APPENDIX 3-7

Project 7: City of Guadalupe, Recycled Water Feasibility Study

- City of Guadalupe Water Master Plan
- City of Guadalupe WWTP Study
- Recycled Water Feasibility Study Scope of Work
- Technical Memorandum 1, Conceptual Design Report
- Technical Memorandum 2, Basis of Design Report
- SBCAG Regional Growth Forecast
- Proposed Santa Barbara County IRWM Data Management System, Application for Prop 84 Planning Grant, Round 1, Santa Barbara County, IRWM Plan 2012, Task 4: Establish Data Management System, pp. 51, September 28, 2010

CITY OF GUADALUPE

STATE OF CALIFORNIA

GENERAL PLANNING AND TECHNICAL ASSISTANCE GRANT/
ECONOMIC DEVELOPMENT GRANT

DRAFT WATER MASTER PLAN

DECEMBER 2001

FUNDED BY:

STATE OF CALIFORNIA DEPARTMENT OF HOUSING
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CHAPTER 1

INTRODUCTION

The City of Guadalupe supplies its customers with domestic water service and fire protection, among other services. As older infrastructure is replaced and new development projects are constructed, it is the City's intent to construct water improvements consistent with the current and ultimate needs of the City. In order to facilitate this goal, and to adequately plan for the capital resources needed to meet this goal, the City has elected to prepare a comprehensive Water Master Plan.

PURPOSE OF PROJECT

Preparation of a water system master plan will assist the City in prioritizing both present and future water system needs and set forth a mechanism for addressing those needs. Present needs addressed in the water system master plan will include the "three R's": Repair, Rehabilitation, and Replacement. Future needs will address those capital improvement projects required to support the anticipated growth of the City through the next twenty years. The master planning process will also tie the needs assessment, both existing and future, to the budgeting process so that the capital and operating costs can be anticipated and equitably distributed to those who will benefit. Finally, the water system master plan will demonstrate that the organization has the operational, technical, managerial and financial capability to achieve and maintain compliance with all relevant local, state and federal plans and regulations.

AUTHORIZATION AND SCOPE OF WORK

On February 12, 2001, the City of Guadalupe authorized JLWA to prepare a comprehensive water system master plan, to be funded in part through the Community Development Block Grant (CDBG) program. This water master plan was prepared in accordance with JLWA's proposal dated February 8, 2001. The scope of work is summarized as follows:

1. Review existing production and consumption records to determine water demand and unaccounted for water.

2. Estimated future water demand by land use type within the existing City boundary.

3. Analyze the existing sources of water supply for the City including groundwater and State Water as well as the State Water turnout.

4. Review the adequacy of the existing supply entitlements structure to meet existing and future demands under drought conditions.

5. Provide recommendations for additional supplies and related capital projects.

6. Based on existing system information, develop a comprehensive computer model of the City distribution, storage, and pumping systems. Calibrate the model using data obtained from the fire flow testing in the field.

7. Identify existing and future system deficiencies and develop capital improvement projects to address the deficiencies.

8. Review existing water quality data and provide recommendations to address water quality issues.

9. Provide a prioritized capital improvement program in five year increments along with budget cost estimates for each of the proposed capital improvement projects.

10. Review the existing operations and maintenance program and provide recommendations for staffing levels, alternative meter reading technology and energy savings methods.

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Sam Arca, Mayor
Frank Usher, City Administrator
Sam Angulo, Public Works Director

JLWA Staff

The following JLWA key team members were involved in the preparation of this Water Master Plan.

Steven G. Tanaka, P.E., Project Manager
Robert Miller, P.E., Water Resources Division Manager
Kari Wagner, Project Engineer
Joshua Reynolds, Associate Engineer
Jeremy Freund, Planner

According to the 2000 California Census data, there are 1,450 existing residential units, of which 36 units were vacant at the time of the census. The future potential residential development within the City limits includes an additional 72 units in the Point Sal Dunes development, an estimated 481 units to be developed as part of the DJ Farms Specific Plan and approximately 22 units remaining as in-fill throughout the older established residential neighborhoods. The total future residential development within the City at build-out is estimated at 2,025 units.

POPULATION

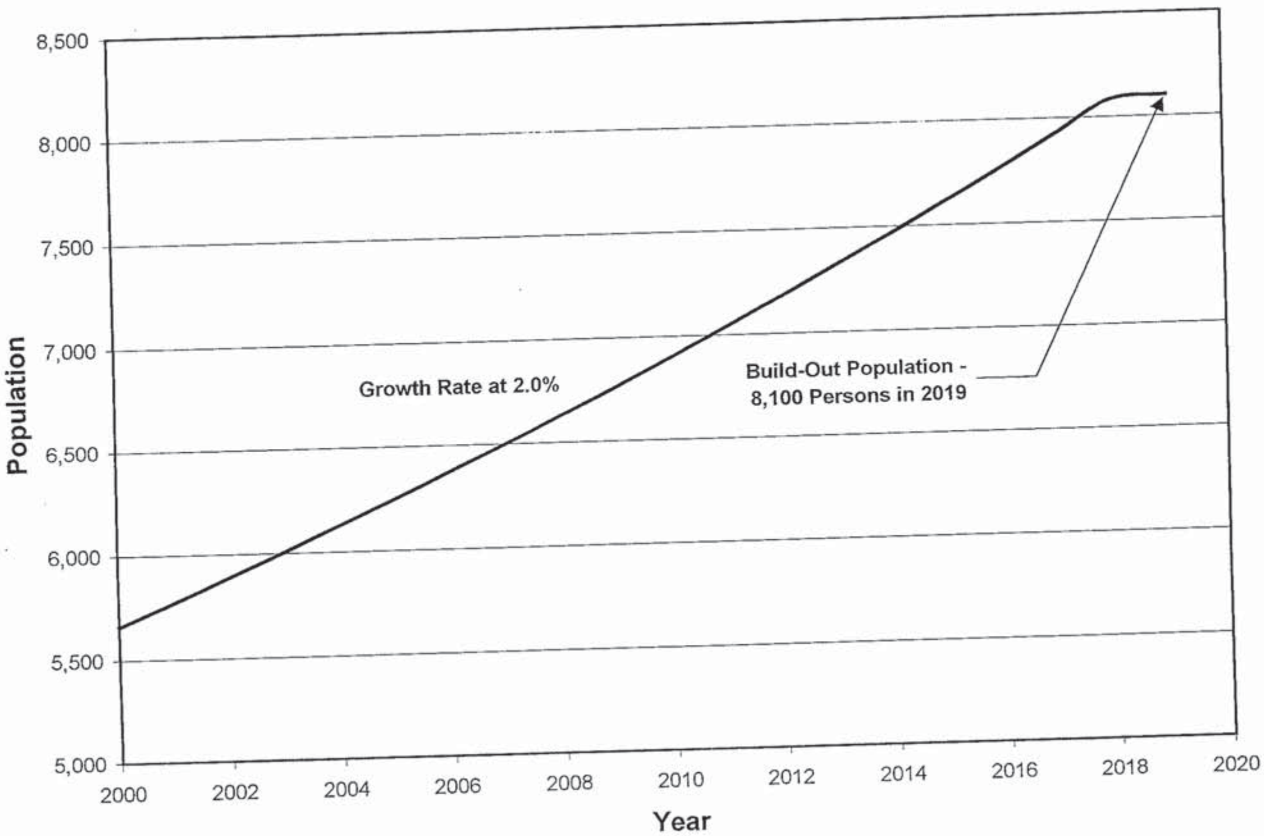
The 2000 California Census data indicates that the City of Guadalupe's existing population is 5,659. The census also states that the existing average household size is 4.0 persons per household, which is significantly higher than other municipalities such as Nipomo CDP at 3.13 persons per household and Oceano CDP at 2.96 persons per household. This higher density per dwelling unit is likely the result of the lower income levels of the majority of City residents.

Using this average household density of 4.0 persons per household, the future population within the City is projected to be 8,100 persons. This population estimate incorporates the planned 481 units for the DJ Farms development in addition to the remaining development at Point Sal Dunes, the vacant units not counted in the 2000 Census, and the in-fill throughout the established residential neighborhoods. The build-out of 8,100 persons will be used to project future water demand for the City.

GROWTH RATE ANALYSIS

The projected growth rate for the City of Guadalupe is estimated at 2.0 percent per year. This growth rate is a conservative estimate based on the average growth rate from 1990 through 2000 of neighboring City of Santa Maria. Therefore, the City is projected to be completely built-out by the year 2019. Figure 2-2 depicts the anticipated population growth for the City, based on a projected 2.0 percent growth rate.

Figure 2-2. Population Growth Analysis



Future Water Demands

The demographics of Guadalupe are expected to change as the City expands. Recent and planned housing developments (Point Sal Dunes and DJ Farms) are aimed at home buyers with a higher median income than older portions of the City. The lots are larger than the majority of older lots and

Table 3-1. Hydraulic Demand Factors

Demand Condition	Peaking Factor	Existing Demand, mgd	Comments
Average Day Demand	N/A	0.65	Historical factor based on 2000 data.
Maximum Day Demand	2.1	1.37	Historical factor based on largest demand to date, which occurred on July 23, 1998
Peak Hour Demand	3.5	2.28	Historical data for similar systems indicate that the peak hour demand is approximately 3.5 times ADD

the lots have more developed landscaping. In addition, a significant amount of commercial and industrial development is expected to occur in the future. These factors will likely lead to a higher per capita water demand in the future. Central Coast cities with similar demographics have a per capita demand ranging from 120 to 150 gpcd. For this water master plan, it is assumed that Guadalupe's per capita water demand for future incremental growth will be 158 gpcd, while maintaining a 115 gpcd demand for existing population. The per capita water use was determined using two factors, incremental population demand and increased industrial use. The future incremental population is expected to have a per capita demand of 135 gpcd. As mentioned above, this higher per capita demand is anticipated due to the larger lots and the higher expected median income levels associated with the future development. The incremental water consumption from future population is estimated at 330,000 gpd, based on 2,444 persons at 135 gpcd. The second analysis deals with the impact of large water consumers within the industrial zones. A local industrial company, APIO, has intentions of doubling their water demand in the near future. APIO is currently the City's largest single user totaling 55,000 gpd. APIO's current water demand is "rolled-in" to the current per capita demand of 115 gpcd. However, the projected additional 55,000 gpd for APIO's water consumption will have a significant impact on the City's future water demand projections and therefore must be considered as a single demand user. The total future incremental water demand is 385,000 gpd (431 AFY). The future incremental population is 2,444 persons and therefore, the future incremental per capita demand is projected at 158 gpcd.

Table 3-2. Future Water System Demands

Source	Population	Per Capita Demand, gpcd	Demand, mgd
Existing Unoccupied Residential Units	144	135	0.02
Point Sal Dunes	288	135	0.04
DJ Farms	1,924	135	0.26
In-Fill of Vacant Lots	88	135	0.01
APIO	---	---	0.06
Incremental Future Water Demand			**0.39**
Existing Water Demand	5,659	115	0.65
Total Future Water Demand			**1.04 (1,159 AFY)**

The total future water demand at build-out for the City of Guadalupe is 1,035,000 gpd (1,159 AFY). The resulting per capita water demand for the build-out population of 8,100 persons is 128 gpcd. Future water system demands are summarized in Table 3-2 and the hydraulic demand factors are summarized in Table 3-3.

Table 3-3. Future Hydraulic Demand Factors

Demand Condition	Peaking Factor	Demand, mgd
Average Day Demand	N/A	1.04
Maximum Day Demand	2.1	2.18
Peak Hour Demand	3.5	3.64

Diurnal Fluctuations

Water use is not constant throughout the day. Typically, water use will peak in the morning when people are getting ready for work, peak again around lunchtime, and again in the evening when people prepare evening meals and get ready for bed. During the nighttime hours, water usage will be far below the average day demand. The water use characteristics for the City of Guadalupe vary from the typical diurnal curve because of the relatively high demand industrial users have on the system. The industrial demand occurs during business hours and tends to sustain water demands throughout the day. Figure 3-1 illustrates a diurnal curve developed by actual water usage

CHAPTER 4

WATER SUPPLY AND WATER QUALITY

This Chapter presents a discussion of the City's existing and future water supplies, their corresponding water qualities, and potential constraints to meeting future water demands for the City.

WATER SOURCES

The City of Guadalupe is supplied by two potable water sources: 1) Local groundwater; and 2) The State Project Water.

Groundwater

The City of Guadalupe extracts groundwater from the Santa Maria Groundwater Basin, which underlies the City. The City shares this resource with agricultural and other domestic users throughout the Santa Maria Valley. The available storage of the basin is estimated to be approximately 1.5 million AF. A lawsuit is in progress at this time against the users of the Santa Maria Ground Water Basin, alleging the basin is in overdraft. The lawsuit was filed to determine the adjudication of the basin as part of an overall groundwater basin management program. The lawsuit could take a number of years to reach settlement, and if successful, should specify the extraction rights available to the City of Guadalupe and all users of the Santa Maria Groundwater Basin. At this time, the City is capable of pumping the basin on an as-needed basis.

The City currently operates one well, the Fifth Street well. This well was constructed in 1978, and is of marginal quality, as described later in this chapter. This well is rated at 750 gpm. Since the City does not have a restriction on groundwater pumping at this time, the City extracts water on an as needed basis depending on State Water Deliveries. Construction details of this well are included in Table 4-1. The City also has two wells, the 9th Street Well and the Obispo Street Well, currently inoperable due to mechanical problems. The 9th Street well was drilled in 1964 and was taken out-of-service due to motor failure. The 9th Street well could be readily brought back into to service upon completion of the repairs. The Obispo Street well was drilled in 1972 and was taken out-of-

Table 4-1. Fifth Street Well

Parameter	Unit
Year Installed	1978
Well Depth, feet	725
Screened Interval, feet	118
Pump Horsepower	60
Pump/Well Capacity, gpm	750
Total Pump Head, feet	~139
Standby Power	Yes

service due to sand uptake. Additional analysis will be required to determine the condition of each of the wells and the cost to bring each back into service.

State Water

Since 1998, the City has received 550 AFY allocation of State Water to augment the City's water supply. Although the City's allocation is for 550 AFY, this allocation is not guaranteed. Cutbacks can and will occur depending on water availability from rainfall and snow-pack in the northern part of the State of California, the origin of this supplemental water source. In addition, annual shutdowns in the State water distribution system occur for several weeks at a time for maintenance. The State Water is carried to the City via a pipeline built off the Coastal Branch located 11 miles to the east and delivered to the Bonita Reservoir (See Figure 5-1). The Coastal Branch is fed by the Central Valley Aqueduct. Actual deliveries are billed to the City at 100 percent of the operating, maintenance, and fixed cost associated with the project. In the event of non-delivery, due to weather and lack of water supplies, the City is still billed approximately 85 percent of the cost without receiving any water.

DRINKING WATER STANDARDS

Drinking water standards are established by the United States Environmental Protection Agency (EPA) and by the California Department of Health Services. These federal and state agencies are responsible for ensuring that all public water systems are in compliance with the Safe Drinking Water Act (SDWA). The State of California has been consistent in applying drinking water standards as the EPA adopts them. Moreover, California has established action levels for contaminants not on the federal list. Future water quality regulations germane to the City of Guadalupe are discussed herein.

Water Quality Parameters

State and Federal water standards fall into two categories:

- Primary Standards relate specifically to the health of the community as it might be affected by the water supply. Mandatory maximum contaminant levels (MCLs) are established for specific constituents.

- State Secondary Standards relate to aesthetic qualities of the water including taste, odor, color and some minerals. In California, maximum contaminant levels (MCLs) are also established for these secondary constituents.

Table 4-2 lists the current MCLs, which the City must meet, along with other water quality parameters (secondary and aesthetic standards). Table 4-2 also lists the City's 2000 Water Quality Analysis. The quality of the City's well water is of marginal quality, and should be blended with State water prior to introduction into the system thus, the quality of the Fifth Street Well limits the

Table 4-2. 2000 Water Quality Analysis

PRIMARY STANDARDS - Mandatory Health-Related Standards					
Parameter	Units	MCL	PHG	CCWA PPWTP	5TH STREET WELL
CLARITY					
Turbidity (NTU)	NTU	5	NS	0.04	0.1
MICROBIOLOGICAL (b)					
Total Coliform Bacteria	(b)	5.0%	(0)	0	0
Fecal Coliform and E. coli	(b)	(b)	(0)	0 Positives	0 Positives
ORGANIC CHEMICALS					
Total Trihalomethanes (c)	ppb	100	n/a	31.2	ND
INORGANIC CHEMICALS					
Aluminum (d)	ppm	1000	n/a	0.06	< 50
Arsenic	ppb	50	n/a	ND	< 2
Asbestos	MFL	7	(7)	ND[1]	NC
Copper	ppm	AL=1.3	n/a	ND	< 50
Fluoride	ppm	2	1	0.08	0.08
Nitrate (as N) (e)	ppm	1000	n/a	NC	< 400
RADIONUCLIDES (f)					
Gross Alpha Particle Activity	pCi/L	15	(0)	1.46	1.0
SECONDARY STANDARDS - Aesthetic Standards					
Chloride	ppm	500	NS	69	51.3
Color	Units	15	NS	5	< 3
Corrosivity		Non-corrosive	NS		Non-corrosive
Hardness (Total Hardness)	ppm	NS	NS	98	586
Heterotrophic Plate Count (h)	CFU/mL	NS	NS	< 1	< 1
Iron	ppb	300	NS	ND[1]	NC
Manganese	ppb	50	NS	ND[1]	NC
Odor – Threshold	Units	3	NS	ND[1]	NC
Sodium	ppm	NS	NS	48	99
Specific Conductance	mmho/cm	1600	NS	446[1]	NC
Sulfate	ppm	500	NS	53	489
Total Dissolved Solids	ppm	1000	NS	300	995
Turbidity (Monthly)	NTU	5	NS	0.04	.1

[1] Data taken from 1999 CCWA water quality report.

Table 4-2. 2000 Water Quality Analysis (continued)

ADDITIONAL PARAMETERS - Unregulated					
Parameter	Units	MCL	PHG	CCWA PPWTP	5TH STREET WELL
Alkalinity	ppm	-	-	69	208
Calcium	ppm	-	-	21	150
Haloacetic acids	ppb	-	-	17.1[1]	NC
Magnesium	ppm	-	-	11.6	51.1
pH	pH Units	-	-	8.11	7.413
Potassium	ppm	-	-	2.3	2.90
Total Chlorine Residual	ppm	-	-	2.0	2.0

[1] Data taken from 1999 CCWA water quality report.

ABBREVIATIONS AND NOTES

N/A = Not Applicable
NS = No Standard
NC = Not Collected
ND = None Detected, Detection Limits for the purposes of reporting (DLR's) available on request

(a) The turbidity level of the filtered water shall be less than or equal to 0.5 NTU in 95 % of the measurements taken each month and shall not exceed 5.0 NTU at any time. Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system. Monthly turbidity values are listed in the *Secondary Standards* section.

(b) Total coliform MCLs: No more than 5.0% of the monthly samples may be total coliform positive. Fecal coliform/*E. coli* MCLs: The occurrence of 2 consecutive total coliform positive samples, one of which contains fecal coliform/*E. coli*, constitutes an acute MCL violation. These MCLs were not violated in 1999. Results are based on the distribution system's highest percent positives. Compliance is based on the combined distribution system sampling from all the filtration plants. 1,888 samples were analyzed in 1999.

(c) Calculated from the highest of quarterly filtration plant effluent samples. Compliance is based on a running annual average of more than 44 quarterly distribution system samples, which was 36.3 ppb for 1999.

(d) Aluminum has a secondary MCL of 200 ppb (0.2 ppm).

(e) State MCL is 45 mg/L as Nitrate, which equals 10.16 mg/L as N.

(f) Results are for the 1998 calendar year. Water utilities are required to make these surveys every four years.

(g) Standard is for Radium-226 and -228 combined.

(h) Pour plate technique, 48-hour incubation at 35°C, monthly averages.

California DHS Abbreviations
AL = Regulatory Action Level
MCL = Maximum Contaminant Level
PHG = Public Health Goal
MCLG = Maximum Contaminant Level Goal
MFL = Million Fibers per Liter
NTU = Nephelometric Turbidity Units
pCi/L = PicoCuries per liter
ppm = parts per million, or milligrams per liter (mg/L)
ppb = parts per billion, or micrograms per Liter (mg/L)
ppt = parts per trillion, or nanograms per liter (ng/L)
ppq = parts per quadrillion, or picograms per liter (pg/L)
TT = Treatment Technique
mmho/cm = micromhos per centimeter

Table 4-4. TDS Levels at Varying Blending Ratios

Parameter	Blending Ratio (State water to well water)			
	4:1	3:1 (exist)	2:1	1:1
Potable water blend TDS, mg/L	439	472	532	648
Potable water salt load, lb/day	2,307	2,480	2,795	3,405
Domestic use additional salt load, lb/day	1,064	1,064	1,064	1,064
Total salt load to WWTP, lb/day	3,371	3,544	3,859	4,469
WWTP effluent TDS quality, mg/L	808	850	925	1,072

[1] Calculations based on 300 mg/L TDS for State water, 995 mg/L TDS for well water, total demand of 731 AFY (0.63 mgd) potable water, 0.5 mgd average wastewater treatment plant effluent flow.

limit TDS concentrations in the WWTP effluent. However, actual blending ratios will be at the discretion of the City. Furthermore, if TDS and sulfate levels do rise above the secondary standards, blending will be a requirement prior to consumption.

FUTURE REGULATIONS

Groundwater is one of the two sources of water to the City. The Santa Maria groundwater basin and the City's well is not under the influence of surface water. Most anticipated federal and state drinking water regulations are directed toward surface water sources or groundwater under the direct influence of surface water, and therefore will most likely not impact the City. Based on conversations with the State Department of Environmental Management, the Disinfectant/Disinfection Byproduct Rule, and revised Waterworks Standards, and will pose the most significant regulatory issues to the City.

Wastewater Treatment Plant Waste Discharge Requirements

As mentioned earlier, the City's existing Waste Discharge Requirements currently allow an effluent TDS level of 1,500 mg/L to be discharged to the disposal fields. The City is in the process of refurbishing the treatment plant at this time. Such improvements will require the issuance of a new set of waste discharge requirements. The effluent limitation for TDS will be subject to Regional Water Quality Control Board review, and could be more stringent in the future. Reduction to this effluent limitation for TDS may impact the City's ability to provide local wellhead treatment and dispose of water treatment brine through the wastewater treatment plant. Even if this discharge limitation does not change, even a small brine discharge stream to the sewer collection system may not be looked upon favorably by the Regional Board.

WATER SUPPLY

The City of Guadalupe has an existing demand of 731 AFY and a future demand of 1,159 AFY. If the City were to blend well and state water at a 2:1 blending ratio, the City should not pump more than 275 AFY from the Santa Maria Groundwater Basin, for a total production capability of 825 AFY. As shown in Table 4-5, the projected water demand would exceed the City's current supply by 334 AFY. However, it should be noted that the City may blend at a higher ratio of well to State Water so long as the secondary aesthetic standard is met.

Table 4-5. Supply vs. Demand

Source	Existing Allocation, AFY	Future Allocation, AFY
Groundwater	275[1]	275[1]
State Water	550	550
Total Supply	**825**	**825**
Demand	731	1,159
Supply Surplus/(Deficit)	94	(334)[2]

[1] Note, the City does not currently have an assigned allocation for groundwater use. The 275 AFY is based on the recommended 2:1 blending ratio.

[2] This deficit is based on only pumping 275 AFY from the groundwater basin.

To reduce the impacts of higher TDS well water, the City should consider some or all of the following:

- Purchase additional State water.
- Construct new well(s) in potential groundwater zones of higher quality, if feasible.
- Implement water conservation programs to the extent practicable, particularly for new development.
- Provide well head treatment to reduce TDS levels (reverse osmosis).
- Limit or control development and growth to within existing water supply capabilities.

Purchase State Water. The purchase of additional State Water will likely be costly for the City, as they would need to purchase another water agency's allocation. In order for the City to purchase

1. Meet future build-out MDD with all supply sources in tact.

2. Meet future build-out MDD with the largest well out of service (State Water in service).

3. Meet future build-out MDD with State Water down (well in service).

Table 4-6 analyzes the City's ability to meet both criteria.

Table 4-6. Supply Redundancy Evaluation

Criteria	Supply Sources, gpm				Max Day Demand, gpm	Supply Surplus/ (Deficit), gpm
	State Water	All Wells[1]	Wells - Largest Out of Service	Total Supply		
1	300	750		1,050	1,514	(464)
2	300	---	---	300	1,514	(1,214)
3	---	750	---	750	1,514	(764)

[1] Currently the City only has one operating well (Fifth Street).

Table 4-6 shows that the City has insufficient supply sources for future MDD under all three critera. It is recommended that the City provide supply with two additional wells at 750 gpm each. This will allow the City to meet all criteria. The City has the option to refurbish the two existing drilled wells, 9th Street and Obispo Street, or drill two new wells. The two wells will likely require treatment and blending if incorporated into the distribution system on a daily basis.

FUTURE SUPPLY RECOMMENDATIONS

The City's build-out demand could exceed the future supply, in light of the pending Santa Maria groundwater basin litigation. In addition, water supply reliability will always be a concern for the City, given the uncertainty of State Water deliveries from year to year, and the expected continuance of groundwater degradation over time. Water supply recommendations are as follows:

Periodic Re-assessment of Water Supply and Demands. Every 5 years, the City should re-assess water supply and demand issues, as factors for water supply will be changing significantly over the coming years. If and when the sphere of influence expands beyond its current boundary, a re-assessment of water supply and demand will be required. It is emphasized that future demand projections contained in this water master plan only address build-out demands within the current sphere of influence.

CHAPTER 6

DISTRIBUTION SYSTEM

This chapter describes the existing water distribution system, model development and calibration, design criteria, and overall system performance.

EXISTING WATER SYSTEM FACILITIES

The City's existing water system includes over 17 miles of water distribution mains, one at-grade reservoir, one elevated storage tank, a booster pump station, one well, and one State Water turn-out. Details of each facility are described in the following sections.

Existing Distribution System

The existing distribution system contains over 17 miles of water mains. The existing water distribution system is shown in Chapter 5, Figure 5-1. An inventory of the existing water main network is summarized in Table 6-1. The existing distribution system is composed of a variety of pipe material and sizes, constructed primarily during the last 40 to 50 years; however, there is some cast iron pipe still in service that was installed in 1928. It is uncertain how much of the cast iron pipe is lined or unlined. The approximate lineal footage of each water main material is summarized in Table 6-2.

Table 6-1. Existing Pipeline Inventory

Diameter, inches	Length	
	Feet	Miles
2	730	0.1
3	610	0.1
4	14,960	2.8
6	23,190	4.4
8	47,550	9.0
12	6,080	1.2
Total	93,120	17.6

Table 6-2. Existing Pipeline Material

Material	Length	
	Feet	Miles
Steel	10,950	2.1
PVC	47,300	9.0
Asbestos Cement	21,160	4.0
Cast Iron	12,550	2.3
Galvanized Iron	1,120	0.2

Existing (Bonita) Booster Station

To pressurize a water distribution system, it is common for storage tanks to be placed at a higher elevation than the customers. This can be done using a nearby hillside, or by constructing an elevated storage tank such as the existing 100,000 gallon elevated tank. Due to modern seismic requirements, costs associated would preclude constructing a large elevated storage tank. Also, it would not be feasible to place several smaller elevated storage tanks on multiple City owned property. The City is also several miles from any hillside adequate to install an at-grade tank. Therefore, the City pressurizes the system with a booster station, located at the site of the Bonita Reservoir. This booster station is equipped with three pumps. The jockey pump is the smallest and runs continuously, while the other two larger booster pumps cycle on and off to meet system demands. Table 6-3 summarizes detailed information regarding each of the pumps.

Table 6-3. Bonita Booster Station

Booster Pump	Flow, gpm	Motor, hp	Total Head, ft	Standby Power
Jockey Pump - Weinman Model # 2 ½ KHB-4A	200	10	107	No
Booster Pump - (2) Weinman Model # 4L2	600	25	106	No

The jockey pump is used to maintain system pressure and to meet low system demand. The jockey pump has a rated capacity of 200 gpm. The two booster pumps are used to meet all other demands. Each pump has a rated capacity of 600 gpm. The total pumping capacity of the three pumps is 1,400 gpm. The booster station at the Bonita Reservoir is unable to deliver the required fire flow stipulated by the City Fire Department. The Bonita booster station is also not equipped with back-up power. During power outages, the City relies solely on the elevated storage tank to pressurize the system.

Distribution System Control

The Bonita Reservoir level and the Fifth Street Well are controlled by telemetry and level switch, to fill the Bonita Reservoir. When the Bonita Reservoir reaches a low level, the Fifth Street Well starts pumping to the reservoir, where the well water is blended with State Water, disinfected, and discharged to the Reservoir. When the Bonita Reservoir reaches a specified fill level, the well and disinfection system shut off, but State Water continues to fill the reservoir. The elevated storage tank is manually controlled by the City, filled and allowed to drain periodically. The elevated tank is used for peak day and peak hour demand, and is also used as a temporary means of sustaining pressure in the event of power outages.

DESIGN REQUIREMENTS

The design requirements for the water distribution system relate primarily to the flow and pressure delivered by the system. Pressures below 30 psi are not acceptable in a municipal water system. Ideally, normal operating (static) pressures will be within the range of 40 to 80 psi. This is the range that most people find comfortable and which will serve most fire sprinkler systems. Pressures within the 30 to 35 psi range are acceptable but less than desirable. Pressures higher than 80 psi are acceptable within the distribution system, but should be reduced to 80 psi at the service connection to prevent water hammer effects or leakage through rapidly-weakening washers and seats.

The flow requirements examined in the network model include fire flow, maximum day demand, peak hour demand, and average daily demand. The various flow scenarios are summarized as follows:

Fire Flow. Residential, commercial, and industrial fire flow requirements were established based on discussions and coordination with the City of Guadalupe Fire Department. Residential fire flow of 1,500 gpm, commercial fire flow that is predominately 2,500 gpm, and industrial fire flows of 3,500 gpm were modeled and deficiencies were noted. In accordance with the Uniform Fire Code (UFC) requirements, no more than 1,000 gpm was extracted from any single hydrant. It was assumed that maximum day demand was occurring concurrent with the fire flow. The booster station pumps were activated according to the demand required by the system. The Bonita Reservoir was modeled 3/4 full, and the elevated storage tank was isolated from the distribution system (normal operation mode).

Maximum Day Demand. MDD flow scenario was generally employed concurrently with fire flow. Domestic demand was distributed throughout the City's service area based on the existing demand distribution. As described previously, the peaking factor applied to the ADD to reach the MDD was 2.1. Future maximum day demands included "fill-in" demands throughout the City, and potential demands from the "D.J. Farms" area (presently agricultural use) southeast of Highway 1 and Highway 166.

Peak Hour Demand This demand condition was used to identify system deficiencies at the maximum domestic use. The booster station pumps were activated according to the demand required by the system. The Bonita Reservoir was modeled 1/2 full and the elevated storage tank was isolated from the distribution system. As described previously, a peaking factor of 3.5 was applied to the ADD.

Average Daily Demand. This flow condition was used to evaluate the system subject to the most common conditions. The booster station pumps were activated according the demand required by the system. The Bonita Reservoir was modeled full, and the elevated storage tank was isolated from the system (normal operation mode).

The following parameters were employed to identify deficient conditions for each run of the model:

- Domestic pressures below 40 psi at ADD and below 30 psi at MDD were highlighted in each run.
- Pipeline velocities exceeding 5 feet per second (fps) at ADD were identified. In general, velocities higher than 5 fps create excessive pressure losses.
- Pipeline velocities exceeding 10 feet per second (fps) during fire flow conditions plus

MDD were identified. Pipelines near the source of the fire were identified if velocities exceeded 15 fps.

- During fire flow model runs, pressures below 20 psi at any node in the system were identified in accordance with UFC Requirements.

The hydraulic design parameters and design criteria for the City of Guadalupe water system evaluation are summarized in Table 6-4.

Table 6-4. Summary of Hydraulic Parameters and Design Criteria

Hydraulic Parameters and Design Criteria	Value
Fire Flow Requirements	Residential – 1,500 gpm Commercial – 2,500 gpm Industrial – 3,500 gpm
Maximum Day Demand Factor	2.1 times ADD
Peak Hour Demand Factor	3.5 times ADD
Minimum Service Pressure @ ADD	40 psi
Minimum Service Pressure @ MDD	30 psi
Minimum Residual Pressure @ MDD and fire flow	20 psi
Pipeline Velocity @ ADD	< 5 ft/s
Pipeline Velocity @ Fire Flow plus MDD conditions	< 10 ft/s (< 15 fps near source of fire)
Minimum Pipe Diameter	all new water mains must be 8-inch or greater
Fire Hydrant Spacing	At every intersection, at intervals not more than 350 feet in commercial and industrial zones, and not more than 400 feet in residential zones.
Valving	No shut downs greater than 500 feet in all zones

HYDRAULIC EVALUATION

In order to evaluate the performance of the existing water system, identify deficiencies in the network, and recommend improvements, a computer model was developed using Haestad's Water CAD computer program.

System Demands

User demands were assigned to the system based on the type of land use and actual consumption records. For residential users, an average consumption rate was determined based on City billing records for water use. The records for the larger users were analyzed on an individual basis. The demands from each lot were then assigned to the closest node. The demand for unaccounted-for water was assigned evenly throughout the City to each node.

Distribution System and Elevation Data

The existing distribution system data was taken from the City's atlas map. City staff also provided information regarding upgrades to water mains that had not been updated on the atlas map. Elevations for the model were taken from Santa Barbara Flood Control District Topographic Map of the Santa Maria Valley, November 1993. All water mains were assumed to have three feet of ground cover.

Model Calibration

As part of the calibration process, fire hydrant tests were conducted on Thursday, May 3, 2001. Present at the tests were representatives from JLWA, the City of Guadalupe Public Works Department, and the City of Guadalupe Fire Department. The fire flow tests were conducted by measuring the static pressure in the system prior to flowing each fire hydrant. The hydrants were then opened fully, and the actual fire flow was measured. Once the hydrant flow had stabilized the residual pressure in the system was measured at the same locations as the static pressure. The field measurements were then compared to the model output as part of the calibration process.

Several parameters, including elevations, demands, and internal pipe roughness, represented by the Hazen-Williams roughness coefficient were rechecked and adjusted to calibrate the model to actual conditions in the field. The Hazen-Williams roughness coefficients ("C" factor) for the water mains in the model were based on known established ranges of values, and were calibrated to match the residual pressure readings of the field tests. Adjusting C-factors was the last parameter to be adjusted, after verifying that all other model parameters were input correctly. Table 6-5 summarizes the calibration results. The following roughness values were utilized in the final calibrated model:

C = 23 for cast iron installed in 1928
C = 40 for cast iron installed between 1929 and 1960
C = 60 for cast iron installed between 1960 and 1975

C = 90 for Galvanized Iron
C = 100 for Steel
C = 135 for Asbestos Cement (AC)
C = Between 135 and 140 for Polyvinyl Chloride (PVC)

Table 6-5. Results of Model Calibration

Test Fire Hydrant	Flow (gpm)	Tested Pressure (psi)			Model Pressure (psi)		
		Static	Residual	Δ	Static	Residual	Δ
Tognazzini Avenue	240	53	23	30	55	24	31
Amber Street	470	31	5	26	36	6	30
Between Obispo and SPRR	505	39	8	31	39	9	30
Mahoney Lane	815	61	45	16	56	42	14
Egret Lane	682	41	18	23	51	24	27
La Guardia	455	40	9	31	43	8	35
Twelfth and Pacheco	300	41	9	32	39	10	29

In addition to the standard fire hydrant test, a test was performed to determine the condition of the older cast-iron pipe found throughout the City. One section of pipe was isolated so that water could only flow in one direction through the pipe. Three fire hydrants were used (the downstream hydrant is the flowed hydrant and the two upstream hydrants measure static and residual pressures) to measure and calculate the roughness coefficient for this pipe. This section of pipe, on Tognazzini Avenue, is an unlined cast-iron pipe installed in 1928, and is severely corroded internally. The c-factor, as measured in the field, was 23. Clean cast iron pipe lined with cement mortar has a c-factor of 130. Deposits on the pipe inner wall, known as tuberculation, create a build up on the inside of the pipe wall, decreasing the internal diameter and thereby the amount of water that can flow through the pipe. In other words, the existing 6-inch cast iron pipe that was installed in 1928 has flow characteristics equivalent to a 3-inch water main in good condition. The older water main is unable to deliver the required fire flow to the residential zones due to its age and corresponding pipe internal roughness characteristics. This information is used in the model calibration process to more accurately represent the actual hydraulic characteristics of the distribution system.

As Table 6-5 shows, all of the hydrant tests matched reasonably well to the model, with the exception of the Egret Lane test. Attempts to rectify this anomaly were made, and all system parameters were verified. It is suspected the discrepancy may be the result of a faulty gauge, or mis-information on some pipe sizes in this area. However, this does not affect the recommendations of this study.

System Performance

The performance of the City's distribution was evaluated based on the City's current facilities, and then was re-evaluated using the City's planned Obispo Street tank and pumping station. The proposed pumping facilities will correct a significant amount of the deficiencies identifies in the "existing system" model run.

__Existing System__. In the analysis, over half of the City's distribution system was found to be severely deficient in pressure under peak hour conditions, while modeling the system with the current pumping facilities. The analysis also showed that the City is unable to achieve the minimum of 1,500 gpm residential fire flow to over 90 percent of the City. The inadequate pressure and flow to all areas of the system are primarily the result of two system deficiencies. The first deficiency is inadequate pumping facilities. As previously mentioned, the Bonita Booster Station is only capable of delivering 1,400 gpm with all pumps running. This results in inadequate fire flows throughout the City. The second deficiency relates to the age and size of pipe throughout the City. Over 20 percent of the City's existing infrastructure is comprised of old, undersized, tuberculated water mains. If a pump station were capable of delivering the required fire flow, the infrastructure would still inhibit the circulation of the flow resulting in inadequate fire flow to the extremities of the distribution system.

__Planned Pumping and Storage Facilities__. To determine the extent of the infrastructure deficiencies, the proposed facilities under the USDA water storage tank loan/grant application were input into the model. The project incorporates an additional tank on Obispo Street and a pumping facility capable of meeting ADD and fire flow requirements. The additional pumping facility alleviates a number of system deficiencies that would otherwise be identified as part of the system analysis. However, the analysis illustrated several areas within the distribution system that will still remain deficient in fire flow and/or pressure.

OPERATION AND MAINTENANCE

Staffing Levels

The City of Guadalupe currently operates one reservoir, one elevated storage tank, one well with a pumping station, one chlorine injection station, one State Water turnout, one booster station, fire hydrants, valves, over 17 miles of water distribution mains and 1,572 water services. The Public Works Division has two full time employees, the Public Works Director and an assistant. The crew checks and maintains the entire system. At this time, the City of Guadalupe is under-staffed to properly maintain and complete preventative maintenance on the distribution system. The City currently has budget to hire one half-time staff member. It is recommended that the City staff this half-time position, or staff a full-time position to help with daily operations and preventative maintenance work and allow the Public Works Director to manage the City's system on a full time basis. Tasks for the new operator would include valve exercising, hydrant and dead-end main flushing, routine maintenance and repairs, and other related work. This additional staff member would also alleviate the burden of on-call time required of the current staff and could help the Public Works Wastewater Division if necessary.

CHAPTER 7

SUMMARY OF RECOMMENDATIONS AND CAPITAL IMPROVEMENTS

This chapter summarizes the City of Guadalupe's recommended improvements to meet existing and future needs, and the capital improvement program to assist the City in the financial planning aspects of implementing the recommended improvements. The improvements are described as first, second and third priorities. The costs for these improvements are summarized in Table 7-1 at the end of this chapter.

BASIS OF CAPITAL IMPROVEMENT PROJECT COSTS

The capital improvement project (CIP) costs were developed based on engineering judgement, confirmed bid prices for similar work in the Central Coast area, consultation with vendors and contractors, established budgetary unit prices for the work, and other reliable sources. All 8-inch water main upgrades were budgeted at $130 per lineal foot and all 12-inch water main upgrades were budgeted at $150 per lineal foot (unless otherwise noted). Hard construction costs are escalated by a factor of 1.4, to allow for preliminary engineering, engineering, administration, construction management, and inspection costs. **All CIP costs are expressed in Year 2001 dollars, using an ENR Construction Cost Index of 6288, and will need to be escalated to the year or years scheduled for the work.**

SUMMARY OF RECOMMENDATIONS AND CAPITAL IMPROVEMENT PROJECTS

This section summarizes all of the recommendations and capital improvements identified throughout this report. These improvements are presented as first, second, and third order priorities. First and second priority projects are listed in order of necessity. The order of completion for the third priority projects are not critical. The costs of these improvements were estimated as described in the above section, Basis of Capital Improvement Project Costs.

Recommendations

The following is a list of recommendations to the City, but which are not specifically capital improvement projects.

Water Conservation Programs

- In the future, if warranted by future water supply shortfalls, pursue water conservation measures to the extent feasible, particularly in new development.

Leak Detection Program

- Install water meters at all un-metered City Facilities that consume water.

- If unaccounted-for-water still remains excessive, implement a leak detection program that may entail video services of water mains.

Staffing Level

- Increase the part-time position to a full-time position. This will give the City one Director and two full time maintenance crew members.

First Priority Capital Improvement Projects

1. South Obispo Street Upgrade: Phase I.
   - Upgrade 615 feet of 8-inch AC to 12-inch PVC on Obispo Street from the Obispo Street connection near Fir Street to 4th Street.
   - If possible, include this project into the Obispo Street Reservoir project.
2. North Obispo Street Upgrade.
   - Upgrade 2,150 feet of 6- and 8-inch AC, PVC and cast iron water main to 12-inch PVC on Obispo Street from 4th Street to 10th Street.
   - Upgrade 465 feet of 4-inch cast iron water main to 8-inch PVC on Obispo Street from 10th Street to 11th Street.
3. Refurbish Elevated Storage Tank
   - Complete the refurbishment of the elevated storage tank.
4. Construct New Wells.
   - Construct two new wells (750 gpm each) that may achieve higher water quality. The City has the option to refurbish the two existing drilled wells, 9th Street and Obispo Street, or drill two new wells. The wells will likely require treatment and blending if incorporated into the distribution system on a daily basis.
5. Wellhead Treatment
   - Incorporate wellhead treatment into one or all of the wells to improve water quality.
6. Elementary School Upgrade.
   - Upgrade 425 feet of 8-inch steel water main to 12-inch PVC on 10th Street from Obispo Street to Peralta Street.

- Upgrade 320 feet of water main on school grounds to 12-inch PVC.

7. Pioneer Street Upgrade.
   - Upgrade 300 feet of 4-inch cast iron to 8-inch PVC on 8th Street from Highway 1 to Pioneer Street.
   - Upgrade 1,000 feet of 4-inch cast iron to 8-inch PVC on Pioneer Street from 8th Street to 9th Street.
   - Upgrade 330 feet of 4-inch cast iron to 8-inch PVC on 9th Street from Pioneer Street to Highway 1.

8. 11th Street Upgrade.
   - Connect the water mains together on 11th Street at Pacheco Street to create a second direct connection.
   - Upgrade 750 feet of 4-inch cast iron to 8-inch PVC on 11th Street from Pacheco Street to Peralta Street.

9. Escalante Street Upgrade.
   - Upgrade the entire length (1,100 feet) of 4-inch cast iron within the development to 8-inch PVC.

10. Tognazzini Avenue Upgrade.
    - Upgrade 2,300 feet of 6-inch cast iron to 8-inch PVC on Tognazzini Avenue from 2nd Street to the dead end past 5th Street.

11. Highway 166 Loop.
    - Extend the recently constructed 12-inch PVC water main and additional 200 feet on Highway 166 from the east side of the railroad to Highway 1 via a jack and bore project.

Second Priority Capital Improvement Projects

12. Fire Hydrant Installation
    - Install 10 new fire hydrants.

13. Isolation Valve Installation
    - Install 28 new isolation valves.

14. Campodonico Avenue Upgrade.
    - Upgrade 2,610 of 4-inch steel to 8-inch PVC on Campodonico Avenue from 2nd Street to 7th Street.

- Abandon the 3- and 6-inch cast iron water main located in the alley east of Campodonico Avenue between 2nd Street and 5th Street and relocate all services onto the new 8-inch water main on Campodonico Avenue.

15. West Main Street Upgrade.
    - Upgrade 975 feet of 4-inch cast iron to 8-inch PVC on West Main Street from Highway 1 to Pioneer Street.
    - Upgrade 215 feet of 6-inch PVC to 8-inch PVC on Pioneer south of West Main Street
    - Upgrade 385 feet of 6-inch PVC to 8-inch PVC at the Junior Highschool between Pioneer Street and Julia Drive.

16. 2nd Street Upgrade.
    - Upgrade 750 feet of 6-inch cast iron to 8-inch PVC on 2nd Street from Highway 1 to Tognazzini Avenue.

17. 5th Street Upgrade.
    - Upgrade 295 feet of 6-inch cast iron to 8-inch PVC from Pioneer Street to Tognazzini Avenue.
    - Abandon the 6-inch cast iron water main on 5th Street from Tognazzini Avenue to Highway 1 and reconnect all services to the existing 8-inch water main.

18. Olivera Street Upgrade.
    - Upgrade 2,500 feet of 4-inch cast iron and steel water mains to 8-inch PVC on Olivera Street from Highway 1 to north of 12th Street.

19. 12th and Obispo Street Upgrade.
    - Upgrade the 2- and 4-inch cast iron water mains to a single 8-inch PVC (total of 850 feet).

20. Flower Avenue Upgrade.
    - Install 8-inch PVC on Flower Avenue from 4th Street to Elm Street (2,175 feet).

Third Priority Capital Improvement Projects

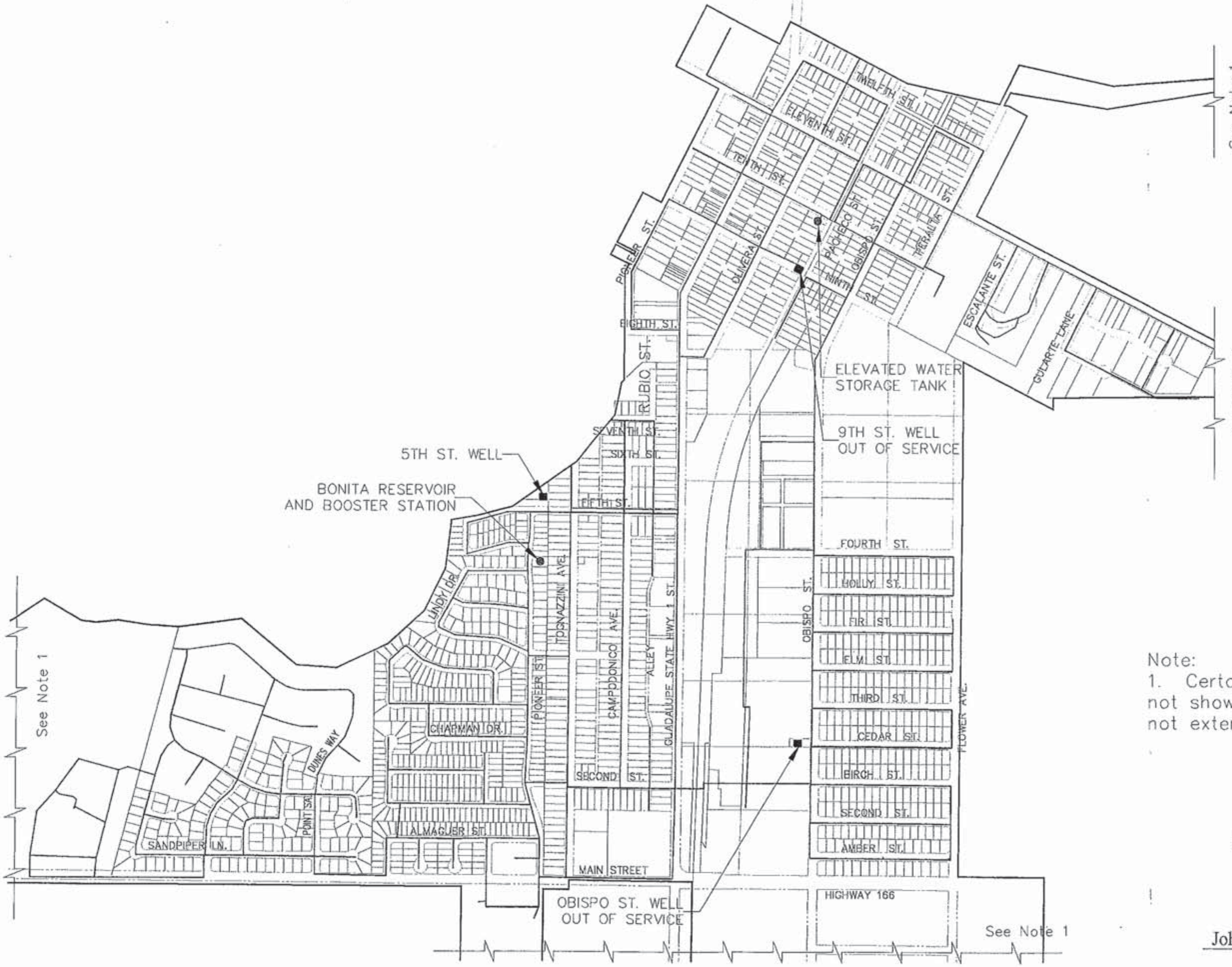
21. Pacheco and 12th Street Upgrade.
    - Upgrade 460 feet of 4-inch steel water main to 8-inch PVC on Pacheco Street from 11th Street to 12 th Street.
    - Upgrade 650 feet of 4-inch steel water main to 8-inch PVC on 12th Street from Pacheco Street to Highway 1.
22. Point Sal Dunes Way Upgrade.
    - Upgrade 1,000 feet of 8-inch PVC to 12-inch PVC from Nelson Drive and Almaguer Street to Point Sal Dunes Way and Sandpiper Lane, if warranted based on discussions with the City Fire Department
23. South Obispo Street Upgrade: Phase II.
    - Upgrade 1,525 feet of 6- and 8-inch AC water main to 12-inch PVC on Obispo Street from the Obispo Street Reservoir connection near Fir Street to Amber Street.
24. Industrial Users Upgrade.
    - Upgrade 815 feet of 8-inch cast iron to 12-inch PVC west of Obispo Street near Birch Street.
25. 10th Street Upgrade.
    - Upgrade 370 feet of 8-inch cast iron to 8-inch PVC on 10th Street from Olivera Street to Pacheco Street.
    - Upgrade 30 feet of 8-inch cast iron to 8-inch PVC from the elevated storage tank to 10th Street.
26. 9th Street Upgrade.
    - Upgrade 625 feet of 8-inch cast iron to 8-inch PVC on 9th Street from the 9th Street well to Highway 1.

City of Guadalupe

Water Master Plan

Figure 5-1

Existing Facilities



Legend:

- Sphere of Influence/ City Limits
- 4" and Smaller Water Main
- 6" Water Main
- 8" Water Main
- 12" Water Main
- ■ Well
- ● Tank

Note:
1. Certain areas of City Limits are not shown since water facilities do not extend to these areas.

1" = 700'
0 175 350 700

John L. Wallace & Associates JLWA

City of Guadalupe
Wastewater Treatment Plant Study

Final Report

June 2007

REGISTERED PROFESSIONAL ENGINEER
CHRISTINA KO HARTINGER
No. C 040752
Exp. 3/31/09
CIVIL
STATE OF CALIFORNIA

Black & Veatch

B&V Project No. 145655

Table of Contents

EXECUTIVE SUMMARY

1.0 Introduction

The purpose of this wastewater treatment plant study prepared for the City of Guadalupe is to evaluate the City's Wastewater Treatment Plant (WWTP) and develop recommendations for the necessary improvements to meet the current and anticipated future Waste Discharge Requirements (WDRs). The recommended improvements support planned growth in the City's service area by increasing the wastewater treatment facilities treatment and disposal capacity. This report presents the results of that evaluation and the resulting recommendations that will assist the City in planning for future infrastructure needs. The recommendations are presented in phases to address short-term improvements to existing facilities for compliance with current effluent limits, and longer-term improvements to provide facilities for future growth and expanded effluent reuse opportunities.

During the summer of 2005, the newly configured WWTP exhibited rising Total Suspended Solids (TSS) concentrations in the effluent. Process and operational changes accomplished in consultation with the designers of the AIPS system were partially successful in reducing effluent TSS concentrations. However, new Waste Discharge Requirements (WDRs) adopted in September of 2005, lowered allowable monthly average effluent TSS concentrations from 100 mg/L to 60 mg/L. In response to this latest challenge, the City council authorized this comprehensive evaluation.

2.0 Existing Conditions

The City completed upgrading the WWTP to an Advanced Integrated Pond System (AIPS) in 2004 in response to the previous lagoon system experiencing challenges meeting effluent requirements due to solids accumulation and solids washout. The City's AIPS treatment system consists of four treatment cells in two stages which utilize anaerobic degradation of solids settled in the submerged pits constructed at the head of each pond, and aerobic degradation of organic matter in the water column. Treated effluent is released into an adjacent pasture from a distribution ditch and flows across the pasture into a storage pond constructed at the north end of the pasture. Effluent is stored in this pond and two interconnected smaller ponds and then is spray-distributed over a 71-acre irrigated cattle-grazing pasture located north and adjacent to the Santa Maria River.

3.0 Regulatory Requirements

The City is required to operate its wastewater treatment plant in compliance with WDRs contained in their discharge permit issued in September 2005 by the California Regional Water Quality Control Board (RWQCB), Central Coast Region, as Order No. R3-2005-0015. The point of compliance is the effluent from the second stage ponds. The new WDRs reduced monthly average effluent limits for TSS from 100 mg/L to 60 mg/L, and changed effluent Biochemical Oxygen Demand (BOD) limits from soluble to total 5-day BOD, and also set the average 5-day BOD limit to 60 mg/L. These new limits have caused the City's WWTP to be out of compliance, particularly during summer months when algae growth is accelerated. Total treatment and effluent disposal capacity is limited to 0.96 mgd.

Regulations for the use of recycled water in irrigation (such as is currently practiced by the City) and other uses are found at Title 22. Social Security, Division 4. Environmental Health, Chapter 3. Water Recycling Criteria, Article 3. Uses Of Recycled Water of the California Code of Regulations. These regulations specify four levels of required treatment for water recycle as follows, and then specify what level of treatment is needed for specific recycle uses:

1. Disinfected tertiary recycled water
2. Disinfected secondary-2.2 recycled water
3. Disinfected secondary-23 recycled water
4. Undisinfected secondary recycled water

Article 3 of Chapter 3 also specifies allowable uses and level of treatment for recycled water including irrigation, impoundments, cooling, and other uses.

4.0 Wastewater Characteristics

Over the last six years, influent wastewater flow has averaged 0.50 mgd, ranging from 0.47 mgd in 2002 to 0.55 mgd in 2006. The monthly average flow trend was relatively constant from 2001 through 2004, but the last two years have shown a steady rise in wastewater flows.

Developers have approached the City with plans for two separate significant residential developments. The two planned developments will provide approximately 1,400 new residential housing units for the City. At historical household size, approximately 5600 new residents could be added through these developments. The associated average increase in sewer flow is estimated to be about 0.4 to 0.5 mgd, which, in addition to monthly peak flow variations, would result in the total flow to the WWTP exceeding the permitted capacity of 0.96 mgd.

Historical influent wastewater BOD and TSS concentrations and loads are depicted in Section 4. The characteristics are normal for residential wastewater flows. Influent BOD concentrations and loads have been increasing (by approximately 30 percent) over the period of record.

The City began reporting effluent Total BOD in September 2005, rather than effluent soluble BOD, which is reflected in the data presented. The effluent TSS data shows no significant long-term trends, but does indicate generally higher effluent TSS concentrations during summer months.

5.0 Upgrade of Existing Treatment and Effluent Facilities

Potential improvements to the WWTP facilities to ensure compliance with current WDRs at existing and near-term wastewater flows, and to improve current system operability were identified. Evaluation and recommendations are provided for algae control, headworks improvements, and effluent disposal.

The primary current concern for the Guadalupe WWTP is challenged compliance with effluent TSS and BOD limits caused by the presence of algae in the lagoon effluent. As discussed in Section 4, testing of effluent samples has indicated that the cause of the seasonal high effluent TSS is the growth of algae, primarily during sunny warm months of the year. Ironically, the presence of algae in the ponds is beneficial to the treatment system as the algae release oxygen into the water as a product of photosynthesis, saving energy and cost that would be expended for aeration of the ponds.

Methods used for controlling the algae in lagoon effluent are generally comprised of one of three approaches:
1. Deny the algae one of the factors needed for growth such as time, nutrients or sunlight,
2. Chemically or physically destroy or limit growth of the algae, and
3. Physically separate the algae from the treated effluent.

After screening and evaluating a number of control options, barley straw application was determined to be the lowest cost, potentially effective means of algae control. Application at a number of locations has shown that the aerobic degradation of the barley straw apparently produces a phenolic substance and hydrogen peroxide that inhibits the growth of algae. Application is usually at the rate of 200 to 300 lbs per acre of surface area, contained in a loose netting configuration suspended in the aerobic zone of the pond. It is best to apply in the spring before algae growth is established.

A three phased approach to compliance with current effluent limitations is recommended:
1. It is recommended that the City implement the barley-straw application to test its effectiveness as the lowest-cost approach to algae control.
2. If needed on a temporary basis, pending the results of the barley straw application, it is recommended that the City consider renting equipment to allow chemical precipitation and settling as the short-term method for algae removal.
3. In preparation for future expanded reuse opportunities requiring filtered and coagulated effluent, permanent facilities consisting of either chemical precipitation and settling, or DAF clarification should be implemented.

Table ES-1 provides a summary of the recommended improvements to the Guadalupe WWTP and associated costs, to meet current WDRs at existing flows, and to improve plant operability and existing effluent disposal operations. Only the first phase of the three-phase algae-control approach to meeting current WDRs is listed here. If the mechnically-cleaned barscreen facility is implemented, the total estimated project cost for these improvements will be $1.1 million.

Table ES-1
Summary of Short-Term Recommendations and Costs

Improvement	Estimated Project Cost
Algae control – Barley Straw Application	<$1000
Bar Screen	$35,000
Grit Removal	$250,000
Effluent Distribution Pipeline	$350,000
Irrigation Pump Station Enclosure	$65,000
Total	~$700,000

6.0 Future Treatment, Reclamation And Disposal Options

Based on projected influent flows, the future treatment and disposal capacity that was planned for was 1.5 mgd, with flexibility to add treatment and disposal capacity up to 2.0 mgd. Treatment options are dictated by the level of treatment needed for effluent disposal. It is anticipated that the current effluent disposal method will continue in the future. However, adding the capability to treat effluent to higher levels of disinfection will allow greater flexibility in effluent disposal if the current discharge location and practice is negatively impacted by human or natural causes.

It is recommended that the AIPS capacity be increased eventually to 1.5 mgd by adding aerators to the existing ponds. To treat effluent to higher quality for additional reuse opportunities and ensure long-term compliance with the WDRs, it is recommended that ***additional treatment steps*** be added after the AIPS. The recommended treatment train involves adding chemical coagulation and a dissolved air floatation (DAF) process specifically designed for algae removal or a chemical precipitation and settling unit. Effluent from this unit could then be filtered through an acceptable Title 22-approved filtration technology such as a continuous backwash upflow filter, or a cloth filter. Effluent from this process would then be disinfected through an ultraviolet (UV) light system to meet required pathogen inactivation. It would be beneficial to pilot test these technologies onsite.

In addition to the current irrigated pasture sprayfield, there are a number of potential ***regional opportunities for effluent reuse.*** One specific effluent discharge opportunity that has been identified is a 20 acre wetland area located near the City center that has experienced degraded quality and limited water flow. Discharge of treated effluent to this area is anticipated to help restore the wetland characteristics and could allow development of an attractive natural resource that would draw visitors to the downtown area. Delivery of treated effluent would require a pump station and 2.5 mile pipeline. A more limited pumping arrangement and pipeline will allow treated effluent to be directed to one of the proposed developments for irrigation of landscape and greenway areas.

It is recommended that the City implement a multi-phase approach to meeting current effluent requirements and add additional facilities necessary to produce at least disinfected secondary 2.2 recycled water while leaving space for a filtration system that will allow treatment to tertiary levels. Alternately, it may be possible to coagulate and directly filter the effluent without a settling or DAF step. It would be beneficial to pilot test these technologies onsite. Table ES-2 summarizes the recommended phases and the estimated costs for implementing the improvements.

Table ES-2 Recommended Improvement Phasing and Costs			
Improvement	*Construction Cost*	*Engineering*[A]	*Total Project Cost*[B]
Phase 1 – Algae Control			
Barley Straw Application			<$1000
Phase 2 – Plant Improvements			
Grit Removal	$210,000	$40,000	$250,000
Effluent Distribution Pipeline	$300,000	$50,000	$350,000
Irrigation Pump Station Enclosure	$55,000	$10,000	$65,000
Mechanical Bar Screen/Washer	$370,000	$65,000	$435,000
Subtotal	$935,000	$165,000	$1,100,000
Phase 3 – Capacity Increase and Tertiary/Disinfection Treatment			
Aeration Capacity Increase	$680,000	$120,000	$800,000
Coagulation/DAF	$1,780,000	$320,000	$2,100,000
Filters	$1,100,000	$200,000	$1,300,000
UV Disinfection	$850,000	$150,000	$1,000,000
Limited Effluent Reuse Pumping/Pipeline	$500,000	$90,000	$590,000
Subtotal	$4,910,000	$880,000	$5,790,000
Phase 4 – Wetland Rehabilitation Project			
Pumping & Pipeline	$2,200,000	$400,000	$2,600,000
Wetland Improvements[C]	$1,690,000	$310,000	$2,000,000
Subtotal	$3,890,000	$710,000	$4,600,000
TOTAL	$9,735,000	$1,755,000	$11,490,000

[A] - Engineering fees include Design and Construction Mgmt. @18% of Construction Cost with Contingency.
[B] - Costs for Project Direct Administration, CEQA Compliance, Legal and Post Implementation Monitoring to be included separately.
[C] – Scope of wetland improvements still to be determined.

7.0 Salts Minimization Plan

WDR Order No. R3-2005-0015 Provision E.8 indicates that the City must develop and implement a salts minimization plan (SMP) in order to minimize concentrations of salts in the discharge, with annual reviews and progress summaries provided thereafter. The City's initial proposed SMP submitted in 2006 was intended to prevent WWTP effluent from exceeding the allowable concentrations of salt constituents that adversely impact water quality and cause exceedence of water quality objectives. The City's WWTP effluent has consistently met its limitations for TDS, sodium, and chloride.

In addition to the progress that City staff is accomplishing, the following recommendations are intended to help attain the goals of the SMP:

1. Complete the inventory of businesses and identify any facilities that need to implement alternate management practices based on the existing ordinance limiting water softener waste.

2. Consider proactively addressing alternate sources of salts through an additional ordinance that applies to other instances of discharge such as swimming pools or industrial processes.

3. Resources for alternate management practices are readily available. For example, the installation of new automatic water softeners that use salt or potassium chloride pellets has been banned in the Santa Clarita Valley since 2003. Their website has a number of resources for alternatives to automatic water softeners (activated carbon adsorption, filtration, portable exchange tank softening) and proposed language for ordinances: http://www.lacsd.org/info/industrial_waste/chloride_in_santa_clarita/default.asp

4. Continue to monitor WWTP effluent water quality, as is required, to monitor salt concentrations. In addition, continue to monitor drinking water quality to gauge the quantity of salts being introduced through this source.

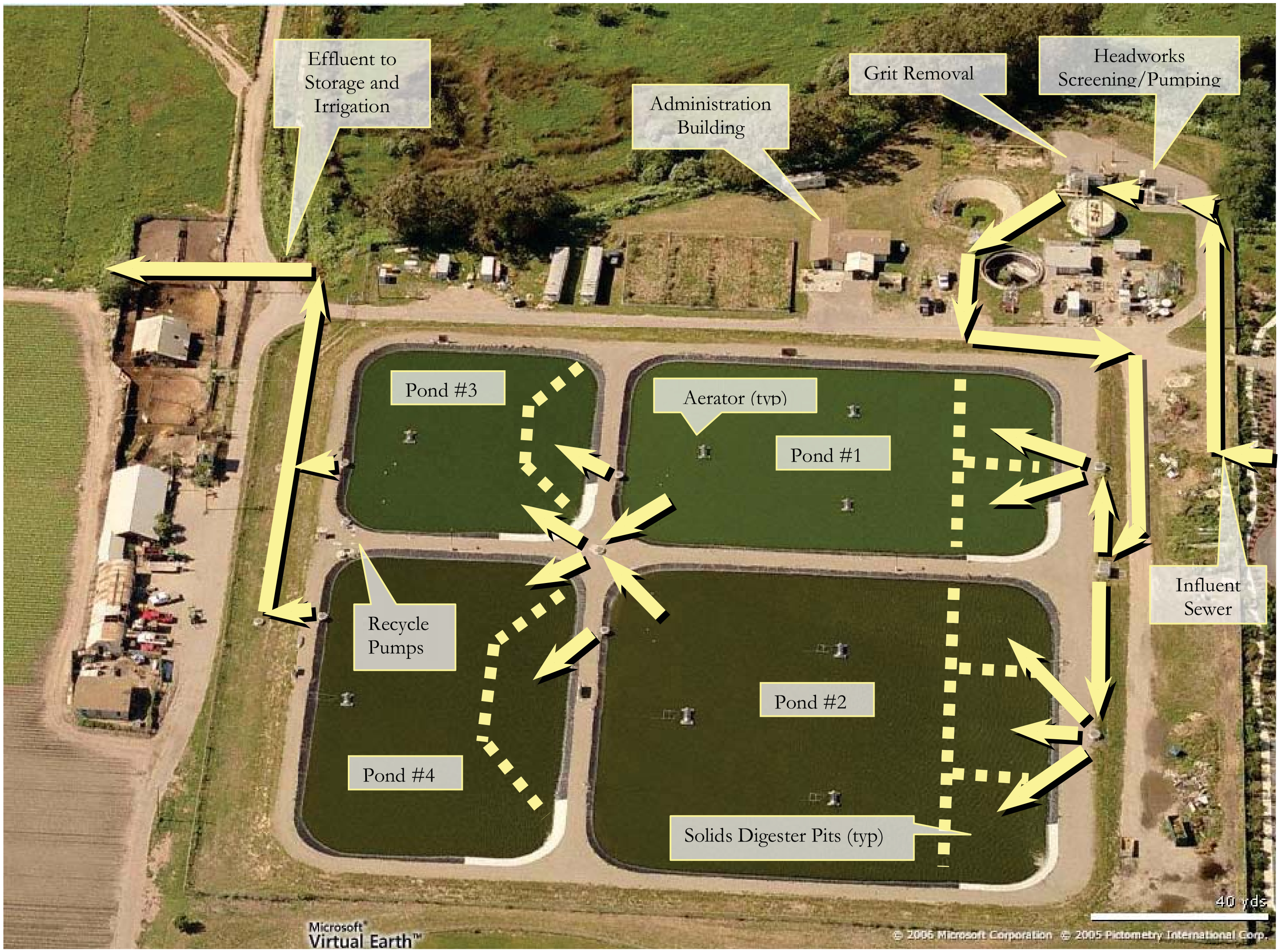


Figure 2-1 – Existing Guadalupe WWTP

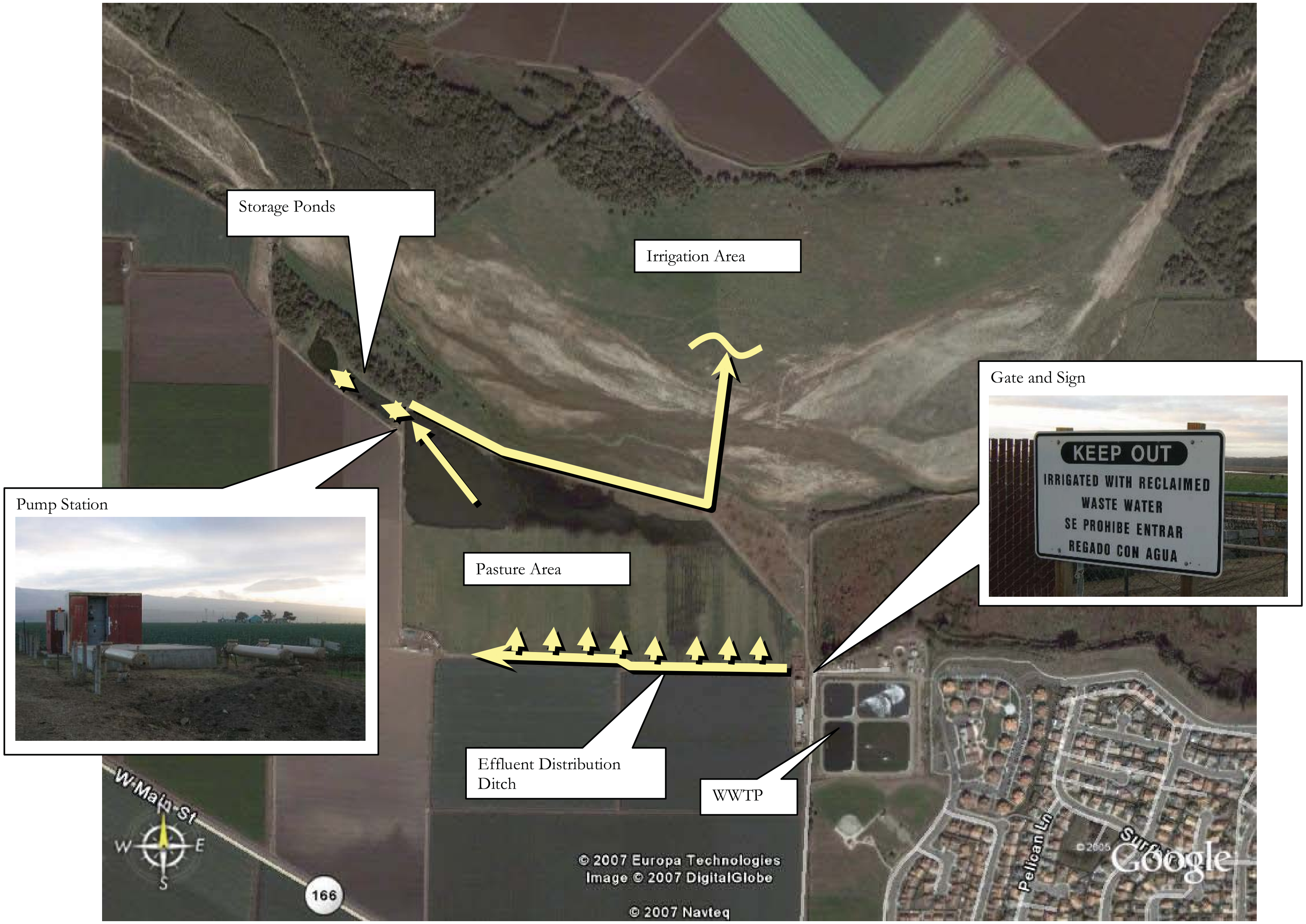


Figure 2-2 – Guadalupe WWTP Effluent Irrigation System

6.0 FUTURE TREATMENT, RECLAMATION AND DISPOSAL OPTIONS

6.1 Introduction

As presented in Section 4, new residential developments are planned that will contribute to raising projected maximum month wastewater flows to over the currently permitted 0.96 mgd flow discharge limit. The estimated rate of development indicates projected maximum month wastewater flows of over 1.2 mgd by the year 2017 assuming continued linear growth (other than from the two new developments), and consistent population density and contribution rates. If linear growth continues beyond this, the maximum month flow is projected to be approaching 1.5 mgd by 2025. Therefore, the future treatment and disposal capacity that was planned for was 1.5 mgd, with flexibility to add treatment and disposal capacity up to 2.0 mgd if future development should necessitate this flow capacity.

6.2 Treatment Options

Treatment options are dictated by the level of treatment needed for effluent disposal. It is anticipated that the current effluent disposal method will continue in the future. However, adding the capability to treat effluent to higher levels of disinfection will allow greater flexibility in effluent disposal if the current discharge location and practice is negatively impacted by human or natural causes.

To treat the increased influent flow to secondary treatment levels, options include construction of additional AIPS cells or construction of a conventional activated sludge treatment plant. The capital and operating costs for adding an additional AIPS treatment train will be considerably less than construction of facilities for a conventional plant. The additional land needed for the 0.5 mgd AIPS ponds will initially be approximately half of the current pond area (4 acres with berms), but at least 8 acres should be acquired near the WWTP for eventual treatment up to 2.0 mgd. Capital cost (not including land) is estimated to be $900,000 for the 0.5 mgd AIPS treatment train based on the recent construction cost of the existing AIPS.

Alternately, additional aeration can be added to the existing AIPS treatment trains to increase treatment capacity. It is estimated that four additional aerators will be needed to increase liquid treatment capacity to 1.5 mgd. Additional solids accumulation will occur in the solids pits at this higher capacity, necessitating more frequent cleanout of the material. Equipment and construction costs for the additional aeration capacity and other potential improvements are estimated to be $680,000.

To treat the effluent from the ponds to higher levels will require additional treatment processes, or the conversion of the entire treatment system to a membrane bioreactor (MBR). The first option would involve adding coagulation and a DAF specifically designed for algae removal or a chemical precipitation and settling unit. Effluent from this unit could then be filtered through an acceptable Title 22-approved filtration technology such as a continuous backwash upflow filter, or a cloth filter. Effluent from this process would then be disinfected through an ultraviolet (UV) light system to meet required pathogen inactivation. The construction cost of these additional treatment processes is estimated to be approximately $3.7 million, with filtration, at 1.5 mgd capacity.

The second option is to convert the entire system to a 1.5 mgd MBR plant. Membrane bioreactors are based on recently developed membrane technologies combined with an activated sludge basin. The membranes are highly effective in separating particles down to virus size from the treated effluent, and qualify as tertiary treatment. The estimated cost for converting the WWTP to an MBR process is $8 million.

These two options are depicted schematically in Figures 6-1 and 6-2 respectively. It is recommended that the City increase treatment capacity by adding aeration capacity to the existing ponds as the lowest cost option, and then add unit processes as necessary to produce higher quality effluent for reuse. The total construction cost of Option 1 is estimated to be about half of constructing a new MBR plant, which is Option 2.

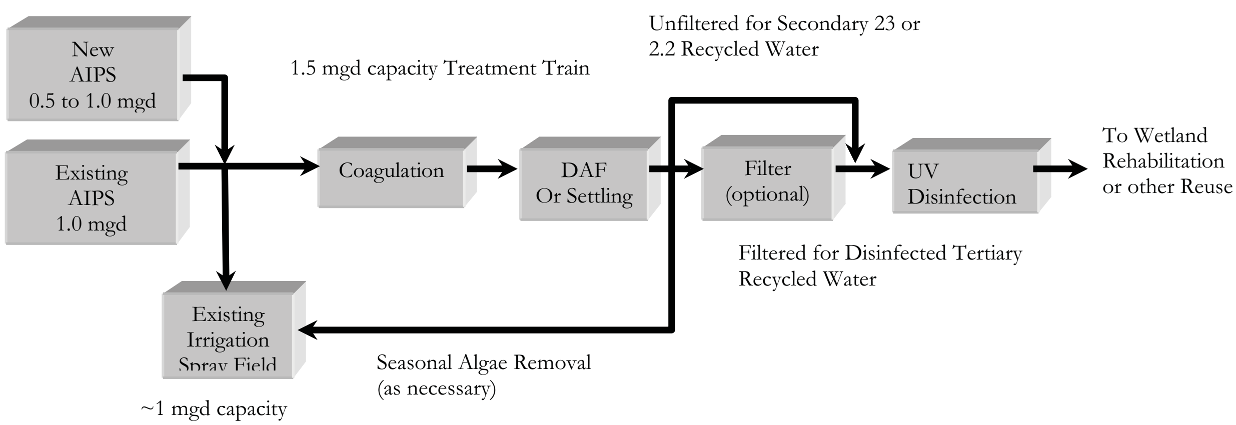


Figure 6-1 – Treatment Option 1

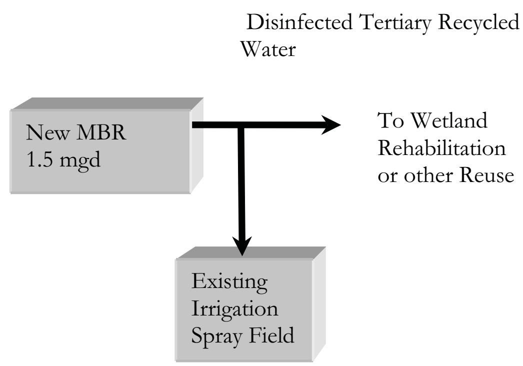


Figure 6-2 – Treatment Option 2

6.3 Effluent Reuse Options

In addition to the current irrigated pasture sprayfield, there are a number of potential regional opportunities for effluent reuse. The specific opportunities should be determined by a market study, but general uses and potential quality concerns in addition to adequate disinfection are listed as follows:

- Agricultural – salinity, permeability, nutrients, and heavy metals.
- Large Landscape – salinity and nutrients.
- Industry - hardness, TSS, BOD, and metals.
- Environment - WQ for aquatic habitat.

One specific effluent discharge opportunity that has been identified is a 20 acre wetland area located near the City center that has experienced degraded quality and limited water flow. Discharge of treated effluent to this area is anticipated to help restore the wetland characteristics and could allow development of an attractive natural resource that would draw visitors to the downtown area. Figure 6-4 shows the location of this wetland along with a potential 2.5 mile pipeline that could deliver treated effluent to this location from the WWTP. The pipeline also passes near other potential reuse sites. The construction cost for the pipeline and a pump station designed to deliver the flow is estimated to be $2.2 million.

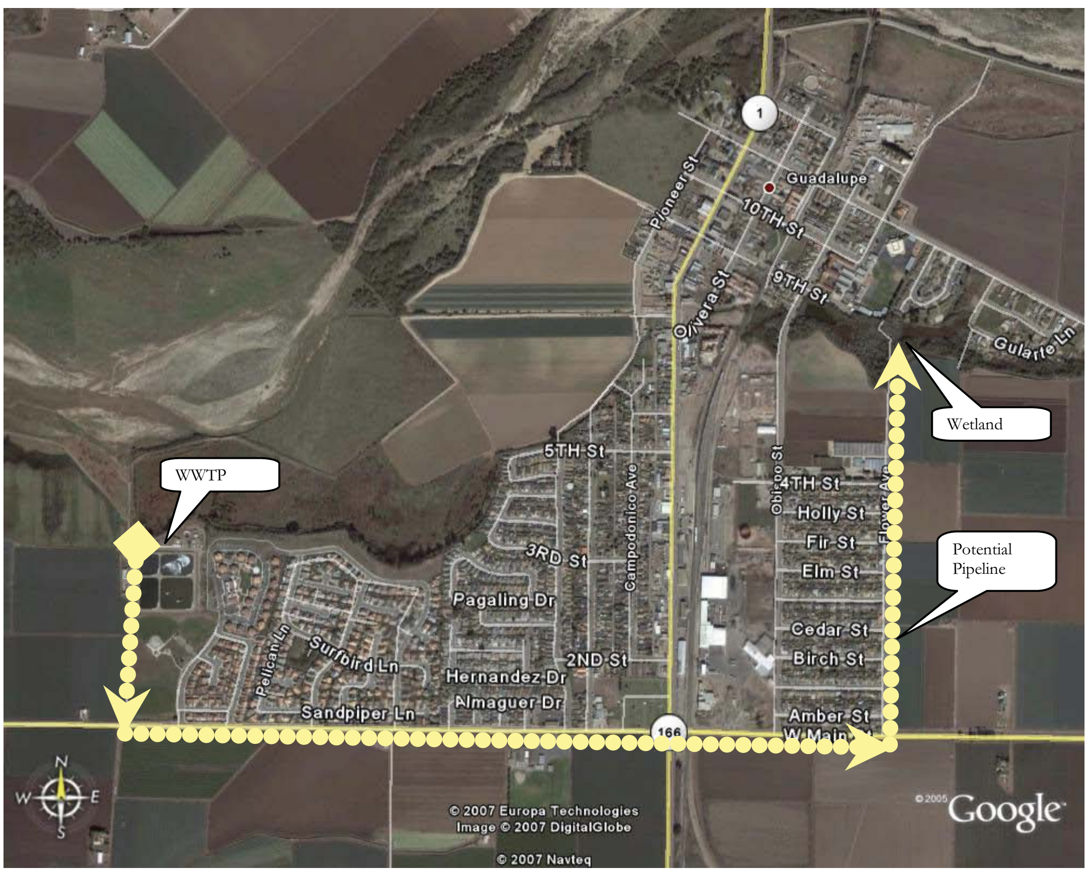


Figure 6-3 Wetland Reuse Site and Effluent Pipeline

A more limited pumping arrangement and pipeline will allow treated effluent to be directed to one of the proposed developments for irrigation of landscape and greenway areas. The construction cost for this smaller system is estimated to be approximately $500,000.

6.4 Recommendations and Costs

It is recommended that the City implement a multi-phase approach to meeting current effluent requirements and add additional facilities necessary to produce at least disinfected secondary 2.2 recycled water while leaving space for a filtration system that will allow treatment to tertiary levels. Alternately, it may be possible to coagulate and directly filter the effluent without a settling or DAF step. It would be beneficial to pilot test these technologies onsite. Table 6-1 summarizes the recommended phases and the estimated costs for implementing the improvements.

Table 6-1
Recommended Improvement Phasing and Costs

Improvement	*Construction Cost*	*Engineering*[A]	*Total Project Cost*[B]
Phase 1 – Algae Control			
Barley Straw Application			<$1000
Phase 2 – Plant Improvements			
Grit Removal	$210,000	$40,000	$250,000
Effluent Distribution Pipeline	$300,000	$50,000	$350,000
Irrigation Pump Station Enclosure	$55,000	$10,000	$65,000
Mechanical Bar Screen/Washer	$370,000	$65,000	$435,000
Subtotal	$935,000	$165,000	$1,100,000
Phase 3 – Capacity Increase and Tertiary/Disinfection Treatment			
Aeration Capacity Increase	$680,000	$120,000	$800,000
Coagulation/DAF	$1,780,000	$320,000	$2,100,000
Filters	$1,100,000	$200,000	$1,300,000
UV Disinfection	$850,000	$150,000	$1,000,000
Limited Effluent Pumping/Pipeline	$500,000	$90,000	$590,000
Subtotal	$4,910,000	$880,000	$5,790,000
Phase 4 – Wetland Rehabilitation Project			
Pumping & Pipeline	$2,200,000	$400,000	$2,600,000
Wetland Improvements[C]	$1,690,000	$310,000	$2,000,000
Subtotal	$3,890,000	$710,000	$4,600,000
TOTAL	$9,735,000	$1,755,000	$11,490,000

[A] - Engineering fees include Design and Construction Mgmt. @18% of Construction Cost with Contingency.
[B] - Costs for Project Direct Administration, CEQA Compliance, Legal and Post Implementation Monitoring to be included separately.
[C] – Scope of wetland improvements still to be determined.

Recycled Water Feasibility Study Scope of Work

Prepared by Dudek for the City of Guadalupe

February 2010

Background

The City of Guadalupe is currently in the process of upgrading its Wastewater Treatment Plant (WWTP). The scope of improvements includes: headworks, conversion of the current pond system to an extended aeration design, new sludge handling facilities, dredging the existing ponds, disposal of solids and minimal site work. This project will allow water treatment to full secondary and upgrade to Title 22 standards will be very feasible. The City has expressed interest to ultimately upgrade the treatment plant to tertiary treatment and produce Title 22 recycled water.

Under Title 22, there are three different levels of recycled water quality, the most stringent level being that for unrestricted use (which is known as disinfected tertiary recycled water). Disinfected, tertiary recycled water is defined in 22 CCR 60301.230 and requires that secondary effluent be subsequently filtered and disinfected, while meeting the following two criteria:

- The filtered wastewater has been disinfected by either:
  - A chlorine disinfection process following filtration that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak day dry weather design flow; or,
  - A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. A virus that is at least as resistant to disinfection as poliovirus may be used for purposes of the demonstration.
- The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an maximum probable number (MPN)

of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days, for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

Filtered wastewater, in turn, is defined in 22 CCR 60301.320 as an oxidized wastewater that meets either of the following criteria:

- Has been coagulated and passed through natural undisturbed soils or a bed of filter media pursuant to the following:
  - At a rate that does not exceed five gallons per minute per square foot of surface area in mono, dual or mixed media gravity, upflow or pressure filtration systems, or does not exceed 2 gallons per minute per square foot of surface area in traveling bridge automatic backwash filters; and,
  - So that the turbidity of the filtered wastewater does not exceed any of the following:
    - An average of 2 NTU within a 24-hour period;
    - 5 NTU more than 5 percent of the time within a 24-hour period; and NTU at any time.
- Has been passed through a microfiltration, ultrafiltration, nanofiltration, or reverse osmosis membrane so that the turbidity of the filtered wastewater does not exceed any of the following:
  - 0.2 NTU more than 5% of the time within a 24-hour period; and
  - 0.5 NTU at any time (State of California, 2008)

Direct filtration is only applicable as a filter option when the water quality of the filter influent does not exceed 5.0 NTU for more than 15 minutes, and never exceeds 10.0 NTU. Where direct filtration is not applicable, conventional full Title 22 treatment, which includes secondary treatment followed by coagulation, flocculation, and sedimentation, prior to filtration, is required.

Recycled water quality requirement varies with applied technology and reuse objectives in the State of California. In general, the recycled water quality will have, as a minimum, turbidity of 2 NTU or less and total coliform less than 2.2 MPN/100 mL. To meet Title 22 standards for reuse, tertiary treatment followed by disinfection will need to generate an effluent with at most 10 mg/L of BOD, 10 mg/L of TSS and 2 mg/L of TKN[1]. However, the economics of a recycled water market will need to be studied before the feasibility of a tertiary treatment project can be established for the City of Guadalupe.

Scope of Work

The main goal of the recycled water feasibility study is to identify the best use of the City's water resources in terms of costs versus benefits. A market assessment will first be performed to identify potential recycled water customers, both within and adjacent to the City boundaries, and match recycled water supply to potential demand. A different set of criteria will be needed to compare the benefits of groundwater recharge versus the delivery of recycled water to existing potable water customers. In this case, water quality impacts will need to be considered. Delivery of recycled water to customers outside of the existing water service area will also be evaluated differently due to the impact on overall revenues. The approach is to discuss these issues up front to prioritize the types of potential reuse customers.

Once reuse categories are prioritized and sets of potential customers are identified, distribution system alternatives will be explored to maximize recycled water use with the lowest capital and O&M costs. The economics of recycled water distribution systems is such that the larger demands will dictate the alignments of the backbone pipeline routes. Additionally, it has proven advantageous to develop payback criteria to evaluate service to incidental customers located off the backbone pipelines; the ability to sell enough recycled water to pay for a pipeline extension within a set amount of time. For example, industrial customers, such as a concrete batch plant, can typically justify pipelines with less demand because of the year round use and the lower peaking factors. The vertical distance or elevation of reuse sites must also be considered when trying to minimize pumping/O&M costs.

After alternative alignments are identified for up to three different customer sets, the required pipelines, pump stations, and storage reservoirs will be sited. Facilities will be sized using a hydraulic computer model analyzed under peak flow conditions. We propose to develop the models using the GIS-based MWHSoft H2OMap software to be compatible with the City's existing water system model. Planning level life cycle cost estimates will be prepared to

[1] Total Kjeldahl Nitrogen, the sum of organic nitrogen; ammonia (NH_3) and ammonium (NH_4^+) in wastewater.

compare and evaluate the different alternatives. City Staff will make the final selection of the preferred alternative will be made at a workshop.

The preparation of technical memorandums at the conclusion of specific tasks will simplify the report preparation effort at the end of the project, thus technical memoranda will be delivered at the conclusion of each task, so that City Staff have the opportunity to review and comment.

Task 1 – Data Collection and Review

This task includes collect and review pertinent background information, reference materials, and data necessary for the project. The project information will be summarized in a Project Data Summary Log to track the information type, format, when it was received, and where the information was obtained. The information to be reviewed will include, but not be limited to, the following:

- City of Guadalupe's General Plan and Specific Plans, 2001 Draft Water Master Plan, 2007 WWTP Study
- Historical water consumption data, water production records, wastewater treatment flows and water quality data, as provided by the City
- City design standards and specifications
- GIS data, relevant facility drawings and maps, topography data, and aerial photography
- Santa Barbara Countywide Integrated Regional Water Management Plan
- Pertinent information from other agencies and companies

Task 2 – Review of Standards, Ordinances and Regulations

Based on review of the current City ordinances and resolutions, recommendations will be made for changes and/or additional regulations. Also, design standards that are applicable to recycled water systems will be reviewed. Review and comment on the previously prepared documents related to potentials for recharge basins will be discussed. All of this information will be looked at in the context of State and Federal regulations regarding water quality standards and implementing recycled water systems. A concise, technical memorandum will be prepared that summarizes findings with regard to how the various regulations could affect the development of the City's recycled water system and the necessary Municipal Code modifications to bring the City into compliance.

Task 3 – Recycled Water Market Assessment

A detailed market assessment will be performed to identify potential recycled water customers within the City's service area boundary. The market assessment will be accomplished with the following subtasks:

- A list of potential recycled water use categories applicable to the City will be developed from the Title 22 Water Recycling Criteria and with other agencies throughout the state.
- Customer and water use information from the City's billing system will be converted to MSAccess format for the purpose of quantifying demands and developing a GIS database.
- Water account types and demand will be reviewed to classify users based on total demand and water use patterns. Sites with multiple meters will be grouped to a single customer.
- Monthly and seasonal water use variations will be evaluated to establish a maximum day peaking factor.
- Water accounts of potential reuse water customers will be linked to the City's base map by geo-coding from the site address field.
- Aerial images will be reviewed to delineate irrigated acreage and topographic data will be used to assign elevations.
- Potential recycled customers outside of the City boundary will be identified from aerial photography. Estimates of water use will be made using unit demand factors developed from billing data for similar land use types.
- The City's Water Master Plan, General Plan and Specific Plans will be reviewed to identify future development with potential recycled water demands.
- The GIS-based Access database will be refined and populated with information from the above subtasks. All data fields identified in the City's RFP will be populated for existing potable water customers.
- The final products of this task will be a GIS-linked database of viable reuse customers, an exhibit illustrating the location and classification of each customer, and a technical memorandum that documents the market assessment process and provides summary tables of the potential reuse customers

Task 4 – Recycled Water Supply Evaluation

This task will evaluate the potential recycled water quality and quantity, and set a water reuse goal based on the projected supply and demand for recycled water.

- Historical wastewater effluent flow data will be evaluated to estimate the potential supply of recycled water. Seasonal peaking trends will be considered.

- The City's Wastewater Master Plan will be reviewed to obtain future wastewater flow projections. A supply/demand comparison will be made based on both existing and future conditions. Results will be presented to City Staff, and existing and future water reuse goals will be developed. The use of supplemental potable water during peak demand periods will be discussed as an option to maximize the annual use of recycled water.
- Effluent water quality data will be evaluated with respect to the recycled water quality standards and regulations investigated in previous tasks
- Potential water quality issues will be identified together with mitigation measures or treatment options.

The final product of this task will be a technical memorandum documenting the results of the recycled water supply evaluation and setting a water reuse goal.

Task 5 – Feasibility Analysis and Alternatives Development

Up to three (3) system alternatives will be developed for the distribution of recycled water based on the water reuse goal and water markets identified in the previous tasks. The alternatives will each target a different set of customers. Preliminary alternatives with backbone pipelines and storage locations will first be reviewed with City Staff. It is assumed that each alternative will have, as a minimum, one pump station at the treatment plant and a storage facility. An additional pump station may be required if there are no viable locations for elevated storage. Criteria will be developed to evaluate the cost effectiveness of providing recycled water service to individual users located at a distance from backbone pipelines. Each distribution system alternative will be developed as follows:

- Pipeline alignments will be identified to supply the largest demand with the shortest length of pipe.
- A service zone will be established based on the highest elevation customer and standard pressure criteria
- Daily flow patterns and peak flows will be calculated for the various demand types (irrigation, agriculture, and industrial) using peaking factors derived from the billing data and assuming a 10-hour irrigation period.
- A hydraulic model will be developed using MWHSoft H2OMap to size the pipelines, pump stations and reservoirs for peak demand conditions.

- Reservoirs will be sized based on a constant recycled water supply rate and peak demands.
- Reservoirs will be located on City-owned property or vacant land at the required elevation.
- An exhibit will be prepared showing the pipeline alignments, location of pump stations and reservoirs, and the customers served. A summary table of demands served and potential future demands will be included on the exhibit.
- A planning level cost estimate will be prepared. The estimate will include both capital and O&M costs for treatment facilities, pipelines, pump stations and storage facilities.
- Potential constraints and constructability issues or implementation challenges will be identified.

Task 6 – Alternatives Evaluation

A workshop will be held with City Staff to review and evaluate the distribution system alternatives. The exhibits for each alternative will be provided to the City for review prior to the workshop. A formal ranking and evaluation of each alternative based on weighted criteria is not required, and that the selection of a preferred alternative will be made at the conclusion of the workshop based on the most advantageous cost/benefits for the City.

Development of the alternatives and the final selection of the preferred alternative will be documented in a technical memorandum. The need for further analysis and next steps required for the development of the recycled water system will be outlined in the memorandum.

Task 7 – Report Preparation

Draft and final versions of the Recycled Water Feasibility Study will be prepared to document the analyses, findings, and recommendations described under the preceding tasks. The technical memorandums submitted will be included in a section of the draft and final reports.

Technical Memorandum 1

Conceptual Design Report

Prepared for

City of Guadalupe

Wastewater Treatment Plant Improvement Project

Prepared By

DUDEK

May 2010

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TABLES

FIGURES

APPENDICES

1 EXECUTIVE SUMMARY

The City of Guadalupe wastewater treatment plant has had ongoing violations of the Waste Discharge Requirement (WDR) permit since 2005. This conceptual design memorandum highlights the action plan for remediation of this problem by proposing several upgrades to the treatment plant.

Review of the condition of the existing plant revealed several mechanical and process deficiencies that will be corrected by this project. The design life considered for this project with upgrades is 30 years assuming current levels of regulatory standards. The plant will also be designed to enable future upgrades to tertiary treatment and water reuse. Apart from the need to meet the requirements of the current discharge permit, the project is required to meet environmental standards and address the ease of operation and maintenance.

The proposed project consists of: upgrade to the headworks, rehabilitation of the grit removal system, conversion of current pond system to an extended aeration design, new sludge handling facilities, new effluent disposal pipeline, upgrade to the existing irrigation pump station, redesign of the spray field, dredging the existing ponds and disposal of solids, and miscellaneous site work. The preliminary estimate of the proposed project cost is approximately $7,728,000.

The grant available for this project is limited, and therefore a reduced project scope has been proposed to enable the plant to attain reliable compliance with the WDR by the end of 2011. This phased approach will first address the upgrade to the headworks, conversion of current pond system to an extended aeration design, new sludge handling facilities, dredging the existing ponds and disposal of solids, and minimal site work. This reduced scope project cost estimate is approximately $4,032,000. It is recommended that the City pursue additional funding resources to enable the completion of the design and construction of the entire project within a short term (2 to 3 years) time frame. The next technical memorandum (TM2) will provide more detail on the selection of equipment and actual design elements, including an implementation schedule.

2 INTRODUCTION

The City of Guadalupe, Department of Public Works, currently owns and operates a wastewater treatment plant (WWTP) utilizing Advanced Integrated Pond System (AIPS) under Waste Discharge Requirement (WDR) Order No. R3-2005-0015. Since 2005 there have been total suspended solids (TSS) and biochemical oxygen demand (BOD) violations. Possible reasons of these excesses can be attributed to the following:

- Food waste discharges from local packing facilities (vegetable matter)
- Ineffective preliminary treatment at treatment plant (lack of effective grit removal)
- Failed equipment and overloaded pond system
- Operational inefficiencies of the treatment process

The City commissioned Dudek to provide professional engineering services to plan and design improvements to the existing plant to ensure compliance with the WDR.

3 PROJECT PLANNING

3.1 Plant History, Location, and Description

The WWTP was first constructed in the 1960s to serve the City of Guadalupe and since has gone through multiple renovations and upgrades. The original design included headworks, aerator, two clarifiers, digester, sludge drying beds, and holding ponds. In 1979, various facilities were refurbished and upgraded, along with the demolition of the aerator, construction of new headworks and lagoons, spray distribution system and off-site holding ponds. The plant upgrade in 1992 included new headworks, Pista® grit removal system, new sludge drying beds, irrigation pump station, and spray distribution system across the river. In 2004, the aerated lagoons were converted to the AIPS.

The WWTP is located at the western edge of the City of Guadalupe, which is in northwest Santa Barbara County. Agricultural land borders the south and west sides of the plant and the Santa Maria River is approximately 1,000 feet north of the plant. Figure 1 shows the vicinity map.

The existing process flow diagram is shown in Figure 2. The process units at the plant are:

- Headworks consisting of an influent gate; two parallel open channels, one with a manually cleaned screen and the other with a comminutor; followed by the influent pumps.
- Grit removal system consisting of a grit pump system and classifier.
- AIPS ponds consisting of four ponds, each with sludge preselector digester pits and surface aeration.
- Effluent discharge via an open unlined ditch to the off-site holding ponds.

- Effluent holding ponds consisting of three ponds with a total approximate storage volume of 10.5 million gallons.
- Irrigation Pump Station with two 60 HP and one 88 HP pumps.
- 71 acre irrigation field to spray the effluent for disposal.

3.2 Growth Areas and Population Trends

The City of Guadalupe has experienced moderate population growth since 1990. Table 1 shows the population growth trend between 1990 and 2009.

Table 1 – Population Growth Trends – Guadalupe vs. Santa Barbara County, 1990-2009

Geographic Area	1990	2000	2009	Percent Change (1990-2000)	Percent Change (2000-2009)
Guadalupe	5,479	5,659	6,534	3.3%	15.5%
Santa Barbara County	369,608	399,347	431,312	8.1%	8.0%

Sources: US Census Bureau, SF3:PF1, 1990, 2000; California Department of Finance, Report E-5, 2009

The planning horizon for this treatment plant upgrade is 30 years. Per the 2007 Santa Barbara County Association of Governments Regional Growth Forecast, the population of the City is projected to be approximately 12,000 in 2040.

3.3 Effluent Requirements

The WDR dictates the maximum effluent levels which are presented in Table 2.

Table 2 – Effluent Discharge Limitations

Constituent	Units	Monthly Average	Daily Maximum
Flow	MGD	0.96	
Settleable Solids	mL/L	0.2	0.5
BOD, 5-Day	mg/L	60	100
Suspended Solids	mg/L	60	100
Total Dissolved Solids	mg/L	1500	
Sodium	mg/L	230	
Chloride	mg/L	230	
pH	Within the range 6.5 – 8.4		

3.4 Future Treatment Upgrade Requirements

The City has expressed interest to ultimately upgrade the treatment plant to tertiary treatment and produce Title 22 recycled water.

Under Title 22, there are three different levels of recycled water quality, the most stringent level being that for unrestricted use (which is known as disinfected tertiary recycled water). Disinfected, tertiary recycled water is defined in 22 CCR 60301.230 and requires that secondary effluent be subsequently filtered and disinfected, while meeting the following two criteria:

- The filtered wastewater has been disinfected by either:
  - A chlorine disinfection process following filtration that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak day dry weather design flow; or,
  - A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. A virus that is at least as resistant to disinfection as poliovirus may be used for purposes of the demonstration.
- The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an maximum probable number (MPN) of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days, for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

Filtered wastewater, in turn, is defined in 22 CCR 60301.320 as an oxidized wastewater that meets either of the following criteria:

- Has been coagulated and passed through natural undisturbed soils or a bed of filter media pursuant to the following:
  - At a rate that does not exceed five gallons per minute per square foot of surface area in mono, dual or mixed media gravity, upflow or pressure filtration systems, or does not exceed 2 gallons per minute per square foot of surface area in traveling bridge automatic backwash filters; and,
  - So that the turbidity of the filtered wastewater does not exceed any of the following:
    - An average of 2 NTU within a 24-hour period;
    - 5 NTU more than 5 percent of the time within a 24-hour period; and NTU at any time.
- Has been passed through a microfiltration, ultrafiltration, nanofiltration, or reverse osmosis membrane so that the turbidity of the filtered wastewater does not exceed any of the following:
  - 0.2 NTU more than 5% of the time within a 24-hour period; and
  - 0.5 NTU at any time (State of California, 2008)

Direct filtration is only applicable as a filter option when the water quality of the filter influent does not exceed 5.0 NTU for more than 15 minutes, and never exceeds 10.0 NTU. Where direct filtration is not applicable, conventional full Title 22 treatment, which includes secondary treatment followed by coagulation, flocculation, and sedimentation, prior to filtration, is required.

In summary, the recycled water quality requirement varies with applied technology and reuse objectives in the State of California. In general, the recycled water quality will have, as a minimum, turbidity of 2 NTU or less and total coliform less than 2.2 MPN/100 mL. To meet Title 22 standards for reuse, tertiary treatment followed by disinfection will need to generate an effluent with at most 10 mg/L of BOD, 10 mg/L of TSS and 2 mg/L of TKN[1]. However, the economics of a recycled water market will need to be studied before the feasibility of a tertiary treatment project can be established.

4 EXISTING CONDITIONS

4.1 Condition of Facilities

4.1.1 Headworks

Figure 3 shows the condition of the influent structure. The wastewater flows into the plant via a 24-inch sewer, approximately 15-feet deep. The headworks structure is approximately 20-feet deep. The sluice gate installed at the influent channel has never been exercised, but appears to be in good condition.

Following the sluice gate, the influent sewer bifurcates into two open channels, each equipped with stop gates. A communitor, which grinds the influent solids, is located on the southern channel, while a manually cleaned bar screen is located on the northern channel. During normal operation, the stop gate for the northern channel is closed and all flow is directed through the communitor. The communitor is approximately 18 years old and has reportedly had several breakdowns. The cutting mechanism is also reported to have worn out and replacement parts are not readily available.

Flow from the two channels spill into the influent pump station wet well. Currently three 20 HP submersible centrifugal pumps are installed with space allocated for a future fourth pump. These pumps have problems with movement along the guide rails and seating. They are also at the end of their useful life. A high water level alarm is lacking at the pump station which has led to several instances of flooding. There is a manual lift crane for the removal and handling of the pumps.

One check valve on the pipe manifold was been replaced recently but the other two are leaking and in need of replacement. The flowmeter, though working, is also at the end of its useful life and needs replacement.

[1] Total Kjeldahl Nitrogen, the sum of organic nitrogen; ammonia (NH_3) and ammonium (NH_4^+) in wastewater.

The pumps are operated by variable frequency drives (VFDs) which reside at ground level next to the headworks pipe manifold. Two of the three VFDs were replaced in 2008. There is no air conditioning and only minimal dust filtration at the VFD enclosure which has led to frequent failures of the VFDs.

The concrete structure, metal stairs, railing, and grating appear to be in good physical condition and do not require rehabilitation. The lights in the structure are currently not functioning and are due for replacement. The structure has reportedly flooded several times in the past resulting in the electrical system not functioning.

4.1.2 Grit Removal System

At the present time, the entire grit removal unit is being bypassed and the effluent from the headworks flows directly to the ponds. For AIPS, removal of grit is a critical step in reducing the inert load to the initial "digester" pits. With the grit system offline, all grit is collected in the ponds, displacing treatment volume intended for degradation of organic solids, and therefore contributing to the observed overloading.

Figure 4 shows condition of the grit removal facilities. The existing concrete structure, piping, metal stairs, railing, grating, and vortex system appear to be in good condition and do not require rehabilitation.

The grit removal system is not being utilized because of regular clogging problems at the grit pump. The current configuration incorporates a flooded suction grit removal pump and no provision for high pressure purge. To reduce the probability of clogging in a flooded suction configuration, the following design could have been implemented as recommended by the equipment manufacturer:

- A water flushing connection fitted to the pump suction pipe. While there is a water line in the area, it is not adequately sized or connected to the grit line to provide adequate flushing.
- A high-pressure air line to the bottom of the grit pocket. Before starting the pump, the suction line would be flushed and the grit in the pocket should be suspended by agitating with compressed air.
- Discharge piping less than 20 feet and a straight run is recommended. Current discharge piping is approximately 48 feet and has four bends.
- Pinch valve on discharge line. Current configuration has a gate valve which has seating problem due to grit accumulation.
- Check valves are not recommended on grit piping since they get grit locked, as is the case in this installation.

Since the current system lacks these recommended characteristics, the system has been regularly plagued by clogging. The grit classifier is from the 1979 plant upgrade and is severely corroded and beyond repair. While the grit propeller is currently functioning, it is recommended to replace the rotating propeller drive motor with all the improvements in this facility.

4.1.3 AIPS Ponds

Typical AIPS facilities are composed of a series of four earthen ponds using algae and bacteria to treat waste. The wastewater first flows into deep pits in an advanced facultative pond (First Pond, Facultative Pond), where solids are fermented to methane and most pathogens are removed. The water then flows to a high rate pond (Second Pond, High Rate Pond) for rapid growth of algae and concurrent production of oxygen, oxidation of organics, ammonia removal, heavy metal removal and disinfection. Typically, there are at least a couple of downstream ponds to settle and remove algae (Third Pond, Settling Pond) and provide further disinfection by exposure to sun's UV rays (Fourth Pond, Maturation Pond)

At Guadalupe, the AIPS has four ponds, each with separate digester and aeration cells, but does not follow the typical AIPS configuration. (Refer to Figure 2.) The influent flows into a splitter chamber and is split by two weirs. Approximately 66% of the flow flows into Pond 2 and thereafter to Pond 4, whereas 33% of the flow is received by Pond 1 and thereafter by Pond 3. The pond dimensions are summarized in Table 3.

Table 3 – Existing Pond Dimension Summary

Parameter	Pond 1	Pond 2	Pond 3	Pond 4
Water Depth (ft)	11	11	11	11
Free board (ft)	2.5	2.5	3	3
Side Slope (perimeter)	3:1	3:1	3:1	3:1
Side Slope (interior berm)	2.5:1	2.5:1	2.5:1	2.5:1
Length (ft)	300	300	167	167
Width (ft)	193	286.5	190	283.5
Water surface area (acre)	1.28	1.92	0.68	1.04
Water Volume (million gal.)	3.3	5.5	1.5	2.2

At the submerged pits at the head of each pond, anaerobic degradation of settled solids occur followed by aerobic degradation of organic matter in the water column. The aerobic stabilization relies heavily on oxygenation from algae growing in the pond system, which emit oxygen during their photosynthesis process. To supplement and maintain aerobic conditions in the upper pond layer, and ensure odor-free operation, the ponds are equipped with brush-type mechanical aerators, which are controlled either manually or by dissolved oxygen probes in the first stage ponds. The mechanical aerators suffer from frequent breakdowns and require excessive maintenance. At this time three of the eight aerators are reported to be near failure and in need of replacement. Figure 5 shows the condition of facilities at the AIPS ponds.

The point of compliance for the WWTP is set at the AIPS pond effluent (refer to Figure 2). This configuration differs from the conventional AIPS due to the lack of settling pond and maturation ponds to complete the treatment. A possible reason for non compliance of the WDR may be due to the location of this sampling point. The algae developing in the high-rate region of the treatment train is not providing sufficient time to settle out.

Typical AIPS designs generate less than one feet of sludge over a five to seven year period. The facility at St. Helena, California, has not had to dispose of primary sludge in over 30 years. However, the ponds at this plant have accumulated approximately six feet of sludge within six years of operation.

In addition to the high sludge layer, algal blooms during summer months are also reported as an issue of concern with the City's facility. Retention times over three days, with moderate mixing energy applied to the pond, typically promote algal growth. With only the smallest two-pond train (Nos. 1 & 3) in service at current flows, the hydraulic retention time is approximately eight days. However, it is not recommended that only one pond be operated.

The earthen berms, geomembrane liners, flow distribution and transfer structures, and recirculation pumps are working properly and are in good condition.

4.1.4 Sludge Handling Facilities

The condition of sludge handling facilities is shown in Figure 6. There are two existing sets of sand sludge drying beds at Guadalupe's WWTP. The drying beds at the north end of the plant were re-constructed in 1979 and later abandoned in 1992. Currently these beds are in dire condition and will need to remain abandoned or demolished. The beds at the west side of the plant were constructed in 1992 have not been used since 2004 and are overgrown with plants. These may not require substantial structural rehabilitation, but would need a new media and drainage piping system.

The existing anaerobic digester is from the 1960s construction and has not been used since 2004. The concrete is in poor condition and the sludge was never pumped out. Consequently, this digester could never be brought back online and will need to be demolished.

4.1.5 Effluent Ditch and Holding Ponds

The effluent from the plant runs along an unprotected earthen ditch along the uphill border of a 50-acre pasture area as shown in Figure 7. Since this ditch runs through grazing pastures, cattle constantly walk over the ditch which causes the effluent to be released at several locations along the ditch. The effluent subsequently flows overland into Pond C, which is the largest and is connected with Pond B via an equalization pipe. Effluent is designed to flow through Pond B and Pond A through a sluice gate. All three ponds are designed to be equalized to maintain equal water surface elevations. The effluent holding ponds A, B, and C were designed to have approximate storage volumes of 6, 2.5, and 2 million gallons respectively.

The equalization pipe connecting the Ponds C and B appears to be clogged since Pond C is at a very high level compared to Ponds A and B, which appear to be well below the normal operation level. The slide gate between Ponds A and B also appears to have deteriorated and requires attention.

The entire area of Ponds A and B, and a small segment of pond C are within the FEMA 100-year flood plain. Significant erosion has been observed around Pond C (see Figure 7), including the erosion of the access road to the irrigation pump station and electrical poles and fence. It also appears that the original berm elevations from the 1992 construction have not been maintained. This issue will be verified after survey is performed during the preliminary design phase of this project.

4.1.6 Irrigation Pump Station

Figure 8 shows condition of the irrigation pump station. The irrigation pump station is situated in between Pond B and C and receives water directly from both these ponds. Effluent from each pond flows by gravity into the pump station wet well through two 16-inch PVC pipes. The pump station is comprised of a 22 feet deep wet well with three submersible centrifugal pumps and space reserved for a future fourth pump.

Two of the existing 88HP pumps were replaced in 2006 and 2008 respectively with two new 60HP pumps, and are reported to be working well. The ductile iron piping, pond intakes, and concrete structure are also reported to be in good condition. The irrigation filters have never been serviced and cattle have damaged multiple parts of these filters.

The irrigation pump station motor control center and variable frequency drives are currently located in a small, cramped space, making operational control and maintenance activities more difficult and potentially unsafe. The VFDs were replaced in 2005. However there is no air conditioning and only minimal dust filtration at the VFD enclosure which has led to frequent failures of the VFDs. The absence of a pump lift crane also makes pump maintenance difficult. The facility appears to have been equipped with an alarm system with telemetry, but it is not functional.

4.1.7 Spray Distribution System

From the irrigation pump station, an underground 12-inch PVC (C-900) force main delivers the effluent north of the Santa Maria River to a spray distribution system which irrigates a 71-acre cattle pasture. It has been reported that the butterfly valves at the end of the force main are not functioning properly and may need replacement. The entire 71-acre pasture is within the 100-year flood plain.

Figure 9 shows condition of the spray irrigation system. The original 1992 spray distribution system had approximately 34,500 feet of above ground 3-inch aluminum piping with sprinklers spaced every 60-feet. Nearly all of the 3-inch aluminum piping and sprinklers have been heavily damaged by cattle grazing. As a result, all the above ground irrigation lines and sprinklers were removed from service without replacement. Currently, two laterals have been assembled with the remaining pipes, and a high capacity sprinkler gun installed at each lateral. The larger sprinkler guns do not distribute effluent efficiently, and need to be repositioned twice a day to minimize standing water.

4.2 Hydraulic Analysis

The current average daily flow is approximately 0.6 million gallons per day (MGD)[2]. Figure 10 shows data of monthly average for the last five years.

The flow measurement is taken once a day, typically at 10:00AM each day. There are no diurnal flow variation records available. Hence, maximum day and peak hour flows are assumed. The current and projected operational criteria are presented in Table 4.

Table 4 – Current Hydraulic Criteria

Parameter	2009	2040[3]
Residents	6,534	12,000
Average Annual Flow (gpd)	599,000[4]	1,104,000
Maximum day Flow (gpd)	1,037,000[5]	1,911,300[6]
Peaking Factor	3.2[7]	3.0[8]
Peak Hourly Flow (MGD)	1.92	3.31
Per capita average flow (gal / capita / day)	92	92[9]

Based on the analysis above, the WDR limit for flow at 0.96MGD seems adequate in the near term.

4.3 Influent and Effluent Analysis

4.3.1 Suspended Solids

Figure 11 shows the trend in Total Suspended Solids (TSS) in the plant influent and effluent. The influent data suggests a typical domestic wastewater with average approximately 230 mg/L and ranging from 150 mg/L to 320mg/L with occasional spikes of 400mg/L. The cause of these spikes is unknown, but given the rarity of the events, it is not a cause of concern.

The effluent data have been found to fluctuate on an annual cycle, with the highest levels in the summer and the lowest levels, and occasionally compliant, in the winter months. The plant has consistently violated the WDR permit levels which suggest incomplete treatment at the plant. High TSS in the summer months can be attributed to algal bloom in the ponds. The observed rise of TSS annual average is likely caused by the sludge levels in the AIPS rising far beyond optimal levels for effective treatment.

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[2] Based on monthly monitoring reports, Jan 2004 – Dec 2009.
[3] Projected values.
[4] Average of monthly average flows from Jan 2009 through December 2009.
[5] Maximum from flow records (Jan 2009 through December 2009).
[6] Assumed same correlation between average annual flow and maximum day flow in 2040 as 2009.
[7] Recommended Standards for Wastewater Facilities, 2004 edition.
[8] Recommended Standards for Wastewater Facilities, 2004 edition.
[9] Assumed to be the same as in 2009.

4.3.2 Biochemical Oxygen Demand (BOD)

Figure 12 shows the trend in BOD in the plant influent and effluent. Similar to TSS, the influent data suggests a typical domestic wastewater with average approximately 265 mg/L and ranging from 150 mg/L to 350mg/L with occasional spikes around 400mg/L.

Since July 2005, the effluent levels have gradually increased and since April 2006 violating the WDR regularly. From the data it is quite evident that effective treatment is not being achieved at the AIPS ponds. In 2009, there is significant increase in BOD in the effluent suggesting high sludge volumes in the ponds reducing the capacity of the plant.

4.3.3 Settleable Solids

Figure 13 show the analysis of settleable solids in the plant influent and effluent. No data was available for the influent settleable solids levels for the year 2009. Average settleable solids was approximately 15mL/L with typically non-detect at the effluent. However in 2009, there have been some violations of the WDR, again possibly due to ineffective treatment in the AIPS ponds causing solids discharge.

4.3.4 pH

Figure 14 shows the pH levels in the influent and effluent. While the pH levels in the plant effluent has always been in compliance with the WDR, it was interesting to note that the effluent was a bit acidic compared to the influent coming into the plant.

4.3.5 Salts

Figure 15 show the Total Dissolved Solids (TDS), Sodium, and Chloride in the plant effluent. The influent values are not required to be measured. The effluent levels of Total Dissolved Solids (TDS), Sodium, and Chloride is currently in compliance with the WDR, and has been for at least the last 5 years. Samples are usually taken on a semi-annual basis, however, some sample periods have missing data.

4.4 Design Parameters

Based on the analysis of the influent data from the plant, the influent parameters have been assumed for the project and are given in Table 5.

Table 5 – Design Influent Parameters

Constituent	Units	Value
Average Daily Wastewater Flow[10]	MGD	0.96
Peak Wet Weather Flow[11]	MGD	3.84
BOD, 5-Day[12]	mg/L	300
Suspended Solids	mg/L	300
TKN (no data available, assumed)	mg/L	50
Ammonia as Nitrogen (no data available, assumed)	mg/L	35
Alkalinity (no data available, assumed)	mg/L	410

5 NEED FOR THE PROJECT

5.1 Health and Safety

Health and safety of the operators and the general public in the City of Guadalupe is a primary concern. For the last five years, this plant has been struggling to meet the WDR limits. Along with failing infrastructure, there is a potential health risk of exposure of humans and cattle to under treated wastewater. The existence of a groundwater basin lying below the effluent disposal field creates a concern for long term groundwater quality.

5.2 System O&M

As evident in Section 4.1, the facilities at this treatment plant have deteriorated and are in dire need of rehabilitation. Equipment in the headworks, the grit removal system, and the irrigation pump station require replacement. The proposed process design should also address ease of operation and maintenance by Grade II operators.

5.3 Growth

No upgrade is required for this plant at this time to meet the short term growth needs of the City of Guadalupe. The current plant at design capacity of 0.96 MGD, if operating efficiently, will adequately meet the needs of the area for the next 20 years, provided the current General Plan is adhered to.

6 ALTERNATIVE ANALYSIS

6.1 Headworks

6.1.1 Screens

As discussed in Section 4.1, the comminutor is close to the end of its useful life and in need of replacement. Since the plant has a possibility of receiving large particulate vegetable matter

[10] Based on WDR.

[11] Based on a conservative peaking factor of 4.0.

[12] Though the historical average at the plant is approximately 260mg/L, 300mg/L has been assumed as a conservative design parameter. Also applies to TSS.

7 RECOMMENDATIONS

7.1 Proposed Project

As identified in the analysis above, the proposed scope of work for the project is summarized in Table 9 and shown in Figure 18. The detailed cost estimate and preliminary system Process and Instrumentation Diagrams (P&IDs) are presented in Appendices E and F respectively.

Table 9 – Summary of Proposed Project

SCOPE OF WORK	CAPITAL COST
Headworks (Described in Sections 4.1.1 and 6.1)	
Replace the comminutor with one mechanically cleaned bar screen, and a washer/compactor system, retain the manual bar rack Replace submersible pumps Valves and meter replacement, painting of manifold, new pump crane New VFD, air conditioning, dust control and enclosure	$ 474,000
Grit System (Described in Sections 4.1.2 and 6.2)	
New rotating propeller drive motor and shaft extended down to the bottom sump with grit fluidizer vanes Installation of a top mounted Turbo Pista® Grit Pump Installation of a suction line, which extends down inside the drive tube to the storage hopper bottom Replacement and relocation of the grit screw conveyor to west end of grit chamber and close to the grit pump New grit piping and valves, painting of all pipe work	$223,000
Ponds (Described in Sections 4.1.3 and 6.3)	
Install new Biolac® diffusers in Pond No. 3, install new integral clarifiers Install new blowers and building, install all necessary pipe work	$1,389,000
Sludge Handling (Described in Sections 4.1.4 and 6.4)	
Restore existing sludge drying beds (9,600 SF) Build new 38,400SF sludge drying beds	$1,414,000
Effluent Pipe and Holding Ponds (Described in Sections 4.1.5, and 6.5)	
Install piping system to directly connect plant effluent to storage ponds Restore the eroded holding ponds Rehabilitate the equalization between three holding ponds	$895,000
Irrigation Pump Station (described in Sections 4.1.6 and 6.6)	
Replace remaining three submersible pumps, new filters New Electrical building and equipment, telemetry to plant New pump crane, New fencing around pump station	$263,000
Spray Distribution System (Described in Sections 4.1.7 and 6.7)	
Aeration of pasture, New Sprinkler system New underground laterals and isolation valves	$425,000
Site Services (described in Section 6.8)	
Sewer and Water, Demolition, Electrical and Instrumentation, Security, Road	$1,527,000

SCOPE OF WORK	CAPITAL COST
Dredging (Described in Section 7.2.2)	$750,000
TOTAL PROJECT COST[21]	$7,728,000

The above mentioned project cost estimate is in excess of the previously anticipated project costs and current available grant funding. This estimate is based on a thorough investigation and needs assessment of the plant and has revealed a more detailed scope of work as described Table 9. During the preliminary design phase, the project will be further defined and the cost estimates refined.

However, to meet the available grant funding and to ensure WDR compliance by 2012, a reduced scope project is proposed for the near term as presented in Table 10. It is recommended that additional funding sources be reviewed to facilitate the design and construction of the entire project as described in Table 9.

Table 10 – Summary of Near Term Project

SCOPE OF WORK	CAPITAL COST
Headworks (Described in Sections 4.1.1 and 6.1)	
Replace the comminutor with one mechanically cleaned bar screen, and a washer/compactor system, retain the manual bar rack Replace submersible pumps Valves and meter replacement, painting of manifold, new pump crane New VFD, air conditioning, dust control and enclosure	$ 474,000
Ponds (Described in Sections 4.1.3 and 6.3)	
Install new Biolac® diffusers in Pond No. 3, install new integral clarifiers Install new blowers and building, install all necessary pipe work	$1,389,000
Sludge Handling (Described in Sections 4.1.4 and 6.4)	
An alternative sludge handling facility, e.g. mechanical screw press, or, QuickDry® beds. These new technologies may cost less than the conventional sludge drying beds. (Refer Section 7.2.3.	$707,000
Site Services (described in Section 6.8)	
Gravel road within site only, one additional sewer manhole only, extension of current water system with two additional hose stations only, no security or demolition of existing facilities.	$520,000
Dredging (Described in Section 7.2.2)	$750,000
TOTAL PROJECT COST[22]	$4,032,000

[21] Includes 5% for Mobilization and Demobilization.
[22] Includes 5% for Mobilization and Demobilization.

7.2 Issues for Further Consideration

7.2.1 Sequence of Construction

While the new plant is being constructed, the existing plant is required to be operational and producing effluent in compliance with the WDR. During the Preliminary Design Phase, a detailed sequence of construction will be developed which may incorporate the following:

- Rehabilitating the existing sludge drying beds at first.
- Dredging one pond at a time and processing the sludge. This will increase the treatment capacity of the existing ponds. City staff has already initiated this process.
- Renting a temporary dewatering unit (e.g. screw press, or belt press) and applying the dewatered sludge to the drying beds for further drying.
- Possibly dosing ferric chloride or alum or other coagulant at the influent pump station. This can be done by renting a chemical dosing unit temporarily. Coagulant dosing can help in removal of BOD and TSS while the plant is in construction. It is not advised as a long term treatment strategy.
- Take Pond 3 out of service converting into Biolac®. Put into service.
- Take Pond 2 out of service and convert into sludge drying beds. Put into service.
- Build all other facilities – headworks improvement, grit system, site services, etc.

7.2.2 Dredging and Disposal of Sludge from Existing Ponds

Dredging of sludge from the existing ponds is a key concern due to the volume of sludge accumulated, the concentration, the condition, and the potential of odor release. Certified dredging contractors will be hired to dredge the ponds. The sludge produced is municipal solids and therefore need to be disposed per 40 CFR 503. Possible opportunities for disposal are nearby treatment plants for further stabilization and disposal. If the sludge is treated to Class A or B and approximately 20% dry solids, the sludge can be disposed to the local composting facilities. This issue will be further studied during the Preliminary Design Phase.

7.2.3 Long Term Sludge Dewatering Strategy

As evident in Section 6.4, the cost of implementing sludge drying beds is high. Other emerging and innovative dewatering technologies will be evaluated in detail during the Preliminary Design Phase to assess the applicability to the project. If potential capital cost savings (potentially half of the current estimate) and ease of operation and maintenance is identified, these alternative dewatering technologies will be proposed in lieu of the conventional sludge drying beds.

7.2.4 Lease Agreements with Adjacent Property Owners

The land owned by the City is limited to the property on which the treatment plant exists. The effluent is currently transported, stored and disposed on property leased from local land owners. Since this project entails significant construction on the leased land, the City may need to review with the City Attorney to ascertain what the City can and cannot do without first modifying the existing agreement.

7.2.5 Electrical Design Enhancements

During the Preliminary Design Phase, the need for upgrade of the electrical system will be evaluated in depth. Avenues to limit the need for an electrical upgrade will be evaluated, including the following:

- Depending on the mode of operation of the irrigation pumps, e.g. start-stop with a lag and lead configuration, there is a chance of eliminating the VFDs at that facility altogether.
- While the combined load of the Biolac® blowers are slightly higher than the combined load of the current mechanical aerators, the possibility of reducing the electrical load at other facilities will be reviewed.
- Operation of the influent pump without a VFD will be investigated.
- Projected power costs will be analyzed and compared to existing costs

7.2.6 Holding Pond Redesign to Alleviate Danger during Flooding

The current holding ponds are in the 100-year flood plain and have been, in the past, subject to flooding. While the scope of the project is to restore these ponds to their original design levels and shapes, the possibility of raising the levees to prevent flooding can be investigated. However, this may trigger several permitting issues with the jurisdictional and resource agencies monitoring and responsible for the Santa Maria River.

7.2.7 Permitting

The proposed project is unique in that its various components fall within the permitting jurisdiction of the City, the County of Santa Barbara, the County of San Luis Obispo, and the California Coastal Commission, depending on the parcel of land on which construction is proposed. The project is subject to CEQA review and it is predicted that the project will utilize a Mitigated Negative Declaration (MND) process. The City will utilize the expertise of its contract planning consultant to process the permitting of the project. As the project description is developed, it will be important to forecast the impact that certain elements may have on the permit process timeline. If excess permitting time is predicted, the project description should be modified accordingly. Funding from Proposition 50 is scheduled to end in early 2012. All construction funded by this program needs to be completed by the end of 2011 to guarantee eligibility.

7.3 Provisions for Future Capacity and Tertiary Treatment/Water Reuse Upgrades

The proposed plant is being designed to treat wastewater to the current WDR stipulations. To achieve water for reuse (as described in Section 3.4), the plant will require upgrade to tertiary treatment, followed by disinfection processes. The plant upgrades would involve the following:

- Another Biolac plant similar to the proposed design (as shown in Figure 16). This will also enable the plant to expand capacity if required in the future.
- Change of operation of the Biolac to alternate aeration to achieve alternate anoxic and oxic zones to enable tertiary treatment and production of higher quality effluent as described in Section 3.4.
- Effluent could then be filtered through an acceptable Title 22-approved filtration technology such as a granular media filtration, or a cloth filter; and then disinfected through an ultraviolet (UV) light or chlorine system to meet required pathogen inactivation.

Adding the capability to treat effluent to higher levels of disinfection will allow greater flexibility in effluent disposal. It is anticipated that the current effluent disposal method will continue in the future for fail-safe disposal.

In addition to the current irrigated pasture spray field, future water reuse customers could include:

- Playground adjacent to the plant site.
- Service to the current and future home sites in the City and the landscaped areas that come with new development.
- Wetlands rejuvenation around the City.
- Irrigation water for other agricultural lands around the City.
- Other pasture irrigation sites in the City and County.

Specific water reuse opportunities will need to be determined by a market study, with particular focus on salinity, hardness, permeability, nutrients, heavy metals, and affordability.

FIGURES

Figure 1 – Vicinity Map

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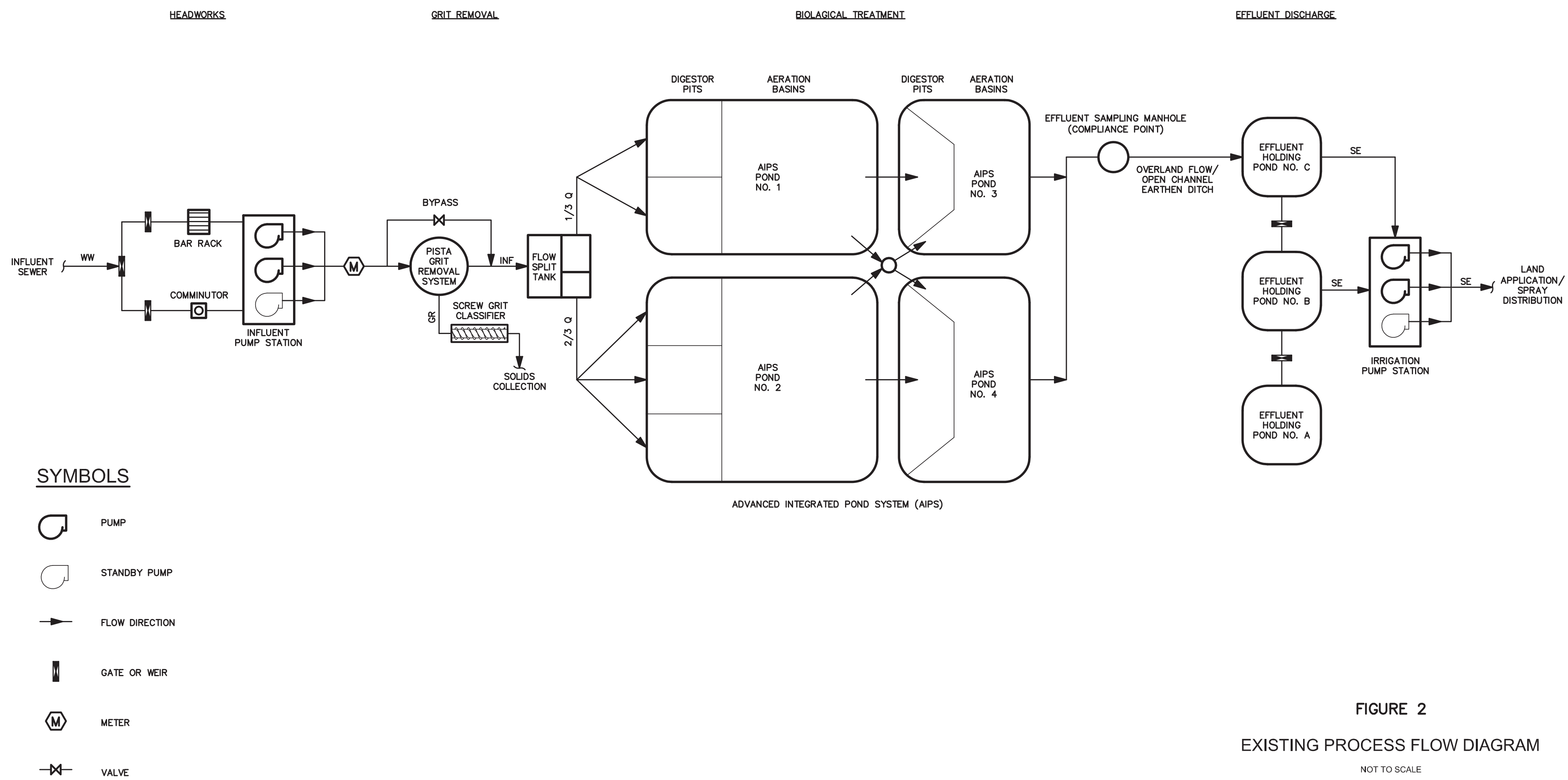

FIGURE 2

EXISTING PROCESS FLOW DIAGRAM

NOT TO SCALE

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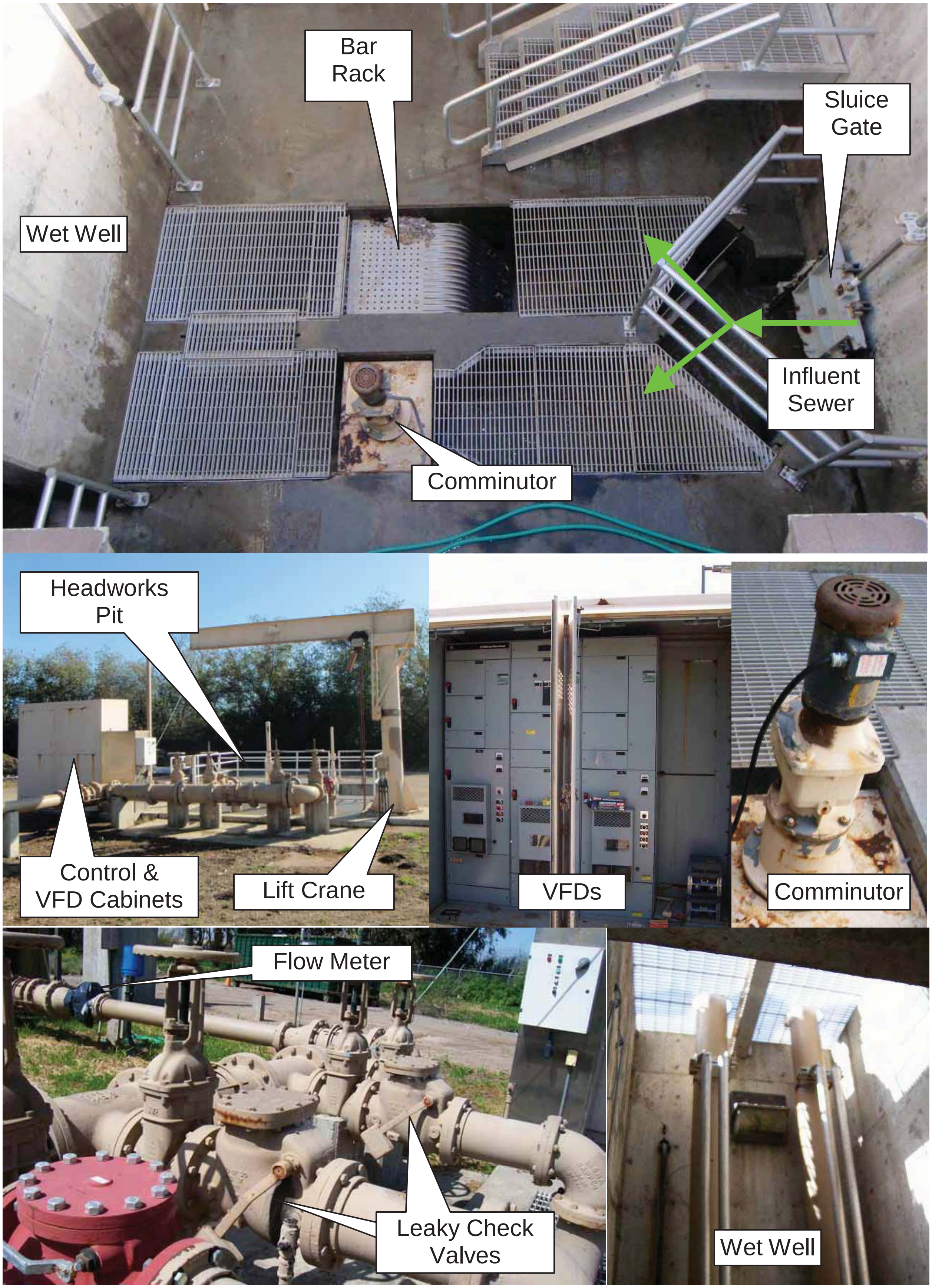

Figure 3 – Condition of Headworks

Figure 4 – Condition of Grit Removal System

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Figure 5 – Condition of AIPS

Figure 6 – Condition of Sludge Handling Facilities

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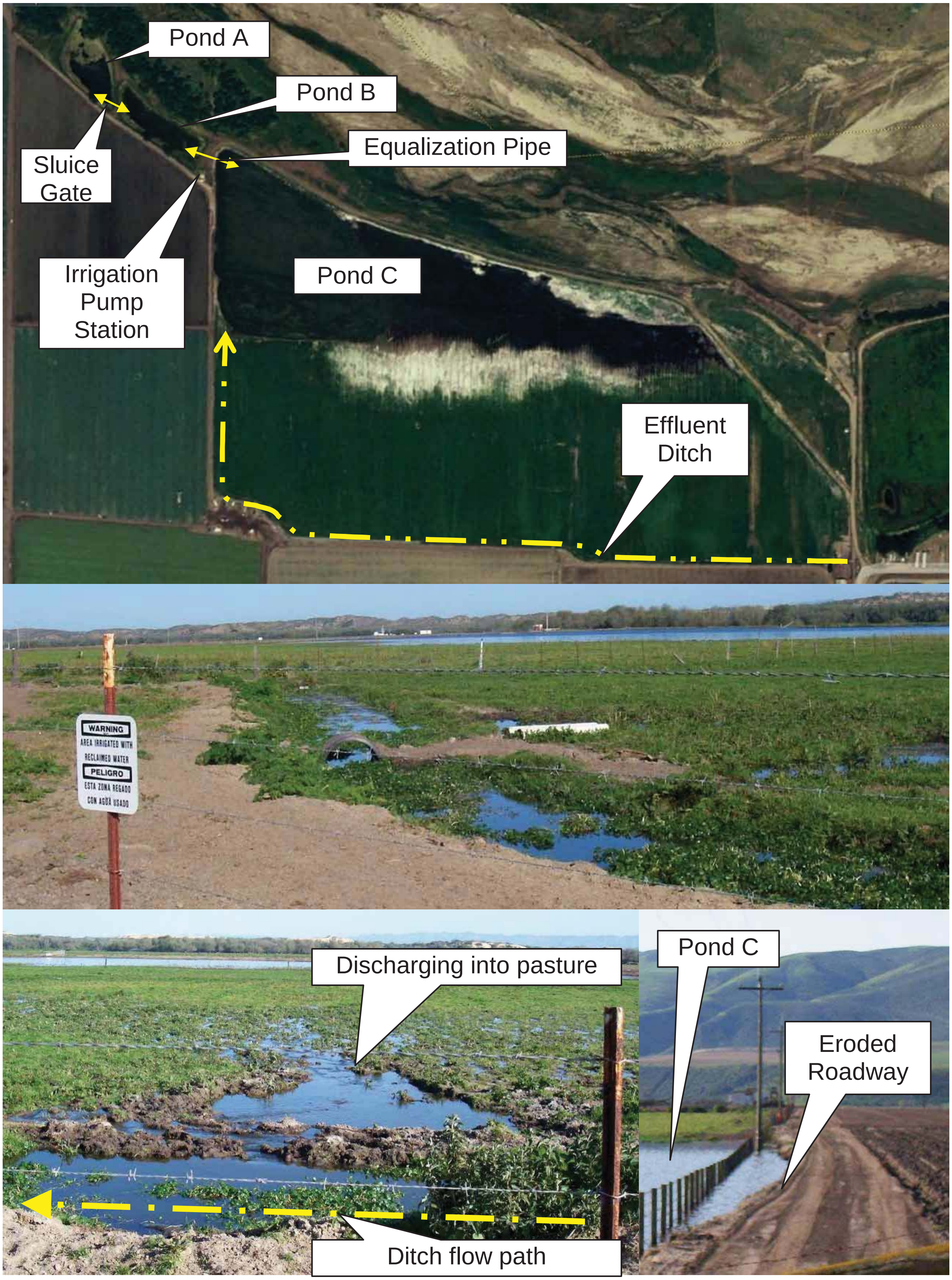

Figure 7 – Condition of Effluent Ditch and Holding Ponds

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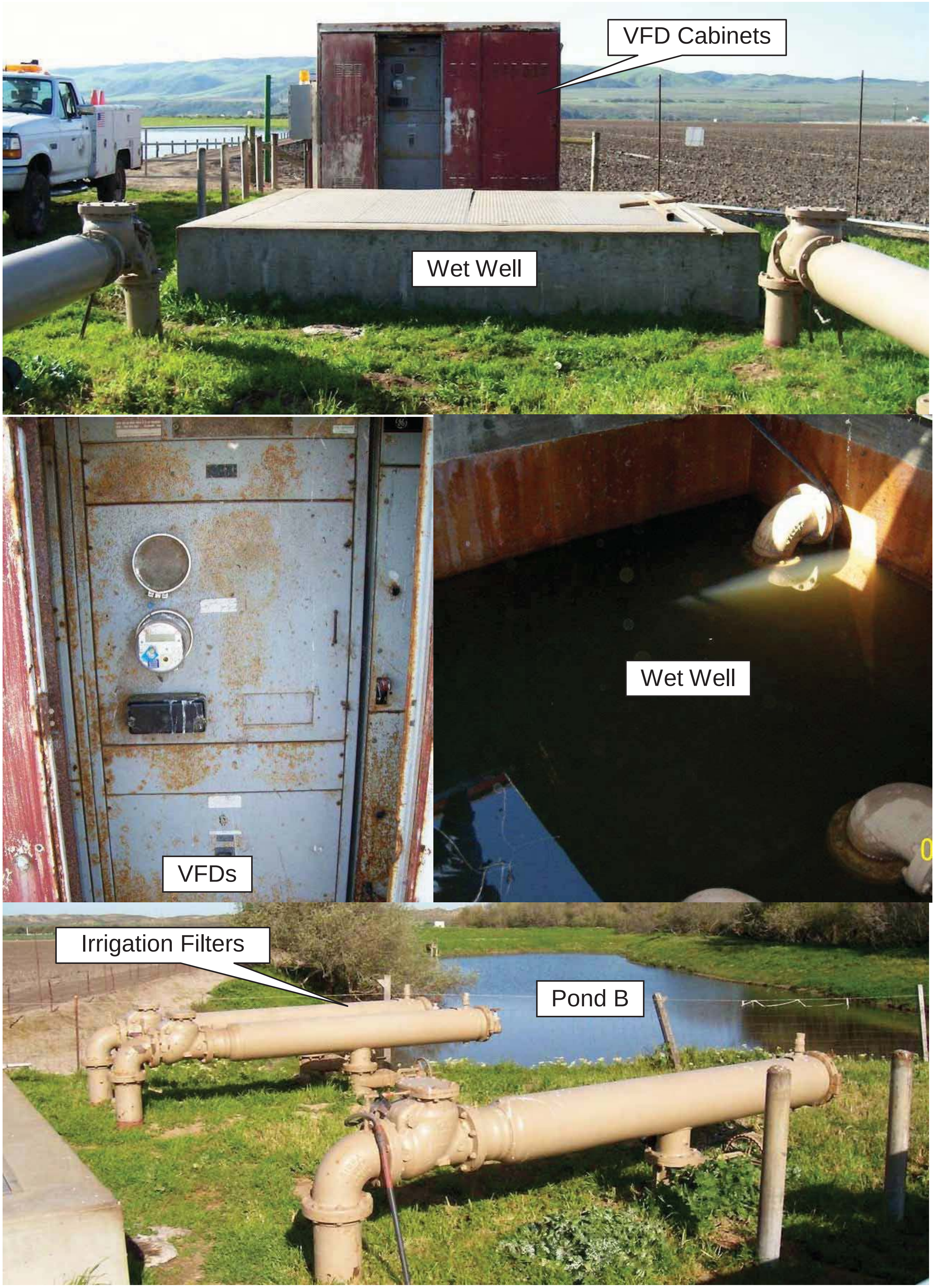

Figure 8 – Condition of Irrigation Pump Station

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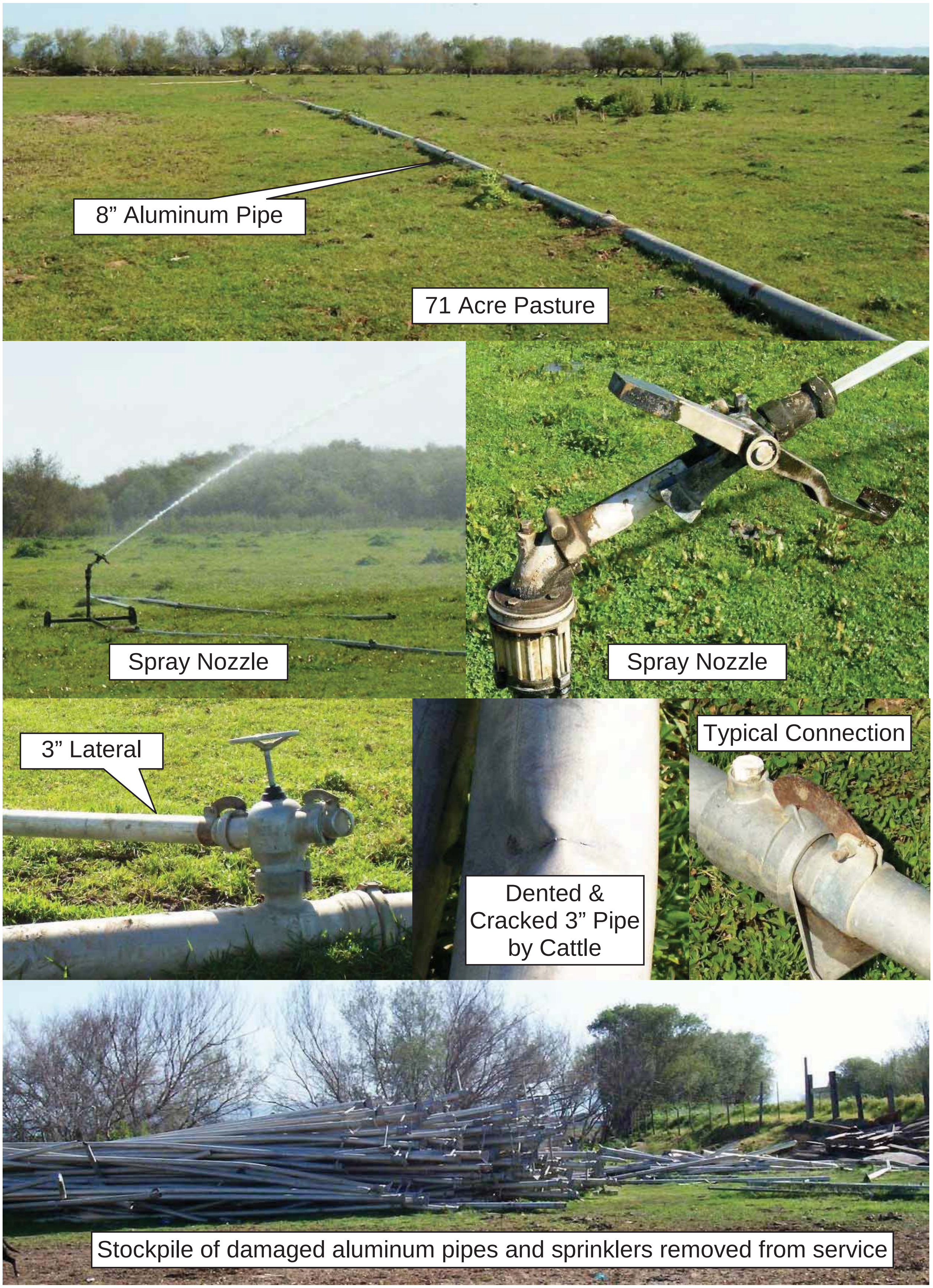

Figure 9 – Condition of Spray Irrigation System

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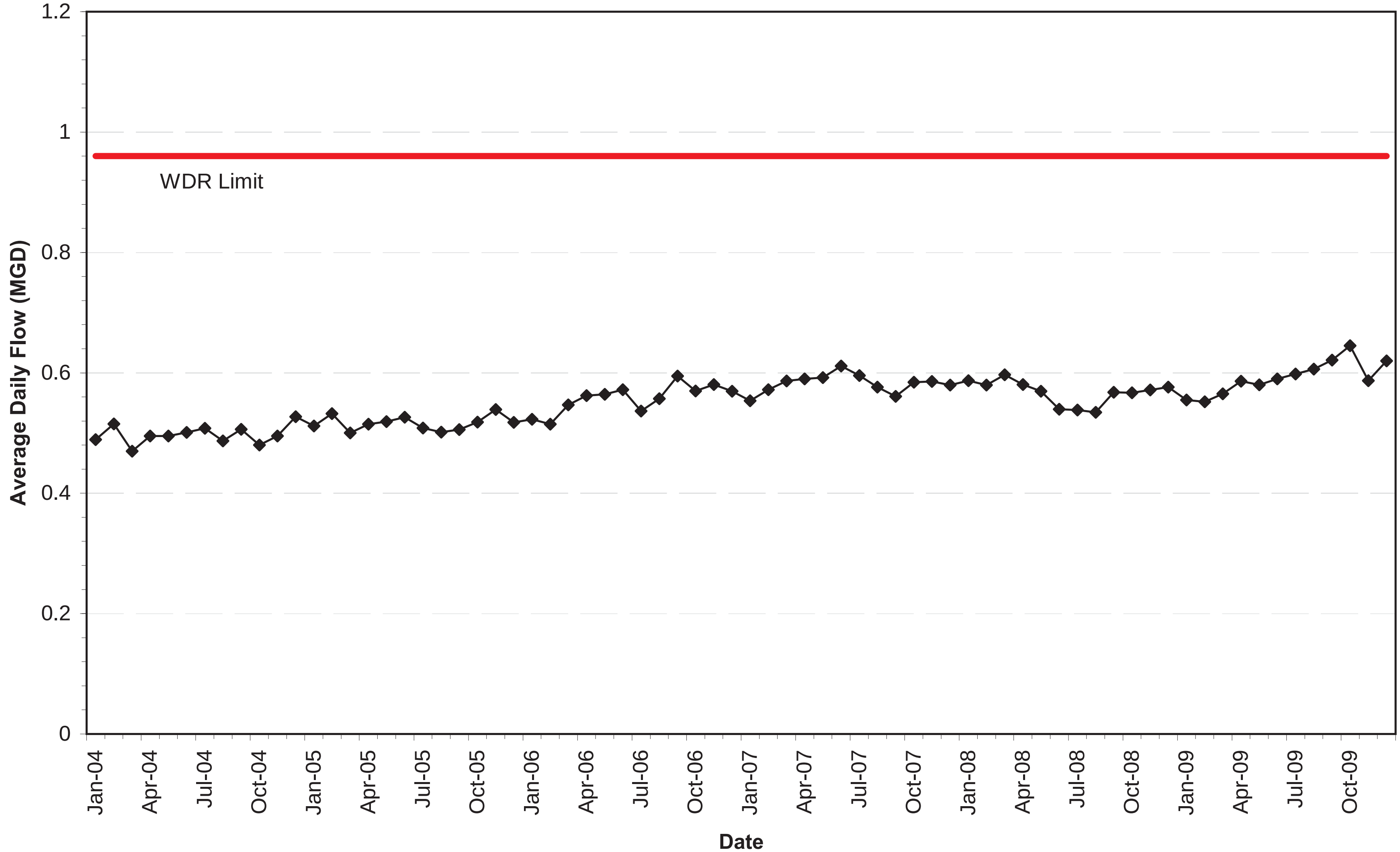

Figure 10 - Monthly Average Daily Flow

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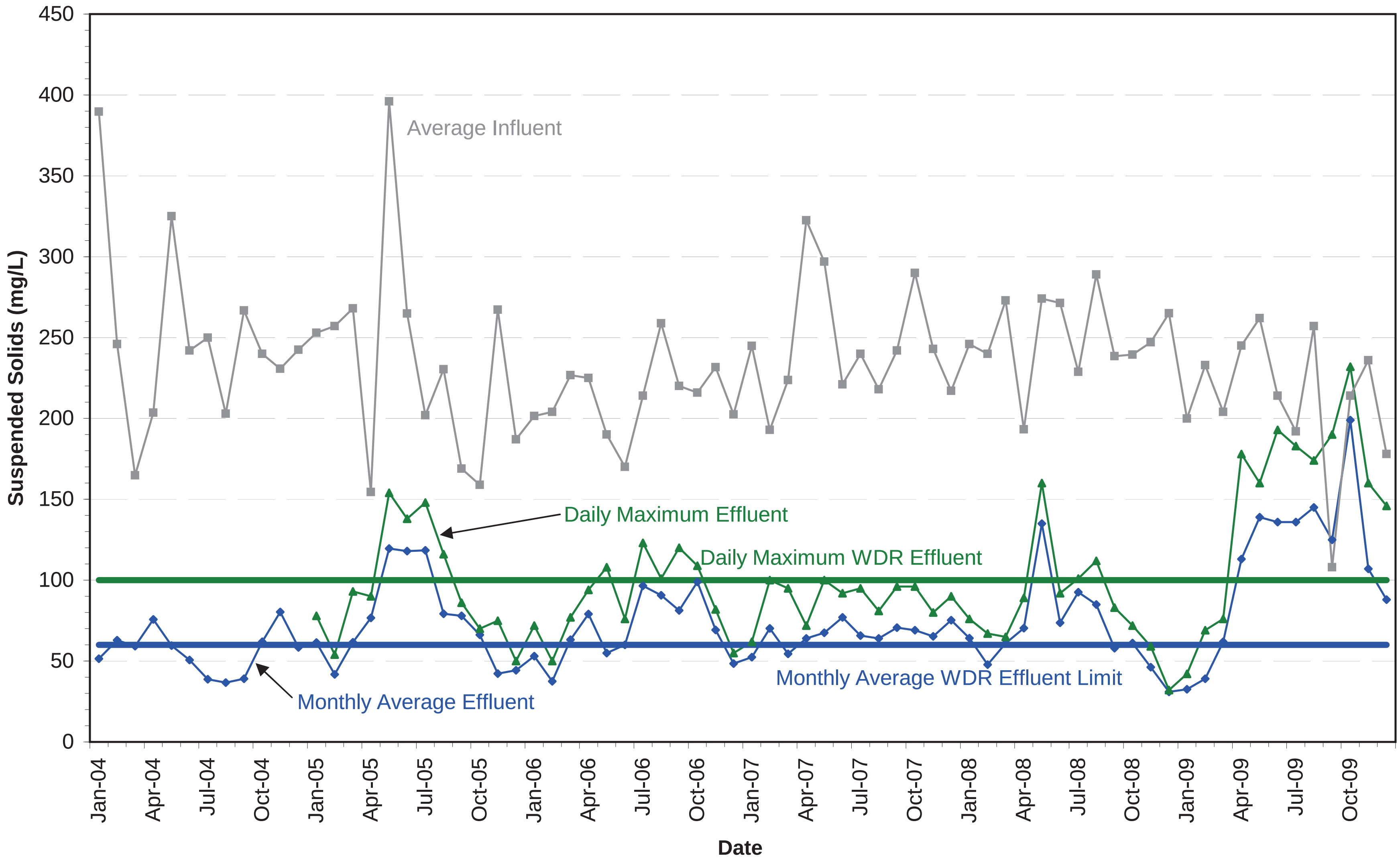

Figure 11 - TSS in the Plant Influent and Effluent

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Figure 12 - BOD in the Plant Influent and Effluent

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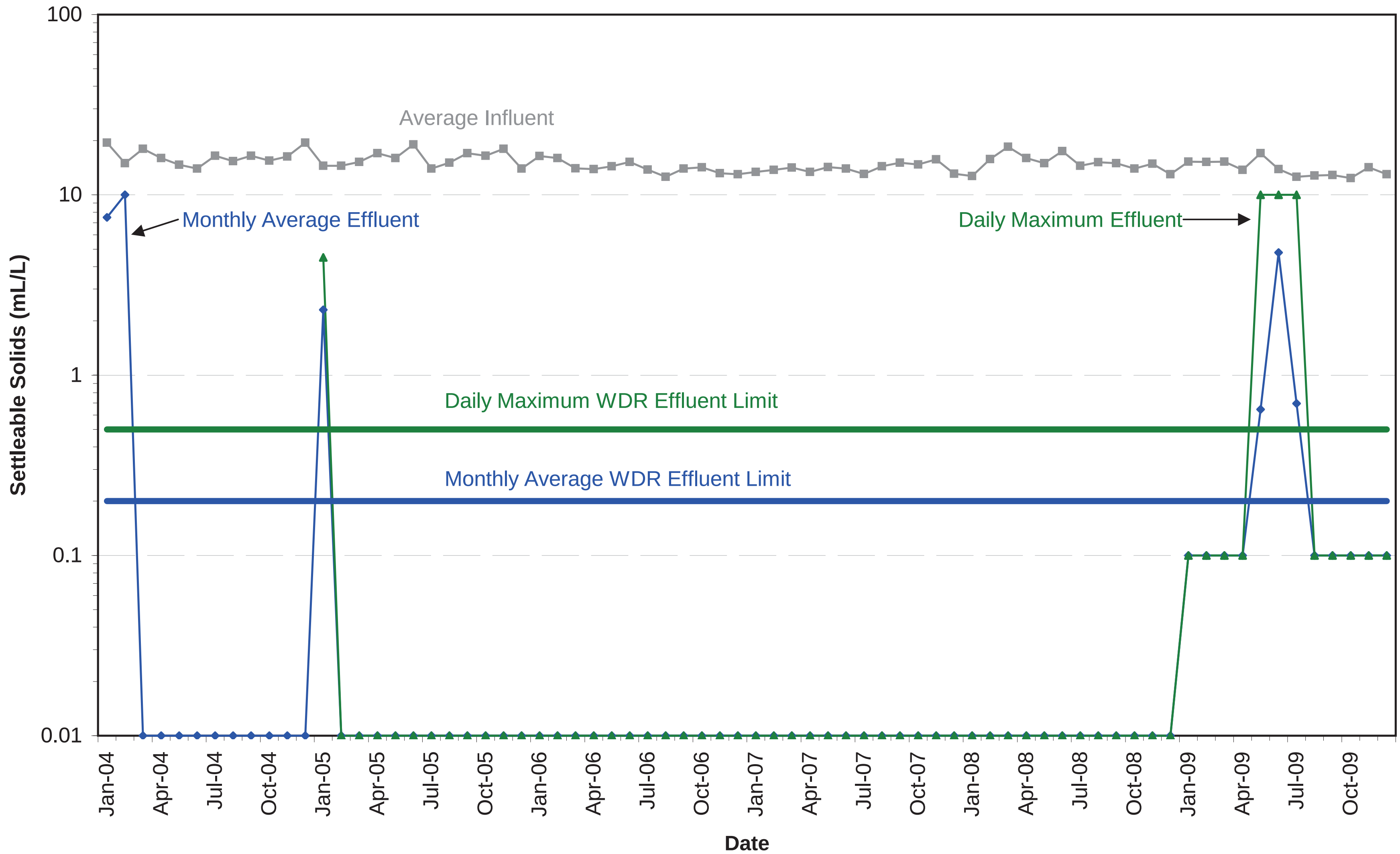

Figure 13 - Settleable Solids in the Plant Influent and Effluent

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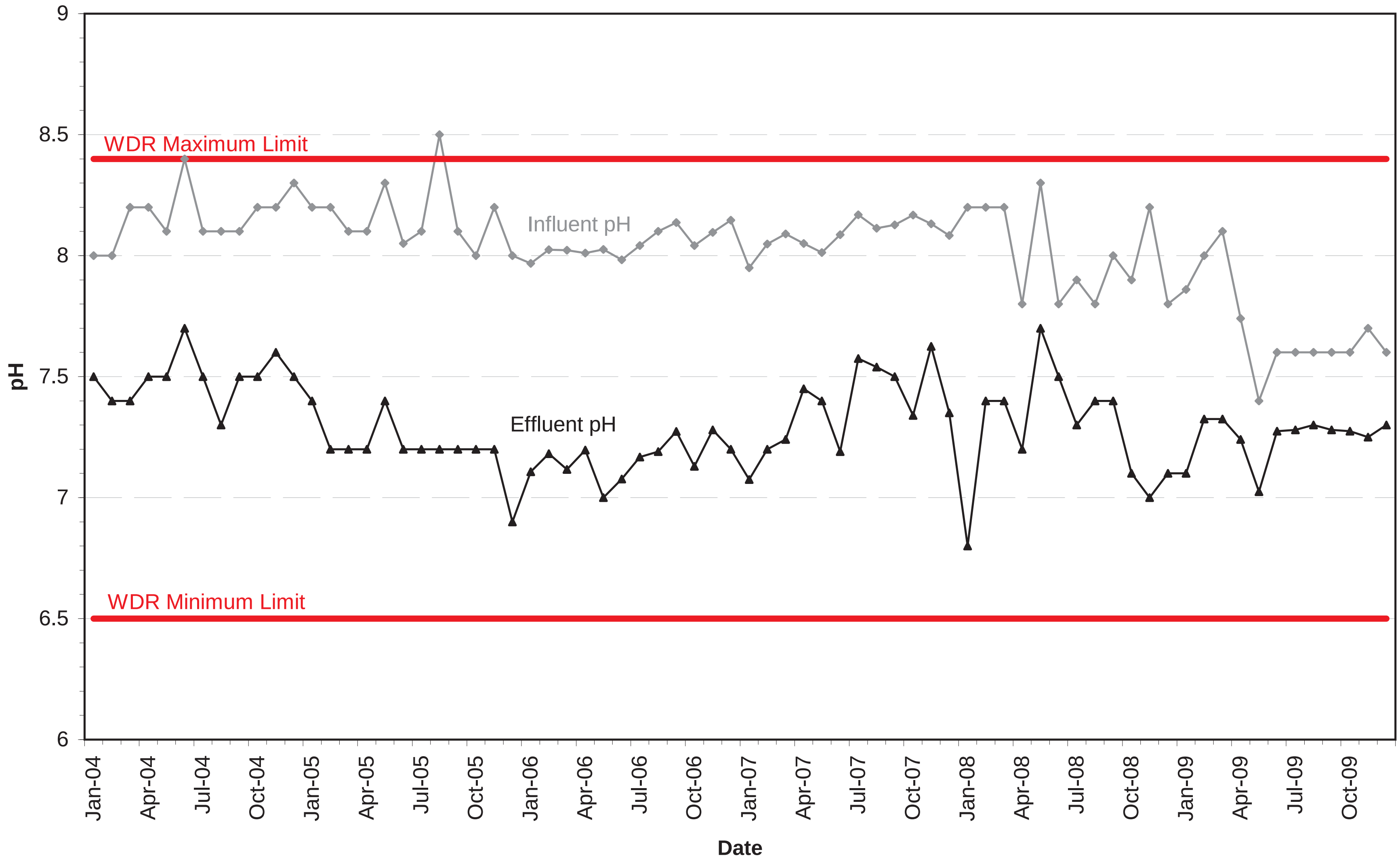

Figure 14 - pH Levels in the Influent and Effluent

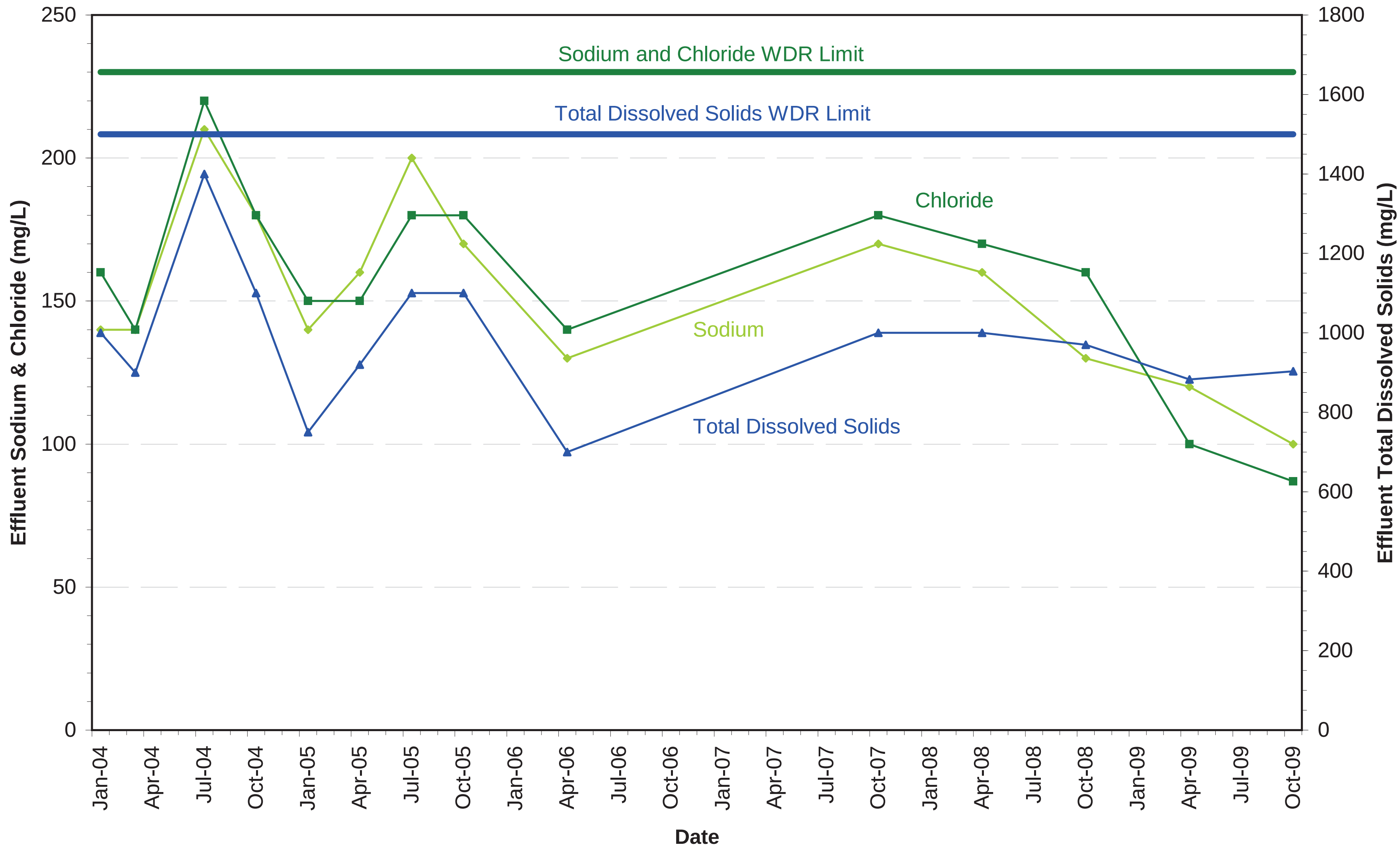

Figure 15 - TDS, Sodium, and Chloride in the Plant Effluent

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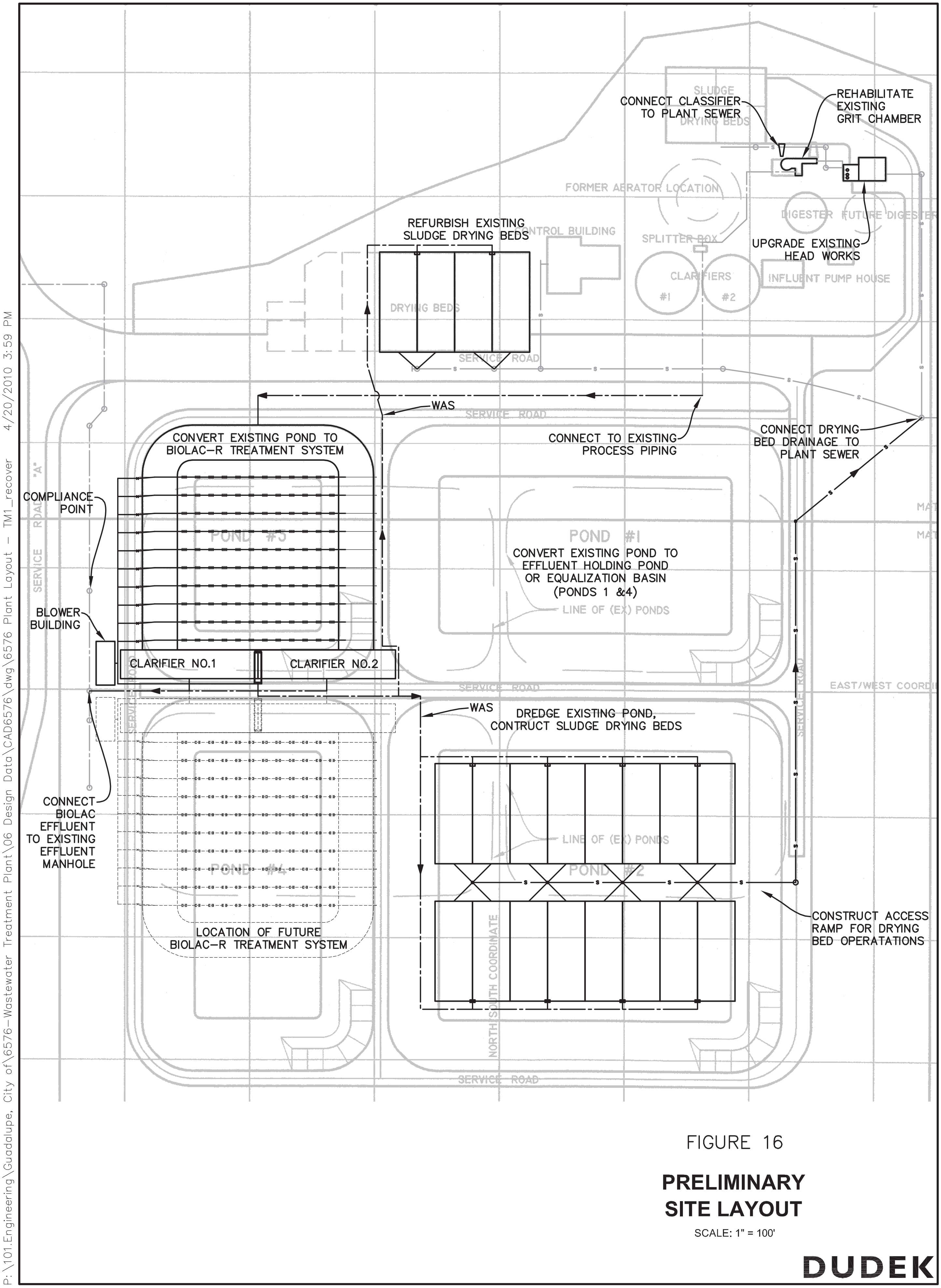
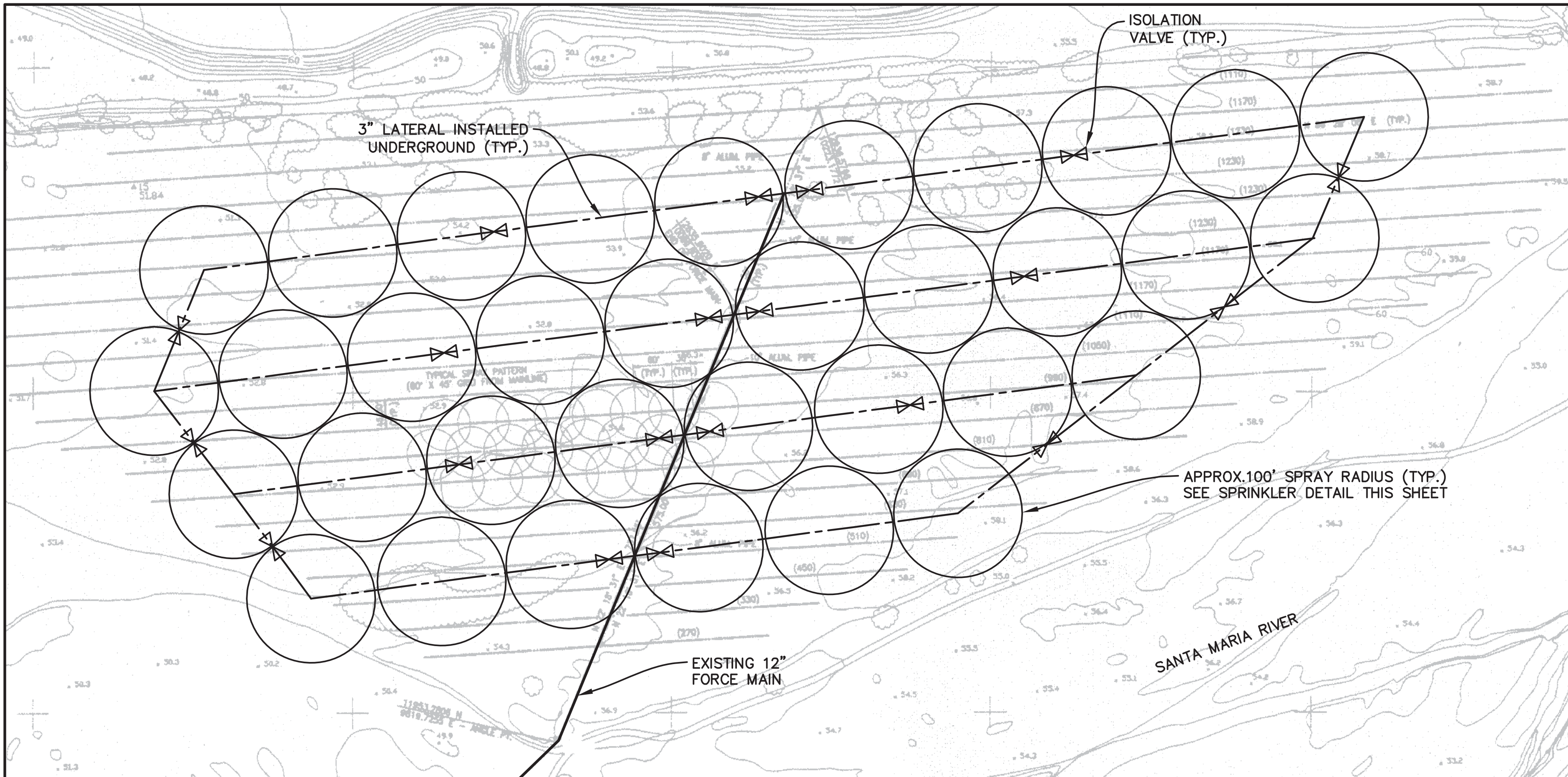


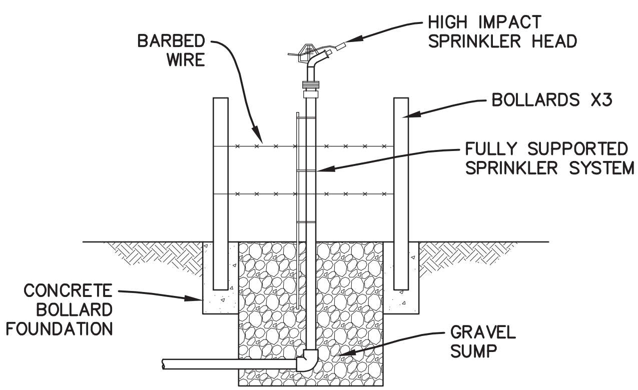
FIGURE 16

PRELIMINARY SITE LAYOUT

SCALE: 1" = 100'

DUDEK





SPRINKLER DETAIL

SCALE: 1" = 4'

FIGURE 17

PROPOSED LAYOUT OF THE IRRIGATION SYSTEM

SCALE: 1" = 250'

DUDEK

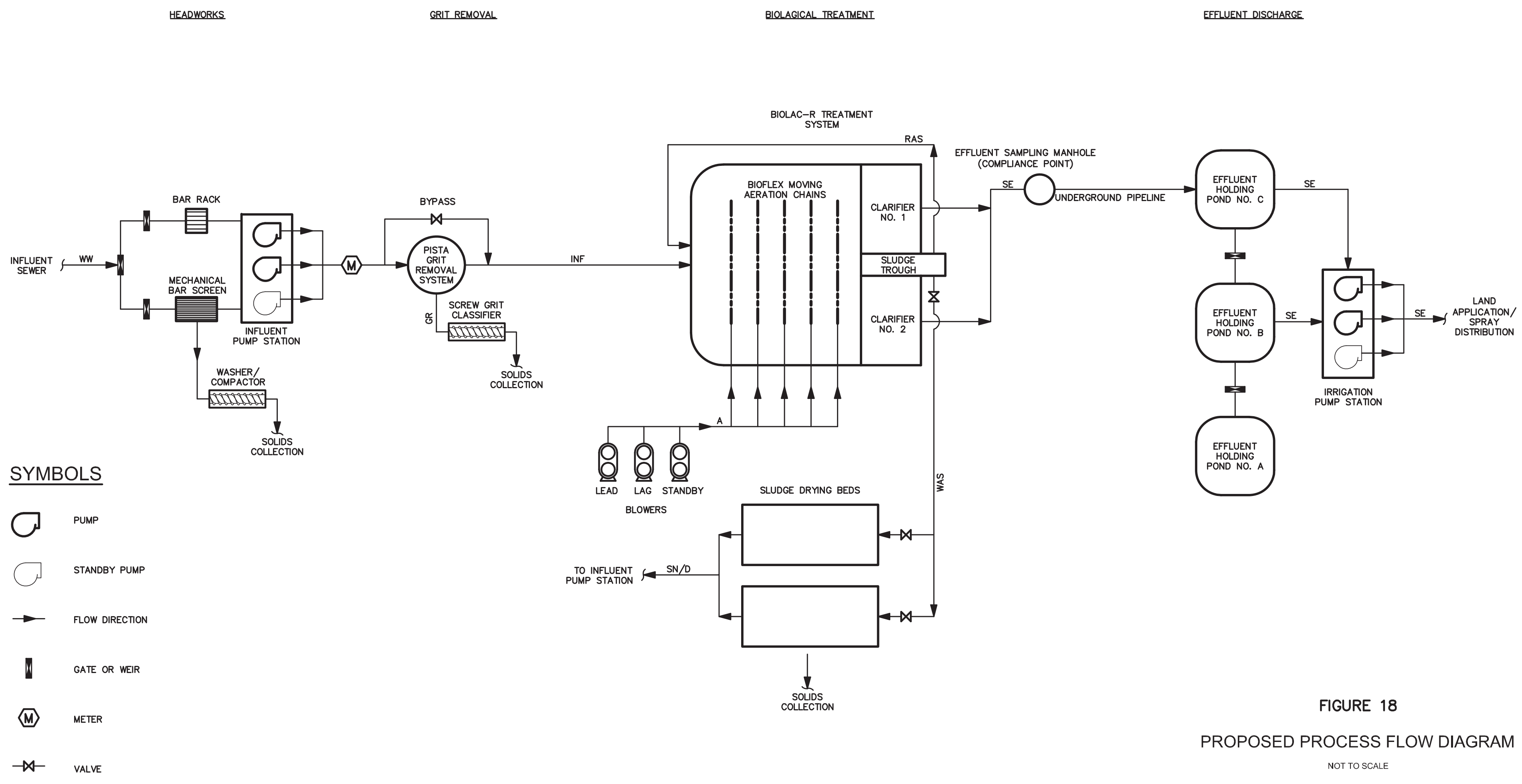


FIGURE 18

PROPOSED PROCESS FLOW DIAGRAM

NOT TO SCALE

DUDEK

Appendix E
Cost Estimate

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS
WASTEWATER TREATMENT PLANT IMPROVEMENTS
DUDEK JOB NO.: 6576
DATE: May 04, 2010
JOB STATUS: CONCEPTUAL DESIGN (TM1)

COST SUMMARY SHEET - TOTAL PROJECT			
DESIGN PACKAGE		SUBTOTAL	
1	HEADWORKS	$	474,000.00
2	GRIT REMOVAL SYSTEM	$	223,000.00
3	BIOLAC SYSTEM AND BLOWERS	$	1,389,000.00
4	SLUDGE DRYING BEDS	$	1,414,000.00
5	EFFLUENT PIPELINE, HOLDING PONDS	$	895,000.00
6	IRRIGATION PUMP STATION	$	263,000.00
7	SPRAY DISTRIBUTION SYSTEM	$	425,000.00
8	SITE SERVICES	$	1,527,000.00
9	DREDGING AND DISPOSAL	$	750,000.00
10	MOBILIZATION AND DEMOBILIZATION (5%)	$	368,000.00
	TOTAL	**$**	**7,728,000.00**

COST SUMMARY SHEET - REDUCED SCOPE PROJECT			
DESIGN PACKAGE		SUBTOTAL	
1	HEADWORKS	$	474,000.00
2	BIOLAC SYSTEM AND BLOWERS	$	1,389,000.00
3	ALTERNATIVE SLUDGE PROCESSING	$	707,000.00
4	SITE SERVICES	$	520,000.00
5	DREDGING AND DISPOSAL	$	750,000.00
6	MOBILIZATION AND DEMOBILIZATION (5%)	$	192,000.00
	TOTAL	**$**	**4,032,000.00**

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576		DATE: May 04, 2010	
	ESTIMATE BY: DUDEK			COMMENTS:
AREA/PROCESS LOCATION: HEADWORKS	JOB STATUS: CONCEPTUAL DESIGN (TM1)			

ITEM DESCRIPTION	EST. QTY.	UNIT	EST. UNIT COST	TOTAL
Concrete	1	CY	$ 700.00	$ 700.00
Grout	1	CY	$ 500.00	$ 250.00
Painting and Coating	1	LS	$ 10,000.00	$ 10,000.00
Furnish and Install Influent Screen	1	EA	$ 188,500.00	$ 188,500.00
Furnish and Install Washer/Compactor	1	EA	$ 100,100.00	$ 100,100.00
Furnish and Install Non-clog submersible pumps	3	EA	$ 20,540.00	$ 61,620.00
Furnish and Install Lift crane	1	EA	$ 10,000.00	$ 10,000.00
Furnish and Install 8" FLG Check Valve	2	EA	$ 1,500.00	$ 3,000.00
Furnish and Install 8" Flow Meter	1	EA	$ 5,000.00	$ 5,000.00
Connect with Influent Lift Station Control Panel (ILS-CP)	1	LS	$ 3,000.00	$ 3,000.00
Install Influent Screenings Control Panel (IS-CP)	1	LS	$ 3,000.00	$ 3,000.00
Repair/Fix Lights	1	LS	$ 4,000.00	$ 4,000.00
Furnish and Install New VFD	1	EA	$ 10,000.00	$ 10,000.00
VFD Air conditioning, dust control structure	1	LS	$ 8,000.00	$ 8,000.00
Float Switches	1	LS	$ 3,000.00	$ 3,000.00
Level Alarm	1	LS	$ 2,000.00	$ 2,000.00
			SUBTOTAL	$412,170.00
			CONTINGENCY (15%)	$61,825.50
			TOTAL	$473,995.50
			TOTAL ESTIMATED COSTS	$474,000.00

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576		DATE: May 04, 2010	
	ESTIMATE BY: DUDEK			COMMENTS:
AREA/PROCESS LOCATION: GRIT REMOVAL SYSTEM	JOB STATUS: CONCEPTUAL DESIGN (TM1)			
ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	TOTAL
ALTERNATIVE 1: TOP MOUNTED GRIT PUMP				
Concrete Slab and Pedestal for Classifier	8	CY	$ 700.00	$ 5,600.00
Fill existing grit suction outlet with grout	1	CY	$ 500.00	$ 500.00
Painting and Coating	1	LS	$ 3,000.00	$ 3,000.00
Furnish and install Pista Grit Removal System complete	1	EA	$ 182,000.00	$ 182,000.00
Furnish and Install 4" DI Pipe	20	LF	$ 25.00	$ 500.00
Furnish and Install 4" FLG 90 Degree DI Bend	3	EA	$ 300.00	$ 900.00
Drainage piping, classifier	30	LF	$ 35.00	$ 1,050.00
			SUBTOTAL	$193,550.00
			CONTINGENCY (15%)	$29,032.50
			TOTAL	$222,582.50
			TOTAL ESTIMATED COSTS	$223,000.00

ALTERNATIVE 2: EXISTING SYSTEM REHAB

ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	TOTAL
Painting and Coating	1	LS	$ 7,000.00	$ 7,000.00
Furnish and install Pista Grit Motor, pump, and classifier	1	EA	$ 163,800.00	$ 163,800.00
Furnish and Install 4" DI Pipe	10	LF	$ 25.00	$ 250.00
Furnish and Install 4" FLG 90 Degree DI Bend	3	EA	$ 300.00	$ 900.00
Drainage piping, classifier	20	LF	$ 35.00	$ 700.00
			SUBTOTAL	$172,650.00
			CONTINGENCY (15%)	$25,897.50
			TOTAL	$198,547.50
			TOTAL ESTIMATED COSTS	$199,000.00

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576		DATE: May 04, 2010	
AREA/PROCESS LOCATION: BIOLAC SYSTEM AND BLOWERS	ESTIMATE BY: DUDEK			COMMENTS:
	JOB STATUS: CONCEPTUAL DESIGN (TM1)			
ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	UNIT
Earthwork	5,000	CY	$ 8.00	$ 40,000.00
Anchor Posts	20	EA	$ 500.00	$ 10,000.00
Concrete walls and slabs	400	CY	$ 700.00	$ 280,000.00
Grout for sludge piping	25	CY	$ 500.00	$ 12,500.00
Miscellaneous concrete	5	CY	$ 700.00	$ 3,500.00
Furnish and Install Prefabricated Building for blowers	550	SF	$ 50.00	$ 27,500.00
Biolac Equipment Including Blowers	1	LS	$ 761,800.00	$ 761,800.00
Furnish and Install SST Air Header 14"	500	LS	$ 60.00	$ 30,000.00
Furnish and Install 8" DI Pipe	400	LF	$ 45.00	$ 18,000.00
Furnish and Install 6" x 4" FLG Eccentric Reducer	3	EA	$ 300.00	$ 900.00
Furnish and Install 6" FLG Check Valves	3	EA	$ 800.00	$ 2,400.00
Furnish and Install 6" FLG Butterfly Valves	3	EA	$ 700.00	$ 2,100.00
Furnish and Install 6" FLG Pressure Relief Valve and Gauge	3	EA	$ 800.00	$ 2,400.00
Furnish and Install 6" FLG Dismantling Joint	3	EA	$ 1,000.00	$ 3,000.00
HVAC for Blower Building	1	LS	$ 8,000.00	$ 8,000.00
Blower Building Lighting and Receptacles	1	LS	$ 6,000.00	$ 6,000.00
			SUBTOTAL	$1,208,100.00
			CONTINGENCY (15%)	$181,215.00
			TOTAL	$1,389,315.00
			TOTAL ESTIMATED COSTS	$1,389,000.00

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576		DATE: May 04, 2010	
AREA/PROCESS LOCATION: SLUDGE DRYING BEDS	ESTIMATE BY: DUDEK			COMMENTS:
	JOB STATUS: CONCEPTUAL DESIGN (TM1)			
ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	UNIT
3/4" Crushed Rock	2,100	CY	$ 45.00	$ 94,500.00
Sand Bed 12" Thick	1,400	CY	$ 45.00	$ 63,000.00
Scarify and Compact sub-grade	48,000	SF	$ 5.00	$ 240,000.00
Wall Footings	200	CY	$ 500.00	$ 100,000.00
Drive Strips for sludge removal (6" thick x 2' wide)	200	CY	$ 600.00	$ 120,000.00
Furnish and Install 4" thick conc. splash pad & loader ramps	300	CY	$ 400.00	$ 120,000.00
Furnish and Install Concrete Sewer Cleanout	4	EA	$ 2,000.00	$ 8,000.00
3' High CMU Wall (8" thick reinforced blocks)	5,520	SF	$ 40.00	$ 220,800.00
Furnish and Install 6" x 6" x 4" 45 Degree Wye	10	EA	$ 550.00	$ 5,500.00
Furnish and Install 4" PVC Perforated Underdrain	3,200	LF	$ 45.00	$ 144,000.00
Furnish and Install 4" 45 Degree Bend Push On	10	EA	$ 125.00	$ 1,250.00
Furnish and Install 4" PVC Pipe	420	LF	$ 40.00	$ 16,800.00
Furnish and Install 4" x 4" x 4" MJ Tee	10	EA	$ 400.00	$ 4,000.00
Furnish and Install 4" 90 Degree FLG Bend	10	EA	$ 250.00	$ 2,500.00
Furnish and Install 4" FLG Plug Valve	10	EA	$ 700.00	$ 7,000.00
Furnish and Install 4" FLG DI Spool	10	EA	$ 400.00	$ 4,000.00
Furnish and Install 4" 45 Degree Bend FLG	10	EA	$ 225.00	$ 2,250.00
Furnish and Install 4" 90 Degree Bend MJ	10	EA	$ 200.00	$ 2,000.00
Furnish and Install 4" x 4" x 4" FLG Tee	10	EA	$ 450.00	$ 4,500.00
Furnish and Install 6" MJ Plug Valve	2	EA	$ 800.00	$ 1,600.00
Furnish and Install 6" Pipe PVC	1,360	LF	$ 50.00	$ 68,000.00
			SUBTOTAL	$1,229,700.00
			CONTINGENCY (15%)	$184,455.00
			TOTAL	$1,414,155.00
			TOTAL ESTIMATED COSTS	$1,414,000.00

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576		DATE: May 04, 2010	
	ESTIMATE BY: DUDEK			COMMENTS:
AREA/PROCESS LOCATION: EFFLUENT PIPELINE, HOLDING PONDS	JOB STATUS: CONCEPTUAL DESIGN (TM1)			
ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	UNIT
HDPE Pipe	3,000	LF	$ 120.00	$ 360,000.00
Manholes/Vaults	3	EA	$ 6,000.00	$ 18,000.00
Earthwork	50,000	CY	$ 8.00	$ 400,000.00
			SUBTOTAL	$778,000.00
			CONTINGENCY (15%)	$116,700.00
			TOTAL	$894,700.00
			TOTAL ESTIMATED COSTS	$895,000.00

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576		DATE: May 04, 2010	
AREA/PROCESS LOCATION: IRRIGATION PUMP STATION	ESTIMATE BY: DUDEK			COMMENTS:
	JOB STATUS: CONCEPTUAL DESIGN (TM1)			
ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	UNIT
Furnish and Install Fencing	100	LF	$ 75.00	$ 7,500.00
Furnish and Install Prefabricated Building Controls & VFDs	400	SF	$ 50.00	$ 20,000.00
Furnish and Install Non-clog submersible pumps	3	LS	$ 27,200.00	$ 81,600.00
Furnish and Install Pump lift crane	1	EA	$ 20,000.00	$ 20,000.00
Furnish and Install Filters	3	EA	$ 8,000.00	$ 24,000.00
Furnish and Install Pump Permanent Installation Kit	3	LS	$ 2,000.00	$ 6,000.00
Furnish and Install Guide Rail	3	EA	$ 2,000.00	$ 6,000.00
Furnish and Install Pump station Control Panel	1	LS	$ 15,000.00	$ 15,000.00
Furnish and Install Pressure Sensor	3	EA	$ 3,000.00	$ 9,000.00
Furnish and Install Install New VFD	3	EA	$ 10,000.00	$ 30,000.00
Furnish and Install Alarm system, antenna	1	LS	$ 10,000.00	$ 10,000.00
			SUBTOTAL	$229,100.00
			CONTINGENCY (15%)	$34,365.00
			TOTAL	$263,465.00
			TOTAL ESTIMATED COSTS	$263,000.00

DUDEK

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576		DATE: May 04, 2010	
	ESTIMATE BY: DUDEK			COMMENTS:
AREA/PROCESS LOCATION: SPRAY DISTRIBUTION SYSTEM	JOB STATUS: CONCEPTUAL DESIGN (TM1)			
ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	UNIT
Aerate Ground to improve percolation	1	LS	$ 20,000.00	$ 20,000.00
Gravel	68	CY	$ 200.00	$ 13,600.00
Concrete	68	CY	$ 700.00	$ 47,600.00
Furnish and Install Sprinkler Nozzles/Guns	34	EA	$ 500.00	$ 17,000.00
Furnish and Install 2" DI pipe	136	LF	$ 15.00	$ 2,040.00
Furnish and Install 3" HDPE pipe	9,000	LF	$ 20.00	$ 180,000.00
Furnish and Install 8" HDPE pipe	1,000	LF	$ 35.00	$ 35,000.00
Furnish and Install 8" Gate Valves Valves	20	EA	$ 700.00	$ 14,000.00
Furnish and Install Bollards	110	EA	$ 300.00	$ 33,000.00
Furnish and Install 8" Tees	6	EA	$ 700.00	$ 4,200.00
Furnish and Install 3" Tees	34	EA	$ 100.00	$ 3,400.00
			SUBTOTAL	$369,840.00
			CONTINGENCY (15%)	$55,476.00
			TOTAL	$425,316.00
			TOTAL ESTIMATED COSTS	$425,000.00

PROJECT: CITY OF GUADALUPE, DEPARTMENT OF PUBLIC WORKS WASTEWATER TREATMENT PLANT IMPROVEMENTS	JOB NO.: 6576	DATE: May 04, 2010
AREA/PROCESS LOCATION: SITE SERVICES	ESTIMATE BY: DUDEK	COMMENTS:
	JOB STATUS: CONCEPTUAL DESIGN (TM1)	

ALTERNATIVE 1: TOTAL REHABILITATION PROJECT

ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	UNIT
New Asphalt Concrete Paving (3" AC over 6" CAB)	82,000	SF	$ 5.00	$ 410,000.00
Demolition	1	LS	$ 300,000.00	$ 300,000.00
Finish Grading	1	LS	$ 15,000.00	$ 15,000.00
Misc. Earthwork	1	LS	$ 10,000.00	$ 10,000.00
Erosion Control	1	LS	$ 7,000.00	$ 7,000.00
Misc. Concrete	30	CY	$ 700.00	$ 21,000.00
Misc. Grout	30	CY	$ 500.00	$ 15,000.00
Furnish and Install 48" Diameter Sewer Manhole Complete	2	EA	$ 6,500.00	$ 13,000.00
Painting and Coating of Fuel Tank	1	LS	$ 25,000.00	$ 25,000.00
Fuel supply pump	1	LS	$ 5,000.00	$ 5,000.00
Generator Enclosure	1	LS	$ 8,000.00	$ 8,000.00
Plant Water pipe incl. fittings, install complete	4,100	LF	$ 35.00	$ 143,500.00
Plant Water Water Hose Station	10	EA	$ 500.00	$ 5,000.00
Furnish and Install 8" Drain Pipe PVC	1,000	LF	$ 50.00	$ 50,000.00
General Electrical (scope to develop)	1	LS	$ 300,000.00	$ 300,000.00
			SUBTOTAL	$1,327,500.00
			CONTINGENCY (15%)	$199,125.00
			TOTAL	$1,526,625.00
			TOTAL ESTIMATED COSTS	$1,527,000.00

ALTERNATIVE 2: REDUCED SCOPE PROJECT

ITEM DESCRIPTION	EST. QTY.	UNIT	ESTIMATED UNIT COST	UNIT
Gravel Driveway	40,000	SF	$ 1.50	$ 60,000.00
Demolition	1	LS	$ 10,000.00	$ 10,000.00
Finish Grading	1	LS	$ 5,000.00	$ 5,000.00
Misc. Earthwork	1	LS	$ 5,000.00	$ 5,000.00
Erosion Control	1	LS	$ 4,000.00	$ 4,000.00
Misc. Concrete	7	CY	$ 700.00	$ 4,900.00
Misc. Grout	2	CY	$ 500.00	$ 1,000.00
Furnish and Install 48" Diameter Sewer Manhole Complete	1	EA	$ 6,500.00	$ 6,500.00
Plant Water pipe incl. fittings, install complete	2,000	LF	$ 35.00	$ 70,000.00
Plant Water Water Hose Station	2	EA	$ 500.00	$ 1,000.00
Furnish and Install 8" Drain Pipe PVC	700	LF	$ 50.00	$ 35,000.00
General Electrical (scope to develop)	1	LS	$ 250,000.00	$ 250,000.00
			SUBTOTAL	$452,400.00
			CONTINGENCY (15%)	$67,860.00
			TOTAL	$520,260.00
			TOTAL ESTIMATED COSTS	$520,000.00

Appendix F
Preliminary Process and Instrumentation Diagrams (P&IDs)

A B C D E F G H

INSTRUMENT TAG IDENTIFICATION

	PRIMARY LOCATION (b)NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNT	AUXILIARY LOCATION (b)NORMALLY ACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS	LCP		LCP
SHARED DISPLAY, SHARED CONTROL	LCP		LCP
COMPUTER FUNCTION	LCP		LCP
PROGRAMMABLE LOGIC CONTROL	LCP		LCP

(a) DESIGNATIONS SUCH AS 100 (LOCAL CONTROL BOARD NO. 100), 200 (LOCAL CONTROL BOARD NO.200), ETC., ARE USED WHEN NECESSARY TO SPECIFY INSTRUMENT OR FUNCTION LOCATION.

(b) NORMALLY INACCESSIBLE OR BEHIND-THE-PANEL DEVICES OR FUNCTIONS ARE DEPICTED BY USING THE SAME SYMBOLS BUT WITH DASHED HORIZONTAL BARS, I.E.

SINGLE INSTRUMENT OR OTHER COMPONENT HAVING MULTIPLE FUNCTIONS

(XXX) SOFTWARE OR LOGIC RESIDENT IN DISTRIBUTED CONTROL SYSTEM (DCS) AT PROGRAMMABLE LOGIC CONTROLLER (PLC) XXX. SEE ASSOCIATED LOGIC DIAGRAMS.

(XXX) PANEL MOUNTED PILOT LIGHT WITH PANEL NUMBER DESIGNATION(i.e. XXX = 100, 200, ETC.).

FY INSTRUMENT PANEL MOUNTED WITH COMPUTING OR CONVERTING FUNCTION

CONVERT

- E – VOLTAGE
- I – CURRENT
- P – PNEUMATIC
- A – ANALOG
- B – BINARY
- H – HYDRAULIC
- O – ELECTROMAGNETIC, SONIC
- R – RESISTANCE (ELECT.)
- D – DIGITAL
- PF – PULSE FREQUENCY

COMPUTE

- SUMMING
- SUBTRACTOR
- MUTIPLYING
- DIVIDING
- ROOT EXTRACTION
- PROPORTIONAL
- DERIVITIVE
- AVERAGING
- RATIO
- DIFFERENCE
- HIGH SELECTING
- LOW SELECTING
- INTEGRAL

(XXX) DESIGNATIONS OF CONTROL FUNCTIONS ASSOCIATED INSTRUMENT OR OTHER COMPONENTS.

AC	AUTO/CLOSE	OSC	OPEN/STOP/CLOSED
AHC	AUTO/HOLD/CLOSE	POT	POTENTIOMETER
AM	AUTO/MANUAL	RST	RESET
DEV	DEVIATION	RL	RAISE/LOWER
HOA	HAND/OFF/AUTO	RSL	RAISE/STOP/LOWER
HOR	HAND/OFF/REMOTE	SD	SHUTDOWN
LOS	LOCKOUT STOP	SEL	SELECT
LR	LOCAL/REMOTE	SP	SET POINT
MOA	MANUAL/OFF/AUTO	SR	START/RESET
OO	ON/OFF	SS	STOP/START
OCA	OPEN/CLOSE/AUTO	WA	WARNING ALARM

ISA FUNCTION IDENTIFICATION TABLE

	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTOR, MOISTURE	MOMENTARY			MIDDLE, INTERMEDIATE
N	TORQUE		ISOLATE	ISOLATOR	
O			ORIFICE, RESTRICTION		OPEN
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	RUN	X AXIS		COMPUTE, CONVERT	
Y	EVENT, STATE OR PRESENCE	Y AXIS		DRIVER, ACTUATOR, FINAL	
Z	POSITION, DIMENSION	Z AXIS		CONTROL ELEMENT	

TYPICAL: FORMAT

- TIC-1 – INSTRUMENT IDENTIFICATION OR TAG NUMBER
- TIC – FUNCTIONAL IDENTIFICATION
- T – FIRST-LETTER
- IC – SUCCEEDING-LETTER(S)
- 1 – LOOP NUMBER

EXPANDED: FORMAT

- 10-PAH-1A — TAG NUMBER
- 10 — OPTIONAL PREFIX
- A — OPTIONAL SUFFIX

FIRST LETTER; SUCCEEDING LETTER; SUCCEEDING LETTER; INSTRUMENT LOOP NUMBER; (INSTRUMENT SYMBOLS)

UNDEFINED INTERLOCK DEVICE

INPUT/OUTPUT INTERFACE SYMBOLS

- = DIGITAL OUTPUT
- = ANALOG OUTPUT
- = DIGITAL INPUT
- = ANALOG INPUT

MECHANICAL EQUIPMENT SYMBOLS

SUMP PUMP; MOTOR; CENTRIFUGAL PUMP; VERTICAL TURBINE PUMP; TANK; BLOWER; VARIABLE FREQUENCY DRIVE CABINET (VFD); MIXER OR FLOCCULATOR; COMPRESSOR

PROCESS AND SIGNAL LINE SYMBOLS

- PRIMARY PROCESS LINE
- SECONDARY PROCESS LINE
- INSTRUMENT OR CONNECTION TO PROCESS (1)
- ELECTRIC SIGNAL
- ELECTRIC ANALOG SIGNAL (4–20 ma, 1–5 Vdc, etc.)
- PF ELECTRIC PULSE FREQUENCY SIGNAL (0–100 CYCLE/SEC., 0–150 PULSE/MIN., etc.)
- PD ELECTRIC PULSE DURATION SIGNAL (15 SEC., 3/12 SEC = 0 %, etc.)
- PNEUMATIC SYMBOL (2)
- HYDRAULIC SYMBOL
- CAPILLARY TUBE
- ELECTROMAGNETIC OR SONIC SIGNAL (3)
- INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)
- MECHANICAL LINK
- CONNECTING LINES
- FIELD INSTRUMENT/ DEVICE

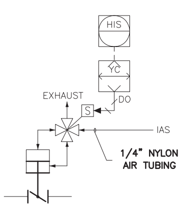
(1) REFER TO DWG G-2 FOR PIPING ABBREVIATION

(2) THE PNEUMATIC SIGNAL SYMBOLS APPLIES TO A SIGNAL, NOT A SUPPLY SOURCE, USING ANY GAS AS A MEDIUM. IF A GAS OTHER THAN AIR IS USED, THE GAS IS IDENTIFIED BY A NOTE ON THE SIGNAL.

(3) ELECTROMAGNETIC PHENOMENA INCLUDE HEAT, RADIO WAVES, NUCLEAR RADIATION, AND LIGHT.

GENERAL NOTES

1. ADDITIONAL INSTRUMENTATION AND CONTROL SYMBOLS MAY BE USED AS REQUIRED. SYMBOLS AND NOMENCLATURE ARE BASED ON ISA STANDARDS S5.1, S5.2, S5.4.
2. SEE ASSOCIATED ELECTRICAL AND MECHANICAL SYMBOL SHEETS FOR ADDITIONAL SYMBOLS AND ABBREVIATIONS.
3. FOR PIPE SIZES, MATERIAL, AS WELL AS DETAILS OF METER COUPLING AND OTHER MECHANICAL EQUIPMENT (E.G. VALVE, PUMP ETC.) SEE PROCESS AND INSTRUMENTATION DIAGRAMS, MECHANICAL DRAWINGS AND SPECIFICATIONS.
4. POWER SUPPLIES FOR LOOPS OR SYSTEMS SHALL BE FURNISHED BY THE INSTRUMENTATION MANUFACTURER TO MEET THE PARTICULAR CHARACTERISTICS (E.G. VOLTAGE AND CURRENT REQUIREMENTS) OF COMPONENTS IN EACH LOOP OR SYSTEM.
5. THOSE ITEMS IDENTIFIED BY AN ASTERISK SHALL BE PROVIDED BY THE SYSTEM PROCESS EQUIPMENT SUPPLIER.



TYP. AIR ACTUATED VALVE CONTROL DETAIL

VALVE AND ACTUATOR SYMBOLS

- GATE VALVE
- THREE WAY VALVE
- PLUG VALVE
- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- DOUBLE FLAP CHECK VALVE
- NEEDLE VALVE
- BALANCING VALVE
- GLOBE VALVE
- AIR RELEASE VALVE
- PRESSURE RELEASE VALVE
- VACUUM RELIEF VALVE
- PRESSURE REDUCING VALVE BACK PRESSURE REGULATING VALVE
- VALVE WITH DIAPHRAGM OPERATOR
- SV SOLENOID VALVE
- M VALVE WITH MOTOR OPERATOR
- VALVE WITH PISTON OPERATOR
- VALVE WITH PRESSURE BALANCED OPERATOR
- QUICK COUPLER
- PINCH VALVE

DEVICE SYMBOLS

- ROTOMETER
- THERMOMETER
- MANUAL SAMPLER
- INJECTOR
- FILTER
- D DRAIN
- MANUAL AIR VENT
- BLIND FLANGE CAP OR PLUG
- STRAINER
- WATER SURFACE ELEVATION
- LE/LT XXXX ULTRA SONIC LEVEL SENSOR
- LE/LT XXXX CAPACITANCE LEVEL PROBE
- PROPELLER FLOW METER
- REDUCER OR INCREASER
- SLUICE GATE
- SLIDE GATE (NORMALLY OPEN)
- SLIDE GATE (NORMALLY CLOSED)
- FLAP GATE
- STOP GATE
- CHEMICAL DIFFUSER
- PULSATION DAMPER
- STATIC MIXER
- CALIBRATION CHAMBER

DRAFT

REV	DESCRIPTION	ENGR	DATE	APPD	DATE

PROGRESS: PRELIMINARY DESIGN
SUBMITTAL DATE: 4/10/10
PROJECT MANAGER: S. BAHDRA
DESIGNED BY: M. HILL
DRAWN BY: M. HILL
CHECKED BY: T. FALK

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WASTEWATER TREATMENT PLANT IMPROVEMENT

GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS

DWG. P&ID 1
PROJECT NO. 6576
SHT. NO. 1 OF 5

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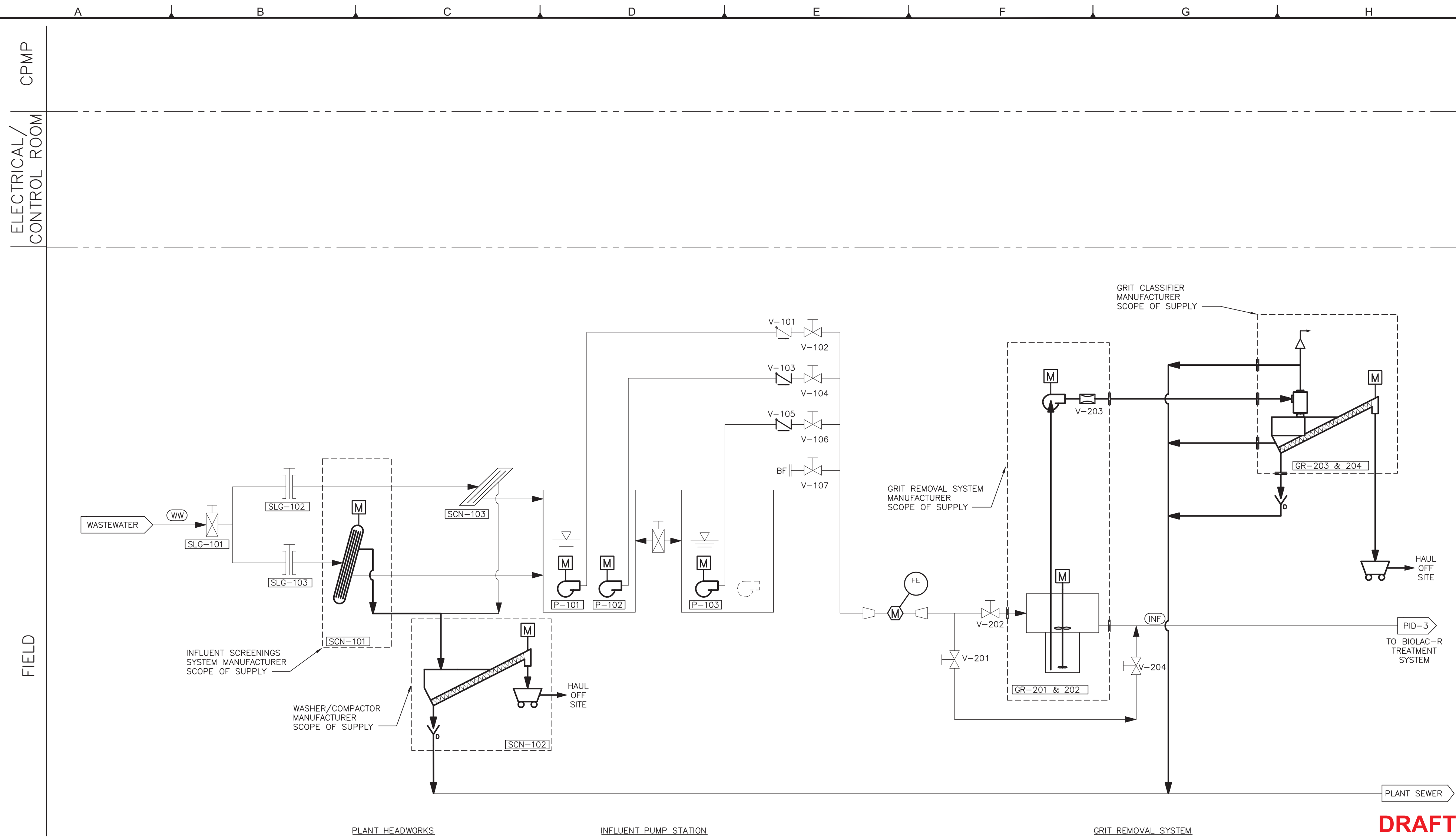

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WASTEWATER TREATMENT PLANT IMPROVEMENT

HEADWORKS AND GRIT REMOVAL SYSTEM

DWG. P&ID 2
PROJECT NO. 6576
SHT. NO. 2 OF 5

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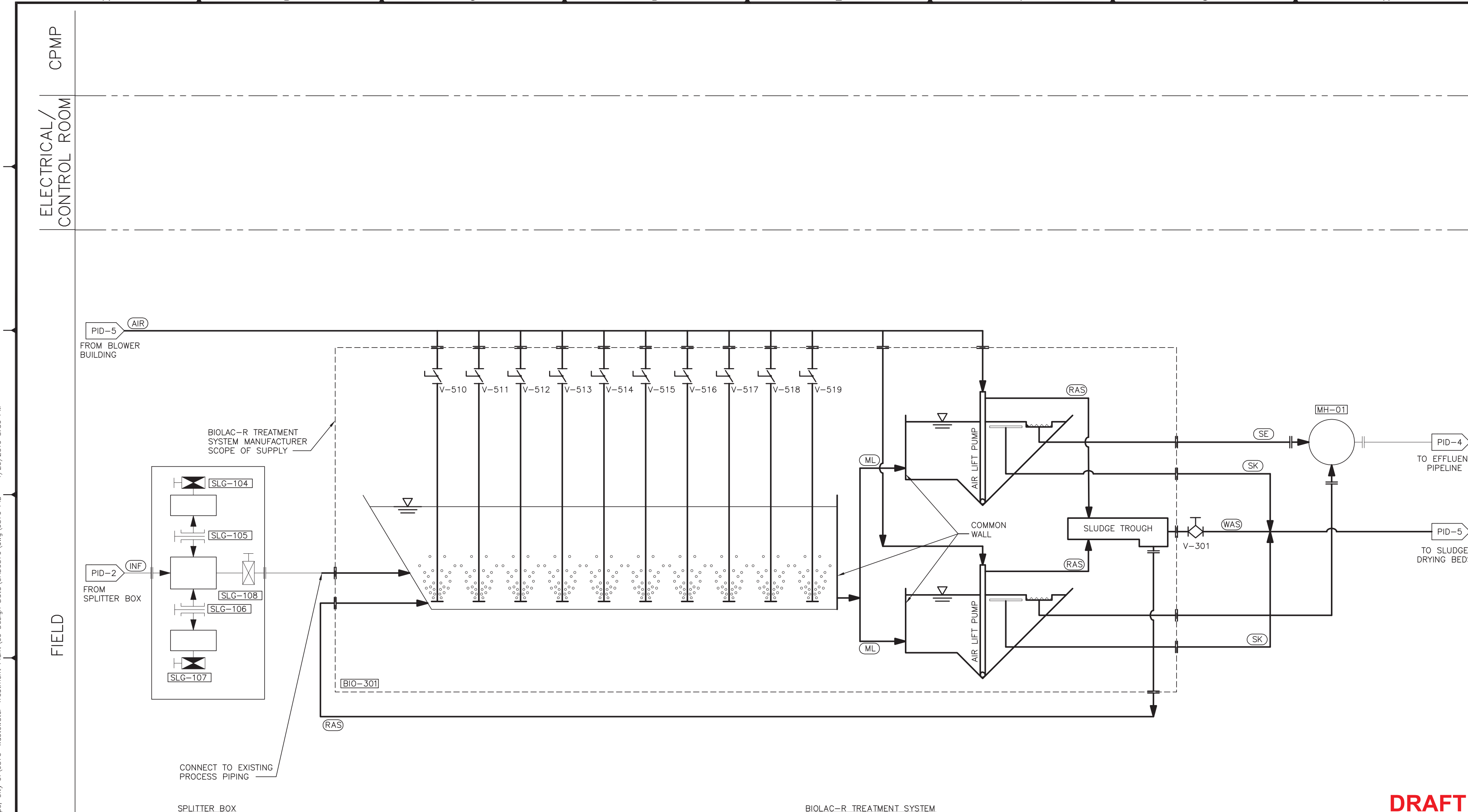

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WASTEWATER TREATMENT PLANT IMPROVEMENT

BIOLAC-R TREATMENT SYSTEM

DWG. P&ID 3
PROJECT NO. 6576
SHT. NO. 3 OF 5

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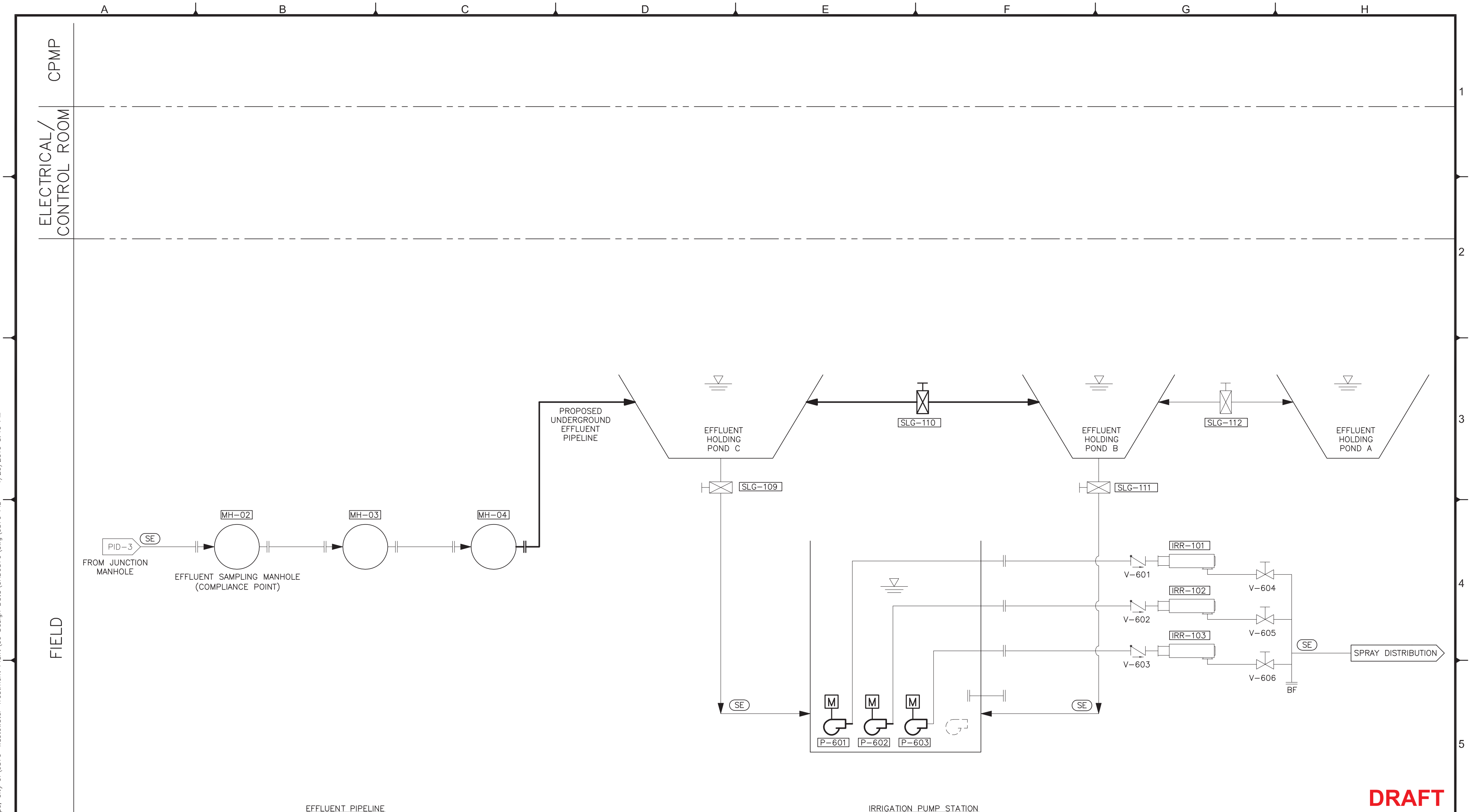

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WASTEWATER TREATMENT PLANT IMPROVEMENT

EFFLUENT PIPELINE, HOLDING PONDS, AND IRRIGATION PUMP STATION

DWG. P&ID 4
PROJECT NO. 6576
SHT. NO. 4 OF 5

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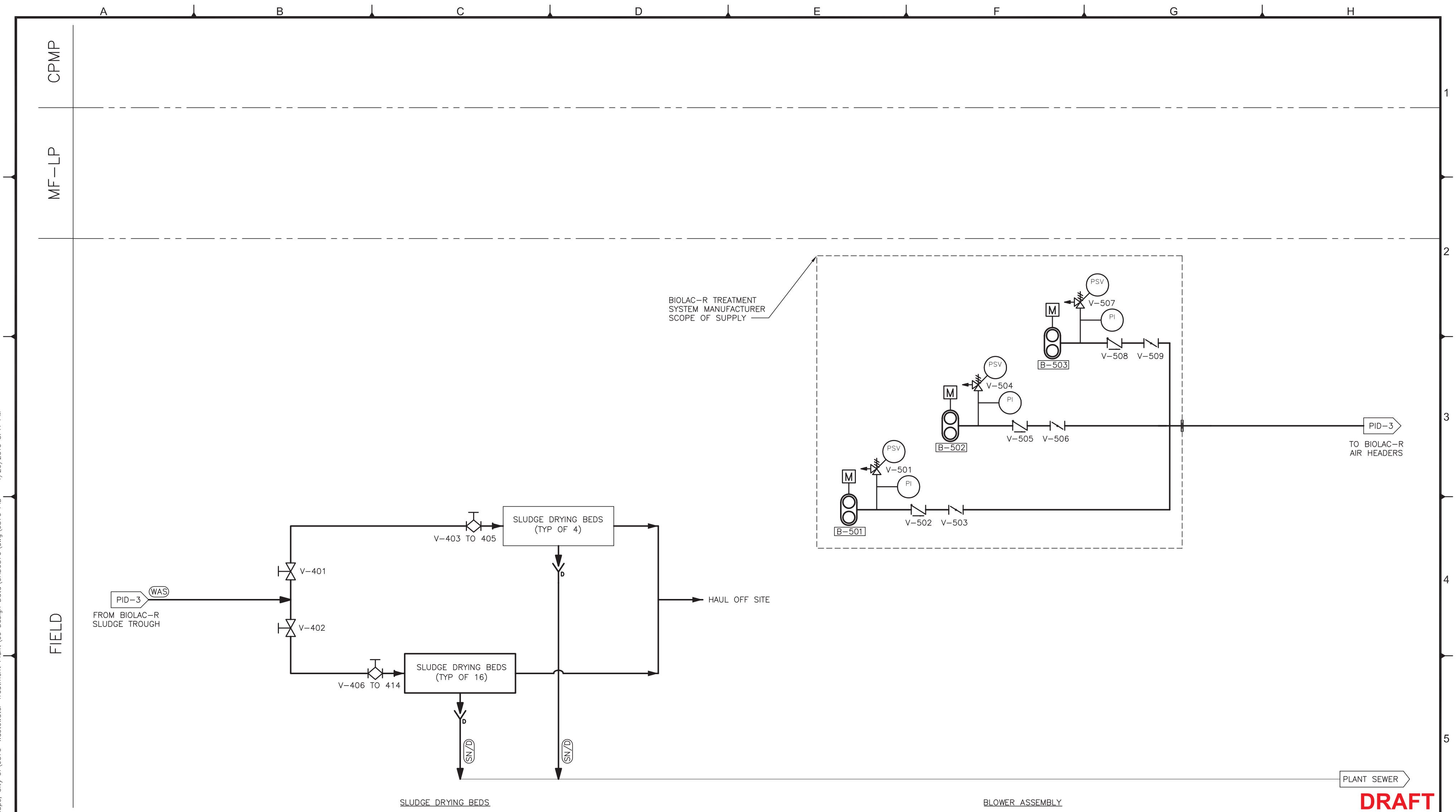

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WASTEWATER TREATMENT PLANT IMPROVEMENT

SLUDGE DRYING BEDS AND BLOWER ASSEMBLY

DWG. P&ID 5
PROJECT NO. 6576
SHT. NO. 5 OF 5

Technical Memorandum 2

Basis of Design

DRAFT

Prepared for

City of Guadalupe

Wastewater Treatment Plant Improvement Project

Prepared By

DUDEK

Date
August 2010

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TABLES

APPENDICES

1 INTRODUCTION

1.1 Background

The City of Guadalupe, CA owns and operates the Guadalupe Wastewater Treatment Plant (WWTP) located at 5125 W. Main Street, Guadalupe, CA 93434 (Latitude N 3457.738, Longitude W 12035.451). The City is required to operate their WWTP in compliance with the Waste Discharge Requirement (WDR) permit Order No. R3-2005-0015 as issued by the California Regional Water Quality Control Board (RWQCB), Central Coast Region. The Guadalupe WWTP has had ongoing WDR violations of Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) levels since 2005. Through Prop 50 grant funding, the City is financing improvements to the WWTP that will ensure the compliance with the WDR.

1.2 Purpose of this Document

The objective of the project is to renovate the existing Guadalupe WWTP to reliably treat the influent wastewater and consistently produce effluent compliant with the WDR permit. Technical Memorandum 1 (TM1) summarized the alternatives and provided recommendations to this end. The outcome of that memorandum was a definition of the project scope that satisfies the project objective to gain reliable compliance to the requirements of the WDR within the grant funding limitations; those improvements were designated as Phase I. The remaining improvements identified in TM1, while important for long-term reliability, were designated as Phase II and will be considered at a later date when supplemental funding can be secured.

The purpose of this document, Technical Memorandum 2 – Basis of Design, is to present design criteria, confirm process selection, and highlight specific design details for Phase I. Specifically, TM2 presents equipment sizing, plant layout, hydraulic design, process and equipment design criteria, equipment selection, and major systems plan for Final Design.

TM2 is submitted as the final deliverable in the preliminary design development scope of work. Accompanying this memorandum are 30% design drawings, a preliminary list of project specifications, and preliminary cost estimate. The accompanying documents are complimentary to this memorandum and reference is made to them throughout the following narrative. Following the City's acceptance of the preliminary design conclusions, final construction documents will be prepared.

1.3 Influent Wastewater Quality

The design influent wastewater parameters are given in Table 1.

Table 1 - Influent Wastewater Characteristics

Parameter	Unit	Value
Biochemical Oxygen Demand (BOD-5)	mg/L	300
Total Suspended Solids (TSS)	mg/L	300
Total Kjeldahl Nitrogen (TKN) (assumed)	mg/L	50
Ammonia as Nitrogen (assumed)	mg/L	35
pH	-	7.7
Alkalinity (assumed)	mg/L	410

1.4 Effluent Wastewater Requirements

The effluent discharge limitations in the WDR for the Guadalupe WWTP are given in Table 2.

Table 2 - Effluent Wastewater Requirements[1]

Constituent	Units	Monthly Average	Daily Maximum
Flow	MGD	0.96	-
Settleable Solids	mL/L	0.2	0.5
BOD, 5-Day	mg/L	60	100
Suspended Solids	mg/L	60	100
Total Dissolved Solids	mg/L	1500	-
Sodium	mg/L	230	-
Chloride	mg/L	230	-
pH	Within the range 6.5 – 8.4		

1.5 Hydraulic Design Criteria

The hydraulic design of the Guadalupe WWTP is based on the existing hydraulic profile and site topography. Following the headworks, wastewater flows through each treatment process by gravity. The wastewater flow rates are shown in Table 3.

Table 3 – Wastewater Flow Rates

Parameter	Units	Current[2]	WDR Limit	Design
Average Daily Flow (ADF) Rate	mgd	0.60	0.96	0.96
Maximum Daily Flow Rate	mgd	1.04	-	1.66[3]
Peak Hour Flow (PHF) Rate[4]	mgd	1.92	-	2.88
Minimum Daily Flow Rate[5]	mgd	0.18	-	0.48

[1] WDR permit as issued by the California RWQCB, Central Coast Region, as Order No. R3-2005-0015, pg 4

[2] Average and maximum daily flow rates were determined from monthly monitoring reports, Jan 2004 – Dec 2009. Monthly reports are based on daily flow measurements taken at approximately 10:00 AM each day. Diurnal flow data is not available.

[3] Assumed same correlation between average daily flow and maximum daily flow observed at current flow conditions.

[4] Peaking factor determined from *Recommended Standards for Wastewater Facilities*, 2004 edition.

[5] Value assumed due to lack of flow data; minimum flow rate equal to 30% of average flow rate, *Wastewater* Engineering, Metcalf & Eddy, third edition.

The existing hydraulic structures and piping are sized appropriately to handle design peak hourly flows and do not require upsizing. The return flow rates from the filtrate of the screenings, grit, and sludge dewatering systems will be assumed to be negligible. The existing and proposed hydraulic profiles are shown in Drawing G-3. The individual hydraulic design of each unit process is presented in Section 4 of this document.

2 SITE DEVELOPMENT

2.1 Layout of Facilities

With the intent to maximize existing plant infrastructure, most of the proposed improvements will be implemented with only minor changes to the existing plant layout. Facility upgrades will be the result of rehabilitating or upgrading existing systems and structures. The only new process unit at the facility is the new sludge handling facilities which will be constructed near the existing sludge drying beds on the west end of the plant near the WWTP entrance.

AIPS Pond 3 will be converted to the Biolac® treatment system. Ponds 2 and 4 will provide up to 8.8 million gallons of effluent storage. Pond 1 can be used either to store 3.3 million gallons of effluent or sludge during emergency conditions. The proposed layout is shown in Drawing C-4.

2.2 Facility Improvement Phasing

TM1 – Conceptual Design Report provided a detailed investigation and needs assessment for the existing facility recommending a comprehensive overhaul of the facility to modernize and improve reliability. Given the project funding constraints, the identified improvements were prioritized to maximize value of the available funding. TM1 recommended Near Term Project improvements hereinafter referred to as Phase 1 Improvements to best address project objectives relative to delivering a facility that can consistently maintain WDR compliance. The remaining facility needs identified in TM1 are considered Phase 2 improvements. Expansion or upgrades to produce recycled water have been considered in preliminary design development and are summarized in Future Improvements.

Descriptions of Phase 1 Improvements, Phase 2 Improvements, and Future Improvements are presented in the following sections. Only Phase 1 Improvements for which funding is immediately available will be implemented at this time. The City is investigating supplemental funding sources that may facilitate implementation of Phase 2 Improvements. Future Improvements should be considered when market analysis justifies the expenditures.

2.3 Phase 1 Improvements

The WWTP planned improvements for Phase I (current project) are:

- Headworks
  - Replace the comminutor with one mechanically cleaned bar screen and a washer/compactor system, retain existing manually cleaned bar rack.
  - Replace submersible pumps, mounting system, and install new water level sensors.

  - Replace necessary valves, piping, and repaint influent piping manifold.
  - New VFD, air conditioning, dust control, and enclosure.
- Grit Removal System upgrade
  - Installation of a new propeller drive system and top-mounted grit pump in existing structure.
  - Installation of new grit classifier.
  - Installation of new grit piping.
  - Will be bid as an alternate.
- AIPS pond conversion to Biolac® system
  - Reshaping of Pond No. 3 and installation of diffusers and the
  - Construction of two integral clarifiers.
  - New aeration blowers and enclosure.
  - Installation of necessary pipe work.
- Sludge Handling Facilities
  - Waste activated sludge (WAS) pumps.
  - New sludge dewatering screw press system.
  - Installation of necessary pipe work.
- Site Services
  - Extension of sewer, water, and electrical lines and facilities as necessary.
  - Gravel road from Main Street to the plant.

The proposed process flow diagram is shown in Drawing G-4. The above mentioned improvements are described in details In Section 4 Design Packages.

2.4 Phase II Improvements

The remainder of the project as defined in TM 1 as Phase II shall be built at a latter date and comprises of the following scope of work:

- Effluent Pipe and Holding Ponds
  - Install piping system to directly connect plant effluent to storage ponds
  - Restore the eroded holding ponds
  - Refurbish the equalization between three holding ponds
- Irrigation Pump Station
  - Replace existing three submersible pumps and filters
  - New electrical building and equipment, and telemetry to plant

- New pump crane
- New fencing around pump station

- Spray Distribution System
  - Aeration of pasture
  - New Sprinkler system
  - New underground laterals and isolation valves
- Site Services such as demolition and removal of existing debris from the plant, enhanced electrical and instrumentation, SCADA, security systems, paved road to the facility.

2.5 Future Improvements

The current design is limited to the WDR prescribed limits for flow and effluent quality. However, there is sufficient space available for future expansion. Based on the population projections, the hydraulic capacity of 0.96 MGD will sustain to 2031. After that, the plant may need capacity upgrades and a parallel reactor basin could be built similar to proposed design mirrored on Pond 1.

With recycled water gaining acceptance in California, this plant will also be well suited for a future upgrade to meet the criteria for reuse. For that, the plant will require upgrade to tertiary treatment, followed by disinfection processes. The plant upgrades for water reuse would involve the following:

- Change of operation of the Biolac® pond to alternate aeration to achieve alternate anoxic and oxic zones to enable tertiary treatment and production of higher quality effluent.
- Effluent could then be filtered through an acceptable Title 22-approved filtration technology such as a granular media filtration, or a cloth filter; and then disinfected by ultraviolet (UV) light or chlorine to meet the required pathogen inactivation.

3 PROCESS SELECTION

3.1 Problems at the Existing Plant

The Guadalupe WWTP effluent has regularly exhibited TSS and BOD levels resulting in violations of the City's WDR. The following problems identified during site visits in July and August 2010 are presumably contributing factors to the plant's performance issues:

- Headworks Deficiencies – Excess rags and floating debris has accumulated in the first two AIPS ponds (1 and 2) due to the mechanical deficiencies in headworks facility. Rags and debris that was not removed at the headworks were found to clog the AIPS surface aerators and render them inoperable. Rags also contribute to nuisance conditions leading to odor emissions from the plant.

- Inoperable Grit Removal System – The grit removal system is not operating which may be causing a decrease in treatment capacity due to grit accumulation in the AIPS ponds (See TM1 for details).
- Algae Growth – Substantial growth of green and blue-green algae has occurred in all the AIPS ponds and final effluent with particularly high growth in the final ponds (AIPS Ponds 3 and 4). This is due in part to extended hydraulic retention times in the final ponds.
- Blue-green algae (BGA) – BGA is not actually algae, but a primitive bacterial form that looks like algae and is often confused with the appearance of sludge. Its significance is that it creates nuisance conditions of high TSS, foul odors and toxicity to preferred life forms. The presence of BGA indicates a shallow oxic layer and thus poor circulation of water in the ponds and poor aeration. This can result in less treatment of soluble BOD and the potential for significant odor generation. Unfortunately, improving circulation and aeration to the necessary level cannot be performed economically or effectively with the current surface aerators.
- Aerators – Some of the AIPS surface aerators appear to be out of service due to damage to the gear drives. The aerators are reportedly obsolete and new gear drives would have to be fabricated.
- Aeration Strategy – The AIPS aerators are controlled by signals from DO sensors in the ponds whereby a low DO signal calls for the aerators to activate and a high DO signal deactivates the aerators. Theoretically, DO is decreased by biological demand associated with bacterial activity on influent BOD and supplementary aeration is needed to provide sufficient oxygen for BOD stabilization. The current operations strategy of the system generates more algae than appropriate, which is measured as TSS and BOD in the effluent. Furthermore, the current DO operating range is lower than typical AIPS.
- Recirculation – The AIPS recirculation pumps transfer water from ponds 3 and 4 to ponds 1 and 2 and are set to run for a short period of time each morning before daylight. Lower DO levels occur in AIPS during unlit periods of the day such as early morning. Therefore, water with low DO levels is currently being returned to the beginning of the AIPS. Recirculation is typically performed during daylight which reduces aerator demand.
- Outlet Depths – The outlets for AIPS Ponds 1 and 2 are at a depth which is likely drawing water that is less treated and containing higher levels of CO_2. Drawing effluent with these characteristics from Ponds 1 and 2 will increase algae growth in the ponds 3 and 4.

3.2 Intermediate Solutions

While various immediate and intermediate operation modifications have been discussed and are being implemented, the long-term corrective action as recommended in TM1 is conversion of the AIPS ponds to the extended aeration process defined as Biolac®.

Immediate and intermediate measures for City consideration include the following:

- Sampling and Monitoring – Focused sampling and monitoring of influent and effluent with regular measurements of BOD, total suspended solids, pH, TKN, nitrite-N, turbidity, and microscopic exam at each pond. This will help characterize the conditions and performance of the ponds and will serve as a basis for adjusting and evaluating the effectiveness of various recommendations and decisions until the full-scale plant is constructed.
- Headworks Optimization – Optimal grit and rag removal should be a very high priority for the current plant operations.
- Pond 3 Bypass – Redirect effluent from Pond 1 to Pond 4 so that Pond 3 is bypassed. This will reduce the hydraulic retention time in the final Pond which will aid in reducing algae production and TSS and BOD levels.
- Improve Circulation and Aeration – To improve circulation and aeration within the ponds, it is recommended that a different type of aerator such as a SolarBee® be installed. These are not mechanical aerators, but provide oxidation by circulating oxygen generated by a limited growth of algae to a deeper zone of the pond. The unit is sized and adjusted to prevent scouring and oxidation of the anaerobic sludge zones. The oxygen circulated from the surface stimulates and supports bacterial growth, which competes for nutrients needed by algae, thus limiting algal growth. In addition, the circulation of oxygen breaks the life cycle needed by BGA and prevents its growth. These circulators also provide a defined zone for sludge digestion, optimizing sludge reduction.
- Increase DO – The DO set points for the aerators should be increased and the recirculation pumps should be run during daylight and for longer periods of time.
- The outlets for Ponds 1 and 2 should be adjusted so that effluent is drawn from water depth with less CO_2 and improved treatment.
- Bio-Augmentation of sludge digestion by artificially increasing the population of aggressive bacteria that digests the sludge. Sludge digestion requires specific conditions for anaerobic digestion. These conditions determine the natural population of bacteria that decompose and reduce the sludge mass. The major benefit to systems such as this plant is the reduction of sludge mass to avoid dredging and hauling costs in near future. The goal would be to reduce the existing sludge volume to avoid treatment impacts on the ponds and to minimize future cost of sludge removal and disposal. It is common for this approach to reduce sludge volume by 30-50% within a few months.

3.3 Recommended Long-term Solution

While the intermediate steps mentioned above may alleviate the compliance problems for the time being, it cannot be guaranteed to meet the WDR requirements in the long-term. This plant requires adequate preliminary and secondary treatment process that can reduce wastewater organic matter, and the accompanying biological oxygen demand (BOD) and total suspended solids (TSS).

Secondary treatment systems are characterized according to where the process biomass is located. Fixed film systems are processes where the biomass grows on media and the wastewater flows over the media. Trickling filters and rotating biological contactors (RBCs) are examples of fixed-film systems. Suspended growth systems are processes where the raw wastewater is mixed into the biomass slurry, called mixed liquor. Activated sludge systems are the most common example of a suspended growth system. Activated sludge systems can be characterized as "conventional treatment" utilizing primary clarification and anaerobic digestion or "extended aeration" in which all incoming waste load is treated in aeration tanks. Extended aeration facilities are simpler and are typically implemented for smaller facilities where space is less of a concern and a less complex operation is preferred.

Extended aeration, an activated sludge suspended growth secondary treatment process is considered the most feasible for the Guadalupe WWTP given the incoming wastewater characteristics, flowrate, and WDR limitations. The extended aeration processes exhibit a relatively long sludge age, usually greater than 20 days, thereby producing a stabilized sludge waste stream. Numerous extended aeration technologies are available, but not all are considered viable for this facility. Extended aeration alternatives feasible for the Guadalupe WWTP site have been identified considering the existing land area, the ease of operations and maintenance, the use of existing infrastructure, and capital costs. Process technologies that meet these basic criteria include:

- Oxidation ditches
- AeroMod SEQUOX®
- Biolac®

A description of each of these processes follows, with the summary of the evaluation of each type of treatment system.

OXIDATION DITCH An oxidation ditch is an extended aeration activated sludge biological treatment process that employs a long solids retention time (SRT) to stabilize the wastewater. Oxidation ditches are typically arranged in a single or multi-channel configuration within a ring, oval or horseshoe-shaped basin. Surface aerators provide motive force for mixing/circulation, oxygen transfer, and aeration. The oxidation ditch is usually preceded by conventional headworks (e.g. bar screens and grit removal). After passing through the headworks, the wastewater flow enters the oxidation ditch where it is mixed with return sludge from the secondary clarifier and then aerated.

Surface aerators impart dissolved oxygen via surface agitation to promote microbial growth while circulating the mixed liquor. Automated control of DO concentrations is available on some proprietary systems to minimize power requirements and provide process control. The design SRT for oxidation ditches is typically long enough that complete biological nitrification will occur. Because nitrification will occur in a properly aerated oxidation ditch, the process can incorporate unaerated sections that serve as anoxic zones to provide effective denitrification. To encourage biological phosphorus removal, an anaerobic tank can be added upstream of the oxidation ditch as the contact point where the wastewater will first contact the mixed liquor. It is important that nitrate concentrations be minimized in the biological design to ensure that the anaerobic zone will properly function. The treated effluent from the oxidation ditch is separated from the solids by sedimentation in a secondary clarifier.

Infrastructure for a typical oxidation ditch of this capacity would consist of cast-in-place concrete tanks for the oxidation ditch and secondary clarifiers. The oxidation ditch volume is approximately equal to the treatment capacity to yield a 24-hour hydraulic retention time. Circular secondary clarifiers are commonly employed for solids separation. Surface aerators including vertical turbine mixers or brush rotors are installed at specific points along the oxidation ditch configuration. Circular secondary clarifiers require rotating sludge collectors and substantial return activated sludge (RAS) pumps are necessary with pumping capacity of up to 150% of influent flow. Waste sludge pumps are also required to remove sludge from the system for further processing or dewatering. The feasibility of a oxidation ditch is summarized in Table 4.

Table 4 – Oxidation Ditch Feasibility Evaluation Summary

Advantages	Disadvantages
• Optimal performance can be achieved with low operational requirements • Operation and maintenance costs are low compared to conventional biological treatment processes • Constant water level and continuous discharge improves reliability and performance with low weir overflow rates thereby alleviating periodic effluent surges experienced in other biological processes • Long hydraulic retention time minimize the impact of shock loading or hydraulic surges • Less sludge is produced than conventional biological treatment processes due to extended biological activity during the activated sludge process • Biological nutrient removal can be cost effectively incorporated to design	• Footprint of the oxidation ditch is larger than other activated sludge processes due to the long SRT/HRT requirements for extended aeration. • Large concrete volumes required to construct process tanks compared to other activated sludge processes, which increases capital costs • Surface aerators provide lower oxygen transfer efficiencies compared to fine bubble diffusers resulting in higher electrical operating costs • If nutrient removal is not included in design, substantial total nitrogen can be expected in the effluent which is receiving significant attention from Regional Boards throughout the State. Incorporating nutrient removal adds capital costs which are partially offset by improved operational performance. • Separated tanks (i.e. oxidation ditches and clarifiers) necessitate substantial mechanical sludge recycle pumping adding significant capital and operating costs.

AEROMOD SEQUOX® - The SEQUOX® is an extended aeration process with equipment and tankage configuration patented by Aeromod. The process begins by combining wastewater with return activated sludge (RAS) from the clarifiers in a selector tank. The flow then enters the continuously aerated first stage aeration basins, which provide sufficient hydraulic retention time (HRT) to achieve substantial BOD removal and nitrification. After this step, the mixed liquor flows into the second stage, which includes two parallel reactors where aeration is sequenced on and off between tanks on a programmable cycle. This cycling achieves denitrification by forcing aerobic/anoxic conditions. Nitrification occurs when a tank is receiving air (aerobic) and denitrification occurs when the air is shutoff and the tank becomes anoxic. Both the anoxic and aerobic conditions provide additional BOD removal. The effluent from the second stage aeration tanks enters the integral clarifiers where the biomass settles and is returned to the selector tank. The clarifier effluent is withdrawn and discharged from the system. Periodically, solids sent from the first stage aeration nitrification tank to the aerobic digesters. The supernatant from the digesters is decanted into the second stage aeration tanks by a fixed overflow weir and the solids are removed for disposal.

Infrastructure for a typical Aeromod plant of this capacity would include a strategically sized, but even number of process trains, configured by rectangular cast-in-place concrete tanks. The process compartments are achieved with internal concrete partition walls. Aeration is delivered with blowers and submerged fine bubble diffusers. Hydraulic movement is achieved with air lift pumps facilitated by common water levels and close proximity of process tank compartments. The feasibility of the Aeromod SEQUOX® system is summarized in Table 5.

Table 5 – Aeromod SEQUOX® Feasibility Evaluation Summary

Advantages	Disadvantages
• Similar to oxidation ditch relative to advantages attributed to process reliability of extended aeration plants • Selector to encourage proper biological flocculation • Process control is achieved by sequencing the air addition with simple timer logic. Process control can be automated by manufacturer's control system • Combines the secondary process with some flow equalization, solids digestion, and clarification into common-wall structure • Nitrogen removal is incorporated into the design and it is possible to incorporate phosphorus removal • Given configuration of process tank compartments, air lift transfer pumps eliminate the need for mechanical return sludge pumping. • Modular design is readily expandable, if site is properly planned.	• Although common wall construction reduces the footprint and concrete requirements relative to oxidation ditches, this process is still capital intensive with major concrete tankage required. • Manufacturer dictates nutrient removal process capabilities • Compact, rectangular clarifiers are susceptible to solid-liquid separation difficulties

BIOLAC® The Biolac® system is a patented extended aeration activated sludge process that uses a fully-mixed treatment tank concept similar to an oxidation ditch, but utilizing a more adaptable pond system configuration (Figure 9). Typical process flow incorporates conventional headworks (screenings and grit removal) from which the raw wastewater flows into the Biolac® system. The Biolac® system consists of a large pond with an efficient aeration/mixing system consisting of aeration blowers and submerged flexible-hose diffusers called aeration chains. Varying levels of control functionality are available from Parkson and a simple control upgrade to the system can provide alternating oxic and anoxic zones for biological nutrient removal. Mixed liquor is eventually discharged at the end of the pond into an integral clarifier that incorporates a sludge removal system on the bottom and a scum removal system at the surface. Return activated sludge is withdrawn from the bottom of the clarifier with airlift pumps and is returned to the beginning of the pond with the raw wastewater.

Large ponds are used in the treatment process, which allows for operation at long solids retention times (SRT) of 30 – 70 days, compared with 15 – 25 days for other extended aeration activated sludge processes to ensure complete oxidation of BOD and ammonia. The large amount of biomass in the system permits reliable treatment of widely varying loads with only minor operational impacts. The long SRT creates stable sludge that allows sludge wasting to non-aerated sludge holding ponds or directly to dewatering facilities. The manufacturer reports effluent BOD levels of less than 10 mg/L and complete nitrification (ammonia less than 1 mg/L).

Infrastructure for a typical Biolac pond includes sloped-side earthen basin lined with either a geomembrane liner (i.e. HDPE) or concrete. Secondary clarifiers can be configured either with integral rectangular tanks at the outlet end of the basins (referred to as Biolac-R®) or separate secondary clarifiers (referred to as Biolac-SS®), depending on the plant space constraints. Air is provided to the reactor basin for aeration and mixing via aeration blowers and submerged diffuser chains. Return of waste activated sludge is achieved with air lift transfer pumps alleviating the need for mechanical sludge return pumping. The feasibility of the Biolac® system is summarized in Table 6.

Table 6 – Biolac® Feasibility Evaluation Summary

Advantages	Disadvantages
• Low-loaded (Low F:M) extended aeration activated sludge technology • High oxygen transfer efficiency delivery system • Exceptional mixing from controlled aeration chain movement with little energy input • Simple system construction that could incorporate existing pond structure at the plant. Only minimal concrete structures required for clarifiers. • Floating air lines and diffusers – do not require anchoring so no pond penetrations • Very stable – can handle variable flows and loading easily because of the high SRT and low F/M ratio • Provides biological nutrient removal	• Larger footprint because of high SRT (40 – 60 days) – not an issue for Guadalupe WWTP since pond infrastructure is existing at the site.

As already mentioned in TM 1, Biolac® has been selected as the best-fit long-term solution for reliable and consistent WDR compliance. The smallest pond, Pond 3 will be converted to a Biolac® pond for treatment of the design flows and integral clarifiers constructed on the north bank of the basin. Because only one small pond is necessary for treatment with the Biolac® process, the other three ponds will remain available for other uses such as effluent wet weather storage.

4 DESIGN PACKAGES

4.1 Headworks

4.1.1 Mechanical

The headworks mechanical layout is shown in Drawings M-1 and M-2. Please refer to details of existing facility and alternative analysis in Sections 4.1.1 and 6.1 in TM1.

4.1.1.1 Bar Screens

The existing comminutor will be replaced with a mechanically cleaned bar screen, while retaining the manual bar rack as a stand-by option. The rake mechanism will transport the screenings out of the headworks pit on to the ground level into a washer/compactor. Design data for the screen is presented in Table 7.

Table 7 - Mechanically Cleaned Bar Screen

Parameter	Units	Value
Number of Screens	no	1
Type	-	Multiple Rake
Bar Spacing	mm	6
Channel Width	ft	2.5
Channel Depth	ft	2.8
Inclination from horizontal	deg	75 (minimum)
Discharge height	ft	24
Motor Size	HP	5 (maximum)
Material	-	304 Stainless Steel
Vendors	-	Huber, Vulcan, Duperon, Headworks

4.1.1.2 Washer/Compactor

The screenings will discharge into a washer/compactor which will be mounted on top of the wall between the wet well and headworks pit. Filtrate from the washer/compacter will be discharged to the influent pump station wet well. Screenings will be washed, dewatered, and then collected in waste bins for disposal.

Design data for the washer/compacter is presented in Table 8.

Table 8 - Screenings Washer/Compacter

Parameter	Units	Value
Number of washer/compacters	no	1
Screenings capture rate at design ADF (Q = 0.96 mgd)[6]	CF/d	12.5
Screenings capacity of washer compactor	CF/hr	70
Minimum percent dry solids of compacted screenings	%	45
Number of storage containers	no	2 (1 in use, 1 standby)
Motor Size	HP	4 (maximum)
Material	-	304 Stainless Steel
Vendors	-	Huber, Vulcan, Duperon, Headworks

4.1.1.3 Influent Pump Station

The existing pumps, vertical discharge piping segments, base discharge elbows and guide rail system, and two (2) check valves will be replaced. The existing ductile iron force main and manifold piping will remain in place. The replacement pumps will have the characteristics shown in Table 9.

Table 9 - Influent Pumps

Parameter	Units	Value
Type	-	Submersible Solids Handling Non-Clog
Number of pumps	no	3 (Lead, Lag, Standby)
Suction inlet diameter	in	6
Discharge flange diameter	in	6
Nominal motor speed	rpm	1200
Impeller diameter	in	11.625
Motor size	HP	20 (maximum)
Material	-	Cast Iron Impeller and Volute
Vendors	-	Flygt, Yeomans, Cornell

4.1.2 Civil and Structural

The asphalt driveways which access the headworks are in satisfactory condition and size and do not require repair or widening. One hose station is located in the southeast corner of the headworks pit, which is adequate for servicing the screen, washer/compactor and pump station. A water line will be extended to the washer/compacter for washing the screenings.

The bar screen will be anchored to the top of channel and top of the wall between the headworks pit and wet well. The washer/compacter will be installed on a metal bracket mounted on top of the same wall. A metal platform will be constructed to access the bar screen motor and chain tension adjustment assembly. This platform will require new handrails as well as modifications to the existing handrails around the headworks. Minor concrete channel modifications will be needed to install the bar screen.

[6] Values for 0.25 inch bar spacing extrapolated from figure 9-4 of Metcalf & Eddy, 3rd ed, pg 453

Foot-mounted base discharge elbows will be anchored to the wet well floor to securely hold the pumps in place. The guide rail system will be clamped to the eight-inch discharge piping. The existing grating above each wet well will be modified with a hinge to allow easy removal of the pumps.

4.1.3 Electrical and Control

Electrical upgrades will include replacing light fixtures, installing new control panels for the bar screen and washer/compacter, and providing power to the new equipment. One Variable Frequency Drive (VFD) will be installed to match the two existing VFDs installed in 2008. New level sensing devices will be installed. The existing MCC NEMA 3R enclosure for the VFDs will be replaced with a new air-conditioned and gasketed enclosure, which will match the existing footprint.

4.1.3.1 Bar Screen and Washer Compacter

The bar screen and washer/compacter will be controlled by a common Programmable Logic Controller (PLC) and a local control station. The PLC and local control station will be installed next to the bar screen and will allow the bar screen to be changed between manual and automatic controls.

When the local control station is in the AUTO position, the bar screen shall be controlled by upstream and downstream ultrasonic water level sensors. Screen operation shall be started when the water level sensors monitor a certain water level difference, when the float switch senses high water level, or when a certain time has passed since the last operation of the screen. Screen operation is stopped with an adjustable delay time after the water difference is below a certain value and after the float switch ceases to indicate high water alarm, or after a certain run time has expired (if operation was started by timer). When the local control station is in the HAND position the operator shall be able to run the rake assembly or the screenings washer by pushing the respective FORWARD or REVERSE tip button.

A proximity switch will be furnished on the screen to detect a stand-still of the motor shaft while the motor is running forward. In this situation, the motor direction is automatically reversed for a PLC adjustable period of time. Then the motor direction and rake movement is reversed again to forward movement. If the shaft stalls again during the forward movement, return is repeated one more time. If the shaft stalls a third time, the screen shut-off alarm is rendered. Resetting the bar screen is manually performed after correction of any cause for the alarm.

The washer/compacter shall be cycled on and off by remote control signals from the PLC. The washing press shall be cycled by a screen cycle counter generated from the bar screen. The washer/compacter can be run automatically or manually in forward and reverse.

4.1.3.2 Influent Pumps

Each pump will be controlled automatically by the existing controller. The existing control system will need to be slightly modified to incorporate the new water level sensors and adjusted water surface elevations. During normal operation, the wet well level will operate in the variable speed zone and the pump speeds will be adjusted using variable frequency drives (VFD) based on the measured water levels. The variable speed zone is between HHWL and LWL. The controller operation will be based on the functions shown in Table 10.

Table 10 - Wet Well Water Level Controls

Water Level	Sensor Type	Function
HHHWL	Emergency Float Switch	High water level alarm, all pumps full speed
HHWL	Pressure Transducer	Both pumps on at full speed
HWL	Pressure Transducer	Lead pump on at full speed
LWL	Pressure Transducer	Lead pump at constant minimum speed, Lag pump off
LLWL	Pressure Transducer	Lead pump off
LLLWL	Emergency Float Switch	Low water alarm, all pumps off

4.1.3.3 Flow Measurement

Flow measurement will be accomplished by the City-installed Endress + Hauser Proline Promag 10W electromagnetic flow meter. The instantaneous flow rate is displayed on the digital screen at the flow meter. It is recommended that a totalizer, chart recorder, or data logging system be installed prior to construction to obtain the diurnal curves for the influent flow rate.

4.1.4 Hydraulics

4.1.4.1 Wet Well

To ensure that the bar screen channel maintains the desired velocities, the wet well water level will be designed to operate just below the bar screen channel invert elevation. The minimum wet well level will be set above the invert elevation of the normally-open slide gate connecting the two wet wells to allow use of both wet well volumes simultaneously. The minimum wet well water level will also provide enough submergence above the pump inlet elevation to prevent surface vortex. The wet well water level data is presented in Table 11 and water level elevations are shown in Drawing M-2.

Table 11 - Wet Well Water and Structure Elevations

Parameter	Units	Value
HHWL	ft	52.12
Depth of variable speed operating volume	ft	1.00
LWL	ft	51.12
Required wet well operating volume for low flow periods (pumps at minimum speed)[7]	gal	125
Required wet well operating depth for low flow periods (pumps at minimum speed)	ft	0.21
Pumps off elevation (minimum wet well water level)	ft	50.64
Slide gate invert elevation	ft	50.58
Minimum submergence above base discharge elbow	in	22
Wet well invert elevation	ft	48.50

[7] Based on a minimum flow rate of 250 gpm and two pumps switching off between starts with maximum 15 starts per hour for each pump.

4.1.4.2 Bar Screen Channel

The headworks shall be designed so that the screen approach velocities will minimize grit deposition during low flows and reduce dislodging of screenings during high flows. The water levels and head loss through the screen at various flow rates is presented in Table 12.

Table 12 - Bar Screen Channel Depths

Parameter	Units	Value		
Flow Regime	-	Current	Design (WDR Limit)	Design Peak Hour
Flow Rate	mgd	0.6	0.96	2.88
Downstream water depth[8]	ft	0.22	0.29	0.56
Downstream velocity	fps	1.69	2.05	3.18
Velocity through openings[9]	fps	2.93	3.45	5.03
Upstream water depth	ft	0.43	0.58	1.19
Upstream velocity	fps	0.87	1.02	1.49
Head loss[10]	ft	0.17	0.24	0.51
Change in depth	ft	0.21	0.29	0.63
Upstream Channel Freeboard	ft	2.27	2.21	1.51

4.1.4.3 Pump Station Force Main

A summary of the force main data is presented in Table 13. The operating points for the force main are shown in Table 14.

Table 13 - Force Main Data

Parameter	Units	Value
Discharge Elevation (at grit chamber inlet)	ft	76.57
Minimum Static Head	ft	24.55
Maximum Static Head	ft	26.10
Discharge piping diameter	in	8
Force main piping diameter	in	12
Minimum Hazen-Williams coefficient	-	120

Table 14 - Influent Pump Station Operating Points

Parameter	Units	Values				
Flow regime	-	Low	Current ADF	Current PHF	Design ADF*	Design PHF
Influent Flow Rate	mgd	0.3	0.6	1.92	0.96	2.88
Number of Pumps	no	3 Installed Units - Lead, Lag, Standby [+, ++]				
Operating Flow Rate	gpm	250	416	1333	667	2000
Operating TDH	ft	26.34	26.70	32.23	27.58	31.60

* WDR Limit
\+ One unit required for flowrates up to 1,340 gpm (Approximate TDH = 32.5-ft)
\++ Two units required for flowrates up to 2,460 gpm (Approximate TDH = 35-ft)

[8] Water depth calculated at seven (7) feet upstream of wet well and is based on draw down curve calculations.
[9] Through velocities based on Vulcan VMR bar screen dimensions.
[10] Calculated using a 1.43 k factor, *Manual of Practice*, ACSE WEF, No. 8, Vol 1, pg 407, eq. 1.

4.2 Grit Removal System Upgrade

4.2.1 Mechanical

Drawing M-3 and M-4 illustrates the layout of the grit removal system components. A new rotating propeller drive motor and shaft will extend down to the bottom sump with grit fluidizer vanes, which keep the grit fluidized. A new top mounted Turbo Pista® Grit Pump will be installed with a suction line, which extends down inside the drive tube to the storage hopper bottom. Having a vertical suction line will reduce the probability of plugging in the suction pipe. A new grit screw conveyor and classifier will also be installed at the west end of grit chamber and close to the grit pump, thus enabling the shortest and straightest possible grit discharge piping alignment.

4.2.1.1 Rotating Propeller System

A new rotating propeller system and drive motor with a full-length shaft and grit fluidizer vanes will be installed in the existing grit chamber structure. Propeller system data is presented in Table 15.

Table 15 - Grit Chamber Rotating Propeller System

Parameter	Units	Value
Number of grit chambers	no	1
Existing grit well diameter	ft	3
Existing grit well depth	ft	5.9
Existing vortex chamber diameter	ft	8
Existing vortex chamber depth	ft	4.4
Design capacity of grit chamber	gpm	3007
Propeller system rotational speed	rpm	21
Motor size	HP	3/4
Material	-	304 Stainless Steel
Vendors		Smith & Loveless

4.2.1.2 Grit Pump and Piping

A new top mounted grit pump and new grit piping will be installed to remove settled grit. The pump will be installed with a vacuum priming system. Grit pump and piping data is shown Table 16.

Table 16 - Grit Pump and Piping

Parameter	Units	Value
Grit Pump		
Type of Pump	-	Centrifugal Recessed Impeller
Number of Grit Pumps	no	1
Nominal Motor Speed	rpm	1200
Impeller Diameter	in	9.5
Motor Size	HP	10
Material	-	Ni-Hard Impeller and Volute
Vendors	-	Smith & Loveless
Grit Piping		
Diameter	in	4
Material	-	Ductile Iron

4.2.1.3 Grit Classifier

A new grit classifier system will be installed northwest of the grit chamber. Drainage piping will be connected to the sewer lines approximately eight feet north of the grit chamber. A concentrator will be installed above the classifier, which aids in dewatering and washing the grit by returning over 90% of the water and organics back to the headworks. Grit classifier design data is presented in Table 17.

Table 17 - Grit Concentrator, Classifier, and Drainage Piping

Parameter	Units	Value
Grit Concentrator		
Number of concentrators	no	1
Concentrator Capacity	gpm	250
Grit Classifier		
Number of classifiers	no	1
Grit capacity	gpm	50
Slope of screw conveyor	deg	22
Rotational speed of screw conveyor	rpm	9
Screw Diameter	in	9
Motor Size	HP	1
Material	-	Type 304 SS
Vendors	-	Smith & Loveless
Number of storage containers	no	2
Volume of each container	CF	36
Drainage Piping		
Diameter	in	6
Material	-	Ductile Iron

4.2.2 Civil and Structural

The asphalt driveway which accesses the grit chamber area is in sufficient condition and size and does not require repair or widening. One hose station is located near the inlet piping which is adequate for servicing the grit removal systems. The existing grit pump and piping will need to be removed to allow installation of the new grit classifier.

A concrete pad will be constructed for mounting the grit classifier. A concrete pedestal will be constructed to mount a base bend for the drainage piping.

4.2.3 Electrical and Control

Electrical lines will be rerouted to provide service to the relocated grit removal system components. The existing light fixtures are sufficient for nighttime operations and do not require improvements.

The rotating propeller system, grit pump, grit classifier, and vacuum priming system will be controlled by a common control panel installed in an enclosure mounted next to the grit pump. The rotating propeller drive runs continuously but can be controlled by an On-Off selector switch.

To control the operation of the grit pump, a manual Momentary-Off-Automatic selector switch shall be provided. In the automatic position, control shall be by a time clock with manual selector switch to override the timer and initiate the pumping cycle. A 24-hour, 96-position time clock will be provided. The 24-hour timer contacts shall operate a 0-30-Minute Pump Timer (and a 0-30-Minute priming timer). All timers will be provided within the control cabinet enclosure. The grit classifier and pump turn on simultaneously and the classifier will continue running for 10 minutes after the pump stops.

The vacuum priming system is comprised of a pneumatically controlled discharge pinch valve installed on the grit pump discharge piping, air compressor, vacuum pump, vacuum control solenoid valve, resonant frequency prime level sensor, heater, and a float-operated check valve. The operation of the vacuum priming system shall be tied into the pump cycle timer, so as to be fully automatic.

4.2.4 Hydraulics

As the wastewater flows through the vortex chamber a maximum head loss of ¼” will occur at peak flow conditions according to the Smith & Loveless. Flow leaves the grit structure by freefalling into a vertical pipe set flush with the bottom of a rectangular concrete channel.

The hydraulic conditions shown in Table 18 will occur in the grit pump system.

Table 18 - Grit Piping Hydraulics

Parameter	Units	Value
Design flow rate of pump	gpm	250
Design Total Dynamic Head (TDH)	ft	22.89
Suction lift	ft	10.53
Pipe velocity	fps	6.4

4.3 AIPS pond conversion to Biolac® system

4.3.1 Process Design

As discussed in TM 1 and Section 3 of this report, Pond 3 will be converted to a Biolac® pond. Wastewater will be delivered from the grit removal system directly to the Biolac® pond where mixing and aeration of the wastewater will be achieved by blowers and flexible diffusers assemblies. Two integral concrete clarifiers will be constructed at one end of the pond to provide solids clarification. Mixed liquor (ML) from the aeration pond will flow through orifices along the bottom of the concrete partition wall and into the two clarifiers. Solids will flocculate and settle to the bottom of the clarifier while the clarified secondary effluent flows over the V-notch weirs for effluent storage and disposal. The activated sludge settled at the bottom of the clarifier will be airlifted to a trough, from where the sludge can be returned to the aeration basin or wasted.

The complete Biolac® Treatment System sizing shown in Table 19 will provide the biological treatment conditions shown in Table 20. The Biolac® system will be designed to meet possible future secondary effluent requirements of 30 mg/L BOD and TSS and in consideration of future tertiary treatment upgrades for Title 22 Recycled Water. Please also refer to Section 6.3.2 in TM 1.

Table 19 – Biolac® Sizing[11]

Parameter	Units	Value
Aeration Basin		
Width at grade	ft	162
Length at grade	ft	164
Side Water depth	ft	11
Slope ratio	ft	2:1
Width at bottom	ft	106
Length at bottom	ft	136
Basin volume	MG	1.57
Hydraulic retention time	Day	1.57
Freeboard	ft	3
Clarifiers		
Number of Clarifiers	no	2
Width at grade	ft	24.32
Length at grade	ft	55
Side water depth	ft	17
Side slope angle	deg	50
Rise rate per clarifier	gpd/ft^2	399
Weir loading rate per clarifier	gpd/ft	5,000
Freeboard	ft	3
Sludge hopper depth	ft	6
Aeration		
Total air flow rate	scfm	2658

[11] Sizing by Parkson

Table 20 - Biological Treatment Conditions[12]

Parameter	Units	Value
Aeration Basin Conditions		
MLSS in aeration basin	mg/L	3189
Food to Microorganism (F/M) ratio	d^{-1}	0.06
Sludge Retention Time (SRT)	days	69
Activated Sludge		
Activated sludge concentration	mg/L	6,378
Return Activated Sludge (RAS) flow rate	mgd	1.2
Wasting rate	lb/d	1,681
Effluent Quality		
BOD_5 (maximum)	mg/L	12
TSS (maximum)	mg/L	15

4.3.2 Mechanical

4.3.2.1 Influent and Effluent Biolac® Piping

The Biolac® influent piping will be 16" ductile iron pipe and will connect to the pipe following the existing splitter box as shown in Drawing C-4.

The Biolac® effluent piping will be connected to the existing effluent manholes on the west side of the plant. Bypass piping will be constructed to allow secondary effluent to flow to pond 4 for additional effluent storage. The existing AIPS piping and weirs will require minor modifications to allow stored effluent to flow from pond 4 to ponds 1 and 2.

4.3.2.2 Aeration Equipment

Aeration and mixing is accomplished through the use of Parkson BioFuser® fine bubble diffuser assembly and the Parkson BioFlex® floating air delivery pipes. Air flow to each floating air delivery pipe will be supplied by the positive displacement aeration blowers. Each floating air delivery pipe can be shut off by butterfly valves located above grade. An aeration equipment summary is given in Table 21.

[12] Provided by Parkson

Table 21 - Aeration Equipment

Parameter	Units	Value
Diffuser Equipment		
Number of BioFuser® fine bubble diffuser assemblies	no	117
Air flow rate to each fine bubble diffuser assembly	scfm	21
Material of BioFuser® fine bubble diffuser assemblies	-	soft urethane
Floating air delivery pipes		
Number of Parkson BioFlex® floating air delivery pipes	no	9
Air flow rate to each floating air delivery pipe	scfm	273
Material of Parkson BioFlex® floating air delivery pipes		Polyethylene
Air Header Piping		
Pipe diameter	in	12
Material	-	Ductile Iron
Blowers		
Number of blowers	no	3 (2 Duty, 1 Standby)
Design capacity of each blower	scfm	1,600
Design total dynamic head of each blower	psig	5.82
Nominal motor speed	rpm	1800
Motor Size	HP	60
Material	-	Cast Iron
Vendors	-	Aerzen, Dresser Roots,

4.3.2.3 Activated Sludge Piping

The Biolac® clarifier utilizes a floating flocculating rake mechanism improves the distribution of the settled solids by traveling back and forth above the sludge hopper. The settled solids (activated sludge) are collected by a stationary perforated suction manifold pipe laid along the hopper bottom. Utilizing air from the blowers, sludge is pumped to a sludge trough using an air lift pump system. The RAS pipeline is directly connected to the sludge trough and is routed to the aeration basin inlet zone. A bypass connection will be installed in the RAS pipeline to allow the wastewater in the clarifier and basin to be drained and returned to the headworks. WAS piping is connected between the sludge trough and WAS pump station. Activated sludge piping data is presented in Table 22.

Table 22 - Activated Sludge Piping

Parameter	Units	Value
Air lift pump pipe diameter	in	10
Air lift pump pipe material	-	Polyvinyl Chloride Schedule 40
RAS pipe diameter	in	16
RAS pipe material	-	PVC
WAS pipe diameter	in	4
WAS pipe material		PVC

4.3.3 Civil and Structural

To construct a Biolac® treatment system within the existing AIPS pond 3, the following earthwork will need to be accomplished:

- Remove digester pit internal earthen berm,
- Reshape existing 3:1 side slopes to be 2:1,
- Excavation for construction of clarifier.

The Biolac® pond will produce excess fill which can be stockpiled onsite. A summary of the earthwork volumes for converting AIPS Pond 3 into a Biolac® system is shown in Table 23.

Table 23 - Pond 3 Earthwork Summary

Parameter	Units	Value
Internal earthen berm	CY	1,400 (cut)
Reshaping side slopes	CY	1,200 (fill)
Clarifier excavation	CY	150 (cut)
Total earthwork required	CY	350 (waste)

The existing geomembrane liner will be removed and a new 60 mil HDPE liner will be installed after the earthwork, pipe installation, and clarifier construction is completed.

The aeration blowers will be housed in a prefabricated building mounted on a new concrete slab. The clarifiers, partition wall, and sludge trough will be constructed of concrete. Metal platforms and handrails will be installed at the clarifier. The floating air delivery pipes will be secured to the top of the aeration basin with anchor posts.

4.3.4 Electrical and Control

Electrical work will consist of providing power for the blower building, rake mechanisms, DO sensor, and control panel. A single light fixture south of proposed clarifier location is sufficient for night time operations.

The control panel for the Biolac® system will be the supplier's standard panel. Several options are available for Biolac® control including adjustable speed blowers and the proprietary "Wave Oxidation" process for dissolved oxygen control and biological nutrient removal. The effluent goals for the Guadalupe WWTP do not necessitate advanced control strategies and the basic control panel is proposed for this project, as described in the following discussion. Preliminary calculations conclude that a single blower unit will satisfy mixing requirements and the second duty blower will only be required during periods of peak loading. To minimize electrical system demands, a timer system will be employed to allow staging blowers on/off to match diurnal oxygen demands.

The manufacturer-supplied control panel will be furnished with all blower control and monitoring equipment including full-voltage soft-starters, motor overload and temperature protection measures, and system control utilizing either relay-ladder logic or a programmable logic controller. The control panel will be factory-tested and shipped to the site for integration by the Contractor's electrician.

To control the aeration blowers, HAND-OFF-AUTO selector switches are provided on the control panel. The HAND position is to provide for manual operation of the blowers in the event of processor and or panel view failure. When in the AUTO position, the blowers can be operated on a Timer function to control aeration timing by controlling blowers according to an operator-adjustable schedule. In the OFF position, the blowers are shut down.

A dissolved oxygen (DO) probe will be provided to provide monitoring of the reactor basin for operational control. The DO probe will not provide automatic control.

The flocculating rakes are controlled by the manufacturer-supplied control panel. Through a selector switch, the rakes can be run on a timer or manually. Limit switches are used to change the motor direction or enable alarms.

The sludge airlift utilizes compressed air from the aeration blowers. The airlift will run continuously, but can be controlled by a manual valve at the clarifier. The RAS will run continuously as long as the airlift is operating.

4.3.5 Hydraulics

Head loss through the aeration basin, clarifier and the partition wall orifices is negligible. The water in the aeration basin and clarifier is set by the double sided vee-notch weir in each clarifier. The preliminary sizing for the weir and launder is presented in Table 24.

Table 24 - Effluent Weir and Trough Data[13]

Parameter	Units	Value
Trough		
Trough width	in	18
Trough depth	in	12
Water depth at peak flow	in	10.15
Weir		
V-notch weir angle	deg	90
V-notch spacing	in	6
Total weir length per clarifier	ft	74
Number of v-notches per clarifier	no	146
Flow to each weir at peak flow	gpm	6.85
Nappe height at peak flow	in	1.55

The activated sludge flows under gravity head and is returned to the influent zone of the aeration basin.

4.4 Sludge Handling Facilities

As stated in Technical Memorandum No. 1 (TM1), using conventional sand drying beds would require 48,000 square feet (SF) of drying area and would cost in excess of $1,400,000. Three potential alternatives discussed in TM1 were mechanical dewatering equipment, vacuum assisted sludge drying beds (VASDB), and Quick Dry filter® beds. A comparison of these alternatives is presented in Table 25.

[13] Sizing by Parkson

Table 25 - Sludge Dewatering Alternatives

Parameter	Value		
Type	Screw press	Quick-Dry Filter Bed	VASDB
Capital cost	$391,000	$767,000	$661,000
Typical labor requirement[14]	Low	Medium	Medium-Low
Polymer injection system required	yes	Yes	yes
Required area footprint	500 SF	10000 SF	2000 SF
Companies	Huber, FKC, PWT	F.D. Deskins Co. Inc.	US Environmental

The combination of lower capital cost, smaller footprint, and fewer required hours of labor, and at least three competitive vendors, substantiate the screw press as the preferred alternative.

4.4.1 Mechanical

Layouts of the WAS pump station and Screw Press are shown on Drawings M-9 and M-11 respectively.

4.4.1.1 WAS Pump Station

Progressive cavity pumps will pump the WAS to the screw press facility at the required inlet pressure. Connections for a future screw press will be incorporated into the piping. Bypass connections points will be installed along the WAS force main to direct the WAS to Pond 1 or the existing drying beds in the event the screw press is in operable. At the bypass connections, quick connect adapters will be installed to facilitate hose connection. Once the screw press is operable, the stored sludge could be processed by the screw press during off cycle times. Temporary pumps could be used to pump the stored sludge to the screw press using the same bypass connections. The WAS pumps and piping will have the characteristics shown in Table 26.

Table 26 - Sludge Feed Pumps and Piping

Parameter	Units	Value
Pumps		
Pump type	-	Progressive Cavity
Number of pumps	no	2 (1 Duty,1 Standby)
Nominal Speed	rpm	1,800
Motor Size	HP	3
Material	-	Buna N rubber stator, tungsten carbide rotor
Vendors	-	Seepex, Netzsch, Moyno
Piping		
Diameter	in	4
Material	-	Ductile Iron

[14] Values are based on information obtained from telephone conversations with operators

4.4.1.2 Sludge Dewatering Screw Press

Adjustments to the wasting rates of the Biolac® clarifier are handled by the screw press by adjusting the daily run times. The screw press will be installed with an air compressor and a polymer injection system. Design data for the screw press facility is presented in Table 27.

Table 27 - Screw Press

Parameter	Units	Value
Percent dry solids of feed sludge	%	0.64
Run time at design capacity	hrs/day	17
Solids loading capacity	lb/hr	100
Sludge feed flow rate	gpm	30.3
Solids capture rate	%	95
Percent dry solids of effluent	%	22
Polymer usage	lb/d	25
Maximum screw speed	rpm	1.9
Screw diameter	in	17.3
Nominal motor speed	rpm	1,800
Motor size	HP	2
Material	-	Type 316SS
Vendors	-	Huber, PWT, FKC

4.4.2 Hydraulics

Hydraulic design data for the WAS force main is shown in Table 28.

Table 28 - WAS Force Main

Parameter	Units	Value
Water surface elevation in Biolac® sludge trough	ft	70.60
Pump center line elevation	ft	68.00
Screw press inlet center line elevation	ft	68.50
Design flow rate of each pump	gpm	30
Design total dynamic head	ft	68.5
Design pipe velocity	fps	0.78

4.4.3 Civil and Structural

The screw press facility will require the following civil work:

- Concrete loading driveway to remove dried sludge cake,
- Extension of existing water lines,
- Filtrate piping connected to existing sewer line.

The WAS pump station will be built on the same concrete slab as the screw press facility which will include a canopy for protection from and rain.

4.4.4 Electrical and Control

Electrical wiring will be extended to the screw press facility. Lighting fixtures will be installed at the WAS pump station and screw press facility. Additional electrical work will be required to install and connect control panels.

Run times for the sludge handling facilities are dictated by the desired sludge wasting rate of the Biolac® clarifier. Operations for each sludge handling facility component (screw press, WAS pumps, polymer injection system) can be controlled manually or automatically by a common PLC. Startup and run times for all sludge handling facilities are determined by a preset timer on the PLC. Immediately following the startup of the screw press motor, the WAS pump station and polymer injection system are started. The screw press speed and polymer feed rates are adjusted automatically based on signals from a flow meter installed on the discharge end of the WAS pumps. Pressure inside the press is controlled by a pressure cone, pneumatic actuator, integrated controller, and a pressure sensor at the screw press inlet. When the maximum throughput capacity of the screw press is reached, the pressure sensor will measures the maximum limit pressure level and the sludge feed will shut off. The feed is allowed to start again when the pressure sensor no longer measures the limit pressure level and a selectable delay time has expired. The washing sequence is initiated and terminated based on preset timers. During the washing sequence, the WAS pumps and polymer injection system is stopped and the screw press motor direction is reversed.

4.5 Site Services

4.5.1 Civil

It is anticipated that 20% of the existing asphalt driveways will require repair at the end of construction. Table 29 shows the anticipated required area of asphalt rehabilitation.

Table 29 – Asphalt Rehabilitation

Parameter	Units	Value
Current asphalt driveway area	SF	42,000
Required area asphalt rehabilitation	SF	8.400

4.5.2 Plant Electrical

The treatment plant has two electrical services from PG&E.

The main service (Service No. 1) is 600 amps, 480 volt, 3-phase with a 125 kw generator. The plant is split into critical (with generator backup) and non-critical motor control centers. The critical loads consisted of the headworks, half of the aeration lagoons, half of the influent pumps, administration offices, and site lighting.

In 2004, the lagoons were redesigned into new aeration ponds and the aerators were removed from the existing service. A second 400 amp, 480 volt, 3-phase service (Service No. 2) was added northwest of AIPS Pond 3. The new pond aerator load was transferred to Service

No. 2. This service has a critical and non-critical switchboard. A 60 kw generator backs up the critical load.

The aeration load transfer removed approximately 120 hp of connected load from the 600 amp service. This allows excess capacity to absorb any increase in load at the headworks area.

The new biological aeration system, WAS pumps, clarifiers, and sludge handling facilities will be powered from Service No. 2. A new 400 amp service meter switchboard, with automatic transfer switch and distribution switchboard, will be added adjacent to the existing second service which is north of the proposed aeration basin. The new switchboard will re-feed the existing second service switchboard to keep the aerators active during construction. The new switchboard will also serve the new loads mentioned herein. The new service will have a new standby generator sized at approximately 150kw to 200kw. The generator size will be confirmed during the design phase based on desired spare capacity for load growth.

The existing 60kw generator likely meets current APCD Tier emissions and can be salvaged and sold prior to 2012 when the standards are next expected to change. The existing service will be abandoned in place after startup of the new facility. The aeration controls may be abandoned in place. The switchboard is fairly new and should remain as an asset since it has a conduit system and duct banks to the pond areas.

The new 400 amp service will have approximately 300 amps of connected load during construction and approximately 200 amps of load after construction (abandon pond aerators).

4.5.3 Plant Controls

The electrical room has a status control panel with a mimic site plan. The mimic has indicator lights showing when a process is operating. An indicator may be added to show new WAS and sludge handling processes. The Biolac® process can utilize Pond 3 indication on the status panel. This level of display will be determined during the design stage. Alarms are reported via an autodailer.

The plant does not have a SCADA system. A SCADA system with alarm telemetry is not included in the Phase 1 scope but is recommended for future upgrades.

4.5.4 Site Security

The existing WWTP is surrounded by fencing. No additional security improvements are identified for Phase 1 of the project.

4.5.5 Roadways

The existing access road on the west side of the plant is a dirt road in poor condition. Assuming adequate project funds are available, a gravel road will be constructed above the existing road from Main Street to the plant entrance. This work effort may be included in the Phase 1 construction documents as an optional bid item to maintain project budget objectives.

4.5.6 Stormwater Drainage

No changes or additions will be made to the existing drainage system of the plant.

5 MAINTENANCE OF PLANT OPERATION DURING CONSTRUCTION

5.1 Headworks

During installation of the mechanical bar screen, flow will be directed to the manually cleaned bar rack using the existing stop plates. For installation of the new pumping system components, work will be accomplished one wet well at a time by closing the slide gates.

5.2 Grit Removal System

The grit chamber will continue to be bypassed until improvements to the grit removal system are complete.

5.3 Biolac® Treatment System

As mentioned in Section 3.2 Intermediate Solutions, taking Pond 3 off line may improve performance of the existing process. Doing so will facilitate the Biolac® conversion to take place with out disrupting on-going plant operations. Bypassing Pond 3 can be done by placing the existing stop gates in the north and west walls of the existing transfer manhole and place stop gates in both walls of the manhole between Ponds 1 and 3. The existing electrical load center and controls for Pond 3 surface aerator will need to be demolished to facilitate construction of the new clarifier structure.

Appendix I
Engineer's Opinion of Probable Construction Cost (30%)

DUDEK

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

CITY OF GUADALUPE PUBLIC WORKS DEPARTMENT
WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECT

DUDEK JOB NO.: 6576
PROJECT STATUS: 30% Design
DATE: August 20, 2010

AREA/ PROCESS LOCATION	TOTAL COST
HEADWORKS	$ 503,000.00
BIOLAC SYSTEM AND BLOWERS	$ 2,119,000.00
SLUDGE HANDLING AND WAS PUMP STATION	$ 513,000.00
SITE SERVICES	$ 437,000.00
MOBILIZATION AND DEMOBILIZATION (5%)	$ 179,000.00
SUBTOTAL	$ 3,751,000.00
ALTERNATE 1 (GRIT REMOVAL SYSTEM)	$ 245,000.00
TOTAL ESTIMATED PROJECT COSTS (SUBTOTAL + ALTERNATE 1)	**$ 3,996,000.00**

CLIENT: CITY OF GUADALUPE PUBLIC WORKS DEPARTMENT	DUDEK JOB NO.: 6576 PROJECT STATUS: 30% Design			
PROJECT: WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECT	BY: MDH		DATE: 8/20/2010	COMMENTS:
AREA/PROCESS LOCATION: HEADWORKS	CHK'D BY: SB		DATE CHK'D: 8/20/2010	
ITEM DESCRIPTION	EST. COST	UNIT	ESTIMATED UNIT COST	UNIT
DIVISION 2 - SITEWORK				
Remove Existing Pumps Discharge Elbows & Guide Rails	1	LS	$ 2,000.00	$ 2,000.00
Remove Discharge Piping and Valves	1	LS	$ 2,000.00	$ 2,000.00
Remove Existing Comminutor	1	LS	$ 2,000.00	$ 2,000.00
Remove Concrete Stubs	1	LS	$ 2,000.00	$ 2,000.00
DIVISION 3 - CONCRETE				
Concrete	0.5	CY	$ 1,000.00	$ 500.00
Grout	0.5	CY	$ 500.00	$ 250.00
DIVISION 5 - METALS				
Furnish and Install Steel Bar Screen Maintenance Platform	1	LS	$ 35,000.00	$ 35,000.00
Furnish and Install Steel Support Brackets for Screen and Platform	1	LS	$ 5,000.00	$ 5,000.00
Furnish and Install Aluminum Handrails	1	LS	$ 1,500.00	$ 1,500.00
Furnish and Install Steel Mounting Brackets for Washer/Compacter	1	LS	$ 1,500.00	$ 1,500.00
DIVISION 9 - FINISHES				
Painting and Coating	1	LS	$ 10,000.00	$ 10,000.00
DIVISION 11 - EQUIPMENT				
Furnish and Install Influent Screen	1	EA	$ 188,500.00	$ 188,500.00
Furnish and Install Washer/Compactor	1	EA	$ 58,500.00	$ 58,500.00
Furnish and Install Non-clog submersible pumps	3	EA	$ 20,540.00	$ 61,620.00
DIVISION 15 - MECHANICAL				
Furnish and Install 8" FLG Check Valve	2	EA	$ 2,340.00	$ 4,680.00
Furnish and Install 8" FLG DI Pipe	57	LF	$ 50.00	$ 2,850.00
Furnish and Install 8" FLG DI 90 Degree Bend	2	EA	$ 585.00	$ 1,170.00
Furnish and Install 8" x 6" FLG DI Reducer	3	EA	$ 390.00	$ 1,170.00
DIVISION 16 - ELECTRICAL				
Connect with Influent Lift Station Control Panel (ILS-CP)	1	LS	$ 4,000.00	$ 4,000.00
Install Influent Screenings Control Panel (IS-CP)	1	LS	$ 4,000.00	$ 4,000.00
Repair/Fix Lights	1	LS	$ 5,000.00	$ 5,000.00
Furnish and Install New VFD	1	EA	$ 10,000.00	$ 10,000.00
VFD Air conditioning, dust control structure	1	LS	$ 8,000.00	$ 8,000.00
DIVISION 17 - INSTRUMENTATION AND CONTROL				
Float Switches	2	EA	$ 1,000.00	$ 2,000.00
Pressure Transducers	2	EA	$ 2,000.00	$ 4,000.00
			SUBTOTAL	$ 419,240.00
			CONTINGENCY (20%)	$ 83,848.00
			TOTAL	$ 503,088.00
			TOTAL ESTIMATED COSTS	**$ 503,000.00**

CLIENT: CITY OF GUADALUPE PUBLIC WORKS DEPARTMENT	DUDEK JOB NO.: 6576 PROJECT STATUS: 30% Design			
PROJECT: WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECT	BY: MDH		DATE: 8/20/2010	COMMENTS:
AREA/PROCESS LOCATION: BIOLAC SYSTEM AND BLOWERS	CHK'D BY: SB		DATE CHK'D: 8/20/2010	
ITEM DESCRIPTION	EST. COST	UNIT	ESTIMATED UNIT COST	UNIT
DIVISION 2 - SITE WORK				
Excavation and Fill	3,085	CY	$ 36.00	$ 111,060.00
Excavation and Export	336	CY	$ 52.00	$ 17,472.00
Anchor Posts	18	EA	$ 300.00	$ 5,400.00
DIVISION 3 - CONCRETE				
Concrete walls and slabs for clarifier	320	CY	$ 1,000.00	$ 320,000.00
Miscellaneous concrete	4	CY	$ 1,000.00	$ 4,000.00
Concrete slab for blower building	22	0	$ 1,000.00	$ 22,222.22
DIVISION 5 - METALS				
Furnish and Install Handrails	362	LF	$ 80.00	$ 28,960.00
Furnish and Install Prefabricated Building for blowers	600	SF	$ 40.00	$ 24,000.00
DIVISION 5 - WOOD AND PLASTICS				
Furnish and Install 60 mil HDPE liner	27,000	SF	$ 4.00	$ 108,000.00
Liner Pipe Penetration	4	EA	$ 500.00	$ 2,000.00
Anchor Liner to Concrete	170	LF	$ 50.00	$ 8,500.00
DIVISION 11 - EQUIPMENT				
Biolac Equipment Including Blowers	1	LS	$ 761,800.00	$ 761,800.00
DIVISION 15 - MECHANICAL				
Furnish and Install 12" FLG DI 90 Degree Bend	1	EA	$ 1,222.00	$ 1,222.00
Furnish and Install 12" MJ DI 90 Degree Bend	1	EA	$ 754.00	$ 754.00
Furnish and Install 12" MJ DI Pipe	225	LF	$ 120.00	$ 27,000.00
Furnish and Install 12"x 4" MJ DI Tee	9	EA	$ 1,000.00	$ 9,000.00
Furnish and Install 12"x 6" FLG DI Tee	3	EA	$ 1,000.00	$ 3,000.00
Furnish and Install 14" MJ DI 45 Degree Bend	3	EA	$ 1,300.00	$ 3,900.00
Furnish and Install 14" MJ DI 90 Degree Bend	2	EA	$ 1,500.00	$ 3,000.00
Furnish and Install 14" MJ DI Gate Valve	1	EA	$ 5,000.00	$ 5,000.00
Furnish and Install 14" MJ DI Tee	3	EA	$ 1,850.00	$ 5,550.00
Furnish and Install 14" PVC Pipe C900	457	LF	$ 140.00	$ 63,980.00
Furnish and Install 16" M J DI 45 Degree Bend	4	EA	$ 1,400.00	$ 5,600.00
Furnish and Install 16" MJ DI 90 Degree Bend	4	EA	$ 1,700.00	$ 6,800.00
Furnish and Install 16" MJ DI Tee	2	EA	$ 2,000.00	$ 4,000.00
Furnish and Install 16" PVC Pipe C900	1091	LF	$ 160.00	$ 174,560.00
Furnish and Install 4" FLG-MJ DI Pipe	54	LF	$ 40.00	$ 2,160.00
Furnish and Install 4" MJ DI Pipe	92	LF	$ 40.00	$ 3,680.00
Furnish and Install 4" PVC C900 Pipe	80	LF	$ 40.00	$ 3,200.00
Furnish and Install 6" FLG Dismantling Joint	3	EA	$ 1,000.00	$ 3,000.00
Furnish and Install 6" PVC SDR-35 90 Degree Bend	1	EA	$ 200.00	$ 200.00
Furnish and Install 6" PVC SDR-35 Pipe	108	LF	$ 60.00	$ 6,480.00
Furnish and Install 6" PVC SDR-35 Wye	4	EA	$ 350.00	$ 1,400.00
DIVISION 16 - ELECTRICAL				
Electrical Connections	1	LS	$ 13,000.00	$ 13,000.00
Blower Building Lighting and Receptacles	1	LS	$ 6,000.00	$ 6,000.00
			SUBTOTAL	$ 1,765,900.22
			CONTINGENCY (20%)	$ 353,180.04
			TOTAL	$ 2,119,080.27
			TOTAL ESTIMATED COSTS	**$ 2,119,000.00**

CLIENT: CITY OF GUADALUPE PUBLIC WORKS DEPARTMENT	DUDEK JOB NO.: 6576 PROJECT STATUS: 30% Design			
PROJECT: WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECT	BY: MDH		DATE: 8/20/2010	COMMENTS:
AREA/PROCESS LOCATION: SLUDGE HANDLING AND WAS PUMP STATION	CHK'D BY: SB		DATE CHK'D: 8/20/2010	

ITEM DESCRIPTION	EST. COST	UNIT	ESTIMATED UNIT COST	UNIT
DIVISION 2 - SITE WORK				
Asphalt Driveway	150	SF	$ 3.00	$ 450.00
Connect Drain to sewer manhole	1	LS	$ 5,000.00	$ 5,000.00
DIVISION 3 - CONCRETE				
Concrete	14	CY	$ 1,000.00	$ 14,000.00
DIVISION 5 - METAL				
Prefabricated Equipment Canopy	720	SF	$ 30.00	$ 21,600.00
Pipe Supports	6	EA	$ 750.00	$ 4,500.00
DIVISION 11 - EQUIPMENT				
Furnish and Install Screw Press	1	LS	$ 297,700.00	$ 297,700.00
Furnish and Install Progressive Cavity Pump	2	LS	$ 19,500.00	$ 39,000.00
DIVISION 15 - MECHANICAL				
Furnish and Install 4" FLG DI Pipe	31	LF	$ 20.00	$ 620.00
Furnish and Install 4" FLG DI 90 Bend	8	EA	$ 195.00	$ 1,560.00
Furnish and Install 4" FLG DI Tee	3	EA	$ 300.00	$ 900.00
Furnish and Install 4" FLG DI Cross	1	EA	$ 400.00	$ 400.00
Furnish and Install 4" FLG Plug Valve	6	EA	$ 715.00	$ 4,290.00
Furnish and Install 4" PVC SDR-35 Pipe	125	EA	$ 40.00	$ 5,000.00
Furnish and Install 4" PVC SDR-35 90 Bend	2	EA	$ 150.00	$ 300.00
DIVISION 16 - ELECTRICAL				
VFD for WAS pumps	2	EA	$ 3,000.00	$ 6,000.00
Electrical System Installation	1	LS	$ 10,000.00	$ 10,000.00
DIVISION 17 - INSTRUMENTATION AND CONTROL				
Furnish and Install Magnetic Flow Meter	1	EA	$ 6,000.00	$ 6,000.00
Instrument and control installation and coordination	1	LS	$ 10,000.00	$ 10,000.00
			SUBTOTAL	$ 427,320.00
			CONTINGENCY (20%)	$ 85,464.00
			TOTAL	$ 512,784.00
			TOTAL ESTIMATED COSTS	**$ 513,000.00**

CLIENT: CITY OF GUADALUPE PUBLIC WORKS DEPARTMENT	DUDEK JOB NO.: 6576			
	PROJECT STATUS: 30% Design			
PROJECT: WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECT	BY: MDH		DATE: 8/20/2010	COMMENTS:
AREA/PROCESS LOCATION: SITE SERVICES	CHK'D BY: SB		DATE CHK'D: 8/20/2010	
ITEM DESCRIPTION	EST. COST	UNIT	ESTIMATED UNIT COST	UNIT
DIVISION 2 - SITEWORK				
Gravel Driveway	40,000	SF	$ 1.50	$ 60,000.00
Misc. Sitework	1	LS	$ 20,000.00	$ 20,000.00
Erosion Control	1	LS	$ 10,000.00	$ 10,000.00
DIVISION 15 - MECHANICAL				
Plant Water pipe incl. fittings, install complete	100	LS	$ 35.00	$ 3,500.00
Plant Water Water Hose Station	2	EA	$ 500.00	$ 1,000.00
DIVISION 16 - ELECTRICAL WORK				
General Electrical (scope to develop)	1	LS	$ 270,000.00	$ 270,000.00
			SUBTOTAL	$ 364,500.00
			CONTINGENCY (20%)	$ 72,900.00
			TOTAL	$ 437,400.00
			TOTAL ESTIMATED COSTS	**$ 437,000.00**

CLIENT: CITY OF GUADALUPE PUBLIC WORKS DEPARTMENT	DUDEK JOB NO.: 6576			
	PROJECT STATUS: 30% Design			
PROJECT: WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECT	BY: MDH		DATE: 8/20/2010	COMMENTS:
AREA/PROCESS LOCATION: ALTERNATE 1 (GRIT REMOVAL SYSTEM)	CHK'D BY: SB		DATE CHK'D: 8/20/2010	
ITEM DESCRIPTION	EST. COST	UNIT	ESTIMATED UNIT COST	UNIT
DIVISION 2 - SITEWORK				
Demolish Existing Grit Pump, Piping, and Valves	1	LS	$ 5,000.00	$ 5,000.00
DIVISION 3 - CONCRETE				
Concrete Slab and Pedestal for Classifier	1	CY	$ 1,000.00	$ 1,000.00
Fill existing grit suction outlet with grout	0.25	CY	$ 500.00	$ 125.00
DIVISION 3 - METALS				
Modify Existing Handrails	1	LS	$ 1,000.00	$ 1,000.00
Furnish and Install Support Bracket for Concentrator	1	LS	$ 1,000.00	$ 1,000.00
Pipe Supports	2	EA	$ 750.00	$ 1,500.00
DIVISION 11 - EQUIPMENT				
Furnish and install Pista Grit Removal System complete	1	EA	$ 182,000.00	$ 182,000.00
DIVISION 15 - MECHANICAL				
Furnish and Install 4" FLG DI Pipe	7	LF	$ 20.00	$ 140.00
Furnish and Install 4" DI Blind Flange	1	EA	$ 50.00	$ 50.00
Furnish and Install 4" FLG DI 90 Degree Bend	2	EA	$ 195.00	$ 390.00
Furnish and Install 6" FLG DI Pipe	24	LF	$ 30.00	$ 720.00
Furnish and Install 6" FLG DI 90 Degree Bend	3	EA	$ 364.00	$ 1,092.00
Furnish and Install 6" FLG DI Tee	1	EA	$ 350.00	$ 350.00
Furnish and Install 6" x 4" FLG DI Wye	1	EA	$ 350.00	$ 350.00
Furnish and Install 6" FLG DI 45 Degree Bend	1	EA	$ 292.50	$ 292.50
Furnish and Install 6" DI Blind Flange	1	EA	$ 100.00	$ 100.00
Furnish and Install 6" PVC SDR-35 Pipe	14	LF	$ 60.00	$ 840.00
Furnish and Install 6" PVC SDR-35 45 Degree Wye Saddle	1	EA	$ 300.00	$ 300.00
Furnish and Install 6" PVC SDR-35 45 Degree Bend	1	EA	$ 200.00	$ 200.00
Furnish and Install 6" PVC SDR-35 90 Degree Bend	1	EA	$ 200.00	$ 200.00
Furnish and Install 6" Neoprene Hose	4.5	LF	$ 100.00	$ 450.00
DIVISION 16 - ELECTRICAL				
Electrical Connection of Equipment	1	LS	$ 7,000.00	$ 7,000.00
			SUBTOTAL	$204,099.50
			CONTINGENCY (20%)	$ 40,819.90
			TOTAL	$244,919.40
			TOTAL ESTIMATED COSTS	**$245,000.00**

Application for Proposition 84 Planning Grant Round 1

Santa Barbara County IRWM Plan 2012

Santa Barbara County Water Agency

Prepared by

CH2MHILL

September 28, 2010

Task 4: Establish Data Management System

Introduction

The objective of this task is to establish a DMS, which will set up a process of data collection, storage, and dissemination to IRWM participants, stakeholders, the public, and the State. The type of data that will be included for dissemination may include technical information such as designs, feasibility studies, reports, and information gathered for a specific project in any phase of development including the planning, design, construction, operation, and monitoring of a project. This task will also include cross referencing of existing data in various databases such as:

The WDL that DWR maintains for the state, which stores data from various monitoring stations, including groundwater level wells, water quality stations, surface water stage and flow sites, rainfall/climate observers, and water well logs (http://wdl.water.ca.gov/).

The SWAMP created by SWRCB has standards required for any group collecting or monitoring surface water quality data, using funds from Propositions 13, 40, 50, and 84 (http://www.swrcb.ca.gov/water_issues/programs/swamp).

The GAMA program is maintained by the SWRCB and provides a comprehensive assessment of water quality in water wells throughout the State. GAMA has two main components, the California Aquifer Susceptibility (CAS) assessment and the Voluntary Domestic Well Assessment Project. The CAS combines age dating of water and sampling for low-level volatile organic compounds to assess the relative susceptibility of public supply wells throughout the State. Because water quality in individual domestic wells is unregulated, the program is voluntary and will focus, as resources permit, on specific areas of the State. Constituents to be analyzed include nitrate, total and fecal coliform bacteria, methyl tert-butyl ether, and minerals (http://www.swrcb.ca.gov/gama).

DWR maintains the Integrated Water Resources Information System (IWRIS), which is a data management tool for water resources data and not a database. IWRIS is a web based GIS application that allows entities to access, integrate, query, and visualize multiple sets of data simultaneously (http://www.water.ca.gov/iwris/).

California Environmental Resources Evaluation System (CERES) is an information system developed and maintained by the California Natural Resources Agency to facilitate access to a variety of electronic data describing California's rich and diverse environments.

The DMS as proposed in the 2007 Santa Barbara IRWM Plan needs improvements to include or better provide access to more local water-related information. Currently, Santa Barbara County maintains existing water resources-related and IRWM-related data on the Santa Barbara County Water Agency website located at: http://www.countyofsb.org/pwd/water/index.htm. This site also provides the forum for sharing of reports, public meeting dates, agendas, meeting minutes, and annual reports. In-depth data are not currently stored on the website and the GIS capabilities are not explored extensively.

The objective of the DMS for IRWM Plan 2012 is to store project related data and make it publicly available, is to ensure efficient use of available data, stakeholder access to data, and to ensure the data generated by IRWM implementation activities can be integrated into existing State databases. A part of the effort of this task will be to explore financial and staff resources to implement the scope under this task.

Task 4.1 Review the Existing Data within the IRWM Region and Identify Data Needs

This task includes identifying and analyzing documents and data that are pertinent to updating the IRWM Plan. The principal task will be to conduct review of previous studies, e.g., City of Santa Barbara's Water Supply Planning Study; SMVWCD annual report, Reports of Santa Barbara County, monitoring reports required by adjudicator. The data gaps/data needs within the IRWM region will be identified from the existing documents.

Where appropriate, data management will be coordinated with State and Federal databases in a format consistent with SWAMP and GAMA.

Task 4.2: Develop a Web-based DMS

One of the objectives of the DMS is to make the data publicly available. This task includes development of a web-based DMS with easy access to the participating agencies including stakeholders. The DMS will serve as a data repository for various types of data (for example, project related data, water quality data). Depending on the type of data, the components and protocols for data assimilation from various sources into the DMS will be developed. For example, a library of information for spatial data can be complied into a Geographic Information System (GIS) on a project by project basis and shared with the stakeholders.

The RWMG will decide on the use of an appropriate website for developing the DMS. The existing system on the website management will be explored at the time of implementation of DMS. For example, the existing Santa Barbara County Water Agency website located at: http://www.countyofsb.org/pwd/water/index.htm also may serve as a resource for the development of the DMS. This site may also be continued to provide the forum for sharing of reports, public meeting dates, agendas, meeting minutes, and annual reports. All data used to support development of the IRWM will be outlined in a database and available for review on the website, which will provide links to information available on partner agency websites. Any required documentation of Proposition 50 will be made available on the DMS website by appropriate project administrators.

Task 4.3 Establish Typical Data Collection Technique

For data gathering a common data collection protocol will be developed to keep the web-based DMS up-to-date. The protocol will describe the use of common and compatible methods for data gathering, analysis, monitoring, and reporting formats. The data collection technique will be developed in such a way that any update on the website will be notified automatically to all the participating stakeholders to bring their attention on the changes made on the data bank.

Task 4.4 Develop Procedure for Adding Data to the DMS

Separate account login information and the website links will be set up to provide access to the DMS for all the stakeholders. Guidelines for uploading the information to the DMS will be developed. Stakeholders will access the website to retrieve information and/or contribute data to the DMS using their account login information.

Task 4.5 Maintain the DMS

The responsibilities for maintenance of the DMS will be explored by the RWMG. The RWMG will select the best approach for maintaining the DMS. This task will include the following:

Develop guidelines for maintaining the DMS system

Update information as it becomes available

Update calendar of meetings and workshops to inform the stakeholders for the upcoming events

Encourage participation from various stakeholders

Resolve any data management related issues

Task 4.6 Data Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) of data is a major task that involves reviewing the quality of data. This task includes description of the validation or quality assurance/quality control measures that will be implemented by the RWMG for data generated and submitted for inclusion into the DMS.

Under the QA/QC task an effort will be taken to update the datasets and to prepare a consistent format for all types of data.

Task 4.7 Data Sharing

This task includes a protocol preparation on how data collected for IRWM project implementation will be transferred or shared between members of the RWMG and other interested parties throughout the IRWM region, including local, State, and federal agencies. The data saved in the DMS will be distributed to the stakeholders. Efforts will be made to keep compatibility with the State databases including SWAMP, WDL, GAMA program, CEIC, and the CERES.

RWMG and public workshops will serve as the primary venue for information sharing. Other settings where information can be shared include quarterly project progress meetings, monthly agency coordination meetings, e-mail subscription lists, and monthly e-mail newsletters. These forums will serve to continue to facilitate the ongoing data sharing between stakeholders as well as the expansion of the existing Water Agency data warehousing activities.