.4 or less for best management farming practice mandated by the CVRWQCB. Proposed conditions, the nitrogen whole farm balance ratio would be 1.37.
- The recommended amount of salt applied to cropland will be provided in the future versions of the approved NMP for the dairy.
- The proposed 17,948,257 gallons of storage capacity for the two treatment and wastewater ponds would be sufficient to permit storage of wastewater generated by the facility for a 120-day cycle during normal precipitation periods and 1.5 factor normal precipitation periods. Pond freeboard capacity is used to address 100-year storm events. Existing pond construction information was not available for review. Based on permitting information provided in the IS/NOP, the dairy lagoons were likely constructed with the facility several decades ago. The proposed two new ponds will be double lined using geomembrane material (i.e. a High Density Polyethylene (HDPE)).
- A tailwater collection system, composed of berms, piping, and sumps, is used to prevent the movement of water off site.
- Rainwater would not be separated and would be co-mingled with on-site wastewater. Stormwater runoff from impervious areas would continue to be directed to the wastewater management system, except for rainwater from one new animal shelter roof, which would be routed to a nearby field.
- The site is in the Federal Emergency Management Agency (FIRM 2008) Zone X, and as discussed in Section 2.8. Zone X is not subject to inundation by the 100 and 500-year storm events.
- With construction of the proposed facilities, approximately 26 acres of cropped acreage would be converted to active dairy facilities. This leaves 105 acres of the fields receiving both wastewater and solid manure. Fields would be cropped in oats silage-soft dough, corn silage, and sudan grass silage. Future crops could vary from those discussed above as long as nitrogen balance requirements are met. Additional off-site fields not owned by the dairy operator would receive solid manure and wastewater as a soil amendment purchase.

[3]These standards and improvements do not address potential environmental effects from the proposed expansion. For an evaluation of these effects and required additional mitigation, see Impacts HYD-1 through HYD-7 in this chapter.

The NMP demonstrates that the proposed dairy facility would, after off-site disposal of solid wastes, comply with the nitrogen loading groundwater protection requirements of the CVRWQCB and the Merced County ACO. The NMP shows the whole farm balance would be reduced from 1.62 and 1.4 at the existing dairy facility and heifer facility, respectively. The proposed dairy facility whole farm balance is 1.37. The balance ratio would remain below the regulatory limit of 1.65.

4.2 SUMMARY OF POTENTIAL GROUNDWATER RESOURCE DEGRADATION FROM OPERATION OF THE AZEVEDO DAIRY # 4 EXPANSION

Expanded operations at the Azevedo Dairy # 4 have the potential to result in the degradation of the area groundwater resources for the following reasons:

- With the increased dairy herd (which results in more wastewater processing), the expanded operations may contribute to the decline of groundwater elevations. However, the reduced irrigation demand for crops from 213 to 170 million gallons annually would reduce the whole farm risk to the depletion of ground water levels. As referenced in the GSP, three groundwater depression areas and flow direction changes have been reported near El Nido.
- The Azevedo Dairy #4 proposed expansion would increase the wastewater component to the total application rates from 2 to 26 percent of the crop water demand. Note that due to the off site export of solid manure, the whole farm nitrogen balance has improved even though the wastewater percentage of land application water has increased significantly. The referenced annual reports from the CVDRMP demonstrate the level of concern related to waste containment and land application of manure wastewater to irrigation lands.
- The proposed expansion may impact the underlying groundwater quality with the continued land application of nutrients, salts, and other constituents. The rationale associated with this finding is related primarily to the CVDRMP documented impacts of the regulatory approved and herein referenced whole farm balance that exceeds the crop uptake need which results in the excess nutrients available to groundwater. Even though the potential impact is stated, water quality samples were available from on-site domestic wells and one irrigation well and water quality impacts were noted as minimal. EC was reported above the secondary MCL (see Table 1 for water quality data). Nitrate as N was not reported above the MCL in the on site wells with the highest reported value of 8.7 mg/l . The domestic wells and irrigation well demonstrated good water quality. Area groundwater quality reported by the GAMA shows very limited data for interpretation. The California CV-SALTS

control efforts will be used to assess impacts related to Nitrate, EC and other salt indicators in the future.

The Dairy Expansion project would concentrate animals and their wastes within the feeding areas, and to a lesser degree, within open corrals. Concrete lined feed lanes would flush wastes to the on-site wastewater management system for treatment and storage in ponds as referenced in the existing and proposed WMP as summarized below.

Existing Wastewater Storage and Treatment Ponds. The treatment and storage ponds receive wastewater as described in the project NMP/WMP. Pond construction information was not available for review. According to the project applicant, the ponds are earthen embankment structures constructed to the standards in place at that time. The existing dairy wastewater ponds have the potential to impact groundwater because they contain elevated concentrations of inorganic and organic constituents, and because hydraulic pressure and gravity force liquids downward through soils to groundwater. The flux of liquid through the base of the existing ponds has been estimated based on the soil permeability at the base of the ponds (estimated as 10-6 centimeters per second or 1 foot per year). Based on the combined existing pond sizes of approximately 277,000 square feet, the total leakage through the base of the ponds is estimated at 2.1 million gallons per year.

New Lined Wastewater Ponds. With the proposed dairy expansion, two new wastewater storage ponds and associated wastewater pumps and pipelines would be constructed at the dairy site, and an existing wastewater pond would be decommissioned. Since a double lined pond system with HDPE geomembrane is proposed for construction, pond leakage is not anticipated.

Corrals and Shade Barns. The dairy expansion would continue to use open-air, concrete-lined feed lanes which are roofed, where animals are fed and watered, and waste is collected. Outside of the feed lanes and covered loafing areas, cows are allowed to roam in uncovered areas where manure is collected two times a year, which minimizes the potential impact. Liquid discharge from corrals is minimal.

Crop Fields. Dry and liquid manure is used to fertilize dairy cropland. A tailwater collection system, composed of berms, piping and sumps, is used to prevent the movement of water off site and allow the recycling of applied wastewater. As indicated by monitoring data by the CVDRMP, crop fields are the primary source of nutrient emissions to groundwater on a dairy. As mentioned previously, under proposed conditions, total land application area would be reduced.

With implementation of the proposed operations NMP/WMP, field application of manure using the proposed cropping pattern and land application area would maintain a field by field nutrient balance of less than 1.4. No nitrogen would be imported to the site as commercial fertilizer and significant amounts of solid manure will be exported off site which results in reduced whole farm nitrogen. The whole farm nitrogen balance ratio would be reduced to 1.37 for the proposed combined operation from 1.62 and 1.4 at the existing dairy facility and heifer facility, respectively.

5 REFERENCES

Bradford, 2012. Transport and Fate of Nutrients and Indicator Microorganisms at a Dairy Lagoon Water Application Site: An Assessment of Nutrient Management Plans. Bradford, S. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/116, 2012.

California Regional Water Quality Control Board – Central Valley Region, Order No. R5-2007-0035, Waste Discharge Requirements General Order For Existing Milk Cow Dairies, May 3, 2007 with MRP. Amended by Order No. R5-2009-0029, April 29, 2009. Revised MRP, February 23, 2011.

California Regional Water Quality Control Board – Central Valley Region, Order No. R5-2010-0118 (as revised by Order R5-2011-0091) NPDES No. CAG015001 General Waste Discharge Requirements And General National Pollutant Discharge Elimination System (NPDES) Permit For Existing Milk Cow Dairy Concentrated Animal Feeding Operations Within The Central Valley Region, December 1, 2011.

Department of Water Resources, California's Groundwater, Bulletin 118, October 2003.

Department of Water Resources, California's Groundwater, Bulletin 118, San Joaquin Valley Groundwater Basin, Delta-Mendota Subbasin, January 20, 2006.

Department of Water Resources, Groundwater Information Center Interactive Map Application, https://gis.water.ca.gov/app/gicima/.

Department of Water Resources, Water Data Library, http://www.water.ca.gov/waterdatalibrary/.

Harter, Thomas, Davis, Harley, Mathews, Marsha C., and Meyer, Roland D. 2002. Shallow Groundwater Quality on Dairy Farms With Irrigated Forage Crops. Journal of Contaminant Hydrology. Volume 55, pg. 287-315.

Harter, Thomas. 2009. Agricultural Impacts on Groundwater Nitrate. Southwest Hydrology. July/August, pg. 22-23, 35.

Luhdorff and Scalmanini Consulting Engineers, Central Valley Dairy Representative Monitoring Program Year 1 Annual Report (2012), April 1, 2013.

Luhdorff and Scalmanini Consulting Engineers, Central Valley Dairy Representative Monitoring Program Year 2 Annual Report (2013), April 1, 2014.

Luhdorff and Scalmanini Consulting Engineers, Central Valley Dairy Representative Monitoring Program Year 3 Annual Report (2014), April 1, 2015.

Luhdorff and Scalmanini Consulting Engineers, Central Valley Dairy Representative Monitoring Program Year 4 Annual Report (2015), April 1, 2016.

Luhdorff and Scalmanini Consulting Engineers, Central Valley Dairy Representative Monitoring Program Year 5 Annual Report (2016), April 1, 2017.

Luhdorff and Scalmanini Consulting Engineers, Central Valley Dairy Representative Monitoring Program Year 6 Annual Report (2017), April 1, 2018.

Luhdorff and Scalmanini Consulting Engineers, Central Valley Dairy Representative Monitoring Program Year 8 Annual Report (2019), April 1, 2020.

Luhdorff and Scalmanini Consulting Engineers, Evaluation of Earthern Liquid Dairy Manure Lagoons in the Central Valley of California: Seepage, Mass Emissions and Effects on Groundwater Quality, April 6, 2017.

MAGPI. See Merced Area Groundwater Pool Interests.

Merced Groundwater Subbasin, Groundwater Sustainability Plan, November 2019.

Merced County Ordinances

National Resources Conservation Service, Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Sousa Engineering, Flood Protection Analysis, October 2020.

State Water Resources Control Board, GAMA – Groundwater Ambient Monitoring and Assessment Program, http://www.waterboards.ca.gov/gama/geotracker_gama.shtml.

U.S. Federal Emergency Management Agency, Flood Insurance Rate Maps; https://msc.fema.gov/portal/search?AddressQuery=Merced