Erler & Kalinowski, Inc.

UPDATE TO WATERSHED SANITARY SURVEY

City of Tracy
Tracy, California

Prepared for:

City of Tracy

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Consulting engineers and scientists

Update to Watershed Sanitary Survey
City of Tracy, California

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LIST OF ABBREVIATIONS AND ACRONYMS

AF	acre-feet
AFY	acre-feet per year
ASR	aquifer storage and recovery
AWWA	American Water Works Association
BBID	Byron Bethany Irrigation District
BCID	Banta-Carbona Irrigation District
bgs	below ground surface
BOD	biological oxygen demand
BV	Black & Veatch Corporation
CDPH	California Department of Public Health
cfs	cubic feet per second
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Quality Control Board
DBP	Disinfection By-Product
DDBR	Disinfectants/Disinfection By-Product Rule
Delta	Sacramento-San Joaquin Delta Region
DGWTP	Nick C. DeGroot Water Treatment Plant
DMC	Delta-Mendota Canal
DPW	Department of Public Works
DWR	State of California Department of Water Resources
EKI	Erler & Kalinowski, Inc.
EPA	United States Environmental Protection Agency
ERP	Emergency Response Plan
HAA5	five regulated haloacetic acids
IESWTR	Interim Enhanced Surface Water Treatment Rule
JPP	C.W. “Bill” Jones Pumping Plant
JJWTP	John Jones Water Treatment Plant
M&I	municipal and industrial
MCL	maximum contaminant level
MCLG	maximum contaminant goal level

LIST OF ABBREVIATIONS AND ACRONYMS

mgd	million gallons per day
mg/L	milligrams per liter
MPN/100 mL	most probable number units per 100 milliliters
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulation
NSDWR	National Secondary Drinking Water Regulations
NTU	nephelometric turbidity units
RR	Revised Radionuclides Rule
SC Project	South County Surface Water Supply Project
SLDMWA	San Luis and Delta-Mendota Water Authority
SRW	Stanislaus River Watershed
SSJID	South San Joaquin Irrigation District
SSJMC	South San Joaquin Main Canal
Survey Update	EKI's 2010 Sanitary Survey Update of the Tracy Watershed
SWP	State Water Project
SWRCB	State Water Resources Control Board
TBP	Temporary Barrier Project
TDS	total dissolved solids
THM	trihalomethanes
TOC	total organic carbon
TON	threshold odor number
TTHM	total trihalomethanes
UCMR	Unregulated Contaminant Monitoring Rule
USBR	United States Bureau of Reclamations
UV	Ultraviolet
VA	Vulnerability Assessment
WSID	West Side Irrigation District
WWTP	Wastewater Treatment Plant

1 INTRODUCTION

In accordance with the requirements of the State of California State Water Resources Control Board ("SWRCB") Division of Drinking Water, the City of Tracy ("Tracy" or the "City") has completed this 2015 Sanitary Survey Update ("Survey Update) for its watershed. The content of this Update is intended to meet the standards presented in the guidance manual for sanitary surveys prepared by the American Water Works Association ("AWWA", 1993). Tracy originally conducted a Sanitary Survey in 1995 and was last updated in 2010. The general area considered for the Sanitary Survey is presented on Figure 1.

The 2015 Survey Update includes a review of the 2010 Survey Update and a discussion of the progress Tracy has made on each of the recommendations presented in the 2010 Survey Update. The 2015 Survey Update also reviews any significant changes in the water supply, recent water quality data, Tracy's ability to meet upcoming water quality standards, and other relevant findings, conclusions, and recommendations.

More specifically, this Survey Update will address the following:

- Description of the current watershed and water supply system (including the United States Bureau of Reclamation's ("USBR's") Central Valley Project ("CVP") water delivered through the Delta-Mendota Canal (DMC), and the South County Water Project ("SC Project"), which treats and delivers water to Tracy from the South San Joaquin Irrigation District ("SSJID");
- Review and update of the recommendations from the 2010 Survey Update;
- Summary of future potential water supply sources for the City of Tracy;
- Review of potential contamination sources and control and management practices for the DMC, which delivers water to Tracy from the CVP;
- Identification of potential contamination sources, and control and management practices for the SSJID water supply;
- Summary of water quality for both the CVP and SSJID water supplies;
- Recommendations to improve the quality of the water supply sources that provide water to the City of Tracy.

2 WATERSHED AND WATER SUPPLY SYSTEM

2.1 Watershed Characteristics

2.1.1.1 *Delta-Mendota Canal*

Historically, Tracy has received an annual allotment of raw surface water from the USBR CVP, transported through the DMC. Tracy's USBR contract is currently in the process of being renewed and it entitles the City to 10,000 acre-feet per year ("AFY") of CVP water from the DMC for municipal and industrial ("M&I") purposes.[1] In 1990, a group of agencies that use State Water Project ("SWP") water from the California Aqueduct completed a comprehensive sanitary survey of the SWP watershed. The California Department of Public Health ("CDPH") Drinking Water Division[2] verbally indicated that Tracy could use the SWP Sanitary Survey as the basis for its watershed survey because the configurations, modes of operation, and watershed locations for the SWP are similar to those of the CVP (EKI, 1995). Thus, the 1990 SWP Sanitary Survey (Brown and Caldwell, 1990), the SWP Sanitary Survey Updates (Department of Water Resources "DWR", 1996, 2001, 2006, 2011) can appropriately continue to serve as the basis for Tracy's 2015 Survey Update for the water supply source from the DMC.

Tracy has contracted with USBR for an additional 10,000 AFY of Agricultural-reliability surface water from the Banta-Carbona and West Side Irrigation Districts ("BCID" and "WSID", respectfully). Under these contracts, 10,000 AFY of CVP water from the DMC originally entitled to BCID and WSID will instead be available to meet Tracy's water demand. Sanitary survey information regarding this additional DMC water is consistent with the available information for the historic and existing water supply also delivered via the DMC.

2.1.1.2 *South County Surface Water Supply Project – Watershed Characteristics*

In August 2005, Tracy began receiving water from the South County ("SC") Project. The City is entitled to 11,120 AFY of water from the SC Project during normal and wet years. The SC Project aims to provide water from SSJID to the partner cities of Escalon, Lathrop, Manteca, and Tracy. Water from SSJID is processed and delivered via the Nick C. DeGroot Water Treatment Plant ("DGWTP") and transmission pipeline.

SSJID completed the first sanitary survey of its watershed in May 1996. The initial survey encompassed a delineated watershed, including the Woodward Reservoir watershed and the

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[1] It is important to note that contractual entitlement is not necessarily equivalent to the actual quantity of water the will be delivered by the USBR. Water allotments are highly dependent on the intended purpose of the contracted water (e.g., Agricultural versus Municipal and Industrial), hydrologic conditions, and environmental restrictions. According to the USBR, M&I-reliable water carries a higher priority than Agricultural-reliable water and has historically received a larger allotment relative its contractual entitlements. This reliability is explained further in Tracy's 2010 Urban Water Management Plan Update (EKI, 2011).

[2] The CDPH Drinking Water Division is now part of the State Water Resources Control Board ("SWRCB").

South San Joaquin Main Canal ("SSJMC"). The most recent survey update, prepared by Brown and Caldwell ("B&C") in May 2011, is a survey of the entire Stanislaus River Watershed ("SRW"), which includes both the Woodward Reservoir and the SSJMC. The next update to the SRW sanitary survey will occur in 2016. The 2011 SRW survey update by B&C will serve as the basis for this survey assessment with respect to the SSJID water supply for the 2015 Survey Update.

2.1.1 Natural Setting

2.1.1.1 *Delta-Mendota Canal - Natural Setting*

The DMC trends north to south through the Central San Joaquin Valley, from the Sacramento-San Joaquin Delta Region ("Delta") to the Mendota Pool, near Fresno. Water from the Sacramento, San Joaquin, Old River, and Middle River drainage basins, and saline water from Suisan Bay combine in the Delta to form the original source of the DMC water. The 2011 SWP Sanitary Survey Update (DWR, 2011) contains detailed information on all watersheds that supply both the CVP and the SWP with water, as well as information on the geology, hydrology, and land use within the respective watersheds.

2.1.1.2 *South County Surface Water Supply Project - Natural Setting*

SSJID collects rainfall and snowmelt runoff originating from the western slope of the Sierra Nevada via the Stanislaus River watershed (B&C, 2011). The Stanislaus River watershed encompasses a 980 square mile drainage basin that includes the Stanislaus River, New Melones Reservoir, Tulloch Reservoir, and several smaller reservoirs, lakes, and streams. Part of the watershed empties into the Goodwin Dam and then is diverted to the SSJMC, which feeds the Woodward Reservoir. The Woodward Reservoir and SSJMC watershed is shown in the lower portion of Figures 2-1 and 2-2 of Appendix A. Additional information on the geology, hydrology, soils, vegetation, and wildlife on the Stanislaus River Watershed, which feeds the Woodward Reservoir and SSJMC watershed, is also available in the SRW 2011 Survey Update.

2.1.2 Land Use

2.1.2.1 *Delta-Mendota Canal - Land Use*

The climate and fertile soil of the Central San Joaquin Valley support agriculture as the primary land use. Cultivated land dominates the landscape adjacent to the section of the DMC up stream of the City of Tracy John Jones Water Treatment Plant. This section of the DMC was evaluated in this Survey Update. In addition, grazing land, some gravel mining operations, and limited industrial and commercial activity also exist in the general area.

2.1.2.2 *South County Surface Water Supply Project - Land Use*

The area within the Woodward Reservoir and SSJMC watershed lies within the foothills of the Sierra Nevada, and is sparsely populated except for a few farms and ranch homes (B&C, 2011). The 3,300 acres that make up the Woodward Reservoir and lands adjacent to the reservoir are owned by SSJID. Historically, the majority of the land within the watershed was zoned for agriculture and was mostly non-irrigated land used for cattle grazing. The Woodward Reservoir zoning was converted to shared agriculture and drinking water resources. The zoning has allowed the SC Project to construct the water treatment plant and pipeline.

2.2 Supply System

2.2.1.1 *Delta-Mendota Canal - Supply System*

Owned by the USBR and operated by the San Luis & Delta Mendota Water Authority ("SLDMWA"), the DMC was built as part of the CVP to provide irrigation water to Central Valley farmers. The DMC consists of two segments; a 2.5-mile-long intake that runs from the juncture of Old and Middle Rivers into the C.W. "Bill" Jones Pumping Plant ("JPP"), and a 114-mile-long canal that extends south from the JPP to Mendota Pool in Fresno County. The first 98.62 miles of the 116.5-mile open canal is lined with concrete, and the remaining length of the canal that runs to the Mendota Pool at its terminus is unlined.

The DMC infrastructure consists of the JPP, the O'Neill Pumping Plant, the Mendota Pool, and the open canal that runs north to south through the Central Valley. Six pumps at the JPP, operating with a total capacity of 4,602 cubic feet per second ("cfs"), lift water 197 vertical feet from the Delta, Old River, Grant Line Canal, and Middle River into the DMC. Construction was completed on an intertie between the California Aqueduct and the DMC in April 2012. The intertie will allow water pumped at the JPP to be conveyed in the California Aqueduct to O'Neill Pumping Plant, and the Mendota Pool.

Water for Tracy from the DMC is treated at the John Jones Water Treatment Plant ("JJWTP"). The plant has a capacity of 30 million gallons per day ("mgd"). The JJWTP intake that supplies Tracy with its annual allotment of DMC water is located at canal mile 15.95. Figure 1, adapted from the 2000 Sanitary Survey Update, shows the DMC intake canal, Old River, Grant Line Canal, the JPP, and the location of Tracy's JJWTP.

2.2.1.2 *South County Water Project - Supply System*

SSJID collects water from the Stanislaus River watershed. Raw water travels through the SSJMC and then flows to the Woodward Reservoir. The reservoir, built over 80 years ago, holds approximately 36,000 acre-feet ("AF") of water and is used for recreational use, including fishing. SSJID is the sponsoring agency of the SC Project that conveys drinking water to the cities of Escalon, Lathrop, Manteca, and Tracy.

The SC Project infrastructure consists of a water quality control structure, intake screens, a raw water pipeline, and a treated water pipeline (B&C, 2011). Water is pumped from Woodward Reservoir to the DGWTP. The facilities draw water from the upper impoundment of the reservoir, where recreational contact is prohibited. During the winter months, when body-contact with the reservoir is a minimum, water is drawn from a reservoir intake. During summer months, when fully-body contact recreation takes place, water is drawn from a canal intake.

After passing through the DGWTP, the treated water is distributed through a 40 mile pipeline that runs westward towards Manteca and Lathrop. The pipeline continues southwest crossing Highway 99 towards 120, and terminates in Tracy (BV, 2005).

2.3 City of Tracy's Water Sources

In 2009, 67 percent of the City's water supply was from the SC Project, 29 percent from the CVP water supplies via the DMC, and 4 percent from groundwater pumped from the 950 square mile Tracy Basin aquifer (City of Tracy, 2014). Discussion of the water quality associated with the DMC and the SC Project is included in Section 5. A summary of water supplies that the City is pursuing to meet additional future demand, beyond the scope of this Sanitary Survey Update, is provided in Section 2.6.

2.3.1 Surface Water Supply and Treatment Facilities

2.3.1.1 *Central Valley Project – Delta-Mendota Canal*

Tracy entered into a 40-year contract with the USBR in 1974 entitling the City to 10,000 AFY of water from the CVP via the DMC to be used for M&I purposes. The CVP system guarantees delivery of at least 75% of M&I contractual entitlement, or 75% of an entity's historical use of that contractual entitlement. Tracy's average deliveries of water in the last six years have been 67% of its M&I contract entitlement (EKI, 2016). This contract expired in 2014, however an interim agreement is in place and Tracy and USBR are currently negotiating its full renewal. Tracy expects a renewed contract to be completed in the near future. During drought conditions or other times of water shortage, the USBR water allotment under the current contract is subject to reductions as specified in the CVP M&I Water Shortage Provision, discussed in the 2000 Survey Update (EKI, 2000).

As of 2004, Tracy entered into two contracts with the USBR for 10,000 AFY of agricultural ("Ag") reliable water from the BCID and WSID contracts. This water will also be delivered from via the DMC. Because Tracy's USBR supply carries Ag-reliability its allocation is much more dependent on yearly hydrologic conditions than Tracy's M&I-reliable allocation. Average deliveries of Ag-reliable water during the last six years have been 31% of the contractual entitlement (EKI, 2016). During extreme dry years however, allocations of DMC water with

Ag-reliability has historically been reduced to as low as 0% of its contractual entitlement (Steve Bayley, personal communication, 2016).

The DMC canal is fed by water that the JPP pumps from the Delta, Old River, Grant Line Canal, and Middle River. Grant Line Canal is fed by the Old River and for the purposes of this report will be considered synonymous with the Old River. Tracy operates three surface water intake pumps at the JJWTP that pump water from the DMC to the JJWTP. Completed in 1979 and expanded most recently in 2008 from 15 mgd to 30 mgd, the JJWTP is located at the southern end of the City, just east of the DMC and the SWP (Figure 2).

The JJWTP treatment unit treatment processes include aeration, coagulation, flocculation, sedimentation, filtration, and disinfection. Disinfection is accomplished by chlorination, as well as UV as an added barrier against viruses, including cryptosporidium. Chloramines are used as a secondary disinfectant to reduce the production of trihalomethanes ("THMs").

2.3.1.2 *South San Joaquin Irrigation District - South County Water Project*

As mentioned in Section 2.1, the SC Project is a partnership between the Cities of Tracy, Escalon, Lathrop, and Manteca, under the sponsorship of SSJID. Tracy is allotted 11,120 AFY of surface water from SSJID through the SC Project. The DGWTP is fed by water from the Woodward Reservoir, which collects water from the Woodward Reservoir Watershed and the SSJMC, both originating from the San Joaquin River Watershed.

As mentioned in Section 2.2 the facilities draw water from a controlled access area where recreational contact is prohibited. This area is separated from the area where body-contact recreation is permitted by a water quality control structure. The structure is further described in detail in the B&C Survey Update (2011). There are three 46-inch diameter intake screens at the intake facility, with room for a fourth to be installed in the future. Up to 65 mgd will be delivered to the DGWTP. The treatment process consists of pre-oxidation (for iron precipitation), coagulation and dissolved air flotation, chemical stabilization, membrane filtration, and disinfection by chlorination (B&C, 2011). The treated water is distributed through a 40-mile pipeline that runs westward towards Manteca and Lathrop. The pipeline then crosses Highway 99, runs south towards Highway 120, crosses the San Joaquin River and continues southwest towards Tracy.

2.3.2 Groundwater Supply

Tracy's groundwater source is the lower water-bearing zone of the Tulare Formation called the Tracy Basin aquifer. This water-bearing zone occurs at depths of 300-700 feet below ground surface ("bgs") and is confined by an extensive clay stratum known as the Corcoran Clay. It is part of a regional aquifer system in the San Joaquin subregion of the Central Valley groundwater basin (Kennedy Jenks, 1994).

Tracy currently operates nine groundwater extraction wells that pump from the Tracy Basin aquifer with a combined capacity of 15 mgd. The wells located near the JJWTP pump directly into the JJWTP clearwells, where the groundwater is blended with treated surface water. The outlying groundwater wells pump water into the water distribution system after disinfection. In 2014, the water demand from the groundwater wells was approximately 920 AF (City of Tracy, 2014). The safe yield of the groundwater basin is estimated to be approximately 9,000 AF.

2.4 Emergency Response Plans

2.4.1.1 *Delta-Mendota Canal*

In accordance with the Federal Public Health, Security and Bioterrorism Preparedness and Response Act of 2002, the City of Tracy was required to prepare a Vulnerability Assessment ("VA") and Emergency Response Plan ("ERP") for its water and wastewater facilities. The VA and ERP Reports were submitted to the United States Environmental Protection Agency ("EPA") in December 2003 and June 2004, respectively.

Tracy is a member agency of the SLDMWA, a collective of entities that draw water from the DMC. Emergency response procedures and protocols have been established in the event of an emergency, such as a pipeline break or tanker truck spill. In addition, representatives from Tracy attend the SLDMWA board meetings, and operators of the DMC maintain close communication with Tracy personnel regarding any canal shutdowns, canal cleaning, or changes in pump operations (Steve Bayley, personal communication, 2016).

2.4.1.2 *South County Surface Water Supply Project*

SSJID has prepared an ERP for water quality events in the pipeline (SSJID, 2014). In 2010, a field exercise was conducted between SSJID, Lathrop, Manteca, and Tracy. The field exercise included site visits, verification of sampling sites, and photo documentation of all system isolation valves. Following the exercise, a meeting was held to discuss how the exercise went.

2.5 Progress Made on 2010 Recommendations

During the Tracy Watershed Sanitary Survey Update in 2010, the following recommendations were made (EKI, 2010):

1. Pursue the completion of an Emergency Response Plan with the other South County Surface Water Project participants and SSJID;

2. Continue to monitor land planning, both within its planning area and those within unincorporated access of Alameda and San Joaquin Counties, to mitigate impacts of such developments on DMC water quality; and
3. Monitor the control and management practices implemented by SSJID to prevent contamination of its watersheds by recreational uses, agricultural uses and development.

Tracy's progress on these recommendations are described in the following subsections. Each section presents the recommendations summarized in Tracy's 2010 Survey Update along with a description of the City's mitigating efforts.

2.5.1 Pursue SSJID Emergency Response Plan

As discussed in Section 2.4.1.2, SSJID has completed the ERP for a water quality event in the pipeline (SSJID, 2014).

2.5.2 Monitor Land Planning That May Impact DMC Quality

Tracy has stayed very involved with the planning of new developments within its urban growth boundary, both to assure that the City can supply an adequate and reliable source of water to meet the increased demand, as well as to assess the impacts of the increased wastewater and storm water discharges to DMC and Old River.

2.5.3 Monitor implementation of SSJID policies

Tracy monitors policies being implemented by SSJID.

2.6 Future Water Supply

In addition to the water supply sources identified in Section 2.3, Tracy is also pursuing the following changes and additions to its water supply in the future:

- Byron Bethany Irrigation District ("BBID") River Water - Up to 2,430 AFY of surface water from the BBID would be delivered to the JJWTP. Contractual agreements and environmental documentation to deliver this water to the JJWTP via the DMC are completed.
- BBID USBR Contract – The Plain View Water District merged with BBID. A portion of the Plain View Water District receives USBR water supply. The City of Tracy is negotiating an agreement with BBID to assign a portion of the USBR water to the City as agricultural water is no longer needed.
- Water Recycling – According to Tracy Municipal Code (§11.30), all new subdivisions are required to install infrastructure to provide recycled water to meet non-potable water

demands. Tracy has instituted a Water Exchange Program that allows potable water currently used for irrigation purposes within the City to be transferred to new and proposed developments in exchange for an equivalent supply of non-potable water (EKI, 2005).

- Groundwater Banking – The City is pursuing groundwater banking through aquifer storage and recovery ("ASR") and the Semitropic Water Bank for droughts and other water system emergencies (EKI, 2005). The City could depend on the water in the event of an emergency situation or dry-year period.[3]

[3] Unlike the aforementioned future supplies however, water banking is not an actual source of water, but instead a method used for increasing the supply reliability by "storing" or "banking" surface water in the ground during wet years for use during times of drought. If Tracy were to use water it had banked with Semitropic or an ASR program, it would work to manage its supplies during subsequent years such that it could "refill" its water bank for future use.

3 POTENTIAL SOURCES OF CONTAMINATION

The following sections describe potential sources of contamination to the DMC and SC Project water supply systems. Information regarding potential contaminant sources are summarized from various surveys performed between 2000 and 2015 (described below).

EKI performed a visual inspection of watershed lands adjacent to the DMC between the JPP to the JJWTP in December 2015. The potential sources of contamination to the DMC between the intake canal to the JPP and the JJWTP identified in the 2010 Tracy Sanitary Survey Update, the 2001 SWP Sanitary Survey, and during EKI's visual inspection are summarized in Section 3.1.

Since the DMC is fed by Delta water via the Old River, sources of contamination to the Old River and to the Delta in general are also considered potential sources for the DMC. As part of this Survey Update, EKI performed an aerial photo review along stretches of the Grant Line Canal and the Old River. The purpose of the aerial photo review was to identify potential discharges to, and withdrawals from, the Grant Line Canal and the Old River, and to get a qualitative sense for the potential sources and types of contamination. The results from EKI's photo review are summarized in Section 3.2, along with potential sources of contamination to the Delta in general. Two figures showing agricultural diversions and drainage outfalls in the south Delta area, including along Old River and the Grant Line Canal, are included in Appendix B.

A field survey was originally performed for SSJID in 2000. B&C conducted another site survey in 2010 in the Woodward Reservoir and SSJMC watershed. Section 3.3 provides a summary of the B&C's 2010 survey, detailed in the SRW 2011 Survey Update, and a discussion of other potential sources of contamination to SSJID. The two main concerns for contamination to SSJID's water supply are from grazing cattle within the watershed and recreational uses of the Woodward Reservoir. The field survey will be updated by SSJID during the next sanitary survey update.

3.1 Potential Sources of Contamination to the DMC

The DMC was constructed to provide agricultural users in the Central Valley and Southern California with a reliable surface water supply. Because it was designed with water conservation in mind, runoff from the surrounding land is diverted to the canal, including runoff from agricultural and grazing land, and streets and highways. Thus, the DMC is vulnerable to contamination from natural organic matter and synthetic organic compounds including pesticides, fertilizers, animal waste, and petroleum-based products.

The following potential inflow sources between the water intake canal located upstream of the JPP and the JJWTP intake were identified by the 1990 SWP Sanitary Survey (Brown and Caldwell, 1990) and confirmed during the 2015 field survey:

- Agricultural and grazing land runoff (total of 32 drain inlets);
- Petroleum pipe overcrossings (approximately nine overcrossings);
- Roads and bridges (four county bridges, one Interstate 205 bridge, 28 drain inlets from the canal access road, four drain inlets from country roads, and two drain inlets from railroad right-of-ways);
- Groundwater well discharges (six pipes discharging groundwater into the canal– currently inactive).

The 1990 Survey did not quantify the volume or the water quality of these inflows to the DMC and discussions with Craig Thompson of Kennedy Jenks Consultants, and an internet search by EKI indicated that there are likely no sources of information to quantify the volume of any of the above inflows into the DMC. EKI's visual inspection of the DMC watershed in December 2015 verified the presence of these features, but noted that the six groundwater discharge points identified by Brown and Caldwell (1990) discharge intermittently to the DMC.

In addition, EKI noted the following potential sources of contamination during the December 2015 visual inspection:

- Urban runoff
- Wildlife; and
- Public-access points

The following subsections describe potential effects from the aforementioned potential sources of contamination.

3.1.1 Agricultural and Grazing Return Flows

Drainage from agricultural land may include fertilizers, fungicides, herbicides, and insecticides that are typically applied to crops in the Central San Joaquin Valley. In addition, livestock grazing can produce runoff that contains pathogens such as *Giardia* or *Cryptosporidium.* Livestock grazing can also cause erosion, which leads to increased levels of sediment, nutrients, pathogens, and total organic carbon ("TOC"). In particular, when organic compounds from agricultural return flows, a source of TOC, are combined with chlorine at a water treatment plant, disinfection by-products, such as THMs, may be created. To address this issue, JJWTP uses UV (in addition to chlorine) in the disinfection process, with chloramines added as a secondary disinfectant, to maintain a residual in the distribution system.

The SWP 2011 Sanitary Survey Update discusses the quantity and type of chemicals applied to crops in the Delta, Sacramento, and San Joaquin Basins. The SWP 2011 Sanitary Survey Update also discusses the number and type of livestock that graze in San Joaquin County and other counties within the boundary of the Delta. No data were available regarding the microbiological quality of agricultural return water that flows into the DMC upstream of the JJWTP.

3.1.2 Petroleum Pipe, Railroad, and Road Overcrossings

The petroleum pipes that cross the DMC have the potential to leak or rupture, spilling petroleum products into the canal. A train or vehicular accident on a road adjacent to or crossing the DMC could result in a spill of chemicals into the canal. The SLDMWA, the operator of the DMC, has emergency response procedures and equipment in place to respond to such events.

3.1.3 Discharge from Groundwater Wells

Groundwater discharged into the DMC from adjacent groundwater wells must meet certain water quality standards. These standards are further discussed in EKI's 2000 Survey Update. As noted above, the discharge points discharge groundwater intermittently into the DMC. The pumping equipment from all of the groundwater wells has been removed.

3.1.4 Urban Runoff

Urban runoff often includes pollutants such as suspended solids, road salts, heavy metals, petroleum hydrocarbons. Runoff from Patterson Pass Business Park is discharged into on-site catchment basins. Increased industrial and commercial activity adjacent to the DMC may increase the potential for contamination (e.g., accidental spills) (Steve Bayley, personal communication, 2016).

3.1.5 Wildlife

Wildlife, including many species of birds, has access to the DMC. Wildlife has the potential for bacteriological contamination of the water.

3.1.6 Public-access Points

During the December 2015 visual inspection, EKI noted a number of points along the DMC that were easily accessible to the public by pedestrians. Though no evidence of deliberate disturbances were observed, these points may be susceptible to activities such as illegal dumping. All road crossings had locked gates, but were accessible by a pedestrian.

3.2 Potential Sources of Contamination to the Old River and the Delta

In addition to the aforementioned potential sources of contamination to the DMC, the following were noted during EKI's 2015 photo review as potential sources of water quality degradation caused by activities along the Old River, or in the Delta in general:

- Agricultural return flows;
- Urban and storm water runoff;
- Flows from connected waterways and tributary inflows (such as the Old River, Grant Line and Fabian Bell Canals, and Middle River);
- Wastewater effluent;
- Saltwater intrusion from the Delta; and
- Recreational uses of the Delta water.

3.2.1 Agricultural and Grazing Discharges

Agricultural discharges into the Old River include seepage, surface runoff, and irrigation return water from the fields and grazing areas adjacent to the river. Although the amount of drainage has not been quantified, agricultural drainage into Old River is marked by seasonal fluctuations (Lee, 1998). Drainage volumes are highest in late fall and early winter, when surrounding agricultural fields are flooded to leach out salts, and during the summer, when the irrigation needs are greatest. These high relative volumes of agricultural return flows often result in low dilution ratios of river flow to drainage flow. During these periods of low dilution, potential agricultural return flows containing significant concentrations of pesticides and heavy metals may have a detrimental effect on the water quality of the Old River (Kennedy/Jenks, 1994). In addition to contributing high levels of synthetic organics, nitrogen-based nutrients, and heavy metals to the Old River, agricultural return flows were observed to have high THM formation potentials (Kennedy/Jenks, 1994).

3.2.2 Urban and Storm Water Runoff

Urban runoff contributes heavy metals, polycyclic aromatic hydrocarbons, fecal coliform and high salinity loads to the Old River (Stantec, 2012). Tracy's storm water is collected in particulate settlement detention basins and channeled north to the Old River. Storm water is discharged at three locations along the Old River: (1) an agricultural irrigation ditch collected storm water from the west side of Tracy and discharges to the Old River near Bethany Road, (2) a conduit collects storm water from a portion of the west side of Tracy and discharges into Old River at Lammers Road, (3) a conduit that collects storm water from the east side of Tracy discharges into Sugar Cut Canal (Figure 1). Runoff is regulated through the NPDES Program, managed by the Central Valley Regional Water Quality Control Board ("CVRWQCB"). The

City of Tracy adopted a NPDES Storm Water Management Plan to address and control urban runoff in December 2003.

Storm water runoff is also discharged from Mountain House, a community located north of Highway 205, south of the Old River, east of the San Joaquin/Alameda County boundary, and west of Patterson Pass Road. Storm water runoff from Mountain House is retained in particulate settlement basins prior to discharge to Old River.

3.2.3 Wastewater Treatment Plant Discharges

Old River flows through the Grant Line Canal and toward the DMC intake canal. The proximity of the Tracy WWTP discharge to the DMC intake canal raised initial concerned from the CDPH/SWRCB that Tracy may have occasionally "recycled" a portion of its treated wastewater back into the City's potable water system (EKI, 1995). In response to this concern and as part of the NPDES permitting requirements, Tracy studied and documented the dilution rate of fresh water to discharged water. The results showed dilution mostly in the area of a 50:1, with periods of higher and lower dilution (Steve Bayley, personal communication, 2016). This dilution is above the preferred minimum of 20:1 dilution identified by SWRCB sanitary rules.

Tracy completed a WWTP upgrade in 2008. The plant discharges effluent through one outfall at Old River. The NPDES permit CA0079154 currently allows for the discharge of 10.8 MGD and up to 16 MGD if applicable permit requirements are met.

The Central Valley Regional Water Quality Control Board ("CVRWQCB") requires Tracy to perform sampling of effluent into the Old River to assess compliance with the discharge and receiving water standards. Three sampling points, R-001, R-002, and R-003 (depicted on Figure 1) are located upstream and downstream of the WWTP outfall. At each sampling point multiple parameters are measured based on the permit. The monitoring results reviewed from the sampling do not indicate any significant differences in the monitored water quality parameters between the measurements taken upstream and downstream of the WWTP outfall (Steve Bayley, personal communication, 2016).

3.2.4 Flows from connected waterways

The Old River is interconnected with a number of tributaries that may receive potential contaminants described below. The lower San Joaquin River and the Delta receive industrial and domestic wastewater discharges and raw agricultural return waters. Delta water may also be impacted by high saline content, algae blooms, and recreational uses. Sugar Cut canal receives a significant portion of Tracy's storm water discharge. All of these bodies of water connect to the Old River, which in turn connects to the DMC, making them potential sources of contamination to the DMC. A series of temporary barriers described below however, address these water quality concerns by diverting water from the Old River during certain times of year.

Since 1991, temporary stream barriers installed at key places on the Old River have helped to mitigate any potential dilution issues by improving water levels, water quality, and water circulation. Temporary barriers are located at the confluence of the San Joaquin and Old Rivers, at Old River near the JPP, and at the western ends of Grant Line Canal and Middle River (Figure 1). Although these systems were not designed with the purpose of preventing Old River water from flowing into the DMC, they help to mitigate this problem. When in place, the temporary barrier on Old River near the JPP restricts the flow of Old River into the DMC intake canal and reduces flow toward the direction of the DMC Intake Canal. The temporary barriers are typically constructed in the spring and removed in the following September, prior to the start of the rainy season.

Construction was completed on an intertie between the California Aqueduct and the DMC in April 2012. The intertie allows water pumped at the JPP to be conveyed in the California Aqueduct to O'Neill Pumping Plant, and the Mendota Pool. Water from the California Aqueduct can also flow by gravity into the DMC. Up to 900 cfs could be conveyed from the California Aqueduct to the DMC using gravity flow to mitigate impacts on water deliveries attributable to temporary restrictions in flow or water levels in the aqueduct south of the intertie, or the DMC north of the intertie, for system maintenance or for an emergency outage of the DMC, JPP, or Tracy Fish Facility. Water quality in the California Aqueduct is generally of the same or higher quality than water in the DMC. There are therefore no water quality concerns for the DMC related to the intertie.

3.2.5 Saltwater Intrusion

Depending on the time of year, Delta water can contain elevated levels of salts (chloride and bromide) from seawater intrusion, especially during low-flow late fall conditions. Delta water with elevated salinity levels can be pumped into the DMC at the JPP, particularly during the late summer. Additional salt also reaches the DMC through agricultural drainage that is high in salinity. When surface water with chlorides, bromides, and a high organic content is treated with chlorine or ozone, it can form disinfection byproducts ("DBPs") such as chloroform and bromoform. DBPs are potentially carcinogenic.

Organic matter can find its way into the water supply through algal growth, agricultural activities, animal waste, storm water runoff, riparian growth along canals, wetlands, and wastewater treatment plants (DWR, 2011). Algae blooms are especially common in the Delta during low-flow, summer conditions. These sources of organic matter not only contribute to the formation of DBPs, but they also provide a surface for pathogens to adhere to, making disinfection less effective.

3.2.6 Recreational Use

Recreational uses of Delta water that involve water-contact include motor and house boating, fishing, water-skiing, wakeboarding, swimming, and sailing. The release of gasoline, diesel, and raw sewage during times of high recreational usage can negatively impact the Delta water that is pumped into the DMC (DWR, 2011). In addition, land-based activities such as hiking, horseback riding, and off-road vehicles can also accelerate erosion, causing increased turbidity in Delta water and potentially in the DMC water.

A study conducted by the Delta Protection Commission in 2006 on recreational use in the Delta concluded that of six defined recreational areas, the area directly upstream of the JPP (Appendix C, Figure 4-21, Area F) had substantially fewer recreational opportunities than the more northern zones (DWR, 2011). Based on these findings, the impact of recreational use on the DMC may not be as significant as the impact from other sources identified above.

3.3 Potential Sources of Contamination to SSJID

Land-use within the Woodward Reservoir watershed is predominantly zoned as agriculture, with the majority of the land used for cattle grazing. Much of the area surrounding the watershed still contains native vegetation. From two miles west of Goodwin Dam along the SSJMC to Woodward Reservoir, there were no identified sources of inflow to the surface water supply (B&C, 2010).

The major forms of potential contamination discussed in the SSJID Survey Update include recreational uses and cattle grazing. Several locations were observed along the SSJMC and close to the Woodward Reservoir where cattle and/or other livestock have access to the canal. Cattle has been previously observed where the canal empties into the reservoir, along the western arm (BV, 2005). The reservoir's uses include irrigation, camping, picnicking, fishing, boating, swimming, and duck hunting (B&C, 2011). In addition there are three sewage lift stations, several restroom facilities on the western shore of the reservoir, and a small treatment facility located on the southwestern shore. These potential sources of contamination are summarized in Sections 3.3.1 through 3.3.3.

On a broader scale, SSJID is also potentially affected by contamination that occurs within the entire Stanislaus River Watershed, which is the main feed to the SSJMC and the Woodward Reservoir Watershed. A field assessment of the entire Stanislaus River Watershed is described in the SRW 2011 Update and in Section 3.3.4 below.

3.3.1 Dairy and Turkey Farms

Contaminated runoff from farming operations at Dairy farms was identified as a potential source of *Cryptosporidium* oocysts, *Giardia*, other viruses, nitrates, and other salts to the watershed during the 1996 SSJID Survey Update. At least one dairy has two sludge lagoons installed under CVRWQCB regulation to limit the amount of contaminated runoff (BV, 2005).

A turkey farm was also identified in the watershed, but is not currently under CVRWQCB regulations for runoff. Discharges from the farm likely reach the Woodward Reservoir.

3.3.2 Grazing Animals

Land use within the Woodward Reservoir watershed is predominantly non-irrigated agricultural land used for range cattle ranching. Access to the SSJMC by grazing animals is generally limited by either steep terrain or fencing. A portion of the canal between the Goodwin Dam and the Woodward Reservoir also runs underground through a tunnel. As the canal approaches the reservoir, there are several locations where the fence is ineffective, providing cattle with access to both the SSJMC and the Woodward Reservoir Watershed. Cattle and other grazing animals have the potential to contaminate the water with viruses (e.g., *Cryptosporidium* and *Giardia*). Due to the nature of the land use as rangeland, the number of cattle within the watershed is hard to track and control. To prevent access to the canal and watershed, SSJID fixed the fencing along the SSJMC (EKI, 2011).

3.3.3 Recreation

Recreational uses of the Woodward Reservoir include swimming, water skiing, boating, camping, and picnicking. Body-contact activities such as swimming have the potential to introduce viruses into the watershed, as well as expose humans to potential contamination. Non-body contact activities, such as boating and camping also have the potential to contaminate the reservoir. Boating has the potential to contaminate the watershed with fuel contaminants such as gasoline, oil, and MTBE. However, as of the 2011 SRW Survey, MTBE was not a known contaminant in the watershed.

Other non-body contact activities such as camping can also have a negative effect on water quality. The campsites, both developed and undeveloped, are located very close to the water's edge. Litter and spills from campsites have the potential to reach the reservoir and contaminate the water. Erosion from these sites can also negatively impact the reservoir (i.e., higher turbidity, higher suspended and dissolved solids concentrations).

Wastewater treatment facilities and portable toilets were not identified as a concern for potential contamination in B&C's 2011 Survey Update (2011).

3.3.4 Stanislaus River Watershed

The activities that have the potential to adversely affect the Stanislaus River watershed, which feeds the Woodward Reservoir Watershed through the Goodwin Dam, include body-contact recreation (i.e., swimming, water skiing), cattle grazing, population growth, spills from wastewater treatment plants and waste collection systems, livestock grazing and stream access, and erosion. B&C did not identify any specific activities in the Stanislaus River watershed as potential major sources of contamination to the Woodward Reservoir watershed in the most recent SRW Survey Update.

3.4 Anticipated Growth and Projected Changes in Sources of Contaminants

3.4.1.1 *Delta-Mendota Canal*

Future development within Tracy's urban growth boundary will increase the contribution of storm water runoff to the Old River, as discussed in Section 3.2.2. At the same time, development in those areas will decrease the volume of agricultural runoff to both Old River and the DMC. The storm water systems are designed to trap oil and other floating and sinking contaminants before they are discharged to retention basins (Stantec, 2012). In the retention basins, heavier contaminants have more time to settle out of the water (Stantec, 2012) reducing the impact of the storm water on Old River. Additionally, new developments are required to incorporate low impact development practices in order to manage and reduce the impact of storm water on the Old River (Stantec, 2012).

3.4.1.2 *South San Joaquin Irrigation District*

The Woodward Reservoir watershed does not include any towns or cities and the land is primarily used as rangeland. Therefore, population growth and urbanization are expected to be slow. Although development is not likely to increase significantly in the coming years, upstream growth in areas such as the Tulloch Watershed may have an impact on contamination within the Stanislaus River watershed and ultimately within the Woodward Reservoir watershed.

Population growth and urbanization are projected to occur within the Stanislaus River Watershed since the 2000 SSJID Survey Update. Sources of contamination resulting from development and expansion include urban runoff, recreational use of the New Melones Reservoir and United States Forest Service lands, traffic accidents, septic tanks, and WWTP discharges into the watershed (B&C, 2011). These sources of contamination could lead to increased levels of pollutants such as bacteria, pesticides, herbicides, surfactants, solids, and turbidity, as well as increased nutrient levels.

4 WATERSHED CONTROL AND MANAGEMENT PRACTICES

This section addresses the current controls in place to mitigate the potential sources of contamination described in Section 3.

4.1 Delta-Mendota Canal

4.1.1 Agency Oversight

The water that is pumped from the Delta into the DMC is mainly affected by municipal and industrial wastewater discharges, urban and agricultural runoff, and seawater intrusion. The CVRWQCB regulates discharges from municipal and industrial facilities, as well as urban storm water runoff under the NPDES program. Detailed information on these issues is presented in the 2011 SWP Sanitary Survey.

4.1.2 Temporary Barrier Project ("TBP")

The TBP was implemented to increase flows in the San Joaquin River to promote fish migration, improve water circulation throughout the Delta, and maintain water levels during the agricultural irrigation season. The barrier of most relevance to Tracy and this sanitary survey update is the one located along the Old River east of the DMC intake at the JPP (Figure 1). This barrier, known as the "DMC barrier", is typically installed in April and then removed in late September of each year. Although these systems were not designed with the purpose of preventing Old River water from flowing into the DMC, they help to mitigate this problem. The DMC barrier has historically been effective in achieving the goals of improving water circulation and quality, and meeting the irrigation demands of local farmers. When in place, the temporary barrier on Old River near the JPP restricts the flow of Old River into the DMC intake canal and reduces flow toward the direction of the DMC Intake Canal. The operation of the TBP has not changed since its initiation in 1991 (West Yost & Associates, 2002). The DMC barrier is further described in the 2000 Survey Update. See Appendix D for the DMC barrier construction schedule.

4.1.3 Runoff Control

Because most surface drainage occurs only during winter months, runoff into the DMC between the JPP and the JJWTP is believed to be only a small percentage of the total flow in the DMC. The majority of the land adjacent to the DMC between the JPP and the JJWTP is agricultural, however not all runoff from this land drains into the DMC. Since this land is not within Tracy's Urban Growth Boundaries, it is not governed by the City, but by Alameda and San Joaquin

Counties. Numerous ordinances exist to regulate development, grading, and associated runoff of agricultural lands, but none specifically address drainage into the DMC.

Tracy monitors development plans for areas within the Urban Growth Boundary that drain into the DMC to assure that the proposed development does not adversely impact the water quality of the DMC. To minimize negative impacts to the DMC water, the City has suggested a number of control measures, including routing storm water under or over the DMC so that it is not discharged directly into the canal (Steve Bayley, personal communication, 2016). As of 2015, the City has not implemented any new control measures as there has been no development in the areas draining to the DMC (Steve Bayley, personal communication, 2016).

4.2 SSJID / South County Water Supply Project

4.2.1 Agency Oversight

SSJID relies on several agencies (SWRCB, CVRWQCB, and EPA) to oversee their watershed and compliance of their watershed, including the SC Project (treatment plant and pipe). Based on the findings of the SSJID 2005 Survey Update, the watershed does not have any current identified sources of runoff or discharge into the SSJMC that are regulated by CVRWQCB under the NPDES program.

4.2.2 Cattle Grazing Control

During construction of the DGWTP, SSJID made improvements to manage and protect their watershed. The major improvement consisted of fence installation along areas of the SSJMC and the Woodward Reservoir to prevent cattle access. SSJID also completed minor grading to minimize runoff and to provide water to cattle in the winter.

4.2.3 Recreation

SSJID has restricted recreational access around the reservoir by developing a 30-foot boundary from the water line. This boundary will prevent campers, campsites, and parking from potentially contaminating the watershed. In addition, a second intake to the SCWTP was constructed upstream of the recreation area for use during summer months. The second intake decreased potential restrictions on recreational use within the watershed.

SSJID has also implemented educational measures aimed at informing the public about source-water protection efforts and changes in the permitted use of the Woodward Reservoir recreation area. These measures include distribution of educational materials and access to a Question / Answer forum for direct response to questions about SSJID's water protection efforts.

5 WATER QUALITY

5.1 Drinking Water Regulations

There are a variety of State and Federal drinking water regulations concerned with the quality of raw and treated water. The following paragraph gives a short explanation of a few of these regulations; a more complete description is provided in the 1996 SWP Sanitary Survey Update (DWR, 1996).

- Primary Maximum Contaminant Levels – National Primary Drinking Water Regulations ("NPDWRs" or "primary MCLs") are legally enforceable Federal standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water.
- Secondary Maximum Contaminant Levels – National Secondary Drinking Water Regulations ("NSDWRs" or "secondary MCLs") are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. Individual States, however, may choose to adopt them as enforceable standards.
- Notification and Response Levels (known as Action Levels until January 2005) – Notification levels are health-based advisory levels established by SWRCB for chemicals in drinking water that lack MCLs. When chemicals are found at concentrations greater than their notification levels, certain requirements and recommendations apply. If a chemical is present at the response level concentration, SWRCB recommends taking the source out of service.
- Total Coliform Rule – The Total Coliform Rule sets a maximum contaminant level goal ("MCLG") for total coliform (including fecal coliform and *E. coli*) of zero, and an MCL based on the presence or absence of total coliform. The rule requires all public water systems to monitor for the presence of total coliform in the distribution system.
- Surface Water Treatment Rule – The Surface Water Treatment Rule includes treatment technique requirements for filtered and unfiltered systems that are intended to protect against the adverse health effects of exposure to *Giardia lamblia*, viruses, and *Legionella*, as well as many other pathogenic organisms.

Since the 1996 Survey Update there have been several changes to State and Federal drinking water regulations. Below are some regulations that affect Tracy.

- Stage 1 Disinfectants/Disinfection Byproducts Rule ("DDBR") – Effective January 2002, the DDBR was enacted to regulate the concentrations of DBPs in drinking water.

- Stage 2 Disinfectants and Disinfection Byproducts Rule – Published in 2006, the Stage 2 Disinfectants and Disinfection Byproducts Rule ("Stage 2 DBPR"), builds on existing regulations by requiring water systems to meet disinfection byproduct ("DBP") maximum contaminant levels (MCLs) at each monitoring site in the distribution system to better protect public health.
- Interim Enhanced Surface Water Treatment Rule ("IESWTR") – Enacted in 1998, the IESWTR was developed to improve microbial pathogen control in drinking water, specifically the removal of *Cryptosporidium*, and to guard against microbial risk (DWR, 2001).
- California IESWTR – Drafted in March 2003, the California IESWTR was developed by the CDPH to more appropriately and more stringently protect the public from exposure to pathogens.
- Long Term 1 Enhanced Surface Water Treatment Rule – The Long Term 1 Enhanced Surface Water Treatment Rule ("LT1ESWTR") published in January 2002. The purposes of the LT1ESWTR are to improve control of microbial pathogens, specifically the protozoan Cryptosporidium, in drinking water, and address risk trade-offs with disinfection byproducts.
- Long Term 2 Enhanced Surface Water Treatment Rule – Published in 2006, the Long Term 2 Enhanced Surface Water Treatment Rule ("LT2ESWTR") improves control of microbial pathogens.
- Revised Radionuclides Rule ("RR") – Effective December 2003, the revised RR introduced an MCL for uranium and also finalized MCLGs for radionuclides.
- Proposed Radon Rule – In 1999 the EPA proposed a radon rule to prevent radon exposure from drinking water. The rule is not yet final.
- California MTBE Standard – In January 1999 the CDPH finalized a secondary MCL of 5 ug/L for MTBE. In May 2000, CDPH finalized a primary MCL of 13 ug/L.
- Revised Lead and Copper Rule – Revised in 1999 and finalized in April 2000, only minor changes were made by the EPA to the Lead and Copper Rule.
- Long-Term Revisions to the Lead and Copper Rule – Updated the Lead and Copper rule based on topics that were identified in the 2004 National Review, and to streamline the rule requirements.
- Arsenic Rule – Finalized in January 2001, the Arsenic rule established an MCLG and MCL for arsenic (0.0 and 0.01 milligrams per liter, "mg/L", respectively).
- Unregulated Contaminant Monitoring Regulation ("UCMR") – Originally enacted by the EPA in September 1999, the UCMR was developed to monitor unregulated chemicals. The EPA will use the data collected as part of the UCMR to determine and develop drinking water standards.

- Revised CDPH Unregulated Chemicals Requiring Monitoring – In January 2003, the CDPH limited the number of unregulated chemicals to be monitored from 52 chemicals to nine.
- Groundwater Rule – The federal Groundwater Rule went into effect November 1, 2010. The public health objective of this rule is to increase public health protection by reducing the risk of viruses and bacteria in drinking water wells.
- Filter Backwash Recycling Rule – In May 2001, EPA released a rule governing the process of recycling waste water generated by the backwashing of drinking water filters. The Filter Backwash Recycling Rule ("FBRR") is required by the Safe Drinking Water Act as one method of reducing the risks posed to consumers by microbial contaminants that may be present in public drinking water supplies.
- San Francisco Bay/Sacramento-San Joaquin Delta Water Quality Control Plan – The Water Board adopted a new plan in 2006. The Bay Delta Water Quality Control Plan establishes water quality control measures that protect the beneficial uses of San Francisco Bay and the Delta, that require control of salinity (caused by sea water intrusion, municipal discharges, and agricultural drainage) and water project operations (flows and diversions).
- Groundwater Replenishment Using Recycled Water Rule – Adopted by the Water Board in June 2014, it establishes criteria for implementing indirect potable reuse operations using surface application and subsurface injection of recycled water.

5.2 Existing Raw and Treated Water Quality

5.2.1 Raw Surface Water Quality

5.2.1.1 *Delta-Mendota Canal*

Raw surface water quality data from samples collected in the summer 2015 are listed in Appendix F. Total dissolved solids ("TDS") were detected at a concentration of 420 mg/L, which is close to the recommended secondary MCL of 500 mg/L. The higher TDS values are most likely reflective of the agricultural activity around the DMC and DMC's source waters, as well as of salt water intrusion in the Delta.

5.2.1.2 *South County Surface Water Supply Project*

Available raw water quality data are summarized and analyzed in the SRW 2011 Survey Update. A summary of raw water quality data collected from 2003 through 2010 is presented in Appendix G (B&C, 2011). Of the parameters monitored and reported in the SSJID 2005 Survey Update, almost all of the compounds were detected at concentrations below applicable water quality standards (i.e., MCLs).

Woodward Reservoir had consistently low total coliform concentrations, with occasional spikes above 1000 MPN/100mL, and a high of 3,255 MPN/100mL. The SSJMC microbial samples had higher concentrations of total coliform. After 2006, total coliform was routinely measured at above 1000 MPN/100mL, peaking in 2007 at 6472 MPN/100mL. These results indicate that a significant source of total coliform emerged after 2006 in the SSJMC. However, the fecal coliform concentration in the SSJMC peaked only in 2006 but not after that year. For fecal coliform, Woodward Reservoir measurements were consistently below 100 MPN/100mL, with an occasional value above 500 MPN/100mL. Similar results were seen for the SSJMC samples; the measurements were consistently below 100 MPN/100mL, with a notable spike in 2006 of 2,419 MPN/100mL. The fecal coliform data show no seasonal trends. In the future SSJID will have to closely monitor and regulate the occurrence of elevated levels of total and fecal coliform.

The SSJID 2010 Survey Update did not identify any other parameters or constituents of concern beyond those mentioned in this report.

5.2.2 Groundwater Quality

Tracy groundwater is considered to be hard. The data from the Consumer Confidence Report, included as Appendix E, indicate an average TDS concentration of 676 mg/L and an average total hardness of 250 mg/L expressed as calcium carbonate. The average TDS concentration exceeds the recommended secondary MCL of 500 mg/L.

5.2.3 Treated Water Quality

5.2.3.1 *John Jones Water Treatment Plant*

The potable water that Tracy delivers to customers from the DMC complies with all Federal and State of California drinking water standards. The treated DMC surface water supply and the supply from those wells not discharging to the JJWTP influent basin are tested at their respective points of entry into the distribution system.

Tracy's Consumer Confidence Report compares the water quality parameters after treatment at the JJWTP to applicable MCLs (see Appendix E). The data show that treated effluent concentrations from the JJWTP are below all applicable primary and secondary MCLs and MCLGs.

5.2.3.2 *South County Surface Water Project Water Treatment Plant*

The potable water that Tracy delivers to customers from the SC Project complies with all Federal and State of California drinking water standards. Tracy's Consumer Confidence Report compares the water quality parameters after treatment at the DGWTP to applicable MCLs (see

Appendix E). The data show that treated effluent concentrations from the DGWTP are below all applicable primary and secondary MCLs and MCLGs.

5.3 Monitoring Program

As described below, Tracy has established a regular monitoring program for both its raw and treated surface water.

5.3.1 Raw Water Monitoring Program

5.3.1.1 *Delta-Mendota Canal*

Tracy conducted an intensive one-year water quality analysis program between 2001 and 2002 to compare the quality of DMC and SWP surface water supplies. The results of the raw water monitoring program suggested that there was no significant difference in water quality between the DMC and the SWP California Aqueduct.

The USBR collects DMC water samples for analysis at the DMC Intake at Kelso Road. The USBR also collects samples from the DMC near Check 13 near the O'Neill Forebay, south of Tracy.

Source water samples of the DMC water supply are currently collected at the JJWTP Raw Water Pump Station on a weekly schedule when the plant is in service and analyzed for total and fecal coliform and for heterotrophic bacteria. Water quality data for *Giardia* and *Cryptosporidium* is collected monthly at McCabe Road (near the O'Neill Forebay), which is approximately 50 miles downstream of the Tracy turnout from the DMC. Due to its distance from Tracy's turnout, this sampling point may not be fully representative of the upstream microbial quality at the City's turnout.

5.3.1.2 *South San Joaquin Irrigation District*

As mentioned in Section 5.2.1, raw water samples have historically been collected at two intake locations, the reservoir and canal intakes. Depending on time of year, reservoir water is transferred from either the reservoir intake or the canal intake to prevent contamination from recreational activities.

5.3.2 Treated Water Monitoring Program

Tracy performs bacteriological monitoring of the potable water distribution system at 23 monitoring locations and performs THM and Haloacetic Acid analysis on water samples collected from eight sampling locations (Figure 2). In accordance with SWRCB requirements, Tracy also analyzes samples for several organic compounds. The sampling schedules for the above constituents are set according to SWRCB requirements.

The JJWTP and the DGWTP also monitor treated effluent according to their respective facility-specific Waste Discharge Requirements.

5.4 Ability to Meet Surface Water Treatment Regulation Requirements

To date, Tracy has met the surface water treatment regulation requirements imposed by SWRCB and the EPA.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The conclusions from the 2015 City of Tracy Watershed Sanitary Survey Update are summarized below:

1. Major potential sources of contamination to the DMC and Old River include agricultural runoff, wastewater treatment plant discharges, and seawater intrusion.
2. Major potential sources of contamination to the SC Project include recreational use.
3. Implementation of the TBP seasonal barrier at Old River near the JPP (operating Spring and Summer) has been effective in limiting flows from Old River into the DMC.
4. Tracy is actively involved in the planning of new developments within its urban growth boundary to ensure adequate and reliable water to meet increasing water demands from Tracy's growing population, as well as to assess the impacts of the increased wastewater and storm water discharges to DMC and Old River.
5. The City will work with the new developments within Tracy's urban growth boundary to limit discharges of storm water runoff into the DMC.
6. The raw and treated surface water from the DMC and SC Project generally meet applicable water standards.
7. Additional water supply options that are currently being considered or negotiated (e.g., from aquifer storage and recovery, out of area groundwater storage, recycled water, or BBID river and USBR water) will be addressed in the next update to Tracy's Sanitary Survey.

6.2 Recommendations

Based on the findings of the 2010 Survey Update, EKI recommends that the City of Tracy:

1. Continue to monitor land planning, both within its planning area and those within unincorporated access of Alameda and San Joaquin Counties, to mitigate impacts of such developments on DMC water quality;
2. Monitor the control and management practices implemented by SSJID to prevent contamination of its watersheds by recreational uses, agricultural uses and development.

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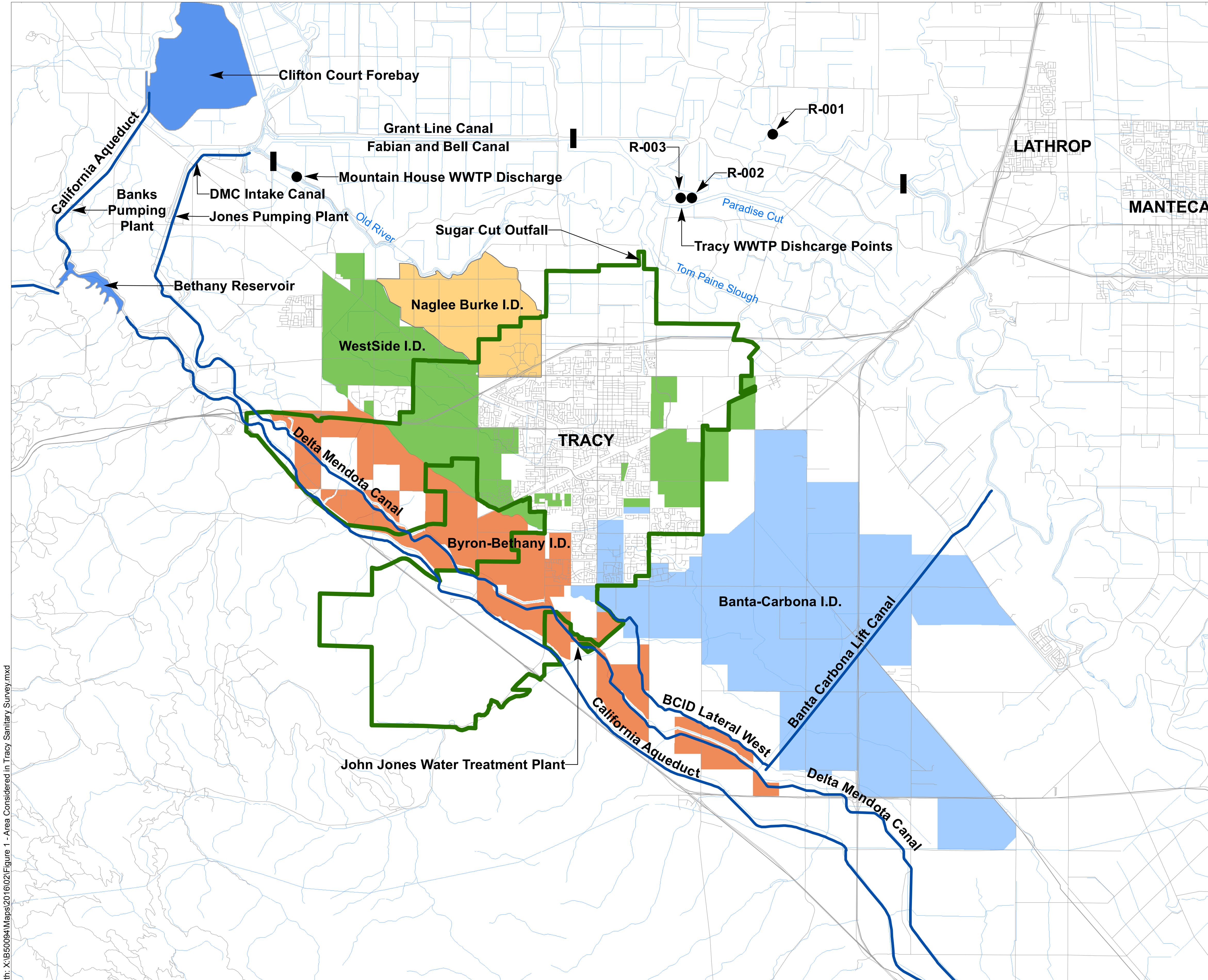


N

0 10,000 20,000

(Approximate Scale in Feet)

Legend

- Sphere of Influence
- Streets and Highways
- Canal
- Rivers and Creeks
- Temporary Barrier
- Monitoring Station

Abbreviations

I.D. = Irrigation Districts

WWTP = Waste Waster Treatment Plant

Notes

1. All locations are approximate.

Sources

Irrigation District: California Department of Water Resources

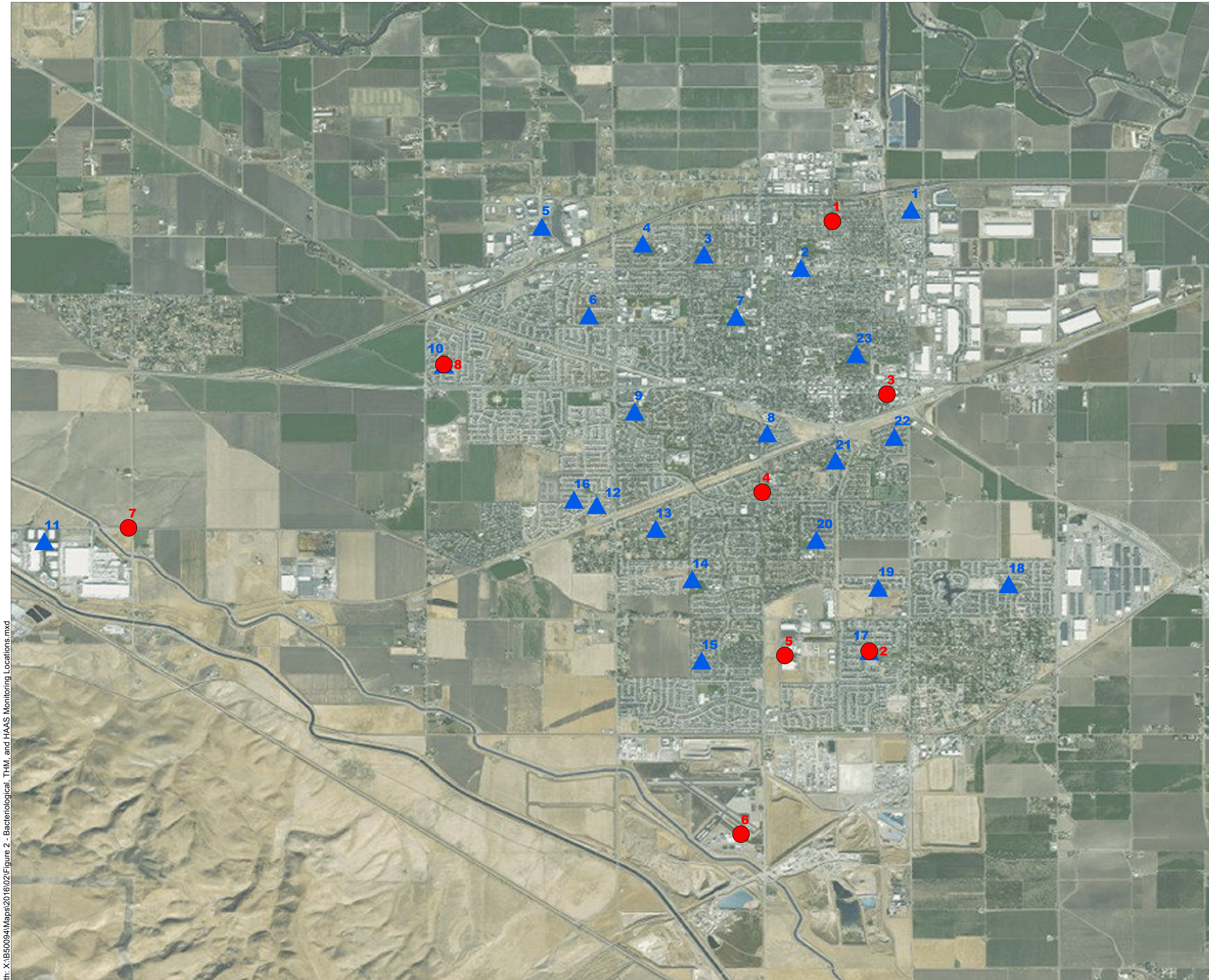
Erler & Kalinowski, Inc.

Area Considered in Tracy Sanitary Survey

City of Tracy
Tracy, CA
February 2016
EKI B50094.00

Figure 1

Path: X:\B50094\Maps\2016\02\Figure 1 - Area Considered in Tracy Sanitary Survey.mxd



N

0 4,500 9,000

(Approximate Scale in Feet)

Legend

Bacteriological Monitoring Stations

THM/HAA Monitoring Stations

Bacteriological Monitoring Stations

1. 584 Pescadero
2. 301 W. Grant Line
3. 1405 Suellen
4. 1850 Kavanagh
5. 3140 Naglee
6. 2155 Tammi Ct.
7. 900 W. Lowell
8. 564 Center Ct.
9. 705 Foxhollow
10. 3204 Antonio
11. 25701 Corporate
12. 2130 Robert Gabriel
13. 1730 Parkside
14. 1551 Dove
15. 1407 Jonathan
16. 4089 English Oak
17. 490 Glenbriar Cr.
18. 2224 Mount Pellier
19. 2286 Stalsburg Ct.
20. 1401 S. Central
21. 25 N. Central
22. 501 Wagtail
23. 200 E. Eaton

TTHM/HAA Monitoring Stations

1. Curtis-Maruyasu - 3204 Holly Drive
2. 490 Glenbriar Circle
3. Police Department - 1000 Civic Centre Drive
4. Boyd Service Center - 520 Tracy Boulevard
5. Celotex - 400 Gandy Dancer Drive
6. Tracy Meter Vault -
7. Safeway Booster - 16900 W. Shulte Road
8. 3204 Antonio Loop

Abbreviations

HAA = Haloacetic Acid

THM = Trihalomethanes

Notes

1. All locations are approximate.

Sources

Aerial base map provided by ArcGIS Online (ESRI, DigitalGlobe, GeoEye, Earthstar Geogrpahics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community), obtained 2 February 2016.

Erler & Kalinowski, Inc.

Bacteriological, THM, and HAA Monitoring Locations

City of Tracy

Tracy, CA

February 2016

EKI B50094.00

Figure 2

Path: X:\B50094\Maps\2016\02\Figure 2 - Bacteriological, THM, and HAAS Monitoring Locations.mxd

APPENDIX A

Figures from:

Stanislaus River Watershed Sanitary Survey
Prepared by Brown & Caldwell, May 2011

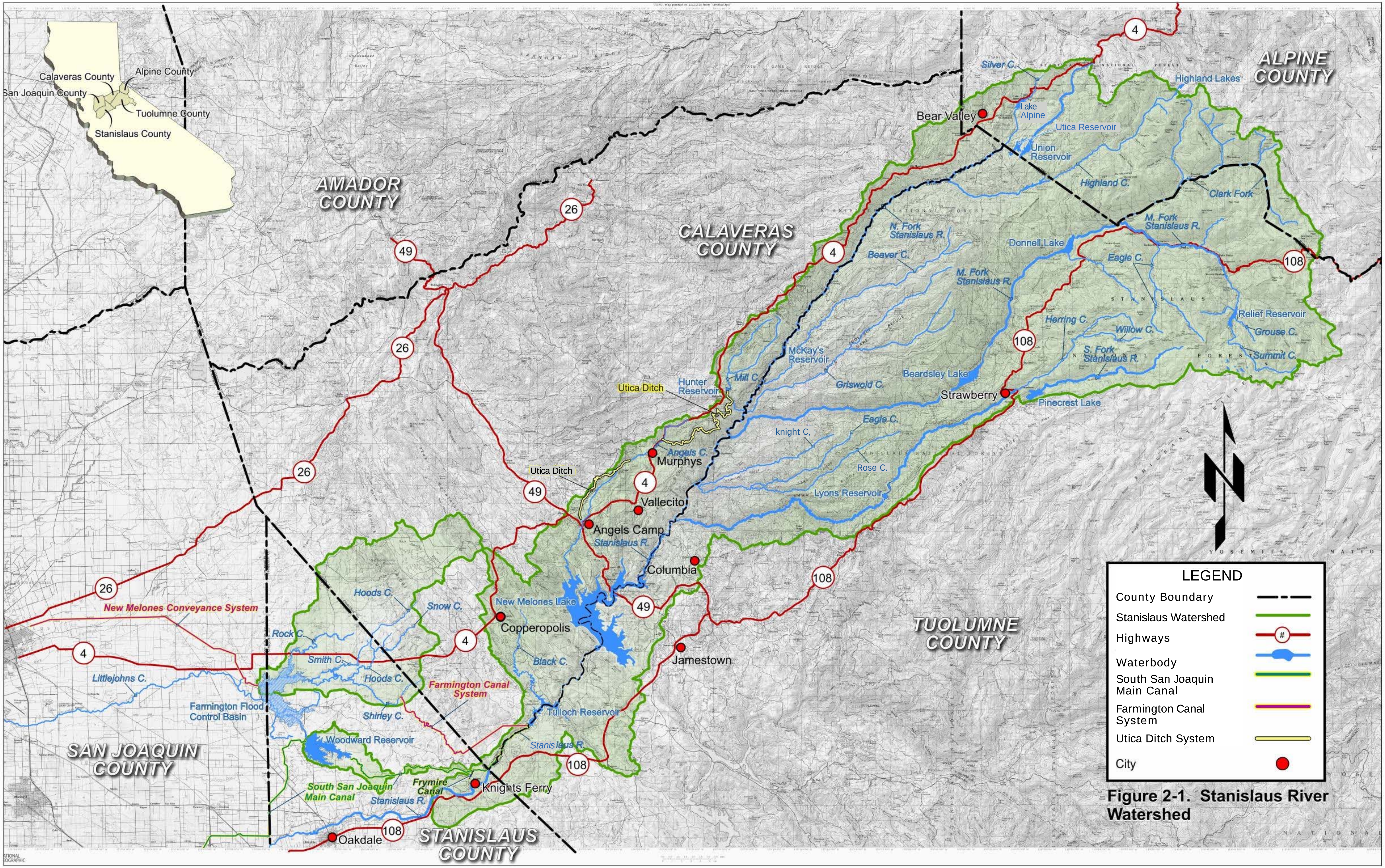


Figure 2-1. Stanislaus River Watershed

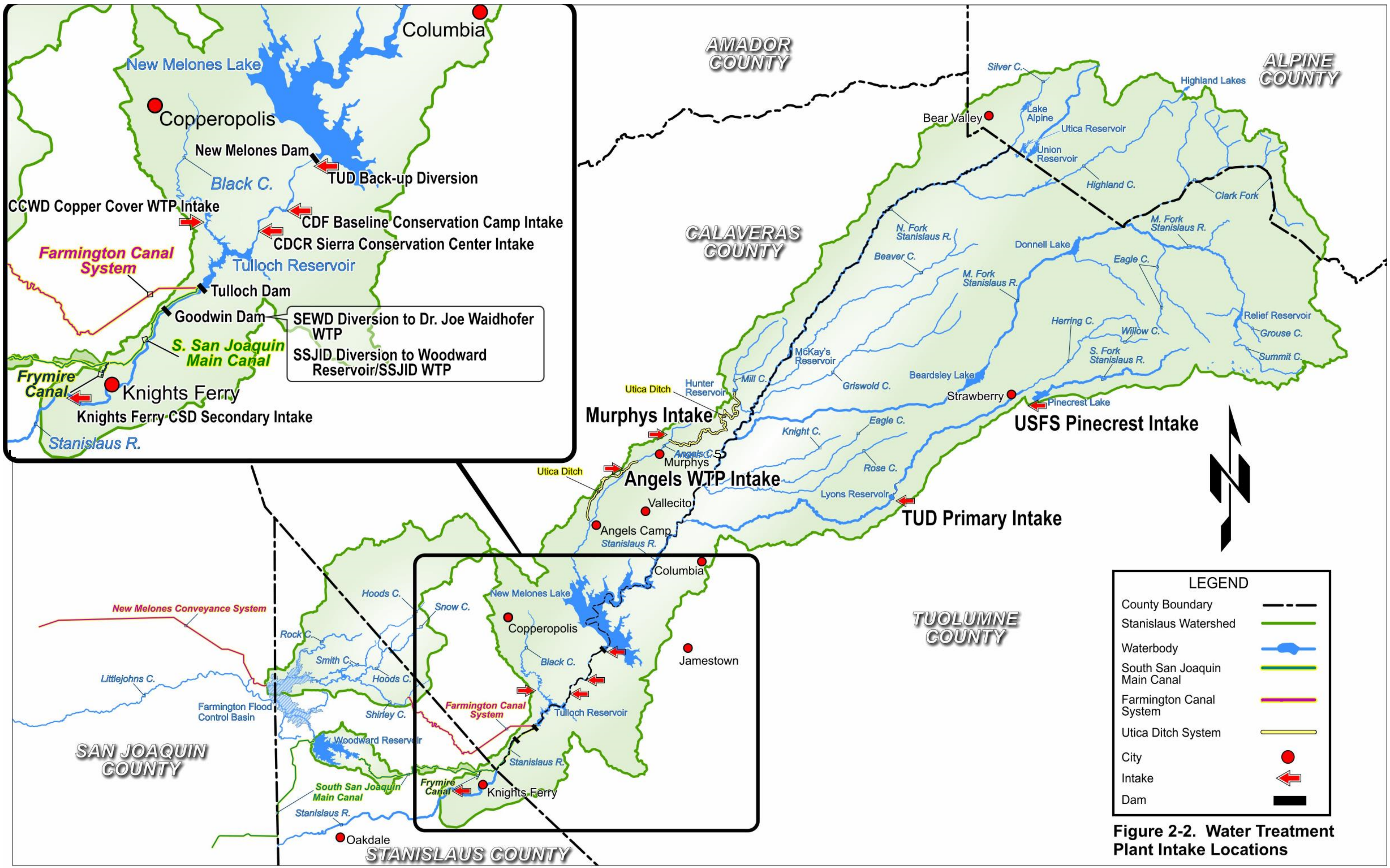


Figure 2-2. Water Treatment Plant Intake Locations

APPENDIX B

2015 EKI Aerial Photo Review – Potential inflows to Old River & Grant Line Canal
2015 EKI Delta-Mendota Canal Field Review

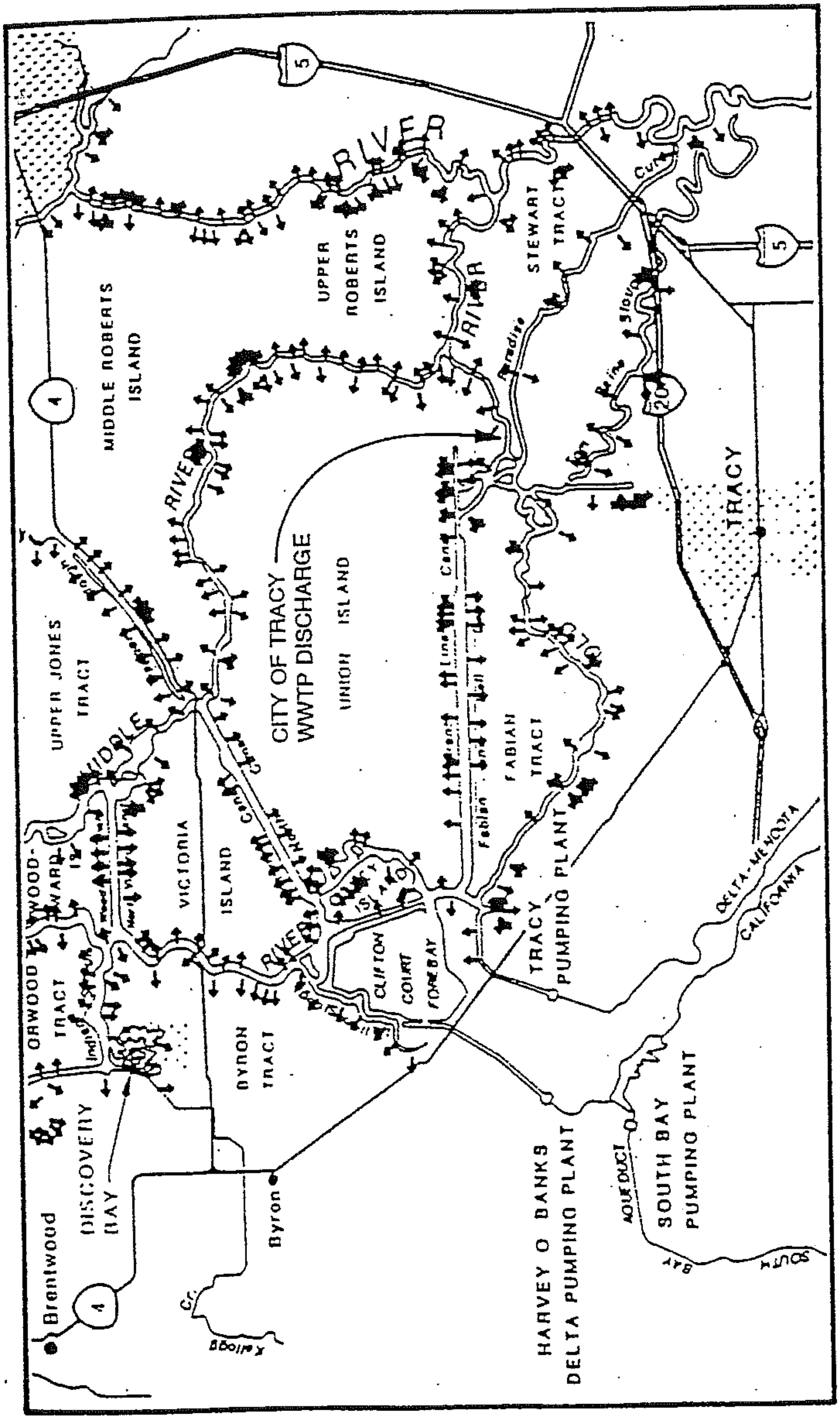


FIGURE 3. AGRICULTURAL DIVERSIONS FROM THE SOUTH DELTA

CH2M Hill, 1994

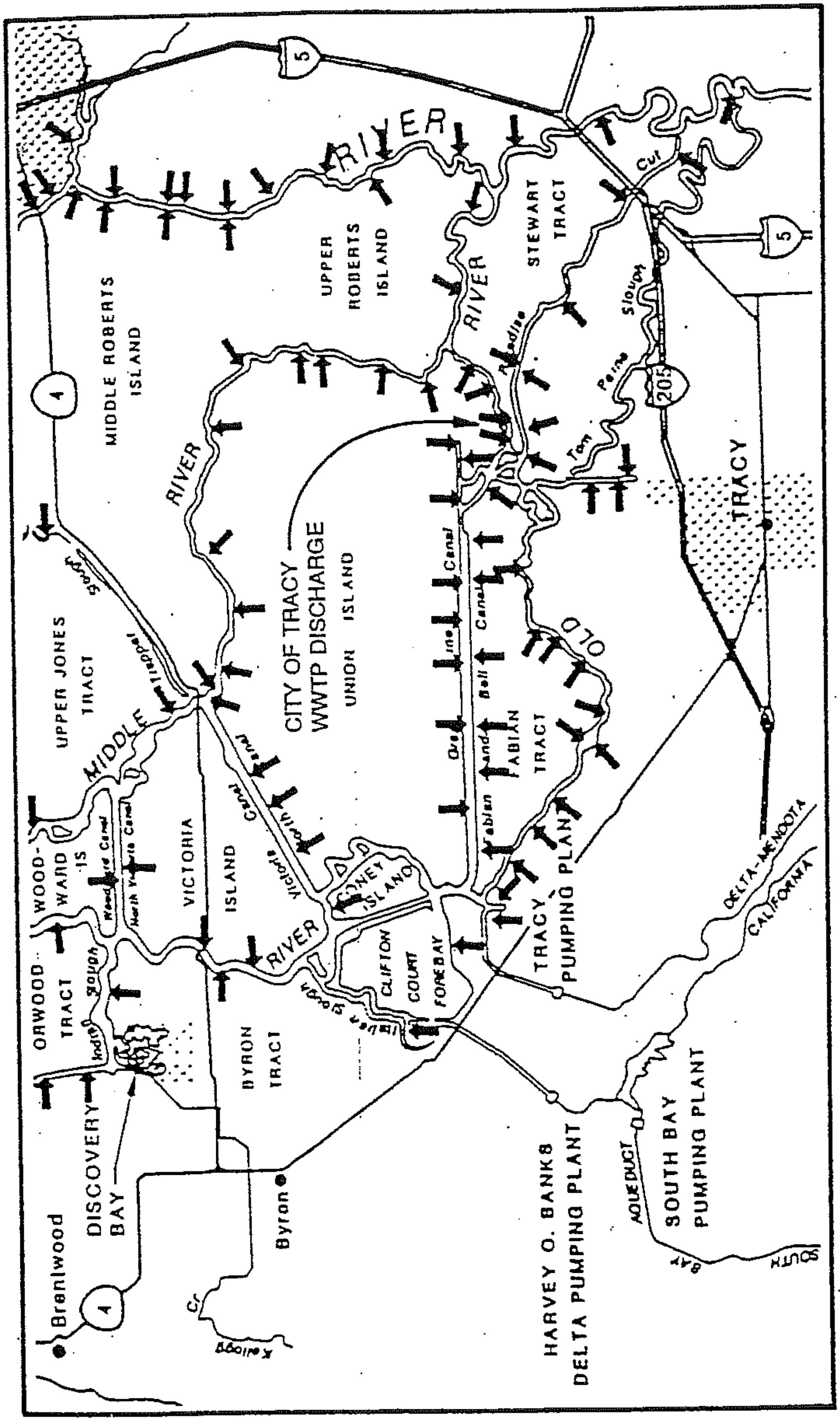


FIGURE 4. AGRICULTURAL DRAINAGE OUTFALLS TO SOUTH DALTA CHANNELS

CH2M Hill 1994

City of Tracy
2015 Aerial Photo Review
Potential Inputs and Outputs to Grant Line Canal
Tracy, California

Section: Eastern End of Grant Line Canal West to Tracy Boulevard Overcrossing

existing pumping stations (4)
flows from Old River and Paradise Cut waters passing through Salmon Slough
intersection with Fabian and Bell Canal
runoff from Tracy Boulevard overpass
agricultural drainage outfalls (4)
temporary barrier
boat traffic
runoff/seepage from adjacent lands

Section: Tracy Boulevard Overcrossing West to Private Calpack Road

existing pumping stations (5)
intersection with Fabian and Bell Canal
runoff from Tracy Boulevard overpass
agricultural drainage outfalls (7)
boat traffic
runoff/seepage from adjacent lands
structures on Fabian and Bell canals/boat docks/piers

Section: Private Calpack Road West to Contra Costa County Border

existing pumping stations (3)
intersection with Fabian and Bell Canal
flows from Clifton Court Forebay and Delta Mendota Canal
agricultural drainage outfalls (7)
boat traffic
runoff/seepage from adjacent lands
structures on Fabian and Bell canals/boat docks/piers

City of Tracy
2015 Aerial Photo Review
Potential Inputs and Outputs to Sugar Cut, Paradise Cut, and Old River
Tracy, California

Section: Pardise Cut from Paradise Road West to Power Transmission Lines Crossing

runoff from Paradise Road
existing pumping stations (3)
runoff/seepage from surrounding lands
discharge from Tracy wastewater treatment plant
Old River and Salmon Slough
agricultural drainage outfalls (4)
boat traffic
runoff/seepage from adjacent lands

Section: Sugar Cut from Tracy Wastewater Treatment Facility North to Old River

runoff from Tracy wastewater treatment facility
flows from Tom Paine Slough
runoff from MacArthur Drive into Tom Paine Slough
three structures at southern end of Sugar Cut
open ditch originating from City of Tracy and running beneath Hwy. 205
pier and tide gauge station at intersection with Tom Paine
runoff/seepage from surrounding lands, including runoff from Holly Drive, Southern Pacific Railroad Tracks
runoff from Old River Golf Course
agricultural drainage outfalls (3)

Section: Power Transmission Lines Crossing West to Tracy Boulevard Overpass

existing pumping stations (1)
runoff/seepage from surrounding lands
runoff from bridge crossing
runoff from Tracy Boulevard overpass
boat traffic
agricultural drainage outfall (1)

Section: Tracy Boulevard Overpass West to Lammers Road

existing pumping stations (4)
runoff/seepage from surrounding lands
runoff from Tracy Boulevard overpass
structures (e.g., houseboats, piers, etc.)
boat traffic
agricultural drainage outfall (2)

City of Tracy
2015 Aerial Photo Review
Potential Inputs and Outputs to Sugar Cut, Paradise Cut, and Old River
Tracy, California

Section: Lammers Road to Power Transmission Line Overcrossing

existing pumping stations (4)
runoff/seepage from surrounding lands
boat traffic
agricultural drainage outfall (4)

Section: Power Transmission Line Overcrossing to Tri-County Border (CC, Ala., SJ)

existing pumping stations (1)
runoff/seepage from surrounding lands
runoff from Bethany Road (bridge)
flows from Clifton Court Forebay and Delta Mendota Canal
flows from mountain house
structures (e.g., houseboats)
boat traffic
temporary barrier
agricultural drainage outfall (3)

Photo 1. Taken from the east side of the Delta-Mendota Canal looking west, at canal mile 7.25. Background shows completed DMC intertie to California Aqueduct.

Photo 2. Taken from the east side of the Delta-Mendota Canal looking west, at canal mile 15.11. Shows a groundwater well discharge.

Photo 3. Taken from the east side of the Delta-Mendota Canal looking west, at canal mile 14.49. Shows a pipeline crossing.

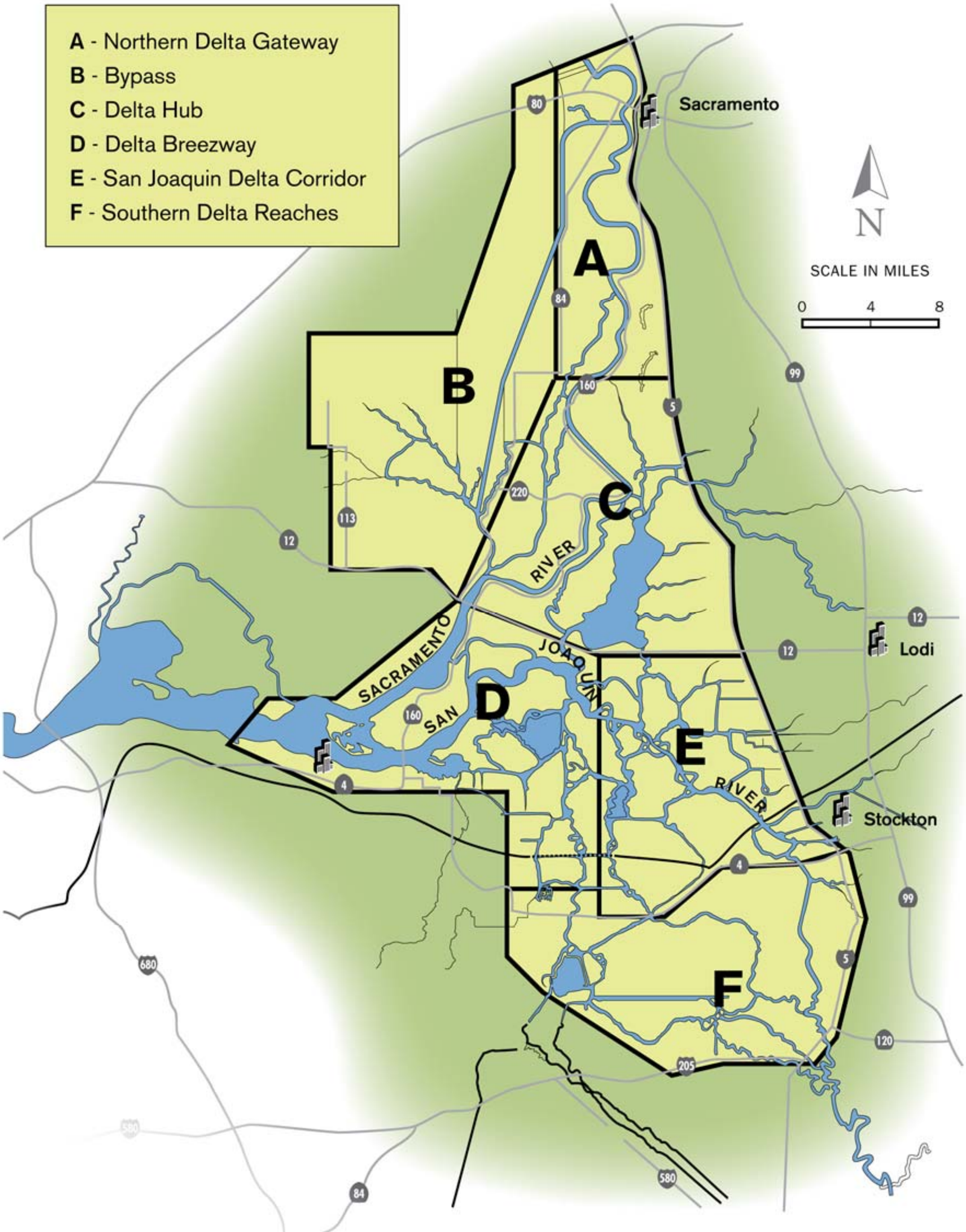
Photo 4. Taken from the east side of the Delta-Mendota Canal looking west, at canal mile 14.19. Shows an agriculture drain.

APPENDIX C

Figures from:

California State Water Project Watershed: Sanitary Survey Update Report 2006
Prepared by California Department of Water Resources, June 2007

Figure 4-21. Delta Recreational Zones



APPENDIX D

DMC Temporary Barrier Project Construction Schedule

Year	***Old River near Tracy (DMC)***						
	Installation				***Removal***		
	Started	***Closed***	***Completed***	***Notched***	***Started***	***Breached***	***Completed***
1987							
1988							
1989							
1990							
1991	14-Aug		30-Aug		28-Sep		13-Oct (i)
1992	15-Apr boat port on		5/1/1992 5/9/1992 boat port on		30-Sep		09-Oct (ii)
1993	5/12/193		1-Jun		27-Sep		6-Oct
1994	22-Apr boat port on All culverts tied open (5/18-6/1)		24-Apr 1-May		26-Sep		10-Oct
1995	3-Aug		8-Aug		27-Sep		6-Oct
1996	12-May		10-Jun (iii)		29-Sep		16-Oct
1997	8-Apr		17-Apr		30-Sep		7-Oct
1998	(vii)						
1999	15-May		28-May		28-Sep		8-Oct
2000	4-Apr		16-Apr		1-Oct		7-Oct
2001	23-Apr		26-Apr		13-Nov	14-Nov	26-Nov
2002	1-Apr		18-Apr		16-Nov	16-Nov	29-Nov
2003	1-Apr	14-Apr	22-Apr	17-Sep	13-Nov	15-Nov	25-Nov
2004	1-Apr	15-Apr	20-Apr	10-Sep	8-Nov	8-Nov	1-Dec
2005	9-May	31-May	6-Jun	15-Sep	8-Nov	10-Nov	30-Nov
2006	7-Jul	17-Jul	31-Jul	1-Oct	13-Nov	16-Nov	8-Dec
2007	2-Apr	18-Apr	23-Apr	21-Sep	5-Nov	7-Nov	18-Nov
2008	12-May	4-Jun	19-Jun	10-Sep	3-Nov	4-Nov	25-Nov
2009	18-May	23-Jun	3-Jul	12-Sep	2-Nov	4-Nov	19-Nov
2010	10-May	3-Jun	8-Jul	15-Sep	19-Oct	20-Oct	4-Nov
2011	27-May	10-Jun	15-Jun	15-Sep	10-Oct	11-Oct	31-Oct
2012	15-Mar	31-Mar	6-Apr	14-Sep	16-Oct	22-Oct	8-Nov
2013	8-May	30-May	3-Jun	13-Sep	30-Oct	2-Nov	18-Nov
2014	11-Mar	3-Apr	8-Apr	8-Sep	31-Oct	5-Nov	22-Nov
2015	16-Mar	3-Apr	8-Apr	8-Sep	10-Oct	4-Nov	

Reference:
http://baydeltaoffice.water.ca.gov/sdb/tbp/web_pg/tempbsch.cfm, accessed 26 January 2016

(i) Barrier notched on Sept. 28, 1991. Construction resumed on Oct. 10 and finished on Oct. 13.
(ii) Barrier notched on Sept. 30, 1992. Construction resumed on Oct. 2 and finished on Oct. 9.
(iii) Construction was delayed on 5/17 and resumed on 6/5 due to high flows.
(viii) Not installed upon DFG's request.

APPENDIX E

2014 Tracy Consumer Confidence Report

Where Does Your Water Come From?

Sources of the City of Tracy's water supply include the Stanislaus River, the Delta-Mendota Canal, and groundwater pumped from wells. In 2014, 67% of the surface water supply, or 4.3-billion gallons, came from the Stanislaus River. Surface water from the Delta-Mendota Canal comprised 29% of the total water supply, or 1.8-billion gallons. The groundwater supply comprised 4%, or 0.3-billion gallons of the total water supply.

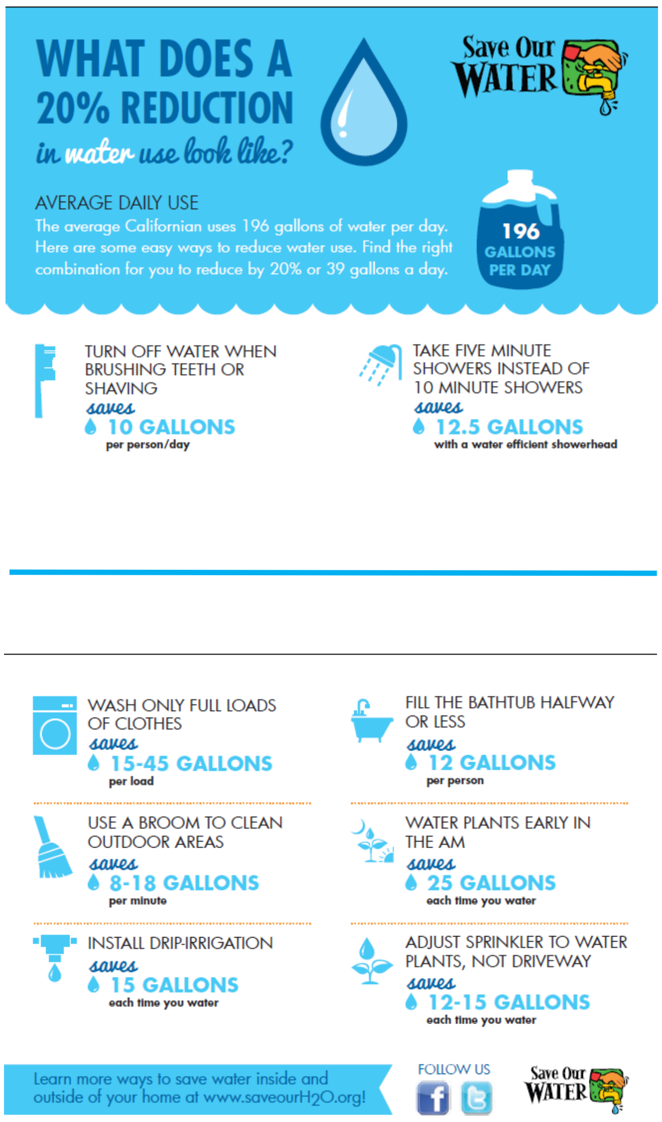
During 2015 , the City anticipates having an adequate water supply for the community. This is due to the healthy groundwater supply (well water) underneath Tracy. Unfortunately, using well water results in an increase in water hardness (mineral content), however, the water is still safe to drink. City staff will minimize the use of well water as much as possible. In addition, residents and businesses are encouraged to conserve water whenever possible.

Water Quality Control

Before the water reaches your tap, samples are collected and tested in State-certified laboratories. The City of Tracy has a water quality monitoring program and inspection system that ensures safe drinking water is delivered to you and your family.

As required by the Federal Safe Drinking Water Act, the City's water supplies must meet stringent water quality standards set by the California Department of Public Health and the United States Environmental Protection Agency. The City of Tracy completed a watershed sanitary survey of its drinking water sources in 2010. This survey can be obtained by contacting the Water Production Superintendent at the number provided below.

Water customers who are landlords receiving this report are asked to share this information with any tenant or user on the premises. The City of Tracy staff is available to answer your questions and provide further information: (209) 831-6302.



2014 Consumer Confidence Report

TRACY
Think Inside the Triangle™

CITY OF TRACY

The City of Tracy is pleased to report that from January 1 - December 31, 2014 the water delivered to your home or business complied with, or exceeded, all state and federal drinking water requirements! Provided in this brochure is a table that lists detectable and non-detectable substances found in the City's drinking water, and the maximum allowable substance levels set by United States Environmental Protection Agency (USEPA).

In California, drinking water standards, also called Maximum Contaminant Levels (MCLs), are set in two categories: Primary Standards related to public health, and Secondary Standards which relate to the aesthetic qualities such as taste, odor, and color. Within you will find a complete listing of both types of standards along with the results of the analysis of your water supply.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

WATER CONSERVATION IS MANDATORY!

The State of California will be in its fourth year of drought for the summer of 2015 according to the California Department of Water Resources. As of March 3, 2015 statewide, the water content of the Sierra snowpack was just 19 percent of average, the second lowest early March reading since 1950.

The State of California has issued mandatory water conservation measures for outdoor irrigation practices. We believe that water users who change their water usage habits now, will create water savings that will result in increased water supply for use this summer and possibly into next year should the drought continue into 2016.

The City has prepared for such droughts with a diverse portfolio of water supplies and public outreach campaigns. Efforts have been made to share the message of mandatory outdoor water restrictions to residents, visitors, and business owners through theater and radio advertisements, utility billing messages and inserts, website information, and door hangers. City staff discourages water waste through the education and communication of its municipal code. You may report water waste by visiting www.thinkinsidethetriangle.com and clicking the "Contact Us" link on the homepage.

WATER YOU DOING TO CONSERVE?

How can you voluntarily help meet the Governor's request? Some simple indoor measures include: taking shorter showers, turning water off while shampooing, washing full loads of laundry, never using the toilet as a trash receptacle, repairing drips and leaking faucets quickly, and always turning off water while brushing teeth. Businesses might also consider offering water to customers only if asked, reminding hotel guests to conserve water when showering, and changing out high water consuming appliances and toilets to more efficient models.

The biggest use of water by homeowners and businesses is outdoor activities. Mandatory outdoor water conservation measures include: sweeping instead of rinsing off driveways, parking lots, or sidewalks; using a triggered handheld sprayer when washing your car; only water lawns and landscapes between the hours of 9:00 p.m. and 7:00 a.m.; and turning off non-recirculating fountains and ornamental water features. Some simple voluntary measures are: turning off irrigation timers in the winter months; never water landscaping on a windy day; and do not water for longer than 8 minutes per cycle. For more information on drought conditions visit http://www.water.ca.gov/waterconditions/drought/. Also, you may report any water waste by calling (209) 831-4333 or online at www.thinkinsidethetriangle.com. You're continued efforts will assist the City in attaining its water conservation goals!

Substances Expected to be in the Drinking Water

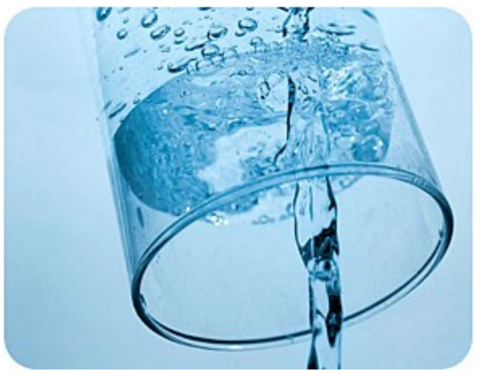
The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or human activity. Contaminants that may be present in source water include:

- **Microbial Contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;
- **Inorganic Contaminants**, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;
- **Pesticides and Herbicides**, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses;
- **Organic Chemical Contaminants**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can, also come from gas stations, urban runoff and septic systems;
- **Radio Active Contaminants**, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that the tap water is safe to drink, USEPA and the California Department of Public Health prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. California Department of Public Health regulations also establish limits for contaminants in bottled water that must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (800) 426-4791.

Special Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune disorders, and some elderly and infants, can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/CDC (Center for Disease Control) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800) 426-4791.



Safe Drinking Water Act

Under the Safe Drinking Water Act (SDWA), USEPA is responsible for setting national limits for hundreds of substances in drinking water and also specifies various treatments that water systems must use to remove these substances. Each system continually monitors for these substances and reports directly to the California Department of Public Health if they were detected in the drinking water. USEPA uses this data to ensure that the consumers are receiving clean water and to verify that states are enforcing the laws that regulate drinking water.

This publication conforms to the regulation under SDWA requiring water utilities to provide detailed water quality information to each of their customers annually. We are committed to providing you with this information about your water supply because customers who are well informed are our best allies in supporting improvements necessary to maintain the highest quality drinking water standards.

What's in My Water?

ANALYTICAL PARAMETER	TREATED SURFACE WATER	TREATED SURFACE WATER	WELL WATER			REGULATORY LIMITS		TYPICAL SOURCE
	SOUTH SAN JOAQUIN IRRIGATION DISTRICT	JOHN JONES WATER TREATMENT PLANT	AVERAGE	MINIMUM	MAXIMUM	MCLG or PHG	MAXIMUM CONTAMINANT LEVEL (MCL)	
PRIMARY STANDARDS								
INORGANIC (ug/L)								
Aluminum	10	34	ND	ND	ND	none	200 ug/L	Erosion of natural deposits
Arsenic	ND	1.1	2.1	1.2	3.8	0	10 ug/L	Erosion of natural deposits
Barium	14.1	34	29	23	41	2000	1000 ug/L	Erosion of natural deposits
Chromium	ND	ND	3.9	ND	8.4	100	50 ug/L	Erosion of natural deposits
Copper	ND	2.3	6.7	5.8	7.6	170	1000 ug/L	Erosion of natural deposits
Iron	ND	ND	0.054	0.032	0.098	NA	300 ug/L	Erosion of natural deposits
Manganese	ND	ND	9.2	ND	37.0	NA	50 ug/L	Erosion of natural deposits
Zinc	ND	ND	2.8	ND	25.0	NA	5000 ug/L	Erosion of natural deposits
FLUORIDE (mg/L)								
Fluoride	ND	0.098	0.14	0.07	0.19	1.0	2.0 mg/L	Erosion of natural deposits
NITRATE/NITRITE								
Nitrate (as NO3)[1]	0.6	1	6.4	ND	15.0	45	45 mg/L	Runoff from fertilizer use; Erosion of natural deposits
Nitrate + Nitrite (sum as N)	0.14	0.23	1.5	ND	3.4	10	10 mg/L	
Nitrite (as N)	ND	ND	ND	ND	ND	1	1 mg/L	
REGULATED ORGANICS (ug/L)								
TRIHALOMETHANE								
Bromodichloromethane	1.8	19	0.27	ND	1.20	NA	ug/L	
Bromoform	ND	2.2	ND	ND	ND	NA	ug/L	
Chloroform	14.2	15	2.5	ND	17	NA	ug/L	
Dibromochloromethane	ND	14	ND	ND	ND	NA	ug/L	
Total Trihalomethane	32.2	50.2	2.7	ND	18	NA	80 ug/L	By-product of drinking water chlorination
SECONDARY STANDARDS								
Aesthetic - Related								
Aluminum (ug/L)	10	34	ND	ND	ND	none	200 ug/L	Erosion of natural deposits
Apparent Color (Units)	ND	ND	1.7	ND	10.0	NA	15 Units	Naturally occurring organic materials
Copper (ug/L)	ND	2.3	1.5	ND	7.6	170	1000 ug/L	Erosion of natural deposits
Iron (ug/L)	ND	ND	0.054	0.032	0.098	NA	300 ug/L	Erosion of natural deposits
Manganese (ug/L)	ND	ND	9.2	ND	37.0	NA	50 ug/L	Erosion of natural deposits
Odor (TON)	1	2	1.0	ND	2.0	NA	3 TON	Naturally occuring organic materials
Potassium (K) (mg/L)	4	3	3.3	1.3	4.7	NA	NS	Erosion of natural deposits
Turbidity (NTU)[2]	ND	0.1	0.75	0.16	2.90	NA	5 NTU	Soil runoff
Zinc (ug/L)	ND	ND	2.8	ND	25.0	NA	5000 ug/L	Erosion of natural deposits
Bicarbonate (HCO3) (mg/L)	20	82	144	58	210	NA	NS	Erosion of natural deposits
Carbonate (CO3) (mg/L)	50	ND	ND	ND	ND	NA	NS	Erosion of natural deposits
Total Alkalinity (CaCO3)(mg/L)	20	79	120	48	170	NA	NS	Erosion of natural deposits
Boron (B) (mg/L)	ND	0.31	1.5	0.2	2.4	NA	NS	Erosion of natural deposits
Calcium (Ca) (mg/L)	13	26	62	20	90	NA	NS	Erosion of natural deposits
Magnesium (Mg) (mg/L)	2	17	23	5	32	NA	NS	Erosion of natural deposits
Sodium (Na) (mg/L)	2	63	128	24	190	NA	NS	Erosion of natural deposits
Total Hardness (CaCO3) (mg/L)	40.7	130	250	69	360	NA	NS	Erosion of natural deposits
TDS (mg/L)	70	340	676	160	870	NA	1000 mg/L	Erosion of natural deposits
Specific Conductance (umhos/cm)	98	600	1068	260	1300	NA	1600 umhos/cm	Substances that form ions when in water
Chloride (mg/L)	3	90	115	20	220	NA	500 mg/L	Erosion of natural deposits
Sulfate (mg/L)	1.9	69	221	30	310	NA	500 mg/L	Erosion of natural deposits
pH	8.1	7.5	7.6	7.2	8.4	NA	6.5 - 8.5 Units	NA
WATER DISTRIBUTION SYSTEM DATA SHEET								
BACTERIOLOGICAL (% Present)								
Coliform Density	<1	<1	<1	<1	<1	0	5% Present/mo.	Municipal and industrial waste discharge
ORGANICS (ug/L)			RUNNING ANNUAL AVERAGE					
Total Trihalomethane			35			NA	80 ug/L	By-product of drinking water chlorination
Total Haloacetic Acids			18			NA	60 ug/L	By-product of drinking water chlorination

[1] Nitrate in drinking water at levels above 45 ppm is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 45 ppm may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or if you are pregnant, you should ask advice from your health care provider.

[2] Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of water quality and the effectiveness of disinfectants.

DEFINITIONS

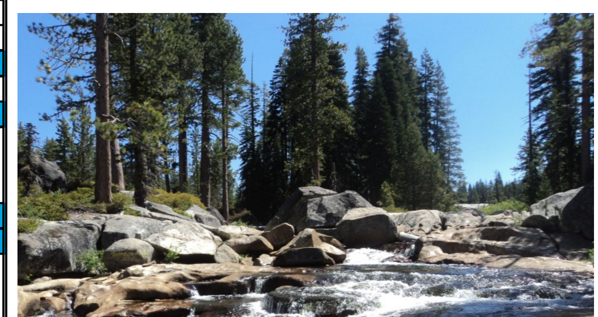
AL (Action Level): The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements, which a water system must follow.
MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.
Secondary MCLs (SMCL): Are set to protect the odor, taste, and appearance of drinking water.
MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below, which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.
PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.
PDWS (Primary Drinking Water Standard): MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.
TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.
NA: Not applicable.
ND: Not detected.
NS: No standard.
NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water.
ppb (Parts Per Billion): One part per billion (or micrograms per liter).
ppm (Parts Per Million): One part per million (or milligrams per liter).
pCi/L (Picocuries Per Liter): A measure of the natural rate of radioactive disintegration.
umhos/cm (Micromhos Per Centimeter): A measure of electrical conductance.

DISINFECTION PRACTICES

The City uses two types of disinfectant:
CHLORINE: Chlorine is used as the primary disinfectant chemical to kill or inactivate bacteria, viruses and other potentially harmful organisms in drinking water. Chlorine also serves as a secondary or residual disinfectant in the distribution system.
CHLORAMINES: Chloramines are created by adding ammonia that then combines with the chlorine as the drinking water leaves the treatment plant. Chlorine will still be used as the primary disinfectant; however, chloramines will be used as the secondary disinfectant in the water distribution system when treating source water from the Delta Mendota Cannel.
For most regular uses of potable water, chloraminated water is the same as chlorinated water. **However, chloramines must be removed for kidney dialysis treatment and may require recalibration of dialysis equipment. If you are receiving kidney dialysis treatment, please contact your doctor or dialysis technician.**

STANISLAUS RIVER WATER

The City of Tracy is committed to providing a safe, reliable and affordable water supply to meet the needs of the community today and in the future. The City has participated with the cities of Manteca, Lathrop, Escalon, and the South San Joaquin Irrigation District to bring high quality Sierra water from the Stanislaus River. This water source has increased the reliability of City water supplies by having a third source of supply and redundancy in treatment facilities. Delivery of this water comprises the majority of water consumed in the City and is the only supply source used during the winter months. The Stanislaus River water supply is very soft water and has significantly reduced the minerals in the City's water supply. You may no longer need to use a water softener.



CROSS CONNECTION PROTECTION

Backflow prevention assemblies are designed to allow water to flow into your home or office from the public water system but not allow water to flow in the reverse direction, creating effective cross connection protection. Reverse flow can carry untreatable pollutants and contaminants back to the public water system, compromising the water quality for all customers. Backflow prevention assemblies are required to be tested annually to ensure they are effectively protecting the public water system. If your residence has an active well on the premises or your business has fire sprinklers and/or landscaping, you should have a backflow prevention assembly. For questions regarding annual testing requirements, please call Erich Delmas, Laboratory Supervisor at (209) 831-4488.

WATER SOURCE ASSESSMENT

An assessment of the drinking water sources for the City of Tracy's water system was completed in June 2001. The sources are considered most vulnerable to the following activities: airports (maintenance and fueling areas), gas stations (historic and current), mining activities (historic and current), septic and waste landfill dumps (historic and current). You may request a copy of the assessment by contacting the Water Production Superintendent, Dave Carter, at (209) 831-6302.

The native groundwater under Tracy contains boron. Boron is a naturally occurring, non-carcinogenic, unregulated contaminant. Six of the City's wells contain elevated levels of boron. Although well water comprises only a small portion of the City's total water supply, well water does contain boron that may affect the babies of some pregnant women who drink water containing boron in excess of the notification level may have an increased risk of developmental effects, based on studies in laboratory animals.

SAMPLING RESULTS SHOWING TREATMENT OF SURFACE WATER SOURCES

Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water (type of approved filtration technology used).

Turbidity of the filtered water must:

1. Be less than or equal to 0.3 NTU in 95% of measurements in a month.
2. Not exceed 1 NTU for more than eight consecutive hours.
3. Not exceed 3 NTU at any time.

Turbidity Performance Standards: Turbidity (measured in NTU) is a measurement of the cloudiness of water and is a good indicator of water quality and filtration performance. Turbidity results, which meet performance standards, are considered to be in compliance with filtration requirements (that must be met through the water treatment process).

Lowest monthly percentage of samples that met Turbidity Performance Standard No.1: 100%. Highest single turbidity measurement during 2014 was 0.18 NTU.

SAMPLING RESULTS SHOWING THE DETECTION OF LEAD AND COPPER

Lead and Copper (To be completed only if there was a detection of lead or copper in the last sample set)	# Of Samples Collected	90TH Percentile Level Detected	# Sites Exceeding AL	AL	MCLG	Typical Source of Contaminant
Lead (ppb)	33	1.4	0	15	2	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits.
Copper (ppm)	33	0.38	0	1.3	0.17	Internal corrosion of household water plumbing systems; erosion of natural deposits; leaching from wood preservatives.

APPENDIX F

DMC Raw Water Quality Data

Appendix F

Summary of DMC Raw Water Quality

Inorganic (ug/L)	**Untreated DMC (a)**
Arsenic	3.4
Barium	40
Chromium	0.37
Copper	2
Iron	0.14
Manganese	39
Zinc	1.3
Fluoride (mg/L)	
Fluoride	0.11
Nitrate/Nitrite (mg/L)	
Nitrate (as NO3)	0.52
Nitrate + Nitrite (sum as N)	ND
REGULATED ORGANICS (ug/L)	
TRIHALOMETHANE	
Bromodichloromethane	ND
Bromoform	ND
Chloroform	ND
Dibromochloromethane	ND
Total Trihalomethane	ND
Radioactivity (pCi/L)	
Gross Alpha	<3.0
Aesthetic-Related	
Apparent Color (Units)	25
Corrosivity Index	0.5
Odor (TON)	2
Turbidity (NTU)	3.8
Zinc (ug/L)	1.3
Bicarbonate (HCO3) (mg/L)	86
Total Alkalinity (CaCO3) (mg/L)	71
Boron (B) (mg/L)	0.17
Calcium (Ca) (mg/L)	21
Magnesium (Mg) (mg/L)	19
Sodium (Na) (mg/L)	96
Total Hardness (CaCO3) (mg/L)	130
TDS (mg/L)	420
Specific Conductance (umhos/cm)	730
Chloride (mg/L)	160
Sulfate (mg/L)	37
pH	8.2

Abbreviations:

ND = none detected

Notes:

(a) Data from laboratory report 549943 provided by City for samples taken from DMC on 24 August 2015.

APPENDIX G

Raw Water Quality Data from:

Stanislaus River Watershed Sanitary Survey
Prepared by Brown & Caldwell, May 2011

Appendix G – Raw Water Quality Data Summary (2003-2010)

Parameter	Reservoir Intake		Canal Intake	
	Maximum	Minimum	Maximum	Minimum
pH	8.2	6.8	8.4	6.6
Temperature, °C	27	5	25	10
Turbidity, NTU	13	0.7	8	0.5
Total Hardness, mg/L as $CaCO_3$	36	8	57	19
Total Alkalinity, mg/L as $CaCO_3$	43	19	59	22
TOC, mg/L	5	1.5	5	1
Total Coliform (MPN/100mL)	3,255	3	6,472	20
Fecal Coliform (MPN/100mL)	~1,000	1	2,419	1
Antimony, µg/L	N.D.	N.D.	N.D.	N.D.
Arsenic, µg/L	N.D.	N.D.	N.D.	N.D.
Barium, µg/L	29	17	14	11
Beryllium, µg/L	N.D.	N.D.	N.D.	N.D.
Cadmium, µg/L	N.D.	N.D.	N.D.	N.D.
Chromium, µg/L	N.D.	N.D.	N.D.	N.D.
Copper, µg/L	N.D.	N.D.	N.D.	N.D.
Mercury, µg/L	N.D.	N.D.	N.D.	N.D.
Nickel, µg/L	N.D.	N.D.	N.D.	N.D.
Selenium, µg/L	N.D.	N.D.	N.D.	N.D.
Thallium, µg/L	N.D.	N.D.	N.D.	N.D.
Zn, µg/L	N.D.	N.D.	N.D.	N.D.

Notes:
N.D. = Not Detected
From Brown & Caldwell, Stanislaus River Watershed Sanitary Survey Update, May 2011.