



**CITY OF MODESTO  
SUTTER AVENUE PRIMARY TREATMENT  
FACILITIES LAYOUT PLAN**

**TECHNICAL MEMORANDUM  
FACILITY LAYOUT PLAN**

**FINAL**  
January 2013

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## 1.0 INTRODUCTION

The future of the Sutter Avenue plant will depend on many complex and interrelated factors. Since the last master plan for the Sutter Avenue Primary Treatment Facilities (Sutter Plant) (prepared by Carollo Engineers in 2007), new issues have arisen that will affect how the facility will be used in the future. In addition, unresolved challenges, which had been deferred for future consideration, will be addressed. The Facility Layout Plan will serve as a guide for the near-term and future use of the Sutter Avenue site.

The current plant site is shown in Figures 1-1 and 1-2. The treatment facilities at Sutter Avenue include influent pumping, screening, grit removal and primary clarification. Biosolids removed by the primary clarifiers are digested in anaerobic digesters. Digested biosolids are dried in the City's sludge drying beds shown in Figure 1-1. Primary effluent from the Sutter Plant is pumped through the City's 60-inch outfall pipeline some six miles to the Jennings Road secondary/tertiary treatment facilities (Jennings Plant). The Jennings Plant is located next to the San Joaquin River, near Patterson. Treated effluent is currently discharged to the river seasonally and to the City's 2,500 acres of ranch land. The ranch land is also used once per year for land application of dried and digested biosolids that are trucked from the Sutter Plant. When the tertiary facilities currently under construction are complete, the City will be able to discharge up to 14.9 million gallons per day (mgd) of tertiary treated effluent to the San Joaquin River, year round.

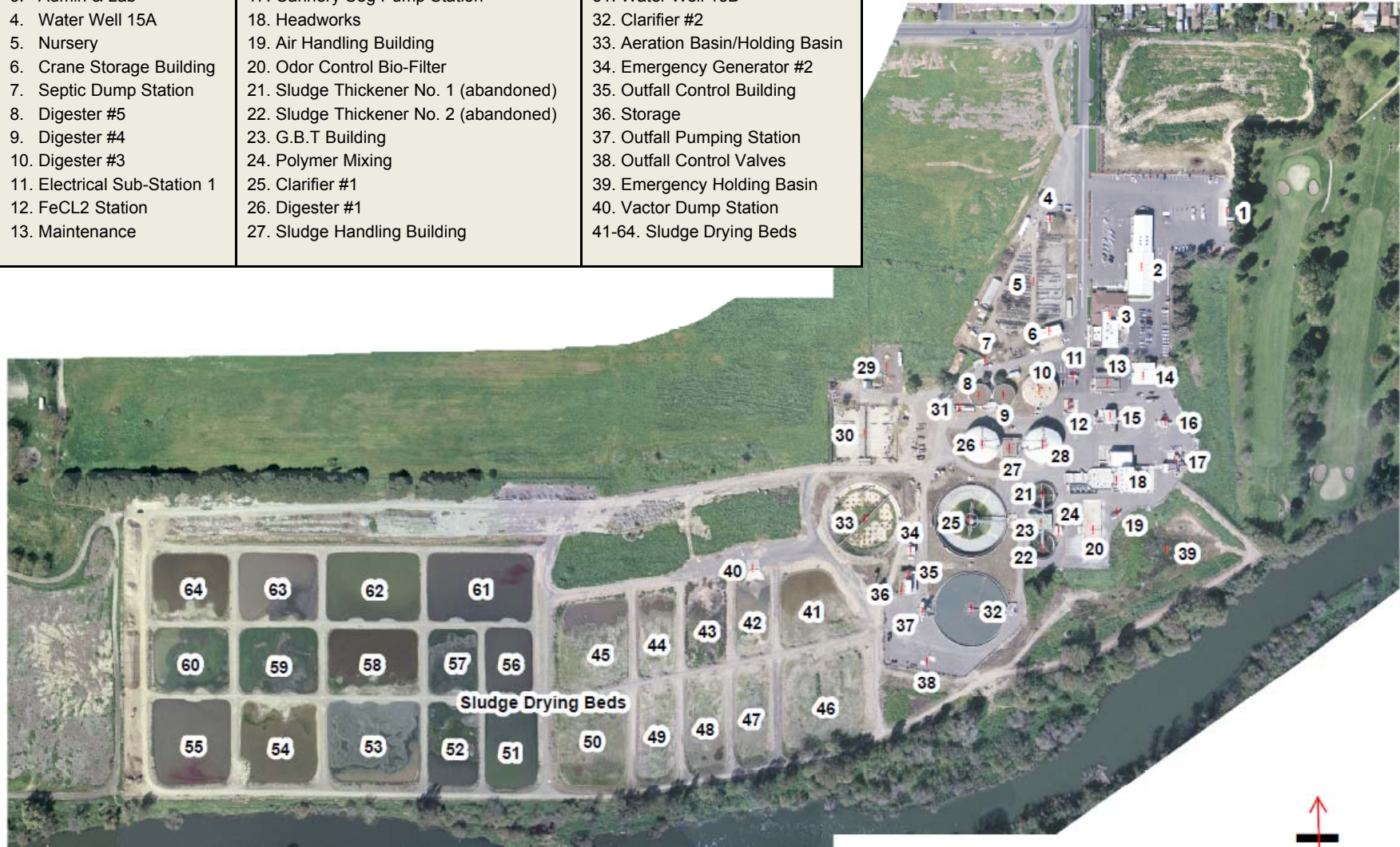
The technical memorandum (TM) will address the following issues:

1. **Fate of Abandoned Structures (for example, aeration basins, and sludge thickener tanks).** What structures should be removed? What is the best use of the new space left after removing the existing structures?
2. **Integrating land use with Tuolumne River Regional Park (TRRP).** The Sutter plant site is adjacent to the future TRRP. The TRRP site is on higher ground than most of the Sutter Plant site, although it is still mainly in the flood plain. There may be some advantages of exchanging property with TRRP to relocate Sutter facilities to higher elevations. Land use compatibility for the Sutter Plant and the future TRRP also needs to be assessed.
3. **Impacts on nearby residences.** Environmental impacts, such as odors, noise, dust and traffic are important considerations for the development of the Facility Layout Plan.

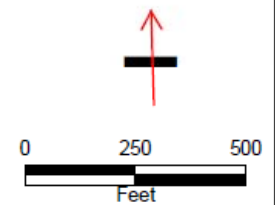
**Legend**

- |                              |  |                                  |
|------------------------------|--|----------------------------------|
| 1. Collection Storage Yard   | 14. Maintenance                        | 28. Digester #2                  |
| 2. Collection & Electrical   | 15. Emergency Generator #1             | 29. Collection Storage Yard      |
| 3. Admin & Lab               | 16. Electrical Sub-Station 2           | 30. Storage Yard                 |
| 4. Water Well 15A            | 17. Cannery Seg Pump Station           | 31. Water Well 15B               |
| 5. Nursery                   | 18. Headworks                          | 32. Clarifier #2                 |
| 6. Crane Storage Building    | 19. Air Handling Building              | 33. Aeration Basin/Holding Basin |
| 7. Septic Dump Station       | 20. Odor Control Bio-Filter            | 34. Emergency Generator #2       |
| 8. Digester #5               | 21. Sludge Thickener No. 1 (abandoned) | 35. Outfall Control Building     |
| 9. Digester #4               | 22. Sludge Thickener No. 2 (abandoned) | 36. Storage                      |
| 10. Digester #3              | 23. G.B.T Building                     | 37. Outfall Pumping Station      |
| 11. Electrical Sub-Station 1 | 24. Polymer Mixing                     | 38. Outfall Control Valves       |
| 12. FeCL2 Station            | 25. Clarifier #1                       | 39. Emergency Holding Basin      |
| 13. Maintenance              | 26. Digester #1                        | 40. Vactor Dump Station          |
|                              | 27. Sludge Handling Building           | 41-64. Sludge Drying Beds        |

## City of Modesto Primary Treatment Plant



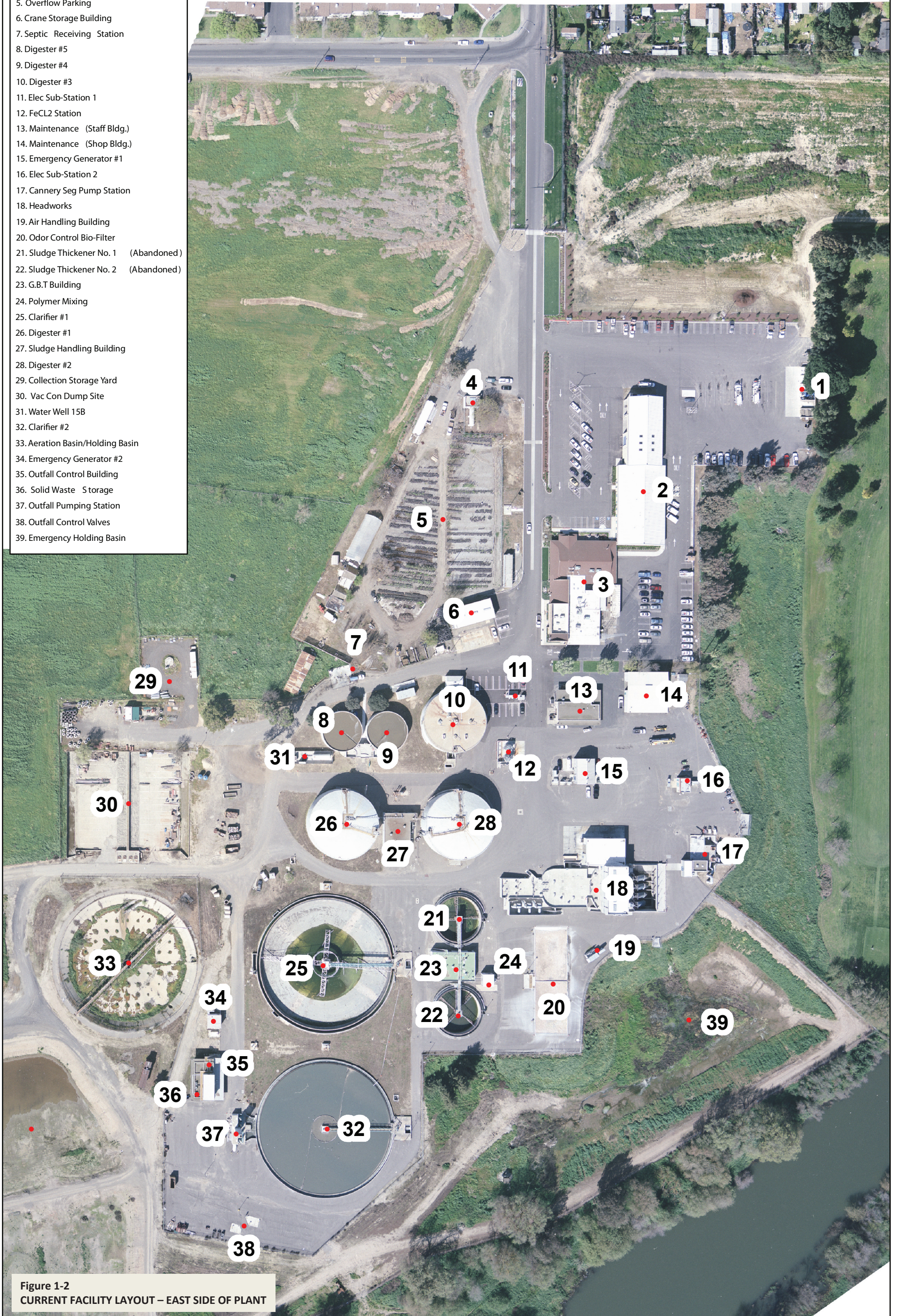
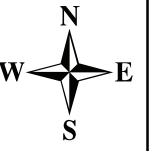
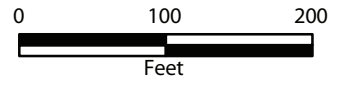
**Figure 1-1  
OVERALL CURRENT FACILITIES LAYOUT**



**Legend**

- 1. Collection Storage Yard
- 2. Collection & Electrical
- 3. Admin & Lab
- 4. Water Well 15A
- 5. Overflow Parking
- 6. Crane Storage Building
- 7. Septic Receiving Station
- 8. Digester #5
- 9. Digester #4
- 10. Digester #3
- 11. Elec Sub-Station 1
- 12. FeCL2 Station
- 13. Maintenance (Staff Bldg.)
- 14. Maintenance (Shop Bldg.)
- 15. Emergency Generator #1
- 16. Elec Sub-Station 2
- 17. Cannery Seg Pump Station
- 18. Headworks
- 19. Air Handling Building
- 20. Odor Control Bio-Filter
- 21. Sludge Thickener No. 1 (Abandoned)
- 22. Sludge Thickener No. 2 (Abandoned)
- 23. G.B.T Building
- 24. Polymer Mixing
- 25. Clarifier #1
- 26. Digester #1
- 27. Sludge Handling Building
- 28. Digester #2
- 29. Collection Storage Yard
- 30. Vac Con Dump Site
- 31. Water Well 15B
- 32. Clarifier #2
- 33. Aeration Basin/Holding Basin
- 34. Emergency Generator #2
- 35. Outfall Control Building
- 36. Solid Waste Storage
- 37. Outfall Pumping Station
- 38. Outfall Control Valves
- 39. Emergency Holding Basin

# City of Modesto Primary Treatment Plant



**Figure 1-2  
CURRENT FACILITY LAYOUT – EAST SIDE OF PLANT**

6. **New anaerobic digesters and control building.** The City completed a preliminary design for new digesters at the Sutter Plant. Implementation of the digester project is currently on hold. What is the best location for the new digesters (see item 11, below)?
7. **Gravity Belt Thickener (GBT).** The GBT is essentially new and it could be utilized for thickening primary sludge to increase the capacity of the solids processes. However, the GBT room is cramped, and it has inadequate ventilation and no odor control. Can the ventilation be improved enough to make use of the GBT, or should it be removed and used for other purposes? Is the GBT needed for the long term use of the Sutter Plant? If the GBT were removed, what is the best use of the building afterwards?
8. **Use of existing buildings.** There are several buildings on the site that no longer serve their original purpose. A coordinated plan should be developed to designate a formal purpose for each building, and the needs for rehabilitation should be assessed. Alternatively, the activities currently taking place in these buildings could be consolidated into a new single structure for improved efficiency.
9. **Aging treatment units (primary clarifiers, digesters, effluent pump station).** An important decision needs to be made whether to keep and upgrade these facilities or replace them. In the 2007 master plan, it was recommended to replace the primary effluent pump station to provide higher pumping capacity to convey peak wet weather flows. The pump station would be constructed above the flood plain elevation. It was also recommended to construct a berm around the clarifiers for flood protection. The clarifiers are nearly 60 years old, and the channels that feed the effluent pump station are open, which exposes them to flooding. In addition, the clarifiers may require costly rehabilitation. Would it be more cost effective to construct new clarifiers at a higher elevation, so that a berm would not be needed? With this approach, the City would have the benefit of new clarifiers that would be adequately protected from flooding without the need for a flood berm.
10. **Flood Protection.** The Sutter Plant site is located within the 100-year flood plain. Flooding is a concern, as demonstrated by two major floods in the last 55 years: in 1957 and in 1997. The 1997 flood inundated the site, forced the staff to abandon the plant, and shut it down for several days. The 2007 master plan identified the need for a flood control berm and floodwall. However, owing to the uncertainties of the scope of the flood control measures, and recognizing that further study would be required, the costs for this approach are not well-defined. The critical issue is whether to construct the floodwalls, reconstruct critical treatment units at elevations above flood levels (primary clarifiers and effluent pump station), or a combination of the two. A floodwall system may be required in any case, because structures like the administration building and the digesters, which are not as critical, would still be at risk. A study will be needed to assess if the floodwall would significantly impede flow and cause upstream river levels to rise more than current estimates. Lastly, whether a floodwall or berm system is feasible is questionable because during a major flood the

influent main trunk sewers will be inundated, causing wastewater to overflow from the manholes within the protected side of the flood protection walls.

11. **Relocation of Primary Treatment Facilities to Jennings Plant.** A more global approach to addressing the Sutter Plant challenges would be to decommission the primary treatment and solids treatment facilities at the Sutter Plant and construct new primary treatment and solids facilities at the Jennings Plant. The chief advantages of moving the primary facilities to the Jennings Plant are that the Jennings Plant would be above the flood plain and, according to preliminary estimates, new primary treatment facilities at the Jennings site could be constructed for about the same capital cost as upgrading the current primary facilities at the Sutter Plant. There are other advantages and disadvantages that will be addressed in this technical memorandum.
12. **Future Facilities.** The Sutter Plant site could be used for future facilities, such as a recycled water facility, or additional treatment units to process increased flow from regionalization of nearby communities. This memorandum addresses the need to reserve space for future facilities.
13. **Biosolids Management.** Currently, digested solids are sent to the drying beds for dewatering and solar drying. Once a year the dried solids are removed from the beds and applied to the City's ranch land at the Jennings Plant site. The drying beds are vulnerable to flooding because they lie within the flood way and flood plain (see definition in Section 2.1.2). The 2007 master plan considered construction of earthen berms surrounding the drying beds. Would it be more cost effective to convert to a mechanical dewatering system constructed above flood levels? If so, what are the effects of hauling solids more frequently through the residential areas? Lastly, would it be more efficient to construct new primary facilities and digesters at the Jennings Road site where the solids could be dried and land applied without the need for hauling? In addition, future biosolids regulations could force the need to compost biosolids. Having the solids proceed through all the stages of processing would be more efficient if contained on one site. The city has a compost facility at the Jennings Plant. A new compost facility, as part of the Phase 2 BNR/Tertiary Facilities Project, is under construction.
14. **Future Cogeneration System.** Carollo assisted the City in assessing the potential for adding a fuel cell system at the Sutter Avenue plant in partnership with Modesto Irrigation District (MID). However, MID decided against the project. In the future, the economics and government subsidies may favor construction of a power generation system, whether a fuel cell, engine generator, solar, or other power generation system. Space should be planned for a future power generation system, either at the Sutter Plant or the Jennings Plant.
15. **Plant Water System.** The City must use non-potable well water for in-plant uses, such as wash down, foam control sprays for the secondary digesters 4 and 5, and water seals for pumps. Because the Sutter Plant treatment levels are limited to primary treatment, the plant effluent would be unsuitable for these uses. Potential

sources of plant water could include utilizing the current non-potable well, adding a packaged tertiary plant to produce high quality plant water, or adding a potable water system connection as a backup to the non-potable system. An air gap tank would be required to prevent cross-contamination.

16. **Joint Use of the Facilities, Parking, Access/Traffic Circulation, and Site Security.** A coordinated plan is be required to incorporate use of the site by several City departments. Site security also needs to be assessed. The current uncontrolled access to the site by vendors and haulers needs to be monitored and controlled by a card reader system.
17. **Storm water management** The storm water management system will be assessed to determine if upgrades are required and to accommodate the future grading of the Sutter Plant site.
18. **Emergency Response Plan** The most recent emergency response plan for the Sutter Plant is contained in Appendix D of the “Risk Management Plan” completed by BASE Associates in 1998. A cursory review of the plan was performed to determine where updates are required for the current and future facilities at the site.

## **2.0 SUTTER PLANT SITE SETTING AND CONSTRAINTS**

### **2.1 Plant Boundaries**

The Sutter Plant is located adjacent to the Tuolumne River at the south end of Sutter Avenue. The site is constrained on all four sides: residential neighbors and the future TRRP to the north, the Modesto Municipal Golf Course to the east, the future TRRP to the west, and the Tuolumne River to the south. The property boundaries, located by NorthStar Engineering, are shown on Figure 2-1. The eastern property boundary of the plant is actually located further east than the current fence line on the golf course. To the north, some of the residences have encroached on City property. Formal lot line adjustments are recommended to resolve these apparent conflicts.

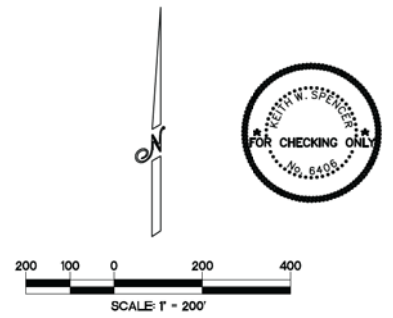
#### **2.1.1 Plant History**

Prior to the 1940s, most of the Sutter Plant site was a municipal landfill. Most of the landfill material has been removed from the area beneath the current treatment facilities. However, the land west of the plant, extending from the sludge drying beds to Carpenter Road, still contains landfill material that has been capped with fill.

A detailed account of the history of the Sutter Plant is provided in Appendix A. The first wastewater facilities, constructed in 1910, consisted of a septic tank and outfall to the Tuolumne River. The first primary clarifier was added in 1930, followed by a biofilter for secondary treatment in 1937. Over the period from 1947 to 1962, the City added biosolids treatment (anaerobic digesters and sludge drying beds) and additional secondary treatment. The current two large primary clarifiers were added in the 1950s. Upgrades to



**Figure 2-1  
PROPERTY BOUNDARIES**



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Engineering Group, Inc.  
CIVIL ENGINEERING • SURVEYING • PLANNING  
909 14th Street, Modesto, CA 95354  
(209) 524-3525 Phone (209) 524-3526 Fax

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SCALE	1" = 200'
DR. BY	kws
FILE:	field

the digesters and primary treatment were made in the 1960s. Sludge drying beds were constructed in 1960s as well. From 1946 to 1968, treated effluent from the plant was discharged to the Tuolumne River. In 1968, new secondary treatment facilities were constructed at the Jennings Road location, and the discharge point was changed from the Tuolumne River to the San Joaquin River.

A dissolved air flotation thickening (DAFT) system was added at the Sutter Plant in 1985. The DAFT system was added to allow thickening of primary sludge during canning season when high flows overloaded the primary clarifiers and thinned the primary sludge, which in turn, overloaded the anaerobic digesters. In 1997, the City instituted the cannery segregation program (commonly referred to as “Can Seg”). During the annual canning season (normally from June through September) the cannery processing byproducts are conveyed by a dedicated pipeline to the Jennings Plant. There, the materials are applied to the some 2,500 acres of ranch land. With the Can Seg program now in place, the impacts to the primary clarifiers during canning season are minimal. Thus, the need for the DAFTs became less of a priority and the City mothballed the DAFTs soon after the Can Seg program began. However, in 2003 the City installed a gravity belt thickener (GBT) in the DAFT control building to replace the abandoned DAFTs. The GBT was added to restore the ability to thicken primary sludge in case the Can Seg land application operation was interrupted.

The last major upgrade to the Sutter Plant was a new headworks structure, completed in 1999. The headworks structure includes new screw-type lift pumps, climber-type bar screens, a vortex grit removal system, and flow measurement (Parshall flumes). The headworks were constructed at an elevation above the flood plain, although road access to the structures is still vulnerable to flooding and would be cut off in a major flood.

### **2.1.2 Flood Vulnerability at the Sutter Plant**

Two floods from the Tuolumne River have occurred at the Sutter Plant. The first occurred in 1957. Historical records of the extent of the flooding in that year were not available. The second flood in 1997 inundated the entire site (Figures 2-2 and 2-3). Electrical conduits and all major electrical equipment were inundated in the flood. All of the incoming wastewater was diverted to Pump Station 3 (the Can Seg pump station), which pumped raw sewage to the Jennings Plant. Manholes upstream of the Sutter Plant surcharged and spouted wastewater several feet into the air. The plant was out of service for 10 days while repairs were being made. Most of the facilities were restored; however, some damage still remains.

Flood plain and flood way boundaries recently updated by the Federal Emergency Management Administration (FEMA) are shown in Figure 2-4. A copy of the FEMA map showing flood lines and site topography are provided in Figure 2.4. As shown, the entire Sutter Plant site is within the 100-year flood plain, and the southern half of the sludge drying beds and Primary Clarifier No. 2 are in a “regulatory flood way”. A Regulatory Floodway is defined by FEMA as “the channel of a river or other watercourse and the adjacent land

areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations.”



Figure 2-2 1997 Flood at the Sutter Plant

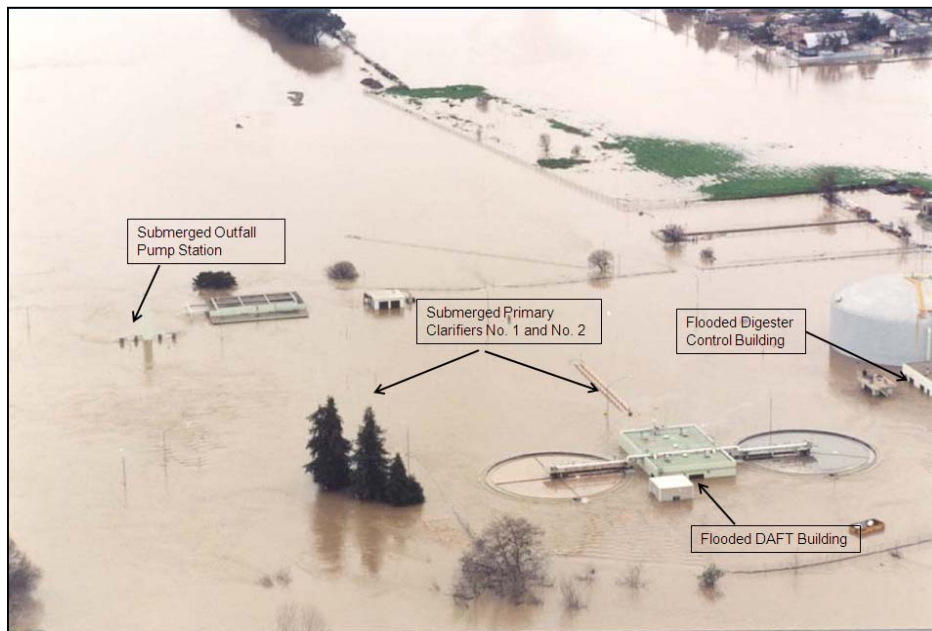


Figure 2-3 Submerged Structures in the 1997 Flood

(Note: Primaries are actually submerged and only a portion of the bridge of Clarifier No. 1 is visible. The two circular tanks shown in the picture are actually the DAFTs.)



Figure 2-4 Floodplain and Floodway Boundaries

In the context of the Sutter Plant, this indicates that new structures (“encroachments”) cannot be constructed in the floodway unless it can be demonstrated that structures would not cause upstream water surface elevations to increase during flooding. Examples of encroachments include activities or construction within the floodway, adding fill, new structures, substantial improvements, and other development. These activities are prohibited within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses that the proposed encroachment would not result in any increase in flood levels. The City is responsible for reviewing and maintaining records demonstrating that any permitted floodway encroachment meets National Flood Insurance Program (NFIP) requirements. A “no-rise certification” for floodways would be used to document these analyses.

Construction of a flood protection wall or berm in the floodway would be subject to the flood way restrictions. Per FEMA policy, “any project in a floodway must be reviewed to determine if the project will increase flood heights. An engineering analysis must be conducted before a permit can be issued.” From a regulatory standpoint, it may not be feasible to construct floodwalls or berms in the flood way. By definition, the flood protection structures would be in the floodway, and they would likely cause upstream river levels to rise above the current designated heights established by FEMA. Even if a permit could be obtained, constructing flood control structures could cause flooding of residence and structures up river.

In addition to the institutional challenges of constructing flood walls and berms, there are technical challenges. The walls and berms would need to be designed with cut-off walls to prevent the migration of water beneath the foundation, causing the soil to fluidize (commonly referred to as “quick” conditions). This would require deep cutoff walls constructed of clay or concrete. A detailed geotechnical study would be required to establish design criteria.

Further, storm water pumps would be required to remove the storm water trapped within the flood protection walls and berms. In summary, constructing flood protection walls within the floodway does not appear feasible. Constructing flood protection berms in the flood plain may be more achievable, depending on their location. Therefore, it is assumed that flood protection at the Sutter Plant would consist of earthen berms where feasible. In addition, some areas would be raised by adding fill, similar to the approach used for the headworks project. The earthen berms would stay follow the north boundaries of the floodway.

## **2.2 Plant Access Needs, Traffic Circulation, Vehicle Parking, and Site Security**

### **2.2.1 Access Requirements**

Access to the Sutter Plant is needed for the following uses:

1. Vacuum truck (Vac Con truck) unloading of waste materials removed from the sanitary collection system.
2. Haulers unloading septage (from septic tanks or portable toilets) at the septage receiving station.
3. Laboratory samples (potable water and wastewater) drop off from City and outside contractors.
4. Public visits.
5. Guest parking, visitors, including the general public, vendors, consultants and regulatory agencies.
6. City employee parking.
7. Delivery trucks for equipment, supplies, and chemicals.
8. Trash and waste materials pickup.
9. Interdepartmental uses including the Department of Parks and Recreation and the Police Department.

## **2.3 Recommended Plan for Access, Traffic Circulation, Parking and Security**

A new plan for access, in-plant traffic circulation, parking, and security control points is shown in Figure 2-5. Features of the new site plan include:

1. Signage and limited access for private septage haulers, City-owned Vac Con trucks and City interdepartmental drop offs of waste materials. The circulation routes will be controlled with a separate carded access gates and fencing.
2. A main access gate opened by key code for employees or remotely by the receptionist or the plant operator on duty at the operations center. A video surveillance system should be installed to monitor access to the main gate.
3. A designated haul route for trash pickup, chemical and equipment deliveries, controlled by signage. Access for these purposes will be through the main gate.
4. The following parking areas: (See appendix G for Parking Analysis)
  - a. A new covered employee parking lot with optional solar panel on the covers, located west of the administration building and collection system buildings.
  - b. A designated parking lot for management staff and visitors, located immediately west of the maintenance building.
  - c. A parking lot for maintenance vehicles
  - d. A parking lot for backhoes and dump trucks.
  - e. A designated parking lot for collections section and crew leaders.
  - f. A designated Vac Con parking area.

In addition, it is recommended that the main entrance road from Sutter Avenue be regraded to prevent heavy delivery trucks from bottoming out on the pavement.

## **2.4 Land Acquisition from TRRP**

The relationship between the TRRP land and the Sutter Plant site is illustrated in Figure 2-6, excerpted from the TRRP Master Plan. The City Public Works Department has been in discussion with TRRP to acquire the TRRP land west of the plant entrance road, from the current northern plant boundary to Robertson Road. The TRRP site is on higher ground and outside of the flood way, although portions of it are within the flood plain and subject to flooding. This is a possible location for sludge drying beds or other facilities to lessen the requirement for flood protection. Locating the future administration building in the northeast corner of the site may also be desirable. The area east of the entrance road could be used for storage or other uses. If the primary facilities are relocated to the Jennings Plant, additional land from TRRP would not be needed to accommodate the Sutter Plant. Even so, it may be desirable to exchange land along the riverfront so that TRRP would have access to the river trail and the riparian habitat. If this exchange was made, and the relocation of the primary facilities implemented, the land along the north boundary where the current sludge drying beds are located could be used for other purposes.

North

City Vac-Con Dumping

Tire, Battery and Light Bulb Storage

Dumping Bins

Covered Staff Parking with optional solar panels

Access Gate

Chem

Grit

trash

trash

Delivery and Public Parking

Manager parking

Maintenance Parking

Back Hoes, Dump Trucks

Collections Section, Crew Leaders

Vac-Con Parking

- Route For Trash Pick up, Water Delivery, Uniform Delivery, UPS et. al.
- Route for Septic Haulers
- Route for Vac- Con and Dumping
- Route For Grit Removal, Large Parts and Chemical Delivery
- Route for Public and Deliveries
- Route for City Employee Parking

City Of Modesto  
**Sutter Avenue Facilities Layout Plan**



Figure 2-6 Tuolumne River Regional Park (TRRP) Master Plan

### 3.0 CONDITION ASSESSMENT

A cursory condition assessment was performed for the existing buildings, structures, and major equipment to identify change in their use, visible deficiencies, estimate their remaining useful life, and determine their disposition. The plant site was divided among six areas, as shown on Figures 3-1 and 3-2.

1. Area 1: Headworks (Figure 3-1)
2. Area 2: Primary Treatment (Figure 3-1)
3. Area 3: Digestion (Figure 3-1)
4. Area 4: Sludge Drying Beds (Figure 3-2)
5. Area 5: Septic Disposal and Nursery (Figure 3-1)
6. Area 6: Collection and Administration (Figure 3-1)

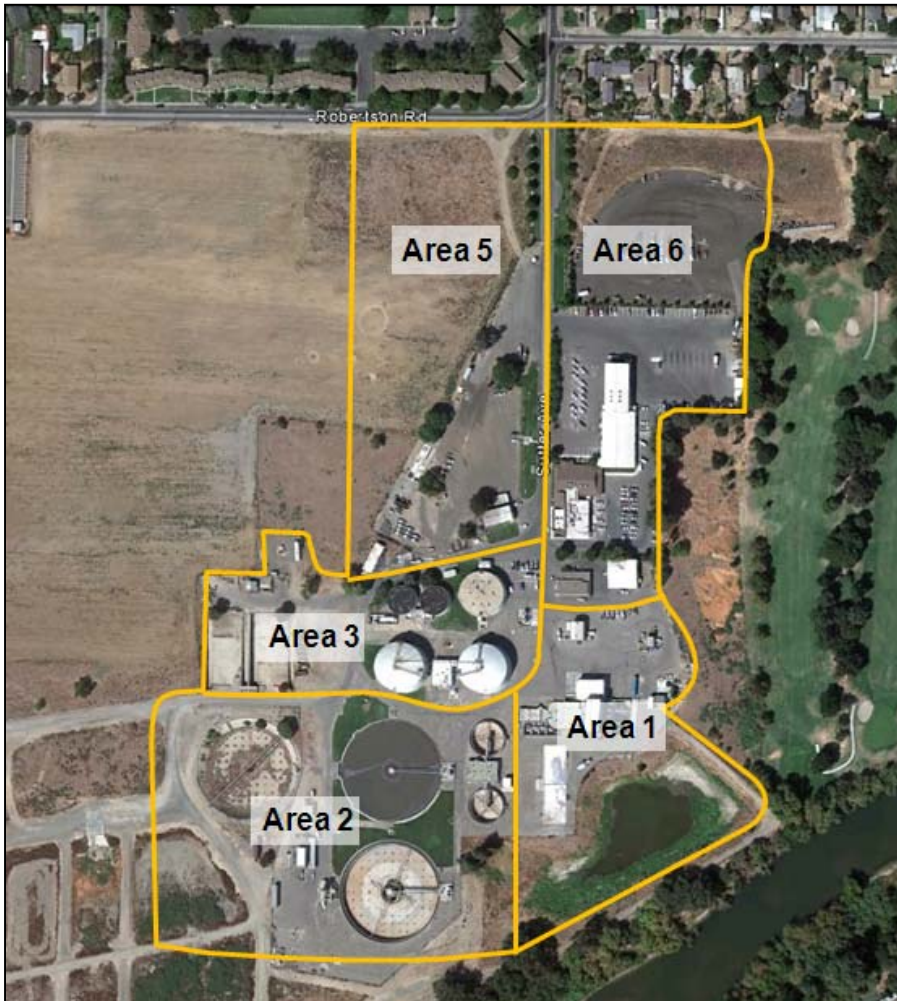


Figure 3-1 Condition Assessment Areas 1 through 3 and 5 – 6



Figure 3-2 Condition Assessment Area 4 – Sludge Drying Beds

A summary of the design criteria for the major treatment facilities is provided in Table 3.1. The condition assessment is summarized in Table 3.2.

<b>Table 3.1 Summary of Existing Facilities Facility Layout Plan Modesto Sutter Avenue Primary Treatment Facilities</b>	
<b>Item</b>	<b>Value</b>
<b><u>Preliminary Treatment – Headworks Building</u></b>	
<b>Influent Pump Station</b>	
Number of units	3 +1 standby
Year of construction	1998
Type	Enclosed screw, variable speed
Capacity, mgd, ea	27
<b>Influent flow measurement (Parshall flumes)</b>	
Number of units	4
Year of construction	1998
Type	Parshall flume
<b>Mechanical Bar Screens</b>	
Number of units	3 + 1 standby
Year of construction	1998-99
Channel Width, feet	7
Opening size, inches	3/4"
<b>Grit Removal</b>	
Number of units	3
Year of construction	1998
Type	vortex
Diameter, feet	18
Capacity, mgd, ea.	30
<b><u>Primary Treatment</u></b>	
<b>Primary Clarifiers</b>	
Number of units	2
Year of construction	1952
No. 1	1957
No. 2	
Diameter, feet (ea.)	200
Side Water Depth, feet (ea.)	10
Effective surface area (each), sf	31,400
Estimated capacity ea , at 1,200 gpd/sf overflow rate	37.7 mgd
<b>Primary Sludge Pumps</b>	
Number of units	3 + 1 standby

<b>Table 3.1 Summary of Existing Facilities Facility Layout Plan Modesto Sutter Avenue Primary Treatment Facilities</b>	
<b>Item</b>	<b>Value</b>
Year of construction	1960s
Type	Progressing Cavity
<b>Primary Effluent Pumps</b>	
Number of units	3 + 1 standby
Year of construction	1960s
Type	Mixed flow, variable speed
Capacity, ea, mgd	17.3
Horsepower, ea	200
<b><u>Solids Handling Facilities</u></b>	
<b>Primary Digesters 1 and 2</b>	
Number of Units	2
Year of Construction	1986/1988
Diameter, feet	104
Side water depth, feet	32
Volume, ea., MG	2.0
<b>Anaerobic Digesters 4 and 5</b>	
Number of units	2
Year of construction	1946
Diameter, feet	60
Side Water Depth, feet	22/19.5
Volume, MG (each)	0.47/0.41
<b>Decommissioned Anaerobic Digester No. 3</b>	
Year of construction	1960s
Type	Fixed cover
Diameter, feet	90
<b>Sludge Drying Beds</b>	
Number of units	24
Year of construction	1960s
Surface area, square acres	21.2
Volume, MG (each)	0.78
Percentage of total volume, %	19
<b>Gravity Belt Thickener (GBT)</b>	
Number of units	1
Year of installation	2003
Belt width, meters	2

Table 3.2

Sutter Facilities Layout Plan  
Assessment Summary  
City of Modesto, CA

Structure	Area	Site Plan Key Number	Structure Age, years	Flood Vulnerability	Condition Assessment	Purpose changes /Utilization	Comments	Estimated Useful Life, years	Recommended Disposition (1)
<b>Area 1: Headworks</b>									
Headworks Building									
Building structure	1	18	14	low	Good, some corrosion of HVAC	Unchanged, fully utilized		40	Replace HVAC duct
Influent pump station	1	18	14	low	Good, some corrosion	Unchanged, fully utilized	City recently replaced pump 1 bearings	40	No changes
Bar screens	1	18	14	low	Good, belt conveyor is high maintenance	Unchanged, fully utilized	Coarse bar screen spacing allows rags to reach Jennings Plant. Finer bar spacing needed.	40	Replace bars and bar screen mechanisms with fine screens
Grit removal system	1	18	14	low	vortex grit equipment unknown; grit piping is damaged	Unchanged, fully utilized	High priority, causing leaks	40	Maintain current mechanisms, replace grit piping
Parshall Flumes	1	18	14	low	Good, flow measurement inaccuracies due to short channel runs upstream and downstream of flume	Unchanged, fully utilized		40	Extend channels when new effluent pump station is constructed
Headworks gate operators	1	18	14	low	Significant corrosion	Unchanged, fully utilized	H2S attack from openings in Parshall flume channels	40	Maintain, replace coating, cover channel openings for gates
Odor control beds	1	20	14	low	Excellent	Unchanged, fully utilized	Recently replaced media supports	40	No changes
Cannery Segregation Pump Station (Pump Station No. 3)	1	17	15	low	Good, some corrosion	Unchanged, fully utilized	Operates during canning season only	30	Maintain - minor corrosion repairs
Emergency Generator No. 1	1	15	NA (2)	low	Good	Unchanged, fully utilized		30	No changes
Influent flow control Structure	1	NA	NA	low	Good, some corrosion	Unchanged, fully utilized		20	Maintain - may require corrosion repairs to concrete to extend life of structure
<b>Area 2: Primary Treatment</b>									
Primary Effluent (outfall) pump station	2	35	60	High		Unchanged, fully utilized		30	Replace with new effluent pump station, designed for pressurizing outfall, on high ground
Primary clarifiers 1 and 2	2	25 & 32	60/55	High	Good, some corrosion	Unchanged, fully utilized	Concrete rehabilitation performed by city	20	Relocate to Jennings Plant, demolish after primary facilities are relocated to Jennings Plant
DAFT Building	2	23	27	High	Good	GBT Building/Equipment Storage		20	Convert GBT space to storage
Sludge Thickeners 1 and 2 (abandoned)	2	21 & 22	27	High	Poor	Abandoned, not utilized	Replaced by GBT	0	Demolish and pave over
Gravity Belt Thickener (GBT) system	2	23	9	High	Excellent	Added for emergency use during canning season; not being utilized	Poor ventilation, could be improved with ferric chloride addition	25	Relocate GBT to Jennings Plant for waste activated sludge thickening
Chlorination station building (converted to paint booth and storage)	2	36	44	High	Good	Paint booth, wood shop and storage; fully utilized	Needs regrading for storm water	20	Relocate to new maintenance/storage building; demolish afterward
Vortex Aeration Basin (abandoned)	2	33	49	High	Poor -mechanism non operable, corroded	Available for "ad-hoc" emergency influent flow storage; otherwise not utilized	Short storage time, limited value does not justify retaining tank for this use.	0	Demolish
Emergency Generator No. 2, Switchgear and Transformer	2	34	60	High	Generator in good condition, switchgear is in poor condition and breakers are failing and obsolete	Unchanged, fully utilized	Repairs made after '97 flood. New breakers are not available.	20	Replace with new unit for new effluent pump station, on high ground
<b>Area 3: Digestion</b>									
Aeration Deck (converted to vacuum truck unloading station)	3	30	60+	High	Good	Converted to vacuum truck unloading station; fully utilized	Converted in 2012	30	No changes
Primary Anaerobic Digester No. 1	3	26	44	High	Poor	Not utilized; currently off line for improvements	Interim improvements needed	20	Renovate for interim use; demolish after new digesters are constructed at Jennings Plant
Primary Anaerobic Digester No. 2	3	28	29	High	Poor	Unchanged, fully utilized	Interim improvements needed	20	Renovate for interim use; demolish after new digesters are constructed at Jennings Plant
Anaerobic Digester No. 3 (abandoned)	3	10	59	Medium	Poor	Abandoned, not utilized		0	Demolish after new digesters are constructed at Jennings Plant
Anaerobic Digester No. 4 (sludge storage)	3	9	66	Medium	Good, uncovered, requires high water use to control foam	Unchanged, fully utilized		20	Demolish after new digesters are constructed at Jennings Plant
Anaerobic Digester No. 5 (sludge storage)	3	8	66	Medium	Good, uncovered, requires high water use to control foam	Unchanged, fully utilized		20	Demolish after new digesters are constructed at Jennings Plant
Non potable well No. 2 (15B)	3	31	NA	Medium	Good. Excessive cycling of pump, surge movement	Unchanged, fully utilized	Used as primary non-potable well.	20	Evaluate cause of cycling, consider surge controls; reduce demand after primary facilities are relocated to Jennings Plant
Ferric Chloride Storage	3	12	14	Low	Good	Unchanged, fully utilized	Seldom used, could be used to control sulfides for GBT or outfall	30	Maintain. Evaluate use for sulfide control at new effluent pump station or relocate to Jennings Plant
Sludge Handling Building (Dig 1 and 2)	3	27	44	Medium	Good	Unchanged, fully utilized	Interim improvements needed	20	Renovate for interim use; demolish after new digesters are constructed at Jennings Plant
Sludge Building Electrical System	3	27	44	Medium	Electrical panels are obsolete, replacement parts unavailable			5	Perform interim improvements then demolish after new digesters are constructed at Jennings Plant
Sludge control building (Digesters 3 & 4)	3	Btw 8 & 9	66	Medium	Poor. Essentially abandoned.	Unchanged, fully utilized		0	Demolish after new digesters are constructed at Jennings Plant
Digester Gas Scrubbing System	3	27	2	Low	Excellent	Unchanged, fully utilized	Constructed on platform above flood plain	30	Relocate to Jennings Plant when new digesters are constructed
<b>Area 4: Sludge Drying Beds</b>									
Sludge drying beds	4	41 - 64	66	High	Good	Unchanged, fully utilized		50	Maintain use for interim operation; perform site cleanup after new digesters are constructed at Jennings Plant.
<b>Area 5: Septic Disposal</b>									
Septage Dump Station	5	7	NA	Medium	Good	Unchanged, fully utilized	City constructed new concrete pad in road	30	No changes
Parks and recreation storage shed	5	NA	60+	Medium	Poor - severe corrosion, former dog pound building	Unchanged, fully utilized		0	Relocate contents to new maintenance building and demolish
Crane Storage Building	5	6	6	Medium	Good	Unchanged, fully utilized	Relocate files to new maintenance building	20	No changes
City vehicle storage yard	5	5	NA	Medium	Poor. Needs paving.	Unchanged, fully utilized	Combine with new employee parking lot	NA	Convert to employee parking
Non-potable Well No. 1 (15A)	5	4	60+	Medium	Poor, diminished capacity	Unchanged, partially utilized as backup to Well No. 2	Conflicts with new parking lot	5	Demolish and cap well.
<b>Area 6: Collection and Administration</b>									
Administration Building	6	3	30 + (3)	Medium	Good. Partially flooded during '97 flood. Numerous remodels. Inadequate lab space and design.	Unchanged	Remodeling in progress for office space.	30	Expand laboratory. Utilize office space made available when primary facilities are relocated to Jennings Plant.
Maintenance Building	6	13	27	Medium	Good	Unchanged		20	No changes
Maintenance Building Annex	6	14	15	Medium	Good	Unchanged		30	No changes
Collection System Building	6	2	4	Low	Excellent	Unchanged		50	No changes

(1). Assumes primary facilities will be relocated to Jennings Plan, headworks will remain (with new finer screens), effluent pump station will be replaced on high ground above flood plain.

(2) Not available

(3) Has been modified and remodeled and added on over the years

### 3.1 Area 1: Headworks

#### 3.1.1 Headworks

Original Construction Date: 1998.

Structural/Mechanical: Overall, the concrete is in good condition (Figures 3-3 and 3-4). There is minor corrosion of HVAC ducting in the screen building and more serious corrosion on the gate valve operators on the flume structure are corroding (Figure 3-5). According to City staff, the grit piping is eroded on the inside on the elbows. These grit handling pipes were cement mortar lined and should be replaced with glass lined piping in the near future. The openings at the gate operator base should be covered to reduce degradation due to exposure of the operator mechanisms to hydrogen sulfide. New bar screens with closer bar spacing are preferred to prevent fouling downstream processes and those located at the Jennings secondary and tertiary plant. Some of the smaller solids (paper and plastics) pass through the current screens and deposit on the fixed film reactor media. Further study is required to assess the feasibility of adding new screens at the Sutter Plant, including the impacts on hydraulics and costs. The existing bar screens could be replaced with fine screens within the existing headworks building. Alternatively, a new screen could be installed at the Jennings Plant, although the wastewater at that location is more corrosive because the long travel time in the outfall creates high sulfide levels.

The pavement around the perimeter of the headworks is showing signs of settlement, likely due to poor compaction, and will require some repairs or replacement in the future.

Electrical: All screw pump VFDs are bus-tapped, requiring preventive maintenance under "hot conditions.". The MCCs, located in the Headworks Building, are in good condition.

Flood vulnerability: The headworks and grit handling, as well as some of the electrical support facilities, were constructed at an elevation high enough to provide protection from a 100-year storm. The structure perimeter is protected with concrete walls with a top elevation of approximately 72.0 feet, which is approximately 2 feet higher than the 100-year flood elevation. However, if the site were to flood to the levels experienced in 1997, the headworks would be isolated from operator access because the surrounding area would be flooded as the area between Robertson Road and the headworks has a low point this is subject to flooding. Ideally, the low points should be filled in to allow access under flood conditions.



Figure 3-3 Influent screw pumps at Headworks, (looking north).



Figure 3-4 Headworks grit tanks and Parshall flumes (looking north).



Figure 3-5 Corrosion on a Gate Valve Operator at Headworks

### **3.1.2 Pumping Plant (Can-Seg PS)**

Original Construction Date: 1998.

Structural/Mechanical: Overall, the concrete and mechanical equipment is in good condition.

The pavement around the perimeter of the pump station and the electrical building is showing signs of settlement, likely due to poor compaction, and will require some repairs or replacement in the future.

Flood vulnerability: The Can-Seg pump station, as well as some of the electrical support facilities, was constructed at an elevation high enough to provide protection from a 100-year storm. Furthermore, the pumps were also designed as dry sump submersible pumps with the electrical connection above grade to allow the pump station to operate in case of flooding.

### **3.1.3 Headworks Treatment Area Electrical System**

Original Construction Date: 1998

This system consists of an 1250 KW standby power generator “A” or No. 1, a separate loop feed 12-kV transformer (XFRM- G) This electrical system serves MCC-P18 for the Headworks. a distribution switchboard which ties back to the headworks standby generator No. 1 or “A”,

For the Can-Seg PS, a separate loop feed a 12-kV transformer (XFRM –E), a distribution switchboard which ties back to the standby generator No. 1 or “A”, and MCC-P11.

Structural/Mechanical: The emergency generator that serves the headworks and Can-Seg PS is new and reliable. New controls have been installed for the generator to improve reliability. The 12 kV to 480 V transformers are also in good condition.

Flood vulnerability: The emergency power and primary electrical feed slightly above the flood plain for a 100-year storm. Therefore the risk of flood impacts to the system is low.

## **3.2 Area 2: Primary Treatment**

### **3.2.1 Substation A**

Original Construction Date: 1950s.

Structural/Mechanical: The Substation A building is in good condition except there is a minor roof leak and the HVAC system needs a filtration system to prevent dust from entering the equipment room. Storm water ponding was observed near the headworks transformer during a minor storm. Some improvements to the pavement grade or a new catch basin may be needed to prevent flooding. Preventive maintenance (PM) is needed on the primary electrical system. Transformer “XFRM-F” is an open type unit that has never been shut down and cleaned. This substation serves MCC P-10 (distribution switchboard), MCC-P17 (Digesters), and MCC-P3 (Sludge Handling Bldg), as well as the Administration Building and laboratory (Control Building).

### **3.2.2 Primary Clarifiers**

Original Construction Date: Clarifier No. 1 – 1955; Clarifier No. 2 - 1960.

The primary clarifiers are designed to run in parallel, but the normal operation is to run only one clarifier at a time. The second clarifier was added for redundancy and to provide additional capacity during the canning season and to thicken the primary solids during canning season. After the City converted to the can seg program, the City has rarely needed to operate two clarifiers in parallel during dry weather. However, both clarifiers are required for peak wet weather events.

Structural/Mechanical: The clarifiers and pump station were submerged during the 1997 flood. Mechanical and structural upgrades, including concrete repairs and new mechanisms, were performed in 2001 by City staff. Overall, the structural concrete appears to be in good condition (Figure 3-6). Access to the sludge pumping stations is by ship’s

ladders that do not meet current uniform building codes. However, according to the City, the City staff will be revising the access in-house. The clarifiers have pressure relief pipes in bottom of clarifier floor slab that could allow primary effluent to leak into the groundwater, as shown on Figure 3-7 for Clarifier #2 currently not in service. The pipes may be sealed from the primary solids that have accumulated over the years.



Figure 3-6 Primary Clarifier No. 1



Figure 3-7 Primary Clarifier No. 2 (with Pressure Relief Pipes in the Floor Slab)

Flood vulnerability: Both Primary Clarifiers are in the flood way and were completely submerged during the 1997 flood. It may not be feasible to protect the clarifier with a floodwall because the wall would need to be constructed in the floodway. Construction in the flood way would require “non-rise” permits from FEMA and the Army Corps of Engineers. To gain approval, the City would need to demonstrate that the flood way would not cause the upstream water surface to rise beyond the current FEMA map elevations for a 100-year storm. Therefore, a new Clarifier No. 2 on higher ground (out of the flood way) would need to be constructed. Clarifier No. 1 is on higher ground but in the flood plain. Flood protection (walls or berms) could be provided outside of the flood way, so special

permitting from FEMA would not likely be required to construct the flood protection structures.

### **3.2.3 Effluent Pump Station (Also know as “Outfall Pump Station”)**

Original Construction Date: 1950s.

Structural/Mechanical: The structural concrete appears to be in good condition.

Flood vulnerability: The effluent pump station was also submerged in 1997. After the flood, the pump motors were replaced. (Figure 3-8). In addition, pump controls were relocated in the second story of the former chlorine building, which is above the 100-year flood elevation. Although these improvements improve the protection of the pumps, the pump station wet well is still below the flood elevation and therefore prone to future flooding and the release of primary effluent to the river. As recommended in the 2007 master plan, the pump station (and wet well) should be replaced at a higher elevation. In addition, the pump station capacity would need to be increased substantially to pump high flows that would enter the upstream sewer system through manholes during flood conditions. A potential mitigation of inflow during floods is to seal all upstream and in-plant gravity manholes. Further study is required to evaluate the feasibility of this approach.



Figure 3-8 Effluent Pump Station with Pump Motors at Higher Elevation

### **3.2.4 Primary Treatment Electrical System**

Original Construction Date: 1950s

This system consists of an 800 KW standby power generator “B” or No. 2, switchgear and 12-kV transformer (XFRM- C) This electrical system serves MCC-P9 (the effluent PS) and MCC-P12 (primary clarifiers and pump station, and GBT).

Structural/Mechanical: The concrete pad for the generator appears to be in good condition. The generator itself was submerged during the 1997 flood. It was repaired after the flood, and the controls were replaced. In general, the generator is old but it has been very reliable.

The west emergency generator that serves the effluent pump station and primary facilities is old, but reliable. New controls have been installed for the generator to improve reliability. The 12 kV- to- 480 V transformer is also in good condition. However, the 480 V switchgear is obsolete and very vulnerable to failure. The outdoor-enclosed switchgear is in poor condition. The switchgear breakers were fully rebuilt after the 1997 flood, utilizing used breakers. The switchgear equipment is obsolete, and it is not possible to purchase new breakers. One breaker is failing and will need to be replaced soon. The switchgear slab has settled causing storm water to pond around the switchgear equipment during wet weather. Also, an electrical pull box drains to the switchgear.

Flood vulnerability: The emergency power and primary electrical feed are in the flood plain and therefore vulnerable to flooding from a 100-year storm. The distribution panel and generator that feed the primary effluent pump station MCCs are also in the flood plain (Figure 3-9). The switchgear and generator could be raised out of the floodplain by supporting them on a new raised platform. The west standby generator, near the primary effluent pump station, should be moved to higher ground. The generator could be placed on a new platform or replaced with a new 1,250 kW generator adjacent to the east generator. In this configuration, the generators could be paralleled. The clarifier motor control center (MCC) was submerged in the 1997 flood and the bus duct is corroded from the exposure to water.

As recommended in the 2007 master plan, the effluent pump station, and the electrical controls should be replaced on higher ground. A new standby generator should be added to support the new effluent pump station.



Figure 3-9 Effluent Pump Station Standby Generator

### 3.2.5 Vortex Aeration Basin (also known as Aeration Basin/Holding Basin)

Original Construction Date: 1963

Structural/Mechanical: The mechanism in the vortex basin is heavily corroded and not functional. Soil has accumulated in the base of the tank, and due to the infrequency of use, grasses and shrubs are growing in the accumulated soil (Figure 3-10).

As discussed in Section 3.2.2, a new primary clarifier would need to be constructed at higher ground. The most logical location for the new clarifier is just west of Clarifier No. 1 in the footprint of the current vortex aeration basin. Therefore, if the primary facilities remain at the Sutter Plant, it is recommended that the vortex aeration basin be demolished and replaced with a new primary clarifier. If the primary facilities are relocated to the Jennings Plant, the vortex aeration basin should be removed.



Figure 3-10 Old Abandoned Vortex Aeration Basin

Flood vulnerability: The vortex aeration basin is within the 100 year flood plain, but outside of the flood way. The tank was inundated and filled in the 1997 flood. If a new clarifier were to be constructed in this location, it would require protection with a flood protection berm.

### 3.2.6 Abandoned Dissolved Air Flotation Thickeners (DAFTs) and GBT Building

Original construction date: DAFTs – 1985; GBT – 2003

Structural/Mechanical: The DAFTs became obsolete when the City implemented the cannery segregation program and installed a new gravity belt thickener (Figure 3-11). The City has fully decommissioned the DAFTs, so they can be demolished. Since the building that houses the GBT is separate from the DAFT structures, the building can remain. The GBT was installed in the existing DAFT Building to provide a backup primary sludge thickening system in case cannery flow has to be combined with domestic waste. When the flows are combined, the primary sludge is too thin and high flows hydraulically overload the digesters and lower detention times. The GBT itself is in nearly new condition; however, the GBT cannot be operated because the ventilation system for the building is inadequate. In the initial operation of the unit sulfides levels were too high for safe occupation of the building. The existing ventilation system consists of two roof fans with a combined capacity of about 6,000 standard cubic feet per minute (scfm). Typical air change rates for a GBT building are 5 minutes per air change (12 changes per hour). This is equivalent to an air flow of 6,500 standard cubic feet per minute (scfm). Ventilation designs for a GBT building should include air ducting to supply fresh air and separate ducting to exhaust air, providing a sweep of fresh air across the room. In addition, an exhaust hood is typically provided over the GBT top tray to capture the foul air.



Figure 3-11 Gravity Belt Thickener (GBT) in the DAFT Support Building

If the GBT is operated, the City should consider adding ferric chloride to the primary sludge to reduce the release of sulfides to the air. Ferric chloride could be added to the primary clarifiers by utilizing the current ferric chloride system at the Sutter Plant. Ferric chloride addition would provide an added benefit of reduced biochemical oxygen demand (BOD) loadings to the secondary treatment facility. However, care must be taken to ensure that ferric chloride addition does not impact the current and future UV disinfection system at the Jennings Plant. Ferric chloride can reflect light and reduce the efficiency of the UV system.

Use of the GBT during canning season would be tied to the anaerobic digesters, which are currently operating at near capacity with domestic wastes alone. Additional solids from the canneries would severely impact the digesters. Both digesters would need to be operational well in advance of the canning season. Because the canning solids are much higher in carbohydrates than domestic waste, the biology in the digesters would need time to acclimate to the new conditions. A sudden influx of cannery solids could cause digester upsets and odors.

Continued standby use of the GBT would depend on having the digesters available to process the wastes. If the primary facilities are relocated to the Jennings Road site, the digesters at the Sutter site would be abandoned and removed, and the GBT would be obsolete at the Sutter Plant. The recommended long term plan, assuming the primary facilities are relocated to Jennings Road, is to remove the GBT and reuse it at the Jennings Road facility. Its original purpose can be duplicated at Jennings Road, or it can be used to thicken waste activated sludge. The existing DAF units at the Jennings Road site could also be utilized as a backup system to thicken primary solids during the canning season. The DAFs at Jennings Road will not be needed for secondary effluent discharge after 2016.

In summary, the recommended approach for the DAFTs, GBT, and support building is as follows:

1. Demolish the DAFT structures and utilize the space for future use.
2. Relocate the GBT to the Jennings Road Facility when the primary facilities are relocated to Jennings Road. The GBT could be used to thicken waste activated sludge or for its original purpose as a contingency to thicken primary solids during the canning season if the canning wastes and domestic wastes need to be combined and treated together.
3. Utilize the DAFT support building for storage or other uses. Flood vulnerability: The DAFTs and GBT are located within the flood plain but higher than the flood way. The DAFT structures and control building were submerged during the 1997 flood. Flood protection structures would be needed to protect the DAFT control building if necessary. However, if the use of the building is non-critical, then it could be flooded for a short time and flood protection for this structure would not be warranted.

### 3.2.7 Hazardous Materials Storage

Hazardous materials storage on the Sutter Plant site consists of open box containers near the effluent pump station. (Figures 3-12 and 3-13). The containers hold light bulbs, batteries, tires, and electronic equipment waste generated from the City's Parks and Recreation Department. This arrangement is informal and could be replaced with an updated receiving station similar to the Stanislaus County hazardous storage area. Paints and solvents are stored separately in a converted room in the Maintenance Building Annex. Hazardous materials storage is limited to City of Modesto inter-departmental use only – the public does not have access to the facility. The Sutter Plant hazardous storage area functions like a solid waste transfer station. The materials are periodically removed from the Sutter Plant and hauled to the County hazardous waste facility.

Flood vulnerability: The hazardous waste storage boxes in their current location are subject to flooding, but since they are portable, they can be moved if necessary. The paints and solvents are in the Maintenance Building Annex and above the flood plain.



Figure 3-12 Tire Recycling and other stored material on site



Figure 3-13 Hazardous Material Storage Bins

### **3.2.8 Paint Booth in former Chlorination Station Building**

Original construction date: The chlorination station building was constructed in 1968. Chlorination was discontinued in the late 1980s when the Jennings Plant was commissioned.

Structural/Mechanical: The paint booth is in good condition. Grading on the north side of the chlorine station building needs to be revised to prevent storm water from flooding the building floor.

The paint booth is located in the former Chlorination Station building in the old chlorine cylinder storage room. See Figure 3-14. Common tasks for the paint booth are to abrasive blast and coat Sutter Plant and collection system operating equipment, such as pumps. As this building will be removed in the future, it is recommended that a new paint booth be integrated with a new maintenance building, constructed on fill above the flood plain.

Flood vulnerability: The chlorination station building (and paint booth) is in the flood plain and therefore subject to flooding.



Figure 3-14 Picture of Paint Booth inside old Chlorine Building

### **3.2.9 Wood Shop**

The wood shop is in a storage room in the chlorine station building. The shop is informal – it includes an old lathe and drill press that are used infrequently. The wood shop area is primarily a storage room not designed to support an industrial wood shop. According to City staff, a formal dedicated area for wood working that meets industrial standards is not required. However, an area could be provided in a new building to accommodate occasional use of the wood working tools.

## **3.3 Area 3: Anaerobic Digestion**

### **3.3.1 Primary Anaerobic Digesters No. 1 and No. 2**

Original Construction Dates: Digester 1 – 1968, Digester 2 – 1983

Structural/Mechanical: The steel tanks are generally in good condition as determined during the Modesto Digester Evaluation Project by Carollo, 2009, (Figures 3-15 and 3-16). The flat bottoms on the digesters and digester mixing deficiencies allow grit and sand to deposit on the bottom, which hamper the performance of the digesters. New coatings, seismic upgrades to the foundations, and new heating and mixing systems would be required to restore the digesters for long-term use. The City is currently operating with only Digester 2, in service, and it is operating at the limits of state standards. Digester capacity needs to be expanded depending on the current and forecasted loadings. Recommendations to

construct two new digesters were presented in a preliminary design report by Brown and Caldwell (2012). However, if the primary facilities are to be relocated to the Jennings Plant, the City should not construct new digesters at the Sutter Plant. In the interim period before the new digesters are constructed at the Jennings Plant, the City will need to make improvements to Digesters 1 and 2 so that solids processing can reliably continue at the Sutter Plant for the time being. Improvements to Digester 2 were developed for the Digester Evaluation Project (Carollo, 2009). The recommended short term improvements included a new gas scrubbing system, seismic improvements, new heating system and recirculation pumps and a new external pump mixing system. The gas scrubbing system was installed in 2011. Seismic improvements could be eliminated, depending on how long the interim operating period will be. Costs for the new heating and mixing system for Digester 2 were estimated at \$1.5 million in 2009 dollars. An analysis should be performed to evaluate whether interim improvements to Digester 1 are warranted for the interim period. The need for revamping Digester 1 will depend on the length of the interim period and current/projected loadings over the interim period. If it is decided that Digester 1 does not need interim improvements, it can continue to be used as a backup digester.

Electrical: The MCCs in the sludge control building are obsolete and replacement parts are no longer available. The 480 V distribution panel that feeds the digester area is also obsolete.



Figure 3-15 Primary Anaerobic Digesters No. 1 and No. 2

Flood Vulnerability: Both anaerobic digesters are within the 100 year flood plain, but outside of the flood way. The digesters were half submerged during the 1997 flood. New anaerobic digesters should be constructed on higher ground, as recommended in the preliminary design report.



Figure 3-16 Interior of Digester No. 1  
(Note: Generally in good condition [note absence of corrosion]).

### **3.3.2 Anaerobic Digesters No. 3, 4 and 5**

Original Construction Dates: Digester 3 – 1953, Digesters 4 and 5 – 1946

Structural/Mechanical: These digesters are not in use anymore and should be demolished.

### **3.3.3 Aeration Structure**

Original Construction Date: 1950s

Structural/Mechanical: The former aeration structure (Figure 3-17) was recently converted to a Vac Con truck unloading station.



Figure 3-17 Aeration Structure converted to a Vac Con Truck unloading station

Flood Vulnerability: The aeration structure is in the 100-year flood plain but not in the floodway.

### **3.3.4 Non-Potable Well No. 2**

Well No. 2 was added to supplement the diminishing yield of Well No. 1. Well No. 2 provides about 70% of the non-potable water supply and Well No. 1 the remaining 30%. In addition, the City has a 10-inch potable water supply that enters the site just north of the entrance road on Sutter Avenue and Robertson Road. The potable and non-potable water systems are not connected.

Original Construction Date: unknown,

Mechanical/Structural: During a site visit, the pump for Well No, 2 was found to be cycling excessively – at the rate of approximately 1 minute on and 3 minutes off. This may have been occurring because of high water use for running sprays on the surface of the sludge storage tanks. If so, the City should consider reducing the spray flow to save energy costs. Another reason for cycling may be an incorrect level setting or a saturated bladder in the hydro-pneumatic tank.

Flood Vulnerability: Well No. 2 is in the flood plain and therefore subject to flooding under extreme conditions.

### **3.4 Area 4: Sludge Drying Beds**

Original Construction Date: 1960s

Structural/Mechanical: The sludge drying beds are unlined and constructed over sandy soil (Figures 3-18 and 3-19), and they are effective in dewatering sludge. The City collected soil samples from beneath the drying beds. According to the City, tests indicate that the drying beds show minimal impact on the Tuolumne River water at this time.



Figure 3-18 Sludge Drying Beds



Figure 3-19 Sludge Drying Beds

Flood Vulnerability: The north half of the drying beds is in the flood plain (see Figure 2-4) The south half is in the flood way. Relocating the drying beds to higher ground to the north is a concern because of odor and noise impacts on residences along Robertson Road. In addition, new drying beds would likely need to be lined to comply with current discharge permit regulations. New sludge drying beds would trigger the requirement to evaluate whether the beds would degrade the underlying groundwater. Per the State's Anti-degradation Policy, Resolution 68-16, land discharge activities cannot cause degradation of groundwater supplies. Based on the experience of municipal waste facilities in the Central Valley, it is likely that the Regional Board will consider drying beds as a reasonable threat to the groundwater. For example, liners were required for new drying beds at Merced, Tulare, Porterville, Hanford, San Joaquin, Livingston, and Delano.

With the conversion of the aeration decks to a Vac Con unloading station, the drying beds formerly used for Vac Con unloading can be restored to their original use as sludge drying beds.

### **3.5 Area 5: Septic Receiving Station, Parking/Storage Yard north of Entrance Road**

The parking and storage lot in Area 5 includes the Crane Storage Building, a storage shed for the Parks and Recreation Department, a parking lot for retired police cars, a septage receiving station, a fuel storage facility for City vehicles, and Well No. 1.

#### **3.5.1 Crane Storage Building**

Original Construction Date: unknown

Structural/Mechanical: The building is a steel prefabricated structure used primarily to store the City's mobile crane, but it also provides storage for documents, and other equipment. The building is in good condition.

Flood Vulnerability: The Crane Storage Building is in the flood plain and therefore subject to flooding during the most extreme conditions. However, the building suffered only minor damage during the 1997 flood. Since this is a non-critical building, it could be flooded for a short time.

#### **3.5.2 Parks and Recreation Storage Shed**

Original Construction Date: unknown – likely in the 1950s or earlier

Structural/Mechanical: The metal building was originally the City Pound building. The exterior is rusted and unsightly, and appears to be in poor condition. It is recommended that the building be removed and the equivalent storage space be replaced in a new structure integrated with a new maintenance building to serve the Sutter Plant.

Flood Vulnerability: The Parks and Recreation storage shed is in the flood plain and therefore subject to flooding during the most extreme conditions.

#### **3.5.3 Non-Potable Well No. 1**

Well No. 1 is the original non-potable water well for the Sutter Plant. Currently Well No. 1 provides about 30% of the non-potable water supply and Well No. 2 the remaining 70%. In addition, the City has a 10-inch potable water supply that enters the site just north of the entrance road on Sutter Avenue and Robertson Road.

Original Construction Date: unknown, but likely before the 1940s.

Mechanical/Structural: The yield from Well No. 1 is low relative to Well No. 2 and the well pump and hydro pneumatic tank will likely need to be replaced. The well and well house are also located at the north entrance to the Area 5 lot, which blocks the entrance. To open the entrance to the Area 5 lot it will be necessary to remove Well No. 2. As described previously, the City should consider reducing the demands on Well No. 2 to make up for the loss of Well No. 1. It appears that most of the demand is from the foam control spray on the

open digesters 4 and 5. If the primary facilities are relocated to the Jennings Plant, the digesters will be demolished and the non-potable demands significantly reduced. In addition, the potable water system could be used as a back up to Well No. 2 if an air-gap system were installed to prevent cross-contamination with the potable water supply.

Flood Vulnerability: Well No. 2 is in the flood plain and therefore subject to flooding under extreme conditions.

#### **3.5.4 Potable Water Supply**

The City has a 10-inch potable water supply line that enters the plant at Sutter Avenue and Robertson Road. The potable water line is protected with backflow preventers. The potable and non-potable water systems are not connected.

Original Construction Date: unknown

Mechanical/Structural: The potable water lines from the backflow preventers to the rest of the plant have experienced several breaks/leaks as the result of surge pressures and they need to be replaced. Surge control should also be considered to prevent future breaks.

Flood Vulnerability: The potable water supply is above the flood plain and not vulnerable to flooding.

#### **3.5.5 Septage Receiving Station**

Original Construction Date: unknown

Mechanical/Structural: The septage receiving station is in good condition and should be retained. The City recently paved the road at the receiving station entrance with concrete to protect the surface from truck damage.

Flood Vulnerability: The septage receiving station is in the flood plain and therefore subject to flooding under extreme conditions. Since the structure is primarily underground, it is not vulnerable to significant damage from flooding. However, the contents of the receiving vault could be released to the river if the station were fully submerged. A gasketed vault cover on the receiving manhole should be considered. The cover could be stored on a rack at the station so it could be used in case of a flood.

#### **3.5.6 Fuel Storage Station**

Original Construction Date: unknown

Mechanical/Structural: The fuel storage station consists of a con-vault above ground storage tank for diesel fuel. The fuel storage system is inspected by a third party regularly. The fuel system serves as a backup fuel supply system for plant equipment and incidental use. The station is in good condition and should be retained.

Flood Vulnerability: The fuel storage tank is in the flood plain and vulnerable to flooding under extreme conditions. However, the tank is above ground and ballasted with heavy concrete, which will help protect it from damage or leakage.

### **3.6 Area 6: Collection and Administration**

#### **3.6.1 Collection Storage Yard**

Original Construction Date: 2008 (constructed with the Collection and Electrical Building project)

Mechanical/Structural: The storage yard is a paved area that is generally in good condition.

Flood Vulnerability: The storage yard is within the flood plain and therefore vulnerable to flooding from a 100-year storm. However, the parked vehicles and equipment can be moved to higher ground if a flood is anticipated.

#### **3.6.2 Collection and Electrical Building**

Original Construction Date: 2008

Mechanical/Structural: The building is a metal building constructed over a concrete floor. The building is new so it is in excellent condition.

Flood Vulnerability: The building was constructed on engineered fill at an elevation above the flood plain, so it is not vulnerable to a 100-year flood.

#### **3.6.3 Administration and Laboratory Building**

Original Construction Date: 1960s, expanded in 1980s

Mechanical/Structural: The building is constructed of masonry walls over a slab on grade. The building was flooded to a depth of about 1 to 2 feet during the 1997 flood. The building has been modified several times since its original construction. The most recent renovation was completed this year in 2012 to improve office space utilization. The laboratory space is inadequate and out of date for current laboratory procedures. The City is considering expanding the laboratory in the future. If the primary facilities are relocated to the Jennings Plant the office space surrounding the lab could be available to expand and upgrade the laboratory. Additional study is required to assess current and future lab needs.

Flood Vulnerability: The building floor elevation is within the flood plain and therefore vulnerable to a 100-year flood.

#### **3.6.4 Maintenance Building/Office**

Original Construction Date: 1985

Mechanical/Structural: The building is a metal building constructed over a concrete floor. The building is new so it is in excellent condition.

Flood Vulnerability: The building was constructed on engineered fill at an elevation above the flood plain, so it is not vulnerable to a 100-year flood.

### **3.6.5 Plant Maintenance Annex**

Original Construction Date: 1997 (constructed with the Headworks project)

Mechanical/Structural: The building is a metal building constructed over a concrete floor. The building is relatively new and in good condition.

Flood Vulnerability: The building was constructed on engineered fill at an elevation above the flood plain, so it is not vulnerable to a 100-year flood.

## **3.7 Storm Water Collection and Storage System**

The storm water collection system at the Sutter Plant is shown on Figure 3-20. In general, the storm water system drains runoff from the east half of the Sutter Plant to City property next to the golf course on the east boundary of the plant. The west half drains to a storm water retention pond (the southeast sludge drying bed).

Original Construction Date: unknown – varies by area.

Mechanical/Structural: The storm water system pumps and pipelines are in good condition. Old storm water outfalls to the Tuolumne River have been plugged and abandoned. Per the Industrial Storm water General Permit (Order 97-03-DEW), industrial sites, in whose definition wastewater treatment sites are named, must implement Storm Water Pollution Prevention Plan and manage storm water and pollutant run-off. Untreated storm water cannot be directly discharged from the plant site. Currently all storm water is collected and contained on the site. Since no storm water leaves city property, the City is exempted from the annual storm water permit requirements.

The following summarizes the storm water system by plant area.

#### **a. Area 1 (Head works area)**

Storm water runoff from this area flows by gravity to the influent pump station in the head works structure and the emergency holding basin located just south of the head works structure. Storm water pumps in the emergency holding basin return the water back to the head works for treatment.

#### **b. Areas 2 and 3 (Primary treatment and anaerobic digesters)**

Storm runoff from Areas 2 and 3 paved areas around the digesters, clarifiers, primary outfall pump station flows by gravity to one designated drying bed, where it is contained for percolation.

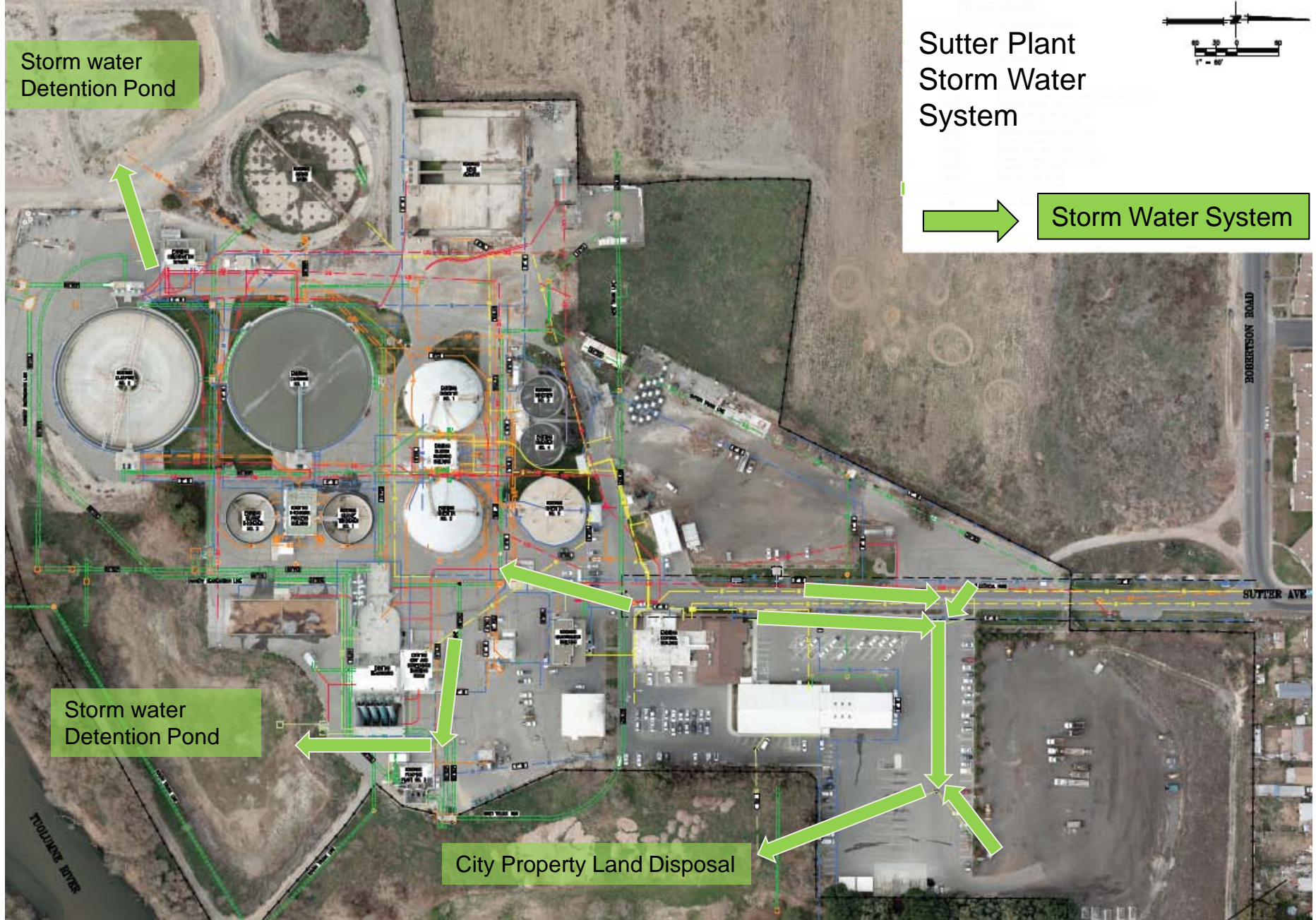


Figure 3-6 Storm Water System at Sutter Plant

c. Area 4 (sludge drying beds)

Run off from the drying beds and roads around the drying beds sheet-flows to the drying beds, where it is contained.

d. Areas 5 and 6

Storm water runoff from the parking areas in the northern paved area and driveway (parking and driveway only) are collected and conveyed to the plant property grass area just to the east of the collection system building, alongside the golf course.

Changes to the storm water system will be required for the new site layout if the primary treatment facilities are relocated to the Jennings Rd. Plant, because the grade will be raised in some areas to provide flood protection for new structures. However, it appears that the current basic storm water approach and disposal points can be preserved.

Flood Vulnerability: The storm water system is in the flood plain and is therefore vulnerable to flooding. However, since the system is mostly underground, it is not vulnerable to significant damage from flooding.

### **3.8 Security System**

The security system at the Sutter Plant consists of a perimeter chain link fence six feet high, made of galvanized steel. There is also some interior fencing along the west and north sides of the digester area. Most of the fencing has a top rail with three rows of barbed wire. The main gate at Sutter Avenue and Robertson Road is open during normal business hours and closed and locked after business hours. The main gate is monitored with video surveillance.

Original Construction Date: unknown – varies by area.

Mechanical/Structural:

The fence is generally in good condition, however there are sections along the north boundary with residences where the barbed wire is missing or damaged. Fencing along the Tuolumne River are also damaged and occasionally cut by the public that frequent the river bank. Repairs to damaged fencing along the river bank and on the north boundary should be made.

### **4.0 BIOSOLIDS MANAGEMENT**

As described previously, digested biosolids are conveyed by a gravity pipeline to the drying beds. The drying beds dewater and dry the biosolids. Continued use of the drying beds poses some risks to the City. The drying beds are constructed over permeable soils, which drain to the groundwater. The City's tests of the groundwater indicated that the impacts of the groundwater are minimal. However the City's testing program indicates that the sludge

drying beds are affecting the ground water and river, the beds may need to be lined. New sludge drying beds would also likely need to be lined. Another risk in continuing operation of the drying beds is that the drying beds are in the 100-year flood plain and flood way. An inundation of the drying beds would release undisinfected biosolids to the river. It may not be feasible to protect the southern half of the beds from a 100-year flood. Constructing berms or walls to protect the beds would impede flow in the floodway and would likely not be permitted. The southern half of the drying beds could be relocated to the north in the space currently owned by TRRP, but this would create environmental impacts on the Robertson Road residential area, as discussed previously, in Section 3.8

An alternative approach to processing biosolids is to replace the drying beds with a mechanical dewatering system. A mechanical dewatering system could reduce or eliminate the area required for new drying beds, and it would reduce the area to be protected with levees.

Three options for mechanical dewatering at the Sutter Plant site were considered:

1. Mechanical dewatering with daily hauling of sludge cake to the Jennings Road Facilities.
2. Mechanical dewatering with solar drying of sludge cake in new drying beds at the Sutter Plant.
3. Mechanical dewatering with thermal drying and temporary storage in a lined storage area. Fuel for thermal drying would be digester gas augmented with natural gas. There is a potential to reduce the need for natural gas by adding FOG to the digesters.

Table 4.1 presents a comparison of the costs for the above alternatives. As indicated, the costs for the alternatives are nearly the same; however, the third alternative (mechanical dewatering and thermal drying) has some advantages. This approach addresses the issue of flooding and it would avoid ground water contamination. Thermal drying would require the use of digester gas and seasonal augmentation with natural gas. Additional studies would be required to confirm this concept. Pilot testing should be conducted to determine the effectiveness of various dewatering processes (belt press, centrifuge or screw press) and the required chemical usage.

If the primary facilities (and anaerobic digesters) were relocated to the Jennings Road site, the lowest cost alternative would be to dewater digested sludge with lined solar drying beds. Digested sludge could be pumped to new drying beds for solar drying. The drying beds could be emptied seasonally and applied to the adjacent City-owned ranch as currently practiced.

<b>Table 4.1 Cost Comparison for Biosolids Dewatering Alternatives Sutter Plant Facilities Layout Plan City of Modesto, CA</b>			
<b>Alternative</b>	<b>Project Cost <sup>(1)</sup> (\$M)</b>	<b>O&amp;M Cost (\$M)</b>	<b>Net Present Value (\$M)</b>
Current operation: Sludge drying beds, annual land application to Jennings Road Ranch	\$0	\$0.17	\$3.5
Alt. 1: Dewatering plus daily hauling	\$12	\$0.74	\$26.4
Alt. 2 Dewatering with new solar drying beds	\$20	\$0.42	\$28.2
Alt 3: Dewatering plus thermal drying	\$17.5	\$0.54	\$28.0
Note: (1) Costs are in 2012 dollars.			

## **5.0 REGIONAL WASTEWATER FACILITIES AT SUTTER PLANT**

The Sutter Plant provides wastewater treatment service for the City of Modesto, portions of north Ceres, Stanislaus County and the community of Empire. Wastewater from Modesto is conveyed by gravity through six main interceptors: the West Trunk, Emerald Trunk, River Trunk, the Cannery Segregation Line, and the South Trunk. A flow of approximately 1 mgd from north Ceres is conveyed by the Ceres Trunk. The Ceres Trunk is a 24 inch reinforced concrete pipeline that intercepts wastewater flow from the Ceres collection system at Holm Avenue and Richland Avenue, crosses the Tuolumne River to the north, and connects to the River Trunk (see Figure 5-1). Per the Modesto Collection System Master Plan (Carollo, 2007), the capacity of the Ceres Trunk was calculated to be adequate for the current North Ceres service area flows, through build out conditions. However, the Ceres Trunk is in poor condition, and it was identified in the master plan as a high priority project. The recommended improvements to the trunk sewer include structural rehabilitation (slip lining or replacement) and a new parallel 24 inch line that crosses the Tuolumne River.

A regional wastewater master plan was prepared by EKI in 2010 to investigate the potential to regionalize wastewater treatment in the northern San Joaquin County area. The study considered consolidation of treatment facilities for Salida, Modesto, Ceres, and Turlock.

One option investigated was to convey all raw wastewater from Ceres to the Sutter Plant (in addition to the wastewater from North Ceres that is currently treated at the Sutter Avenue Plant). The Ceres wastewater would be combined with current Modesto flow and treated to primary treatment levels at the Sutter Avenue facilities. Primary treated effluent would

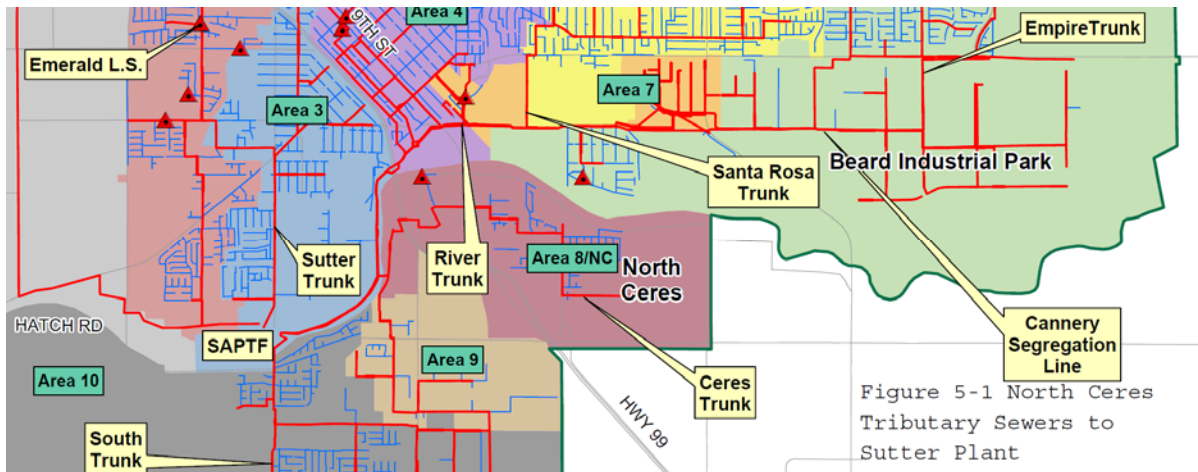


Figure 5-1 North Ceres Tributary Sewers to Sutter Plant

continue to be conveyed to the Jennings secondary/tertiary plant. This alternative was not selected, but the potential remains that Ceres could request to discharge its wastewater to the Sutter Plant in the future. Owing to the flood potential at the site, expanding the Sutter plant to accommodate Ceres is not recommended. If flood protection is eventually constructed at the site, there will be little room for expansion. If land to the west in the area of the sludge drying beds were utilized, it would require costly floodwalls or berms. In addition, the Ceres Trunk would need to be replaced with a larger diameter pipeline to provide sufficient capacity for the additional flow from Ceres. Additional analysis would be required to assess the capacity impacts on the River Trunk from increased flows from Ceres. Therefore, it is assumed that regionalization at Sutter is not a viable option, and space should not be reserved for future regional facilities.

## 6.0 RECYCLED WATER FACILITIES AT SUTTER PLANT

Recommendations from the Northern San Joaquin Valley Water Reclamation Project (RMC, 2005) included constructing a 6 to 10 mgd recycled water facility at the Sutter Plant site. However, because the only available room for the proposed recycled facilities would be the flood plain, so the area for the facilities would need to be raised with fill. For the reasons stated above (flooding potential), it would not be practical to add a recycled water plant of this capacity at the Sutter Plant. In addition, the City has begun construction of new tertiary facilities at the Jennings Road plant site that will supply recycled water. Accordingly, space will not be reserved for a future recycled water plant at the Sutter Plant.

## **7.0 COMPARISON OF PRIMARY TREATMENT LOCATIONS – CONTINUED PRIMARY TREATMENT AT SUTTER PLANT VERSUS RELOCATING THE PRIMARY FACILITIES TO THE JENNINGS ROAD PLANT SITE**

There are many challenges associated with continuing to provide primary treatment at the Sutter Plant site. Maintaining primary treatment at the Sutter Plant would require a sizable capital investment in a 50 to 60-year-old facility that is prone to flood risks. As described previously, the site would require major improvements: addition of flood protection berms, raised areas, new anaerobic digesters, a biosolids mechanical dewatering system, and new sludge drying beds with impervious linings. These projects could affect nearby residences with increasing odors and noise. Additionally, sludge hauling along city streets would impact either Robertson Road or Sutter Avenue, the only haul routes available from the Sutter Avenue plant. Public schools are located along both streets. In addition, there is a potential that the impacts to residences from new treatment facilities and the environmental effects from sludge hauling would not comply with federal environmental justice requirements (Executive Order – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, Appendix C).

An alternative approach is to construct new primary treatment facilities at the Jennings Plant and maintain the Sutter Plant for preliminary treatment (screening and de-gritting) and pumping stations (Can-Seg and Outfall Pump Station). The existing influent pump station and headworks at the Sutter Plant would remain. A new outfall pump station would replace the existing outfall pump station. The new outfall pump station would pump the screened and de-gritted wastewater to the Jennings Road Plant via the existing outfall pipeline, which is currently being relined. Flood protection (berms and raised fill) would be provided for the new pump station so that it could be accessible during flood conditions. The administration building could be converted to a regional laboratory. Operation and maintenance responsibilities for the remaining facilities at the Sutter Plant could be turned over to the City sewer collections system department, which is already housed at the Sutter Plant site.

At the Jennings Plant, primary clarifiers would be added upstream of the current secondary treatment processes (fixed film reactors and oxidation ponds) and tertiary facilities. It is assumed for comparison that the primary clarifiers would be the same size as the current clarifiers at Sutter Avenue. An alternate configuration, to tailor the clarifiers to non-cannery flows, should be considered in future planning. Two new anaerobic digesters would be added to process the solids removed by the primary clarifiers and waste activated sludge from the tertiary facilities. Because there is sufficient space at the Jennings Road site, it is assumed that the digested biosolids would be solar dried in lined sludge drying beds. Final, dried sludge cake from the drying beds would be applied to the existing Modesto Ranch land at the Jennings Plant. Currently, the biosolids disposal method is to truck dried solids from the Sutter Plant to the Jennings Plant site and apply them to the ranch land. This is done in a single “batch” operation performed at the end of each summer. If the biosolids

facilities were relocated to the Jennings Plant site, long-distance hauling would no longer be needed. Because the elevation of the Jennings Plant site is above the flood plain, flood protection of the drying beds would not be required.

Table 7.1 presents a preliminary estimate of capital costs for Alternative 1: Maintain primary treatment at Sutter Avenue. Table 7.2 presents an estimate for Alternative 2: Construct new primary facilities at the Jennings Road Plant. The preliminary estimates indicate that the costs for both alternatives may be essentially equal. Alternative 1 has an estimated cost of **\$79,990,000** and the cost for Alternative 2 is estimated at about **\$80,550,000**. Additional study is required to refine these estimates.

The City management staff met on May 2, 2012 to discuss the pros and cons of the concept of relocating the primary facilities to the Jennings Plant. Meeting notes are included in Appendix E. The following summarizes the advantages and disadvantages of the proposed relocation, taking into account the City's discussions and the analysis conducted for this Technical Memorandum.

#### Advantages:

1. Capital costs for relocating the primary facilities to the Jennings Plant site may be essentially equal to maintaining primary treatment at the Sutter Plant. Consolidating primary, secondary and tertiary treatment processes provides operational efficiencies and streamlining of staff.
2. Moving the primary treatment facilities to the Jennings Plant would be better aligned with the intent of environmental justice considerations. The remaining property could be used for a purpose more appropriate for a residential setting.
3. Moving all treatment processes to the Jennings Plant would reduce the need for land outside of the flood way at the Sutter Plant.
4. Moving solids handling operations to the Jennings Plant would place the bio-solids at their final destination, eliminating the need for transportation from the Jennings Plant.
5. The Jennings Plant has space for the primary treatment process outside the flood plain. Space is also available for expansion should the neighboring cities decide in the future to consolidate wastewater treatment in a regional facility at the Jennings Plant.

<b>Table 7.1 Preliminary Cost Estimate</b>		
<b>Alternative 1 - Maintain Primary Facilities at Sutter Plant</b>		
<b>City of Modesto, CA</b>		
<b>Project Elements</b>		<b>Project Cost <sup>(1)</sup></b>
<b>Demolition of Sutter Primary Treatment Facilities</b>		
	Primary Clarifiers	\$ 160,000
	Large Digesters	\$ 330,000
	Small Digesters	\$ -
	Digester Building No. 1	\$ 160,000
	Sludge Thickening Facilities	\$ 160,000
	Vortex Aeration Basin	\$ 160,000
	Sludge Drying Beds	\$ 160,000
	Effluent Pump Station	\$ 160,000
<b>Preliminary Treatment</b>		
	<b>Headworks (Modifications to Existing)</b>	
	New Influent Screw Pump	\$ 1,120,000
	New Fine Mechanical Bar Screens	\$ 2,820,000
	New Vortex Grit Propeller	\$ 130,000
	New Grit Pumps	\$ 180,000
	Influent Flow Metering R&R	\$ 1,550,000
<b>New Primary Effluent Pump Station</b>		
	Primary Effluent Pump Station	\$ 9,260,000
<b>Floodplain Improvements</b>		
	Levee/Fill Construction	\$ 14,010,000
	Stormwater Pump Station	\$ 1,950,000
<b>Access/Site Improvements</b>		
	Fencing/Gates/Paving/Security Improvements	\$ 1,530,000
	New Maintenance Shop/Storage Building	\$ 2,700,000
	Renovate Admin Building/Lab	\$ 1,000,000
<b>New Primary Treatment</b>		
	Primary Clarifier	
	Replacement to Primary Clarifier No. 2	\$ 9,980,000
<b>Solids Handling Facilities</b>		
	Anaerobic Digesters	
	Anaerobic Digesters 1 and 2	\$ 20,440,000
	Sludge Dewatering	\$ 12,030,000
	<b>Total Estimated Cost</b>	<b>\$ 79,990,000</b>
Note: (1) Includes engineering and contingencies		

<b>Table 7.2 Preliminary Cost Estimate</b>		
<b>Alternative 2 – Relocate Primary Facilities to Jennings Plant</b>		
<b>City of Modesto, CA</b>		
<b>Project Elements</b>		<b>Project Cost <sup>(1)</sup></b>
<b>Demolition</b>		
<b>Sutter Primary Treatment Facilities</b>	Primary Clarifiers	\$ 330,000
	Large Digesters	\$ 330,000
	Small Digesters	\$ 330,000
	Digester Buildings 1 and 2	\$ 320,000
	Sludge Thickening Facilities	\$ 160,000
	Relocate GBT	\$ 20,000
	Vortex Aeration Basin	\$ 160,000
	Sludge Drying Beds	\$ 160,000
	Effluent Pump Station	\$ 160,000
	Chlorine Support Building	\$ 160,000
<b>Preliminary Treatment at Sutter</b>		
<b>Headworks Improvements</b>		
	New Influent Screw Pump	\$ 1,120,000
	New Fine Mechanical Bar Screens	\$ 2,820,000
	New Vortex Grit Propeller	\$ 130,000
	New Grit Pumps	\$ 180,000
	Influent Flow Metering R&R	\$ 1,550,000
	Interim Digester Improvements <sup>(2)</sup>	\$ 1,400,000
<b>New Screened Effluent Pump Station at Sutter Ave</b>		
	Screened Effluent Pump Station	\$ 9,260,000
	Screened Effluent Pipeline within Sutter Plant Site	\$ 1,140,000
<b>Floodplain Improvements at Sutter Ave.</b>		
	Raise Grade around new Structures	\$ 1,380,000
<b>Access/Site Improvements at Sutter</b>		
	Fencing/Gates/Paving/Security Improvements	\$ 1,530,000
<b>Operations Support Facilities</b>		
	Laboratory Improvements	\$ 1,010,000
	New Maintenance Shop/Storage Building	\$ 2,700,000
	Annex to Operations Center <sup>(3)</sup>	\$ 1,400,000
<b>New Primary Treatment (at Jennings Plant)</b>		<b>\$ 19,960,000</b>
<b>Solids Handling Facilities (at Jennings Plant)</b>		
<b>Anaerobic Digesters</b>	Anaerobic Digesters 1 and 2 including	\$ 20,440,000
	Digester Support Facilities	
	Sludge Drying Beds	\$ 12,560,000
	<b>Total Estimated Cost</b>	<b>\$ 80,550,000</b>
Notes:		
(1) Includes engineering and contingencies		
(2) Based on Digester Evaluation Report by Carollo Engineers, January 2009. Costs escalated to 2012.		
(3) Based on 3,000 square feet at \$480/SF.		

6. Solids handling facility at the Jennings Plant would provide a permanent way to process waste activated sludge (WAS) rather than the current practice of sending WAS to the recirculation channel. Using the recirculation channel for WAS disposal is a temporary measure.
7. The City is exploring renewable energy opportunities using digester gas generated from anaerobic digesters. The Jennings Plant location would be more advantageous for a regional energy project because it could receive wastes from domestic and agricultural sources, such as cow manure.
8. The existing sludge drying beds at the Sutter Plant are in the flood way; alternative locations on the site put them in the flood plain. There are no sites available at the Sutter Plant that are above the flood zone. At the Jennings Plant site, the new drying beds would be above the flood plain and lined to protect the groundwater.

Disadvantages:

1. The Sutter Plant digesters are in need of immediate attention; moving the primary facilities to the Jennings Plant would delay this project. An interim digester rehabilitation project would be needed to allow operation of the two existing digesters so that the City can operate within permit requirements.
2. Building primary treatment facilities at the Jennings Plant was not in the Master Plan or programmed in the rate study.
3. Transporting raw sewage through the 60" outfall pipelines could result in unwanted accumulation of settable solids or grease in the pipeline. The impacts of more solids and grease could be mitigated by providing fine screens upstream of the raw sewage pump station. In addition, without primary treatment, the BOD levels would be some 20 to 30 percent higher, which may result in higher levels of hydrogen sulfide generation in the wastewater as it travels down the pipeline. The City is already experiencing severe corrosion from sulfides in the primary effluent. Additional study is required to better predict the effects of higher BOD levels in the wastewater and the potential for increased hydrogen sulfide levels. Possible remedies for reducing sulfides may include chemical addition at the Sutter Plant.
4. The digester facilities at the Jennings Plant would result in a longer haul for fats oils and grease (FOG) and waste haulers that currently use the Sutter Plant.
5. The new primary facilities at Jennings road would remove approximately 18 acres of land out of the 2,500 acres currently used for irrigation with secondary effluent and food processing wastes (less than 1%). This would have a minor impact on the water balance at Jennings Road and the food processing waste land application capacity. An alternative to preserve the current land area is to acquire land to the north of the Jennings Plant entrance road.

## 8.0 FACILITY LAYOUT PLANS

Facility layout plans were prepared for three planning scenarios to evaluate the range of possible outcomes for the Sutter Plant. Selection of one of the alternatives is pending the outcome of a more detailed study. Facility layout plans were developed for the following scenarios.

Scenario A – Continued primary treatment at the Sutter Plant, no land acquired from TRRP

Scenario B – Continued primary treatment at the Sutter Plant, land acquired from TRRP

Scenario C – Primary treatment facilities (primary clarifiers and digesters) moved to the Jennings Plant. This plan also includes a possible layout for the Jennings Plant primary facilities.

### 8.1 Scenario A Layout – Continued Primary Treatment at Sutter Plant, No Land Acquired from TRRP

Under this scenario it is assumed that the plant site would remain in its present boundaries, i.e., land would not be acquired from TRRP. The layout for scenario A is shown in Figure 8-1. The key features of the layout are described below.



Figure 8-1

Figure 8-1 Facility Layout Plan – Scenario A (current available land)

### **8.1.1 Plant Access and Traffic Circulation.**

Access to the plant would be restricted with electronic key-controlled gates. A detail of the access and traffic routes was shown previously in Figure 2-5. This layout was prepared assuming that the existing administration building would not be moved. The plan was developed to confine access to the routes shown, providing more restrictions to areas deeper in the plant.

### **8.1.2 Flood Protection**

Flood protection would be provided by constructing a combination of and earthen berms and raised areas. A conceptual view of the earthen berms system is illustrated in Figure 8-2. It was assumed that the berms and raised areas would be located along the northern boundary of the flood way line to protect all facilities except Primary Clarifier 2, which is in the floodway. Additional geotechnical Clarifier 2 would be demolished and replaced with a new primary clarifier. The new clarifier would be constructed in the site of the abandoned vortex aeration basin. New Clarifier No. 2 should be designed to match the elevation of Clarifier 1 to facilitate equal flow distribution.

Flood protection berms would also surround the sludge drying beds. See discussion that follows.

### **8.1.3 Administration Building**

Under this scenario, the administration building would be renovated. Space will be reserved in the northeast corner of the site for a future administration building.

### **8.1.4 Solids Handling**

The layout for solids handling was developed with the following assumptions:

1. Two new anaerobic digesters would be constructed at the site shown.
2. The sludge drying beds would be used for storing and drying sludge cake from a new mechanical sludge dewatering facility at the Sutter Plant. With this approach, the required land space for the beds could be reduced from the current approximately 21 acres to approximately 8 acres. This approach would minimize the length of flood protection berms and the cost of new drying beds. Minimizing the area for the drying beds is beneficial because the new drying beds would need to be lined, which would increase costs. Dried sludge cake would be hauled once per year to the Jennings Road site per current practices.
3. A new solids handling building would be added to house a mechanical dewatering process - a screw press, belt filter press, or centrifuge. The solids building would also contain the relocated gravity belt thickener. The building would be equipped

with a robust ventilation system and odor scrubbing system (soil bed filters or ozone scrubbing system).

### **8.1.5 Abandoned or underutilized structures**

Abandoned or underutilized structures at the Sutter Plant would be removed or used for new purposes:

1. **Dissolved air flotation thickeners (DAFTs) (Area 2):** The DAFTs would be removed entirely, and the remaining excavation will be backfilled and paved.
2. **Vortex aeration basin (Area 2):** The vortex aeration basin would be removed and a new primary clarifier (No. 2) constructed in its place.
3. **Aeration structures (Area 3):** As described previously, the aeration structure has been converted to a new VacCon unloading station.
4. **Sludge drying beds (Area 4):** The drying beds would be replaced with a mechanical sludge dewatering system and then abandoned. The current basins used for storm water retention and to hold solids during anaerobic digester cleaning would be retained. If the City is considering acquisition of TRRP land, the land currently occupied by the south half of the drying beds along the riverbank could be offered in exchange for the land to the north. The TRRP master plan expressed an interest in extending the park to the riverfront so that the riverbank trail could be extended from the golf course to Carpenter Road. Design feature could also be incorporated along the riverbank to enhance the riparian habitat experience for the public.

## **8.2 Scenario B Layout - Continued Primary Treatment at Sutter Plant, Acquisition of Land from TRRP**

The site layout for this scenario is shown in Figure 8-2. The principal advantage of acquiring TRRP land is to gain space on the north boundary of the site along Robertson Road. This would be the only area at the Sutter Plant that would be out of the flood plain. In addition, the land further west and to the north would be at higher ground, although still within the flood zone.

This layout differs from the Scenario A layout as follows:

1. The sludge cake drying beds would be moved further to the north to higher ground. This would reduce the extent of flood protection berms, although the sludge cake beds would need to be covered to contain odors and site impacts to nearby residents. It is assumed that the sludge cake drying operation would be contained in a greenhouse with automatic sludge turners to maintain aerobic conditions. Solar drying with greenhouses is supplied through several vendors. A representative example is the Heliantis Solar Sludge Drying system manufactured by Degremont. Figures 8-3 and

8-4 illustrate the features of a green house sludge drying facility. The ventilation air from the greenhouse would need to be treated within an odor scrubber.

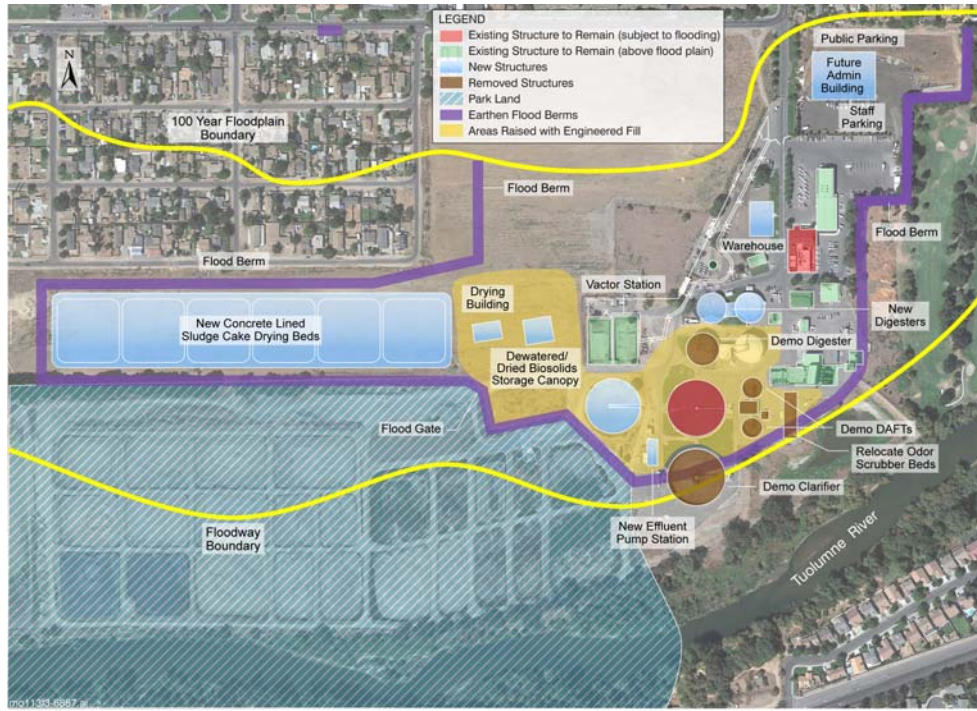


Figure 8-2 Facility Layout Plan – Scenario B (Land Acquisition from TRRP)

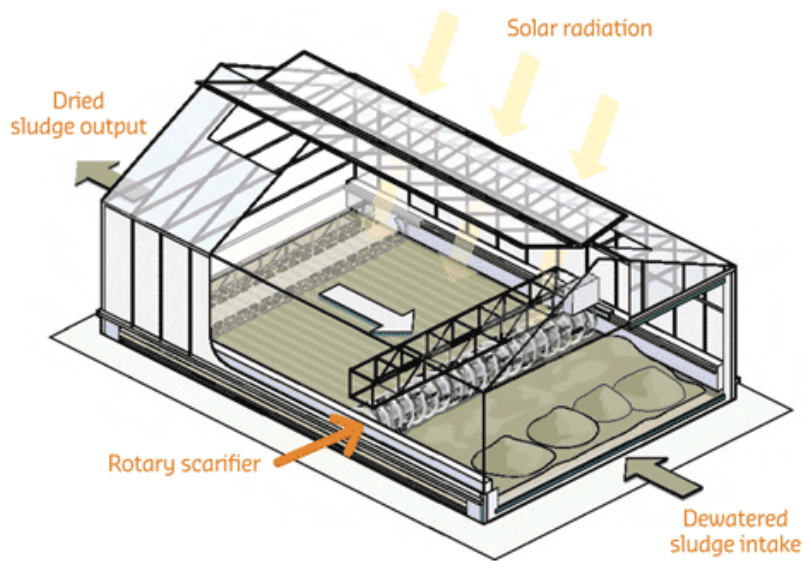


Figure 8-3 Schematic of Solar Sludge Drying. Image Courtesy of Heliantis™



Figure 8-4 Solar Sludge Drying Bed. Image Courtesy of Heliantis™

2. The space bordering Robertson Road and the plant entrance road would be reserved for a future administration building and parking area. Because this area is above the flood zone, flood protection berms would not be required. Locating treatment facilities in this area is not recommended because they would impact residences immediately to the west, north, and east.

### **8.3 Scenario C – Move Primary Treatment Facilities to the Jennings Plant**

Under this scenario, the primary treatment facilities (primary clarifiers, anaerobic digesters, and sludge drying beds) would be demolished at the Sutter Plant. New primary facilities would be constructed at the Jennings Plant. The site layout for the Sutter Plant under Scenario C is shown in Figure 8-5. Features of the layout include:

1. The following structures would be removed: primary clarifiers, anaerobic digesters, sludge drying beds, the chlorine support building, effluent pump station.
2. A new screened effluent pump station would be added just downstream of the influent flumes at the Headworks. The pump station would discharge to the current outfall pipeline to the Jennings Plant.

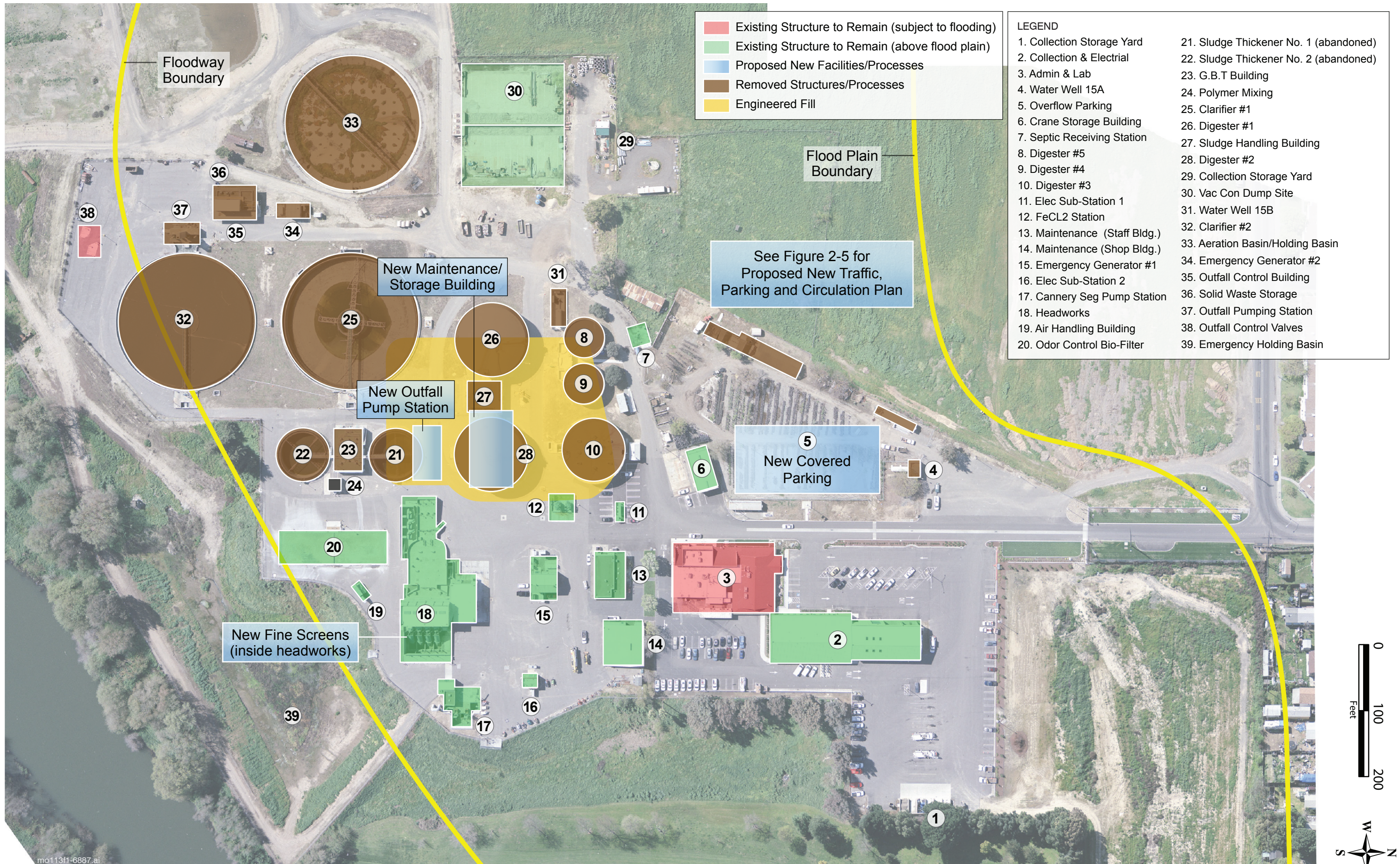


Figure 8-5

mo113f1-6887.ai

3. A new bar screen system with fine screens would replace the existing coarse screen system. The screens would be designed to remove small pieces of rags, paper, plastics, and other trash from the flow. Providing improved screening at the Sutter Plant would reduce maintenance needs in the raw sewage pump station, outfall and the primary treatment facilities at the Jennings Plant. The screens would be installed as replacements to the current bar screens in the Headworks.
4. The laboratory at Sutter Plant would be expanded. With fewer unit processes at the Sutter Plant, the revised Sutter Plant facilities would require fewer people for operation and maintenance (most staff would be transferred to the Jennings Plant). The reduction of staff at the Sutter Plant and the office space would provide space for expanding the current laboratory for water and wastewater testing.
5. A new maintenance/storage building would be added at the Sutter Plant to house equipment storage, a paint booth, wood shop and materials storage.
6. The space currently occupied by the sludge drying beds would be available for other uses, such as expanding the TRRP.

Figure 8-6 is a preliminary layout of the primary treatment facilities at the Jennings Plant. The new facilities could be located to the south of the Jennings Plant entrance road next to the tertiary treatment facilities. Additional piping would be required to convey the raw sewage from the outfall pipelines to the primary facilities. Alternative sites to the north may also be available, but land would need to be acquired for this location. A more detailed analysis (facility plan) will be required to select the site for the primary facilities. Features of the new primary facilities at the Jennings Plant would include:

1. Circular primary clarifiers, similar to the existing clarifiers at Sutter Avenue.
2. A 3,000 square foot expansion of the Operations Center.
3. Two anaerobic digesters of the same size as recommended for the Sutter Avenue Plant.
4. Sludge drying beds. It is assumed that there is land available for solar drying and a mechanical dewatering system would not be required.
5. The entire site would be above the flood zone (Figure 8-7).



Figure 8-6 Primary Treatment Facilities Layout at the Jennings Plant

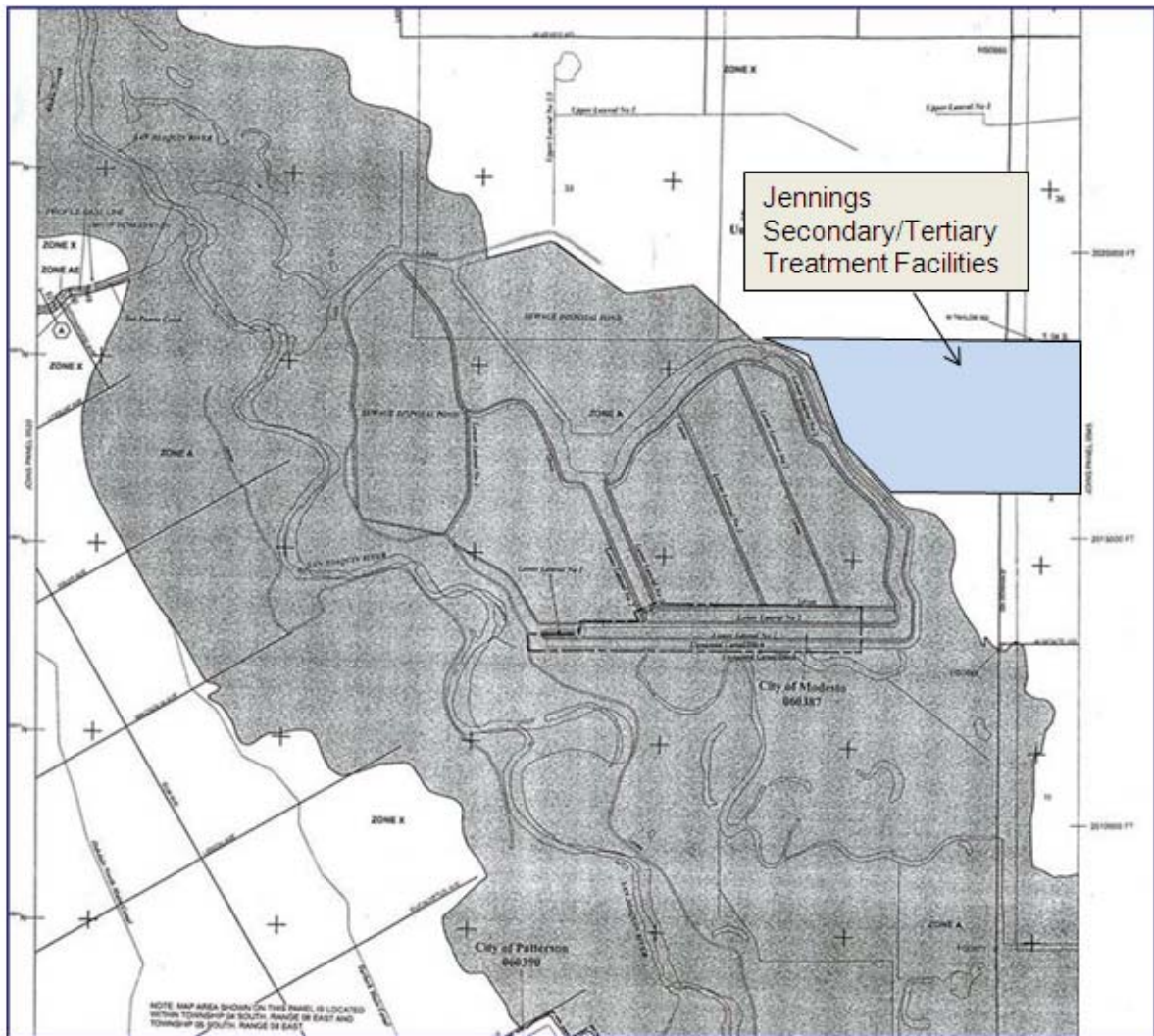


Figure 8-7 Floodway Map of the Jennings Road Plant

## 8.4 Summary and Conclusions

The following are preliminary recommendations for Scenario C, which is to move the primary facilities to the Jennings Plant. Additional study will be required to confirm selection of this alternative and to finalize the layouts at the Sutter and Jennings Plants.

1. The following structures will be demolished at the Sutter Plant:
  - Vortex aeration tank
  - DAFT units
  - Primary clarifiers No. 1 and No. 2
  - Digesters 1 through 5
  - Digester control building

- Digester Gas Flare
  - Sludge drying beds (except for pond designated for storm water retention basin)
  - Primary effluent pump station and electrical support system
  - Chlorine support building (current paint booth and wood shop)
2. The existing headworks will remain. The existing bar screens will be replaced with fine screens.
  3. The primary effluent pump station at the Sutter Plant will be replaced with a new effluent pump station. The area surrounding the pump station will be raised to above the flood plain so the station can remain in operation and accessible by road during flooding. A new standby power system to serve the pump station would also be located above the flood plain.
  4. Additional new structures will be added to the Sutter Plant.
    - A new maintenance building will be provided at the Sutter Plant on high ground roughly in the footprint of the existing Digester No. 1.
    - The area surrounding the building will be raised to be above the flood plain.
    - The maintenance building will house a new paint shop, wood shop and provide space for storing equipment and supplies.
  5. The following structures will remain at the Sutter Plant:
    - Head works structure.
    - Administration building (remodeled to upgrade laboratory).
    - DAFT support building (to be reused for storage).
    - Maintenance building annex.
    - Electrical support equipment for the head works.
    - Vac Con truck unloading station.
    - Storm water retention basin.
  6. The following equipment will be relocated to the Jennings Plant:
    - Gravity belt thickener for thickening waste activated sludge.
    - Digester gas scrubbing system.
  7. The following improvements at the Sutter Plant will be implemented:
    - Site access restrictions (signage and card reading system with security gates)
    - New parking lot.
    - Hazardous materials storage facility.
    - Upgraded lab.
    - Repairs and new coatings for corroded equipment in the headworks area, including: ductwork, gate operators on the flume structure, and grit piping.

- Improvements to the flume structure to correct hydraulic deficiencies and improve flow measurement accuracy.
  - Interim improvements to Digesters 1 and 2.
8. No flood control measures will be provided except for raising the grade around the new effluent pump station and maintenance building. Flood walls and flood berms will not be constructed.

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**APPENDIX A – TOPOGRAPHIC MAP**

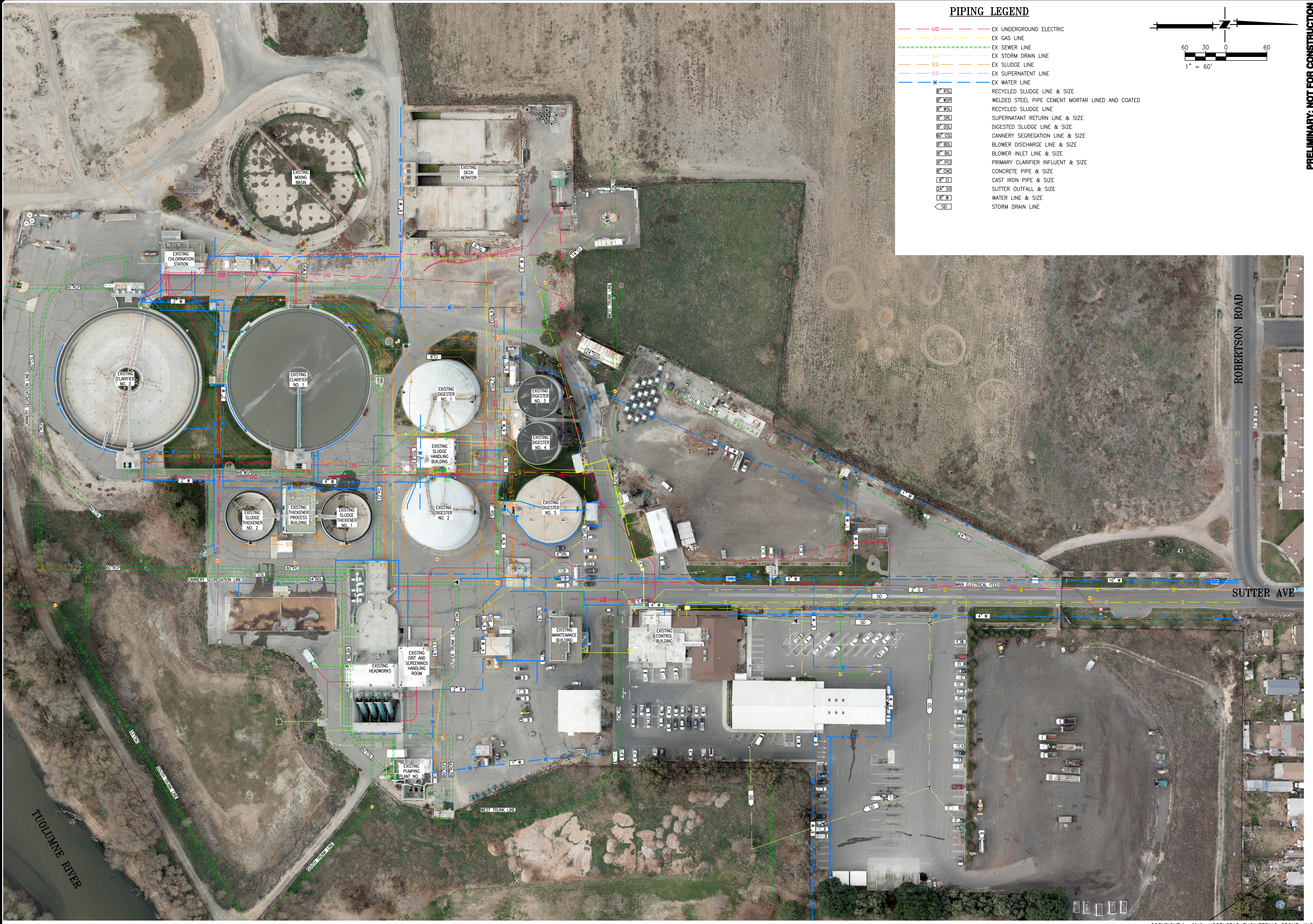
### APPENDIX A: TOPOGRAPHIC MAP



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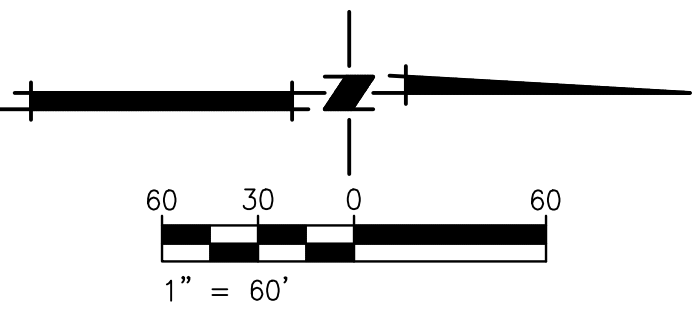
**APPENDIX B – UTILITY LAYOUT PLAN**

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**PIPING LEGEND**

- UG UNDERGROUND ELECTRIC
- G EX GAS LINE
- SD EX SEWER LINE
- SD EX STORM DRAIN LINE
- SS EX SLUDGE LINE
- SS EX SUPERNATANT LINE
- W EX WATER LINE
- 8" RSL RECYCLED SLUDGE LINE & SIZE
- 8" WSP WELDED STEEL PIPE CEMENT MORTAR LINED AND COATED
- 8" WSL RECYCLED SLUDGE LINE
- 8" SRL SUPERNATANT RETURN LINE & SIZE
- 8" DSL DIGESTED SLUDGE LINE & SIZE
- 60" CSL CANNERY SEGREGATION LINE & SIZE
- 8" BDL BLOWER DISCHARGE LINE & SIZE
- 8" BIL BLOWER INLET LINE & SIZE
- 8" PCP PRIMARY CLARIFIER INFLUENT & SIZE
- 8" CNG CONCRETE PIPE & SIZE
- 8" CI CAST IRON PIPE & SIZE
- 24" SO SLUTTER OUTFALL & SIZE
- 8" W WATER LINE & SIZE
- SD STORM DRAIN LINE



**PRELIMINARY: NOT FOR CONSTRUCTION**



NO.	DESCRIPTION	APPROVED	DATE

**EXISTING FACILITIES LAYOUT**  
**CITY OF MODESTO**  
**FACILITIES LAYOUT PLAN**

MODESTO, CALIFORNIA

JOB #: 11-1030  
 DATE: 03/01/12  
 SCALE: 1"=60'  
 DRAWN: EWB  
 DESIGN: JMB  
 CHK'D: JMB

SHEET NUMBER  
**01**

**APPENDIX C – ENVIRONMENTAL JUSTICE  
EXECUTIVE ORDER**

# Presidential Documents

## Title 3—

## Executive Order 12898 of February 11, 1994

### The President

### Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

#### **Section 1-1.***Implementation.*

**1-101.** *Agency Responsibilities.* To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

#### **1-102.** *Creation of an Interagency Working Group on Environmental Justice.*

(a) Within 3 months of the date of this order, the Administrator of the Environmental Protection Agency (“Administrator”) or the Administrator’s designee shall convene an interagency Federal Working Group on Environmental Justice (“Working Group”). The Working Group shall comprise the heads of the following executive agencies and offices, or their designees: (a) Department of Defense; (b) Department of Health and Human Services; (c) Department of Housing and Urban Development; (d) Department of Labor; (e) Department of Agriculture; (f) Department of Transportation; (g) Department of Justice; (h) Department of the Interior; (i) Department of Commerce; (j) Department of Energy; (k) Environmental Protection Agency; (l) Office of Management and Budget; (m) Office of Science and Technology Policy; (n) Office of the Deputy Assistant to the President for Environmental Policy; (o) Office of the Assistant to the President for Domestic Policy; (p) National Economic Council; (q) Council of Economic Advisers; and (r) such other Government officials as the President may designate. The Working Group shall report to the President through the Deputy Assistant to the President for Environmental Policy and the Assistant to the President for Domestic Policy.

(b) The Working Group shall: (1) provide guidance to Federal agencies on criteria for identifying disproportionately high and adverse human health or environmental effects on minority populations and low-income populations;

(2) coordinate with, provide guidance to, and serve as a clearinghouse for, each Federal agency as it develops an environmental justice strategy as required by section 1-103 of this order, in order to ensure that the administration, interpretation and enforcement of programs, activities and policies are undertaken in a consistent manner;

(3) assist in coordinating research by, and stimulating cooperation among, the Environmental Protection Agency, the Department of Health and Human Services, the Department of Housing and Urban Development, and other agencies conducting research or other activities in accordance with section 3-3 of this order;

(4) assist in coordinating data collection, required by this order;

(5) examine existing data and studies on environmental justice;

(6) hold public meetings as required in section 5-502(d) of this order; and

(7) develop interagency model projects on environmental justice that evidence cooperation among Federal agencies.

**1-103. *Development of Agency Strategies.*** (a) Except as provided in section 6-605 of this order, each Federal agency shall develop an agency-wide environmental justice strategy, as set forth in subsections (b)-(e) of this section that identifies and addresses disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The environmental justice strategy shall list programs, policies, planning and public participation processes, enforcement, and/or rulemakings related to human health or the environment that should be revised to, at a minimum: (1) promote enforcement of all health and environmental statutes in areas with minority populations and low-income populations; (2) ensure greater public participation; (3) improve research and data collection relating to the health of and environment of minority populations and low-income populations; and (4) identify differential patterns of consumption of natural resources among minority populations and low-income populations. In addition, the environmental justice strategy shall include, where appropriate, a timetable for undertaking identified revisions and consideration of economic and social implications of the revisions.

(b) Within 4 months of the date of this order, each Federal agency shall identify an internal administrative process for developing its environmental justice strategy, and shall inform the Working Group of the process.

(c) Within 6 months of the date of this order, each Federal agency shall provide the Working Group with an outline of its proposed environmental justice strategy.

(d) Within 10 months of the date of this order, each Federal agency shall provide the Working Group with its proposed environmental justice strategy.

(e) Within 12 months of the date of this order, each Federal agency shall finalize its environmental justice strategy and provide a copy and written description of its strategy to the Working Group. During the 12 month period from the date of this order, each Federal agency, as part of its environmental justice strategy, shall identify several specific projects that can be promptly undertaken to address particular concerns identified during the development of the proposed environmental justice strategy, and a schedule for implementing those projects.

(f) Within 24 months of the date of this order, each Federal agency shall report to the Working Group on its progress in implementing its agency-wide environmental justice strategy.

(g) Federal agencies shall provide additional periodic reports to the Working Group as requested by the Working Group.

**1-104. *Reports to the President.*** Within 14 months of the date of this order, the Working Group shall submit to the President, through the Office of the Deputy Assistant to the President for Environmental Policy and the Office of the Assistant to the President for Domestic Policy, a report that describes the implementation of this order, and includes the final environmental justice strategies described in section 1-103(e) of this order.

**Sec. 2-2. *Federal Agency Responsibilities for Federal Programs.*** Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin.

**Sec. 3-3. Research, Data Collection, and Analysis.**

**3-301. Human Health and Environmental Research and Analysis.** (a) Environmental human health research, whenever practicable and appropriate, shall include diverse segments of the population in epidemiological and clinical studies, including segments at high risk from environmental hazards, such as minority populations, low-income populations and workers who may be exposed to substantial environmental hazards.

(b) Environmental human health analyses, whenever practicable and appropriate, shall identify multiple and cumulative exposures.

(c) Federal agencies shall provide minority populations and low-income populations the opportunity to comment on the development and design of research strategies undertaken pursuant to this order.

**3-302. Human Health and Environmental Data Collection and Analysis.** To the extent permitted by existing law, including the Privacy Act, as amended (5 U.S.C. section 552a): (a) each Federal agency, whenever practicable and appropriate, shall collect, maintain, and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin, or income. To the extent practical and appropriate, Federal agencies shall use this information to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations;

(b) In connection with the development and implementation of agency strategies in section 1-103 of this order, each Federal agency, whenever practicable and appropriate, shall collect, maintain and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have a substantial environmental, human health, or economic effect on the surrounding populations, when such facilities or sites become the subject of a substantial Federal environmental administrative or judicial action. Such information shall be made available to the public, unless prohibited by law; and

(c) Each Federal agency, whenever practicable and appropriate, shall collect, maintain, and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding Federal facilities that are: (1) subject to the reporting requirements under the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. section 11001-11050 as mandated in Executive Order No. 12856; and (2) expected to have a substantial environmental, human health, or economic effect on surrounding populations. Such information shall be made available to the public, unless prohibited by law.

(d) In carrying out the responsibilities in this section, each Federal agency, whenever practicable and appropriate, shall share information and eliminate unnecessary duplication of efforts through the use of existing data systems and cooperative agreements among Federal agencies and with State, local, and tribal governments.

**Sec. 4-4. Subsistence Consumption of Fish and Wildlife.**

**4-401. Consumption Patterns.** In order to assist in identifying the need for ensuring protection of populations with differential patterns of subsistence consumption of fish and wildlife, Federal agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Federal agencies shall communicate to the public the risks of those consumption patterns.

**4-402. Guidance.** Federal agencies, whenever practicable and appropriate, shall work in a coordinated manner to publish guidance reflecting the latest scientific information available concerning methods for evaluating the human health risks associated with the consumption of pollutant-bearing fish or

wildlife. Agencies shall consider such guidance in developing their policies and rules.

**Sec. 5-5. *Public Participation and Access to Information.*** (a) The public may submit recommendations to Federal agencies relating to the incorporation of environmental justice principles into Federal agency programs or policies. Each Federal agency shall convey such recommendations to the Working Group.

(b) Each Federal agency may, whenever practicable and appropriate, translate crucial public documents, notices, and hearings relating to human health or the environment for limited English speaking populations.

(c) Each Federal agency shall work to ensure that public documents, notices, and hearings relating to human health or the environment are concise, understandable, and readily accessible to the public.

(d) The Working Group shall hold public meetings, as appropriate, for the purpose of fact-finding, receiving public comments, and conducting inquiries concerning environmental justice. The Working Group shall prepare for public review a summary of the comments and recommendations discussed at the public meetings.

**Sec. 6-6. *General Provisions.***

**6-601. *Responsibility for Agency Implementation.*** The head of each Federal agency shall be responsible for ensuring compliance with this order. Each Federal agency shall conduct internal reviews and take such other steps as may be necessary to monitor compliance with this order.

**6-602. *Executive Order No. 12250.*** This Executive order is intended to supplement but not supersede Executive Order No. 12250, which requires consistent and effective implementation of various laws prohibiting discriminatory practices in programs receiving Federal financial assistance. Nothing herein shall limit the effect or mandate of Executive Order No. 12250.

**6-603. *Executive Order No. 12875.*** This Executive order is not intended to limit the effect or mandate of Executive Order No. 12875.

**6-604. *Scope.*** For purposes of this order, Federal agency means any agency on the Working Group, and such other agencies as may be designated by the President, that conducts any Federal program or activity that substantially affects human health or the environment. Independent agencies are requested to comply with the provisions of this order.

**6-605. *Petitions for Exemptions.*** The head of a Federal agency may petition the President for an exemption from the requirements of this order on the grounds that all or some of the petitioning agency's programs or activities should not be subject to the requirements of this order.

**6-606. *Native American Programs.*** Each Federal agency responsibility set forth under this order shall apply equally to Native American programs. In addition, the Department of the Interior, in coordination with the Working Group, and, after consultation with tribal leaders, shall coordinate steps to be taken pursuant to this order that address Federally-recognized Indian Tribes.

**6-607. *Costs.*** Unless otherwise provided by law, Federal agencies shall assume the financial costs of complying with this order.

**6-608. *General.*** Federal agencies shall implement this order consistent with, and to the extent permitted by, existing law.

**6-609. *Judicial Review.*** This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any person. This order shall not be construed to create any right to judicial review involving the compliance or noncompliance

of the United States, its agencies, its officers, or any other person with this order.

A handwritten signature in black ink that reads "William J. Clinton". The signature is written in a cursive, flowing style.

THE WHITE HOUSE,  
*February 11, 1994.*

[FR Citation 59 FR 7629]

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**APPENDIX D – RISK MANAGEMENT PLAN**

**RISK MANAGEMENT PLAN**  
**FOR**  
**CITY OF MODESTO**  
**PRIMARY WASTEWATER TREATMENT PLANT**

**PREPARED BY**

**BASE ASSOCIATES**  
**ELK GROVE, CALIFORNIA**  
916-687-6586

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## RMP CERTIFICATION

### FACILITY CERTIFICATION

I certify that the information contained in this report is a true and accurate reflection of the practices and procedures currently in effect at the City of Modesto - Primary Wastewater Treatment Plant located at 1221 Sutter Avenue in Modesto, California. I hereby attest that this Risk Management Plan is complete and has been prepared in accordance with the California Health and Safety Code Division 20 Chapter 6.95 Article 2 and CCR Title 19 Division 2 Chapter 4.5 Articles 1 thru 11.

J. N. Ericson  
Signature

8/26/98  
Date

JEFFREY N. ERICSON  
Name - Printed

PLANT MAINTENANCE SUPERVISOR  
Title of Facility Executive

CITY OF MODESTO  
Organization

### TECHNICAL VALIDATION

I hereby attest to the validity and accuracy of the results and findings of the Technical Studies. I have prepared or reviewed the technical documents and am satisfied that they are a true reflection of the current status of the Regulated Substances handling equipment, controls, instrumentation, procedures, and maintenance at the City of Modesto - Primary Wastewater Treatment Plant located at 1221 Sutter Avenue in Modesto, California.

Ronald J. Baschiere  
Signature

08/05/98  
Date

RONALD J. BASCHIERE  
Name - Printed

SENIOR PARTNER  
Title of Technical Expert

BASE ASSOCIATES  
Company

## SECTION 1

### INTRODUCTION

The City of Modesto - Primary Wastewater Treatment Plant (PWTP) located at 1221 Sutter Avenue in Modesto, California is providing to the Stanislaus County - Hazardous Materials Division (SC-HMD), who is the Administering Agency, a Risk Management Plan (RMP) as part of the California Accidental Release Program (CalARP). This document is the RMP for the subject stationary source.

This response is made pursuant to California Health & Safety Code (H&SC) Division 20, Chapter 6.95, Article 2 and the California Code of Regulations (CCR) Title 19 Division 2 Chapter 4.5 Articles 1 through 11. The Code permits Administering Agencies to require a stationary source handling greater than a Threshold Quantity (TQ) of a regulated substance to prepare a RMP. At the subject site, regulated substances are handled in quantities greater than the TQ. This RMP is being prepared to identify the equipment, procedures, maintenance, inspection, and training associated with the regulated substances; to provide a structured assessment of hazards which may affect offsite sensitive populations; to define prevention and mitigation measures to reduce the probability and magnitude of accidental releases of the regulated substances; and to establish a schedule and responsibilities for implementation of prevention, minimization, and mitigation measures regarding the accidental release of the regulated substances.

### Subject Processes And Regulated Substances

The processes and regulated substances to be considered in this RMP are the chlorination of the primary effluent for the control of sulfides by chlorine from one ton containers of chlorine. Information on these chemicals is presented in Table 1 (all Tables are included in Section 9) and the MSDS in Appendix E.

### Program Levels

The process for the chlorination of the primary effluent for the control of sulfides by chlorine from one ton containers of chlorine requires a Process Safety Management (PSM) Program and is a Program 3.

### Overview Of RMP Elements

This RMP contains all of the elements required by the Federal RMP per 40 CFR, Chapter I, Subchapter C, Subpart A, Part 68; the State of California RMP per State of California Health & Safety Code Division 20, Chapter 6.95, Article 2 and the CCR Title 19 Division 2 Chapter 4.5 Articles 1 through 11; the CAL/OSHA Process Safety Management Program (PSM) per CCR Title 8 Division 1 Chapter 4 Subchapter 7 Section 5189; and the

Administering Agency including:

- The description of systems for all regulated processes at the stationary source containing or handling the regulated substances
- The equipment and procedures to prevent, minimize or mitigate accidental releases for each regulated substance for each regulated process at the stationary source
- The quality control procedures utilized for system design, installation, operation, and maintenance for each regulated substance for each regulated process at the stationary source
- The hazard assessment for each regulated substance for each regulated process at the stationary source to identify hazards resulting from operational normal and abnormal events and external events, and to identify further risk reduction and mitigation measures to prevent the actual or potential release of a regulated substance
- An Offsite Consequence Analysis of the Worst Case release scenario and Alternative Release scenario for each regulated substance for each regulated process at the stationary source
- The administrative program and management system for the RMP, to implement recommended risk reduction, prevention and mitigation measures, and to keep the RMP updated
- The prevention program implemented for each regulated substance for each regulated process at the stationary source
- The emergency response program for each regulated substance for each regulated process at the stationary source
- The Federal and State of California mandated RMP submission with the Executive Summary and Risk Management Plan Data Elements

A detailed "Checklist" provided in Appendix P has the information requested in each section of CCR Title 19 Division 2 Chapter 4.5 Articles 1 through 11 and states where that information is located in this RMP.

**RMP Submittals**

The PWTP, as a stationary source which handles more than the threshold quantity of a regulated substance, namely, chlorine, will submit a single RMP for all the subject regulated processes. The processes at the PWTP are all Program 3. The PWTP will submit this RMP to the SC-HMD for all the regulated processes since the regulated substances exceed the

threshold quantities for each given in Title 19 Division 2 Chapter 4.5 Section 2770.5 Table 3.

The PWTP will submit the required RMP to the United States Environmental Protection Agency (USEPA) in the method and format specified by USEPA for the Program 3 regulated processes covered by the regulated substances which exceed the threshold quantities for each given in Title 19 Division 2 Chapter 4.5 Section 2770.5 Table 1.

## SECTION 2

### DESCRIPTION OF FACILITY AND SUBJECT PROCESSES

#### Overall Site

The PWTP site is situated in the central portion of Stanislaus County. The site is in the southwest portion of the City of Modesto in a urban area. The location for the PWTP site is provided in Figure 1.

A general layout and site plan is shown in Figure 2. The chlorine system is located in the Chlorination Station building. Further details of this location is given in the drawings provided in Appendix A.

#### Description Of Facility

##### General

The Modesto Water Quality Control Facility consists of the main plant termed the Primary Wastewater Treatment Plant (PWTP) and the remote ponding site with land disposal facilities termed the Secondary Wastewater Treatment Plant (SWTP).

##### Primary Treatment

Five trunk systems carry wastewater to the treatment plant for processing. They are the Emerald Avenue trunk, Sutter Avenue trunk, Dryden trunk, West trunk, and South trunk. The influent wastewater passes through bar screens and is then pumped by the Upper Level, Lower Level, or No. 3 Pumping Plant. The discharge from each pumping plant is combined for treatment in one Vacuator to remove grit and floatable solids.

Following treatment by the Vacuator, the wastewater undergoes primary clarification. Two Primary Clarifiers are operated in parallel during the canning season. During the remaining months of the year, only one Primary Clarifier is normally required due to the decreased flows.

##### Remote Ponding Site

The primary effluent is chlorinated for the control of sulfides, and is then pumped by the Outfall Pump Station to the remote ponding site, i.e., the SWTP. There, the plant effluent is further treated by three fixed film reactors, then is recirculated through aerated channels and three oxidation ponds that have a combined surface area of 496 acres. This fixed film reactor-ponding system provides final processing to satisfy the biochemical oxygen demand (BOD) through biological action with mechanical aeration and recirculation.

The ponds are essentially algae lagoons, but with supplemental aeration and recirculation. Under most circumstances, the oxygen required for normal biologic oxidation of dissolved organic material is supplied by the photosynthesis of algae within the ponding system. Large quantities of additional oxygen are available by turning on the floating aerators as needed. In addition, the very high rate of recirculation provided by the recirculation pumps promotes high surface reaeration and assists in maintaining uniform conditions within the ponding system.

Following treatment in the ponds, the effluent is disinfected by chlorine in solution prior to river disposal or, if required, prior to irrigation disposal. All river discharge must also be dechlorinated by using sulfur dioxide in solution. When discharged for use at the effluent disposal ranch, the treated wastewater is pumped to an Irrigation Reservoir by the Irrigation Pump Station. Discharge to the San Joaquin River may be by gravity, or may be pumped to the river as conditions require.

#### Treatment Of Plant Solids

Vacuator, primary clarifier and sludge thickener solids are handled through the plant's Solids Handling System. The general flow of scum and sludge is through the Primary Digesters, the Secondary Digesters, and then to the Sludge Drying Beds for dewatering. The resulting sludge cake, the solids from the degritters, and scum from the remote ponds must be removed manually for disposal.

There is a daily maximum of 60,000 lb of chlorine at the PWTP facility.

#### Accident History Involving Regulated Substances

There have been no incidents involving the release of chlorine within the past five years at the PWTP site.

#### Subject Processes

The subject process, which utilizes the regulated substance to be considered in this RMP, is described below.

#### Sulfide Control By Chlorine System

The primary effluent is chlorinated for the control of sulfides, and is then pumped by the Outfall Pump Station to the remote ponding site, i.e., the SWTP. A process flow chart of the chlorine operations is given in Figure 6.

## Equipment And Operation

The one ton containers of chlorine are located in the Chlorination Station building. Up to fifteen (15) one ton containers of chlorine are connected on-line and fifteen (15) one ton containers of chlorine are connected on standby in the Chlorine Storage Room of the Chlorination Station. The one ton containers of chlorine are supplied by the All Pure Chemical Company.

The one ton containers of chlorine are joined by connection lines (pigtailed) to a header which connects the chlorinators together. Chlorine gas is withdrawn from the liquid chlorine in the one ton containers on-line and directed to the chlorinators in the Chlorination Room. Each chlorinator vents to the ambient atmosphere external to the Chlorination Room through a vent line if there is failure of the internal regulator in the chlorinator. The gas is metered through the chlorinator and drawn into solution at the chlorine injector. An emergency drench shower/eyewash unit is located at the Chlorinator Station.

## Detection, Monitoring, Automatic Control Systems And Procedures

Chlorine residual is monitored by an analyzer which is receiving a continuous sample from a sample pump. Chlorine feed rate is adjusted automatically in proportion to both the residual chlorine reading and plant influent flow to maintain the residual chlorine concentration set on the controller.

## Administrative Design Quality Control

The regulated substance equipment and systems are designed under the quality control and quality assurance (QA/QC) procedures set forth by the City of Modesto and augmented by the QA/QC procedures that exist at the engineering and design firms that perform design services for the City of Modesto. The codes and standards utilized by the City for design of the systems are stated in the City Of Modesto's Procurement Specifications. These codes and standards include the applicable standards of UBC, ASCE, and ASME.

## Administrative Operating Control

The PWTP maintains administrative operating control by means of a combination of operating training and a set of operating and maintenance procedures which is used in addition to process operator training to conduct their operating and maintenance activities. Prior to starting up a new regulated process with regulated substances or a portion of a regulated process which has undergone major modifications, the appropriate PWTP personnel are trained for the new equipment and procedures.

### **Administrative Maintenance Control**

The PWTP has a Computerized Maintenance Management System (CMMS) with backup by a card-based system for inspection, preventive and corrective maintenance, and testing for the regulated processes, systems and equipment. This insures that these tasks are accomplished as required and per the manufacturer's specifications as stated in the equipment operating and maintenance manuals. Using the CMMS, the Plant Maintenance Supervisor determines the maintenance requirements and provides details to the Maintenance Mechanic and/or the Electrical/Instrumentation person of the tasks to be performed, related information, and personnel assigned. The Maintenance Mechanic and/or Electrical/Instrumentation person provides work completion information for the assigned tasks back to the Plant Maintenance Supervisor to complete the feedback loop.

### **Inspection Procedures And Schedules**

The PWTP has three shifts per day for seven days a week. Each day, the Operator inspects the regulated processes with regulated substances. At least once each day, the Maintenance Mechanic notes any changes to the regulated process systems and equipment in performing duties in and around the Chlorination Buildings. The Plant Maintenance Supervisor is notified of any changes noted to the regulated process systems and equipment. The Plant Maintenance Supervisor initiates whatever corrective actions are required.

### **Maintenance Procedures And Schedules**

The PWTP has a Computerized Maintenance Management System (CMMS), which is backed by a card-based system by which preventive maintenance required by the equipment manufacturers and PWTP procedures is brought to the attention of the Plant Maintenance Supervisor. Maintenance and Operations personnel perform those actions required by the card system. The regulated process control systems are overhauled at least once a year. The card-based system tracks maintenance and repairs done and alerts for the preventive maintenance required.

Other maintenance requirements are based upon the Operator inspections of the regulated process systems and equipment. Operators perform this required maintenance on an emergency basis. The Maintenance Mechanic conducts the preventive maintenance as dictated by the nature of the requirement and the decision of the Plant Maintenance Supervisor.

### **Testing Procedures And Schedules**

The equipment in the regulated process systems are tested at least once a year, or as required per the manufacturer's recommendations in the equipment operating and maintenance manuals, by the Operators, the Maintenance Mechanic and/or the Electrical/Instrumentation person.

### **Seismic Assessment Study**

A seismic assessment of the condition of the regulated process associated equipment is presented in a report of the evaluation. This is included as Appendix F. The recommended corrective actions are included in the HAZOP study in the consideration of external events, of which one is the occurrence of a seismic event.

## SECTION 3

### PROCESS HAZARD ANALYSIS

A Hazard and Operability Study (HAZOP) was performed at the PWTP for this RMP to systematically identify the hazards associated with handling each regulated substance at the PWTP. The scope of the HAZOP included human factor, facility siting, operating error, equipment failure, operational impacts, external events, and procedures related to each regulated process.

#### Team

The HAZOP team consisted of PWTP operations and maintenance personnel, a team leader (serving as scribe), and representative of the supplier of the regulated substances. The identities of the team members are given in Table 2.

The HAZOP study was conducted in one day. The study commenced with training of the team by the team leader in the elements of an RMP, and continued with a site walk, review of system information and HAZOP sessions. The P&ID for each of the regulated processes was used to provide information for the HAZOP. These drawings are provided in Appendix A with the equipment of the regulated process given in the equipment list provided in Appendix B.

Deliveries of Chlorine were conducted as part of the HAZOP study on the day of the HAZOP study at the Primary Wastewater Treatment Plant. Chlorine delivery was done for the Primary Wastewater Treatment Plant (PWTP).

#### Methodology

The HAZOP study used a "Guide Word" methodology to identify hazardous conditions produced by deviations from normal procedures based on the premise that most accidents are caused when facilities operate outside of design conditions; and used a "What If" methodology for the chemical delivery nodes to identify hazardous conditions by going through the operation and maintenance procedures step by step. In the Guide Word methodology, deviations in each relevant design parameter (flow, level, pressure, temperature, etc.) are prompted by a series of guide words (high, low, reverse, etc.). Guide words and process considerations used in the HAZOP are listed in Appendix G.

The systems for the regulated processes are broken down into nodes representing logical divisions of each system, and the set of "Guide Words" and/or "What If" statements considered for each of these nodes. Normal conditions studied in the HAZOP included system design, operating experience, inspection, testing, and maintenance procedures. Abnormal conditions studied in the HAZOP included improper material or equipment applications, improper installation, equipment malfunction, component failure, system

malfunctions, operator error, human factors, facility siting, and external events (sabotage including disgruntled employee, fire, impact from vehicles etc., geological activity including seismic events, and weather-induced hazards). The complete list of considerations for the HAZOP and the forms used to define the nodes and study sheets used for the HAZOP are provided in Appendix G.

Also see PSM for City of Modesto - Water Quality Control Facility.

### **Risk Ranking**

For each adverse consequence, a Severity and Likelihood ranking were assigned according to the Risk Ranking procedure provided in Appendix G. For each combination of Severity and Likelihood, an overall Risk Ranking value was assigned from the Risk Ranking matrix chart. Recommendations to improve the operability and safety of the regulated processes developed during the HAZOP sessions and recorded on the HAZOP sheets were assigned a Risk Ranking by the Risk Ranking procedure provided in Appendix G.

### **Results**

The nodes selected for each regulated process and the HAZOP considerations for each node are presented in the respective HAZOP node and study sheets given in Appendix H.

### **Risk Reduction Recommendations For Prevention And Mitigation Measures**

Recommendations to improve the operability and safety of the regulated processes were developed during the HAZOP sessions and recorded on the HAZOP sheets given in Appendix H.

### **Commitments For Prevention And Mitigation Measures And Schedule Of Implementation**

The Recommendations to improve the operability and safety of AHM systems developed during the HAZOP sessions were considered for commitment of implementation by the PWTP management and scheduled for implementation as detailed in Appendix L.

## SECTION 4

### OFFSITE CONSEQUENCE ANALYSIS

The purpose of the offsite consequence analysis is to estimate the probable effects of defined releases of chlorine on populations and the environment located in the vicinity of the point of release. The magnitude and duration of the Worst Case scenarios and Alternative Release scenarios of chlorine are determined from information developed in the Process Hazard Analysis and physical properties of chlorine.

#### Worst Case Release Scenarios

The Worst Case release scenario for interconnected equipment must consider the largest quantity of a regulated substance handled on site in a single vessel at any time, taking into account administrative controls as per the CCR Title 19 Division 2 Chapter 4.5 Article 2 Section 2750.3 (b).

The one ton container of chlorine is the largest vessel in the chlorine feed system. This container is, at most, filled with 2,000 lb of chlorine which is 67% of container capacity. The Worst Case release scenario for the one ton container of chlorine is the release of 2,000 lb of chlorine at the rate of 200 lb/min for 10 minutes.

#### Worst Case Dispersion Modeling

The gaseous dispersion for the Worst Case scenario is obtained by modeling the Worst Case release rate. The Areal Locations Of Hazardous Atmospheres (ALOHA) computer program is used to obtain dispersion footprint patterns for the chlorine scenarios considering heavy gas and gaussian dispersion models.

Details of the dispersion models, emission flow histories, and dispersion footprints to the pertinent level of concern are given in Appendix I for the one ton container of chlorine.

#### Alternative Release Scenarios

The Alternative Release scenario for the one ton container is complete failure and separation of a ¼ inch fuse plug insert in the bottom area of the one ton container. Chlorine liquid loss will continue until the liquid contents left in the one ton container solidify due to the withdrawal of the Heat of Vaporization by the escaping chlorine vapor, and/or the level of liquid chlorine drops to just below the bottom of the hole left by the missing fuse plug insert, which is 1/3 ft above the bottom of the horizontal one ton container. This amounts to a loss of 1,813 lb of liquid chlorine from the one ton container which flashes to vapor.

## **Alternative Release Dispersion Modeling**

The gaseous dispersion for the Alternative Release scenario is obtained by modeling the Alternative Release scenario release rate. The Areal Locations Of Hazardous Atmospheres (ALOHA) computer program is used to obtain dispersion footprint patterns for the scenario considering heavy gas and gaussian dispersion models. Details of the dispersion models, emission flow histories, and dispersion footprints to the pertinent level of concern are given in Appendix J for the one ton container of chlorine. Both heavy gas and gaussian dispersion models are used for the evaluation.

## **Meteorological Conditions**

The meteorological conditions used in the gaseous dispersion analyses for the Worst Case and Alternative Release scenarios are stipulated. The values and assumptions used for these conditions are given in Table 3. The temperature of the contents of the subject one ton container is set equal to the ambient dry-bulb temperature for the given scenario.

## **Level Of Concern**

Health effects caused by the gaseous emissions of chlorine are to be determined for populations. Populations are to include those populations who are in schools, residential areas, general acute care hospitals, long-term health care facilities, child day care facilities, parks and recreation areas, and jails. These health effects are estimated using available data based upon the response of healthy young males, about 25 years old, obtained in the existing studies of health effects on populations. The health effects on general populations due to gaseous dispersion of chlorine are estimated by determining the geographic extent of ground level concentrations of the regulated substance denoted by the values of the Emergency Response Planning Guideline (ERPG)-2 as reported for chlorine by the American Industrial Hygiene Association.

ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

The exact magnitude of the airborne concentration for the level of concern, which is also the end-point for the zone of vulnerability, for chlorine is given in Table 1.

## **Dispersion Modeling Results For Worst Case**

For the Worst Case release scenarios, the greater distance from the point of release to the pertinent level of concern, i.e., end-point, obtained from the heavy gas and gaussian dispersion models is used to establish the magnitude of distance for the zone of vulnerability. Input data used in the calculations, and calculation result printouts, are provided in

Appendix I for the chlorine releases for the Worst Case release scenarios. The results are given in Table 4 for the Worst Case release scenarios.

The zone of vulnerability for the Worst Case release scenarios extends beyond the site boundaries of PWTP as shown in Figure 3.

### **Dispersion Modeling Results For Alternative Release**

For the Alternative Release scenario of chlorine release, the greater distance from the point of release to the pertinent level of concern obtained from the heavy gas and gaussian dispersion models is used to establish the magnitude of distance for the zone of vulnerability. Input data used in the calculations, and calculation result printouts, are provided in Appendix J for the chlorine releases for the Alternative Release scenarios. The results are given in Table 5 for the Alternative Release scenarios.

The zone of vulnerability for the Alternative Release scenarios extends beyond the PWTP site boundaries as shown in Figure 4.

### **Effects On Populations**

The LandView III computer program was used to determine the population located within the distance to the end-point for each of the Worst Case and Alternative Release scenarios as per the 1990 Census data. The population that resides within the zone of vulnerability, i.e., the circular area about the point of release with a radius defined by the end-point, per the 1990 census data for each of the Worst Case release scenarios is given in Table 6. The population that resides within the zone of vulnerability, i.e., the circular area about the point of release with a radius defined by the end-point, per the 1990 census data for the Alternative Release scenarios is given in Table 7.

The zone of vulnerability for the Worst Case release scenario from the one ton container of chlorine is 3.1 miles in radius and extends over the greater area of the City of Modesto, see Figure 3. The zone includes 70,759 people per the 1990 census data, see Table 6. The locations of sensitive populations in the greater City of Modesto area are listed in Appendix K and shown in Figure 5. The residential sensitive populations and major commercial, office and industrial buildings are not shown in Figure 5 for clarity. It is recognized that the City of Modesto has residential sensitive populations and major commercial, office and industrial buildings throughout the City and the surrounding area.

The zone of vulnerability for the Alternative Release scenario from the one ton container of chlorine is 1.1 miles in radius and contains primarily the area around the PWTP, see Figure 4. The zone includes 18,517 people per the 1990 census data, see Table 7. The zone extends into the City of Modesto itself. There is residential population located within the zone of vulnerability. The locations of sensitive populations in the greater City of Modesto area are listed in Appendix K and shown in Figure 4 and Figure 5. The residential sensitive

populations and major commercial, office and industrial buildings are not shown in Figure 4 or Figure 5 for clarity. It is recognized that the City of Modesto has residential sensitive populations and major commercial, office and industrial buildings throughout the City and the surrounding area.

### **Effects On Environment**

The effects on the environment are to be established by determining if there are any of the stipulated environmental receptors within the zone of vulnerability, i.e., area defined by the end-point, per Title 19 Division 2 Chapter 4.5 Article 4 Section 2750.6 and the Risk Management Data Element 2.14 for the Worst Case scenario and Element 3.14 for the Alternative Release scenario. The receptors are listed as:

- a) National or state parks, forests or monuments
- b) Officially designated wildlife sanctuaries, preserves, or refuges
- c) Federal wilderness areas

The zone of vulnerability, i.e., distance to end-point, for the Worst Case scenario for the one ton container of chlorine does not affect environmental receptors.

The zone of vulnerability, i.e., distance to end-point, for the Alternative Release scenario for the one ton container of chlorine does not affect environmental receptors.

## SECTION 5

### **ADMINISTRATIVE PROGRAM FOR RMP**

A management program is required to administer the implementation of the RMP elements of the California Accidental Release Program (CalARP). This includes CalARP Program Registration, Federal Registration, RMP submission, training on the RMP, recordkeeping of RMP documentation, auditing for RMP compliance, and RMP updates as needed.

#### **Hazardous Materials Management Plan**

The Management Program incorporates the Hazardous Materials Business Plan (HMBP) for the PWTP as adjuncts of the Program. The HMBP is included in Appendix D for the site. The HMBP specifies the identity and quantities of regulated substances present at the stationary source, where the quantities are greater than the TQ, and contains information on the emergency response procedures used in case of a release of a regulated substance.

#### **CalARP Program Management**

A management system will be established at PWTP to oversee the development, implementation and integration of the RMP elements. This system incorporates training on the RMP elements, recordkeeping of the pertinent RMP documentation, and auditing for RMP compliance. This includes a management system to identify risk reduction, prevention and mitigation measures, to record the commitment by management to implement the measures according to a defined schedule, to identify personnel by job title who are responsible for implementing the measures, to define the procedures by which progress in implementing the measures can be audited, and to commit to keep the RMP up-to-date.

The PWTP personnel responsible for the management aspects of the RMP elements, listed by job title and area of responsibility, are as follows.

<u>Area of Responsibility</u>	<u>Job Title</u>
● Overall responsibility of RMP elements:	Plant Maintenance Supervisor
● Development of RMP elements:	Plant Maintenance Supervisor
● Implementation of RMP elements:	Plant Maintenance Supervisor
● Integration of RMP elements:	Plant Maintenance Supervisor
● Training on RMP elements:	Plant Maintenance Supervisor

<u>Area of Responsibility (Continued)</u>	<u>Job Title (Continued)</u>
● Recordkeeping of RMP documentation:	Plant Maintenance Supervisor
● Auditing of RMP elements:	Plant Maintenance Supervisor

The PWTP personnel to assure management accountability in the RMP post-submittal phase are as follows:

<u>Area of Responsibility</u>	<u>Job Title</u>
● Assure that the risk reduction prevention and mitigation measures are implemented according to the commitments of Appendix N.	Plant Maintenance Supervisor
● Revise the RMP following a modification of the chlorine system as per Section 25543.2 of Article 2 of Chapter 6.95 of Division 20 of the California Health & Safety Code; and as per Section 2745.10 of Article 3 of Chapter 4.5 of Division 2 of Title 19.	Plant Maintenance Supervisor

The RMP will be revised and updated as follows:

- Within five years of its initial submission or most recent update required by the following update requirements, whichever is later
- No later than three years after a newly regulated substance is first listed by USEPA or State of California OES
- No later than the date on which a new regulated substance is first present in an already covered process above a threshold quantity
- No later than the date on which a regulated substance is first present above a threshold quantity in a new process
- Within six months of a change that requires a revised Process Hazard Analysis or Hazard Review
- Within six months of a change that requires a revised offsite consequence analysis
- Within six months of a change that alters the Program level that applies to any covered process

The RMP will be submitted to USEPA, when required, in the method and format specified by the USEPA. The RMP will be submitted to the AA, when required, in the method and format specified by the AA.

## **Training On RMP Elements**

Training programs ensure that all affected employees are provided awareness training on the RMP elements, refresher training, and update training as needed. Those persons responsible for implementation of the RMP are trained to be able to carry out their responsibilities. Training programs will include the fundamental elements of the RMP. This training includes:

- Requirements of the RMP
- Goals of the RMP effort
- Hazard analysis
- Potential regulated substance emission evaluations
- Risk reduction measures
- Administrative aspects of the RMP

These training programs are in addition to the training provided with the PSM regarding:

- Accident investigations
- Regulated substance safety
- Regulated substance system maintenance
- Auditing
- Emergency response plan

Employees assigned to work in the chlorine areas receive basic instruction in area warning systems, use of emergency equipment, shutdown procedures, and facility operations. Personnel are instructed in the hazards and handling precautions of chlorine with which they will work. This includes instruction in chlorine warning properties and behavior, personnel protective equipment, fire and health hazards, and emergency response. New employees are assigned typically to work with more experienced personnel until area supervision is satisfied that expected tasks can be performed safely and independently. Throughout this training period, proper respect for the regulated substance and possible consequences is stressed.

## **Document Management And Recordkeeping For RMP**

Document Management for the Prevention Program is dictated by the Document Management requirements in each element of the Process Safety Management (PSM) program for the stationary source. See PSM for City of Modesto - Water Quality Control Facility.

The Document Management for the RMP are dictated by the recordkeeping requirements for the RMP. Records related to the RMP program will be kept for a period of at least five years. This includes records related to:

- Regulated Substance registration forms

- Audits of the RMP
- Chemical safety data
- Correspondence with the County pertaining to the RMP
- File management procedures
- Monthly safety inspection reports
- Operating procedures
- Permits
- Personnel training profiles
- Preventive maintenance records
- Release and accident report summaries
- RMP reports and technical memoranda
- Testing procedures
- The Hazardous Materials Management Plan

These records will include the records and their storage locations given in Table 8.

### **Auditing Program For RMP**

The PWTP will conduct an audit of procedures, records, emergency preparedness, training, and plant safety every six months for the first year and annually thereafter. The RMP Audit will be done annually under the direction of the Secondary Treatment Site Supervisor and accommodate the Compliance Audit of the PSM program that will be done at least every three years.

The RMP Audit will include audits of the inspection and maintenance of the subject processes which will be done on a more frequent basis. The audit will evaluate people, equipment, controls, and actual and potential accidents. Systematic weaknesses and corrective actions will be identified. A typical RMP Audit Checklist to be used for the audit is provided in Table 9. The audit report prepared from the audit under the direction of the Secondary Treatment Site Supervisor will be provided to the Assistant Water Quality Control Superintendent for review and concurrence.

These programs will be set up to accommodate the audits by SC-HMD that can occur at any time; and the inspections by SC-HMD that will occur at least once every three years to determine whether this stationary source is in compliance with CCR Title 19 Division 2 Chapter 4.5.

## SECTION 6

### **PREVENTION PROGRAM**

The details of the Prevention Program for the chlorine process at the PWTP are contained in the Process Safety Management (PSM) program for the City of Modesto - Water Quality Control Facility.

#### **Process Safety Information**

See the content of the Process Safety Information in element (d) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

#### **Process Hazard Analysis**

See the content of the Process Hazard Analysis in element (e) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

#### **Operating Procedures**

See the content of the Operating Procedures in element (f) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

#### **Training**

See the content of the Training in element (g) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

#### **Mechanical Integrity**

See the content of the Mechanical Integrity in element (j) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions,

procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

### **Management of Change**

See the content of the Management of Change in element (l) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

### **Pre-startup Safety Review**

See the content of the Pre-startup Safety Review in element (i) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

### **Compliance Audit**

See the content of the Compliance Audits in element (s) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

### **Incident Investigation**

See the content of the Incident Investigation in element (m) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

### **Employee Participation**

See the content of the Employee Participation in element (p) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

### **Hot Work Permits**

See the content of the Hot Work Permit in element (k) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

### **Contractors**

See the content of the Contractors in element (h) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

## SECTION 7

### **EMERGENCY RESPONSE PROGRAM**

The details of the Emergency Response Program for the chlorine processes at the PWTP are contained in the Emergency Action Plan in the Emergency Planning and Response element of the Process Safety Management (PSM) program for the City of Modesto - Water Quality Control Facility.

#### **Emergency Action Plan**

See the content of the Emergency Action Plan in the Emergency Planning and Response element (o) of the PSM for City of Modesto - Water Quality Control Facility which includes the purpose, scope, references, definitions, procedures, personnel responsibilities, forms, document management and other related information for the implementation and utilization of this element of the subject PSM program.

## SECTION 8

### **FEDERAL MANDATED RMP PROGRAM**

#### **Executive Summary**

The Executive Summary mandated by the Federal RMP program is provided in Appendix N. This is the version to be submitted to the Federal EPA and the SC-HMD. The following topics are included:

- Accidental Release Prevention and Emergency Response Policies
- Stationary Source and Regulated Substances Handled
- Worst Case Release Scenarios
  - Scenario and Distance to End-Point
- Alternative Release Scenarios
- Administrative Controls
- Mitigation Measures
- General Accidental Release Prevention Programs
- Chemical Specific Prevention Steps
- Five-Year Accident History
- Emergency Response Program
- Planned Changes to Improve Safety

#### **Risk Management Plan Data Elements**

The Risk Management Plan Data Elements mandated by the Federal RMP program are provided in Appendix N. This is the version to be submitted to the Federal EPA and the SC-HMD. The following topics are included:

Registration  
Toxics: Worst Case  
Toxics: Alternative Releases  
Flammables: Worst Case  
Flammables: Alternative Releases  
Five-Year Accident History  
Prevention Program: Program 3  
Prevention Program: Program 2  
Emergency Response

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**APPENDIX E – MEETING NOTES**

Meetings Notes from the City Management staff meeting dated May 2, 2012 to discuss the pros and cons of the concept of relocating the primary facilities to Jennings Road.

**From:** [Gary DeJesus](#)  
**To:** [Rich Ulm](#); [William Wong](#); [Dennis Turner](#); [Rob Christensen](#); [Jerry Hirota](#)  
**Cc:** [Mike Britten](#)  
**Subject:** Facilites Lay Out Plan  
**Date:** Thursday, May 03, 2012 7:48:36 AM

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Hello All,

The following is brief summary of our discussion yesterday regarding moving primary treatment and bio-solids treatment processes to Jennings.

It was agreed that moving primary treatment processes from Sutter to Jennings was a good idea; based on the benefits gained in relation to regionalization, operational efficiencies, revenue enhancement, environmental justice and opportunities for public private partnership.

It was agreed that this change would require revision of the 2006 Wastewater Master Plan and an EIR study.

Making this move would likely take ten to fifteen years, which complicates work underway to build a new digester at Sutter.

I plan to direct the work of the Facilities Lay Out Plan to reflect the consensus we reached yesterday.

## **Key Points in the decision to move primary treatment and solids handling from Sutter to Jennings:**

In July 2007, Council adopted new sewer service fees base on a Brown Caldwell Sewer Rate Study that included \$420.6M in improvements identified in the Wastewater Master Plan.

Of that \$420.6M, \$41.2 was identified for improvement at the Sutter WWTP

The Facilities Lay Out Plan indentifies \$77.1M in improvements at Sutter; of which \$31.3M is not part of the 2007 rate study. ( $77.1-41.2=35.9$ )

Those improvements not in the rate study include: Demolition of abandon facilities, new administration building and temporary digester repairs, which will need a source of funding.

The Facilities Lay Out Plan estimates the cost of improvements at Sutter to be \$77.15M and the cost of improvements to move to all treatment systems to Jennings is \$79.1, a difference of \$2M.

Moving to Jennings WWTP would mean primary treatment and solids handling would be added to existing secondary and Tertiary treatment systems.

Primary treatment at Sutter includes bar screens, grit removal, floatable and settable solids. Bar Screenings and grit are stored in dumpsters and disposed of at landfills. Floatable and Settable Solids are further treated in the digester and drying beds.

Locating all treatment systems at Jennings will move some Sutter processes that are currently in the flood way.

### **Pros and Cons of Moving to Jennings**

#### **Pros:**

Consolidating Primary, Secondary and Tertiary treatment processes provides operational efficiencies.

Moving all treatment process to Jennings reduces the need for land outside the flood way at Sutter.

Moving solids handling operations to Jennings places the bio-solids at their final destination, eliminating the need for transportation from Jennings

Jennings has space for the primary treatment process outside the flood plain.

Solids handling facility at Jennings removes WAS disposal from the Circulation channel.

Sludge drying beds at Sutter are in the flood way; alternative locations put them in the flood plain.

#### **Cons:**

Sutter digesters are in need of immediate attention; moving to Jennings will delay this project.

Building a second clarifier at Jennings was not in the master plan or programmed in the rate study.

Transporting raw sewage through 60" transmission lines could result in unwanted accumulation of settable solids.

Removing solids prior to pumping wastewater to Jennings is easier on pumps and pipes.

Digester at Jennings will result in a longer haul for FOG and waste hauler deliveries.

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**APPENDIX F – SUTTER PLANT STAFF COUNT**



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**APPENDIX G – SUTTER PLANT PARKING ANALYSIS**

