Appendix Q

Blanco Drain Yield Study

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BLANCO DRAIN YIELD STUDY

Prepared for

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Cover Photos: Blanco Drain, December 2007

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Table i. Acronyms Used in this Report

Acronym	Description
AFY, ac-ft/yr	Acre-feet/year
cfs	Cubic foot per second
gpd	Gallons per day
mgd	Million gallons per day
mg/L	Milligrams per liter
µg/L	Micrograms per liter
MPN	Most Probable Number
ng/L	Nanogram per liter
ppb	Parts per billion
ppm	Parts per million
ASBS	Areas of Special Biological Significance
ASR	Aquifer Storage and Recovery
BMP	Best management practice
CAW, CalAm	California American Water Company
CCAMP	Central Coast Ambient Monitoring Program
CCoWS	Central Coast Watershed Studies Program
CCR	California Code of Regulations
CCRWQCB	Central Coast Regional Water Quality Control Board
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CSIP	Castroville Seawater Intrusion Project
CWC	California Water Code
DWR	California Department of Water Resources
GWR	Groundwater Replenishment
MCWRA	Monterey County Water Resources Agency
MPWMD	Monterey Peninsula Water Management District
MRSWMP	Monterey Regional Stormwater Management Program
MRWPCA	Monterey Regional Water Pollution Control Agency
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	USDA Natural Resources Conservation Service
RTP	Regional Treatment Plant
SIWTF	Salinas Industrial Wastewater Treatment Facility
SRDF	Salinas River Diversion Facility
SRDP	Salinas River Diversion Project
SVRP	Salinas Valley Reclamation Plant
SVWP	Salinas Valley Water Project
SVGB	Salinas Valley Groundwater Basin
SWRCB	California State Water Resources Control Board
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geologic Survey

Table ii. Units of Measure Used in this Report

Unit	Equals
1 acre-foot	= 43,560 cubic feet = 325,851 gallons
1 cubic foot	= 7.48 gallons
1 cfs	= 448.8 gallons per minute
1 MGD	= 1,000,000 gallons/day = 1,120 acre-feet / year
1 mg/L	= 1 ppm = $1 / 10^6$
1 µg/L	= 0.001 mg/L = 1 ppb = $1 / 10^9$
1 ng/L	= 0.001 µg/L = 1 part per trillion = $1 / 10^{12}$

Summary of Blanco Drain Yield Study

The Monterey Peninsula Water Management District (MPWMD) and the Monterey Regional Water Pollution Control Agency (MRWPCA) are jointly sponsoring the proposed Pure Water Monterey Groundwater Replenishment Project (Proposed Project), a water supply project that will serve northern Monterey County. The project will provide purified water for recharge of the Seaside Groundwater Basin that serves as drinking water supply, and recycled water to augment the existing Castroville Seawater Intrusion Project agricultural irrigation supply. One of the proposed sources of water supply to be developed for this project is tile drainage and stormwater runoff from the Blanco Drain, which currently contributes flow to the Salinas River. The purpose of this study was to (1) analyze water availability in the Blanco Drain, (2) provide an engineering analysis of the potential yields and the infrastructure required to capture and convey those flows to the Proposed Project, and (3) assess the potential project impacts on hydrology and water quality.

The Blanco Drain watershed is approximately 6400 acres of agricultural land near the City of Salinas. Summer flows are predominantly agricultural tile drainage. Irrigation supply in this area is a mix of Salinas Valley Groundwater, recycled water from the Castroville Seawater Intrusion Project and surface water from the Salinas River Diversion Facility. Winter flows also include storm water runoff.

Yields were estimated just above the confluence of the Blanco Drain with the Salinas River. There is an existing pump station at that location used to lift flows from the Blanco Drain into the river during the Salinas River Diversion Facility operating season. To convey the flows to the MRWPCA Regional Treatment Plant, a new pipeline will be required from the proposed pump station, crossing under the Salinas River. Based on previous reviews of the Blanco Drain water quality by the regulatory agencies, it was assumed that all flows may be diverted for the GWR Project. The estimated annual yields for the Blanco Drain are:

2,050 ac-ft/yr, using a maximum diversion rate of 2.9 cfs

2,104 ac-ft/yr, using a maximum diversion rate of 2.99 cfs

2,620 ac-ft/yr, using a maximum diversion rate of 6 cfs

Section 1 - Introduction

1.1 Project Description

The Monterey Peninsula Water Management District (MPWMD) and the Monterey Regional Water Pollution Control Agency (MRWPCA) are jointly sponsoring the proposed Pure Water Monterey Groundwater Replenishment Project (Proposed Project), a water supply project that will serve northern Monterey County. The project will provide purified water for recharge of the Seaside Groundwater Basin that serves as drinking water supply, and recycled water to augment the existing Castroville Seawater Intrusion Project agricultural irrigation supply.

Source water for the project would include agricultural wash water from the City of Salinas Industrial Wastewater Collection System, stormwater from MRWPCA member cities, secondary-treated effluent from the MRWPCA Regional Treatment Plant, and surface water diverted from the Reclamation Ditch, Tembladero Slough and Blanco Drain. Water supplied to the Proposed Project would undergo primary and secondary treatment at the existing Regional Treatment Plant. The portion used for groundwater recharge would then undergo advanced treatment at a new facility to be located at the MRWPCA site, and then be conveyed to the Seaside Groundwater Basin for injection. The portion used for agricultural irrigation would undergo tertiary treatment at the existing Salinas Valley Reclamation Plant, and distribution through the Castroville Seawater Intrusion Project system.

The MRWPCA provides wastewater treatment for municipalities along the Monterey Bay from Pacific Grove north to Moss Landing, and inland to the City of Salinas. Wastewater is collected in an interceptor pipeline system and conveyed to the Regional Treatment Plant (RTP), located two miles north of the City of Marina. A large portion of this incoming flow undergoes tertiary treatment and is used for unrestricted agricultural irrigation within the Castroville Seawater Intrusion Project system in the northern Salinas Valley. Flow that is not sent to the tertiary treatment system is discharged through an outfall to Monterey Bay after receiving secondary treatment. The RTP has an average dry weather design capacity of 29.6 million gallons per day (mgd) and a peak wet weather design capacity of 75.6 mgd. It currently receives and treats approximately 17 to 18 mgd of average dry weather flow and therefore has capacity to treat additional flows. The interceptor pipeline system also has currently unused or excess conveyance capacity. Most of the new source waters would be conveyed to the RTP using the existing wastewater collection system; water from Blanco Drain would be conveyed in a new pipeline directly to the RTP.

Transfers of source water flowing in known and definite channels, such as the Blanco Drain, to the GWR project and thence out of the Salinas Valley to the Monterey Peninsula would be a consumptive use that may require an appropriative permit from the State Water Resources Control Board (SWRCB). The purpose of this study was to analyze water availability in the Blanco Drain and provide an engineering analysis of the potential yields and the infrastructure

required to capture and convey those flows to the RTP. This hydrologic information and analysis may then be used in a permit application to the SWRCB.

1.2 Water Source Description

The Blanco Drain is a man-made reclamation ditch draining approximately 6,400 acres of agricultural lands near Salinas, CA. The watershed is between the Salinas River and Alisal Slough, and discharges to the Salinas River at river mile 5 (see Figure A-1). The system is maintained by the Monterey County Water Resources Agency (MCWRA).

The system consists of three separate ditches (A, B, and C) as shown in Figure 1.1. Ditch A is what is commonly referred to as the Blanco Drain. A headwall and flap gate at the lower end of Ditch A prevents seasonal high flows in the Salinas River from migrating up the Blanco Drain channel (Figure 1.2). Until 2010, MCWRA operated a seasonal pump station at the confluence of ditches A, B and C to lift summer flows over a low weir and into the ditch channel. This was required to improve tile drainage into ditches B and C (Figure 1.3). The pump station was not operated in the winter months, and ditches B and C were allowed to fill and overflow the weir.

Figure 1.1: Blanco Drain Schematic

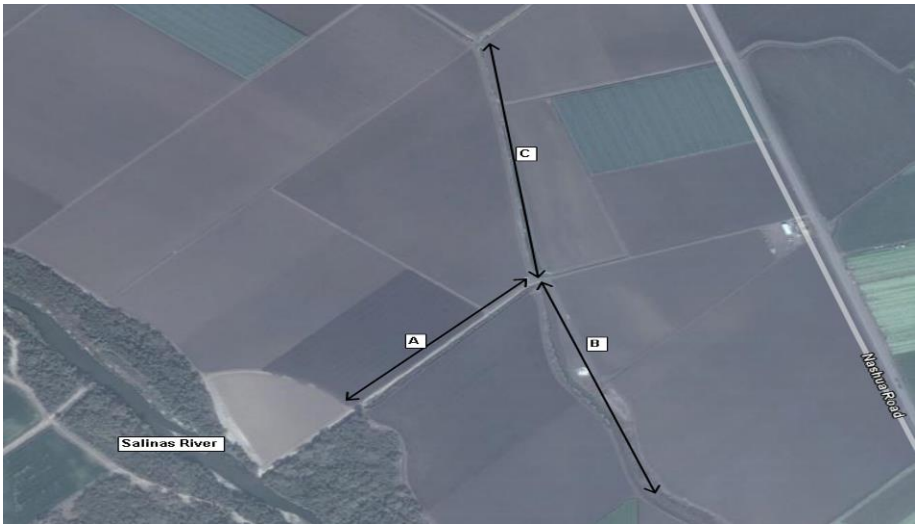


Figure 1.2: Blanco Drain Flap Gate

Figure 1.3: Old Pump Station

In 2009-2010, the MCWRA Salinas River Diversion Facility (SRDF) was constructed downstream of the Blanco Drain. The SRDF includes an inflatable rubber dam that impounds water during the summer months to supply the diversion pump station. To overcome the backwater into the Blanco Drain channel, the Blanco Drain channels were regraded and a new pump station was installed at the lower end of Ditch A. The new pump station (Figure 1.4) lifts Blanco Drain flows past a new slide gate and into the gravity portion of the channel.

Figure 1.4: Current Pump Station

Summer flows in the Blanco Drain are generally tile drainage and runoff from irrigated agriculture. Winter flows include stormwater runoff, although some fields remain in production and under irrigation year-round. Irrigation supply is predominantly groundwater from the Pressure Subarea of the Salinas Valley Groundwater Basin (see Figure A-2). A portion of the area tributary to the Blanco Drain is within the Castroville Seawater Intrusion Project (CSIP) service area (see figure A-3). The CSIP supplies growers with Recycled Water from the Salinas Valley Reclamation Plant (SVRP), located next to the MRWPCA RTP, and Salinas River water diverted at the MCWRA Salinas River Diversion Facility (SRDF).

During the summer months, the Salinas River flows into the Old Salinas River Channel through a gated culvert at the Salinas Lagoon. Direct discharge to the ocean is blocked by a seasonal sand bar which forms across the mouth of the Salinas Lagoon due to wave and tidal action in the Monterey Bay. The Old Salinas River channel is controlled by tide gates at Potrero Road in Moss Landing. River flow combines with Tembladero Slough flow approximately 1.2-miles above the tide gates. During high winter flows in the Salinas River, the sand bar breaches and the river flows directly to the Bay. When this occurs, MCWRA closes the slide gate to the Old Salinas River.

The Central Coast Regional Water Quality Control Board (CCRWQCB) has listed Blanco Drain on the impaired water body listing pursuant to Section 303(d) of the Clean Water Act for pesticides, nitrate and low dissolved oxygen. The lower Salinas River is also listed as an impaired water body for pesticides, nitrate, chloride and other parameters. A summary matrix of

303(d) listed streams is provided in Appendix B, Table B-1. Water quality is discussed in greater detail in Section 4 of this report.

Aquatic habitats within the Blanco Drain system are poor. In addition to the poor water quality, the system is generally maintained as a drainage canal without tree canopy. The adjacent agricultural lands are used for growing table crops (leafy greens, berries and artichokes). The growers prevent vegetation from establishing along the Ditch banks to discourage birds and rodents from nesting near their fields. The Biological Opinion for the Salinas Valley Water project, NMFS noted: "The outlet culvert of the Blanco Drain, where the drain enters the Salinas River, has a flap gate on its downstream end, preventing fish passage in Blanco Drain. Even if the flap gate fails and some fish are able to enter the drain, current water quality conditions are such that survival is not likely.[1]"

[1] NMFS, Biological Opinion for the Salinas River Diversion Facility, pg 84.

Section 2 - Yield Estimation

2.1 Methodology

Estimates of stream flow capture from the Blanco Drain system were made, assuming diversion would occur at the existing MCWRA Blanco Drain pump station. Limited seasonal flow data was available for this location and was used as the basis of this analysis. The Blanco Drain is an 8-mile long channel that drains approximately 6,000 acres of irrigated agricultural land west of Salinas, CA. The terrain is generally flat with type C and D clay soils. Flows are primarily agricultural tile drainage.

The Blanco Drain connects to the Salinas River through a 60-inch pipe culvert with a flap gate. To facilitate drainage, MCWRA historically operated a pump station approximately 2-miles upstream of the pipe culvert, from the drain channel (parallel to the Salinas River) to the connecting channel. This pump station was replaced as part of the Salinas River Diversion Facility (SRDF) project. The current pump station is located at the upstream end of the 60-inch pipe culvert, and includes a slide gate which is closed when the SRDF rubber dam is inflated, and a by-pass pump station which lifts Blanco Drain flows past the gate structure.

Limited flow data is available for the Blanco Drain. A weir gage was installed in 2007 to record flows used in sizing the current pump station, and operational records for the pump station were obtained for 2010 through 2013 and used in this analysis. Because the SRDF only operates during the peak irrigation season (April to October), flow data was not recorded for the rest of the year.

Approximately one third of the area tributary to the Blanco Drain is within the Castroville Seawater Intrusion Project (CSIP) service area. The MCWRA publishes monthly records of the total CSIP water deliveries, which can be used to estimate applied irrigation per acre (= total deliveries ÷ 12,000 acre service area). Similar crops and irrigation methods are used throughout the Blanco Drain tributary areas, so it was assumed that the CSIP irrigation rates applied to the full area.

Flows from the Blanco Drain were estimated as return flows from applied irrigation and natural precipitation. For the months with recorded Blanco Drain flow data, the source flows were calculated as:

(CSIP Irrigation) + (Precipitation at Salinas) x 6,000 acres = total acre-feet/month

Return Rate = (Blanco Drain Flow) / (total ac-ft/mo)

The calculated return rates ranged from 3% to 25%, with an average return of 17.3% (see Table B-2: Blanco Drain Flows as Return Flows). The period with the most complete flow data for the Blanco Drain was August to October 2013, with an average return rate of 16.9%. For this estimate, we assumed a flat 17% return rate. The MCWRA CSIP records were combined with

the Salinas rainfall records to calculate the total estimated source flows (Table B-4: Applied Irrigation and Recorded Precipitation in the CSIP Service Area). The return flows were estimated by month as shown below.

Table 2-1: Estimated Return Flows into Blanco Drain

Month	Applied Irrig + Precip	17% return	Avg Return Flow Rate
	AF	AF	cfs
January	1,229	209	3.4
February	1,314	223	4.0
March	1,446	246	4.0
April	1,481	252	4.2
May	1,323	225	3.7
June	1,613	274	4.6
July	1,629	277	4.5
August	1,436	244	4.0
September	1,080	184	3.1
October	989	168	2.7
November	782	133	2.2
December	1,088	185	3.0
Totals	**15,410**	**2,620**	

The values shown in Table 2-1 are monthly average values. Although the average monthly return flow rates range from 2.2 to 4.6 cfs, daily flows rates over 6 cfs have been recorded during the four years the Blanco Drain pump station has been in operation. To achieve an annual average diversion of 2,620 AFY, a peak diversion rate of 6 cfs is therefore required. Yields applying lower average station capacities are shown in Table 2-2. If excess flows on peak days may be stored in-channel behind the slide gate and held until the following day, diverting at a lower rate may be feasible. However, the current pump station configuration and operating regimen is designed to drain the channel to facilitate tile drainage, so the use of in-channel storage should not be assumed.

Table 2-2: Estimated Yields based on Pump Capacity

Station Capacity	Yield
cfs	AFY
2.9	2,050
2.99	2,104
3.0	2,110
3.5	2,350
4.0	2,538
4.5	2,613
4.6	2,619

The permitting process for a water right diversion rate less than 3 cfs is shorter than for a larger diversion rate, so the proposed project assumes an initial water right diversion at 2.99 cfs, and an ultimate water right allowing diversions at up to 6 cfs. Both capacities are considered in Section 3, Facility Requirements.

2.2 In-Stream Flow Requirements

For this report, we assumed that all flows within the Blanco Drain are available for diversion and capture. This is based upon previous documentation in the Salinas Valley Water Project EIR and the supporting Biological Opinion prepared by NMFS for the SRDF construction. Those documents identify (1) the water quality within the Blanco Drain is poor and does not support aquatic species, (2) the flap gate between the river and the Blanco Drain prevents the migration of fish from the river into the drain, and (3) the water quality at the downstream Salinas Lagoon would be improved if the flows from the Blanco Drain were diverted to the MRWPCA Regional Treatment Plant.

As a condition of operating the SRDF, MCWRA must maintain certain in-stream flows in the Salinas River. When San Antonio and Nacimiento Reservoirs have a combined storage of 220,000 acre-feet, the SRDF has a requirement to release (1) a minimum of 15 cfs downstream from April 1 to June 30, and (2) a minimum of 2 cfs downstream from July 1 to the end of the SRDF operating season for maintenance of the Salinas River Lagoon habitat. Higher block flow releases are triggered during steelhead migration season if the Salinas Lagoon is open to the ocean. When the combined storage in the two reservoirs is under 220,000 ac-ft, the minimum release requirement for Lagoon habitat maintenance is 2 cfs while the SRDF is in operation. In Table 2-3, we compare the recorded daily by-passed flows at the SRDF (fish ladder plus regulating weir, as shown in Figure 2.1) to the recorded Blanco Drain flows during year 2012. Additional flow is reported to have spilled over the rubber dam during this period, but that volume was not estimated. In each month, the by-passed flow minus the Blanco Drain flow exceeds the required minimum release.

Table 2-3: SRDF By-Passed Flows, with and without Blanco Drain[2]

Month	Year	Avg Daily By-Passed Flow	Blanco Drain Flow	Average minus B.D.	Required Minimum By-Pass
		cfs	cfs	cfs	cfs
4	2012	22.5	5.6	16.9	2.0
5	2012	18.6	5.0	13.6	2.0
6	2012	9.1	5.6	3.5	2.0
7	2012	10.1	5.3	4.8	2.0
8	2012	11.3	4.8	6.5	2.0
9	2012	18.3	3.6	14.7	2.0
10	2012	15.0	2.4	12.6	2.0
11	2012	57.3	1.1	56.2	2.0

Note: The triggers for a 15 cfs by-pass in April did not occur in 2012.

[2] Salinas Valley Water Project, Annual Flow Monitoring Report, Water Year 2012

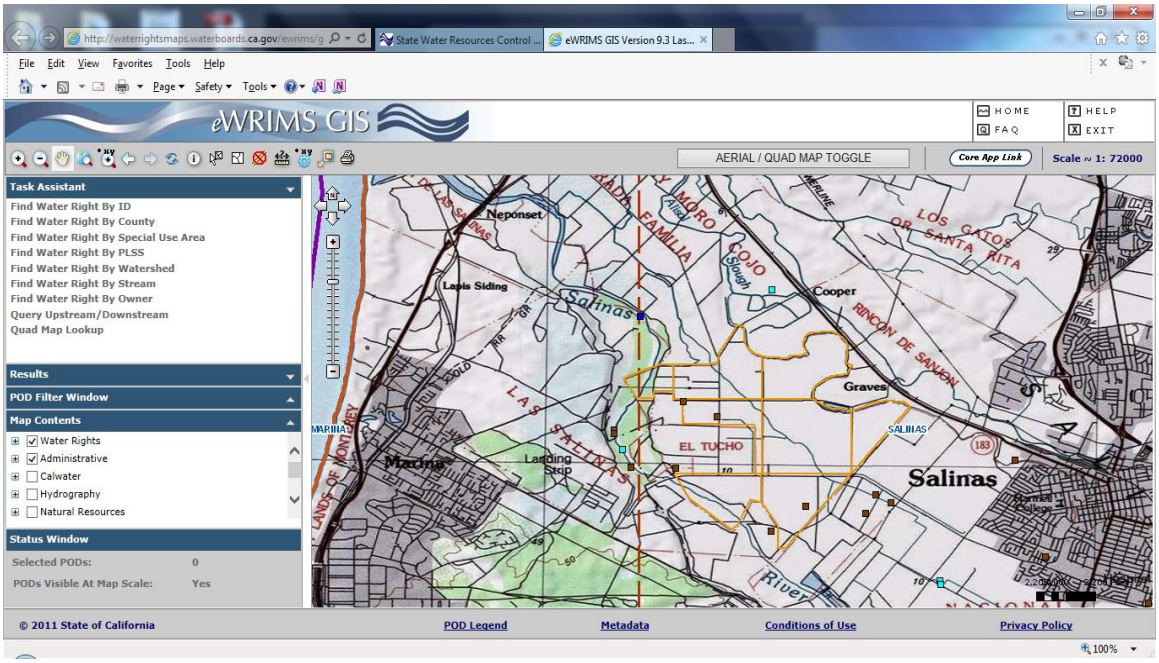
Figure 2.1: SRDF Release Weir

2.3 Water Rights

Water that enters surface streams and rivers is considered water of the state. A water rights permit is required to impound or divert waters of the state, except for certain riparian uses. Stormwater and agricultural return flows in the Blanco Drain would be subject to water rights permitting rules. Existing surface water rights were researched to assess potential impacts to current water right holders or challenges to the proposed diversions.

The State Water Resources Control Board Electronic Water Rights Information Management System (eWRIMS) was queried to identify existing water rights in the Lower Salinas Watershed. A listing of all current water rights for Monterey County was obtained using a database query. The Points of Diversion (PODs) within the Lower Salinas watershed and vicinity were identified using the on-line GIS mapping tool. The POD listing was used to create a tailored list of water rights within the area of interest (see Table B-4).

Figure 2.2: SWRCB eWRIMS Interface



The SWRCB Water Rights Order 98-08, Declaration of Fully Appropriated Stream Systems in California, identifies those stream segments which cannot support additional authorizations for diversion. Neither the Blanco Drain nor the Lower Salinas River were listed in that decision, so there is no regulatory prohibition on requesting a water right on this stream.

The water rights listing includes several water right types:

- Appropriative, for the diversion and use of surface water.
- Stockpond, for the on-stream impoundment and use of water.

- Statements of Diversion and Use, for reporting riparian use of surface water and for the use of groundwater. Statements of Diversion and Use are also used for claims of pre-1914 appropriative water rights. The limitation of the eWRIMS database is that most Claimed water rights do not appear with a Face Amount the way Appropriative Rights are listed.

There are no surface water rights or claims listed within the Blanco Drain watershed. The existing points of diversion within the Blanco Drain watershed are all for groundwater use. The sources for these are listed as "Salinas River Underflow." The shallow "A-Aquifer" groundwater in this area is not used due to poor water quality. Wells in this area tap the Pressure subarea of the Salinas Valley Groundwater Basin (SVGB), which is recharged in the Forebay and Upper Valley subareas. Diverting surface water for this project should not affect groundwater yields from the SVGB.

The Blanco Drain is tributary to the Salinas River, just above the SRDF (small blue square on the map above). The MCWRA has three water rights (Permits 10137, 21089 and 12261) for water diversion and storage in San Antonio and Nacimiento Reservoirs, with authorized points of rediversion at the SRDF (see Table B-5). There are no surface water rights with points of diversion below the SRDF. MCWRA has a fourth water right, Permit 11043, for run-of-river flows with two authorized points of diversion upstream of the Blanco Drain. This fourth water right has not been used but has a priority date of July 11, 1949.

Section 3 - Facility Requirements

3.1 Description and Sizing

As stated in the Project Description, water supplies for the GWR Project will be conveyed to the RTP using existing excess capacity in the MRWPCA interceptor system. There are no interceptor facilities near the Blanco Drain, so a new pipeline will be required to convey flows to the RTP. There is an existing diversion pump station on the Blanco Drain, used to lift flows from the Drain to the Salinas River while the SRDF rubber dam is inflated. The station consists of a concrete weir with a slide gate, a concrete-box intake structure in the channel bottom, a concrete manhole to house the pumps, a concrete deck above the manhole for the electrical panel and concrete stairs for maintenance operation. As can be seen in the photo below, the current station has a small static lift and a free discharge just below the weir. The plan and profile design drawings are included as Figures C-1 and C-2 in Appendix C.

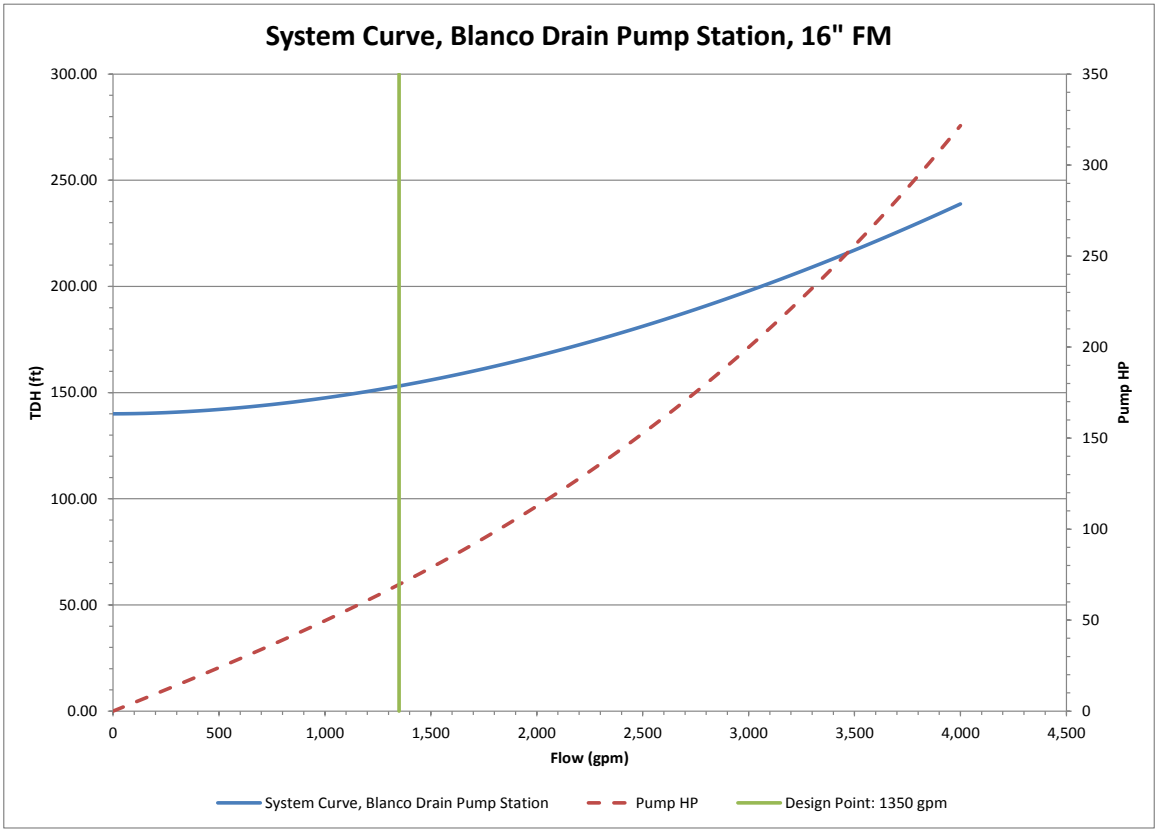
Figure 3.1: Existing Blanco Drain Pump Station

A similar pump station would be required to divert flows for the GWR project. Significantly larger pumps will be needed due to the increased static lift and force main length. The proposed force main is approximately 9,500 LF, from the existing pump station to the head-works side of the RTP (see Figure C-3). A static lift of 140-ft is estimated from the Blanco Drain to the highest point along the force main alignment.

Several flow rates and force main sizes were considered. The force main should be sized for a minimum velocity of 2 ft/s to prevent solids from settling out in the pipeline, and a maximum

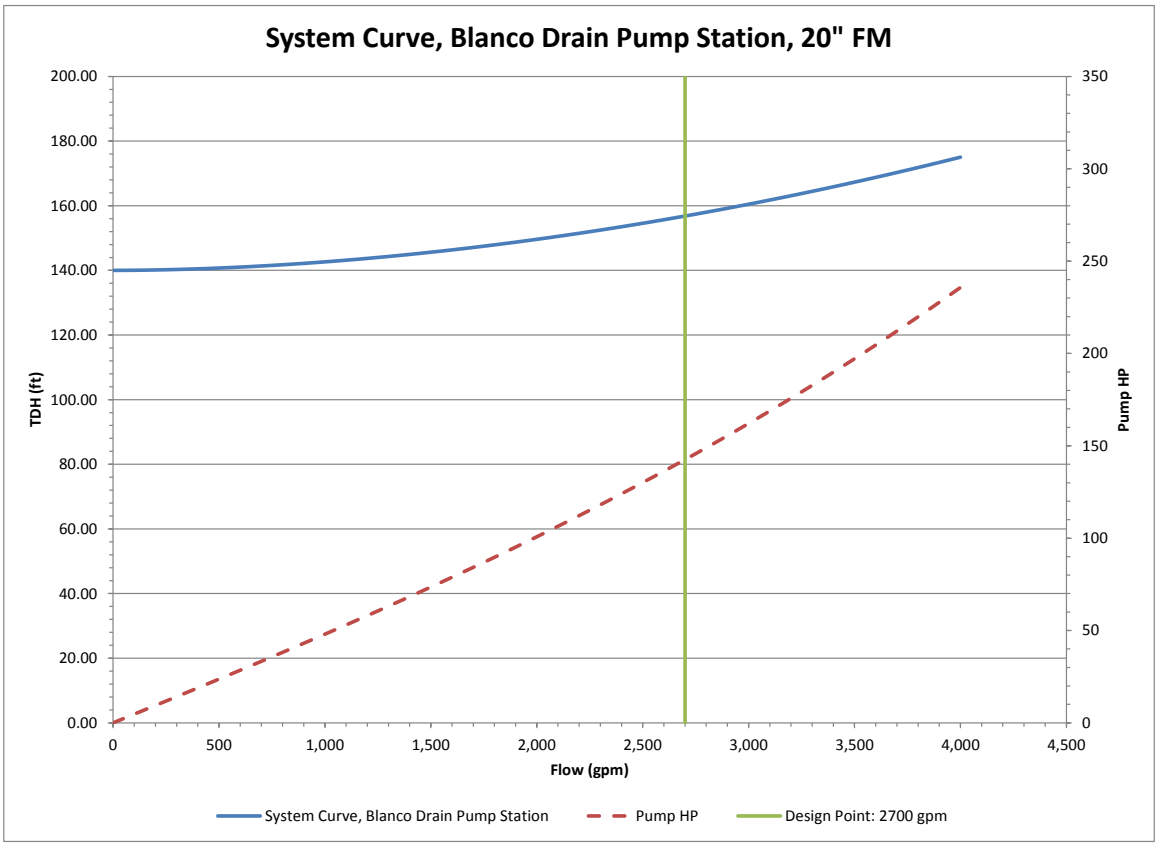
velocity of 8 ft/s to limit the friction losses. For a 2.99 cfs diversion (nominally 1350 gpm), an 88 hp pump and a 16-in force main are required (see Figure 3.2). For the peak flow rate of 6 cfs (nominally 2700 gpm), a 143 hp pump and a 20-inch force main are required (see Figure 3.3). System head tables are provided in Appendix C.

Figure 3.2: System Curve for a 16-inch Force Main



It may be possible to modify the existing pump station to also serve the GWR Project, rather than construct a duplicate pump station next to the existing MCWRA facility. A new wet well may be constructed adjacent to and connected to the existing wet well. This would allow for shared use of the existing inlet structure and pipeline. A second option would be to construct a "mirror" station on the opposite bank, sharing only the inlet box. Either option would use the existing pump station to move excess Blanco Drain flows that exceed the GWR Project diversions into the Salinas River. Conceptual site plan diagrams are provided as Figures C-4 and C-5 in Appendix C.

Figure 3.3: System Curve for a 20-inch Force Main



The inlet structure consists of a concrete box with a screened inlet. The inlet must be sized to allow full flow through the screen with a maximum velocity of 1 ft/s to allow fish to escape. Assume the screen has an open area of 50%, and that 50% of the screen is blinded by trash/vegetation. For a maximum flow of 6 cfs:

A_{screen} = 6 cfs / [(1 ft/s) x (50% screen openings) x (50% blinded)] = 24 sq-ft

Minimum dimensions: 4-ft wide x 6-ft long

The existing inlet box is 8-ft x 8-ft, so it exceeds the required minimum.

The channel invert surrounding the intake should be concrete lined to prevent scour during high flow periods. Similarly, the channel banks above the inlet structure should be protected with grouted rip-rap to prevent scour and potential bank sloughing into the inlet. As can be seen in Figure 3.1, the channel bank at the existing pump station is experiencing some erosion within the first year of operation.

The inlet will connect to the wet well through a large diameter pipe, sloped towards the wet well. A new wet well may be connected to the northwest side of the existing wet well (opposite the inlet pipe). The new wet well would be an 8-ft diameter manhole, with mounting rails to

facilitate the installation and removal of the submersible pumps. Within the wet well, the pumps will be set below the inlet pipe elevation. The pump operation may be controlled by a pressure transducer in the wet well, with float switches for backup control and alarms. Because the system will be discharging to the RTP head works, a SCADA radio connection to the MRWPCA controls system is recommended so that this station may be shut down to facilitate maintenance at the RTP.

The force main to the RTP must be pressure pipe (typically HDPE, PVC or ductile iron), with a check valve and isolation valve located outside the wet well in a separate vault. The pipeline should be installed with a minimum of 4-ft of cover in the pipe trench. The segment crossing the Salinas River must be installed using trenchless methods. Directional drilling is the most likely method, but the RWQCB may prescribe a different method for the river crossing. The CSIP supply pipeline crosses the river near the SRDF facility. This crossing should be made upstream of the SRDF to avoid potential conflicts.

The pumps may operate at fixed speed or under variable speed control. Operation under fixed speed is simpler to design, but may require excessive cycling if the inflow rates are significantly lower than the pump design point. Variable speed control will allow the pumps to start and stop less frequently.

The proposed pump station is located in a FEMA floodway (Salinas River Overbank). The proposed submersible pumps will not be affected by storm inundation, but the power and control equipment must be elevated above the base flood elevation of 27-ft[3].

The Blanco Drain is within a 40-ft wide parcel, owned by Monterey County. As can be seen on the existing facility drawing, that parcel does not reach to the top of the existing bank. An easement with the adjacent property owner was required for the existing pump station, and an additional easement must be obtained for a GWR pump station and force main.

Construction of the pump station will require regulatory permits from many agencies, including the Army Corps of Engineers (Clean Water Act, Section 404), the CC RWQCB (Clean Water Act, Section 401) and the California Department of Fish and Wildlife. The National Marine Fisheries Service may be required to prepare a Biological Opinion as well.

[3] FEMA Flood Insurance Rate Map, Map Panels 06053C0205G and 06053C0185G, April 2009 (see Appendix A)

3.2 Costs

Capital costs were estimated for two pump station configurations, a 3 cfs station with a 16-inch force main, and a 6 cfs station with a 20-inch force main, summarized in Table 3-1, below. The cost of constructing the force main from the pump station to the MRWPCA RTP is just over half of the total capital cost. Detailed estimates are provided in Tables C-3 and C-4 in Appendix C. Non-construction costs (design, permitting, legal, etc.) were estimated as 40% of the construction cost.

Right-of-way acquisition costs were not included in the capital cost estimates. Easements across private property must be negotiated with landowners. The affected agricultural lands are typically in active cultivation during the construction season, so a premium cost should be anticipated.

Table 3-1: Estimated Capital Costs

	3 cfs Pump Station	6 cfs Pump Station
Estimated Construction Cost	$1,789,420	$2,280,420
Inspection and Testing (15%)	$268,000	$342,000
Construction Contingency (20%)	$358,000	$456,000
Estimated Total Construction Cost	$2,415,000	$3,078,000
Design, Permitting, Legal (40%)	$966,000	$1,232,000

Costs are in 1st Quarter 2014 dollars

The MRWPCA has standard capacity charges for connection to the regional wastewater system, based upon the flow rate, the biological oxygen demand (BOD) and the suspended solids concentration, and monthly charges for wastewater treatment. These fees are not included in this estimate, because the MRWPCA is a sponsor of the GWR Project. The primary, secondary and advanced treatment costs for this source of supply will appear in the overall project cost analysis.

Annual operating and debt service costs for each configuration were estimated using the following planning factors:

- Debt service assumes a 30-year bond at 4% annual interest
- Annual operation and maintenance of pump stations is estimated at 2.5% of the capital cost
- Annual operation and maintenance of pipelines is estimated at 1% of the capital cost
- Electrical power cost is assumed at $0.16 per kWh
- Assume the station operates 365 days a year

The factors above provide an order-of-magnitude estimate of annual costs, which may be used in comparing project configurations. The estimated annual costs are provided below.

Table 3-2: Estimated Annual Costs, 3 cfs Pump Station

Category	Basis	Annual $
Capital Repayment		
Assume 30-year bond at 4%	$2,415,000.00	$139,659.69
Annual Operation and Maintenance		
Assume 2.5% of Pump Station Capital Cost	$795,000.00	$19,875.00
Assume 1.0% of Pipeline Capital Cost	$1,620,000.00	$40,500.00
Electrical Power		
Number of operating days/year	365	
Pumps: 88 HP (0.7457 kW/hp)	65.6	
Estimated annual kWh	574,845	
Assumed cost per KWH	$0.16	$91,975.23
Total Estimated Annual Cost		**$292,000.00**

Table 3-3: Estimated Annual Costs, 6 cfs Pump Station

Category	Basis	Annual $
Capital Repayment		
Assume 30-year bond at 4%	$3,078,000.00	$178,001.05
Annual Operation and Maintenance		
Assume 2.5% of Pump Station Capital Cost	$1,093,500.00	$27,337.50
Assume 1.0% of Pipeline Capital Cost	$1,984,500.00	$49,612.50
Electrical Power		
Number of operating days/year	365	
Pumps: 143 HP (0.7457 kW/hp)	106.6	
Estimated annual kWh	934,123	
Assumed cost per KWH	$0.16	$149,459.76
Total Estimated Annual Cost		**$404,400.00**

Section 4 - Water Quality

4.1 Summary of Current Condition

The Central Coast Regional Water Quality Control Board (CCRWQCB) Water Quality Control Plan for the Central Coast Basin (Basin Plan) designated beneficial uses of the Blanco Drain as including water contact recreation, non-contact water recreation, wildlife habitat, warm water fish habitat and commercial or sport fishing. These are the minimum uses listed for all inland water bodies within the region, unless specific water quality information caused the RWQCB to remove a specific use (e.g., not listing water contact recreation for a stream segment listed for fecal coliform contamination).

The Blanco Drain is listed as an impaired water body pursuant to Section 303(d) of the Clean Water Act for pesticides, nitrate and low dissolved oxygen. Water quality has been sampled and monitored for the past 15 years under various programs, including the Central Coast Ambient Monitoring Program (CCAMP) under the RWQCB, the Central Coast Watershed Studies (CCoWS) program of the Watershed Institute at California State University Monterey Bay, and the Cooperative Monitoring Program under the Conditional Waiver of Waste Discharges from Irrigated Lands (Ag Waiver). The results of these programs have been consolidated in Table B-6, Stream Water Quality, for the Blanco Drain and all downstream inland water bodies. Figure A-6 shows the primary sampling locations.

The Blanco Drain is not designated for use as municipal or domestic water supply, so Total Maximum Daily Loads (TMDL) for pollutants had to be established by the RWQCB. The Central Coast RWQCB adopted order R3-2013-0008 to establish certain TMDLs for the lower Salinas River Basin in 2013. These and other applicable water quality standards are consolidated in Table B-6, Total Maximum Daily Loads. A summary of the key parameters for the Blanco Drain are shown in Table 4-1, below.

Table 4-1: Water Quality Parameters, Blanco Drain above Salinas River

Parameter	Units	Mean	Max	Standard
Ammonia as N, Unionized	mg/L	0.014	0.26	0.025
Ammonia as NH3	mg/L	0.20	4.96	0.025
Chlorophyll a, water column	mg/L	0.0021	0.028	0.015
Chlorpyrifos	mg/L	0.0009	0.018	0.00025
Diazinon	mg/L	0.01	0.17	0.00016
Dissolved Solids, Total	mg/L	2,019	2,250	1,000
Nitrate as N	mg/L	65.27	325.00	8.0
OrthoPhosphate as P	mg/L	0.85	4.40	0.3
Oxygen, Dissolved	mg/L	0.20	2.52	> 5.0
Turbidity	NTU	66.48	1,210.00	10

4.2 Potential Pollutant Removal

In the Biological Opinion for the SRDF Project, NMFS recommended diverting the Blanco Drain flows to the RTP as a means of improving the habitat in the Salinas River Lagoon. Removing water from the drain will carry dissolved pollutants out of the environment along with the water. The quantity removed may be estimated using the conversion factor 1 mg/L = 2.7 lb/AF. The tables below show the estimated annual pollutant removal, assuming average annual flow conditions and historic average pollutant concentrations for two conditions: a 6 cfs pumping capacity and a 3 cfs pumping capacity.

Table 4-2: Estimated Pollutant Removal at Blanco Drain, 6 cfs capacity

Pollutant	Average Conc.	Average Annual Flow	Average Pollutant Load	Diverted Flow	Diverted Pollutant Load
	(mg/L)	(AFY)	(lb/yr)	(AFY)	(lb/yr)
Ammonia as N, Unionized	0.014	2,620	98	2,620	98
Ammonia as NH3	0.20	2,620	1,432	2,620	1,432
Chlorophyll a, water column	0.0021	2,620	15	2,620	15
Chlorpyrifos	0.00085	2,620	6	2,620	6
Diazinon	0.011	2,620	76	2,620	76
Dissolved Solids, Total	2019.7	2,620	14,287,358	2,620	14,287,358
Nitrate as N	65.27	2,620	461,726	2,620	461,726
OrthoPhosphate as P	0.85	2,620	6,026	2,620	6,026

Table 4-3: Estimated Pollutant Removal at Blanco Drain, 3 cfs capacity

Pollutant	Average Conc.	Average Annual Flow	Average Pollutant Load	Diverted Flow	Diverted Pollutant Load
	(mg/L)	(AFY)	(lb/yr)	(AFY)	(lb/yr)
Ammonia as N, Unionized	0.014	2,620	98	2,110	79
Ammonia as NH3	0.20	2,620	1,432	2,110	1,153
Chlorophyll a, water column	0.0021	2,620	15	2,110	12
Chlorpyrifos	0.00085	2,620	6	2,110	5
Diazinon	0.011	2,620	76	2,110	61
Dissolved Solids, Total	2019.7	2,620	14,287,358	2,110	11,506,231
Nitrate as N	65.27	2,620	461,726	2,110	371,848
OrthoPhosphate as P	0.85	2,620	6,026	2,110	4,853

Section 5 - Hydrology Considerations

The California Environmental Quality Act (CEQA) requires that effects of the Proposed Project on surface water hydrology be analyzed to identify impacts in the following areas:

a. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?

The Blanco Drain diversion would capture some stormwater which currently flows to the Salinas River. Reducing runoff from the Blanco Drain would reduce the amount of sediment carried into the main stem of the Salinas River. The channel around the inlet structure for the diversion pump station would be lined with concrete to prevent local scour and erosion. The Blanco Drain diversion may not be required to operate during wet winter months when storm runoff typically occurs. In that case, the conveyance of sediment from the Blanco Drain into the River will be no greater than under the current condition.

The construction of the Blanco Drain diversion structure and pipeline will require open-cut excavation, which will require the use of erosion and sediment controls to prevent the migration of sediments into the river. The pipeline crossing of the river will be installed using trenchless methods to avoid impacts to the channel. The pipeline trench will be restored to prevent erosion, either by reseeding (if outside a roadway) or by resurfacing if in a trafficked area.

b. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?

The Project would not make physical changes to the Salinas River, and the changes at the Blanco Drain diversion will not alter the channel cross-section. The operation of the Project would reduce the amount of surface runoff entering the river. The proposed project components would increase impervious areas by less than 1000 square feet each at the diversion pump station. The Project would not substantially alter the existing drainage patterns of any of the proposed project sites of the area.

c. Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The Project would add a new pump station on the bank of the Blanco Drain. Up to 1,000 square-feet of impervious surface may be added, and runoff from the new hardscape would be directed to the existing drainage channel. The soils in this area is Type C (runoff coefficient >80), so the increase in runoff will be small and within the available existing drainage system conveyance capacity. No impact is expected under this criterion

d. Would the project place within a 100-year flood hazard area structures that would impede or redirect flood flows?

The Project would add a diversion pump station on the Blanco Drain adjacent to an existing pump station which would be located within a 100-year flood hazard area. The proposed Blanco Drain pump station intake would be located at the channel bottom, and would be configured to not alter the conveyance capacity of the Blanco Drain. The pump station would not impede or reduce flood flows because they are low profile, small (less than 500 square-feet of vertical structures) and would be located at sites that currently contain similar above-ground structures of similar size and profile.

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Appendix A: Figures

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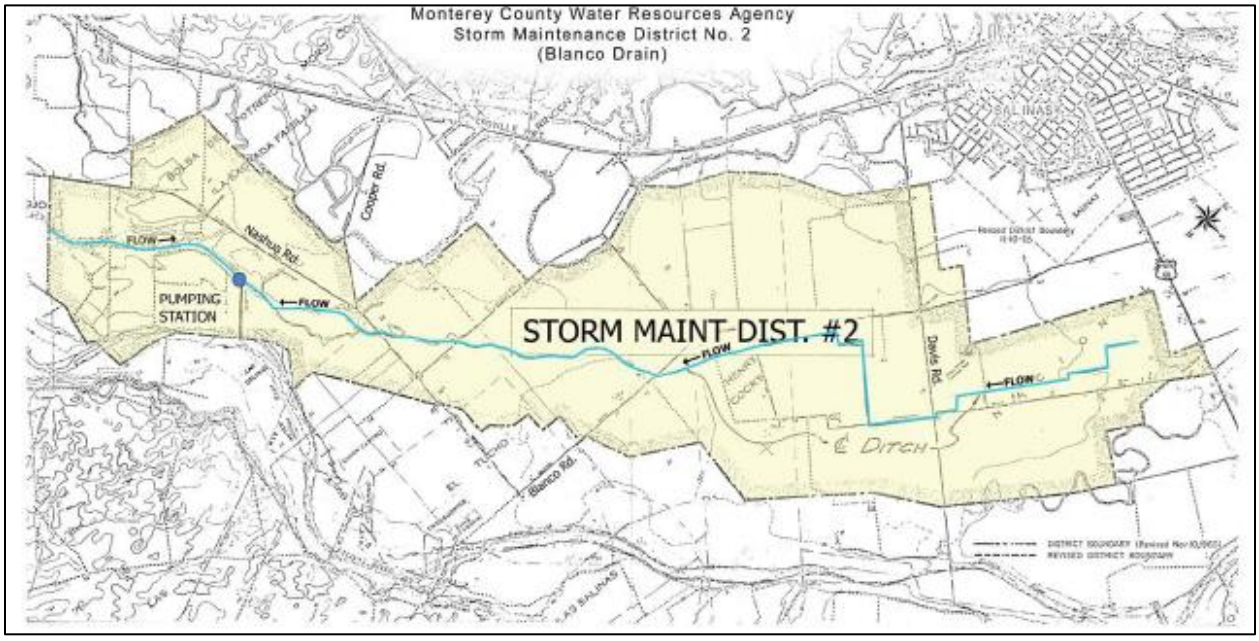

Figure A-1: Storm Drain Maintenance District No. 2, Blanco Drain

Source: Monterey County Water Resources Agency

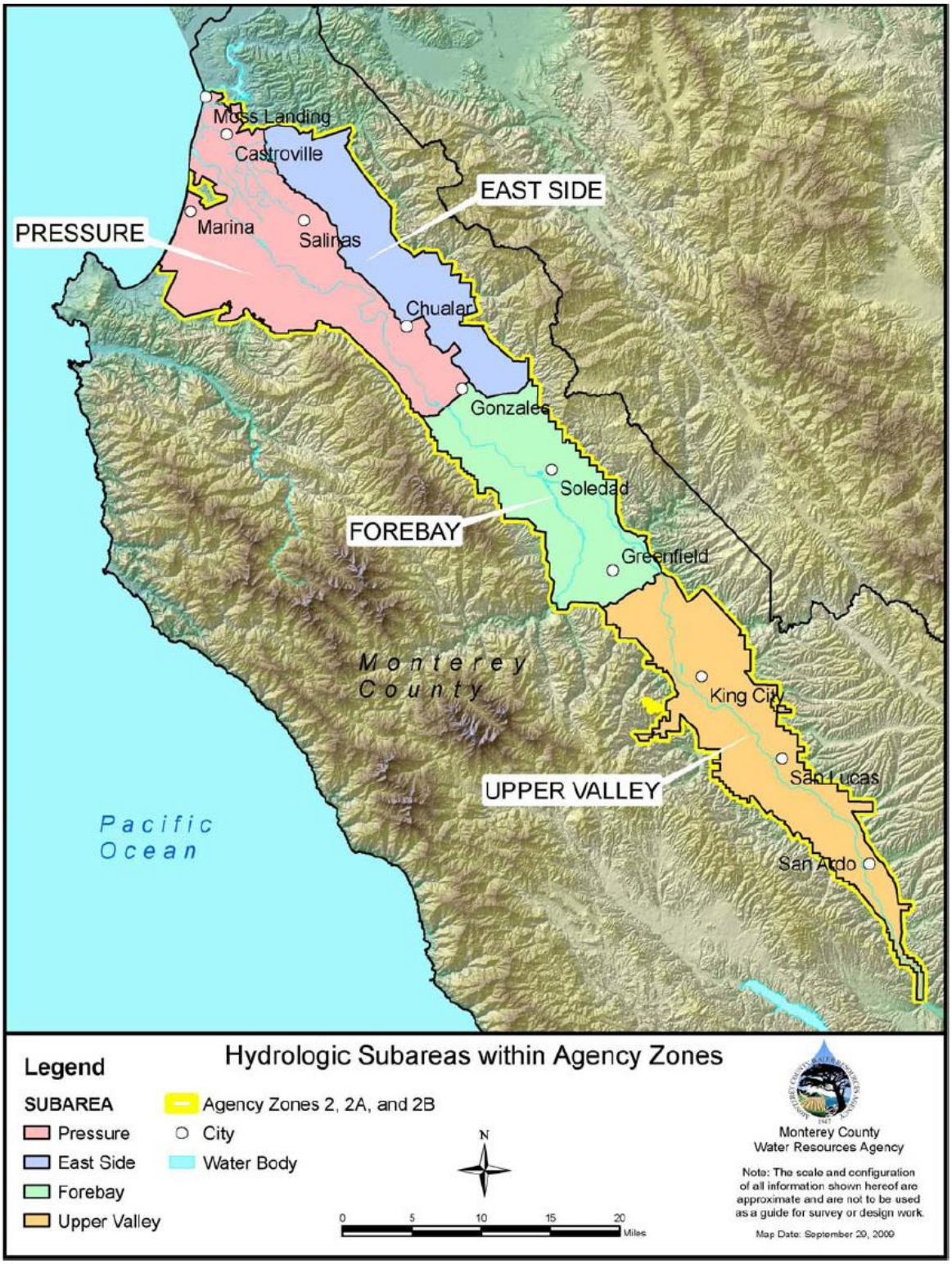

Figure A-2: Salinas Valley Groundwater Basin, Hydrologic Subareas

Source: MCWRA Annual Groundwater Report

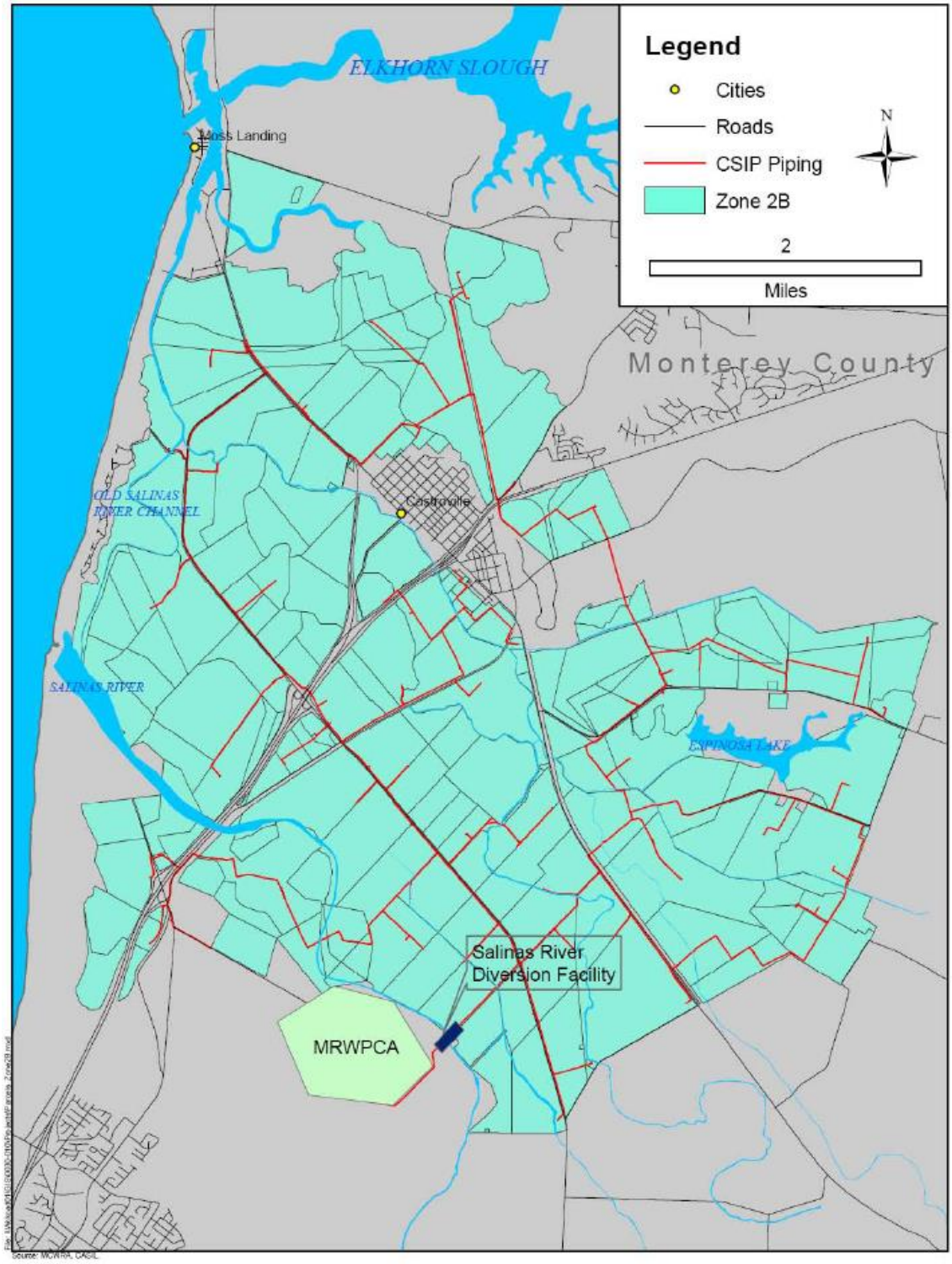

Figure A-3: Castroville Seawater Intrusion Project Service Area

Source: Zone 2B, Proposition 218 Engineers Report, RMC Water and Environment, 2007

Figure A-4: FEMA FIRMette, Blanco Drain Pump Station

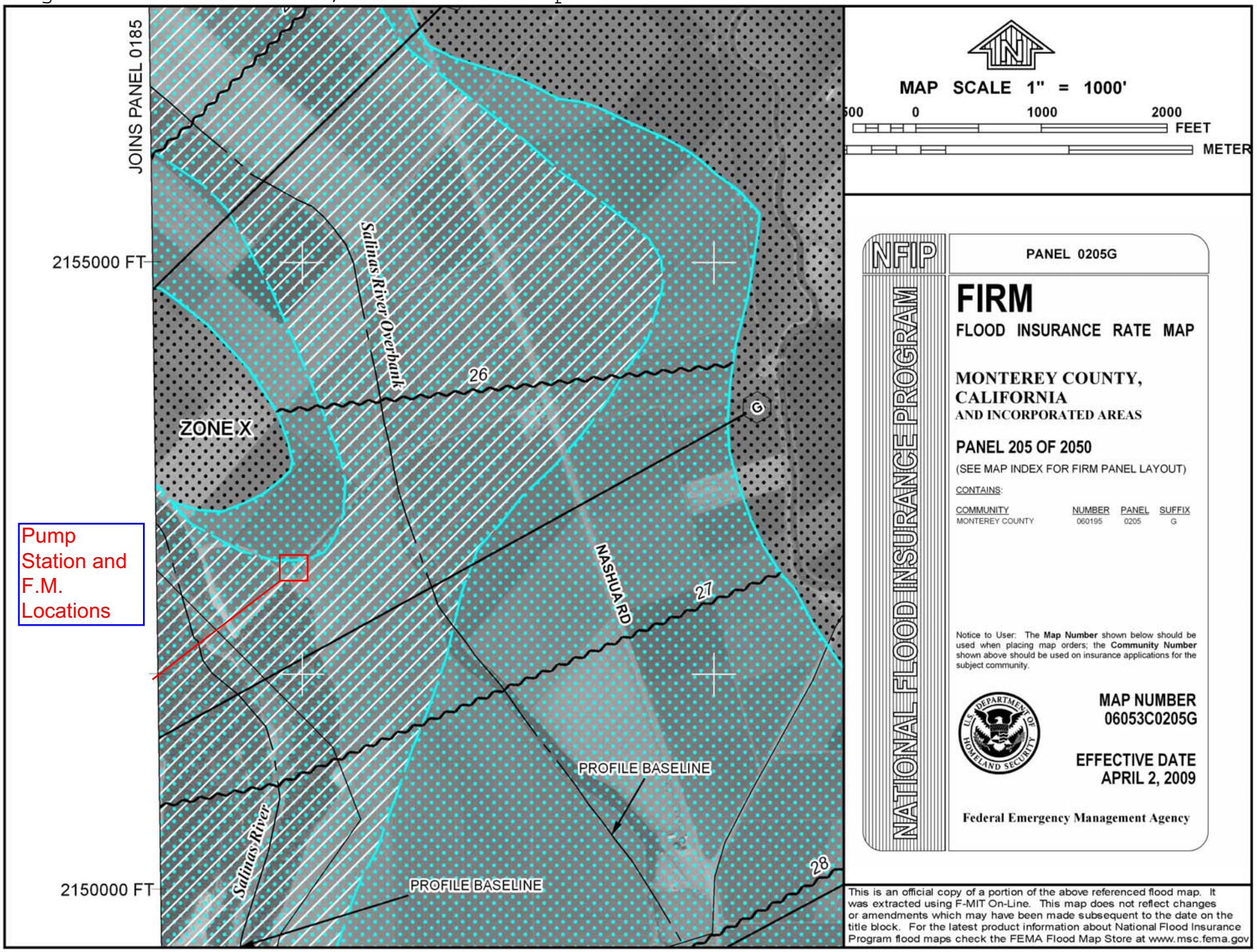

Figure A-5: FEMA FIRMETTE, Blanco Drain Force Main

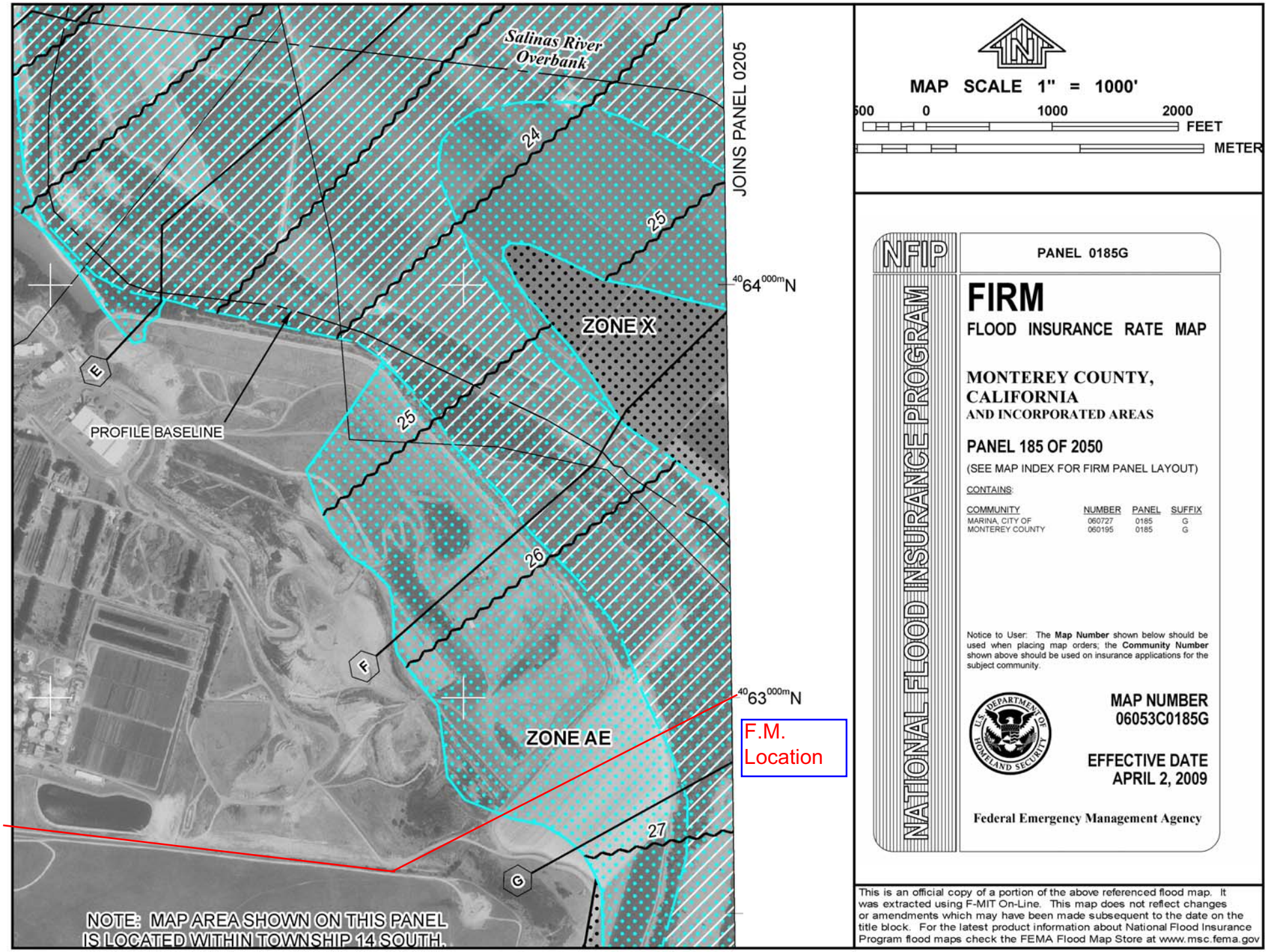

Figure A-5 (continued)

Definitions of FEMA Flood Zones

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk and type of flooding. These zones are depicted on the published Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map (FHBM).

Special Flood Hazard Areas – High Risk

Special Flood Hazard Areas represent the area subject to inundation by 1-percent-annual chance flood. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Federal floodplain management regulations and mandatory flood insurance purchase requirements apply in these zones.

ZONE	DESCRIPTION
A	Areas subject to inundation by the 1-percent-annual-chance flood event. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.
AE, A1-A30	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. BFEs are shown within these zones. (Zone AE is used on new and revised maps in place of Zones A1–A30.)
AH	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet. BFEs derived from detailed hydraulic analyses are shown in this zone.
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1–3 feet. Average flood depths derived from detailed hydraulic analyses are shown within this zone.
AR	Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection.
A99	Areas subject to inundation by the 1-percent-annual-chance flood event, but which will ultimately be protected upon completion of an under-construction Federal flood protection system. These are areas of special flood hazard where enough progress has been made on the construction of a protection system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes. Zone A99 may be used only when the flood protection system has reached specified statutory progress toward completion. No BFEs or flood depths are shown.

Figure A-5 (continued)

Coastal High Hazard Areas – High Risk

Coastal High Hazard Areas (CHHA) represent the area subject to inundation by 1-percent-annual chance flood, extending from offshore to the inland limit of a primary front al dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. Structures located within the CHHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Federal floodplain management regulations and mandatory purchase requirements apply in these zones.

ZONE	DESCRIPTION
V	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed coastal analyses have not been performed, no BFEs or flood depths are shown.
VE, V1-V30	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. BFEs derived from detailed hydraulic coastal analyses are shown within these zones. (Zone VE is used on new and revised maps in place of Zones V1–V30.)

Moderate and Minimal Risk Areas

Areas of moderate or minimal hazard are studied based upon the principal source of flood in the area. However, buildings in these zones could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems. Local stormwater drainage systems are not normally considered in a community's flood insurance study. The failure of a local drainage system can create areas of high flood risk within these zones. Flood insurance is available in participating communities, but is not required by regulation in these zones. Nearly 25-percent of all flood claims filed are for structures located within these zones.

ZONE	DESCRIPTION
B, X (shaded)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
C, X (unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. (Zone X (unshaded) is used on new and revised maps in place of Zone C.)

Undetermined Risk Areas

ZONE	DESCRIPTION
D	Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

#	Site ID	Site Name
1	306MOR	Moro Cojo Slough @ Highway 1
2	309OLD	Old Salinas River @ Monterey Dunes Way
3	309TEH	Tembladero Slough @ Haro
4	309MER	Merrit Ditch u/s of 183
5	309ESP	Espinosa Slough u/s of Alisal Slough
6	309ASB	Alisal Slough @ White Barn
7	309BLA	Lower Salinas River/Blanco?
8	309JON	Lower Salinas River
9	309GAB	Gabilan Creek @ Independence Road and East Boranda Road
10	309NAT	Natividad Creek?
11	309ALG	Alisal Creek?
12	309SSP	Salinas River @ El Toro Creek
13	309QUI	Quail Creek
14	309SAC	Salinas River @ Chualar bridge on River Road
15	309CRR	Chualar Creek
36	309GRN	Salinas River @ Elm Rd in Greenfield
37	309SAG	Salinas River @ Gonzales River Rd Bridge

Figure A-6: CCAMP/CMP Water Sampling Sites

Source: Central Coast Region Conditional Waiver Cooperative Monitoring Program, 5 Year Evaluation Report, Larry Walker & Associates, 2010

Appendix B: Tables

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Table B-1: 2010 California 303(d) Listing

Listed for:	Ammonia (Unionized)	Chlordane	Chloride	Chlorophyll-a	Chlorpyrifos	Copper	DDD (Dichlorodiphenyldichloroethane)	Diazinon	Dieldrin	Electrical Conductivity	Enterococcus	Escherichia coli (E. coli)	Fecal Coliform	Low Dissolved Oxygen	Nickel	Nitrate	Nutrients	Pathogens	PCBs (Polychlorinated biphenyls)	Pesticides	pH	Priority Organics	Sediment Toxicity	Sedimentation/Siltation	Sodium	Temperature, water	Total Coliform	Total Dissolved Solids	Toxaphene	Turbidity	Unknown Toxicity
Water Body																															
Alisal Creek (Monterey County)				X									X			X									X						
Alisal Slough (Monterey County)														X		X							X								X
Blanco Drain					**X**			**X**						**X**		**X**				**X**										**X**	
Espinosa Lake					X			X																							
Espinosa Slough	X							X								X				X	X	X	X							X	X
Gabilan Creek	X												X			X					X		X							X	X
Merrit Ditch	X													X		X							X							X	X
Moss Landing Harbor					X			X						X	X			X		X	X		X	X							
Natividad Creek	X											X		X		X					X		X			X				X	X
Old Salinas River				X	X			X				X	X	X		X					X		X							X	X
Old Salinas River Estuary																	X			X											
Salinas Reclamation Canal	X				X	X		X				X	X	X		X				X	X	X	X							X	X
Salinas River (lower, estuary to near Gonzales Rd crossing, watersheds 30910 and 30920)		X	X		X		X	X	X	X	X	X	X			X			X	X	X				X			X	X	X	X
Salinas River Lagoon (North)																	X			X											
Santa Rita Creek (Monterey County)	X											X	X	X		X									X					X	
Tembladero Slough				X	X			X			X	X	X			X	X			X	X		X					X		X	X

Table B-2: Blanco Drain Flows as Return Flows

Mo-Yr	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07		Jul-10	Aug-10	Sep-10		May-11	Jun-11	Jul-11
CSIP-Wells (AF)	1,523	1,517	1,115	380	125		267	272	191		284	428	316
SRDF-River (AF)	0	0	0	0	0		1,035	968	478		593	1,020	1,145
SVRP-Recycled (AF)	1,874	1,957	1,927	1,616	1,129		1,889	1,902	1,821		1,694	1,713	1,869
Total Irrig (AF)	3,397	3,474	3,042	1,996	1,254		3,191	3,142	2,490		2,571	3,161	3,330
Precip (in)	0.0	0.0	0.0	0.4	1.1		0.0	0.0	0.0		0.7	0.3	0.0
Precip (AF)	0	0	0	400	1100		0	0	0		700	300	0
Total (AF)	3,397	3,474	3,042	2,396	2,354		3,191	3,142	2,490		3,271	3,461	3,330
Scale to 6,000 ac	1698.5	1737	1521	1198	1177		1595.5	1571	1245		1635.5	1730.5	1665
Measured Flow (see note)	114.2	312.2	229.2	178.7	72.1		106.8	355.1	225.9		362.8	363	319.7
Net Loss	1584.3	1424.8	1291.8	1019.3	1104.9		1488.7	1215.9	1019.1		1272.7	1367.5	1345.3
Percent Return	6.7%	18.0%	15.1%	14.9%	6.1%		6.7%	22.6%	18.1%		22.2%	21.0%	19.2%

Notes:

CSIP/SRDF/SVRP data from MCWRA

CSIP Service area approx 12,000 acres

Blanco Drain area approx 6,000 acres

Rainfall measured at Salinas Airport gage

Measured flow from weir (2007) and Blanco Drain pump station (2010-2012)

April and October are omitted from summary (partial month data)

Recorded Blanco Drain Flows

	AVG %	AVG Q
May	23.0%	279.6
June	16.3%	270.1
July	16.3%	266.2
August	20.3%	292.4
Sept.	18.1%	209.6

Statistics for all available data

	AVG	MAX	MIN
Loss (AF)	1175	1886	577
Pct Return	17.3%	24.6%	3.4%

Table B-2 (continued)

Aug-11	Sep-11		Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12		Aug-13	Sep-13	Oct-13
568	419		80	125	276	214	311	135	16	72		263	248	165
709	0		0	618	906	992	799	314	65	0		220	537	133
1,873	1,617		1,044	1,745	1,764	1,834	1,847	1,734	1,168	731		1803	1725	1548
3,150	2,036		1,124	2,488	2,946	3,040	2,957	2,183	1,249	803		2,286	2,510	1,846
0.0	0.0		1.9	0.1	0.2	0.0	0.0	0.0	0.2	3.1		0	0.1	0.2
0	0		1900	100	200	0	0	0	200	3100		0	100	200
3,150	2,036		3,024	2,588	3,146	3,040	2,957	2,183	1,449	3,903		2,286	2,610	2,046
1575	1018		1512	1294	1573	1520	1478.5	1091.5	724.5	1951.5		1143	1305	1023
301.3	226.1		333.2	307.4	333.2	325.9	295.1	214.2	147.6	65.5		281.2	202.9	107.5
1273.7	791.9		1178.8	986.6	1239.8	1194.1	1183.4	877.3	576.9	1886		861.9	1102.1	915.5
19.1%	22.2%		22.0%	23.8%	21.2%	21.4%	20.0%	19.6%	20.4%	3.4%		24.6%	15.5%	10.5%

Table B-3: Applied Irrigation and Recorded Rainfall within the CSIP Service Area (Acre Feet)

MCWRA & NOAA DATA

Source	FY 98-99	FY 99-00	FY 00-01	FY 01-02	FY 02-03	FY 03-04	FY 04-05	FY 05-06	FY 06-07	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 12-13		Scale to 6000 ac	17% return
	Jul-98	Jul-99	Jul-00	Jul-01	Jul-02	Jul-03	Jul-04	Jul-05	Jul-06	Jul-07	Jul-08	Jul-09	Jul-10	Jul-11	Jul-12	Jul-13			
CSIP-Wells	772	1,318	1,234	1,535	1,363	1,821	1,565	1,507	1,424	1,517	1,590	1,699	267	316	214	98			
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	1,035	1,145	992	1,260			
SVRP-Recycled	1,114	1,870	1,886	1,879	1,900	1,898	1,957	1,906	1,931	1,957	1,943	1,837	1,889	1,869	1,834	1,786			
Precip (in)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	AVG		
Total Irrig (AF)	1,886	3,188	3,120	3,414	3,263	3,719	3,522	3,413	3,355	3,474	3,533	3,536	3,191	3,330	3,040	3,144	3,258	1,629	277
	Aug-98	Aug-99	Aug-00	Aug-01	Aug-02	Aug-03	Aug-04	Aug-05	Aug-06	Aug-07	Aug-08	Aug-09	Aug-10	Aug-11	Aug-12	Aug-13			
CSIP-Wells	748	899	774	1,105	1,073	1,283	1,145	770	1,103	1,115	969	1,107	272	568	311	263			
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	968	709	799	220			
SVRP-Recycled	1,118	1,772	1,843	1,944	1,877	1,889	1,954	1,838	1,925	1,927	1,906	1,839	1,902	1,873	1,847	1,803			
Precip (in)	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	AVG		
Total Irrig (AF)	1,866	2,671	2,717	3,049	2,950	3,272	3,099	2,608	3,028	3,042	2,875	3,246	3,142	3,150	2,957	2,286	2,872	1,436	244
	Sep-98	Sep-99	Sep-00	Sep-01	Sep-02	Sep-03	Sep-04	Sep-05	Sep-06	Sep-07	Sep-08	Sep-09	Sep-10	Sep-11	Sep-12	Sep-13			
CSIP-Wells	226	368	517	417	793	561	727	337	342	380	545	509	191	419	135	248			
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	478	0	314	537			
SVRP-Recycled	989	1,398	1,460	1,505	1,435	1,750	1,821	1,689	1,782	1,616	1,683	1,594	1,821	1,617	1,734	1,725			
Precip (in)	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.0	0.1	AVG		
Total Irrig (AF)	1,315	1,766	2,077	2,022	2,228	2,311	2,548	2,026	2,124	2,396	2,228	2,203	2,490	2,036	2,183	2,610	2,160	1,080	184
	Oct-98	Oct-99	Oct-00	Oct-01	Oct-02	Oct-03	Oct-04	Oct-05	Oct-06	Oct-07	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13			
CSIP-Wells	309	370	450	164	162	174	183	115	172	125	140	119	20	54	16	165			
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	80	0	65	133			
SVRP-Recycled	432	1,017	475	1,276	1,316	1,371	862	1,241	1,509	1,129	1,378	465	1,006	733	1,168	1,548			
Precip (in)	0.5	0.1	2.5	0.0	0.0	0.2	2.8	0.1	0.0	1.1	0.2	1.7	0.6	1.5	0.2	0.2	AVG		
Total Irrig (AF)	1,241	1,487	3,425	1,440	1,478	1,745	3,845	1,456	1,681	2,354	1,718	2,284	1,706	2,287	1,449	2,046	1,978	989	168
	Nov-98	Nov-99	Nov-00	Nov-01	Nov-02	Nov-03	Nov-04	Nov-05	Nov-06	Nov-07	Nov-08	Nov-09	Nov-10	Nov-11	Nov-12	Nov-13			
CSIP-Wells	77	82	230	11	183	134	171	330	90	692	35	575	246	238	72	35			
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
SVRP-Recycled	32	153	0	260	184	149	0	209	342	0	730	0	179	224	731	1,127			
Precip (in)	2.3	1.1	0.2	0.9	0.9	0.8	0.4	0.4	1.3	0.4	1.3	0.1	2.0	1.8	3.1	0.5	AVG		
Total Irrig (AF)	2,409	1,335	430	1,171	1,267	1,083	571	939	1,732	1,092	2,065	675	2,425	2,262	3,903	1,662	1,564	782	133
	Dec-98	Dec-99	Dec-00	Dec-01	Dec-02	Dec-03	Dec-04	Dec-05	Dec-06	Dec-07	Dec-08	Jan-00	Dec-00	Dec-01	Dec-02	Dec-03			
CSIP-Wells	72	215	397	10	107	40	150	85	119	445	29	194	69	723	44	730			
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
SVRP-Recycled	0	0	0	0	0	0	0	0	0	0	289	0	0	0	0	88			
Precip (in)	0.9	0.1	0.7	1.6	2.8	3.9	3.8	3.3	2.3	1.2	2.3	1.6	3.0	0.0	3.3	0.2	AVG		
Total Irrig (AF)	972	315	1,097	1,610	2,907	3,940	3,950	3,385	2,419	1,645	2,618	1,794	3,069	723	3,344	1,018	2,175	1,088	185
	Jan-99	Jan-00	Jan-01	Jan-02	Jan-03	Jan-04	Jan-05	Jan-06	Jan-07	Jan-08	Jan-09	Jan-10	Jan-11	Jan-12	Jan-13	Jan-14			
CSIP-Wells	169	202	189	151	130	179	83	109	687	91	485	100	333	1,067	253				
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
SVRP-Recycled	22	0	0	0	0	0	0	0	0	0	0	0	26	0	0				
Precip (in)	2.6	4.9	2.9	0.2	0.7	1.5	2.7	2.0	0.7	4.8	1.3	4.0	1.7	1.6	1.0		AVG		
Total Irrig (AF)	2,791	5,102	3,089	351	830	1,679	2,783	2,109	1,387	4,891	1,785	4,100	2,059	2,667	1,253		2,458	1,229	209
	Feb-99	Feb-00	Feb-01	Feb-02	Feb-03	Feb-04	Feb-05	Feb-06	Feb-07	Feb-08	Feb-09	Feb-10	Feb-11	Feb-12	Feb-13	Feb-14			
CSIP-Wells	52	43	128	358	345	121	280	583	252	171	235	143	100	162	334				
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
SVRP-Recycled	58	0	0	385	32	1	0	0	154	173	112	0	580	1,031	692				
Precip (in)	3.1	4.2	3.0	0.3	0.7	3.1	3.4	0.9	2.4	0.9	3.5	3.1	2.9	0.8	0.6		AVG		
Total Irrig (AF)	3,210	4,243	3,128	1,043	1,077	3,222	3,680	1,483	2,806	1,244	3,847	3,243	3,580	1,993	1,626		2,628	1,314	223
	Mar-99	Mar-00	Mar-01	Mar-02	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07	Mar-08	Mar-09	Mar-10	Mar-11	Mar-12	Mar-13	Mar-14			
CSIP-Wells	138	651	529	233	473	455	241	124	459	520	408	529	154	211	218				
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
SVRP-Recycled	35	11	422	791	1,184	1,121	0	0	1,099	1,602	676	49	450	929	1,561				
Precip (in)	1.8	1.7	1.6	0.4	0.6	0.5	4.3	5.0	0.5	0.3	1.8	2.4	4.2	2.6	0.4		AVG		
Total Irrig (AF)	1,973	2,362	2,551	1,424	2,257	2,076	4,541	5,124	2,058	2,422	2,884	2,978	4,804	3,740	2,179		2,892	1,446	246
	Apr-99	Apr-00	Apr-01	Apr-02	Apr-03	Apr-04	Apr-05	Apr-06	Apr-07	Apr-08	Apr-09	Apr-10	Apr-11	Apr-12	Apr-13	Apr-14			
CSIP-Wells	601	678	587	564	190	878	482	195	496	1,513	1,054	143	544	80	239				
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	501				
SVRP-Recycled	586	1,136	1,332	1,763	1,381	1,848	740	328	1,642	1,806	1,702	839	1,650	1,044	1,679				
Precip (in)	1.4	0.4	1.8	0.1	1.2	0.0	1.3	2.9	1.0	0.2	0.2	3.4	0.1	1.9	0.3		AVG		
Total Irrig (AF)	2,587	2,214	3,719	2,427	2,771	2,726	2,522	3,423	3,138	3,519	2,956	4,382	2,294	3,024	2,719		2,961	1,481	252
	May-99	May-00	May-01	May-02	May-03	May-04	May-05	May-06	May-07	May-08	May-09	May-10	May-11	May-12	May-13	May-14			
CSIP-Wells	313	439	531	446	535	810	388	249	417	939	822	150	284	125	239				
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	375	593	618	1,219				
SVRP-Recycled	1,561	1,283	1,805	1,770	1,722	1,933	1,770	1,751	1,907	1,914	1,717	1,737	1,694	1,745	1,799				
Precip (in)	0.0	0.6	0.0	0.0	0.2	0.0	0.8	0.7	0.1	0.0	0.3	0.6	0.7	0.1	0.0		AVG		
Total Irrig (AF)	1,874	2,322	2,336	2,216	2,457	2,743	2,958	2,700	2,424	2,853	2,839	2,862	3,271	2,588	3,257		2,647	1,323	225
	Jun-99	Jun-00	Jun-01	Jun-02	Jun-03	Jun-04	Jun-05	Jun-06	Jun-07	Jun-08	Jun-09	Jun-10	Jun-11	Jun-12	Jun-13	Jun-14			
CSIP-Wells	743	1,051	1,359	1,256	1,435	1,653	1,402	1,394	1,523	1,726	1,391	570	428	276	363				
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	944	1,020	906	1,224				
SVRP-Recycled	1,615	1,793	1,877	1,664	1,808	1,913	1,833	1,903	1,874	1,797	1,750	1,838	1,713	1,764	1,677				
Precip (in)	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.3	0.2	0.0		AVG		
Total Irrig (AF)	2,458	2,844	3,236	2,920	3,243	3,566	3,435	3,297	3,397	3,523	3,241	3,352	3,461	3,146	3,264		3,226	1,613	274
Totals	**FY 98-99**	**FY 99-00**	**FY 00-01**	**FY 01-02**	**FY 02-03**	**FY 03-04**	**FY 04-05**	**FY 05-06**	**FY 06-07**	**FY 07-08**	**FY 08-09**	**FY 09-10**	**FY 10-11**	**FY 11-12**	**FY 12-13**	**FY 12-13**			
CSIP-Wells	4,220	6,316	6,925	6,250	6,789	8,109	6,817	5,798	7,084	9,234	7,703	5,838	2,908	4,239	2,438	1,539			
SRDF-River	0	0	0	0	0	0	0	0	0	0	0	1,319	4,174	3,378	5,114	2,150		Scaled to 6000 ac	17% Return
SVRP-Recycled	7,562	10,433	11,100	13,237	12,839	13,873	10,937	10,865	14,165	13,921	13,886	10,198	12,910	12,829	14,722	8,077			
Precip (in)	13	13	13	4	7	10	20	15	8	9	11	17	16	11	9	1	AVG		
Total Irrig (AF)	24,582	29,849	30,925	23,087	26,728	32,082	37,454	31,963	29,549	32,455	32,589	34,655	35,492	30,946	31,174	12,766	29,769	**14,884**	**2,530**

Year Type	Normal	Normal	Normal	Dry	Dry	Normal	Wet	Normal	Dry	Dry	Normal	Wet	Normal	Normal	Dry		
	5.8	7.0	7.3	5.4	6.3	7.5	8.8	7.5	6.9	7.6	7.7	8.1	8.3	7.3	7.3		

Sum of monthly values: **15,410** **2,620**

CSIP Service Area approx 12,000 acres
Precipitation from Salinas Airport Rain Gage, NOAA Station USW00023233
Blanco Drain area is approximately 6,000 acres

Year Type	Average Total Irrig (AF)	Scale to 6,000 ac (AF)	17% Return (AF)
Wet	36,055	18,027	3,065
Normal	31,054	15,527	2,640
Dry	28,599	14,299	2,431

Table B-4: Water Rights Database GIS Capture, PODs near Salinas

Application ID	No.	Permit ID	License ID	DB ID	Water Right Type	Water Right Type ID	Status	Holder Name	Date	Face Amt	County	Watershed	Source
A013225	1	11043	0	3413	Appropriative	84	Permitted	MONTEREY COUNTY WATER RESOURCES AGENCY	7/11/1949	168,538.0	Monterey	SALINAS, SALINA	SALINAS RIVER
A016124	2	10137	7543	4833	Appropriative	84	Licensed	MONTEREY COUNTY WATER RESOURCES AGENCY	11/4/1954	350,000.0	Monterey, San L	SALINAS, SALINA	NACIMIENTO RIVER, Salinas River
A016761	2	12261	12624	5163	Appropriative	84	Licensed	MONTEREY COUNTY WATER RESOURCES AGENCY	12/2/1955	220,000.0	Monterey	SALINAS, SALINA	SAN ANTONIO RIVER, Salinas River
A030532	2	21089	0	14037	Appropriative	84	Permitted	MONTEREY COUNTY WATER RESOURCES AGENCY	3/25/1996	27,900.0	Monterey, San L	SALINAS, SALINA	NACIMIENTO RIVER, Salinas River
S014817	1	0	0	37657	Statement of Div and Use	92	Inactive	STEPHEN JENSEN	7/5/2000	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014826	1	0	0	37666	Statement of Div and Use	92	Claimed	ELMER N JENSEN & ELSIE R JENSEN LIVING TRUST	5/28/1997	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014867	1	0	0	37707	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014868	1	0	0	37708	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014869	1	0	0	37709	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014870	1	0	0	37710	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014872	1	0	0	37712	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014873	1	0	0	37713	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014874	1	0	0	37714	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014875	1	0	0	37715	Statement of Div and Use	92	Inactive	TANIMURA & ANTLE INC	6/28/2013	-	Monterey	SALINAS	GROUNDWATER USE
S014876	1	0	0	37716	Statement of Div and Use	92	Inactive	TANIMURA & ANTLE INC	6/28/2013	-	Monterey	SALINAS	GROUNDWATER USE
S014877	1	0	0	37717	Statement of Div and Use	92	Inactive	TANIMURA & ANTLE INC	6/28/2013	-	Monterey	SALINAS	GROUNDWATER USE
S014878	1	0	0	37718	Statement of Div and Use	92	Claimed	T. Yuki Farms, LPII	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014879	1	0	0	37719	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014880	1	0	0	37720	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014881	1	0	0	37721	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014882	1	0	0	37722	Statement of Div and Use	92	Claimed	Robert Tanimura 1980 IrrevocableTrust; et al	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014883	1	0	0	37723	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014884	1	0	0	37724	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	5/30/2013	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014885	1	0	0	37725	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014886	1	0	0	37726	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014887	1	0	0	37727	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014888	1	0	0	37728	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014889	1	0	0	37729	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014890	1	0	0	37730	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014892	1	0	0	37732	Statement of Div and Use	92	Claimed	Tanimura & Antle Partnership; et al	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014893	1	0	0	37733	Statement of Div and Use	92	Claimed	Tanimura & Antle Partnership; et al	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014894	1	0	0	37734	Statement of Div and Use	92	Claimed	Tanimura & Antle Partnership; et al	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014895	1	0	0	37735	Statement of Div and Use	92	Claimed	Tanimura & Antle Partnership; et al	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S014896	1	0	0	37736	Statement of Div and Use	92	Claimed	Tanimura & Antle Partnership; et al	1/22/1998	-	Monterey	SALINAS	SALINAS RIVER UNDERFLOW
S016592	1	0	0	51867	Statement of Div and Use	92	Claimed	TANIMURA LAND COMPANY LLC	7/6/2010	192.4	Monterey	SALINAS	Salinas River Underflow
S021637	1	0	0	53889	Statement of Div and Use	92	Claimed	PORTER FAMILY PARTNERSHIP, LP	7/6/2010	136,339.0	Monterey	SALINAS	Salinas River Underflow
S021638	1	0	0	53890	Statement of Div and Use	92	Claimed	PORTER FAMILY PARTNERSHIP, LP	7/6/2010	107,448.0	Monterey	SALINAS	Salinas River Underflow
S021639	1	0	0	53891	Statement of Div and Use	92	Claimed	M.B.T. FAMILY PARTNERSHIP	7/6/2010	202,417.0	Monterey	SALINAS	Salinas River Underflow
S021641	1	0	0	53893	Statement of Div and Use	92	Claimed	THE HARDY FAMILY TRUST, ET AL.	7/6/2010	262.5	Monterey	SALINAS	Salinas River Underflow
S021642	1	0	0	53900	Statement of Div and Use	92	Claimed	THE HARDY FAMILY TRUST, ET AL.	7/6/2010	333.8	Monterey	SALINAS	Salinas River Underflow
S023945	1	0	0		Statement of Div and Use	92	Claimed	TANIMURA & ANTLE	7/2/2013	-	Monterey	SALINAS	Salinas Valley Basin
S023947	1	0	0		Statement of Div and Use	92	Claimed	TANIMURA & ANTLE	7/2/2013	-	Monterey	SALINAS	Salinas Valley Basin

Table B-5: Surface Water Rights and Claims in the Salinas River below Spreckels

Water Right ID	Source	Direct Diversion Rate (cfs)	Direct Diversion Season	Face Value Direct Diversion Amount Oct. 1-Mar. 31 (af)	Face Value Storage Amount (af)	Storage Season	Reported Use 2011 (Used)	Reported Use 2012 (Used)	Purpose of Use Code**
A016124, Permit 10137	Nacimento River, Salinas River			350,000	377,900	Oct 1 - July 1	197,000	158,633	M, D, I, J, R
A016761, Permit 12261	San Antonio River, Salinas River			220,000	335,000	Oct 1 - July 1	26,410	72,175	M, D, I, J, R
A030532, Permit 21089	Nacimento River, Salinas River			27,900		Oct 1 - July 1	-	-	M, D, I, J, R
A013225, Permit 11043	Salinas River	400	Jan 1 - Dec 31	135,000			84,270	-	I, M
Totals				732,900	712,900		307,680	230,808	

Blank fields indicate no data/ no report

**B-Mining, C-Milling, D-Domestic, E-Fire Protection, G-Dust Control, H-Fish Culture, I-Irrigation, J-Industrial, K-Incidental Power, L-Heat Protection, M-Municipal, N-Frost Protection, P-Power, R-Recreational, S-Stockwatering, T-Snow Making, W-Fish and Wildlife Protection and/or Enhancement, Z-Other.

Table B-6: Stream Water Quality, Blanco Drain to Potrero Road
Note: Location above or below indicates multiple sampling locations

Stream	Location	Analyte Name	No. Samples	Units	Mean	Min	Max
Blanco Drain	above Salinas River	Ammonia as N, Unionized	53	mg/L	0.014	0.0009	0.26
Blanco Drain	above Salinas River	Ammonia as NH3	37	mg/L	0.20	0.00	4.96
Blanco Drain	above Salinas River	Chlorophyll a, water column	54	mg/L	0.0021	0.00	0.028
Blanco Drain	above Salinas River	Chlorpyrifos	55	mg/L	0.0009	0.00	0.018
Blanco Drain	above Salinas River	Diazinon	59	mg/L	0.01	0.00	0.17
Blanco Drain	above Salinas River	Dissolved Solids, Total	60	mg/L	2,019.70	1,450.00	2,250.00
Blanco Drain	above Salinas River	Nitrate as N	98	mg/L	65.27	0.01	325.00
Blanco Drain	above Salinas River	OrthoPhosphate as P	99	mg/L	0.85	0.01	4.40
Blanco Drain	above Salinas River	Oxygen, Dissolved	55	mg/L	0.20	0.00	2.52
Blanco Drain	above Salinas River	Turbidity	94	NTU	66.48	0.10	1,210.00
Salinas River	below Spreckels	Ammonia as N, Unionized	37	mg/L	0.02	0.0007	0.13
Salinas River	below Spreckels	Ammonia as NH3	38	mg/L	0.12	0.00	0.98
Salinas River	below Spreckels	Chlorophyll a, water column	36	mg/L	0.0033	0.0003	0.023
Salinas River	below Spreckels	Chlorpyrifos	32	mg/L	0.0011	0.00	0.029
Salinas River	below Spreckels	Diazinon	32	mg/L	0.008	0.00	0.22
Salinas River	below Spreckels	Dissolved Solids, Total	38	mg/L	369.60	230.00	610.00
Salinas River	below Spreckels	Nitrate as N	76	mg/L	5.08	0.002	78.00
Salinas River	below Spreckels	OrthoPhosphate as P	75	mg/L	0.23	0.0075	2.60
Salinas River	below Spreckels	Oxygen, Dissolved	37	mg/L	0.36	0.00	2.66
Salinas River	below Spreckels	Turbidity	58	NTU	118.66	1.40	2,584.00
Salinas Lagoon	Salinas Lagoon	Ammonia as NH3	32	mg/L	0.05	0.00	0.52
Salinas Lagoon	Salinas Lagoon	Chlorpyrifos	28	mg/L	0.000064	0.00	0.00021
Salinas Lagoon	Salinas Lagoon	Diazinon	24	mg/L	0.000036	0.00	0.00020
Salinas Lagoon	Salinas Lagoon	Nitrate as N	32	mg/L	11.31	0.06	67.00
Salinas Lagoon	Salinas Lagoon	OrthoPhosphate as P	33	mg/L	0.31	0.00	1.09
Salinas Lagoon	Salinas Lagoon	Turbidity	18	NTU	29.77	3.76	76.70
Old Salinas River	above Potrero Rd	Ammonia as N, Unionized	96	mg/L	0.0075	0.0002	0.027
Old Salinas River	above Potrero Rd	Ammonia as NH3	22	mg/L	0.24	0.00	1.17
Old Salinas River	above Potrero Rd	Chloride	109	mg/L	2,504.48	79.00	17,000.00
Old Salinas River	above Potrero Rd	Chlorophyll a, water column	134	mg/L	0.029	0.00045	0.24
Old Salinas River	above Potrero Rd	Chlorpyrifos	33	mg/L	0.00022	0.000044	0.0010
Old Salinas River	above Potrero Rd	Coliform, Fecal	106	MPN/100 ml	3,222.87	23.00	92,000.00
Old Salinas River	above Potrero Rd	Coliform, Total	106	MPN/100 ml	19,573.45	260.00	240,000.00
Old Salinas River	above Potrero Rd	Diazinon	31	mg/L	0.011	0.00	0.21
Old Salinas River	above Potrero Rd	Dissolved Solids, Total	116	mg/L	5,964.12	193.00	59,000.00
Old Salinas River	above Potrero Rd	Nitrate as N	138	mg/L	19.50	0.00	64.00
Old Salinas River	above Potrero Rd	OrthoPhosphate as P	138	mg/L	0.42	0.00	2.40
Old Salinas River	above Potrero Rd	Oxygen, Dissolved	138	mg/L	1.02	0.00	18.03
Old Salinas River	above Potrero Rd	Suspended Solids, Total	114	mg/L	113.33	5.00	578.00
Old Salinas River	above Potrero Rd	Turbidity	158	NTU	183.41	0.10	4,869.00

Highlighted cells exceed TMDL / standards. See table B-7.
Min value of 0.00 = Not Detected.

Table B-7: Total Maximum Daily Loads

Analyte Name	Units	Standard	Reference
Ammonia as N, Unionized	mg/L	0.025	Board Order R3-2013-0008
Ammonia as NH3	mg/L	0.025	CCAMP Proposed
Chloride	mg/L	150	Basin Plan
Chlorophyll a, water column	mg/L	0.015	Board Order R3-2013-0008
Chlorpyrifos	mg/L	CMC 0.00025 CCC 0.00015	Board Decision 2011
Coliform, Fecal	MPN/100 ml	400	Basin Plan, Water Body Contact
Coliform, Total	MPN/100 ml	10,000	US EPA
Diazinon	mg/L	CMC 0.00016 CCC 0.00010	CC RWQCB Decision 2011
Dissolved Solids, Total	mg/L	1000	CCAMP Proposed
Nitrate as N (all streams with MUN use)	mg/L	10	Board Order R3-2013-0008
Nitrate as N (Salinas River)	mg/L	1.4 (dry season) 8.0 (wet season)	Board Order R3-2013-0008
Nitrate as N (Rec. Ditch, Tembladero, Blanco Drain, Alisal Slough, Espinosa Slough, Merritt Ditch, Santa Rita Creek)	mg/L	6.4 (dry season) 8.0 (wet season)	Board Order R3-2013-0008
Nitrate as N (OSR)	mg/L	3.1 (dry season) 8.0 (wet season)	Board Order R3-2013-0008
OrthoPhosphate as P (Salinas River)	mg/L	0.07 (dry season) 0.30 (wet season)	Board Order R3-2013-0008
Orthophosphate as P (Rec. Ditch, Tembladero, Blanco Drain, Alisal Slough, Espinosa Slough, Merritt Ditch, Santa Rita Creek)	mg/L	0.13 (dry season) 0.30 (wet season)	Board Order R3-2013-0008
Oxygen, Dissolved	mg/L	>7.0 and <13.0 (Cold) >5.0 and <13.0 (Warm)	Board Order R3-2013-0008
Suspended Solids, Total	mg/L	500	CCAMP Proposed
Turbidity	NTU	10	CCAMP Proposed

CMC = Criterion Maximum Concentration (1-hr average)
CCC = Criterion Continuous Concentration (96-hour average)
Seasonal targets for nitrate and orthophosphate

Appendix C: Conceptual Diversion Facility

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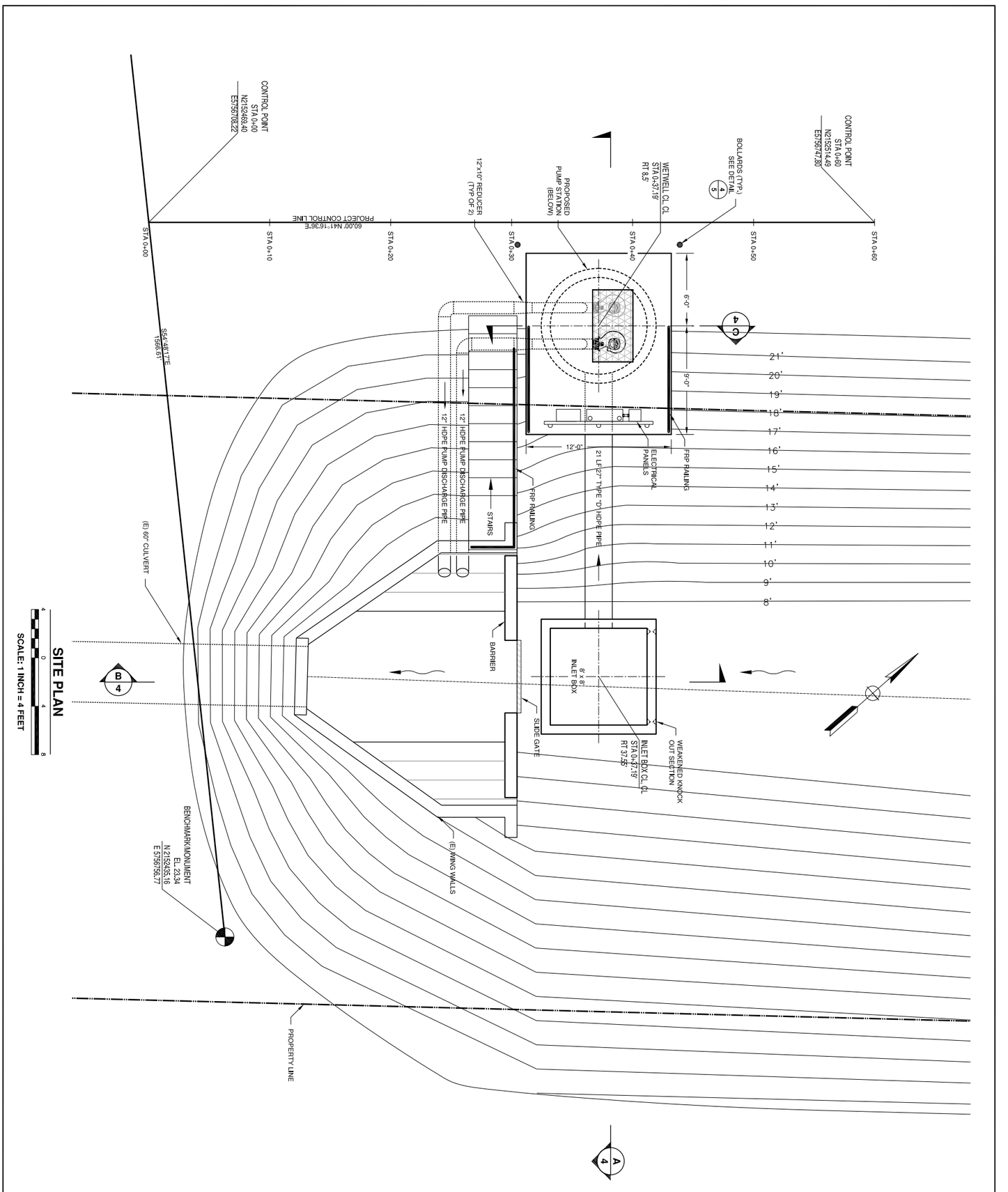


SHEET 3 OF 12	CASE / DRAWER / SET	SURVEYED BY:	**BLANCO DRAIN PUMP STATION SITE PLAN**
		BOOK NO. DATE:	
		DRAWN BY: NJL DATE: 2/08	
		CHECKED BY: DAF DATE: 2/08	
		SCALE: AS SHOWN	
		PROJECT NO.: MCFC.20.07	

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
100 N. WINCHESTER BLVD, STE. 300
SANTA CLARA, CA 95050
(408) 246-4848

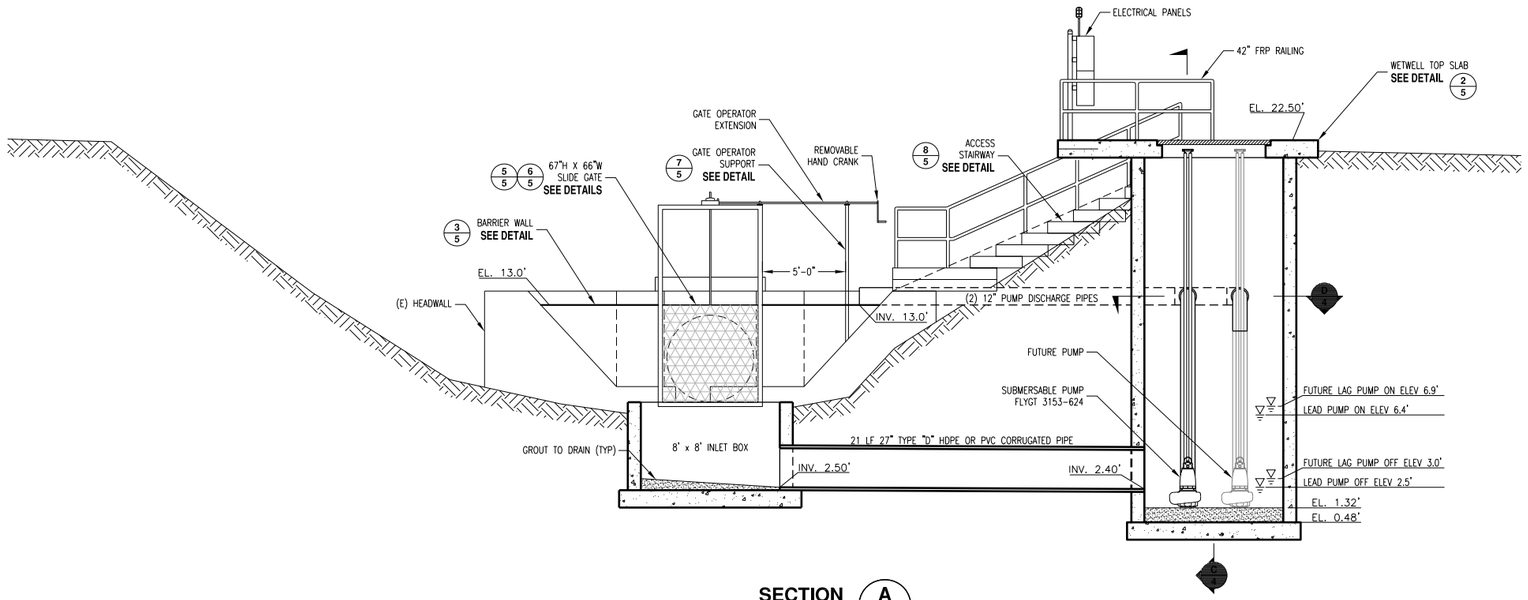
REGISTERED PROFESSIONAL ENGINEER — DANIEL A. FOX — No. 19877 — Exp. 09/30/09 — CIVIL — STATE OF CALIFORNIA

MONTEREY COUNTY WATER RESOURCE AGENCY

AGENCY ENGINEER ____ DATE ____

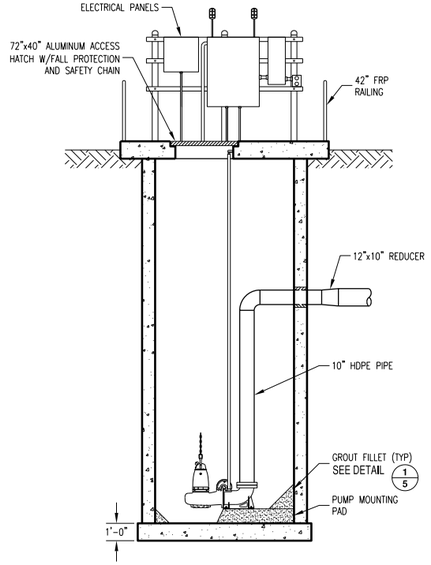
DIRECTOR OF AGENCY ____ DATE ____

REVISION	DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			
6			
7			

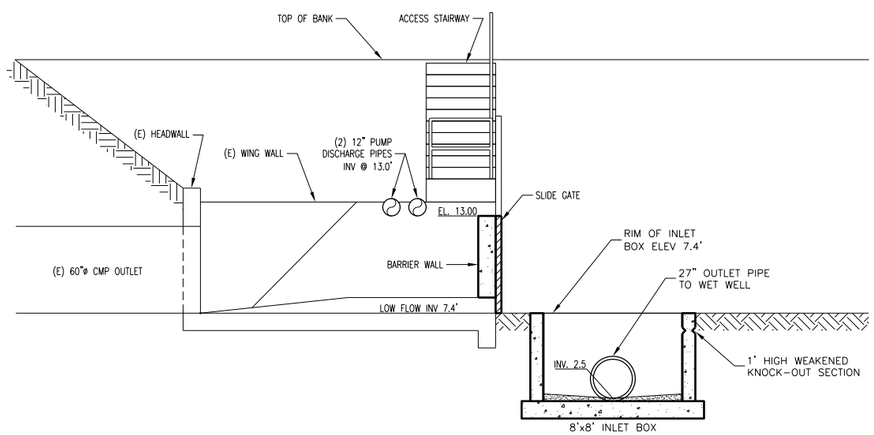


SECTION A/4
SCALE: 1/4"=1'

4 0 4 8

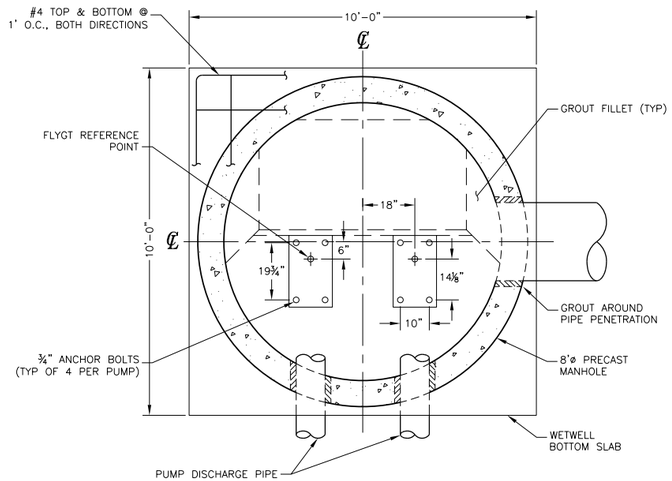


SECTION C/4
SCALE: 1/4"=1'



SECTION B/4
SCALE: 1/4"=1'

4 0 4 8



WETWELL SECTION: EL. = 13.5 D/4
SCALE: 1" = 2'-0"

REVISION	BY	DATE	DESCRIPTION

MONTEREY COUNTY WATER RESOURCE AGENCY

AGENCY ENGINEER — DATE

DIRECTOR OF AGENCY — DATE

REGISTERED PROFESSIONAL ENGINEER — DANIEL A. SCHAAF — No. 19877 — Exp. 09/30/09 — CIVIL — STATE OF CALIFORNIA

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
100 N. WINCHESTER BLVD, STE. 200
SANTA CLARA, CA 95050
(408) 246-4848

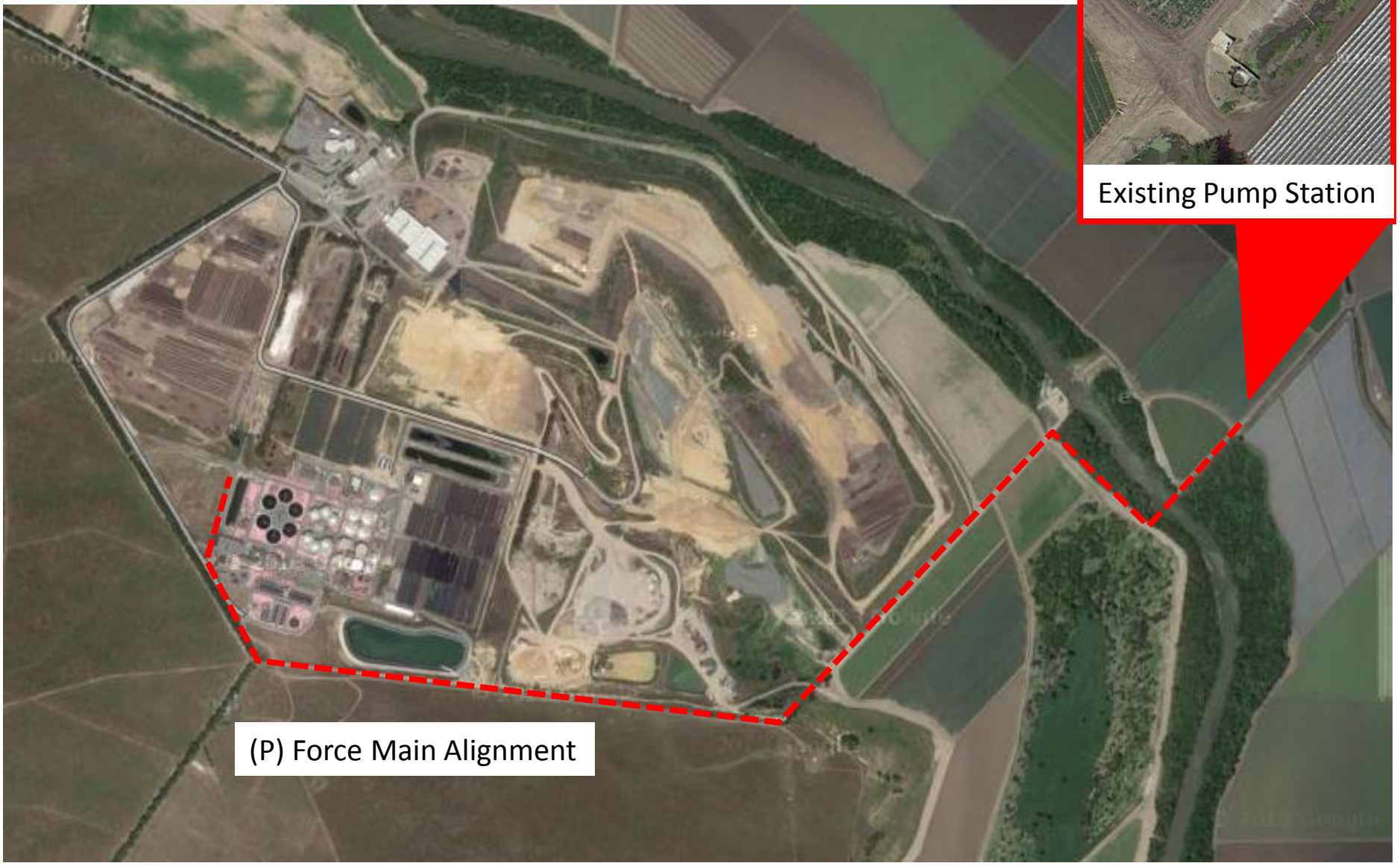
BLANCO DRAIN PUMP STATION ELEVATIONS

SURVEYED BY:		DATE:	
BOOK NO.		DRAWN BY: NJL	DATE: 2/08
CHECKED BY: DAF	DATE: 2/08	SCALE: AS SHOWN	
PROJECT NO.: MCFC-20.07			
CASE	DRAWER	SET	

SHEET 4 OF 12

J:\JOBS\MCFC\20-Blanco\Drawings\100%\SHEET\04- ELEVATION.dwg, 2/22/2008 2:38:44 PM

C-3: Blanco Drain Diversion Pump Station and Force Main



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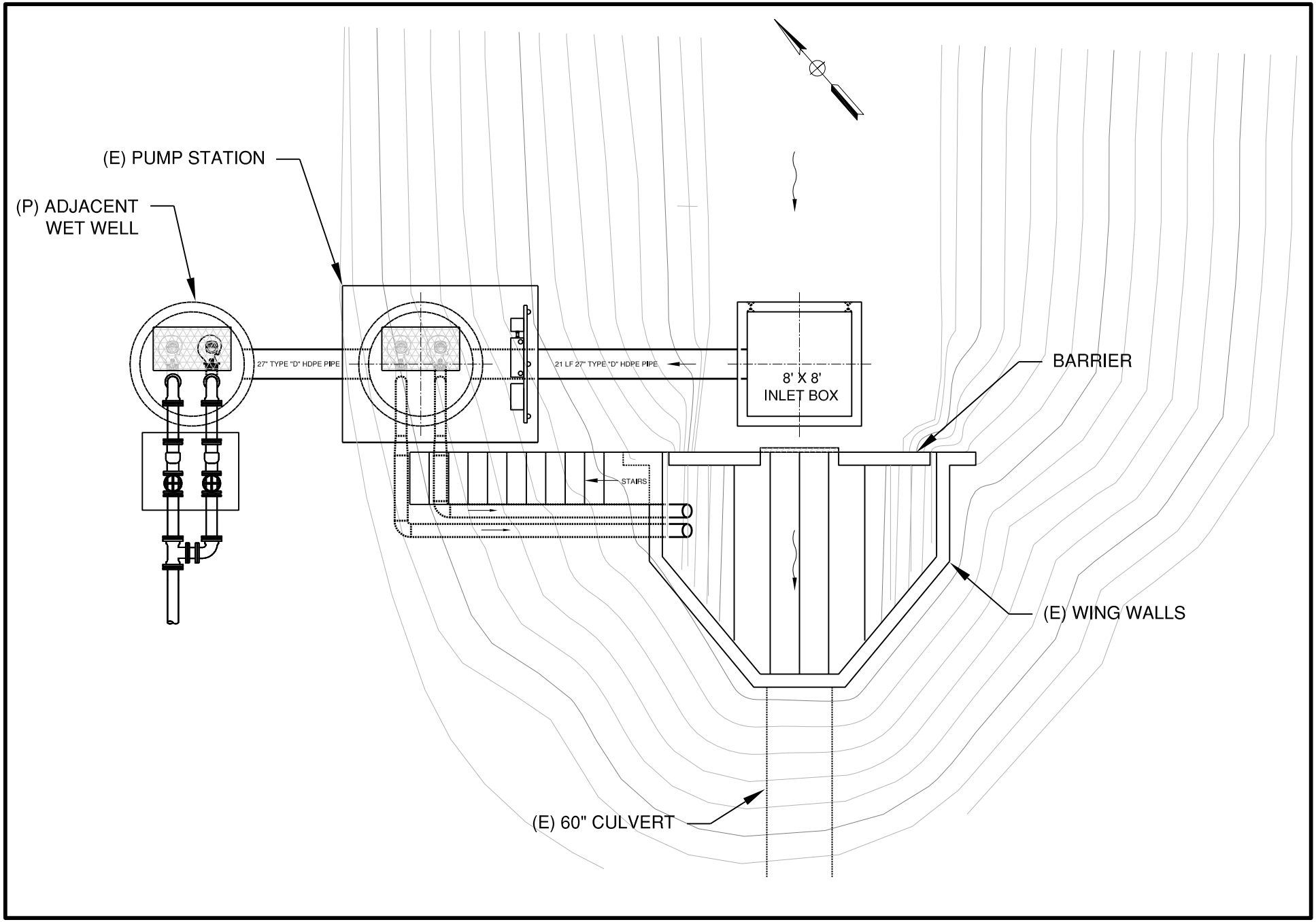
Option A - Adjacent Wet Well



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Option B - New Pump Station with Shared Inlet

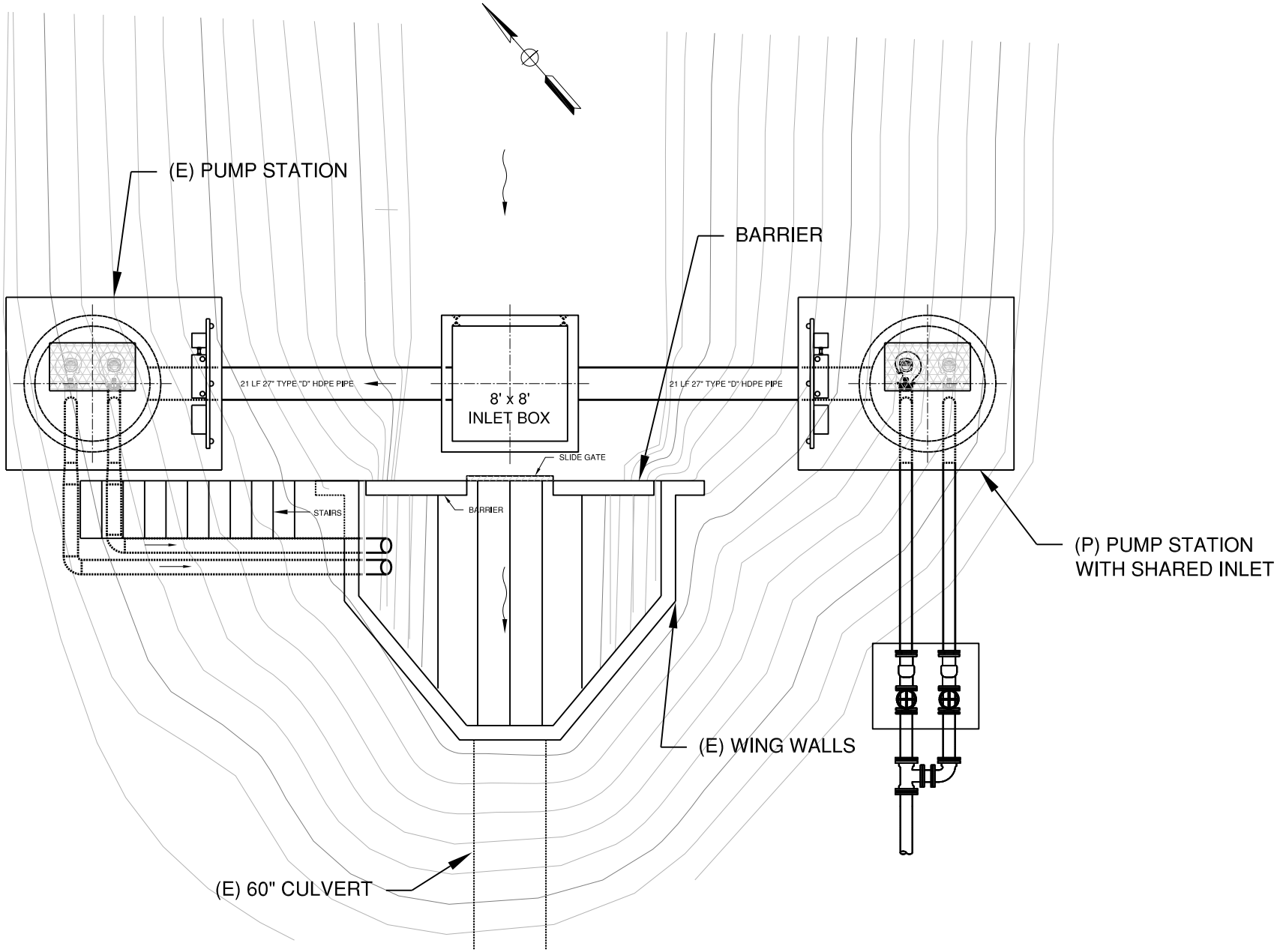

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Table C-1: Blanco Drain Diversion Pump Station, 16-inch Force Main

System Head Calculations

Number of Pumps in Parallel	**1**
Pump Discharge Diameter (inches)	**12**
Length of Pump Discharge (feet)	**40**
Discharge Hazen-Williams Coefficient (C)	**130**
Force Main Diameter in PS#2 (inches)	**16**
Force Main Length in PS#2 (feet)	**0**
Force Main Diameter from PS#2 to MH (inches)	**16**
Force Main Length from PS#2 to MH (feet)	**9500**
Force Main Hazen-Williams Coefficient (C)	**120**
Outfall Elevation (feet)	**143.00**
Wetwell Pumping Level (feet)	**3.00**
Static Lift (feet)	140.00

Fitting	K Value
45 Elbow	0.2
90 Elbow	0.3
22.5 Elbow	0.075
11.25 Elbow	0
GV	0.3
CV	2.5
Reducer	0.03
FR Elbow	0.3
Tee branch	0.75

Pump Discharge Piping												Force Main in PS					Force Main from PS to MH								
				Minor Losses																					
Flow (gpm)	Velocity (fps)	Velocity Head (ft)	Friction Loss (ft)	K:	Flare Elbow **0** (ft)	Suction Elbow **0** (ft)	Discharge Elbows **0.8** (ft)	Tee Branch **0** (ft)	Gate Valve **0.3** (ft)	Check Valve **2.5** (ft)	Total Minor Losses (ft)	Flow (gpm)	Velocity (fps)	Velocity Head (ft)	Friction Loss (ft)	**0.0** Minor Losses (ft)	Flow (gpm)	Velocity (fps)	Velocity Head (ft)	Friction Loss (ft)	**0.3** Minor Losses (ft)	Total Loss (ft)	TDH (ft)	Pump Flow (gpm)	HP at 75% eff. HP	
0	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	140.00	**0**	**0**	
100	0.28	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	100	0.16	0.00	0.00	0.00	100	0.16	0.00	0.10	0.00	0.10	140.10	**100**	**5**	
200	0.57	0.00	0.01		0.00	0.00	0.00	0.00	0.00	0.01	0.02	200	0.32	0.00	0.00	0.00	200	0.32	0.00	0.35	0.00	0.38	140.38	**200**	**9**	
300	0.85	0.01	0.01		0.00	0.00	0.01	0.00	0.00	0.03	0.04	300	0.48	0.00	0.00	0.00	300	0.48	0.00	0.75	0.00	0.80	140.80	**300**	**14**	
400	1.13	0.02	0.02		0.00	0.00	0.02	0.00	0.01	0.05	0.07	400	0.64	0.01	0.00	0.00	400	0.64	0.01	1.27	0.00	1.37	141.37	**400**	**19**	
500	1.42	0.03	0.03		0.00	0.00	0.02	0.00	0.01	0.08	0.11	500	0.80	0.01	0.00	0.00	500	0.80	0.01	1.92	0.00	2.07	142.07	**500**	**24**	
600	1.70	0.04	0.04		0.00	0.00	0.04	0.00	0.01	0.11	0.16	600	0.96	0.01	0.00	0.00	600	0.96	0.01	2.70	0.00	2.90	142.90	**600**	**29**	
700	1.99	0.06	0.05		0.00	0.00	0.05	0.00	0.02	0.15	0.22	700	1.12	0.02	0.00	0.00	700	1.12	0.02	3.59	0.01	3.86	143.86	**700**	**34**	
800	2.27	0.08	0.07		0.00	0.00	0.06	0.00	0.02	0.20	0.29	800	1.28	0.03	0.00	0.00	800	1.28	0.03	4.59	0.01	4.95	144.95	**800**	**39**	
900	2.55	0.10	0.08		0.00	0.00	0.08	0.00	0.03	0.25	0.36	900	1.44	0.03	0.00	0.00	900	1.44	0.03	5.71	0.01	6.17	146.17	**900**	**44**	
1,000	2.84	0.12	0.10		0.00	0.00	0.10	0.00	0.04	0.31	0.45	1,000	1.60	0.04	0.00	0.00	1,000	1.60	0.04	6.94	0.01	7.50	147.50	**1,000**	**50**	
1,100	3.12	0.15	0.12		0.00	0.00	0.12	0.00	0.05	0.38	0.54	1,100	1.76	0.05	0.00	0.00	1,100	1.76	0.05	8.27	0.01	8.95	148.95	**1,100**	**55**	
1,200	3.40	0.18	0.14		0.00	0.00	0.14	0.00	0.05	0.45	0.65	1,200	1.91	0.06	0.00	0.00	1,200	1.91	0.06	9.72	0.02	10.53	150.53	**1,200**	**61**	
1,300	3.69	0.21	0.17		0.00	0.00	0.17	0.00	0.06	0.53	0.76	1,300	2.07	0.07	0.00	0.00	1,300	2.07	0.07	11.27	0.02	12.21	152.21	**1,300**	**67**	
1,400	3.97	0.24	0.19		0.00	0.00	0.20	0.00	0.07	0.61	0.88	1,400	2.23	0.08	0.00	0.00	1,400	2.23	0.08	12.92	0.02	14.02	154.02	**1,400**	**73**	3 cfs
1,500	4.26	0.28	0.22		0.00	0.00	0.22	0.00	0.08	0.70	1.01	1,500	2.39	0.09	0.00	0.00	1,500	2.39	0.09	14.68	0.03	15.94	155.94	**1,500**	**79**	
1,600	4.54	0.32	0.24		0.00	0.00	0.26	0.00	0.10	0.80	1.15	1,600	2.55	0.10	0.00	0.00	1,600	2.55	0.10	16.55	0.03	17.97	157.97	**1,600**	**85**	
1,700	4.82	0.36	0.27		0.00	0.00	0.29	0.00	0.11	0.90	1.30	1,700	2.71	0.11	0.00	0.00	1,700	2.71	0.11	18.51	0.03	20.12	160.12	**1,700**	**92**	
1,800	5.11	0.40	0.30		0.00	0.00	0.32	0.00	0.12	1.01	1.46	1,800	2.87	0.13	0.00	0.00	1,800	2.87	0.13	20.57	0.04	22.37	162.37	**1,800**	**98**	
1,900	5.39	0.45	0.33		0.00	0.00	0.36	0.00	0.14	1.13	1.62	1,900	3.03	0.14	0.00	0.00	1,900	3.03	0.14	22.74	0.04	24.74	164.74	**1,900**	**105**	
2,000	5.67	0.50	0.37		0.00	0.00	0.40	0.00	0.15	1.25	1.80	2,000	3.19	0.16	0.00	0.00	2,000	3.19	0.16	25.00	0.05	27.22	167.22	**2,000**	**113**	
2,100	5.96	0.55	0.40		0.00	0.00	0.44	0.00	0.17	1.38	1.98	2,100	3.35	0.17	0.00	0.00	2,100	3.35	0.17	27.36	0.05	29.80	169.80	**2,100**	**120**	
2,200	6.24	0.60	0.44		0.00	0.00	0.48	0.00	0.18	1.51	2.18	2,200	3.51	0.19	0.00	0.00	2,200	3.51	0.19	29.82	0.06	32.50	172.50	**2,200**	**128**	
2,300	6.53	0.66	0.48		0.00	0.00	0.53	0.00	0.20	1.65	2.38	2,300	3.67	0.21	0.00	0.00	2,300	3.67	0.21	32.38	0.06	35.30	175.30	**2,300**	**136**	5 cfs
2,400	6.81	0.72	0.52		0.00	0.00	0.58	0.00	0.22	1.80	2.59	2,400	3.83	0.23	0.00	0.00	2,400	3.83	0.23	35.03	0.07	38.21	178.21	**2,400**	**144**	
2,500	7.09	0.78	0.56		0.00	0.00	0.62	0.00	0.23	1.95	2.81	2,500	3.99	0.25	0.00	0.00	2,500	3.99	0.25	37.78	0.07	41.22	181.22	**2,500**	**153**	
2,600	7.38	0.84	0.60		0.00	0.00	0.68	0.00	0.25	2.11	3.04	2,600	4.15	0.27	0.00	0.00	2,600	4.15	0.27	40.62	0.08	44.34	184.34	**2,600**	**161**	
2,700	7.66	0.91	0.64		0.00	0.00	0.73	0.00	0.27	2.28	3.28	2,700	4.31	0.29	0.00	0.00	2,700	4.31	0.29	43.56	0.09	47.57	187.57	**2,700**	**171**	
2,800	7.94	0.98	0.69		0.00	0.00	0.78	0.00	0.29	2.45	3.53	2,800	4.47	0.31	0.00	0.00	2,800	4.47	0.31	46.59	0.09	50.90	190.90	**2,800**	**180**	
2,900	8.23	1.05	0.73		0.00	0.00	0.84	0.00	0.32	2.63	3.78	2,900	4.63	0.33	0.00	0.00	2,900	4.63	0.33	49.72	0.10	54.33	194.33	**2,900**	**190**	
3,000	8.51	1.12	0.78		0.00	0.00	0.90	0.00	0.34	2.81	4.05	3,000	4.79	0.36	0.00	0.00	3,000	4.79	0.36	52.93	0.11	57.87	197.87	**3,000**	**200**	
3,100	8.79	1.20	0.83		0.00	0.00	0.96	0.00	0.36	3.00	4.32	3,100	4.95	0.38	0.00	0.00	3,100	4.95	0.38	56.24	0.11	61.51	201.51	**3,100**	**210**	
3,200	9.08	1.28	0.88		0.00	0.00	1.02	0.00	0.38	3.20	4.61	3,200	5.11	0.40	0.00	0.00	3,200	5.11	0.40	59.65	0.12	65.25	205.25	**3,200**	**221**	7 cfs
3,300	9.36	1.36	0.93		0.00	0.00	1.09	0.00	0.41	3.40	4.90	3,300	5.27	0.43	0.00	0.00	3,300	5.27	0.43	63.14	0.13	69.10	209.10	**3,300**	**232**	
3,400	9.65	1.44	0.98		0.00	0.00	1.16	0.00	0.43	3.61	5.20	3,400	5.43	0.46	0.00	0.00	3,400	5.43	0.46	66.73	0.14	73.05	213.05	**3,400**	**244**	
3,500	9.93	1.53	1.04		0.00	0.00	1.22	0.00	0.46	3.83	5.51	3,500	5.59	0.48	0.00	0.00	3,500	5.59	0.48	70.40	0.15	77.09	217.09	**3,500**	**256**	
3,600	10.21	1.62	1.09		0.00	0.00	1.30	0.00	0.49	4.05	5.83	3,600	5.74	0.51	0.00	0.00	3,600	5.74	0.51	74.17	0.15	81.24	221.24	**3,600**	**268**	
3,700	10.50	1.71	1.15		0.00	0.00	1.37	0.00	0.51	4.28	6.16	3,700	5.90	0.54	0.00	0.00	3,700	5.90	0.54	78.02	0.16	85.49	225.49	**3,700**	**281**	
3,800	10.78	1.80	1.21		0.00	0.00	1.44	0.00	0.54	4.51	6.50	3,800	6.06	0.57	0.00	0.00	3,800	6.06	0.57	81.97	0.17	89.85	229.85	**3,800**	**294**	
3,900	11.06	1.90	1.27		0.00	0.00	1.52	0.00	0.57	4.75	6.84	3,900	6.22	0.60	0.00	0.00	3,900	6.22	0.60	86.01	0.18	94.30	234.30	**3,900**	**308**	
4,000	11.35	2.00	1.33		0.00	0.00	1.60	0.00	0.60	5.00	7.20	4,000	6.38	0.63	0.00	0.00	4,000	6.38	0.63	90.13	0.19	98.85	238.85	**4,000**	**322**	

Table C-2: Blanco Drain Divserion Pump Station, 20-inch Force Main

System Head Calculations

Number of Pumps in Parallel	**1**
Pump Discharge Diameter (inches)	**14**
Length of Pump Discharge (feet)	**40**
Discharge Hazen-Williams Coefficient (C)	**130**
Force Main Diameter in PS#2 (inches)	**16**
Force Main Length in PS#2 (feet)	**0**
Force Main Diameter from PS#2 to MH (inches)	**20**
Force Main Length from PS#2 to MH (feet)	**9500**
Force Main Hazen-Williams Coefficient (C)	**120**
Outfall Elevation (feet)	**143.00**
Wetwell Pumping Level (feet)	**3.00**
Static Lift (feet)	140.00

Fitting	K Value
45 Elbow	0.2
90 Elbow	0.3
22.5 Elbow	0.075
11.25 Elbow	0
GV	0.3
CV	2.5
Reducer	0.03
FR Elbow	0.3
Tee branch	0.75

Pump Discharge Piping												Force Main in PS					Force Main from PS to MH									
				Minor Losses																						
Flow (gpm)	Velocity (fps)	Velocity Head (ft)	Friction Loss (ft)	K:	Flare Elbow **0** (ft)	Suction Elbow **0** (ft)	Discharge Elbows **0.8** (ft)	Tee Branch **0** (ft)	Gate Valve **0.3** (ft)	Check Valve **2.5** (ft)	Total Minor Losses (ft)	Flow (gpm)	Velocity (fps)	Velocity Head (ft)	Friction Loss (ft)	**0.0** Minor Losses (ft)	Flow (gpm)	Velocity (fps)	Velocity Head (ft)	Friction Loss (ft)	**0.3** Minor Losses (ft)	Total Loss (ft)	TDH (ft)	Pump Flow (gpm)	HP at 75% eff. HP	
0	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	140.00	**0**	**0**	
100	0.21	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	100	0.16	0.00	0.00	0.00	100	0.10	0.00	0.03	0.00	0.04	140.04	**100**	**5**	
200	0.42	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.01	0.01	200	0.32	0.00	0.00	0.00	200	0.20	0.00	0.12	0.00	0.13	140.13	**200**	**9**	
300	0.63	0.01	0.01		0.00	0.00	0.00	0.00	0.00	0.02	0.02	300	0.48	0.00	0.00	0.00	300	0.31	0.00	0.25	0.00	0.28	140.28	**300**	**14**	
400	0.83	0.01	0.01		0.00	0.00	0.01	0.00	0.00	0.03	0.04	400	0.64	0.01	0.00	0.00	400	0.41	0.00	0.43	0.00	0.48	140.48	**400**	**19**	
500	1.04	0.02	0.01		0.00	0.00	0.01	0.00	0.01	0.04	0.06	500	0.80	0.01	0.00	0.00	500	0.51	0.00	0.65	0.00	0.72	140.72	**500**	**24**	
600	1.25	0.02	0.02		0.00	0.00	0.02	0.00	0.01	0.06	0.09	600	0.96	0.01	0.00	0.00	600	0.61	0.01	0.91	0.00	1.02	141.02	**600**	**28**	
700	1.46	0.03	0.02		0.00	0.00	0.03	0.00	0.01	0.08	0.12	700	1.12	0.02	0.00	0.00	700	0.71	0.01	1.21	0.00	1.36	141.36	**700**	**33**	
800	1.67	0.04	0.03		0.00	0.00	0.03	0.00	0.01	0.11	0.16	800	1.28	0.03	0.00	0.00	800	0.82	0.01	1.55	0.00	1.74	141.74	**800**	**38**	
900	1.88	0.05	0.04		0.00	0.00	0.04	0.00	0.02	0.14	0.20	900	1.44	0.03	0.00	0.00	900	0.92	0.01	1.93	0.00	2.17	142.17	**900**	**43**	
1,000	2.08	0.07	0.05		0.00	0.00	0.05	0.00	0.02	0.17	0.24	1,000	1.60	0.04	0.00	0.00	1,000	1.02	0.02	2.34	0.00	2.64	142.64	**1,000**	**48**	
1,100	2.29	0.08	0.06		0.00	0.00	0.07	0.00	0.02	0.20	0.29	1,100	1.76	0.05	0.00	0.00	1,100	1.12	0.02	2.79	0.01	3.15	143.15	**1,100**	**53**	
1,200	2.50	0.10	0.07		0.00	0.00	0.08	0.00	0.03	0.24	0.35	1,200	1.91	0.06	0.00	0.00	1,200	1.23	0.02	3.28	0.01	3.71	143.71	**1,200**	**58**	
1,300	2.71	0.11	0.08		0.00	0.00	0.09	0.00	0.03	0.29	0.41	1,300	2.07	0.07	0.00	0.00	1,300	1.33	0.03	3.80	0.01	4.30	144.30	**1,300**	**63**	
1,400	2.92	0.13	0.09		0.00	0.00	0.11	0.00	0.04	0.33	0.48	1,400	2.23	0.08	0.00	0.00	1,400	1.43	0.03	4.36	0.01	4.94	144.94	**1,400**	**68**	
1,500	3.13	0.15	0.10		0.00	0.00	0.12	0.00	0.05	0.38	0.55	1,500	2.39	0.09	0.00	0.00	1,500	1.53	0.04	4.96	0.01	5.62	145.62	**1,500**	**74**	
1,600	3.33	0.17	0.12		0.00	0.00	0.14	0.00	0.05	0.43	0.62	1,600	2.55	0.10	0.00	0.00	1,600	1.63	0.04	5.59	0.01	6.34	146.34	**1,600**	**79**	
1,700	3.54	0.19	0.13		0.00	0.00	0.16	0.00	0.06	0.49	0.70	1,700	2.71	0.11	0.00	0.00	1,700	1.74	0.05	6.25	0.01	7.09	147.09	**1,700**	**84**	
1,800	3.75	0.22	0.14		0.00	0.00	0.17	0.00	0.07	0.55	0.79	1,800	2.87	0.13	0.00	0.00	1,800	1.84	0.05	6.95	0.02	7.89	147.89	**1,800**	**90**	
1,900	3.96	0.24	0.16		0.00	0.00	0.19	0.00	0.07	0.61	0.88	1,900	3.03	0.14	0.00	0.00	1,900	1.94	0.06	7.68	0.02	8.73	148.73	**1,900**	**95**	
2,000	4.17	0.27	0.17		0.00	0.00	0.22	0.00	0.08	0.67	0.97	2,000	3.19	0.16	0.00	0.00	2,000	2.04	0.06	8.44	0.02	9.61	149.61	**2,000**	**101**	
2,100	4.38	0.30	0.19		0.00	0.00	0.24	0.00	0.09	0.74	1.07	2,100	3.35	0.17	0.00	0.00	2,100	2.14	0.07	9.24	0.02	10.52	150.52	**2,100**	**106**	
2,200	4.59	0.33	0.21		0.00	0.00	0.26	0.00	0.10	0.82	1.18	2,200	3.51	0.19	0.00	0.00	2,200	2.25	0.08	10.07	0.02	11.48	151.48	**2,200**	**112**	
2,300	4.79	0.36	0.23		0.00	0.00	0.29	0.00	0.11	0.89	1.28	2,300	3.67	0.21	0.00	0.00	2,300	2.35	0.09	10.93	0.03	12.47	152.47	**2,300**	**118**	5 cfs
2,400	5.00	0.39	0.24		0.00	0.00	0.31	0.00	0.12	0.97	1.40	2,400	3.83	0.23	0.00	0.00	2,400	2.45	0.09	11.83	0.03	13.50	153.50	**2,400**	**124**	
2,500	5.21	0.42	0.26		0.00	0.00	0.34	0.00	0.13	1.05	1.52	2,500	3.99	0.25	0.00	0.00	2,500	2.55	0.10	12.76	0.03	14.57	154.57	**2,500**	**130**	
2,600	5.42	0.46	0.28		0.00	0.00	0.36	0.00	0.14	1.14	1.64	2,600	4.15	0.27	0.00	0.00	2,600	2.66	0.11	13.72	0.03	15.67	155.67	**2,600**	**136**	
2,700	5.63	0.49	0.30		0.00	0.00	0.39	0.00	0.15	1.23	1.77	2,700	4.31	0.29	0.00	0.00	2,700	2.76	0.12	14.71	0.04	16.82	156.82	**2,700**	**143**	6 cfs
2,800	5.84	0.53	0.32		0.00	0.00	0.42	0.00	0.16	1.32	1.90	2,800	4.47	0.31	0.00	0.00	2,800	2.86	0.13	15.73	0.04	18.00	158.00	**2,800**	**149**	
2,900	6.04	0.57	0.35		0.00	0.00	0.45	0.00	0.17	1.42	2.04	2,900	4.63	0.33	0.00	0.00	2,900	2.96	0.14	16.79	0.04	19.22	159.22	**2,900**	**155**	
3,000	6.25	0.61	0.37		0.00	0.00	0.49	0.00	0.18	1.52	2.19	3,000	4.79	0.36	0.00	0.00	3,000	3.06	0.15	17.87	0.04	20.47	160.47	**3,000**	**162**	
3,100	6.46	0.65	0.39		0.00	0.00	0.52	0.00	0.19	1.62	2.33	3,100	4.95	0.38	0.00	0.00	3,100	3.17	0.16	18.99	0.05	21.76	161.76	**3,100**	**169**	
3,200	6.67	0.69	0.41		0.00	0.00	0.55	0.00	0.21	1.73	2.49	3,200	5.11	0.40	0.00	0.00	3,200	3.27	0.17	20.14	0.05	23.09	163.09	**3,200**	**176**	7 cfs
3,300	6.88	0.73	0.44		0.00	0.00	0.59	0.00	0.22	1.84	2.64	3,300	5.27	0.43	0.00	0.00	3,300	3.37	0.18	21.32	0.05	24.46	164.46	**3,300**	**183**	
3,400	7.09	0.78	0.46		0.00	0.00	0.62	0.00	0.23	1.95	2.81	3,400	5.43	0.46	0.00	0.00	3,400	3.47	0.19	22.53	0.06	25.86	165.86	**3,400**	**190**	
3,500	7.30	0.83	0.49		0.00	0.00	0.66	0.00	0.25	2.07	2.97	3,500	5.59	0.48	0.00	0.00	3,500	3.57	0.20	23.77	0.06	27.30	167.30	**3,500**	**197**	
3,600	7.50	0.87	0.52		0.00	0.00	0.70	0.00	0.26	2.19	3.15	3,600	5.74	0.51	0.00	0.00	3,600	3.68	0.21	25.04	0.06	28.77	168.77	**3,600**	**205**	
3,700	7.71	0.92	0.54		0.00	0.00	0.74	0.00	0.28	2.31	3.32	3,700	5.90	0.54	0.00	0.00	3,700	3.78	0.22	26.35	0.07	30.28	170.28	**3,700**	**212**	
3,800	7.92	0.97	0.57		0.00	0.00	0.78	0.00	0.29	2.44	3.51	3,800	6.06	0.57	0.00	0.00	3,800	3.88	0.23	27.68	0.07	31.83	171.83	**3,800**	**220**	
3,900	8.13	1.03	0.60		0.00	0.00	0.82	0.00	0.31	2.57	3.69	3,900	6.22	0.60	0.00	0.00	3,900	3.98	0.25	29.04	0.07	33.41	173.41	**3,900**	**228**	
4,000	8.34	1.08	0.63		0.00	0.00	0.86	0.00	0.32	2.70	3.89	4,000	6.38	0.63	0.00	0.00	4,000	4.09	0.26	30.43	0.08	35.02	175.02	**4,000**	**236**	

Table C-3: Estimated Cost of Construction of the Blanco Drain Diversion Pump Station
16" Force Main
Preliminary Design Cost Estimate

April-14
By: Josh Tabije

Item of Work	Unit	Unit Cost	Quantity	Subtotal
Mobilization / Demobilization				
~ 5% of of project cost. This cost includes permits, fees, temporary structures, equipment rental and various misc. items				***$86,000***
Structures				
96" Precast Manhole	EA	$30,000	1	$30,000
Cast-In-Place Concrete	CY	$1,000	40	$40,000
Concrete Dowel Inserts	EA	$300	30	$9,000
Wetwell Inlet Pipe	LF	$300	80	$24,000
				$79,000
Miscellaneous Exterior Site Work				
Excavation	CY	$140	180	$25,200
Site Shoring	SF	$3	1200	$3,600
Concrete Channel Lining	CY	$410	20	$8,200
Concrete Seal Slab	CY	$340	4	$1,360
Concrete Stairs	CY	$420	4	$1,680
Grouted RipRap	CY	$160	38	$6,080
				$46,120
Pump Station/Channel Ammenities				
88 hp Flygt Centrifugal Pump	EA	$79,200	2	$158,400
Pump Installation	LS	$12,000	1	$12,000
Pump Discharge Pipe	LF	$200	50	$10,000
Aluminum Pump Access Hatch	EA	$17,900	1	$17,900
Fiberglass Railing	LS	$12,000	1	$12,000
				$210,300
Force Main				
16-Inch C900 PVC with Trench and Backfill	LF	$100	9000	$900,000
16-Inch C900 PVC HDD	LF	$600	500	$300,000
				$1,200,000
Electrical Equipment				
Electrical Equipment (Including Installation)	LS	$158,000	1	$158,000
Electrical Conduit Run	LF	$100	100	$10,000
				$168,000
ESTIMATED CONSTRUCTION COST				**$1,789,420**
INSPECTION AND TESTING (15%)				**$268,000**
CONSTRUCTION CONTINGENCY (20%)				**$358,000**
ESTIMATED TOTAL CONSTRUCTION COST				**$2,415,000**
DESIGN, PERMITTING, LEGAL (40%)				**$966,000**

This estimate of construction cost is a professional opinion, based upon the engineer's experience with the design and construction of similar projects. It is prepared only as a guide and is subject to change. Schaaf & Wheeler and its subconsultants make no warranty, whether expressed or implied, that the actual costs will not vary from these estimated costs, and assumes no liability for such variances. This estimate specifically excludes any costs associated with designing for handling and disposal of hazardous wastes and contaminated materials. Costs associated with land, right-of-way, or easement purchase are not included in this estimate.

Table C-4: Estimated Cost of Construction of the Blanco Drain Diversion Pump Station
20" Force Main
Preliminary Design Cost Estimate

2-Apr-14
By: Josh Tabije

Item of Work	Unit	Unit Cost	Quantity	Subtotal
Mobilization / Demobilization				
~ 5% of of project cost. This cost includes permits, fees, temporary structures, equipment rental and various misc. items				***$109,000***
Structures				
96" Precast Manhole	EA	$30,000	1	$30,000
Cast-In-Place Concrete	CY	$1,000	40	$40,000
Concrete Dowel Inserts	EA	$300	30	$9,000
Wetwell Inlet Pipe	LF	$300	80	$24,000
				$79,000
Miscellaneous Exterior Site Work				
Excavation	CY	$140	180	$25,200
Site Shoring	SF	$3	1200	$3,600
Concrete Channel Lining	CY	$410	20	$8,200
Concrete Seal Slab	CY	$340	4	$1,360
Concrete Stairs	CY	$420	4	$1,680
Grouted RipRap	CY	$160	38	$6,080
				$46,120
Pump Station/Channel Ammenities				
143 hp Pump	EA	$128,700	2	$257,400
Pump Installation	LS	$12,000	1	$12,000
Pump Discharge Pipe	LF	$200	50	$10,000
Aluminum Pump Access Hatch	EA	$17,900	1	$17,900
Fiberglass Railing	LS	$12,000	1	$12,000
				$309,300
Force Main				
20-Inch C900 PVC with Trench and Backfill	LF	$130	9000	$1,170,000
20-Inch C900 PVC HDD	LF	$600	500	$300,000
				$1,470,000
Electrical Equipment				
Electrical Equipment (Including Installation)	LS	$257,000	1	$257,000
Electrical Conduit Run	LF	$100	100	$10,000
				$267,000
ESTIMATED CONSTRUCTION COST				**$2,280,420**
INSPECTION AND TESTING (15%)				**$342,000**
CONSTRUCTION CONTINGENCY (20%)				**$456,000**
ESTIMATED TOTAL CONSTRUCTION COST				**$3,078,000**
DESIGN, PERMITTING, LEGAL (40%)				**$1,232,000**

This estimate of construction cost is a professional opinion, based upon the engineer's experience with the design and construction of similar projects. It is prepared only as a guide and is subject to change. Schaaf & Wheeler and its subconsultants make no warranty, whether expressed or implied, that the actual costs will not vary from these estimated costs, and assumes no liability for such variances. This estimate specifically excludes any costs associated with designing for handling and disposal of hazardous wastes and contaminated materials. Costs associated with land, right-of-way, or easement purchase are not included in this estimate.

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Appendix D: References

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