APPENDIX I

Hydrogeologic Assessment Summary for CEQA

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HYDROGEOLOGIC ASSESSMENT SUMMARY FOR CEQA

for the

CORREIA FAMILY DAIRY FARMS EXPANSION
26380 WEST FAHEY ROAD
GUSTINE, CA 95322

prepared for

CORREIA FAMILY DAIRY FARM

and

ENVIRONMENTAL PLANNING PARTNERS

January 2025

REVISION 0

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1 GENERAL INFORMATION

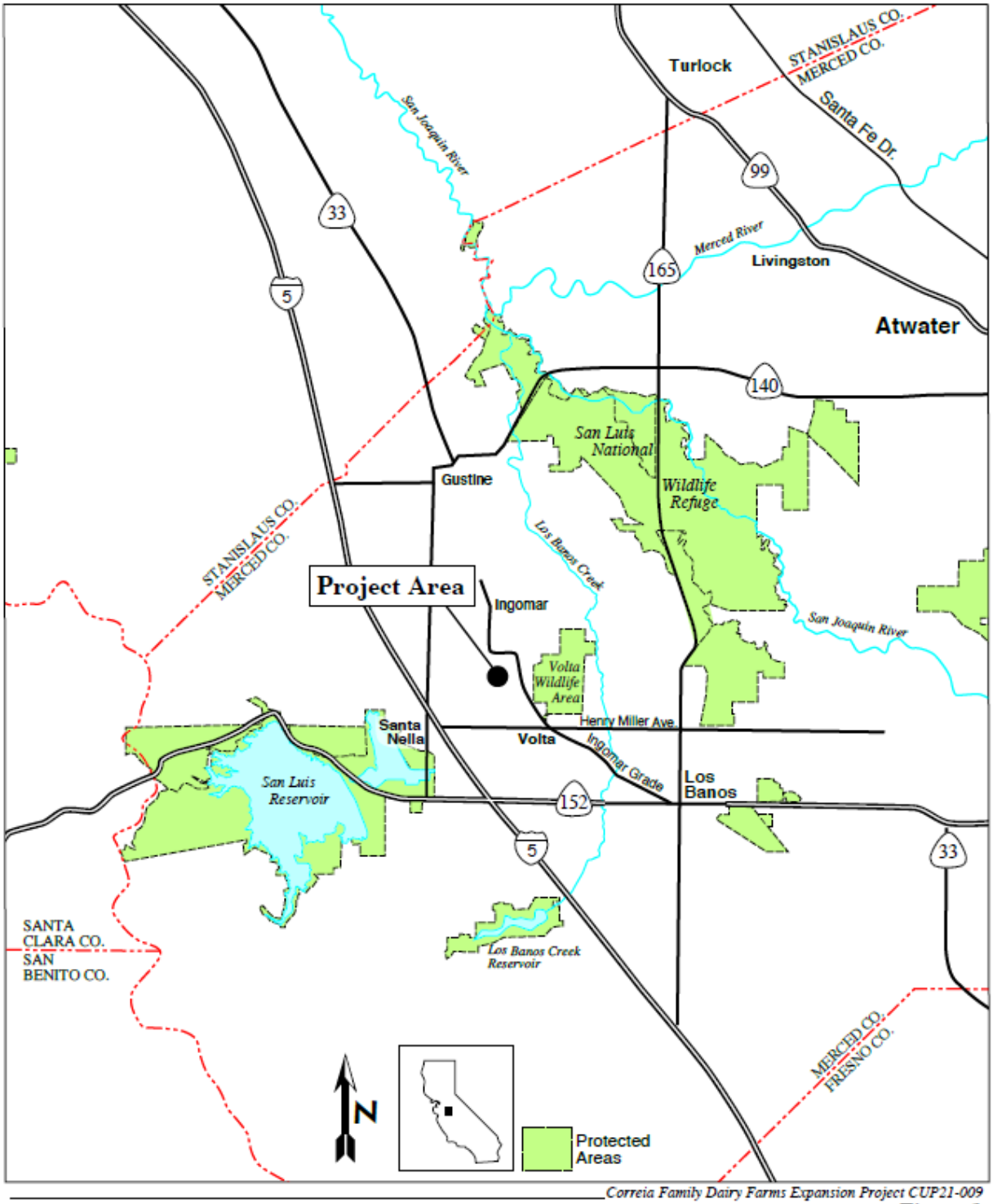
On behalf of the Correia Family Dairy Farm (Correia Dairy) and Environmental Planning Partners, Inc., NV5 has prepared the following Hydrogeologic Assessment Summary for CEQA. This report documents existing hydrogeologic conditions at the Correia Dairy and assesses potential hydrogeologic impacts related to the proposed dairy expansion project. NV5 has prepared this report to comply with County CEQA requirements and support the Draft Environmental Impact Report (DEIR) for the proposed expansion project.

The active dairy facilities of the Correia Dairy are located on 60± acres of an existing farm totaling approximately 502± acres in unincorporated Merced County. The dairy project site and associated heifer facilities are located on the north and south sides of W. Fahey Road, respectively, one mile west of S. Ingomar Grade in the Gustine area of the County. The project's location is within the central California region (see Figures 1 through 3). The active dairy facilities on the north side of W. Fahey Road are located on Merced County Assessor's Parcel Number (APN) 070-270-008 and the associated heifer facilities on the south side of W. Fahey Road are located on portions of APNs 070-270-011, -019, and -020. Additional parcels in the vicinity are used as cropland and for wastewater and manure application. The existing project cropland application area consists of 398± acres located on portions of 12 parcels (see Table 1 and Figure 3 for Merced County APN). The project site is located in Section 27, Township 9 South, Range 9 East, Mount Diablo Base and Meridian; 37°7′21.68″N, 120°58′5.10″W.

This hydrogeologic assessment was completed based on desktop review of existing data, published and non-published resources detailed herein and listed in Section 5. Facility or crop area environmental boring investigations have not been completed nor has a Monitoring Well Installation and Sampling Plan (MWISP) been prepared for the Correia Family Dairy.

Figure 1 – Facility Location Map

(Map Taken from the 2023 NOP)



Correia Family Dairy Farms Expansion Project CUP21-009

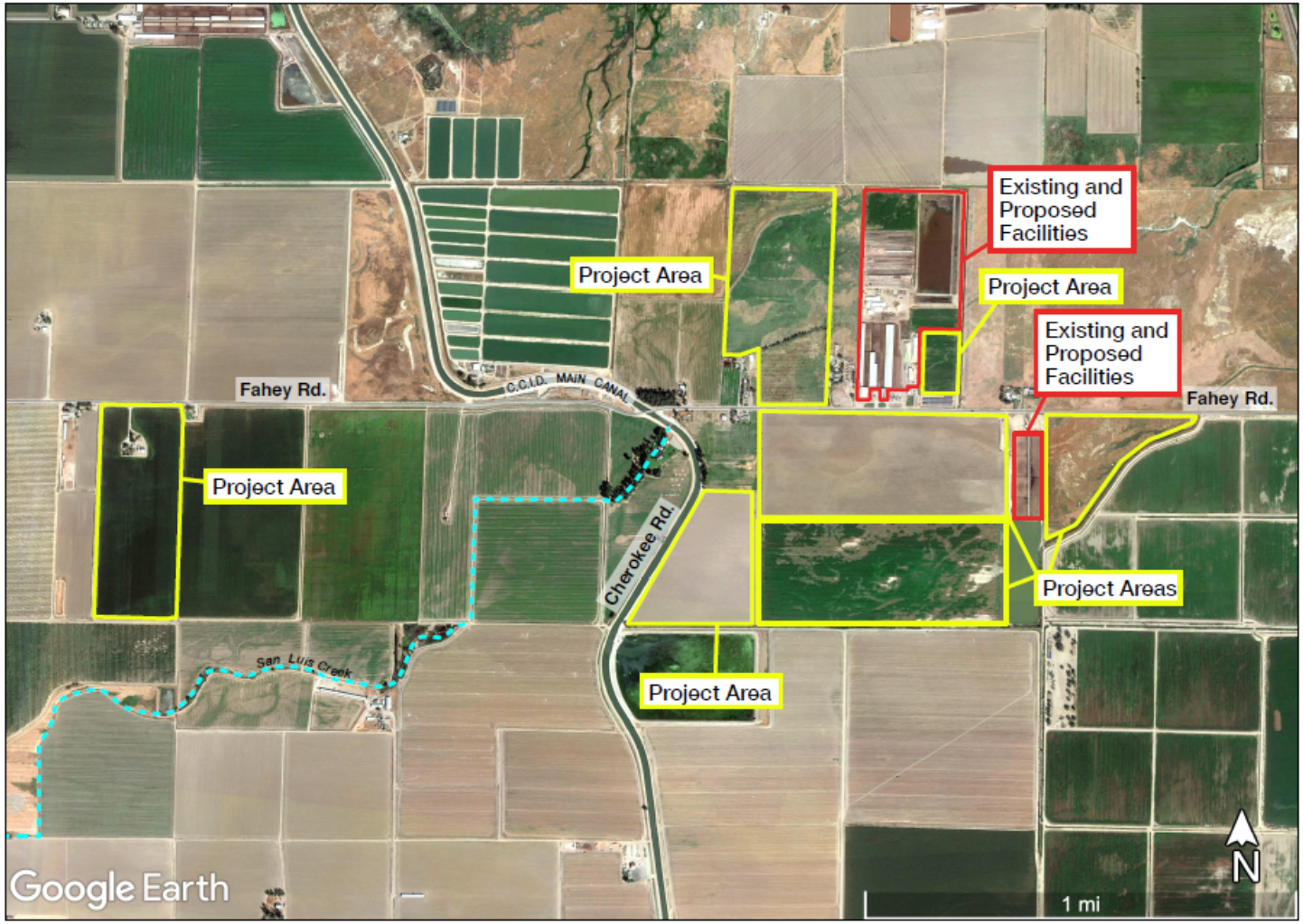
SOURCE: Planning Partners 2023

Figure 1

Regional Location

Figure 2 – Facility, Field Application Map

(Map Taken from the 2023 NOP)

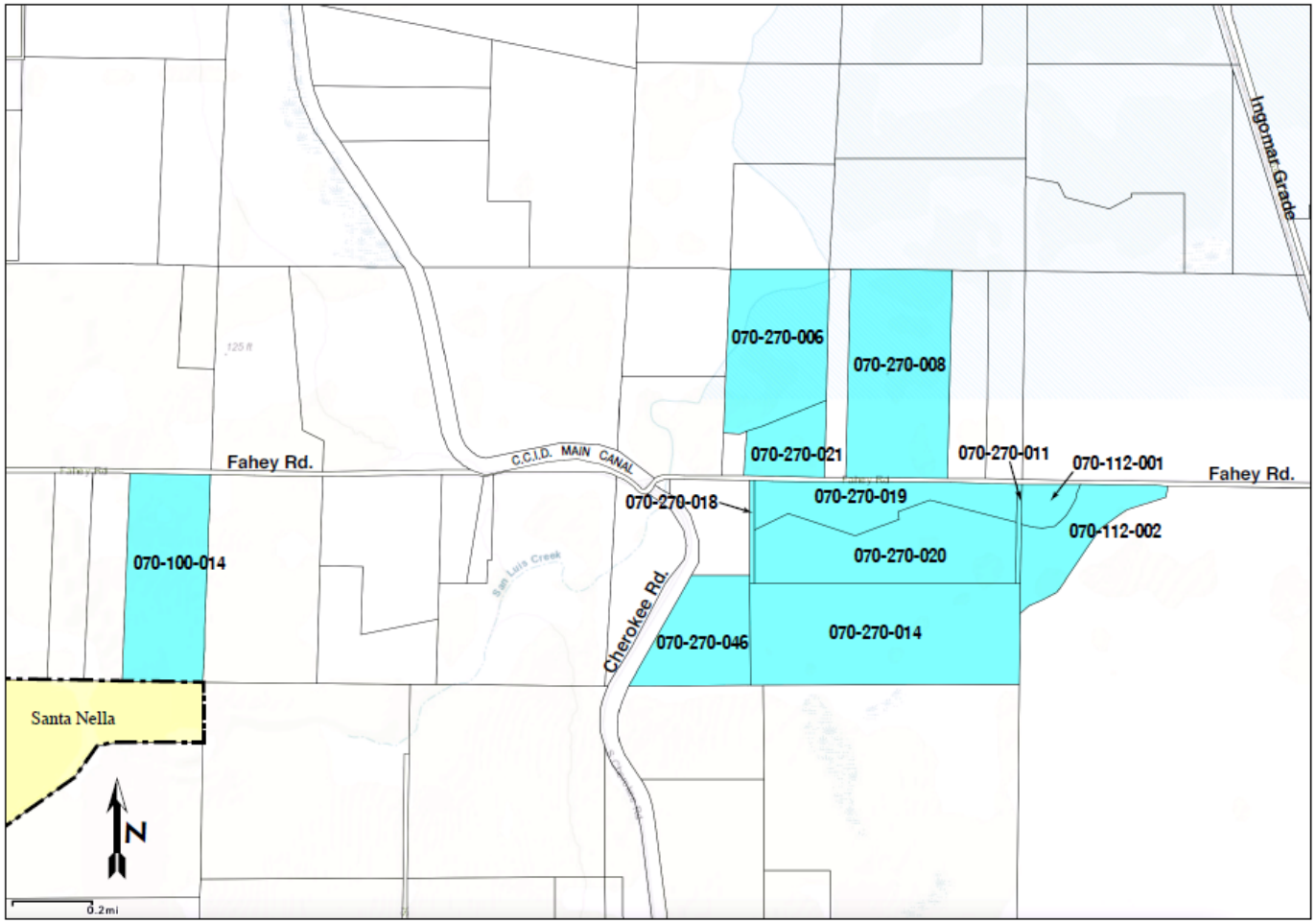


SOURCE: Planning Partners 2023

Correia Family Dairy Farms Expansion Project CUP21-009

Figure 2
Project Location

Figure 3 – Project Site Merced County Assessor Parcel Numbers
(Map Taken from the 2023 NOP)



SOURCE: Merced County GIS 2023; Planning Partners 2023

Correia Family Dairy Farms Expansion Project CUP21-009

Figure 3

Project Site Merced County Assessor Parcel Numbers

2 PHYSICAL SETTING AND EXISTING CONDITIONS

2.1 EXISTING HERD AND RANCH FEATURES

The IS/NOP and Environmental Evaluation which contains the Project Description, dated December 2023, contains project details. The Correia Dairy plans to modify and expand the existing dairy to house 3,000 milk cows, 390 dry cows, and 2,685 support stock. Considering the existing animals as the dairy facility, the proposed expansion would represent an increase of 3,945 animals over the existing numbers.

Refer to Section 4 for additional details regarding the existing herd and ranch features as well as details related to the surface and groundwater water use/drainage and proposed dairy expansion and hydrologic impacts.

2.2 SURROUNDING LAND USE

From the IS/NOP, there are offsite single-family residences associated with neighboring agricultural operations surrounding the project site. There are several off-site residences located within the windshed of the dairy (defined as an area of 1,320 feet upwind to 2,640 downwind of the periphery of the animal facility). The immediate surrounding land uses are as follows:

Location	Land Use	General Plan	Zoning
ON-SITE	Dairy / Agriculture / Residences	Agricultural	General Agricultural A-1
NORTH:	Agriculture / Animal Confinement Facilities	Agricultural	General Agricultural A-1
EAST:	Agriculture / Residences	Agricultural	General Agricultural A-1
SOUTH:	Agriculture	Agricultural	General Agricultural A-1
WEST:	Agriculture / Residences / San Luis Creek / CCID Main Canal	Agricultural	General Agricultural A-1

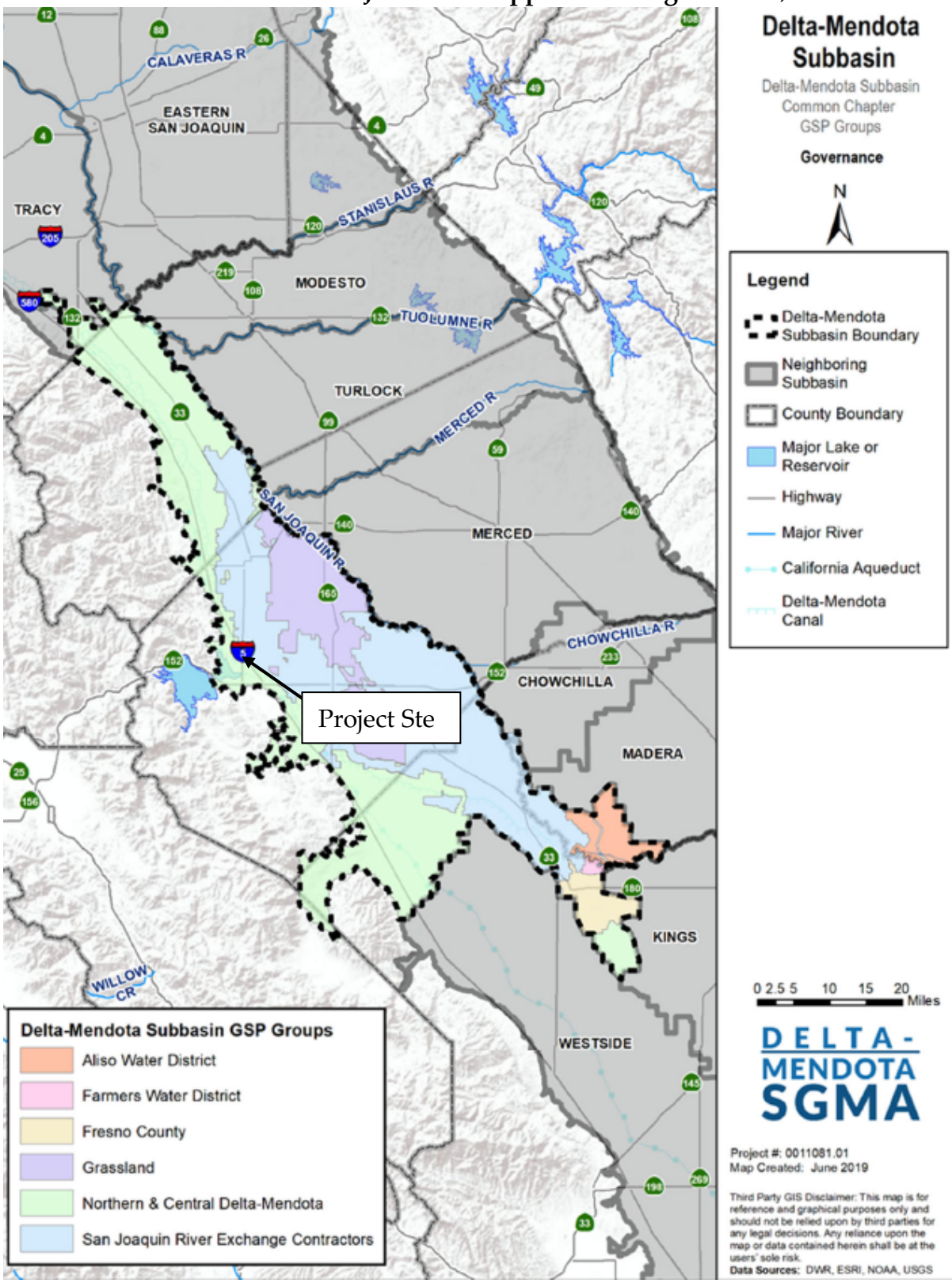
The San Luis Creek is an intermittent waterway located west of the project site; the creek channel appears intermittently, and in some stretches is modified as concrete ditches. The CCID Main Canal is located approximately 0.4 miles west of the dairy site, and the San Luis Wasteway is located 1.4 miles to the south. The community of Volta is located 2.5 miles to the southeast, and the community of Santa Nella is located 2.5 miles to the west-southwest. The project site is located within the boundary of the Grasslands Focus Area, and the feedlot is located adjacent to the Grasslands Ecological Area (GEA) boundary. The Pavao Pasture is located within the boundaries of the GEA. The Volta

State Wildlife Area is located to the east, approximately 1.25 miles from active dairy facilities.

2.3 PROJECT SETTING

As referenced in Section 3.2– California Laws and Regulations of this document, the 2014 Sustainable Groundwater Management Act (SGMA) resulted in the issuance of six separate Groundwater Sustainability Plans (GSPs) for the same Delta Mendota Subbasin (5-002.07) approved in 2022. The project setting and hydrogeologic information has been summarized based on the common elements between GSPs and as provided primarily in the 2022 North and Central Delta Mendota and secondly the San Joaquin River Exchange Contractors GSP Group in the Delta Mendota Subbasin GSPs (N&C DM GSP and SJREC DM GSP). The hydrogeologic conceptual model was also used as a common chapter between the several GSPs. Groundwater level and water quality information was taken from the N&C DM GSP.

Figure 4 – Delta Mendota Subbasin GSP Regions (Surface Water Features) (Map Taken from the SJREC GSP Appendix B. Figure CC-1).



The project site is located in an active agricultural district within the San Joaquin Valley and the larger Central Valley of California. The topography of the site is generally flat with surface elevations from 100 to 110 feet above mean sea level (MSL).

Figure 4 depicts the natural surface water features in the subbasin. As referenced above portions of San Luis Reservoir and Creek are located in close proximity with the Correia Dairy land application area. Due to the shallow groundwater table, groundwater and surface water interconnection occurs in these drainage areas. This interconnection is also referenced as gaining portions of the river. The dairy facility uses both surface water and groundwater resources for farm operations. Domestic water to the site residences and dairy barns is provided by two on-site water wells, and one domestic well is located at the feedlot south of W. Fahey Road. Irrigation water is supplied by surface water sources from Central California Irrigation District (CCID) canals, in addition to groundwater from two irrigation wells, one north of the existing animal housing and one on the west end of field CFD 1-3. Wastewater is mixed with irrigation water and applied to cropland. Receiving fields are graded to guide excess applied irrigation water to an existing tailwater return and/or retention system. Collected tailwater is either returned to top of the field, or retained by berms. Field application of wastewater is via pipeline or surface application. The dairy facility uses surface water primarily with groundwater resource use as needed for farm operations as detailed in Section 4.

2.4 GEOLOGY

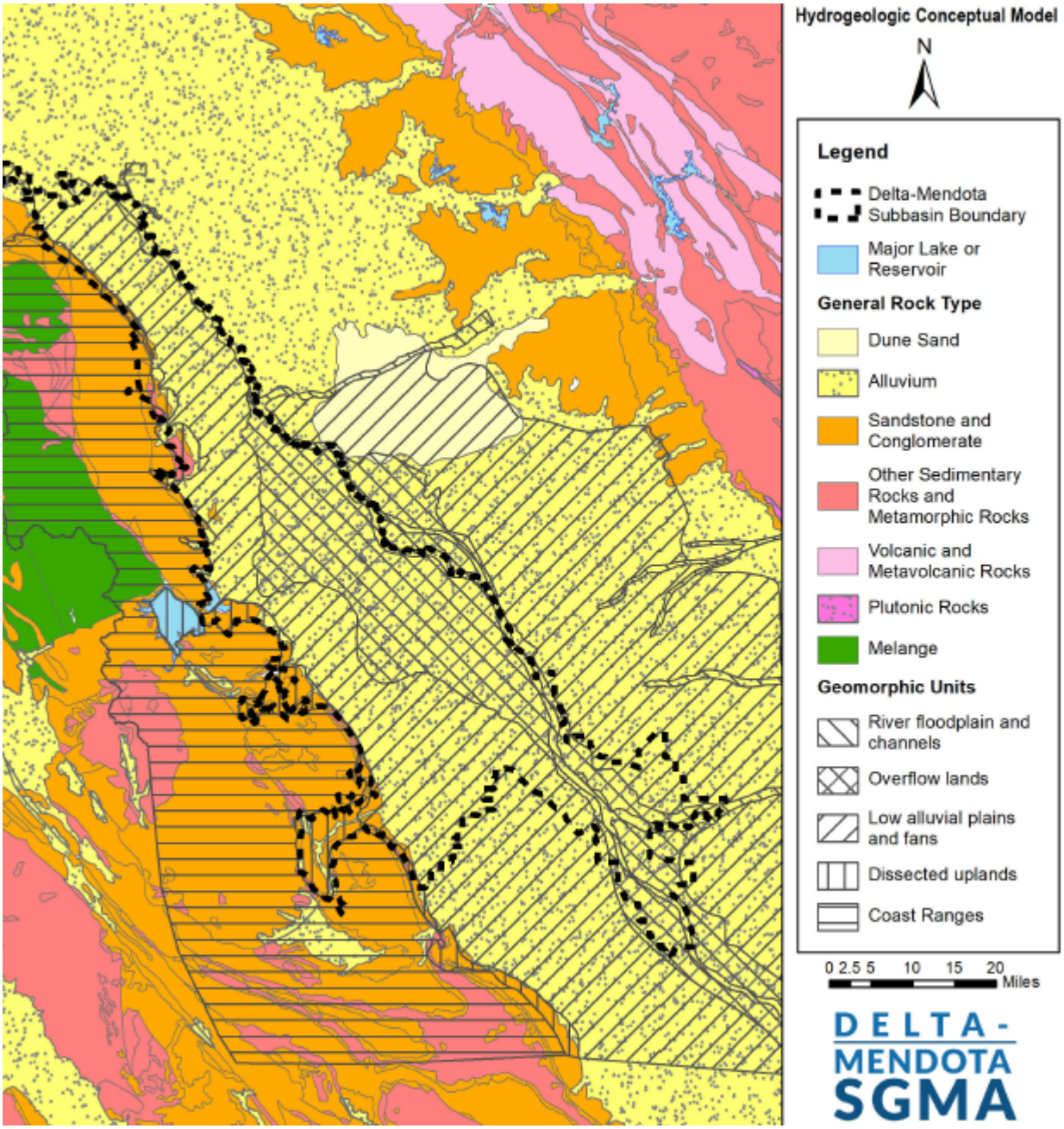
The Correia Family Dairy lies within the Great Central Valley, California. The Central Valley is composed of interfingered alluvial deposits from the erosion of the Coastal Mountains located to the west and the Sierra Mountains located to the east.

In the 2022 GSP, details of the Distinct geomorphic units that exist within the Delta-Mendota Subbasin, defining areas of unique hydrogeologic environments. The geomorphic units are mapped and described by Hotchkiss and Balding (1971) and Davis et al. (1959) and are shown on Figure 5. The two primary geomorphic units within the Central Valley Floor area of the Delta-Mendota Subbasin include the overflow lands geomorphic unit and the alluvial fans and plains geomorphic unit. Overflow lands are defined as areas of relatively poorly draining soils with a shallow water table. The overflow lands geomorphic unit is located in the southeastern portion of the Subbasin and is dominated by finer-grained floodplain deposits that are the result of historical episodic flooding of this low-land area. This has formed poorly draining soils with generally low hydraulic conductivity characteristics. In contrast, the alluvial fans and plains geomorphic unit is characterized by relatively better drainage conditions, with sediments comprised of coalescing and somewhat coarser-grained

alluvial fan materials deposited by higher-energy streams flowing out of the Coast Range (Hotchkiss and Balding, 1971). The alluvial fans and plains geomorphic unit covers much of the Delta-Mendota Subbasin along the western margins of the Central Valley Floor at the base of the Coast Range.

The primary groundwater bearing units within the Delta-Mendota North and Central Subbasin consist of Quaternary and Tertiary aged unconsolidated continental deposits of Alluvium and the Tulare Formation. Subsurface hydrogeologic materials covering the Central Valley Floor consist of lenticular and generally poorly sorted clay, silt, sand, and gravel that make up the alluvium and Tulare Formation.

Figure 5 - Generalized Geology, Delta-Mendota Subbasin
(Map Taken from the 2022 GSP, Appendix B. Figure C-22)



The Representative Cross-Sections Map and Cross-Section D-D′ are displayed on Figures 6 and 7. They were taken from the GSPs convey the hydrogeology description presented herein. The selected Cross-Section D-D′ is a transect of the earth through the Volta and Ingomar area east of the San Joaquin River. The Cross-Sections depict the geologic sequence found within Delta-Mendota Subbasin from surface to over 1,000 feet below ground surface (bgs). The basement complex is the bedrock on which valley

sediments were deposited. 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, E-clay (CC) Member, a prominent aquitard that is found. 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.

REGIONAL HYDROGEOLOGY

Regional groundwater in Merced County is composed of four subbasins of the San Joaquin Hydrologic Region which are named the Turlock, the Merced, the Chowchilla, and the Delta-Mendota. The Delta-Mendota is bound to the West by the Coastal Mountains and to the east by the San Joaquin River.

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 7, 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. Groundwater levels are described below. The base of the fresh groundwater near the Site is lower elevation approximately -1,100 feet msl.

Figure 6 - Location of Geologic Cross Sections
(Map Taken from the SJREC GSP Appendix B, Figure CC-24)

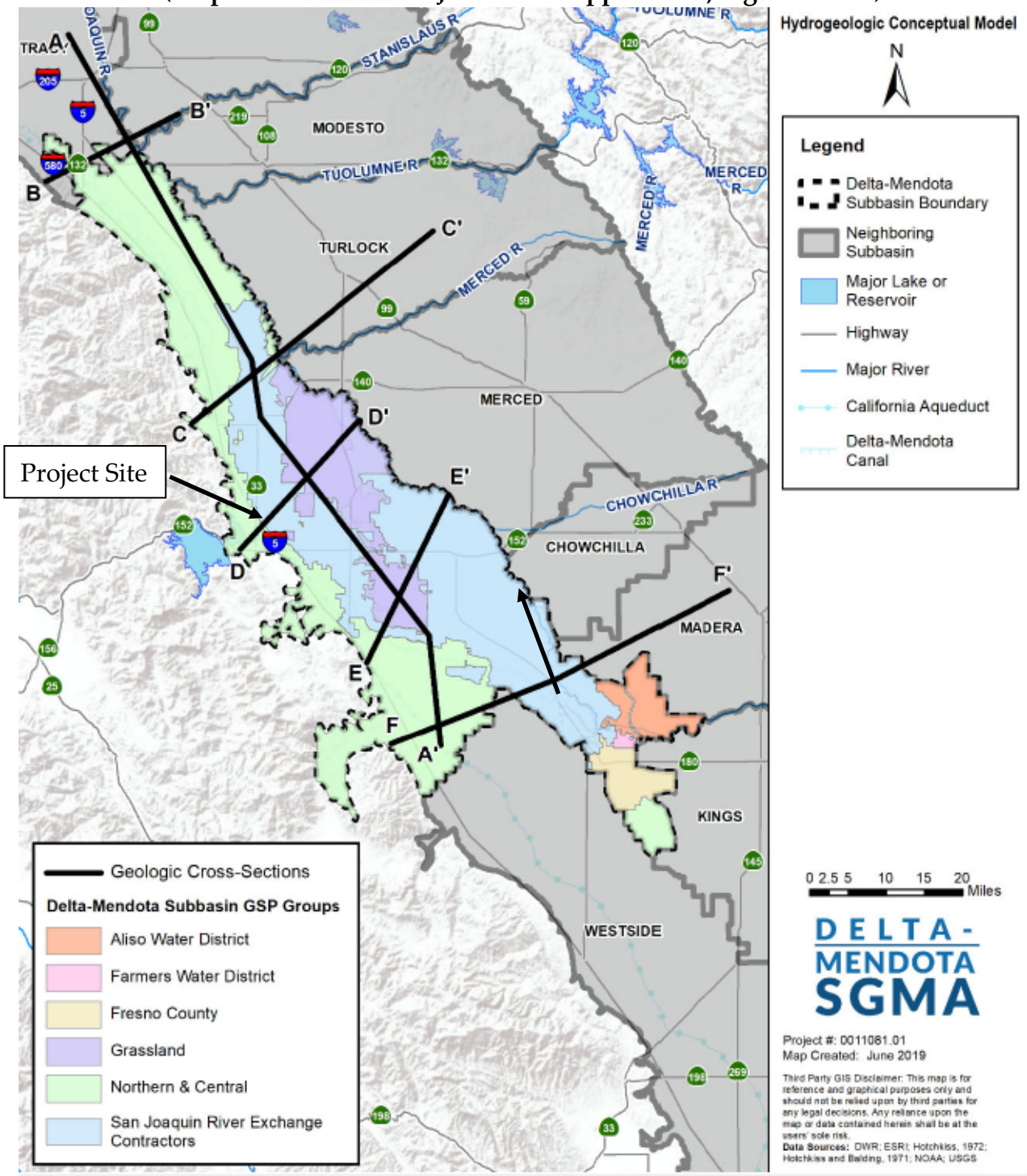
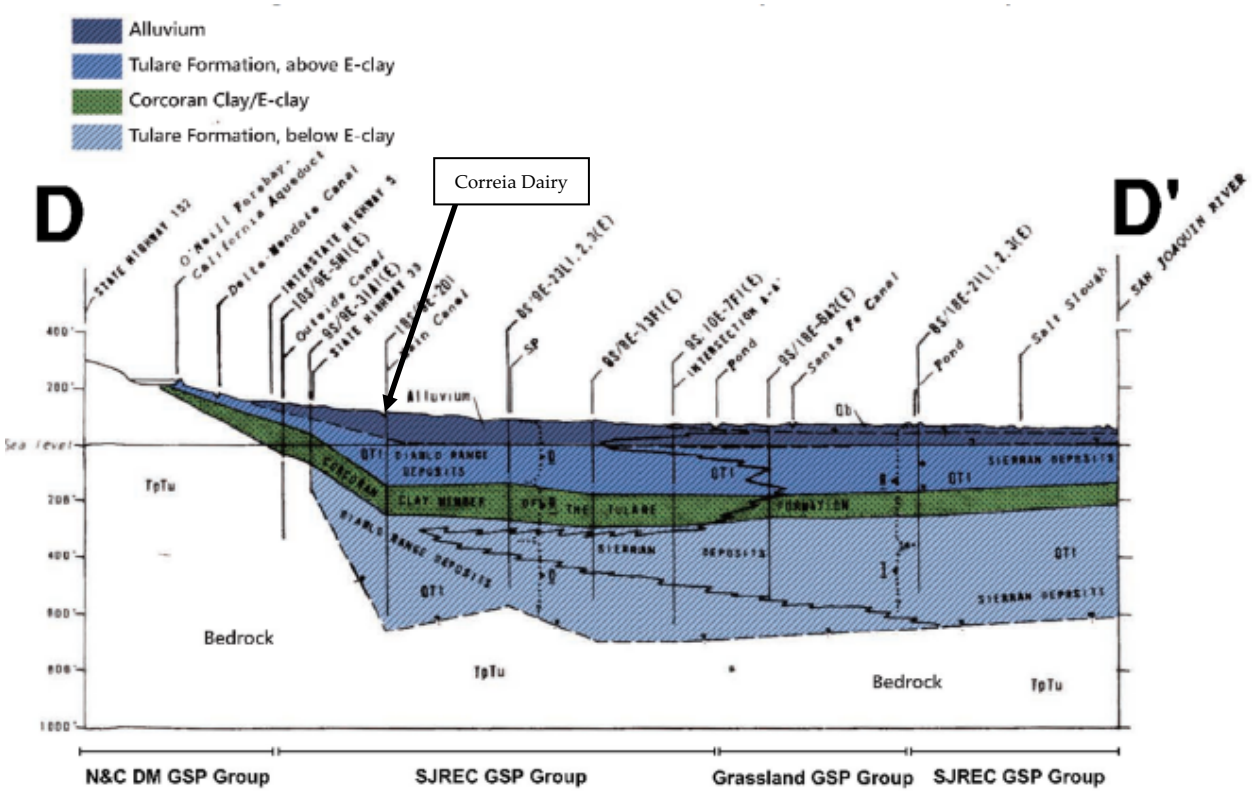


Figure 7 - Geologic Cross Section D-D'
(Taken from the 2022 SJREC GSP, Appendix B, Figure CC-28)



As stated in the GSP, the older geologic units crop out in the western Subbasin and dip east into the San Joaquin Valley below younger units. Three principal aquifers were defined in the Delta-Mendota Subbasin for this GSP under SGMA. As referenced, the Corcoran Clay (CC or E clay), underlying the western Subbasin, is the primary aquitard in this part of the Subbasin and is used to separate and define the two aquifers in the west part of the subbasin: the Upper Aquifer Above CC is the unconfined aquifer above the Corcoran Clay-E-clay or CC. The deep aquifer is the confined groundwater and referenced as the Aquifer Below the CC. Cross sections developed for the GSP, illustrate the easterly slight dipping aquifer system, the aquifers, and the Corcoran Clay aquitard. (2022 GSP)

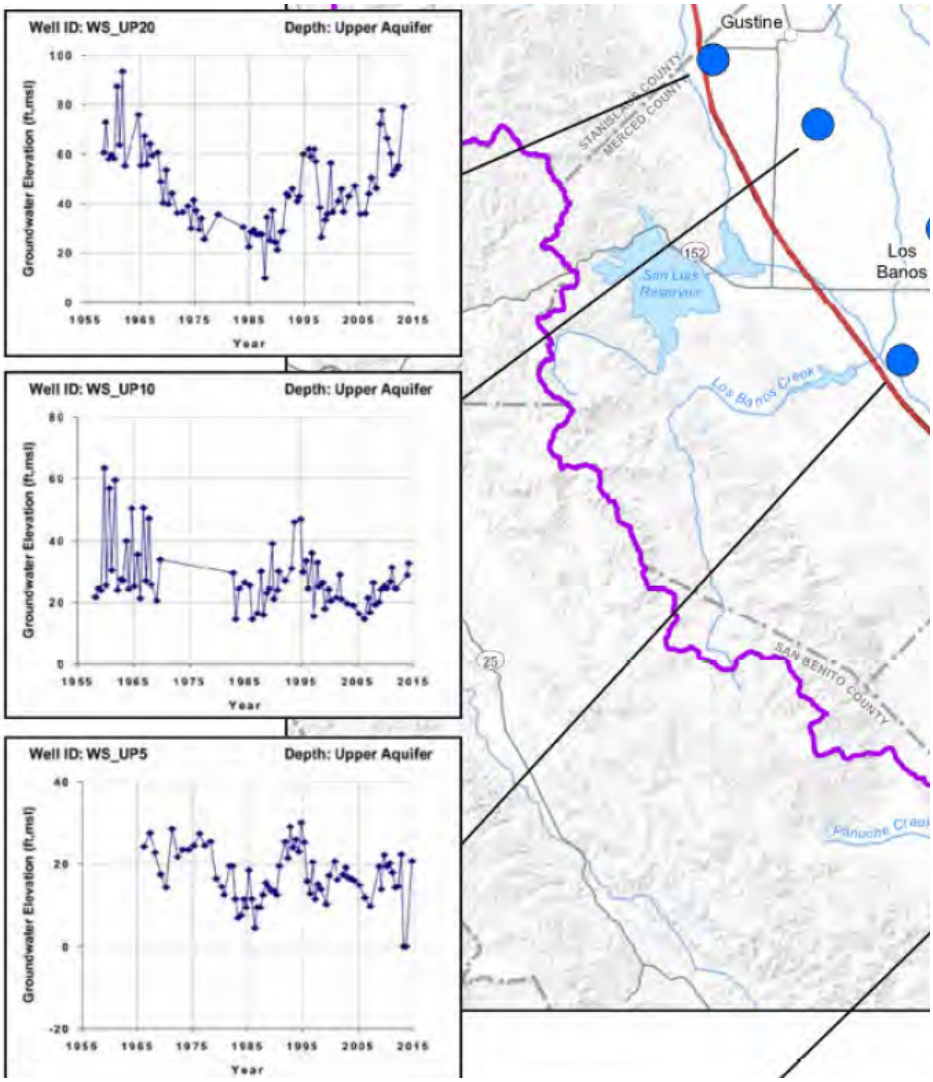
The extent of the CC in the Subbasin is shown on the cross section at depths over 300 feet below the ground surface. The upper aquifer ranges in thickness from approximately 10 feet to 300 feet.

As stated in the GSP, the regional groundwater flows toward the east and southeast across the Subbasin, but flows are altered locally by pumping from wells. Vertical groundwater flow within the extent of the CC is downward to the lower aquifer. Groundwater elevations in the aquifer above and below the CC, the area of the Correia

Dairy, have been variable as shown on Figure 8 taken from the GSP study period, with declines during drought of less than 10 feet in change, followed by water level recovery. Recent minimal water level declines have been observed.

Recent aquifer groundwater levels near San Joaquin River above the CC are supported showing higher levels by the high recharge within the permeable unconfined aquifer conditions.

Figure 8 - Select Hydrographs of Groundwater Elevation, Upper Aquifer (Map taken from the 2022 SJREC GSP, Appendix B, Figure CC-42)



REGIONAL GROUNDWATER QUALITY

For this section, the parameters Nitrate as N and Total Dissolved Solid (TDS) have been used to assess the groundwater impacts.

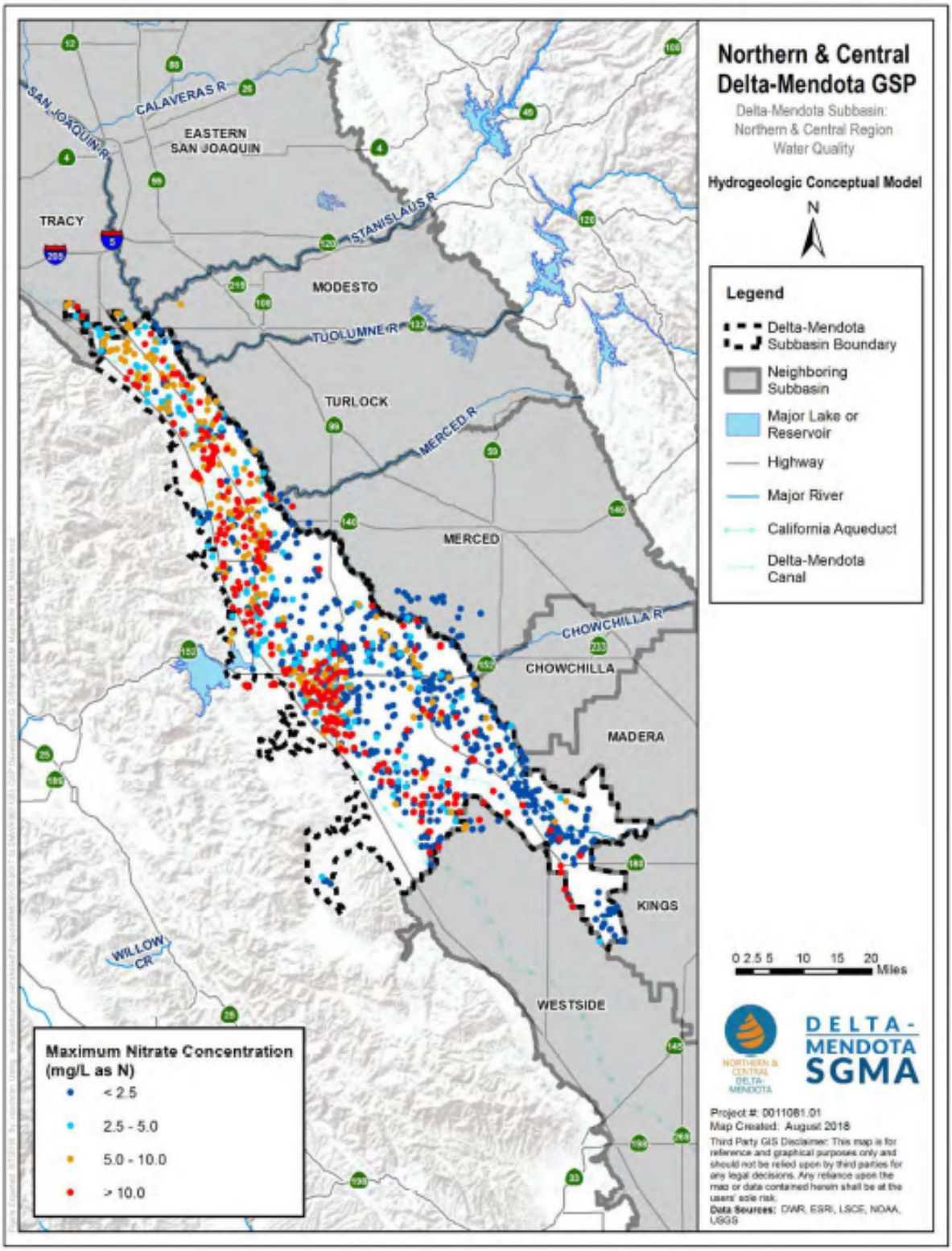
As cited in the 2022 N&CDM GSP and depicted below on Figures 9 and 10, maximum Nitrate as N in the center to west portion of the subbasin is elevated for all wells; but for wells below the CC, the maximum values were lower than the Maximum Contaminant Level (MCL) of 10 mg/l. (N&CDM GSP). Nitrate is typically associated with agricultural practices. For the limited number of wells near Correia Dairy, the observed proximal average Nitrate concentration above the CC and below the CC is lower than the MCL.

As cited in the 2022 GSP and depicted below on Figures 11 and 12, TDS is associated with saline or water impacted from agricultural uses. For the limited monitoring data near the Correia Dairy, TDS maximum concentration for all wells elevated; however, below the CC was elevated above 700 mg/l, which is above the secondary MCL of 500 mg/l.

As cited in the 2022 GSP localized areas of high iron, fluoride, nitrate, selenium, and boron are found in this subbasin.

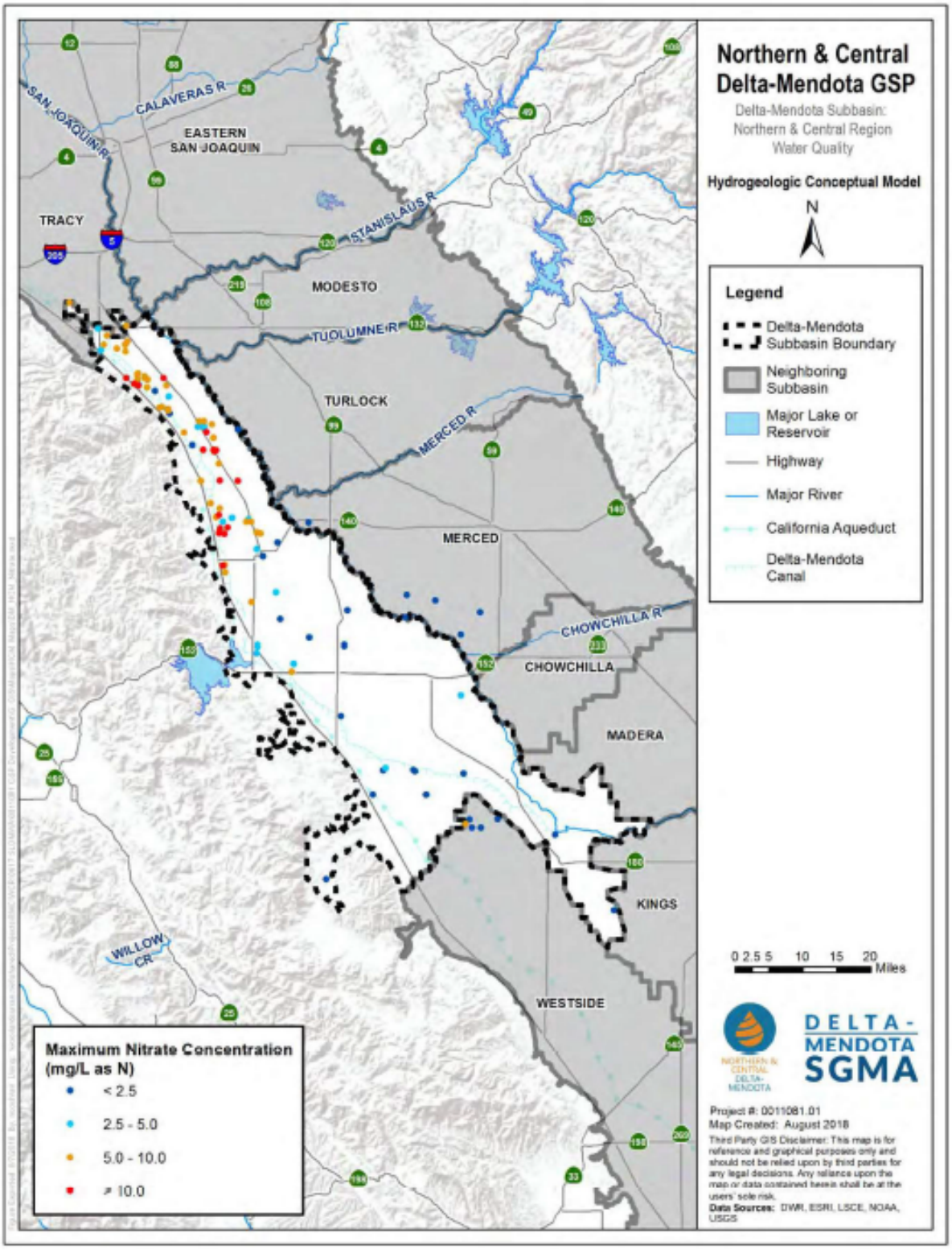
Please refer below for site-specific groundwater quality data from Correia Dairy Monitoring Wells, Irrigation and Domestic well.

Figure 9 - Max Nitrate (as N) Concentration All Wells
(Map Taken from the 2022 N&C DM GSP, Figure 5-21)



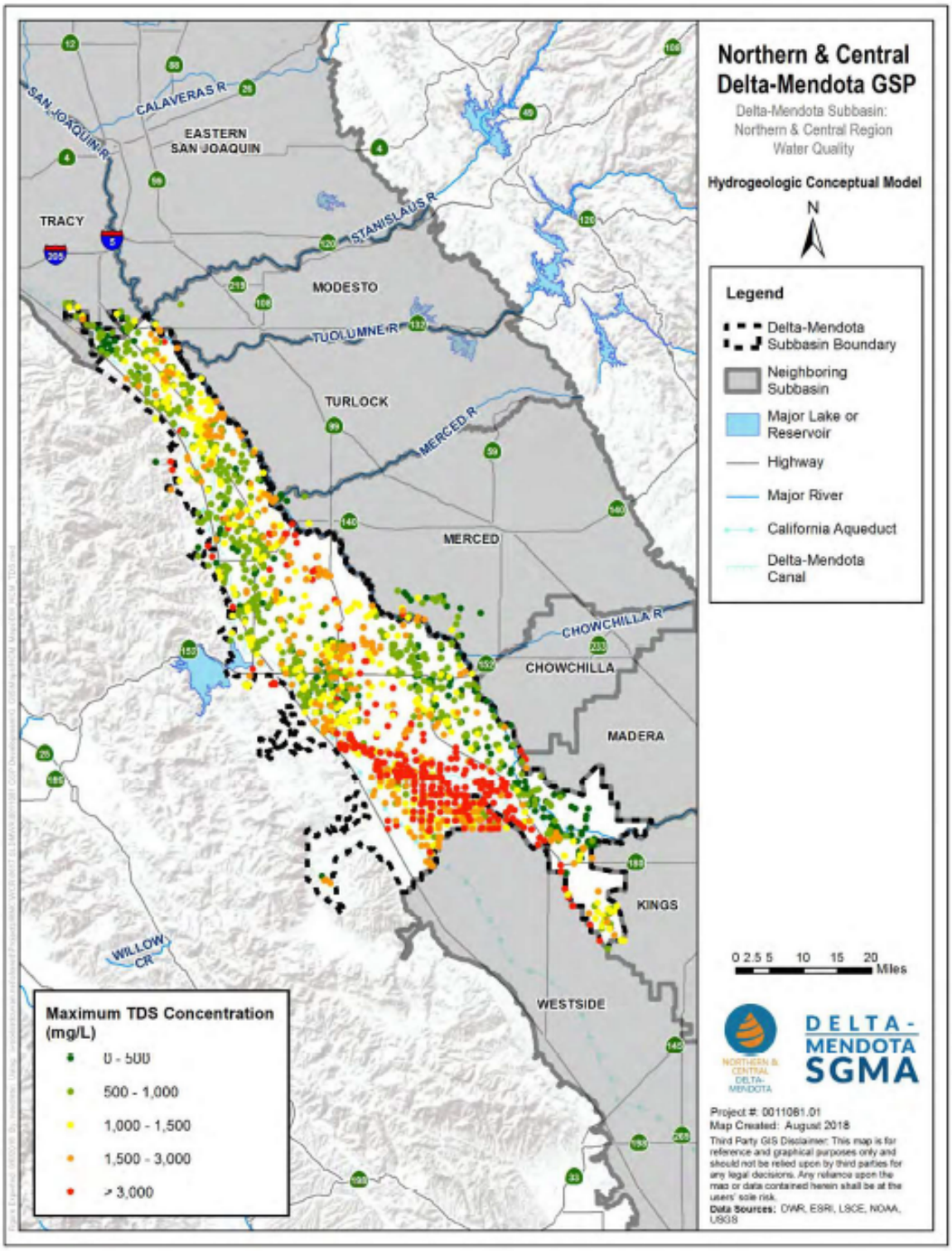
Note: Maximum concentrations are based on all data collected to date for the identified wells.

Figure 10 - Max Nitrate (as N) Concentration, Below Corcoran Clay
(Map Taken from the 2022 N&C DM GSP, Figure 5-25)



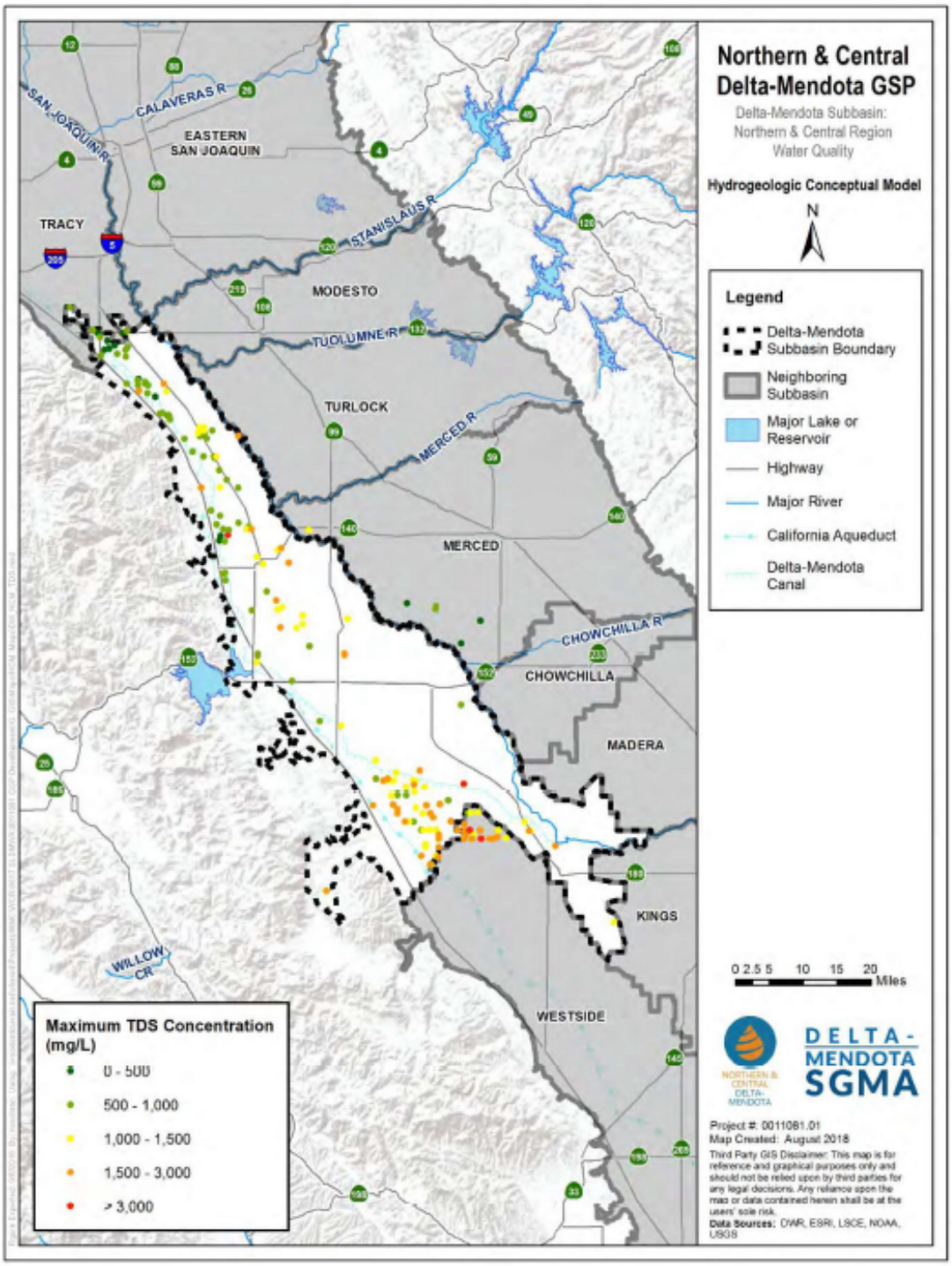
Note: Maximum concentrations are based on all data collected to date for the identified wells.

Figure 11 - Max TDS Concentration, All Wells
(Map Taken from the 2022 N&C DM **GSP, Figure 5-31)**



Note: Maximum concentrations are based on all data collected to date for the identified wells.

Figure 12 - Maximum TDS Concentration, Below Corcoran Clay
(Map Taken from the 2022 N&C DM GSP, Figure 5-35)



Note: Maximum concentrations are based on all data collected to date for the identified wells.

2.5 SITE SPECIFIC SOILS

Predominant soils in the area of the proposed Site as classified by the Natural Resources Conservation Service (NRCS Web Soil Survey) consist of loam and clay. The primary soil group by Site acreage are Pedcat loam and clay with 0 to 2 percent slopes. The project site is comprised of soils that have limitations for development that include depth to saturated zone and shrink/swell potential. (NRCS 2023)

Near surface geology at the Site consists of Alluvium underlain by Tulare Formation clay deposits. The referenced GSP and cross section above in Figure 7 indicate that interbedded clay, sandy clay, and sand deposits dominate the near surface geology in proximity to the proposed facility. Gravel lenses 5 to 10 feet in thickness exist beneath the site. Somewhat continuous sand deposits and continuous clay beds varying in thickness exist at depths ranging from 300 feet bgs are considered to be part of the Corcoran Clay (CC). Deep well log information in the area was limited.

2.6 AREA HYDROGEOLOGY

As referenced the Site lies in the Delta-Mendota subbasin of the San Joaquin hydrologic region. Historically groundwater flow in the Subbasin is generally to the east, towards the San Joaquin River for shallow groundwater. Groundwater follows the dip of the sedimentary bedrock units. In general, groundwater depths are shallowest near San Joaquin River and increase to the west as surface elevation increases. As referenced in the N&C DM GSP, ground water elevations have decreased significantly over the last two decades as shown by the declining groundwater 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 hydrogeology 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.

First encountered groundwater was fully investigated on Site by the CVDRMP program, unconfined aquifers within laterally or as isolated perched units. As referenced in the 2022 GSP, regional historical groundwater levels are shown which indicate the decline in groundwater elevations. The Site specific data is utilized for facility changes in groundwater elevations.

The GSP stated that groundwater levels generally increased for principal aquifers. Based on data from wells Above Corcoran Clay Aquifer, average groundwater level

increased. Based on data from wells below Corcoran Clay aquifer, average groundwater level increased as well.

For the groundwater sustainable management criteria – land subsidence remains an ongoing concern in the Subbasin. Measurements have been recorded semiannually in July and December of each year to monitor ongoing subsidence since 2008. In the Dos Palos area, the lower end of the Northern and Central Delta-Mendota Regions, where most land subsidence has historically occurred) experienced between 0.38 and 0.42 feet/year in subsidence between 2008 and 2016. As a result of subsidence, freeboard in Reach 4A is projected to be reduced by 0.5 foot by 2026 as compared to 2016, resulting in a 50 percent reduction in designed flow capacity (DWR, May 2018). Reduced flow capacities in the California Aqueduct will impact deliveries and transfers throughout the State and result in the need to pump more groundwater, thus contributing to further subsidence (2022 N&C DM GSP).

2.7 FACILITY GROUNDWATER SUMMARY

CORREIA DAIRY SITE SPECIFIC FROM CVDRMP ANNUAL REPORT

The General Order and Individual WDRs also established the ability for individual dairies to be used for hydrogeologic assessment. The Correia Dairy Specific Summary is as follows taken from below and the 2023 Annual Report Year 12, (pages 67 and 68) the Correia Dairy is detailed as shown:

Correia Dairy Monitoring Well Network Description and Assessment

There are 5 dedicated monitoring wells at the Correia Dairy. CVDRMP installed these wells in 2011 using a nested structure design such that two wells were installed in each borehole. The wells in the nested structures were completed in the same water-bearing zone but at different depth intervals to facilitate monitoring and sampling of the uppermost zone of first encountered groundwater under non-steady groundwater conditions.

Correia Dairy Groundwater Levels

Groundwater level measurements indicate that first-encountered groundwater occurred at depths ranging from 4.03 to 13.77 ft btc (below top of casing) beneath the dairy since 2012. Multi-year water level fluctuations are relatively minor but do correspond to periods of relatively dry hydrologic conditions (e.g., 2012-2016 and 2020-2022) and intermittent periods of relatively wet hydrologic conditions. Overall, the hydrographs indicate stable conditions over the period of record. 2023 contours of equipotential groundwater level elevations indicate consistent east-northeasterly to northeasterly groundwater flow. Well sites and associated source areas are provided in the 2023 Annual Report.

2023 Correia Dairy Groundwater Chemistry

Per the 2023 Annual Report, near complete listing of parameters in Table 1. This data is detailed as referenced below. Nitrate as N is the focus of the study.

COR-MW1

1. Ammoniacal N concentrations were non-detect.

2. TKN concentration was non-detect.

3. Nitrate-N concentrations ranged from 18 to 22 mg/L.

4. K concentration was 2.6 mg/L.

5. PO4 concentration was 0.45 mg/L.

6. HCO3 concentration was 810 mg/L.

7. TDS concentrations ranged from 2,000 to 2,100 mg/L.

2023 groundwater chemistry at this location did not exhibit typical indications of lagoon seepage with the possible exception of an elevated HCO3 concentration and overall higher salinity compared to most other wells at this site (not MW5).

COR-MW2

Groundwater chemistry at this location is substantially attributed to recharge occurring in an off-site source area. This includes nitrate-N concentrations ranging from 5.8 to 6.5 mg/L.

COR-MW3

Groundwater chemistry at this location is substantially attributed to recharge occurring in an off-site source area. This includes nitrate-N concentrations ranging from 13 to 14 mg/L.

COR-MW4

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the animal housing. This includes nitrate-N concentrations ranging from 12 to 21 mg/L.

COR-MW5

Groundwater chemistry at this location is substantially attributed to recharge occurring in a source area within the animal housing although it may also be affected by areas south of the animal housing. This includes high TKN (9.8 mg/L), K (380 mg/L), and PO4 (20 mg/L) concentrations.

The monitoring network is shown below CVDRMP Report Map depiction Figure 13 and water chemistry is on the Table 1 below.

Figure 13 - Correia Monitoring Well Locations
(Taken from CVDRMP Annual Report, Year 12, page 448 of 554)

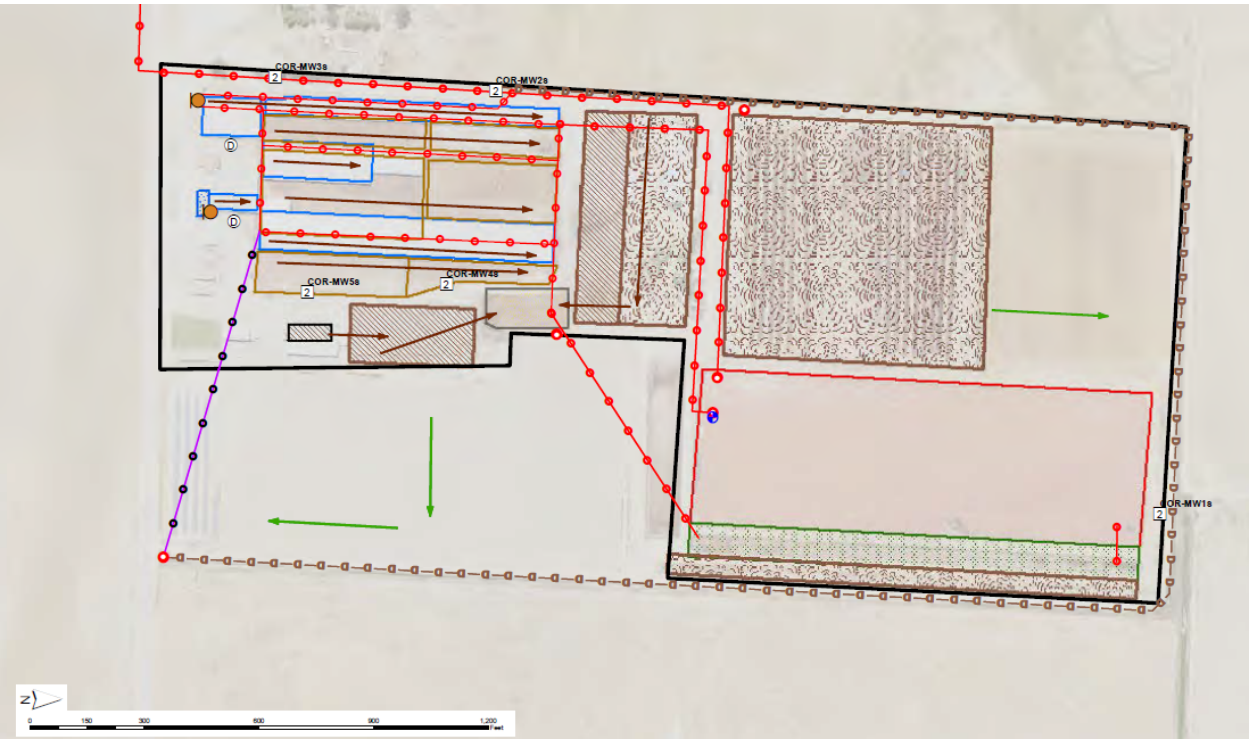


Table 1 - Correia Dairy 2022/2023 Monitoring Well Water Quality (Taken from CVDRMP Annual Report, Year 12)

		-------Field Measurements-------																				----Alkalinity as CaCO3----					
Well	Date	T	pH	DO	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-MW1s	2/16/2022	20.1	7.52	0.8	21	16	1.5	3,406	2,100	24		0.082J	2002.96	610	2.0	69	71	540	250	0.45	700	52	<8.2	752	-1.9	8	
COR-MW1s	8/18/2022	21.2	7.44	1.7	31	-10	2.0	2,783	1,800	13		0.1J	2022													7	
COR-MW1s	2/27/2023	18.0	7.29	1.6	36	40	3.0	3,433	2,000	18		<0.20	<0.20	630	2.6	77	72	480	240	0.45	810	<8.2	<8.2	810	1.9	11	
COR-MW1s	8/22/2023	21.0	7.43	1.0	14	158	11	3,348	2,100	22		<0.2														9	
COR-MW2s	2/16/2022	19.2	7.40	0.9	24	59	1.5	2,165	1,200	5.0		0.081J	2002.51	240	3.4	70	140	310	250	0.28	450	14	<8.2	464	-0.7	9	
COR-MW2s	8/18/2022	21.3	7.24	0.8	13	29	2.0	2,468	1,500	9.3		0.1J	2022													8	
COR-MW2s	2/27/2023	17.0	7.07	1.2	24	104	3.0	2,140	1,400	6.5		<0.20	<0.20	260	3.0	74	140	320	250	0.15	420	<8.2	<8.2	420	2.9	12	
COR-MW2s	8/22/2023	21.6	7.31	0.4	12	70	7.0	2,155	1,500	5.8		<0.2														11	
COR-MW3s	2/16/2022	20.1	7.22	0.7	20	71	0.7	2,973	1,700	9.4		0.071J	2002.85	330	3.4	100	200	390	300	0.15	700	<8.2	<8.2	700	1.1	8	
COR-MW3s	8/18/2022	22.0	7.07	1.0	27	38	0.7	2,203	1,400	15		0.13J	2022													7	
COR-MW3s	2/27/2023	18.3	6.83	1.1	27	105	1.5	2,781	1,800	14		<0.20	0.77	350	3.2	94	170	370	290	0.10J	650	<8.2	<8.2	650	1.7	11	
COR-MW3s	8/22/2023	22.2	7.20	1.0	14	100	3.0	2,446	1,700	13		<0.2														10	
COR-MW4s	2/16/2022	20.3	7.27	1.0	20	-50	3.0	2,416	1,300	5.9		0.071J	2002.43	260	2.6	89	150	330	210	0.18	590	<8.2	<8.2	590	0.5	8	
COR-MW4s	8/18/2022	22.8	7.12	1.5	28	-21	1.5	2,207	1,400	7		0.092J	2022													8	
COR-MW4s	2/27/2023	16.9	6.89	0.8	25	91	1.5	2,414	1,500	21		<0.20	0.47	290	3.3	93	140	300	190	0.12J	590	<8.2	<8.2	590	3.1	12	
COR-MW4s	8/22/2023	24.0	7.10	1.0	14	57	7.0	2,484	1,800	12		<0.2														10	
COR-MW5s	2/16/2022	20.2	7.16	0.9	21	-124	32	4,131	2,400	0.22J		21	2022.34	470	310	96	110	390	37	25	1,700	<8.2	<8.2	1,700	-3.7	8	
COR-MW5s	8/18/2022	22.6	7.07	3.3	42	-136	12	4,131	2,700	0.058J		7.5	2022													8	
COR-MW5s	2/27/2023	18.5	7.27	0.4	17	-62	11	3,484	2,300	1.5		5.3	9.8	440	380	70	66	250	240	20	1,200	<8.2	<8.2	1,200	2	12	
COR-MW5s	8/22/2023	23.9	7.36	1.7	20	-118	85	3,342	2,200	1.0		5.6														10	

The 2022 GSP describes groundwater in the area as characterized by mixed sulfate to bicarbonate water types in the northern and central portion of the subbasin, with areas of sodium chloride and sodium sulfate waters in the central and southern portions.

Irrigation and Drinking Water Quality

As depicted on Table 2, the Correia Dairy groundwater sampling data is provided for 2019 through 2023, which relates to the annual reports. Concentration of Nitrate as N ranged from <0.1 to 8.7 mg/L, which is below the California Title 22 Primary Maximum Contaminant Limit (MCL) of 10 mg/L. Regional groundwater quality also confirms the low Nitrate concentrations in this area, see Section 2. Total dissolved solids (TDS) values range from 493 to 803 milligrams per liter (mg/L). Electrical Conductance ranged from 856 to 1,550 umhos/cm, which is above the Title 22 Secondary MCL of 900 umhos/cm. Chloride ranged from 134 to 188 mg/L, which is below the MCL of 250 mg/L.

Table 2 - Correia Dairy Water Historic Domestic and Irrigation Well Water Quality

Correia Family Dairy Well Results
2018-2023

Year	Well	Sample Date	EC µmhos/cm	Nitrate (NO3)-N (mg/l)	TDS (mg/l)	TKN (mg/l)	Total Nitrogen (mg/l)	Cabonate (mg/l)	Bicarbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)
2018	IW-Small Well	7/23/2018	1200	3.2	745	<1.0	3.5	<1	279	170	117	65.3	35.1	157
	Domestic Well - Heifers	8/30/2018	1060	5.8	630	-	-	<1	257	134	84.0	72.0	36.7	86
	Big Well Irrigation Well	8/30/2018	1360	4.9	-	-	-	-	-	-	-	-	-	-
	Domestic Well #1	12/4/2018	1090	4.0	-	-	-	-	-	-	-	-	-	-
	Domestic Well #2	12/4/2018	1090	4.1	-	-	-	-	-	-	-	-	-	-
2019	DW #1	11/26/2019	1230	4.5	-	-	-	-	-	-	-	-	-	-
	DW #2	11/26/2019	1220	4.4	-	-	-	-	-	-	-	-	-	-
	DW Heifers	11/26/2019	1140	<0.1	670	-	-	<1	265	149	85.2	85.1	41.8	94
	Irrigation Well - Big	12/9/2019	856	3.1	493	<1.0	3.5	-	-	-	-	-	-	-
	Irrigation Well - Little	12/9/2019	1270	4.9	740	<1.0	5.1	-	-	-	-	-	-	-
2020	IW Big	7/9/2020	1250	5.2	-	-	-	-	-	-	-	-	-	-
	IW Dairy	7/9/2020	1310	3.7	-	-	-	-	-	-	-	-	-	-
2021	DW #1	11/3/2021	1260	4.2	733	-	-	ND	273	160	105	94.7	45.6	116
	DW #2	11/3/2021	1260	4.2	750	-	-	ND	276	160	105	96.3	46.2	119
	IW Big	12/2/2021	1550	6.9	-	-	-	-	-	-	-	-	-	-
	IW Little	12/2/2021	1480	4.3	-	-	-	-	-	-	-	-	-	-
2022	Big IW	7/28/2022	1080	5.7	803	-	-	ND	296	156	114	85	433.6	145
	Little IW	7/28/2022	1280	3.2	740	-	-	ND	261	163	112	68.2	37.7	155
	DW Heifers	11/22/2022	1310	5.9	693	-	-	ND	265	188	100	94.1	47	99
	DW East	11/22/2022	1330	4.2	-	-	-	-	-	-	-	-	-	-
	DW West	11/22/2022	1340	4.2	-	-	-	-	-	-	-	-	-	-
2023	IW Big	12/13/2023	1410	8.7	-	-	-	-	-	-	-	-	-	-
	IW Little	12/13/2023	1280	1.28	-	-	-	-	-	-	-	-	-	-
	DW West	12/13/2023	1120	1.12	-	-	-	-	-	-	-	-	-	-
	DW East	12/13/2023	1200	1.2	-	-	-	-	-	-	-	-	-	-
	DW Heifers	12/13/2023	1300	1.3	-	-	-	-	-	-	-	-	-	-

2.8 IMPAIRED SURFACE WATERS

The Central Valley Regional Water Quality Control Board (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 3.5 for more details.

2.9 FLOODING

The Flood Insurance Rate Maps (FIRM) from the Federal Emergency Management Agency (FEMA) show that the Dairy Production Area is located within Zone X. Areas within the FEMA designation Zone X are defined as an area outside of the 1% annual chance or the 100-year floodplain. The Flood Protection Analysis is attached to the 2021 WMP.

3 REGULATORY BACKGROUND

3.1 FEDERAL LAWS AND REGULATIONS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY CLEAN WATER ACT

Federal, state, and local regulations have been 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) has 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[1] and discharges or proposes to discharge pollutants to the waters of the Unites States.

FEDERAL EMERGENCY MANAGEMENT AGENCY

The 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 Total Maximum Daily Load (TMDL) program.

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

[1] A large CAFO is defined has having 700 or more mature dairy cattle. Medium and small CAFOs that propose to discharge must also apply for and receive a permit under the NPDES program.

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 dairies complete 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). Over the next several years, this general order will be remanded, revised and reissued to address groundwater protection concerns.

As in the past, 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.

CENTRAL VALLEY REPRESENTATIVE MONITORING PROGRAM

The General Order and Individual WDRs also established the ability for individual dairies to participate in a Central Valley Dairy Representative Monitoring Program (CVDRMP) as an alternative to an individual requirement for groundwater monitoring. Each dairy must have notified the CVRWQCB about its decision to join the CVDRMP. 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 Correia Dairy joined the CVDRMP efforts and volunteered to have monitoring wells installed at their site in 2011. In the future, they could be treated as an individual discharger and this monitoring network would facilitate the requirement to have an individual WDR and a separate groundwater monitoring system.

The CVDRMP establishes a regional monitoring plan for the member dairies through the organization Dairy Cares at first. The CVDRMP 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 CVDRMP, theoretically removing the need to install monitoring well networks on an individual basis. Phase I of the CVDRMP 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 Correia Dairy monitoring network was completed during Phase I and is part of the CVDRMP. 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 selected dairies were initiated in 2013. The CVDRMP currently monitors 443 monitoring wells at 42 representative dairies to cover their 1,100+ dairy members.

Annual reports are submitted to the CVRWQCB. Summaries of these reports are provided below.

The Year 1 (2012) Report initial findings for the 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 CVDRMP 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 CVDRMP continued to implement research projects for investigations of different portions of dairy components. In 2016, the CVDRMP 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).

The Year 9 (2020) report provides cumulative data collected from January 2012 through December 2020, 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 2020) collected from CVDRMP's dedicated monitoring wells indicate the following groundwater TN concentration trends:

a. 35% (92 data sets) increasing,

b. 23% (60 data sets) decreasing,
c. 42% stable conditions (109 data sets).

The 2020 mean TN concentration across all dairies was 44 mg/L; it was the highest in light soils and in shallow groundwater (55 and 46 mg/L, respectively); and 34 mg/L in deep groundwater and 28 mg/l in heavy soils.

Of the three management units, the 2012-2020 TN concentration increase in wells associated with fields was similar to the Comprehensive (All) subgroup (12 mg/L compared to 14 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 monitoring period (28 mg/L; p=0.02).

The Year 10 (2021) report provides cumulative data collected from January 2012 through December 2021, the CVDRMP 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.

- TN concentrations associated with wells that have onsite sources increased by 16 mg/l from 2012 to 2021.
- TN concentrations associated with wells that have off site sources increased by 8 mg/l from 2012 to 2021.

The 2021 mean TN concentrations across all dairies were higher in shallow and light soil wells (47 and 57 MG/l, respectively) than in deep and heavy soils (34 and 28 Mg/l respectively). Of the three management units, the 2012-2021 TN concentration increase in wells associated with fields (17 mg/l) was similar to the Comprehensive (All) subgroup (16 mg/L). This is consistent with the fact that field wells contribute the largest subset of data points. The 2021 mean TN concentration was 40 mg/l. (Luhdroff, 2022)

The Year 11 (2022) report provides data collected from January 2012 through December 2022, the CVDRMP 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.

- On average, total nitrogen (TN) concentrations associated with wells that have source areas on dairies increased 16 mg/L from 2012 to 2022. The 2022 mean TN concentration remained unchanged from 2021 at 45 mg/L.

- On average, TN concentrations associated with wells that have offsite source areas increased 6.8 mg/L from 2012 to 2022. The 2022 mean TN concentration remained unchanged from 2021 at 23 mg/L.

The Year 12 (2023) report provides data collected from January 2012 through December 2023, the CVDRMP observations confirm that first encountered groundwater is affected by dairy farming practices. With few exceptions, nitrate-N concentrations beneath lagoons, animal housing, and crop fields are greater than 10 mg/L.

- On average, total nitrogen (TN) concentrations associated with wells that have source areas on dairies increased between 2012 and 2023. The 2023 mean and median TN concentrations were 55 and 41 mg/L, respectively.
- On average, TN concentrations associated with wells that have offsite source areas increased between 2012 and 2023. The 2023 mean and median TN concentrations were 15 and 22 mg/L, respectively.

Refer to Section 2 for the Site-specific data related to the Correia Dairy Monitoring Well Network installed by the CVDRMP in 2011.

OTHER CVDRMP REPORTS

Luhdorff and Scalmanini, as part of the Dairy CVDRMP program, published an extensive report related to earthen liquid dairy lagoons. The report compiled groundwater quality data from the CVDRMP network, 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 Correia Dairy facilities are separately regulated under 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.
- Continued 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 Corrriea Dairy facility was prepared pursuant to the requirements of the CVRWQCB (see Appendix J 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. Annual reports are used to confirm the planning efforts.

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 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 plans were developed addressing basins in critical overdraft and by January 31, 2022 for all other basins.

The GSAs are 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.

The Correia Dairy is in the groundwater SGMA jurisdiction of the County of Merced GSA – Delta-Mendota. Ten GSAs in the subbasin, including the County of Merced GSA – Delta-Mendota, worked to develop a joint GSP for the San Joaquin River Exchange Contractors GSP Group in the Delta-Mendota Subbasin. Thirteen additional GSAs submitted five separate GSPs for five areas within the Delta Mendota Subbasin, revised in 2022. In 2023, DWR ruled the six revised GSPs for the Delta-Mendota Subbasin inadequate. In response to this action, the Delta-Mendota Subbasin Coordination

[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.

Committee recommended all 23 GSAs in the Subbasin adopt a new, single Groundwater Sustainability Plan. Once adopted, the single GSP will replace the six previous GSPs deemed inadequate by DWR. The Public Review Draft was published in July 2024.

After years of implementation efforts under the GSP, 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 GSP 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 GSP, should be reached by 2040 for basins in critical overdraft and by 2042 for other basins.

As stated in the GSP, a summary depiction is provided of the primary hydrogeological considerations across the Subbasin with respect to sustainable management criteria selection. Icons of the five applicable sustainability indicators have been generally placed around the Subbasin for illustration purposes. Characterization of groundwater quality identified six constituents of concern to track and analyze from existing drinking water monitoring programs for potential water quality impacts from future GSA management activities. Interconnected surface water criteria have been selected to protect each river boundary. As referenced above in the in Section 2, land subsidence has been an issue in the Subbasin.

As referenced in the general GSP updates, this is a typical implementation schedule.

2020	2025	2030	2035 2040
Monitoring and Reporting	**Preparation for Allocations and Low Capital Outlay Projects**	**Prepare for Sustainability**	**Implement Sustainable Operations**
• Establish Monitoring Network • Install New Groundwater Wells • Reduce/Fill Data Gaps	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue
• GSAs allocated initial allocations • GSAs establish their allocation procedures and demand reduction efforts • Develop Metering Program	• As-needed demand reduction to reach Sustainable Yield allocation • Metering program continues	• As-needed demand reduction to reach Sustainable Yield allocation	• Full implementation demand reduction as needed to reach Sustainable Yield allocation by 2040
• Funded and smaller projects implemented	• Planning/ Design/ Construction for small to medium sized projects	• Planning/ Design/ Construction for larger projects begins	• Project implementation completed
• Extensive public outreach regarding GSP and allocations	• Outreach regarding GSP and allocations continues	• Outreach continues	• Outreach continues

In the future, the preparation of the sustainable groundwater yield allocations may be presented in an updated GSP and Annual Reports. Water allocations determinations may include specific dairy operation elements. Efforts have been made to achieve the sustainability goal for the Delta Mendota Subbasin, and to avoid undesirable results over the remainder of a 50-year planning horizon. Projects and Management Actions have been developed by the GSAs. Most projects and management actions relate to the increase of aquifer recharge. The GSP Annual reports provide a summary of the results from monitoring/construction projects and management action.

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 Correia Dairy may be regulated in the future under the ILRP program if regulations change. 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)

In 2018, the CVRWQCB adopted Basin Plan amendments (Resolution R5-2018-0034) (and as amended in the 2020 Resolution R5-2020-0057) that established valley-wide Salt and Nitrate Control Programs. Central Valley Salinity Alternatives for Long Term Sustainability (CV-SALTS) is a collaborative stakeholder driven and management effort to develop sustainable salinity and nitrate management planning. The long-term solutions for managing salt in the Central Valley will be developed and implemented through a phased Salt Control Program. The three phases of the Salt Control Program include: (1) Complete a comprehensive study and analysis to define long-term salt management actions, beginning in 2021 over 10 to 15 years; (2) Complete design and permitting of projects identified in Phase 1; and (3) Construct projects to manage salts. The program approach is intended to protect beneficial uses by maintaining water quality that meets applicable objectives, allow some salt accumulation in areas where salt can be stored without impairing beneficial uses of water, and through long-term management, restore water quality where reasonable, feasible, and practicable. In 2020 and 2021, initiatives were made through the IRLP coalitions, the CVDRMP, and private WDR holders to fund the 20-year salinity study. The CVDRMP is paying the fee for participation in the CV-SALTS Salt Control Program on behalf of its members.

The Nitrate Control Program is a prioritized program that will require facilities that discharge nitrates at levels that are causing exceedances of drinking water standards (including most dairies) to upgrade their facilities and/or waste management practices over a timeframe that may extend as long as 35 years. While upgrades are being developed and implemented, facilities responsible for adverse nitrate impacts are required to supply impacted communities with replacement drinking water. Facilities such as dairies may comply with the Nitrate Control Program individually or may elect to participate in Management Zones, which are collectives of permitees that collaborate on enhancing water quality management practices while providing affected communities replacement drinking water. Regulatory requirements under the Nitrate Control Program are triggered by the issuance of a Notice to Comply.

The Nitrate Control Program occurs in priority-based stages. The Basin Plan identified Priority 1, Priority 2, and Non-Prioritized basins based on estimated nitrate water quality impacts. Priority 1 areas had the highest nitrate concentrations, so efforts began

there first. For the purposes of compliance with the Nitrate Control Program, the Correia Dairy is in Priority Area 2, which were sent Notices to Comply in December 2023. The Nitrate Control Program has officially initiated the second stage in Priority 2 areas. In each of the basins, a new Management Zone is being developed to begin planning and early actions in the Priority 2 areas. Priority 2 groundwater subbasins include Delta-Mendota, Eastern San Joaquin, Kern County (Poso), Kern County (West Side South), Madera, Merced, Tulare Lake, and Yolo. The Nitrate Control Program collaboratives will be developed in Merced County within subbasins. The collaboratives will be charged with developing and implementing action plans to provide safe drinking water, reducing nitrate impacts and restoring groundwater quality. Discharges off site would have to comply with discharge limits outlined in the Basin Plan and the 2020 Revised Salt and Nitrate Program Resolution R5-2020-0057.

Correia Dairy (by membership in the CVDMRP and volunteer monitoring well placement) became part of future coalition efforts for planning management.

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 as per the California 2020-2022 Integrated Report (Appendix A 303(d) List) and web link: 2020-2022 California Integrated Report | California State Water Resources Control Board

The San Luis Reservoir and San Joaquin River is 303d listed. See Section 3.5 for more specific details.

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. Refer to Section 2 for specific site details.

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 the Correia Diary project. 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 Correia Dairy Project) for the full text of the ACO or web search link:

< https://ecode360.com/ME4967>

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:

	Water Well (feet)	Public Well (feet)
Septic tank or sewer line	50	100
Leach line or disposal field	100	150
Leaching/seepage pit	150	200
Areas of intense animal confinement	100	150
Agricultural well	300	300
Unlined canals, surface body or course or drainage water pond	100	100
Swimming pool	10	10

2. Property Line Setback. All wells shall be located with a minimum setback of fifteen (15) feet from a property line. The health officer may authorize an exception to this requirement where space restrictions on existing small lots necessitate, but in no case shall the minimum setback of the well from the property line be less than five feet.

3. 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.

Sections C.4 – C.12 have been modified.

MERCED COUNTY GENERAL PLAN

The Water Element of the 2030 Merced County General Plan, data December 10, 2013 contains goals and policies pertaining to protection of water resources in Merced County. Those water 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.

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 Planning and Community Development Department requests regulatory compliance audits of expanding dairies from the Division of Environmental Health (DEH) as part of the Conditional Use Permit (CUP) evaluation process prior to project approval. DEH staff completed a regulatory compliance audit of the Correia

Dairy on January 13, 2022. The DEH concluded that the dairy facility was in substantial compliance with the ACO on January 20, 2022.

3.5 TMDL AND IMPACTED WATERWAYS NEAR THE PROJECT SITE

Under Section 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 Total Maximum Daily Load[3] for all listed water contaminants that do not meet water quality standards. TMDLs are action plans to restore clean water by defining how much of a pollutant a water body can tolerate and 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 are adopted by the Regional Water Quality Control Board as amendments to the Basin Plan. The TMDLs are implemented through NPDES permits, nonpoint source control programs, and other local and state requirements.

The San Luis Reservoir and San Joaquin River are approximately 7 and 12 miles to the west and east, respectively. As listed under the 2020-2022 California Section 303(d) List of Water Quality Limited Segments of the San Joaquin River (downgradient of the Correia Dairy), several segments are impaired for the pollutants/stressors of arsenic, indicator bacteria, dissolved oxygen, pH, and toxicity. The likely source of pollutants is agriculture.

The CVRWQCB adopted Amendments to The Water Quality Control Plan For The Sacramento River and San Joaquin River Basins in February 2019. TMDLs or regulatory programs required to address water body impairments are identified by the CVRWQCB and include monitoring strategies that will be used to evaluate the effectiveness of the program. As set forth in the 2020-2022 Integrated Report, regulatory programs such as the Irrigated Lands Regulatory Program (ILRP) address water quality impairments throughout the Region.

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3 A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

4 EXISTING AND PROPOSED DAIRY CONDITIONS

4.1 EXISTING AND PROPOSED PROJECT OPERATIONS AND NMP & WMP SUMMARY

The project applicant has prepared a NMP/WMP as required by the CVRWQCB General Order for Milk Cow Dairies. A professional engineer registered in the State of California and a Certified Crop Advisor completed the required elements of the NMP/WMP. The previously prepared WMP and NMP for the existing dairy operations, dated in 2020 were used to establish a baseline of existing conditions.

The existing active dairy facilities include approximately 185,354 square feet of roofed structures located on 60± acres of an existing farm. Existing dairy facilities are located on the north side of W. Fahey Road and include the following:

- freestall barns and shades
- commodity barn
- calf hutches
- manure drying and stacking area
- solid manure weeping wall
- office
- open corrals
- milk barn
- feed storage area
- 1 WW retention pond
- 2 settling basin
- shop

The existing dairy facility consists of flush and scrape systems that are used to collect and process wastewater and solid manure. Animal wastes from animal barns and other concrete-surfaced areas are flushed with recycled water to an on-site waste management system that consists of a manure drying area, weeping wall and two solid settling basins and one wastewater storage pond (retention pond). All ponds are earthen-lined. The area of active dairy facilities has been graded to direct corral runoff to the existing waste management system. Wastewater from the heifer facility is transported via wastewater pipeline to the dairy facility pond. Stormwater runoff from impervious surfaces and roofed areas is routed to the wastewater pond. Recycled water is used to clean the milk parlor floor and is the source of sprinkler pen water.

Dry manure is scraped from corrals twice per year, removed from the settling basins two to three times per year, and removed from the weeping wall two times per year. Solid manure is currently composted onsite. Some of the solid manure is used as bedding (consisting of dry manure and almond shells), applied on the project site, or hauled off site to fields in the project vicinity. Manure solids are separated from liquids with 55 percent solids separation efficiency using a weeping wall system combined with settling basins. As reflected in the NMP, approximately 7,400 tons of solid manure

and separated solids (approximately 20 percent of the dry manure generated at the dairy) is exported and applied to off-site fields not owned by the dairy operator.

The dairy facility uses both surface water and groundwater resources for farm operations. Domestic water to the site and dairy barns is provided by two on-site water wells, and one domestic well is located at the feedlot south of W. Fahey Road. Irrigation water is supplied by surface water sources primarily from Central California Irrigation District (CCID) canals, in drought times groundwater is used from two irrigation wells, one north of the existing animal housing and one on the west end of field CFD 1-3. Wastewater is mixed with irrigation water and applied to cropland. Receiving fields are graded to guide excess applied irrigation water to an existing tailwater return and/or retention system. Collected tailwater is either returned to top of the field or retained by berms. Field application of wastewater is via pipeline or surface application.

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 August 2020 NMP total annual gross nitrogen generated by facility is estimated at 458,723.9 pounds/year. Nitrogen exports currently total 179,809.8 pounds/year. After ammonia losses, existing operations reflect a whole farm nitrogen balance ratio of 1.37.

With implementation of the proposed expansion as reported by the April 2021 proposed conditions NMP, total annual gross nitrogen generated by the expanded facility would increase to 1,310,887.6 pounds/year. A total of 762,752.2 pounds/year of nitrogen would be removed through nitrogen exports as solid manure. After ammonia losses, the whole farm balance ratio will be 1.36. Overall management of nitrogen on the

farm, including increasing nitrogen exported, would result in a slight reduction in the whole farm nitrogen value.

From the existing facility WMP, dated August 2020 and a for a referenced normal precipitation year, there are currently 82,367 gallons per day of wastewater (approximately 30 million gallons per year) generated by the existing dairy herd (which includes process water from the milkbarn and manure and bedding, rainfall runoff into ponds, and direct rainfall onto ponds). The proposed expanded dairy would generate approximately 163,193 gallons/day of wastewater (approximately 60 million gallons per year for a normal precipitation year).

There would be a 30 million gallon per year increase in process wastewater generated with the proposed dairy expansion and sent to the pond. An increase in water use is related to an increase in equipment water and other reusable water. Process wastewater from the pond would continue to be mixed with irrigation water and applied to crops.

The irrigation water demand of the existing farming operations is estimated by multiplying the cropable acres by the estimated average irrigation demand per acre. The existing NMP estimates an irrigation average demand of over 3.8 feet of water for pasture and cropped acres. As summarized in the IS/NOP, there are approximately 398 acres currently single and double cropped with pasture, oats or corn and silage – soft dough or 492 million gallons applied. For the existing dairy, the total irrigation water demand is approximately 6 percent of total water volume, not accounting for pond evaporation and evapotranspiration.

The proposed NMP estimates an irrigation demand of over 2.8 feet of water [4]for cropped acres. Note that under proposed conditions, total land application area would be decreased from 398 acres to 389 acres. With the proposed use, the estimated crop water demand would decrease from 492 to 355 million gallons.

Using 60 million gallons of wastewater annually, the estimated wastewater component of the total irrigation the water demand is approximately 17 percent of total water volume, not accounting for pond evaporation and evapotranspiration. This calculation is simply 60 million gallons of wastewater volume divided by a total of 355 million gallons.

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

[4].The proposed NMP may be incorrect for irrigation demand. The anticipated value would over 4 feet of water.

- Proposed nutrient application rates meet required agronomic rates of 1.4 or less for best management farming practice mandated by the CVRWQCB. The whole farm nitrogen balance under existing conditions is 1.37 and would decrease to 1.36 under proposed conditions.
- The recommended amount of salt applied to cropland will be provided in the future versions of the approved NMP for the dairy.
- The proposed 21,960,292 gallons of storage capacity for the two basins and one wastewater pond would be sufficient to permit storage of wastewater generated by the facility for a 120-day cycle during normal precipitation periods and normal precipitation periods (16,262,851 gallons). Pond freeboard capacity is used to address 100-year storm events.
- A tailwater return and/or retention 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 stormwater from the commodity barn, which would be routed to an adjacent field.
- Based on the WMP assessment, the site is partially in the Federal Emergency Management Agency (FIRM 2008) Zone X, and as discussed in Section 2.8 the proposed project site would not be sited within a floodway, implementation of the proposed project would not risk the release of pollutants due to project inundation. Thus, no adverse effects from flooding and pollutant release would occur, a less-than-significant impact would result, and no mitigation would be required.
- With construction of the proposed facilities, approximately 11.4 acres of cropped acreage would be converted to active dairy facilities. This leaves 389 acres of the fields receiving both wastewater and solid manure. Fields would be cropped in pasture, wheat silage-soft dough, ryegrass silage, and corn 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.

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 1.37 at the existing dairy facility, to 1.36 with the proposed expansion. The balance ratio would remain below the regulatory limit of 1.65.

4.2 SUMMARY OF POTENTIAL GROUNDWATER RESOURCE DEGRADATION FROM OPERATION OF THE CORREIA FAMILY DAIRY EXPANSION

Expanded operations at the Correia Family Dairy 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 elevation and groundwater quality. However, the acres used and the percentage of wastewater applied for the land application would reduce the whole farm risk of surface water and groundwater quality impacts. As referenced in the 2022 GSP, groundwater chemistry and depressions are minimally impacted in the subbasin area around the Correia Family Dairy.
- The Correia Family Dairy proposed expansion would have an increase component to the total application amount of 6 to 17 percent of the crop water demand. Note that due to the off-site export of solid manure and/or liquid manure, cropping patterns and other farm practices, the whole farm nitrogen balance has improved even with the higher wastewater percentage of land application water.
- 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. Good farming practices have been followed by the Correia Dairy. 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 existing and proposed whole farm balance that exceeds the crop uptake need which results in the excess nutrients available to groundwater.
- The potential impact to groundwater quality is demonstrated by the on-site domestic wells and irrigation well sporadic values for the indicator parameters. EC and Nitrate were reported below the MCL for all wells. Area groundwater quality reported by the 2022 GSP depicts low impacts to groundwater. The CVDRMP and California CV-SALTS control efforts to date indicate impacts related to Nitrate, EC and other salt indicators. The referenced programs will be used to monitor results toward the future implementation of a corrective action plan elements.

The Correia Dairy Expansion project would concentrate animals and their wastes within the feeding areas, and to a lesser degree, within open corrals. The lined feed

lanes would flush wastes to the on-site wastewater management system for treatment and storage in a pond as referenced in the existing and proposed WMP as summarized below.

Existing Wastewater Storage Pond. The storage pond capacity can facilitate the storage of wastewater as described in the project NMP/WMP. According to the project applicant, the pond is earthen-lined constructed to the standards in place at that time. The existing dairy wastewater pond has the potential to impact groundwater because it contains elevated concentrations of inorganic and organic constituents, and because hydraulic pressure and gravity force liquids downward through soils to groundwater. However, since no changes to the existing pond construction or operation are proposed with the dairy modification, the hydraulic pressure within the existing pond and overall pond leakage would stay the same. Therefore, there would be no anticipated increase to groundwater quality impacts from the pond with implementation of the proposed project.

Corrals and Housing/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 result in a lower field by field nutrient balance. Farming cropping pattern, fresh water mix and exportation of manure off site results in a reduced whole farm nitrogen. The whole farm nitrogen balance ratio would be reduced to 1.36 for the proposed operation from 1.37 at the existing dairy facility, respectively.

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