

DAIRY MANURE DIGESTER AND CO-DIGESTER FACILITIES

Draft Program Environmental Impact Report
SCH No. 2010031085

Prepared for
California Regional Water Quality
Control Board, Central Valley Region

July 2010



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Arnold
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NOTICE OF AVAILABILITY

Opportunity for Public Comment on Draft Program Environmental Impact Report for a Waste Discharge Regulatory Program for Dairy Manure Digester and Co-Digester Facilities within the Central Valley Region (Region 5) (SCH #2010031085)

NOTICE IS HEREBY GIVEN that the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board), as the lead agency, has released a draft Program Environmental Impact Report (EIR) for a waste discharge regulatory program for dairy manure digester and co-digester facilities within the Central Valley Region (Region 5). The 45-day public review and comment period for the draft EIR is from July 8, 2010 until August 23, 2010. During the review period, the Central Valley Water Board will hold two public meetings to receive comments on the draft EIR.

BACKGROUND

The Program EIR assesses the environmental impacts associated with the Central Valley Water Board's waste discharge regulatory program ("the project") for dairy digester and co-digester (i.e., that use manure plus other organic feedstocks) facilities in Region 5. The Program EIR provides a programmatic analysis of the environmental impacts of the development of dairy manure digester and co-digester facilities and is intended to provide California Environmental Quality Act (CEQA) compliance for the Central Valley Water Board's waste discharge regulatory program for these facilities. Additionally, other State and local permitting agencies may tier off the Program EIR to satisfy CEQA requirements for other permits related to dairy manure digester and co-digester projects.

The proposed Central Valley Water Board waste discharge regulatory program will involve the adoption of one or more Waste Discharge Requirements (WDRs) General Orders to regulate the discharge to land of liquid and solid digestate generated from dairy manure digesters and dairy manure co-digester facilities located at individual dairies or at centralized facilities on or off-site of dairies within Region 5. Under the program, the Central Valley Water Board may also adopt Individual WDRs when the General Orders would not be applicable, as well as Conditional Waivers of WDRs when a waste discharge is found to have such low threat to water quality that a waiver of WDRs is not against the public interest pursuant to California Water Code §13269.

Significant Environmental Effects

The draft EIR evaluates and describes the potential environmental impacts associated with the construction and operation of dairy digester and co-digester facilities, identifies those impacts that could be significant, and presents mitigation measures, which, if adopted by the Central Valley Water Board or other responsible agencies, could avoid or minimize these impacts. Significant unavoidable impacts are identified for water quality and criteria air pollutants.

California Environmental Protection Agency

DOCUMENT AVAILABILITY

The draft Program EIR will be available for public review at the Rancho Cordova, Fresno, and Redding offices of the Central Valley Water Board during the review period:

Central Valley Water Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114
Phone: (916) 464-3291

Central Valley Water Board
1685 E Street
Fresno, CA 93706-2007
Phone: (559) 445-5116

Central Valley Water Board
415 Knollcrest Drive, Suite 100
Redding, CA 96002
Phone: (530) 224-4845

Electronic copies of the draft Program EIR can be downloaded in PDF format from the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/press_room/announcements

Copies may also be obtained by contacting Paul Miller of ESA, by phone at (916) 564-4500 or by e-mail (PMiller@esassoc.com); there will be a reasonable fee charged for a hardcopy or CD version of the draft Program EIR. Documents referenced in the draft EIR can be reviewed by appointment at the offices of ESA: 2600 Capitol Avenue, Suite 200; Sacramento, CA 95816.

PUBLIC MEETING AND SCHEDULE

Two public meetings will be held to provide participants with an opportunity to comment on the draft Program EIR.

Date:	Tuesday August 3, 2010	Wednesday August 4, 2010
Time:	6:30 PM – 8:00 PM	6:30 PM – 8:00 PM
Address:	Central Valley Water Board 1685 E Street Fresno, CA 93706	Central Valley Water Board 11020 Sun Center Drive, Suite 200 Rancho Cordova, CA 95670

Directions and location information to the Fresno and Rancho Cordova offices can be found on the Central Valley Water Board's website (next page):

http://www.waterboards.ca.gov/centralvalley/about_us/contact_us/

The facilities will be accessible to persons with disabilities. Individuals requiring special accommodations are requested to contact Stephen Klein at (559) 445-5558 at least five working days prior to the meeting. TTY users may contact the California Relay Service at (800) 735-2929 or voice line at (800) 735-2922.

Submission of Comments

The Central Valley Water Board will accept both written and oral comments regarding the adequacy of the draft Program EIR. Written comments should be submitted to Stephen Klein no later than **5:00 PM on August 23, 2010** (contact information below). Comments received after that date may not be used in staff's analysis and recommendation. Please indicate the project you are commenting upon in the subject line, "**Comment Letter – Dairy Digester and Co-Digester draft Program EIR.**" Please send your written comments regarding the draft Program EIR to:

Central Valley Water Board
Attn: Stephen Klein, Project Manager
1685 E Street
Fresno, CA 93706-2007

CONTACT INFORMATION

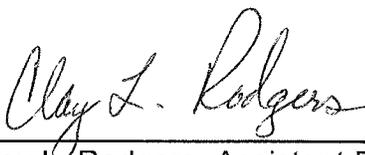
Additional information concerning the public review schedule for the draft Program EIR, or changes to the schedule, and information on the public meetings can be obtained by visiting the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/press_room/announcements

or by contacting Stephen Klein, by phone at (559) 445-5558 or by e-mail (sklein@waterboards.ca.gov). If you wish to receive ongoing information regarding the development of a dairy manure digester and co-digester waste discharge regulatory program, you may subscribe to the "Dairy Program" mailing list through our website at:

http://www.waterboards.ca.gov/resources/email_subscriptions/reg5_subscribe.shtml

or call Stephen Klein and request to be added to the mailing list. Please bring the above information to the attention of anyone you know who would be interested in this matter.



Clay L. Rodgers, Assistant Executive Officer
8 July 2010

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CHAPTER 1

Executive Summary

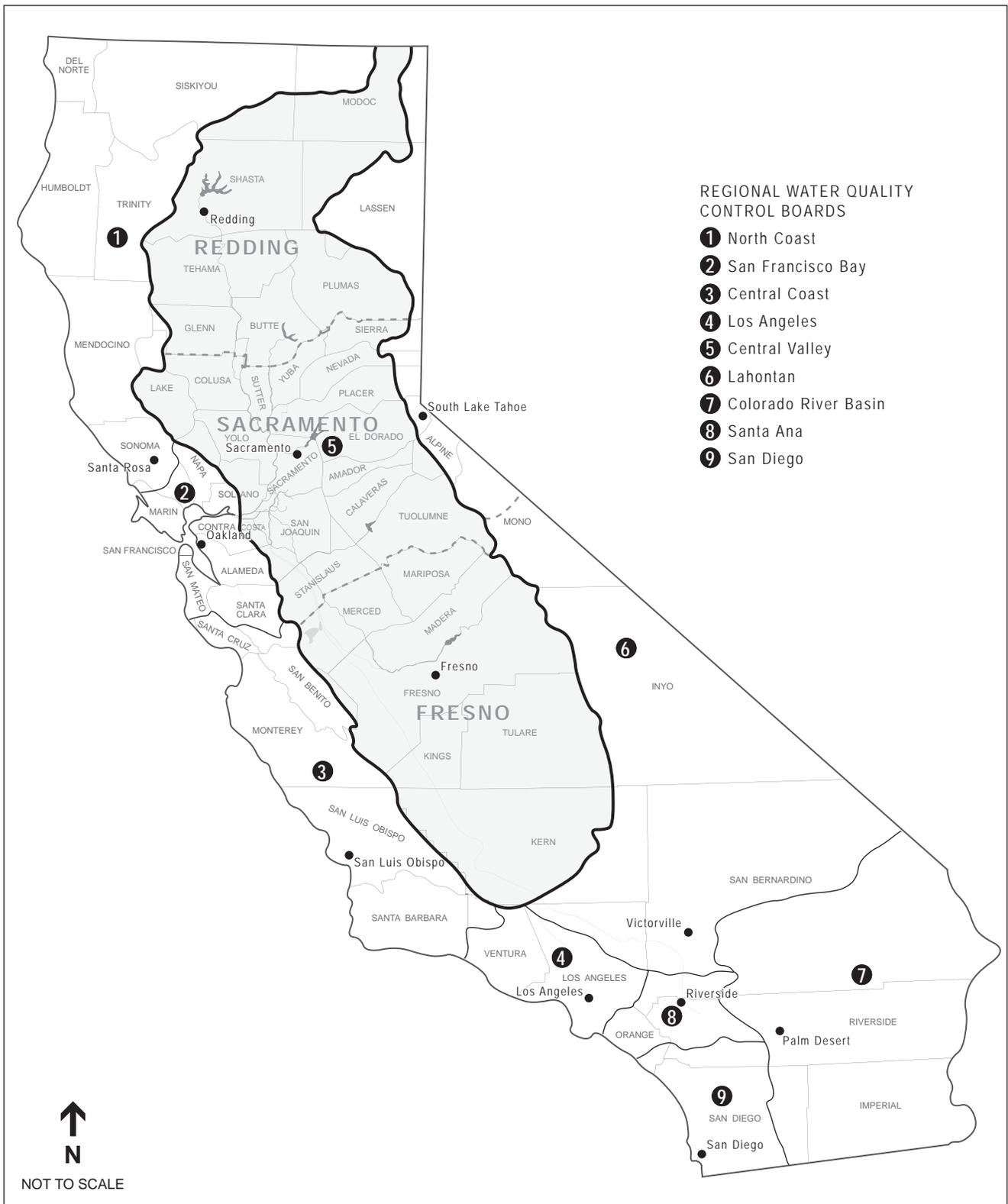
1.1 Summary

The California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) is the lead agency for this Program Environmental Impact Report (EIR) that assesses the environmental impacts associated with the Central Valley Water Board's waste discharge regulatory program ("the project") for dairy digester and co-digester (i.e., that use manure plus other organic feedstocks) facilities within the jurisdictional boundaries of the Central Valley Region (Region 5), see **Figure 1-1**. The Program EIR provides a programmatic analysis of the environmental impacts of the development of dairy manure digester and co-digester facilities and is intended to provide California Environmental Quality Act (CEQA) compliance for the Central Valley Water Board's waste discharge regulatory program for these facilities. Additionally, other State and local permitting agencies may tier off the Program EIR to satisfy CEQA requirements for other permits related to dairy manure digester and co-digester projects.

The Central Valley Water Board has proactively prepared this Program EIR to help support future development of dairy manure digester and co-digester projects in Region 5. Dairy manure digester and co-digester projects can provide benefits to the State by generating renewable energy and by reducing greenhouse gas (GHG) emissions. With these benefits as a driving force for preparing the Program EIR, the primary objectives for the waste discharge regulatory program include the following:

- Protect the beneficial uses of surface and groundwater¹ within the Central Valley Region from discharges to land associated with dairy manure digesters and co-digesters on or off-site of dairies.
- Provide a regulatory framework for the water quality aspects of anaerobic biological digestion facilities using dairy manure and dairy manure with other organic substrates (co-digestion) to produce biogas (a flexible renewable fuel source).
- Assist the State in meeting GHG reduction measures in support of the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) through the production of biogas from dairy manure.
- Provide a renewable green energy source to allow energy companies to help achieve the 2010 and 2020 California Renewables Portfolio Standard (RPS) through the production of biogas from dairy manure.

¹ Beneficial uses are described in *Water Quality Control Plan for the Tulare Lake Basin*, Second Edition, revised January 2004 (Tulare Lake Basin Plan) and *Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basins*, Fourth Edition, revised September 2009 (Sacramento and San Joaquin Basin Plan).



SOURCE: Central Valley Water Board, 2009; and ESA, 2010

Central Valley Dairy Digester and Co-Digester Program EIR . 209481

Figure 1-1
California Regional Water Quality Control Boards

- Reduce the time required to develop and issue water quality permits for dairy manure digester and co-digester projects by more than 75 percent primarily through the issuance of one or more Waste Discharge Requirements (WDRs) General Orders (GOs) and secondarily through the issuance of Individual WDRs or Conditional Waivers of WDRs (CWs).
- Reduce the permitting time for other State and local agencies² with discretionary permit responsibilities by providing a Program EIR that can be relied upon or tiered from for statewide environmental and regulatory settings, project alternatives analyses and cumulative impacts analyses

The waste discharge regulatory program will regulate the discharge of liquid and solid digestate for dairy digester and co-digester facilities in Region 5. The Central Valley Water Board maintains authority and responsibility for implementing and enforcing water quality laws regulations, policies and plans to protect the groundwater and surface waters within Region 5 under the Porter-Cologne Water Quality Control Act.

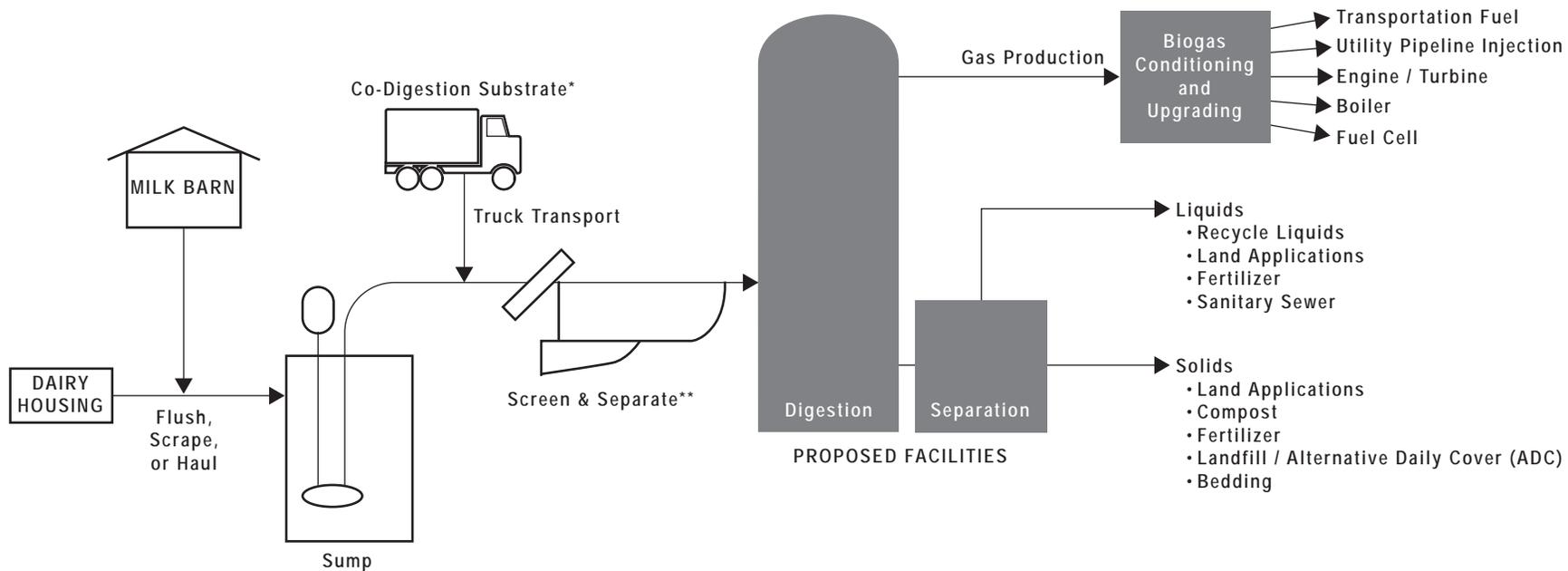
To meet the objectives, the Central Valley Water Board is proposing to adopt one or more GOs to regulate the discharge to land of liquid and solid digestate generated from dairy manure digesters and dairy manure co-digester facilities located at individual dairies or at centralized facilities on or off-site of dairies within Region 5. Under the program, the Central Valley Water Board may also adopt Individual WDRs when the GOs would not be applicable, as well as CWs when a waste discharge is found to have such low threat to water quality that a waiver of WDRs is not against the public interest pursuant to California Water Code §13269.

1.2 Description of Dairy Digester Facilities and Feedstocks

The adoption by the Central Valley Water Board, of orders under the waste discharge regulatory program (i.e., primarily GOs and secondarily Individual WDRs or CWs), would facilitate the development of new dairy digesters and co-digesters within Region 5. Therefore, this Program EIR evaluates the effects of development of these facilities, including construction and operation.

For the purpose of this Program EIR, dairy digester and co-digester development is expected to take place on individual dairies and at centralized facilities located on and off-site of dairies. **Figure 1-2** is an overview of the basic function and layout of a dairy manure digester or co-digester facility. Chapter 3 of the Program EIR provides more details on the various processes, including a description of the three basic types of dairy digesters (i.e., ambient-temperature covered lagoon digesters, plug-flow digesters, and complete mix digesters).

² San Joaquin Valley Air Pollution Control District staff have estimated that the certification of the Program EIR will reduce air quality permitting time 50 percent or more for certain digester projects.



* If co-digestion will be implemented at facility

** Screen & Separate - this step may be needed to remove straw, sand, and silt (Burke, 2001)

Individual Dairy Digesters

This facility type includes the addition of anaerobic digestion (AD) facilities, either dairy manure digester or co-digester facilities, onto an individual dairy. An individual dairy is an operation that houses dairy cows and collects and processes manure. Digester or co-digester facilities would be located within the footprint of the dairy operations.

Centralized Locations

There are two categories of centralized location facilities for dairies that will be assessed in this Program EIR: (1) Central AD Facility, whereby individual dairies would collect manure and transport the manure by pipeline or truck to a central facility; and (2) a Central Biogas Clean-Up Facility, whereby raw biogas from individual dairies (including dairies linked via underground gas pipelines) is piped to a central facility. These types of centralized facilities may be sited on or off-site of dairies. For both location options, the central facility would have the potential to receive manure, manure plus co-digestion substrate, and/or raw biogas.

Feedstock

The feedstock for dairy manure digesters would be either manure only, or the addition of other organic substrates to manure for dairy co-digesters. The feedstocks for co-digestion could include food processing residues, the organic fraction of municipal solid waste, fats, oils, grease, agricultural residues, and biomass energy crops. The addition of other organic substrates to the manure waste stream as part of co-digestion can dramatically increase the generation of biogas compared to a manure-only digester system. Co-digestion substrates can increase the electrical capacity of a proposed system by a magnitude five times or greater than that of dairy manure alone. Technically, digestion of dairy manure alone is straightforward; the difficulty is in the economics. The use of co-digestion substrates is generally considered by dairy digester project developers as an important element that can be used to help achieve project viability.

1.3 Environmental Impacts and Mitigation Measures

Potential environmental impacts of the project are summarized in **Table 1-1** at the end of this chapter. For each significant impact, the table indicates whether the impact would be mitigated to a less than significant level. Please refer to Chapters 5 through Chapter 15 in this draft Program EIR for a complete discussion of each impact. As discussed in Chapter 2, a Mitigation Monitoring and Reporting Program (MMRP) will be prepared at the time of the Final Program EIR for this project.

Development of dairy digesters could result in significant adverse environmental impacts. Suggested mitigation measures are identified in this Program EIR that would avoid or reduce all but two of the potentially significant impacts to a less than significant level.

The following significant adverse impact would be unavoidable, even with implementation of mitigation measures:

- Impact 5.6 – Development of dairy digester and co-digester facilities, together with anticipated cumulative development in the area, could contribute to cumulative water quality impacts.
- Impact 6.6 – The criteria air pollutant emissions from the cumulative development of dairy manure digester and co-digester facilities in Region 5 (200 total digesters at a rate of 20 digesters or co-digesters per year for 10 years) were compared to and exceeded the significance thresholds of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for both annual construction emissions and operational emissions.

In the case where potentially significant impacts cannot be feasibly mitigated, a “Statement of Overriding Considerations” must be included in the record of project approval of the Program EIR by the Central Valley Water Board.

Notably, the development of dairy digesters would have substantial benefits in regards to reducing GHG emissions in comparison to existing manure management practices. Also, the draft EIR includes mitigations that could reduce the air quality impacts of individual dairy manure digester and co-digester projects to a less-than-significant level.

1.4 Areas of Controversy and Unresolved Issues

For the most part, comments received from dairy owners, dairy representatives, and the Technical Advisory Group (TAG) assembled for the project have been supportive of the goals of the Program EIR to reduce the time required to develop water quality permits and other discretionary permits for dairy manure digester and co-digester facilities and centralized facilities. The development of dairy manure digester facilities is capital intensive and getting a project started would benefit from any assistance in minimizing the cost of permitting facilities and/or identifying a more certain path to obtaining permits.

The areas of controversy identified included the following:

- Multiple concerns from one commenter about increased ammonia emissions that would result from the project. Literature reviews and discussions with the SJVAPCD staff did not support the concerns expressed about increased ammonia emissions.
- A general concern has been expressed by several parties about the addition of co-digestion substrates to the dairy manure digesters. The most common concern is that the addition of co-digestion substrates will add nutrients and salts to the digestate and that many dairies will not be able to land apply these “additional” nutrients and salts (i.e., added via the imported co-digestion substrates).
- Some stakeholders have expressed the concern that meeting the new stringent SJVAPCD nitrogen oxide (NO_x) emission standards (9-11 parts per million [ppm]) is infeasible, but others indicate that existing systems can generate power and meet the standard. The SJVAPCD strongly disagrees that achieving 9-11 ppm is infeasible for new operations. The SJVAPCD reports that the two newest San Joaquin Valley dairy digester power-production operations are currently operating in compliance with this standard. The SJVAPCD contends that, while operations that can achieve this standard are more expensive to construct and operate than their more polluting counterparts, they are a

necessary part of controlling air pollution in the San Joaquin Valley, one of the most polluted air basins in the country.

1.5 Alternatives

The purpose of the alternatives analysis in an EIR is to describe a range of reasonable alternatives to the project that could feasibly attain the objectives of the project, and to evaluate the comparative merits of the alternatives (CEQA Guidelines §15126.6(a)).

Additionally, CEQA Guidelines §15126.6(b) requires consideration of alternatives that could avoid or substantially lessen any significant adverse environmental effects of the proposed project, including alternatives that may be more costly or could otherwise impede the project's objectives. The range of alternatives considered must include those that offer substantial environmental advantages over the proposed project and may be feasibly accomplished in a successful manner considering economic, environmental, social, technological, and legal factors.

The following alternatives are discussed in Chapter 17, "Alternatives:"

- Alternative 1 - "No Project" Alternative. The No Project Alternative is required by CEQA. According to the CEQA Guidelines, the No Project Alternative shall discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.
- Alternative 2 - "Additional Co-Digester Substrate Restrictions" Alternative. This alternative would apply three additional restrictions to the use of co-digestion substrates in dairy manure digesters. First, it would prohibit the use of co-digestion substrates that originate from outside the regional aquifer. Second, it would prohibit the use of co-digestion substrates until dairies have identified and secured an appropriate destination or market for the additional digestate that would be generated by the additional co-digestion substrates. Finally, the alternative would regulate that volume of materials processed by dairy manure digester facilities.
- Alternative 3 - "Thermal Conversion" Alternative. The Thermal Conversion Alternative would replace anaerobic digesters with thermal conversion technologies. Under the Thermal Conversion Alternative, the regulatory program would apply to the construction and operation of thermal conversion facilities for the production of biogas from dairy manure.
- Alternative 4 - "The Reduced NOx Emissions Alternative" would limit the use of combustion engines in the generation of electricity by requiring or developing incentives for biogas uses from dairy digester facilities that minimize nitrogen oxide (NOx) emissions in the Central Valley (i.e., fuel cells, transportation fuels and injection into utility gas pipelines). NOx emissions are a precursor to the formation of ozone that are generated by internal combustion engines and microturbines. Combustion of biogas generates electricity but it also generates NOx emissions. This alternative involves the use of technologies or strategies that would reduce NOx emissions in the air basin. By limiting energy production to the use of fuel cells or for utility pipeline injection or for development of transportation fuel, significant unavoidable cumulative air quality impacts from the emission of NOx would be reduced.

CEQA requires that an EIR identify which among the alternatives is the "environmentally superior alternative". Table 17-1 in the Alternatives Chapter indicates that the Additional Co-digestion Substrate Restrictions Alternative, and the Reduced NOx Emissions Alternative each would have

reduced impacts in some environmental resource areas when compared to the project and none of the potential impacts for these two alternatives are greater than impacts of the proposed project. The Additional Co-digestion Substrate Restrictions Alternative has restrictions on co-digestion substrates that could potentially provide additional protection for the water resources in Region 5. By reducing NOx emissions that would have an incremental beneficial effect to all Region 5 residents, the Reduced NOx Emissions Alternative provides the most potential benefit to the greatest number of residents of the Central Valley. To the extent that the technology required for the Reduced NOx Emissions Alternative becomes feasible and cost effective, this Alternative would constitute the environmentally superior alternative.

Regardless of their potential benefits, both the Additional Co-digestion Substrate Restrictions Alternative, and the Reduced NOx Emissions Alternative place restrictions on the development of dairy manure digester and co-digester projects that could further restrict future growth of digesters in Region 5. Dairy digester development would be restricted by the high costs and/or additional regulatory hurdles of the technologies associated with the Reduced NOx Emissions Alternative (i.e., fuel cells, transportation fuel, and utility pipeline injection). Dairy digester development would also be restricted by additional limitations contained in the Additional Co-digestion Substrate Restrictions Alternative. By likely restricting the development of dairy digesters in Region 5, both the Additional Co-digestion Substrate Restrictions Alternative, and the Reduced NOx Emissions Alternative would have a negative influence on two of the primary objectives of the project, which are the development of a renewable energy resource (biogas) and the reduction of GHG emissions from dairy operations. Accordingly, some environmental benefits would as a practical matter be lost under these alternatives. Given the existing technological and economic constraints, therefore, these alternatives cannot be said to be clearly environmentally superior to the proposed project.

**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
5. Hydrology and Water Quality			
Impact 5.1: Construction associated with installation of dairy digesters and co-digester facilities could generate loose, erodible soils that may impair water quality.	None required.	LS	LS
Impact 5.2: Digester and co-digester development could adversely affect surface waters.	<p>Measure 5.2: WDRs for digester and co-digester facilities shall include design and operational requirements to manage all wastes and discharges to protect surface waters. Requirements shall include the following:</p> <ul style="list-style-type: none"> • Prohibitions against any surface water discharges (unless covered by separate NPDES permit), • Prohibitions against any discharges that would cause exceedance of surface water quality objectives, • Setbacks from surface water bodies • Drainage requirements for co-digestion substrates/waste storage/receiving/handling areas to drain to on-site wastewater retention ponds, • Lining requirements for retention ponds in new facilities and operational dairies, • Monitoring requirements that include sampling data of soils, retention water, and waste streams to reconcile annually with Nutrient Management Plan (NMP), • Requirements for tailwater return systems to minimize offsite discharges; • Prohibitions against any unreasonable effects on beneficial uses of nearby surface waters. 	S	LSM
Impact 5.3: Digester and co-digester development could adversely affect groundwater quality.	<p>Measure 5.3: WDRs for the discharge to land from dairy digester and co-digester facilities shall include the following BPTC requirements or equivalent:</p> <ul style="list-style-type: none"> • Prepare and implement site-specific Salt Minimization Plan (SMP) as approved by the Central Valley Water Board; • Prepare and implement a site-specific NMP that includes a soils and groundwater monitoring and reporting program that include a variety of waste constituents, as well as yearly reconciliation based on sampling results that measure agronomic rates; • Require all drainage be directed to a retention wastewater pond that has been designed to meet antidegradation provisions of Resolution 68-16 by an appropriately licensed professional; • Prohibit, decommission, or reduce use of regenerative water softeners on process water distribution networks or, alternatively, evaluate and install alternate technology that reduces or eliminates on-site brine disposal; • To the extent practicable, use crops that maximize salt uptake; • Apply liquid digestate consistently with crop water uptake rates; • Prohibit hazardous substances in co-digestion substrates processed by each facility as verified by laboratory analytical testing; 	S	LSM

LS – Less than Significant

LSM – Less than Significant with Mitigation

NI – No Impact

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SU – Significant and Unavoidable

**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
	<ul style="list-style-type: none"> • Apply digestate at an approved rate commensurate with agronomic rate; • Properly time application of digestate in accordance with crop requirements; • Avoid excess irrigation; • Maintain cover crops and vegetative buffer zones; • Develop co-substrate acceptance criteria; • Develop and implement a vector attraction reduction plan; • Monitor digestate, and groundwater for pathogen indicator organisms; • Require that solid wastes be stored on impermeable surfaces; • Maintain a neutral or alkaline pH for dairy digestate waste water applied to cropland • Prohibit hazardous waste, mammalian tissues, dead animals, and human waste from all discharges; and • Incorporate lined digester and co-digestion substrate storage facilities that meet the antidegradation provisions of Resolution 68-16, as relevant, into project design in order to prevent groundwater contamination with salts, nutrients, and other constituents. <p>Each facility shall prepare a site-specific BPTC plan in accordance with the WDR requirements for review and approval to the Central Valley Water Board prior to commencement of operations. Annual monitoring reports shall be reviewed by the Central Valley Water Board and any revisions deemed necessary to the handling, storage, or land application of wastes shall be incorporated into facility operations.</p>		
Impact 5.4: Development of dairy digester and co-digester facilities could be exposed to flooding hazards.	Mitigation Measure 5.4: WDRs for digester and co-digester facilities shall include design requirements for individual or centralized anaerobic digester or co-digester facilities, application croplands, and associated facilities to protect them from FEMA 100-year flood events. Design measures may include, but are not limited to: facility siting, access placement, grading foundation soils above projected water elevation, and site protection.	S	LSM
Impact 5.5: Development of dairy digester and co-digester facilities could require additional water supplies resulting in depletion of groundwater.	None required.	LS	LS
Impact 5.6: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to water quality.	Mitigation Measure 5.6: Implement Mitigation Measures 5.2, 5.3 and 5.4.	S	SU
6. Air Quality and Greenhouse Gas Emissions			
Impact 6.1: Construction of dairy digester and co-digester facilities within Region 5 would generate short-term emissions of criteria air pollutants: ROG, NOx, CO, SO ₂ , PM10, and PM2.5 that could contribute to existing nonattainment conditions and further degrade air quality.	Measure 6.1a: Applicants shall prepare and submit an Air Quality Technical Report as part of the environmental assessments for the development of future dairy digester or co-digester facilities on a specific project-by-project basis. The technical report shall include an analysis of potential air quality impacts (including a screening level analysis to determine if construction and operation related criteria air pollutant emissions would exceed applicable air district thresholds, as well as any health risk associated with TACs from all dairy digester or co-digester facility sources) and reduction measures as necessary	S	LSM

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
	<p>associated with digester developments through the environmental review process. Preparation of the technical report should be coordinated with the appropriate air district and shall identify compliance with all applicable New Source Review and Best Available Control Technology (BACT) requirements. The technical report shall identify all project emissions from permitted (stationary) and non-permitted (mobile and area) sources and mitigation measures (as appropriate) designed to reduce significant emissions to below the applicable air district thresholds of significance, and if these thresholds cannot be met with mitigation, then the individual digester project could require additional CEQA review or additional mitigation measures.</p> <p>Measure 6.1b: Applicants shall require construction contractors and system operators to implement the following Best Management Practices (BMPs) as applicable during construction and operations:</p> <ul style="list-style-type: none"> • Facilities shall be required to comply with the rules and regulations from the applicable AQMD or APCD. For example, development of dairy digester and co-digester facilities in the SJVAPCD jurisdiction shall comply with the applicable requirements of Regulation VIII (Fugitive PM10 Prohibitions) and Rule 9510 (Indirect Source Review). • Use equipment meeting, at a minimum, Tier II emission standards, as set forth in §2423 of Title 13 of the California Code of Regulations, and Part 89 of Title 40 Code of Federal Regulations. • Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes (as required by the state airborne toxics control measure [Title 13, §2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site. • Comply with state regulations to minimize truck idling. • Maintain all equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated. • Use electric equipment when possible. • Payment into an AQMD or APCD operated Voluntary Emission Reduction Agreement (VERA). • Incorporate fuel cells where feasible as an alternative to internal combustion engines, which generate NOx emissions, to generate energy from the biogas produced at dairy digester and co-digester facilities. • Where feasible as an alternative to internal combustion engines, which generate NOx emissions, use biogas from dairy manure digester and co-digester projects as a transportation fuel (compressed biomethane) or inject biomethane into the utility gas pipeline system. 		
Impact 6.2: Pre-processing, digestion, and post-processing operational activities of dairy digester and co-digester facilities in Region 5 would result in emissions of criteria air pollutants at levels that could substantially contribute to a potential violation of applicable air quality standards or to nonattainment conditions.	Mitigation Measure 6.2: Implement Mitigation Measures 6.1a and 6.1b.	S	LSM

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
Impact 6.3: Operation of dairy digester and co-digester facilities in Region 5 could create objectionable odors affecting a substantial number of people.	<p>Measure 6.3a: Applicants for the development of digester facilities shall comply with appropriate local land use plans, policies, and regulations, including applicable setbacks and buffer areas from sensitive land uses for potentially odoriferous processes.</p> <p>Measure 6.3b: Applicants shall implement an Odor Management Plan (OMP) as part of each application submitted to establish digester and co-digester facilities. The OMP will specifically address odor control associated with digester operations and will include:</p> <ul style="list-style-type: none"> • A list of potential odor sources. • Identification and description of the most likely sources of odor. • Identification of potential, intensity, and frequency of odor from likely sources. • A list of odor control technologies and management practices that could be implemented to minimize odor releases. These management practices shall include the establishment of the following criteria: <ul style="list-style-type: none"> – Establish time limit for on-site retention of undigested co-substrates (i.e., organic co-substrates must be put into the digester within 48 hours of receipt). – Provide negative pressure buildings for indoor unloading. Treat collected foul air in a biofilter or air scrubbing system. – Establish contingency plans for operating downtime (e.g., equipment malfunction, power outage). – Manage delivery schedule to facilitate prompt handling of odorous co-substrates. – Modification options for land application practices if land application of digestate results in unacceptable odor levels. – Protocol for monitoring and recording odor events. – Protocol for reporting and responding to odor events. 	S	LSM
Impact 6.4: Construction and operation of dairy digester and co-digester facilities in Region 5 could lead to increases in chronic exposure of sensitive receptors in the vicinity to certain toxic air contaminants from stationary and mobile sources.	<p>Measure 6.4a: Implement Mitigation Measures 6.1a and 6.1b.</p> <p>Measure 6.4b: Based on the Air Quality Technical Report (specified in Measure 6.1a), if the health risk is determined to be significant on a project-by-project basis with DPM as a major contributor, then the applicants shall either use new diesel engines that are designed to minimize DPM emissions (usually through the use of catalyzed particulate filters in the exhaust) or retrofit older engines with catalyzed particulate filters, which will reduce DPM emissions by 85%.</p> <p>Measure 6.4c: H₂S contained in the biogas shall be scrubbed.</p>	S	LSM
Impact 6.5: Construction and operation of dairy digester and co-digester facilities in Region 5 would reduce GHG emissions.	None required.	NI	NI
Impact 6.6: Development of dairy digester and co-digester facilities in Region 5, together with anticipated cumulative development in the area, would contribute to regional criteria pollutants.	Mitigation Measure 6.6: Implement Mitigation Measures 6.1a and 6.1b.	S	SU

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
7. Land Use and Agricultural Resources			
Impact 7.1: The project would not physically divide an established community.	None required.	LS	LS
Impact 7.2: The project would not result in dairy digester and co-digester facilities that could conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.	None required.	LS	LS
Impact 7.3: Implementation of the project would not conflict with an applicable habitat conservation plan or natural community conservation plan.	None required.	LS	LS
Impact 7.4: Implementation of the project could result in the permanent conversion of land designated by the Department of Conservation FMMP as Prime Farmland, Farmland of Statewide Importance or Unique Farmland.	Measure 7.4: Whenever feasible, off-site project related facilities should not be sited on Important Farmland as defined by the California Department of Conservation's Farmland Mapping and Monitoring Program.	LS	LS
Impact 7.5: The project would not result in conflicts with existing zoning for agricultural use or a Williamson Act contract.	None required.	LS	LS
Impact 7.6: Implementation of the project would not result in the conversion of farmland to non-agricultural uses.	None required.	LS	LS
Impact 7.7: Development of dairy digester and co-digester facilities would not result in cumulative land use impacts or cumulative impacts to agricultural resources.	None required.	LS	LS
8. Transportation and Traffic			
Impact 8.1: Construction of dairy digester and co-digester facilities would intermittently and temporarily increase traffic levels and traffic delays due to vehicle trips generated by construction workers and construction vehicles on area roadways.	Measure 8.1: The contractor(s) will obtain any necessary road encroachment permits prior to installation of pipelines within the existing roadway right-of-way. As part of the road encroachment permit process, the contractor(s) will submit a traffic safety / traffic management plan (for work in the public right-of-way) to the agencies having jurisdiction over the affected roads. Elements of the plan will likely include, but are not necessarily limited to, the following: <ul style="list-style-type: none"> Develop circulation and detour plans to minimize impacts to local street circulation. Use haul routes minimizing truck traffic on local roadways to the extent possible. Use flaggers and/or signage to guide vehicles through and/or around the construction zone. To the extent feasible, and as needed to avoid adverse impacts on traffic flow, schedule truck trips outside of peak morning and evening commute hours. Limit lane closures during peak traffic hours to the extent possible. Restore roads and streets to normal operation by covering trenches with steel plates outside of allowed working hours 	S	LSM

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
	<p>or when work is not in progress.</p> <ul style="list-style-type: none"> Limit, where possible, the pipeline construction work zone to a width that, at a minimum, maintains alternate one-way traffic flow past the construction zone. Install traffic control devices as specified in Caltrans' Manual of Traffic Controls for Construction and Maintenance Work Zones where needed to maintain safe driving conditions. Use flaggers and/or signage to safely direct traffic through construction work zones. Coordinate with facility owners or administrators of sensitive land uses such as police and fire stations, hospitals, and schools. Provide advance notification to the facility owner or operator of the timing, location, and duration of construction activities. To the maximum extent feasible, maintain access to private driveways located within construction zones. Coordinate with the local public transit providers so that bus routes or bus stops in work zones can be temporarily relocated as the service provider deems necessary. 		
Impact 8.2: Operations of dairy digester and co-digester facilities would increase traffic volumes on roadways serving the facility sites.	None required.	LS	LS
Impact 8.3: Construction and operation of dairy digester and co-digester facilities could potentially cause traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways, and could increase traffic hazards due to possible road wear or to accident spills of manure, or co-digestion feedstocks or digestate.	<p>Measure 8.3a: Implement Measure 8.1, which stipulates actions required of the contractor(s) to reduce potential traffic safety impacts to a less-than-significant level.</p> <p>Measure 8.3b: Prior to construction, the contractor(s), in cooperation with the agencies having jurisdiction over the affected roadways, will survey and describe the pre-construction roadway conditions on rural roadways and residential streets. Within 30 days after construction is completed, the affected agencies will survey these same roadways and residential streets in order to identify any damage that has occurred. Roads damaged by construction will be repaired to a structural condition equal to the condition that existed prior to construction activity.</p>	S	LSM
Impact 8.4: Construction of dairy digester and co-digester facilities could intermittently and temporarily impede access to local streets or adjacent uses (including access for emergency vehicles), as well as disruption to bicycle/pedestrian access and circulation.	Mitigation Measure 8.4: Implement Measure 8.1, which stipulates actions required of the contractor(s) to reduce potential access impacts to a less-than-significant level.	S	LSM
Impact 8.5: Construction and operation of dairy digester and co-digester facilities could contribute to cumulative impacts to traffic and transportation (traffic congestion, traffic safety, and emergency vehicle access).	<p>Measure 8.5a: Prior to construction, the project sponsor will coordinate with the appropriate local government departments, Caltrans, and utility districts and agencies regarding the timing of construction projects that would occur near project sites. Specific measures to mitigate potential significant impacts will be determined as part of the interagency coordination, and could include measures such as employing flaggers during key construction periods, designating alternate haul routes, and providing more outreach and community noticing.</p> <p>Measure 8.5b: Implement Mitigation Measures 8.1 and 8.3b.</p>	S	LSM

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
9. Biological Resources			
Impact 9.1: The project could impact special-status plant or wildlife species or their habitats.	<p>Measure 9.1a: The project applicant or agency(s) responsible shall submit, as part of the NOI, a site assessment report for dairy digester and co-digester facilities to be constructed (including the location of digestate application) in areas that contain undisturbed land and/or any agricultural fields that have been fallow for more than 1 year. This report shall be prepared by a qualified biologist. It shall evaluate the project site's potential to support special-status plant and wildlife species (including critical habitat) and whether special-status species could be affected by dairy digester and co-digester development, including construction and operations. If there are no special-status species or critical habitat present, no additional mitigation would be required.</p> <p>Measure 9.1b: If the site assessment determines that special-status species could be affected by facilities development, the project would not be eligible as part of the project (for the Central Valley Water Board discharge permit) unless the applicant submits a plan, prepared by a qualified biologist, to mitigate or avoid any significant impacts on special-status species. This plan must be forwarded to the appropriate regional office of the CDFG, the Endangered Species Unit of the USFWS in Sacramento, and/or NMFS for review and approval of the mitigation strategy, when appropriate. If the site assessment determines that a State or federally listed species would be affected by facilities development, the project applicant shall consult with CDFG, the Endangered Species Unit of the USFWS in Sacramento, and/or NMFS, as appropriate.</p>	S	LSM
Impact 9.2: The project could result in impacts on biologically unique or sensitive natural communities.	<p>Measure 9.2a: The project applicant or agency(s) responsible shall submit, with the NOI, a site assessment report prepared by a qualified biologist that determines if the project is likely to affect biologically unique or sensitive natural communities. This information could be included in the report prepared under Mitigation Measure 9.1a. If there are no biologically unique or sensitive natural communities present, no further mitigation is required.</p> <p>Measure 9.2b: If biologically unique or sensitive natural communities are present and would be disturbed, the project would not be authorized under the project unless the applicant or agency(s) responsible submits a plan to avoid or mitigate for any significant impacts on biologically unique or sensitive natural communities and agrees to implement the mitigation. This report must be forwarded to the appropriate regional office of the CDFG and/or the Endangered Species Unit of the USFWS in Sacramento (as appropriate) for review and approval of the mitigation strategy. As described above, this portion of the report could be incorporated into the report prepared under Mitigation Measure 9.1a.</p>	S	LSM
Impact 9.3: The project could result in impacts on waters of the State and/or the U.S., including wetlands.	<p>Measure 9.3a: The project applicant or agency(s) responsible shall submit, with the NOI, a site assessment report prepared by a qualified biologist that evaluates if the project is likely to affect waters of the State and/or U.S., including wetlands. This information could be included in the report prepared under Mitigation Measure 9.1a. If there are no waters present, no further mitigation would be required.</p> <p>Measure 9.3b: If waters of the State and/or U.S. are present in the project area, the project applicant or agency(s) responsible shall either re-design the project to avoid affecting the waters, or obtain the appropriate permits to allow for the impact. For waters that cannot be avoided, the permit process shall start with the preparation of a jurisdictional wetland delineation, prepared by a qualified biologist that will be submitted to the Corps for verification. Following verification, if jurisdictional waters occur within the project site, the project applicant or agency(s) responsible shall obtain and comply with federal and State permit requirements. This could include obtaining a Clean Water Act Section 404 permit, Section 401 Water</p>	S	LSM

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
	Quality Certification or Waiver, a Section 1602 Streambed Alteration Agreement, and any other applicable permits.		
Impact 9.4: The project would not result in impacts on migratory corridors or native wildlife nursery sites.	None required	LS	LS
Impact 9.5: Dairy digester and co-digester facilities would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	None required.	LS	LS
Impact 9.6: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to biological resources.	Mitigation Measure 9.6: Implement Measures 9.1a, 9.1b, 9.2a, 9.2b, 9.3a, and 9.3b.	S	LSM
10. Hazards and Hazardous Materials			
Impact 10.1: Construction of dairy digester and co-digester facilities could result in the potential exposure of construction workers, the public and the environment to preexisting soil and/or groundwater contamination.	<p>Mitigation Measure 10.1: Prior to final project design and any earth disturbing activities, the applicant or agency(s) responsible shall conduct a Phase I Site Assessment. The Phase I Environmental Site Assessment (ESA) shall be prepared by a Registered Environmental Assessor (REA) or other qualified professional to assess the potential for contaminated soil or groundwater conditions at the project site; specifically in the area proposed for construction of dairy digester or co-digester facilities. The Phase I ESA shall include a review of appropriate federal and State hazardous materials databases, as well as relevant local hazardous material site databases for hazardous waste on-site and off-site locations within a one quarter mile radius of the project site. This Phase I ESA shall also include a review of existing or past land uses and areal photographs, summary of results of reconnaissance site visit(s), and review of other relevant existing information that could identify the potential existence of contaminated soil or groundwater.</p> <p>If no contaminated soil or groundwater is identified or if the Phase I ESA does not recommend any further investigation then the project applicant or agency(s) responsible shall proceed with final project design and construction.</p> <p>OR</p> <p>If existing soil or groundwater contamination is identified and if the Phase 1 ESA recommends further review, the applicant or agency(s) responsible shall retain a REA to conduct follow-up sampling to characterize the contamination and to identify any required remediation that shall be conducted consistent with applicable regulations prior to any earth disturbing activities. The environmental professional shall prepare a report that includes, but is not limited to, activities performed for the assessment, summary of anticipated contaminants and contaminant concentrations at the proposed construction site, and recommendations for appropriate handling of any contaminated materials during construction.</p>	S	LSM
Impact 10.2: Transportation, use, disposal or accidental spill of hazardous materials during construction of dairy digester and co-digester facilities would not result in the potential exposure of construction workers, the public and the environment to hazardous materials.	None required.	LS	LS

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
Impact 10.3: Transportation, use, disposal or accidental spill of hazardous materials during the operation and maintenance of dairy digester and co-digester facilities would not result in the potential exposure of the public or the environment to hazardous materials.	None required.	LS	LS
Impact 10.4: Operation of dairy digester and co-digester facilities would not result in the release of biogas which could increase the risk of fire hazards.	None required.	LS	LS
Impact 10.5: Dairy digester and co-digester facilities could be located within a one quarter mile of a school resulting in potential hazards associated with accidental release of hazardous materials, including biogas.	Mitigation Measure 10.5: Dairy digester and co-digester facilities shall be sited at least one quarter mile from existing or proposed schools, daycare facilities, hospitals and other sensitive land uses.	LS	LS
Impact 10.6: Installation of biogas pipelines in public rights-of-way could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Mitigation Measure 10.6: Implement Mitigation Measure 8.1.	S	LSM
Impact 10.7: Development of dairy digester and co-digester facilities could contribute to cumulative impacts related to hazardous materials.	Mitigation Measure 10.7: Implement Mitigation Measures 10.1 and 10.5.	LS	LS
11. Aesthetic Resources			
Impact 11.1: Implementation of the project, including operation of dairy digester and co-digestion facilities, could result in impacts to scenic highways and/or scenic vistas.	<p>Mitigation Measure 11.1a: Centralized biogas processing facilities shall be sited in locations that do not conflict with local policies for preservation of vistas or scenic views.</p> <p>Mitigation Measure 11.1b: When feasible considering the scale of the facilities and the site specific topography, site specific landscape design, including berms and/or tree rows, shall be constructed in order to minimize potentially sensitive views of both digester facilities at dairies or off dairies at centralized facilities.</p> <p>Mitigation Measure 11.1c: Centralized biogas processing facilities shall be designed similarly in massing and scale to other nearby agricultural buildings in agricultural areas, in order to retain the character of the surrounding visual landscape.</p>	S	LSM
Impact 11.2: Construction of the project could result in impacts to scenic highways and/or scenic vistas.	<p>Mitigation Measure 11.2: The project shall incorporate into all construction contracts for the proposed project and ensure implementation of the following measures:</p> <ul style="list-style-type: none"> • Main construction staging areas and the storage of large equipment shall be situated on individual sites in such a manner to minimize visibility to nearby receptors. As feasible, staging areas and storage shall occur away from heavily traveled designated scenic roadways, in areas where it will be least visible from the surrounding roads. • Construction staging areas shall be onsite and remain clear of all trash, weeds and debris, etc. Construction staging areas shall be located in areas that limit visibility from scenic roadways and sensitive receptors to the extent feasible. 	S	LSM

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
Impact 11.3: Implementation of the project could result in substantial creation of or change in light or glare.	Mitigation Measure 11.3: Whenever possible, flares shall be situated on individual sites in such a manner to minimize visibility to nearby receptors. Site specific design shall discourage placement of flares at higher elevations, or within the line of site of nearby residential buildings or scenic highways. In the event that site design does not provide adequate coverage, an enclosed flare design shall be used or landscaping, such as berms or tree rows, shall be constructed to minimize light impacts.	S	LSM
Impact 11.4: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to aesthetics.	Mitigation Measure 11.4: Implement Mitigation Measures 11.1a, 11.1b, 11.1c, 11.2, and 11.3.	S	LSM
12. Cultural Resources			
Impact 12.1: Construction of dairy digester and co-digester facilities could result in the adverse change in the significance of a historical or archaeological resource, pursuant to §15064.5.	<p>Measure 12.1a: In order to determine whether a project may cause a significant impact to cultural resources, and therefore, have an adverse effect on the environment, the Central Valley Water Board shall require a project-specific cultural resources inventory and evaluation with each application submitted to establish a digester or co-digester facility (COHP 2001). A project-level cultural resources inventory and evaluation shall be required prior to project implementation to provide a thorough assessment of the project's potential direct, indirect, and cumulative impacts on historical resources or significant archaeological resources during construction and installation, in adherence to established regulations, standards, and policies to avoid or minimize potential impacts.</p> <p>For projects that constitute federal undertakings, as described in the Federal Agencies section of the Introduction (Chapter 2), the cultural resources study shall be prepared in accordance with Section 106 of the NHPA. The cultural resources study and inclusive mitigation measures shall form the basis for the cultural resources component of the project-level environmental documentation prepared for the project under Section 106 (NPS 1991).</p> <p>Prior to ground-disturbing activities, the project applicant or agency(s) responsible shall retain a qualified professional archaeologist, who meets the Secretary of the Interior's professional qualifications standards for archaeology (36 CFR §61), to (1) conduct a research search at the appropriate information center of the California Historical Resources Information System (CHRIS) to determine whether the project area has been previously surveyed and whether cultural resources were identified within the project area, and if the project area is considered sensitive for the presence of cultural resources; (2) request a Sacred Lands search from the NAHC to determine whether known sacred sites or traditional cultural resources are situated within the project area; and (3) request a contact list from the NAHC of Native American tribes, groups or individuals who may have information about the project area, and contact the listed parties requesting information and any concerns about the project.</p> <p>In the event the CHRIS records search indicates that no previous survey has been conducted, the qualified archaeologist shall recommend whether a survey is warranted to satisfy the requirements of CEQA based on the sensitivity of the project area for cultural resources. As necessary, prior to the start of ground disturbance, the project applicant or agency(s) responsible shall retain a qualified archaeologist to conduct the recommended project-level survey in compliance with CEQA requirements (14 CCR §15064.5 and PRC §21083.2) and in accordance with the standards set by the Secretary of the Interior.</p> <p>After completion of the survey, the qualified archaeologist shall complete a technical report documenting the results of all work, and any cultural resources identified during the survey shall be formally recorded</p>	S	LSM

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
	<p>on Department of Parks and Recreation series 523 forms. The report shall follow the Office of Historic Preservation's ARMR guidelines (<i>Archaeological Resource Management Reports: Recommended Contents and Format</i>) (COHP 1990). The report shall include assessment of the significance of identified resources according to the applicable local, State and federal significance criteria, assessment of the sensitivity of the project area for cultural resources, and recommend appropriate procedures to either further investigate, or mitigate adverse impacts in conformance with the protocols set forth in 14 CCR §15126.4. The final technical report shall be approved by the lead agency prior to the initiation of any ground-disturbing activities. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure. The final written report should be submitted to the appropriate CHRIS information center(s) within three (3) months after the work has been completed.</p> <p>If cultural resources within a project area identified by the searches at the CHRIS or NAHC or during the survey are considered potentially significant, the project applicant or agency(s) responsible shall undertake additional studies to evaluate the resources' NRHP or CRHR eligibility and to recommend further mitigative treatment. Evaluations shall be based on surface remains, subsurface testing, archival and ethnographic resources, and in the framework of the historic context and important research questions of the project area.</p> <p>If cultural resources within a project area identified by the searches at the CHRIS or NAHC, during the survey, or by the evaluation process are determined significant historical resources, the lead agency must review and approve treatment measures devised by the project applicant or agency(s) responsible, in concert with a qualified archaeologist, or architectural historian for built environmental resources, and other concerned parties, to ameliorate any "substantial adverse change" in the significance of each <u>historical resource</u> resulting from project implementation. When a project may impact historical resources on State lands, consultation with California's Office of Historic Preservation (OHP) is required pursuant to PRC §5024. The SHPO may also be consulted regarding appropriate treatment measures for historical resources.</p> <p>Treatment measures for historical resources that are archaeological or ethnographic in nature may include preservation through avoidance or project redesign, incorporation within open space or conservation easements, covering with a layer of sterile soil, data recovery excavation, photodocumentation (including low-level aerial photography, video, and scale drawings), or similar measures. Treatment measures for historical resources that are architectural in nature may include Historic American Buildings Survey/Historic American Engineering Report (HABS/HAER) documentation to formally document historic resources through the use of large-format photography, measured drawings, written architectural descriptions, and historical narratives. Such documentation packages are entered into the Library of Congress, and a second copy is generally archived in the regional information centers of the CHRIS. In the event of building relocation, the Lead agency shall ensure that any alterations to significant buildings or structures conform to the <i>Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings</i> (Grimmer and Weeks 1992). All final documentation of mitigative treatment for historical resources of an archaeological or architectural nature to be impacted by the project will be approved by the Lead agency prior to the initiation of any project ground-disturbing activities.</p> <p>If cultural resources identified within a project area are neither a historical resource nor unique archaeological resource, there would be no significant effect to the environment and no further treatment of those</p>		

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**TABLE 1-1
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
	<p>known resources would be required.</p> <p>Measure 12.1b: Inadvertent discovery measures for cultural resources shall be implemented during all construction activities within the project area. Measures shall include procedures for discovery and protection of cultural resources, including human remains, during construction or earth-disturbing activities. If human remains are discovered during construction or earth-disturbing activities, the applicant shall halt all activities and contact the appropriate authorities in compliance with PRC §5097.98.</p> <p>The project applicant or agency(s) responsible shall implement inadvertent discovery measures during all construction activities within the project area. Within project areas of identified archaeological sensitivity, measures would include: (1) a worker education course for all construction personnel; (2) monitoring of all earth-disturbing activities by a qualified archeologist; and (3) procedures for discovery of cultural resources, including human remains, during construction or ground-disturbing activities if an archaeological monitor is not present. If known traditional cultural resources are located within the project area or if the potential for discovery of buried traditional cultural resources is high, a culturally affiliated Native American, with knowledge in cultural resources, should also be retained to monitor all ground-disturbing activities. Monitoring within recent fill deposits would not be required.</p> <p>The worker education course for all construction personnel will be conducted immediately prior to initiation of ground-disturbing activities. The course will explain the importance of, and legal basis for, the protection of significant archaeological resources. Each worker will also learn the proper procedures to follow in the event cultural resources or human remains/burials are uncovered during construction activities, including work curtailment or redirection and to immediately contact their supervisor and the archaeological monitor. The worker education session will include visuals of artifacts (prehistoric and historic) that might be found in the project vicinity, and may include handouts.</p> <p>The project applicant or agency(s) responsible shall provide an on-site qualified archeological monitor during all earth-disturbing activities, including but not limited to grading, excavation, trenching, or removal of existing features of the subject property, within project areas considered sensitive for the discovery of buried archaeological resources. If an unknown cultural resource were discovered, the monitor(s) shall have the authority to halt all ground-disturbing activities within 100 feet of the find, and the resource should be immediately evaluated by the qualified archaeologist. If the find is determined to be a significant historical resource and the archaeological resource cannot be avoided, then applicable mitigation measures for significant resources will be completed (e.g., preservation in place, data recovery program pursuant to PRC §21083.2[i]). During evaluation or mitigative treatment, ground disturbance and construction work could continue on other parts of the project area.</p> <p>In the event an archaeological monitor is not present when cultural resources, including human remains, are discovered during construction or ground-disturbing activities, the project applicant or agency(s) responsible shall halt all activities within 100 feet of the find until a qualified professional archaeologist can evaluate it. The archaeologist will examine the findings, assess their significance, and recommend appropriate procedures to either further investigate or mitigate adverse impacts (e.g., adverse effect on a significant historical resource) to the resources encountered in conformance with the protocols set forth in PRC §5097.98. Any human remains encountered during construction will be treated in accordance with HSC §7050.5.</p>		

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ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
Impact 12.2: Construction of dairy digester and co-digester facilities could result in the disruption of human remains, including those interred outside formal cemeteries.	Mitigation Measure 12.2: Implement inadvertent discovery measures for the protection of cultural resources, including human remains (Measure 12.1b).	S	LSM
Impact 12.3: Construction of dairy digester and co-digester facilities could result in direct or indirect disturbance or destruction of a unique paleontological resource or site or unique geologic feature.	Mitigation Measure 12.3: If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, all ground disturbing activities within 50 feet of the find shall be halted until a qualified paleontologist can assess the significance of the find and, if necessary, develop appropriate salvage measures in consultation with the lead agency and in conformance with Society of Vertebrate Paleontology Guidelines (SVP, 1995; SVP, 1996). Additional guidance may be found in <i>Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources</i> (SVP 2010).	S	LSM
Impact 12.4: Development of dairy digester and co-digester facilities could contribute to cumulative impacts related to archaeological, historical, and/or paleontological resources.	Mitigation Measure 12.4: Implement Measures 12.1a, 12.1b, 12.2, and 12.3.	S	LSM
13. Geology			
Impact 13.1: The project could expose people to injury and structures to damage resulting from seismic activity.	Measure 13.1: Prior to construction, project applicants or agency(s) responsible shall ensure that dairy digester facilities are designed and construction techniques are used that comply with relevant local, State and federal regulations and building code requirements. Requirements could include, but might not be limited to: <ul style="list-style-type: none"> Preparation of site-specific soil and geotechnical engineering studies performed by a licensed professional including, but not limited to, a geologist, engineering geologist, certified soil scientist, certified agronomist, registered agricultural engineer, registered civil or structural engineer, and/or certified professional erosion and sediment control specialist with expertise in geotechnical engineering issues who is registered and/or certified in the State of California, to determine site specific impacts and to recommend site specific mitigations. The site specific soil and geotechnical engineering studies shall be submitted to the all appropriate State and local regulatory agencies including, but not limited to, the CVRWQCB and the city or county engineering department for review and approval. The project applicant or agency(s) responsible shall implement all feasible recommendations addressing potential seismic hazards and soil constraints; and Implementation of CBC design requirements 	S	LSM
Impact 13.2: The project could expose people to injury and structures to damage resulting from unstable soil conditions.	Mitigation Measure 13.2: Implement Mitigation Measure 13.1.	S	LSM
Impact 13.3: Construction of project facilities would not result in an increase in the erosion of soils which could result in a loss of top soil.	None required	LS	LS
Impact 13.4: Development of dairy digester and co-digester facilities would not contribute to cumulative impacts related to geology, soils and seismicity.	None required	LS	LS

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ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
14. Noise			
Impact 14.1: Construction of dairy digester and co-digester facilities could temporarily increase noise levels at nearby sensitive receptor locations or result in noise levels in excess of standards in local general plans, noise ordinance, or other applicable standards.	<p>Measure 14.1a: Construction activities shall be limited to daytime hours, between 7 a.m. and 6 p.m., Monday through Saturday, or an alternative schedule established by the local jurisdiction.</p> <p>Measure 14.1b: Construction equipment noise shall be minimized by muffling and shielding intakes and exhaust on construction equipment to a level no less effective than the manufacture's specifications, and by shrouding or shielding impact tools.</p> <p>Measure 14.1c: Construction contractors within 750 feet of sensitive receptors shall locate fixed construction equipment, such as compressors and generators, and construction staging areas as far as possible from nearby sensitive receptors.</p> <p>Measure 14.1d: Construction contractors shall comply with all local noise ordinances and regulations.</p>	S	LSM
Impact 14.2: Noise from operation of dairy digester and co-digester facilities or centralized facilities could substantially increase ambient noise levels at nearby land uses or result in noise levels in excess of standards in local general plans, local noise ordinances, or other applicable standards.	Mitigation Measure 14.2: Any continuous equipment operating at night within 1,000 feet of a sensitive receptor must be enclosed. Furthermore, an acoustic study and follow-up measurements must be performed (after construction) to prove that the noise from any continuous equipment operating at night would comply with all local noise regulations. If no local regulations are available, noise levels must be below 45 dBA at the nearest sensitive receptor. If the sound level exceeds local regulations, or 45 dBA if applicable, additional sound-proofing shall be installed to meet the required sound level.	S	LSM
Impact 14.3: Project operational activities associated with transportation would not increase ambient noise levels at nearby land uses.	None required.	LS	LS
Impact 14.4: Development of dairy digester and co-digester facilities could result in a cumulative increase in noise levels.	Mitigation Measure 14.4a: Implement Mitigation Measures 14.1a through Measure 14.1d and Measure 14.2, above.	S	LSM
15. Public Services			
Impact 15.1: The project would not substantially increase demands on fire protection services.	None required.	LS	LS
Impact 15.2: The project would not conflict with wastewater treatment requirements of the Central Valley Water Board.	None required.	LS	LS
Impact 15.3: The project could result in significant environmental effects from the construction and operation of new water and wastewater treatment facilities or expansion of existing facilities.	<p>Measure 15.3a: If the project proposes to obtain water from a water supplier (irrigation district, municipal system or other public water entity), the developer would enter into an agreement for service with the supplier.</p> <p>Measure 15.3b: If the project proposes to obtain wastewater service from a wastewater treatment provider (municipal or other public entity), the developer would enter into an agreement for service with the provider.</p>	S	LSM
Impact 15.4: The project would not result in significant environmental effects from the construction of new stormwater treatment facilities or expansion of existing facilities.	None required.	LS	LS
Impact 15.5: The project would not require significant levels of new or expanded water supply resources or entitlements.	None required.	LS	LS

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ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Impact	Mitigation Measure	Impact Significance	
		Before Mitigation	After Mitigation
Impact 15.6: The project could result in exceeding the capacity of a wastewater treatment provider.	Measure 15.6: If the project proposes to obtain wastewater service from a wastewater treatment provider (municipal or other public entity), implement Mitigation Measure 15.3b.	S	LSM
Impact 15.7: The project could result in the construction new energy supplies and could require additional energy infrastructure.	Mitigation Measure 15.7: Implement Mitigation Measures for construction of energy infrastructure including Mitigation Measures 6.1b, 9.1a, 9.1b, 9.2a, 9.2b, 9.3b, 12.1b, 12.2, 12.3, and 14.1a-c.	S	LSM
Impact 15.8: The project would not conflict with existing energy policies or standards.	None required.	NI	NI
Impact 15.9: Development of dairy digester and co-digester facilities would not contribute to cumulative impacts to public services and utilities.	None required.	LS	LS

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CHAPTER 2

Introduction

The California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) is proposing a waste discharge regulatory program which will involve the adoption of one or more Waste Discharge Requirements (WDRs) General Orders (GOs) to regulate the discharge of liquid and solid digestate generated from dairy manure digesters and dairy manure co-digester projects (i.e., that use manure plus other organic feedstocks) within the jurisdictional boundaries of the Central Valley Region (Region 5). This Program Environmental Impact Report (EIR) will serve to meet California Environmental Quality Act (CEQA) requirements for the Central Valley Water Board's consideration of orders issued under this waste discharge regulatory program. Once adopted, these orders would permit the discharge to land from dairy manure digester and co-digester projects located on or off-site of dairies and would specify the terms and conditions of such discharges.

The Program EIR is intended to provide a comprehensive analysis of the environmental impacts of the development of dairy manure digester and co-digester facilities, including construction and operation. As such, it is expected to facilitate and enhance the CEQA process for individual dairy manure digester and co-digester facilities throughout Region 5. Further, the GOs would establish a notification and permit review process for the owners and operators of both the digester and the dairy (i.e., when located at a dairy) who intend to apply liquid and solid digestate generated from dairy manure digesters and co-digester projects to land. The GOs will contain discharge prohibitions, discharge and applicable specifications, transportation and storage requirements, and general procedures to protect surface and groundwater quality.

In addition to one or more GOs, under this waste discharge regulatory program, the Central Valley Water Board may also develop and adopt Individual WDRs to provide permit coverage for dairy digester and co-digester facilities for which the GOs would not be applicable. Further, the Central Valley Water Board may develop and adopt Conditional Waivers of WDRs (CWs) under this waste discharge regulatory program in instances where a waste discharge is found to have such low threat to water quality that the Central Valley Water Board finds that a waiver of WDRs is not against the public interest pursuant to California Water Code §13269. Such waivers are conditional, may not exceed five years in duration, and may be terminated by the Central Valley Water Board at any time.

This chapter briefly describes the background of the development of the regulatory program for digesters using manure and other organic feedstocks in Region 5. In addition, the chapter describes the purpose of the Program EIR that is being prepared in accordance with CEQA and the State CEQA Guidelines, the scope of issues to be addressed, and the organization of the draft Program EIR.

2.1 Project Background

Several statewide actions require the increased future use of renewable energy in California and provide impetus for the Central Valley Water Board to move forward in the development of a waste discharge regulatory program for dairy digesters.

On August 23, 2005, Governor Schwarzenegger asked the Bioenergy Interagency Working Group (Working Group), composed of state agencies with jurisdictional or mandate interests, to continue work on the California Biomass Collaborative. The California Biomass Collaborative looked to develop an integrated and comprehensive state policy on biomass, which includes electricity, natural gas, and petroleum substitution potential. Reducing municipal solid waste, which a wide range of conversion technologies can capture, was also a policy component. The Working Group developed recommendations for a Bioenergy Action Plan for California (Bioenergy Action Plan) and sent the Governor its final Working Group Report in April 2006. The Governor's Office responded with publication of the Bioenergy Action Plan on July 13, 2006 (California Energy Commission, 2006).

On November 17, 2008, Governor Schwarzenegger issued Executive Order S-14-08 to streamline California's renewable energy project approval process and increase the State's Renewable Portfolio Standard renewable energy load target to 33 percent by 2020. This order directs all State regulatory agencies to give priority to renewable energy projects to meet the Governor's directives. The order affects projects such as the one proposed in this Program EIR and the anticipated Program EIR being prepared by the Department of Resources Recycling and Recovery (CalRecycle) for anaerobic digester facilities that would use food waste, green material, and mixed solid waste as feedstocks; thus diverting these materials from landfills.

To implement the Bioenergy Action Plan, the State Water Resources Control Board (State Water Board) adopted Resolution No. 2007-0059 (September 18, 2009) which renewed the State Water Board's commitment to identify clear and consistent procedures for permitting biomass facilities, and to conduct prompt reviews of planning documents, CEQA documents, and monitoring proposals for biomass facilities. The Bioenergy Action Plan recommended that California "consider ways to simplify siting and permitting" of bioenergy products in order to overcome "complex and time-consuming permitting process(es)." Development of a Central Valley Water Board regulatory program for digesters using manure and other organic feedstocks is one of several initiatives by the State of California in response to Governor Schwarzenegger's call for a consistent and coordinated state policy on bioenergy.

Once certified, the Program EIR may be used by other state and local agencies with discretionary permit responsibilities to expedite the review process by providing the first tier review of a project. Specifically, staff at the Air Resources Board with concurrence of the San Joaquin Valley Air Pollution Control District have identified that the Program EIR will help to reduce air quality permitting time for certain digester projects.

2.2 Purpose of Program EIR

The primary purpose of this draft Program EIR is to inform public agency decision makers and the public generally of any significant environmental effects associated with the project (i.e., development of waste discharge regulatory program) which would facilitate the development of new dairy manure digesters and co-digesters in Region 5. Additionally, the draft Program EIR identifies ways to minimize significant effects of the project, and describes reasonable alternatives to the program that would avoid or reduce the project's significant effects (CEQA Guidelines §15121[a]). CEQA requires that all state and local government agencies consider the environmental consequences of programs and projects over which they have discretionary authority before taking action on them.

This draft Program EIR assesses the broad range of environmental impacts associated with the construction and operations of dairy digester and co-digester facilities in Region 5. The Program EIR is intended to provide CEQA compliance for the water quality GOs, Individual WDRs, or CWs issued by the Central Valley Water Board to the owners and operators of those facilities. The Program EIR should also allow other State, and local permitting agencies that issue discretionary permits to tier off the Program EIR to satisfy CEQA requirements (CEQA Guidelines §15168[c])(see Chapter 3, Program Description).

The Program EIR analyzes the environmental impacts of digester and co-digester facilities sited both on and off dairies. The Program EIR is not intended to consider the environmental impacts of the dairy operations unrelated to the digester facilities. Where a digester or co-digester is to be located on a dairy, in permitting of the full facility under the waste discharge regulatory program, the Central Valley Water Board may rely on or tier off of the Program EIR but must additionally establish CEQA compliance for the non-digester related dairy operations.

2.2.1 Central Valley Water Board

The Central Valley Water Board is the CEQA lead agency for this Program EIR. As the CEQA lead agency, the Central Valley Water Board is responsible for considering the effects, both individual and collective, of all activities involved in the project before certifying the Program EIR and subsequently approving the project. For the project, the Central Valley Water Board will develop a regulatory program involving water quality GOs, Individual WDRs, and CWs which will, subsequent to certification of this Program EIR, be issued by the Central Valley Water Board to the owners and operators of dairy digester facilities that meet the Central Valley Water Board standards and requirements.

GOs, Individual WDRs, and CWs under this program would contain terms and conditions to implement the requirements of the Porter-Cologne Act, Title 27 of the California Code of Regulations, Division 2, Subdivision 1, Chapter 7, Subchapter 2, Article 1 (Title 27); the Water Quality Control Plan for the Tulare Lake Basin, Second Edition, 1995 (Tulare Lake Basin Plan); the Water Quality Control Plan for the Sacramento and the San Joaquin River Basins, Fourth Edition, 1998 (Sacramento and San Joaquin Basin Plan); and the State Water Board Resolution No. 68-16

(Antidegradation Policy); and other applicable Central Valley Water Board or State Water Board plans and policies.

The GOs, Individual WDRs, and CWs under this program would be applicable to the following types of digester projects:

- New co-digestion facilities to be constructed on an existing General Order Dairy¹ without an expansion of dairy operations;
- New manure only digester or co-digester facilities to be constructed on an existing General Order Dairy with an expansion of dairy operations;
- New manure only digester or co-digester facilities proposed to be constructed at new dairies;
- Centralized manure digester or co-digester facilities on a General Order Dairy, with or without an expansion; and
- Centralized, stand-alone manure digester or co-digester facilities not located on a dairy.
- General Order Dairies with manure only digesters using only manure generated by onsite animals will remain under the Dairy General Order but may, if required, submit a Notice of Intent seeking coverage under a dairy digester General Order.

This Program EIR evaluates the effects of proposed discharges as well as the physical dairy manure digester facilities within the above categories. The Central Valley Water Board permitting process will require future dairy manure digester permit applicants to submit specific information to address environmental issues and mitigation measures identified through this Program EIR process prior to obtaining coverage under a GO, Individual WDR, or CWs.

As stated previously, where a digester or co-digester is to be located on a dairy, in permitting of the full facility under the waste discharge regulatory program, the Central Valley Water Board may rely on or tier off of the Program EIR but must additionally establish CEQA compliance for the non-digester related dairy operations.

2.2.2 Other Agencies

As described above, other federal, state and local agencies may also use some or all of the analysis presented in the Program EIR document for purposes of project review and permitting to regulate manure digester and co-digester facilities. This includes agencies that are responsible for permits and/or approvals related to the construction and operation of dairy digester and co-digester facilities. These entities could tier off or rely on this Program EIR to meet the requirements of CEQA, and may also require agency-specific requirements be met. Regulatory requirements for other agencies are presented in the Program EIR (see Section 3.7 Other Agency Approvals).

¹ Dairies that are currently regulated under Order No. R5-2007-0035, Waste Discharge Requirements General Order for Existing Milk Cow Dairies (General Order Dairy).

State and Local Agencies

It is anticipated that future individual dairy digester projects will require permits or other discretionary actions from state and local agencies other than the Central Valley Water Board. These agencies, acting as responsible agencies, could rely on or tier off this Program EIR in order to comply with CEQA. Future specific projects must be examined on a project specific basis, in light of the Program EIR, to determine whether additional environmental documentation is necessary. If a responsible agency determines that, in compliance with CEQA Guidelines §15162, no new effects would occur and no new mitigation would be required, the agency can rely on this existing Program EIR to comply with CEQA. In the event that it is determined that a future dairy digester project would result in new or substantially greater impacts, including site-specific impacts, the agency may require the preparation of a subsequent environmental document which can be tiered from this Program EIR (as described below).

Federal Agencies

It is anticipated that some dairy digestion and co-digestion facilities may use federal funding or require federal authorizations for development and construction. Examples of federal agencies that may fund, permit, or otherwise authorize the construction of these facilities include the U.S. Department of Agriculture, U.S. Department of Energy, Environmental Protection Agency, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service. Federal agencies may use the analysis within this Program EIR when preparing documents to comply with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code (USC) §4321, et seq.) as well as other federal regulatory compliance documents.

NEPA requires federal agencies to consider potential environmental impacts of projects with federal involvement and to consider appropriate mitigation measures. NEPA is applicable to projects that are federal undertakings, which may include projects with involvement by a United States government agency. As defined in 36 Code of Federal Regulations (CFR) §800.16(y), a federal undertaking means a “project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval.” Undertakings are determined based on the type of action proposed as described above. Further, when federal and state laws, regulations and standards are applicable to a project, joint planning processes, environmental research, public hearings, and environmental documents are encouraged (40 CFR §1506.2). It is anticipated that most federal actions associated with individual dairy digester and co-digester development would be evaluated under an Environmental Assessment when not categorically excluded from NEPA.

2.3 CEQA Process

This section summarizes the steps of the CEQA process relevant to this Program EIR. As described below, the key steps in this process are:

- Notice of Preparation (NOP)

- Draft Program EIR
- Public Review and Comments on the Draft Program EIR
- Final Program EIR and Certification of the Program EIR

2.3.1 Type of EIR

This draft Program EIR has been prepared pursuant to CEQA Guidelines §15168. CEQA defines a Program EIR as one “which may be prepared on a series of actions that can be characterized as one large project and are related either:

- Geographically;
- As logical parts in the chain of contemplated actions;
- In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program; or
- As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.”

Under CEQA, a Program EIR assesses and documents the broad environmental impacts of a program with the understanding that a more detailed site-specific review may be required to assess future projects implemented under the program.

Subsequent projects would be examined in the light of the Program EIR to determine whether an additional environmental document must be prepared (CEQA Guidelines §15168). A subsequent environmental document may be “tiered” from the Program EIR, pursuant to CEQA Guidelines §15152 and 15168. “Tiering” refers to the use of analysis from a broader EIR, with later EIRs and negative declarations prepared for subsequent narrower projects, concentrating on issues specific to the later projects.

2.3.2 Notice of Preparation

In accordance with §15082(a), 15103, and 15375 of the CEQA Guidelines, Central Valley Water Board prepared and circulated a NOP of a draft Program EIR for the proposed project for a 30-day comment period, between March 18, 2010 and April 23, 2010. Public scoping meetings were held to provide the public with an opportunity to comment on the appropriate scope and content of the draft Program EIR. Three meetings were held during the 30-day comment period, each from 5:30 p.m. to 7:00 p.m. at Central Valley Water Board offices as follows: March 24 (Rancho Cordova); March 30 (Fresno); and April 7 (Rancho Cordova). Appendix NOP contains a copy of the NOP and the Initial Study Checklist that was issued with the NOP.

2.3.3 Draft Program EIR

This document constitutes the draft Program EIR. The draft Program EIR contains a description of the project, environmental setting, potential project impacts, and measures that would mitigate impacts found to be potentially significant. The document also describes and evaluates alternatives to the project.

It should be noted that within the Initial Study checklist, various impacts were determined to be potentially significant. Following subsequent additional analysis during the draft Program EIR, many of these impacts were determined to be less than significant.

As required by CEQA, this draft Program EIR focuses on significant or potentially significant environmental effects (CEQA Guidelines §15143). As discussed above, the NOP was prepared to identify issues to be evaluated in this draft Program EIR. Comments received on the NOP helped to further refine the list of environmental issues to be evaluated. All of the impacts evaluated in this document, including those considered to be less-than-significant, are summarized in **Table 1-1** in **Chapter 1, Executive Summary**.

2.3.4 Public Review

The draft Program EIR will be distributed directly to numerous agencies, organizations, and interested groups and persons for comment during the 45-day public review period. The document will also be available for public review at the Rancho Cordova, Fresno, and Redding offices of the Central Valley Water Board during the review period:

California Regional Water Quality Control Board
 Central Valley Region
 11020 Sun Center Drive, Suite 200
 Rancho Cordova, CA 95670-6114
 Phone: (916) 464-3291

California Regional Water Quality Control Board
 Central Valley Region
 1685 "E" Street, Suite 100
 Fresno, CA 93706-2007
 Phone: (559) 445-5116

California Regional Water Quality Control Board
 Central Valley Region
 415 Knollcrest Drive, Suite 100
 Redding, CA 96002
 Phone: (530) 224-4845

Electronic copies of the draft Program EIR can be downloaded in PDF format for no charge from the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/press_room/announcements

Copies may also be obtained by contacting Paul Miller, by phone at (916) 564-4500 x1277 or by e-mail (pmiller@esassoc.com); there will be a reasonable fee charged for a hardcopy or CD version of the draft Program EIR.

Written comments or questions concerning the draft Program EIR must be directed to the name and address listed below by no later than 5:00 p.m. on Monday, August 23, 2010.

Central Valley Water Board
Attn: Stephen Klein, Project Manager
1685 E Street
Fresno, California 93706
Telephone (559) 445-5558

Central Valley Water Board will also receive public input on the draft Program EIR at two meetings before making a decision on the project. The dates, times, and locations for the public meetings on the draft Program EIR are provided in the Notice of Availability included at the beginning of this draft Program EIR. Public comment is encouraged during the 45-day public review period. Additional information concerning the public review schedule for the draft Program EIR, or changes to the schedule, and information on the public hearings can be obtained by visiting the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/press_room/announcements

or by contacting Jennifer Tencati, by phone at (916) 658-0180 x131 or by e-mail (j.tencati@circlepoint.com).

2.3.5 Final Program EIR and Certification

Written and oral comments received in response to the draft Program EIR will be addressed in a response to comments document, which, together with the draft Program EIR, will constitute the final Program EIR. The Central Valley Water Board will then review the final Program EIR, staff recommendations, and public testimony and decide whether to certify the Program EIR and whether to approve, approve with changes, or deny the project.

If the Central Valley Water Board approves the project, even though significant impacts identified by the Program EIR cannot be mitigated, the Central Valley Water Board must state in writing the reasons for its actions. A statement of overriding considerations must be included in the record of the project approval and mentioned in the notice of determination (Public Resources Code §21081; CEQA Guidelines, §15093[c]).

2.3.6 Mitigation Monitoring and Reporting Program

CEQA Statutes (§21081.6(a)(1) of the Public Resources Code) require public agencies, as part of the certification of an EIR, to prepare and approve a mitigation monitoring or reporting program. A Mitigation Monitoring and Reporting Program (MMRP) will be prepared at the time of the Final Program EIR for this project and will identify the specific timing and roles and responsibilities for implementing mitigation measures. This MMRP will be structured to ensure that changes to the project that the lead agency has adopted to mitigate or avoid significant environmental impacts are carried out during project implementation.

Throughout this draft Program EIR, mitigation measures have been clearly identified and presented in language that will facilitate establishment of the MMRP. Mitigation measures are listed in **Table 1-1 in Chapter 1, Executive Summary**.

2.4 References

California Energy Commission, 2006. Bioenergy Action Plan for California, California Energy Commission Publication number CEC-600-2006-010. July 13 2006.

State of California, 2010a. State of California, *California Environmental Quality Act*, Public Resources Code, Division 13, Sections 21000 through 21177, as amended January 1, 2010.

State of California, 2010b. State of California, Guidelines for California Environmental Quality Act, California Code of Regulations, Title 14, Chapter 3, Sections 15000 through 15387, as amended January 1, 2010.

CHAPTER 3

Program Description

3.1 Introduction

This draft Program Environmental Impact Report (EIR) has been prepared for the Central Valley Water Board to evaluate the environmental effects of a waste discharge regulatory program to permit the waste discharge to land from dairy manure digester and co-digester projects located on or off-site of dairies within the jurisdictional boundaries of the Central Valley Water Board (Region 5). The Central Valley Water Board is responsible for implementing and enforcing water quality laws regulations, policies and plans to protect the groundwater and surface waters within Region 5 under the Porter-Cologne Water Quality Control Act. Throughout the Program EIR the development of the program will be referred to as the “project”.

As identified in the Chapter 2, Introduction, the Central Valley Water Board is proposing as part of a waste discharge regulatory program to adopt one or more Waste Discharge Requirements (WDRs) General Orders (GOs) to regulate the discharge of liquid and solid digestate generated from dairy manure digesters and dairy manure co-digester projects. Dairy manure digesters process only manure and dairy manure co-digester projects process manure plus a broad variety other organic substrates. This Program EIR will serve to meet CEQA requirements for orders issued under this waste discharge regulatory program. Once adopted by the Central Valley Water Board, these orders would permit discharge by multiple dairy manure digester and co-digester projects and specify the terms and conditions of such discharges.

The Program EIR is intended to provide a programmatic analysis of the environmental impacts of the development of dairy manure digester and co-digester facilities and is expected to reduce permitting time for future dairy manure digester and co-digester projects throughout Region 5. The GOs, which are the primary focus of proposed waste discharge regulatory program (i.e., one of the goals of the waste discharge regulatory program is maximize the number of dairy digester facilities covered under the GOs), would establish a notification and permit review process for the owners and operators of both the digester and the dairy (i.e., when the digester is located at a dairy) ¹ who intend to apply liquid and solid digestate generated from dairy manure digesters and co-digester projects to land.

¹ As explained in chapter, this draft Program EIR does not analyze the impacts from the dairy itself, independent of the digester facility, except where cumulative impacts are implicated. Where a digester or co-digester is to be located on a dairy, in permitting of the full facility under the waste discharge regulatory program, the Central Valley Water Board will establish CEQA compliance for the non digester-related dairy operations by showing existing CEQA compliance or preparing a tiered CEQA analysis.

Liquid and solid digestate application to land is considered to be a “discharge” to waters of the State, as defined in the Porter-Cologne Water Quality Act. The GOs issued under this waste discharge regulatory program will contain discharge prohibitions, discharge and applicable specifications, transportation and storage requirements, and general procedures to protect surface and groundwater quality. More specifically, with regard to the waste discharge regulatory program, **Table 3-1** summarizes the discharges that are likely to result from a dairy digester operation and how those discharges will be potentially regulated under the program.

**TABLE 3-1
WASTE DISCHARGE REGULATORY PROGRAM**

What are likely discharges that the Central Valley Water Board will regulate under the waste discharge regulatory program?	How might the Central Valley Water Board potentially regulate under the waste discharge regulatory program?
Co-digestion Feedstock Waste Storage / Receiving / Handling Area	<ul style="list-style-type: none"> • Solid must be on impermeable surface • Comply with Local Enforcement Agency (LEA) requirements • In ground liquid waste storage must comply with Anti-Degradation Policy • Drain to Wastewater Pond • Comply with site-specific Salt Minimization Plan (SMP) • No Hazardous Waste • Flood protection that complies with local, State, and federal laws and regulations • No mammalian tissues or dead animals • No human waste (e.g. biosolids, septage, domestic and municipal wastewater) • No nuisance or vector
Digester - Above Ground Tank	<ul style="list-style-type: none"> • Comply with LEA requirements • No nuisance or vector • Drain to pond
Digester - In Ground	<ul style="list-style-type: none"> • No nuisance or vector • Flood protection that complies with local, State, and federal laws and regulations • Liner to protect groundwater (likely required for compliance with the State Board's Antidegradation Policy, Resolution 68-16)
Liquid Waste	<ul style="list-style-type: none"> • Comply with site-specific Nutrient Management Plan (NMP) • Comply with site-specific SMP • No off-site discharge • Surface water protection • Well-head protection
Solid Waste	<ul style="list-style-type: none"> • Classify as soil amendment • Use on-site in compliance with NMP and SMP • Properly dispose of at a permitted facility • Surface water protection • Well-head protection
Sulfur Biogas Scrubber Waste	<ul style="list-style-type: none"> • Classify as a soil amendment

In addition to one or more GOs, under this waste discharge regulatory program, the Central Valley Water Board may also develop and adopt Individual WDRs to provide permit coverage for dairy digester and co-digester facilities for which the GOs would not be applicable. Further, the Central Valley Water Board may develop and adopt Conditional Waivers of WDRs (CWs) under this waste discharge regulatory program in instances where a waste discharge is found to have such low threat to water quality that the Central Valley Water Board finds that a waiver of WDRs is not against the public interest pursuant to California Water Code §13269. Such waivers are conditional, may not exceed five years in duration, and may be terminated by a Central Valley Water Board at any time.

Any GOs, Individual WDRs, and CWs issued under this program will contain terms and conditions to implement applicable requirements contained in the following laws, regulations, and guidance:

- Porter-Cologne Water Quality Control Act (California Water Code §13000 *et seq.*);
- California Code of Regulations;
- *Water Quality Control Plan for the Tulare Lake Basin*, Second Edition, revised January 2004 (Tulare Lake Basin Plan);
- Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basins, Fourth Edition, revised September 2009 (Sacramento and San Joaquin Basin Plan);
- State Water Resource Control Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (Antidegradation Policy); and
- all other applicable Central Valley Water Board or State Water Resources Control Board plans and policies.

3.2 Project Location and Dairy Overview

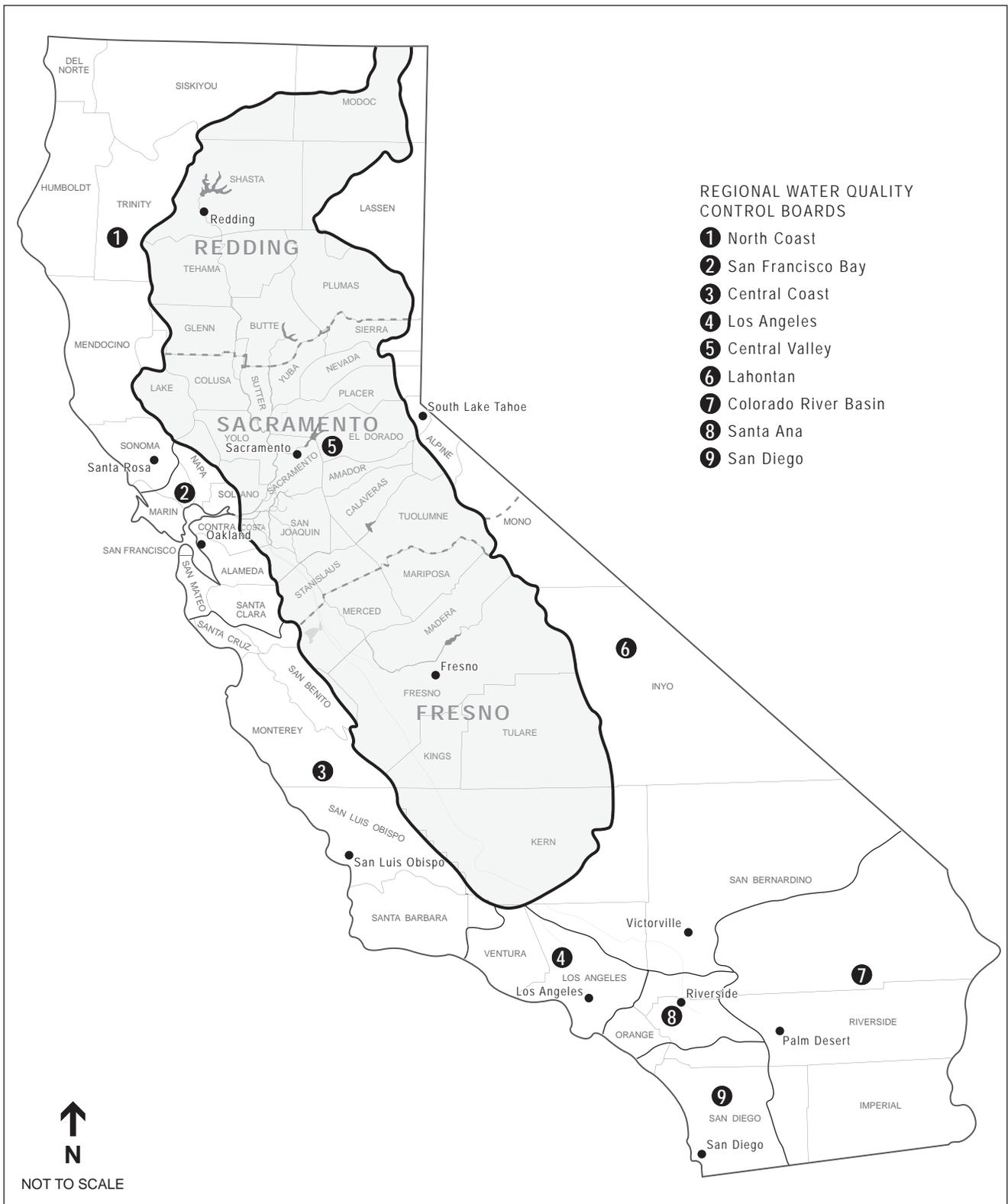
There are nine regional water quality boards statewide with jurisdiction over separate regions of the state based on watershed boundaries. The Central Valley Water Board is proposing a waste discharge regulatory program to regulate the discharge of liquid and solid digestate generated from dairy digester and co-digester projects located on or off-site of dairies within Region 5 (shown on **Figure 3-1**).

Approximately 1.6 million cows are housed in approximately 1,400 dairies located throughout Region 5, extending from and including Kern County to the south, to the California-Oregon state line to the north. The distribution of dairies throughout the Region 5 is shown in **Figure 3-2**.

An estimated 180 million pounds of manure generated per day within Region 5 based on 1.6 million cows producing approximately 112 pounds of manure per day. It has been estimated that the estimates dairies in Region 5 could generate approximately 14 billion cubic feet of methane per year through manure only anaerobic digestion, which would correspond to 140 megawatts of annual electrical capacity (Krich, et al., 2005)². This estimate of potential methane and energy production would increase through the addition of other organic substrates to the manure digestion process (co-digestion). Co-digestion of organic material can help to mitigate the greenhouse gas (GHG) emissions emanating from California's multiple organic waste streams. Co-digesting multiple biodegradable waste streams such as municipal waste sludge, food processor waste, restaurant leftovers, and dairy manure can add as much as 450 MW to the combined heat and power (CHP) potential in California (CEC, 2009).

Herd populations at dairies within the region range from the smallest herds with less than 100 cows, to herds which include more than 11,000 cows. Facilities housing fewer than 1,000 cows constitute approximately 60 percent of the region's dairies. Another roughly 25 percent of the region's dairies house herds of between 1,000 and 2,000 cows while approximately 15 percent of the region's dairies house herds more than 2,000 cows.

² This is a peak estimate for manure only digestion that does not reflect the practicalities of manure collection and storage.



SOURCE: Central Valley Water Board, 2009; and ESA, 2010

Central Valley Dairy Digester and Co-Digester Program EIR . 209481

Figure 3-1
California Regional Water Quality Control Boards

The top five milk producing counties in California are located in the central and southern portions of Region 5, and include: Tulare County with 315 dairies producing 27 percent of the milk produced in California; Merced County with 310 dairies producing 14 percent of the state's milk; Kings County with 139 dairies producing 10 percent of the state's milk; Stanislaus County with 288 dairies producing 10 percent of the state's milk; and Kern County with 50 dairies producing 9 percent of the state's milk (CDFA, 2009).

Dairies in Region 5 employ manure handling practices as a matter of manure management and general animal husbandry. Manure handling practices include: dry scrape, flush, and some combination of the two. Dry scrape operations occur at dairies where stock are housed in open corrals and manure is scraped from the corrals several times during the year. Stormwater runoff and process wastewater generated within the milk barn at these facilities are piped directly to the wastewater retention system.

Flush operations occur at dairies that house their stock in flushed free stalls and allow only intermittent access to open loafing pens. At flush dairies, most of the animal waste is deposited on concrete flush lanes, which are flushed with process wastewater from the milk barn and recycled wastewater from the wastewater retention system. Stormwater is routed through the flush system into the wastewater retention system. Flush manure management practices tend to occur at newer larger dairies.

Dairies that employ both dry scrap and flush are dairies that house their herds in open corrals with flushed concrete lanes designed to capture manure deposited while the cows are eating. At these facilities, the corrals are scraped several times a year while the lanes are flushed daily with process wastewater from the milk barn and recycled wastewater from the wastewater retention system. Stormwater is routed through the flush system or piped directly to the wastewater retention system.

3.3 Program Objectives

The primary objectives for the waste discharge regulatory program include the following:

- Protect the beneficial uses of surface and groundwater³ within the Central Valley Region from discharges to land associated with dairy manure digesters and co-digesters on or off-site of dairies.
- Provide a regulatory framework for the water quality aspects of anaerobic biological digestion facilities using dairy manure and dairy manure with other organic substrates (co-digestion) to produce biogas (a flexible renewable fuel source).
- Assist the State in meeting GHG reduction measures in support of the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) through the production of biogas from dairy manure.
- Provide a renewable green energy source to allow energy companies to help achieve the 2010 and 2020 California Renewables Portfolio Standard (RPS) through the production of biogas from dairy manure.
- Reduce the time required to develop and issue water quality permits for dairy manure digester and co-digester projects by more than 75 percent primarily through the issuance

³ Beneficial uses are described in *Water Quality Control Plan for the Tulare Lake Basin*, Second Edition, revised January 2004 (Tulare Lake Basin Plan) and *Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basins*, Fourth Edition, revised September 2009 (Sacramento and San Joaquin Basin Plan).

of one or more Waste Discharge Requirements (WDRs) General Orders (GOs) and secondarily through the issuance of Individual WDRs or Conditional Waivers of WDRs (CWs).

- Reduce the permitting time for other State and local agencies⁴ with discretionary permit responsibilities by providing a Program EIR that can be relied upon or tiered from for region wide environmental and regulatory settings, project alternatives analyses and cumulative impacts analyses

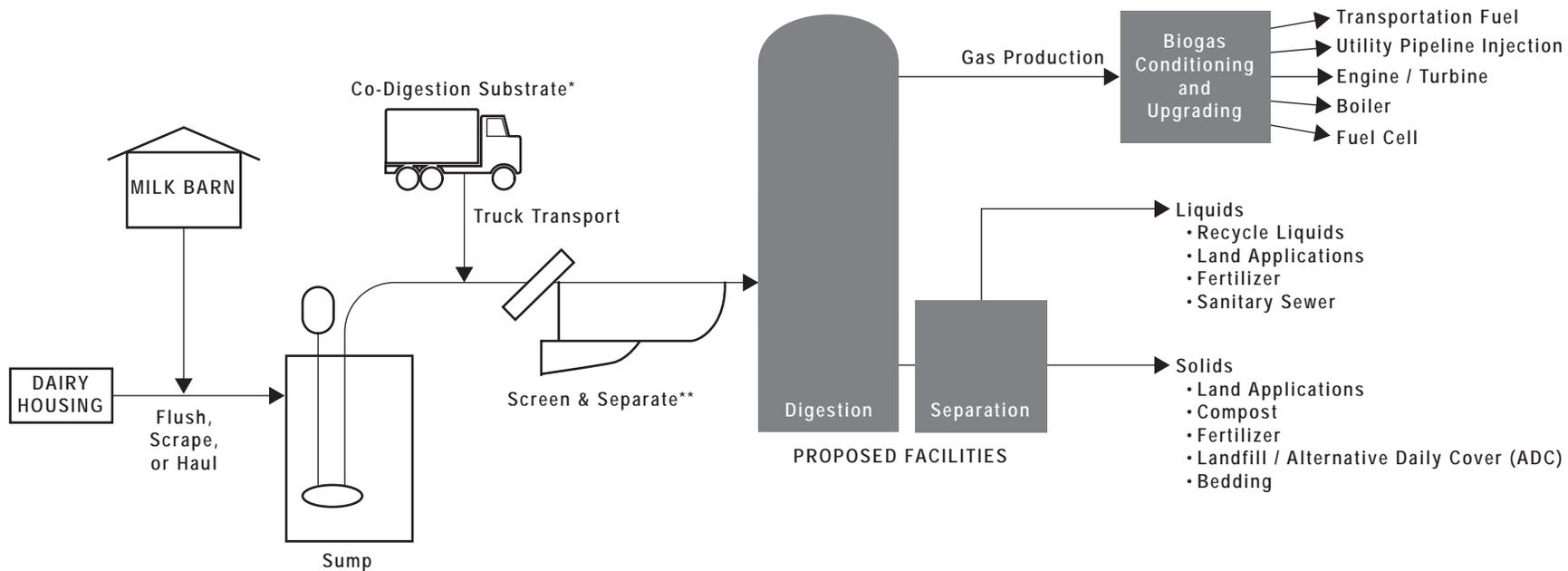
3.4 Background on Dairy Manure Digesters and Co-Digesters

Anaerobic digestion is the biological decomposition of organic matter in the absence of molecular oxygen. This project encompasses both manure digestion and co-digestion processes, which can differ according to the feedstock used. The anaerobic digestion process results in the production of biogas and digestate. The biogas consists primarily of methane (CH₄), which can be used for energy, and carbon dioxide (CO₂), with small amounts of hydrogen sulfide (H₂S), and ammonia (NH₃). Typically biogas is saturated with water vapor and may have trace amounts of hydrogen (H₂), nitrogen (N₂), oxygen (O₂), dust and siloxane (Greer, 2010). Digestate is the liquid and solids slurry residual of the dairy digesters. A common first process after the digester is to separate the solids from the slurry, resulting in liquid digestate and solid digestate. The anaerobic digestion process occurs naturally in marshes, wetlands and is the principal decomposition process in landfills. There are a variety of controlled systems where anaerobic digestion (AD) technology is utilized including:

- Wastewater Treatment Facilities
- Controlled Reactors
- Dairy/Animal Feeding Operations
- Digesters for Biogas Production

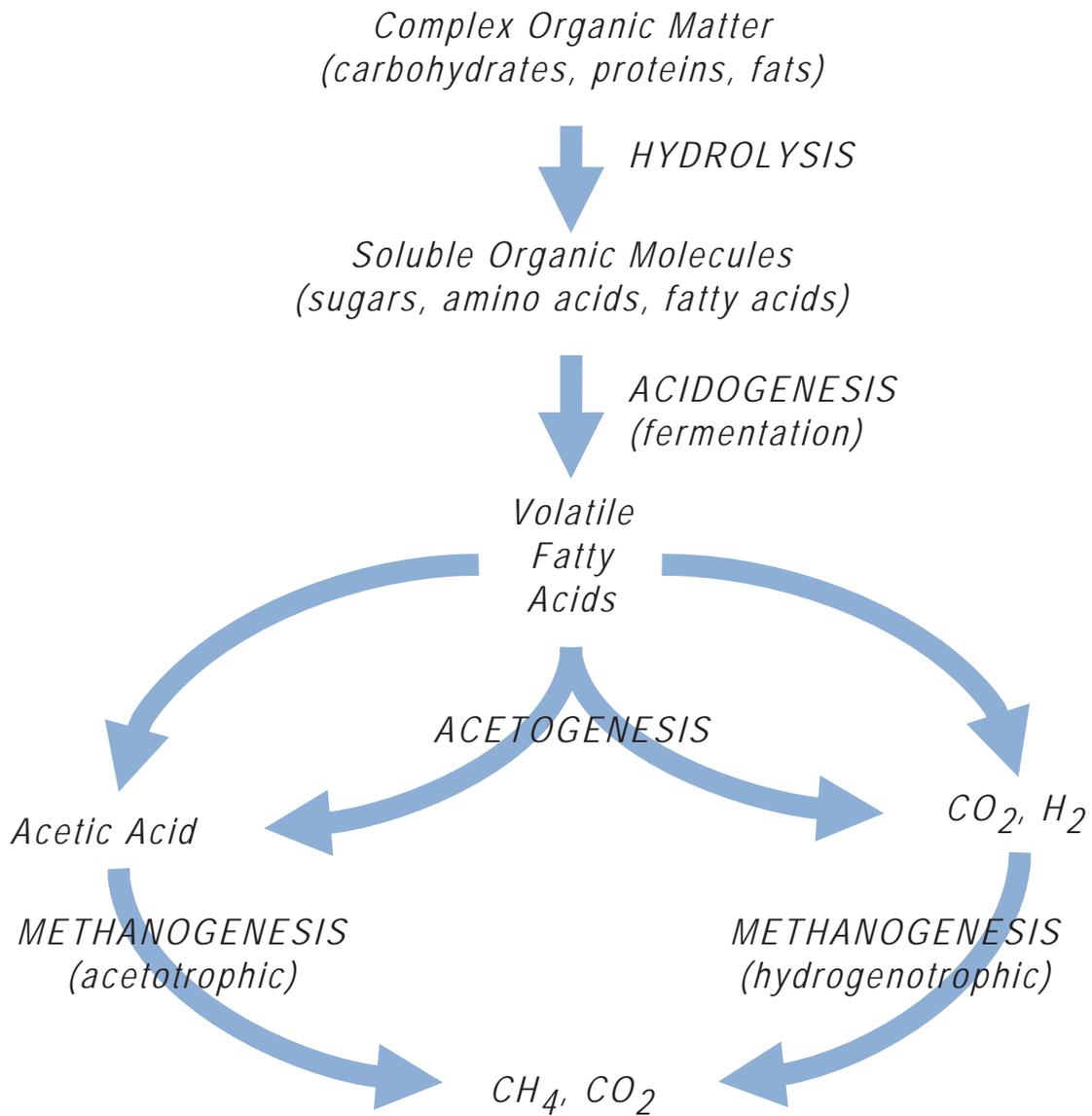
AD facilities at dairies follow a typical process as shown in **Figure 3-3**, although the actual digester type can vary. As seen in Figure 3-3 there are several potential uses for the biogas produced by the AD facilities. As described below, organic materials may be pre-processed (screening and gravity sedimentation) prior to loading into the digester, although for manure only digestion, this step can be by-passed based on conditions of the waste stream. Within the digester, decomposition occurs in a four phase process as shown in **Figure 3-4**: hydrolysis, acidogenesis, acetogenesis, and methanogenesis resulting primarily in methane, carbon dioxide, water and digestate/residuals. Post-processing of gas, liquid and/or solids from the digester is necessary. After completion of post-processing, solid digestate and liquid digestate (effluent) require disposal in compliance with the applicable NMP.

⁴ San Joaquin Valley Air Pollution Control District staff have estimated that the certification of the Program EIR will reduce air quality permitting time 50 percent or more for certain digester projects.



* If co-digestion will be implemented at facility

** Screen & Separate - this step may be needed to remove straw, sand, and silt (Burke, 2001)



AD facilities at dairies provide a number of potentially environmental and economic benefits (Burke, 2001), which are summarized below. Environmental benefits include, but are not limited to:

- Reduction in the mass of solid wastes;
- Generation of clean liquid effluent for irrigation or recycled water;
- Concentration of nutrients in condensed solid for export or storage;
- Reduction of pathogens in the solid and liquid waste;
- Reduction in GHG emissions;
- Generation of renewable energy from the biogas;
- Reduction or elimination of odors associated with waste products; and
- Reduction in flies.

The economic benefits of AD facilities at dairies include, but are not limited to:

- Time needed to move, handle, and process manure is reduced;
- Biogas can be used for energy recovery;
- Waste heat can be used to meet the heating and cooling requirements of the dairy;
- Concentration of nutrients generates a high nutrients soil amendment, which can be sold to the public, nurseries, or other agricultural facilities;
- Reduction in the mass of solid waste also reduces the amount of export needed;
- Income can be obtained from the processing of imported food or agricultural wastes for co-digestion (tipping fees), the sale of organic fertilizer, potential GHG credits, and the sale of energy generated by biogas processing;
- Energy tax credits may be available for power produced;
- Greenhouse gas tax credits may be available for each ton of carbon reduction; and
- Other federal and State incentives available now or in the future related to generation of renewable energy and reduction of GHG emissions.

3.4.1 Description of Dairy Digester Facilities

Individual Dairy Digesters

This facility type includes the addition of AD facilities, either dairy manure digester or co-digester facilities, onto an individual dairy. An individual dairy is an operation that houses dairy cows and collects and processes manure. Facilities would be located within the current footprint of the dairy operations. A dairy under the Existing Dairy General Order may add a manure only digester without any additional permits required by the Central Valley Water Board, provided the manure is from the dairy and there is no expansion of the dairy⁵. Other permits could be required depending on the complexity of the project's scope of work and project location. A new or expanding dairy will no

⁵ As described in Section 4.3 "General Order Dairies with manure only digesters using only manure generated by onsite animals will remain under the Dairy General Order but may, if required, submit a Notice of Intent seeking coverage under a dairy digester GO."

longer be covered under the Dairy General Order and must be covered by individual WDRs or a Dairy Digester General Order.

Centralized Locations

There are two categories of centralized location facilities for dairies that will be assessed in this Program EIR: (1) Central AD Facility, whereby individual dairies would collect manure and transport the manure by pipeline or truck to a centralized facility; and a (2) Central Biogas Clean-Up Facility, whereby raw biogas from individual dairies (including dairies linked via underground gas pipelines) is piped to a central facility. These types of centralized facilities may be sited on or off-site of dairies. For both location options, the central facility would have the potential to receive manure, manure plus co-digestion substrate, and/or raw biogas.

3.4.2 Dairy Operations that Affect the AD Process

In addition to the total number of cows at a dairy, specific dairy operations affect the amount and quality of manure that are processed at a dairy digester. Operational variables include, but are not limited to, animal housing, transport, manure pre-processing, animal bedding, and stormwater management (Burke, 2001). In regards to animal housing, free stall barns provide greater manure collection and quality compared to corral or open lot facilities. A flush system for manure transport, which affects the dilution of waste, would require larger AD facilities than if the manure were collected using a scrape or vacuum system. For manure pre-processing, the removal of organic solids through screening and sedimentation would reduce the amount of biomass available to undergo biogas conversion through AD. Animal bedding typically consists of compost, straw, wood chips, or sand and silt, may alter the composition of the waste stream and could affect the efficacy of AD. Sands and silts are inorganic and cannot degrade in the AD process. Therefore, sands and silts may need to be separated from the waste stream if they are present in high concentrations. However, if low or moderate quantities of these materials are present in the waste stream, then the pre-processing (screen and gravity separation) may be avoided, which would allow the maximum amount of organic solids to undergo AD (Burke, 2001). Stormwater management is also an operational variable affecting dairies. Stormwater runoff from impermeable surfaces can be directed to storm drains or collected and sent to waste water ponds to be used in AD.

3.4.3 Feedstock

The feedstock for dairy manure digesters would be either manure only, or the addition of other organic substrates to manure for dairy co-digesters. The feedstocks for co-digestion could include food processing residues, the organic fraction of municipal solid waste, fats, oils, grease, agricultural residues, and biomass energy crops. The addition of other organic substrates to the manure waste stream as part of co-digestion can dramatically increase the generation of biogas compared to a manure-only digester system. Co-digestion substrates can increase the electrical capacity of a proposed system by a magnitude five times or greater than that of dairy manure alone. Technically, digestion of dairy manure alone is straightforward; the difficulty is in the economics. Co-digestion is considered to be essential for dairy digester project viability (ECOregon, 2010).

3.4.4 Pre-Processing

Pre-processing would be minimal for a manure-only digester system, potentially including screening and gravity separation depending on the solids composition. In addition, for centralized facilities, there may be increased truck trips associated with the transport of manure.

Pre-processing activities for co-digestion substrate would include receiving, processing steps such as screening and grinding, and delivery into the digester. These co-digestion pre-processing activities would occur at either individual dairies or at centralized facilities. The handling of residual waste generated from pre-processing will vary depending on the co-digestion substrate being used. This process could result in some additional municipal solid waste.

3.4.5 Digestion

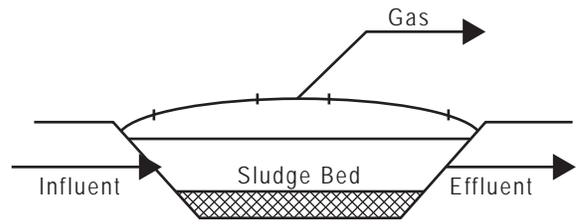
The three types of basic AD systems that are the most suitable for California dairies at this time include ambient-temperature anaerobic covered lagoons, plug-flow digesters, and complete mix systems (Krich, et al., 2005; Anders, 2007). An example of each type of digester is depicted in **Figure 3-5**. There are many variations and gradations between these basic types of AD systems, however, the basic digestion processes covered by these three types are likely to be used in any digester design. The three basic digester types are described below.

Ambient-Temperature Covered Lagoons

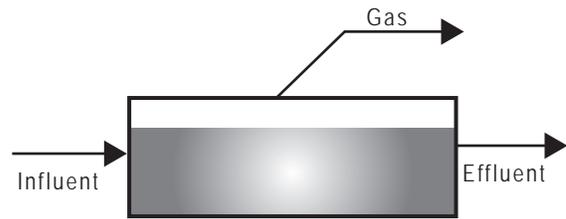
Ambient-temperature covered lagoons are covered earthen or concrete lined ponds, where the manure waste stream enters one end (influent) and the digested effluent is removed at the other end. The lagoons are covered by a floating, impermeable cover that captures the biogas generated by AD. The covered lagoons are not heated and operate at ambient ground temperatures and therefore the AD reaction and biogas production rates are affected by seasonal temperature variations. Therefore, covered lagoons for energy recovery are more compatible with flush manure systems in warm climates. Covered lagoons are used to treat and produce biogas from liquid manure with less than 3 percent solids (Roos et al., 2004). Generally, large lagoon volumes are required, preferably with depths greater than 12 feet (Roos et al., 2004). This type of AD system would typically be installed at self-contained individual dairies. In addition, covered lagoons could be used at individual dairies that pump raw biogas to a centralized facility.

Plug-Flow Digesters

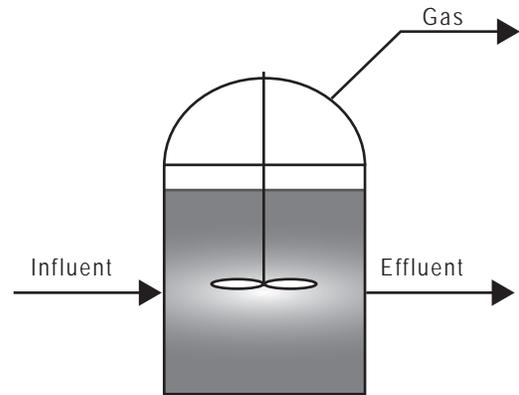
Plug-flow digesters consist of unmixed, long rectangular tanks that are normally heated by a hot water piping system to mesophilic temperatures (80° to 100° F) within the reactor. The rate of bacterial growth and AD is faster with higher temperatures than at ambient conditions. This AD system is typically used to treat scraped dairy manure with a range of 11 to 13 percent total solids (Roos et al., 2004). Similar to covered lagoons, plug-flow digesters would typically be installed at self-contained individual dairies. In addition, plug-flow digesters could also be used at individual dairies that pump raw biogas to a centralized facility.



COVERED LAGOON DIGESTER



PLUG FLOW DIGESTER



COMPLETE MIXED DIGESTER

Complete Mix Digesters

Complete mix anaerobic digesters, which are typically used at sewage and other industrial treatment plants, and dairies, consist of aboveground tanks whereby the organic waste stream is heated to mesophilic or thermophilic (110° to 140° F) temperatures and continuously or intermittently mixed by mechanical, gas, or liquid circulation mixers. Complete mix digester systems treat slurry manure with a solids concentration in the range of approximately 3 to 10 percent (Roos et al., 2004). However, these systems require higher costs for installation and energy associated with the mixing process. Complete mix digesters would typically be installed at larger self-contained individual dairies, or as the AD system at centralized facility.

3.4.6 Post-Processing

The byproducts of the AD process are biogas and digestate. The biogas consists primarily of methane (CH₄), which can be used for energy, and carbon dioxide (CO₂), with small amounts of hydrogen sulfide (H₂S), and ammonia (NH₃). Digestate is the liquid and solids slurry residual of the dairy digesters. A common first process after the digester is to separate the solids from the slurry, resulting in liquid digestate and solid digestate.

Biogas

There are many opportunities in California to produce more biogas. About 50 percent of sewage sludge, 2 percent of dairy manure, and less than 1 percent of food processing wastes and wastewater generated in the state are used to produce biogas. Biogas generated through the AD process is captured and can be combusted in a flare, used directly in internal combustion engines to produce electricity and heat (see electrical generation facilities at dairies **Figure 3-6**), or the biogas can be upgraded to biomethane through the removal of hydrogen sulfide, carbon dioxide (CO₂), and moisture. Biomethane is a product equivalent to natural gas, which typically contains more than 95 percent of methane (CH₄). Biomethane can be used in place of natural gas for various processes, including use by utility companies. Biomethane can be upgraded to utility standards and pumped into a natural gas supply pipeline, as well as for electrical generation, heating, cooling, and for natural gas-fueled vehicles. Hilarides Dairy in Lindsay, California, is using compressed biomethane for use as a vehicle fuel for dairy trucks. Hilarides initially used the compressed biomethane in two semitrucks, three pickup trucks and four boilers (CaliforniaFarmer.com, 2009).

Biomethane can also be used to power microturbines and fuel cells. For each biogas use alternative, specific gas conditioning measures would be required. Although there are methodological variations in how the biogas can be conditioned, the diagrams below depict the general processes considered during the development of this Program EIR.



PHOTOGRAPH 1. Electrical Generator at Castelanelli Brothers Dairy.



PHOTOGRAPH 2. Enclosure for Electrical Generator at Castelanelli Brothers Dairy.



PHOTOGRAPH 3. Enclosure for Electrical Generator at Fiscallini Dairy.

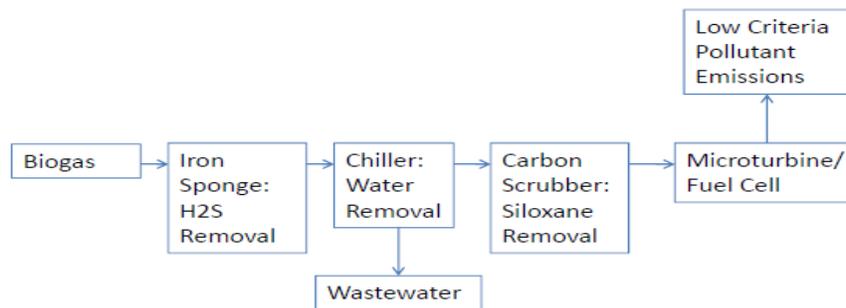
Alternative 1: Raw Combustion in Internal Combustion (IC) Engine or Flare

Below is a schematic showing the biogas utilization in a flare or IC engine. All AD facilities should have a flare to combust biogas in the event of equipment failure or excess biogas.



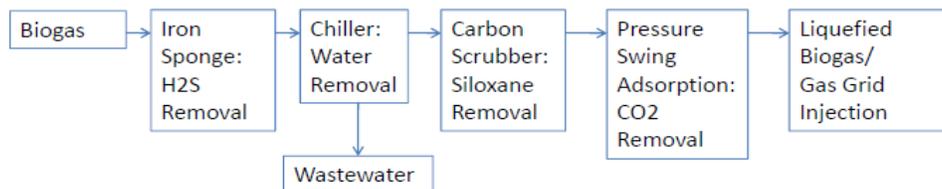
Alternative 2: Biogas Conditioning for Use in a Fuel Cell/Microturbine

Below is a schematic showing a potential biogas conditioning method for use in a fuel cell or microturbine.



Alternative 3: Biogas Conditioning for Liquefied Biomethane/Gas Grid Injection

Below is a potential process schematic showing gas conditioning requirements for the production of liquefied biomethane or biomethane that could be injected into a gas grid or for use as transportation fuel.



Liquids/Solids

Through the AD process, biomass in the waste stream is reduced through conversion to biogas and the nutrients are concentrated in the remaining effluent. The effluent from the AD process consists of liquids, remaining biomass, and inorganic solids. The post-treatment options to separate the liquids from the solids in the effluent include screening and presses. The separated solids and liquids would then be applied pursuant to the applicable nutrient management plan. As an example, the solids could be used for land application, compost, fertilizer, or potentially landfill alternative daily cover and the liquid portion of the effluent could be recycled for flush water, used for land application, or at a centralized facility it could potentially be sent to a sanitary sewer.

3.5 Construction

3.5.1 Site Preparation and Earthwork

Digester installation at individual dairies or at centralized facilities would require site preparation and earthwork, consisting of stripping the area of vegetation and either removing or storing the materials for later use in the finished grading phase. Rough earthwork would consist of cutting or filling the site to produce site overall site gradients as specified by each project. In general, surfaces would be graded to drain to on-site retention/detention facilities. Excavation may occur for on-site utility infrastructure. Road paving may be required for entrance and on-site access roads.

If gas or manure transport pipelines are proposed for a project, construction activities could include surface preparation, excavation, trench shoring, pipeline installation, trench backfilling, and surface restoration, which may include paving if the pipelines are constructed within roadway rights-of-way. Jack and bore drilling may also be required for some areas of pipeline installation. Pipeline construction would occur both on and off-site of dairies.

3.5.2 Structures

Digester structures would vary depending on the type of facility, digester to be operated, substrate, and the biogas post-processing. These are listed below:

- Central facilities may need administrative buildings, which would be typical for industrial operations and would likely be prefabricated metal buildings.
- Complete mix digesters would require the digester tank structures and may need an operating control room.
- Co-digestion substrate would potentially need a storage tank or storage area if the materials are not added directly into the digester.
- A structure may be needed to house the biogas post-processing equipment, such as an IC engine, or microturbine to generate electricity from the biogas.

3.5.3 Ancillary Components

Development of AD facilities will require the construction of various supporting infrastructure including, but not limited to, lined waste storage ponds and/or upgrades to existing dairy ponds, pipelines for transporting effluent to disposal fields, bypass valves, and processes for stormwater management.

3.5.4 Off-Site Improvements

In addition to the on-site improvements, some off-site improvements could also be needed such as signage, utility or traffic improvements. As discussed above, transport pipelines, if proposed, would be developed on and off-site of dairies.

3.6 Required Approvals

The Central Valley Water Board would approve the final waste discharge regulatory program for dairy digesters. The approval process would include:

- Certification of a Final Program EIR, under the CEQA requirements;
- Adoption of a Mitigation Monitoring and Reporting Plan (MMRP), Findings of Fact, and Statement of Overriding Considerations (if necessary);
- Adoption of the waste discharge regulatory program.

3.7 Other Agency Approvals

Additional subsequent approvals and permits that may be required from other agencies for the development of site-specific dairy digester projects are identified below.

**TABLE 3-2
PERMITS AND APPROVALS POTENTIALLY NEEDED FOR PROGRAM IMPLEMENTATION
OF MANURE DIGESTER AND CO-DIGESTION FACILITIES**

Permit	Permitting Authority	Potentially Affected Resources
Federal Permits/Approvals		
Clean Water Act Section 404/ Rivers and Harbor Act Section 10 Dredge and Fill Permit (Clean Water Act, 33 USC 1344)	U.S. Army Corps of Engineers	Project facilities involving the discharge of dredge for fill material into waters of the U.S, including wetlands, or construction in navigable waters or activities within a floodplain.
Federal Endangered Species Act compliance (Sections 7 and 9, 16 USC 1536)	U.S. Fish and Wildlife Service	Project facilities affecting species listed as endangered and threatened and critical habitat
Federal Endangered Species Act compliance (Sections 7 and 9, 16 USC 1536)	National Marine Fisheries Service	Project facilities affecting anadromous fish and marine mammals listed as endangered or threatened and critical habitat
Magnuson Stevens Fisheries Conservation and Management Act	National Marine Fisheries Service	Project facilities affecting Essential Fish Habitat
State Permits/Approvals		
Composting Permit or, Transfer Processing Permit	California Department of Resources Recycling and Recovery (CalRecycle)	Incoming co-digestion substrates
Rendering Permit	California Department of Food and Agriculture	Incoming co-digestion substrates (specific meat and poultry substrates)
California Endangered Species Act compliance (California Fish and Game Code, §2081 and 2090)	California Department of Fish and Game	Project facilities affecting State listed endangered and threatened species
Section 1601 <i>et seq.</i> Streambed Alteration Agreement (California Fish and Game Code, §1600-1616)	California Department of Fish and Game	Project facilities that may alter the bed, bank, or riparian habitat of a stream or lake.
Williamson Act contract	Department of Conservation	Agricultural land when portions of project facilities require public acquisition of land under a Williamson Act contract
Encroachment Permit	California Department of Transportation	Portions of project facilities (pipelines, etc.) within rights-of-way or easements managed by Caltrans

**TABLE 3-2
PERMITS AND APPROVALS POTENTIALLY NEEDED FOR PROGRAM IMPLEMENTATION
OF MANURE DIGESTER AND CO-DIGESTION FACILITIES**

Permit	Permitting Authority	Potentially Affected Resources
Porter-Cologne Water Quality Control Act, GOs, Individual WDRs, or CWs for Manure Digester and Co-Digester Facilities (Division 7, California Water Code)	Central Valley Water Board	Protect the beneficial uses of surface and groundwater within the Central Valley Region from discharges to land associated with dairy manure digesters and co-digesters on or off-site of dairies.
Porter-Cologne Water Quality Control Act, GOs, Individual WDRs or CWs for filling waters of the State (Division 7, California Water Code)	Central Valley Water Board	Project facilities affecting waters of the State (where those waters are determined not to be waters of the U.S.)
Water Quality Certification (Clean Water Act, Section 401, 33 USC 1341)	Central Valley Water Board	Water quality certification for projects that affect wetlands and other waters of the U.S.
NPDES Construction Stormwater Permit (Clean Water Act, Section 402, 33 USC 1342)	Central Valley Water Board	Water quality permit when portions of project activities or facilities may result in pollutant discharges to waters of the U.S.
General Order for Dewatering and Other Low Threat Discharge to Surface Waters	Central Valley Water Board	Water quality permit when portions of project construction may require local groundwater dewatering, resulting in discharges to surface waters
National Historic Preservation Act Section 106 Compliance	State Historic Preservation Office	For activities in portions of project that could affect cultural and historic resources considered eligible for inclusion in the National Register of Historic Places
Regional/Local Permit/Approvals		
Authority to Construct	Air District with jurisdiction	Combustion sources. Air quality Authority to Construct (ATC), in compliance with the local air district rules and regulations.
Permit To Operate	Air District with jurisdiction	Combustion sources. Air quality Permit to Operate (PTO), upon completion of facility construction in compliance with the local air district rules and regulations.
Rezoning, Conditional Use Permit or similar land use approval	Counties and cities	Facilities or activities modifying land uses regulated under county or city land use codes
Environmental Health Permit	County Department of Environmental Health (the Local Enforcement Agency or LEA)	Facilities or activities affecting food and water resources regulated under county environmental health codes
Site plan review and approval	Counties and cities	Facilities or activities affecting land regulated under county or city site planning regulations
Local grading and erosion control Permit	Counties and cities	Earthmoving conducted as part of project
Building Permit	Counties and cities	Building(s) constructed as part of project
Encroachment Permit	Counties or cities or other local jurisdictions such as special districts	Pipelines or other facilities in portions of project area on or affecting rights-of-way or easements

3.8 References

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CHAPTER 4

Approach to Environmental Analysis

4.1 Introduction

This chapter presents the general approach to analysis that was used in this draft Program EIR to evaluate the impacts of the project.

Developing the approach to the environmental analysis involves:

- Identifying the types of discharges the program would regulate and permit,
- Identifying the types of facilities that the program would cover and thereby facilitate development,
- Projecting the extent of dairy digester facilities development that may occur as a result of the program, and
- Assessing the environmental changes resulting from authorizing the proposed discharges as well as the construction and operation of digester facilities that could be developed as a result of the program.

This chapter expands upon each of these items.

4.2 Proposed Discharges

The Program EIR will serve to meet California Environmental Quality Act (CEQA) requirements for the Central Valley Water Board's decision to adopt as part of a waste discharge regulatory program one or more Waste Discharge Requirements (WDRs) General Orders (GOs) to regulate the discharge of liquid and solid digestate generated from dairy manure digesters and dairy manure co-digester projects located on or off-site of dairies within the jurisdictional boundaries of the Central Valley Water Board (Region 5). The GOs, Individual WDRs, or Conditional Waivers of WDRs (CWs) would regulate facility discharges that have the potential to affect the waters of the State. Major waste generation and storage processes at a digester facility that will need to be regulated under the program for their potential to affect the waters of the State include:

- Waste storage/receiving/handling areas of co-digestion feedstock,
- Storage of digestate in an above ground tank,
- Storage of digestate in an in ground vessel (e.g., lagoon, pond, tank, etc.), and
- Generation of solid and liquid digestate from dairy digesters and co-digesters.

4.3 Dairy Manure Digestion and Co-Digestion Facilities

The adoption by the Central Valley Water Board, of orders under the waste discharge regulatory program (i.e., primarily GOs and secondarily Individual WDRs or CWs), would facilitate the development of new dairy digesters and co-digesters within Region 5. Therefore, this Program EIR evaluates the effects of development of these facilities, including construction and operation.

For the purpose of this Program EIR, dairy digester and co-digester facility development is expected to take place on dairies and at centralized facilities located on and off-site of dairies. Application of digestate would take place on dairies and surrounding agricultural lands. Under CEQA, a Program EIR may evaluate “individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.” (CEQA Guidelines §15168(a)(4)). Because these actions would be directly facilitated by the proposed waste discharge regulatory program, this document programmatically evaluates the environmental impacts of the development of dairy digesters and co-digesters as actions that could result from program implementation.

As identified in Chapter 2, Introduction, the GOs, Individual WDRs, and CWs under this program would be applicable to the following types of digester projects:

- New co-digestion facilities to be constructed on an existing General Order Dairy¹ without an expansion of dairy operations;
- New manure only digester or co-digester facilities to be constructed on an existing General Order Dairy with an expansion of dairy operations;
- New manure only digester or co-digester facilities proposed to be constructed at new dairies;
- Centralized manure digester or co-digester facilities on a General Order Dairy, with or without an expansion; and
- Centralized, stand-alone manure digester or co-digester facilities not located on a dairy.
- General Order Dairies with manure only digesters using only manure generated by onsite animals will remain under the Dairy General Order but may, if required, submit a Notice of Intent seeking coverage under a dairy digester GO.

This Program EIR evaluates the effects of the proposed discharges listed previously as well as the physical effects to the environment from construction and operation of dairy manure digester and co-digester projects within the above categories. Each of the resource chapters in the Program EIR considers the various phases of digester projects (construction, pre-processing, the digestion phase, and post-processing uses of the gases, liquids and solids) and analyzes those phases that could affect the physical environment.

This Program EIR does not evaluate the impacts of a dairy which are independent of the digester or co-digester facility. Where a digester or co-digester is to be located on a dairy, in permitting of the full facility under the waste discharge regulatory program, the Central Valley

¹ Dairies that are currently regulated under Order No. R5-2007-0035, Waste Discharge Requirements General Order for Existing Milk Cow Dairies (General Order Dairy).

Water Board may rely on or tier off of the Program EIR but must additionally establish CEQA compliance for the non-digester related dairy operations.

Because of the programmatic review, specific equipment brands or vendors are not analyzed and the analysis is more general. Furthermore, the various phases of digester projects are analyzed as individual components rather than a complete system, as there are a variety of different options available to develop dairy manure digesters, co-digester systems, or centralized facilities.

4.4 Impacts and Mitigation Measures

Types of Impacts

The environmental setting is the physical environmental conditions in the vicinity of the project, as they exist at the time the Notice of Preparation (NOP) was published, March 18, 2010 (CEQA Guidelines §15125(a)).

This Program EIR evaluates the potential adverse environmental effects of the Central Valley Water Board's adoption and implementation of the project. The environmental resources analyzed in this Program EIR (see Chapters 5 – 15) are those identified as being potentially affected by dairy manure digester and co-digester projects. Each resource chapter includes a discussion of existing environmental and regulatory settings. The analysis first determines the extent to which each of the studied resources could be affected if the project is approved as proposed. In general, this is a determination of how the proposed discharges, as well as the development of additional dairy digesters, co-digesters, or centralized facilities, would affect the given resource. The analysis then applies a set of specific significance criteria (Thresholds of Significance) to categorize the severity of the potential environmental effects. These standards of significance are defined at the beginning of each impact analysis in Chapters 5 - 15, following a discussion of environmental and regulatory settings. Once the potential environmental changes are identified in this analysis, they are compared to the standards of significance. The impacts are then divided into the following categories:

- **Less-Than-Significant Impact.** A project impact is considered less-than-significant when it does not reach the standard of significance and would therefore cause no substantial change in the environmental. No mitigation is required for less-than-significant impacts.
- **Significant Impact.** Significant impacts are identified by the evaluation of project effects against the significance criteria identified in the Program EIR. A project impact is considered significant if it reaches or could potentially reach the level of significance identified in the Program EIR. Mitigation measures are identified to reduce these effects to the environment.
- **No Impact.** There are not impacts because the project is not anticipated to create change or the project would result in a beneficial impact.
- **Cumulative Significant Impact.** A cumulative impact can result when a change in the environment results from the incremental impact of a project when added to other related past, present or reasonably foreseeable future projects. Significant cumulative impacts may result from individually minor but collectively significant projects.

For all *significant* impacts, the EIR is required to include a description of feasible measures that could be implemented to avoid the adverse impacts entirely or to mitigate (reduce in magnitude) the impacts to a level that is below the defined standard of significance. Where available, mitigation measures are presented for all impacts determined to be significant. Where implementation of the mitigation measures would reduce the magnitude of the impact to below the defined standard of significance, the impact is determined to be less than significant after mitigation. Where implementation of the mitigation measures would not reduce the magnitude of the impact below the defined standard of significance, the impact is determined to be *significant and unavoidable*.

Mitigation Measures

Where significant adverse impacts are identified, the EIR must “describe feasible measures which could minimize” those impacts to a less-than-significant level (CEQA Guidelines §15126.4). For each significant impact, mitigation measures are identified. In some cases, the Program EIR includes a list of alternative mitigation measures, any of which may be selected by the Central Valley Water Board and which could reduce the impact to a less-than-significant level, or contribute to doing so. Where multiple measures are required to reduce an impact to a less-than-significant level, the discussion clearly identifies which combination or permutation of measures would be necessary to achieve the appropriate level of mitigation.

Where measures are available that can reduce the magnitude of an impact, but not to a less-than-significant level, these are also identified. The Program EIR strives not to include measures that are clearly infeasible. Under CEQA, “feasible means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors” (CEQA Guidelines §15364).

If, even with imposition of mitigation measures, the project will generate unavoidable significant effects, the Central Valley Water Board can only approve the project if it makes a statement of overriding considerations and finds that the benefits of the project outweigh the occurrence of those unavoidable effects (CEQA Guidelines §15092 and §15093).

For any mitigation measures imposed by the Central Valley Water Board, CEQA requires that the Central Valley Water Board adopt a Mitigation Monitoring and Reporting Program (MMRP) specifying how it will ensure compliance with the mitigation measures. The MMRP would be developed prior to action on the project. (Public Resources Code §21081.6(a)(1))

4.5 Environmental Setting and Baseline

The environmental setting is the physical environmental conditions in the vicinity of the project, as they exist at the time the NOP was published, March 18, 2010 (CEQA Guidelines §15125). As with any Program EIR, the existing environmental setting for certain topics will include a reasonable amount of historical data in order to accurately and meaningfully portray existing conditions. This environmental setting will normally constitute the baseline physical conditions by which a Lead Agency determines whether an impact is significant. The description of the environmental setting

needs to be no longer than is necessary to understand the significant effects of the project and its alternatives (CEQA Guidelines §15125).

The environmental baseline is that condition against which the future “with-project” condition is compared to determine the amount of impact. Normally, the environmental baseline is the same as existing conditions, as is the case for this Program EIR.

4.6 Cumulative Impacts

Cumulative impacts are defined in the State CEQA Guidelines (§15355) as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” A cumulative impact is “the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor, but collectively significant, projects taking place over a period of time.” In a manner consistent with state CEQA Guidelines §15130[a], the discussion of cumulative impacts in this EIR focuses on potentially significant cumulative impacts.

Cumulative impacts associated with each of the environmental resources (e.g., Geology and Soils, Cultural Resources, etc.) are discussed within their respective chapters. The appropriate geographic scope for cumulative impacts analysis associated with resource areas ranges from site-specific to regional, encompassing primarily Region 5, but also potentially including areas adjacent to Region 5.

The project does not directly propose the construction of any new dairy manure digesters or co-digester facilities or central facilities, but the Program EIR does analyze the impacts from these facilities because the Program EIR and the project will help reduce permitting time for dairy digester water quality permits and other regulatory permits; thus directly facilitating their development. While the Program EIR resource sections analyze the impacts of dairy digester development on and off-site of dairies, the cumulative analysis also considers the impacts from other closely related past, present, and reasonably foreseeable probable future projects throughout the region.

Existing Dairy Digesters and Probable Future Projects

Forecasting future development involves estimating and projection. Invariably projecting a precise level of future development for dairy manure digesters in the project area under a new regulatory program is extremely challenging. Notwithstanding, the Program EIR must provide information about physical environmental effects that could occur as a result of implementing the dairy digester waste regulatory program. To ensure that potential errors that are part of any projection do not downplay or minimize the potential for environmental impacts, this Program EIR has made assumptions that lead to projections of a high level of future dairy digester development so that the cumulative impact analysis does not understate the development of dairy digester facilities (and potential impacts) that could occur.

For the purpose of projecting potential dairy digester, co-digester, and central facility development, a primary consideration is the existing systems that are operational throughout California and the United States.

The AgSTAR Program is a voluntary effort jointly sponsored by the U.S. Environmental Protection Agency (EPA), the U.S. Department of Agriculture, and the U.S. Department of Energy. The program encourages the use of methane recovery (biogas) technologies at the confined animal feeding operations that manage manure as liquids or slurries. The AgSTAR Program has an on-line database that provides valuable information regarding the status of dairy digesters in the United States and also in California. The AgSTAR database identifies 151 systems (including 13 central facilities) across the United States, with 15 dairy digesters in California². This number includes all confined animal facilities but most of them (122 of 151) are dairy digesters. The states with the most digesters are Wisconsin (25), New York (22), and California and Pennsylvania (15).

The AgSTAR website notes positive trends in the developments of the systems.

“ The development of anaerobic digesters for livestock manure treatment and energy production has accelerated at a very fast pace over the past few years. Factors influencing this market demand include: increased technical reliability of anaerobic digesters through the deployment of successful operating systems over the past five years; growing concern of farm owners about environmental quality; an increasing number of State and federal programs designed to cost share in the development of these systems; increasing energy costs and the desire for energy security; and the emergence of new State energy policies (such as net metering legislation) designed to expand growth in reliable renewable energy and green power markets.

Financial incentives have increased the deployment rate of manure digester systems. For example, grants and loans awarded by USDA Rural Development through the Farm Bill have been one of the primary methods for farms to partially fund installation of commercially proven livestock waste digestion technologies. Since 2003, USDA Rural Development has awarded more than \$37 million for anaerobic digestion systems.”

Other recent evidence of the potential growth of dairy manure digesters is provided in a review of dairy digesters in the state of Wisconsin (Kramer and Krom, 2010). While the growth of digesters in Wisconsin has been steady (an average of 3.75 new digesters per year), the 2009 *Wisconsin Biogas Casebook* indicates that at least 8 digesters were added in 2009. The authors indicate the continued growth of anaerobic digesters can be attributed to improved overall performance. Overall performance has improved because the dairy digesters and co-digesters have become more fine-tuned; system providers continue to improve their designs, and owners and day-to-day operators discover innovative operational changes. Nine of the digesters in Wisconsin add up to 20 percent co-digestion substrates (chopped straw, waste corn silage, moldy or unused feed and off-farm wastes from food or beverage processing industries) to the manure to increase biogas production. Co-digestion is encouraged and generally supported by interests in developing renewable energy sources and keeping compostable organics out of landfills. Dairies in California and other states can benefit from the fine-tuning that has

² Note that more recent information (May, 2010) from the Western Dairymen identifies only 14 dairy digesters that are currently operations. A list on the CARB website (dated January 20, 2009) identified 12 dairy digesters in operation at that time (see <http://www.arb.ca.gov/ag/manuremgmt/operating-manure-digester-site-list.pdf>) accessed June 2, 2010.

occurred in Wisconsin and other states. Such synergies could further boost the potential for dairy digester and co-digester development in California.

Another example of the growth of anaerobic digester systems is the growth of digestion capacity for biowaste or MSW in Europe. Plants installed per year increased from 3 per year in the early 1990s (in the first years of the adoption of the technology) to 14.6 plants per year between 2006 and 2010 (Du Baere, 2010).

The cumulative analysis in this Program EIR analyzes the potential development of approximately 20 dairy digesters built per year in Region 5, which equates to approximately 200 dairy digesters over a 10-year period. This would change the number of dairies with dairy digester facilities in Region 5 from only about one percent of the dairies now to the equivalent of approximately 15 percent in 10 years. Under this development scenario, it is likely that multiple dairy digesters would be built on large dairies. As noted in Chapter 3, Program Description, approximately 1.6 million cows are housed in approximately 1,400 dairies located throughout Region 5.

It is acknowledged that currently, dairy digester facilities in California face difficult economic conditions; capital requirements are high and the financial return from the systems do not justify the cost. Most, if not all, of the systems have used government grants to help with initial development costs. Several factors would need to be necessary to develop up to 20 dairy digesters per year in Region 5. Key factors would include:

- Increased demand for new energy sources;
- Increased demand for local renewable energy sources;
- Increased incentives for co-digester facilities;
- Improvements in dairy digester technologies; and
- Public financial support or the development of profitable business models; or
- Regulations that require the development of energy-producing dairy digester facilities for specified dairies.

There have been a variety of factors that have caused the price of fossil-fuels to spike over the past 50 years and there are no sources of energy that can be developed without environmental consequences. Changes in public opinion could dramatically change the types of energy projects that are supported or required in the future. Dairy digesters and co-digester facilities could benefit from increased incentives for local, renewable energy sources. Potentially, dairies in Region 5 could generate approximately 14.6 billion cubic feet of methane per year through manure only anaerobic digestion, which would correspond to 140 megawatts³ of annual electrical capacity (Krich, et al., 2005). California efforts to achieve the greenhouse gases (GHG) reductions identified in AB 32 could also provide support for dairy digester and co-digester projects.

³ This was based on an estimate of 1.7 million cows.

For the purpose of cumulative impact analyses in the various resource chapters in this Program EIR, development of the digesters can be assumed to be concentrated geographically (within reasonable limits), to the extent that such assumptions will help to identify potentially significant cumulative impacts. The potential for central facilities to be connected to dairies by biogas pipelines would be one of the factors that would concentrate several dairy digester or co-digesters in a localized geographic area.

Operating Parameters of Future Dairy Digester Facilities

Based on the existing dairy digester data for California where 19 of the 21 digesters (operational and non-operational) used biogas for electricity or co-generation, this analysis projects that the majority of the dairy digesters to be developed will use the biogas for electricity or co-generation, which typically occurs on individual dairies. Of the 200 digesters, the analyses assumes that about 180 of the facilities would combust the biogas on-site through a generator and that 20 of these would be at centralized facilities. The analysis assumes there would be 5 centralized facilities that would process biogas piped from digesters at individual dairies and 5 centralized facilities that would have multiple digesters each to process manure that would be piped or trucked from dairies and co-digestion organic substrates that would be trucked to the central facilities.

**TABLE 4-1
EXISTING DAIRY DIGESTERS IN CALIFORNIA**

Facility	Digester Type	Biogas End Use(s)	Operational Status
Blakes Landing Dairy	Covered Lagoon	Electricity	Operational
Bob Giacomini Dairy	Covered Lagoon	Cogeneration	Operational
Bullfrog Dairy	Covered Lagoon	Electricity	Operational
Cal Poly Dairy	Covered Lagoon	Electricity	Not Operating
CAL-Denier Dairy	Covered Lagoon	Electricity	Operational
Castelanelli Bros. Dairy	Covered Lagoon	Electricity	Operational
CottonWood Dairy	Covered Lagoon	Cogeneration; Boiler/Furnace Fuel	Operational
Edenvale Dairy	Horizontal Plug Flow	Electricity	Not Operating
Fiscalini Farms	Complete Mix	Cogeneration	Operational
Hilarides Dairy	Covered Lagoon	Electricity; Vehicle Fuel	Operational
Inland Empire Utilities Agency - Reg Plant 5	Horizontal Plug Flow; Complete Mix	Electricity	Not Operating
Koetser Dairy	Horizontal Plug Flow	Electricity	Not Operating
Langerwerf Dairy	Horizontal Plug Flow	Cogeneration	Operational
Lourenco Dairy	Covered Lagoon	Flared Full Time	Not Operating
Meadowbrook Dairy	Horizontal Plug Flow	Electricity	Operational
St. Anthony Dairy	Covered Lagoon	Cogeneration	Not Operating
Strauss Family Dairy	Covered Lagoon	Cogeneration	Operational
Tollenaar Holsteins Dairy	Complete Mix	Cogeneration; Boiler/Furnace Fuel	Operational
Van Ommering Dairy	Horizontal Plug Flow	Electricity	Operational
Van Warmerdam Dairy	Unknown	Electricity	Operational
Vintage Dairy	Covered Lagoon	Pipeline Gas	Not Operating

SOURCE: Western United Dairymen, 2010

Several of the environmental resource chapters analyze vehicles trips directly (Chapter 8, Transportation and Traffic) or indirectly (Chapter 6, Air Quality and GHG Emissions, and Chapter 14, Noise). In regards to truck and employee trips the analyses in this Program EIR have relied upon estimates detailed in recent information provided to Fresno County on the details of two dairy co-digester projects in the County (Munzen, 2010) and the *Microgy Pipeline Project for Cloverdale, Hollandia, and Wreden Dairies IS/MND* (SJVAPCD, March 2008), which analyzed anaerobic digester development on three dairies in order to centrally collect the biogas and pipe it into the gas network of the Southern California Gas Company. On average these projects assumed that approximately 2 trucks per day per digester would haul co-digestion substrates to the dairies, and that two employees would routinely monitor the central gas conditioning facility and the dairy digesters. Thus, the analyses in this Program EIR assumes that 400 trucks per day would haul anaerobic digester substrate for the cumulative development (i.e., 2 trucks per day for each of the 200 dairy digesters). In addition, it was assumed that 2 employees would be needed for the operation of each of the centralized facilities, or 20 employees total. These relatively low estimates of daily vehicle trips and employees necessary to operate the facilities are consistent with observations and discussions with dairy digester facility operators during the site tour of three dairy digester facilities on April 6, 2010 (ESA, 2010).

Finally, based on the US EPA AgSTAR Anaerobic Digester Database⁴, the average electrical generation capacity per digester facility in California is 261 kW. In addition, the average methane emission reduction per digester facility in California is 296 metric tons CH₄ per year and 6,223 metric tons CO₂e per year. These averages are used in the analysis in this Program EIR.

4.7 References

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CHAPTER 5

Hydrology and Water Quality

5.1 Setting

The Central Valley, also referred to as the Great Valley, is a very large, flat alluvial valley that dominates the central portion of California. Land use in this region includes a majority of the state's most productive agricultural operations. The valley stretches approximately 500 miles from north to south, from the about 100 miles south of the Oregon border to the boundary between Kern and Los Angeles counties. The Central Valley is divided into three hydrologic regions or surface water basins including the Sacramento River Basin in the north (**Figure 5-1**), the San Joaquin River Basin (**Figure 5-2**), and the Tulare Lake Basin (**Figure 5-3**) to the very south.¹ Together the Sacramento and San Joaquin River Basins cover about one fourth of the total areas of the State and over 30 percent of the irrigable land. The two main drainages for these valleys, the Sacramento River and the San Joaquin River, empty into the San Francisco Bay estuary system through a large expanse of interconnected canals, streambeds, sloughs, marshes and peat islands known as the Sacramento-San Joaquin Delta (Delta).

The Tulare Lake Basin comprises the drainage area south of the San Joaquin River. The basin is essentially enclosed with no natural drainage to the ocean although surface waters of the basin will drain into the San Joaquin River during years of extreme rainfall and some engineering improvements such as the Cross Valley Canal and some Fresno Irrigation District canals allow flows to exit the Tulare Lake Basin. The Tulare Lake Basin is an agricultural center although the surface water supplies are insufficient to support the current level of agriculture and therefore groundwater resources are also used to meet the total demand.

The Sacramento River Basin receives about 20 inches of rain annually, with some of the northern areas receiving more precipitation. Both the San Joaquin River Basin and the Tulare Lake Basin are very dry, often semi-arid desert in many places. The northern Central Valley is considered a hot Mediterranean climate, whereas the more southerly parts are located in a rainshadow zones are dry enough to be considered low-latitude desert. Summers are typically hot and dry and the winter is cool and damp, with frequent ground fog known regionally as tule fog. Summer daytime temperatures commonly reach 90 °F, and occasional heat waves that might bring temperatures exceeding 115 °F. Frost occurs at times during the winter months, but snow is extremely rare.

¹ A more detailed description of the three hydrologic regions and subwatersheds can be found in the Irrigated Lands Existing Conditions report, December 2008, which can be accessed at http://www.swrcb.ca.gov/rwqcb5/water_issues/irrigated_lands/long_term_program_development/rev_existing_conditions_report/index.shtml.

Surface Water Hydrology

Sacramento River

Flows within the Sacramento River are highly regulated and are influenced by the following factors: runoff from precipitation and snowmelt; natural variation; upstream water storage facilities; water diversions for agricultural, municipal, and industrial purposes; agricultural and municipal discharges; and a flood control system that includes levees, bypasses (e.g., the Yolo, Sutter, and Colusa bypasses), and weirs.

Sacramento River flows vary substantially on a seasonal and year-to-year basis. Seasonally, flows in the river may vary as a result of runoff from local tributaries and releases from the major water storage reservoirs, as well as diversions by agricultural, municipal, and other users. Interannually, river flows vary according to precipitation, the volume of carryover storage in reservoirs, and releases to downstream water users. The Sacramento River enters the Delta (as defined by California Water Code Section 12220) at Freeport, where the average annual flow is about 16 million acre-feet (MAF).

The Sacramento River Basin is further divided into eight subwatersheds (See Figure 5-1) including:

- Pit River Watershed
- Shasta-Tehama Watershed
- Upper Feather River–Upper Yuba River Watershed
- Colusa Basin Watershed
- Butte-Sutter-Yuba Watershed
- Lake-Napa Watershed
- Solano-Yolo Watershed
- American River Watershed

The Sacramento River Basin encompasses approximately 12.2 million acres. Of this amount, 2.4 million acres are classified as agricultural lands. The majority of these irrigated acres occur on the Valley floor, in the Solano-Yolo, Colusa Basin, and Butte-Sutter-Yuba Watersheds. Rice is the primary crop in the Sacramento River Basin, particularly in the Colusa and Butte-Sutter-Yuba Watersheds where poorly drained soils provide ideal conditions. Other predominant crop types include field crops, orchards, pasture, and grains (Jones and Stokes, 2008).

San Joaquin River

Flows within the San Joaquin River are highly regulated and influenced by the following factors: runoff from precipitation and snowmelt; natural variation; upstream water storage facilities; water diversions for agricultural, municipal, and industrial purposes; agricultural and municipal discharges; and a flood damage reduction system. The average annual flow of the San Joaquin River as it enters the Delta at Vernalis is about 2.6 MAF, or 3,600 cubic feet per second (cfs).





Typically, during summer months, flows within the lower San Joaquin River are composed primarily of agricultural and wildlife refuge return flows and municipal discharges. Portions of the middle/lower San Joaquin River below Friant Dam typically run dry during the dry season, resulting in a temporary hydrologic disconnect between the lower and upper watersheds though the area has been undergoing changes in water management.

The San Joaquin River Basin is further divided into 12 subwatersheds (See Figure 5-2) including:

- Cosumnes River Watershed
- Delta-Mendota Canal Watershed
- San Joaquin River Watershed
- San Joaquin Valley Floor Watershed
- Delta-Carbona Watershed
- Ahwahnee Watershed
- Mariposa Watershed
- Upper Mokelumne River–Upper Calaveras River Watershed
- Merced River Watershed
- North Valley Floor Watershed
- Stanislaus River Watershed
- Tuolumne River Watershed

The San Joaquin River Basin encompasses approximately 9.8 million acres. The primary tributaries in the basin are the Stanislaus River, Tuolumne River, and Merced River, which meet with the San Joaquin River in the Valley floor at the basin's southern end. The basin is dominated by agriculture at the confluence of the San Joaquin and these various rivers. Multiple canals in the Delta Mendota Canal Watershed deliver water to agricultural operations and then back to the natural drainages (Jones and Stokes, 2008). Many tributaries in the watershed that would otherwise be dry during the summer irrigation season flow year-round due to agricultural return flows. The San Joaquin River receives the majority of its flow from snow melt and runoff in the Sierra Nevada Mountains. However, groundwater flows from the upper aquifer in the valley may also contribute to the total surface water flow in the San Joaquin River as well as to surface water flows in a variety of San Joaquin River Basin streams (Grismer and Rashmawi, 1993, Domagalski, et al, 2008, Wildman et al, 2009). This groundwater influx has been demonstrated to induce a variety of contaminants, primarily nutrients and salts into surface waters (Domagalski, et al, 2008, Wildman et al, 2009 and Lee, G.F., and Jones-Lee, A., 2007).

Approximately 2 million acres within the basin are classified as agricultural. The primary crops that are produced in the San Joaquin River Basin include field crops, pasture, deciduous fruits and nut orchards, vineyards, and grain and hay. Agricultural land uses in the basin are concentrated in the Valley floor—specifically in the Delta-Mendota Canal, San Joaquin Valley Floor, Delta-Carbona, and North Valley Floor Watersheds. There is very little agriculture in the remaining watersheds.

Sacramento–San Joaquin Delta

The Sacramento-San Joaquin Delta, to the east of San Francisco Bay, represents the point of discharge for the Sacramento-San Joaquin River system. Water flows out of the Delta, into San Francisco Bay, and through the Golden Gate to the Pacific Ocean, creating an extensive estuary where salty ocean water and fresh river water commingle. In sum, water from over 40 percent of the state's land area is discharged into the Delta (Heim, et al., 2009).

The Delta supports several beneficial uses, including water supply to local and south of Delta municipalities and agricultural uses, ecological support for fisheries including wetlands and important habitat, in-Delta agriculture, flood management, water quality management, and a major conveyance for transporting fresh water from northern to southern portions of the state. In addition, many other water projects also divert Delta waters including export pumps for the State Water Project, diversions for Delta-area and San Francisco Bay Area municipalities, and regional agricultural users. An extensive network of drainage ditches prevents islands in the Delta from flooding internally and maintains groundwater levels deep enough for agricultural crops to grow. The accumulated agricultural drainage is then discharged through or over the levees into stream channels. Without this drainage, the islands would become flooded.

Tulare Lake Basin

The majority of surface water supply in the basin is provided by the Kings, Kaweah, Tule and Kern Rivers which drain the west face of the Sierra Nevada Mountains. Imported surface water supplies enter the basin through the San Luis Canal/California Aqueduct System, Friant-Kern Canal, and Delta-Mendota Canal. Imported surface water supplies represent the introduction of half the salts that are found in the basin (discussed further below). The former Buena Vista Lake and Tulare Lake are natural depressions on the valley floor which once received flood waters from the major drainages during times of heavy runoff. Currently though, Buena Vista and Tulare Lake are now developed into agricultural fields. Heavy flows from the Kings River can reach the San Joaquin River through the Fresno Slough.

The Tulare Lake Basin is further divided into 10 subwatersheds (See Figure 5-3) including:

- Kings River Watershed
- Kaweah River Watershed
- Kern River Watershed
- South Valley Floor Watershed
- Grapevine Watershed
- Coast Range Watershed
- Fellows Watershed
- Temblor Watershed
- Sunflower Valley Watershed
- Southern Sierra Watershed

The Tulare Lake Basin encompasses approximately 10.7 million acres of which 3.6 million acres are classified as agricultural (Jones and Stokes, 2008). The vast majority of this agricultural land is located in the South Valley Floor Watershed (3.5 million acres). In comparison with other watersheds in the Tulare Lake Basin, the South Valley Floor Watershed is relatively flat. Consequently, the bulk of water quality concerns related to the Tulare Lake Basin involve agricultural operations and agricultural return flows in the South Valley Floor Watershed (Jones and Stokes, 2008).

In the upper watershed areas, irrigated agriculture accounts for less than 2 percent of land uses in the Kings River, Kaweah River, Kern River, Grapevine, Coast Range, Sunflower Valley, and Southern Sierra Watersheds—with just slightly more in the Temblor Watershed (3.3 percent). There is no agriculture in the Fellows Watershed. The primary crop types within the Tulare Lake Basin as a whole are grain and hay crops, pasture, and deciduous fruits and nuts. The primary crop types within the South Valley Floor Watershed are field crops, followed by deciduous fruits and nuts, vineyards, pasture, and grain and hay.

Surface Water Quality

Water Quality Constituents

A variety of water quality problems exist within the surface waters of the Central Valley, and contribute to impairments of the beneficial uses of surface water in portions of the region. In general, surface water quality is dependent on a number of factors including seasonal hydrologic patterns, mineral composition of watershed soils, topography, land use, and sources of contamination. During low-flow conditions of the summer months, the surface water quality characteristics of most importance to aquatic life are temperature, dissolved oxygen, turbidity, nutrients such as nitrogen and phosphorous, algae growth, and other toxic constituents including ammonia, pesticides, and residual chlorine (all beneficial uses of surface waters in the Central Valley are presented below in the Regulatory Framework section). Higher flow conditions in the winter are influenced more by stormwater runoff and associated pollutants such as sediment (turbidity), petroleum hydrocarbons, nutrients and bacteria from livestock areas and agricultural fields, heavy metals, pesticides, and various other pollutants.

Historical and ongoing point source and nonpoint source discharges have been found to contribute to impairments of surface waters.² Significant portions of major drainages within the Central Valley have been impaired by discharges from agriculture, mining, urban areas, and industrial activities (RWQCB, 2004 and 2009). Studies of the San Joaquin River's water quality, have indicated that groundwater flow entering the river along a 60-mile reach from Merced County to Vernalis in Stanislaus County, though relatively small compared with the total river flows, could nonetheless represent significant contributions of salt, boron, and other trace elements found in the groundwater (Grismer and Rashmawi, 1993). Constituents of concern for dairies and associated animal wastes include excess amounts of nutrients, salts, organics rich in biochemical oxygen-demanding material, microbial pathogens, antibiotics, and natural and synthetic hormones (Bradford, 2008)

² Discharges are often described as either point source or nonpoint source. A point source discharge usually refers to waste emanating from a single, identifiable place. A nonpoint source discharge usually refers to waste emanating from diffuse locations.

Salinity is a problem that has been identified in both surface and groundwater within portions of the Central Valley, particularly in the Tulare Lake Basin. Salinity refers to the concentration of salts or ions present in water, including sodium, magnesium, calcium, phosphates, nitrates, potassium, chloride, bromide, and sulphate. Salinity is commonly measured by total dissolved solids (TDS) concentrations. Salinity is both an aesthetic (taste) and a health issue for drinking water quality. High salinity adversely affects drinking water taste, landscape irrigation, and industrial and manufacturing processes. Salinity is particularly problematic because it cannot be removed via conventional drinking water treatment processes.

Section 303(d) List of Impaired Water Bodies and TMDLs

In accordance with Section 303(d) of the Clean Water Act (discussed further below), state governments must present the US Environmental Protection Agency (USEPA) with a list of “impaired water bodies,” defined as those water bodies that do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology.

Placement of a water body on the Section 303(d) List of Impaired Water Bodies acts as the trigger for developing a Total Maximum Daily Load (TMDL) pollution control plan for each water body and associated pollutant/stressor on the list. The TMDL is the quantity of a pollutant that can be safely assimilated by a water body without violating water quality standards. The TMDL serves as the means to attain and maintain water quality standards for the impaired water body to support designated and potential beneficial uses identified in the Basin Plan. During each Section 303(d) listing cycle, the water bodies on the list are prioritized, and a schedule is established for completing the TMDLs.

There are numerous surface water bodies listed in the 303(d) list for the Central Valley Region for a variety of pollutant/stressors, however three of them specifically name dairies as potential sources of the impairment (SWRCB, 2009 and CVRWQCB, 2009). Little Johns Creek, located in the San Joaquin River Basin, is a small drainage that connects to French Camp Slough and the Delta. Little Johns Creek is not considered to have significant water quality problems, but some of its tributaries have water quality issues that are associated with their proximity to dairies. These small tributaries are:

- Lone Tree Creek—Lone Tree Creek runs along the southern edge of the North Valley Floor Watershed, with some small sections falling in the San Joaquin Valley Floor Watershed. Lone Tree Creek is a direct tributary to Little Johns Creek. Lone Tree Creek is listed as impaired from ammonia, biochemical oxygen demand (BOD), chlorpyrifos, Diuron escherichia coli (E. coli), sediment toxicity, and unknown toxicity. Dairies have been identified as a potential source for the ammonia and BOD (SWRCB, 2009).
- Temple Creek—Temple Creek is north of Lone Tree Creek and is a small tributary to Lone Tree Creek. According to the 303(d) list, Temple Creek is impaired with ammonia and electrical conductivity with dairies listed as the potential source for both (SWRCB, 2009).
- Avena Drain—Avena Drain is also a tributary to Lone Tree Creek and is located between Lone Tree Creek and Temple Creek. Its main source of inflow is agricultural drainage and storm runoff. Ammonia and pathogens are the listed pollutant/stressors for Avena Drain with dairies identified as the potential source.

Groundwater

Similar to the surface water regions, the Central Valley region lies within three groundwater basins: the Sacramento River Hydrologic Region (HR) (**Figure 5-4**), the San Joaquin River HR (**Figure 5-5**), and the Tulare Lake HR (**Figure 5-6**).

Sacramento River HR

The Sacramento River HR covers approximately 17.4 million acres that extend from the Modoc Plateau and Cascade Range at the Oregon border to the Delta in the south (DWR, 2003a). On the east side, the region is bounded by the Sierra Nevada and on the west by the Coast Range and Klamath mountains. The Sacramento River HR has been divided into 88 groundwater basins, some of which have been further divided into subbasins. The Sacramento Valley basin, the largest in the HR, generally consists of a large trough filled with thick alluvial sediments of varying permeability. However, in general the well yields or amount of water that can be extracted from a single well are very good. Groundwater is used as supplemental agricultural water supply sources to surface water supplies throughout the Sacramento Valley. Domestic use of groundwater varies but in general, rural areas rely solely on groundwater as well as some cities and towns including Red Bluff, Corning, Woodland, Davis, and Dixon.

San Joaquin River HR

The San Joaquin River HR covers approximately 9.7 million acres, representing the central portion of the Central Valley. The region is bound on the north by the Delta, the east by the Sierra Nevada, the west by the Diablo Range and the south by the Tehachapi Mountains. The HR includes two groundwater basins (Yosemite Valley and Los Banos Creek Valley) and part of the San Joaquin Valley basin including 9 subbasins. In general, this HR is heavily reliant on groundwater supplies and accounts for approximately 18 percent of statewide groundwater use for both agricultural and urban needs (DWR, 2003b).

The aquifers or water bearing zones within the San Joaquin River HR are generally very thick, accommodating wells as deep as 800 feet below ground surface (DWR, 2003b). Aquifers include unconsolidated alluvium as well as consolidated rocks with unconfined and confined groundwater conditions. Since the beginning of agricultural development in the region, groundwater has been used in conjunction with surface water to meet water supply needs (DWR, 2003b). Historical groundwater use and over pumping in areas has resulted in significant land subsidence especially in the southwest portion of the region.

Tulare Lake HR

The southernmost HR of the Central Valley has 13 groundwater basins including the southern portion of San Joaquin Valley basin (south of San Joaquin River) with 7 identified subbasins. The Tulare Lake HR covers approximately 5.33 million acres. Groundwater has historically been used as an important source of urban and agricultural uses providing 41 percent of the region's total annual supply (DWR, 2003c). The San Joaquin River basin is characterized by relatively thick aquifers with groundwater wells that commonly exceed 1,000 feet in depth. Freshwater bearing deposits can be found as much as 4,400 feet thick at the southern end of the San Joaquin Valley. In the central and west-side portions of the valley a confining layer of tight clays known as the

Corcoran Clay restricts vertical groundwater flow between the overlying unconfined aquifer and the underlying confined aquifer. Well yields are generally quite good in the valley with lower yields found in the smaller basins of the mountains surrounding the valley (DWR, 2003c).

Groundwater Quality

Groundwater Quality Constituents

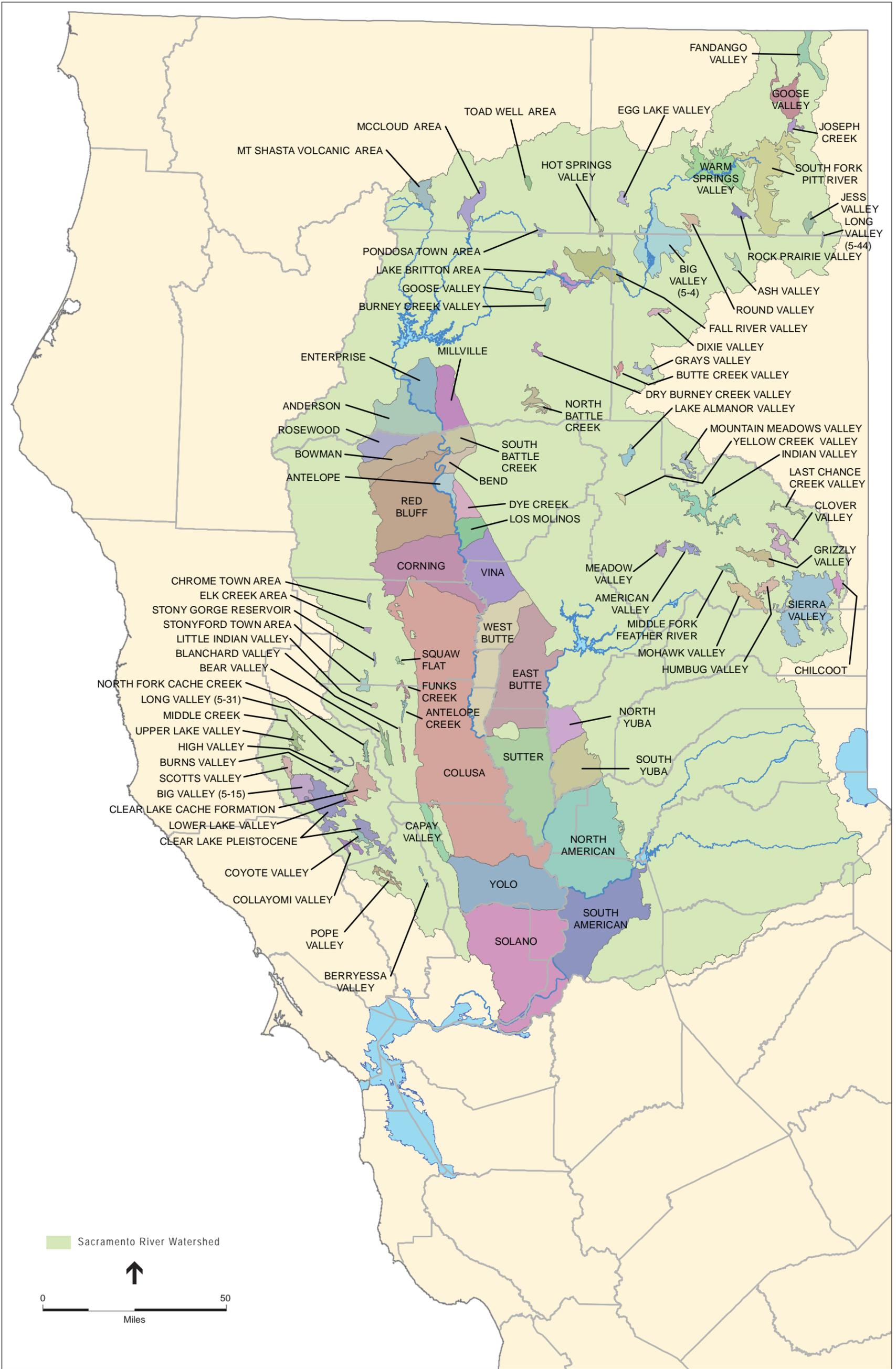
Groundwater monitoring data indicates that many dairies in the Central Valley region have impacted groundwater quality. The main constituents of concern for waste discharge from dairies are nitrogen in the form of both ammonium and nitrate, phosphorus, salinity or salts, chloride, boron, pathogens, and organic matter. These constituents of concern are also present in various forms and concentrations in both the liquid and solid streams of the anaerobic digestion process for dairy cow manure. Following is a discussion of the environmental and health implications for each constituent of concern.

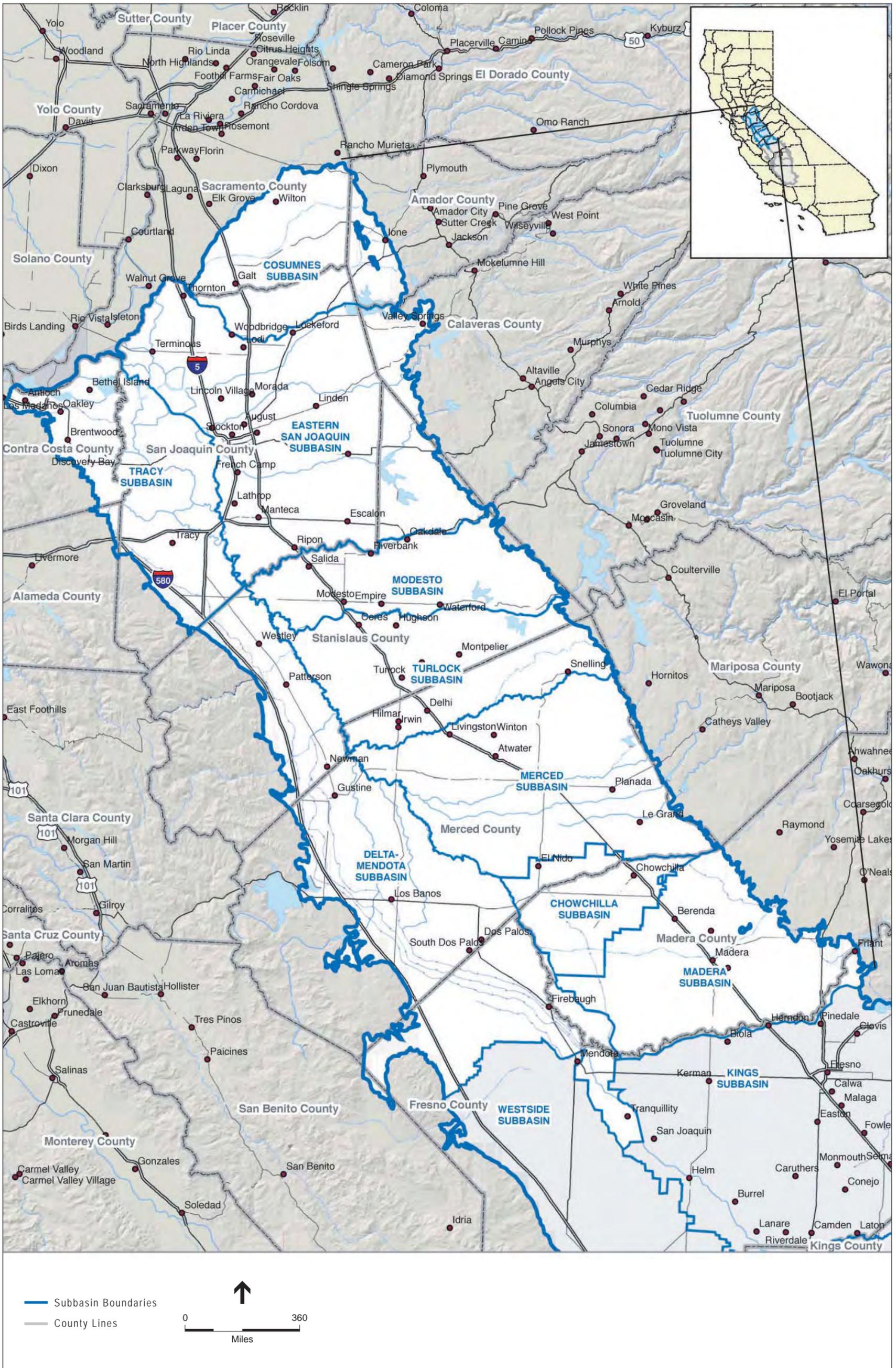
Salinity and Total Dissolved Solids

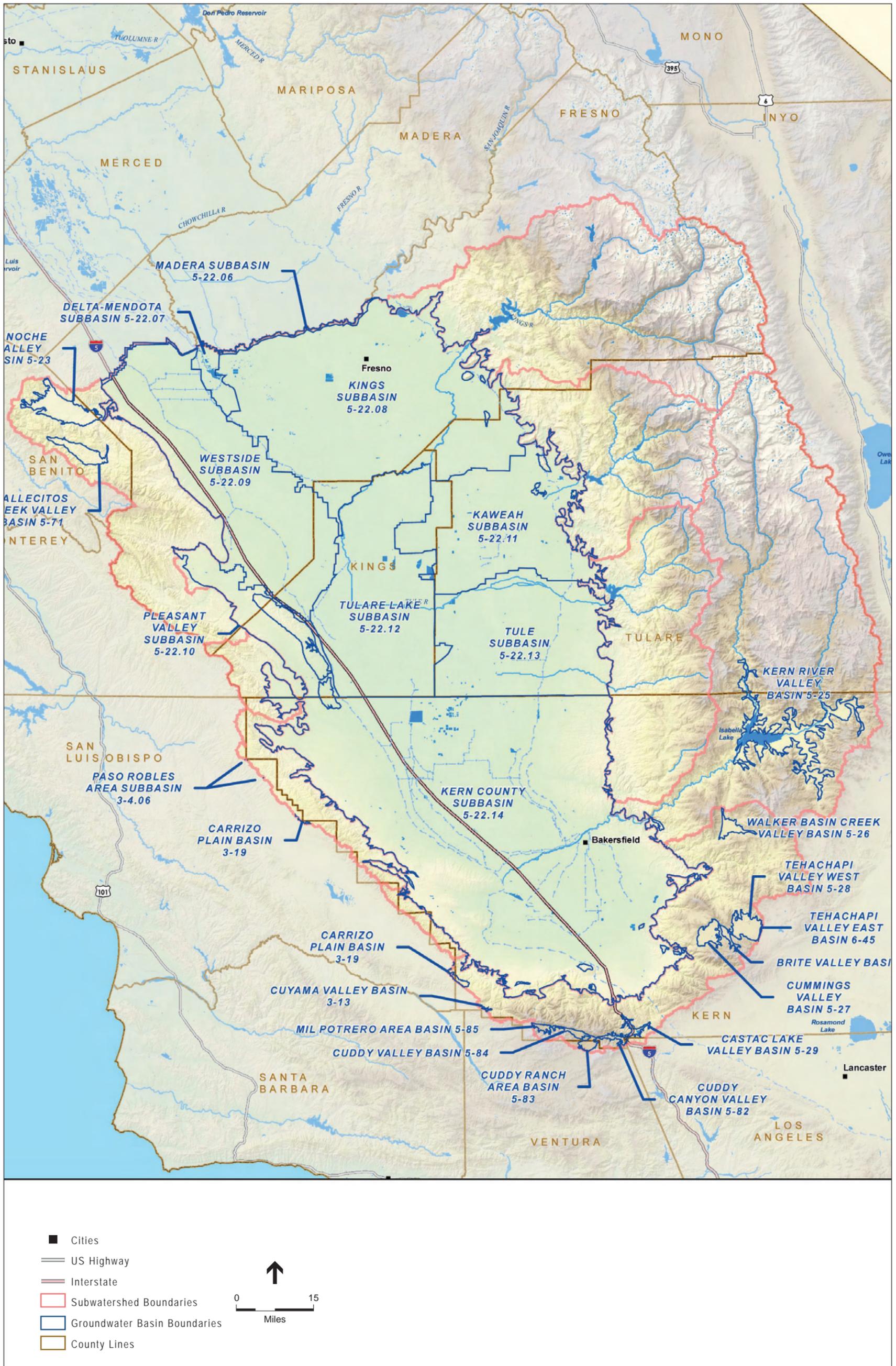
Salt is a general term used to describe a combination of cations and anions that are common to groundwater. The concentration of salts in groundwater can increase through what is known as evaporative enrichment. Evaporation rates are highest during the summer months when irrigation water is typically applied to crops. As the water molecules evaporate, the salts remain behind to percolate into the underlying groundwater. When this water is later pumped for additional irrigation, the evaporation cycle is repeated and salinity levels continue to increase. In addition, the application of synthetic fertilizers, manures, and wastewater treatment facilities can all contribute salt to groundwater. Co-digestion substrates that might be used for a co-digestion process typically vary in their constituents but can include high salt concentrations.

TDS is a measure of the total amount of inorganic and organic substances dissolved in water and is, therefore, a very useful parameter in the overall evaluation of groundwater quality. TDS concentrations provide a qualitative measure of the amount of dissolved ions, but it does not explain the nature or ion relationships. High TDS concentration does not by itself identify a specific water quality issue, such as: elevated hardness³, salinity, or corrosiveness. Instead, TDS is used as an indicator test to determine the general quality of the water. Common cations include sodium, calcium and magnesium and common anions include chloride, sulfate, and nitrate. Electrical conductivity (EC) is also used to measure the ions dissolved in water: the higher the EC the more mineralized the water. The presence of salts in soil and root zone water may adversely affect the viability of crops.

³ Hardness is the measure of the amount of calcium, magnesium, and iron dissolved in the water. Hardness of about 60 mg/l or less is considered soft water, and more than about 120 mg/l is generally considered hard water.







SOURCE: ICF Jones & Stokes, 2006; and ESA, 2010

Central Valley Dairy Digester and Co-Digester Program EIR . 209481

Figure 5-6
Tulare Lake Groundwater Subbasins

An elevated TDS concentration is not necessarily a health hazard. The TDS concentration is a secondary drinking water standard and therefore is regulated because it is more of an aesthetic rather than a health hazard. However, it can also damage crops, affect plant growth and damage industrial equipment. An elevated TDS indicates the following:

1. The concentration of the dissolved ions may cause the water to be corrosive, salty or brackish taste, result in scale formation, and interfere and decrease efficiency of hot water heaters; and
2. Many contain elevated levels of ions that are above the Primary or Secondary Drinking Water Standards, such as: an elevated level of nitrate, arsenic, aluminum, copper, lead, etc.

Nitrogen Cycle

The nitrogen cycle is the process by which nitrogen is converted between its various chemical forms. This transformation can be carried out through both biological and non-biological processes. Important processes in the nitrogen cycle include fixation (the natural process by which nitrogen in the atmosphere is converted into ammonia), mineralization (the decomposition of chemical compounds in organic matter by oxidation into plant-accessible forms), nitrification (the biological oxidation of ammonia with oxygen into nitrite followed by the oxidation of these nitrites into nitrates), and denitrification (the microbially facilitated process of reducing nitrate to produce molecular nitrogen (N_2) through a series of intermediate gaseous nitrogen oxide products). The nitrogen cycle is of particular concern to the environment because nitrogen availability can affect the rate of key ecosystem processes, including primary production and decomposition. Human activities such as fossil fuel combustion, use of artificial nitrogen fertilizers, and release of nitrogen in wastewater have dramatically altered the global nitrogen cycle.

Ammonia

Ammonia, a compound of nitrogen and hydrogen with the formula NH_3 , is a colorless gas with a strong pungent odor. It is easily liquefied and solidified and is very soluble in water. Ammonia will react with water to form a weak base. About three-fourths of the ammonia produced in the United States is used in fertilizers either as the compound itself or as ammonium salts such as sulfate and nitrate. Large quantities of ammonia are used in the production of nitric acid, urea and nitrogen compounds. It is used in the production of ice and in refrigerating plants. Household ammonia is an aqueous solution of ammonia used to remove carbonate from hard water. Since ammonia is a decomposition product from urea and protein, it is found in domestic wastewater and can be formed as a result of dairy waste degradation. Aquatic life and fish also contribute to ammonia levels in surface waters.

Ammonia is un-ionized, and has the formula NH_3 . Ammonium is ionized, and has the formula NH_4^+ . The major factor that determines the proportion of ammonia or ammonium in water is the pH of the water. This is important as the unionized NH_3 is the form that can be toxic to aquatic organisms. The ionized NH_4 is basically harmless to aquatic organisms. The activity of ammonia is also influenced by temperature and ionic strength.

The chemical equation that drives the relationship between ammonia and ammonium is:



When the pH is low, the reaction is driven to the right, and when the pH is high, the reaction is driven to the left

Ammonia has been reported toxic to fresh water organisms at concentrations ranging from 0.53 to 22.8 mg/L. Toxic levels are both pH and temperature dependent. Toxicity increases as pH decreases and as temperature decreases. Plants are more tolerant of ammonia than animals, and invertebrates are more tolerant than fish. Hatching and growth rates of fishes may be affected.

The California Department of Health Services (CDHS) has established a draft Suggested No Adverse Response Level (SNARL) for ammonia of 30 mg/L. Although not applicable to groundwater, the RWQCB has established pH- and temperature-dependant surface water quality goals for freshwater aquatic life.

Ammonia is broken down by bacteria (*Nitrosomonas*) to form nitrite (NO₂), which is then broken down by another type of bacteria (*Nitrobacter*) to form nitrate (NO₃). This conversion of ammonia to nitrite and nitrate is called nitrification. Nitrates are essential nutrients for plants or crops to grow. Commercial fertilizers are typically applied either as ammonia or nitrate, but ammonia is rapidly converted to nitrate in the soil. Animal manure is also commonly used as a nitrogen fertilizer. Organic nitrogen and urea in the manure are converted to ammonia and, ultimately, to nitrate in the soil. Ammonia is easily transformed to nitrate in waters that contain oxygen and can be transformed to nitrogen gas in waters that are low in oxygen under a process known as denitrification. Fertilizer is a major influence on nitrogen concentrations in the environment. Excess nitrate that is not used by plants can wash from farmlands and residential and commercial lawns into storm drains and nearby surface waters, or seep into groundwater.

Nitrate

Nitrogen is present in groundwater primarily in the nitrate form which is highly soluble in water. Nitrogen can also be present in groundwater as ammonium or nitrite. Nitrates can easily move through the soil profile to groundwater. The sources of nitrate include human and animal waste and large scale use of nitrogen-based fertilizers. The presence of nitrates in groundwater can be affected by soil characteristics, crop type, irrigation practices, timing and application of nitrogen, geology, climate, and hydrologic conditions. It can also be difficult to determine whether the presence of nitrates in groundwater is due to historical or current practices or whether from agricultural, animal waste, septic, or wastewater sources. Coarse grained sandy soils transmit water containing dissolved nitrates downward more rapidly than tighter grained soils. In addition, the coarse grained soils are less likely to provide the reducing conditions that allow nitrates to turn into a gas and escape the soil (denitrification). The CDHS has established a Maximum Contaminant Level (MCL) for nitrate (as NO₃) of 45 mg/L. This is equivalent to the state and federal drinking water standard of nitrate as nitrogen MCL of 10 mg/L. The CDHS has established a MCL for nitrite (as Nitrogen) of 1 mg/L. Like nitrate, nitrite is anionic and can move through the soil profile to groundwater.

Under typical environmental conditions, nitrite is readily oxidized to nitrate. Nitrates in drinking water have been associated with methemoglobinemia (MHB), often referred to as “blue-baby” syndrome. MHB affects infants under 6 months of age with symptoms that include an ashen, bluish (cyanotic) hue to the skin and nails.

Nitrate contamination of ground water in California is an issue of concern, in part, because nitrate concentrations have increased over time (Burow, 1998, Burow, et al, 2008, and Burow and Green, 2008). This increase could be due in part to the increased use of nitrogen fertilizers since the 1950’s. Low levels of nitrate occur naturally in ground water; however, in agricultural areas, elevated concentrations of nitrate occur as the result of farming operations where nitrogen fertilizers are applied. However, other sources of nitrogen, such as animal waste and sewage effluent, have also been linked to the elevated concentrations (Burow, 1998).

Total Kjeldahl Nitrogen (TKN) represents the combination of ammonia and organic nitrogen in water. Dairy waste contains organic nitrogen in the form of proteins or various forms of degraded protein. No MCL or regulatory limit exists for TKN; however the degradation of TKN eventually produces ammonia and nitrate.

Phosphorus

Phosphorous is a nonmetal element that is an essential plant nutrient. Due to its high reactivity it is never found in its elemental form. Phosphorus exists as both organic and inorganic forms in dairy manure. Inorganic phosphorus in manure is easily adsorbed to soil particles, and is less subject to leaching or dissolution in runoff. Although phosphorous does not present a health risk in surface water or groundwater, it does have environmental impacts in surface water. Similar to ammonia, phosphorous can cause eutrophication of surface water bodies, thereby depleting the dissolved oxygen concentrations which can cause fish and other aquatic organisms to die. Inorganic phosphate is the form that is available as a nutrient and thus, is the major contributor to eutrophication.

Although phosphorus tends to bind to soil, phosphorus leaching to groundwater has been documented to occur in the Central Valley (Bennett, et al, 2005 and 2006; Dawson, et al, 2008; Shelton, et al, 2008;), especially in soils that are low in clay, organic carbon, iron and aluminum; and in soils where downward flow occurs through preferential pathways (root holes, worm burrows and desiccation cracks).

Pathogens

A pathogen is an infectious biological agent that causes disease to its host. Pathogens include bacteria, viruses, fungi, parasites, and prions. Fecal coliform bacteria are a subgroup of total coliform bacteria, and *Escherichia coli* (*E. coli*) is a particular genus and species of fecal coliform. Fecal coliform bacteria depend on their host environment for survival and reproduction and are found in the intestinal tracts of warm-blooded animals such as dairy cows. The presence of fecal coliform bacteria in water can indicate the presence of animal waste and may indicate the presence of pathogens. In order for viruses to actively replicate, they need to have invaded a host cell. There is some evidence that viruses may be transmitted from animals to man (US EPA 2004).

Use of the surface water, such as for recreation, could bring humans in direct contact with these pathogenic organisms resulting in disease outbreaks. In addition, pathogens could be leached down to drinking water supplies and individuals utilizing well water could be exposed. Additionally, an exposure route exists through the consumption of contaminated food.

Manure management practices and access to groundwater determine the degree to which groundwater may be impacted. The presence of microorganisms in groundwater is heavily dependent upon geologic conditions such as flow pathways and mechanisms, sunlight, temperature, pH, and soil properties (SWRCB, 2008). In addition, the characteristics of the microbial community are also important factors that influence the transport of microorganisms (SWRCB, 2008).

Pharmaceuticals and Hormones

Veterinary pharmaceuticals are routinely used at dairies for the purpose of therapeutics, growth-improvements, and health-protection purposes. Antibiotics are a major component of veterinary pharmaceuticals (Bradford, 2008). Most of the antibiotics are not completely metabolized by the cows and are subsequently excreted from the treated animal shortly after medication. Little is currently known about the toxicity of antibiotics or their degradation byproducts, the potential synergistic effects of various mixtures of contaminants, or the effects of long-term exposure to low levels of antibiotics (Bradford, 2008, Chee-Sanford, J.C., et al, 2009)

Animals also eliminate estrogen, androgen, and gestagen hormones from their bodies in their feces and urine. At present hormones do not have MCLs at either the state or federal level. Steroid hormones, however, have been classified as highly potent endocrine-disrupting chemicals (EDCs), which may interfere with the normal function of the endocrine system of humans and animals. Physiological and reproductive disorders in birds, fish, shellfish, turtles, gastropods, and mammals could be caused by EDCs, including steroid hormones. Steroid hormones are a particular concern because there is evidence that very low concentrations of these chemicals can adversely affect the reproduction of fish and other aquatic species (Bradford, 2008).

Application of animal wastes to agricultural land may serve as an important pathway to disseminate antibiotics and hormones in the environment. However, limited studies have been conducted on the environmental persistence, sorption, and transport of various pharmaceutical compounds (Bradford, 2008). One study indicated that longer residence times for dairy wastewater in secondary and tertiary lagoons have the effect of lowering hormone levels than those found in the primary lagoon (Zheng, 2007). The theory being that longer residence times allow more time to remove hormones by degradation (biodegradation, photodegradation, etc.) and settle hormone-associated manure particles (Zheng, 2007). Similarly, longer residence times for solid manure wastes also reduces hormone concentrations.

A second study by Arnon, et al (2008) found seepage of hormones as well as inorganic contaminants from dairy waste lagoons to deep groundwater. The study concluded that hormones were detected in different geological media and under different redox conditions and suggest that their degradation in the subsurface environment is limited, and therefore, natural attenuation cannot be relied on as a removal mechanism (Arnon, 2008).

Regional Groundwater Quality⁴

Sacramento River HR

In general, the groundwater quality of the Sacramento River HR is excellent with some isolated areas of local impairments (DWR, 2003a). Problem areas that are the result of natural conditions include the north end of Sacramento Valley in the Redding subbasin and along the margins of the valley in the vicinity of Sutter Buttes where marine sedimentary rocks contain brackish to saline water near the surface. Water from the older deposits below mix with the fresh water in the alluvial sediments and degrade the quality by creating high TDS concentrations. High salinity is also noticed in shallow groundwater near Maxwell, Colusa County (DWR, 2009) as well as high TDS and boron concentrations in some groundwater of Yolo County (DWR, 2009). Other natural impairments include the presence of hydrogen sulfide concentrations in groundwater near volcanic and geothermal areas of the western portion of the region. Groundwater in the Sierra foothills can be impaired with natural concentrations of uranium, radon, or heavy metals from sulfide mineral deposits.

According to data collected from public water supply wells throughout the HR, 95 percent of the wells sampled from 1994 to 2000 were in compliance with the states drinking water standards. Of the 5 percent that did not meet the drinking water standards, the contaminants included nitrates (33 percent), volatile and semi-volatile organic compounds (32 percent), inorganics (i.e. heavy metals) (26 percent), radiological elements (5 percent), and pesticides (4 percent) (DWR, 2003a). Average TDS concentrations throughout the HR range from 105 (Lake Almanor Valley) to 880 (Yolo) mg/L. **Table 5-1** shows the three most frequently occurring contaminants by contaminant group for the Sacramento River HR. The number of wells where the contaminant exceeded the MCL for that contaminant is also shown.

**TABLE 5-1
TOP THREE CONTAMINANTS BY CONTAMINANT GROUP - SACRAMENTO RIVER HR**

Contaminant Group	Contaminant – # of wells	Contaminant – # of wells	Contaminant – # of wells
Inorganics – Primary	Cadmium – 4	Chromium (Total) – 3	3 tied at 2
Inorganics – Secondary	Manganese – 221	Iron – 166	Specific Conductance – 3
Radiological	Gross Alpha – 4		
Nitrates	Nitrate (as NO ₃) – 22	Nitrate + Nitrite – 5	Nitrate Nitrogen (NO ₃ -N) – 2
Pesticides	Di(2-Ethylhexyl)phthalate–4		
VOCs	Tetrachloroethylene–11	Trichloroethylene – 7	Benzene – 4

SOURCE: California's Groundwater – Bulletin 118 (2002), Version 2 (Draft) (water quality data provided by California DHS)

San Joaquin River HR

Groundwater within the San Joaquin River HR is generally suitable for most urban and agricultural uses with some impairments, primarily due to nitrates (DWR, 2003b). The National Water Quality Assessment (NAQWA) for the San Joaquin Valley Groundwater Basin concluded that groundwater

⁴ A more detailed description of the groundwater quality for the three hydrologic regions and subbasins can be found in the Irrigated Lands Existing Conditions report, December 2008, which can be accessed at http://www.swrcb.ca.gov/rwqcb5/water_issues/irrigated_lands/long_term_program_development/rev_existing_conditions_report/index.shtml.

within the eastern portion of the San Joaquin Valley that supplies drinking water to the majority of the population has been degraded by fertilizers and pesticides (Dubrovsky et al. 1998). The sources of high nitrates and salts in groundwater include irrigated agriculture, dairies, discharges of wastewater to land, and disposal of sewage from community wastewater systems and septic tanks (DWR, 2009).

The primary non-nitrate constituents of concern include: TDS, boron, chloride, and organic compounds (i.e. pesticides, herbicides, solvents, etc.). Areas of high TDS concentrations are found in the central and west side areas of San Joaquin Valley. The high TDS content in the center of the valley is a result of a concentration of salts due to evaporation and poor drainage. Boron and chloride are likely a result of accumulation from evaporation around the center of the valley. Organic contaminants can be categorized as agricultural (e.g. pesticides and herbicides) and industrial (e.g. solvents such as trichloroethene (TCE) and dichloroethylene (DCE)). The industrial contaminants are generally found near airports, industrial areas, and landfills.

According to data collected from public water supply wells throughout the HR (10 of 11 basins and subbasins), 76 percent of the wells sampled from 1994 to 2000 were in compliance with the states drinking water standards. Of the 24 percent that did not meet the drinking water standards, the contaminants included radiological elements (30 percent), pesticides (33 percent), nitrates (16 percent), volatile and semi-volatile organic compounds (11 percent), and inorganics (i.e. heavy metals) (10 percent) (DWR, 2003b). Average TDS concentrations throughout the HR ranged from 54 (Yosemite Valley) to 1,190 (Tracy) mg/L. **Table 5-2** shows the three most frequently occurring contaminants by contaminant group for the San Joaquin River HR. The number of wells where the contaminant exceeded the MCL for that contaminant is also shown.

**TABLE 5-2
TOP THREE CONTAMINANTS BY CONTAMINANT GROUP - SAN JOAQUIN RIVER HR**

Contaminant Group	Contaminant –# of wells	Contaminant –# of wells	Contaminant –# of wells
Inorganics – Primary	Aluminum – 4	Arsenic – 4	4 tied at 2 exceedances
Inorganics – Secondary	Manganese – 123	Iron – 102	TDS – 9
Radiological	Uranium – 33	Gross Alpha – 26	Radium 228 – 6
Nitrates	Nitrate (as NO ₃) – 23	Nitrate + Nitrite – 6	Nitrate Nitrogen (NO ₃ -N) – 3
Pesticides	DBCP – 44	Di(2-Ethylhexyl)phthalate – 11	EDB – 6
VOCs	Tetrachloroethylene–8	Dichloromethane – 3	Trichloroethylene – 3

SOURCE: California's Groundwater – Bulletin 118 (2002), Version 2 (Draft) (water quality data provided by California DHS)

Tulare Lake HR

In general, the groundwater quality of the Tulare Lake HR is adequate for most urban and agricultural uses with areas of local impairments. The primary constituents of concern are high TDS, nitrates, arsenic, and organic compounds (DWR, 2003c). However, salinity is arguably the primary contaminant affecting water quality because of the salts that are introduced into the basin with imported water supplies and the natural internal drainage of the region (DWR, 2009). High TDS concentrations are found primarily on the west side of San Joaquin Valley and in the trough of the valley and are

generally higher in this HR than the other two. The high TDS on the west side of the San Joaquin Valley is due to recharge of stream flow originating from marine sediments from the Coast Ranges to the west of the valley. The center or trough of the valley contains high TDS from evaporation and poor drainage. Where the Corcoran Clay is present in the central and west-side portions of the valley, water quality is generally better below the clay than above it (DWR, 2003c). Nitrates occur naturally or as a result of human and animal waste products or from agricultural use of fertilizers. Areas of high nitrate concentrations are known to exist near the town of Shafter and other isolated areas within San Joaquin Valley. High levels of arsenic occur locally and appear to be associated with historical lakebed areas. Agricultural organic contaminants such as pesticides and herbicides have been detected throughout the valley but primarily along the east side, in areas where soil permeability is higher and depth to groundwater is shallower. Historical agricultural uses of the region have contributed to elevated concentrations of 1,2-Dibromo-3-chloropropane (DBCP – a soil fumigant) and ethylene dibromide (EDB – a pesticide). DBCP is now banned from use but was once used extensively on grapes. Solvents such as TCE and DCE are the primary solvents that have contaminated groundwater from industrial activities mostly found near airports, industrial areas, and landfills.

According to data collected from public water supply wells throughout the HR (14 of 19 basins and subbasins), 71 percent of the wells sampled from 1994 to 2000 were in compliance with the states drinking water standards. Of the 29 percent that did not meet the drinking water standards, the contaminants included pesticides (35 percent), nitrates (20 percent), radiological elements (19 percent), inorganics (i.e. heavy metals) (16 percent) volatile and semi-volatile organic compounds (10 percent), and (DWR, 2003c). Average TDS concentrations throughout the HR ranged from 189 (Kaweah) to 1,500 (Pleasant Valley) mg/L. **Table 5-3** shows the three most frequently occurring contaminants by contaminant group for the Tulare Lake HR. The number of wells where the contaminant exceeded the MCL for that contaminant is also shown.

**TABLE 5-3
TOP THREE CONTAMINANTS BY CONTAMINANT GROUP -
TULARE LAKE HR**

Contaminant Group	Contaminant –# of wells	Contaminant –# of wells	Contaminant –# of wells
Inorganics - Primary	Fluoride – 32	Arsenic – 16	Aluminum – 13
Inorganics - Secondary	Iron – 155	Manganese – 82	TDS – 9
Radiological	Gross Alpha – 74	Uranium – 24	Radium 228 – 8
Nitrates	Nitrate(as NO ₃) – 83	Nitrate + Nitrite – 14	Nitrite(as N) – 3
Pesticides	DBCP – 130	EDB – 24	Di(2-Ethylhexyl)phthalate – 7
VOCs	Trichloroethylene – 17	Tetrachloroethylene – 16	Benzene – 6 MTBE – 6

SOURCE: California's Groundwater – Bulletin 118 (2002), Version 2 (Draft) (water quality data provided by California DHS)

Recently, groundwater in private domestic wells was analyzed as part of a study conducted under the State Water Resources Control Board Groundwater Ambient Monitoring and Assessment (GAMA) Program.⁵ Private domestic wells in Tulare County were sampled and analyzed in 2006

⁵ The GAMA Program is California's comprehensive groundwater quality monitoring program created by the State Water Board in 2000 and later expanded by Assembly Bill 599 – the Groundwater Quality Monitoring Act of 2001.

and compared with drinking water standards. Thirteen chemicals were detected at concentrations above public drinking water standards (SWRCB, 2009). Chemicals detected above MCLs included arsenic, beryllium, chromium, nickel, nitrate, nitrite, perchlorate, thallium, bacteria indicators, 1,2-dibromo-3-chloropropane (DBCP), and radionuclides. Nitrate was the most frequently detected chemical above an MCL.

Nitrate was detected in 75 wells at concentrations greater than or equal to the MCL of 10 mg/L (nitrate as N). Total coliform bacteria were present in 60 wells, and fecal coliform bacteria were present in 13 wells. Thallium and DBCP were detected at concentrations above the MCL in six and eight wells, respectively. Aluminum, iron, manganese, TDS, and zinc were detected at concentrations above secondary MCLs. Vanadium was detected in 14 wells above the notification level of 50 µg/L.

Regulatory Setting

Federal

Clean Water Act

The Clean Water Act establishes the basic structure for regulating discharges of pollutants into “waters of the United States.” The act specifies a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff.

Section 303(d) requires states, territories, and authorized tribes to develop a list of water-quality limited segments of rivers and other water bodies under their jurisdiction. These waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the list and develop action plans, called TMDLs, to improve water quality.

Section 401 requires every applicant for a federal permit or license for any activity that may result in a discharge to a water body to obtain a water quality certification that the proposed activity will comply with applicable water quality standards.

Section 402 regulates point- and nonpoint-source discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program. In California, the State Water Resources Control Board (State Water Board) oversees the NPDES program, which is administered by the Regional Water Quality Control Boards (RWQCBs). The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits. The NPDES program covers municipalities, industrial activities, and construction activities. The NPDES program includes an industrial stormwater permitting component that covers 10 categories of industrial activity

The main goals of GAMA are to improve statewide groundwater monitoring and to increase the availability of groundwater quality information to the public.

that require authorization under an NPDES industrial stormwater permit for stormwater discharges. Dairy digester/co-digester facilities are covered by Category 5 which also includes landfills, land application sites, and open dumps with industrial wastes. Construction activities, also administered by the State Water Board, are discussed below.

Concentrated Animal Feeding Operations – Final Rule

The Environmental Protection Agency (EPA) promulgated revised regulations for concentrated animal feeding operations (CAFOs) on February 12, 2003. The 2003 regulations expanded the number of operations covered by the CAFO regulations and included requirements to address the land application of manure from CAFOs. The rule became effective on April 14, 2003 and authorized NPDES states to modify their programs by February 2005 and develop state technical standards.

Revised regulations that address the Second Circuit court's 2005 decision in *Waterkeeper Alliance et al. v. EPA*, 399 F.3d 486, were signed on October 31, 2008 and were published in the Federal Register on November 20, 2008. These regulations are effective on December 22, 2008. The 2008 final rule revises the 2003 regulations.

National Toxics Rule

The National Toxics Rule promulgates for 14 States, including California, the chemical-specific, numeric criteria for priority toxic pollutants necessary to bring all States into compliance with the requirements of section 303(c)(2)(B) of the Clean Water Act (CWA). States determined by EPA to fully comply with section 303(c)(2)(B) requirements are not affected by this rule, however California is not in compliance.

The rule addresses two situations. For a few States, EPA is promulgating a limited number of criteria which were previously identified as necessary in disapproval letters to such States, and which the State has failed to address. For other States, Federal criteria are necessary for all priority toxic pollutants for which EPA has issued section 304(a) water quality criteria guidance and that are not the subject of approved State criteria.

When these standards take effect, they will be the legally enforceable standards in the named States for all purposes and programs under the Clean Water Act, including planning, monitoring, NPDES permitting, enforcement and compliance.

California Toxics Rule

The U.S. Environmental Agency published the California Toxics Rule (CTR) in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations, on May 18, 2000. The CTR contains numeric water quality criteria for priority toxic pollutants and other water quality standards provisions to be applied to waters in California. EPA promulgated this rule based on the Administrator's determination that the numeric criteria are necessary in California to protect human health and the environment.

EPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a State court overturned the State's water quality control plans containing water quality criteria for priority toxic pollutants. Thus, the State of California has been without numeric water quality criteria for many priority toxic pollutants as required by the Clean Water Act, necessitating this action by EPA. These Federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the Clean Water Act.

Federal Antidegradation Policy (40 CFR Part 131.12)

The first antidegradation policy statement was released on February 8, 1968 and subsequently included in the EPA's first Water Quality Standards Regulation (40 CFR 130.17, 40 F.R. 55340-41) published on November 28, 1975. The policy was refined in 1983 (48 F.R. 51400, 40 CFR 131.12). Antidegradation requirements and methods for implementing those requirements are minimum conditions to be included in a State's water quality standards as required by the Clean Water Act. The antidegradation policy and implementation methods are required, at a minimum, to be consistent with the following:

1. Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
2. Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices (BMPs) for nonpoint source control.
3. Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.
4. In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

The Antidegradation Policy established a three-tiered antidegradation program.

Tier 1 maintains and protects existing uses and water quality conditions necessary to support such uses. An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur. Where an existing use is established, it must be protected even if it is not listed in the water quality standards as a designated use. Tier 1 requirements are applicable to all surface waters.

Tier 2 maintains and protects "high quality" waters -- water bodies where existing conditions are better than necessary to support CWA § 101(a)(2) "fishable/swimmable" uses. Water

quality can be lowered in such waters. However, State and Tribal Tier 2 programs identify procedures that must be followed and questions that must be answered before a reduction in water quality can be allowed. In no case may water quality be lowered to a level which would interfere with existing or designated uses.

Tier 3 maintains and protects water quality in outstanding national resource waters (ONRWs). Except for certain temporary changes, water quality cannot be lowered in such waters. ONRWs generally include the highest quality waters of the United States. However, the ONRW classification also offers special protection for waters of exceptional ecological significance, i.e., those which are important, unique, or sensitive ecologically. Decisions regarding which water bodies qualify to be ONRWs are made by States and authorized Indian Tribes.

Antidegradation implementation procedures identify the steps and questions that must be addressed when regulated activities are proposed that may affect water quality. The specific steps to be followed depend upon which tier or tiers of antidegradation apply.

Safe Drinking Water Act

The Safe Drinking Water Act was established to protect the quality of waters actually or potentially designated for drinking use, whether from aboveground or underground sources. Contaminants of concern in a domestic water supply are those that either pose a health threat or in some way alter the aesthetic acceptability of the water. Primary and secondary maximum contaminant levels (MCLs) are established for numerous constituents of concern including turbidity, TDS, chloride (Cl), fluoride, nitrate, priority pollutant metals and organic compounds, selenium, bromate, trihalomethane and haloacetic acid precursors, radioactive compounds, and gross radioactivity. All domestic water suppliers must follow the requirements established by this Act and its associated amendments.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act established the State Water Board and divided the state into nine regions, each overseen by a regional board. The nine regional boards have the primary responsibility for the coordination and control of water quality within their respective jurisdictional boundaries. Under the Porter-Cologne Water Quality Control Act, water quality objectives are limits or levels of water quality constituents or characteristics established for the purpose of protecting beneficial uses. The Act requires the RWQCBs to establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Designated beneficial uses, together with the corresponding water quality objectives, also constitute water quality standards under the federal Clean Water Act. Therefore, the water quality objectives form the regulatory references for meeting state and federal requirements for water quality control.

Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board)

The Central Valley Water Board is responsible for implementing the Basin Plans for the Sacramento, and San Joaquin Rivers, and the Tulare Lake Basin. These plans identify the existing and potential beneficial uses of waters of the State and establish water quality objectives to protect these uses.

The basin plans also contain implementation, surveillance, and monitoring plans. Statewide and regional water quality control plans include enforceable prohibitions against certain types of discharges, including those that may pertain to nonpoint sources.

Beneficial uses and their corresponding water quality objectives, meet federal regulatory criteria for water quality standards and as such, California's basin plans serve as regulatory references for meeting both State and federal requirements for water quality control (40 CFR Parts 130 and 131). Beneficial uses are defined in Water Code section 13050(f) and **Table 5-4** below presents the identified beneficial uses for the surface waters in the basin plans of the Study Area.

Basin plans adopted by RWQCBs are primarily implemented through the NPDES permitting system and issuance of waste discharge requirements (WDRs) to regulate waste discharges so that water quality objectives are met. Basin plans provide the technical basis for determining WDRs and taking regulatory enforcement actions if deemed necessary.

**TABLE 5-4
BENEFICIAL USES DESIGNATED FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER AND
THE TULARE LAKE BASIN PLANS**

Beneficial Uses for Surface Water defined in the Basin Plans

<ul style="list-style-type: none"> • Municipal and domestic supply • Agricultural supply • Industrial service supply • Industrial process supply • Ground water recharge • Freshwater replenishment • Hydropower generation • Water contact recreation • Non-contact water recreation • Commercial and sport fishing¹ • Aquaculture 	<ul style="list-style-type: none"> • Warm freshwater habitat • Cold freshwater habitat • Estuarine habitat¹ • Wildlife habitat • Preservation of biological habitats of special significance • Rare, threatened, or endangered species • Migration of aquatic organisms¹ • Spawning, reproduction, and/or early development • Shellfish harvesting • Navigation²
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1. Beneficial use is designated only for the Sacramento River and San Joaquin River Basins.

2. Beneficial use is designated only for the Tulare Lake Basin.

**Statement of Policy With Respect to Maintaining High Quality of Waters in California
(Resolution 68-16)**

A key policy of California's water quality program is the State's Antidegradation Policy. This policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Waters in California (State Water Board Resolution No. 68-16), restricts degradation of surface and ground waters. In particular, this policy protects water bodies where existing quality is higher than necessary for the protection of beneficial uses. Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and ground waters must (1) meet WDRs which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained, 2) not unreasonably affect present and anticipated beneficial use of the water, and (3) not result in water quality less than that prescribed in water quality plans and policies. Furthermore, any actions that can adversely affect surface waters are also subject to

the Federal Antidegradation Policy (40 Code of Federal Regulations [CFR] section 131.12) developed under the Clean Water Act.

Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS)

In 2006, the Central Valley Water Board, the State Water Board, and stakeholders began a joint effort to address salinity and nitrate problems in California's Central Valley and adopt long-term solutions that will lead to enhanced water quality and economic sustainability (CVRWQCB, 2010a). The Central Valley Water Board is currently engaged in developing a significantly new regulatory program that will result in the development of a Salinity and Nitrate Management Plan to be implemented throughout the entire Central Valley (CVRWQCB, 2010b). This effort is referred to as the CV-SALTS Initiative.

The goal of CV-SALTS is to develop a comprehensive region-wide Salt and Nitrate Management Plan (Plan) describing a water quality protection strategy that will be implemented through a mix of voluntary and regulatory efforts. The Plan will serve as the basis for amendments to the three Basin Plans that cover the Central Valley Region (Sacramento River and San Joaquin River Basin Plan, the Tulare Lake Basin Plan and the Sacramento/San Joaquin Rivers Bay-Delta Plan). The basin plan "amendment" will likely be a suite of amendments to establish a comprehensive implementation plan to achieve water quality objectives for salinity (including nitrate) in the Region's surface waters and groundwater; and the Plan may include recommendations for numeric water quality objectives, beneficial use designation refinements, and/or other refinements, enhancements, or basin plan revisions.

CV-SALTS participants include the State Water Board and Central Valley Regional Water Board, the Central Valley Salinity Leadership Group (CVSLG), the Central Valley Salinity Coalition (CVSC), and interested parties outside these groups. The CVSLG consists of leadership from a wide range of organizations including state, federal and local agencies, regulated industries, agriculture, research institutions, and environmental and social justice organizations. Representatives of these groups serve on various working committees and subcommittees. The CVSC, a non-profit organization, was formed in 2008 as the funding arm of the CV-SALTS effort. The stakeholder-driven CV-SALTS Initiative is the Central Valley Water Board's primary mechanism to conduct the necessary studies, research and develop technical and science reports to formulate the components of the basin plan amendment and to implement the Salt Plan.

Construction Stormwater NPDES Permit

The federal Clean Water Act prohibits discharges of stormwater from construction projects unless the discharge is in compliance with an NPDES permit. The State Water Board is the permitting authority in California and has adopted a Statewide General Permit for Stormwater Discharges Associated with Construction Activity (Construction General Permit, Order No. 99-08) that encompasses one or more acres of soil disturbance. Effective July 1, 2010 all dischargers are required to obtain coverage under the updated Construction General Permit Order 2009-0009-DWQ, adopted on September 2, 2009. Construction activities include clearing, grading, excavation, stockpiling, and reconstruction of existing facilities (removal or replacement).

In general, the Construction General Permit requires that the landowner and/or contractor submit a notice of intent (NOI) and develop and implement a storm water pollution prevention plan (SWPPP). It is the responsibility of the landowner to obtain coverage under this General Permit prior to commencement of construction activities. To obtain coverage, the landowner must file an NOI with a vicinity map and the appropriate fee to the State Water Board. The NOI requirements of the General Permit are intended to establish a mechanism which can be used to clearly identify the responsible parties, locations, and scope of operations of dischargers covered by the General Permit and to document the discharger's knowledge of the requirements for a SWPPP. The new permit requires a risk-based permitting approach, dependent upon the likely level of risk imparted by a project. The new permit also contains several additional compliance items, including (1) additional mandatory BMPs to reduce erosion and sedimentation, which may include incorporation of vegetated swales, setbacks and buffers, rooftop and impervious surface disconnection, bioretention cells, rain gardens, rain cisterns, implementation of pollution/sediment/spill control plans, training, and other structural and non-structural actions; (2) sampling and monitoring for non-visible pollutants; (3) effluent monitoring and annual compliance reports; (4) development and adherence to a Rain Event Action Plan; (5) requirements for the post-construction period; (6) numeric action levels and effluent limits for pH and turbidity; (7) monitoring of soil characteristics on site; and (8) mandatory training under a specific curriculum. Under the updated permit, BMPs will be incorporated into the compliance action and monitoring requirements for each development site, as compared to the existing permit, where specific BMPs are implemented via a SWPPP. Under the updated permit, a SWPPP would be reviewed by the State Water Board.

California Department of Health Services Drinking Water Regulations

DHS serves as the primary responsible agency for drinking water regulations. DHS must adopt drinking water quality standards at least as stringent as federal standards, and may also regulate contaminants to more stringent standards than U.S. EPA, or develop additional standards. DHS regulations cover over 150 contaminants, including microorganisms, particulates, inorganics, natural organics, synthetic organics, radionuclides, and DBPs. The specific regulations promulgated by DHS, in coordination with the U.S. EPA, are summarized in **Table 5-5**.

**TABLE 5-5
FEDERAL AND STATE DRINKING WATER REGULATIONS**

Regulation	Promulgation Year	Contaminants Regulated
National Interim Primary Drinking Water Regulations	1975–1981	Inorganics, Organics, Physical, Radioactivity, Bacteriological
National Secondary Drinking Water Regulations	1979	Inorganics, Color, Corrosivity, Odor, Foaming Agents
Phase I Standards	1987	VOCs
Phase II Standards	1991	VOCs, SOCs, IOCs
Phase V Standards	1992	VOCs, SOCs, IOCs
Surface Water Treatment Rule	1989	Microbiological and Turbidity
Total Coliform Rule	1989	Microbiological
Lead and Copper Rule	1991 / 2003	Lead, Copper
Drinking Water Source Assessment and Protection Program	1996	Source Water Protection
Information Collection Rule	1996	Microbiological and Disinfectants / DBPs
Stage 1 Disinfectants/Disinfection Byproducts Rule	1998	Disinfectants / DBPs, Precursors

**TABLE 5-5
FEDERAL AND STATE DRINKING WATER REGULATIONS**

Regulation	Promulgation Year	Contaminants Regulated
Interim Enhanced Surface Water Treatment Rule	1998	Microbiological, Turbidity
Unregulated Contaminant Monitoring Rule	1999	Organics, Microbiological
Radionuclides Rule	2000	Radionuclides
Arsenic Rule	2001	Arsenic
Filter Backwash Rule	2002	Microbiological, Turbidity
Drinking Water Candidate Contaminant List	2003	Chemical, Microbiological
Stage 2 Microbiological and Disinfection Byproducts Rules	2006	Microbiological and Disinfectants / DBPs
Secondary Maximum Contaminant Levels	2006	Metals, Color, Foaming Agents, MTBE, Odor, Thiobencarb, Turbidity, TDS, and Anions
Primary MCL for Perchlorate	2007	Perchlorate
Interim Enhanced Surface Water Treatment Rule	2008	Microbiological and Turbidity

DBP = Disinfection by-product	SOC = Synthetic Organic Compound
IOC = Inorganic Compound	TDS = Total Dissolved Solids
MCL = Maximum Contaminant Level	VOC = Volatile Organic Compound
MTBE = methyl tertiary-butyl ether	

5.2 Impacts and Mitigation Measures

Significance Criteria

The significance criteria for this analysis were adapted from criteria presented in Appendix G of the CEQA Guidelines and based on the professional judgment of the Central Valley Water Board and its consultants. The Proposed Project would result in a significant impact if it would:

- Violate any water quality standards or WDRs.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there should be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.
- Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.
- Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Issues Determined to Have No Impact on Project

Based on the scope of the proposed project plan and its geographical location, the proposed project would not result in impacts related to the following criteria. No impact discussion is provided for these topics for the following reasons:

- *Failure of Levee or Dam.* The addition of anaerobic digester and co-digester facilities would not be intended for human occupancy and would not require significant increases in staff to maintain the facilities. Therefore, although some facilities may be constructed in a potential inundation area, there would be no potential impact of loss, death or injury.

Impact 5.1: Construction associated with installation of dairy digesters and co-digester facilities could generate loose, erodible soils that may impair water quality. (Less than Significant)

During site grading and construction activities related to dairy digester and co-digester facilities, large areas of bare soil could be exposed to erosion by wind and water for extended periods of time. Bare soil surfaces are more likely to erode than vegetated areas due to the lack of dispersion, infiltration, and retention created by covering vegetation. Soil disturbance, excavation, cutting/filling, stockpiling, and grading activities could increase erosion and sedimentation to storm drains that empty to local surface waters. Construction water quality impacts are temporary and managed through the standard, industry accepted BMPs, which are managed and monitored by the contractor conducting the work.

If precautions are not taken to contain contaminants, construction could produce contaminated stormwater runoff. Runoff from future dairy projects would be collected in process water ponds and ditches at the project sites and would not be discharged to surface water canals. In addition, hazardous materials associated with construction equipment and practices, such as fuels, oils, antifreeze, coolants, and other substances, could adversely affect water quality if spilled or stored improperly. Potential chemical releases are regulated by the National Pollutant Discharge Elimination System (NPDES) permitting process.

For sites that would disturb more than one acre, the owner/operator of the proposed digester or co-digester would be required by the RWQCB to prepare and implement a SWPPP designed to reduce potential impacts to water quality during construction. Conditions of this permit would include adherence to requirements of the revised NPDES General Construction Permit, effective July 1, 2010. As discussed previously, permit requirements would include the following or equivalent measures:

- Preparation of a site-specific SWPPP;
- Preparation of hazardous material spill control and countermeasure programs;
- Stormwater quality sampling, monitoring, and compliance reporting;
- Development and adherence to a Rain Event Action Plan;

- Adherence to numeric action levels and effluent limits for pH and turbidity; monitoring of soil characteristics on site;
- Mandatory training under a specific curriculum; and
- Mandatory implementation of BMPs, which could include, but would not be limited to, as necessary:
 - Physical barriers to prevent erosion and sedimentation including setbacks and buffers, rooftop and impervious surface disconnection, rain gardens and cisterns, and other installations;
 - Construction and maintenance of sedimentation basins;
 - Limitations on construction work during storm events;
 - Use of swales, mechanical, or chemical means of stormwater treatment during construction, including vegetated swales, bioretention cells, chemical treatments, and mechanical stormwater filters; and
 - Implementation of spill control, sediment control, and pollution control plans and training.

Adherence to these and/or other similar BMPs would be required as a condition of the permit, and would substantially reduce or prevent waterborne pollutants from entering natural waters. The specific set of BMPs would be determined prior to initiation of construction activities of any particular project, and a schedule for implementation, as well as a series of monitoring and compliance measures would be developed in coordination with the permitting agency, to meet Clean Water Act standards. Therefore, additional mitigation for stormwater quality is not required to protect water quality during construction, over and above that which is required by the NPDES General Construction Permit.

For sites that would disturb less than one acre, the amount of disturbance required for the construction of these facilities would be considered relatively minor and current standard practices sufficient to reduce the potential for impacting receiving waters. Implementation of the various water quality BMPs and the monitoring program outlined through a required SWPPP, where necessary, and incorporated into a NPDES permit would ensure that future digester and co-digester development would have a less-than-significant impact on water quality during construction activities.

Mitigation: None required.

Impact 5.2: Digester and co-digester development could adversely affect surface waters. (Significant)

Dairy operations produce a considerable amount of manure and wastewater, which contain nutrients, organic matter, salts, microorganisms, pathogens and pathogens including fecal bacteria. Under the Project, these manure and wastewater streams would be fed into the digester system for processing. The byproducts of the digestion process including both liquid effluent and solid digestate would be then applied to croplands. The separated liquids could be used for irrigation, flush water or fertilizer

purposes and the solid wastes for soil amendment, fertilizer, compost, animal bedding or landfill alternative daily cover.

If the constituents of manure and byproducts of anaerobic digestion are not properly managed, they can pollute surface water quality by contributing excess nutrients, oxygen-demanding materials, and bacterial pathogens. Release of water that has come into contact with manure, feed, co-digestion substrates, or dead animals, may transport nutrients and other pollutants to surface waters. Substantial amounts of nitrogen and phosphorus may be transported to surface waters via such releases of water. Operation of dairy digesters would result in the processing of existing dairy waste streams, resulting in a net reduction in biochemical oxygen demand and microbial content of effluent waters. Other constituents, including salts, nutrients, heavy metals, and other inorganic water quality constituents, would not be substantially affected by the digestion process. In addition, any adverse effects to groundwater (discussed below in Impact 5.3) could impact surface waters in areas where groundwater flows into surface waters (identified as gaining conditions). Areas where surface waters lose water to ground water by outflow through the streambed are known as losing conditions.

In general, dairies already have required stormwater, irrigation and tailwater return systems in place. Irrigation and stormwater are typically collected on site and delivered back on the dairy's land application system. Dairies are required to retain all storm runoff on-site during a 25-year, 24-hour rainfall event plus the runoff from 120 days of December through March average rainfall plus all dairy wastewater, ultimately discharging such runoff to the wastewater lagoon. However, digester and co-digester operations could add additional volumes of wastewater to the existing retention systems that currently are required to have the capacity to provide for 120 days of wastewater storage during the winter months. For centralized digester facilities that are located outside of the footprint of current dairy operations, protective measures would be necessary to prevent impacts to surface waters.

The discharges of wastewater produced from the digesters or co-digesters would be regulated under the waste discharge program that is proposed as the subject of this EIR. The collection, treatment, storage, and disposal of wastes at the facility, specific to the changes with the addition of digester or co-digester improvements, would all be regulated and include specific performance standards. In general, WDRs developed by the Central Valley Water Board are based on water quality objectives as set in the respective Basin Plans. These objectives consider existing conditions and water quality criteria necessary to protect beneficial uses of surface waters within the region. Requirements such as retention of all stormwater runoff, limitations on discharges to surface waters, setback distances from surface water bodies, and specifications on land application would all be effective minimizing the potential to impair water quality of nearby surface waters. Implementation of the waste management and discharge requirements as described below in Mitigation Measure 5-2, would ensure that impacts on surface water quality would be less than significant.

Mitigation Measure

Measure 5.2: WDRs for digester and co-digester facilities shall include design and operational requirements to manage all wastes and discharges to protect surface waters. Requirements shall include the following:

- Prohibitions against any surface water discharges (unless covered by separate NPDES permit),
- Prohibitions against any discharges that would cause exceedance of surface water quality objectives,
- Setbacks from surface water bodies
- Drainage requirements for co-digestion substrates/waste storage/receiving/handling areas to drain to on-site wastewater retention ponds,
- Lining requirements for retention ponds in new facilities and operational dairies,
- Monitoring requirements that include sampling data of soils, retention water, and waste streams to reconcile annually with Nutrient Management Plan (NMP),
- Requirements for tailwater return systems to minimize offsite discharges;
- Prohibitions against any unreasonable effects on beneficial uses of nearby surface waters.

. **Impact Significance After Mitigation:** Less than Significant

Impact 5.3: Digester and co-digester development could adversely affect groundwater quality. (Significant)

The operation of anaerobic digesters or co-digesters for the treatment of dairy wastes, as well as co-digestion substrates could cause environmental degradation of groundwater quality. Reductions in groundwater quality could occur as a result of substrate handling procedures, dairy digester operation, and the disposal of digester effluent (including both liquid and solid digestate). If not properly managed, components of animal manure such as salts, nutrients (nitrogen, ammonia, phosphorous, potassium), pharmaceuticals and hormones, pathogens, chloride, boron, and heavy metals could enter into groundwater and, depending on the volume, the characteristics of the waste, and duration of the release, result in short term or ongoing groundwater quality degradation. It should also be noted that groundwater quality can also affect surface waters in areas where the groundwater flows into the surface waters (gaining conditions).

Salt Loading

Salts and salt loading to croplands is an important concern throughout the Central Valley. Salt management is becoming increasingly important in the San Joaquin Valley for urban and agricultural interests. If current practices for discharging waters containing elevated levels of salt continue unabated, the San Joaquin Valley can have a large portion of its ground water severely degraded within a few decades (RWQCB, 2009). For the Tulare Lake Basin, almost all of the salt loading introduced from outside of the basin concentrates in the underlying aquifers (CVRWQCB, 2010b). Salinity increases can affect municipal, agricultural, and industrial beneficial uses of water. Salinity increases in municipal use can affect the ability to recycle and reuse municipal wastewater. In digester/co-digester operations, salt concentrations are found in the manure, as a byproduct of some water softening processes, and in co-digestion substrates.

Salt treatment options include membrane treatment, evaporative ponds, deep well injection, and flash distillation. Evaporation ponds and deep well injection technologies are not considered a viable option because of the high volumes of water that would then not be reused and the environmental impact of their implementation. Reverse osmosis is another technology that can remove salinity, however, the cost and other high energy demands make it infeasible and unsustainable. Another option for obtaining salt balance includes conveyance of salts out of the valley provided beneficial uses of waters are not impaired. According to the Basin Plan for the Sacramento and San Joaquin Valley Basin, Policy 10 of the Central Valley Water Board is to encourage construction of facilities to convey agricultural drain water from the San Joaquin and Tulare Lake Basins (RWQCB, 2009). Degradation of ground water in the Tulare Lake Basin by salts is unavoidable without a plan for removing salts from the Basin (RWQCB, 2004). The Basin Plan also identifies a salt and boron control program for the Lower San Joaquin River as an amendment to the Basin Plan for control of salt and boron discharges into the lower San Joaquin River basin, approved by the Central Valley Water Board in Resolution No. 2004-0108. The goal of the salt and boron control program is to achieve compliance with salt and boron water quality objectives without restricting the ability of dischargers to export salt out of the San Joaquin River basin. In addition, the Central Valley Water Board is engaged in developing a comprehensive regional salinity management plan through the CV-SALTS Initiative, a stakeholder-regulator collaborative effort to update the Water Quality Control Plans for the Sacramento and San Joaquin River Basins, the Tulare Lake Basin and the Bay-Delta to address salinity management as a regional priority.

Based on a study conducted by J.L. Meyer in 1973, “reasonable” salt loading rates under normal situations were determined to help prevent the vertical migration of salts within the soil profile (Meyer, 1973 as cited in RWQCB, 2008). Unless environmental conditions show differently, “reasonable” is accepted to be a maximum annual non-nitrate salt loading rate of 2,000 pounds per acre for single-cropped land and 3,000 pounds per acre for double-cropped land.

Substrate storage and handling, as well as digester effluent could potentially contribute to salt loading associated with a proposed digester facility. Improper handling and storage of digester substrates could result in the accidental release of substrates or leachate from substrates. Such releases could infiltrate into groundwater, resulting in the unintentional release of salts to groundwater, which could degrade groundwater quality.

The amount of salt that is contained in digester effluent depends on the substrate that is input into the digester. The digestion process neither adds nor reduces the total salt content of the substrate that it processes, but simply passes salt from the substrate through to the digester effluent. For every unit of salt that is fed into a digester from dairy wastes or other substrates, that same unit of salt is released from the digester in its effluent. Depending on the characteristics of the digester facility, the digester effluent may be released on site at the dairy where the initial effluent was produced, or off site in a separate location. Therefore, the potential salt related effects of implementing dairy digesters or co-digesters depends substantially on the digester characteristics, the location, the existing quality of the supply water, and whether it accepts only dairy wastes, or dairy wastes combined with other co-digestion substrates. The following configurations are considered:

1. Digesters serving a single dairy and are located on the dairy site accepting only on-site manure substrate (*manure only*);
2. Digesters serving a single dairy, located on the dairy site, accepting additional, non-dairy co-digestion substrates (*manure plus other substrates*);
3. Centralized digesters serving one or more dairies and are located off-site from a dairy that are accepting manure substrate only (*manure only*); and
4. Centralized digesters serving one or more dairies, located off-site, accepting non-dairy waste co-digestion substrates (*manure plus other substrates*).

Digesters serving a single dairy (*manure only*). Operation of an anaerobic digester on site at a single dairy to treat only wastes from that dairy (e.g., where no additional or outside digester co-digestion substrates are incorporated for digestion), would not result in any change in salt loading associated with the dairy. That is, in comparison to existing operations, where dairy wastes are discharged onto fields for the production of crops, the same load of salt would be applied to the fields as compared to existing conditions. Therefore, no change in salt loading would occur.

Digesters serving a single dairy (*manure plus other substrates*). For on-site digesters serving a single dairy that also incorporate an additional or supplemental co-digestion substrates, all of the salt contained in that additional co-digestion substrate would be processed through the digester, and would be released as digester effluent. Release of this effluent would therefore result in a potential net increase in the amount of salt that is applied to land at a specific dairy site.

Centralized digesters serving one or more dairies (*manure only*). Centralized dairy digester facilities located offsite that treat only dairy waste from two or more dairies, would also result in the release of salts in digester effluent. These salts would be land applied as digester effluent, in support of agriculture. Land application of digester effluent would likely occur in the vicinity of the off site or centralized plant. This situation would result in a net reduction in the application of salts at the original dairy waste application site (as relevant), and a net increase in salt application at the new site.

Centralized digesters serving one or more dairies (*manure plus other substrates*). For off site digesters that also accept an additional or supplemental co-digestion substrate, all of the salt contained in that additional co-digestion substrate would be processed through the digester, and would be released as digester effluent. This salt load would be in addition to the salt associated with the dairy waste processed by the digester. Therefore, release of this additional effluent would result in a net increase in the total load of salt that is applied to the land at the original dairies or at a new site. However, there could be a reduction in salt loading where the co-digestion substrate might otherwise have been disposed, within the jurisdictional boundaries of the Central Valley Water Board (Region 5) without the co-digestion facility.

Nitrogen/Nutrients

Historical activities throughout the Central Valley have caused areas of concern for nutrients, and nitrogen in particular which commonly shows up as nitrate in groundwater. Widespread occurrence of nitrate at concentrations of concern affects both rural and public drinking-water supplies in various areas but notably in the eastern San Joaquin Valley (Burow, 2007). The general trend in concentrated

livestock production throughout the United States has been associated with a trend of increasing nitrogen contamination locally in groundwater (Bukart and Stoner, 2002). Concentrated livestock operations provide both point sources of nitrogen in the immediate area of the confinement as well as larger areas of intense non-point sources as fields close to facilities that are used for manure disposal.

The processes of anaerobic digestion do not significantly alter total nitrogen content from the manure or co-substrates leaving potentially high nitrogen concentration in liquid digestate that would be subsequently applied to croplands. After reaching the soil's root zone, nitrogen can either volatilize or may be assimilated by plants. It may also be denitrified through microbial action, releasing gaseous nitrogen; or it may be leached below the root zone. The more denitrification that occurs in the root zone, the less the nitrate is leached down to the water table (Harter, 2009). Denitrification requires anoxic conditions, which in the root zone occur locally and are often limited to prolonged flooding conditions (Harter, 2009). Dairy operations have been shown to drive denitrification of dairy-derived nitrate in groundwater of San Joaquin Valley (Esser, et al, 2009). .

Various studies of the transport and fate of nutrients suggest that wastewater from dairy facilities that contain nitrogen levels above the crop requirements can potentially leach into the groundwater. Therefore, nitrogen levels can be managed through reasonable application which requires careful timing and prudent monitoring of crop nutrient requirements, available nutrients in the soil, and water inputs (Bradford, et al, 2008). Any additional nutrient loading through application of liquid or solid digestate as a result of implementation of digester and co-digester facilities could further degrade groundwater quality if not managed appropriately.

The conversion of the organic nitrogen to ammonium through the digestion process can reduce the risk of leaching and impacts on groundwater quality. Within the aerobic soil environment, ammonium can either be taken up by plants or converted to nitrate via nitrification, which is the most readily available form for plant uptake. As it is readily available to plants or rapidly converted to nitrate, ammonium functions as a fertilizer. Since the rate of organic nitrogen mineralization in the soil is not predictable, its application can be problematic as it can be mineralized when minimal plant growth is occurring. If organic nitrogen is mineralized and converted to nitrate during times of minimal plant uptake, there is a higher potential to leach nitrate. Because addition of digesters and co-digesters will result in a higher percentage of nitrogen in the ammonium form, it will allow a more accurate application of manure nitrogen as fertilizer during the time of uptake and minimize leaching losses due to organic nitrogen (Zublena, 1997). Under existing conditions, the manure used for land application would have the higher organic nitrogen forms which require microbial activity to break it down into the mineralized form which can take several years (Zublena, 1997).

If the liquid or solid digestate is applied when crops are not in the growing phase, then a possibility for leaching past the plant root zone exists. However, with appropriate timing of nutrient application that corresponds as closely as possible with plant nutrient uptake characteristics, the potential for leaching past the root zone can be minimized. Reasonable application can be achieved through implementation of an appropriate NMP that is designed to maximize harvest and minimize leaching. Development of a nutrient budget that includes planned rates of nutrient applications

for each crop that do not exceed the crop's requirements for total nitrogen that consider the stage of crop growth as well as all other nutrient sources can be effective (Bradford, et al, 2008). The potential improvements in groundwater quality associated with nutrient-managed fields indicate that appropriate management of manure can significantly reduce nitrate leaching from dairy crop fields (Harter, 2002).

Several factors affect the amount of digestate that can be applied including the total nitrogen content, the forms of nitrogen and their relative concentrations, residual organic nitrogen from prior applications, and crop nitrogen requirements. The addition of digestion processes would have the beneficial effect of reducing the organic nitrogen content of the manure that would otherwise be applied to cropped fields. Regardless, through implementation of a NMP which establishes a site specific analysis of the various factors involved to establish acceptance criteria that are consistent with agronomic rates and water quality objectives, the application of nitrogen can be effectively managed. The NMP can also be used to regulate the method of nutrient application that promotes efficient nutrient use such as applying digestate close to planting for maximum plant uptake, avoiding excess irrigation, maintaining vegetative buffer zones, use of cover crops, and development of co-substrate acceptance criteria. With measures such as these required as part of Best Practical Treatment or Controls (BPTCs) under the General Order WDRs for digesters and co-digesters and identified below in Mitigation Measure 5-3, the amount of nitrogen that would be released to the groundwater would be minimized.

Addition of an anaerobic digester or co-digester would require construction of an irrigation storage pond to store liquid digestate until land application is appropriate. Leakage from below-grade digesters and/or irrigation storage ponds is a potential source of nitrogen compounds to be leached to groundwater (McNab, et al, 2007). If existing structures are utilized, the integrity of the walls and bottoms of the digester may be compromised and result in the release of nitrogen compounds. Due to its negative charge, nitrate has the highest possibility of leaching and impacting groundwater quality. However, due to the anaerobic environment, most nitrogen within the digester and irrigation storage pond will be in a mineralized form (ammonium or nitrate) rather than organic nitrogen, which is more readily available for plants (Pillars, 2010). While nitrate contamination resulting from the land application of animal manure is well recognized, the impact of manure lagoon leakage on groundwater quality is less well characterized (Esser, et al., 2009). However, the operations of dairies themselves have been attributed as sources of nitrate contamination in groundwater (McNab, et al, 2007).

Pathogens

Pathogens including bacteria, viruses, and parasites most commonly associated with dairy manure include cryptosporidium, E. Coli 0157, and salmonella. If not controlled or managed effectively, pathogens can be transmitted to humans through groundwater supplies. Anaerobic digestion processes destroy more than 90 percent of pathogens if operated under appropriate conditions including retention time and operating temperature (Pillars, 2010). In addition, the fate and transport of pathogens under NMP conditions has been shown as effective in protecting groundwater quality (Bradford and Segal, 2009). Pathogens can also be controlled through a reduction in attractions for rodents, birds, and other animals that could come in contact with affected manure or digestate. Otherwise, monitoring and reporting requirements for pathogen indicators can ensure protection of groundwater.

Pathogens could, however, potentially be released during substrate transport and storage associated with the digester facility, as relevant, or as a result of leaks or other accidental releases during digester operation. The anaerobic digestion process has been proven to provide a substantial reduction in the number of pathogens. Pathogens could be added to the liquid digestate within the irrigation storage pond from stormwater that has come in contact with manure and/or dairy digester facilities. However, the addition of pathogens from stormwater runoff from the production area is not associated with the implementation of new digesters or co-digesters. In addition, due to the fact that digesters are sealed to be gas tight, there is little chance for manure and associated pathogens to leak from the digester. It is anticipated that stormwater that comes in contact with the digester will contain very little, if any, pathogens. As such, implementation of new anaerobic digesters and co-digesters could significantly reduce the risk of pathogens contaminating surface water and groundwater. Thus, there is a less-than-significant risk related to pathogens impairing groundwater.

Chloride

Chloride is a component of salt, as discussed above. Therefore, the digestion process will not have a significant effect on the chloride concentration of manure. Thus, the effluent concentration should be similar to the influent (i.e., manure). Effects discussed for potential salt impacts, above, related to the type of digester facility that would be implemented, also apply to the discussion of chloride. Please refer to the discussion of salts, above.

Boron

Boron is an essential micronutrient but may be toxic to sensitive plants in concentrations as low as 0.5 milligram per liter (USGS, 2010). The U.S. Environmental Protection Agency has no standards for boron in drinking water. Boron is found in concentrations potentially harmful to plants in the northern and southwestern parts of the Sacramento Valley and in the Tulare Basin in the extreme southern part of the San Joaquin Valley (USGS, 2010). Large concentrations of boron also have been detected in shallow ground-water in the western part of the San Joaquin Valley. Anaerobic digestion will not have a significant effect on the boron concentration of manure. Thus, the effluent concentration should be similar to the influent (i.e., manure).

Heavy Metals

Land application of digestate from either the anaerobic digestion of manure or manure plus co-digestion substrates can affect soil metal concentrations. Depending on the pH of the digestate applied, the digestate can cause heavy metal migration to groundwater, which can make the water unsuitable for consumption.

Antibiotics and Growth Hormones

The occurrence of antibiotics and growth hormones in both soils and groundwater beneath waste lagoons in dairies has been documented (Arnon, 2008). In one study, hormones were identified in soil samples at depth, however, the transport mechanisms for these detections were not well understood (Arnon, 2008). As mentioned in the setting section above, the application of animal wastes to agricultural land may serve as an important pathway to disseminate antibiotics and hormones in the environment. Longer residence times for dairy wastewater in secondary and tertiary lagoons

have been shown to lower hormone levels compared to those found in the primary lagoon (Zheng, 2007). Similarly, longer residence times for solid manure waste also reduces hormone concentrations. Some studies have shown that significant reductions in the concentrations of steroid hormones in the effluent can be accomplished from anaerobic digestion processes (Ermawati, 2007). Current practices at operational dairies already include the application of manure and manure wastewater to croplands. The greatest risks associated with the transport of antibiotics to groundwater appear to be the development of antibiotic resistance (Bradford, 2008). Steroid hormones have been classified as highly potent endocrine-disrupting chemicals (EDCs), which may interfere with the normal function of the endocrine system of humans and animals

Summary

Dairy facilities that employ digester or co-digester improvements would alter the handling procedures compared to current conventional dairy operations. The large volume of waste currently generated at dairies is generally challenged by the lack of disposal area available at the facilities, which further limits the ability for effective manure management. Manure and wastewater are, therefore, usually land-applied within about 10 miles of the dairy (Bradford, 2008). The digestion processes would include the storage handling and application of digestion byproducts including solid wastes, liquid effluent, and sulfur biogas scrubber wastes that could potentially result in increases of groundwater contaminants such as salts, nutrients (primarily nitrate), pathogens, chloride, boron, heavy metals, antibiotics, and growth hormones. Biogas produced in an anaerobic digester contains methane (60 to 70 percent), carbon dioxide (30 to 40 percent), and traces of various gases, including hydrogen sulfide, ammonia, and sulfur-derived mercaptans (Kapdi, 2004). Hydrogen sulfide is always present in biogas, although concentrations vary with the feedstock. It has to be removed in order to avoid corrosion in compressors, gas storage tanks and engines. Hydrogen sulfide can be removed either in the digester, from the crude biogas or in upgrading process and then either discharge into a wastewater treatment system (subject to requirements contained in a WDR permit issued by the Central Valley Water Board or used as a soil amendment.

Dairies would still be required to adhere to local enforcement agency requirements as part of the solid waste facility permit, and WDRs developed specifically for digester or co-digester facilities. The waste streams that would be regulated under the proposed WDRs for digesters and co-digesters would include:

- Co-digestion substrates/waste storage/receiving/handling areas,
- Above ground digester tanks,
- In ground digester tanks,
- Liquid wastes (effluent),
- Solid wastes, and
- Sulfur Biogas scrubber wastes.

BMPs for protection of water quality in groundwater include application of waste at rates that are reasonable for the crop, soil, climate, special local situations, management system, and type of manure consistent with Title 27 CCR §22563(a). Reasonable application is considered to be application

of wastes at a rate that does not unreasonably degrade and does not pollute groundwater or create a nuisance condition.

By controlling the storage, handling, and application of all dairy waste and co-digestion substrates associated with the digestion and co-digestion processes, the potential impacts could be minimized. Therefore, implementation of **Mitigation Measure 5-3**, the potential impact to groundwater quality would be less than significant.

Mitigation Measure

Measure 5.3: WDRs for the discharge to land from dairy digester and co-digester facilities shall include the following BPTC requirements or equivalent:

- Prepare and implement site-specific Salt Minimization Plan (SMP) as approved by the Central Valley Water Board;
- Prepare and implement a site-specific NMP that includes a soils and groundwater monitoring and reporting program that include a variety of waste constituents, as well as yearly reconciliation based on sampling results that measure agronomic rates;
- Require all drainage be directed to a retention wastewater pond that has been designed to meet antidegradation provisions of Resolution 68-16 by an appropriately licensed professional;
- Prohibit, decommission, or reduce use of regenerative water softeners on process water distribution networks or, alternatively, evaluate and install alternate technology that reduces or eliminates on-site brine disposal;
- To the extent practicable, use crops that maximize salt uptake;
- Apply liquid digestate consistently with crop water uptake rates;
- Prohibit hazardous substances in co-digestion substrates processed by each facility as verified by laboratory analytical testing;
- Apply digestate at an approved rate commensurate with agronomic rate;
- Properly time application of digestate in accordance with crop requirements;
- Avoid excess irrigation;
- Maintain cover crops and vegetative buffer zones;
- Develop co-substrate acceptance criteria;
- Develop and implement a vector attraction reduction plan;
- Monitor digestate, and groundwater for pathogen indicator organisms;
- Require that solid wastes be stored on impermeable surfaces;
- Maintain a neutral or alkaline pH for dairy digestate waste water applied to cropland
- Prohibit hazardous waste, mammalian tissues, dead animals, and human waste from all discharges; and
- Incorporate lined digester and co-digestion substrate storage facilities that meet the antidegradation provisions of Resolution 68-16, as relevant, into project

design in order to prevent groundwater contamination with salts, nutrients, and other constituents.

Each facility shall prepare a site-specific BPTC plan in accordance with the WDR requirements for review and approval to the Central Valley Water Board prior to commencement of operations. Annual monitoring reports shall be reviewed by the Central Valley Water Board and any revisions deemed necessary to the handling, storage, or land application of wastes shall be incorporated into facility operations.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 5.3 would minimize the impacts to groundwater quality by requiring all proposed digester and co-digester facilities to incorporate BPTC measures that are designed to protect groundwater quality from constituents of concern that have been identified in the waste stream of the digester process. By providing site-specific criteria through a NMP and SMP, facilities will be required to provide quantitative support that the proposed activities are not significantly impairing groundwater quality compared to existing conditions. The General Order WDRs for digesters and co-digesters would establish groundwater limitations and practices for each facility that would not unreasonably threaten present and anticipated beneficial uses or result in groundwater quality that exceeds water quality objectives as set forth in the respective Basin Plan. The General Order would contain tasks for ensuring BPTC measures and the highest water quality consistent with the maximum benefit to the people of the state and verify effectiveness of BPTC measures through a stringent monitoring and reporting program. Implementation of control measures including implementation of an NMP (already required by the Dairy General Order), a SMP, BPTC measures, and a monitoring/reporting program for each primary pollutant associated with dairy operations as would be required under the General Order WDRs for digesters and co-digesters, would be effective in reducing potential impacts to less than significant levels. Accordingly, the discharge of effluent would then also be in compliance with existing regulations including the antidegradation provisions of Resolution 68-16, California Code of Regulations (CCR) Title 27, Central Valley Water Board Basin Plan, and the Local Enforcement Agency Solid Waste Facility Permit, which are all designed to minimize impacts to groundwater and protect beneficial uses.

Impact 5.4: Development of dairy digester and co-digester facilities could be exposed to flooding hazards. (Significant)

Many lowland areas of the Central Valley are prone to flooding, especially in the former Tulare Lake, Buena Vista Lake, and Kern Lake beds. These former lake beds originally would accommodate seasonal flood flows, however the construction of farms, towns and infrastructure have altered these natural floodplains partly through the construction of levees. Other counties in the valley that often face flooding are Yuba, Stanislaus, and San Joaquin. Many areas protected by levees are susceptible to flooding in the event of levee failure or overtopping. The Federal Emergency Management Agency (FEMA) provides information on flood hazard and frequency for cities and counties on its Flood Insurance Rate Maps (FIRMs). FEMA identifies designated zones to indicate flood hazard potential. The addition of anaerobic digester and co-digester facilities could be located

in areas that have been identified as subject to 100-year floods.⁶ Centralized facilities and associated buildings, disposal fields and co-digestion substrate storage could be subject to damage if located in flood hazard areas. Workers at these facilities could also be subject to injury or death as a result of flooding hazards. Given the widespread extent of potential flooding hazards in many areas of the Central Valley, the risk of flooding may not be completely unavoidable, however protection measures and design requirements can minimize potential impacts. With implementation of Mitigation Measure 5.4, the potential impacts from flooding can be reduced to less-than-significant levels.

Mitigation Measure

Measure 5.4: WDRs for digester and co-digester facilities shall include design requirements for individual or centralized anaerobic digester or co-digester facilities, application croplands, and associated facilities to protect them from FEMA 100-year flood events. Design measures may include, but are not limited to: facility siting, access placement, grading foundation soils above projected water elevation, and site protection.

Impact Significance After Mitigation: Less than Significant

Impact 5.5: Development of dairy digester and co-digester facilities could require additional water supplies resulting in depletion of groundwater. (Less than Significant)

Dairies and agricultural facilities in general, typically receive water supplies through onsite groundwater pumping or private systems which provide groundwater, imported waters or surface waters. Dairies within the Central Valley also reuse process wastewater for some aspects of operation. With the available wastewater stored in the retention lagoons, reuse of this water can be used for the addition of water to the digestion process, if necessary. Co-digestion typically does not require additional water supplies because of the excess water already contained in the co-digestion substrate which is then separated from the solid materials. Considering the existing water usage for management of manure on dairies, development of digester or co-digester facilities would not significantly increase water demands. The development of a potential centralized facility off-site of a dairy, however could require new water demands. In addition, the construction of new digester or co-digester facilities could potentially introduce new impervious surfaces resulting in a potential reduction in area of groundwater recharge. However, the amount of impervious surfaces required for a new centralized facility would be relatively limited in areal extent and considering the generally low precipitation rates of the Central Valley, there would be less than significant effects on recharge rates and groundwater levels.

The California Senate Bill AB 610 requires that qualified large developments (including processing plants that occupy 40 acres) must provide a water supply assessment demonstrating adequate water supplies are available for any proposed needs prior to project approval. The purpose of the bill is to coordinate local water supply and land use decisions to help provide California's cities,

⁶ A 100-year floodplain is defined as an area calculated to have a one percent chance of flooding in any given year.

farms and rural communities with adequate water supplies. Some centralized digestion and co-digestion facilities may not be large enough to meet the minimum requirements of this bill and therefore do not represent a significant source of water supply demands. Those facilities that must adhere to the requirements of AB610 would be required to demonstrate adequate water supplies are available and therefore would have a less than significant impact on groundwater supplies.

Mitigation: None required.

Impact 5.6: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to water quality. (Significant)

The geographic scope of potential cumulative water quality impacts includes the entire Region 5. As discussed in this chapter, past projects have caused water quality impacts in the Central Valley. Past projects that have historically discharged to cropland have led in some instances to the degradation of both surface waters and groundwater in various areas of Region 5. For example, groundwater in the Tulare Lake Basin has been degraded by salt loading through a combination of natural processes and human activities. On a cumulative basis, on-going activities, including dairies and other agricultural activities, continue to have the potential for additional degradation of surface waters and groundwater. However, the operation of digesters and co-digesters, as required by Mitigation Measure 5.2, would be prohibited from discharging into surface waters unless covered by a separate NPDES permit with effluent limitations to protect surface water quality. Despite the possible hydraulic connection of groundwater to surface waters in isolated areas of gaining conditions, a prohibition on direct discharge to surface waters combined with the other elements of Mitigation Measure 5.2, the cumulative contribution of digesters and co-digesters on surface water quality would be less than significant.

The addition of a projected 200 dairy digesters to be developed over the next ten years (see discussion in Chapter 4, Approach to Environmental Analysis), has the potential to contribute pollutants through land application of solid digestate and liquid effluent to groundwater. A thorough analysis of the range of potential impacts to groundwater of the Central Valley has already been laid out in this chapter. As with the discussion of the project effects under Impact 5.3, the potential impacts will vary from constituent to constituent. For some contaminants of concern, such as pathogens, the addition of digester and co-digester facilities will be effective in reducing the amount of pathogens that might otherwise be applied to land without the dairy digesters and co-digesters. The dairy digesters would also result in the conversion of more of the nitrogen into its mineralized form, which is more readily available to plants than organic nitrogen compounds, which release nitrogen slowly and not always at times and rates useful to plants. Reducing the time organic nitrogen remains in the surface soil reduces the potential that slowly mineralized nitrogen will be available to leach to groundwater.

For manure only digesters, other contaminants of concern (i.e., salts, chloride, boron) would be relatively unchanged by the digestion process and have no additional adverse effects on groundwater quality compared to existing conditions. digesters using co-digestion substrates

would likely vary considerably in their constituents but could potentially include concentrations of nitrogen, salt, phosphorus, chloride, and/or boron that would be at risk of adversely affecting groundwater if not managed appropriately. The addition of co-digestion substrates in some instances would represent a potential additional loading that is not currently present under existing conditions. Therefore, overall, considering the significant impacts of past, present, and future projects, the dairy digesters and co-digesters could have an incremental contribution to groundwater quality impacts that is cumulatively considerable.

The existing regulatory environment for the Central Valley, including the antidegradation provisions of Resolution 68-16, CCR Title 27, Dairy General Order, the Conditional Waiver for Agricultural Discharges, Central Valley Water Board Basin Plans, and the Local Enforcement Agency Solid Waste Facility Permit, imposes measures designed to protect water quality throughout the cumulative region considered. In recent years, a large percentage of past projects contributing to the significant environmental impact have come under more stringent regulatory requirements such as the Dairy General Order which include measures that are designed to reduce the potential impacts to surface waters and groundwater. The implementation of NMPs are designed as a means to ensure that potential impacts to water quality are minimized. Other industries in Region 5 are similarly required to adhere to some of these same regulatory requirements such as State Board Resolution 68-16, CCR Title 27, Central Valley Water Board basin plans.

To address cumulative impacts of salts and nitrate impacts throughout Region 5, the Central Valley Water Board through the CV-SALTS initiative is currently engaged in a collaborative stakeholder effort aimed at developing a region-wide Salt and Nitrate Management Plan. The Plan once developed will be implemented through basin plan amendments. This basin planning effort will result in the establishment of a comprehensive implementation plan to achieve water quality objectives for salts and nitrate throughout Region 5.

As discussed under impacts 5.2 and 5.3, a number of mitigation measures (Mitigation Measures 5.2, 5.3, and 5.4) are proposed in this chapter that would reduce the potential water quality impacts of dairy digesters and co-digesters permitted under the program to a level of less than significant. These same measures would also help reduce the program's cumulative contribution to water quality, as they would occur within the context of the broader regulation of past, present, and future projects, all working toward reducing cumulative impacts (e.g., Dairy General Order and CV-SALTS initiative). Nevertheless, given the existing, significant cumulative impacts caused by other projects to groundwater throughout Region 5, and in particular those areas most likely to be affected by the future development of dairy digesters and co-digesters, the program's potential incremental contribution to groundwater quality remains cumulatively considerable, even after mitigation.

Mitigation Measure

Measure 5.6. Implement Mitigation Measures 5.2, 5.3, and 5.4.

Impact Significance After Mitigation: Significant and Unavoidable

Implementation of the above mitigation measures were determined as discussed in impacts 5.2 and 5.3 to reduce the impacts to a less than significant level on an incremental project

basis. However, the incremental contribution of the program to the significant cumulative effects of past and future projects may be cumulatively considerable even with mitigation.

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CHAPTER 6

Air Quality and Greenhouse Gas Emissions

6.1 Setting

Environmental Setting

The environmental setting first identifies the air quality pollutants of concern in California, including criteria air pollutants, toxic air contaminants (TACs), odors, and greenhouse gases (GHGs) that could be emitted during the dairy anaerobic digestion process. This discussion also explains California's climate and meteorology and their effect on air quality.

Air Quality Pollutants of Concern

Criteria Air Pollutants

Ozone. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) (also termed volatile organic compounds or VOCs) and nitrogen oxides (NO_x). ROG and NO_x are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NO_x under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone. Ground level ozone in conjunction with suspended particulate matter in the atmosphere leads to hazy conditions generally termed as "smog."

Carbon Monoxide (CO). Ambient CO concentrations normally are considered a local effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic. Wind speed and atmospheric mixing also influence carbon monoxide concentrations. Under inversion conditions, CO concentrations may be distributed more uniformly over an area that may extend some distance from vehicular sources. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in

reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia, as well as for fetuses.

Carbon monoxide concentrations have declined dramatically in California due to existing controls and programs and most areas of the state have no problem meeting the CO State and federal standards. CO measurements and modeling were important in the early 1980's when CO levels were regularly exceeded throughout California. In more recent years, CO measurements and modeling have not been a priority in most California air districts due to the retirement of older polluting vehicles, less emissions from new vehicles and improvements in fuels. The clear success in reducing CO levels is evident in the first paragraph of the executive summary of the California Air Resources Board *2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for Ten Federal Planning Areas* (CARB, 2004), shown below:

“The dramatic reduction in carbon monoxide (CO) levels across California is one of the biggest success stories in air pollution control. Air Resources Board (CARB or Board) requirements for cleaner vehicles, equipment and fuels have cut peak CO levels in half since 1980, despite growth. All areas of the State designated as non-attainment for the federal 8-hour CO standard in 1991 now attain the standard, including the Los Angeles urbanized area. Even the Calexico area of Imperial County on the congested Mexican border had no violations of the federal CO standard in 2003. Only the South Coast and Calexico continue to violate the more protective State 8-hour CO standard, with declining levels beginning to approach that standard.”

Respirable Particulate Matter (PM10 and PM2.5). PM10 and PM2.5 consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. (A micron is one-millionth of a meter). PM10 and PM2.5 represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Some sources of particulate matter, such as wood burning in fireplaces, demolition, and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility. Large dust particles (diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This large dust is of more concern as a soiling nuisance rather than a health hazard. The remaining fraction, PM10 and PM2.5, are a health concern particularly at levels above the federal and State ambient air quality standards. PM2.5 (including diesel exhaust particles) is thought to have greater effects on health, because these particles are so small and thus, are able to penetrate to the deepest parts of the lungs. Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Recent studies have shown an association between morbidity and mortality and daily concentrations of particulate matter in the air. Children are more susceptible to the health risks of PM10 and PM2.5 because their immune and respiratory systems are still developing.

Mortality studies since the 1990s have shown a statistically significant direct association between mortality (premature deaths) and daily concentrations of particulate matter in the air. Despite important gaps in scientific knowledge and continued reasons for some skepticism, a comprehensive evaluation of the research findings provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health (Dockery and Pope, 2006). The CARB has estimated that achieving the ambient air quality standards for PM10 could reduce premature mortality rates by 6,500 cases per year (CARB, 2002).

Nitrogen Dioxide (NO₂). NO₂ is a reddish brown gas that is a by-product of combustion processes. Automobiles and industrial operations are the main sources of NO₂. NO₂ may be visible as a coloring component of a brown cloud on high pollution days, especially in conjunction with high ozone levels.

NO₂ is an air quality concern because it acts a respiratory irritant and is a precursor of ozone. NO₂ is a major component of the group of gaseous nitrogen compounds commonly referred to as nitrogen oxides (NO_x). Nitrogen oxides are produced by fuel combustion in motor vehicles, industrial stationary sources (such as industrial activities), ships, aircraft, and rail transit. Typically, nitrogen oxides emitted from fuel combustion are in the form of nitric oxide (NO) and nitrogen dioxide (NO₂). NO is often converted to NO₂ when it reacts with ozone or undergoes photochemical reactions in the atmosphere. Therefore, emissions of NO₂ from combustion sources are typically evaluated based on the amount of NO_x emitted from the source.

Sulfur dioxide (SO₂). SO₂ is a combustion product of sulfur or sulfur-containing fuels such as coal, diesel, and biogas. SO₂ is also a precursor to the formation of atmospheric sulfate, particulate matter and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain. SO₂ is a major component of the group of gaseous sulfurous compounds commonly referred to as sulfur oxides (SO_x)

Hydrogen sulfide (H₂S). H₂S is generated by the anaerobic decomposition of manure and other organic material. It is emitted naturally in geothermal areas and is also associated with certain industrial processes. Exposure to low concentrations of H₂S may cause irritation to eyes, nose, or throat. Exposure to higher concentrations (typically at work settings) can cause olfactory fatigue, respiratory paralysis, and death. However, no health effects have been found in humans exposed to typical environmental concentrations.

Lead. Lead has a range of adverse neurotoxin health effects, and was formerly released into the atmosphere primarily via leaded gasoline products. The phase-out of leaded gasoline in California resulted in decreasing levels of atmospheric lead. Dairy digester and co-digester facilities would not introduce any new sources of lead emissions; consequently, lead emissions are not required to be quantified and are not further evaluated in this analysis.

Toxic Air Contaminants

TACs are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic and/or carcinogenic) adverse human health effects (i.e., injury or illness). TACs are substances for which federal or State criteria air pollutant standards have not been adopted. Thus, for TACs, there

is no federal or State ambient air quality standard against which to measure a project's air quality impacts. For this reason, TACs are analyzed by performing a health risk assessment. TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including particulate emissions from diesel-fueled engines and ammonia, which can be emitted through the construction and/or operation of dairy digester and co-digester facilities.

Diesel Particulate Matter. Diesel particulate matter (DPM) is the most complex of diesel emissions. Diesel particulates, as defined by most emission standards, are sampled from diluted and cooled exhaust gases. This definition includes both solids and liquid material that condenses during the dilution process. The basic fractions of DPM are elemental carbon and heavy hydrocarbons derived from fuel and lubricating oil. DPM contains a large portion of the polycyclic aromatic hydrocarbons (PAH) found in diesel exhaust. Diesel particulates include small nuclei mode particles of diameters below $0.04\mu\text{m}$ and their agglomerates of diameters up to $1\mu\text{m}$. DPM is expected to be the TAC of greatest concern generated by the construction and operation of dairy digester and co-digester facilities since it would be emitted outside of the digester and thus not captured during the digestion process.

In 2001, CARB assessed the statewide health risks from exposure to DPM and to other TACs. Ambient exposures to diesel particulates in California are significant fractions of total TAC levels in the State. CARB subsequently developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (CARB, 2000). According to this plan, the statewide cancer risk from exposure to diesel exhaust was about 540 per million (i.e., 540 cancers per million people) as compared to a total risk for exposure to all ambient air toxics of 760 per million as reported in 2000. This estimate of risk from diesel exhaust, which accounts for a substantial portion (about 70 percent) of the total risk from TACs, included both urban and rural areas in the State. It can be considered as an average worst-case for the State, since it assumes constant exposure to outdoor concentrations of diesel exhaust and does not account for expected lower concentrations indoors, where people spend most of their time.

Ammonia. Ammonia is a TAC and is considered a precursor to PM_{2.5}. Ammonia is generated during anaerobic decomposition of manure and is therefore of interest in evaluating the air quality impacts of the project. Ammonia gas (a base) is known to react with acids in the atmosphere (typically nitric or sulfuric acid) to form ammonium nitrates or sulfates, which are particulates. Although it is known that the release of ammonia gas is a participant in the formation of ammonium nitrate, it is difficult to forecast how much ammonium nitrate would be created by a release of a certain amount of ammonia. The reaction that forms ammonium nitrate or ammonium sulfate depends on the presence of other chemicals that are in turn part of a complex photochemical process occurring in the atmosphere (including NO_x and SO_x, which the San Joaquin Valley Air Pollution Control District (SJVAPCD) focuses on controlling in order to also limit ammonium nitrate and ammonium sulfate generation). At the same time, both ammonia and ammonium particulates are subject to removal processes that constantly remove the pollutants from the atmosphere. No health effects have been found in humans exposed to typical environmental (moderate) concentrations of ammonia.

In high concentrations, it can severely irritate the eyes, nose, ears, and throat. Lung damage and death may occur after exposure to very high concentrations of ammonia. Individuals with asthma may be more sensitive to breathing ammonia than others.

Odorous Emissions

Manure generated at dairies can be a source of substantial odor. Though offensive odors from stationary sources rarely cause any physical harm, they still remain unpleasant and can lead to public distress generating citizen complaints to local governments. The occurrence and severity of odor impacts depend on the nature, frequency and intensity of the source; wind speed and direction; and the sensitivity of receptors. The *CEQA Guidelines* recommends that odor impacts be considered for any proposed new odor sources located near existing receptors, as well as any new sensitive receptors located near existing odor sources. Generally, increasing the distance between the receptor and the source will mitigate odor impacts.

Greenhouse Gas Emissions

Global climate change refers to observed changes in weather features that occur across the Earth as a whole, such as temperature, wind patterns, precipitation, and storms, over a long period (CAT, 2006; CEC, 2006; CEC, 2008; IPCC, 2007). Global temperatures are modulated by naturally occurring atmospheric gases, such as water vapor, carbon dioxide, methane, and nitrous oxide. These gases allow sunlight into the Earth's atmosphere, but prevent radiative heat from escaping into outer space, thus altering Earth's energy balance in a phenomenon called the "greenhouse effect". The term "natural greenhouse effect" refers to how greenhouse gases trap heat with the system-troposphere system; the term "enhanced greenhouse effect" refers to an increased concentration of greenhouse gases, which results in an increase in temperature of the surface-troposphere system. Some greenhouse gases are short lived, such as water vapor, while others, such as sulfur hexafluoride, have a long lifespan in the atmosphere.

Earth has a dynamic climate that is evidenced by repeated episodes of warming and cooling in the geologic record. Consistent with a general warming trend, global surface temperatures have increased by $0.74^{\circ}\text{C} \pm 0.18^{\circ}\text{C}$ over the past 100 years (IPCC, 2007). The recent warming trend has been correlated with the global Industrial Revolution, which resulted in increased urban and agricultural centers at the expense of forests and reliance on fossil fuels (CAT, 2006). Eleven of the past twelve years are among the twelve warmest years recorded since 1850 (CEC, 2006). Although natural processes and sources of greenhouse gases contribute to warming periods, recent warming trends are attributed to human activities as well (CAT, 2006; CEC 2006a). Potential global warming impacts may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years. Secondary effects are likely to include a global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity. While the possible outcomes and the feedback mechanisms involved are not fully understood, and much research remains to be done, the potential for substantial environmental, social, and economic consequences over the long term may be great.

Whether naturally or anthropogenically produced, greenhouse gases of concern include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆) (CAT, 2006; CAPCOA, 2009; OPR, 2008). In terms of Global Warming Potential (GWP), each of these gases varies substantially from one another. GWP is a measure of how much a given mass of GHG will contribute to global warming, comparing one GHG to the same mass of CO₂ on a relative scale (CAPCOA, 2009; CAT, 2006; IPCC, 2007). The GWP depends on the absorption of infrared radiation by a given species, the spectral location of its absorbing wavelengths, and the atmospheric lifetime of the species. GHG emissions are measured in units of pounds or tons of CO₂ equivalents (CO₂e). As an example, HFC-23 contributes 14,800 times as much as CO₂ to the GWP over 100 years. GWP values for key GHGs are summarized in the following table. The following sections contain a general discussion of the natural and anthropogenic sources of each GHG.

**TABLE 6-1
GLOBAL WARMING POTENTIAL OF GREENHOUSE GASES**

Gas	Lifetime (years)	Global Warming Potential for 100-Year Time Horizon
Carbon Dioxide (CO ₂)	50-200	1
Methane (CH ₄)	12	25
Nitrous Oxide (NO ₂)	114	298
Perfluorocarbons (PFC-14)	50,000	7.300
Hydrofluorocarbons (HFC-23)	270	14,800
Sulfur Hexafluoride (SF ₆)	3.200	22.800

SOURCE: IPCC. 2007. Table 2.14, Chapter 2, Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Available at: http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch02.pdf

Carbon Dioxide (CO₂). In the atmosphere, carbon generally exists in its oxidized form as CO₂. Natural sources of CO₂ include animal and plant respiration, ocean-atmospheric exchange and volcanic eruptions. Anthropogenic sources of CO₂ include the combustion of fossil fuels, such as coal, oil, and gas in power plants, automobiles, industrial facilities and other sources, and specialized industrial production processes and product uses (i.e., mineral production, metal production, and use of petroleum based products). The largest source of CO₂ emissions globally is the combustion of fossil fuels. Sinks of CO₂ include forests, wetlands and agriculture. When CO₂ sources exceed CO₂ sinks, the Earth's natural balance is no longer in equilibrium. Since the late 1800s, the concentration of CO₂ in the atmosphere has risen approximately 30% (CAT, 2006; CAPCOA, 2009).

Methane (CH₄). Methane in the atmosphere is eventually oxidized, yielding carbon dioxide and water. Natural sources of methane include, but are not limited to, anaerobic production, wetlands, termites, oceans, methane gas hydrates (clathrates), volcanoes and other geologic structures, wildfires, and animals. Anthropogenic sources of methane include, but are not limited to, landfills, natural gas systems, coal mining, manure management, forested lands, wastewater treatment, rice cultivation, composting, petrochemical production, and field burning of agricultural residues. In California, agricultural processes contribute significant sources of anthropogenic methane (CAT, 2006; CAPCOA, 2009).

Nitrous Oxide (N₂O). In the atmosphere, nitrous oxide reacts with ozone. Primary natural sources of nitrous oxide include bacterial breakdown of nitrogen in soils and oceans. Anthropogenic sources of nitrous oxide include fertilizer application, production of nitrogen fixing crops, nitric acid production, animal manure management, sewage treatment, combustion of fossil fuels, and nitric acid production (CAT, 2006; CAPCOA, 2009).

Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF₆). HFCs are man-made chemicals containing the element fluorine. Developed as alternatives to ozone-depleting substances for industrial, commercial and consumer products, they are used predominantly as refrigerants and aerosol propellants. PFCs are man-made as well, primarily used as replacements to ozone-damaging chlorofluorocarbons and hydrochlorofluorocarbons. Sources include aluminum production and semiconductor manufacturing. Man made, major releases of SF₆ come from leakage from electrical substations, magnesium smelters and some consumer goods, such as tennis balls and training shoes. Each of these GHGs possesses a relatively high GWP and long atmospheric lifetimes (CAT, 2006; CAPCOA, 2009).

California Climate and Meteorology

The jurisdictional boundaries of the Central Valley Region (Region 5) encompasses approximately 60,000 square miles, or about 40 percent of the State's total area. There is considerable variation in climate and meteorology across Region 5, and as such, will be discussed below for California as generally representative of Region 5.

Air quality is affected by the rate, amount, and location of pollutant emissions and the associated meteorological conditions that influence pollutant movement and dispersal. Atmospheric conditions (for example, wind speed, wind direction, and air temperature) in combination with local surface topography (for example, geographic features such as mountains and valleys), determine how air pollutant emissions affect local air quality.

Because of the strong influence of the Pacific Ocean and mountains, variations in climate in California run in a general east-to-west direction. California's climate varies from Mediterranean (most of the State) to steppe (scattered foothill areas), to alpine (high Sierra), to desert (Colorado and Mojave Deserts).

The Sierra Nevada, Coast and Cascade Ranges act as barriers to the passage of air masses. During summer, California is protected from much of the hot, dry air masses that develop over the central United States. Because of these barriers, and California's western border of the Pacific Ocean, summer weather in portions of the State is generally milder than that in the rest of the country and is characterized by dry, sunny conditions with infrequent rain.

In winter, the same mountain ranges prevent cold, dry air masses from moving into California from the central areas of the United States. Consequently, winters in California are also milder than would be expected at these latitudes.

Regulatory Setting

Federal

Clean Air Act

The Clean Air Act (CAA) is a federal law that regulates air emissions from stationary and mobile sources. Principal provisions include the authorization for the United States Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and to regulate emissions of hazardous air pollutants. Six criteria pollutants include carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, particulate matter (equal to or less than PM10) and lead. **Table 6-2** shows current federal and State ambient air quality standards and provides a brief discussion of the related health effects and principal sources for each pollutant. The CAA was amended in 1977 and 1990, primarily to set new deadlines for achieving attainment of NAAQS because many areas of the country had failed to meet the deadlines.

**TABLE 6-2
STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS, EFFECTS, AND SOURCES**

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 hour	0.09 ppm	---	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when reactive organic gases (ROG) and nitrogen oxides (NOx) react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial / industrial mobile equipment.
	8 hours	0.07 ppm	0.075 ppm		
Carbon Monoxide	1 hour	20 ppm	35 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm		
Nitrogen Dioxide	1 hour	0.18 ppm	0.100 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
	Annual Avg.	0.030 ppm	0.053 ppm		
Sulfur Dioxide	1 hour	0.25 ppm	---	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	3 hours	---	0.5 ppm		
	24 hours	0.04 ppm	0.14 ppm		
	Annual Avg.	---	0.03 ppm		
Respirable Particulate Matter (PM10)	24 hours	50 µg/m3	150 µg/m3	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	Annual Avg.	20 µg/m3	---		
Fine Particulate Matter (PM2.5)	24 hours	---	35 µg/m3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; Also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.
	Annual Avg.	12 µg/m3	15 µg/m3		
Lead	Monthly Ave.	1.5 µg/m3	---	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	Quarterly	---	1.5 µg/m3		

**TABLE 6-2
STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS, EFFECTS, AND SOURCES**

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Hydrogen Sulfide	1 hour	0.03 ppm	No National Standard	Nuisance odor (rotten egg smell), headache and breathing difficulties (higher concentrations)	Geothermal Power Plants, Petroleum Production and refining
Sulfates	24 hour	25 µg/m ³	No National Standard	Breathing difficulties, aggravates asthma, reduced visibility	Produced by the reaction in the air of SO ₂ .
Visibility Reducing Particles	8 hour	Extinction coefficient of 0.23/km; visibility of 10 miles or more	No National Standard	Reduces visibility, reduced airport safety, lower real estate value, discourages tourism.	See PM _{2.5} .

ppm = parts per million; µg/m³ = micrograms per cubic meter.

SOURCE: California Air Resources Board (CARB), 2010a. *Ambient Air Quality Standards*, available at <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf> Standards last updated February 16, 2010. California Air Resources Board, 2009a. *ARB Fact Sheet: Air Pollution Sources, Effects and Control*, <http://www.arb.ca.gov/research/health/fs/fs2/fs2.htm>, page last reviewed December 2009.

Pursuant to the 1990 amendments to the CAA, the USEPA classifies air basins, or portions of air basins, as “attainment” or “nonattainment” for each criteria air pollutant, based on whether or not the NAAQS had been achieved. **Table 6-3** shows the current attainment statuses across the project area by air basin (shown in **Figure 6-1**) for the pollutants of highest concern (ozone and particulates).

**TABLE 6-3
REGION 5 CRITERIA POLLUTANT ATTAINMENT STATUS BY AIR BASIN**

Air Basin	State Ozone	Federal Ozone	State PM10	Federal PM10	State PM2.5	Federal PM2.5
Great Basin Valleys Air Basin	N	U	N	N	A	U
Lake County Air Basin	A	U	A	U	A	U
Mojave Desert Air Basin	N	N	N	N	N	U
Mountain Counties Air Basin	N	N	N	U	U	N
North Central Coast Air Basin	N	U	N	U	A	U
Northeast Plateau Air Basin	NT	U	N	U	U	U
Sacramento Valley Air Basin	N	N	N	N	N	N
San Francisco Bay Area Air Basin	N	N	N	U	N	N
San Joaquin Valley Air Basin	N	N	N	A	N	N
South Central Coast	N	N	N	U	N	U

A Attainment. An area is designated attainment if the state or federal standard for the specified pollutant is met.

N Nonattainment. An area is designated nonattainment if the State or federal standard for the specified pollutant is not met.

NT Nonattainment – Transitional. An area is designated non-attainment – transitional to signify that the area is close to attaining the standard for that pollutant.

U Unclassified. An area is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.

Air basins classified as N or NT areas have at least one area within that basin that has shown a violation of the relevant ambient standard.

SOURCE: California Air Resources Board (CARB), 2010b. *Area Designation Maps*, <http://www.arb.ca.gov/desig/adm/adm.htm>, page updated March 29, 2010 and accessed April 30, 2010.



SOURCE: CA Air Resources Board, 2008; Central Valley Water Board, 2009; and ESA, 2010

Central Valley Dairy Digester and Co-Digester Program EIR . 209481

Figure 6-1
California Air Basins

The 1990 amendments to the CAA requires each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The amendments added requirements for states containing areas that violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. The USEPA has responsibility to review all state SIPs to determine if they conform to the mandates of the CAA and will achieve air quality goals when implemented. If the USEPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan (FIP) for the nonattainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated timeframes can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basins.

Regulation of TACs, termed Hazardous Air Pollutants (HAPs) under federal regulations, is achieved through federal, State and local controls on individual sources. The 1977 amendments to the CAA required the USEPA to identify National Emission Standards for Hazardous Air Pollutants (NESHAPs) to protect public health and welfare. These substances include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals. There is uncertainty in the precise degree of hazard.

Relevant to the CAA, GHGs and climate change, *Massachusetts v. Environmental Protection Agency* (549 U.S. 497) is the pivotal federal court case. In this case, twelve states and cities, including California, sued to force the USEPA to regulate GHGs as a pollutant pursuant to the CAA. This lawsuit was pursued in conjunction with several environmental organizations. The petitioners contended that the CAA gave the USEPA the necessary authority and the mandate to address GHGs in light of scientific evidence on global warming.

The USEPA was one of several respondents in the case. The USEPA contended that it did not have the authority under the CAA to regulate GHGs, and even if the USEPA did have such authority, it would decline to exercise it. Central to this case was the exact definition of an air pollutant as stipulated in the CAA. In April 2007, the United States Supreme Court ruled five to four that the plaintiffs had standing to sue, that the CAA gave the USEPA the authority to regulate GHGs, and that the USEPA's reasons for not regulating GHG were found to be inadequate. Since this ruling, the USEPA has been developing regulations for geologic carbon sequestration projects and will be issuing GHG permits for large sources.

State

The CARB manages air quality, regulates mobile emissions sources, and oversees the activities of county APCDs and regional AQMDs. CARB establishes state ambient air quality standards and vehicle emissions standards.

California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants. These are shown in **Table 6-2**. Under the 1988 California Clean Air Act (CCAA) patterned after the CAA, areas have been designated as attainment or nonattainment

with respect to the state standards. **Table 6-3** summarizes the attainment status with California standards of the Program area by air basin for the pollutants of highest concern (ozone and particulates).

Toxic Air Contaminants

The State Air Toxics Program was established in 1983 under Assembly Bill (AB) 1807 (Tanner). A total of 243 substances have been designated TACs under California law; they include the 189 (federal) hazardous air pollutants (HAPs) adopted in accordance with AB 2728. The Air Toxics “Hot Spots” Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; however, AB 2588 does not regulate air toxics emissions. Toxic air contaminant emissions from individual facilities are quantified and prioritized. “High-priority” facilities are required to perform a health risk assessment and, if specific thresholds are violated, are required to communicate the results to the public in the form of notices and public meetings.

CARB developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (CARB, 2000), which represents proposals to reduce diesel particulate emissions, with the goal of reducing emissions and associated health risks by 75 percent in 2010 and by 85 percent in 2020. The program aims to require the use of state-of-the-art catalyzed diesel particulate filters and ultra low sulfur diesel fuel on diesel-fueled engines.

CARB recently published the *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB, 2005). The primary goal in developing the handbook was to provide information that will help keep California’s children and other vulnerable populations out of harm’s way with respect to nearby sources of TACs. The handbook highlights recent studies that have shown that public exposure to air pollution can be substantially elevated near freeways and certain other facilities. The health risk is greatly reduced with distance. For that reason, CARB provides some general recommendations aimed at keeping appropriate distances between sources of air pollution and sensitive land uses, such as residences.

Greenhouse Gases

Executive Order S-3-05

In 2005, in recognition of California’s vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emission of greenhouse gas would be progressively reduced, as follows:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels; and
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

Assembly Bill 32 (AB 32)

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, §s 38500, et seq., or AB 32), which requires the CARB to design and implement emission limits, regulations, and other measures, such that statewide greenhouse gas emissions will be reduced to 1990 levels by 2020.

In December 2007, CARB approved the 2020 emission limit of 427 million metric tons of CO₂ equivalents (CO₂e) of greenhouse gases. The 2020 target of 427 million metric tons of CO₂e requires the reduction of 169 million metric tons of CO₂e, or approximately 30 percent, from the state's projected 2020 emissions of 596 million metric tons of CO₂e (business-as-usual).

AB 32 required development of a mandatory reporting rule for major sources of GHGs. The CARB reporting rule (California Code of Regulations Title 17, Subchapter 10, Article 2, §95100 to 95133) became effective in January 2009. The rule requires reporting of GHG emissions for:

- Cement plants;
- Petroleum refineries (\geq 25,000 metric tons of CO₂e in any calendar year);
- Hydrogen plants (\geq 25,000 metric tons of CO₂e in any calendar year);
- Electric generating facilities and cogeneration facilities ($>$ 1 MW capacity and $>$ 2,500 metric tons of CO₂e in any year)
- Electricity retail providers and marketers
- Other facilities that emit $>$ 25,000 metric tons of CO₂e, for stationary combustion sources, in any calendar year.

Cement plants, oil refineries, fossil-fueled electric-generating facilities/providers, cogeneration facilities, and hydrogen plants and other stationary combustion sources that emit more than 25,000 metric tons/year CO₂e, make up 94 percent of the point source CO₂e emissions in California.

In June 2008, CARB published its *Climate Change Draft Scoping Plan* (CARB, 2008a) that was approved and adopted by the CARB Board on December 11, 2008 as the *Climate Change Scoping Plan* (CARB, 2008b). The *Climate Change Draft Scoping Plan* reported that CARB met the first milestones set by AB 32 in 2007: developing a list of early actions to begin sharply reducing GHG emissions; assembling an inventory of historic emissions; and establishing the 2020 emissions limit. Key elements of the *Climate Change Scoping Plan* include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation (CARB, 2008b).

CARB has not yet determined what amount of GHG emissions reductions it recommends from local government land use decisions; however, the *Climate Change Scoping Plan* does state that successful implementation of the plan relies on local governments' land use planning and urban growth decisions because local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. CARB further acknowledges that decisions on how land is used will have large effects on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors.

The *Climate Change Scoping Plan* also includes recommended measures that were developed to reduce GHG emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving our natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately impact low-income and minority communities. These measures, shown below in **Table 6-4** by sector, also put the state on a path to meet the long-term 2050 goal of reducing California's GHG emissions to 80 percent below 1990 levels.

The total reduction for the recommended measures is 174 million metric tons/year of CO₂e, slightly exceeding the 169 million metric tons/year of CO₂e reductions estimated to be needed in the *Climate Change Draft Scoping Plan*. The measures in the *Climate Change Scoping Plan* approved by the Board will be developed over the next two years and be in place by 2012.

**TABLE 6-4
LIST OF RECOMMENDED ACTIONS BY SECTOR**

Measure No.	Measure Description	GHG Reductions (Annual Million Metric Tons CO ₂ e)
Transportation		
T-1	Pavley I and II – Light Duty Vehicle Greenhouse Gas Standards	31.7
T-2	Low Carbon Fuel Standard (Discrete Early Action)	15
T-3 ¹	Regional Transportation-Related Greenhouse Gas Targets	5
T-4	Vehicle Efficiency Measures	4.5
T-5	Ship Electrification at Ports (Discrete Early Action)	0.2
T-6	Goods Movement Efficiency Measures. <ul style="list-style-type: none"> • Ship Electrification at Ports • System-Wide Efficiency Improvements 	3.5
T-7	Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure – Aerodynamic Efficiency (Discrete Early Action)	0.93
T-8	Medium- and Heavy-Duty Vehicle Hybridization	0.5
T-9	High Speed Rail	1
Electricity and Natural Gas		
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) <ul style="list-style-type: none"> • Increased Utility Energy Efficiency Programs • More Stringent Building & Appliance Standards Additional Efficiency and Conservation Programs	15.2
E-2	Increase Combined Heat and Power Use by 30,000 GWh (Net reductions include avoided transmission line loss)	6.7
E-3	Renewables Portfolio Standard (33% by 2020)	21.3
E-4	Million Solar Roofs (including California Solar Initiative, New Solar Homes Partnership and solar programs of publicly owned utilities) <ul style="list-style-type: none"> • Target of 3000 MW Total Installation by 2020 	2.1

**TABLE 6-4
LIST OF RECOMMENDED ACTIONS BY SECTOR**

Measure No.	Measure Description	GHG Reductions (Annual Million Metric Tons CO₂e)
CR-1	Energy Efficiency (800 Million Therms Reduced Consumptions) <ul style="list-style-type: none"> • Utility Energy Efficiency Programs • Building and Appliance Standards • Additional Efficiency and Conservation Programs 	4.3
CR-2	Solar Water Heating (AB 1470 goal)	0.1
Green Buildings		
GB-1	Green Buildings	26
Water		
W-1	Water Use Efficiency	1.4†
W-2	Water Recycling	0.3†
W-3	Water System Energy Efficiency	2.0†
W-4	Reuse Urban Runoff	0.2†
W-5	Increase Renewable Energy Production	0.9†
W-6	Public Goods Charge (Water)	TBD†
Industry		
I-1	Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	TBD
I-2	Oil and Gas Extraction GHG Emission Reduction	0.2
I-3	GHG Leak Reduction from Oil and Gas Transmission	0.9
I-4	Refinery Flare Recovery Process Improvements	0.3
I-5	Removal of Methane Exemption from Existing Refinery Regulations	0.01
Recycling and Water Management		
RW-1	Landfill Methane Control (Discrete Early Action)	1
RW-2	Additional Reductions in Landfill Methane <ul style="list-style-type: none"> • Increase the Efficiency of Landfill Methane Capture 	TBD†
RW-3	High Recycling/Zero Waste <ul style="list-style-type: none"> • Commercial Recycling • Increase Production and Markets for Compost • Anaerobic Digestion • Extended Producer Responsibility • Environmentally Preferable Purchasing 	9†
Forests		
F-1	Sustainable Forest Target	5
High Global Warming Potential (GWP) Gases		
H-1	Motor Vehicle Air Conditioning Systems: Reduction of Refrigerant Emissions from Non-Professional Services (Discrete Early Action)	0.26
H-2	SF ₆ Limits in Non-Utility and Non-Semiconductor Applications (Discrete Early Action)	0.3
H-3	Reduction of Perfluorocarbons in Semiconductor Manufacturing (Discrete Early Action)	0.15
H-4	Limit High GWP Use in Consumer Products Discrete Early Action (Adopted June 2008)	0.25
H-5	High GWP Reductions from Mobile Sources <ul style="list-style-type: none"> • Low GWP Refrigerants for New Motor Vehicle Air Conditioning Systems • Air Conditioner Refrigerant Leak Test During Vehicle Smog Check • Refrigerant Recovery from Decommissioned Refrigerated Shipping Containers • Enforcement of Federal Ban on Refrigerant Release during Servicing or Dismantling of Motor Vehicle Air Conditioning Systems 	3.3
H-6	High GWP Reductions from Stationary Sources <ul style="list-style-type: none"> • High GWP Stationary Equipment Refrigerant Management Program: <ul style="list-style-type: none"> - Refrigerant Tracking/Reporting/Repair Deposit Program - Specifications for Commercial and Industrial Refrigeration Systems 	10.9

TABLE 6-4
LIST OF RECOMMENDED ACTIONS BY SECTOR

Measure No.	Measure Description	GHG Reductions (Annual Million Metric Tons CO ₂ e)
	<ul style="list-style-type: none"> • Foam Recovery and Destruction Program • SF Leak Reduction and Recycling in Electrical Applications • Alternative Suppressants in Fire Protection Systems • Residential Refrigeration Early Retirement Program 	
H-7	Mitigation Fee on High GWP Gases	5
Agriculture		
A-1	Methane Capture at Large Dairies	1.0†

1. This is not the SB 375 regional target. CARB will establish regional targets for each California's 18 Metropolitan Planning Organization (MPO's) regions following the input of the regional targets advisory committee and a consultation process with MPO's and other stakeholders per SB 375

† GHG emission reduction estimates are not included in calculating the total reductions needed to meet the 2020 target

Senate Bill 97 (SB 97)

SB 97, signed August 2007 (Chapter 185, Statutes of 2007; Public Resources Code §21083.05 and 21097), acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the Governor's Office of Planning and Research (OPR), which is part of the state Resources Agency, to prepare, develop, and transmit to CARB guidelines for the feasible mitigation of GHG emissions (or the effects of GHG emissions), as required by CEQA, by July 1, 2009. The Resources Agency was required to certify and adopt those guidelines by January 1, 2010. On December 31, 2009, the Natural Resources Agency delivered its rulemaking package to the Office of Administrative Law for their review pursuant to the Administrative Procedure Act. The adopted guidelines became effective on March 18, 2010 (for more information on the adopted guidelines, see the *OPR Proposed Amendments to the CEQA Guidelines* discussion below).

Governor's Office of Planning and Research (OPR)

On June 19, 2008, OPR published a technical advisory on CEQA and Climate Change. The advisory provides OPR's perspective on the emerging role of CEQA in addressing climate change and greenhouse gas emissions, while recognizing that approaches and methodologies for calculating greenhouse gas emissions and addressing environmental impacts through CEQA review are rapidly evolving. The advisory recognizes that OPR will develop, and the Resources Agency will adopt amendments to the CEQA Guidelines pursuant to SB 97. In the interim, the technical advisory "offers informal guidance regarding the steps lead agencies should take to address climate change in their CEQA documents" (OPR, 2008).

The technical advisory points out that neither CEQA nor the CEQA Guidelines prescribe thresholds of significance or particular methodologies for performing an impact analysis. "This is left to lead agency judgment and discretion, based upon factual data and guidance from regulatory agencies and other sources where available and applicable" (OPR, 2008). OPR recommends that "the global nature of climate change warrants investigation of a statewide threshold of significance for GHG emissions" (OPR, 2008). Until such a standard is established, OPR advises that each lead agency

should develop its own approach to performing an analysis for projects that generate greenhouse gas emissions (OPR, 2008).

Agencies should then assess whether the emissions are “cumulatively considerable” even though a project’s greenhouse gas emissions may be individually limited. OPR states: “Although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment” (OPR, 2008). Individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice (OPR, 2008).

Finally, if the lead agency determines emissions are a cumulatively considerable contribution to a significant cumulative impact, the lead agency must investigate and implement ways to mitigate the emissions (OPR, 2008). OPR states: “Mitigation measures will vary with the type of project being contemplated, but may include alternative project designs or locations that conserve energy and water, measures that reduce vehicle miles traveled (VMT) by fossil-fueled vehicles, measures that contribute to established regional or programmatic mitigation strategies, and measures that sequester carbon to offset the emissions from the project” (OPR, 2008). OPR concludes that “A lead agency is not responsible for wholly eliminating all GHG emissions from a project; the CEQA standard is to mitigate to a level that is “less than significant” (OPR, 2008). The technical advisory includes a list of mitigation measures that can be applied on a project-by-project basis.

OPR Proposed Amendments to the CEQA Guidelines

On April 13, 2009, OPR submitted to the Secretary for Natural Resources its proposed amendments to the state CEQA Guidelines for GHG emissions, as required by Public Resources Code §21083.05 (Senate Bill 97) (OPR, 2009) to provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in draft CEQA documents. The Natural Resources Agency adopted the CEQA Guidelines Amendments with minor, non-substantial changes on December 31, 2009 and transmitted the Adopted Amendments and the entire rulemaking file to the Office of Administrative Law (OAL). The adopted guidelines became effective on March 18, 2010.

The proposed amendments suggest relatively modest changes to various portions of the existing CEQA Guidelines. Modifications address those issues where analysis of GHG emissions may differ in some respects from more traditional CEQA analysis.

Proposed amendments include a new section (15064.4) to assist lead agencies in determining the significance of the GHG impacts. This section urges lead agencies to quantify, where possible, the GHG emissions of projects. In addition to quantification, this section recommends consideration of several other qualitative factors that may be used in determination of significance including:

1. the extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting;
2. whether the GHG emissions exceed a threshold of significance that the lead agency determines applies to the project; and
3. the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

The proposed amendments include a new subdivision 15064.7(c) to clarify that in developing thresholds of significance, a lead agency may appropriately review thresholds developed by other public agencies, including the CARB's recommended CEQA Thresholds, or suggested by other experts, such as the California Air Pollution Control Officers Association (CAPCOA), so long as any threshold chosen is supported by substantial evidence.

The proposed amendments also include a new subdivision 15130(f) to emphasize that the effects of GHG emissions are cumulative, and should be analyzed when the incremental contribution of those emissions may be cumulatively considerable.

In addition, the proposed amendments add a new set of environmental checklist questions (VII. Greenhouse Gas Emissions) to the CEQA Guidelines Appendix G. The new set includes the following two questions:

- a. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- b. Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHG?

California Air Pollution Control Officers Association (CAPCOA)

In January 2008, CAPCOA issued a "white paper" on evaluating and addressing GHGs under CEQA (CAPCOA, 2008). This resource guide was prepared to support local governments as they develop their programs and policies around climate change issues. The paper is not a guidance document. It is not intended to dictate or direct how any agency chooses to address GHG emissions. Rather, it is intended to provide a common platform of information about key elements of CEQA as they pertain to GHG, including an analysis of different approaches to setting significance thresholds.

The paper notes that for a variety of reasons local agencies may decide not to have a CEQA threshold. Local agencies may also decide to assess projects on a case-by-case basis when the projects come forward. The paper also discusses a range of GHG emission thresholds that could be used. The range of thresholds discussed includes a GHG threshold of zero and several non-zero thresholds. Non-zero thresholds include percentage reductions for new projects that would allow the state to meet its goals for GHG emissions reductions by 2020 and perhaps 2050. These would be determined by a comparison of new emissions versus business as usual emissions and the reductions required would be approximately 30 percent to achieve 2020 goals and 90 percent (effectively immediately) to achieve the more aggressive 2050 goals. These goals could be varied to apply differently to a new project, by economic sector, or by region in the state.

Other non-zero thresholds are discussed in the paper, including:

- 900 metric tons/year CO₂e (a market capture approach);
- 10,000 metric tons/year CO₂e (potential CARB mandatory reporting level with Cap and Trade);

- 25,000 metric tons/year CO₂e (the CARB mandatory reporting level for the statewide emissions inventory);
- 40,000 to 50,000 metric tons/year CO₂e (regulated emissions inventory capture – using percentages equivalent to those used in air districts for criteria air pollutants),
- Projects of statewide importance (9,000 metric tons/year CO₂e for residential, 13,000 metric tons/year CO₂e for office project, and 41,000 metric tons/year CO₂e for retail projects), and
- Unit-based thresholds and efficiency-based thresholds that were not quantified in the report.

Local

The project applies to areas within the Central Valley Water Board jurisdiction of Region 5. As shown above in **Figure 6-1** and listed in **Table 6-3**, 10 of California's 15 air basins are fully or partially encompassed within Region 5. The CARB has delegated much of its air pollution control authority to local air pollution control districts (APCDs) and air quality management districts (AQMDs). For some air basins covering more than one county, a unified air district has been formed to manage air quality issues throughout the basin. In other multicounty air basins, individual county air districts manage air quality in only their county. Individual air districts or groups of air districts prepare air quality management plans designed to bring an air basin into compliance for nonattainment criteria pollutants. Those plans are submitted to the CARB for approval and usually contain an emissions inventory and a list of rules proposed for adoption. The project would not preempt or supersede the authority of local agencies to prohibit, restrict, or control air pollutant sources subject to those agencies' control.

Some California counties, including Madera, Glenn, and Kings Counties, possess General Plans that include a Dairy Element, which provides guidance and policies regarding the management existing and new dairies within the counties. Such guidance includes buffer zones between dairies and sensitive receptors, and policies addressing air quality issues from dairies. However, no local ordinances have been identified that specifically relate to the operation of dairy digesters or co-digester facilities.

Although dairies are found throughout the Region 5 geographic area, most dairies are located within the eight San Joaquin Valley counties (San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, Kings, western portion of Kern). These counties are all located within the geographic area of the SJVAPCD. Within the remaining portions of Region 5 are many additional counties and several air districts; it is expected that the other air districts will follow the lead of the SJVAPCD for air quality permits for dairy manure digester facilities.

6.2 Impacts and Mitigation Measures

Approach and Methods

Criteria Pollutants

Construction of dairy digester and co-digester facilities would produce emissions of PM₁₀ and PM_{2.5} from fugitive dust primarily during earthmoving activities, as well as construction equipment and haul truck exhaust emissions of ROG, NO_x, PM₁₀, PM_{2.5}, and CO. Implementation of standard best management practices would reduce the potential for air quality violations from construction of digester facilities. This impact is discussed and mitigation measures are identified below in Impact 6.1.

In regards to operational criteria air pollutant emissions, additional sources and emissions would include any additional diesel equipment on-site for pre-processing, increased truck traffic on the local roadway network, and the post processing of the biogas. The potential NO_x emissions that could result from the combustion of the biogas on-site to produce electricity are an important issue and are analyzed below. This impact is discussed and mitigation measures are identified below in Impact 6.2.

The Urban Emissions model (URBEMIS 2007), version 9.2.4, was used to quantify direct emissions of criteria pollutants from digester construction and operations, including off-road equipment and fugitive dust emissions during construction activities and on-road vehicle pollutant emissions during operations. Cumulative criteria pollutant impacts are discussed in Impact 6.6. Additional information and model results are presented in Appendix AQ.

Odors

Due to the transport, storage, and pre-processing activities of the odiferous cow manure and other organic substrates for potential co-digestion, the siting of these digester facilities, in particular centralized facilities not located on dairies, could lead to objectionable odors at off-site receptors in the vicinity. This impact is discussed and mitigation measures are identified below in Impact 6.3.

Toxic Air Contaminants

Since accurate quantification of health risks requires detailed site specific information which is not available on a programmatic level, health risk impacts are discussed qualitatively below in Impact 6.4. This includes a description of general methodology, risk models, TAC sources, and potential mitigation measures.

Greenhouse Gases

The development of dairy digester and co-digestion facilities could result in changes in (temporary, short-term) and operation-related (long-term) emissions of GHGs. This Program EIR does discuss, for consideration by decision makers, estimated GHG emissions associated with dairy digester and co-digester facilities, as well as the potential direct and indirect reduction in GHGs from digester operations.

As discussed above, at this time there are no adopted quantitative statewide guidelines for GHG emission impacts. In the interim, local agencies must develop methods to analyze the impact of GHG in CEQA review documents. This Program would be considered to have a significant impact if it would be in conflict with the AB 32 State goals for reducing GHG emissions. It is assumed that AB 32 will be successful in reducing GHG emissions and reducing the cumulative GHG emissions statewide by 2020. It is important that the State has taken these measures, because no project individually could have a major impact (either positively or negatively) on the global concentration of GHG. Therefore, the project has been reviewed to determine whether it would conflict with the goals of AB 32.

GHG emissions associated with the dairy digester and co-digester facilities were calculated using the URBEMIS 2007 Version 9.2.4 model based on the projected equipment and traffic information contained in Chapter 3 (Program Description). In addition, methane capture and electricity generation information provided by the USEPA AgSTAR program (USEPA, 2010) was averaged for all California dairy digester and co-digester facilities and applied to the Program EIR based on the projected number of digesters that could be developed by the year 2020 in Region 5. This data was used to determine the annual metric tons of CO₂e that would be displaced through dairy digester operations. This impact is discussed below in Impact 6.5. Additional information and model results are presented in Appendix AQ.

Thresholds of Significance

CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions of the area affected by the project. According to Appendix G of the CEQA Guidelines, a project would have a significant effect on air quality or associated with GHG if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any nonattainment pollutant (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors affecting a substantial number of people;
- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG.

The following discussion of environmental impacts is limited to those potential impacts that could result in some level of potentially significant environmental change, as defined by CEQA. However, consistent with the CEQA Guidelines for a program-level EIR (CEQA Guidelines §15168), the Central Valley Water Board is preparing this EIR to address the environmental impacts of the

Central Valley Water Board's decision to implement a waste discharge regulatory program. Following this approach for large scale programs, as individual dairy digester and co-digester facilities are proposed, the lead agency will examine these individual projects to determine whether their construction and operational effects were fully analyzed in this Program EIR. It is possible that future review of these individual dairy digester and co-digester facilities may require an air quality study that could include further modeling (e.g., AERMOD) or analysis of these particular air quality impacts on a project-by-project basis.

Finally, as described above, it is expected that the other air districts will follow the lead of the SJVAPCD for air quality permits. Thus, the analyses below follow the methodology and threshold recommendations outlined by the SJVAPCD specifically (SJVAPCD, 2010), and implements mitigation measures more generally to account for the varied air district requirements.

Impact 6.1: Construction of dairy digester and co-digester facilities within Region 5 would generate short-term emissions of criteria air pollutants: ROG, NO_x, CO, SO₂, PM₁₀, and PM_{2.5} that could contribute to existing nonattainment conditions and further degrade air quality. (Significant)

Construction related emissions for dairy digesters would arise from a variety of activities, including: (1) grading, excavation, road building, and other earth moving activities; (2) travel by construction equipment and employee vehicles, especially on unpaved surfaces; (3) exhaust from construction equipment; (4) architectural coatings; and (5) asphalt paving.

Construction-related fugitive dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and the weather. In the absence of mitigation, construction activities may result in significant quantities of dust, and as a result, local visibility and PM₁₀ concentrations may be adversely affected on a temporary and intermittent basis during construction. In addition, the fugitive dust generated by construction would include not only PM₁₀, but also larger particles, which would fall out of the atmosphere within several hundred feet of the site and could result in nuisance-type impacts. For digester facilities in the SJVAPCD jurisdiction, the construction contractor must comply with SJVAPCD Regulation VIII (Fugitive PM₁₀ Prohibition) by law, which includes measures for fugitive dust control.

Construction equipment and construction-worker commute vehicles would also generate criteria air pollutant emissions. Criteria pollutant emissions of ROG and NO_x from these emissions sources would incrementally add to regional atmospheric loading of ozone precursors during the construction period. Construction emissions for an individual dairy digester (assuming construction would disturb four acres and would take a full year) were modeled using URBEMIS 2007 and are depicted below in **Table 6-5**. Phases of construction, duration, and additional assumptions are provided in Appendix AQ.

**TABLE 6-5
INDIVIDUAL DIGESTER CONSTRUCTION UNMITIGATED EMISSIONS (TONS PER YEAR)**

Pollutant	SJVAPCD Thresholds (tons/yr)	Unmitigated Project Construction Emissions (tons/yr) ¹ Year 2011	
ROG	10		1
NO _x	10		3
PM10	15	Fugitive Dust	1
		Exhaust	<1
		Total	1
PM2.5	NA	Fugitive Dust	<1
		Exhaust	<1
		Total	<1
SO ₂	NA		0
CO	NA		2

1. Emission factors were generated by the URBEMIS 2007 model for the SJVAPCD jurisdiction. Heavy duty equipment is based on the URBEMIS defaults assuming that a total of four acres would be disturbed, with one acre disturbed daily. Additional information and model results are provided in Appendix AQ.

Bold values are in excess of applicable standard. The SJVAPCD does not have established thresholds for construction emissions. However, the SJVAPCD recommended that the following thresholds be applied (SJVAPCD, 2010): 10 tons per year for ROG and NO_x, 15 tons per year for PM10. CO, SO₂ and PM2.5 do not have an established emissions threshold of significance.

As depicted in **Table 6-5** above, the construction of a single dairy digester is not anticipated to exceed the SJVAPCD thresholds of significance in most cases. However, due to the uncertainties regarding size of potential central facilities, or whether new lagoons would be developed for anaerobic digestion, dairy digester construction activities are considered potentially significant without mitigation.

Mitigation Measures

Measure 6.1a: Applicants shall prepare and submit an Air Quality Technical Report as part of the environmental assessments for the development of future dairy digester or co-digester facilities on a specific project-by-project basis. The technical report shall include an analysis of potential air quality impacts (including a screening level analysis to determine if construction and operation related criteria air pollutant emissions would exceed applicable air district thresholds, as well as any health risk associated with TACs from all dairy digester or co-digester facility sources) and reduction measures as necessary associated with digester developments through the environmental review process. Preparation of the technical report should be coordinated with the appropriate air district and shall identify compliance with all applicable New Source Review and Best Available Control Technology (BACT) requirements. The technical report shall identify all project emissions from permitted (stationary) and non-permitted (mobile and area) sources and mitigation measures (as appropriate) designed to reduce significant emissions to below the applicable air district thresholds of significance, and if these thresholds cannot be met with mitigation, then the individual digester project could require additional CEQA review or additional mitigation measures.

Measure 6.1b: Applicants shall require construction contractors and system operators to implement the following Best Management Practices (BMPs) as applicable during construction and operations:

- Facilities shall be required to comply with the rules and regulations from the applicable AQMD or APCD. For example, development of dairy digester and co-digester facilities in the SJVAPCD jurisdiction shall comply with the applicable requirements of Regulation VIII (Fugitive PM10 Prohibitions) and Rule 9510 (Indirect Source Review).
- Use equipment meeting, at a minimum, Tier II emission standards, as set forth in §2423 of Title 13 of the California Code of Regulations, and Part 89 of Title 40 Code of Federal Regulations.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes (as required by the state airborne toxics control measure [Title 13, §2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site.
- Comply with state regulations to minimize truck idling.
- Maintain all equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated.
- Use electric equipment when possible.
- Payment into an AQMD or APCD operated Voluntary Emission Reduction Agreement (VERA).
- Incorporate fuel cells where feasible as an alternative to internal combustion engines, which generate NOx emissions, to generate energy from the biogas produced at dairy digester and co-digester facilities.
- Where feasible as an alternative to internal combustion engines, which generate NOx emissions, use biogas from dairy manure digester and co-digester projects as a transportation fuel (compressed biomethane) or inject biomethane into the utility gas pipeline system.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measures 6.1a and 6.1b would ensure that BMPs are followed during construction activities and that construction emissions for digester development to be built under this Program EIR would be reduced to a less-than-significant level.

Impact 6.2: Pre-processing, digestion, and post-processing operational activities of dairy digester and co-digester facilities in Region 5 would result in emissions of criteria air pollutants at levels that could substantially contribute to a potential violation of applicable air quality standards or to nonattainment conditions. (Significant)

Emissions associated with dairy digester operations would depend on several factors, such as the size and type of facility (i.e., digesters on individual dairies versus centralized locations), any equipment needed for pre-processing manure/co-substrate, the increased truck traffic on the local roadway network (including haul trucks for co-digester facilities and for potential waste or biogas transport to centralized facilities), and the post processing of the biogas (e.g., flaring of excess biogas, combusting for electricity, or cleaning up biogas for use as a transportation fuel or

injection to utility transmission lines). Operational sources of fugitive dust would primarily be equipment and truck movement over paved and unpaved surfaces. Sources of fugitive dust at digester facilities in the SJVAPCD jurisdiction must comply with SJVAPCD Regulation VIII (Fugitive PM10 Prohibition) by law unless specifically exempted, which includes measures for fugitive dust control. Other air districts have similar fugitive dust control regulations.

In order to quantify potential operational emissions for a single dairy digester, information was incorporated from several sources. In regards to truck and employee trips, estimates detailed in the *Microgy Pipeline Project for Cloverdale, Hollandia, and Wreden Dairies IS/MND* (SJVAPCD, 2008), which assumed that 6 trucks per day would be needed to haul co-digestion organic substrates to the three dairies (or 2 trucks per dairy digester facility), and that two employees would routinely monitor the digesters and central gas conditioning facility, were assumed for this analysis as well. For the on-site equipment, it was assumed that one loader would operate two hours per day, seven days per week to handle any material handling needs (ESA, 2010). Since NO_x and SO_x production from biogas combustion is the primary concern of the SJVAPCD, these emissions were back-calculated using the SJVAPCD BACT standards and an average digester energy capacity of 261 kilowatts (USEPA, 2010), which is based on the installed energy capacity category for California dairy digester and co-digester facilities that combust the biogas for electricity and co-generation. Using the above assumptions, with more information included in Appendix AQ, operational emissions for an individual digester are presented in **Table 6-6** below.

**TABLE 6-6
INDIVIDUAL DIGESTER OPERATION UNMITIGATED EMISSIONS (TONS PER YEAR)**

Pollutant	SJVAPCD Thresholds (tons/year)	Year 2012 Unmitigated Operation Emissions (tons/year)			
		Vehicle and Equipment Emissions ¹	Biogas Combustion Emissions ²	Net VOCs Emitted Without Digester ³	Total Net Emissions
ROG	10	0.1	0.7	(0.8)	0
NO _x	10	0.5	0.5	0	1.0
PM10	15	3.7	0.3	0	4.0
PM2.5	NA	0.8	0.3	0	1.1
SO ₂	NA	0	0.2	0	0.2
CO	NA	0.5	8.4	0	8.9

1. On-road vehicle and off-road equipment emissions were estimated using URBEMIS 2007. Assumes two heavy truck and two employee trips per day, with a one-way trip length of 20 miles. See Appendix AQ for more details.
2. Biogas combustion emissions are based on BACT standards provided by the SJVAPCD (Norman, 2010) and assumes that the dairy digester and co-digester facilities will comply with these standards. Also of note, BACT is typically not required for CO emissions, but is included for disclosure purposes.
3. The VOCs emitted without a dairy digester is based on the SJVAPCD proposed VOC emission factor of 1.3 lbs per head per year from lagoons and assuming that the digester would reduce emissions by 60 percent (Norman, 2010). The average head of cows that feed the digesters at existing California dairies is 1,983 cows (USEPA, 2010). This average was used to determine the proportion of VOCs that would have been emitted to the atmosphere without the digester. This value in (parentheses) was then subtracted from the emissions total.

Bold values are in excess of applicable standard. The SJVAPCD recommended that the following thresholds be applied (SJVAPCD, 2010): 10 tons per year for ROG and NO_x, 15 tons per year for PM10. CO, SO₂ and PM2.5 do not have an established emissions threshold of significance.

As depicted in **Table 6-6** above, the operation of a single dairy digester is not anticipated to exceed the SJVAPCD thresholds of significance in most cases. However, due to uncertainties in the assumptions, such as biogas combustion engine size, and traffic and equipment requirements of

potential central facilities, dairy digester operational activities are considered potentially significant without mitigation. Mitigation measures have been incorporated below to determine if emissions would be significant on a project specific level and control strategies to reduce these emissions.

Mitigation Measure

Measure 6.2: Implement Mitigation Measures 6.1a and 6.1b.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measures 6.1a and 6.1b would ensure that BMPs are followed during operations and that emissions from digester operations to be built under this Program EIR would be reduced to a less-than-significant level.

Impact 6.3: Operation of dairy digester and co-digester facilities in Region 5 could create objectionable odors affecting a substantial number of people. (Significant)

Although odors from raising livestock are exempt from direct regulation by the local air quality jurisdiction under California state law (CHSC 41705[a]), odor can still be considered a perceived nuisance and an environmental impact. Factors that affect odor impacts include the proposed dairy digester design and exposure duration. Typical manure management operations at dairies include collection, treatment, storage, and reuse of the manure. Manure management at dairies without incorporation of digester facilities typically flush or scrape manure into on-site storage ponds or stockpiles, respectively, or a combination of these techniques are used. Manure in storage ponds and stockpiles would naturally undergo anaerobic decomposition, and as a result, odorous compounds, such as ammonia and H₂S, could be released into the environment, especially when the surface layer of the manure is agitated. However, in the operation of dairy digester and co-digester facilities, the manure would be flushed, scraped, or transported into the digester, which would limit its open air degradation. Operation of dairy digester and co-digester facilities is anticipated to reduce odors currently associated with dairy waste products since anaerobic digestion occurs in a closed system. Volatile organic compounds are broken down through the anaerobic digestion process, and exhaust is generally processed in a more controlled environment.

However, the transport, storage, and pre-processing activities of the odiferous cow manure and other organic substrates for potential co-digestion could produce nuisance odors at digesters. In addition, the siting of these digester facilities (especially centralized facilities not located on dairies) could lead to objectionable odors at off-site receptors in the vicinity. Several mitigation measures shall be implemented in order to ensure the potential nuisance impact associated with odors would not affect a substantial number of people.

Mitigation Measures

Measure 6.3a: Applicants for the development of digester facilities shall comply with appropriate local land use plans, policies, and regulations, including applicable setbacks and buffer areas from sensitive land uses for potentially odoriferous processes.

Measure 6.3b: Applicants shall implement an Odor Management Plan (OMP) as part of each application submitted to establish digester and co-digester facilities. The OMP will specifically address odor control associated with digester operations and will include:

- A list of potential odor sources.
- Identification and description of the most likely sources of odor.
- Identification of potential, intensity, and frequency of odor from likely sources.
- A list of odor control technologies and management practices that could be implemented to minimize odor releases. These management practices shall include the establishment of the following criteria:
 - Establish time limit for on-site retention of undigested co-substrates (i.e., organic co-substrates must be put into the digester within 48 hours of receipt).
 - Provide negative pressure buildings for indoor unloading. Treat collected foul air in a biofilter or air scrubbing system.
 - Establish contingency plans for operating downtime (e.g., equipment malfunction, power outage).
 - Manage delivery schedule to facilitate prompt handling of odorous co-substrates.
 - Modification options for land application practices if land application of digestate results in unacceptable odor levels.
 - Protocol for monitoring and recording odor events.
 - Protocol for reporting and responding to odor events.

Impact Significance After Mitigation: Less than Significant

Impact 6.4: Construction and operation of dairy digester and co-digester facilities in Region 5 could lead to increases in chronic exposure of sensitive receptors in the vicinity to certain toxic air contaminants from stationary and mobile sources. (Significant)

For construction impacts, emissions of toxics can occur from site preparation and construction activities that are required for dairy digester and co-digester facilities. Large construction projects may last many months and may result in significant levels of DPM emissions and possibly resulting in long-term significant health risks. The nearest sensitive receptors must be included in the modeling analysis to determine worst case impacts from construction activities.

The impacts from operation of a typical digestion facility can be determined by comparing the facility's pre- and post-project emissions. For operations, air toxics emissions could include DPM from trucks that deliver manure and/or co-substrate to the facility, or from trace amounts of air toxics that may be released as fugitives in the anaerobic digester or from the potential combustion or flaring of the biogas. After reviewing Authority to Construct permits for a dairy digester facility in the Central

Valley, including a biogas fired internal combustion engine and biogas flare, the primary air toxics considered include H₂S and ammonia (SJVAPCD, 2007). Additional air toxics that could be generated by the combustion of biogas (either in an engine or flare) include benzene, formaldehyde, and other products of incomplete combustion.

H₂S corrodes engine parts in the combustion chamber and in the exhaust system. Combustion of biogas containing H₂S generates sulfur dioxide, which can react with water to produce sulfuric acid. New facilities should include control technologies that convert the H₂S to sulfur, which is then removed from the gas stream. In addition, ammonia may form in the anaerobic digestion process from nitrogen compounds contained in the manure and organic substrates for co-digestion. This already occurs under existing conditions where anaerobic digestion of manure occurs in ponds and is released to the atmosphere. It is unclear at this stage whether the use of the digesters would result in an increase, decrease, or equal amount of ammonia emissions as compared to existing standard operations. This uncertainty is primarily due to the addition of co-digestion substrates, which add nitrogen to the anaerobic digestion process. However, control of ammonia is not a primary concern for the SJVAPCD because neither California nor USEPA have established Ambient Air Quality Standards for ammonia and ammonia concentrations in the atmosphere are not expected to approach levels that would be toxic. Additionally, the SJVAPCD approach to control ammonia impacts is based on limiting NO_x and SO_x (i.e., via BACT standards) available to generate ammonium particulates, rather than directly limiting ammonia emissions (Gill and Sweet, 2010).

Health impacts from exposure to toxic emissions related to the digester facilities are dependent on the magnitude of concentrations that the public can be exposed to, as well as to the relative toxicities of the individual pollutants released from each type of facility. Exposure levels are determined by carrying out dispersion modeling of estimated toxics emissions from typical proposed facility sources (described above) by using a screening model, such as the EPA model SCREEN3 (EPA, 1995). The SCREEN3 model predicts possible worst-case impacts, by using hypothetical worst-case meteorology. For calculating more accurate impacts at site-specific facilities, the EPA model AERMOD can be used (American Meteorological Society, 2006). AERMOD uses meteorological data that is representative of the site, as well as multiple toxic emission source types, such as point, area, or volume to represent the emission sources.

For a screening analysis, cancer and non-cancer health risks can be calculated by applying algorithms given in the document published by California Office of Environmental Health Hazard Assessment (OEHHA) to calculate health risks (OEHHA, 2003). For more accurate site specific risks, AERMOD can be run in conjunction with the CARB model “Hot Spots Analysis Reporting Program” (HARP) to estimate cancer and non-cancer health risks that the public can be exposed to (CARB, 2009b). HARP uses the same toxicity values as are given in the OEHHA Risk Assessment Guidelines and incorporates multi-pathway uptake factors for the various toxic species to calculate risks.

The estimated cancer risks from digester facility emissions are then compared to the applicable Air District significance thresholds to determine if the impacts from the scenarios evaluated might result in significant impacts to the public. In addition, Hazard Quotients are estimated for non-carcinogens in HARP to determine if the modeled exposure levels exceed established health thresholds,

called Reference Exposure Levels (RELs), to test for significance. The estimated risks for the various digester scenarios can then be used to estimate health risks, and for those scenarios with unacceptable risks, mitigation measures are applied to determine if the projects can achieve acceptable health risks to the public. Due to the unknown site specific exposure and information that is needed to quantify and evaluated health risk associated with dairy digester and co-digester facilities, this impact is considered potentially significant.

Mitigation Measures

Measure 6.4a: Implement Mitigation Measures 6.1a and 6.1b.

Measure 6.4b: Based on the Air Quality Technical Report (specified in Measure 6.1a), if the health risk is determined to be significant on a project-by-project basis with DPM as a major contributor, then the applicants shall either use new diesel engines that are designed to minimize DPM emissions (usually through the use of catalyzed particulate filters in the exhaust) or retrofit older engines with catalyzed particulate filters, which will reduce DPM emissions by 85%.

Measure 6.4c: H₂S contained in the biogas shall be scrubbed.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measures 6.4a, 6.4b, and 6.4c would ensure that BMPs are followed during construction and operations and that TAC emissions from digester operations to be built under this Program EIR would be reduced to a less-than-significant level.

Cumulative Impact 6.5: Construction and operation of dairy digester and co-digester facilities in Region 5 would reduce GHG emissions. (No Impact)

“The most common GHG that results from human activity is carbon dioxide, followed by methane and nitrous oxide” (OPR, 2008). State law defines GHG to also include hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. These latter GHG compounds are usually emitted in industrial processes, and therefore are not applicable to dairy digesters or co-digester facilities. GHG impacts are considered to be exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective (CAPCOA, 2008). The emission estimates presented below include annual CO₂e GHG emissions from off-road equipment, trucks, and workers during construction and operations of cumulative dairy digester and co-digester facilities in Region 5 (assuming 200 new digesters could be developed by the year 2020), as well as the amount of CO₂e reduced by the capture and combustion of methane in biogas and subsequent electricity displacement due to on-site generation. Appendix AQ contains information regarding assumptions and emissions calculations used in this analysis.

Four types of analyses are used to determine whether the project could conflict with the state goals for reducing GHG emissions. The analyses are as follows:

- a. Any potential conflicts with the CARB's 39 recommended actions in the Climate Change Scoping Plan.
- b. The relative size of the potential dairy digester and co-digester facilities. The operational GHG emissions will be compared to the size of major facilities that are required to report GHG emissions (25,000 metric tons/year of CO₂e)¹ to the State. In reaching its goals the CARB will focus upon the largest emitters of GHG emissions. Although this criterion is typically applied on a project-by-project basis, we have included it in this analysis as a quantitative comparison.
- c. The general energy efficiency parameters of dairy digester and co-digester facilities to determine whether its design is inherently energy efficient.
- d. Any potential conflicts with applicable City or County plans, policies, or regulations adopted for the purpose of reducing the emissions of GHGs.

With regard to Criterion A described above, the project does not pose any apparent conflict with the most recent list of the CARB early action strategies (see **Table 6-4**). In fact, an established goal of the project is the furthering of compliance with the GHG reduction measures contained in AB 32, specifically Measures E-3 (achieve a 33% renewables mix by 2020) and RW-3 (high recycling/zero waste). Anaerobic digestion produces biogas which is a renewable energy source (supports Measure E-3) and anaerobic digestion is one of the categories listed under measure RW-3.

Regarding Criterion B, GHG emissions during construction (assuming 20 of the 200 projected digesters would be constructed concurrently during the year) would be approximately 7,146 metric tons CO₂e. This estimate is conservative and was developed since there are no specific construction schedules available at this time (see Impact 6.6 and Appendix AQ for more information). In comparison to the major emitter criterion of 25,000 metric tons/year of CO₂e, the short-term construction emissions would equate to approximately 29 percent of this threshold and would be less than significant in regard to this criterion. In addition, some of these GHGs emitted during construction would be off-set as the digesters start operating (see discussion below). Finally, implementation of the BMPs applicable to construction activities included in Mitigation Measure 6.1b would reduce GHGs associated with dairy digester and co-digestion facility construction.

In regards to operations, as shown in **Table 6-7**, the overall impact of the operation of the assumed dairy digester and co-digestion facilities to be built in the next 10 years would be a net decrease in GHG emissions of 1,650,014 metric tons of CO₂e emissions per year. The majority of this reduction is due to methane capture through the closed system inherent in the dairy digester process, whereas conventional manure storage structures result in large quantities of methane release into the atmosphere from the anaerobic digestion of animal waste. When the captured biogas is combusted, the substantial methane portion is converted to CO₂, which is much less damaging as a GHG than methane (methane has a global warming potential approximately 23 times greater than CO₂). In addition, the analysis assumed that 180 of the assumed digester facilities would burn the biogas on-site to produce electricity (or co-generation), which would displace energy produced from oil, natural gas, or coal.

¹ As noted above the 25,000 metric ton annual limit identifies the large stationary point sources in California that make up approximately 94 percent of the stationary emissions. If the project's total emissions are below this limit, its total emissions are equivalent in size to the smaller projects in California that as a group only make up 6 percent of all stationary emissions. It is assumed that the activities of these smaller projects generally would not conflict with State's ability to reach AB 32 overall goals.

These GHG emission benefits outweigh the increased emissions associated with on-road vehicles and off-road equipment for digester operations. Thus, dairy digester and co-digester facilities to be built under the Program would not exceed the 25,000 metric tons/year CO₂e threshold used to classify major emitters.

**TABLE 6-7
OPERATIONAL GREENHOUSE GAS EMISSIONS**

Sources	Greenhouse Gas Emissions (metric tons/year) CO₂e
On-road Vehicles ¹	10,715
Off-road Equipment ¹	5774
Methane Capture ²	(1,530,752)
Indirect Electricity Displacement ³	(135,751)
Total Net Unmitigated Emissions (metric tons/year)	(1,650,014)

1. Emissions of on-road vehicles and off-road equipment were modeled using URBEMIS 2007. Operational assumptions are described in more detail in Impact 6.6 and Appendix AQ.

2. GHG emission reductions from methane capture is based on the USEPA AgSTAR average for California dairy digester and co-digester facilities (USEPA, 2010) and multiplied by the projected number of dairy digester and co-digester facilities in Region 5 under the Program by year 2020.

3. Indirect electricity was determined based on the average digester energy capacity of 261 kilowatts, which is based on the USEPA AgSTAR installed energy capacity category for California dairy digester and co-digester facilities that combust the biogas for electricity and co-generation (USEPA, 2010) and using the Statewide average lbs/mWh emission factors for CO₂, N₂O, and CH₄ (California Climate Action Registry, 2009).

With respect to GHG analysis Criterion C, biogas generated through the anaerobic digestion process is captured in the digester and can be combusted in a flare, used directly in internal combustion engines to produce electricity and heat, or the biogas can be upgraded to biomethane through the removal of hydrogen sulfide, CO₂, and moisture. Biomethane can be used in place of natural gas for various processes, including use by utility companies if the biomethane is upgraded to utility standards and pumped into a natural gas supply pipeline, as well as for electrical generation, heating, and for natural gas-fueled vehicles. Thus, development of dairy digester and co-digester facilities would result in an inherently efficient and renewable source of energy.

Finally, with regard to Criterion D, dairy digester development and operations would comply with applicable City or County plans, policies, or regulations adopted for the purpose of reducing the emissions of GHGs. As described for Criterion A, the Program would directly support several GHG reduction measures contained in AB 32 (increased renewables mix and high recycling/zero waste), which would also be beneficial in meeting any local jurisdiction reduction goals.

Based upon the analysis of Criteria A, B, C and D presented above, development of dairy digester can co-digester facilities would result in a net decrease in GHG emissions and therefore would not result in a cumulatively considerable increase in GHG emissions and would not impair the State's ability to implement AB 32. This impact would be a beneficial impact.

Mitigation: None required.

Cumulative Impact 6.6: Development of dairy digester and co-digester facilities in Region 5, together with anticipated cumulative development in the area, would contribute to regional criteria pollutants. (Significant)

CEQA requires that the EIR examine cumulative impacts. As discussed in CEQA Guidelines §15130(a)(1), a cumulative impact “consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts.” The analysis of cumulative impacts need not provide the level of detail required of the analysis of impacts from the project itself, but shall “reflect the severity of the impacts and their likelihood of occurrence” (CEQA Guidelines §15130(b)). A cumulative impact occurs when two or more individual effects, considered together, are considerable or would compound or increase other environmental impacts. Cumulative impacts can result from individually minor but collectively significant impacts, meaning that the project’s incremental effects are considerable when viewed in connection with the effects of past, current, and probable future projects. Notably, any project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact.

Cumulative Construction Impacts

Construction equipment and construction-worker commute vehicles would generate criteria air pollutant emissions. Criteria pollutant emissions of ROG and NO_x from these emissions sources would incrementally add to regional atmospheric loading of ozone precursors during the construction period. Construction emissions (assuming 20 of the 200 projected digesters would be constructed within a single year) were scaled based on the individual digester construction scenario (described in Impact 6.1) modeled using URBEMIS 2007 and are depicted below in **Table 6-8**. As shown below, dairy digester construction would be cumulatively significant for ROG, NO_x, and PM10 without mitigation. Mitigation measures have been incorporated below to reduce these emissions. Phases of construction, duration, and additional assumptions are provided in Appendix AQ.

**TABLE 6-8
DIGESTER CUMULATIVE CONSTRUCTION UNMITIGATED EMISSIONS (TONS PER YEAR)**

Pollutant	SJVAPCD Thresholds (tons/yr)	Unmitigated Project Construction Emissions (tons/yr) ^a Year 2011
ROG	10	25
NO _x	10	56
PM10	15	Fugitive Dust 22
		Exhaust 3
		Total 25
PM2.5	NA	Fugitive Dust 5
		Exhaust 3
		Total 8
SO ₂	NA	<1
CO	NA	43

a Emission factors were generated by the URBEMIS 2007 model for the SJVAPCD jurisdiction. Heavy duty equipment is based on the URBEMIS defaults assuming that 20 (of the 200 total projected) digesters could be constructed during the most intense year. Additional information and model results are provided in Appendix AQ.

Bold values are in excess of applicable standard. The SJVAPCD does not have established thresholds for construction emissions. However, the SJVAPCD recommended that the following thresholds be applied (SJVAPCD, 2010): 10 tons per year for ROG and NO_x, 15 tons per year for PM10. CO, SO₂ and PM2.5 do not have an established emissions threshold of significance.

Cumulative Operational Impacts

In order to quantify potential operational emissions for the projected dairy digester and co-digester facilities that could be developed by the year 2020, information was incorporated from the same sources as described above in Impact 6.2. Of the 200 digesters under the cumulative scenario, it was assumed that 180 of the digesters would combust the biogas on-site through a generator or co-digestion and that 10 of the facilities would be centralized, 5 of which were assumed to process biogas piped from digesters at individual dairies and 5 of which would have multiple digesters to process manure that would be piped or trucked from dairies and co-digestion organic substrates that would be trucked to the central facilities. The *Microgy Pipeline Project for Cloverdale, Hollandia, and Wreden Dairies IS/MND* (SJVAPCD, 2008) assumed that 6 trucks per day would be needed to haul co-digestion organic substrates to the dairies (or 2 trucks per dairy digester facility), and that two employees would routinely monitor the central gas conditioning facility and the dairy digesters. Thus, for our analysis, we assumed that 400 trucks per day would haul anaerobic digestion substrate for the cumulative development (i.e., 2 trucks per dairy digester). In addition, it was assumed that 2 employees would be needed for each of the centralized facility operations, or 20 employees total. For the on-site equipment, it was assumed that one loader would operate at each dairy digester facility for two hours per day, seven days per week to handle any material handling needs (ESA, 2010). Finally, NO_x and SO_x emissions were back-calculated using the SJVAPCD BACT standards and an average digester energy capacity of 261 kilowatts. Using the above assumptions, with more information included in Appendix AQ, operational emissions for projected dairy digester and co-digester facilities are presented in **Table 6-9** below.

**TABLE 6-9
CUMULATIVE DIGESTER OPERATION UNMITIGATED EMISSIONS (TONS PER YEAR)**

Pollutant	SJVAPCD Thresholds (tons/year)	Year 2020 Unmitigated Operation Emissions (tons/year)			
		Vehicle and Equipment Emissions ¹	Biogas Combustion Emissions ²	Net VOCs Emitted Without Digester ³	Total Net Emissions
ROG	10	5	122	(155)	(28) ⁴
NO _x	10	42	91	0	133
PM10	15	179	61	0	240
PM2.5	NA	39	60	0	99
SO ₂	NA	<1	37	0	37
CO	NA	44	1,521	0	1,565

1. On-road vehicle and off-road equipment emissions were estimated using URBEMIS 2007. See Appendix AQ for more details.

2. Biogas combustion emissions are based on BACT standards provided by the SJVAPCD (Norman, 2010) and assumes that the dairy digester and co-digester facilities will comply with these standards. The emissions provided in this table assume that 180 of the 200 digesters will combust the biogas for electricity or co-generation. Also of note, BACT is typically not required for CO emissions, but is included for disclosure purposes.

3. The VOCs emitted without a dairy digester is based on the SJVAPCD proposed VOC emission factor of 1.3 lbs per head per year from lagoons and assuming that the digester would reduce emissions by 60 percent (Norman, 2010). The average head of cows that feed the digesters at existing California dairies is 1,983 cows (USEPA, 2010). This average was used to determine the proportion of VOCs that would have been emitted to the atmosphere without the 200 digesters. This value in (parentheses) was then subtracted from the emissions total.

4. This value shows a reduction in VOCs from cumulative digester operations.

Bold values are in excess of applicable standard. The SJVAPCD recommended that the following thresholds be applied (SJVAPCD, 2010): 10 tons per year for ROG and NO_x, 15 tons per year for PM10. CO, SO₂ and PM2.5 do not have an established emissions threshold of significance.

As depicted in **Table 6-9** above, the operation of the projected dairy digester and co-digester facilities in Region 5 would generate cumulatively significant quantities of NO_x and PM₁₀ without mitigation. Mitigation measures have been incorporated below to reduce these emissions.

Mitigation Measure

Measure 6.6: Implement Mitigation Measures 6.1a and 6.1b.

Impact Significance After Mitigation: Significant and Unavoidable

Implementation of the above mitigation measures would ensure that criteria pollutant emissions would be reduced to a less-than-significant level on a project-by-project basis. However, cumulative construction and operation of digesters that are assumed over the next 10 years would generate cumulatively considerable emissions that would remain significant and unavoidable.

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CHAPTER 7

Land Use and Agricultural Resources

7.1 Setting

Environmental Setting

Regional Overview

The Central Valley encompasses approximately 60,000 square miles, and is surrounded by the Sierra Nevada Mountain range to the east, the Coastal and Klamath Mountain ranges on the west, the Oregon border on the north, and the Tehachapi Mountains ranges on the south. The two major river systems in the Central Valley region are the Sacramento River, which drains the northern portion of the valley, and the San Joaquin River that drains the central portion of the valley. Both rivers drain into the Sacramento-San Joaquin Delta. The southern end of the Central Valley includes the Tulare Lake Basin; this area is essentially a closed basin. During periods of exceptional precipitation, surface water can flow from the Tulare Lake Basin to the San Joaquin River.

The following 37 counties fall entirely or at least partially within the jurisdiction of the Central Valley Water Board: Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Sierra, Siskiyou, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Ventura, Yolo and Yuba.

Land Use

The total population of the Central Valley is approximately 7 million people (SWRCB, 2004). Most of that population is concentrated along State Route 99 in areas south of Sacramento and along Interstate 5 and State Route 99 north of Sacramento (DOF, 1998).

Although agriculture is widespread throughout the region, land uses within the project area vary greatly. Rural residential areas can also be found throughout the project area. Furthermore, the project area includes major urban and suburban areas along SR 99 and Interstate 5, including the cities of Redding, Sacramento, Stockton, Modesto, and Fresno. Additionally, the Sierra Nevada foothills located along the eastern side of the project area contains numerous rural communities, forestry, and mining operations. Supporting commercial and industrial land uses are located throughout the project area.

Agriculture

The state of California is by far the most agriculturally productive state in the country, producing over 12 percent of the entire national agricultural output. California grows over half the United States' fruits, nuts, and vegetables and produces more than 400 different crops and commodities. Agricultural uses within the Central Valley region typically consist of row crops, orchards, poultry and dairy operations. According to the California Department of Food and Agriculture, milk and cream products are the highest ranked commodity in the State, generating over \$7 billion dollars in 2007 (CDFA, 2008-2009). The Central Valley is California's most productive agricultural region, with six of the top seven agriculturally producing counties located in the Central Valley. The Central Valley generated over 63 percent of the state's agricultural output in 2007 (Great Valley Center, 2009). Agricultural development in the valley varies from small farms to agricultural enterprises of several thousand acres. There are approximately 1.6 million cows at 1,400 dairies in the jurisdictional boundaries of the Central Valley Region (Region 5). Dairy digester facilities would be expected to be located at dairies or near dairies and accordingly in areas of agricultural land use.

Farmland Quality

Important Farmland

The Farmland Mapping and Monitoring Program of the Department of Conservation has identified and mapped areas important for agricultural uses through the development of Important Farmland Maps (DOC, 2010). Important Farmland Maps integrate resource quality (i.e., soil) and current land use information data. Farmland is designated in one of several categories: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance (if adopted by a county), Grazing Land, Urban and Built-up Land, Other Land, and Water. Land Committed to Nonagricultural Use is an optional designation. Designations are further defined as follows (DOC, 2010):

- ***Prime¹ Farmland:*** Farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- ***Farmland of Statewide Importance:*** Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- ***Unique Farmland:*** Farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.

1 The term 'Prime' as it refers to rating for agricultural use has two meanings in California. The Farmland Mapping and Monitoring Program determines the location and extent of 'Prime Farmland' as described above; while under the state's Williamson Act, land may be enrolled under the 'Prime Agricultural Land' designation if it meets certain economic or production criteria (http://www.conservation.ca.gov/dlrp/fmmp/overview/Pages/prime_farm_land_fmmp.aspx)

- ***Farmland of Local Importance:*** Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee. The definition of Farmland of Local Importance varies from county to county (DOC, 2010). Specific to this project, some counties list Confined Animal Agriculture facilities as part of Farmland of Local Importance separately (DOC, 2009).
- ***Grazing Land:*** Land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The minimum mapping unit for Grazing Land is 40 acres. Due to variations in soil quality, smaller units of Grazing Land may appear within larger irrigated pastures.
- ***Urban and Built-up Land:*** Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.
- ***Other Land:*** Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines, borrow pits; and water bodies smaller than forty acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land. The Rural Mapping Project provides more detail on the distribution of various land uses within the Other Land category in nine counties, including all eight San Joaquin Valley counties. Rural Land categories include, Confined Animal Agriculture, among others (DOC, 2006).
- ***Water:*** Perennial water bodies with an extent of at least 40 acres.
- ***Land Committed to Nonagricultural Use:*** This category was developed in cooperation with local government planning departments and county board of supervisors. Land committed to Nonagricultural Use is defined as existing farmland, grazing land, and vacant areas which have a permanent commitment for development.

Land Capability Classifications

A land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit.

Capability classes are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. Capability subclasses are soil groups within one class, designated by adding a small letter (e, w, s, or c) to the class numeral. Lastly, capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral (1 through 10) to

the subclass symbol. **Table 7-1** provides descriptions of all capability classes, subclasses, and units. Large portions of the Central Valley consist of Class I and Class II soils indicating that the soil has few limitations affecting how it can be used.

**TABLE 7-1
LAND CAPABILITY CLASSIFICATION DEFINITIONS**

Capability Classes	
Class I	Soils have few limitations restricting their use
Class II	Soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices
Class III	Soils have severe limitations that reduce the choice of plants or that require moderate conservation practices, or both
Class IV	Soils have very severe limitations that reduce the choice of plants or that require very careful management, or both
Class V	Soils are not likely to erode but have other limitations, impractical to remove, that limit their use
Class VI	Soils have severe limitations that make them generally unsuitable for cultivation
Class VII	Soils have very severe limitations that make them unsuitable for cultivation
Class VIII	Soil and miscellaneous areas have limitations that nearly preclude their use for commercial crop production
Capability Subclasses	
e	Main hazards is the risk of erosion unless close-growing plant cover is maintained
w	Water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage)
s	The soil is limited mainly because it is shallow, droughty, or stony
c	The chief limitation is climate that is very dry
Capability Units	
0	Indicates limitations caused by stony, cobbly, or gravelly material in the substratum
1	Indicates limitations caused by slope or by an actual or potential erosion hazard
2	Indicates a limitation of wetness caused by poor drainage or flooding
3	Indicates a limitation of slow or very slow permeability in a clayey subsoil or a semiconsolidated substratum
4	Indicates a low available water capacity in sandy or gravelly soils
5	Indicates limitations caused by a fine textured or very fine textured surface layer
6	Indicates limitations caused by salts or alkali
7	Indicates limitations caused by stony, cobbly, or gravelly material in the surface layer
8	Indicates that the soil has a very low or low available water capacity because the root zone generally is less than 40 inches deep over massive bedrock
9	Indicates that limitations caused by very low or low fertility, acidity, or toxicity cannot be overcome by adding normal amounts of fertilizer, lime, or other amendments
10	Indicates that the soil has a high content of organic material, such as peat and muck

SOURCE: USDA NRCS (1998)

Regulatory Setting

Federal

Renewable Energy System and Energy Efficiency Improvements Program

Also known as the 2002 Farm Bill, this program section directs the Secretary of Agriculture to make loan guarantees and grants to farmers, ranchers, and rural small businesses to purchase renewable

energy systems and make energy efficiency improvements. The Secretary of Agriculture delegated the responsibility for this program to the USDA's Rural Development Division.

AgSTAR Program

AgSTAR is an outreach program designed to reduce methane emissions from livestock waste management operations by promoting the use of biogas recovery systems. AgSTAR is a collaborative effort of EPA, US Department of Agriculture, and US Department of Energy. AgSTAR provides an array of information and tools designed to assist producers in the evaluation and implementation these systems, including:

- Conducting farm digester extension events and conferences;
- Providing “How-To” project development tools and industry listings;
- Conducting performance characterizations for digesters and conventional waste management systems;
- Operating a toll free hotline;
- Providing farm recognition for voluntary environmental initiatives;
- Collaborating with federal and State renewable energy, agricultural, and environmental programs.

State

Currently there are no statewide land use regulations pertaining to dairy digester facilities (Sousa, 2010). Dairy digester facilities developed as a result of the project would be located in areas designated and zoned for agricultural uses and would be subject to the land use policies and regulations of the local jurisdiction in which they are located.

California Land Conservation Act of 1965 (Williamson Act)

Under the provisions of §51200, *et seq.* of the California Land Conservation Act, private landowners contract with counties and cities to voluntarily restrict lands to agricultural or compatible open space uses (DOC, 2008). Private lands enrolled in this program are assessed for property taxes based on their actual use, not their potential market value. In 1994, the Williamson Act was amended to include specific language regarding “conditional compatibility” (§51238.1), mining compatibility (§51238.2) and grandfather provisions (§51238.3). Williamson Act lands are located throughout the Central Valley's agricultural regions, generally some distance from urban centers. In 2007, approximately 16.5 million acres of land were under Williamson Act contract statewide, a majority of which was located within the Central Valley (DOC, 2008).

Farmland Mapping and Monitoring Program

The California Department of Conservation, under the Division of Land Resource Protection, administers the Farmland Mapping and Monitoring Program (FMMP). The FMMP monitors the conversion of the state's farmland to and from agricultural use. The map series identifies eight classifications and uses a minimum mapping unit size of 10 acres. The FMMP also produces a biannual report on the amount of land converted from agricultural to non-agricultural use. The

FMMP maintains an inventory of state agricultural land and updates its “Important Farmland Series Maps” every two years.

The FMMP is an informational service only and does not have regulatory jurisdiction over local land use decisions. Three categories of farmland (Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) are considered valuable and any conversion of land within these categories is typically considered to be an adverse impact.

Local

Individual digester projects within the scope of this program could also potentially require approvals or permits from other jurisdictions or agencies; such as individual counties, local air quality management districts, the California Department of Fish and Game, or the U.S. Army Corps of Engineers. As noted above, the Williamson Act is administered at the county level; therefore, permitted uses on Williamson Act lands vary depending on what county the contracted land is in. The waste discharge regulatory program would not preempt or supersede the authority of local agencies to prohibit, restrict, or control land uses subject to those agencies’ control.

County Land Use Regulations and Ordinances

Various cities and counties within the project area contain design and aesthetic regulations relating to agricultural and dairies. Some California counties, including Madera, Glenn, and Kings Counties, possess General Plans that include a Dairy Element, which provides guidance and policies regarding the management and setting of existing and new dairies within the counties. Such guidance includes buffer zones between dairies and sensitive receptors, and policies addressing light and glare issues from dairies. No local ordinances have been identified that specifically relate to the operation of dairy digesters or co-digesters.

7.2 Impacts and Mitigation Measures

Approach and Methods

The analysis presented below evaluates whether the project may conflict with the type and intensities of the existing and planned land uses or result in the conversion of existing agricultural resources in the project area. Potential land use conflicts or incompatibility with adjacent areas are usually the result of other environmental effects, such as the generation of noise, aesthetical impacts, or objectionable odors. Potential land use conflicts to adjacent areas and the potential for the conversion of agricultural land to non-agricultural use resulting from the effects of the project are discussed below. Noise, traffic, air quality (including odor), and public service-related effects of the project to nearby areas are discussed in detail in other relevant chapters of the draft Program EIR. As noted previously, it is anticipated that most dairy digester facilities would be located in areas zoned for agricultural uses. In determining the level of significance, the analysis assumed that the dairy digester and co-digester facilities would comply with relevant federal, State, and local laws, regulations, ordinances and guidance.

Thresholds of Significance

The impact analysis presented below evaluates the potential for the project to adversely affect existing land uses and agricultural resources. Consistent with the CEQA Guidelines, Appendix G, the project may result in significant impacts to land use or agricultural resources if it would:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the General Plan and zoning ordinance) adopted for the purpose of avoiding or mitigating a significant environmental effect;
- Conflict with any applicable habitat conservation plan or natural community conservation plan;
- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to non-agricultural use;
- Conflict with existing zoning for agricultural use or a Williamson Act;
- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code §12220(g), timberland (as defined by Public Resources Code §4526), or timberland zoned Timberland Production (as defined in Government Code §51104(g));
- Result in the loss of forest land or conversion of forest land to non-forest use; or
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural uses.

The following discussion of environmental impacts is limited to those potential impacts that could result in some level of potentially significant environmental change, as defined by CEQA. As discussed in the Initial Study, dairy digester and co-digester facilities would not be located on forest land and the project would not result in the loss of forest land or conversion of forest land to non-forest use; therefore, impacts to forest land are not further evaluated in this EIR.

Impact Analysis

Impact 7.1: The project would not physically divide an established community. (Less than Significant)

Dairy digester facilities do not present a significant threat of physically dividing an established community since they would be located on agricultural lands. It is anticipated that facilities would be fully contained within existing or new dairies or in other areas that are predominately agricultural in nature. If required, gas collection pipelines would be placed underground and would not divide communities except temporarily during construction periods. Therefore, this impact is considered less than significant.

Mitigation: None required.

Impact 7.2: The project would not result in dairy digester and co-digester facilities that could conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect. (Less than Significant)

At the project level, dairy digester facilities would be designed to be consistent with applicable land use plans, policies, and regulations. In general, the facilities would be located on sites zoned for agriculture. Dairy digester facilities would be considered an agricultural use; they support dairies by providing additional benefits from the dairy manure. Under this scenario, dairy manure management is an integral part of the agricultural use of the land and would not result in a significant land use conflicts. The placement of co-digester and central facilities would also be subject to local land use plans and policies and would thus not conflict with them. Based on these factors, the construction of dairy digestion facilities is unlikely to conflict with existing land use policies.

Several counties have adopted ordinances that specify locations and applicable setbacks for land application of effluent and solid digestate. Furthermore, local land use plans designate areas for future growth. As that growth occurs, conflicts may develop between land applications and urbanizing areas. However, the waste discharge regulatory program would not preempt or supersede the authority of local agencies to prohibit, restrict, or control the placement of facilities or the use of effluent or solid digestate subject to those agencies' control. Also, the regulatory program would require the discharger to obtain any necessary local governmental agency permits or authorizations prior to the application of effluent or solid digestate at each application site. Because the regulatory program would not conflict with any local land use plans, policies, or ordinances, this impact is considered less than significant.

Mitigation: None required.

Impact 7.3: Implementation of the project would not conflict with an applicable habitat conservation plan or natural community conservation plan. (Less than Significant)

Major adopted plans in Region 5 include the San Joaquin Multi-species Habitat Conservation and Open Space Plan, Natomas Basin Habitat Conservation Plan (HCP), Kern Water Bank Authority HCP/Natural Communities Conservation Plan and East Contra Costa County HCP. The continuation and expansion of agricultural facilities is provided for in most HCPs. Off-dairy digesters and centralized facilities may trigger the need for compliance measures, including site-specific surveys and payment of fees under adopted plans, but are not likely to conflict with approved plans due to their limited size (site footprint) and need to be placed near active agricultural areas. This impact is therefore considered less than significant.

Mitigation: None required.

Impact 7.4: Implementation of the project could result in the permanent conversion of land designated by the Department of Conservation FMMP as Prime Farmland, Farmland of Statewide Importance or Unique Farmland. (Less than Significant)

It is unknown how much of the land on which dairy digesters would be constructed has been designated as Important Farmland. Typically, dairy digester facilities would be considered an agricultural use; they support dairies by providing additional benefits from the dairy manure. However, there is the potential for some dairy digester centralized facilities to be located off-site of existing dairies on Important Farmland. As described previously in the setting discussion, Important Farmland designated by the Department of Conservation FMMP exists throughout the region. In general, these classifications are used for lands that have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

Construction of central facilities at off-dairy locations may result in the conversion of Important Farmland; however, these facilities would typically be less than 5-acres in size and would therefore result in a minor loss in farmland. Any impacts related to pipeline construction (connecting dairies or dairies to central facilities) would be temporary in nature. Construction of the pipelines would require a temporary easement and may result in the temporary disturbance of land designated as Important Farmland. Because these impacts are temporary in nature and would not result in the permanent conversion of farmland they are considered less than significant. Furthermore, project development activities would emphasize minimizing disturbance to existing agricultural operations and would permit continued agricultural operations surrounding the facilities following project completion. For the reasons listed above, impacts to Important Farmland are considered less than significant.

Although not required, to further reduce the magnitude of this less-than-significant impact, Mitigation Measure 7.4 recommends that dairy digester and co-digester facilities not be sited on Important Farmland.

Mitigation Measure

Measure 7.4: Whenever feasible, off-site project related facilities should not be sited on Important Farmland as defined by the California Department of Conservation's Farmland Mapping and Monitoring Program.

Impact Significance After Mitigation: Less than Significant

Impact 7.5: The project would not result in conflicts with existing zoning for agricultural use or a Williamson Act contract. (Less than Significant)

It is unknown how much of the land on which dairy digesters would be constructed has been zoned for agricultural use or is under a Williamson Act contract. Dairy digester facilities would be considered an agricultural use or use compatible with agriculture and are thus generally considered to be a compatible use with dairies. However, there is the potential for development of some central facilities

to occur at locations off dairies on land zoned for agricultural use or under a Williamson Act contract. As noted above, Williamson Act land is located throughout the Central Valley's agricultural regions, generally some distance from the urban centers. In 2007, approximately 16.5 million acres of land were under Williamson Act contract statewide, a majority of which was located within the Central Valley (DOC, 2008).

The Williamson Act allows county governments to define compatible land uses for contract lands within their jurisdictions, as long as those uses are consistent with the compatibility principles set forth in Government Code, §51238.1. Public agencies acquiring contracted lands for a public use must comply with Government Code §51293. Two criteria must be met when acquiring contracted lands:

- The location is not based primarily on a consideration of the lower cost of acquiring land in an agricultural preserve.
- If the land for any public improvement is agricultural land covered under a Williamson Act contract and there is no other land within or outside the preserve on which it is reasonably feasible to locate the public improvement.

As previously discussed, the Williamson Act is administered at the county level; therefore, permitted uses on Williamson Act lands vary depending on what county the contracted land is in. The waste discharge regulatory program would not preempt or supersede the authority of local agencies to prohibit, restrict, or control land uses subject to those agencies' control; therefore, this impact is considered less than significant.

Mitigation: None required.

Impact 7.6: Implementation of the project would not result in the conversion of farmland to non-agricultural uses. (Less than Significant)

As discussed above, dairy digester and co-digester facilities are considered an agricultural use or a use compatible with agriculture. Therefore, the development of digester facilities would not result in the conversion of farmland to non-agricultural uses. Although there is the potential for development of some central facilities to occur at locations off dairies on land used for agriculture, these facilities would be limited in size and scope and would be used to support existing agricultural operations. Furthermore, these off-site facilities would typically be less than 5-acres in size and would therefore not constitute a significant loss of farmland. For the reasons listed above, this impact is considered less than significant.

Mitigation: None required.

Impact 7.7: Development of dairy digester and co-digester facilities would not result in cumulative land use impacts or cumulative impacts to agricultural resources. (Less than Significant)

As noted above, dairy digester and co-digester facilities would be located on existing dairies and are considered an agricultural use or a use compatible with agriculture. Central facilities could occur at locations off dairies on land used for agriculture, however these facilities would be limited in size and scope and would be used to support existing agricultural operations. Additionally, individual off-dairy centralized facilities would typically be less than 5-acres in size and would therefore not constitute a significant loss of farmland. Furthermore, individual projects within the scope of this program may also require approvals or permits from other jurisdictions or agencies, such as counties, local air quality management districts, California Department of Fish and Game, and/or the U.S. Army Corps of Engineers. These agencies may place additional conditions upon specific dairy digester facilities and/or discharges. Because most facilities would be fully contained within dairies or placed in areas zoned for agricultural use, and because digester facilities would adhere to all applicable local, regional, statewide, and federal plans, policies, and requirements, the project would not result in adverse cumulative land use impacts or cumulative impacts to agricultural resources.

Mitigation: None required.

7.3 References

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CHAPTER 8

Transportation and Traffic

8.1 Setting

Environmental Setting

Regional and Local Roadways

The network of regional and local roadways in the potentially affected areas of the Central Valley Water Board jurisdictional boundaries (Region 5) consists of Interstate freeways (e.g., I-5 that runs north-south on the spine of California), State highways (e.g., State Route 99, which runs parallel to I-5), and numerous local roads that are under the jurisdiction of a particular city or county public works department (see **Figure 8-1**). Local roads provide access to adjacent parcels and also provide a connection between local land uses and major thoroughfares.

Public Transit

Public transit service is provided by various agencies in the study area; for example, the San Joaquin Regional Transit District, Stanislaus Regional Transit, Modesto Area Express, Madera Area Express, Fresno Area Express, and Golden Empire Transit District. Buses serve local and regional needs for public transportation with varying frequencies.

Bikeways/Pedestrian Circulation

The regional network of bicycle facilities includes a variety of Class I (bicycle paths), Class II (bicycle lanes, striped in roads), and Class III (bicycle routes without striping) bikeways within the cities and communities in the study area. Pedestrian facilities consist of sidewalks and intersection crosswalks in built-up areas.

Truck Routes

Cities often develop a truck route plan, which designates truck routes to provide contractors with the preferred travel roadways to and from connecting local roadways. For example, the cities of Stockton, Modesto, Fresno, and Bakersfield have such plans. Typically, counties do not develop a similar system of truck routes for unincorporated areas.

Regulatory Setting

Federal

The Federal Highway Administration (FHWA) oversees the interstate freeway system, but delegates approval authority of federal highway standards to State transportation departments, such as the California Department of Transportation (Caltrans).

State

Caltrans is responsible for planning, designing, constructing, operating, and maintaining all State highway and interstate freeway systems. As a result, any change to the State roadway system requires an encroachment permit from Caltrans. As stated above, the FHWA delegates authority to Caltrans to implement federal highway standards for interstates (e.g., I-5). Caltrans' construction practices require temporary traffic control planning "during any time the normal function of a roadway is suspended". In addition, Caltrans has the discretionary authority to issue special permits for the movement of vehicles/loads exceeding statutory limitations on the size, weight, and loading of vehicles contained in Division 15 of the California Vehicle Code. Requests for such special permits require the completion of an application for a Transportation Permit. The California Highway Patrol is notified about transportation of oversize/overweight loads. In addition to maintaining highways, and general regulations and laws dealing with licensing, traffic signage, and other noncommercial driver requirements, State laws and regulations also govern motor carriers on roadways within the State.

State highway weight and load limitations are specified in the California Vehicle Code, §35550 to 35559. The following general provisions would apply to the project:

- The gross weight imposed upon the highway by the wheels on any axle of a vehicle shall not exceed 20,000 pounds, and the gross weight upon any one wheel, or wheels, supporting one end of an axle, and resting upon the roadway, shall not exceed 10,500 pounds.
- The maximum wheel load is the lesser of the following: (a) the load limit established by the tire manufacturer, or (b) a load of 620 pounds per lateral inch of tire width, as determined by the manufacturer's rated tire width.

For vehicles with trailers or semi-trailer, the following provision applies:

- The gross weight imposed upon the highway by the wheels on any one axle of a vehicle shall not exceed 18,000 pounds, and the gross weight upon any one wheel, or wheels, supporting one end of an axle and resting upon the roadway, shall not exceed 9,500 pounds, except that the gross weight imposed upon the highway by the wheels on any front steering axle of a motor vehicle shall not exceed 12,500 pounds.

These weight and load limitations for State highways would also apply to county or city roadways if no limitations are specified by the local jurisdiction.

The California Vehicle Code also specifies requirements for the safe operation of motor vehicles, especially those motor vehicles used for the transportation of hazardous and explosive materials.

Local Regulations

County and City Land Use Regulations and Ordinances

Local regulations and ordinances vary widely in the project area. Traffic-related policies included in General Plans typically concern traffic resulting from project operation rather than project construction. However, some local jurisdictions incorporate restrictions to their General Plans that pertain to construction activities in or through their jurisdictional areas, such as assigning truck traffic routes, or requiring the development of Traffic Control Plans (TCP). TCP may be required for any project that includes lane closures, partial road closures, and road closures with detours. An encroachment permit generally is required from the responsible jurisdiction for any work to be performed in the roadway right-of-way.

8.2 Impacts and Mitigation Measures

Approach and Methods

This chapter assesses the transportation impacts that could result from the implementation of the proposed regulatory program and subsequent development of dairy manure digester and co-digester facilities in Region 5. As described in Chapter 3, Program Description, development of digesters could take place on individual dairies (i.e., the addition of dairy manure digester or co-digester facilities within the current footprint of individual dairies), or at centralized locations (whereby individual dairies would transport their manure by pipeline or truck to a central facility, or biogas from individual dairies would be piped to a central facility).

Due to the geographic scale of the project area and the range of actions that fall within the scope of development of future dairy digester and co-digester facilities, this impact analysis was conducted at a programmatic level. Assumptions regarding the types of transport and the types of roads used to haul materials were used to assess the overall significance of project impacts. In determining the level of significance, the analysis assumed that the dairy digester facilities would comply with relevant federal, State, and local law, regulations, ordinances and guidance. It is assumed that project-level analysis of transportation-related safety hazards (associated with turning movements by large trucks) would be required for site-specific digester and co-digester facilities as they are designed and constructed.

Thresholds of Significance

CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions of the area affected by the project. An impact related to transportation would be considered significant if it would result in any of the following, which are from Appendix G of the CEQA *Guidelines*:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation

system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

- Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment);
- Result in inadequate emergency access;
- Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Additionally, the Institute of Transportation Engineers recommends the following screening criterion for assessing the effects of development projects that create permanent traffic increases (ITE, 1991):

- In lieu of other locally preferred thresholds, a traffic access/impact study should be conducted whenever a proposed development will generate 100 or more added (new) peak direction trips to or from the site during the adjacent roadway's peak hours or the development's peak hours.

The above criterion is intended to assess the effect of a traffic mix consisting primarily of automobiles and lightweight trucks. To account for the large percentage of heavy trucks associated with the project, the threshold level would reasonably be reduced to 50 new peak-direction trips. Therefore, project-related traffic is considered significant if transporting digestate or other materials to an off-site location would cause a substantial increase in traffic volumes, defined as the generation of 50 or more trips per hour. Trips using private roads within a dairy property or properties are not counted, because this type of travel activity would not affect State, county or other public roadways.

The following discussion of environmental impacts is limited to those potential impacts that could result in some level of potentially significant environmental change, as defined by CEQA. Implementation of the project would not affect air traffic patterns of airports in the project area (bullet 3 above). In addition, implementation of the project would neither directly or indirectly eliminate existing or planned alternative transportation corridors or facilities (e.g., bike paths, lanes, bus turnouts, etc.), include changes in policies or programs that support alternative transportation, nor construct facilities in locations in which future alternative transportation facilities are planned (bullet 6 above). Therefore, no impact would occur under either of these two categories, and these two categories are not discussed further within this section. It is noted, however, that the potential effect of project construction on existing bus transit service in the project area is discussed in Impact 8.1.

Impact 8.1: Construction of dairy digester and co-digester facilities would intermittently and temporarily increase traffic levels and traffic delays due to vehicle trips generated by construction workers and construction vehicles on area roadways. (Significant)

Although the project being evaluated under this Program EIR does not directly include construction of specific facilities, general information about construction is evaluated for facilities that could be developed as a result of the project. The analysis is based on the construction of project facilities as presented in Chapter 3, Program Description. The intensity and nature of the construction activity would vary over the construction period, and the number of vehicle trips generated by that activity would similarly vary. Vehicle trips would be generated primarily by construction workers commuting to and from the facility sites, and by trucks hauling materials and equipment to and from the sites (including delivery of pipe). Based on estimates of manpower per task and the experience of similar construction projects, there would be up to approximately 15 construction workers on an average day.

Construction equipment would be delivered to and removed from each project facility site in phases for site clearing, grading, excavation and foundation work; structure and building construction; interior, mechanical and electrical work; and finally, for road work, utilities and site finishing / landscaping. Earthwork (cut and fill) is expected to be balanced on-site (i.e., any excavated material cut would be used as fill on-site during the construction process), resulting in no off-hauling of cut or fill material, but that assumption will need to be confirmed during site-specific design of each facility.

Construction of pipelines, if proposed, would primarily involve open trenching, with pipelines installed (using a conventional cut-and-cover construction technique) within the existing roadway right-of-way. Jack and bore drilling may also be required for some areas of pipeline installation. The construction corridor for pipeline installation would be approximately 20 feet wide to allow for staging areas and vehicle access, though the width of the trench would be limited to about one to two feet beyond the diameter of the pipe.¹ Depending on the available road width, vehicles traveling past the construction zone could be restricted to alternate one-way traffic flow, controlled by flaggers. On average, 50 to 100 feet of pipeline could be installed per day. Trenches would be temporarily closed at the end of each work day, by covering with steel trench plates and installing barricades to restrict access to staging areas.

The primary off-site impacts resulting from the movement of construction trucks would include a short-term and intermittent lessening of roadway capacities due to the slower movements and larger turning radii of the trucks compared to passenger vehicles. Drivers could experience delays if they were traveling behind a heavy truck. The added traffic would be mostly apparent on the minor roadways serving the facility sites. Although project-related traffic is unlikely to exceed the threshold of significance of 50 or more trips per hour, project-level analysis of site-specific digester and co-digester facilities could determine that addition of project-generated traffic would be considered substantial in relation to traffic flow conditions on local roadways. For this program level analysis, this impact is considered potentially significant.

Mitigation Measure

Measure 8.1: The contractor(s) will obtain any necessary road encroachment permits prior to installation of pipelines within the existing roadway right-of-way. As part of the road

¹ The rule-of-thumb for trench width is multiply the pipe diameter by 1.25, and then add one foot.

encroachment permit process, the contractor(s) will submit a traffic safety / traffic management plan (for work in the public right-of-way) to the agencies having jurisdiction over the affected roads. Elements of the plan will likely include, but are not necessarily limited to, the following:

- Develop circulation and detour plans to minimize impacts to local street circulation. Use haul routes minimizing truck traffic on local roadways to the extent possible. Use flaggers and/or signage to guide vehicles through and/or around the construction zone.
- To the extent feasible, and as needed to avoid adverse impacts on traffic flow, schedule truck trips outside of peak morning and evening commute hours.
- Limit lane closures during peak traffic hours to the extent possible. Restore roads and streets to normal operation by covering trenches with steel plates outside of allowed working hours or when work is not in progress.
- Limit, where possible, the pipeline construction work zone to a width that, at a minimum, maintains alternate one-way traffic flow past the construction zone.
- Install traffic control devices as specified in Caltrans' Manual of Traffic Controls for Construction and Maintenance Work Zones where needed to maintain safe driving conditions. Use flaggers and/or signage to safely direct traffic through construction work zones.
- Coordinate with facility owners or administrators of sensitive land uses such as police and fire stations, hospitals, and schools. Provide advance notification to the facility owner or operator of the timing, location, and duration of construction activities.
- To the maximum extent feasible, maintain access to private driveways located within construction zones.
- Coordinate with the local public transit providers so that bus routes or bus stops in work zones can be temporarily relocated as the service provider deems necessary.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 8.1 would lessen the impacts to traffic flow and congestion on area roadways to a less than significant level by avoiding as needed truck trips during peak commute hours, minimizing use of local roads by haul trucks, and coordinating with emergency service providers, schools, and transit providers.

Impact 8.2: Operations of dairy digester and co-digester facilities would increase traffic volumes on roadways serving the facility sites. (Less than Significant)

The dairy digesters and co-digester facilities would operate 24 hours a day, but most of the digestion process would be automated, and most traffic activities limited to daytime hours. The number of site visitors and employees at dairies is not anticipated to change substantially as a result of additional digester facilities. For dairy digester and co-digester projects at individual dairies, there would be increased truck trips associated with the delivery of feedstocks (in the case of co-digestion) and potentially the shipment of solid digestate. In the case of centralized facilities, there would be new employee trips, and there could be increased truck trips associated with the delivery of manure and co-digestion feedstocks and shipping of end products such as digestate and potentially biogas products.

In regards to truck and employee trips under facility operations, estimates detailed in the *Microgy Pipeline Project for Cloverdale, Hollandia, and Wreden Dairies IS/MND* (SJVAPCD, March 2008), which discussed anaerobic digester development on three dairies in order to centrally collect the biogas and pipe it into the gas network of the Southern California Gas Company, are incorporated by reference as applicable to this Program EIR analysis. Specifically, the Microgy project assumed that six trucks per day would be needed to haul co-digestion organic substrates to the dairies (or two trucks per dairy digester facility), and that two employees would routinely monitor the central gas conditioning facility and the dairy digesters. The number of daily truck trips would be twice the number of trucks per day (i.e., each truck would generate one trip to the facility site and one trip away from the site). Thus, it is assumed that up to 16 daily one-way vehicle trips (trucks and employee vehicles) would be generated on the roadway(s) that would access each facility. The project-related traffic would not exceed the threshold of significance of 50 or more trips per hour (and the vehicle trips would occur over the course of a day), and this impact would be less than significant.

Mitigation: None required.

Impact 8.3: Construction and operation of dairy digester and co-digester facilities could potentially cause traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways, and could increase traffic hazards due to possible road wear or to accident spills of manure, or co-digestion feedstocks or digestate. (Significant)

Neither project construction nor project operations would alter the physical configuration of the existing roadway network serving the area, and would not introduce unsafe design features, but trucks generated by the project would interact with other vehicles on project area roadways. Creation of a construction work zone on high-volume roadways would potentially create traffic safety hazards where traffic is routed into the travel lane adjacent to the work zone. Potential conflicts could also occur between construction traffic and bicyclists and pedestrians. For this program level analysis, this impact is considered potentially significant.

In addition, construction activity along roads as well as heavy truck traffic delivering equipment and materials to facilities sites could result in road wear and damage that result in a driving safety hazard. The degree to which this impact would occur depends on the existing roadway design (pavement type and thickness) and existing condition of the road. Freeways, major arterials and collectors are designed to accommodate a mix of vehicle types, including heavy trucks. The project's impacts are expected to be negligible on those roads. However, rural roadways may not have been constructed to support the weight and use of large construction equipment. For this program level analysis, this impact is considered potentially significant.

The accidental spill of digestate along project-related access roads could create potential safety hazards for other motorists. However, a Spill Prevention Plan must be submitted with the NOI, and each truck driver is required to know how to carry out the emergency measures described in the Spill Prevention Plan (therefore reducing roadway hazards if an accidental spill were to

occur). Because of the low probability of accidental spills during the transport of digestate, this impact is considered less than significant.

Mitigation Measures

Measure 8.3a: Implement Measure 8.1, which stipulates actions required of the contractor(s) to reduce potential traffic safety impacts to a less-than-significant level.

Measure 8.3b: Prior to construction, the contractor(s), in cooperation with the agencies having jurisdiction over the affected roadways, will survey and describe the pre-construction roadway conditions on rural roadways and residential streets. Within 30 days after construction is completed, the affected agencies will survey these same roadways and residential streets in order to identify any damage that has occurred. Roads damaged by construction will be repaired to a structural condition equal to the condition that existed prior to construction activity.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measures 8.1 and 8.3b would lessen the impacts to traffic safety on area roadways to a less than significant level by using traffic control devices to safely direct vehicular movements through the construction area, and by repairing damage to roadway pavement caused by project-generated heavy trucks, as well as by avoiding as needed truck trips during peak commute hours, minimizing use of local roads by haul trucks, and coordinating with emergency service providers, schools, and transit providers.

Impact 8.4: Construction of dairy digester and co-digester facilities could intermittently and temporarily impede access to local streets or adjacent uses (including access for emergency vehicles), as well as disruption to bicycle/pedestrian access and circulation. (Significant)

Operations of dairy digester and co-digestion facilities would have no effect on access to local streets or adjacent uses (including access for emergency vehicles). Nor would bicycle/pedestrian access and circulation be adversely affected by facility operations. The project could, however, result in construction of new pipelines within right-of-way of the public roadways. Such construction activity could result in road restrictions that affect the vehicle travel lanes in order to provide adequate construction work area, and could temporarily block vehicle, bicycle and pedestrian access to local streets or property driveways, including access for emergency vehicles. For this program level analysis, this impact is considered potentially significant.

Mitigation Measures

Measure 8.4: Implement Measure 8.1, which stipulates actions required of the contractor(s) to reduce potential access impacts to a less-than-significant level.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 8.1 would lessen the impacts to access to local streets or adjacent uses to a less than significant level by coordinating with emergency service providers, including advance notification of the timing, location, and duration of construction activities.

Impact 8.5: Construction and operation of dairy digester and co-digester facilities could contribute to cumulative impacts to traffic and transportation (traffic congestion, traffic safety, and emergency vehicle access). (Significant)

The geographic scope of potential cumulative traffic impacts includes access routes to regional and local roadways used for haul routes and construction equipment/vehicle access throughout the project area. As described under Impact 8.2, operating the facilities associated with the project would generate less-than-substantial increases in traffic volumes on area roadways. Cumulatively (using the same trip generation assumptions applied under Impact 8.2), it is assumed that a total of about 800 one-way truck trips would be generated per day for the up to 200 dairy digester facilities, and a total of 400 employees would be needed for the dairy digester facilities. Given the dispersion of those additional vehicle trips over the Region 5 area, and the fact that the trips would occur over the course of a day, the project-related traffic on any one roadway during any hour of the day would not exceed the threshold of significance of 50 or more trips per hour, and the contribution to cumulative traffic conditions would be less than significant.

However, constructing those facilities, also described above, could result in intermittent and temporary traffic-related impacts in the cumulative context. Traffic impacts include temporary increases in traffic congestion, increased potential for traffic safety hazards, and temporary and intermittent impedances to access.

The project has the potential to contribute to potentially significant cumulative construction-related impacts as a result of (1) cumulative projects (such as land development projects) that generate increased traffic at the same time on the same roads as would the proposed project, causing increased congestion and delays; and (2) infrastructure projects in roads that would be used by project construction workers and trucks, which could affect detour routes around project work zones or could delay project-generated vehicles past the work zones of those other projects.

Implementation of circulation and detour plans, installing traffic control devices, and scheduling (to the extent feasible) truck trips outside of peak morning and evening commute hours (as identified in Mitigation Measures 8-1 and 8-3b) would reduce the project's contribution to the cumulative impacts. However, some traffic disruption and increased delays would still occur during project construction, even with mitigation. Given the lack of certainty about the timing (and identification) of development of dairy digester and co-digester facilities, as well as that for other projects (specifically what projects would overlap), it is prudent to conclude for this program-level analysis that significant cumulative traffic and circulation impacts could occur.

Mitigation Measures

Measure 8.5a: Prior to construction, the project sponsor will coordinate with the appropriate local government departments, Caltrans, and utility districts and agencies regarding the timing of construction projects that would occur near project sites. Specific measures to mitigate potential significant impacts will be determined as part of the interagency coordination, and could include measures such as employing flaggers during key construction periods, designating alternate haul routes, and providing more outreach and community noticing.

Measure 8.5b: Implement Mitigation Measures 8.1 and 8.3b.

Impact Significance After Mitigation: Less than Significant.

Implementation of Mitigation Measure 8.5 would lessen the cumulative impacts to a less than significant level by coordinating mitigating strategies among the concurrent projects.

8.3 References

Institute of Transportation Engineers (ITE), 1991. *Traffic Access and Impact Studies for Site Development – A Recommended Practice*.

San Joaquin Valley Unified Air Pollution Control District, 2008. *Microgy Pipeline Project for Cloverdale, Hollandia and Wreden Dairies Initial Study and Mitigated Negative Declaration*, March 5, 2008.

CHAPTER 9

Biological Resources

9.1 Setting

Environmental Setting

A great diversity of vegetation and wildlife resources exist in the project area, the jurisdictional boundaries of the Central Valley Region (Region 5), across a broad range of physiographic regions. While most of this region lies within the Great Central Valley, the project area also includes portions of foothills and mountains of the Cascade, Sierra Nevada, and Klamath Ranges. The area can be further subdivided into many habitats, defined by the plant communities present and their associated wildlife species. Habitat types within the project area include annual grassland, chaparral, riparian, oak woodland, and hardwood forests, and more human-influenced habitats such as agricultural land, pastureland, and urban areas.

The varied habitat types within the project area are conducive to a variety of plant and animal species, many of which are endemic to the state. As a consequence of habitat conversion to agriculture and urban development as well as other factors, many of these species have become rare, threatened, or endangered. For example, in the project area, 69 plant species have been State or federally listed as endangered or threatened under the California Endangered Species Act of 1984 and/or the Federal Endangered Species Act of 1973; or State listed as rare under the Native Plant Protection Act of 1977 (CDFG, 2010a). Additionally, 60 species of animals have been State or federally listed as threatened or endangered in the project area (CDFG, 2010b). Many others are considered special-status species by local, State, and federal agencies.

This analysis focuses on the habitat types and resources that could be affected by the project. While the project area supports a wide variety of plant and animal species, the majority of the habitats that could be affected by the project have been altered in the past to support agricultural activities and urban development. Most of the areas where dairy digester and co-digester facilities would be constructed, and where discharges would occur are in active agricultural production; however, some relatively undisturbed terrestrial habitats could potentially also be affected, such as annual grasslands, seasonal wetlands, and vernal pools, although project planning and siting should be used to select locations where impacts to biological resources would be avoided. In addition, riparian areas and aquatic habitats (primarily agricultural ditches, streams, and freshwater marsh) could be indirectly affected by proposed discharges to agricultural lands. Each of these habitat types is discussed in greater detail below, and summarized in Table 9-1.

**TABLE 9-1
POTENTIALLY AFFECTED HABITATS**

Habitats/ Description	Common Wildlife Species	Special-status Species
Agricultural		
Cropland and pasture, includes row crops, hay and grain crops, and irrigated pasture	red-winged black bird, Brewer's blackbird, mourning dove, American crow, scrub jay, northern flicker, American robin, killdeer, white-faced ibis, red-tailed hawk, northern harrier, California vole, Botta's pocket gopher, California ground squirrel, deer mouse, black-tailed hare, raccoon, and coyote.	white-tailed kite, Swainson's hawk, San Joaquin kit fox, kangaroo rats.
Annual Grassland		
Open stand of grasses primarily on flat plains to gently rolling foothills, ridges, and south-facing slopes.	Western toad, gopher snake, northern harrier, killdeer, western kingbird, loggerhead shrike, savannah sparrow, pocket gopher, American badger, and coyote	California tiger salamander (upland habitat), Swainson's hawk, San Joaquin kit fox, kangaroo rats.
Seasonal Wetlands		
Areas that pond or remain flooded for a portion of the year.	valley garter snake, Sierran treefrog, black phoebe, house sparrow, red-winged blackbird, killdeer, and northern mockingbird	Orcutt grasses, vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander
Vernal Pools		
Shallow depressional features that store water seasonally and support unique plant and wildlife species.	Same species found in seasonal wetlands	Orcutt grasses, vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander
Freshwater Marsh		
Areas with extended periods of inundation, that support erect, rooted herbaceous plants that are hydrophytic and can withstand the anaerobic soil conditions.	herons and egrets, muskrats, raccoon, red-winged blackbirds, and a wide variety of waterfowl	giant garter snake, northern harrier, tricolor blackbird, Sanford's arrowhead, and rose mallow.
Irrigation Ditches		
Incised channels used to convey irrigation water to and from agricultural lands.	Same species found in agricultural and freshwater marsh habitats	giant garter snake
Intermittent/Perennial Streams		
Natural drainage features in the project area; most have been modified for flood control and/or irrigation purposes.	freshwater clams, crayfish, catfish, trout, striped bass, largemouth bass, sunfish, and crappie.	steelhead, salmon

SOURCE: ESA, 2010

Agricultural

Agricultural activities include soil cultivation for crop production and raising livestock. Agricultural activities usually take place on flat to gently rolling terrain, primarily in the Central Valley and the Modoc Plateau. Habitat types on agricultural lands where dairy digester and co-digester facilities could be constructed and where land discharges could occur include cropland and pasture, and other disturbed portions of dairies.

Croplands typically comprise row crops, hay, or grains planted in monocultures. Natural vegetation and weeds are generally eliminated by flood irrigation, tillage, and herbicide application, however integrated pest management (IPM) practices also include planting hedgerows of native vegetation

to attract beneficial insects to control pest outbreaks. Pasture consists of perennial grasses and legumes planted for livestock forage, although the vegetation also could include native grasses and forbs and weedy non-natives. Pastures are managed to improve forage quality using irrigation, fertilizer application, and weed control. Habitats that are commonly found adjacent to agricultural lands include irrigation ditches, annual grasslands, seasonal wetlands, riparian woodlands, and freshwater marsh.

Although natural communities provide the highest value for wildlife, many of these natural habitats have been replaced by agricultural habitats throughout California with varying benefits to wildlife. The intensive management of agricultural lands, including disking, grazing, crop rotation, and the use of chemicals, further reduces the value of agricultural lands for wildlife. In spite of intensive management, however, some wildlife species have adapted to particular crop types and now use them for foraging and nesting/reproduction.

Compared to other agricultural crops, rice and grain are considered high-value crops for wildlife because many species forage on waste grain, and flooded rice fields provide habitat similar to freshwater marsh. Pasture also provides abundant forage and cover. Compared to rice and grains, row crops provide moderate-quality habitat because they provide only limited cover and foraging opportunities. Cotton crops provide low-quality wildlife habitat because they are frequently disturbed and require many applications of herbicides, resulting in limited foraging and nesting opportunities and lack of cover.

Common wildlife that could use agricultural areas include: red-winged black bird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), scrub jay (*Aphelocoma californica*), northern flicker (*Colaptes auratus*), American robin (*Turdus migratorius*), killdeer (*Charadrius vociferous*), white-faced ibis (*Plegadis chihi*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), California vole (*Microtus californicus*), Botta's pocket gopher (*Thomomys bottae*), California ground squirrel (*Spermophilus beecheyi*), deer mouse (*Peromyscus maniculatus*), black-tailed hare (*Lepus californicus*), raccoon (*Procyon lotor*), and coyote (*Canis latrans*). Special-status species associated with agricultural lands include Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus*), burrowing owl (*Athene cunicularia*) and San Joaquin kit fox (*Vulpes macrotis*).

Annual Grassland

Although native perennial grasslands once occupied vast expanses of the project area, these have largely been replaced by non-native annual grassland communities. Annual grasslands are dominated by non-native annual species, including ripgut (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), wild oat (*Avena fatua*), Italian ryegrass (*Lolium multiflorum*), and medusahead (*Taeniatherum caput-medusae*). In addition, a wide variety of native and invasive non-native broad-leaved plants (forbs) occur within the annual grassland community including yellow-star thistle (*Centaurea solstitialis*), coyote bush (*Baccharis pilularis*), black mustard (*Brassica nigra*), bull thistle (*Cirsium vulgare*) and toad rush (*Juncus bufonius*).

Wildlife species occurring in annual grasslands include: California tiger salamander (*Ambystoma californiense*) Pacific gopher snake (*Pituophis catenifer catenifer*), California kingsnake (*Lampropeltis*

getula californiae), valley garter snake (*Thamnophis sirtalis fitchii*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), Gilbert's skink (*Eumeces gilberti*), American crow, red-winged blackbird, Brewer's black bird, western meadowlark (*Sturnella neglecta*), barn swallow (*Hirundo rustica*), red-tailed hawk, red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), barn owl (*Tyto alba*), burrowing owl, deer mice, California vole, blacktail hare, California ground squirrel, coyote, gray fox (*Urocyon cinereoargenteus*), raccoon, striped skunk (*Mephitis mephitis*), and opossum (*Didelphis virginiana*).

Seasonal Wetlands

Seasonal wetlands are ephemeral wetlands that pond or remain flooded for extended periods during a portion of the year, often the wet season, then could dry in spring or early summer. Vegetation found in seasonal wetlands include grasses such as Italian ryegrass (*Lolium multiflorum*), foxtail barley (*Hordeum marinum* ssp. *gussoneanum*), annual air grass (*Deschampsia danthoniodes*), spike rush (*Eleocharis macrostachya*), Pacific foxtail (*Alopecurus saccatus*), and Bermuda grass (*Cynodon dactylon*). Seasonal wetlands could support a diversity of birds, invertebrates, amphibians, and few reptiles which could use the wetland for foraging, cover, and/or breeding. Common wildlife species that could use the seasonal wetlands in the project area include valley garter snake, Sierran treefrog, (*Pseudacris sierra*), black phoebe (*Sayornis nigricans*), house sparrow (*Passer domesticus*), red-winged blackbird, killdeer, and northern mockingbird (*Mimus polyglottos*).

Vernal Pools

Vernal pools are a sub-set of seasonal wetlands that support specialized plants and animals. This community is dominated by native annual species occurring in shallow depressions in open grasslands where water collects and remains on the surface for extended periods during the rainy season. As these depressions dry in the spring, the plants grow and bloom often forming concentric rings of brightly colored flowers. Common species includes coyote thistle (*Eryngium vaseyi*), Fremont's goldfields (*Lasthenia fremontii*), white-head pincushion (*Navarretia leucocephala*), Douglas mesamint (*Pogogyne douglasii*), doublehorn calicoflower (*Downingia bicornuta*), cow's clover (*Trifolium depauperatum*), loosestrife hedge-hyssop (*Lythrum hyssopifolia*), toad rush, ranunculus (*Ranunculus bonariensis*) and hedge hyssop (*Gratiola ebracteata*). Special-status species found in seasonal wetlands and vernal pools include dwarf downingia (*Downingia pusilla*), legenere (*Legenere limosa*), Colusa grass (*Neostapfia colusana*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), and California tiger salamander.

Freshwater Marsh

Freshwater marsh habitat is typically associated with the margins of rivers, streams or ponds, but can form anywhere shallow, slow moving perennial water is present. This habitat is characterized by erect, rooted herbaceous plants that are hydrophytic and can withstand the anaerobic soil conditions created by extended periods of inundation. Vegetation cover is typically continuous and dense. Plant species common to freshwater marsh habitat include cattails (*Typha latifolia*), tule (*Scirpus californicus*), sedges and umbrella sedges, rushes, water primrose (*Ludwigia peploides*), water smartweed (*Polygonum amphibium*), parrot feather (*Myriophyllum aquaticum*), pennyroyal (*Mentha*

pulegium), verbena (*Verbena litoralis*), common yellow monkey flower (*Mimulus guttatus*), and smooth cocklebur (*Xanthium strumarium*). Freshwater marshes provide important breeding and foraging habitat for a wide variety of local wildlife such as herons and egrets, muskrats (*Ondatra zibethicus*), raccoon, red-winged blackbirds, and a wide variety of waterfowl. Special-status species that use freshwater marsh habitats in the project area include giant garter snake (*Thamnophis gigas*), northern harrier (*Circus cyaneus*), tricolor blackbird (*Agelaius tricolor*), Sanford's arrowhead (*Sagittaria sanfordii*), and rose mallow (*Hibiscus lasiocarpus*).

Irrigation Ditches

Irrigation ditches are used to convey water to and from agricultural land for irrigation and discharge of agricultural runoff. Depending on their location and use, these features could be largely maintained to be devoid of vegetation, or if not maintained, they could support freshwater marsh habitat. They would support plant and wildlife species, similar to those in both agricultural habitats and freshwater marsh habitat.

Intermittent/Perennial Streams

Perennial streams in the project area are included in the Sacramento-San Joaquin River drainage, which ultimately empties into San Francisco Bay. This large drainage is isolated by mountains on all sides and supports a variety of aquatic habitat types; consequently, it contains several endemic fish species. Streamflow depends primarily on snowmelt but is moderated by major dams on all large rivers except the Cosumnes River. Flows are greatest in winter and spring and least in summer and fall. Special-status fish species inhabiting streams in the project area include steelhead and salmon.

The project area also supports intermittent streams, which have flowing water during certain times of the year, when groundwater provides water for stream flow. Runoff from rainfall may be a supplementation source of waters for stream flow. During dry periods, intermittent streams may not have flowing water.

Special-Status Species

For the purposes of this EIR, special-status species include:

- Plants or animals listed or proposed for listing as threatened or endangered under the federal ESA (50 Code of Federal regulations [CFR] 17.12 [listed plants], 17.11 [listed animals] and various notices in the Federal Register [FR] [proposed species]).
- Plants or animals that are candidates for possible future listing as threatened or endangered under the federal ESA (61 FR 40, February 28, 1996);
- Plants or animals listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 California Code of Regulations [CCR] 670.5);
- Plants listed as rare or endangered under the California Native Plant Protection Act (California Fish and Game Code, §1900 et seq.);

- Plants that meet the definitions of rare and endangered under CEQA (State CEQA Guidelines, §15380);
- Plants considered under the California Native Plant Society (CNPS) to be “rare, threatened or endangered in California” (Lists 1A, 1B, and 2 in CNPS 2010);
- Plants listed by CNPS as plants about which more information is needed to determine their status and plants of limited distribution (Lists 3 and 4 in CNPS 2010), which may be included as special-status species on the basis of local significance or recent biological information; and
- Animals fully protected in California (California Fish and Game Code, §3511 [birds], §4700 [mammals], and §5050 [reptiles and amphibians]).

The California Natural Diversity Database (CNDDDB) was queried to determine which special-status species have been recorded within the project area (CDFG, 2010c). While several hundred special-status species have been documented in the project area, many of these species occur in habitats that would not be affected by the project. Those special-status species that could be affected by the project are included in **Appendix-BIO**.

Plants

Special-status plants would not be expected to occur in croplands because they are typically eliminated by cultivation. They are also unlikely to occur in pastures because of habitat modification and intense grazing, although some plants could be present in pasture habitat where there is limited habitat alteration or less-intense grazing. Because pasture is not a habitat category used in the California Native Plant Society (CNPS) inventory or the CNDDDB, no specific information on the occurrence of special-status plant species in pastures was found. The habitat most similar to pasture is grassland and many special-status plants have been reported to occur in grassland habitats (Great Basin grassland, meadows, and valley and foothill grassland) statewide. Undisturbed habitat adjacent to agricultural fields are more likely to support special-status plant species, including: succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*), Mason's lilaepsis (*Lilaeopsis masonii*), and hairy Orcutt grass (*Orcuttia pilosa*).

Wildlife

A number of special-status wildlife species could occur in agricultural habitats throughout California. Grain crops and pasture provide important habitat for species such as the Swainson's hawk (*Buteo swainsoni*) and greater sandhill crane (*Grus canadensis tabida*). Pasture provides habitat for a number of other listed species including San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia sila*), and Tipton kangaroo rat (*Dipodomys nitratooides nitratooides*). Undisturbed habitats adjacent to agricultural fields, such as seasonal wetlands, vernal pools, and irrigation ditches, could also support special-status species, including vernal pool fairy shrimp (*Branchinecta lynchi*), California tiger salamander (*Ambystoma californiense*), and giant garter snake (*Thamnophis gigas*).

Movement Corridors

Movements of wildlife generally fall into three basic categories: a) movements along corridors or habitat linkages associated with home range activities such as foraging, territory defense, and breeding; b) dispersal movements—typically one-way movements (e.g., juvenile animals leaving their natal areas or individuals colonizing new areas), and; c) temporal migration movements—these movements are essentially dispersal actions which involve a return to the place of origin (e.g., deer moving from winter grounds to summer ranges and fawning areas).

Given the project area's large size, it supports the local and regional movements of several species of fish, mammals, birds, and other animal species. The project area includes a portion of the Pacific Flyway, a major corridor for migratory birds. The project area also supports regional movements of mesocarnivores such as the San Joaquin kit fox, a State and federally listed species that covers a large territory while hunting for prey. Larger mammals, including deer and elk may move through the area as well, particularly in the northern portion of the project area. Lastly, anadromous fish, including chinook salmon, use movement corridors (rivers and streams) to travel from the Pacific Ocean through the Sacramento-San Joaquin Delta to freshwater streams in the project area.

Regulatory Setting

Federal

Federal Endangered Species Act

U.S. Fish and Wildlife Service (USFWS) (plants, wildlife, and resident fish) and the National Marine Fisheries Service (NMFS) (anadromous fish and marine fish and mammals) oversee the federal Endangered Species Act (ESA). Section 7 of the ESA mandates that all federal agencies consult with USFWS and NMFS to ensure that the federal agencies' actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. A federal lead agency under the National Environmental Policy Act (NEPA) is required to consult with USFWS or NMFS if it determines that the proposed action "may affect" a listed species. This determination is made through preparation of a biological assessment. USFWS or NMFS will subsequently provide a Biological Opinion on wildlife species that are federally listed, proposed, or candidates for listing as threatened or endangered.

Section 9 of the federal ESA prohibits the take of any wildlife species listed as endangered, including the destruction of habitat that prevents species recovery, without an incidental take permit. "Take" is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Wildlife federally listed as threatened are protected from take under Section 4 of the ESA.

The take prohibitions under Section 9 of the federal ESA apply to only fish and wildlife species; however, Section 9 does prohibit the unlawful removal, collecting, or malicious damage or destruction of any endangered plant from federal land. Section 9 prohibits acts to remove, cut, dig up, damage, or destroy any endangered plant in nonfederal areas in knowing violation of any State law or in

the course of criminal trespass. Candidate species and species that are proposed or under petition for listing receive no protection under Section 9 of the federal ESA.

Clean Water Act, Section 404

The U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA) regulate the discharge of fill into “waters of the United States” under Section 404 of the Clean Water Act. Waters of the United States include lakes, rivers, streams and their tributaries, and wetlands. Wetlands are defined for regulatory purposes as areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR §328.3, 40 CFR §230.3). Project proponents must obtain a permit from the Corps for all discharges of fill material into waters of the United States, including wetlands, before proceeding with a proposed action.

The Corps may either issue individual permits on a case-by-case basis or general permits for activities that are expected to cause only minimal adverse environmental effects. Nationwide permits (NWP) are a type of general permit that have been issued to cover particular fill activities. NWPs have a set of general conditions that must be met for the permits to apply to a particular project, as well as specific conditions that apply to each NWP.

Federal Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to take or attempt to take any migratory bird, any part, nest, or egg of any such bird except under the terms of a permit issued by the U. S. Department of the Interior. In total, 836 bird species are protected by the MBTA, 58 of which are currently legally hunted as game birds. A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

Fish and Wildlife Coordination Act (16 USC 661-667e)

The Fish and Wildlife Coordination Act requires coordination with USFWS, NMFS, and the California Department of Fish and Game when the waters of any stream or other body of water are proposed, authorized, permitted, or licensed to be impounded, diverted, or otherwise controlled or modified

under a federal permit or license (16 USC 661–667[e]). USFWS typically prepares a Coordination Act Report (CAR) with recommendations to address impacts on fish and wildlife resources. The recommendations in the CAR are advisory only.

State

California Environmental Quality Act

A project will be deemed to have a significant environmental impact on biological resources if it substantially reduces the number or restricts the range of a rare, threatened, or endangered species or the habitat of that species; substantially interferes with the movement of resident or migratory fish or wildlife; or substantially diminishes habitat for fish, wildlife, or plants. (Specific significance criteria for this project are described in a separate section below.) The State CEQA Guidelines define rare, threatened, or endangered species as those listed under the California Endangered Species Act (CESA) and the ESA, as well as other species that meet the criteria of the resource agencies or local agencies—for example, DFG-designated species of special concern and some CNPS-listed species.

California Endangered Species Act

The CESA requires State agencies to seek and conserve threatened and endangered species (Section 2055) and restricts all persons from taking listed species. DFG administers the act and authorizes take under Section 2081 agreements (except for designated “fully protected species”). The CESA defers to the California Native Plant Protection Act of 1977, which prohibits importing of rare and endangered plants into California, taking of rare and endangered plants, and selling of rare and endangered plants. State-listed species are protected mainly in cases where State agencies are involved in projects under CEQA. In this case, plants listed as rare under the California Native Plant Protection Act are not protected under the CESA but can be protected under CEQA. The following activities are exempt from the California Native Plant Protection Act:

- agricultural operations;
- fire control measures;
- timber harvest operations;
- mining assessment work;
- removal of plants by private landowners on private land for construction of
- canals, ditches, buildings, roads, or other rights-of-way; and
- removal of plants for performance of a public service by a public agency or a publicly or privately owned public utility.

Clean Water Act, Section 401

The State Water Resources Control Board (SWRCB) has authority over wetlands through Section 401 of the CWA, which requires that an application for a Section 404 permit (to discharge dredged or fill material into waters of the U.S.) first obtain certification from the appropriate State agency, stating that the fill is consistent with the State’s water quality standards and criteria. In California, the

authority to either grant certification or waive the requirements for permits is delegated by the SWRQB to the nine Regional Water Quality Control Boards (RWQCB). The Central Valley Water Board is the appointed authority for Section 401 compliance in the project area. A request for certification or waiver is submitted to the regional board at the same time that an application is filed with the Corps. The regional board has 60 days to review the application and act on it.

Porter-Cologne Water Quality Control Act

Under State law, anybody discharging “waste” (including clean fill, riprap or other revetment, excavation sidecasting, dredge spoils, soil displaced while clearing vegetation, etc.) where it could affect waters of the State (any surface or sub-surface water) must first file a Report of Waste Discharge with the appropriate RWQCB, which will regulate the discharge as necessary to protect the beneficial uses of the waters. This is completed during the Section 401 process for those waters of the State also covered under the CWA. For waters of the State not covered under the CWA, the RWQCB regulates discharges using the Porter-Cologne Water Quality Control Act.

CDFG Lake and Streambed Alteration Agreements

Under Section 1600-1616 of the California Fish and Game Code, the CDFG prohibits activities that would “substantially divert or obstruct the natural flow of, or substantially change or use material of the bed, channel, or bank of any river, stream, and lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake” without consulting with CDFG. Notification is required prior to any such activities and CDFG will issue an Agreement with any necessary mitigation to ensure protection of the State’s fish and wildlife resources.

9.2 Impacts and Mitigation Measures

Approach and Methods

The evaluation was performed in light of current conditions in the project area, applicable regulations and guidelines, and typical construction activities and operations of dairy digester and co-digester facilities. In determining the level of significance, the analysis assumed that the dairy digester and co-digester facilities would comply with relevant federal, State, and local ordinances and regulations.

Dairy digester and co-digester facilities could be constructed in a variety of agricultural locations within the project area, and specific locations and details are unknown at this time. For this reason, detailed site- and species-specific effects of dairy digester and co-digester facilities on native plants and wildlife are not evaluated; the following discussion focuses on general impacts to biological resources and the regulatory consequences of dairy digester and co-digester facilities.

Thresholds of Significance

CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions of the area affected by the project. An impact related to biological resources, would be considered significant if it would result in any of the following, which are adapted from Appendix G of the CEQA *Guidelines*:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The following discussion of environmental impacts is limited to those potential impacts that could result in some level of potentially significant environmental change, as defined by CEQA.

Because facilities development would not conflict with adopted conservation plans, the project would have a less-than-significant impact on the provisions of adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional, or State habitat conservation plans. Therefore this issue is not discussed further within this chapter.

Impact 9.1: The project could impact special-status plant or wildlife species or their habitats. (Significant)

Most dairy digesters and co-digesters facilities (especially those on individual dairies) would be constructed on existing developed agricultural lands that are unlikely to support special-status plant and wildlife species. In general, previous agricultural activities in these areas have altered the physical and biological environment such that habitat for special-status plant and animal species has been eliminated. Facilities associated with centralized locations could be constructed on land that has experienced fewer agricultural disturbances and supports special-status species or their habitats; therefore, these facilities have a greater potential to affect special-status species. Additionally, pipelines that could connect dairy digester and co-digester facilities with individual dairy farms could cross undisturbed land. Land application of dairy digester and co-digester digestate could also indirectly affect special-status species habitats such as wetlands, streams, and ditches if not properly applied.

Dairy digester and co-digester facilities, as well as pipelines and centralized facilities, could result in the loss of habitat for special-status plant or wildlife species if they are constructed on undisturbed land (such as annual grasslands adjacent to agricultural lands) or any agricultural lands that have been fallow for more than 1 year. Construction activities could also result in the direct loss of special-status species (species mortality) if present within the project footprint at the time of construction. Special-status species that could use these areas and therefore be affected by facilities development include, but are not limited to, California tiger salamander, white-tailed kite, San Joaquin kit fox, Swainson's hawk, and kangaroo rats. Special-status fish species such as steelhead and salmonids may be impacted if pipelines need to cross larger streams that support these species. Construction across streams is likely to occur using jack and bore drilling, which would limit direct disturbance to special-status fish species. The direct loss of special-status species or their habitats due to facilities construction (including dairy digester and co-digester facilities and connecting pipelines) within fallow agricultural areas and adjacent annual grasslands would be a significant impact.

Most dairy digester and co-digester facilities would be constructed in the Central Valley, a portion of the state that also supports some of the state's few remaining vernal pool habitats. As much as 90% of vernal pool habitat has been lost in much of the state, due to the conversion of land for urban and agricultural purposes. These features are often protected as wetlands under the federal Clean Water Act and the State Porter-Cologne Act. In addition to wetland habitat, these features support a unique group of plant and wildlife species, many of which are also State and/or federally listed, including Orcutt grasses, vernal pool fairy shrimp, and California tiger salamander, as shown in Table 9-1. These species could also be found in seasonal wetland habitat. The USFWS has listed critical habitat for many of these species within the project area, and has also identified areas for species recovery. Therefore, loss of vernal pool and seasonal wetland habitats due to facilities development would be a significant impact.

Habitat for other aquatic species, such as giant garter snake, tricolor blackbird, Sanford's arrowhead, and salmonids could be indirectly affected by facilities development or the application of dairy digestate, if not properly protected. These habitats include freshwater marsh, streams, and irrigation ditches that are not regularly maintained. Potential indirect effects could include discharges of sediments from nearby construction activities or the leaching of nutrients into aquatic habitats after the application of digestate. Degradation of suitable habitat for these species would be a significant impact.

If the dairy digester and co-digester facilities construction would affect State or federally listed species, the applicant would need to consult with the USFWS, CDFG or NMFS, depending on the species. Consultation with the federal agencies could occur either under Section 7 of the federal ESA, if a federal nexus is present (often a 404 permit from the Corps), or Section 10 of the federal ESA. Consultation under Section 7 would require the preparation of a biological assessment, after which a biological opinion would be issued. Consultation under Section 10 would require the preparation of a habitat conservation plan after which an incidental take permit would be issued. If state-listed species would be affected, the project applicant would need to consult with CDFG and obtain a 2081 permit. CDFG cannot authorize take of fully protected species.

As described above, implementation of the project could impact special-status species within the project area. Implementation of Mitigation Measures 9.1a and 9.1b would reduce this impact to a less-than-significant level.

Mitigation Measures

Measure 9.1a: The project applicant or agency(s) responsible shall submit, as part of the NOI, a site assessment report for dairy digester and co-digester facilities to be constructed (including the location of digestate application) in areas that contain undisturbed land and/or any agricultural fields that have been fallow for more than 1 year. This report shall be prepared by a qualified biologist. It shall evaluate the project site's potential to support special-status plant and wildlife species (including critical habitat) and whether special-status species could be affected by dairy digester and co-digester development, including construction and operations. If there are no special-status species or critical habitat present, no additional mitigation would be required.

Measure 9.1b: If the site assessment determines that special-status species could be affected by facilities development, the project would not be eligible as part of the project (for the Central Valley Water Board discharge permit) unless the applicant submits a plan, prepared by a qualified biologist, to mitigate or avoid any significant impacts on special-status species. This plan must be forwarded to the appropriate regional office of the CDFG, the Endangered Species Unit of the USFWS in Sacramento, and/or NMFS for review and approval of the mitigation strategy, when appropriate. If the site assessment determines that a State or federally listed species would be affected by facilities development, the project applicant shall consult with CDFG, the Endangered Species Unit of the USFWS in Sacramento, and/or NMFS, as appropriate.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measures 9.1a would reduce the project's potential impact on special-status species to a less-than-significant level by first determining if special-status species or critical habitat occur in the project area and could be affected by dairy digester and co-digester development. If special-status species or their habitat does occur, Mitigation Measure 9.1b requires the preparation of an impact avoidance and minimization plan, subject to review and approval by the CDFG and/or USFWS, to mitigate for impacts on special-status species.

Impact 9.2: The project could result in impacts on biologically unique or sensitive natural communities. (Significant)

As shown in Table 9-1, the project has the potential to directly or indirectly affect biologically unique or sensitive natural communities, including seasonal wetlands, vernal pools, and freshwater marsh. Dairy digester and co-digester facilities constructed on cultivated or otherwise developed agricultural lands would likely not have an impact on biologically unique or sensitive natural communities, because cultivation and development would have removed any previously existing vegetation. However, construction of facilities off of cultivated or developed agricultural lands (potentially including centralized facilities and pipelines, as well as the application of digestate on

undisturbed lands), could have a significant impact on sensitive natural communities. Implementation of Mitigation Measures 9.2a and 9.2b would reduce this impact to a less-than-significant level.

Mitigation Measures

Measure 9.2a: The project applicant or agency(s) responsible shall submit, with the NOI, a site assessment report prepared by a qualified biologist that determines if the project is likely to affect biologically unique or sensitive natural communities. This information could be included in the report prepared under Mitigation Measure 9.1a. If there are no biologically unique or sensitive natural communities present, no further mitigation is required.

Measure 9.2b: If biologically unique or sensitive natural communities are present and would be disturbed, the project would not be authorized under the project unless the applicant or agency(s) responsible submits a plan to avoid or mitigate for any significant impacts on biologically unique or sensitive natural communities and agrees to implement the mitigation. This report must be forwarded to the appropriate regional office of the CDFG and/or the Endangered Species Unit of the USFWS in Sacramento (as appropriate) for review and approval of the mitigation strategy. As described above, this portion of the report could be incorporated into the report prepared under Mitigation Measure 9.1a.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 9.2a would reduce the project's potential impact to a less-than-significant level by first determining if biologically unique or sensitive natural communities are likely to be affected by the project. If biologically unique or sensitive natural communities do occur, Mitigation Measure 9.2b requires preparation of an avoidance and mitigation plan, subject to review and approval by the CDFG and/or USFWS.

Impact 9.3: The project could result in impacts on waters of the State and/or the U.S., including wetlands. (Significant)

As discussed above, it is anticipated that most dairy digester and co-digester facilities would be constructed on existing dairies and/or in areas that have already been altered by agricultural activities. Some facilities, such as centralized facilities and gas collection pipelines, have a greater potential to affect waters of the State and/or U.S. because they have the potential to occur in areas that are not disturbed by agricultural activities. In particular, pipelines constructed to connect centralized facilities with existing dairies could cross drainage features such as streams, flood channels, and irrigation ditches. Furthermore, runoff from fields that receive digestate application could indirectly affect waters of the State and/or U.S. The direct loss of or reduction in water quality of waters of the State and/or U.S. would be a potentially significant impact. Implementation of Mitigation Measures 9.3a and 9.3b would reduce this impact to a less-than-significant level.

Mitigation Measures

Measure 9.3a: The project applicant or agency(s) responsible shall submit, with the NOI, a site assessment report prepared by a qualified biologist that evaluates if the project is likely to affect waters of the State and/or U.S., including wetlands. This information could be included

in the report prepared under Mitigation Measure 9.1a. If there are no waters present, no further mitigation would be required.

Measure 9.3b: If waters of the State and/or U.S. are present in the project area, the project applicant or agency(s) responsible shall either re-design the project to avoid affecting the waters, or obtain the appropriate permits to allow for the impact. For waters that cannot be avoided, the permit process shall start with the preparation of a jurisdictional wetland delineation, prepared by a qualified biologist that will be submitted to the Corps for verification. Following verification, if jurisdictional waters occur within the project site, the project applicant or agency(s) responsible shall obtain and comply with federal and State permit requirements. This could include obtaining a Clean Water Act Section 404 permit, Section 401 Water Quality Certification or Waiver, a Section 1602 Streambed Alteration Agreement, and any other applicable permits.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 9.3a would reduce the project's potential impact to a less-than-significant level by first determining if waters of the State or U.S. occur in the project area. If waters of the State or U.S. do occur, Mitigation Measure 9.3b requires completion of the appropriate regulatory permit process, including the assurance of a no-net-loss of the value and function of affected features. These measures would reduce this impact to a less-than-significant level.

Impact 9.4: The project would not result in impacts on migratory corridors or native wildlife nursery sites. (Less than Significant)

Dairy digester and co-digester facilities would likely be constructed on lands previously altered by agricultural disturbance, including existing dairies. However, some facilities (including centralized facilities and gas collection pipelines) could be constructed on land that is not currently in active agricultural uses. It is anticipated that these facilities would have a relatively small project footprint (less than an acre for individual dairies and up to 3 acres for centralized facilities, relative to dairies over 150 acres in size) and therefore would not limit migration through an area; wildlife species would be able to move around the constructed facilities. Limited lighting and power lines could be required for dairy digesters, but would not constitute a significant increase over that lighting power lines used at dairies and other agricultural operations in the area. Therefore, it is unlikely that any increase in lighting or power lines would affect migratory birds. The facilities also would not require major new transportation networks that would affect species movement, nor would result in a substantial increase in human presence. Furthermore, pipelines would be buried and would not create a barrier to migration. Digesters are unlikely to be sited in or near native wildlife nursery sites; therefore, the project would have a less-than-significant impact on migratory corridors or nursery sites.

Mitigation: None required.

Impact 9.5: Dairy digester and co-digester facilities would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (Less than Significant)

Dairy digester and co-digester facilities and centralized facilities would be constructed primarily on or near active agricultural sites. Any construction of new facilities would be required to comply with local ordinances, including those that protect biological resources, such as tree preservation policies and ordinances. The project would not preclude project applicants from complying with local ordinances; therefore this impact would be less than significant and no mitigation would be required.

Mitigation: None required.

Impact 9.6: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to biological resources. (Significant)

Development over the last 150 years in the project area has resulted in the conversion of native habitats to agricultural and urban uses. An effort has been made in the past 20 years to protect habitat in the project area (and the rest of the state) through the development of large-scale habitat conservation plans that mitigate for habitat loss at broad scales. While it is not expected that implementation of the project would lead to conversion of habitat to dairy farms, the project could facilitate additional development near dairies that would incrementally deplete native habitats and other biological resources. Most of the dairy digester and co-digester facilities would be constructed on, or in proximity to, existing dairies, on land that is unlikely to support sensitive biological resources. However, facilities that could be constructed on land not currently in active agricultural use could affect biological resources. In combination with other development in the project area, this conversion of potential habitat land represents a significant cumulative impact. Implementation of Mitigation Measures 9.1a, 9.1b, 9.2a, 9.2b, 9.3a and 9.3b would reduce this cumulative impact to a less-than-significant level.

Mitigation Measures

Measure 9.6: Implement Measures 9.1a, 9.1b, 9.2a, 9.2b, 9.3a, and 9.3b.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measures 9.1a, 9.1b, 9.2a, 9.2b, 9.3a, and 9.3b would ensure that potential cumulative effects to biological resources would be minimized.

The project includes mitigation measures that would reduce potential impacts on biological resources to less-than-significant levels. These measures, when combined with the limited potential for the project to broadly affect sensitive biological resources, significantly reduces the project's potential contribution towards a cumulative adverse effect. In addition, the project area includes several existing and planned large-scale Habitat Conservation Plans that mitigate for habitat loss at broad scales. Therefore, the incremental effects of the project and other projects, after mitigation, would be less than significant.

9.3 References

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- California Department of Fish and Game (CDFG), 2010b. Endangered, Threatened, and Rare Plants List. California Department of Fish and Game, Biogeographic Data Branch, Sacramento, CA. April 2010.
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- California Native Plant Society (CNPS), 2010. Inventory of Rare and Endangered Plants (online edition, v7-10b 4-21-10). California Native Plant Society, Sacramento, California. Accessed online: <http://www.cnps.org/inventory>, accessed April 15, 2010.
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CHAPTER 10

Hazards and Hazardous Materials

10.1 Setting

Environmental Setting

For the purposes of this analysis, the term “hazardous materials” refers to both hazardous materials and hazardous wastes. Under federal and State laws, any material, including wastes, may be considered hazardous if it is specifically listed by statute as such or if it is toxic (causes adverse human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), or reactive (causes explosions or generates toxic gases). The term “hazardous material” is defined as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment.¹

Potential Presence of Hazardous Materials in Soil and Groundwater

Hazardous materials, including but not limited to pesticides and herbicides, heavy metals, volatile organic compounds, oil and gas, may be present in soil and groundwater in areas where land uses have resulted in leaking fuel or chemical storage tanks or other releases of hazardous materials have occurred. Land uses that typically involve the handling of hazardous materials include commercial or industrial operations, as well as agricultural areas where soils may contain pesticides and herbicides.

Various federal, State, and local regulatory agencies maintain lists of hazardous materials sites where soil and/or groundwater contamination is known or suspected to have occurred, typically as a result of leaking storage tanks or other spills. These facilities are readily identified through regulatory agency database searches, such as the State Water Board GeoTracker online database, the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) Envirostor online database, and several other federal, State and local regulatory agency databases. **Table 10-1** includes these, and other database references.

For this project, a search of the GeoTracker database was conducted. The search identified numerous of cleanup sites within the Central Valley Water Board’s jurisdictional boundaries (Region 5), as shown in **Table 10-2**. These facilities included, but were not limited to, hazardous materials cleanup sites, leaking underground storage tank (LUST) cleanup sites, land disposal cleanup sites, and cleanups on military properties.

¹ State of California, Health and Safety Code, Chapter 6.95, Section 25501(o).

**TABLE 10-1
DESCRIPTION OF REGULATORY AGENCY DATABASES**

Acronym	Name and Description of Database
US Brownfields	Maintained by the U.S. Environmental Protection Agency (EPA), the U.S. Brownfields database lists abandoned sites that have known or suspected contamination that are currently underutilized.
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System. A U.S. EPA maintained database that contains information on hazardous waste sites, potentially hazardous waste sites and remedial activities, including sites on the National Priorities List (see below).
NPL	National Priorities List. Maintained by the U.S. EPA, the data base lists priority cleanup sites under the federal Superfund Program.
PPIS	Pesticide Product Information System. U.S. EPA maintained database that contains information concerning all pesticide products registered in the U.S.
RCRAInfo	Resource Conservation and Recovery Act Information. RCRA gives the U.S. EPA authority to control the generation, transportation, treatment, storage and disposal of hazardous waste. The information data base provides access to information about RCRA and the management of hazardous waste.
SCP	Site Cleanup Program (formerly the Spills, Leaks, Investigation, and Cleanup Cost Recovery Listing) is maintained by the State Water Board. Provides information on site investigation and corrective action on sites not overseen by the Underground Tank Program and the Well Investigation Program. Found on the Geotracker Database.
CALSITES	List of hazardous waste and substances sites from the DTSC Envirostor database.
CDO and CAO	Cease and Desist Orders and Cleanup and Abatement Orders that do not concern the discharge of wastes that are hazardous materials identified by the State Water Board.
CORTESE	Cortese Hazardous Waste and Substances Site List. An historical compilation of sites listed in the LUST, Solid Waste Information System (SWF/LF), and CALSITES databases. This database is no longer updated.
CORRACTS	List of hazardous waste facilities subject to corrective action identified by DTSC.
LUST	Leaking Underground Storage Tanks. Maintained by the State Water Board it includes a list of leaking USTs. Found on the Geotracker Database
DPR	California Department of Pesticide Regulation provides data and information related to pesticide registration, licensing, pesticide use, environmental effects, and enforcement.
SWIS	Solid waste facilities and landfills that are active, closed, or inactive, maintained by the California Department of Resources Recycling and Recovery.
Toxic Pits	Maintained by the State Water Board, the Toxic Pits database lists sites suspected of containing hazardous substances that have not yet been cleaned up.
VCP	Voluntary Cleanup Program Properties. Low-threat properties with either confirmed or unconfirmed releases, where the project proponents have requested that the DTSC oversee investigation and/or cleanup activities.

SOURCE: State Water Board, U.S. EPA, DTSC 2010

**TABLE 10-2
CENTRAL VALLEY HAZARDOUS MATERIALS CLEANUP SITES**

Organization Name	Cleanup Program Site	LUST Cleanup Site	Land Disposal Site	Military Cleanup Site	Military Privatized Site	Military UST Site
Central Valley Water Board (REGION 5, Fresno)	632	2918	713	60	0	49
Central Valley Water Board (REGION 5, Redding)	182	887	44	0	0	3
Central Valley Water Board (REGION 5, Sacramento)	1307	4511	307	789	50	540

SOURCE: State Water Board GeoTracker website, 2010

Potential Presence of Naturally Occurring Asbestos

Asbestos is a known carcinogen and inhalation of asbestos may result in the development of lung cancer or mesothelioma. The asbestos content of many manufactured products has been regulated in the United States for a number of years. For example, the California Air Resources Board (CARB) has regulated the amount of asbestos in crushed rock used in surfacing applications, such as for gravel on unpaved roads since 1990. In 1998, new concerns were raised about possible health hazards from activities that disturb rocks and soil containing asbestos and may result in the generation of asbestos laden dust. These concerns recently lead to CARB to revise their asbestos limit for crushed serpentinite and ultramafic rock in surfacing applications from 5 percent to less than 0.25 percent, and to adopt a new rule requiring best practices dust control measures for activities that disturb rock and soil containing naturally occurring asbestos. A map of areas more likely to contain naturally occurring asbestos in underlying soil or rock units published by the California Geological Survey indicates that asbestos-containing rocks and minerals are absent from the flat valley bottom of the Central Valley (CGS, 2000).

Biogas

Biogas is comprised primarily of methane, with small amounts of carbon dioxide, hydrogen sulfide and ammonia. Methane is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Handling methane can be hazardous due to its health risk and flammability.

Fire Hazards

While all of California is subject to some degree of fire hazard, there are specific features that make certain areas more hazardous. The California Department of Forestry and Fire Protection (CAL FIRE) is required by law to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors (PRC 4201-4204 and Govt. Code 51175-89). Factors that increase an area's susceptibility to fire hazards include slope, vegetation type and condition, and atmospheric conditions. In regions of the Central Valley areas where the dairies are located, the terrain is typically flat to gently sloping, and is often surrounded by irrigated agricultural land. Many portions of the Central Valley are within Local Responsibility Areas (LRA) and have not been mapped for fire hazard zones; however, based on existing fire hazards maps prepared for the state of California, it is likely that most of the areas affected by the proposed regulatory program would fall within areas of moderate risk (this is the lowest level of risk assigned by CAL FIRE) (CAL FIRE, 2007).

Regulatory Setting

Hazardous materials and hazardous wastes are subject to numerous federal, State, and local laws, regulations, ordinances and guidance intended to protect public health and safety and the environment. The U.S. Environmental Protection Agency (U.S. EPA), Cal-EPA, DTSC, RWQCB, CARB, and the county Air Pollution Control Districts and regional Air Quality Management Districts that CARB oversees are the major federal, State, and regional agencies that enforce these regulations. The main focus of the federal and California Occupational Safety and Health Administration (OSHA) are to

prevent work-related injuries and illnesses, including from exposures to hazardous materials; CAL FIRE implements fire safety regulations. In accordance with Chapter 6.11 of the California Health and Safety Code (§ 25404, et seq.), local regulatory agencies enforce many federal and state regulatory programs through the Certified Unified Program Agency (CUPA) program, including:

- Hazardous materials business plans (Chapter 6.95 of the Health and Safety Code, §25501 et seq.).
- State Uniform Fire Code requirements (§80.103 of the Uniform Fire Code as adopted by the state fire marshal pursuant to Health and Safety Code §13143.9).
- Underground storage tanks (Chapter 6.7 of the Health and Safety Code, §25280 et seq.).
- Aboveground storage tanks (Health and Safety Code §25270.5[c]).
- Hazardous waste generator requirements (Chapter 6.5 of the Health and Safety Code, §25100 et seq.).

The following is a summary of how hazardous materials are regulated by applicable topic. Within each summary is a discussion of the relevant federal, State and local regulatory structure.

Soil and Groundwater Contamination

Remediation of contaminated sites is generally performed under the oversight of the local CUPA, or in some instances, the RWQCB and/or DTSC. At sites where contamination is suspected or known to have occurred, the site owner is required to perform a site investigation and perform site remediation, if necessary. Site remediation or development may also be subject to regulation by other agencies. For example, if a project required dewatering near a hazardous waste site, the project sponsor might be required to obtain a permit from the municipal sewer agency before discharging the water to the sewer system, or a National Pollutant Discharge Elimination System (NPDES) permit from the RWQCB before discharging to the storm water collection system.

Worker Safety Requirements

The federal Occupational Safety and Health Administration (Fed-OSHA) and the California Occupational Safety and Health Administration (Cal-OSHA) are the agencies responsible for assuring worker safety in the handling and use of chemicals in the workplace. The federal regulations pertaining to worker safety are contained in Title 29 of the Code of Federal Regulations (CFR), as authorized in the Occupational Safety and Health Act of 1970. They provide standards for safe workplaces and work practices, including standards relating to hazardous materials handling. In California, Cal-OSHA assumes primary responsibility for developing and enforcing workplace safety regulations; Cal-OSHA standards are generally more stringent than federal regulations.

The state regulations concerning the use of hazardous materials in the workplace are included in Title 8 of the California Code of Regulations, which contain requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal-OSHA also enforces hazard communication program regulations, which contain worker safety training and hazard information requirements, such as procedures for identifying and labeling hazardous

substances, communicating hazard information related to hazardous substances and their handling, and preparation of health and safety plans to protect workers and employees.

At sites known or suspected to have soil or groundwater contamination, construction workers must receive training in hazardous materials operations and a site health and safety plan must be prepared. The health and safety plan establishes policies and procedures to protect workers and the public from exposure to potential hazards at the contaminated site.

Hazardous Materials Business Plans

State and federal laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of, and, in the event that such materials are accidentally released, to prevent or to mitigate injury to health or the environment. California's Hazardous Materials Release Response Plans and Inventory Law, sometimes called the "Business Plan Act," aims to minimize the potential for accidents involving hazardous materials and to facilitate an appropriate response to possible hazardous materials emergencies. The law requires businesses that use hazardous materials to provide inventories of those materials to designated emergency response agencies, to illustrate on a diagram where the materials are stored on-site, to prepare an emergency response plan, and to train employees to use the materials safely.

Use and Storage of Hazardous Materials

State and federal laws require detailed planning and management to ensure that hazardous materials are properly handled, used, stored, and disposed of, and, in the event that such materials are accidentally released, to reduce risks to human health and the environment. Hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; dictate the management of hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills.

Underground Storage Tanks

State laws governing underground storage tanks (USTs) specify requirements for permitting, monitoring, closure, and cleanup of these facilities. Regulations set forth construction and monitoring standards for existing tanks, release reporting requirements, and closure requirements. In general, the local CUPA has regulatory authority for permitting, inspection, and removal of USTs. Any entity proposing to remove a UST must submit a closure plan to the CUPA prior to tank removal. Upon approval of the UST closure plan, the CUPA would issue a permit, oversee removal of the UST, require additional subsurface sampling if necessary, and issue a site closure letter when the appropriate removal and/or remediation has been completed. There are no USTs associated with typical dairy digester facilities; however, these regulations are relevant due to the potential of leaking USTs to affect subsurface conditions at potential project sites.

Aboveground Storage of Petroleum Products

The Aboveground Petroleum Storage Act of 1990 requires facilities storing petroleum products in a single tank greater than 1,320 gallons, or facilities storing petroleum in aboveground tanks or containers

with a cumulative storage capacity of greater than 1,320 gallons to file a storage statement with the State Water Board and prepare a spill prevention, control, and countermeasure plan. The plan must identify appropriate spill containment or equipment for diverting spills from sensitive areas, as well as discuss facility-specific requirements for the storage system, inspections, recordkeeping, security, and personnel training.

The State Water Board requires registration of an aboveground fuel storage tank at a construction site only if the tank is 20,000 gallons or larger, or if the aggregate volume of aboveground petroleum storage is over 100,000 gallons. For smaller temporary tanks used during construction, methods for controlling a release and measures to clean up an accidental release and prevent degradation of water quality are addressed in the construction stormwater pollution prevention plan (SWPPP) prepared for project construction, as described in Section 5, Hydrology and Water Quality.

Transport of Hazardous Materials

The United States Department of Transportation (DOT) regulates hazardous materials transportation on all interstate roads. Within California, the state agencies with primary responsibility for enforcing federal and State regulations and for responding to transportation emergencies are the CHP and Caltrans. Together, federal and State agencies determine driver-training requirements, load labeling procedures, and container specifications. Although special requirements apply to transporting hazardous materials, requirements for transporting hazardous waste are more stringent, and hazardous waste haulers must be licensed to transport hazardous waste on public roads.

Emergency Response

California has developed an emergency response plan to coordinate emergency services provided by federal, State, and local government and private agencies. Responding to hazardous materials incidents is one part of this plan. The plan is administered by the State Office of Emergency Services (OES), which coordinates the responses of other agencies. The local Emergency Response Team (ERT) coordinates response to hazardous materials emergencies within the project area. ERT members respond and work with local fire and police agencies, emergency medical providers, California Highway Patrol (CHP), California Department of Fish and Game, and California Department of Transportation (Caltrans).

Natural Gas Pipelines

The DOT also provides oversight for the nation's natural gas pipeline transportation system. Its responsibilities are promulgated under Title 49, United States Code (USC) Chapter 601. The Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety (OPS), administers the national regulatory program to ensure the safe transportation of gas and other hazardous materials by pipeline.

The OPS shares portions of this responsibility with State agency partners and others at the federal, State, and local levels. The State of California is certified under 49 USC Subtitle VIII, Chapter 601, §60105. The State has the authority to regulate intrastate natural and other gas pipeline facilities.

The California Public Utilities Commission has rules governing design construction, testing, operation, and maintenance of gas gathering, transmission, and distribution piping systems (General Order No. 112-E). The State requirements for designing, constructing, testing, operating, and maintaining gas piping systems are stated in CPUC General Order Number 112. These rules incorporate the federal regulations by reference, but for natural gas pipelines, they do not impose any additional requirements affecting public safety. The federal pipeline regulations are published in Title 49 CFR, Parts 190 through 199. 49 CFR 192 specifically addresses natural and other gas pipelines. These regulations include specific standards for material selection and qualification, design requirements, protection from corrosion, worker training, safety and provisions for safety standards specific to the location of the pipeline relative to population densities and sensitive land uses.

Fire Hazards

The California Uniform Fire Code and local building codes establish requirements for the construction and maintenance of structures for fire safety. The National Fire Protection Association (NFPA) develops and publishes consensus codes and standards intended to minimize the possibility and effects of fire and other risks. While not regulations, these codes and standards are industry-accepted guidelines for construction and fire protection systems. NFPA Code 820 establishes the standard for fire protection in waste water treatment and collection facilities, which would be applicable to dairy digester facilities. Additional relevant codes include a fuel gas code, standard on explosion prevention systems, standards for fire prevention during welding, etc.

The California Public Resources Code (PRC) includes fire safety regulations that restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors² on construction equipment that use an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided onsite for various types of work in fire-prone areas during the time of high fire danger to reduce the risk of wildland fires.

10.2 Impacts and Mitigation Measures

Approach and Methods

The evaluation was performed in light of current conditions in the project area, applicable laws, regulations and guidelines, and typical construction activities and operations of dairy digester and co-digester facilities. In many cases, compliance with laws, regulations, and mandatory regulatory permits prescribe actions that would reduce the adverse effects of implementation of future dairy digester and co-digester facilities. Should potential impacts remain significant or potentially significant under CEQA, even after compliance with legal requirements, mitigation measures are proposed to reduce project impacts to less-than-significant levels.

² A spark arrestor is a device that prohibits exhaust gases from an internal combustion engine from passing through the impeller blades where they could cause a spark. A carbon trap is commonly used to retain carbon particles from the exhaust.

Thresholds of Significance

CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions of the area affected by the project. An impact related to hazards and hazardous materials, including fire hazards, would be considered significant if it would result in any of the following, which are adapted from Appendix G of the CEQA *Guidelines*:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one quarter mile of an existing or proposed school;
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would create a significant hazard to the public or the environment;
- Be located within an area covered by an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would result in a safety hazard for people residing or working in the project area;
- Be located within the vicinity of a private airstrip and would result in a safety hazard for people residing or working in the project area;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Implementation of the program would not result in the construction of facilities that would result in a safety hazard at public airports or private airstrips, therefore, these issues are not discussed further within this section.

Impact 10.1: Construction of dairy digester and co-digester facilities could result in the potential exposure of construction workers, the public and the environment to preexisting soil and/or groundwater contamination. (Significant)

Construction activities associated with development of projects could involve excavation and trenching to install dairy digester or co-digester facilities and pipelines. If hazardous materials, such as pesticides or herbicides, VOC or other hazardous materials are present in excavated soil or groundwater, hazardous materials could be released to the environment resulting in exposing construction workers or the public to potential health risks depending on the nature and extent of any contamination encountered. Contaminated soil or groundwater could also require disposal as a hazardous waste. This is considered a significant impact.

The greatest potential for encountering contaminated soil and groundwater during project construction would be in areas where past or current land uses have resulted in leaks from fuel or chemical

storage tanks or other releases of hazardous materials have occurred. Federal, State and local agencies maintain databases of hazardous materials sites including those listed in **Table 10-1**. As shown in **Table 10-2**, the GeoTracker database identified thousands of hazardous materials sites within the Central Valley Water Board. If sites with soil and/or groundwater contamination are located at or in close proximity to proposed project facilities, hazardous materials could be encountered in the subsurface during excavation and grading activities. Encountering hazardous materials in soil or groundwater during construction could further disperse existing contamination into the environment and expose construction workers or the public to contaminants, potentially resulting in health and safety risks to workers and the public.

Hazardous materials in soil and groundwater, if identified, could be managed appropriately according to applicable laws and regulations to reduce the risks associated with exposure of individuals or releases to the environment. Cal/OSHA regulations require the preparation and implementation of a site health and safety plan to protect workers who could encounter hazardous materials, ensure that construction workers have specialized training and appropriate personal protective equipment. Regulations also require that excavated materials suspected of contamination be segregated, sampled and hauled to a landfill licensed for this type of waste. If groundwater dewatering is required for excavation of subsurface facilities, the groundwater may require treatment prior to discharge, in accordance with regulations.

Mitigation Measure

Mitigation Measure 10.1: Prior to final project design and any earth disturbing activities, the applicant or agency(s) responsible shall conduct a Phase I Site Assessment. The Phase I Environmental Site Assessment (ESA) shall be prepared by a Registered Environmental Assessor (REA) or other qualified professional to assess the potential for contaminated soil or groundwater conditions at the project site; specifically in the area proposed for construction of dairy digester or co-digester facilities. The Phase I ESA shall include a review of appropriate federal and State hazardous materials databases, as well as relevant local hazardous material site databases for hazardous waste on-site and off-site locations within a one quarter mile radius of the project site. This Phase I ESA shall also include a review of existing or past land uses and areal photographs, summary of results of reconnaissance site visit(s), and review of other relevant existing information that could identify the potential existence of contaminated soil or groundwater.

If no contaminated soil or groundwater is identified or if the Phase I ESA does not recommend any further investigation then the project applicant or agency(s) responsible shall proceed with final project design and construction.

OR

If existing soil or groundwater contamination is identified and if the Phase 1 ESA recommends further review, the applicant or agency(s) responsible shall retain a REA to conduct follow-up sampling to characterize the contamination and to identify any required remediation that shall be conducted consistent with applicable regulations prior to any earth disturbing activities. The environmental professional shall prepare a report that includes, but is not limited to, activities performed for the assessment, summary of anticipated contaminants and contaminant concentrations at the proposed construction site, and recommendations for appropriate handling of any contaminated materials during construction.

Impact Significance After Mitigation: Less than Significant

Mitigation Measure 10.1 requires preparation of a Phase I ESA to identify the potential for known soil or groundwater contamination on or in the vicinity of proposed construction of dairy digester or co-digester facilities. If no contamination is identified, then construction can proceed. If contaminated sites are identified that could affect construction, then the applicant shall conduct follow-up sampling to characterize soil and groundwater contamination and would conduct any remediation consistent with applicable laws, regulations, ordinances and guidance. With implementation of Mitigation Measure 10.1, and regulatory compliance, the potential for exposure to hazardous materials during construction activities would be reduced to a less-than-significant level.

Impact 10.2: Transportation, use, disposal or accidental spill of hazardous materials during construction of dairy digester and co-digester facilities would not result in the potential exposure of construction workers, the public and the environment to hazardous materials. (Less than Significant)

Construction activities would likely require use of limited quantities of hazardous materials such as fuels for construction equipment, oils, lubricants glues. The types and quantities of hazardous materials would vary at each proposed dairy digester and co-digester facility. The improper use, storage, handling, transport or disposal of hazardous materials could result in accidental release of hazardous materials, thereby exposing construction workers, the public and the environment, including soil and/or ground or surface water, to hazardous materials contamination.

As discussed in Section 10.1.2, Regulatory Setting, numerous laws and regulations govern the transport, use, storage, handling and disposal of hazardous materials to reduce the potential hazards associated with these activities. Cal/OSHA is responsible for developing and enforcing workplace safety standards, including the handling and use of hazardous materials. Transportation of hazardous materials is regulated by the DOT and Caltrans. Together, federal and State agencies determine driver-training requirements, load labeling procedures, and container specifications designed to minimize the risk of accidental release. Construction activities would also be required to comply with the California fire code to reduce the risk of potential fire hazards. The local fire agency would be responsible for enforcing the provisions of the fire code.

As described in Chapter 5, the federal Clean Water Act prohibits discharges of stormwater from construction projects unless the discharge is in compliance with an NPDES permit. The State Water Board is the permitting authority in California and has adopted a Statewide General Permit for Stormwater Discharges Associated with Construction Activity (Construction General Permit, Order No. 99-08) that encompasses one or more acres of soil disturbance. The permit requires, among other actions, implementation of mandatory Best Management Practices (BMPs) including, implementation of pollution/sediment/spill control plans, training, sampling and monitoring for non-visible pollutants

Because numerous laws and regulations govern the transport, use, storage, handling and disposal of hazardous materials to reduce the potential hazards associated with these activities this impact would be less than significant.

Mitigation: None required.

Impact 10.3: Transportation, use, disposal or accidental spill of hazardous materials during the operation and maintenance of dairy digester and co-digester facilities would not result in the potential exposure of the public or the environment to hazardous materials. (Less than Significant)

Operation and maintenance of dairy digester and co-digester facilities would involve the transport, use, storage and disposal of small quantities of hazardous materials such as fuels, lubricants, hydraulic fluids. Handling of hazardous materials is covered by federal and State laws which minimize worker safety risks from both physical and chemical hazards in the workplace. Cal/OSHA is responsible for developing and enforcing workplace safety standards, including the handling and use of hazardous materials. Businesses that use hazardous materials are required to submit a Hazardous Materials Business Plan to the local CUPA, which performs inspections to ensure compliance with hazardous materials labeling, training, and storage regulations. For example, hazardous materials must be stored in containers according to the manufacturer's guidelines and appropriately labeled. The Material Safety Data Sheet for each chemical must be available for review. Employers must inform workers of the hazards associated with the materials they handle and maintain records documenting training.

In addition, if scrubber facilities are needed for cleaning the biogas to remove hydrogen sulfide, flushing of the scrubbers would produce sulfur biogas scrubber effluent. Discharge of the effluent stream into a wastewater treatment system would be subject to requirements contained in a Waste Discharge Requirements (WDR) permit issued by the Central Valley Water Board. Another possible use for the effluent would be for a soil amendment. If classified as a soil amendment, it would be subject to the California Department of Food and Agriculture Code covering fertilizing materials (Food and Agricultural Code Division 7, Chapter 5).

Transportation of hazardous materials is regulated by the DOT and Caltrans. Together, federal and State agencies determine driver-training requirements, load labeling procedures, and container specifications designed to minimize the risk of accidental release.

Because numerous laws and regulations govern the transport, use, storage, handling and disposal of hazardous materials to reduce the potential hazards associated with these activities, this impact would be less than significant.

Mitigation: None required

Impact 10.4 Operation of dairy digester and co-digester facilities would not result in the release of biogas which could increase the risk of fire hazards. (Less than Significant)

The proposed program involves the production of biogas generated through the anaerobic digestion process. The biogas would be captured and could be combusted in a flare, used directly in internal combustion engines to produce electricity and heat, or upgraded to biomethane through the removal of hydrogen sulfide, carbon dioxide (CO₂), and moisture. Biomethane could be used in place of natural gas for various processes, including use by utility companies. The biomethane would be transported through low-pressure gas pipelines (likely 6-inch diameter or smaller) to centralized digester facilities or biogas cleanup facilities. As described in the environmental setting, biogas is comprised primarily of methane. Methane is not toxic, but handling methane can be hazardous. In addition, methane can be flammable. Methane has an ignition temperature of 1,000 degrees Fahrenheit (°F) and is flammable at concentrations between 5 percent and 15 percent in air. Unconfined mixtures of methane in air are not explosive; however, a flammable concentration within an enclosed space in the presence of an ignition source can explode. Methane is buoyant at atmospheric temperatures and disperses rapidly in air.

Unintentional releases of biogas from dairy digester facilities or pipelines could pose risks to human health and safety. For example, biogas could be released from a leak or rupture of the digester facility or one of the pipe segments. If the gas reaches a combustible mixture and an ignition source is present, a fire and/or explosion could occur, resulting in possible injuries and/or deaths.

Compliance with existing safety regulations and widely-accepted industry standards would minimize the hazard to the public and the environment. With respect to the flaring of biogas and potential fire hazards associated with the storage and transport of methane and small quantities of other materials used in operations, the NFPA has established standards for fire protection which would be applicable to the construction of dairy digester and co-digester facilities. These standards have been successfully implemented by numerous waste water treatment facilities across the country. Construction and operation of facilities would comply with the California fire code, local building codes (including requirements for the installation of fire suppression systems), and gas pipeline regulations. The local fire agency would be responsible for enforcing the provisions of the fire code. The OPS and CPUC regulate the safety of gas transmission pipelines. Standard safety measures for anaerobic treatment facilities that would minimize the potential for exposure to biogas include leak detection systems, warning signals, and safety flares to reduce excess gas capacity. If released to the environment, methane would be dispersed rapidly in air, minimizing the hazards of exposure.

Any biogas transmission pipelines would be designed, constructed and operated consistent with State and federal regulations to minimize the risk of rupture and accidental release. As described in the Regulatory Setting, the CPUC has rules governing design construction, testing, operation, and maintenance of gas gathering, transmission, and distribution piping systems. These rules incorporate the federal regulations by reference, but for natural gas pipelines, they do not impose any additional requirements affecting public safety. The federal pipeline regulations include specific standards for material selection and qualification, design requirements, protection from corrosion, worker

training, safety and provisions for safety standards specific to the location of the pipeline relative to population densities and sensitive land uses.

Dairies in the Central Valley Water Board region are predominantly located in agricultural areas that are not within high wildfire hazard zones. In addition, due to odor and other siting considerations, dairy digester and co-digester facilities would not be constructed immediately adjacent to residential structures. Compliance with existing laws and regulations would reduce the potential for fires and explosions associated with digester and co-digester facilities, however, in the unlikely event of a fire, the potential to expose people or structures to a significant risk involving fires is low. Therefore, this impact would be less than significant.

Mitigation: None required

Impact 10.5 Dairy digester and co-digester facilities could be located within a one quarter mile of a school resulting in potential hazards associated with accidental release of hazardous materials, including biogas. (Less than Significant)

Existing dairies are typically not sited within close proximity to schools, therefore, dairy digesters and co-digesters located at existing dairies would be unlikely to be located within one quarter mile of a school. As the location of central processing facilities and pipelines that could be constructed under this program have not been identified, it is possible that facilities could be located within one quarter mile of a school.

As discussed above under Impacts 10.2 and 10.3, small quantities of hazardous materials could be used in the construction and operation dairy digester and co-digester facilities. Compliance with environmental laws and regulations would reduce the potential for an accidental release of those materials to affect nearby schools. Anaerobic digesters and biogas transmission pipelines would not emit hazardous emissions, such as biogas, under normal operating conditions and biogas transmission pipelines and ancillary facilities would be designed, constructed, operated, and maintained in accordance with State and federal regulations. Although leak detection systems would minimize the potential for substantial biogas releases, any such releases would mix readily in the air and would not present a health risk at nearby properties. As a result, odor concerns and potential fire hazards associated with siting dairy digester and co-digester facilities within one quarter mile of a school would be less than significant.

Although not required, to further reduce the magnitude of this less-than-significant impact, Mitigation Measure 10.5 recommends that dairy digester and co-digester facilities not be constructed and operated within ¼-mile of existing or proposed schools and other sensitive land uses.

Mitigation Measure

Mitigation Measure 10.5: Dairy digester and co-digester facilities shall be sited at least one quarter mile from existing or proposed schools, daycare facilities, hospitals and other sensitive land uses.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 10.5 would ensure that dairy digester facilities, co-digester facilities and centralized processing facilities would be located more than one quarter mile from sensitive land uses; therefore, further reducing the potential for exposure to hazardous materials and fire hazards.

Impact 10.6: Installation of biogas pipelines in public rights-of-way could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (Significant)

Construction and operation of individual dairy digester and co-digester facilities at existing dairies or other private properties would take place within these properties and would be unlikely to affect public roadways that could be designated on adopted emergency response or evacuation plans. Biogas pipelines associated with future digester and co-digester facilities could be installed within public right-of-ways. Construction and installation of pipelines could result in temporary road or lane closures that might impair implementation of emergency response and evacuation plans if proper precautions were not taken. This would be a potentially significant impact.

Mitigation Measure

Mitigation Measure 10.6: Implement Mitigation Measure 8.1.

Impact Significance After Mitigation: Less than Significant

The potential for interference with emergency response or evacuation plans would be less than significant with implementation of Mitigation Measure 8.1 which requires that contractor(s) obtain any necessary road encroachment permits prior to installation of pipelines within the existing roadway right-of-way. As part of the road encroachment permit process, the contractor(s) will submit a traffic safety / traffic management plan (for work in the public right-of-way) to the agencies having jurisdiction over the affected roads. Elements of the plan would require advance coordination with police, fire stations and hospitals to ensure that provisions are made for emergency response and evacuation.

Impact 10.7: Development of dairy digester and co-digester facilities could contribute to cumulative impacts related to hazardous materials. (Less than Significant)

The context for potential cumulative hazards and hazardous materials impacts is projects that could result in an increased risk of exposure due to a release of hazardous materials in the project area. The potential for cumulative projects to result in a release resulting in an increased risk of exposure and the project's contribution would be limited. Exposure to existing soil and groundwater contamination is generally site-specific and depends on past, present, and future uses and existing soil, sediment, and groundwater conditions. Any hazardous materials uncovered during construction activities would be managed consistent with applicable federal, State and local laws to limit exposure and clean up the contamination. In addition, the storage, handling and transport of hazardous materials are also regulated by federal, State and local regulatory agencies to limit risk of exposure.

The contribution of the project to cumulative risk of exposure would not be considerable. While construction and operational activities could result in accidental spills or leaks in the vicinity, the extent of the contamination is not likely to extend beyond the project site boundaries due to the type and limited quantities of hazardous materials likely to be used (for example, motor fuels, hydraulic oils, paint, and lubricants). Furthermore, as identified above, all proposed project activities associated with the use, storage and transportation of hazardous materials would be required to adhere to all applicable laws and regulations. Operation of dairy digester and co-digester facilities would capture and use biogas for energy production. Handling of biogas could be hazardous due to its health risk and flammability. Compliance with existing laws and regulations regarding health and safety and fire safety would minimize the potential for harmful exposures and fires associated with the handling of biogas.

In sum, the construction and operation of the project in combination with other projects in the project area would not create a significant hazard to the public or the environment through the routine transport, use, disposal or accidental release of hazardous materials due to the site-specific nature of the potential impacts and existing laws and regulations that minimize the risk of exposure. Therefore, this is considered a less-than-significant cumulative impact.

Although not required, to further reduce the magnitude of the project's contribution to this less-than-significant cumulative impact, Mitigation Measure 10.1 recommends preparation of a Phase I ESA to identify the potential for known soil or groundwater contamination and Mitigation Measure 10.5 recommends that dairy digester and co-digester facilities not be constructed and operated within ¼-mile of existing or proposed schools and other sensitive land uses.

Mitigation Measure 10.7: Implement Mitigation Measures 10.1 and 10.5.

Impact Significance After Mitigation: Less than Significant

Mitigation Measure 10.1 recommends preparation of a Phase I ESA to identify the potential for known soil or groundwater contamination on or in the vicinity of proposed facilities. If contaminated sites are identified follow-up sampling would be conducted to characterize soil and groundwater contamination and appropriate remediation would occur consistent with applicable laws, regulations, ordinances and guidance. Mitigation Measure 10.5 would ensure that dairy digester facilities, co-digester facilities and centralized processing facilities would be located more than one quarter mile from sensitive land uses; therefore, further reducing the potential for exposure to hazardous materials and fire hazards.

10.3 References

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CHAPTER 11

Aesthetic Resources

11.1 Setting

Environmental Setting

Visual and aesthetic resources within the project area, the jurisdictional boundaries of the Central Valley Region (Region 5), include a mix of urban, rural, and remote landscapes. The project would primarily result in potential impacts to areas dominated by agricultural uses and landscapes. These areas typically afford open views with few trees and little topographical relief. Agricultural structures, such as barns, silos, fences, and farm equipment are common, as well as agricultural products, such as row crops and livestock. Dairies are a common site in these areas; the counties with the largest portion of dairies within the project area include Tulare, Merced, Stanislaus and Kings Counties.

Physical settings may vary widely with respect to dairies. Such physical setting variables may include, but are not limited to:

- distances to nearby rural residences, rural subdivisions, and urban areas;
- distances to sensitive receptors such as recreation or assembly areas, high-traffic streets or roads, restaurants, hospitals, and schools;
- prevailing wind conditions; and
- available access routes and near-site development along such routes.

Typical agricultural sites are level areas with relatively large landholdings that are separate from urban centers. Development throughout the Central Valley region during the late 19th and early 20th centuries centered along waterways and railroad lines, with towns and cities developing along these linear features. Agricultural sites, such as dairies, are frequently located in the general vicinity of a more populous urban area, but zoning and land use restrictions typically prevent dairies from being directly adjacent to urban areas. Dairies are generally accessed by two-lane county roads with relatively low traffic volumes. The potential for visual impact of most dairy properties is limited because they are typically located away from urban centers and major highways. In terms of dairies with digester facilities, their visual and aesthetical characteristics are generally consistent with dairy operations that do not contain these facilities, in that dairy digester facilities are not out of character for the agricultural landscape.

A typical dairy includes structures and buildings similar in scale, form and materials to existing agricultural and residential buildings in agricultural areas. Dairy structures include the main dairy barns, residences and offices, shaded corrals, water tanks, ponds, lagoons, and other barns. The

addition of dairy digester facilities would result in the potential addition of covered lagoons, flares, above and below ground digester tank structures, storage tanks, and structures to house the biogas post-processing equipment (**Figures 11-1** through **11-6**) and other smaller miscellaneous equipment or structures. Photographs and descriptions of typical dairy digester facilities are provided in the Program Description (see Chapter 3, Program Description).

The Central Valley is a generally flat region, consisting of approximately 60,000 square miles extending from Kern County in the south to Shasta County in the north. Viewpoints of the Central Valley typically include long stretches of irrigated agricultural land, aqueducts transporting water throughout the state, concentrated pockets of urban development, and views of either the Coastal or Sierra Nevada mountain ranges. Agricultural development ranges from small farms to enterprises of several thousand acres, with most agricultural operations ranging from small to medium sized. Broad views of the Central Valley would not be impacted by the presence of dairy digesters, as digester facilities would result in a comparatively minor addition to the view shed.

Scenic Roadways

Many state highways are located in areas of outstanding natural beauty. California's Scenic Highway Program was created by the Legislature in 1963 to preserve and protect scenic highway corridors from change which would diminish the aesthetic value of lands adjacent to highways (Caltrans, nd). A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The corridor protection program does not preclude development, but seeks to encourage quality development that does not degrade the scenic value of the corridor. Scenic Highways are identified as either eligible (E) for listing or officially designated (OD), and those located within the project area are described in **Table 11-1** below.

**TABLE 11-1
DESIGNATED AND ELIGIBLE SCENIC HIGHWAYS WITHIN THE PROJECT AREA**

Route	County	Location (From/To)	Designation
4	Alpine	Calaveras County line/SR 89	OD
4	Calaveras / Alpine	SR 49 near Angel's Camp/SR 89	E
4	Calaveras	East of Arnold/Alpine County line	OD
16	Colusa / Yolo	SR 20/Capay	E
4	Contra Costa	SR 160 near Antioch/SR 84 near Brentwood	E
14	Kern	SR 58 near Mojave/SR 395 near Little Lake	E
20	Mendocino / Lake / Colusa	SR 101 near Calpella/SR 16	E
5	Merced / San Joaquin	SR 152 west of Los Banos/I-580 near Vernalis	E
5	Merced	SR 152/Stanislaus County line	OD
20	Nevada	SR 49 near Grass Valley/I-80 near Emigrant Gap	E
20	Nevada	Skillman Flat campground/0.5 miles east of Lowell Hill Rd	OD
5	San Joaquin	Stanislaus County line/I-580	OD
5	Shasta	SR 44 near Redding/Shasta Reservoir	E
5	Siskiyou	SR 89 near Mt Shasta/SR 97 near Weed	E
5	Siskiyou	SR 3 near Yreka/Oregon State Line near Hilt	E
5	Stanislaus	Merced County line/San Joaquin County line	OD
3	Trinity / Siskiyou	SR 299 near Weaverville/Montague	E
3	Trinity	SR 36 near Peanut/SR 299 near Douglas City	E

SOURCE: Caltrans, 2010



SOURCE: ESA, 2010

Dairy Digester and Co-Digestion Facilities. 209481

Figure 11-1
Flare and Shaded Corrals



SOURCE: ESA, 2010

Dairy Digester and Co-Digestion Facilities. 209481

Figure 11-2
Complete Mix Digester Tanks



SOURCE: ESA, 2010

Dairy Digester and Co-Digestion Facilities. 209481

Figure 11-3
Covered Lagoon Digester



SOURCE: ESA, 2010

Dairy Digester and Co-Digestion Facilities. 209481

Figure 11-4
Biogas Processing and Electrical Generation Engine Room



SOURCE: ESA, 2010

Dairy Digester and Co-Digestion Facilities. 209481

Figure 11-5
Corral and Barn Facilities



SOURCE: Werblow, 2010

Dairy Digester and Co-Digestion Facilities. 209481

Figure 11-6
Centralized Facility Example, Vintage Dairy, Riverdale, California

Sensitive Receptors

Sensitive receptors subject to the potential effects of visual changes resulting from the project include travelers along local roadways and regional highways as well as residents living along or in the vicinity of areas subject to the development of new dairy digester facilities. Given the programmatic nature of this analysis, specific locations of potential receptors cannot be identified at this time.

Regulatory Setting

Federal

There are no federal aesthetic regulations applicable to this program.

State

California Department of Transportation – California Scenic Highways Program

California's Scenic Highway Program, run by Caltrans, was created by the Legislature in 1963 (Caltrans, nd). Its purpose is to protect and enhance the natural scenic beauty of California highways and adjacent corridors, through special conservation treatment. The State laws governing the Scenic Highway Program are found in the Streets and Highways Code, §260 through §263. Responsibility for the development of scenic highways, and the establishment and application of specific planning and design standards and procedures falls to State and local agencies.

Local

Various cities and counties within the project area contain design and aesthetic regulations relating to agricultural and dairies. Some California counties, including Madera, Glenn, and Kings Counties, possess General Plans that include a Dairy Element, which provides guidance and policies regarding the management and setting of existing and new dairies within the counties. Such guidance includes buffer zones between dairies and sensitive receptors, and policies addressing light and glare issues from dairies.

11.2 Impacts and Mitigation Measures

Approach and Methods

The evaluation was performed in light of current conditions in the project area, applicable regulations and guidelines, and typical construction activities and operations of dairy digester and co-digester facilities. In determining the level of significance, the analysis assumed that the dairy digester and co-digester facilities would comply with relevant federal, State, and local ordinances and regulations.

ESA conducted a site visit to three dairies with anaerobic digestion facilities within the Central Valley region that lie within Central Valley Water Board boundaries on April 8, 2010 (ESA, 2010). These dairies included Fiscalini Dairy (Modesto), Castelanelli Brothers Dairy (Lodi), and

Tollenaar Holsteins Dairy (Elk Grove). Facility operators were present at each dairy to respond to questions regarding the facilities.

The impact analysis focuses on foreseeable changes to existing conditions in the project area attributable to the project. The assessment of visual resources is a qualitative review of the existing resources located within the project area and a determination of whether the project would result in an adverse impact to these resources. Various methodologies for the evaluation of impacts to visual resources are available and were reviewed in the development of aesthetics impact methodology. The Bureau of Land Management's Visual Resource Management design techniques, including guidance on scale, location and screening of structures, were reviewed, as well as the U.S. Forest Service's Visual Management System (Bureau of Land Management, nd; Bacon, 1979). In making determinations of the impact of increased development of dairy digesters, ESA considered the potential scenic quality of the project site and vicinity, viewing distances and degree to which project components or activities interact with existing landscape characteristics, and the extent the project feature or activities would block views of higher value landscape features.

Thresholds of Significance

An impact related to aesthetics would be considered significant if it would result in any of the following, which are adapted from Appendix G of the CEQA *Guidelines*:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

The following discussion of environmental impacts is limited to those potential impacts that could result in some level of potentially significant environmental change, as defined by CEQA. Dairy digesters are likely to be constructed at dairies or at central facilities in agricultural areas and they would be consistent with other major structures that are part of the visual character of agricultural areas. The visual effect of the digesters developed as a result of the project would not be likely to substantially degrade the visual character of the site and its surroundings, and would still be subject to potential discretionary review from local jurisdictions. Therefore, no impact would occur under this category, and this category is not discussed further within this section.

Impact 11.1: Implementation of the project, including operation of dairy digester and co-digestion facilities, could result in impacts to scenic highways and/or scenic vistas. (Significant)

The general height, scale, lighting, and design of typical dairy digester facilities that could be developed as a result of the project would be consistent with other dairy buildings in the agricultural zones of the project area. The scale of dairy digester facilities at a typical dairy would remain on a similar scale to other agricultural and residential buildings, and would not be out of

character for the surrounding visual landscape. The project does not preempt or supersede the authority of local agencies to prohibit, restrict, or control the development along scenic highways, and therefore in the event that these facilities are located within sight of a scenic highway or vista, local regulations regarding development shall be adhered to.

Centralized facilities would be located either on dairies or on nearby similarly zoned parcels in order to minimize transportation costs for the movement of gas and manure from dairies. As the design and location of these facilities is unknown, there is the potential for the construction of these facilities to result in significant visual impact to sensitive receptors. Implementation of Mitigation Measure 11.1a through 11.1c would result in a less-than-significant impact.

Mitigation Measures

Measure 11.1a: Centralized biogas processing facilities shall be sited in locations that do not conflict with local polices for preservation of vistas or scenic views.

Measure 11.1b: When feasible considering the scale of the facilities and the site specific topography, site specific landscape design, including berms and/or tree rows, shall be constructed in order to minimize potentially sensitive views of both digester facilities at dairies or off dairies at centralized facilities.

Measure 11.1c: Centralized biogas processing facilities shall be designed similarly in massing and scale to other nearby agricultural buildings in agricultural areas, in order to retain the character of the surrounding visual landscape

Impact Significance After Mitigation: Less than Significant

Impact 11.2 Construction of the project could result in impacts to scenic highways and/or scenic vistas. (Significant)

Construction of dairy digester facilities would typically occur on a small scale, with development occurring alongside existing dairies or on similarly zoned parcels. The presence and activity of equipment during construction activities has the potential to present a short term impact to visual resources. As described above, the project does not preempt or supersede the authority of local agencies to prohibit, restrict, or control the development along scenic highways, and therefore in the event that these facilities are located within sight of a scenic highway or vista, local regulations regarding development shall be adhered to.

As the design and location of the dairy digester facilities is unknown, there is the potential for the construction of these facilities to result in significant visual impact to sensitive receptors. Implementation of Mitigation Measure 11.2 would result in a less-than-significant impact.

Mitigation Measure

Measure 11.2: The project shall incorporate into all construction contracts for the proposed project and ensure implementation of the following measures:

- Main construction staging areas and the storage of large equipment shall be situated on individual sites in such a manner to minimize visibility to nearby receptors. As feasible, staging areas and storage shall occur away from heavily traveled designated scenic roadways, in areas where it would be least visible from the surrounding roads.
- Construction staging areas shall be onsite and remain clear of all trash, weeds and debris, etc. Construction staging areas shall be located in areas that limit visibility from scenic roadways and sensitive receptors to the extent feasible.

Impact Significance After Mitigation: Less than Significant

Impact 11.3: Implementation of the project could result in substantial creation of or change in light or glare. (Significant)

New dairy digester facilities would typically include some night-time lighting of equipment or structures. Outdoor lighting may result in a slight loss of darkness in the night sky. Nearby residents may experience a slight brightening in the night sky due to project lighting. Lighting and glare impacts would not be considered significant to these homes, however, as the resultant lighting in itself would not constitute a significant increase over that lighting used at typical dairy operations and any other agricultural operations in the area.

However, the construction of dairy digesters would include flares, which provide for the destruction of air pollutants from releases for excess biogas, sometimes as a result of upset or emergency conditions. The flare burns minimal amounts of gas 24 hours a day, but flames could extend upwards of 10 feet in height during periods of excess gas production, when portions of the gas need to be released. Flames are not typically visible from a distance of over 100 feet during daytime hours; however, at night the emergency burning of excess gas can cause the flare to become visible to nearby sensitive receptors, including passing drivers along local and State roadways, depending on the location of the flare on the property and its design. This is a potentially significant impact. Implementation of Mitigation Measure 11.3 would result in a less-than-significant impact to light and glare.

Mitigation Measure

Measure 11.3: Whenever possible, flares shall be situated on individual sites in such a manner to minimize visibility to nearby receptors. Site specific design shall discourage placement of flares at higher elevations, or within the line of site of nearby residential buildings or scenic highways. In the event that site design does not provide adequate coverage, an enclosed flare design shall be used or landscaping, such as berms or tree rows, shall be constructed to minimize light impacts.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 11.3 would reduce light and glare impacts from flares to a less-than-significant level.

Impact 11.4: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to aesthetics. (Significant)

The geographic scope of the cumulative impacts to visual quality is the local viewsheds that could be affected by the views of dairy digester facilities from public roadways and residential areas.

Future agricultural development is guided by city and county General Plans, and other applicable planning and environmental documents. New development could be subject to the site specific City and County design review process. As described above, typical dairy digester facilities would be similar in massing and scale to other nearby agricultural buildings in agricultural areas, and would not be out of character for the surrounding visual landscape. In addition, in light of the size of the typical dairy, dairy digester facilities would be separated by large distances even when such facilities are located on adjacent dairies. In the event that multiple dairy digester facilities are located within the same local viewshed, impacts to visual resources may occur. It is not anticipated that future project development would result in significant impacts to broad views of the region, nor are future projects anticipated to result in extensive vegetation clearance, as the majority of facilities would be located either on dairy sites or on similar nearby parcels. However, as noted in Impact 11.1 and 11.2, above, mitigation is needed to reduce construction and operation impacts to aesthetics to less-than-significant levels. Therefore, development of dairy digester and co-digester facilities could contribute to cumulative aesthetics impacts. This impact is significant. Mitigation Measures 11.1a, 11.1b, 11.1c, 11.2 and 11.3 would reduce cumulative visual impacts to a less-than-significant level

Mitigation Measure

Mitigation Measure 11.4: Implement Mitigation Measures 11.1a, 11.1b, 11.1c, 11.2, and 11.3.

Significance After Mitigation: Less than Significant

11.3 References

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CHAPTER 12

Cultural Resources

Cultural resources are defined as any object or specific location of past human activity, occupation, or use that is 50 years old and identifiable through historical documentation, inventory, or oral evidence. A wide variety of nonrenewable cultural resources is found throughout California that, if documented, makes a substantial contribution to our understanding of the state's culture, history, and heritage. Three categories are used to characterize cultural resources: archaeological, architectural (i.e., the built environment), and traditional or ethnographic. Within these three categories, historically or culturally significant resources may also achieve recognition as "historic properties" or "historical resources," as defined below.

Prehistoric and Historic Archaeological Resources

Archaeological resources include both prehistoric and historic remains of human activity. Prehistoric archaeological resources reflect the cultural complexity of ancient California and may include, but not be limited to, habitation sites, temporary camps, stone tool scatters, bedrock mortars, milling implements, roasting pits, subsistence remains, rock art, ceremonial sites, trails, and other traces of Native American behavior prior to the historic period. Historic archaeological resources are the physical evidence of activities by peoples who also left written records of their history and may include, but not be limited to, sites of former residential, ranching, farming, mining or industrial activities, foundations or other structural remnants, refuse deposits or scatters, historic objects, such as bottles and cans, shipwrecks, abandoned roadbeds, and other traces of the activities of California's diverse cultures. Both prehistoric and historic archaeological sites may include surface or subsurface deposits or features, buried or otherwise affected by natural geomorphic processes. Archaeological sites may also contain both prehistoric and historic-era components, and have the potential to contribute to our knowledge of local, regional or national prehistory or history, including the sequence of human occupation and temporal changes in climate and resource availability, creating a picture of former inhabitants and their environment.

Built Environment Resources

Built environment resources include an array of historic buildings, structures, and objects serving as a physical connection to California's past. Unlike structures, buildings are created to shelter human activity. Built environment resources may include, but not be limited to, Mission period adobes, Gold Rush-era buildings, Civilian Conservation Corps camps, Chinatowns, ghost towns, unique structures, monuments, canals, historic roads and trails, bridges, ditches, dams, stamp mills, rock walls, courthouses, churches, historic building districts in urban cores, and cemeteries. With the exception of some types of structures, such as tunnels, built environment resources are generally

situated above ground. Similar to archaeological sites, built environment resources have the potential to contribute to our knowledge of local, regional or national history, showcasing the changes in architectural styles and function developed since California was initially colonized nearly 250 years ago.

Traditional or Ethnographic Resources

Traditional or ethnographic cultural resources may include, but are not limited to, Native American sacred sites and traditional resources of any ethnic community that are important for maintaining the cultural traditions of any group, including Native American, African, Asian, and European groups (Parker and King 1998). Following the discovery of gold in California, many different ethnic groups established communities in California. Such resources may include, but not be limited to, traditional landscapes, sacred mountains, buildings, ethnic neighborhoods, structures, objects, cemeteries, ceremonial use areas, or areas where plants are collected for food, medicine, or basket weaving. A traditional cultural property (TCP) is defined generally as one that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that (1) are rooted in that community's history, and (2) are important in maintaining the continuing cultural identity of the community. A potential TCP is a "riverscape" that has significant cultural value and includes a river and its associated features, including water, wildlife, fish, and topography (Gates 2003).

Historic Properties and Historical Resources

"Historic properties" and "historical resources" are terms with defined statutory meanings and include any prehistoric or historic archaeological site, district, built environment resource, or TCP recognized as historically or culturally significant. Under federal law, a historic property is "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP]" (36 CFR 800.16(1)(1)). Districts include the property types known as cultural landscapes (i.e., historic, rural, designed). Under California State law, a historical resource is "a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources [CRHR]," "a resource included in a local register of historical resources," or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant" (California Public Resources Code [PRC] §21084.1; 14 California Code of Regulations [CCR] §15064.5(a)). As defined in PRC §5097.9 and 5097.993, Native American historic, cultural, or sacred sites may be listed or eligible for listing in the CRHR pursuant to PRC §5024.1. The criteria for listing resources on the CRHR were expressly developed to be in accordance with previously established criteria developed for listing on the NRHP (see below). Historic properties located in California are considered historical resources and automatically listed in the CRHR.

Paleontological Resources

Paleontological resources include fossils or imprints, the remains of prehistoric plants and animals, that are important scientific and educational resources due to their use in (1) documenting the presence and evolutionary history of particular extinct and extant organism groups, (2) reconstructing the environments in which these organisms lived, and (3) determining the relative ages of strata in

which they occur and the geologic events that resulted in the deposition of the sediments that formed these strata. Specifically, paleontological resources may include, but are not limited to, mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains.

This chapter describes the general cultural setting of the Central Valley region, including prehistoric archaeological, ethnographic, historic archaeological and architectural, and paleontological descriptions.

This chapter further addresses applicable federal, State and local laws, ordinances, regulations, and standards enacted to protect cultural resources; determination if a cultural resource is significant; potential impacts; and recommends mitigation measures to reduce or eliminate significant impacts.

12.1 Environmental Setting

Prehistoric Setting

The jurisdictional boundaries of the Central Valley Region (Region 5) are situated within the northern interior, Central Valley, and Sierra Nevada regions of inland California. This extensive area, which stretches southward from Modoc County in the northern interior through the Sacramento Valley to Kern County in the southern San Joaquin Valley, was occupied by different prehistoric cultures dating to as early as 8,000 to 12,000 years ago. Characteristic artifacts representative of this early period are fluted Clovis or Folsom projectile points that are generally associated with the hunting of large game animals by relatively mobile groups of hunter-gatherers. Although evidence for the presence of humans prior to about 8,000 years ago is relatively sparse and scattered throughout the state, fluted points have been found at more than a dozen archaeological sites in the northern interior, Central Valley, and Sierra Nevada regions (Rondeau et al. 2007), including many associated with Pleistocene lakeshores, such as Buena Vista, Kern, and Tulare Lakes in today's Kern and Kings Counties.

Approximately 8,000 years ago, regional subsistence strategies in the northern interior, Central Valley, and Sierra Nevada shifted to an increased emphasis on plant resources as a result of climatic changes and the drying of pluvial lakes. The abundance of milling implements in archaeological sites between 8,000 and 3,000 years ago attests to the addition of hard seeds, acorns, and pine nuts to a wide range of natural resources (game animals, wild plants, waterfowl, and fish) procured as part of a seasonal foraging pattern. Subsistence patterns varied somewhat as groups became better adapted to their regional or local environments. Examples of these distinct cultural patterns have been identified in stratified archaeological deposits as distant as Shasta County in the northern interior and the shores of Buena Vista Lake in Kern County in the southern San Joaquin Valley (Raven 1984; Rosenthal et al. 2007).

After approximately 3,000 years ago, the complexity of the prehistoric archaeological record within the vast Central Valley from Modoc and Shasta Counties southward to Kern and Tulare Counties reflects increases in specialized adaptations to locally available resources such as acorns and salmon, in permanently occupied settlements, and in the expansion of regional populations and trade networks.

The increase in sedentism and exchange networks was accompanied by the development of social stratification and craft specialization, as indicated by the variety of artifacts, including bone tools, basketry, obsidian tools, brownware ceramics in some parts of the Central Valley and northern interior, marine shell beads, the use of clamshell disk beads as a form of currency, and variation in burial types and associated grave goods (Hull 2007; McGuire 2007; Rosenthal et al. 2007).

Ethnographic Setting

At the time of European contact, California was the home of approximately 310,000 indigenous people with a complex of cultures distinguished by linguistic affiliation and territorial boundaries (Cook 1978; Mithun 2001). Population density among these mainly sedentary, complex hunter-gatherer native California groups varied, depending mainly on availability and dependability of local resources. Distinct native Californian cultural groups spoke approximately 74 languages plus a large number of dialects. Based on three volumes included in the *Handbook of North American Indians* (d'Azevedo 1986; Heizer 1978; Walker 1988), at least 19 groups, with even more subgroups, inhabited the lands within the Central Valley and Sierran foothills. An inventory of Native American groups in California (UCB 2002) indicates at least the following tribes may have aboriginal lands located within the vast Central Valley region: Achomawi, Atsugewi, Bay Miwok, Huchnom, Klamath, Konkow, Lake Miwok, Maidu, Modoc, Mono, Nisenan, Nomlake, Northern Paiute, Owens Valley Paiute, Patwin, Plains Miwok, Pomo/Kashaya Pomo, Shasta, Shoshone, Sierra Miwok, Wappo, Washo, Wintu, Yahi/Yana, Yokuts, and Yuki.

Like most native Californian groups, those inhabiting the Central Valley region shared similar subsistence practices, settlement patterns, technology, material culture, social organization, and religious beliefs (Heizer 1978; d'Azevedo 1986). The fundamental economy of these complex hunter-gatherer groups was one of subsistence fishing, hunting, and collecting plant foods. Similar to most California Native Americans, the majority relied on the acorn as a dietary staple. Contributions of the various plant, animal, waterfowl, and fish resources to the diet depended on seasonal availability and the geographic location of each group. Fall salmon runs, for example, were depended on by the northern and central interior groups.

Permanent villages were established by the various Native American groups along interior waterways and near lakes and wetlands. Although the social organization of indigenous Californians varied throughout the state, villages or political units were generally organized under a headman. For some groups, the headman also functioned as the religious ceremonial leader. The size of villages and satellite villages depended on local resource availability, including the distance traveled to temporary encampments to collect seasonally available resources, such as acorns or pine nuts. Village structures varied with locally available material, from conical plank or bark houses in the north and the Sierras to thatch or earth covered semi-subterranean dwellings in the Central Valley. Many groups had sweathouses and ceremonial chambers; many had separate cemetery areas depending if internment or cremation was their standard mortuary practice.

Material culture among the groups within the Central Valley region included a variety of utilitarian, ornamental, and ceremonial items. Utilitarian items included basketry, netting, stone and bone tools,

milling implements, watercraft, fishing implements and weirs, and ceramics in parts of the Central Valley and northern interior. Ornamental and ceremonial items included marine shell beads and pendants, medicine tubes, effigies, pipes, charmstones, and musical instruments.

Trade and exchange networks were a significant part of the economy and social organization among California's Native American groups. Obsidian, steatite, beads, acorns, baskets, animal skins, and dried fish were among the variety of traded commodities. Inland groups supplied obsidian from sources along the Sierra Nevada and in the northeast corner of the state. Coastal groups supplied the marine shell beads and ornaments. In addition to trading specific items, clamshell disk beads were widely used as a form of currency.

Native American groups living along the California coast were the first to experience the effect of Spanish settlement and missionization, beginning in 1769. Some of the northern inland tribes had little or no contact with Europeans until at least the 1820s, but epidemics and the 1848 Gold Rush had a tragic effect on the lives of native peoples. Seventy-five percent of the population in the Central Valley is estimated to have perished from a series of epidemics that swept through the Sacramento Valley and San Joaquin Valley between 1830 and 1837 (Cook 1955). Although the Gold Rush resulted in an economic boom and statehood by 1850, the loss of hunting and gathering lands, introduction and concentration of diseases, violence, malnutrition, and starvation of native peoples accompanied the waves of immigrants. California's native population was reduced to only 50,000 people between 1845 and 1855; by 1900, there were only 20,000 or less than seven percent of the pre-contact number (Cook 1978).

Historic Setting

The Spanish were the earliest European explorers to claim and enter what would become the state of California. Although there were brief visits by Spanish, as well as Russian and British, Pacific coast explorers between 1529 and 1769, the official beginning of Spain's conquest and colonization of California began in 1769 with the establishment of a mission and settlement at San Diego. Between 1769 and 1823, the Spanish and the Franciscan Order established a series of 21 missions paralleling the coast along El Camino Real between San Diego and Sonoma. Spain also established four presidios and three pueblos during this period (Hoover et al. 2002; Schuyler 1978).

Large tracts of land fell under the jurisdiction of the Franciscan missions, and during the Spanish Period retired Spanish military had also been charged with running large cattle and agricultural ranchos. As Native American groups within these areas were converted to Christianity, they were removed from their traditional lands and settled at the missions, pueblos or ranchos and used as labor. The friars held title to the land in trust for the indigenous groups, to be repatriated once they learned Spanish laws and culture.

Following independence from Spain in 1822, Mexico awarded extensive land grants to Mexican citizens and opened California to exploration by American fur trappers and mountain men. In order to increase the population away from the more settled coastal areas where the Spanish settlements were concentrated, most of some 500 Mexican land grants were located in the interior (Grunsky

1989; Hoover et al. 2002). Captain John Sutter received the two largest land grants in the Sacramento Valley, and in 1839 he founded the trading and agricultural empire headquartered at Sutter's Fort near the divergence of the Sacramento and American Rivers in today's City of Sacramento.

The process of secularization of the Franciscan mission lands began shortly after the declaration of Mexican independence. Although Native American converts were freed from mission control, Mexican land policies did not adequately protect their interests (Castillo 1978). The lands and property were not divided among the Native American converts and clerical authorities as was originally intended. Most Native American converts returned to traditional lands that had not yet been colonized or found work with the large cattle ranchos being carved out of the mission lands. With the end of the mission system, the entire Mexican economy shifted to the owners of the large ranchos.

Jedediah Smith was the first American trapper to enter California; his party explored along the Sierra Nevada in 1826 and entered the Sacramento Valley in 1827, camping near modern-day Sacramento (Grunsky 1989). Other fur trappers and mountain men, some with the Hudson's Bay Company, entered California in the late 1820s and 1830s. A number of American settlers had arrived in California via overland routes by the mid-1840s.

With the signing of the Treaty of Guadalupe Hidalgo in 1848, 25 years of Mexican rule over California and the two-year Mexican–American War were ended. Lt. Colonel John C. Frémont of the U.S. Mounted Rifles had captured Sutter's Fort in Sacramento, made Sutter a prisoner, and encouraged an American uprising in 1846. The Bear Flag of the California Republic was raised in the town of Sonoma that same year, and in 1847 Frémont had captured the pueblo of Santa Barbara (Hoover et al. 2002). With its release of Mexico's northern lands, California became a territory of the United States.

In 1848 gold was discovered on the American River at Sutter's Mill not far from Sacramento in today's El Dorado County. The resulting Gold Rush era influenced the history of the state and the nation. Drawn by the tales of large nuggets and easy pickings, people traveled to the gold fields by sea or land from the eastern United States, Mexico, Europe, Chile, and China, among other countries. Prospects were established along the western slope of the Sierra Nevada from the Feather River south to the Tuolumne River drainage, and gold was also discovered in other parts of California.

California became the 31st state in 1850, largely as a result of the Gold Rush. By 1853, the population of the state exceeded 300,000 and in 1854, Sacramento became the state capital. Sacramento was a central location to the foothill mining districts, served as a river transportation hub, and had 12 stage lines by 1853. Sacramento was also the westernmost point of the Pony Express (1860–1861) and the terminal of the first California railroad, the Sacramento Valley line (Beck and Haase 1974). In San Joaquin County, a second supply and shipping center at the Port of Stockton also grew with the influx of gold miners.

Outside the city ports of Sacramento, Stockton and San Francisco, the increasing demand for food and commodities by the miners boosted the expansion and success of the agricultural industry, increased cattle and sheep ranching, and poultry production. Lumber production, the manufacture of clothing and dry goods, the ore processing industry, and the beginning of a fishing industry

were also prompted during the Gold Rush era (Beck and Haase 1974). Thousands of settlers and immigrants continued to pour into the state, particularly after the completion of the transcontinental railroad in 1869. Subsequent settlement of the American West was also encouraged by the passage of the Swampland Acts of the mid 1800s-early 1900s and the Homestead Act of 1862, among others.

As gold mining declined, cattle and sheep ranching and agriculture assumed a more prominent role in the state's economy. The vast Central Valley's climate and fertile soil, plus the construction of extensive irrigation systems, combined to produce a variety of fruits, vegetables, nuts, and grains. Population growth and changes in the landscape within the Central Valley region reflect the importance of mining, the growth of agriculture and ranching, and the regional transportation network. The economy of the Central Valley is largely based on agriculture, and California remains a national leader in the production of agricultural products. A wealth of natural resources, such as lumber, minerals, fish, and petroleum deposits, also contribute to the region's continuing growth and development.

Paleontological Setting

Paleontological Assessment Standards

The Society of Vertebrate Paleontology (SVP) has established guidelines for the identification, assessment, and mitigation of adverse impacts on nonrenewable paleontological resources (SVP, 1995; 1996). Most practicing paleontologists in the nation adhere closely to the SVP's assessment, mitigation, and monitoring requirements as outlined in these guidelines, which were approved through a consensus of professional paleontologists. The SVP (1995) outlined criteria for screening the paleontological potential¹ of rock units and established assessment and mitigation procedures tailored to such potential. **Table 12-1** lists the criteria for high-potential, undetermined, and low-potential rock units.

**TABLE 12-1
PALEONTOLOGICAL POTENTIAL CRITERIA**

Paleontological Potential	Description
High	Geologic units from which vertebrate or significant invertebrate or plant fossils have been recovered. Only invertebrate fossils that provide new information on existing flora or fauna or on the age of a rock unit would be considered significant.
Undetermined	Geologic units for which little to no information are available.
Low	Geologic units that are not known to have produced a substantial body of significant paleontological material.

SOURCE: SVP 1995.

Paleontological Resource Potential

The majority of the project area lies within the Central Valley (or the Great Valley), which is an elongated depression that lies between the Coast Ranges and the Sierra Nevada. It is about 430

¹ Paleontological potential refers to the likelihood that a rock unit will yield a unique or significant paleontological resource.

miles long and about 75 miles wide. At its extreme northern and southern ends, the elevation is about 400 feet. At its center, east of San Francisco Bay, it is slightly below sea level. Geologically, the Central Valley is a large sediment-filled basin, where interbedded mud, silt, sand and gravel thousands of feet deep overlie Sierran basement rocks that extend downward at an angle from the western slope of the Sierra Nevada.

The fossil yielding potential of a particular area is highly dependent on the geologic age and origin of the underlying rocks, and is best determined by identifying the aerial and stratigraphic extents of the local geology, and performing a site-specific search of fossil locality records and peer-reviewed literature. However, for the purpose of this regional-scale analysis, the fossil-yielding potential of the region can be classified based on the aerial and stratigraphic extents of several broad geologic categories. As detailed below, the paleontological potential of subsurface materials generally increases with depth beneath the surface, as well as proximity to valley margins and foothills. Soil and rock types are described below as having a low to high paleontological potential, based on SVP criteria (**Table 12-1**).

Disturbed soils and artificial fills

Urban and agricultural areas of the region have disturbed soils, reworked sediment, or artificial fills that are considered to have a *low paleontological potential*. In many urban locations, native soils have been heavily disturbed due to rough grading required for site developments, utility line installations and road construction. In agricultural areas, native soils have been greatly reworked due to historic plowing and crop-ripping. Such soils do not represent *in-situ* geologic deposits and it is highly unlikely that paleontological resources would be present. The depth of soil disturbances in urban areas is not uniform, but *in-situ* geologic deposits have generally been observed to occur at depths of about 6 feet below the ground surface (Dundas, 2010). The depth of historic-era disturbances in agricultural areas is also variable; typically the soils within the plow zone, for example, are disturbed to a depth of 2 feet or more below the ground surface.

Holocene-age sedimentary deposits

Holocene-age deposits (less than 10,000 years old) are considered to have a *low paleontological potential* because they are geologically immature and are unlikely to have fossilized the remains of organisms (fossilization processes take place over millions of years). Holocene-age deposits blanket the majority of the Central Valley floor and primarily consist of the following (Page, 1986):

- Flood-basin deposits of mud, muck, loam and sand, which occur during the flood-stages of major streams. These deposits are extensive along the long-axis of the central valley, and in the Sacramento-San Joaquin river delta.
- River deposits of gravel, sand and silt along channels, floodplains and natural levees of major streams. Typically, the widths of river floodplains are proportional to the size of their contributing watershed. Thus, these deposits range in width from several meters in the mountains to several kilometers near the delta.
- Younger (Holocene-age) alluvial fan deposits of gravel, sand and silt, typically located along the edges of the Central Valley, where streams exit the Sierra Nevada or Coast Range mountains. Alluvial fans form large lobes centered on a stream's outlet from the mountain, and develop due to the rapid deposition of their sediment load (triggered by the distinct break in stream gradient), and due to the lateral migration of stream channels over the land surface.

Generally, the maximum thickness of Holocene sediments in the Central Valley is estimated at 150 feet towards its center and in the bay delta regions, pinching out to near zero, along the valley margins (Page, 1986). The thickness of Holocene sediments is important because in almost all areas of the Central Valley, such sediments are underlain by Pleistocene or older sedimentary rocks with a high paleontological potential.

Pleistocene or older sedimentary rocks

Pleistocene or older (older than 10,000 years) continental sedimentary deposits are considered as having a *high paleontological potential*. Throughout California, such sedimentary formations have a history of yielding numerous vertebrate fossils of extinct mammals or other fauna. Examples of Pleistocene or older sedimentary rock units include the Tulare, Turlock Lake, Riverbank, Modesto, Kern River, San Joaquin, Etchegoin, Mehrten, Laguna, Temblor, Moreno and Tehama Formations. These formations have all yielded numerous vertebrate fossils (UCMP, 2010) and are mapped at the surface along the edges of the central valley and in many foothill areas, as well as underneath Holocene-age deposits closer to the valley's center (Page, 1986).

Metamorphic and igneous rocks

These rock units have a *low paleontological potential*, either because they formed beneath the surface of the earth (such as granite), or because they have been altered under high heat and pressures, chaotically mixed or severely fractured. Generally, the processes that form igneous and metamorphic rocks are too destructive to preserve identifiable fossil remains. The bulk of the Sierra Nevada range is formed by granitic intrusions and metamorphic rock complexes. The mountains in northern California and the Modoc Plateau area are composed primarily of volcanic rocks, and portions of the Coast Ranges are composed of metamorphic rock.

Regulatory Setting

Federal Regulations and Requirements

National Environmental Policy Act of 1969 (NEPA)

The National Environmental Policy Act (NEPA) addresses a wide range of environmental issues, and under NEPA federal agencies have broad responsibilities concerning the impacts of their activities on the environment, including resources of recognized archaeological or historic value (42 USC 4332; 40 CFR §1508.8, and 40 CFR §6.108[f]). Federal agencies are encouraged to coordinate compliance with Section 106 of the National Historic Preservation Act (NHPA) (see below) with the steps taken and documents prepared to meet the requirements of NEPA. The Advisory Council on Historic Preservation (ACHP) regulations (36 CFR 800.8.c) provide guidance on how the NEPA and Section 106 processes can be coordinated. The regulations also set forth the manner in which a federal agency can use the NEPA process and documentation to comply with Section 106.

National Historic Preservation Act (NHPA)

The National Historic Preservation Act (NHPA) of 1966 (16 USC §470), as amended, is the primary federal law governing the preservation of cultural and historic resources in the United States. The NHPA establishes the federal government policy on historic preservation and the programs through which this policy is implemented. Section 106 of NHPA (16 USC §470f) requires federal agencies to take into account the effects of their undertakings on any district, site, building, structure, or object that is included in or determined eligible for inclusion in the NRHP and to afford the ACHP a reasonable opportunity to comment on such undertakings (36 CFR §800.1). Under Section 106, the significance of any adversely affected cultural resource is assessed and mitigation measures are proposed to reduce any impacts to an acceptable level. Significant cultural resources (historic properties) are those resources that are listed in, or are eligible for listing on the NRHP per the criteria listed at 36 CFR §60.4. Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a Native American tribe to be determined eligible for inclusion on the NRHP. Section 106 also directs federal agencies to involve consulting parties, including the State Historic Preservation Officer (SHPO), Native American tribes, and local governments, and to provide an opportunity for public involvement during the compliance process (800 CFR §800.2(4)(c)).

To be eligible for the NRHP, cultural resources must possess integrity and meet at least one of the following four criteria delineated at 36 CFR §60.4:

- Are associated with events that have made a significant contribution to the broad patterns of our history (Criterion A);
- Are associated with the lives of persons significant in our past (Criterion B);
- Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C), or
- Have yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

Under Section 106, impacts of a project to historic properties that affect the characteristics that qualify a property for NRHP inclusion are considered a significant effect on the environment. Examples of adverse effects on historic properties are listed under 36 CFR §800.5(a)(2) and include, but are not limited to, physical destruction or damage to all or part of a property, change of the character of the use of the property or physical feature within the setting of the property that contribute to its significance, or introduction of visual, atmospheric, or audible elements that diminish the integrity of significant features of the property. If an adverse effect is found, the agency shall act pursuant to 36 CFR §800.6 (36 CFR §800.5[d][2]) to resolve the adverse effect by developing and evaluating alternatives or modifications to the undertaking that “could avoid, minimize or mitigate adverse effects on historic properties” (36 CFR §800.6[a]). Cultural resources that have been determined not eligible for the NRHP, in consultation with the SHPO and interested parties, require no further consideration unless new discoveries trigger re-evaluation.

Section 106 of the NHPA does not apply to paleontological resources unless they are found in a culturally-related context. In addition to the Antiquities Act (16 USC §431-433) of 1906, the

preservation and salvage of fossils and other paleontological resources can be protected under the National Registry of Natural Landmarks (16 USC §461-467) and NEPA, which directs federal agencies to “preserve important historic, cultural, and natural aspects of our national heritage.”

Archeological Resources Protection Act of 1979 (ARPA)

The Archeological Resources Protection Act (ARPA) of 1979 (43 CFR §7) may impose additional requirements on an agency if federal or Indian lands are involved. ARPA: (1) prohibits unauthorized excavation on federal and Indian lands; (2) establishes standards for permissible excavation; (3) prescribes civil and criminal penalties; (4) requires agencies to identify archeological sites; and (5) encourages cooperation between federal agencies and private individuals.

American Indian Religious Freedom Act of 1978 (AIRFA)

The American Indian Religious Freedom Act (AIRFA) of 1978 (42 USC 1996 ad 1996a) affirms the right of Native Americans to have access to their sacred places. If a place of religious importance to American Indians may be affected by an undertaking, AIRFA promotes consultation with Indian religious practitioners, which may be coordinated with Section 106 consultation. Amendments to Section 101 of NHPA in 1992 strengthened the interface between AIRFA and NHPA by clarifying the following: (1) properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined to be eligible for inclusion in the NRHP; and (2) in carrying out its responsibilities under Section 106, a federal agency shall consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to properties described under (1).

Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)

For activities on federal lands, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (43 CFR §10) requires consultation with “appropriate” Indian tribes (including Alaska Native villages) or Native Hawaiian organizations prior to the intentional excavation, or removal after inadvertent discovery, of several kinds of cultural items, including human remains and objects of cultural patrimony. For activities on Native American or Native Hawaiian lands, which are defined in the statute, NAGPRA requires the consent of the Indian tribe or Native Hawaiian organization prior to the removal of cultural items. The law also provides for the repatriation of such items from federal agencies and federally assisted museums and other repositories.

The 1992 amendments to the NHPA strengthened NAGPRA by encouraging “protection of Native American cultural items...and of properties of religious or cultural importance to Indian tribes, Native Hawaiians, or other Native American groups” (§112[b][3]) and by stipulating that a federal “...agency’s procedures for compliance with Section 106...provide for the disposition of Native American cultural items from federal or tribal land in a manner consistent with §3(c) of the Native American Graves Protection and Repatriation Act...”

The final rule of the NAGPRA regulations, effective May 14, 2010, added procedures for the disposition of culturally unidentifiable Native American human remains in the possession or control of museums of federal agencies. The rule also amended sections of NAGPRA related to purpose

and applicability of the regulations, definitions, inventories of human remains and related funerary objects, civil penalties, and limitations and remedies.

Executive Order 11593 (1971): Protection and Enhancement of the Cultural Environment

Under Executive Order 11593 (36 Federal Register (FR) 8921), the federal government shall provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the Nation. This Executive Order addresses the NRHP and provides guidance to those involved with federally controlled or owned properties that should be inventoried and nominated for listing on the NRHP.

Executive Order 13007 (1996): Protection and Preservation of Native American Sacred Sites

Executive Order 13007 (61FR 26771–26772) provides direction to improve the management of Native American sacred sites on federal lands. The Executive Order strives to protect and preserve Indian religious practices by accommodating access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and by avoiding adversely affecting the physical integrity of such sacred sites.

State Regulations and Requirements

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) of 1972 (PRC §21000, *et seq.*; California Environmental Quality Act Guidelines, California Code of Regulations (CCR), §1500, *et seq.*) is the principal regulatory control addressing impacts on historical and paleontological resources in California. Projects with the potential to adversely affect significant cultural resources must be reviewed through the CEQA process. As the designated CEQA lead agency for approval of the project, the Central Valley Water Board is responsible for complying with CEQA’s requirements regarding the identification of feasible measures to mitigate significant adverse changes to historical and paleontological resources and ensuring that the measures are enforceable through permit conditions, agreements, or other measures.

Further direction on cultural resources can be found in the CEQA Guidelines (14 CCR §15064.5), “Determining the Significance of Impacts to Archaeological and Historical Resources.” Subsection (a) defines the term “historical resources.” Subsection (b) explains when a project may be deemed to have a significant effect on historical resources and defines terms used in describing those situations. Subsection (c) describes CEQA’s applicability to archaeological sites and provides a bridge between the application of the terms “historical resource” and a “unique” archaeological resource.

The term “historical resource” is similar to but more inclusive than the NRHP criteria. Under CEQA, a historical resource includes, but is not limited to:

- A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in the CRHR (PRC §5024.1; 14 CCR §4852)
- A resource included in a local register of historical resources (as defined by PRC §5020.1[k]), or identified in a historical resource survey meeting the requirements of PRC §5024.1(g) (presumption of historical significance), and:
 - Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage (Criterion 1);
 - Is associated with the lives of persons important in our past (Criterion 2);
 - Embodies the distinctive characteristics of a type, period, region, or method of installation, represents the work of an important creative individual, or possesses high artistic values (Criterion 3); or
 - Has yielded, or may be likely to yield, information important in prehistory or history (Criterion 4).
- A resource that the lead agency otherwise determines is a historical resource as defined by PRC §5020(j) or §5024.1.

CEQA Guidelines (14 CCR §15064.7), “Thresholds of Significance,” encourages agencies to develop thresholds of significance to be used in determining potential impacts and defines the term “cumulatively significant.”

CEQA Guidelines (14 CCR §15065), “Mandatory Findings of Significance,” state that a lead agency shall find that project may have a significant effect on the environment and thereby require an EIR (or, if applicable, an EIR/EIS) to be prepared in certain circumstances. Subsection (a) of §15065 is applicable to cultural resources, and states that the project has the potential to eliminate important examples of major periods of California history or prehistory.

CEQA Guidelines (14 CCR §15126.4), “Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects,” subsection (b) discusses impacts of maintenance, repair, stabilization, restoration, conservation, or reconstruction of a historical resource. Subsection (b) also discusses mitigation through avoidance of damaging effects on any historical resource of an archaeological nature, preferably by preservation in place, or by data recovery through excavation if avoidance or preservation is not feasible. Data recovery must be conducted in accordance with an adopted data recovery plan.

In the case of projects that must consider both federal and State laws, regulations and standards, joint environmental documents, time limits for preparation, and cooperation with federal agencies on common documents is encouraged (14 CCR §15222, §15225).

California Public Resources Code

PRC §5024.1, establishes the CRHR; sets forth the criteria to determine significance (detailed above); defines eligible properties; and lists nomination procedures. As described in subsection (d), resources that are automatically listed in the CRHR include those listed in or formally determined eligible for listing in the NRHP and California Historical Landmarks from No. 770 onward.

PRC §5097.5 states that any unauthorized removal or destruction of archaeological or paleontological resources on sites located on public land is a misdemeanor. As used in this section, “public lands” is defined as “lands owned by, or under the jurisdiction of, the State, or any city, county, district, authority, or public corporation, or agency thereof.”

PRC §5097.9 prohibits the interference with the free expression of Native American religion as provided in the United States Constitution and the California Constitution; nor cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine on public property, except on a clear and convincing showing that the public interest and necessity so require.

PRC §5097.98 requires the Native American Heritage Commission (NAHC), upon notification by a county coroner, to notify the most likely descendants regarding the discovery of Native American human remains; enables the descendants, within 48 hours of the notification by the commission, to inspect the site of the discovery of Native American human remains and to recommend to the landowner or the person responsible for the excavation work means for treating or disposition, with appropriate dignity, the human remains and any associated grave goods; requires the owner of the land upon which Native American human remains were discovered, in the event that no descendant is identified, or the descendant fails to make a recommendation for disposition, or the landowner rejects the recommendation of the descendant, to reinter the remains and burial items with appropriate dignity of the property in a location not subject to further disturbance.

PRC §5097.99 prohibits obtaining or possessing Native American artifacts or human remains taken from a grave or cairn and sets penalties for those actions.

PRC §5097.991 states that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated.

PRC §21083.2 states that if a project may affect a resource that has not met with the definition of a historical resource set forth in §21084, then the lead agency may determine whether a project may have a significant effect on “unique” archaeological resources; if so an EIR (or, if applicable, an EIR/EIS) shall address these resources. If a potential for damage to unique archaeological resources can be demonstrated, such resources must be avoided; if they can not be avoided, mitigation measures shall be required. The law also discusses excavation as mitigation; discusses the costs of mitigation for several types of projects; sets time frames for excavation; defines unique and non-unique archaeological resources; provides for mitigation of unexpected resources; and sets financial limitations for this section.

PRC §21084.1 indicates that a project may have a significant effect on the environment if it causes a substantial adverse change in the significance of a historical resource; the section further defines a “historical resource” and describes what constitutes a “significant” historical resource.

California Administrative Code

California Administrative Code (14 Administrative Code §4307) states that no person shall remove, injure, deface, or destroy any object of paleontological, archaeological or historical interest or value.

California Penal Code

California Penal Code §622.5 establishes as a misdemeanor with willful injury, disfiguration, defacement, or destruction of any object or thing of archaeological or historical interest or value, whether situated on private or public lands.

California Health and Safety Code

California Health and Safety Code (HSC) §7050.5 requires that if human remains are discovered during construction outside of a dedicated cemetery, the project owner is required to contact the county coroner and further excavation or disturbance of land cease until the coroner has made a determination. If the coroner determines the remains are Native American, the procedures outlined in PRC §5097.98 must be followed.

Senate Bill 18 (SB 18) (Government Code §65352.3, §65352.4)

Signed into law in September 2004, and effective March 1, 2005, SB 18 permits California Native American tribes recognized by the NAHC to hold, on terms mutually satisfactory to the tribe and the landowner, conservation easements. The term “California Native American tribe” is defined as a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC.

SB 18 also requires that, prior to the adoption or amendment of a city or county’s general plan or the adoption of a Specific Plan, the city or county conduct consultations with California Native American tribes for the purpose of preserving specified places, features, and objects that are located within the city or county’s jurisdiction. Specifically, SB 18 requires public notice to be sent to tribes listed on the NAHC’s SB 18 Tribal Consultation list within the geographical areas affected by the proposed changes. Tribes must respond to a local government notice within 90 days (unless a shorter time frame has been agreed upon by the tribe), indicating whether or not they want to consult with the local government.

Local Ordinances and General Plans

Each local government has the authority to adopt a historic preservation ordinance which provides regulations for historical resources. Local historic preservation ordinances, which may address archaeological, cultural or historical resources, have been adopted by the Cities of Davis, Fresno, Napa, and Sacramento and by Tuolumne County (COHP 2009). In addition, some City and County General Plans also contain goals, policies and programs that promote the protection of cultural heritage within a Conservation and Open Space, Resources, or similarly titled Element. For instance, the Sacramento County General Plan includes a goal to inventory, protect and interpret the cultural heritage of the County, and the policies and programs that specifically address cultural resources

of Native Americans (County of Sacramento 2007). Another example can be found in the San Joaquin County General Plan, which addresses historical, archaeological or cultural significance to the history of that County in the Heritage Resources section of the Resources Element (County of San Joaquin 2007).

Paleontological resources may not be included in General Plans for any local agency with jurisdiction within the Central Valley region. However, paleontological resources are included as significant cultural resources under CEQA.

12.2 Impacts and Mitigation Measures

Approach and Methods

This section describes the approach and methods used to determine the potential impacts on cultural resources of dairy digesters and discharges that may be authorized by the project. This analysis included a review of the location, cultural setting, and potential construction elements of the project. Potential direct, indirect and cumulative impact mechanisms for disturbing, materially altering, or demolishing cultural resources, including buried human remains, as a result of construction of dairy digester facilities and related ground-disturbing activities were considered.

Thresholds of Significance

As referenced under the Regulatory Setting section of this chapter, subsection (b) of CEQA Guidelines (14 CCR §15064.5) provides that a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment. Adverse impacts to cultural resources would be considered significant if the project would:

- Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5 of the CEQA Guidelines;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5 of the CEQA Guidelines;
- Directly or indirectly destroy a unique paleontological resource or site; or
- Disturb any human remains, including those interred outside of formal cemeteries

§15064.5 provides that, in general, a resource not listed on State or local registers of historical resources shall be considered by the Lead agency to be historically significant if the resource meets the criteria for listing on the CRHR. This section also provides standards for determining what constitutes a “substantial adverse change” that must be considered a significant impact on archaeological or historical resources. For example, a “substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired” (CEQA Guidelines, 14 CCR §15064.5 [b][1]).

§15064.5 of the CEQA Guidelines, pertains to the determination of the significance of impacts to archaeological and historical resources. Direct and indirect impacts may occur by:

- Physically damaging, destroying, or altering all or part of the resource;
- Altering characteristics of the surrounding environment that contribute to the resource's significance;
- Neglecting the resource to the extent that it deteriorates or is destroyed.
- The accidental discovery of cultural resources during construction.

In each of the following issues, potential significant impacts to cultural resources resulting from implementation of the project were identified and mitigation measures were developed. Adherence to established regulations, standards, and policies would avoid or minimize potential impacts.

Impact 12.1: Construction of dairy digester and co-digester facilities could result in the adverse change in the significance of a historical or archaeological resource, pursuant to §15064.5. (Significant)

At the program level of environmental review, it is not possible to determine if historical or archaeological resources would be impacted by the construction and installation of dairy digester facilities, including underground pipelines and utility infrastructure. Although cultural resource inventories and evaluations are typically conducted prior to preparation of a CEQA document, the size of the program area and the degree of uncertainty regarding the precise location of facilities renders program level inventories prior to release of this Program EIR untenable. Construction of dairy digester facilities could potentially cause direct damage to or destroy identified or undocumented historical resources of an architectural or archaeological nature, or to archaeological resources that may be historical resources or unique archaeological resources, by ground-disturbance or demolition activities at the surface or in the subsurface. Direct impacts to such resources may result from, but not be limited to, the immediate disturbance of the materials, features or deposits, whether from vegetation removal, compaction or vibrations resulting from vehicle travel over the surface, earth-moving activities, excavation, demolition of overlying structures, or emissions. Indirect operational impacts to identified or undocumented historical resources or significant archaeological resources would be related to potential alteration of the resource setting through the introduction of visual project elements (e.g., covered lagoons/ponds, aboveground digester tanks, on-site electrical production units, biogas processing facilities, maintenance activities, and/or ancillary facilities) that contrast with the setting of the historical or significant archaeological resource and could diminish the integrity of the resource's significant historic features. Other indirect impacts to consider include increased erosion due to clearance and preparation of the project area, or from inadvertent damage or outright vandalism to exposed resource materials due to improved accessibility.

Dairy digester facilities and infrastructure would be located in the upper layer(s) of soil, but there is the potential that undocumented cultural resources, including human remains, may be encountered and disturbed or destroyed during construction or ground-disturbing activities, particularly during trenching for underground pipelines and utility infrastructure. Based on the cultural setting and knowledge of the occurrence and extent of known archaeological resources, the overall project area may be low to moderately sensitive for the discovery of subsurface prehistoric archaeological

resources, ethnohistoric archaeological resources, historic-period archaeological resources, and human remains. The potential for discovery of prehistoric or ethnohistoric archaeological resources is considered highly sensitive within or near slope or topographic features or within natural resource collecting areas considered culturally sensitive for Native Americans, such as natural rivers and streams, springs, ponds/lakes, ecotones, ridgetops, mid-slope benches, flat benches, meadows, oak groves, and source areas for raw materials. Prehistoric or ethnohistoric materials might include chipped stone, stone milling tools, and soil darkened by cultural activities (midden); examples of significant discoveries would include villages or burials.

The potential for discovery of historic-period archaeological resources is considered highly sensitive within or near areas directly related to the region's transportation, industrial, commercial and agricultural past, traces of which, such as railroad grades and bridges, irrigation canals, houses, farm and ranch buildings, early lumber industry structures, cemeteries, and early mining operations, can occur in virtually any setting or landform. Historic materials might include metal, glass, or ceramic artifacts; examples of significant discoveries might include former privies or refuse pits.

Due to the possible presence within the project area of identified or undocumented historical resources or significant or unique archaeological resources that could be directly or indirectly disturbed, materially altered, or demolished by project implementation, construction-related impacts on cultural resources are potentially significant.

Mitigation Measures

Measure 12.1a: In order to determine whether a project may cause a significant impact to cultural resources, and therefore, have an adverse effect on the environment, the Central Valley Water Board shall require a project-specific cultural resources inventory and evaluation with each application submitted to establish a digester or co-digester facility (COHP 2001). A project-level cultural resources inventory and evaluation shall be required prior to project implementation to provide a thorough assessment of the project's potential direct, indirect, and cumulative impacts on historical resources or significant archaeological resources during construction and installation, in adherence to established regulations, standards, and policies to avoid or minimize potential impacts.

For projects that constitute federal undertakings, as described in the Federal Agencies section of the Introduction (Chapter 2), the cultural resources study shall be prepared in accordance with Section 106 of the NHPA. The cultural resources study and inclusive mitigation measures shall form the basis for the cultural resources component of the project-level environmental documentation prepared for the project under Section 106 (NPS 1991).

Prior to ground-disturbing activities, the project applicant or agency(s) responsible shall retain a qualified professional archaeologist, who meets the Secretary of the Interior's professional qualifications standards for archaeology (36 CFR §61), to (1) conduct a research search at the appropriate information center of the California Historical Resources Information System (CHRIS) to determine whether the project area has been previously surveyed and whether cultural resources were identified within the project area, and if the project area is considered sensitive for the presence of cultural resources; (2) request a Sacred Lands search from the NAHC to determine whether known sacred sites or traditional cultural resources are situated within the project area; and (3) request a contact list from the NAHC of Native American

tribes, groups or individuals who may have information about the project area, and contact the listed parties requesting information and any concerns about the project.

In the event the CHRIS records search indicates that no previous survey has been conducted, the qualified archaeologist shall recommend whether a survey is warranted to satisfy the requirements of CEQA based on the sensitivity of the project area for cultural resources. As necessary, prior to the start of ground disturbance, the project applicant or agency(s) responsible shall retain a qualified archaeologist to conduct the recommended project-level survey in compliance with CEQA requirements (14 CCR §15064.5 and PRC §21083.2) and in accordance with the standards set by the Secretary of the Interior.

After completion of the survey, the qualified archaeologist shall complete a technical report documenting the results of all work, and any cultural resources identified during the survey shall be formally recorded on Department of Parks and Recreation series 523 forms. The report shall follow the Office of Historic Preservation's ARMR guidelines (*Archaeological Resource Management Reports: Recommended Contents and Format*) (COHP 1990). The report shall include assessment of the significance of identified resources according to the applicable local, State and federal significance criteria, assessment of the sensitivity of the project area for cultural resources, and recommend appropriate procedures to either further investigate, or mitigate adverse impacts in conformance with the protocols set forth in 14 CCR §15126.4. The final technical report shall be approved by the lead agency prior to the initiation of any ground-disturbing activities. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure. The final written report should be submitted to the appropriate CHRIS information center(s) within three (3) months after the work has been completed.

If cultural resources within a project area identified by the searches at the CHRIS or NAHC or during the survey are considered potentially significant, the project applicant or agency(s) responsible shall undertake additional studies to evaluate the resources' NRHP or CRHR eligibility and to recommend further mitigative treatment. Evaluations shall be based on surface remains, subsurface testing, archival and ethnographic resources, and in the framework of the historic context and important research questions of the project area.

If cultural resources within a project area identified by the searches at the CHRIS or NAHC, during the survey, or by the evaluation process are determined significant historical resources, the lead agency must review and approve treatment measures devised by the project applicant or agency(s) responsible, in concert with a qualified archaeologist, or architectural historian for built environmental resources, and other concerned parties, to ameliorate any "substantial adverse change" in the significance of each historical resource resulting from project implementation. When a project may impact historical resources on State lands, consultation with California's Office of Historic Preservation (OHP) is required pursuant to PRC §5024. The SHPO may also be consulted regarding appropriate treatment measures for historical resources.

Treatment measures for historical resources that are archaeological or ethnographic in nature may include preservation through avoidance or project redesign, incorporation within open space or conservation easements, covering with a layer of sterile soil, data recovery excavation, photodocumentation (including low-level aerial photography, video, and scale drawings), or similar measures. Treatment measures for historical resources that are architectural in

nature may include Historic American Buildings Survey/Historic American Engineering Report (HABS/HAER) documentation to formally document historic resources through the use of large-format photography, measured drawings, written architectural descriptions, and historical narratives. Such documentation packages are entered into the Library of Congress, and a second copy is generally archived in the regional information centers of the CHRIS. In the event of building relocation, the Lead agency shall ensure that any alterations to significant buildings or structures conform to the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (Grimmer and Weeks 1992). All final documentation of mitigative treatment for historical resources of an archaeological or architectural nature to be impacted by the project will be approved by the Lead agency prior to the initiation of any project ground-disturbing activities.

If cultural resources identified within a project area are neither a historical resource nor unique archaeological resource, there would be no significant effect to the environment and no further treatment of those known resources would be required.

Measure 12.1b: Inadvertent discovery measures for cultural resources shall be implemented during all construction activities within the project area. Measures shall include procedures for discovery and protection of cultural resources, including human remains, during construction or earth-disturbing activities. If human remains are discovered during construction or earth-disturbing activities, the applicant shall halt all activities and contact the appropriate authorities in compliance with PRC §5097.98.

The project applicant or agency(s) responsible shall implement inadvertent discovery measures during all construction activities within the project area. Within project areas of identified archaeological sensitivity, measures would include: (1) a worker education course for all construction personnel; (2) monitoring of all earth-disturbing activities by a qualified archeologist; and (3) procedures for discovery of cultural resources, including human remains, during construction or ground-disturbing activities if an archaeological monitor is not present. If known traditional cultural resources are located within the project area or if the potential for discovery of buried traditional cultural resources is high, a culturally affiliated Native American, with knowledge in cultural resources, should also be retained to monitor all ground-disturbing activities. Monitoring within recent fill deposits would not be required.

The worker education course for all construction personnel will be conducted immediately prior to initiation of ground-disturbing activities. The course will explain the importance of, and legal basis for, the protection of significant archaeological resources. Each worker will also learn the proper procedures to follow in the event cultural resources or human remains/burials are uncovered during construction activities, including work curtailment or redirection and to immediately contact their supervisor and the archaeological monitor. The worker education session will include visuals of artifacts (prehistoric and historic) that might be found in the project vicinity, and may include handouts.

The project applicant or agency(s) responsible shall provide an on-site qualified archeological monitor during all earth-disturbing activities, including but not limited to grading, excavation, trenching, or removal of existing features of the subject property, within project areas considered sensitive for the discovery of buried archaeological resources. If an unknown cultural resource were discovered, the monitor(s) shall have the authority to halt all ground-disturbing activities within 100 feet of the find, and the resource should be immediately evaluated by the qualified archaeologist. If the find is determined to be a significant historical

resource and the archaeological resource cannot be avoided, then applicable mitigation measures for significant resources will be completed (e.g., preservation in place, data recovery program pursuant to PRC §21083.2[i]). During evaluation or mitigative treatment, ground disturbance and construction work could continue on other parts of the project area.

In the event an archaeological monitor is not present when cultural resources, including human remains, are discovered during construction or ground-disturbing activities, the project applicant or agency(s) responsible shall halt all activities within 100 feet of the find until a qualified professional archaeologist can evaluate it. The archaeologist will examine the findings, assess their significance, and recommend appropriate procedures to either further investigate or mitigate adverse impacts (e.g., adverse effect on a significant historical resource) to the resources encountered in conformance with the protocols set forth in PRC §5097.98. Any human remains encountered during construction will be treated in accordance with HSC §7050.5.

Impact Significance After Mitigation: Less than Significant

Implementation of the Mitigation Measures 12.1a and 12.1b would ensure that any identified or undocumented historical resource or archaeological resource, or inadvertent discoveries of cultural resources during construction or ground-disturbing activities, would be properly recorded and the historical significance of the resources documented.

Impact 12.2: Construction of dairy digester and co-digester facilities could result in the disruption of human remains, including those interred outside formal cemeteries. (Significant)

Archaeological evidence indicates that humans have inhabited the Central Valley region as early as 8,000 to 12,000 years ago. It is not always possible to predict where human remains may occur outside of formal cemeteries, therefore the construction and installation, regardless of depth, of dairy digester facilities, including underground pipelines and utility infrastructure could potentially cause direct damage to or destroy undocumented human remains not interred in cemeteries or marked, formal burials. Direct impacts to human remains may result from the immediate disturbance of the materials, features or deposits, whether from vegetation removal, compaction or vibrations resulting from vehicle travel over the surface, earth-moving activities, excavation, trenching, or demolition of overlying structures. Indirect impacts to consider include increased erosion due to project area clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource materials due to improved accessibility.

Due to the possible presence of undocumented human remains within the project area, construction-related impacts on cultural resources would be significant.

Mitigation Measure

Measure 12.2: Implement inadvertent discovery measures for the protection of cultural resources, including human remains (Measure 12.1b).

Impact Significance After Mitigation: Less than Significant

Implementation of the Mitigation Measure 12.1b would ensure that any undocumented cultural resources or inadvertent discoveries of cultural resources, including human remains, during construction or ground-disturbing activities would be properly recorded and the historical significance of the resources documented.

Impact 12.3: Construction of dairy digester and co-digester facilities could result in direct or indirect disturbance or destruction of a unique paleontological resource or site or unique geologic feature. (Significant)

The proposed regulatory program for dairy digesters could result in construction activities (excavation and earthwork) that have the potential to disturb or destroy significant paleontological resources. Rough grading and soil excavation may be required for site preparation, foundation excavations, on-site utility trenches and lagoons. Should pipelines be used to convey manure or biogas to off-site centralized facilities, additional cut and cover trenching would occur, and would likely be located along existing utility or road corridors.

In terms of potential effects on paleontological resources, the important aspects of the various construction scenarios include (1) the depth of excavation required for individual facilities, and (2) the degree to which various construction scenarios would affect previously undisturbed soil. The geographical extent of program effects would likely be within, near, or between dairies. As discussed in the setting, most agricultural lands have been disturbed, generally on the order of a depth 2 feet, and impacts on paleontological resources in shallow soils are unlikely. For these reasons, site preparation activities (rough grading) and construction of shallow foundations are unlikely to unearth paleontological resources.

However, construction activities that disturb *in-situ* geologic units of high paleontological potential could potentially affect unique and significant paleontological resources. As discussed in the setting, these include all geologic formations that may be classified as Pleistocene or older sedimentary rocks and deposits. These occur around the edges of the Central Valley and in many of the low foothills or the Sierra Nevada and Coast Ranges. These units also may exist within very short depths beneath areas mapped as Holocene alluvium. Generally, soil disturbances required for construction of dairy digester facilities would be shallow, would occur in previously disturbed soil, and would not encounter undisturbed Pleistocene or older sedimentary units. However, there are several notable exceptions:

Earthen ponds or lagoons: Construction of earthen ponds or lagoons has the greatest potential to adversely affect paleontological resources. Such facilities often require deep excavation of substantial volumes of soil, and such excavations may extend into *in-situ* geologic units. If the geologic unit has a high paleontological potential, construction could potentially disturb significant fossil resources. Similar projects in the Central Valley have a history of yielding significant paleontological materials (California State University 2008).

Utility installations in native soil: While most utility installations would occur in previously disturbed soil, pipeline installation, in certain cases, could occur deeply enough to disturb potentially sensitive geologic units. This effect is most likely to occur if off-site central facilities use pipelines to collect manure or biogas, because construction of pipelines across linear features (such as highways, busy intersections, railroads, creeks or drainages) may require the use of jack-and-bore tunneling or directional drilling methods. Such methods require excavation of receiving/launch pits which can be up to 20 feet deep, as well as horizontal boring of material in order to undershoot existing obstructions (drainages, utilities, highway underpasses, etc.). Such excavations may encounter *in situ* formations and could disturb significant paleontological resources.

Construction of covered earthen ponds or lagoons or pipelines within units of high paleontological potential may have a potentially significant impact on paleontological resources. However, most earthwork and rough grading that may indirectly occur as a result of the project is considered unlikely to disturb paleontologically-sensitive formations. As such, site preparation, rough grading and shallow foundation excavations on existing dairies are unlikely to disturb significant paleontological resources. While the probability of unearthing significant paleontological resources in such circumstances is low, any level of fossil disturbance is considered significant under CEQA.

Mitigation Measure

Measure 12.3: If paleontological resources, such as fossilized bone, teeth, shell, tracks, trails, casts, molds, or impressions are discovered during ground-disturbing activities, all ground disturbing activities within 50 feet of the find shall be halted until a qualified paleontologist can assess the significance of the find and, if necessary, develop appropriate salvage measures in consultation with the lead agency and in conformance with Society of Vertebrate Paleontology Guidelines (SVP, 1995; SVP, 1996). Additional guidance may be found in *Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources* (SVP 2010).

Impact Significance After Mitigation: Less than Significant

Implementation of the Mitigation Measure 12.3 would ensure that any inadvertent discoveries of paleontological resources during construction or ground-disturbing activities would be properly recorded and documented.

Impact 12.4: Development of dairy digester and co-digester facilities could contribute to cumulative impacts related to archaeological, historical, and/or paleontological resources. (Significant)

The geographic scope of the area potentially affected by cumulative cultural resources impacts is defined by the cultural setting and ethnographic territory of the prehistoric, ethnohistoric, and historic peoples who have occupied the project area — an extensive area within the northern interior, Central Valley, and Sierra Nevada regions of inland California. The preferred location for dairy digester and co-digester facilities would likely be at existing dairies or centralized locations in the vicinity

of existing dairies, which may be connected with the agricultural facet of the region's historic transportation, industrial, commercial, and agricultural past.

Construction activities associated with development of dairy digester and co-digester facilities, combined with construction of other projects in the area and could contribute to the progressive loss of cultural resources or paleontological resources and result in significant cumulative impacts. The project includes mitigation that would reduce potential impacts to a less-than-significant level. Similar measures may also be implemented for other related projects that have the potential to affect cultural and paleontological resources. Consequently, the project's contribution to cumulative effects is significant. Mitigation measures noted below would reduce the impacts to less than significant levels.

Mitigation Measure

Measure 12.4: Implement Measures 12.1a, 12.1b, 12.2, and 12.3.

Impact Significance After Mitigation: Less than Significant

Implementation of the Mitigation Measures 12.1a, 12.1b, 12.2, and 12.3 would ensure that potential cumulative effects to cultural and paleontological resources would be minimized.

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CHAPTER 13

Geology, Soils, and Seismicity

13.1 Setting

Environmental Setting

Regional Physiography

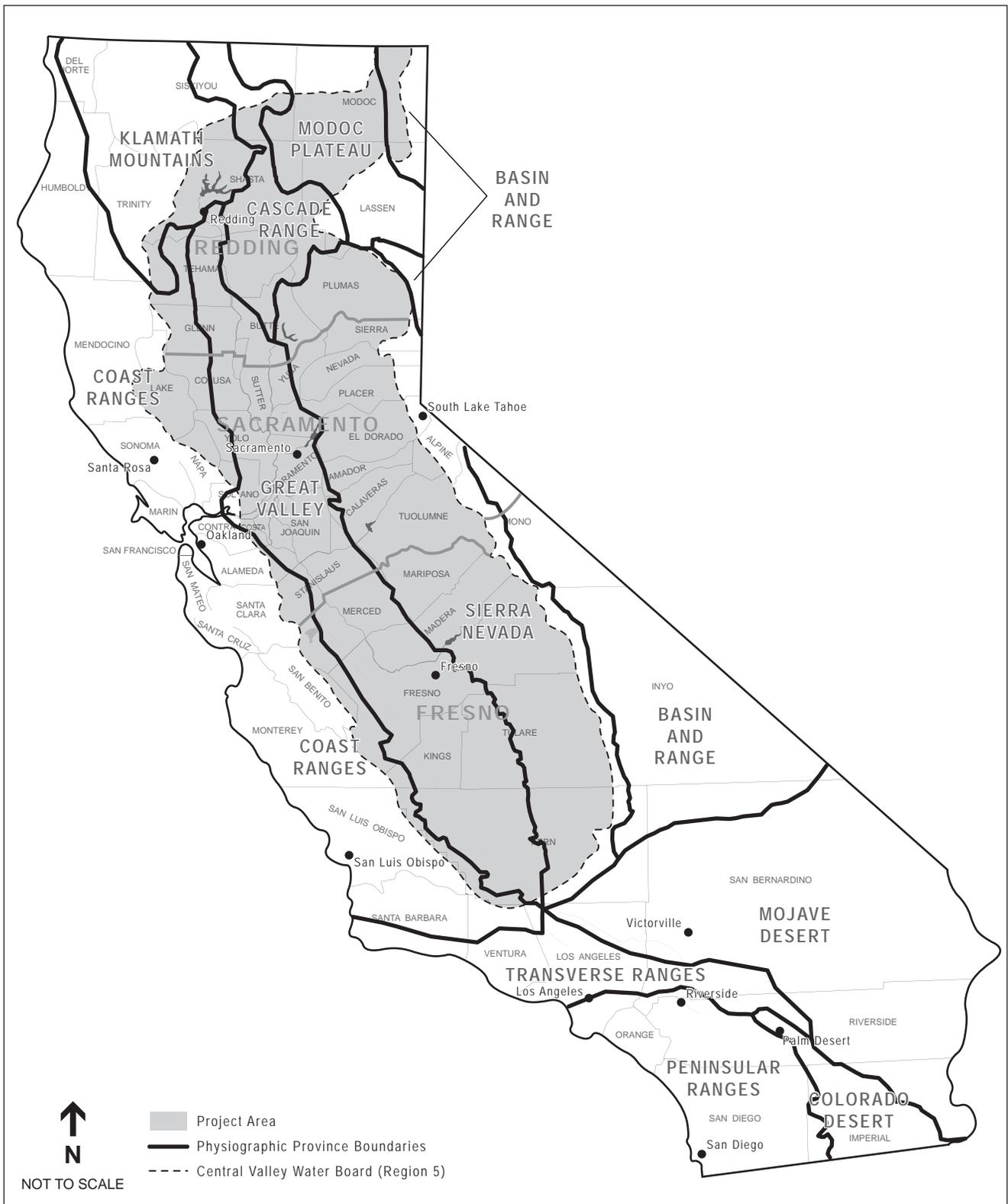
California has an extremely varied landscape and physiography, which ranges from broad, nearly flat valleys to jagged, glaciated mountains. To help distinguish between these areas, California is divided into 12 geomorphic provinces that are topographic-geologic groupings of convenience based primarily on landforms and geologic history (Norris and Webb, 1976). The project area crosses seven geomorphic provinces of California which are described below and shown in **Figure 13-1**.

Coast Ranges

The Coast Ranges province extends approximately 600 miles from the Santa Ynez River in Santa Barbara County to the Oregon border in northern Humboldt County. The region consists of northwest-trending mountain ranges, broad basins, and elongated valleys generally parallel to the San Andreas fault. The Coast Ranges are generally divided in two sub-provinces, north and south of San Francisco Bay. In the Coast Ranges, older, consolidated rocks are characteristically exposed in the mountains but are buried beneath younger, unconsolidated alluvial fan and fluvial sediments in the valleys and lowlands (CGS, 2002). A small portion of the western edge of the Region 5 located in the Coast Ranges province.

Great Valley

The Great Valley province is an elongated depression that lies between the Coast Ranges and the Sierra Nevada. It is about 430 miles long and 75 miles wide. At its extreme northern and southern ends, the elevation is about 400 feet. At its center, east of San Francisco Bay, it is slightly below sea level. The Great Valley province is drained by the Sacramento and the San Joaquin Rivers. The confluence of these two rivers is east of San Francisco Bay. This area, the Sacramento–San Joaquin Delta, was formerly a massive wetland. It is now one of California’s important agricultural areas. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic (about 160 million years ago). Sands and gravel over 30,000 feet deep lie upon Sierran basement rocks that extend downward at an angle from the western slope of the Sierra Nevada. Oil fields have been found in southernmost San Joaquin Valley and along its southwestern margin (CGS, 2002). The Great Valley province is located entirely within the jurisdictional boundaries of the Central Valley Region (Region 5).



SOURCE: Central Valley Water Board, 2009; USGS, 2010; and ESA, 2010

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Figure 13-1
California Physiographic Provinces

Sierra Nevada

The Sierra Nevada is a tilted fault block nearly 400 miles long. Its east face is a high, rugged multiple scarp, contrasting with the gentle western slope that disappears under sediments of the Great Valley. Deep river canyons are cut into the western slope. Their upper courses, especially in massive granites of the higher Sierra, are modified by glacial sculpturing, forming features such as Yosemite Valley. The high crest culminates in Mt. Whitney with an elevation of 14,495 feet above sea level near the eastern scarp. The metamorphic bedrock contains goldbearing veins in the northwest trending Mother Lode. The northern Sierra boundary is marked where bedrock disappears under the Cenozoic volcanic cover of the Cascade Range (CGS, 2002). The majority of the Sierra Nevada province is located in the eastern portion of Region 5.

Cascade Range

The Cascade Range, a chain of volcanic cones, extends through Washington and Oregon into California. It is dominated by Mt. Shasta, a glacier-mantled volcanic cone, rising 14,162 feet above sea level. The southern termination is Lassen Peak, which last erupted in the early 1900s. The Cascade Range is transected by deep canyons of the Pit River. The river flows through the range between these two major volcanic cones, after winding across interior Modoc Plateau on its way to the Sacramento River. All of the known historic eruptions in the contiguous United States have been from Cascade volcanoes. The two most recent were Lassen Peak in 1914 to 1921 (CGS, 2002). The Cascade Range province is almost entirely located within the northernmost portion of Region 5.

Klamath Mountains

The Klamath Mountains have rugged topography with prominent peaks and ridges reaching 6,000-8,000 feet above sea level. In the western Klamath, an irregular drainage is incised into an uplifted plateau called the Klamath peneplain. The uplift has left successive benches with gold-bearing gravels on the sides of the canyons. The Klamath River follows a circuitous course from the Cascade Range through the Klamath Mountains. The province is considered to be a northern extension of the Sierra Nevada (CGS, 2002). A small portion of the Klamath Mountains province is located in the northwest portion of Region 5.

Modoc Plateau

The Modoc Plateau is a volcanic table land (elevation 4,000- 6,000 feet above sea level) consisting of a thick accumulation of lava flows and tuff beds along with many small volcanic cones. Occasional lakes, marshes, and sluggishly flowing streams meander across the plateau. The plateau is cut by many north-south faults. The province is bound indefinitely by the Cascade Range on the west and the Basin and Range on the east and south (CGS, 2002). A small portion of the Modoc Plateau province is located in the northeast portion of Region 5.

Basin and Range

The Basin and Range is the westernmost part of the Great Basin. The province is characterized by interior drainage with lakes and playas, and the typical horst and graben structure (subparallel,

fault-bounded ranges separated by down dropped basins). Death Valley, the lowest area in the United States (280 feet below sea level at Badwater), is one of these grabens. Another graben, Owens Valley, lies between the bold eastern fault scarp of the Sierra Nevada and Inyo Mountains (CGS, 2002). A small portion of the Basin and Range province is located in the northeastern most portion of Region 5.

Geologic and Seismic Hazards

As described above, the landscape is extremely varied within the project area. As a result, the project area is potentially prone to a range of geologic and seismic hazards such as slope failure, unstable soils, and seismic related ground shaking and failure. Potential geologic and seismic hazards that could occur in the project area are described below.

Geologic Hazards

Mass Wasting and Slope Failure

Slope failures (commonly referred to as landslides) include many phenomena that involve the downslope displacement and movement of material either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Slope failures are categorized as falls, topples, spreads, slides, or flows. Falls are masses of soil or rock that dislodge from steep slopes and free-fall, bounce, or roll downslope. Topples move by the forward pivoting of a mass around an axis below the displaced mass. Lateral spreads, described in more detail below, are commonly induced by liquefaction of material in an earthquake and move by horizontal extension and shear or tensile fractures. Slides displace masses of material along one or more discrete planes. In rotational sliding the slide plane is curved and the mass rotates backwards around an axis parallel to the slope; in translational sliding the failure surface is more or less planar and the mass moves parallel to the ground surface. Flows mobilize as a deforming, viscous mass without a discrete failure plane (CGS, 2010a). Slope stability can depend on a number of complex variables, including the geology, structure, and amount of groundwater, as well as external processes such as climate, topography, slope geometry, and human activity. The factors that contribute to slope movements include those that decrease the resistance in the slope materials and those that increase the stresses on the slope.

Unsuitable Soils

The distribution of soil units is highly variable within the project area. The National Resources Conservation Service (NRCS) has published individual soil surveys for all Counties in California. Information contained in these soil surveys is typically used by farmers and ranchers to help determine whether a particular soil type is suited for crops or livestock and what type of soil management might be required. However, these surveys are also used by planners and engineers to determine soil suitability for construction activities. Because the precise location of the location of proposed dairy digesters is unknown, a general discussion of potentially unsuitable soil conditions including corrosive, expansive, and erodible soils is provided below.

Corrosive Soils

Corrosivity of soils is commonly related to several key parameters: soil resistivity, the presence of chlorides and sulfates; oxygen content; and pH. Typically, the most corrosive soils are those with the lowest pH and highest concentration of chlorides and sulfates. Wet/dry conditions can result in a concentration of chlorides and sulfates as well as movement in the soil that tends to break down protective corrosion films and coatings on the surface of building materials. High-sulfate soils are also corrosive to concrete and may prevent complete curing, reducing its strength considerably. Low pH and/or low-resistivity soils can corrode buried or partially buried metal structures (ESA, 2007).

Subsidence and Expansive Soils

Land subsidence is the loss of surface elevation due to removal of subsurface support. Subsidence has many causes, including seismically induced stresses and the extraction of mineral, liquid and/or gas deposits. Although mineral and gas extraction can and do result in subsidence, it is more common for subsidence to occur as a result of groundwater extraction in excess of groundwater recharge. For example, in areas of the San Joaquin Valley of California, the extensive pumping of groundwater for use in crop production has resulted in much of the valley floor subsiding over several generations.

Expansive soils have a significant amount of clay particles that can give up water (shrink) or take on water (swell). The change in volume exerts stress on buildings and other loads placed on these soils. The occurrence of these soils often is associated with geologic units having marginal stability. Expansive soils can be dispersed widely, found in hillside areas, as well as low-lying areas in alluvial basins. As a result, soils testing to identify expansive characteristics and appropriate remediation procedures are routinely required by current grading and building codes.

Erodible Soils

Erosion is the detachment and movement of soil materials through natural processes or human activities. In general, rates of erosion can vary depending on the soil resource's capacity to drain water, slope angle and length, extent of groundcover, and human influence. Given the varied topography of the project area, areas with increased susceptibility to soil erosion would depend on the sediment or rock type, its porosity and permeability, the slope or grade of the land, the amount of existing ground cover from vegetation, amount of existing soil disturbance, and land use type.

Seismic Hazards

Seismic hazards are generally classified in two categories: primary seismic hazards (surface fault rupture and ground shaking) and secondary seismic hazards (liquefaction and other types of seismically induced ground failure, along with seismically induced landslides). Because periodic earthquakes accompanied by surface displacement can be expected to continue in the project area through the lifetime of the proposed project, the effects of strong groundshaking and fault rupture are of primary concern with respect to the safe operation of project facilities. **Figure 13-2** shows the principal active faults in California zoned under the Alquist-Priolo Earthquake Fault Zoning Act.



SOURCE: Alquist-Priolo Earthquake Fault Zoning Act, 1974-2007; Central Valley Dairy Digester and Co-Digester Program EIR . 209481 Central Valley Water Board, 2009; and ESA, 2010

Figure 13-2
Principal Active Faults Zoned Under the Alquist-Priolo Earthquake Fault Zoning Act

Earthquake Groundshaking

An earthquake is classified by the amount of energy released, which traditionally has been quantified using the Richter scale. Seismologists have begun using a moment magnitude (M) scale because it provides a more accurate measurement of the size of major and great earthquakes. For earthquakes of less than M 7.0, the moment and Richter magnitude scales are nearly identical. For earthquake magnitudes greater than M 7.0, readings on the moment magnitude scale are slightly greater than a corresponding Richter magnitude (CGS, 1996).

The intensity of earthquake-induced ground motions can be described using peak ground accelerations, represented as a fraction of the acceleration of gravity (g).¹ The California Geological Survey (CGS) provides data to estimate peak ground accelerations in California. Taking into consideration the uncertainties regarding the size and location of earthquakes and the resulting ground motions that can affect a particular site, the map depicts peak ground accelerations with a 10 percent probability of being exceeded in 50 years, which equals an annual probability of 1 in 475 of being exceeded each year (CGS, 2010). **Figure 13-3** shows the potential shaking hazard for the project area.

Another commonly used measure of earthquake intensity is the Modified Mercalli Scale, which is a subjective measure of the strength of an earthquake at a particular place as determined by its effects on people, structures, and earth materials. **Table 13-1** presents the Modified Mercalli Scale for Earthquake Intensity, along with approximate earthquake magnitudes and average peak accelerations associated with each intensity value (Bolt, 1988).

The intensity of the seismic shaking, or strong ground motion, during an earthquake is dependent on the distance between the project area and the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions underlying and surrounding the project area. Earthquakes occurring on faults closest to individual project related facilities would most likely generate the largest ground motions.

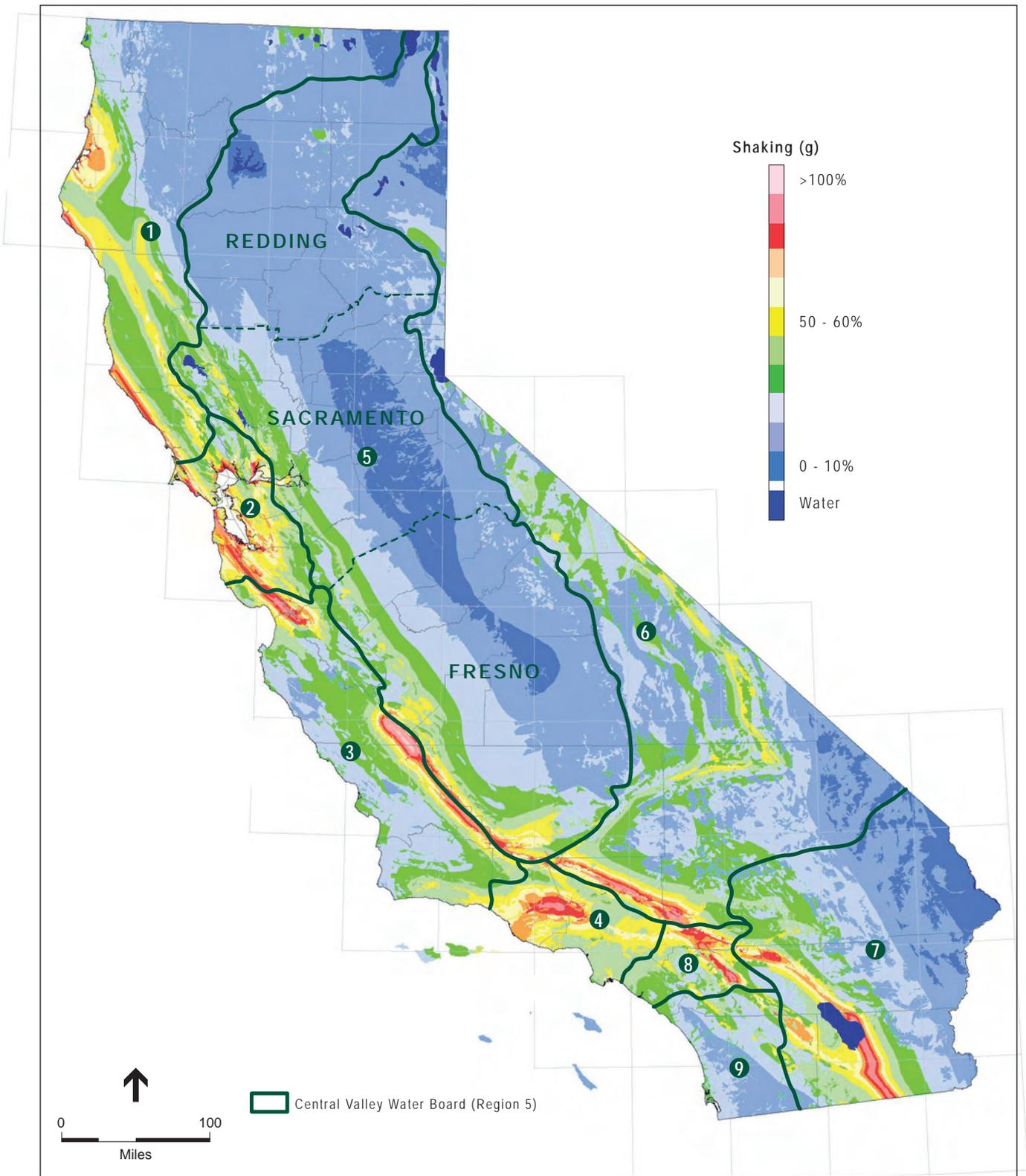
Surface Fault Rupture

Although future earthquakes could occur anywhere along the length of an active fault, only regional strike-slip earthquakes of magnitude 6.0 or greater are likely to be associated with surface fault rupture and offset (CGS, 1996). It is also important to note that earthquake activity and fault rupture due to unmapped subsurface fault traces is a possibility that is not predictable.

Liquefaction

Liquefaction is a phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced, strong groundshaking. The susceptibility of soils to liquefaction is a function of the depth, density, and water content of the granular sediments and the magnitude of earthquakes. Saturated, unconsolidated silts, sands, silty sands, and gravels within 50 feet of the ground surface are most susceptible to liquefaction. Liquefaction-related phenomena include vertical settlement from densification, lateral spreading, ground oscillation, flow failures, loss of bearing strength, subsidence, and buoyancy effects (USGS, 2000).

¹ Acceleration of gravity (g) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.



SOURCE: California Geological Society, 2007; Central Valley Water Board, 2009; and ESA, 2010

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Figure 13-3
Potential Shaking Hazard for the Project Area

**TABLE 13-1
MODIFIED MERCALLI SCALE FOR EARTHQUAKE INTENSITY**

Intensity Value	Intensity Description	Approximate Earthquake Magnitude (Richter)	Average Peak Acceleration
I	Not felt except by a very few persons under especially favorable circumstances.	1.0–3.0	<0.015 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	3.0–3.9	
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.		
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	4.0–4.9	0.015–0.03 g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.		0.03–0.08 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	5.0–5.9	0.08–0.15 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.		0.15–0.25 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	6.0–6.9	0.25–0.45 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.		0.45–0.60 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	7.0 and higher	0.60–0.80 g
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.		0.80–0.90 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.		>0.90 g

SOURCE: Bolt, 1988.

Holocene-age alluvial sediments are especially prone to liquefaction. Older alluvial sediments deposited during the Pleistocene epoch are generally not liquefiable because they are more consolidated. Artificial fills are also highly prone to liquefaction (USGS, 2000).

Lateral Spreading

Of the liquefaction hazards, lateral spreading generally causes the most damage. This is a phenomenon where large blocks of intact, nonliquefied soil move downslope on a liquefied substrate of large aerial extent (Youd et al., 1978). The mass moves toward an unconfined area, such as a descending slope or stream-cut bluff, and can occur on slope gradients as gentle as 1 degree. Drainages and swales between hill slopes are generally filled by alluvium,² colluvium,³ landslide debris, and slope wash. Unconsolidated deposits often develop soils along steep and shallow slopes in these areas. Risk of lateral spreading in the project area is typically limited to slopes of 0.3 to 5% that are underlain by loose sands and a shallow water table (Bartlett et al. 1992).

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid rearrangement, compaction, and settling of subsurface materials (particularly loose, noncompacted, and variable sandy sediments). Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill.

Seismic Slope Instability/Ground Cracking

Earthquake motions can also induce substantial stresses in slopes, causing earthquake-induced landslides or ground cracking when the slope fails. Earthquake-induced landslides can occur in areas with steep slopes that are susceptible to strong ground motion during an earthquake. The 1989 Loma Prieta earthquake, which occurred on the San Andreas Fault, triggered thousands of landslides over an area of 770 square miles (USGS, 1997).

Regulatory Setting

Federal

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1997 to “reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program.” To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), which refined the description of agency responsibilities, program goals, and objectives.

² Alluvium consists of unconsolidated mixtures of gravel, sand, clay, and silt typically deposited by streams.

³ Colluvium is a loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope.

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRPA designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, National Science Foundation, and the USGS.

State

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of Alquist-Priolo Earthquake Fault Zoning is to prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate the hazard of fault rupture. Under the act, the State Geologist is required to delineate earthquake fault zones (EFZs) along known active faults in California. Cities and counties affected by the zones must regulate certain development projects within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting (CGS, 2010b)

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site has to be conducted and appropriate mitigation measures incorporated into the project design.

California Building Standards Code

The California Building Code (CBC) has been codified in the California Code of Regulations (CCR) as Title 24, Part 2. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under State law, all building standards must be centralized in Title 24 or they are not enforceable. The purpose of the CBC is to establish minimum standards to safeguard the public health, safety and general welfare through structural strength, means of egress, and general stability by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all building and structures within its jurisdiction. The CBC is based on the International Building Code. The CBC is based on the International Building Code (IBC) published by the International Code Conference. In addition, the CBC contains necessary California amendments which are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (flood, snow, wind, etc.) for inclusion into building codes. The provisions

of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

Local

County Land Use Regulations and Ordinances

Local regulations and ordinances vary widely in the project area. Typically, local jurisdictions in the project area will have adopted General Plan Safety Elements, building, grading, and erosion control ordinances, but no specific ordinances for dairy digester facilities. The safety element, building, grading, and erosion control ordinances are intended to ensure safe building construction and control erosion and sedimentation caused by construction activities. Specifically, public Resources Code §2699 directs cities and counties to "take into account the information provided in available seismic hazard maps" when it adopts or revises the safety element of the general plan and any land-use planning or permitting ordinances (CGS, 2008). A building permit typically requires that new construction be inspected during and after completion to ensure compliance with national, regional, and local building codes. A grading permit is typically required for prior to initiating the construction phase of a project. As part of the permit, applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of Best Management Practices (BMP) similar to those contained in a Stormwater Pollution Prevention Program (SWPPP).

13.2 Impacts and Mitigation Measures

Approach and Methods

The evaluation was performed in light of current conditions in the project area, applicable regulations and guidelines, and typical construction activities and operations of dairy digester and co-digester facilities. In determining the level of significance, the analysis assumed that the dairy digester and co-digester facilities would comply with relevant federal, State, and local ordinances and regulations.

Due to the geographic scale of the project area and the range of actions that fall within the scope of potential future dairy manure digester projects, this impact analysis was conducted at a programmatic level. Evaluation of potential geologic, soil, and seismic related impacts was based on a review of documents pertaining to the project area including CGS geologic maps and published geologic literature. It is assumed that project level analysis of geologic, soil, and seismic related hazards would be required for site specific digester and co-digester facilities.

Thresholds of Significance

CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions of the area affected by the project. An impact related to soils, seismicity, and geology would be considered significant if it would result in any of the following, which are adapted from Appendix G of the *CEQA Guidelines*:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
 - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mines and Geology Special Publication 42),
 - Strong seismic groundshaking,
 - Seismic-related ground failure
 - Landslides
- Result in substantial soil erosion or the loss of topsoil
- Be located on a geologic or soil unit that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse
- Be located on expansive or corrosive soil, creating substantial risks to life or property
- Substantially change the topography or any unique geologic or physical features of the site

The following discussion of environmental impacts is limited to those potential impacts that could result in some level of potentially significant environmental change, as defined by CEQA. The development of future dairy digester facilities would not include the addition, removal, or use of septic tanks or alternative wastewater disposal systems. This issue will not be analyzed further in this section.

Impact 13.1: The project could expose people to injury and structures to damage resulting from seismic activity. (Significant)

The State of California is susceptible to seismic activity, including earthquakes and ground-shaking events. Numerous active faults are known to exist in and around the project area that could potentially generate seismic events capable of injuring people and damaging structures associated with future digester and co-digester facilities. Ground shaking associated with seismic events could also cause secondary geologic hazards such as slope failures and seismically-induced settlement. This is considered a potentially significant impact.

Mitigation Measure

Measure 13.1: Prior to construction, project applicants or agency(s) responsible shall ensure that dairy digester facilities are designed and construction techniques are used that comply

with relevant local, State and federal regulations and building code requirements. Requirements could include, but might not be limited to:

- Preparation of site-specific soil and geotechnical engineering studies performed by a licensed professional including, but not limited to, a geologist, engineering geologist, certified soil scientist, certified agronomist, registered agricultural engineer, registered civil or structural engineer, and/or certified professional erosion and sediment control specialist with expertise in geotechnical engineering issues who is registered and/or certified in the State of California, to determine site specific impacts and to recommend site specific mitigations. The site specific soil and geotechnical engineering studies shall be submitted to the all appropriate State and local regulatory agencies including, but not limited to, the CVRWQCB and the city or county engineering department for review and approval. The project applicant or agency(s) responsible shall implement all feasible recommendations addressing potential seismic hazards and soil constraints; and
- Implementation of CBC design requirements.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 13.1 would ensure that future digester and co-digester facilities and centralized facilities would comply with local, State and federal requirements for developing structures to minimize hazards associated with seismic hazards. Completion of site specific geotechnical engineering studies would identify potential constraints and recommend methods to construct, install and design structures, including foundations, tanks and pipelines to minimize risks. Compliance with CBC would further ensure that facilities would be designed consistent with design standards that address seismically active areas which would reduce the risks associated with seismic activity.

Impact 13.2: The project could expose people to injury and structures to damage resulting from unstable soil conditions. (Significant)

Future digester and co-digester facilities could be located in areas with hazardous soil conditions including corrosive and expansive soils that could potentially cause damage to surface and subsurface structures. Depending on the degree of corrosivity of the subsurface soils, building materials such as concrete, reinforcing steel in concrete structures, and bare-metal structures exposed to these soils could deteriorate, eventually leading to structural failures. Expansion and contraction of expansive soils in response to changes in moisture content could lead to differential and cyclical movements that could cause damage and/or distress to structures and equipment. In addition, there are soils and topography in the project area that could be subject to landslides. The potential for the project to expose people to injury and structures to damage as a result of construction facilities in areas subject to unstable soil conditions is considered a potentially significant impact.

Mitigation Measure

Measure 13.2: Implement Mitigation Measure 13.1.

Impact Significance After Mitigation: Less than Significant

Implementation of Mitigation Measure 13.2 would ensure that future digester and co-digester facilities and centralized facilities would comply with local, State and federal requirements for developing structures to minimize hazards associated with unstable soil conditions. Completion of site specific geotechnical engineering studies would identify potential constraints and recommend methods to construct, install and design structures, including foundations, tanks and pipelines to minimize risks. Compliance with CBC would further ensure that facilities would be designed consistent with design standards that address unstable soil conditions.

Impact 13.3: Construction of project facilities would not result in an increase in the erosion of soils which could result in a loss of top soil. (Less than Significant)

High erosion potential in soils is primarily caused by loose soils and steep slopes. The potential for erosion generally increases as a result of human activity, as a result of grading and other site preparation activities, including the removal of vegetative cover. Although large scale grading and site preparation activities are not anticipated, it is possible that future on site digester and co-digester facilities and centralized facilities developed in currently undeveloped land with exposed soils in areas of high erosion potential could result in an increase in soil erosion and a loss of top soil. However, as described in Section 5, Hydrology and Water Quality, Impact 5.1, implementation of standard BMPs and the monitoring program outlined through a required Stormwater Pollution Prevention Program (SWPPP), where necessary, and incorporated into a National Pollutant Discharge Elimination System (NPDES) permit would ensure that future dairy development would have a less-than-significant impact relating to soil erosion during construction activities.

Mitigation: None required.

Impact 13.4: Development of dairy digester and co-digester facilities would not contribute to cumulative impacts related to geology, soils and seismicity. (Less than Significant)

Other development proposed in the project area would be subject to the same types of geology, soils, and seismicity impacts as the project. However, these types of impacts represent hazards to people and property on a site-specific basis. For example, liquefaction potential at two separate developments do not result in a greater combined impact than the individual impacts do separately. Additionally, mitigation measures, described above, would reduce project related impacts associated with geologic and seismic hazards to less than significant. As a result, there is little, if any, cumulative relationship between the development of the project and past, present or anticipated future development. Therefore, there would be no cumulative effects related to geology, soils and seismicity. This is considered a less-than-significant impact.

Mitigation: None required.

13.3 References

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CHAPTER 14

Noise

14.1 Setting

Environmental Setting

Environmental Noise Fundamentals

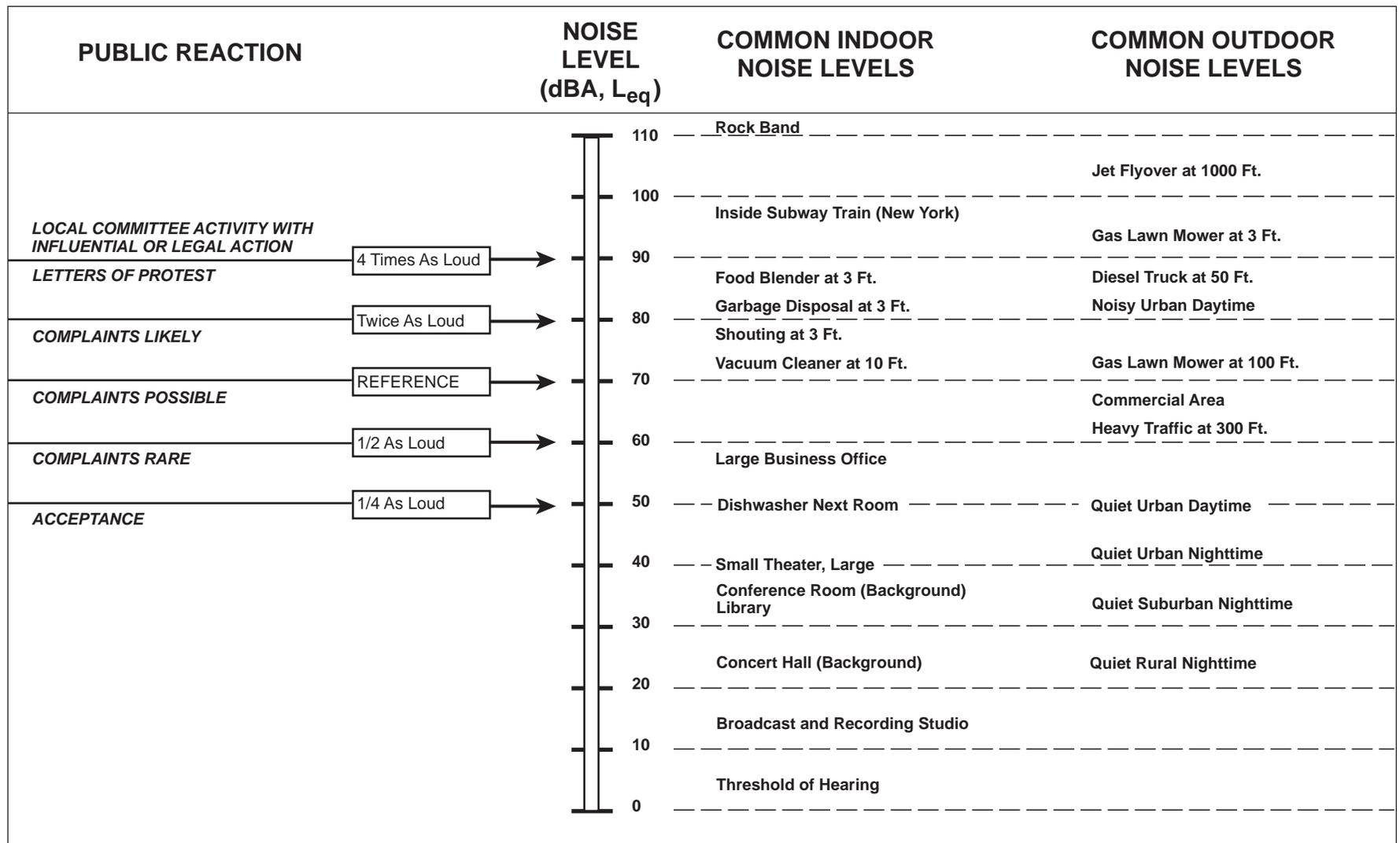
Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequencies spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Figure 14-1**.

Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in **Figure 14-1** are representative of measured noise at a given instant in time, however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable.



The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment varies the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

Leq	the equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The Leq is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
Lmax	the instantaneous maximum noise level for a specified period of time.
L50	the noise level that is equaled or exceeded 50 percent of the specified time period. The L50 represents the median sound level.
L90	the noise level that is equaled or exceeded 90 percent of the specified time period. The L90 is sometimes used to represent the background sound level.
Ldn	24-hour day and night A-weighted noise exposure level which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night (“penalizing” nighttime noises). Noise between 10:00 PM and 7:00 AM is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.
CNEL	similar to the Ldn, the Community Noise Equivalent Level (CNEL) adds a 5-dBA penalty during the evening hours between 7:00 PM and 10:00 PM in addition to a 10-dBA penalty between the hours of 10:00 PM and 7:00 AM

As a general rule, in areas where the noise environment is dominated by traffic, the Leq during the peak-hour is generally equivalent to the Ldn at that location (within +/- 2 dBA) (Caltrans, 1998).

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning; and
- physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A

wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur (Caltrans, 1998):

- except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- a change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- a 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion, hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for hard sites and 7.5 dBA for soft sites for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver such as parking lots or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources (such as traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement (Caltrans, 1998).

Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, health care facilities, schools and parks are typically considered sensitive to noise. Because the location of dairies, manure digester and co-digester facilities, and centralized facilities would typically be in rural or semirural areas, the primary land use potentially affected would be residences, however, noise-sensitive land uses along the delivery routes may include health care facilities, schools and parks.

Existing Noise Environment

The noise near dairy digester or co-digester facilities would be expected to be typical of agricultural areas and rural residences. The predominant sources of noise would include roadway traffic and equipment noise from existing agricultural operations. Average daily noise levels in these types of environments (away from specific noise sources) typically are in the range of 40-50 Ldn, dBA (U.S. EPA, 1978).

A Metrosonics Model db3080 sound level meter was used to measure the existing ambient noise levels at various locations around dairies with operating dairy digesters. The meter was calibrated to ensure the accuracy of the measurements. Short-term noise level measurements were taken at eleven locations at three dairies with digesters and on-site electrical generation facilities. The noise measurement results are presented below in **Table 14-1**.

**TABLE 14-1
EXISTING NOISE ENVIRONMENTS AT PROJECT LOCATION**

Location #: Description	Length of Measurement	Average Noise Level Leq (dBA)	Noise Sources (dBA)
1: Fiscalini Dairy ~ 40 feet from milk parlor	5 minutes	67	Cows, parlor equipment, tractor in distance
2: Fiscalini Dairy ~ 20 feet from Dairy Stall	Spot Measurement	75	Cows, people talking in distance
3: Fiscalini Dairy ~ 20 feet from digester heater and pumps	5 minutes	66	Heater and Pump hum
4: Fiscalini Dairy ~ 15 feet from Auger	4 minutes	73	Auger and bulldozer in distance
5: Fiscalini Dairy ~ 10 feet from small enclosed pump, measurement taken from inside enclosure	1 minute	81	Pump, people talking
6: Fiscalini Dairy ~ 15 feet from electric generator with door open	2 minutes	88	Electricity Generator
7: Fiscalini Dairy ~ 15 feet from electric generator with door closed	1 minute	82	Electricity Generator
8: Fiscalini Dairy ~ at driveway with door closed	2 minutes	68	Electricity Generator
9: Castelanelli Brothers Dairy ~ 10 feet from generator with door open	5 minutes	87	Electricity Generator
10: Castelanelli Brothers Dairy ~ 10 feet from generator with door closed	Spot Measurement	72	Electricity Generator
11: Tollenaar Holstein Dairy~ 15 feet from generator (no doors)	5 minutes	86	Electricity Generator

All measurements were on Thursday April 8, 2010. Weather conditions were sunny and calm.

SOURCE: ESA Noise Measurement Results, 2010.

Regulatory Setting

Federal

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters from the vehicle pathway centerline. These

controls are implemented through regulatory controls on truck manufacturers. Federal OSHA regulations also protect workers from excessive occupational noise exposure (29 CFR § 1910.95, Code of Federal Regulations).

State

The California Department of Health Services' Office of Noise Control studied the correlation of noise levels and their effects on various land uses and published land use compatibility guidelines for the noise elements of local general plans. The guidelines are the basis for most noise element land use compatibility guidelines in California.

The land use compatibility for community noise environment chart identifies the normally acceptable range for several different land uses, as shown in **Figure 14-2** below. Persons in low-density residential settings are most sensitive to noise intrusion, with noise levels of 60 dBA CNEL and below considered "acceptable". For land uses such as schools, libraries, churches, hospitals, and parks, acceptable noise levels go up to 70 dBA CNEL.

The State of California also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB at 15 meters.

The State pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by State and local law enforcement officials.

The State has also established noise insulation standards for new multi-family residential units, hotels, and motels that would be subject to relatively high levels of transportation-related noise. These requirements are collectively known as the California Noise Insulation Standards (Title 24, California Code of Regulations). The noise insulation standards set forth an interior standard of DNL 45 dBA in any habitable room. They require an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than DNL 60 dBA. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

Local

In California most cities and counties have adopted noise ordinances, which serve as enforcement mechanisms for controlling noise, and general plan noise elements, which are used as planning guidelines to ensure that long-term noise generated by a source is compatible with adjacent land uses.

14.2 Impacts and Mitigation Measures

Approach and Methods

The evaluation was performed in light of current conditions in the project area, applicable regulations and guidelines, and typical construction activities and operations of dairy digester and co-digester facilities. In determining the level of significance, the analysis assumed that the dairy digester and co-digester facilities would comply with relevant federal, State, and local ordinances and regulations.

Noise impacts associated with implementation of the project have been evaluated at a program level of detail using standard acoustical modeling techniques that consider typical noise levels from various equipment and noise attenuation levels with distance. Potential noise levels were then compared to typical noise ordinance standards and incompatible noise levels (see Figure 14-2).

Thresholds of Significance

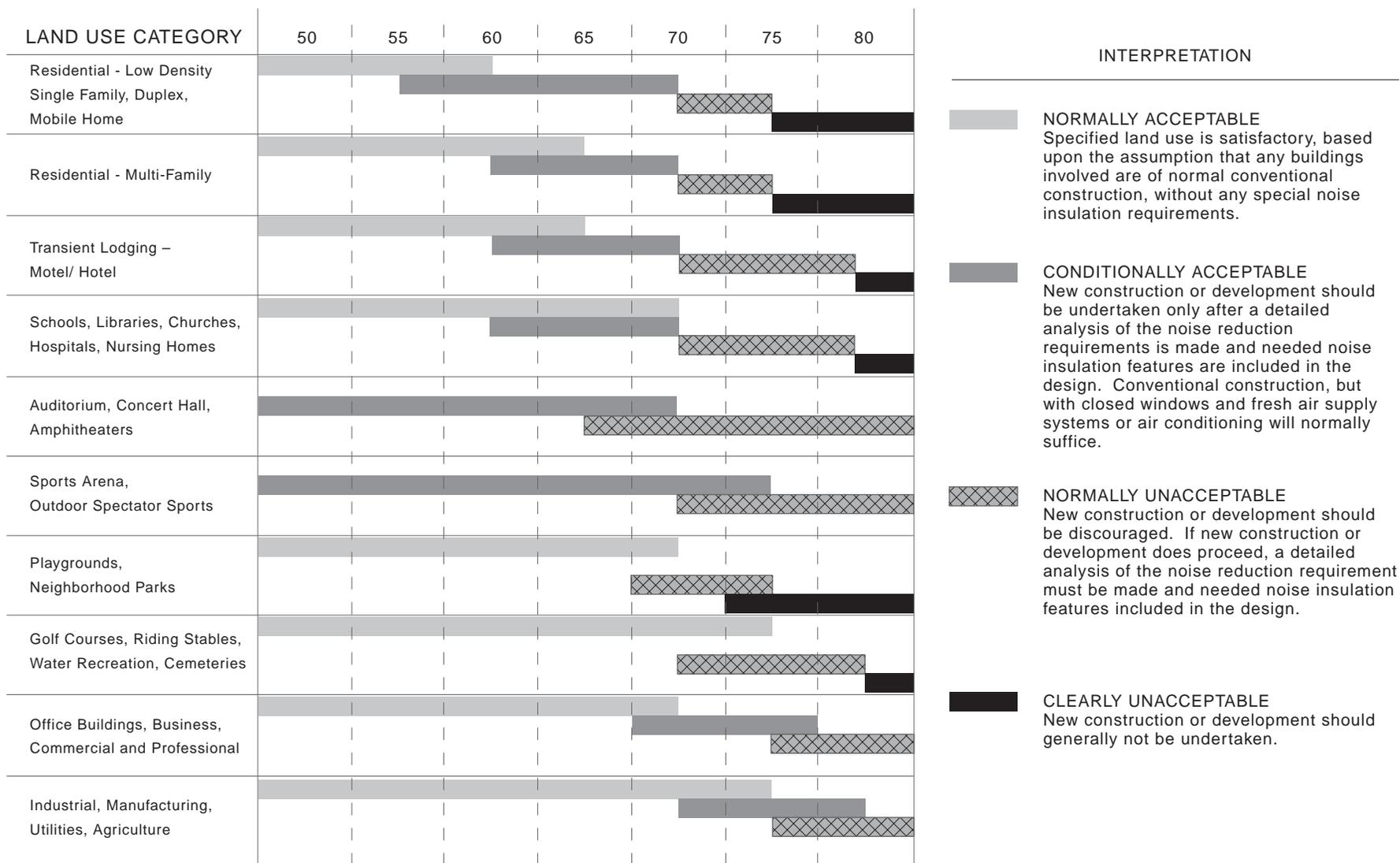
CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions of the area affected by the project. An impact related to hydrology and water quality, including drainage and flooding, would be considered significant if it would result in any of the following, which are adapted from Appendix G of the CEQA *Guidelines*:

- Exposure of persons to or generation of noise levels in excess of standards established in any applicable plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing levels existing without the project;
- Exposure of people residing or working in the project area to excessive noise levels, for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport; or
- Expose people residing or working in the project area to excessive noise levels if the project is located in the vicinity of a private airstrip.

The following does not discuss the second, fifth or sixth criteria. The initial study deemed these impacts as less than significant, and will not be discussed further.

Some guidance as to the significance of changes in ambient noise levels is provided by the 1992 findings of the Federal Interagency Committee on Noise (FICON), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a summary measure of the general adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil

COMMUNITY NOISE EXPOSURE Ldn OR CNEL, db



SOURCE: State of California General Plan Guidelines, Office of Planning and Research, 1998; and ESA, 2008

Figure 14-2
Land Use Compatibility for Community Noise Environment

environment. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been asserted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the Ldn, as shown in **Table 14-2**.

TABLE 14-2
MEASURES OF SUBSTANTIAL INCREASE FOR NOISE EXPOSURE

Ambient Noise Level without Project (Ldn)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels By:
<60 dB	+ 5.0 dB or more
60-65 dB	+ 3.0 dB or more
>65 dB	+ 1.5 dB or more

SOURCE: Federal Interagency Committee on Noise (FICON), 1992.

The rationale for the **Table 14-2** criteria is that the quieter the ambient noise level is, the more the dBA can increase before it causes significant annoyance.

For the purposes of this Program EIR, building off the concepts in Table 14-2, and in consideration of the typical low noise level in agricultural areas, the following noise levels would constitute substantial increases in noise levels and result in a significant impact:

- An increase of 5 dBA, Ldn at sensitive receptors for noise generated from the dairy digester facility on-site sources or dairy digester-related traffic.
- Nighttime construction activity that would affect sensitive receptors.
- Nighttime operations from continuous equipment that have decibel levels above 45 dBA at residences.

Impact 14.1: Construction of dairy digester and co-digester facilities could temporarily increase noise levels at nearby sensitive receptor locations or result in noise levels in excess of standards in local general plans, noise ordinance, or other applicable standards. (Significant)

Construction of facilities could generate noise at sensitive receptors that exceed local regulations and codes. The construction-related noise levels may be from, but not necessarily limited to, the use of heavy equipment at the site or pipeline construction area, or vehicles transporting material to or from the construction site. Noise levels may fluctuate depending on the distance of the sensitive receptor from the construction activity and the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. **Table 14-3** shows typical noise levels during different construction stages and **Table 14-4** shows noise levels produced by various types of construction equipment.

Residential land uses near construction sites are the most concern. Usually such residences would be located on, or immediately adjacent to, a dairy or central facility location or along the route of a pipeline construction project (which would likely be on a dairy or in a roadway right of way).

Some counties possess General Plans that include a Dairy Element, which include buffer zones between dairies and sensitive receptors. For example Madera County has a 1 mile (5,280 feet)

buffer zone to sensitive receptors, and Kings County has a ¼ mile (1,320 feet) buffer zone to residences and a ½ mile (2,640 feet) buffer zone to schools (Madera 2007, Kings 2002).

Although construction activities would likely occur during daytime hours, construction noise could still be considered substantially disruptive to residents. However, periods of intensive noise exposure would be temporary, and noise generated by project construction would be partially masked by other background noise such as traffic noise. Note that construction noise often varies significantly on a day-to-day basis, and the noise levels shown in **Table 14-3** represent a worst-case scenario. Such worst-case scenarios would likely exist only for short periods at any particular residence on a given day. During these times, outdoor activities at the affected residences would be negatively affected by noise and indoor activities (typically 20 to 20 dBA quieter than outdoor noise levels) could be negatively affected. These construction noise levels, especially if they were to occur during the nighttime hours, could cause sleep disturbance to nearby residences. Construction noise on typical days off including Sundays and Holidays could also be annoying to nearby residences and therefore this impact would be potentially significant.

**TABLE 14-3
TYPICAL NOISE LEVELS FROM CONSTRUCTION ACTIVITIES
AND CONSTRUCTION EQUIPMENT**

Construction Phase	Noise Level^a (dBA, Leq)
Ground clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

a Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.

SOURCE: Bolt, Baranek, and Newman, 1971; Cunniff, 1977.

**TABLE 14-4
TYPICAL NOISE LEVELS FROM CONSTRUCTION ACTIVITIES
AND CONSTRUCTION EQUIPMENT**

Construction Equipment	Noise Level^a (dBA, Leq at 50 Feet)
Dump truck	88
Portable air compressor	81
Concrete mixer (truck)	85
Scraper	88
Jackhammer	88
Dozer	87
Paver	89
Generator	76
Backhoe	85
Rock Drilling	98

a Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.

SOURCE: Bolt, Baranek, and Newman, 1971; Cunniff, 1977.

Mitigation Measures

Measure 14.1a: Construction activities shall be limited to daytime hours, between 7 a.m. and 6 p.m., Monday through Saturday, or an alternative schedule established by the local jurisdiction.

Measure 14.1b: Construction equipment noise shall be minimized by muffling and shielding intakes and exhaust on construction equipment to a level no less effective than the manufacture's specifications, and by shrouding or shielding impact tools.

Measure 14.1c: Construction contractors within 750 feet of sensitive receptors shall locate fixed construction equipment, such as compressors and generators, and construction staging areas as far as possible from nearby sensitive receptors.

Measure 14.1d: Construction contractors shall comply with all local noise ordinances and regulations.

Impact Significance After Mitigation: Less than Significant

Implementation of the mitigation measures listed 14.1a-d would significantly reduce construction-related noise impacts by locating staging areas away from adjacent residences when necessary, and prohibiting construction activities during the most noise-sensitive hours of the day. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 14.2: Noise from operation of dairy digester and co-digester facilities or centralized facilities could substantially increase ambient noise levels at nearby land uses or result in noise levels in excess of standards in local general plans, local noise ordinances, or other applicable standards. (Significant)

Stationary Noise

Operations of facilities could generate noise at sensitive receptors that exceed local regulations and codes. Operational activities associated with the project that would generate noise include maintenance vehicle circulation and the operation of certain mechanical equipment such as stationary pumps, motors, compressors, fans, generators, and other equipment. Operation of pipelines would not result in any discernible noise. Noise impacts would be limited to inspection of pipelines during daytime hours and would be temporary.

For equipment such as an electrical generator that runs 24-hours a day, the significance threshold used in the Program EIR is 45 dBA at the location of the nearest residence. In areas with local general plans, ordinances, or other applicable standards are available, they shall apply to project operations. For electrical generator noise, the loudest equipment expected, to be below 45 dBA at a location, would have to occur at an approximate distance of 1,000 feet if it is not enclosed, or approximately 350 feet if the generator is enclosed. Other sensitive receptors located further away from the generator would be exposed to generator noise at incrementally lower levels. Because an

electricity generator on agricultural land would emit noise levels similar to those of existing agricultural equipment (depending on the distances involved), generator noise would be similar to noise from existing agricultural operations. One distinguishing feature would be the continuous operation of the electrical generator.

Some counties possess General Plans that include a Dairy Element, which include buffer zones between dairies and sensitive receptors. For example Madera County has a 1 mile (5,280 feet) buffer zone to sensitive receptors, and Kings County has a ¼ mile (1,320 feet) buffer zone to residences and a ½ mile (2,640 feet) buffer zone to schools (Madera 2007, Kings 2002). Based on site measurement of existing dairy digester electrical generators and standard noise attenuation factors, electrical generator noise levels would be less than significant if the distance to the nearest sensitive receptor would be 1,000 feet or more. If the distance from the electrical generator is less than 1,000 feet from the nearest sensitive receptor (resulting in noise level above 45 dBA at the sensitive receptor) this would be a potentially significant impact.

**TABLE 14-5
MEASURED NOISE LEVELS FROM DAIRY
AND DIGESTER EQUIPMENT**

Digester Equipment	Noise Level^a (dBA, Leq at 50 Feet)
Milk Parlor	65
Dozer	87
Digester Heater and Pump	58
Digester Auger	60
Digester Pump	56
Electricity Generator 1	
-door open	75
-door closed	65
Electricity Generator 2	
-door open	70
-door closed	55
Electricity Generator 3	
-no doors	73

SOURCE: Cunniff, 1977, ESA 2010

Mitigation Measure

Measure 14.2: Any continuous equipment operating at night within 1,000 feet of a sensitive receptor must be enclosed. Furthermore, an acoustic study and follow-up measurements must be performed (after construction) to prove that the noise from any continuous equipment operating at night would comply with all local noise regulations. If no local regulations are available, noise levels must be below 45 dBA at the nearest sensitive receptor. If the sound level exceeds local regulations, or 45 dBA if applicable, additional sound-proofing shall be installed to meet the required sound level.

Impact Significance After Mitigation: Less than Significant

Implementation of the mitigation measure listed 14.2 would reduce operation-related noise to below local regulations, or 45 dBA. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 14.3: Project operational activities associated with transportation would not increase ambient noise levels at nearby land uses. (Less than Significant)

Transportation Noise

It is not anticipated that implementation of the project would result in large numbers of new employees or truck trips. Therefore operational vehicle trip increases would be minimal and would not generate a substantial increase in noise along local roadways. Because of the low number of trips associated with the dairy digester facilities noise levels on roadways would not be expected to increase by more than 1 dBA. This impact would be less than significant.

Mitigation: None required.

Cumulative Impacts

Impact 14.4: Development of dairy digester and co-digester facilities could result in a cumulative increase in noise levels. (Significant)

Cumulative impact refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts (CEQA Guidelines §15355).

The scope of cumulative construction noise impacts is construction noise from dairy digester, co-digester facilities, and pipelines combined with construction noise from other projects in the project area. This combination of noise could affect existing ambient noise conditions at or near the construction site. If construction of the project coincides with and affects the same sensitive receptors as construction noise from other projects, this cumulative impact could be significant. Mitigation Measure 14.4 would restrict construction activities to daytime hours for dairy digester facilities, and would reduce the cumulative construction noise impact to less than significant.

The scope of cumulative operational noise impacts is operational noise from dairy digester and co-digester facilities combined with operational noise from other stationary or mobile sources in the project area. These other sources may contribute considerably to unacceptable ambient noise levels. However, with implementation of Mitigation Measure 14.2, operation of dairy digester and co-digester facilities would not result in significant increases in operational noise. Therefore, the contribution of noise from dairy digestion facilities would not contribute to any cumulative operational noise impact and would be less than significant.

Mitigation Measure

Measure 14.4a: Implement Mitigation Measures 14.1a through Measure 14.1d and Measure 14.2, above.

Impact Significance After Mitigation: Less than Significant

14.3 References

- American Council of Engineering Companies (ACEC) California, 2010. *California Environmental Quality Act (CEQA). State CEQA and State CEQA Guidelines*. 2010.
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- Cunniff, Patrick. 1977. *Environmental Noise Pollution*.
- ESA, 2010. Field Measurement Results: Dairy Digestion Facility Tour (Fiscalini, Castelanelli Brothers, and Tollenaar Holsteins Dairies) April 8, 2010. Compiled by Donald Ambroziak (ESA). April 2010.
- Federal Interagency Committee on Noise, 1992. *Effects of Aviation Noise of Awakenings from Sleep*. Washington, DC: FICON.
- Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Impact Assessment*, May 2006.
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- Madera County, 2007. Madera County Dairy Standards Project EIR, December 2007
- U.S. Department of Transportation, Federal Transit Administration, 2006. Transit Noise and Vibration Impact assessment, FTA-VA-90-1003-06, May 2006.
- U.S. Environmental Protection Agency, 1978. Protective Noise Levels Condensed Version of EPA Levels Document.

CHAPTER 15

Public Services and Utilities

15.1 Setting

Environmental Setting

Water Supply

Potable water and non-potable water within the Central Valley are supplied by many purveyors. Agricultural operations, including dairies, are not typically supplied by municipal water systems but may receive reclaimed water or irrigation water from a municipal system or from an irrigation district. Agricultural operations are primarily served by private systems which utilize either groundwater or surface water. Dairies within the Central Valley may also utilize process wastewater as flush water or applied to cropland consistent with the dairy's Nutrient Management Plan as discussed under the Wastewater section, below.

Wastewater

Wastewater service within the Central Valley may be provided by either a public or private system. Agricultural operations, including dairies, typically use on-site septic systems for domestic wastewater (such as restroom facilities). Process wastewater is directed to wastewater lagoons or ponds. Process wastewater at a dairy can be defined as "water directly or indirectly used in the operation of a milk cow dairy for any or all of the following: spillage or overflow from animal watering systems; washing, cleaning, or flushing pens, barns, manure pits, or other dairy facilities; washing or spray cooling of animals; or dust control...and includes any water or precipitation and precipitation runoff which comes into contact with any raw materials, products, or byproducts including manure, feed, milk, or bedding" (CVRWQCB, 2007). Process wastewater for a digester can be defined as solid and liquid digestate, or water that has directly or indirectly come into contact with co-digestion substrate.

Stormwater Drainage

Within the Central Valley region, urban areas contain linked storm drain systems where stormwater is aggregated and treated by the local jurisdiction. Rural areas are not typically connected to public storm drain systems and thus handle stormwater in accordance with local ordinances and the requirements of the Central Valley Water Board.

Where applicable, drainage from existing dairies must comply with specific WDRs, as defined in the General Order for Existing Milk Cow Dairies. Specifically, the General Order requires a Waste Management Plan to be submitted to the Central Valley Water Board which addresses flood protection and containment of waste, among other considerations. Stormwater drainage, if it comes into contact with any raw materials, products, or byproducts on a dairy, including manure, feed, milk, or bedding is considered process wastewater and must be handled accordingly.

Natural Gas

Pacific Gas and Electric (PG&E) and Southern California Gas (SoCal Gas) provide natural gas service within the Central Valley (CEC, 2008). Most properties in rural areas of the Central Valley do not utilize natural gas, as they are not connected to a distribution network, though they may be located in proximity to a larger transmission pipeline. The California Energy Commission (CEC) publishes an updated map of major natural gas transmission pipelines in California on its website (CEC, 2010a).

Electricity

There are several electricity providers within the Central Valley that serve both urban and rural areas. Providers in the central and southern portion of the Central Valley Region include Sacramento Municipal Utilities District, PG&E, Southern California Edison, Roseville Electric, Lodi Electric Utility, Merced Irrigation District, Modesto Irrigation District, and Turlock Irrigation District (CEC, 2010b). Additional providers in the northern portion of the Central Valley Region include PacifiCorp, Surprise Valley Electrification Corporation, Lassen Municipal Utilities District, and Plumas-Sierra Rural Electric Cooperative (CEC, 2010). Existing dairies that already have digester facilities may generate electricity, in the process of converting biogas in a generator, and sell the power back to these providers.

Fire Protection

Local fire protection services are provided by many agencies within the Central Valley, including municipal fire departments, California Department of Forestry and Fire, fire districts, and volunteer departments. Services provided by fire protection services include building inspections during construction, fire suppression, emergency medical response, and hazardous materials response (CSFM, 2010).

Regulatory Setting

California Public Utilities Commission

The California Public Utilities Commission (CPUC) primarily regulates the provision of investor owned utilities in California. These utilities include privately owned telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation companies. The CPUC is responsible for assuring that California utility customers have safe, reliable utility services at

reasonable rates, protecting utility customers from fraud, and promoting the health of California's economy (CPUC, 2010). General Order No. 112-E includes the State rules on Testing, Operation and Maintenance of Gas Gathering, Transmission and Distribution Piping Systems.

Local

Local agencies that regulate public services and publicly owned utility systems for dairy digester and co-digester facilities include county fire departments and fire districts, county water departments and water districts, county environmental health departments for wells and septic systems, and county flood management departments and drainage districts for flood protection and drainage services. Local agencies regulate facilities within their jurisdiction by enforcing State and local laws and ordinances. Local agencies currently adopt and enforce the 2007 California Fire Code (Title 24 California Code of Regulations Part 9; CBSC, 2010). Local jurisdictions also provide goals, objectives and policies related to public services and utilities in the jurisdiction's general plan.

15.2 Impacts and Mitigation Measures

Approach and Methods

The evaluation was performed in light of current conditions in the project area, the jurisdictional boundaries of the Central Valley Region (Region 5), applicable regulations and guidelines, and typical construction activities and operations of dairy digester and co-digester facilities. In determining the level of significance, the analysis assumed that the dairy digester and co-digester facilities would comply with relevant federal, State, and local laws, regulations, ordinances and guidance.

ESA conducted a site visit to three dairies with anaerobic digestion facilities within the Central Valley Water Board region on April 8, 2010. This provided an opportunity to assess the potential for impacts on public services and utilities (ESA, 2010). These dairies included Fiscalini Dairy (an above ground complete mix digester in Modesto), Castelanelli Brothers Dairy (a covered lagoon digester in Lodi), and Tollenaar Holsteins Dairy (a subsurface complete mix digester in Elk Grove). Facility operators were present at each dairy to respond to questions regarding the facilities. In addition, any planning documents, environmental documents and other relevant literature which were reviewed to assess potential impacts are listed at the end of this chapter.

Thresholds of Significance

An impact related to public services and utilities would be considered significant if it would result in any of the following, which are adapted from Appendix G of the CEQA *Guidelines*:

- Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection or other public facilities

- Conflict with wastewater treatment requirements of the applicable Central Valley Water Board
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects
- Require or result in the construction of new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects
- Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed
- Result in a determination by the wastewater treatment provider that would serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments
- Require or result in the construction of new sources of energy supplies or additional energy infrastructure capacity the construction of which could cause significant environmental effects
- Conflict with applicable energy policies or standards

The discussion of environmental impacts is limited to those potential impacts that could result in some level of potentially significant environmental change, as defined by CEQA Guidelines (§15382).

As discussed in the Initial Study (Appendix B), the project would not impact solid waste facilities, police protection, schools, or parks and would not conflict with existing solid waste regulations; thus, these issues are not discussed within this Program EIR.

This chapter discusses the impacts to water, wastewater treatment and stormwater treatment facilities and utility requirements from a utilities capacity perspective. The anticipated impacts upon surface water quality and groundwater quality from digester and co-digester facilities are discussed within Chapter 5, Hydrology and Water Quality.

Impact 15.1: The project would not substantially increase demands on fire protection services. (Less than Significant)

As described previously, the project would facilitate the construction and operation of dairy digester and co-digester facilities throughout the Central Valley within the jurisdiction of the Central Valley Water Board. Construction and operation of digester and co-digester facilities at dairies and centralized locations would adhere to the building code and the fire code adopted by the relevant local jurisdiction. Building and fire inspections would be conducted during construction of dairy digester and co-digester facilities to ensure code compliance and thereby reduce the risk of fire hazards associated with new facilities. Hazardous issues associated with biogas production and delivery are addressed in Chapter 10, Hazards and Hazardous Materials.

Facilities constructed at dairies or centralized locations would not substantially increase demands on fire protection services. The on-site flare periodically required for burning excess gas may be visible at night from off-site areas leading to increased calls to the local fire district/department

from concern of a potential fire; however, it does not require a response from the fire department, as noted at Castelanelli Brothers Dairy (ESA, 2010). Because the project is not likely to require a substantial need for additional response from local fire service providers, this impact is considered less than significant. However, calls to local fire agencies can be reduced through implementation of Mitigation Measure 11.3 as discussed below.

Mitigation: None required.

While no mitigation is required, Mitigation Measure 11.3 recommends that flares for digester facilities be located in a manner which minimizes visibility to nearby receptors, which would reduce the likelihood of calls from the general public related to the flare. After implementation of Measure 11.3 this would remain a less-than-significant impact.

Impact 15.2: The project would not conflict with wastewater treatment requirements of the Central Valley Water Board. (Less than Significant)

The project consists of the development of a waste discharge regulatory program for dairy digester and co-digester facilities. As such, facilities operating under this program must comply with the terms and conditions of General Orders, Individual WDRs, or Conditional Waivers issued under this regulatory program or any discharges of liquid or solid waste that may affect surface water or groundwater. Because the project includes the development of wastewater treatment requirements under the regulatory program which must be adhered to prior to any discharges, this impact is less than significant.

Mitigation: None required.

Impact 15.3: The project could result in significant environmental effects from the construction and operation of new water and wastewater treatment facilities or expansion of existing facilities. (Significant)

Development of digester facilities, co-digester facilities, or centralized facilities at dairies would not increase water or wastewater treatment demands substantially above those levels already needed for dairy operations. Potential new sources of water and wastewater treatment demands include the following:

- Water for Feedstock – Water needed to increase the liquid content of feedstock would be provided by process wastewater from settling ponds or lagoons which would be available at the dairy and would not require additional treatment capacity.
- Wastewater Treatment/Dilution for Digestate – The digestate (liquid and solid waste) produced from the digester or co-digester facility would receive anaerobic treatment and would not typically require additional treatment. The effluent from co-digester facilities may need water for dilution prior to land application.

- Domestic Water and Wastewater Demands for Employee Facilities (such as restrooms) – Due to the limited number of employees, these demands could be satisfied by the facilities needed for dairy operations and would not require additional treatment capacity.
- Water for Fire Suppression – Fire suppression demands could be satisfied by water already needed for dairy operations including water supplied by agricultural wells or irrigation water. The water could be non-potable and does not require additional treatment capacity.

As there would be no increased water or wastewater treatment demands directly related to projects at dairies, this impact would be less than significant.

The development of off-site centralized facilities could require new water and wastewater treatment facilities or connection to a municipal system. It should be noted that industrial wastewater discharge to a wastewater treatment provider is not covered under this waste discharge regulatory program. Potential new sources of water and wastewater treatment demands include the following:

- Water for Feedstock – There would be a demand for water needed to increase the liquid content of feedstock; this water could be non-potable if available. The demand could be supplied from development of an on-site groundwater well or water from an irrigation district. Projects located in industrial areas or the urban fringe may be able to connect to a municipal system.
- Wastewater Treatment/Dilution for Digestate – The digestate (liquid and solid waste) produced from the digester or co-digester facility would receive anaerobic treatment and would not typically require additional treatment. The effluent from co-digester facilities may need water for dilution prior to land application.
- Domestic Water and Wastewater Demands for Employee Facilities (such as restrooms) – The demand could be supplied from development of an on-site groundwater well and septic system. Projects located in industrial areas or the urban fringe may be able to connect to a municipal system. The water and wastewater demands are considered relatively low due to the limited number of employees needed to operate the facilities.
- Water for Fire Suppression – Fire suppression demands could be satisfied by non-potable water if available. The demand could be supplied from development of an on-site groundwater well. Projects located in industrial areas or the urban fringe may be able to connect to a municipal system.

New private water and wastewater treatment facilities (such as an on-site groundwater well or septic system) would be part of the project plan submitted for local site plan review and would be constructed to the standards of the applicable local jurisdiction; as this condition must be met, impacts from private water and wastewater treatment facilities would be less than significant. For service from an irrigation district or municipal system, the developer would need to ensure that service is available with adequate treatment capacity and thus this impact is potentially significant.

Mitigation Measures

Measure 15.3a: If the project proposes to obtain water from a water supplier (irrigation district, municipal system or other public water entity), the developer would enter into an agreement for service with the supplier.

Measure 15.3b: If the project proposes to obtain wastewater service from a wastewater treatment provider (municipal or other public entity), the developer would enter into an agreement for service with the provider.

Impact Significance After Mitigation: Less than Significant

Impact 15.4: The project would not result in significant environmental effects from the construction of new stormwater treatment facilities or expansion of existing facilities. (Less than Significant)

Dairies have ponds which also receive stormwater runoff. The addition of digester facilities, co-digester facilities, or centralized facilities at dairies would create additional impermeable surfaces; however, these surfaces would be small in comparison to the overall dairy operation and would not be enough to significantly affect the flow (rate or location) of stormwater. This impact is less than significant for facilities located on dairies.

The development of off-site centralized facilities could require new stormwater treatment facilities or connection to a municipal stormwater system. Stormwater facilities would likely be created on site, though there would be some potential for access to connected stormwater systems if the project is located in industrial areas or the urban fringe. Stormwater facilities would be part of the project plans submitted for local site plan review and would be constructed to the standards of the applicable jurisdiction and Central Valley Water Board. As this condition must be met, the impact would be less than significant.

Mitigation: None required.

Impact 15.5: The project would not require significant levels of new or expanded water supply resources or entitlements. (Less than Significant)

As discussed in Impact 15.3, there would be little to no increase in water demands for digester facilities, co-digester facilities, or centralized facilities located at dairies. Thus, facilities located at dairies would have a less-than-significant effect on expanded water supplies or entitlements.

As discussed in Impact 15.3, development of off-site centralized facilities could create water demands for dilution of feedstock/digestate, domestic water uses and fire suppression. Impact 5.5 (in Chapter 5, Hydrology) discusses that California Senate Bill (SB) 610 requires a water supply assessment to demonstrate adequate water supplies for large projects. The requirement applies to processing plants that occupy over 40 acres or projects that require more water than would be typically required for 500 dwelling units, and other projects defined by California Water Code §10912(a). Some centralized digestion and co-digestion facilities may not be large enough to meet the minimum requirements of this bill and therefore do not represent a significant source of water supply demands. Those facilities that must adhere to the requirements of SB 610 would be

required to demonstrate adequate water supplies are available and therefore would have a less-than-significant impact on expanded water supplies or entitlements.

Mitigation: None required.

Impact 15.6: The project could result in exceeding the capacity of a wastewater treatment provider. (Significant)

As discussed in Impact 15.3, use of a wastewater treatment provider is considered only for development of centralized facilities (off-site from dairies) located in industrial areas or the urban fringe where municipal wastewater treatment is available. It should be noted that industrial wastewater discharge to a wastewater treatment provider is not covered under this waste discharge regulatory program. Wastewater treatment demands would include domestic uses. As the developer would need to ensure that adequate wastewater conveyance and treatment capacity is available, this impact is potentially significant.

Mitigation Measure

Measure 15.6: If the project proposes to obtain wastewater service from a wastewater treatment provider (municipal or other public entity), implement Mitigation Measure 15.3b.

Impact Significance After Mitigation: Less than Significant

Impact 15.7: The project could result in the construction new energy supplies and could require additional energy infrastructure. (Significant)

The project could facilitate the construction of new energy supplies within the project area through the production of biogas as part of the dairy digestion and co-digestion process. The energy created from biogas at dairy digester and co-digester facilities is considered renewable. As there is currently a demand for renewable energy in California, there is a beneficial effect to providing energy from renewable resources. Dairy digester and co-digestion facilities are designed to have minimal electrical loads, however accessing additional power on-site or generating electricity to export from the dairy could require additional energy infrastructure, with potential significant impacts from construction.

The amount of energy infrastructure needed would be dependent on how the biogas is used. As an energy source, biogas may be used in internal combustion engines to produce electricity, conditioned to biomethane for use in fuel cells or in natural gas vehicles, or conditioned to biomethane for injection into natural gas pipelines. The need for additional infrastructure for each of these uses is described in greater detail below.

Biogas uses that would not require substantial off-site infrastructure improvements include the production of electricity through the combustion of biogas in internal combustion engines and the

upgrading of biogas to biomethane for use in fuel cells or in natural gas vehicles. The construction of the facilities for each of these options could have less-than-significant environmental effects.

As described previously, biogas may also be conditioned to biomethane and then injected into existing and future natural gas pipelines. The conditioning of biogas could occur at dairies with digester and co-digester facilities, or it may be collected as raw biogas and conditioned a centralized facility. After processing, the biomethane would then likely need to be piped (at least short distances) from the facility to natural gas pipelines. Each of these production scenarios would require the construction of new energy infrastructure, such as pipelines, to connect to the existing gas utility network. Likewise, if biogas is converted into electricity on site and sold to a utility provider, then off-site infrastructure, or upgrades to existing off-site electrical distribution infrastructure, may be needed.

The development of new energy infrastructure or expansion of existing energy infrastructure on-site or off-site has the potential to cause significant impacts to biological, cultural, and/or other environmental resources. Typically, energy infrastructure can be located within existing easements or rights-of-way (i.e., public roads or utility easements). Specific impacts associated with off-site energy improvements would be evaluated at the project level during the local project review process. Mitigation Measure 15.7 would reduce impacts associated with the construction of off-site energy infrastructure improvements to less than significant.

Mitigation Measure

Measure 15.7: Implement Mitigation Measures for construction of energy infrastructure including Mitigation Measures 6.1b, 9.1a, 9.1b, 9.2a, 9.2b, 9.3b, 12.1b, 12.2, 12.3, and 14.1a-c.

Impact Significance After Mitigation: Less than Significant

Implementation of the above resource-specific measures will ensure that the construction of off-site energy infrastructure would result in less-than-significant impacts.

Impact 15.8: The project would not conflict with existing energy policies or standards. (No Impact)

The project may indirectly facilitate the production of biogas and biomethane within the project area. This would be beneficial in helping to meet the California's Renewable Portfolio Standard. If a facility proposes to inject conditioned biogas into a natural gas pipeline, the developer is required to provide evidence to the purchasing utility that the biogas meets the utilities quality standards. No conflicts with existing energy policy or standards would occur and thus there would be no impact.

Mitigation: None required.

Impact 15.9: Development of dairy digester and co-digester facilities would not contribute to cumulative impacts to public services and utilities. (Less than Significant)**Water, Wastewater and Stormwater**

Projects located at dairies would not create substantial increased demands on water, wastewater, or stormwater and thus would not contribute to cumulatively considerable impacts (see Impacts 15.3 to 15.6).

The water, wastewater, and stormwater facilities that may be required for centralized locations off-site of dairies would be distributed throughout the Central Valley. As noted in the discussion of Impacts 15.3 and 15.4, new water, wastewater or stormwater facilities are project components, subject to review and regulation by local jurisdictions and agencies. Because centralized facilities are unlikely to be built within close proximity to one another, where demand may be concentrated and magnified, cumulative impacts to local water, wastewater, and drainage facilities are less than significant for those facilities.

Natural Gas

In cases where biogas is not utilized in natural gas injection into pipelines, impacts would be less than significant as off-site infrastructure would be minimal. No cumulatively considerable impact is expected in these cases.

In cases where energy infrastructure, such as pipelines, must be constructed to collect biogas or biomethane, new natural gas infrastructure would be built. As discussed in Impact 15.7, the specific impacts associated with off-site energy improvements would be evaluated at the project level during the local project review process. Mitigation Measure 15.7 would also reduce cumulative impacts associated with the construction of off-site energy infrastructure improvements to less than significant.

Electricity

The projects would provide additional renewable energy supplies throughout the Central Valley which has beneficial cumulative effects due to existing demand for renewable energy sources.

Fire protection

The project would contribute to a minor increase in fire protection services from fire districts/departments throughout the Central Valley. Impacts would be spread throughout the region and service demands specific to dairy digester and co-digester facilities are expected to be infrequent. Due to the infrequent and limited nature of increased fire protection demands, this impact is considered less than significant.

Mitigation: None required.

15.3 References

- California Building Standards Commission (CBSC), 2010. California Building and Fire Code, available online at: <http://www.bsc.ca.gov/default.htm>, accessed June 01, 2010.
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CHAPTER 16

Other CEQA Considerations - Impact Overview

16.1 Effects Found Not To Be Significant

As required by CEQA, this Draft Program EIR focuses on expected significant or potentially significant environmental effects (CEQA Guidelines §15143). An Initial Study Checklist was prepared for the project to identify issues to be evaluated in this Draft Program EIR (**Appendix NOP**).

Direct and indirect impacts found to be less than significant during the scoping process include mineral resources and population and housing. Direct and indirect impacts found to be no impact during the scoping process include recreation. The Initial Study dismissed potential impacts in these resource areas as clearly insignificant and unlikely to occur as a result of the project. No subsequent scoping comments have been received inconsistent with the findings in the Initial Study related to these three resource areas.

Mineral Resources

Dairy digester facilities would not be of significant size to prohibit recovery of known mineral resources of value to the region or state. While there are several known sand and gravel mines, among other commodities, located within the Central Valley, due to the availability of agricultural land and extent of dairy operations which avoid designated mineral resource areas, the project would not be expected to result in the loss of specific recovery sites (Department of Conservation, 1999). Less than significant impacts are anticipated in this regard. The program will not result in foreseeable loss in mineral resources.

Population and Housing

Dairy digester operation would create a small number of jobs throughout the Central Valley region; however, this increase would not be considered substantial. The project does not involve the construction of features (i.e., roads, residences) that would induce population growth. Biogas generated by the dairy digester facilities would provide for an existing need for renewable energy and is not proposed to be used for new off-site developments. In addition, dairy digester facilities would not displace residences, as they would be located on, or in the vicinity of dairies. Less than significant impact to existing housing would occur. Finally, dairy digester facilities would be located on dairies, or in the immediate vicinity of dairies, and would not displace people. Less than significant impact to population growth would occur. The program will not result in foreseeable displacement of populations or housing.

Recreation

Dairy digester facilities would not induce population growth, restrict recreational opportunities, or thus would not increase use or demand for recreational facilities. The project description does not include recreational facilities. Considering these factors the project would not result in foreseeably significant impacts on recreation.

16.2 Cumulative Impacts

CEQA Guidelines §15130(a) requires that an EIR discuss the cumulative impacts of a project when the project's incremental effect is "cumulatively considerable," meaning that the project's incremental effects are considerable (as defined in §15065(c)). Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts (CEQA Guidelines §15355). Further, such impacts can result from individual effects which may be minor, but collectively significant over time. The discussion on cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence (CEQA Guidelines §15130(b)). CEQA Guidelines note that the cumulative impacts discussion does not need to provide as much detail as is provided in the analysis of project-only impacts and should be guided by the standards of practicality and reasonableness. Considering this, CEQA Guidelines §15130(b)(1) recommends the use of a "list" or "projection" approach in the discussion of significant cumulative impacts to adequately address cumulative impacts.

The cumulative impact analysis considered the combined effect of the proposed project and other closely related, past, present and reasonably foreseeable future projects that may be constructed or commence operation during the time of activity associated with the proposed project. . The cumulative impacts of the project are analyzed in detail in the final impact(s) discussion located in each of the environmental resource chapters (Chapters 5 – 15). Please refer to those impacts for a detailed discussion.

16.3 Growth-Inducing Impacts

The CEQA Guidelines §15126.2(d) require that an EIR evaluate the growth-inducing impacts of a proposed action (Section). A growth-inducing impact is defined by the CEQA Guidelines as:

[T]he ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth.... It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

A project can have direct and/or indirect growth-inducement potential. Direct growth inducement would result if a project involved construction of new housing. A project can have indirect growth-inducement potential if it would establish substantial new permanent employment opportunities (e.g., commercial, industrial or governmental enterprises) or if it would involve a substantial

construction effort with substantial short-term employment opportunities and indirectly stimulate the need for additional housing and services to support the new employment demand. Similarly, under CEQA, a project would indirectly induce growth if it would remove an obstacle to additional growth and development, such as removing a constraint on a required public service. An example of this indirect effect would be the expansion of a wastewater treatment plant, which might allow for more development in service areas.

The proposed project would not result in a substantial increase in employment, and correspondingly, would not result in a substantial increase in population and associated demand for housing in the area. Mitigation of impacts resulting from the Draft Program EIR will not require the construction of any additional roadways or public services or utilities. For these reasons, the project is not anticipated to result in substantial growth inducement.

16.4 Significant and Unavoidable Environmental Impacts

CEQA §21100(b)(2) requires that any significant effect on the environment that cannot be avoided or irreversible if the project be implemented must be identified in a detailed statement of the environmental impact report. CEQA Guidelines §15126.2(b) provides that an environmental impact report must discuss, preferably separately, the significant environmental effects which cannot be avoided if the proposed project is implemented. In addition, CEQA Guidelines §15093(a) requires the decision making agency to balance, as applicable, the economic, legal, social, technological, or other benefits of a proposed project against its unavoidable environmental risks when determining whether to approved a project. Benefits may include, but not be limited to, those that are region-wide or statewide. If the benefits of a proposed project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered : “acceptable.” If the Central Valley Water Board approves a project which will result in the occurrence of significant effects which are identified in the final environmental impact report but are not avoided or substantially lessened, the agency shall state in writing the specific reasons to support this action based on the final environmental impact report (EIR) and/or other information in the record (CEQA Guidelines §15093(b)). In this, the Statement of Overriding Considerations shall be supported by substantial evidence in the record. CEQA Guidelines §15093 provides that if an agency makes a Statement of Overriding Consideration the statement should be included in the record of the project approval and should be mentioned in the notice of determination. This statement does not substitute for and shall be addition to findings the Central Valley Water Board must make before approving a project for which the EIR was prepared (CEQA Guidelines §15091). The potentially significant and unavoidable adverse impact identified in this EIR is listed below. For this potentially significant and unavoidable adverse impact, the Central Valley Water Board must prepare and adopt a Statement of Overriding Considerations if the Central Valley Water Board approves the project.

Significant and Unavoidable Adverse Impact

Significant and unavoidable cumulative impact identified in this Draft Program EIR include:

- Impact 5.6 – Development of dairy digester and co-digester facilities, together with anticipated cumulative development in the area, could contribute to cumulative water quality impacts.
- Impact 6.6 – The criteria air pollutant emissions from the cumulative development of dairy manure digester and co-digester facilities in Region 5 (200 total digesters at a rate of 20 digesters or co-digesters per year for 10 years) were compared to and exceeded the significance thresholds of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for both annual construction emissions and operational emissions.

Implementation of the program has been determined to result in a significant impacts for air quality and water quality. These significant cumulative impact is identified and discussed in greater detail in Chapter 5, Hydrology and Water Quality, and Chapter 6, Air Quality (see Impacts 5.6 and 6.6 respectively).

16.5 Significant Irreversible Environmental Changes

Section 15126.2(c) of the CEQA Guidelines requires an EIR to describe significant irreversible environmental changes that would occur if a proposed project is implemented. The guidelines further state that:

Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts [such as highway improvement which provides access to a previously inaccessible area] generally commit future generations to similar uses. Also irreversible damage can result from environmental accidents associated with the project. Irrecoverable commitments of resources should be evaluated to assure that such current consumption is justified.

The proposed project would use non-renewable fuel resources during construction and such resources would also be used to some degree for the duration of the project (i.e., some petroleum for deliveries of co-digestion substrates and electricity generated off-site that is used for the digester facilities). However development of dairy digester and co-digester facilities would provide the ability to process the manure and co-digestion substrates to generate and capture biogas, which is a flexible renewable energy source. The overall energy would be net positive, the current energy potential of cow manure is not being captured, resulting in a net benefit in energy. In essence the development of the manure digesters and co-digesters would provide future generations access to the equipment that can generate renewable energy.

16.6 References

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CHAPTER 17

Alternatives

17.1 Introduction

CEQA Guidelines §15126(a) requires an Environmental Impact Report (EIR) to describe a range of reasonable alternatives to the project which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate comparative merits of the alternatives. A range of reasonable alternatives to project must be addressed because the EIR will identify ways to mitigate or avoid the significant effects that a project may have on the environment (CEQA Guidelines §15126.6(b)). Consideration of a range of potentially feasible alternatives promotes informed decision making and public participation. An EIR is not required to consider infeasible alternatives, but the alternatives discussion should present alternatives to the project which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly (CEQA Guidelines §15126.6(b)).

CEQA Guidelines §15126.2(f) provides that the range of alternatives is governed by the “rule of reason”, requiring the EIR to set forth only those alternatives necessary to permit a reasoned choice. In the evaluation of alternatives, the EIR shall contain sufficient detail to allow meaningful evaluation, analysis and comparison with the project. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed (CEQA Guidelines §15126.6(d)).

The EIR must evaluate a “No Project” alternative in order to provide a comparison between the impacts of approving the project with the impacts of not approving the project (CEQA Guidelines §15126.6(e)). CEQA Guidelines §15126(e) requires that the alternatives analysis must identify the “environmentally superior” alternative among those considered. If the “No Project” alternative is identified as the environmentally superior alternative, then the EIR must also identify an environmentally superior alternative among the other alternatives.

This chapter discusses the following alternatives to the project:

1. No Project Alternative
2. Additional Co-digester Substrate Restrictions Alternative
3. Thermal Conversion Alternative
4. Reduced NO_x Emissions Alternative

The components of these four alternatives are described below, including a discussion of their impacts and how they would differ from the significant impacts of the project as proposed. A discussion of the environmentally superior alternative is included in this chapter.

Factors in the Selection of Alternatives

CEQA Guidelines §15126.6(c) recommends that an EIR briefly describe the rationale for selecting the alternatives to be discussed. A reasonable range of alternatives is considered for this analysis. The following factors were considered in identifying a reasonable range of alternatives to the project:

- Does the alternative accomplish all or most of the primary project objectives?
- Is the alternative feasible, from an economic, environmental, legal, social and technological standpoint?
- Does the alternative avoid or lessen any significant environmental effects of the project?

Program Objectives

As also stated in Chapter 3, Program Description, the objectives for the project covered by this draft Program EIR are:

1. Protect the beneficial uses of surface and groundwater¹ within the Central Valley Region from discharges to land associated with dairy manure digesters and co-digesters on or off-site of dairies.
2. Provide a regulatory framework for the water quality aspects of anaerobic biological digestion facilities using dairy manure and dairy manure with other organic substrates (co-digestion) to produce biogas (a flexible renewable fuel source).
3. Assist the State in meeting greenhouse gases (GHG) reduction measures in support of the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) through the production of biogas from dairy manure.
4. Provide a renewable green energy source to allow energy companies to help achieve the 2010 and 2020 California Renewables Portfolio Standard (RPS) through the production of biogas from dairy manure.
5. Reduce the time required to develop and issue water quality permits for dairy manure digester and co-digester projects by more than 75 percent primarily through the issuance of one or more Waste Discharge Requirements (WDRs) General Orders (GOs) and secondarily through the issuance of Individual WDRs or Conditional Waivers of WDRs (CWs).
6. Reduce the permitting time for other State and local agencies² with discretionary permit responsibilities by providing a Program EIR that can be relied upon or tiered from for regionwide environmental and regulatory settings, project alternatives analyses and cumulative impacts analyses.

¹ Beneficial uses are described in *Water Quality Control Plan for the Tulare Lake Basin*, Second Edition, revised January 2004 (Tulare Lake Basin Plan) and *Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basins*, Fourth Edition, revised September 2009 (Sacramento and San Joaquin Basin Plan).

² San Joaquin Valley Air Pollution Control District staff have estimated that the certification of the Program EIR will reduce air quality permitting time 50 percent or more for certain digester projects.

The project objectives were considered in the evaluation of the four alternatives, which included a No Project Alternative, in the alternative analysis contained in the draft Program EIR.

17.2 Alternatives that Were Considered but Not Further Analyzed

The CEQA Guidelines §15126.6(a) require that an EIR briefly describe the rationale for selecting the alternatives to be discussed, and suggest that an EIR also identify any alternatives that were considered by the lead agency but were rejected as infeasible (CEQA Guidelines §15126.6(c)). The following alternatives were considered, but were eliminated from further consideration and analysis for the reasons expressed below.

No Co-Digestion Alternative

An alternative that excluded use of co-digestion was considered in order to determine if such an alternative could minimize environmental impacts associated with co-digestion while meeting most of the project objectives. Under this alternative, only manure digester facilities would be included while co-digester facilities would be excluded from the project. Co-digestion has been included in the project because it can substantially increase biogas production and material diversion options for the co-digestion substrates. The increased potential revenue from the increased biogas (and potentially tipping fees for the co-digestion feedstocks) makes the dairy digester facilities more economically feasible. While this alternative could reduce potential impacts to water quality it was rejected for further analysis because, by limiting feedstock materials, it would limit the biogas potential of the dairy digesters and thus limit the potential for this alternative to increase renewable energy sources in California (a key goal of the project).

No Lagoon Digester Alternative

Dairy lagoons are large holding or detention ponds, usually with earthen dikes, used to contain, treat, and/or digest dairy process water and manure. The Central Valley Water Board has specifications regarding the construction of dairy lagoons. The option of modifying existing lagoons for digestion can potentially provide a less expensive method for digesting dairy manure process water than construction of new concrete or steel tanks.

Lagoons have a greater potential than tanks to adversely affect groundwater. By limiting dairy digesters and co-digesters to concrete or steel tanks, significant water quality impacts could potentially be avoided. However, the project is a regulatory program that seeks to promote the increase of renewable energy sources in California. Eliminating the option of lagoon digesters could unnecessarily eliminate a huge potential source of digesters that are essentially in place now, missing only the lagoon covers, potentially additional groundwater protections, and gas collection systems. For this reason, the potential alternative was rejected for any further analysis.

No Centralized Facilities Alternative

There are two categories of centralized location facilities for dairies that are analyzed in this EIR: (1) Central AD Facility, whereby individual dairies would collect manure and transport the manure by pipeline or truck to a central facility; and (2) Central Biogas Clean-Up Facility, whereby raw biogas from individual dairies (including dairies linked via underground gas pipelines) is piped to a central facility. These types of centralized facilities can be on dairies or located off-site. For both location options, the central facility would have the potential to receive manure, manure plus co-digestion substrate, and/or raw biogas.

Under this alternative, the development of centralized AD facilities would not be included in the project. This alternative would result in centralized facilities requiring individual permits and CEQA compliance for the development of dairy manure digester and co-digester facilities within the Central Valley Region.

By excluding centralized facilities from the project, potential site-specific environmental impacts to off-dairy locations would be avoided. However, the project is a regulatory program that seeks to promote the increase of renewable energy sources in California. Various business models have been tested and others are being considered that include a central facility: such facilities would add biogas utilization options that could encourage the development dairy biogas production. The biogas producers would be relieved of the significant expense of biogas treatment. Limiting the project to non-centralized facilities undermines the purpose of the project and therefore is not considered to be within a reasonable range of alternatives. For this reason, the potential alternative was rejected for any further analysis.

17.3 Alternatives Selected for Further Consideration

No Project Alternative

CEQA Guidelines §15126.6(e) provides that a No Project Alternative shall also be evaluated along with its impact. According to the CEQA Guidelines, the No Project Alternative shall discuss the existing conditions at the time the Notice of Preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.

The No Project Alternative would maintain the status quo for dairy digester and co-digester facilities with respect to CEQA and permitting. The waste discharge regulatory program for dairy manure digesters under consideration by the Central Valley Water Board would not be implemented under this alternative. Dairy digester and co-digester facilities would be required to comply with current CEQA and Central Valley Water Board regulatory requirements without the benefit of the Program EIR or regulatory program. Development of dairy digesters and co-digester facilities would continue in its current form and would be regulated by the Central Valley Water Board through individual WDRs and exemptions, by other permits from responsible agencies (i.e., County Use Permits, air quality permits, etc.) and by county governments through local ordinances and regulations.

The No Project Alternative would not change the time that is currently needed for permitting dairy manure digester and co-digester facilities, or reduce the time or expense required to develop and issue permits associated with digesters by federal, State and local permitting agencies. This alternative would also be expected to result in the development of fewer facilities and therefore less renewable energy. The No Project Alternative fails to meet the objectives of the Program EIR. The No Project Alternative would not provide a regulatory framework for dairy manure digesters, it would not assist in reducing GHG emissions, it would not help energy companies achieve RPS targets and it would not help to reduce the time required for permitting dairy manure digesters.

Impacts

Under the No Project Alternative, the proposed waste discharge regulatory program would not be implemented, so development and permitting of dairy digesters and co-digester facilities would continue in its current form. Future development of dairy digester and co-digester facilities would be analyzed on an individual basis, and would be subject to individual federal, State, and local laws, regulations, ordinances and guidance. With this alternative, development of individual dairy manure digester or co-digester projects would result in similar impacts as the project to land use and agricultural resources, transportation and traffic, biological resources, hazards and hazardous materials, aesthetic resources, cultural resources, geological resources, noise, and public services and utilities. However, without the Program EIR or the project, permitting of dairy digesters would slow somewhat or considerably in California, therefore resulting in the development of fewer facilities, thus, any impacts (adverse or beneficial) would likely be seen in fewer locations and be smaller in overall scale. For projects constructed and operated under the No Project Alternative, the impacts resulting from the construction of individual facilities would be similar to those described in the project. Impact 6.6 (significant cumulative impact from criteria air pollutants) would probably be less significant under this alternative as the alternative would be expected to reduce the future development of dairy manure digester and co-digester facilities.

In the event of adoption of the No Project Alternative, the waste discharge regulatory program associated with the Program EIR would not be implemented, which would result in status quo for the development of dairy digesters with respect to hydrology and water quality.

The adoption of the No Project Alternative would result in greater impacts from GHG emissions, as an overall beneficial impact of the dairy digester and co-digestion facilities estimated to be built in the next 10 years would be a net decrease in GHG emissions. The majority of the reduction is due to methane capture through a closed system inherent in the dairy digester process, whereas conventional manure storage structures result in large quantities of fugitive methane emissions released into the atmosphere from the natural anaerobic digestion of animal waste. In the event of the adoption of the No Project Alternative, development and construction of dairy digester facilities remain at the same (slower) rate, resulting in an expectation of continued release of more methane into the environment, as compared to the project. By slowing the potential rate of development of dairy digester facilities (that capture and use methane), this alternative would have a negative effect on California's efforts to reduce GHG emissions (AB 32).

Additional Co-digestion Substrate Restrictions Alternative

The restrictions in the Additional Co-digestion Substrate Restrictions Alternative are proposed to facilitate the management of nutrients and salts in the project area without unnecessarily restricting the potential for increase biogas production and tipping fee revenue. This alternative would apply three additional restrictions to the use of co-digestion substrates in dairy manure digesters. First, it would prohibit the use of co-digestion substrates that originate from outside the regional aquifer. Second, it would prohibit the use of co-digestion substrates until dairies have identified and secured an appropriate destination or market for the additional digestate that would be generated by the additional co-digestion substrates. Finally, the alternative would restrict the percentage of non-manure co-substrates that would be processed by dairy manure digester facilities.

Dairies currently under the General Order for existing Milk Cow Dairies must develop and implement management practices that control nutrient losses and describe these in a Nutrient Management Plan (NMP) (Central Valley Water Board, 2007). The existing General Order also requires preparation of a Salinity Report. As part of the dairy digester waste discharge regulatory program the operation of dairy manure digesters will require a site-specific NMP and a site-specific Salt Minimization Plan (SMP) for the on-site use of liquid and solid digestate.

There are existing restrictions in place regarding the importation of materials onto a dairy for use in digester facilities. The Waste Discharge Requirements General Order for existing Milk Cow Dairies restricts the following materials for importation onto a dairy, for the purpose of nutrient recycling or disposal: whey, cannery wastes, septage, municipal or industrial sludge, municipal or industrial biosolids, ash, or similar types of wastes (Central Valley Water Board, 2007). This draft Program EIR also prohibits hazardous wastes, mammalian tissue, dead animals, or human wastes.

The Additional Co-digestion Substrate Restrictions Alternative would add to the existing restrictions and prohibit the importation of any co-substrates originating from outside the regional aquifer. Despite existing Central Valley Water Board regulations, salt accumulation has been identified as an ongoing and increasingly difficult problem to manage in the jurisdictional boundaries of the Central Valley Region (Region 5). This alternative would address that issue by ensuring that there is no net increase in salts discharged to the regional aquifer due to importation of co-digestion substrates allowed by the project.

This alternative would also require dairy operators to have identified and secured a proper end use for their digestate before any co-substrates could be imported to the dairy. In cases where the digestate would be applied on-site, the operator would need to establish that the application would be consistent with their NMPs or SMPs. In cases where the intended use of solid digestate is land application off-site, or an alternate off-site market, the operator must have an agreement with the third party receiver before importation of the co-substrate.

Finally, this alternative would restrict the volume of materials being processed in the digester to not more than 30 percent non-manure co-substrates, with the remainder being dairy manure. Similar restrictions on the level of co-digestion substrates have been legislatively introduced in

the State of Washington in 2009, as have environmental permitting procedures in the State of New York. Regulations of co-digestion substrates by volume of materials are also enforced in Ohio, Michigan, and Iowa (Greer, 2009).

These additional co-substrate restrictions would limit in several ways the generation and fate of liquid and solid wastes that could result from the development of dairy co-digester facilities. The limitations would, however, still allow for the co-digestion of organic substrates to increase the yield of biogas from the dairy digester and collection of revenue for tipping fees from processing the co-digestion substrates.

The project is a regulatory program that seeks to reduce permitting time and promote the increase of renewable energy sources in California. Limiting the use of co-substrates could work against the project objective of reduced permitting time by adding additional regulations and restrictions. The alternative could also reduce the overall generation of biogas by reducing the income available from co-substrate tipping fees, and thus reducing some of the overall incentives of the project. Strict limitations on co-substrates would also impact the project goal of increasing renewable energy sources because co-substrates can significantly increase biogas generation.

Impacts

The following impact analysis is provided in order to compare the impacts of the Additional Co-digestion Substrate Restrictions Alternative to the impacts of the project. See also Table 17-1, the matrix of effects of the alternatives.

The area physically affected under the Additional Co-digestion Substrate Restrictions Alternative (Region 5) would be the same as that affected under the project. Therefore, most impacts related to land use and agricultural resources, geological resources, cultural resources, aesthetic resources, hydrology, hazards and hazardous materials, and public services and utilities would be similar to those identified with implementation of the project. These impacts would potentially be slightly less overall, however, as the introduction of additional restrictions would make the construction and operation of dairy digester and co-digester facilities less economically viable, therefore probably resulting in the development of fewer facilities. In the event of facility construction and operation with equal levels of development as those detailed in the project, however, many impacts resulting from the construction of individual facilities would be equal to or similar in magnitude to those described in the project.

The Additional Co-digestion Substrate Restrictions Alternative would result in fewer impacts to biological resources relating to waters of the State and/or the United States, including wetlands. Controlling the materials used in anaerobic digestion would result in improving the quality of the digestate that is distributed into agricultural fields. This would result in potentially reduced impacts to the surrounding surface water and groundwater, and subsequently riparian habitats and wetlands.

The Additional Co-digestion Substrate Restrictions Alternative would result in fewer impacts to the degradation of groundwater quality, specifically those relating to the increased rate of nitrogen and salt loading and the release of other contaminants in the basin resulting from the land application

of wastewater from digester and co-digester facilities. By limiting the potential introduction of additional salt and nitrogen, the proposed alternative would reduce potential water quality impacts.

By limiting the distance that trucks transporting materials would be required to travel due to restrictions related to the origin of materials, the impacts of this alternative on air quality and GHG, as well as traffic, would be slightly less than those described by the project. By slowing the potential rate of development of dairy digester facilities (that capture and use methane), this alternative (in comparison to the project) would have a negative effect on California's efforts to reduce greenhouse gas emissions (AB 32).

Thermal Conversion Alternative

The Thermal Conversion Alternative would replace anaerobic digesters with thermal conversion technologies. Under the Thermal Conversion Alternative the regulatory program would apply to the construction and operation of thermal conversion facilities for the production of biogas from dairy manure.

Thermal conversion refers to a range of technologies that use a combination of high heat, steam, high pressure, and oxygen reduced environments to convert organic matter into various products including combustible gases, oils, and charcoals, as well as noncombustible, ashes and molten slags (CIWMB, 2007). Thermal conversion technologies are different from direct incineration of organic matter in that they utilize environments with a range of sub-stoichiometric concentrations of oxygen and thus interrupt the combustion process before complete oxidation can occur. Much like anaerobic digestion, the resultant products can be used for a variety of products including combustion for energy, transportation fuels, industrial chemicals, and soil amendments. Unlike anaerobic digestion, however, thermal conversion involves temperatures sufficiently high to guarantee pathogen reduction.

Possible thermal conversion technologies could include, but not be limited to, the following processes:

- **Heat drying**

Heat Drying is a generic term for any of several methods for heating manure to kill viable pathogens and to reduce their moisture content to 10 percent or lower. This requirement is reached by agitating manure while exposing it to heat using hot gases such as hot air or steam

- **Pyrolysis and gasification**

Pyrolysis and gasification are two closely related thermal conversion processes that have many commercial uses including generating gas from coal, oil refining, conversion of municipal solid waste (MSW) and other organic feedstocks, and charcoal production. Both of these processes have the potential to create combustible gasses and other products from the conversion of dairy manure, and both would likely require pre-processing to remove excess moisture from the manure (Los Angeles County, 2007). In some cases compression/pelletization may be required before the manure could be thermally converted.

Pyrolysis generally operates in the near absence of oxygen and is unique in that it produces "biochar" and a pyrolytic oil in addition to a combustible gas. Biochar is known to have nutrient and water retention characteristics that can make it a valuable soil amendment.

Gasification differs from pyrolysis in that it often involves heating biomass with restricted amounts of oxygen and injected steam, and generally creates ash or molten slag as opposed to carbon rich biochar (CIWMB, 2007).

Like digesters, thermal conversion facilities are capable of processing more than just dairy manure. Potential feedstocks include, among others, energy crops, tires, biomass, or residual MSW (Los Angeles County, 2007). Many of these feedstocks have the potential to increase biogas yield.

Impacts

The following impact analysis is provided in order to compare the impacts of the Thermal Conversion Alternative to the impacts of the project. See also Table 17-1, the matrix of effects of the alternatives.

The area physically affected under the Thermal Conversion Alternative is assumed to be the same as that affected under the project. Due to similarities in construction and processing, most impacts related to land use and agricultural resources, biological resources, geological resources, cultural resources, aesthetic resources, hydrology, air quality and GHG, transportation and traffic, and public services and utilities would be similar to those identified with implementation of the project. These impacts would potentially be slightly less overall, however, as the introduction of new technology would make the construction and operation of dairy facilities less economically viable, therefore resulting in the development of fewer facilities. In the event of facility construction and operation and equal levels of development as those detailed in the project, however, many impacts resulting from the construction of individual facilities would be equal to those described in the project.

The Thermal Conversion Alternative would have similar noise impacts as those described in the project. The additional equipment needed for thermal conversion would not result in significant increase to noise impacts compared to those detailed in the project.

Impacts relating to hazards in the Thermal Conversion Alternative would potentially be greater than the project. Thermal technologies have the potential to create hazardous ash and/or air emissions³, depending on the technology and feedstock used. This would result in the introduction of additional impacts relating to hazardous materials. Additionally, any release of hazardous materials could potentially have a negative effect on water quality, resulting in additional impacts to water quality in addition to those identified in the project.

The project is a regulatory program that seeks to promote availability of biofuels and renewable energy. Limiting the project to thermal conversion processes, which are not as commercially developed for use on dairy manure could undermine opportunities for energy companies to achieve 2010 and 2020 California Renewable Portfolio Standards by converting dairy manure, green waste, and other waste streams to a valuable, renewable green energy resource.

Thermal conversion technologies only treat the screened/dried, solid portion of manure. This alternative would limit opportunities for on-site treatment of dairy manure process water. This

³ Hazardous emissions are an issue with thermal technologies more than anaerobic digesters because anaerobic digesters only process organics. Thermal conversion has the potential, depending on feedstocks, to process plastics and other feedstocks that could leave to eventual emission of toxic constituent.

could undermine the objective to create alternate waste treatment methods for dairy manure and other organic waste streams to the extent it would exclude the liquid component of the dairy manure. While the Thermal Conversion Alternative still meets the alternate waste treatment method objective, it does not meet it as efficiently as the project.

Reduced NOx Emissions Alternative

The Reduced NOx Emissions Alternative would limit the use of combustion engines in the generation of electricity by requiring, or developing incentives, for biogas uses from dairy digester facilities that minimize NOx emissions in the Central Valley (i.e., fuel cells, transportation fuels and injection into utility gas pipelines). The Central Valley Water Board would issue discharge permits only to facilities demonstrating use of technologies supporting low-NOx emissions.

Nitrogen Oxides (NOx) are air quality pollutants generated by internal combustion engines and microturbines that are precursors to the formation of ozone. Combustion of biogas generates electricity but it also generates NOx emissions. This alternative involves the use of technologies that generate reduced NOx emissions. By limiting energy production to the use of fuel cells or for utility pipeline injection or for development of transportation fuel, significant unavoidable cumulative air quality impacts from the emission of NOx could be reduced.

The SJVAPCD, which overlaps geographically with the Central Valley Region, is designated by the US EPA as “extreme nonattainment” for both the 1-hour and 8-hour federal ozone standards.⁴ Due to this designation the district has been required to implement a state implementation plan (SIP) which contains aggressive measure to reduce NOx emissions⁵. Despite SIP NOx requirements, the draft Program EIR analysis indicates that individual dairy digester projects generating on-site electricity would probably not generate NOx emissions that would exceed the SJVAPCD significance threshold for NOx emissions (10 tons per year). However, the cumulative development of dairy digesters over 10 years in Region 5 may culminate in as many as 200 on-site generating facilities which would result in aggregate NOx emissions that would exceed the significance threshold. As mentioned above, there are three options (fuel cells, utility pipeline injection, and transportation fuels) for using the biogas in a manner that would reduce NOx air emissions in the air basin, compared to the project.

Fuel Cells

Fuel cells remain a promising technology for converting biogas to heat and electricity with minimal NOx emissions. There is a 900 kW system fuel cell currently operating at the City of Tulare wastewater treatment plant, but no fuel cells known to be operating at dairy digesters. The high costs of fuel cells are a major impediment, even with numerous State incentives.

The usage of fuel cells significantly elevates the net electrical efficiency and maximizes the potential electrical energy available from small sources of biogas. Moreover, the fuel cell achieves the

⁴ <http://www.epa.gov/region9/air/sjvalley/index.html#0410>

⁵ See section X “Air Quality” for details.

higher conversion efficiency while producing negligible emissions that are well below the most stringent limits established by the presiding air districts.

Fuel cell technology is currently at an early stage of development and consequently the costs for fuel cells are many times greater than for comparably sized micro-turbine, turbine or IC engines. Even though the efficiency of fuel cells are considerably better than the other technologies, given this very large production cost differential, until major technological improvements and/or large scale commercialization is achieved, fuel cells will remain dramatically less cost-effective for implementation.

Transportation Fuel

Raw dairy digester biogas can be converted into biomethane, which, when compressed, can be used as transportation fuel for natural gas-fueled vehicles. Biomethane is created by removing the impurities such as CO₂, water and hydrogen sulfide, from raw biogas, which can then be pressurized and used as fuel (Western United Dairymen, 2005).

Currently, compressed natural gas (CNG) is used as a petroleum alternative for cars and other light use vehicles. In addition, liquefied natural gas (LNG) is also being developed as a diesel alternative suitable for heavier industrial vehicles. Compressed biomethane (CBM) and liquefied biomethane (LBM), which have nearly equivalent heating values to their petroleum based counterparts⁶, are both potential substitute fuels for CNG and LNG vehicles.

One of the primary barriers to upgrading raw biogas to transportation fuel quality is the cost associated with the additional processing. There are incentive and grant programs available to offset these costs at the federal and State levels. Recently California has prioritized alternative fuel production. The California Energy Commission allocated 176 million dollars for fiscal years 2008-09 and 2009-10 as part of its "Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program⁷" Another \$100 million is expected to be allocated for the subsequent fiscal year.

In 2009, Hilarides Dairy in Lindsay, California became the first dairy in the U.S. to produce pressurized, either compressed or liquefied, biomethane for use as vehicle fuel, powering two semi trucks, three pickup trucks, and four boilers (Richardson, 2009). As is typical of most industrial and agricultural operations in the Central Valley Region, Hilarides utilized diesel fueled heavy duty vehicles. Converting heavy duty diesel vehicles significantly reduces NOx emissions. On site use of biomethane as transportation fuel by dairies eliminates the transportation costs and air emissions associated with both the distribution and use of diesel fuel (Richardson, 2009).

Utility Pipeline Injection

Biomethane can be distributed by dedicated biomethane pipelines to the natural gas pipeline utility grid. Injecting biomethane into the grid directly offsets natural gas use which will result in NOx emissions by directing the gas to larger, more efficient consumers.

⁶ Gas Technology Institute- Guidance Document for Introduction of Dairy Waste Biomethane Reporting Period: October 2007 through June 2008 Report Issued: September 30, 2009. Page 8.

⁷ April 2009 CEC-600-2009-008-CMF

The necessary infrastructure and biogas conditioning required for injection into the utility grid typically would be more onerous than for generating transportation fuels. In order to be used within the natural gas pipeline grid, biogas and biomethane must meet standards of quality and interconnection requirements, including system capacity constraints, which would not be necessary for on-site use for energy or fuels. Facilities for the collection and cleaning of biogas would be required to be constructed, as well as the necessary dedicated pipelines to connect the facility to the natural gas grid.

Currently, although California utilities are willing and able to purchase biomethane produced by manure digesters, the supplying dairy must provide all the facilities necessary to deliver pipeline quality biomethane to the utility's natural gas transmission system. Furthermore, the dairy must also perform the scrubbing and compression of the biomethane as well as install and operate the metering equipment and pipeline tap. Interconnection costs are often prohibitively high for dairy operators. Utility operators assert that interconnection fees are based on standard industry practice and existing regulations prohibit them from effectively passing these costs on to ratepayers, thus creating a barrier to implementing injection projects. In addition, proximity to the natural gas transmission line will also be a major limiting factor.

Vintage Dairy in Riverside, California has been selling its biogas, about 200,000 cubic feet per day, to PG&E since 2008 (Walden University, 2009). If an existing network is relatively close to the dairy digester facility, the biomethane can be distributed via dedicated pipelines that are either buried or aboveground. The natural gas pipeline network offers a storage and distribution infrastructure for biomethane. Once the biomethane is injected into the natural gas pipeline network, it becomes a direct substitute for natural gas (Western United Dairymen, 2005).

Impacts

The following impact analysis is provided in order to compare the impacts of the Reduced NO_x Emissions Alternative to the impacts of the project. See also Table 17-1, the matrix of effects of the alternatives.

The area physically affected under the Reduced NO_x Emissions Alternative is assumed to be the same as that affected under the project. Due to similarities in construction and processing, most impacts related to land use and agricultural resources, biological resources, geological resources, cultural resources, aesthetic resources, hydrology and water resources, transportation and traffic, and public services and utilities would be similar to those identified with implementation of the project. These impacts would potentially be slightly less overall, however, as the requirements for the use of specific technologies would make the construction and operation of dairy facilities less economically viable, therefore resulting in the development of fewer facilities. In the event of facility construction and operation and equal levels of development as those detailed in the project, however, many impacts resulting from the construction of individual facilities would be equal to those described in the project.

The Reduced NO_x Emissions Alternative would have similar or lower noise impacts as those described in the project. The additional equipment needed for the conversion of raw dairy digester biogas into biomethane would not result in significant increase to noise impacts compared to those detailed in the project. The noise from the IC engines would be reduced by this alternative.

The Reduced NOx Emissions Alternative would result in fewer impacts to air quality by reducing NOx emissions (an ozone precursor) in the Central Valley. Reducing NOx emissions is a major goal of the San Joaquin Valley Air Pollution Control District San Joaquin Valley Air Pollution Control District.

However, the project is a regulatory program that seeks to promote the increase of renewable energy sources in California. The majority of existing dairy manure digesters in California and in the United States generate electricity from the combustion of biogas. This alternative would reduce the options for producing renewable energy (including the most common current option for dairy digesters).

17.4 Comparison of Alternatives

The relative impacts of the various project alternatives identified for consideration in this document, including the project and No Project Alternative, are shown in **Table 17-1**. Only those effects identified as significant before mitigation for the project are listed in **Table 17-1**. In addition, the significance of each impact is described prior to implementation of feasible mitigation measures. This is done in order to identify which alternatives would avoid or substantially lessen one or more potentially significant impacts, as required by CEQA Guidelines §15126.6(a). For the level of significance of the proposed project after mitigation, refer to Table 1-1 and the impact analysis in Chapters 5-15. Many mitigation measures identified for the project would also be feasible under the No Project Alternative, the Additional Co-digestion Substrate Restrictions Alternative, the Thermal Conversion Alternative, and the Reduced NOx Emissions Alternative.

Ability to achieve project objectives

Table 17-2 shows the ability of each alternative to achieve the project objectives that are listed above. As shown by the table, the No Project Alternative fails to meet the majority of the project objectives and the Thermal Conversion Alternative fails to meet half of the objectives. The proposed project, the Additional Co-digestion Substrate Restrictions Alternative, the Reduced NOx Emissions Alternative each meet all of the project objectives.

Environmentally Superior Alternative

CEQA Guidelines §15126.6(d) requires that an EIR include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. CEQA Guidelines §15126(e) requires that the alternatives analysis must identify the “environmentally superior” alternative among those considered. If the “No Project” alternative is identified as the environmentally superior alternative, then the EIR must also identify an environmentally superior alternative among the other alternatives. The analysis in this chapter clearly shows that the No Project Alternative is not the environmentally superior alternative. The analysis also indicates that the Thermal Conversion Alternatives is not the environmentally superior alternative because it fails to meet several project objectives and could have adverse effects on water quality.

Table 17-1 indicates that the Additional Co-digestion Substrate Restrictions Alternative, and the Reduced NOx Emissions Alternative each would have reduced impacts in some environmental

resource areas when compared to the project and none of the potential impacts for these two alternatives are greater than impacts of the proposed project. The Additional Co-digestion Substrate Restrictions Alternative has restrictions on co-digestion substrates that could potentially provide additional protection for the water resources in Region 5. By reducing NOx emissions that would have an incremental beneficial effect to all Region 5 residents, the Reduced NOx Emissions Alternative provides the most potential benefit to the greatest number of residents of the Central Valley. To the extent that the technology required for the Reduced NOx Emissions Alternative becomes feasible and cost effective, this Alternative would constitute the environmentally superior alternative.

Regardless of their potential benefits, both the Additional Co-digestion Substrate Restrictions Alternative, and the Reduced NOx Emissions Alternative place restrictions on the development of dairy manure digester and co-digester projects that could further restrict future growth of digesters in Region 5. Dairy digester development would be restricted by the high costs and/or additional regulatory hurdles of the technologies associated with the Reduced NOx Emissions Alternative (i.e., fuel cells, transportation fuel, and utility pipeline injection). Dairy digester development would also be restricted by additional limitations contained in the Additional Co-digestion Substrate Restrictions Alternative. By likely restricting the development of dairy digesters in Region 5, both the Additional Co-digestion Substrate Restrictions Alternative, and the Reduced NOx Emissions Alternative would have a negative influence on two of the primary objectives of the project, which are the development of a renewable energy resource (biogas) and the reduction of greenhouse gas emissions from dairy operations. Accordingly, some environmental benefits would as a practical matter be lost under these alternatives. Given the existing technological and economic constraints, therefore, these alternatives cannot be said to be clearly environmentally superior to the proposed project.

**TABLE 17-1
PROJECT ALTERNATIVES: COMPARISON OF SIGNIFICANT EFFECTS¹**

	No Project Alternative	Additional Co-digestion Substrate Restrictions Alternative	Thermal Conversion Alternative	Reduced NOx Emissions Alternative
5. Hydrology and Water Quality				
Impact 5.2: Digester and co-digester development could adversely affect surface waters.	LS	LS	PG	E
Impact 5.3: Digester and co-digester development could adversely affect groundwater quality.	E	LS	PG	E
Impact 5.4: Development of dairy digester and co-digester facilities could be exposed to flooding hazards.	E	LS	PG	E
Impact 5.6: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to water quality.	LS	LS	PG	E
6. Air Quality and GHGs				
Impact 6.1: Construction of dairy digester and co-digester facilities within Region 5 would generate short-term emissions of criteria air pollutants: ROG, NOx, CO, SO ₂ , PM10, and PM2.5 that could contribute to existing nonattainment conditions and further degrade air quality.	E	E	E	E

**TABLE 17-1
PROJECT ALTERNATIVES: COMPARISON OF SIGNIFICANT EFFECTS¹**

	No Project Alternative	Additional Co-digestion Substrate Restrictions Alternative	Thermal Conversion Alternative	Reduced NOx Emissions Alternative
Impact 6.2: Pre-processing, digestion, and post-processing operational activities of dairy digester and co-digester facilities in Region 5 would result in emissions of criteria air pollutants at levels that could substantially contribute to a potential violation of applicable air quality standards or to nonattainment conditions.	E	E	E	LS
Impact 6.3: Operation of dairy digester and co-digester facilities in Region 5 could create objectionable odors affecting a substantial number of people.	E	E	E	E
Impact 6.4: Construction and operation of dairy digester and co-digester facilities in Region 5 could lead to increases in chronic exposure of sensitive receptors in the vicinity to certain toxic air contaminants from stationary and mobile sources.	E	LS	E	LS
Impact 6.6: Development of dairy digester and co-digester facilities in Region 5, together with anticipated cumulative development in the area, would contribute to regional criteria pollutants.	LS	E	E	LS
8. Transportation and Traffic				
Impact 8.1: Construction of dairy digester and co-digester facilities would intermittently and temporarily increase traffic levels and traffic delays due to vehicle trips generated by construction workers and construction vehicles on area roadways.	E	LS	E	E
Impact 8.3: Construction and operation of dairy digester and co-digester facilities could potentially cause traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways, and could increase traffic hazards due to possible road wear or to accident spills of manure, or co-digestion feedstocks or digestate.	E	E	E	E
Impact 8.4: Construction of dairy digester and co-digester facilities could intermittently and temporarily impede access to local streets or adjacent uses (including access for emergency vehicles), as well as disruption to bicycle/pedestrian access and circulation.	E	LS	E	E
Impact 8.5: Construction and operation of dairy digester and co-digester facilities could contribute to cumulative impacts to traffic and transportation (traffic congestion, traffic safety, and emergency vehicle access).	E	E	E	E
9. Biological Resources				
Impact 9.1: The project could impact special-status plant or wildlife species or their habitats.	E	E	E	E
Impact 9.2: The project could result in impacts on biologically unique or sensitive natural communities.	E	E	E	E
Impact 9.3: The project could result in impacts on waters of the State and/or the U.S., including wetlands.	E	LS	E	E

**TABLE 17-1
PROJECT ALTERNATIVES: COMPARISON OF SIGNIFICANT EFFECTS¹**

	No Project Alternative	Additional Co-digestion Substrate Restrictions Alternative	Thermal Conversion Alternative	Reduced NOx Emissions Alternative
Impact 9.6: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to biological resources.	E	E	E	E
10. Hazards and Hazardous Wastes				
Impact 10.1: Construction of dairy digester and co-digester facilities could result in the potential exposure of construction workers, the public and the environment to preexisting soil and/or groundwater contamination.	E	E	PG	E
Impact 10.6: Installation of biogas pipelines in public rights-of-way could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	E	E	E	E
11. Aesthetic Resources				
Impact 11.1: Implementation of the project, including operation of dairy digester and co-digester facilities, could result in impacts to scenic highways and/or scenic vistas.	E	E	E	E
Impact 11.2: Construction of the project could result in impacts to scenic highways and/or scenic vistas.	E	E	E	E
Impact 11.3: Implementation of the project could result in substantial creation of or change in light or glare.	E	E	E	E
Impact 11.4: Development of dairy digester and co-digester facilities could contribute to cumulative impacts to aesthetics.	E	E	E	E
12. Cultural Resources				
Impact 12.1: Construction of dairy digester and co-digester facilities could result in the adverse change in the significance of a historical or archaeological resource, pursuant to §15064.5.	E	E	E	E
Impact 12.2: Construction of dairy digester and co-digester facilities could result in the disruption of human remains, including those interred outside formal cemeteries.	E	E	E	E
Impact 12.3: Construction of dairy digester and co-digester facilities could result in direct or indirect disturbance or destruction of a unique paleontological resource or site or unique geologic feature.	E	E	E	E
Impact 12.4: Development of dairy digester and co-digester facilities could contribute to cumulative impacts related to archaeological, historical, and/or paleontological resources.	E	E	E	E
13. Geology				
Impact 13.1: The project could expose people to injury and structures to damage resulting from seismic activity.	E	E	E	E
Impact 13.2: The project could expose people to injury and structures to damage resulting from unstable soil conditions.	E	E	E	E

**TABLE 17-1
PROJECT ALTERNATIVES: COMPARISON OF SIGNIFICANT EFFECTS¹**

	No Project Alternative	Additional Co-digestion Substrate Restrictions Alternative	Thermal Conversion Alternative	Reduced NOx Emissions Alternative
14. Noise				
Impact 14.1: Construction of dairy digester and co-digester facilities could temporarily increase noise levels at nearby sensitive receptor locations or result in noise levels in excess of standards in local general plans, noise ordinance, or other applicable standards.	E	E	E	E
Impact 14.2: Noise from operation of dairy digester and co-digester facilities or centralized facilities could substantially increase ambient noise levels at nearby land uses or result in noise levels in excess of standards in local general plans, local noise ordinances, or other applicable standards.	E	E	E	E
Impact 14.4: Development of dairy digester and co-digester facilities could result in a cumulative increase in noise levels.	E	E	E	E
15. Public Services				
Impact 15.3: The project could result in significant environmental effects from the construction and operation of new water and wastewater treatment facilities or expansion of existing facilities.	LS	LS	E	E
Impact 15.6: The project could result in exceeding the capacity of a wastewater treatment provider.	LS	LS	E	E
Impact 15.7: The project could result in the construction new energy supplies and could require additional energy infrastructure.	E	E	E	E
PG Potentially Greater Impact than project LS Less Significant Impact than project E Equal Impact to the project 1. The significance of each impact is described prior to implementation of feasible mitigation measures. SOURCE: Environmental Science Associates, 2010				

**TABLE 17-2
PROJECT ALTERNATIVES: COMPARISON OF ABILITY TO ACHIEVE PROJECT OBJECTIVES**

	Project	No Project Alternative	Additional Co-digestion Substrate Restrictions Alternative	Thermal Conversion Alternative	Reduced NOx Emissions Alternative
Objective 1 – Protect the beneficial uses of surface and groundwater within the Central Valley Region from discharges to land associated with dairy manure digesters and co-digesters on or off-site of dairies	✓	✓	✓	✓	✓
Objective 2 – Provide a regulatory framework for the water quality aspects of anaerobic biological digestion facilities using dairy manure and dairy manure with other organic substrates (co-digestion) to produce biogas (a flexible renewable fuel source).	✓	0	✓	0	✓
Objective 3 – Assist the State in meeting greenhouse gases (GHG) reduction measures in support of the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) through the production of biogas from dairy manure.	✓	0	✓	✓	✓
Objective 4 – Provide a renewable green energy source to allow energy companies to help achieve the 2010 and 2020 California Renewables Portfolio Standard (RPS) through the production of biogas from dairy manure.	✓	0	✓	✓	✓
Objective 5 – Reduce the time required to develop and issue water quality permits for dairy manure digester and co-digester projects by more than 75 percent primarily through the issuance of one or more GOs and secondarily through the issuance of Individual WDRs or CWs.	✓	0	✓	0	✓
Objective 6 – Reduce the permitting time for other state and local agencies ⁸ with discretionary permit responsibilities by providing a Program EIR that can be relied upon or tiered from for regionwide environmental and regulatory settings, project alternatives analyses and cumulative impacts analyses.	✓	0	✓	0	✓
✓ Alternative substantially achieves objective 0 Alternative does not achieve objective SOURCE: Environmental Science Associates, 2010					

⁸ San Joaquin Valley Air Pollution Control District staff have estimated that the certification of the Program EIR will reduce air quality permitting time 50 percent or more for certain digester projects.

17.5 References

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CHAPTER 18

EIR Authors and Organizations/Persons Consulted

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The following members are recognized and appreciated for their contribution to Technical Advisory Committee.

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18.3 Organizations/Persons Consulted

The organizations and persons consulted, and other referenced reports and materials can be found in the reference sections at the end of each chapter of this Draft Program EIR

18.4 List of NOP Comment Letters and Scoping Meeting Comments

Comments received in response to the NOP were considered during preparation of the Draft EIR. Listed below are the agencies and persons that responded in writing or at public scoping meetings to the NOP for the preparation of the Dairy Digester and Co-Digester Facilities Draft EIR: Three Scoping Meeting were conducted during the circulation period for the NOP; two meetings in Sacramento and one meeting in Fresno.

Comment Letters:

- Caltrans District 10
- CalRecycle – Department of Resources Recycling and Recovery
- Native American Heritage Commission
- Fresno County Environmental Health Division
- Madera County Resource Management Agency: Planning Department
- Monterey Bay Unified Air Pollution Control District
- San Joaquin Valley Air Pollution Control District
- Stanislaus County Environmental Review Committee
- Yuba County Community Development and Services Agency
- Hanafi R Fraval, Innate Energy California LLC and Biogas Energy Inc.
- Jo Anne Kipps
- Daryl Maas, Pixley Biogas
- Paul Martin, Western United Dairymen
- Herman P. Miller III, PE, Environmental Developers Inc.

Public Hearing Comments:

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- Andy Freeman, Ingersoll Rand
- Marvin Mears, Environmental Products and Technologies Corp
- Nettie Drake, AGPOWER
- Lee Smith,
- Joann Kipps
- Loren Harlow
- Dennis Burke, P.E.

CHAPTER 19

Acronyms and Glossary

19.1 Acronyms

AB	Assembly Bill
ACEEE	American Council for an Energy Efficient Economy
ACHP	Advisory Council on Historic Preservation
AD	Anaerobic Digestion
AIRFA	American Indian Religious Freedom Act
APCDs	Air Pollution Control Districts
AQMDs	Air Quality Management Districts
ARB	Air Resources Board
ARPA	Archeological Resources Protection Act
ASCE	American Society of Civil Engineers
BACT	Best Available Control Technology
BMPs	best management practices
BPTC	Best Practical Treatment or Control
CAA	Clean Air Act
CAFO	Confined Animal Feeding Operations
Cal-EPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CAR	Coordination Act Report
CARB	California Air Resources Board
CAT	Climate Action Team
CBG	Compressed Biomethane

CBC	California Building Code
CCAA	California Clear Air Act
CCAR	California Climate Action Registry
CCR	California Code of Regulations
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDHS	California Department of Health Services
CEC	California Energy Commission
CEN	Compression Biomethane
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHP	California Highway Patrol
CHP	Combined Heat and Power
CNDDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNG	Compressed Natural Gas
CNPS	California Native Plant Society
CO	Carbon monoxide
CO ₂	carbon dioxide
COHP	California Office of Historic Preservation
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CTR	California Toxics Rule
CUPA	Certified Unified Program Agency
CVRWQCB	Central Valley Regional Water Quality Control Board
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability
CVSC	Central Valley Salinity Coalition
CVWB	Central Valley Water Board

CW	Conditional Waiver
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DG	Distributed Generation
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
DTSC	Department of Toxic Substances Control
EC	Electrical Conductivity
EDC	Endocrine disrupting-chemicals
EFZs	earthquake fault zones
EIR	Environmental Impact Report (California)
EIS	Environmental Impact Statement (federal)
EPA	U.S. Environmental Protection Agency
ERB	Emerging Renewables Program
ERT	Emergency Response Team
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FIP	Federal Implementation Plan
FIRM	Flood Insurance Rate Maps
FMMP	Farmland Mapping and Monitoring Program
GAMA	Groundwater Ambient Monitoring and Assessment
GHG	Greenhouse Gas
GO	General order
HABS/HAER	Historic American Buildings Survey/Historic American Engineering Report
HAPs	Hazardous Air Pollutants
HCP	Habitat Conservation Plan
HSC	California Health and Safety Code

HR	Hydrologic Region
Hz	hertz
IBC	International Building Code
IC	Internal Combustion
IEUA	Inland Empire Utilities Agency
IPCC	International Panel on Climate Change
IPM	integrated pest management
LCFS	California Low Carbon Fuel Standard
LBM	Liquefied Biomethane
LNG	Liquefied Natural Gas
LRA	Local Responsibility Areas
LUST	Leaking Underground Storage Tanks
MAF	million acre-feet
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MHB	Methemoglobinemia
MMRP	Mitigation Monitoring and Reporting Program
MPR	Market Price Referent
MSW	Municipal Solid Waste
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NAS	National Academy of Sciences
NAAQS	National Ambient Air Quality Standards
NCRS	Natural Resource Conservation Service
NEHRP	National Earthquake Hazards Reduction Program
NEHRPA	National Earthquake Hazards Reduction Program Act
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association

NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMP	Nutrient Management Plan
NOI	Notice of Intent
NO _x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWPs	Nationwide permits
OES	California State Office of Emergency Services
OHP	California Office of Historic Preservation
ONRWs	Outstanding National Resource Waters
OPR	Governor's Office of Planning and Research
OPS	Office of Pipeline Safety
OSHA	Occupational Safety and Health Administration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PG&E	Pacific Gas and Electric Company
PIER	Public Interest Energy Research Program
PM ₁₀	particulate matter of less than 10 microns in size
PM _{2.5}	particulate matter of less than 2.5 microns
PPA	Power Purchase Agreement
PPD	Pounds Per day
PRC	California Public Resources Code
PSA	Pressure Swing Absorption
REA	Registered Environmental Assessor
REC	Renewable Energy Credits
Region5	Jurisdictional area of the Central Valley Water Board
RELs	Reference Exposure Levels
RWQCB	Regional Water Quality Control Board
ROG	Reactive organic gases

RPS	Renewable Portfolio Standards
SCAQMD	South Coast Air Quality Management District
SDC	Seismic Design Category
SEMP	Salinity Evaluation and Minimization Plan
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMP	Salt Minimization Plan
SMUD	Sacramento Metropolitan Utilities District
SVP	Society of Vertebrate Paleontology
SWRCB	State Water Resources Control Board
SWPPP	Stormwater pollution prevention plan
TAC	Toxic Air contaminant
TAG	Technical Advisory Group
TCPs	Traffic Control Plans
TCP	traditional cultural property
TDS	total dissolved solids
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Loads
USC	United States Code
UST	Underground storage tanks
USDA	U.S. Department of Agriculture
US EPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VERA	Voluntary Emission Reduction Agreement
WDRs	Waste Discharge Requirements
Working Group	Bioenergy Interagency Working Group
WQCP	water quality control plans

19.2 Glossary

25 Year, 24 Hour Storm Event	The rainfall event with a probable recurrence interval of once in 25 years with a duration of 24 hours, as defined by the National Weather Service in technical Paper Number 40, "Rainfall Frequency Atlas of the United States:", May 1961, and subsequent amendments.
Aerobic Bacteria	Bacteria that require free elemental oxygen to sustain life.
Aerobic	Requiring, or not destroyed by, the presence of free elemental oxygen.
AgSTAR	A voluntary federal program that encourages the use of effective technologies to capture methane gas, generated from the decomposition of animal manure, for use as an energy resource.
Anaerobic	Requiring, or not destroyed by, the absence of air or free oxygen.
Anaerobic Bacteria	Bacteria that only grow in the absence of free elemental oxygen.
Anaerobic Lagoon	A treatment or stabilization process that involves retention under anaerobic conditions.
Anaerobic Digestion	The degradation of organic matter including manure brought about through the action of microorganisms in the absence of elemental oxygen.
Bacteria	A group of universally distributed and essentially unicellular microscopic organisms lacking chlorophyll.
Best Management Practice (BMP)	A practice or combination of practices found to be the most effective, practicable (including economic and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.
Biogas	Gas resulting from the decomposition of organic matter under anaerobic conditions. The principal constituents are methane and carbon dioxide.
Biomass	Plant materials and animal wastes used especially as a source of fuel.
Bull	A mature (approximately 24 months of age or older) uncastrated male dairy or beef animal.
Calf	An immature dairy or beef animal up to approximately six months of age.
Carbohydrates	Any of various compounds of carbons, hydrogen, and oxygen (e.g., sugars, starches, and celluloses), which are generally formed by green plants. Carbohydrates are a principal source of energy in animal feeds and are excreted if not utilized.

Co-Digester Facility	See Dairy Digester and Co-Digester Facilities
Co-substrate	For the purposes of this Program EIR, this refers to the additional materials combined with manure during dairy co-digestion, typically food and/or vegetative waste. Also referred to as “substrate” in this Program EIR.
Complete Mix Digester	A controlled temperature, constant volume, mechanically mixed vessel designed to maximize biological treatment, methane production, and odor control as part of a manure management facility with methane recovery.
Composting	The biological decomposition and stabilization of organic matter under conditions which allow the development of elevated temperatures as the result of biologically produced heat. When complete, the final product is sufficiently stable for storage and application to land without adverse environmental effects.
Conditional Waiver (CW)	An exemption given by the State in the event that regulating standards cannot be met; given that certain conditions are met by the applicant.
Covered Lagoon Digester	An anaerobic lagoon fitted with an impermeable, gas- and air-tight cover designed to capture biogas resulting from the decomposition of manure.
Cow	A mature female dairy or beef animal that has produced at least one calf.
CV-SALTS	Central Valley Salinity Alternatives for Long-Term Sustainability: a new Central Valley Water Board regulatory program that will develop a comprehensive region-wide Salt and Nitrate Management Plan (Plan) describing a water quality protection strategy that will be implemented through a mix of voluntary and regulatory efforts throughout the entire Central Valley.
Dairy digester facilities	Shortened version but the same as dairy digester and co-digester facilities.
Dairy digester and co-digester facilities	For the convenience of this Program EIR, this definition includes a facility that processes dairy manure for use in anaerobic digestion to create biogas. This refers also to centralized facilities located on or offsite of dairies. Co-digester facilities refer to facilities with process dairy manure along with other organic substrates (or feedstocks) in order to produce biogas.
Dairy Digester General Order	A General Order under the Central Valley Water Board’s waste discharge regulatory program to permit the waste discharge to land from dairy manure and co-digester projects located on or off-site dairies within Region 5.

Dairy-Free Stall	A dairy farm where cows are confined in a totally or partially enclosed structure but are not confined in individual stalls.
Dairy General Order	Order No. R5-2007-0035, Waste Discharge Requirements General Order for Existing Milk Dairies.
Delta	The Sacramento-San Joaquin Delta
Digestate	Digestate is the liquid and solids slurry residual of the dairy digesters. A common first process after the digester is to separate the solids from the slurry, resulting in liquid digestate and solid digestate. .
Digester facility	Shorthand referring to dairy digester and dairy co-digester facilities (see definition above)
Effluent	The discharge from an anaerobic digester or other manure stabilization process.
Facultative	Living, active, or occurring in the presence or absence of free oxygen.
Facultative Bacteria	Bacteria living in the presence or absence of free oxygen. Facultative bacteria are important in the decomposition of manure.
Farmland of Local Importance	Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee
Farmland of Statewide Importance	Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture.
Fats	Any of numerous compounds of carbon, hydrogen, and oxygen that are glycerides of fatty acids, the chief constituents of plant and animal fat, and a major class of energy-rich food. "Fats are a principal source of energy in animal feeds and are excreted if not utilized."
Flushing System	A manure collection system that collects and transports manure using water.
Freeboard	The distance between the highest possible wastewater level in a manure storage/treatment structure and the top of the structure. Freeboard is an important design parameter in designing lagoons, ponds, storage basins, digesters, and other manure storage and treatment structures.
General Order	A regulatory document which controls discharge requirements for similar types of activities, as long as the facility complies with the terms of the General Order.

General Order Dairy	Dairies that are currently regulated under Order No. R5-2007-0035, Waste Discharge Requirements General Order for Existing Milk Cow Dairies.
Greenhouse Gas	An atmospheric gas, which is transparent to incoming solar radiation but absorbs the infrared radiation emitted by the Earth's surface. The principal greenhouse gases are carbon dioxide, methane, and CFCs.
Heifer	A female dairy or beef animal that has not produced a calf.
Hydraulic Retention Time (HRT)	The average length of time any particle of manure remains in a manure treatment or storage structure. The HRT is an important design parameter for treatment lagoons, covered lagoon digesters, complete mix digesters, and plug flow digesters.
Individual WDR	(Individual Waste Discharge Requirements) A regulatory permit prescribed by the state board or a regional board which controls the discharge of pollutants to state waters.
Influent	The flow into an anaerobic digester or other manure stabilization process.
Kilowatt	One thousand watts (1.341 horsepower).
Kilowatt Hour	A unit of work or energy equal to that expended by one kilowatt in one hour or to 3.6 million joules. A unit of work or energy equal to that expended by one kilowatt in one hour (1.341 horsepower-hours).
Lagoon	Any large holding or detention pond, usually with earthen dikes, used to contain wastewater while sedimentation and biological treatment or stabilization occur.
Land Application	Application of manure to land for reuse of the nutrients and organic matter for their fertilizer value.
Liquid Manure	Manure having a total solids content of no more than five percent.
Loading Rate	A measure of the rate of volatile solids (VS) entry into a manure management facility with methane recovery. Loading rate is often expressed as pounds of VS/1000 cubic feet.
Manure	The fecal and urinary excretions of livestock and poultry.
Mesophilic	Operationally between 80°F and 100°F (27°C and 38°C).
Methane	A colorless, odorless, flammable gaseous hydrocarbon that is a product of the decomposition of organic matter. Methane is a major greenhouse gas. Methane is also the principal component of natural gas.

Mix Tank	A control point where manure is collected and added to water or dry manure to achieve the required solids content for a complete mix or plug flow digester.
Natural Gas	A combustible mixture of methane and other hydrocarbons used chiefly as a fuel.
Nonpoint Source Pollution	Pollution resulting from intermittent discharges of pollutants from diffuse sources and is in transit over land before entering a water body.
Nitrogen oxides (NO _x)	A main ozone precursor that reacts in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial / industrial mobile equipment.
Nitrogen Dioxide	A respiratory irritant and a precursor of ozone created by combustion processes.
Nutrients	A substance required for plant or animal growth. The primary nutrients required by plants are nitrogen, phosphorus, and potassium. The primary nutrients required by animals are carbohydrates, fats, and proteins.
Ozone	A secondary air pollutant produced in the atmosphere from reactions of reactive organic gases and nitrogen oxides.
Parlor	Facility where lactating cows are managed before, during, and after milking.
Pasture	An open area where the animals may roam freely.
pH	A measure of acidity or alkalinity. The pH scale ranges from zero to 14, with a value of 7 considered neutral. The lower a value, the higher the acidity, and the higher the value, the higher the alkalinity.
Plug Flow Digester	A constant volume, flow-through, controlled temperature biological treatment unit designed to maximize biological treatment, methane production, and odor control as part of a manure management facility with methane recovery.
Point Source Pollution	Pollution entering a water body from a discrete conveyance such as a pipe or ditch.
Prime Farmland	Farmland with the best combination of physical and chemical features able to sustain long term agricultural production.
Process Water	Water used in the normal operation of a livestock farm. Process water includes all sources of water that may need to be managed in the farm's manure management system.

Proteins	Any of numerous naturally occurring extremely complex combinations of amino acids containing the elements carbon, hydrogen, nitrogen, and oxygen. Proteins in animal feeds are utilized for growth, reproduction, and lactation and are excreted if not utilized.
Region5	Jurisdictional area of the Central Valley Water Board
Respirable Particulate Matter	PM10 and PM2.5 represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects.
Scrape System	Collection method that uses a mechanical or other device to regularly remove manure from barns, confine buildings, drylots, or other similar areas where manure is deposited.
Separator	A mechanical device or gravity settling basin that separates manure into solid and liquid fractions.
Settling Basin	A basin designed to separate solid and fibrous material in the manure from the liquid portion.
Storage Pond	An earthen basin designed to store manure and wastewater until it can be utilized. Storage ponds are not designed to treat manure.
Storage Tank:	A concrete or metal tank designed to store manure and wastewater until it can be utilized. Storage tanks are not designed to treat manure.
Storm Runoff	Manure contaminated rainfall which must be stored and utilized on the farm and may not be discharged into rivers, streams, lakes, or other bodies of water.
Substrate	For the purposes of this Program EIR, this refers to the additional materials combined with manure during dairy co-digestion, typically food and/or vegetative waste. Also referred to as “co-substrate” in this Program EIR.
Supplemental Heat	Heat added to complete mix and plug-flow digesters to maintain a constant operating temperature to increase rates of waste stabilization and biogas production.
Supplemental Heat	Additional heat added to complete mix and plug flow digester to maintain a constant operating temperature at which maximum biological treatment may occur.
Thermophilic	Operationally between 110°F and 140°F (43°C and 60°C).
Total Solids	The sum of dissolved and suspended solids usually expressed as a concentration or percentage on a wet basis.

Toxic Air Contaminants	Airborne substances that are capable of causing short-term and/or long-term adverse human health effects.
Unique Farmland	Farmland of lesser quality soils used for the production of the state's leading agricultural crops.
Volatile Solids	The fraction of total solids that is comprised primarily of organic matter.
Volatilization	The loss of a dissolved gas, such as ammonia, from solution.
Waste Discharge Requirements (WDRs)	Porter-Cologne requires all who discharge contaminants into state waters (including groundwater) to: (a) file a report of the discharge and, as needed, (b) implement waste discharge requirements that ensure that those discharges do not impact use of the state's waters. The local regional water board then determines whether the discharge should be regulated through waste discharge requirements, or through a waiver of waste discharge requirements accompanied by conditions.
Withdrawal Schedule	The fraction of the treated manure and water effluent that is withdrawn from the effluent storage facility each month.

Appendix AQ

Criteria Pollutant and GHG Emissions

APPENDIX AQ

Criteria Pollutant and GHG Emissions

Introduction to the Air Quality Models and Results

The Urban Emissions model (URBEMIS 2007), version 9.2.4, was used to quantify direct emissions of criteria pollutants from digester construction and operations, including off-road equipment and fugitive dust emissions during construction activities and on-road vehicle pollutant emissions during operations.

GHG emissions associated with the dairy digesters were calculated using the URBEMIS 2007 model based on the projected equipment and traffic. In addition, methane capture and electricity generation information provided by the USEPA AgSTAR program (USEPA, 2010) was averaged for all California dairy digesters and applied to the Program EIR based on the projected number of digesters that could be developed by the year 2020 in Region 5. This data was used to determine the annual metric tons of CO₂e that would be displaced through dairy digester operations.

Results of the URBEMIS2007 modeling and GHG analysis are presented below. This Appendix is separated into the following sub-sections:

- URBEMIS2007 MODEL RESULTS FOR SINGLE DIGESTER CONSTRUCTION
- URBEMIS2007 MODEL RESULTS FOR SINGLE DIGESTER OPERATIONS
- URBEMIS2007 MODEL RESULTS FOR CUMULATIVE OPERATIONS
- AGSTAR CALIFORNIA DAIRY DIGESTER SUMMARY INFORMATION
- GREENHOUSE GAS EMISSION REDUCTIONS
- CRITERIA POLLUTANT EMISSIONS FROM BIOGAS COMBUSTION AND VOCS REDUCED THROUGH DIGESTER OPERATIONS

**URBEMIS2007 MODEL RESULTS FOR SINGLE
DIGESTER CONSTRUCTION**

Combined Annual Emissions Reports (Tons/Year)

File Name: E:\209481 - Dairy Digestion PEIR\Task 19\AQ Modeling\Dairy Digester Proj Construction.urb924

Project Name: Dairy Digester Construction - Single Digester

Project Location: San Joaquin Valley APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2011 TOTALS (tons/year unmitigated)	1.27	2.81	2.14	0.00	1.08	0.14	1.22	0.23	0.13	0.36	393.86

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
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2011	1.27	2.81	2.14	0.00	1.08	0.14	1.22	0.23	0.13	0.36	393.86
Fine Grading 01/01/2011-05/31/2011	0.16	1.29	0.74	0.00	1.07	0.06	1.13	0.22	0.06	0.28	135.16
Fine Grading Dust	0.00	0.00	0.00	0.00	1.07	0.00	1.07	0.22	0.00	0.22	0.00
Fine Grading Off Road Diesel	0.15	1.25	0.64	0.00	0.00	0.06	0.06	0.00	0.06	0.06	120.23
Fine Grading On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.99
Fine Grading Worker Trips	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.94
Trenching 05/01/2011-07/31/2011	0.06	0.54	0.32	0.00	0.00	0.03	0.03	0.00	0.02	0.02	61.76
Trenching Off Road Diesel	0.06	0.53	0.26	0.00	0.00	0.03	0.03	0.00	0.02	0.02	55.73
Trenching Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.04
Asphalt 08/01/2011-08/31/2011	0.02	0.14	0.12	0.00	0.00	0.01	0.01	0.00	0.01	0.01	16.62
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.02	0.13	0.08	0.00	0.00	0.01	0.01	0.00	0.01	0.01	11.26
Paving On Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.62
Paving Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.74
Building 09/01/2011-11/30/2011	0.09	0.84	0.95	0.00	0.01	0.04	0.05	0.00	0.04	0.04	178.29
Building Off Road Diesel	0.04	0.28	0.15	0.00	0.00	0.02	0.02	0.00	0.02	0.02	29.04
Building Vendor Trips	0.04	0.54	0.39	0.00	0.00	0.02	0.02	0.00	0.02	0.02	105.07
Building Worker Trips	0.01	0.02	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.18
Coating 12/01/2011-12/31/2011	0.93	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.02
Architectural Coating	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.02

Phase Assumptions

Phase: Fine Grading 1/1/2011 - 5/31/2011 - Default Fine Site Grading Description

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Total Acres Disturbed: 4

Maximum Daily Acreage Disturbed: 1

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 23.15

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 5/1/2011 - 7/31/2011 - Type Your Description Here

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

Phase: Paving 8/1/2011 - 8/31/2011 - Default Paving Description

Acres to be Paved: 1

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Building Construction 9/1/2011 - 11/30/2011 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

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Phase: Architectural Coating 12/1/2011 - 12/31/2011 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 130
Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 130
Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

**URBEMIS2007 MODEL RESULTS FOR SINGLE
DIGESTER OPERATIONS**

Combined Annual Emissions Reports (Tons/Year)

File Name: E:\209481 - Dairy Digestion PEIR\Task 19\AQ Modeling\Dairy Digester Proj Ops.urb924

Project Name: Dairy Digester Operations - Single Digester

Project Location: San Joaquin Valley APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2012 TOTALS (tons/year unmitigated)	0.02	0.15	0.23	0.00	3.66	0.01	3.67	0.76	0.01	0.78	31.79

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	0.04	0.39	0.25	0.00	0.04	0.02	71.80

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	0.04	0.39	0.25	0.00	0.04	0.02	71.80

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Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012	0.02	0.15	0.23	0.00	3.66	0.01	3.67	0.76	0.01	0.78	31.79
Fine Grading 01/01/2012-12/31/2012	0.02	0.15	0.23	0.00	3.66	0.01	3.67	0.76	0.01	0.78	31.79
Fine Grading Dust	0.00	0.00	0.00	0.00	3.66	0.00	3.66	0.76	0.00	0.76	0.00
Fine Grading Off Road Diesel	0.02	0.14	0.10	0.00	0.00	0.01	0.01	0.00	0.01	0.01	14.98
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.81

Phase Assumptions

Phase: Fine Grading 1/1/2012 - 12/31/2012 - Loader for digester

Total Acres Disturbed: 4

Maximum Daily Acreage Disturbed: 1

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 2 hours per day

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Dairy Digesters	0.04	0.39	0.25	0.00	0.04	0.02	71.80
TOTALS (tons/year, unmitigated)	0.04	0.39	0.25	0.00	0.04	0.02	71.80

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Dairy Digesters	1.00	1.00	acres	4.00	4.00	160.00
					4.00	160.00

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	16.6	1.2	98.6	0.2
Light Truck < 3750 lbs	16.7	2.5	90.9	6.6
Light Truck 3751-5750 lbs	16.7	0.9	98.6	0.5
Med Truck 5751-8500 lbs	0.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.0	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.0	0.0	44.4	55.6

Vehicle Type	<u>Vehicle Fleet Mix</u>				Diesel
	Percent Type	Non-Catalyst	Catalyst	Diesel	
Med-Heavy Truck 14,001-33,000 lbs	0.0	7.7	15.4	76.9	
Heavy-Heavy Truck 33,001-60,000 lbs	50.0	0.0	0.0	100.0	
Other Bus	0.0	0.0	0.0	100.0	
Urban Bus	0.0	0.0	0.0	0.0	
Motorcycle	0.0	64.1	35.9	0.0	
School Bus	0.0	0.0	0.0	100.0	
Motor Home	0.0	0.0	90.0	10.0	

Travel Conditions

	Residential				Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer	
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4	
Rural Trip Length (miles)	40.0	40.0	40.0	40.0	40.0	40.0	
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0	
% of Trips - Residential	32.9	18.0	49.1				

% of Trips - Commercial (by land use)

Dairy Digesters	0.0	0.0	0.0	100.0
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**URBEMIS2007 MODEL RESULTS FOR CUMULATIVE
OPERATIONS**

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\mxm\Desktop\Backup of USB\209481 - Dairy Digestion PEIR\Task 19AQ Modeling\Dairy Digester Cumulative Ops.urb924

Project Name: Dairy Digester Operations - Cumulative

Project Location: San Joaquin Valley APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10.Dust	PM10.Exhaust	PM10	PM2.5.Dust	PM2.5.Exhaust	PM2.5	CO2
2020 TOTALS (tons/year unmitigated)	2.35	14.92	32.69	0.03	174.02	0.85	174.87	36.37	0.78	37.15	6,364.85

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	2.45	27.49	11.38	0.11	3.68	1.39	11,810.78

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	2.45	27.49	11.38	0.11	3.68	1.39	11,810.78

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Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2020	2.35	14.92	32.69	0.03	174.02	0.85	174.87	36.37	0.78	37.15	6,364.85
Fine Grading 01/01/2020-12/31/2020	2.35	14.92	32.69	0.03	174.02	0.85	174.87	36.37	0.78	37.15	6,364.85
Fine Grading Dust	0.00	0.00	0.00	0.00	173.85	0.00	173.85	36.31	0.00	36.31	0.00
Fine Grading Off Road Diesel	2.11	14.27	19.73	0.00	0.00	0.77	0.77	0.00	0.70	0.70	2,996.25
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.65	12.96	0.03	0.17	0.08	0.25	0.06	0.07	0.14	3,368.60

Phase Assumptions

- Phase: Fine Grading 1/1/2020 - 12/31/2020 - Loader for digester
- Total Acres Disturbed: 475
- Maximum Daily Acreage Disturbed: 47.5
- Fugitive Dust Level of Detail: Default
- 20 lbs per acre-day
- On Road Truck Travel (VMT): 0
- Off-Road Equipment:
- 200 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 2 hours per day

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Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Dairy Digesters	2.45	27.49	11.38	0.11	3.68	1.39	11,810.78
TOTALS (tons/year, unmitigated)	2.45	27.49	11.38	0.11	3.68	1.39	11,810.78

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Dairy Digesters	0.88	0.88	acres	475.00	418.00	16,720.00
					418.00	16,720.00

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	1.0	1.2	98.6	0.2
Light Truck < 3750 lbs	2.0	2.5	90.9	6.6
Light Truck 3751-5750 lbs	2.0	0.9	98.6	0.5
Med Truck 5751-8500 lbs	0.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.0	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.0	0.0	44.4	55.6

Vehicle Type	<u>Vehicle Fleet Mix</u>				Diesel
	Percent Type	Non-Catalyst	Catalyst	Diesel	
Med-Heavy Truck 14,001-33,000 lbs	0.0	7.7	15.4	76.9	
Heavy-Heavy Truck 33,001-60,000 lbs	95.0	0.0	0.0	100.0	
Other Bus	0.0	0.0	0.0	100.0	
Urban Bus	0.0	0.0	0.0	0.0	
Motorcycle	0.0	64.1	35.9	0.0	
School Bus	0.0	0.0	0.0	100.0	
Motor Home	0.0	0.0	90.0	10.0	

Travel Conditions

	Residential				Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer	
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4	
Rural Trip Length (miles)	40.0	40.0	40.0	40.0	40.0	40.0	
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0	
% of Trips - Residential	32.9	18.0	49.1				

% of Trips - Commercial (by land use)

Dairy Digesters	0.0	0.0	0.0	100.0
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**AGSTAR CALIFORNIA DAIRY DIGESTER SUMMARY
INFORMATION**

Farm/Project Name	Project Type	County	State	Digester Type	Status	Operational Year	Farm Type	Population Feeding Digester	Bogas End Use(s)	Installed Capacity (kW)	Baseline System	Methane Emission Reductions (metric tons CH4/yr)	Methane Emission Reductions (metric tons CO2E/yr)
Blakes Landing Dairy	Farm Scale	Marin	CA	Covered Lagoon	Operational	2004	Dairy	362	Electricity	75	Storage Lagoon	78	1,639
Bob Giacomini Dairy	Farm Scale	Marin	CA	Covered Lagoon	Operational	2009	Dairy	300	Cogeneration	80	Storage Lagoon	76	1,593
Bullfrog Dairy	Farm Scale	Imperial	CA	Covered Lagoon	Operational	2008	Dairy	3,300	Electricity	300	Storage Lagoon	834	17,519
Cal Poly Dairy	Farm Scale	San Luis Obispo	CA	Covered Lagoon	Operational	1998	Dairy	175	Electricity	30	Storage Lagoon	44	929
CAL-Denier Dairy	Farm Scale	Sacramento	CA	Covered Lagoon	Operational	2008	Dairy	900	Electricity	65	Storage Lagoon	190	3,983
Castellanelli Bros. Dairy	Farm Scale	San Joaquin	CA	Covered Lagoon	Operational	2004	Dairy	3,214	Electricity	180	Storage Lagoon	599	12,588
CottonWood Dairy	Farm Scale	Merced	CA	Covered Lagoon	Operational	2004	Dairy	5,000	Cogeneration; Boiler/Furnace Fuel	700	Storage Lagoon	1,264	26,544
Fiscalini Farms	Farm Scale	Stanislaus	CA	Complete Mix	Operational	2008	Dairy	2,513	Cogeneration	720	Storage Tank or Pond or Pit	254	5,343
Hilariades Dairy	Farm Scale	Tulare	CA	Covered Lagoon	Operational	2004	Dairy	1,500	Electricity; Vehicle Fuel	750	Storage Lagoon	91	1,918
Langerwerf Dairy	Farm Scale	Butte	CA	Horizontal Plug Flow	Operational	1982	Heifer raising facility	750	Cogeneration	60	Storage Tank or Pond or Pit	38	791
Lourenco Dairy	Farm Scale	Tulare	CA	Covered Lagoon	Operational	2006	Dairy	2,640	Flared Full Time		Storage Lagoon	351	7,364
Meadowbrook Dairy	Farm Scale	San Bernardino	CA	Horizontal Plug Flow	Operational	2004	Dairy	2,000	Electricity	160	Storage Stack	13	279
Strauss Family Dairy	Farm Scale	Marin	CA	Covered Lagoon	Operational	2004	Dairy	200	Cogeneration	25	Storage Tank or Pond or Pit; Storage Lagoon	25	525
Tollenaar Holsteins Dairy	Farm Scale	Sacramento	CA	Complete Mix	Operational	2008	Dairy	1,895	Cogeneration; Boiler/Furnace Fuel	250	Storage Lagoon	345	7,248
Vintage Dairy	Farm Scale	Fresno	CA	Covered Lagoon	Operational	2008	Dairy	5,000	Pipeline Gas		Storage Lagoon	1,264	26,544

Averages

1,983 head per facility
261 kW (~350 hp)
364 metric tons CH4/yr
7,654 metric tons CO2e/yr

GREENHOUSE GAS EMISSION REDUCTIONS

Direct (Methane Capture) and Indirect GHG Emissions Reduction from Biogas Combustion for Electricity Generation

Direct Emissions Reductions from AgSTAR: 7,654 metric tons CO₂e/yr per facility
 All 200 Digesters: 1,530,752 metric tons CO₂e/yr from methane reduction

Average Electrical Capacity from AgSTAR: 261 kWh/day per facility that combusts biogas
 All 180 Digesters assumed to combust biogas: 411,544,800 kWh/yr total electricity displaced
 411,545 mWh (megawatt hours)/yr

Indirect GHG gases	Emission Factor lb/mWh	Project Electricity mWh	GHGs metric tons	CO ₂ Equivalent	
				Factor	Emissions (metric tons)
Carbon Dioxide (CO ₂)	724.12	411,545	135,174	1	135174.2
Nitrous Oxide (N ₂ O)	0.0081	411,545	1.5	296	447.6
Methane (CH ₄)	0.0302	411,545	5.6	23	129.7

Total Indirect GHG Emissions from Project Electricity Use= 135751 annual average

Total Direct and Indirect GHG Emissions Reduced: **1,666,503**

Notes and References:
 CO₂, CH₄, and N₂O Emission Factor Source: CCAR, 2009

lbs/metric ton = 2204.62

**CRITERIA POLLUTANT EMISSIONS FROM BIOGAS
COMBUSTION AND VOCS REDUCED THROUGH
DIGESTER OPERATIONS**

Criteria Pollutant Emissions from Biogas Combustion and VOCs Reduced through Digester Operations

Average Electrical Capacity from AgSTAR: 261 kWh/day per facility that combusts biogas
 ~350 hp average engine

	BACT Standard (g/bhp-hr)	Tons Per Year	(assumes 180 digesters combusting biogas)
NOx	0.15	91	
VOC	0.2	122	
SOx	0.06	37	
PM10	0.1	61	
CO	2.5	1,521	
PM2.5	NA	60	(assumes 99% of exhaust PM10 is PM2.5)

VOC Reduction Estimate

Average Pop. Feeding Digester from AgSTAR: 1,983 head per facility

Individual Dairy VOC	1.29 tpy
60% reduction by AD	0.773474 tpy reduced
Total Dairy VOC	257.82 tpy
60% reduction by AD	154.6948 tpy reduced

Appendix B10

Potentially Affected Special-Status Species



**TABLE BIO-1
POTENTIALLY AFFECTED SPECIAL-STATUS PLANT SPECIES^a**

Common and Scientific Name	Legal Status	Geographic Distribution	Habitat Requirements	Identification Period
Ferris' milk-vetch <i>Astragalus tener</i> var. <i>ferrisiae</i>	--/1B.1	Butte, Colusa, Glenn, Solano, Sutter, and Yolo Counties.	Vernally mesic meadow and seeps, and sub alkaline flats in valley and foothill grasslands.	April-May
alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	--/1B.1	Bay Area Region along with San Joaquin, Stanislaus and Merced Counties	Playas; valley and foothill grasslands with adobe clay soils; and vernal pools with alkaline soils.	March-June
heartscale <i>Atriplex cordulata</i>	--/1B.2	Various counties throughout the Sacramento and San Joaquin Valleys	Chenopod scrub, meadows and seeps, and valley and foothill grasslands with saline or alkaline soils.	April-October
brittlescale <i>Atriplex depressa</i>	--/1B.2	Various counties throughout the Sacramento and San Joaquin Valleys	Chenopod scrub; meadows and seeps; playas; alkali vernal pools with clay soil; and valley and foothill grassland.	April-October
Earlimart orache <i>Atriplex erecticaulis</i>	--/1B.2	Kings, Tulare, and Kern Counties	Valley and foothill grasslands	August-September
San Joaquin spearscale <i>Atriplex joaquiniana</i>	--/1B.2	Central California; found mostly in Solano, Contra Costa and Colusa Counties	Chenopod scrub; meadows and seeps; playas; and alkali valley and foothill grassland.	April-October
lesser saltscale <i>Atriplex minuscula</i>	--/1B.1	Butte, Fresno, Kern, Madera, Merced, Stanislaus and Tulare Counties	Chenopod scrub; playas; and valley and foothill grasslands with sandy, alkali soil..	May-October
vernal pool smallscale <i>Atriplex persistens</i>	--/1B.2	Glenn, Madera, Merced, Solano, Stanislaus, and Tulare Counties	Alkali vernal pools.	June-October
subtle orache <i>Atriplex subtilis</i>	--/1B.2	Butte, Fresno, Kings, Kern, Madera, Merced and Tulare Counties	Valley and foothill grasslands	June-August
Lost Hills crownscale <i>Atriplex vallicola</i>	--/1B.2	Fresno, Kings, Kern, and Merced Counties	Chenopod scrub, valley and foothill grasslands, vernal pools (alkaline)	April-August
big tarplant <i>Blepharizonia plumosa</i>	--/1B.2	Alameda, Contra Costa, San Joaquin, San Luis Obispo, Solano, and Stanislaus Counties	Valley and foothill grasslands.	July-October
Hoover's calycadenia <i>Calycadenia hooveri</i>	--/1B.3	Madera, Merced, Mariposa and Stanislaus Counties	Annual herb found in chenopod scrub, playas, and valley and foothill grassland with alkaline, sandy soil.	July-September
Bristly sedge <i>Carex comosa</i>	--/2.1	Sonoma, Contra Costa, Lake, Mendocino, Shasta Sacramento, San Joaquin and San Bernardino Counties	Found on lake margins and wet places.	May-September
Brown fox sedge <i>Carex vulpinoidea</i>	--/2.2	Butte, Kern, Los Angeles, Shasta, Siskiyou, San Joaquin and Tehama Counties	Freshwater marshes and swamps and riparian woodlands.	May-June
succulent owl's-clover <i>Castilleja campestris</i> ssp. <i>succulenta</i>	FT/SE/1B.2	Southern Sierra Nevada foothills: eastern San Joaquin Valley: Fresno, Madera, Merced, Mariposa, San Joaquin, and Stanislaus Counties	Vernal pools (often acidic)	April-May
pink creamsacs <i>Castilleja rubicundula</i> ssp. <i>rubicundula</i>	--/1B.2	Butte, Colusa, Glenn, Lake, Shasta, Napa, and Santa Clara Counties	Chaparral, cismontane woodland, meadows and seeps, Valley Foothill Grassland, on serpentinite soils	April-June
Pappose tarplant <i>Centromadia parryi</i> ssp. <i>parryi</i>	--/1B.2	Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, and Sonoma Counties	Chaparral, marshes, swamps, meadows and seeps, Valley Foothill Grassland (vernally mesic), on alkaline soils	May-November

**TABLE BIO-1
POTENTIALLY AFFECTED SPECIAL-STATUS PLANT SPECIES^a**

Common and Scientific Name	Legal Status	Geographic Distribution	Habitat Requirements	Identification Period
Hoover's spurge <i>Chamaesyce hooveri</i>	FT/--/1B.2	Central Valley, including Butte, Glenn, Merced, Stanislaus, Tehama, and Tulare Counties	Vernal pools.	July-September
slough thistle <i>Cirsium crassicaule</i>	--/--/1B.1	Kings, Kern, and San Joaquin Counties	Chenopod scrub, marshes and swamps, and riparian scrub.	May-August
palmete-bracted bird's-beak <i>Cordylanthus palmatus</i>	FE/SE/1B.1	Livermore Valley, Central Valley, including portions of Alameda, Colusa, Fresno, Madera, San Joaquin, and Yolo Counties	Chenopod scrub and alkali valley and foothill grasslands.	May-October
recurved larkspur <i>Delphinium recurvatum</i>	--/--/1B.1	Various locations throughout central California; primarily in San Joaquin Valley	Chenopod scrub; cismontane woodland; and in alkali valley and foothill grassland.	March-June
dwarf downingia <i>Downingia pusilla</i>	--/--/2.2	Fresno, Merced, Stanislaus, San Joaquin, Napa, Sonoma, Sacramento, Placer, Solano, Yuba, and Tehama Counties	Vernal pools, mesic valley and foothill grassland.	March-May
Delta button-celery <i>Eryngium racemosum</i>	--/SE/1B.1	San Joaquin River Delta and floodplains; Calaveras, Merced, San Joaquin, and Stanislaus Counties	Vernally mesic clay depressions in riparian scrub habitat.	June-October
Diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>	--/--/1B.1	Alameda, Contra Costa, Colusa, San Joaquin, San Luis Obispo, and Stanislaus Counties	Valley and foothill grassland with alkaline clay soil.	March-April
stinkbells <i>Fritillaria agrestis</i>	--/--/4.2	Various counties throughout the Central Valley and foothills	Chaparral; cismontane woodland; pinyon and juniper woodland; and valley and foothill grasslands (clay and sometimes serpentine soils.)	March-June
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>	--/SE/1B.2	Fresno, Lake, Lassen, Madera, Modoc, Placer, Sacramento, Shasta, San Joaquin, Solano, and Tehama Counties	Margins of marshes and swamps and in vernal pools with clay soil.	April-August
Woolly rose-mallow <i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i>	--/--/2.2	Butte, Solano, Sutter, Yolo, Sacramento, San Joaquin, Colusa, and Glenn Counties	Freshwater marshes and swamps	June-September
Carquinez goldenbush <i>Isocoma arguta</i>	--/--/1B.1	Only occurs in Solano County	Alkali valley and foothill grassland	August-December
Ahart's dwarf rush <i>Juncus leiospermus</i> var. <i>ahartii</i>	--/--/1B.2	Butte, Placer, Sacramento, Tehama, and Yuba Counties	Wet areas of valley and foothill grasslands	March-May
Coulter's goldfields <i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	--/--/1B.1	Colusa, Merced, and various counties throughout southern California	Coastal salt marshes and swamps, playas, and vernal pools.	February-June
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	--/--/1B.2	Contra Costa, Napa, Sonoma, Sacramento, and San Joaquin Counties	Freshwater and brackish marshes and swamps.	May-July
Munz's tidy-tips <i>Layia munzii</i>	--/--/1B.2	Fresno, Kern, and San Luis Obispo Counties	Chenopod scrub, valley and foothill grasslands (alkaline clay)	March-April
Legenere <i>Legenere limosa</i>	--/--/1B.1	Shasta, Tehama, Yuba, Placer, Sacramento, San Joaquin Counties; including San Francisco Bay Area region	Vernal pools	April-June

**TABLE BIO-1
POTENTIALLY AFFECTED SPECIAL-STATUS PLANT SPECIES^a**

Common and Scientific Name	Legal Status	Geographic Distribution	Habitat Requirements	Identification Period
Heckard's pepper-grass <i>Lepidium latipes</i> var. <i>heckardii</i>	--/1B.2	Glenn, Solano, and Yolo Counties	Valley and foothill grasslands (alkaline flats)	March-May
Mason's lilaepsis <i>Lilaeopsis masonii</i>	--/SR/1B.1	Various counties in the Sacramento Valley and San Francisco Bay area	marshes and swamps, riparian scrub	April-November
San Joaquin woollythreads <i>Monolopia congdonii</i>	FE--/1B.2	Fresno, Kings, Kern, Santa Barbara, San Benito, San Luis Obispo, and Tulare Counties	Chenopod scrub, Valley and foothill grassland; sandy soils	February-May
Baker's navarretia <i>Navarretia leucocephala</i> ssp. <i>bakeri</i>		Sutter, Tehama, and Yolo Counties; North Bay Region	Cismontane woodland; lower montane coniferous forest; meadows and seeps Valley and foothill grassland; and mesic vernal pools	April-July
Pincushion navarretia <i>Navarretia myersii</i> ssp. <i>myersii</i>	--/1B.1	Amador, Calaveras, Placer, Merced, and Sacramento Counties	vernal pools (often acidic)	May
Colusa grass <i>Neostapfia colusana</i>	FT/SE/1B.1	Colusa*, Merced, Solano, Stanislaus, and Yolo Counties	Vernal pools (large, adobe)	May-August
San Joaquin Valley Orcutt grass <i>Orcuttia inaequalis</i>	FT/SE/1B.1	Scattered occurrences in southwest California: Los Angeles, Riverside, San Diego, and Ventura Counties; Baja California	Vernal pools	April-August
hairy Orcutt grass <i>Orcuttia pilosa</i>	FE/SE/1B.1	Scattered locations along east edge of the Central Valley and adjacent foothills: Butte, Glenn, Madera, Merced, Stanislaus, and Tehama Counties	Vernal pools	May-September
slender Orcutt grass <i>Orcuttia tenuis</i>	FT/SE/1B.1	Sierra Nevada and Cascade Range foothills: Lake, Lassen, Plumas, Sacramento, Shasta, Siskiyou, and Tehama Counties	Vernal pools	May-October
Sacramento Orcutt grass <i>Orcuttia viscida</i>	FE/SE/1B.1	Sacramento County	Vernal pools	May-June
Ahart's paronychia <i>Paronychia ahartii</i>	--/1B.1	Butte, Shasta and Tehama Counties	Cismontane woodland, valley and foothill grassland, and vernal pools	March-June
Hartweg's golden sunburst <i>Pseudobahia bahiifolia</i>	FE/SE/1B.1	Eastern side of Sacramento-San Joaquin Valleys, formerly as far north as Yuba County	Rocky, bare areas along rolling hills, adjacent to vernal pools, usually with heavy clay soils	March-April
San Joaquin adobe sunburst <i>Pseudobahia peirsonii</i>	FT/SE/1B.1	Fresno, Kern, and Tulare Counties	Cismontane woodland, valley and foothill grassland, adobe clay	March-April
Sanford's arrowhead <i>Sagittaria sanfordii</i>	--/1B.2	Various Counties throughout the Central Valley region	Shallow freshwater marshes and swamps	May-October
Wright's trichocoronis <i>Trichocoronis wrightii</i> var. <i>wrightii</i>	--/2.1	Sutter, San Joaquin, Colusa, Merced, and Riverside Counties	Meadows and seeps, marshes and swamps, riparian forest, and vernal pools (alkaline)	May-September
Caper-fruited tropidocarpum <i>Tropidocarpum capparideum</i>	--/1B.1	Fresno, Glenn, San Luis Obispo, Monterey, San Joaquin, and Santa Clara Counties	Valley and foothill grassland (alkaline hills)	March-April

**TABLE BIO-1
POTENTIALLY AFFECTED SPECIAL-STATUS PLANT SPECIES^a**

Common and Scientific Name	Legal Status	Geographic Distribution	Habitat Requirements	Identification Period
Greene's tuctoria <i>Tuctoria greenei</i>	FE/SR/1B.1	Scattered distribution along east edge of the Central Valley from Tehama to Merced County; Fresno, Madera, San Joaquin, Stanislaus, and Tulare Counties	Vernal pools	May-July
Crampton's tuctoria <i>Tuctoria mucronata</i>	FE/SE/1B.1	Solano and Yolo Counties	Valley and foothill grassland (mesic), vernal pools	April-July

a. The list of potentially affected special-status plant species was compiled based off of a review of the CNDDDB query conducted for the project area. Those species with the potential to occur in habitats likely to be impacted by the project were included in this list.

Status Key

Federal

E listed as endangered under the federal Endangered Species Act

T listed as threatened under the federal Endangered Species Act

State

E listed as endangered under the California Endangered Species Act

R listed as rare under the California Native Plant Protection Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation

-- no listing

**TABLE BIO-2
POTENTIALLY AFFECTED SPECIAL-STATUS ANIMAL SPECIES^a**

Common and Scientific Name	Status	California Distribution	Habitats
Invertebrates			
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	FE/--	Disjunct occurrences in Solano, Merced, Tehama, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands
longhorn fairy shrimp <i>Branchinecta longiantenna</i>	FE/--	Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools
vernal pool fairy shrimp <i>Branchinecta lynchi</i>	FT/--	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools
valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	FT/--	Streamside habitats below 3,000 feet through the Central Valley of California	Riparian and oak savanna habitats with elderberry shrubs; elderberries are host plant
vernal pool tadpole shrimp <i>Lepidurus packardii</i>	FE/--	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds
Fish			
Sacramento perch <i>Archoplites interruptus</i>	--/SSC	Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley.	Prefers warm water, as well as aquatic vegetation for young. Tolerates wide range of physio-chemical water conditions.
Delta smelt <i>Hypomesus transpacificus</i>	FT/ST	Found in Sacramento-San Joaquin Delta; seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay	Young delta smelt feed and grow in the mixing zone (Suisun Bay); then spawn upstream in spring in river channels and tidally influenced backwater sloughs
Hardhead <i>Mylopharodon conocephalus</i>	--/SSC	Low to mid-elevation streams in the Sacramento-San Joaquin River Drainage. Also present in the Russian River.	Found in clear, deep pools with sand-gravel-boulder bottoms and slow water velocity. Not found where exotic centrarchids predominate.
chinook salmon - Central Valley spring-run ESU <i>Oncorhynchus tshawytscha</i>	FT/ST	Found in the Sacramento River and its tributaries	Requires cool, well-oxygenated waters, adult numbers depend on pool depth and volume, amount of cover and proximity to gravel
chinook salmon - Sacramento River winter-run ESU <i>Oncorhynchus tshawytscha</i>	FE/SE	Found in the Sacramento River below Keswick Dam; spawns in the Sacramento River but not in tributary streams	This ESU enters the Sacramento and San Joaquin Rivers and tributaries March to July, spawning from late August to early October. Young move to rearing areas in and through the Sacramento and San Joaquin Rivers, Delta, and San Pablo and San Francisco Bays
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	--/SSC	Current spawning distribution includes the Sacramento River up to the Red Bluff Diversion Dam and the San Joaquin River up to Salt Slough in wet years as well as into the lower reaches of the Feather River and American River.	Found mostly in slow-moving marshy sections of rivers, sloughs, backwaters, lakes and rivers in the northern San Francisco Estuary and Central Valley of California. Require floodplains that stay flooded for several weeks for spawning. With the exception of spawning, largely confined to Delta, Suisun Bay, Suisun Marsh, and lower Napa River, lower Petaluma River and parts of the San Francisco Estuary.

**TABLE BIO-2
POTENTIALLY AFFECTED SPECIAL-STATUS ANIMAL SPECIES^a**

Common and Scientific Name	Status	California Distribution	Habitats
Amphibians			
California tiger salamander <i>Ambystoma californiense</i>	FT/SC,SE	Most populations in the Central Valley have been eliminated from its historical range, and the remainder are found in the surrounding foothills. Two other populations have been isolated from the rest of the range long enough that they may constitute two unique species - one in Sonoma County near Santa Rosa, and another in Santa Barbara County.	Lifetime spent mostly underground in willow groves, coastal scrub, coast like oak, or riparian habitats; migrates to breeding ponds in early late winter, and juveniles disperse from the pond in September
California red-legged frog <i>Rana aurora draytonii</i>	FT/SSC	Found along the coastal mountain ranges of California from Humboldt County to San Diego County; Sierra Nevada from Butte County to Fresno County	Permanent and semipermanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation and riparian species along the edges; may aestivate in rodent burrows or cracks during dry periods
Western spadefoot <i>Spea hammondi</i>	--/SSC	Ranges from near Redding south throughout the Great Valley and its associated foothills, through the South Coast Ranges into coastal southern California south of the Transverse mountains and west of the Peninsular mountains, into northwest Baja California.	Occurs seasonally in grasslands, prairies, chaparral, and woodlands, in and around wet sites. Breeds in shallow, temporary pools formed by winter rains. Takes refuge in burrows.
Reptiles			
Western pond turtle <i>Actinemys marmorata</i>	--/SSC	Found in several counties throughout central and coastal California.	Ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites and suitable upland habitat for egg-laying. Nest sites most often characterized as having gentle slopes (<15%) with little vegetation or sandy banks.
Silvery legless lizard <i>Anniella pulchra pulchra</i>	--/SSC	Current range from northern Monterey County south to Baja California extending inland as far as California's central valley and Barstow.	Sandy or loose loamy soils under sparse vegetation. Soil moisture is essential so they prefer soils with a high moisture content.
blunt-nosed leopard lizard <i>Gambelia sila</i>	FE/SE	San Joaquin Valley from Stanislaus County through Kern County and along the eastern edges of San Luis Obispo and San Benito Counties	Open habitats with scattered low bushes on alkali flats, and low foothills, canyon floors, plains, washes, and arroyos; substrates may range from sandy or gravelly soils to hardpan
San Joaquin whipsnake <i>Masticophis flagellum ruddocki</i>	--/SSC	Ranges from Arbuckle in the Sacramento Valley in Colusa County southward to the Grapevine in the Kern County portion of the San Joaquin Valley and westward into the inner South Coast Ranges. An isolated population occurs in the Sutter Buttes.	Occurs in open, dry, treeless areas, including grassland and saltbush scrub. Takes refuge in rodent burrows, under shaded vegetation, and under surface objects.
Coast horned lizard <i>Phrynosoma blainvillii</i>	--/SSC	Historically, found along the Pacific coast from the Baja California border west of the deserts and the Sierra Nevada, north to the Bay Area, and inland as far north as Shasta Reservoir, and south into Baja California. Ranges up onto the Kern Plateau east of the crest of the Sierra Nevada. Current range is more fragmented.	Found in scrubland, grassland, coniferous forests, and broadleaved woodland, especially in lowland areas along sandy washes with scattered low shrubs. Also requires open areas for basking and patches of fine, loose soil for burying prey.
giant garter snake <i>Thamnophis gigas</i>	FT/ST	Central Valley from Fresno north to the Gridley/Sutter Butte area; has been extirpated from areas south of Fresno	Soughs, canals, and other small waterways where there is a prey base of small fish and amphibians; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter

TABLE BIO-2
POTENTIALLY AFFECTED SPECIAL-STATUS ANIMAL SPECIES^a

Common and Scientific Name	Status	California Distribution	Habitats
Birds			
tricolored blackbird <i>Agelaius tricolor</i>	--/SSC	Largely endemic to California, most numerous in the Central Valley and nearby vicinity.	Typically requires open water, protected nesting substrate, and foraging grounds within vicinity of the nesting colony. Nests in dense thickets of cattails, tules, willow, blackberry, wild rose, and other tall herbs near fresh water. Also nests in agricultural crops (e.g. silage), where colonies are threatened during harvest.
Grasshopper sparrow <i>Ammodramus savannarum</i>	--/SSC	Wintering habitat in California is found from Mendocino, Trinity, Shasta, and Lassen Counties south to San Diego County and west of the Sierra Nevada and desert regions. They are now known from Del Norte and Siskiyou Counties as well.	Prefers open grasslands, fallow agricultural fields, and cultivated fields with patches of bare ground.
Burrowing owl <i>Athene cucicularia</i>	--/SSC	Breeding in Central California has been reduced to only three isolated populations: the Central Valley, southern San Francisco Bay between Alameda and Redwood City, and near the Livermore area	Found in open grasslands with low vegetation, golf courses, and disturbed/ruderal habitat in urban areas.
cackling (=Aleutian Canada) goose <i>Branta hutchinsii leucopareia</i>	FD/--	The entire population winters in Butte Sink, then moves to Los Banos, Modesto, the Delta, and East Bay reservoirs; stages near Crescent City during spring before migrating to breeding grounds	Roosts in large marshes, flooded fields, stock ponds, and reservoirs; forages in pastures, meadows, and harvested grain fields; corn is especially preferred
Swainson's hawk <i>Buteo swainsoni</i>	--/ST	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley; the state's highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, grain fields, and vegetable crops
mountain plover <i>Charadrius montanus femoralis</i>	--/SSC	Winter resident in the California Central Valley. Breeds in the Midwest.	Typically found on grassy or bare dirt fields.
Northern harrier <i>Circus cyaneus</i>	--/SSC	Nests throughout California including the interior from Siskiyou County south to western Riverside and San Bernardino Counties and coastal regions from Marin County to San Diego County.	Nests in wet meadows and tall grasslands, forages in grasslands and marshes.
yellow warbler <i>Dendroica petechia brewsteri</i>	--/SSC	Nests throughout California except Central Valley, Mojave Desert region, and high altitudes and eastern side of Sierra Nevada; winters along Colorado River and in parts of Imperial and Riverside Counties; two small permanent populations in San Diego and Santa Barbara Counties.	Typically breeds in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows and other small trees and shrubs typical of low, open-canopy riparian woodland.
white-tailed kite <i>Elanus leucurus</i>	--/FP	Inhabits herbaceous and open stages of most habitats mostly in cismontane California. Has extended range and increased numbers in recent decades.	Forages in open grasslands and agricultural fields and marshes. Nests in scattered mature trees within foraging habitat.
greater sandhill crane <i>Grus canadensis tabida</i>	--/ST	Breeds on the plains east of the Cascade Range and south to Sierra County; winters in the Central Valley, southern Imperial County, Lake Havasu National Wildlife Refuge, and the Colorado River Indian Reserve	Summers in open terrain near shallow lakes or freshwater marshes; winters in plains and valleys near bodies of fresh water

**TABLE BIO-2
POTENTIALLY AFFECTED SPECIAL-STATUS ANIMAL SPECIES^a**

Common and Scientific Name	Status	California Distribution	Habitats
Yellow breasted chat <i>Icteria virens</i>	--/SSC	Nests locally in coastal mountains and Sierra Nevada foothills, east of the Cascades in northern California, along the Colorado River, and very locally inland in southern California.	Typically breeds in dense thickets and brush, often with thorns, streamside tangles, and dry brushy hillsides.
bank swallow <i>Riparia riparia</i>	--/ST	The state's largest remaining breeding populations are along the Sacramento River from Tehama County to Sacramento County and along the Feather and lower American Rivers and Cache Creek, in the Owens Valley; nesting areas also include the plains east of the Cascade Range south through Lassen County, northern Siskiyou County, and small populations near the coast from San Francisco County to Monterey County	Nests in bluffs or banks (usually steep), adjacent to water, where the soil consists of sand or sandy loam to allow digging
yellow-headed blackbird <i>Xanthocephalus xanthocephalus</i>	--/SSC	They winter in isolated sites in the Central Valley and Delta region, as well as the Lower Colorado River Valley and the Imperial Valley. Nesting occurs throughout the Sacramento-San Joaquin basin and the eastern plateau region.	Nests in freshwater marshes or reedy lakes; during migration and winter prefers open cultivated lands, fields, and pastures.
Mammals			
pallid bat <i>Antrozous pallidus</i>	--/SSC	Throughout California except high Sierra from Shasta to Kern Counties and the northwest coast, primarily at lower and mid-elevations.	Favors rocky outcrops with desert scrub, but commonly ranges up to forested areas with oak and pine. Roosts in caves, rock crevices, mines, hollow trees, and buildings.
Nelson's antelope squirrel <i>Ammospermophilus nelsoni</i>	--/ST	Western side of the San Joaquin Valley from southern Merced County south to Kern and Tulare Counties; also found on the Carrizo Plain in San Luis Obispo County and the Cuyama Valley in San Luis Obispo and Santa Barbara Counties	Arid grasslands from 200 to 1,200 feet, with loamy soils and moderate shrub cover of atriplex and other shrub species
giant kangaroo rat <i>Dipodomys ingens</i>	FE/SE	Occurs at high densities in only 12 square miles of habitat along the western side of the San Joaquin Valley, in five separate localities on Elkhorn Plain, Carrizo Plain, McKittrick Valley, and Cuyama Valley in Kern and San Luis Obispo Counties	Restricted to flat, sparsely vegetated areas with native annual grassland and shrubland habitats; requires uncultivated soils consisting of dry, fine, sandy loams for burrowing
Short-nosed kangaroo rat <i>Dipodomys nitratooides brevinasus</i>	--/SSC	The extent of its current distribution is unknown. Populations are known from the Coalinga area, Fresno County, a few scattered locations in the Kettlemen and Lost Hills, Kings and Kern counties, the Lokern, Elk Hills, San Emigdio, and Wheeler Ridge regions of western Kern County, the Carrizo Plain Natural Area, and the Caliente Mountains at the edge of the Cuyama Valley.	Occurs on western side of the San Joaquin Valley in grassland and desert shrub associations, especially <i>Atriplex</i> spp.
Fresno kangaroo rat <i>Dipodomys nitratooides exilis</i>	FE/SE	Found only in Fresno County	Found at elevations from 200 to 300 feet in alkali sink habitats
Tipton kangaroo rat <i>Dipodomys nitratooides nitratooides</i>	FE/SE	Occurs in the Tulare Lake Basin in portions of Fresno, Tulare, and Kern Counties	Found at elevations from 200 to 300 feet in arid grassland and alkali desert scrub communities with sparsely scattered shrubs; soil is usually finely textured and alkaline; may use areas that flood in winter and spring
riparian (=San Joaquin Valley) woodrat <i>Neotoma fuscipes riparia</i>		Riparian areas along the San Joaquin, Stanislaus and Tuolumne Rivers	Need areas with mix of brush and trees; need suitable nesting sites in trees; need suitable nesting sites in trees, snags or logs

**TABLE BIO-2
POTENTIALLY AFFECTED SPECIAL-STATUS ANIMAL SPECIES^a**

Common and Scientific Name	Status	California Distribution	Habitats
Riparian brush rabbit <i>(Sylvilagus bachmani riparius)</i>	FE/SE	The largest remaining fragment of habitat and only extant population are found along the Stanislaus River in Caswell Memorial State Park, San Joaquin County	Found in dense, brushy areas of Valley riparian forests, marked by extensive thickets of wild rose (<i>Rosa</i> spp.), blackberries (<i>Rubus</i> spp.), and willows (<i>Salix</i> spp.).
American badger <i>Taxidea taxus</i>	--/SSC	Uncommon, permanent resident throughout the state except for north coast	Found in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	FE/ST	Principally occurs in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, oak, savanna, and freshwater scrub

a. The list of potentially affected special-status animal species was compiled based off of a review of the CNDDDB query conducted for the project area. Those species with the potential to occur in habitats likely to be impacted by the project were included in this list.

Status Key

Federal

FE listed as endangered under the federal Endangered Species Act

FC Candidate proposed for federal listing under the federal Endangered Species Act

PT proposed for federal listing as threatened under the federal Endangered Species Act

-- no listing

State

SE listed as endangered under the California Endangered Species Act

ST listed as threatened under the California Endangered Species Act

FP fully protected under the California Fish and Game Code

SSC species of special concern in California

-- no listing

Appendix NOP

Notice of Preparation/Initial Study





California Regional Water Quality Control Board Central Valley Region

Katherine Hart, Chair



Linda S. Adams
Secretary for
Environmental
Protection

1685 E Street, Fresno, California 93706
(559) 445-5116 • Fax (559) 445-5910
<http://www.waterboards.ca.gov/centralvalley>

Arnold
Schwarzenegger
Governor

NOTICE OF PREPARATION

Development of Draft Program Environmental Impact Report for a Waste Discharge Regulatory Program for Dairy Manure Digester and Dairy Manure Co-Digester Facilities within Central Valley Region (Region 5)

NOTICE IS HEREBY GIVEN that the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) will be the Lead Agency for preparation of a Program Environmental Impact Report (EIR) for a waste discharge regulatory program for dairy manure digester and dairy manure co-digester facilities (i.e., utilize both manure and other organic feedstocks) located on or offsite of dairy facilities within its jurisdictional boundaries (Central Valley, California). This Notice of Preparation (NOP) provides responsible and trustee agencies with information describing the project and the potential environmental effects.

Public agencies may use the Program EIR prepared by the Central Valley Water Board when considering approval of individual projects for dairy manure digester and dairy manure co-digester facilities. The Central Valley Water Board needs to know the views of these agencies as to the scope and content of the environmental information which is germane to the agency's statutory responsibilities in connection with the proposed project.

The program description, project location, and potential environmental effects are described in the attached Initial Study (IS), which can additionally be downloaded in PDF format from the Central Valley Water Board's website at http://www.waterboards.ca.gov/centralvalley/press_room/announcements/. Copies of this document can also be obtained by contacting or visiting the Central Valley Water Board's office at 1685 E Street, Fresno, CA 93706 weekdays between 8:00 a.m. and 5:00 p.m. (excluding the first three Fridays of each month due to furloughs).

Due to time limits mandated by State law, the response of responsible and trustee agencies must be sent at the earliest possible date **but not later than 30 days after receipt of this notice**. Responses should include a contact name at your agency and be sent to:

Central Valley Regional Water Quality Control Board
Attn: Stephen Klein, Dairy Digester Program Project Manager
1685 E Street
Fresno, California 93706

Additionally, the Central Valley Water Board has set up three scoping meetings to provide participants with an opportunity to comment on the appropriate scope and content of the proposed Program EIR. Please see the Notice of CEQA Scoping Meeting and Public Workshop attached.

If you have any questions regarding this matter, please contact Stephen Klein at (559) 445-5558.

Clay Rodgers, Assistant Executive Officer
18 March 2010

California Environmental Protection Agency



California Regional Water Quality Control Board Central Valley Region

Katherine Hart, Chair

Linda S. Adams
Secretary for
Environmental
Protection

1685 E Street, Fresno, California 93706
(559) 445-5116 • Fax (559) 445-5910
<http://www.waterboards.ca.gov/centralvalley>



Arnold
Schwarzenegger
Governor

NOTICE OF CEQA SCOPING MEETING AND PUBLIC WORKSHOP

Development of Draft Program Environmental Impact Report for a Waste Discharge Regulatory Program for Dairy Manure Digester and Dairy Manure Co-Digester Facilities within Central Valley Region (Region 5)

NOTICE IS HEREBY GIVEN that the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) will hold a California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et seq) scoping meeting and public workshop to seek input on the scope and content of the environmental information that should be considered in the preparation of a Program Environmental Impact Report (EIR) for a waste discharge regulatory program for dairy manure digester and dairy manure co-digester facilities within its jurisdictional boundaries (Central Valley, California).

The Central Valley Water Board is lead agency in preparing a Program Environmental Impact Report (EIR) to evaluate the environmental impacts that could result from the development of dairy manure digester and co-digestion facilities at dairies and centralized off-site locations within the Central Valley. Through the process of anaerobic digestion, digester facilities treat dairy wastes and other non-hazardous organic wastes to produce biogas, a renewable source of energy. Biogas generated at digester facilities can be used in internal combustion engines to produce electricity or refined to biomethane a product equivalent to natural gas.

The Central Valley Water Board will regulate the discharge of effluent and solid digestate generated from such facilities. Regulatory options under consideration for the program include Waste Discharge Requirements (WDRs) General Orders and/or Conditional Waivers of WDRs. The Program EIR will provide CEQA compliance for the water quality permitting by the Central Valley Water Board to the owners and operators of those facilities. These digester facilities will also require discretionary permits issued by other state, county and local agencies and special districts. Other permitting agencies and districts may rely on or tier off the Program EIR to satisfy CEQA requirements.

Supplemental information in the form of an Initial Study may be downloaded in PDF format from the Central Valley Water Board's website at:
http://www.waterboards.ca.gov/centralvalley/press_room/announcements/.

CEQA SCOPING MEETING AND SCHEDULE

Three scoping meetings will be held to provide participants with an opportunity to comment on the appropriate scope and content of the draft Program EIR to be prepared pursuant to CEQA in support of development of General Order(s) and/or Conditional Waiver(s) to regulate the discharge of wastes generated by the operation of dairy manure digester and dairy manure co-digester facilities.

Date:	March 24, 2010	March 30, 2010	April 7, 2010
Time:	5:30 p.m. – 7:00 p.m.	5:30 p.m. – 7:00 p.m.	5:30 p.m. – 7:00 p.m.
Address:	Central Valley Water Board 11020 Sun Center Drive, #200 Rancho Cordova, CA 95670	Central Valley Water Board 1685 E Street Fresno, CA 93706	Central Valley Water Board 11020 Sun Center Drive, #200 Rancho Cordova, CA 95670

Directions and location information to the Rancho Cordova and Fresno offices can be found on the Central Valley Water Board's website:

http://www.waterboards.ca.gov/centralvalley/about_us/contact_us/

The facilities will be accessible to persons with disabilities. Individuals requiring special accommodations are requested to contact Stephen Klein at (559) 445-5558 at least five working days prior to the meeting. TTY users may contact the California Relay Service at 1-800-735-2929 or voice line at 1-800-735-2922.

Submission of CEQA Scoping Comments

The Central Valley Water Board will accept both written and oral suggestions on the scope and content of the information to be included in the CEQA documents. Comments should be limited to identifying the range of actions, alternatives, mitigation measures, reasonably foreseeable means of compliance and their impacts, and potential significant environmental effects to be analyzed in-depth in the draft EIR. Written comments should be submitted to Jennifer Tencati of CirclePoint no later than **12:00 noon on 23 April 2010** (contact information below). Please indicate the project you are commenting upon in the subject line, "**Scoping Comment Letter – Central Valley Water Board Dairy Digester Program EIR.**"

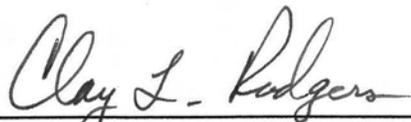
WHO SHOULD ATTEND

Groups and individuals interested in the environmental impacts of dairy manure digester and co-digester projects as well as the development of the Central Valley Water Board's waste discharge regulatory program for these facilities are encouraged to attend these meetings. This includes, but is not limited to, public and private land owners; representatives of tribal nations; agricultural producers; dairy owners and operators; digester developers; and other federal, state and local regulators including air and water management officials.

CONTACT INFORMATION

Questions regarding this scoping meeting can be directed Jennifer Tencati at (916) 658-0180 x131. Please submit comments by mail to Jennifer Tencati, CirclePoint, 455 Capitol Mall, Suite 802, Sacramento, CA 95814, by email to j.tencati@circlepoint.com or by fax to (916) 658-0189. Electronic submission via e-mail is preferred. If you wish to receive ongoing information regarding the development of a dairy manure digester and dairy manure co-digester regulatory program, you may subscribe to the "Dairy Program" mailing list through our website at : http://www.waterboards.ca.gov/resources/email_subscriptions/reg5_subscribe.shtml or call Jennifer Tencati and request to be added to the mailing list.

Please bring the above information to the attention of anyone you know who would be interested in this matter.



Clay Rodgers, Assistant Executive Officer
18 March 2010

ENVIRONMENTAL CHECKLIST

Initial Study

1. **Project Title:** Central Valley Dairy Digester and Co-digester Facilities Program EIR
2. **Lead Agency Name and Address:** California Regional Water Quality Control Board, Central Valley Region, (Central Valley Water Board or CVWB)
3. **Contact Person and Phone Number:** Stephen Klein (559) 445-5558
CVWB Project Manager
4. **Project Location:** California Regional Water Quality Control Board, Central Valley Region (Region 5) jurisdictional boundaries (Central Valley, California)
5. **Project Sponsor's Name and Address:** California Regional Water Quality Control Board, Central Valley Region
1685 E Street
Fresno, California 93706
6. **General Plan Designation(s):** NA
7. **Zoning Designation(s):** NA
8. **Description of Project.**

The Central Valley Regional Water Quality Control Board (Central Valley Water Board or CVWB) is proposing to develop a waste discharge regulatory program for anaerobic digesters (digesters) using manure and manure plus other organic feedstocks (i.e., used in co-digestion) located on-site or off-site dairy facilities in the Central Valley Region (Region 5). Regulatory options under consideration for the program include Waste Discharge Requirements (WDRs) General Orders and/or Conditional Waiver of WDRs. These WDRs and/or conditional waivers will regulate the discharge of effluent and solid digestate generated from dairy manure digesters and dairy manure co-digester projects.

A Program Environmental Impact Report (EIR) will be prepared to evaluate the environmental effects that could result from the development of dairy manure digester and co-digestion facilities within the Central Valley Region, and is intended to provide California Environmental Quality Act compliance for the water quality WDRs and/or conditional waivers issued by the Central Valley Water Board to the owners and operators of those facilities. These digester facilities will also require discretionary permits issued by other state, county and local agencies and special districts. The Program EIR is being developed to allow the other permitting agencies and districts to rely on or tier off the Program EIR to satisfy California Environmental Quality Act (CEQA) requirements. The goal is to reduce the time required for environmental review

and other discretionary permitting of digesters at dairies and central facilities throughout the Central Valley.

Any water quality WDRs and/or conditional waivers issued under this program will contain terms and conditions to implement applicable requirements of the Porter Cologne Water Quality Control Act (California Water Code §13000 et seq.), the California Code of Regulations; the Water Quality Control Plan for the Tulare Lake Basin, Second Edition (Tulare Lake Basin Plan); the Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin, Fourth Edition (Sacramento and San Joaquin Basin Plan); and the State Water Resource Control Board Resolution No. 68-16 (Antidegradation Policy); and all other applicable Central Valley Water Board or State Water Resources Control Board plans and policies.

General WDRs and/or conditional waivers under this program will be applicable to existing dairies with facility-produced manure-only digesters and new or expanded dairies with facility-produced manure-only digesters. The proposed permitting process will also be applicable to dairies that propose to co-digest facility-produced-manure with other organic feedstocks, as well as centralized digester and co-digester facilities on or off-site dairy facilities that receive manure from single or multiple dairies.

Background

California is split into nine water quality regions based on watershed boundaries, with each region under the jurisdiction of a semi-autonomous Regional Board. The project is under the authority of the California Regional Water Quality Control Board, Central Valley Region. (Central Valley Water Board or CVWB). The Central Valley Region is the State's largest region (as shown in **Figure 1**).

According to the 2007 *Census of Dairies and Dairy Cows* (California Agricultural Resource Directory, 2007), there are approximately 1.6 million cows at 1,578 dairies in the CVWB's jurisdiction. Dairy cows on average produce approximately 112 pounds of manure per day (Burke, 2001), which would equate to about 180 million pounds of manure generated per day within the Central Valley Region. This substantial quantity of manure has the potential to produce biogas, a renewable source of energy, if it is processed in a digester.

Broad objectives of the project are as follows:

- Support the Bioenergy Action Plan for California (July 2006)
- Support Executive Order S-06-06, which established targets for the use and production of biofuels and biopower and instructed state agencies to work together to advance biomass programs in California.
- Support a CVWB regulatory program to streamline the permitting of dairy manure digester facilities and dairy manure co-digester facilities. The CVWB estimates that this waste discharge regulatory program will reduce water quality permitting time by 75 percent or more through the use of general WDRs and/or conditional waivers.
- Reduce the time required to develop and issue permits associated with digesters by other state and local permitting agencies. For example, the Air Resources Board (ARB) and San Joaquin Valley Air Pollution Control District (SJVAPCD) have estimated that the certification of the Program EIR will reduce air quality permitting time by 50 percent or more for certain digester projects.



SOURCE: Central Valley RWQCB, 2009; and ESA, 2010

Central Valley Dairy Digester and Co-digester Program EIR . 209481

Figure 1
 California Regional Water Quality Control Board – Central Valley Region
 Region 5

- Enable State Agencies to achieve Executive Order S-14-08 to reduce permitting times by 50 percent or more for renewable energy projects.
- Reduce costs to comply with CEQA on the order of tens of thousands of dollars for smaller projects to hundreds of thousands of dollars for larger projects.
- Address the cross-media environmental requirements of multiple state and local agencies in one EIR.
- Increase opportunities for energy companies to achieve 2010 and 2020 California Renewable Portfolio Standards by converting dairy manure, green waste, and other waste streams to a valuable, renewable green energy resource.
- Provide an alternate waste treatment method for dairy manure and other organic waste streams and create a new revenue source for California dairies.
- Assist in meeting greenhouse gas (GHG) reduction measures in support of the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32). The AB 32 Scoping Plan includes the following greenhouse gas reduction measures related to anaerobic digestion:
 - Measures E-3. Achieve a 33% renewables mix by 2020. (Anaerobic digestion produces biogas which is a renewable energy source.)
 - RW-3 High Recycling/Zero Waste. (Anaerobic digestion is one of five subcategories listed under this measure.)

Anaerobic digestion is the biological decomposition of organic matter in the absence of molecular oxygen. This project encompasses both manure digestion and co-digestion processes, which differ according to feedstock. The anaerobic digestion process results in the production of biogas and digestate. The biogas consists primarily of methane (CH₄), which can be used for energy, and carbon dioxide (CO₂), with small amounts of hydrogen sulfide (H₂S), and ammonia (NH₃). Typically biogas is saturated with water vapor and may have trace amounts of hydrogen (H₂), nitrogen (N₂), oxygen (O₂), dust and siloxane (Greer, 2010). The residual products from anaerobic digestion are wastewater and solid residuals (digestate). The anaerobic digestion process occurs naturally in marshes, wetlands and is the principal decomposition process in landfills.

Anaerobic digestion at dairies follows a general process as shown in **Figure 2**, although the actual facility and digester type can vary. As seen in Figure 2 there are several potential uses for the biogas produced by the anaerobic digester (AD) facilities.

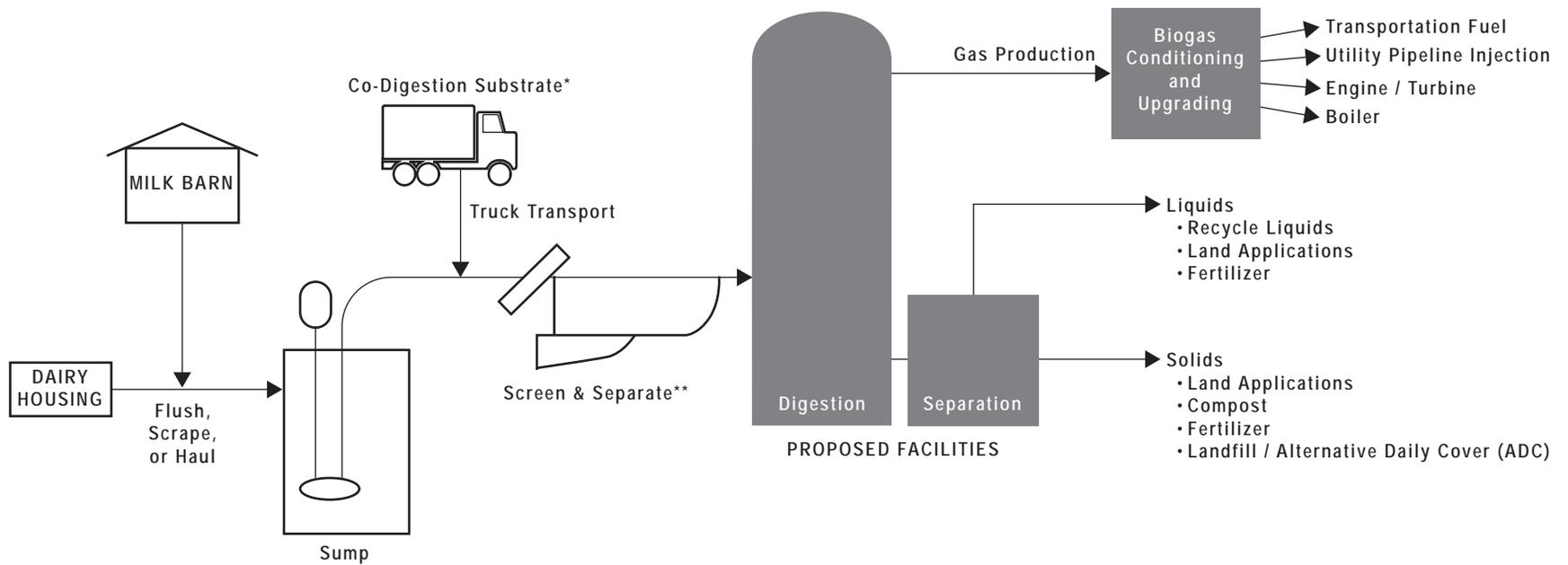
The following AD facility categories are addressed in this document:

- Individual Dairies

This facility type includes the addition of AD facilities (i.e., dairy manure digester or co-digester facilities) onto an individual dairy (an operation that houses dairy cows and collects and processes manure). Facilities would be located within the current footprint of the dairy operations.

- Centralized Locations

There are two categories of centralized location facilities for dairies that will be assessed in this EIR: (1) Central AD Facility, whereby individual dairies would collect manure and transport the manure by pipeline or truck to a central facility; and (2) Central Biogas Clean-Up Facility, whereby raw biogas from individual dairies (including dairies linked



* If co-digestion will be implemented at facility

** Screen & Separate - this step may be needed to remove straw, sand, and silt (Burke, 2001)

via underground gas pipelines) is piped to a central facility. These types of centralized facilities can be on dairies or located off-site. For both location options, the central facility would have the potential to receive manure, manure plus co-digestion substrate, and/or raw biogas.

The EIR will evaluate environmental impacts from the three basic types of systems including ambient-temperature anaerobic covered lagoons, plug-flow digesters, and complete mix systems. There are many variations and gradations between these basic types of AD systems. Each of the three basic digester types is described below.

The EIR will evaluate potential environmental impacts from a range of potential uses of the biogas including: on-site electrical production units (e.g., engines, turbines, and fuel cells), pipeline injection (i.e., into the utility natural gas pipelines), and transportation fuels (e.g., compressed biomethane and liquefied biomethane).

- Anaerobic Covered Lagoons

Ambient-temperature covered lagoons are covered ponds, where the manure waste stream enters one end (influent) and the digested effluent is removed at the other end. The lagoons are covered by an impermeable cover that captures the biogas generated by AD. Covered lagoons are not typically heated and operate at ambient ground temperatures and therefore the AD reaction and biogas production rates are affected by seasonal temperature variations.

- Plug-Flow Digester

Plug-flow digesters typically consist of unmixed, rectangular tanks that are normally heated by a hot water piping system to mesophilic temperatures (68° to 105° F) within the reactor. The rate of bacterial growth and AD is faster with higher temperatures than at ambient conditions. This AD system is typically used to digest thick waste with a relatively high solids concentration.

- Complete Mix Digester

Complete mix anaerobic digesters consist of aboveground tanks whereby the organic waste stream is heated to mesophilic or thermophilic (110° to 160° F) temperatures and continuously or intermittently mixed by mechanical, gas, or liquid circulation mixers. Complete mix digester systems accommodate a wide-range of solids concentrations and can handle sand and silts in the waste stream since the mixing prevents stratification (Burke, 2001).

In summary, AD facilities are anticipated to provide the following benefits:

- reduce the odor associated with dairies,
- reduce GHG emissions,
- provide a renewable source of energy, and
- increase recycling and reduce waste.

Biogas generated through the AD process, which is the renewable source of energy listed above, is captured and can be used directly in internal combustion engines to produce electricity and heat, or the biogas can be upgraded to biomethane through the removal of hydrogen sulfide, carbon dioxide (CO₂), and moisture. Biomethane is a product equivalent to natural gas, which typically contains more than 95 percent methane. Biomethane can be used in place of natural

gas for various processes, including use by utility companies if the biomethane is upgraded to utility standards and injected into a natural gas supply pipeline, as well as for electrical generation, heating, cooling, and for natural gas-fueled vehicles (Krich, et al., 2005).

The manure digestion process would occur 24 hours a day at AD facilities. The number of site visitors and employees at dairies is not anticipated to change substantially as a result of the addition of AD facilities. There may be increased truck trips associated with the delivery of agricultural products (in the case of co-digestion) or the transport of manure or biogas products (in the case of centralized facilities).

This Initial Study (IS) is being utilized as a tool to communicate the project concepts and likely key issues to interested members of the public, as well as trustee and responsible agencies, and to focus issue areas that could be potentially significant. The CVWB intends to prepare a Program EIR to discuss the project's potential effect on the environment and meet the project objectives described above. The Program EIR will identify and address potentially significant effects on the environment related to dairy digesters, and provide program-level measures to mitigate identified impacts.

9. Surrounding Land Uses and Setting.

The AD projects would be located in the Central Valley. The Central Valley is a large valley (approximately 42,000 square miles) that dominates the central portion of California. The population of the Central Valley is about 6.5 million persons. The Central Valley is one of the most productive agricultural regions in the United States, and the location for more than 1,500 dairies. Two major rivers in the Central Valley are the Sacramento River, that drains the northern third of the valley, and the San Joaquin River that drains the central third of the valley. The southern third of the Central Valley is the Tulare Lake Basin that is essentially a closed basin. During periods of exceptional precipitation, surface water can flow from the Tulare Lake Basin to the San Joaquin River. The Central Valley has periods of poor air quality because it is a valley surrounded by mountains that can trap air pollutants, and the air pollutant concentrations of ozone and particulate matter often exceed the state and federal standards. With respect to water quality, groundwater in parts of the Central Valley has been degraded, due in part to historical and current land uses and disposal practices. Generally, dairy digesters would be expected to be at dairies or near dairies and accordingly in areas of agricultural land use.

10. Other public agencies whose approval is required.

The CVWB would certify the EIR and the regulatory program for dairy digesters. Individual digester projects within the scope of this program could also potentially require approvals or permits from other jurisdictions or agencies; such as the County, the local air quality management district, California Department of Fish and Game, or the U.S. Army Corps of Engineers. These other entities responsible for issuing approvals could rely on or tier off this Program EIR.

Environmental Factors Potentially Affected

The proposed project could potentially affect the environmental factor(s) checked below. The following pages present a more detailed checklist and discussion of each environmental factor.

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> Aesthetics | <input checked="" type="checkbox"/> Agriculture and Forest Resources | <input checked="" type="checkbox"/> Air Quality & GHG Emissions |
| <input checked="" type="checkbox"/> Biological Resources | <input checked="" type="checkbox"/> Cultural Resources | <input checked="" type="checkbox"/> Geology, Soils and Seismicity |
| <input checked="" type="checkbox"/> Hazards and Hazardous Materials | <input checked="" type="checkbox"/> Hydrology and Water Quality | <input checked="" type="checkbox"/> Land Use and Land Use Planning |
| <input type="checkbox"/> Mineral Resources | <input checked="" type="checkbox"/> Noise | <input type="checkbox"/> Population and Housing |
| <input checked="" type="checkbox"/> Public Services | <input type="checkbox"/> Recreation | <input checked="" type="checkbox"/> Transportation and Traffic |
| <input checked="" type="checkbox"/> Utilities and Service Systems | <input checked="" type="checkbox"/> Mandatory Findings of Significance | |

DETERMINATION: (To be completed by Lead Agency)

On the basis of this initial study:

- I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- I find that the proposed project MAY have a “potentially significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

Signature



March 18, 2010

Date

CLAY RODGERS, Assistant Executive Officer

Printed Name

Central Valley Water Board

For

Environmental Checklist

Aesthetics

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
1. AESTHETICS—Would the project:				
a) Have a substantial adverse effect on a scenic vista?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway corridor?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a, b) Dairy digesters would be located on dairies, or central facilities that may not be dairies. These facilities are likely to be constructed in areas away from scenic vistas and scenic resources; however, because facility locations are unknown at this time, a determination cannot be made. Therefore, the project may have a potentially significant impact on scenic vistas and scenic resources, and these issues will be addressed in the Program EIR.
- c) As described above, dairy digesters are likely to be constructed at dairies or at central facilities in agricultural areas and they would be consistent with other major structures that are part of the visual character of agricultural areas. Therefore the visual effect of the digesters developed for the project would not be likely to substantially degrade the visual character of the site and its surroundings. This issue will not be evaluated in the Program EIR.
- d) Dairy digesters should have similar lighting requirements to other dairy operations. Outdoor nighttime lighting would primarily be limited to the minimal amount needed for security and safe operations. Dairy digesters may require a flare for combustion of surplus biogas or in the event of equipment failure of biogas conditioning facilities. Flares could be a potential new source of nighttime lighting and thus this issue will be evaluated in the Program EIR.

Agriculture and Forest Resources

<u>Issues (and Supporting Information Sources):</u>	<u>Potentially Significant Impact</u>	<u>Less Than Significant with Mitigation Incorporation</u>	<u>Less Than Significant Impact</u>	<u>No Impact</u>
2. AGRICULTURE and FOREST RESOURCES				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.				
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) It is unknown how much of the land on which dairy digesters would be constructed has been designated as Farmland of Statewide Importance. Typically, dairy digester facilities would be considered an agricultural use; they support dairies by providing additional benefits from the dairy manure. However, there is the potential for some co-digester and central facilities development on Important Farmland; therefore this issue will be addressed in the Program EIR.
- b) It is unknown how much of the land on which dairy digesters would be constructed has been zoned for agricultural use or is under a Williamson Act contract. Dairy digester facilities are generally considered to be a compatible use with dairies. However, there is the potential for some co-digester and the development of central facilities on land zoned for agricultural use or under a Williamson Act contract, therefore this issue will be addressed in the Program EIR.

- c) Dairy digesters would not be located on forest land. The project would not conflict with existing zoning or cause rezoning of forest land. This issue will not be further evaluated in the Program EIR.
 - d) Dairy digesters would not be located on forest land. The project would not result in the loss of forest land or conversion of forest land to non-forest use. This issue will not be further evaluated in the Program EIR.
 - e) As discussed above, dairy digester facilities would be considered an agricultural use or use compatible with agriculture. Therefore, it is unlikely that development of digester facilities would result in the conversion of Farmland of Statewide Importance to non-agricultural uses. However, there is the potential for some co-digester and the development of central facilities on land used for agricultural, therefore this issue will be addressed in the Program EIR. Dairy digester facilities are not anticipated to result in the conversion of any forest land to non-forest use.
-

Air Quality and Greenhouse Gas Emissions

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
3. AIR QUALITY and Greenhouse Gas Emissions				
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.				
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Expose sensitive receptors to substantial pollutant concentrations?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Create objectionable odors affecting a substantial number of people?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) The project would assess potential construction and operation of AD facilities within the CVWB’s jurisdictional boundary. The construction and operation of any AD facilities will be subject to the rules and requirements, including permitting, of the applicable air quality district. The Program EIR will evaluate the potential for the project to conflict with or obstruct the implementation of any applicable air quality plans. Mitigation for potential air quality impacts would be established, as necessary.
- b) Air pollutant emissions that would violate or substantially contribute to air quality standard violations may occur during construction and/or operation of AD facilities. Construction emission sources include exhaust generated from the use of heavy equipment and off-road vehicles and fugitive dust generated as a result of soil disturbance during excavation and grading activities. Implementation of standard best management practices would reduce the potential for air quality violations from construction of AD facilities. Appropriate best management practices will be identified and outlined in the Program EIR.
- The project would result in the 24-hour per day operation of some AD facilities. Additional air pollutant sources and emissions would depend on several factors, such as the size and type of facility (i.e., AD facilities on individual dairies versus centralized locations), the increased truck traffic on the local roadway network (including haul trucks for co-digester

- facilities and for potential waste or biogas transport to centralized facilities), and the post processing of the biogas (i.e., combusted for electricity or cleaned up for use as a transportation fuel or injection to utility transmission lines). The potential nitrogen oxide (NO_x) emissions that could result from the combustion of the biogas to produce electricity are an important issue for the project that will be analyzed in the Program EIR. Further discussion of potential air quality impacts and mitigation to reduce impacts will be evaluated in the Program EIR.
- c) At the cumulative level, it is anticipated that the project would reduce the prevalence of fugitive methane from naturally occurring manure decomposition while producing a renewable source of energy (biogas). However, construction and operation of AD facilities under the project would result in additional sources and emissions of criteria pollutants (as described in issue “b” above). Consistency with applicable federal and state ambient air quality standards will be further discussed in the Program EIR.
- d) Construction and operation of dairy digesters could expose sensitive receptors to substantial pollutant concentrations. During construction, sources of toxic substances would include emissions from off-road equipment (generally diesel fueled) for clearing and grading activities and diesel equipment used to build AD facilities. For operations, toxic emissions would be generated by trucks delivering waste to the AD facilities, as well as emissions from processing equipment operating on-site. In addition, the AD process could release emissions of toxic pollutants such as hydrogen sulfide and ammonia. Further discussion of potential air toxic impacts and mitigation to reduce impacts would be analyzed in the Program EIR.
- e) Construction and operation of dairy digesters is anticipated to reduce odors currently associated with dairy waste products since AD occurs in a closed system. Volatile organic compounds are broken down through the anaerobic digestion process, and exhaust is generally processed in a more controlled environment. However, due to the transport, storage, and pre-processing activities of the odiferous cow manure and other organic substrates for potential co-digestion, the siting of these AD facilities, in particular centralized facilities not located on dairies, could lead to objectionable odors at off-site receptors in the vicinity. This issue will be discussed in the Program EIR.
- f, g) An established goal of the project is the furthering of compliance with the greenhouse gas (GHG) reduction measures contained in the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32), specifically Measures E-3 (achieve a 33% renewables mix by 2020 – AD produces biogas which is a renewable energy source) and RW-3 (high recycling/zero waste – AD is one of the categories listed under this measure). Furthermore, when biogas is combusted, the substantial methane portion is converted to carbon dioxide, which is much less damaging as a GHG than methane (methane has a global warming potential approximately 23 times greater than carbon dioxide). Finally, if the energy produced through AD operations displaces energy produced from oil, natural gas, or coal, the project could result in greenhouse gas benefits. These benefits, as well as additional potential sources of GHGs as part of the project, such as haul trucks, processing equipment, and increased electricity usage for AD facility operations, will be discussed in the Program EIR.

Biological Resources

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
4. BIOLOGICAL RESOURCES— Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) Project development has the potential to affect special-status species. Any direct and/or indirect impacts to special-status species would be dependant upon the specific location of the AD facilities. Impacts on special-status species would be low for those projects that construct facilities within dairy footprints, as dairies do not typically support habitat for special-status species. Central location facilities and pipelines have the potential to affect more habitat depending on their location.

The project would comply with the California Endangered Species Act, Federal Endangered Species Act, and Magnuson Stevens Fisheries Conservation Management Act, as appropriate. Further discussion of potential impacts on special-status species and mitigation to reduce impacts would be provided in the Program EIR and implemented at the project level.

- b, c) While most dairy digesters are likely to be located on dairies or other areas subject to agricultural practices, AD facilities could adversely affect sensitive natural resources and federally protected wetlands, depending on their location. Generally these impacts can be avoided in the siting process.

During project-level facility siting, a habitat assessment shall be conducted, followed by a wetland delineation, if potential wetland habitat is present. As necessary, permits shall be obtained pursuant to Sections 401 and 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act and Sections 1600-1616 of the California Fish and Game Code. These issues will be addressed in the Program EIR.

- d) Project components are unlikely to affect any established wildlife corridors as most digester facilities will be located at dairies. If required, pipelines will be underground and will not impair wildlife movement. The centralized facilities could be located on non-dairy properties and have the potential to affect established wildlife corridors, depending on their location.

The project has the potential to be located on wildlife nursery sites. Mitigation for this potential impact, such as requiring surveys at the project level to determine the potential for wildlife use of the site prior to approval, will be outlined in the Program EIR.

- e) Dairy digesters may affect biological resources protected under local ordinance. Mitigation to reduce any potential impacts, including project-specific surveys, will be addressed in the Program EIR.
- f) Major adopted plans in the CVWB's jurisdiction include the San Joaquin Multi-species Habitat Conservation and Open Space Plan, Natomas Basin Habitat Conservation Plan (HCP), Kern Water Bank Authority HCP/Natural Community Conservation Planning (NCCP) and East Contra Costa County HCP. The continuation and expansion of agricultural facilities is provided for in most HCPs. Centralized facilities may trigger the need for compliance measures, including site-specific surveys and payment of fees under adopted plans but would not create any conflict. This impact will be less than significant and this issue will not be further evaluated in the Program EIR.
-

Cultural Resources

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
5. CULTURAL RESOURCES— Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to §15064.5?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Disturb any human remains, including those interred outside of formal cemeteries?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) The preferred location for the AD facilities would likely be at dairies or centralized locations in the vicinity of dairies. In general, historic-era buildings in these areas are anticipated to be agricultural in nature. Therefore, project implementation in the vicinity of such historic structures would be consistent with the nature of the building. The potential remains, however, for an impact to the significance of a historical resource through site preparations such as demolition. The Program EIR will include a programmatic-level discussion of the historic resources present in the CVWB’s jurisdictional boundary. Additional project-level cultural resources surveys may be necessary for projects located near historic structures or prehistoric sites and such surveys may be considered for inclusion in the provisions of the general WDRs and/or waiver. This issue will be addressed in the Program EIR.
- b) At the program level of environmental review, it is not possible to determine if archaeological resources would be disturbed by the installation of AD facilities. Any site grading and excavation activities have the potential to disturb previously unknown archaeological resources. The EIR shall include a program level discussion of the archeological resources present in the CVWB’s jurisdictional boundary.

Within this area, prehistoric and ethnohistoric materials might include flaked stone tools, tool-making debris, stone milling tools, fire-affected rock, basketry, culturally modified animal bone, fishing implements, or soil darkened by cultural activities (midden). Historic-era materials might include building remains, metal, glass, cans, or ceramic artifacts or debris.

Potential impacts from the project on archeological resources and measures to mitigate this impact will be addressed in the Program EIR.

- c) There is potential for grading operations related to site preparations to result in an adverse impact on paleontological resources. This potential impact would be further discussed in the Program EIR, and measures will be incorporated to mitigate any potentially significant impacts.

 - d) There is potential for grading operations related to site preparations to result in an adverse impact on human remains. This potential impact would be further discussed in the Program EIR.
-

Geology, Soils, and Seismicity

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
6. GEOLOGY, SOILS, AND SEISMICITY— Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a.i) Fault rupture can occur along fault systems during seismic events (earthquakes). If the rupture extends to the surface, movement on a fault is visible as a surface rupture. The occurrence of fault rupture depends on several factors, including location of the epicenter in relation to the project site, and the characteristics of the earthquake, such as intensity and duration. The hazards associated with fault rupture generally occur in the immediate vicinity of the fault system. Based on the available geologic and seismic data, there are few faults in the Central Valley and fault rupture is not considered likely. The Program EIR would further discuss the potential for fault rupture in the project area, as relevant.
- a.ii) Strong earthquakes generated along a fault system generally create ground shaking, which attenuates (i.e., lessens) with distance from the epicenter. In general, the area affected by ground shaking will depend on the characteristics of the earthquake and location of the epicenter.

Much of the Central Valley is located outside of areas that are prone to strong seismic ground shaking. However, depending on the siting of individual AD facilities, some of those facilities may be located in areas that are prone to strong seismic shaking. The Program EIR would require facility construction to meet established local, state, and federal building codes, as relevant, to minimize damage in the event of an earthquake. Additional requirements and mitigation may also be required. For instance, the project applicants would be required to submit to the appropriate county engineering department for review and approval, a geotechnical engineering report produced by a California Registered Civil Engineer or Geotechnical Engineer addressing and making recommendations on the following:

- Road, pavement, and parking area design
- Structural foundations, including retaining wall design (if applicable)
- Design of tanks, pipelines, and other AD facilities
- Grading practices
- Erosion/winterization
- Special problems discovered on the site (e.g., groundwater, expansive/unstable soils, etc.)
- Slope stability

Compliance with California seismic design requirements would ensure that the project would not expose persons or property to hazardous conditions associated with strong seismic ground shaking events. The Program EIR would further discuss the potential for this issue in the project area, as relevant.

- a.iii) Liquefaction and other seismically-induced forms of ground movement have historically occurred in California during major earthquake events. These phenomena generally consist of lateral movement, flow, or vertical settlement of saturated, unconsolidated soil in response to strong ground motion. Primary factors in determining liquefaction potential are soil type, the level and duration of seismic ground motions, and the depth to groundwater. Sandy, loose, or unconsolidated soils are most susceptible to liquefaction hazards. Geotechnical reporting would be incorporated into the project, as described above. Compliance with the California seismic design requirements, as noted above, would ensure that the project would not expose persons or property to hazardous conditions associated with seismic-related ground failure. The Program EIR would further discuss the potential for this issue in the project area, as relevant.
- a.iv) Geographically, the Central Valley is generally flat, and potential for landslides in most areas is therefore low. However, topographic features located in some portions of the Central Valley, including the foothills along Central Valley margins, topographic features associated with rivers and other waterways, and manmade features including levees and other berms and fill areas, may be subject to mass movements including landslide. Program level measures, including compliance with requirements for geotechnical assessment and

compliance with applicable building codes and local building permit requirements, will be applied. The Program EIR would further discuss the potential for this issue in the project area, as relevant.

- b) Site preparation and earthwork would consist of stripping the area of vegetation, as well as site grading, as required. Grading and earthwork would be limited to facility footprint areas, including pipelines and other appurtenant facilities. In general, installation of AD facilities would not typically require excessive grading or earthwork.

Although large scale grading activities are not anticipated, stripping of vegetation and other grading could facilitate the entrainment of soils in water or wind, leading to the transport of surface soils and sediments off site. To minimize the loss of topsoils due to soil erosion and other factors, Best Management Practices (BMPs) would be required under CVWB permitting requirements. These BMPs would implement measures that would reduce or prevent the loss of topsoil from the AD facility site.

In addition, a drainage report would be prepared by a California Registered Civil Engineer, for each individual AD site. The report would identify measures to manage stormwater drainage flows and otherwise prevent topsoil from becoming entrained in stormwater or flood flows. These requirements and additional measures will be addressed in the Program EIR, as relevant. For additional discussion of water quality impacts associated with erosion, please see the Hydrology and Water Quality section of this initial study.

- c-d) The project could result in the construction of AD facilities in locations where unstable geologic units or unstable soils may be present, including expansive soils. General measures may be applied in the Program EIR in order to underscore local, state, and federal requirements for the construction of facilities on potentially unstable geologic units or soils, or on expansive soils. These measures include, but are not limited to, compliance with relevant building codes and geologic investigations, as discussed previously.
- e) The process wastewater produced by the AD facilities would not be discharged into a septic tank or sewer system. However, for larger/centralized AD facilities located in remote areas, as relevant, septic systems may be required for the treatment of sanitary wastewater flows generated by on-site employees. The ability of soils to support a septic system is highly variable, and requires assessment of conditions at specific installation sites. The Program EIR will implement measures to ensure compliance with relevant state and local codes regarding the engineering and installation of septic systems for sanitary wastewater treatment.

Hazards and Hazardous Materials

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
7. HAZARDS AND HAZARDOUS MATERIALS				
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) During construction, hazardous materials may be transported, used, and disposed. All hazardous material transport and use should be performed consistent with standard best management practices that may be identified in the Program EIR and in accordance with state and Federal law.

Operation of dairy digester facilities would require the routine handling of gases that can be hazardous. Methane, in particular, can be hazardous due to its flammability and properties as an asphyxiate capable of reducing oxygen to dangerously low levels in the body. The United States Department of Transportation, Office of Pipeline Safety, regulates the safety of gas transmission pipelines. All gas pipeline projects delivering gas through a distribution system must be designed and constructed to meet or exceed the Federal safety standards established in 49 Code of Federal Regulations Part 192. These regulations include specific

- standards for material selections and qualification, protection from corrosion, and worker training, safety, and qualifications. Adhering to these guidelines and requirements will ensure that no significant hazards will be created to the public or the environment through the routine transport of compressed gas. This issue will be addressed in the Program EIR.
- b) As indicated above, all material transport and use would be consistent with standard industry best management practices. Additional construction-related potential for upset of hazards includes the disturbance of a known or unknown contaminated site, contaminated agricultural soils, or underground storage tank. This issue will be addressed in the Program EIR. Mitigation to be incorporated into the project shall be further defined in the Program EIR, and will include preparation of a stormwater pollution prevention plan and hazardous material management and spill response plan.
 - c) The potential conflicts with locating a dairy digester facility within 1/4 –mile of an existing or proposed school will be addressed in the Program EIR and appropriate provisions to be incorporated into general WDRs and/or a waiver will be analyzed.
 - d) A search of readily available government databases shall be conducted at the project level to determine if proposed dairy digester facilities would be located on a hazardous materials site at the project level. This issue will be addressed in the Program EIR and appropriate provisions for submission of relevant information under general WDRs and/or waiver will be considered.
 - e, f) If a dairy digester were near an airport or private airstrip, airport or airstrip activity would be unlikely to pose an adverse safety hazard for workers at AD facilities. Any potential safety hazards from airport or airstrip operations would be easy to recognize and avoid during the facility siting process. This issue will not be further discussed in the Program EIR.
 - g) The potential of dairy digester facilities to interfere with emergency response plans would be discussed in the Program EIR. Concurrence with local emergency response plans should be reviewed prior to implementation of project construction. This issue will be addressed in the Program EIR.
 - h) The production and concentration of gases increases the risk of fire. This risk would be further evaluated in the Program EIR. Several factors, including the proximity of wildlands to the project site, would be analyzed to determine the significance of this impact at the project level. This issue will be addressed in the Program EIR.
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Hydrology and Water Quality

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
8. HYDROLOGY AND WATER QUALITY— Would the project:				
a) Violate any water quality standards or waste discharge requirements?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river, or by other means, in a manner that would result in substantial erosion or siltation on- or off-site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river or, by other means, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Otherwise substantially degrade water quality?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other authoritative flood hazard delineation map?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) Specific water quality constituents can be reduced (but not eliminated) by the AD process including pathogens and constituents causing odor. Additionally, nutrient concentrations can be reduced via diversion to a solid product stream, for re-use, under some AD setups.

However, substantial potential water quality effects may still occur, especially from the addition of a variety of co-digestion substrates. Of significant concern is salt loading associated with the AD process. Salts that occur in the AD feedstock, including dairy wastes

as well as other potential supplementary feedstocks, could be concentrated in the effluent water. These salts would be discharged to land and could result in degradation of groundwater quality. Salt is already a significant problem in much of the project area, including most Central Valley areas south of the Delta. Additional salt loading that may occur as a result of operation of the AD facilities could result in a potentially significant impact to water quality.

Water from the AD process would be land-applied in support of agriculture, and would in most cases contain high levels of nutrients. If improperly managed, the land application of process water could result in the discharge of water containing nutrients, salts, pathogens, and other water quality constituents to nearby waterways, or to groundwater. Downstream surface water quality, and groundwater quality, could thereby be adversely affected. Co-digestion of dairy wastes with other feedstocks may also introduce other water quality constituents of concern to the discharged wastewater, including increased salt loads, and pre-processing of wastes may require the use of hazardous chemicals, or other procedures that could result in the release of water pollutants to the environment. These issues may be significant, and will be explored in greater detail in the Program EIR.

Most AD facilities would produce solid waste streams, as well as the liquid waste discussed above. These solid waste streams would be composed of solid digestate leftover from the AD process. Solid digestate could in most cases be put to beneficial use, however, depending on that use and the composition of the solid digestate, water quality constituents could be leached from the digestate and become entrained in natural waters. This situation could potentially result in water quality degradation.

If improperly managed, feedstock handling procedures at the digester site could result in the release of untreated dairy wastes (including associated pathogens and other water quality constituents) to receiving waters during rain events. These potential releases would in general be considered mitigable, based on the application of specific measures including sealing of the AD process system, and drainage and seepage control measures.

Various other potential water quality issues could also arise as a result of implementing the project. These include: (1) construction-related release of fuels, sediments, grease, and other construction related water quality pollutants; (2) during operations, treatment chemicals or other hazardous materials may be spilled on site and could migrate into surface or groundwater if improperly managed; and (3) impervious surfaces that would be installed, especially for larger centralized plants, (parking lots, sidewalks, plant facilities, etc) could result in the collection of water quality pollutants (brake dust, oil and fuels from automobiles, dirt, trash) and subsequent discharge of those pollutants to surface waters during storm events. These potential water quality impacts are generally considered mitigable, but will require further analysis within the Program EIR.

- b) Under specific circumstances, installation of dairy facilities may result in the withdrawal of groundwater, resulting in increased drawdown within the underlying aquifer. It is not

expected that this would result in a significant net increase in groundwater depletion because any new water would offset groundwater that would otherwise be pumped for the crops.

Groundwater depletion can also occur as a result of construction of extensive impervious surfaces, which prevent the infiltration of groundwater to the underlying aquifer. The proposed AD facilities would include the construction of some impervious surfaces, associated with roads and other facilities. However, these impervious surfaces would not be extensive, and are not anticipated to substantially interfere with groundwater recharge. Groundwater supply will not be further evaluated in the Program EIR.

- c,d) Earthwork would consist of cutting and/or filling to produce gradients specific to each individual AD project. If improperly managed, grading activities could result in the entrainment of sediment in stormwater flows, resulting in erosion or siltation on-site or off-site. Improperly managed grading could also result in changes in the amount of stormwater discharged from a facility area, resulting in flooding on-site or downstream. During operations, improperly designed or sized stormwater conveyance systems could result in further erosion, sedimentation, and flooding. These potential impacts are common among most construction projects where grading would occur, and would be generally considered mitigable based on the application of Best Management Practices (BMPs) to control erosion, sedimentation, and stormwater management, and in compliance with state and local permitting requirements for stormwater discharges.

In general, AD projects are anticipated to be sited to avoid interference with stream channels and other existing drainages. However, siting of specific facilities at the project level may result in interference with existing streams or drainages. The Program EIR will investigate measures that can be applied to reduce interference with existing streams and other drainages. These issues will be explored in greater detail in the Program EIR.

- e) As discussed previously, installation of AD facilities may result in new impervious surfaces, which can cause increases in stormwater runoff. It is expected that stormwater runoff from individual AD facilities would be channeled into retention basins (lagoons) for flood mitigation, and/or for water quality treatment. The Program EIR will review these potential issues, as well as relevant and applicable mitigation to reduce the intensity of potential impacts related to stormwater flows.
- f) Potential water quality issues are discussed under impact a), above. Note also that at the project level, completion or update of Nutrient Management Plans would be required prior to application of effluent waters to croplands. The discharger would have to comply with the Standard Provisions and Reporting Requirements for Waste Discharge Requirements General Order No. R5-2007-0035 for Existing Milk Cow Dairies dated May 3, 2007 or individual Waste Discharge Requirements. These requirements, and associated water quality, would be further discussed in the Program EIR.

- g) The proposed project would not include any housing and therefore would not place any housing in a 100-year flood hazard area. This issue will not be further evaluated in the Program EIR.
 - h) Substantial portions of the project area are located in a 100-year floodplain hazard area. Installation of specific AD facilities may therefore occur within 100-year floodplain hazard areas. The installation of these facilities could, in the event of a flood event, result in the alteration or displacement of flood flows. Mitigation measures for facilities located within a 100-year floodplain hazard area will be further discussed in the Program EIR.
 - i) Levees and dams are relatively common in the project area, and it is likely that some individual AD facilities would be sited in areas where the collapse of a dam or levee would result in a flooding hazard. These issues will be further discussed in the Program EIR.
 - j) The potential for tsunami in the Central Valley is low. The potential for seiche and mudflow throughout most of the Central Valley is low. These issues will not be further discussed in the Program EIR.
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Land Use and Land Use Planning

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
9. LAND USE AND LAND USE PLANNING— Would the project:				
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) Dairy digester facilities do not present a significant threat of physically dividing an established community. Sites for the facilities would be fully contained within dairies or on specified parcels of land. If required, pipelines would be underground and would not divide communities except temporarily during construction periods. This impact would be less than significant and this issue will not be further evaluated in the Program EIR.

- b) At the project level, dairy digester facilities would be designed to be consistent with applicable land use plans, policies, and regulations. In general, the facilities would be located on sites zoned for agriculture. Under this scenario, dairy manure management is an integral part of the agricultural use of the land and would not result in a significant land use conflicts. Central facilities may be located on either agricultural or industrially zoned lands. At the program level, this impact is generally considered less than significant, however to comprehensively evaluate various land use and planning circumstances throughout the project area jurisdictions, this issue will be evaluated in the Program EIR.

- c) Major adopted plans in the CVWB’s jurisdictional area include the San Joaquin Multi-species Habitat Conservation and Open Space Plan, Natomas Basin HCP, Kern Water Bank Authority HCP/NCCP and East Contra Costa County HCP. The continuation and expansion of agricultural facilities is provided for in most HCPs. Centralized facilities may trigger the need for compliance measures, including site-specific surveys and payment of fees under adopted plans but would not create any substantial conflict. This impact will be less than significant and this issue will not be further evaluated in the Program EIR.

Mineral Resources

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
10. MINERAL RESOURCES—Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

- a, b) Dairy digester facilities would not be of significant size to prohibit recovery of known mineral resources of value to the region or state. Due to the availability of agricultural land and extent of dairy operations which avoid designated mineral resource areas, the project would not be expected to result in the loss of specific recovery sites. Less than significant impacts are anticipated in this regard and this issue will not be discussed in the Program EIR.

Noise

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
11. NOISE—Would the project:				
a) Result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) Construction and operation of dairy digesters would have the potential to expose noise-sensitive receptors in the vicinity of these AD facilities to noise levels in excess of the applicable standards. Noise levels associated with construction activities would generally be higher than the ambient noise levels. Noise may be generated by the transport of materials and construction personnel to the facility sites and/or construction activities at the site. This impact is potentially significant. The Program EIR will set forth best management practices, including limits on the hours of construction operations that would reduce the potential significance of this impact.

The project would result in the 24 hour/day operation of AD facilities. Additional noise sources and levels would depend on several factors, such as proximity to noise-sensitive receptors, type of facility (i.e., AD facilities on individual dairies versus centralized locations), and the increased truck traffic on the local roadway network (including haul trucks for co-digester facilities and for potential manure, digestate or biogas transport to centralized facilities). Further discussion of potential impacts on noise-sensitive receptors and mitigations to reduce impacts will be analyzed in the Program EIR.

- b) Site preparation and construction may result in ground borne vibration associated with earth movement and similar activities. Although these temporary activities may cause perceptible

- ground borne vibration, such impacts are anticipated to be minimal and limited to the project site. Operation of the project would not involve any activity that would produce any substantial groundborne noise or vibration. This issue will not be further evaluated in the Program EIR.
- c) As discussed under issue “a” above, permanent increases in ambient noise levels from dairy digester operations will be analyzed in the Program EIR.
 - d) As discussed under issue “a” above, temporary increases in ambient noise levels from dairy digester construction will be analyzed in the Program EIR.
 - e, f) Even if a dairy digester were near an airport or private airstrip, the noise from the aircraft activities would be unlikely to expose people at the AD facility to excessive noise levels. Dairy digester facilities would not be considered sensitive receptors with regard to noise generated by off-site activities. Any potential impact from aircraft noise would be easy to recognize and avoid during the facility siting process. This issue will not be further discussed in the Program EIR.
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Population and Housing

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
12. POPULATION AND HOUSING— Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Displace substantial numbers of existing housing units, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) Dairy digester operation would create a small number of jobs throughout the Central Valley region; however, this increase would not be considered substantial. The project does not involve the construction of features (i.e. roads, residences) that would induce population growth. Biogas generated by the AD facilities would provide for an existing need for renewable energy and is not proposed to be used for new off-site developments. Therefore, less than significant impacts would occur and this issue will not be further evaluated in the Program EIR.
- b) Dairy digester facilities would not displace residences, as they would be located on, or in the vicinity of dairies. No significant impacts to existing housing would occur and this issue will not be further evaluated in the Program EIR.
- c) Dairy digester facilities would be located on dairies, or in the immediate vicinity of dairies, and would not displace people. No significant impact would occur and this issue will not be further evaluated in the Program EIR.

Public Services

<u>Issues (and Supporting Information Sources):</u>	<u>Potentially Significant Impact</u>	<u>Less Than Significant with Mitigation Incorporation</u>	<u>Less Than Significant Impact</u>	<u>No Impact</u>
13. PUBLIC SERVICES— Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
i) Fire protection?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii) Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iii) Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iv) Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
v) Other public facilities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a.i) The dairy digester and support facilities would be designed to meet the standards of the 2007 California Fire Code. All gas pipeline projects delivering gas through a distribution system must be designed and constructed to meet or exceed the Federal safety standards established in 49 Code of Federal Regulations Part 192. Installation of any pipelines in accordance with these standards would reduce the potential for fire. However, because the dairy digesters would result in the accumulation of methane and other gases that are flammable, this issue will be analyzed in the Program EIR.
- a.ii) Installation of dairy digester facilities would not change the amount of police protection required at dairies. No impact would occur and this issue will not be further evaluated in the Program EIR.
- a.iii) Dairy digester facilities would not include any new housing and would not generate any new students. Therefore, the proposed project would have no effect on schools and this issue will not be further evaluated in the Program EIR.
- a.iv) Dairy digester facilities would not include any new housing and would not generate any new users of public parks. Therefore, the proposed project would have no effect on parks and this issue will not be further evaluated in the Program EIR.
- a.v) The Program EIR will evaluate options for new dairy digester facilities to connect to or add to the existing natural gas infrastructure network.

Recreation

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
14. RECREATION— Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

- a, b) Dairy digester facilities would not induce population growth and thus would not increase use or demand for recreational facilities. The project description does not include recreational facilities. Considering these factors the project would have no impact on recreation. This issue will not be addressed in the Program EIR.

Transportation and Traffic

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
15. TRANSPORTATION AND TRAFFIC— Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location, that results in substantial safety risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

a, b) Dairy digester construction would generally result in the temporary addition of construction-related vehicle trips, including employee commuter trips and the delivery of construction materials and equipment. The existing circulation system in the Central Valley is generally not overburdened and capable of handling additional traffic volumes. As such, construction traffic generated by AD facilities would generally be considered negligible, and would not conflict with applicable plans, ordinances, policies, or programs.

AD facilities could add potential truck trips to haul organic materials to co-digester facilities and/or manure to dairies or central facility locations. In addition, AD facilities could result in increased employee traffic. The increase in traffic associated with AD facilities could conflict with applicable plans, ordinances, policies, or programs, and result in a potentially significant impact to existing roadways. Detail on the expected two-way vehicle trips generated for each of the proposed AD facility types will be analyzed in the Program EIR.

c) Air traffic patterns generally would not be affected by the installation of AD facilities. No impact would occur. This will not be further analyzed in the Program EIR.

- d) Installation of AD facilities would not alter, or substantially change the type of equipment utilizing, existing roadways. Where employed pipelines would likely occur within road rights of way. Construction in the Caltrans right of way would require an encroachment permit. No increase in hazards due to a design feature or incompatible use would occur. This will not be further analyzed in the Program EIR.
 - e) Due to the relatively small footprint of AD facilities in comparison to the size of the dairies, it is not anticipated that development of AD facilities would affect emergency vehicle access. This issue will not be analyzed in the Program EIR.
 - f) AD facilities would not affect or alter existing alternative transportation facilities, nor interfere with the construction of any future alternative transportation facilities. This will not be further analyzed in the Program EIR.
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Utilities and Service Systems

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
16. UTILITIES AND SERVICE SYSTEMS—				
Would the project:				
a) Conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Require or result in the construction of new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Require new or expanded water supply resources or entitlements?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Result in a determination by the wastewater treatment provider that would serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g) Comply with federal, state, and local statutes and regulations related to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Discussion

- a) The project would result in modification of the existing wastewater discharge systems at dairies or centralized facilities. Effluent from the digestion process would require storage and disposal through land application. As discussed above for Hydrology and Water Quality, this impact will be discussed in the Program EIR. The dairies would be required to control the amount of nutrients applied to land.
- b, d) The construction of dairy digesters could create the need for new or expanded water and wastewater facilities at dairies and at centralized facilities. The majority of dairies utilize private water and wastewater systems which may need to be expanded. The Program EIR will address any additional water/wastewater demands created by the project.
- c) Dairy digester facilities would create a demand for new or expanded stormwater drainage facilities. Runoff would be channeled to on-site ponds which may need to be resized to accommodate increased impervious surfaces from the project. The Program EIR will address the additional stormwater facilities created by the project and provide applicable best management practices.

- e) The dairy digester facilities could create liquid waste streams which could require treatment by public wastewater treatment systems. The Program EIR will address whether public wastewater providers would be utilized and to what extent.
 - f) The dairy digesters and central facilities would not be expected to generate substantial amounts of solid waste that would be disposed of at landfills. This will not be further evaluated in the Program EIR.
 - g) The project would comply with federal, state, and local statutes and regulations related to solid waste. No impact would occur; this issue will not be discussed in the Program EIR.
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Mandatory Findings of Significance

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
17. MANDATORY FINDINGS OF SIGNIFICANCE—				
Would the project:				
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Have impacts that would be individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Discussion

- a) AD facilities would be constructed on dairies or on other centrally located parcels. There is a potential for the project, without mitigation, to adversely affect biological and cultural resources, including fish and wildlife species, natural habitat, and significant cultural resources. These issues will be addressed in the Program EIR.
- b) There is a potential for the project to result in effects on the environment that would be cumulatively considerable, such as air quality impacts. Cumulative impacts will be addressed by issue area in the Program EIR.
- c) As discussed above in the Hazards and Hazardous Materials section, there is a potential for hazardous impacts that could affect humans. Air pollutant emissions from AD facilities could also have a substantial adverse effect on humans. These issues will be addressed in the Program EIR.

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