TACNA WATER PLANNING PROJECT CDBG #106-19 Preliminary Engineering Report

Stantec

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Sign-off Sheet

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1.0 PROJECT PLANNING

The objective of this project is to prepare preliminary engineering design report and provide a minimum of three (3) alternatives for improvement to the water system serving the Town of Tacna. An application for funding to United States Department of Agriculture (USDA) Rural Development (RD) will be submitted by Yuma County on behalf of the Yuma County Improvement District 2017-02 (Tacna Water).

The following Preliminary Engineering Report (PER) presents the description of the project area, need for the project, development and analysis of alternatives, and recommendations and conclusions.

1.A LOCATION

Tacna is an unincorporated town located approximately 40 miles east of the City of Yuma, north of Interstate 8. **Figure 1.1** presents a general location map of the project.

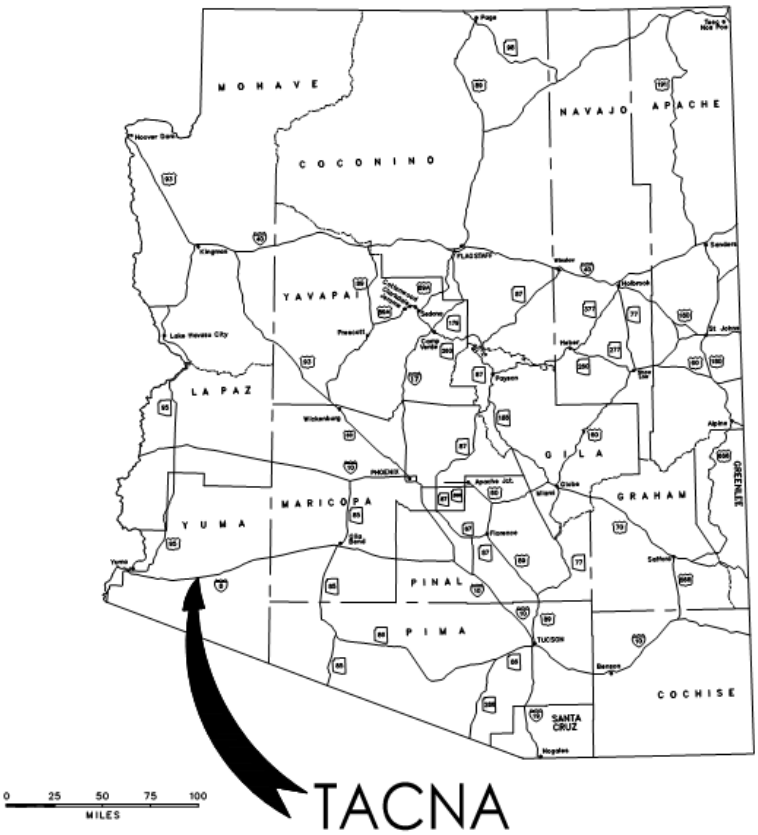

Figure 1.1 General Project Location

The project location is shown in greater detail in **Figure 1.2**.

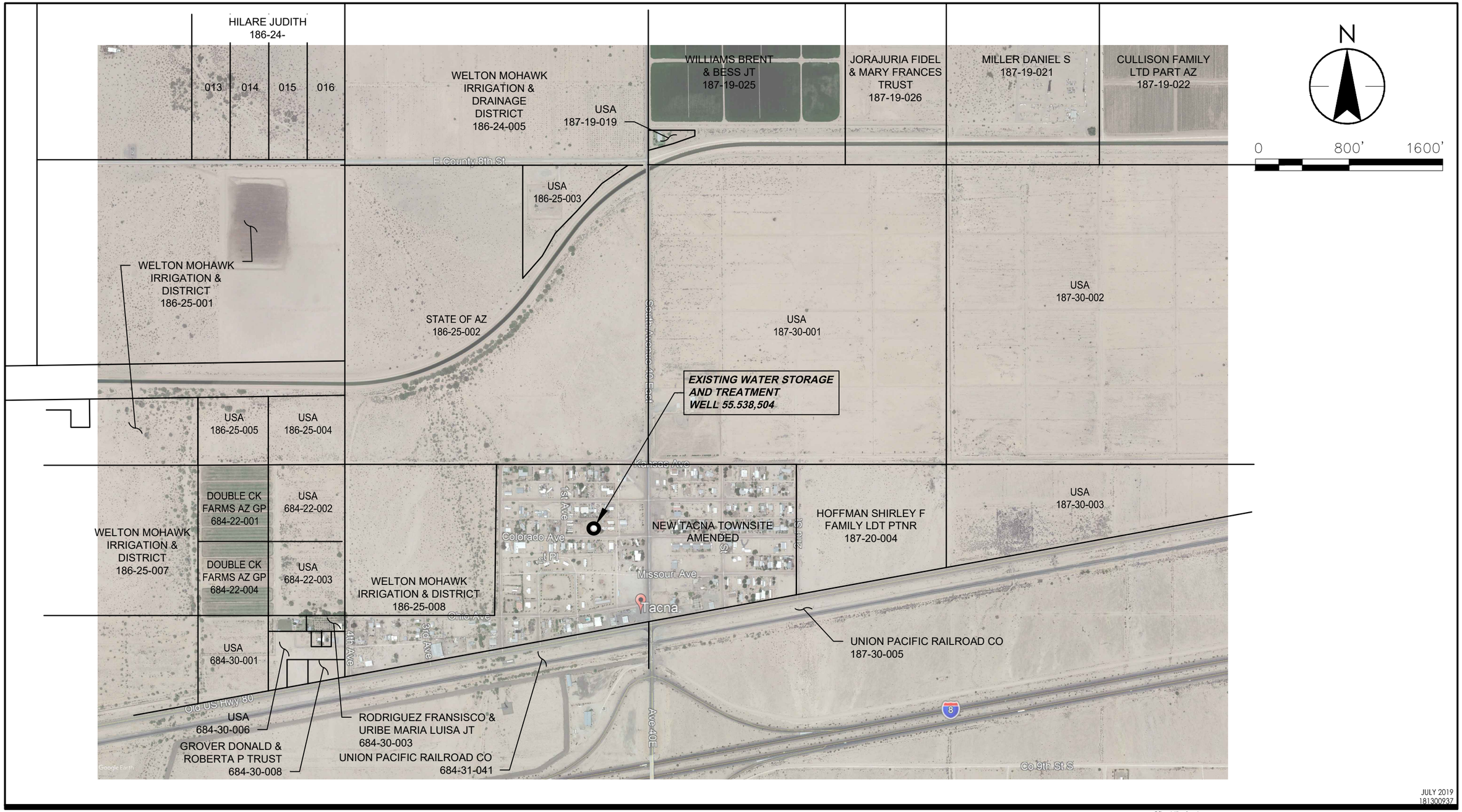

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Figure No.
1.2

Title
DETAILED PROJECT LOCATION

1.B ENVIRONMENTAL RESOURCES PRESENT

The environmental resources present for the planning area are briefly summarized in this section. An Environmental Report (ER) has been prepared for the proposed scope of work. The ER concludes that no significant impacts to the environment will result from the proposed water system improvements. **Table 1.1** summarizes the conclusions of the ERR.

Table 1.1 Environmental Resources Present

Resource	Affected Environment	Environmental Impacts	Mitigation
Land Ownership/ Land Use	The proposed Project is located on a mix of public and private lands. The proposed Project would not be located in areas of special concern, Wild and Scenic Rivers, National Natural Landmarks, National Parks, or Wilderness Areas.	The proposed Project is not anticipated to adversely impact land use as it would only be a replacement to the existing system that currently exists in Tacna. Nearby residences and businesses would have minor disturbances from construction activities including a short-term, temporary increase in noise and dust during construction.	The final treatment site selection would require Yuma County work with the legal, existing landowner prior to any development and secure any required permits. No mitigation is recommended.
Historic Preservation	No cultural resources and/or isolated occurrences were identified during the Class III cultural resources inventory of the Project area.	No impacts to cultural resources from the proposed Project are anticipated to occur	No mitigation is recommended.
Threatened and Endangered Species	The United States Fish and Wildlife Service (USFWS) identified four threatened, endangered, or candidate species that may occur within the Project area and vicinity of the Project area. In addition, the Arizona Game and Fish Department's (AZGFD) Environmental Online Review Tool was utilized to identify potential Special Status Species and Species of Greatest Conservation Concern that may occur within the Project area or the vicinity of the Project area. The AZGFD identified numerous Special Status Species and Species of Greatest	No Threatened, Endangered, or Candidate species were identified during the general wildlife survey for the Project. During the general wildlife survey conducted for the Project, no Threatened, Endangered or Candidate species were identified in the Project area or vicinity of the Project area and it was determined that there was low potential of occurrence of the four species identified by the USFWS as having potential to occur in the Project area due to marginal habitat conditions and proximity to human activity and disturbance. Suitable habitat for the Sonoran pronghorn (*Antilocapra americana sonoriensis*) was identified, but it was determined that this species would likely avoid the habitat as a result of existing human activity and disturbance. Habitat for the other three USFWS identified species was not found during the field survey. However, individual of all four species may travel through the Project area.	The unpaved areas of surface disturbance should be surveyed for active western burrowing owl burrows within three to five days prior to surface disturbance by a qualified biologist. Identified suitable habitat should be surveyed by a qualified biologist utilizing the AZGFD 2009 Burrowing Owl Survey Protocol. Surveys should be conducted within the first two hours of dawn or dusk during calm weather. If active burrows are discovered, then the AZGFD should be notified to implement conservation measures prior to surface disturbance. If inactive

Resource	Affected Environment	Environmental Impacts	Mitigation
Threatened and Endangered Species (continued)	Conservation Concern that may occur or have suitable habitat in the Project area or vicinity of the Project area. Suitable habitat for migratory birds was identified during initial data review.	No AZGFD Special Status Species or Species of Greatest Conservation Concern were identified during the general wildlife survey. Habitat for species identified during review of the AZGFD Environmental Online Review Tool was assessed to be non-existent or low to medium during the field survey, with the existing human presence and disturbance likely deterring the use of any potential habitat under existing conditions. However, potential habitat for western burrowing owl (*Athene cunicularia hypugaea*), Sonoran Desert toad (*Incillius alvarius)*, migratory birds, several bat species, and two mammal species was identified. The proposed Project is not anticipated to have significant impacts on wildlife species and impacts are assumed to be short-term and negligible if pre-construction clearance surveys are conducted. Indirect impacts may include avoidance of suitable habitat due to noise generated from construction of the Project. Direct or indirect impacts would cease once construction of the Project is completed.	burrows are discovered, then the biologist should implement conservation measures prior to surface disturbance in coordination with AZGFD. All vegetation clearing should be completed during the non-migratory bird breeding season, September through April. If it is necessary to clear trees or shrubs during the breeding season, then a migratory bird survey should be completed by a qualified biologist on the lands identified for disturbance and adjacent areas of potential effect. If an active migratory bird nest is discovered, then a buffer around the nest should be established in coordination with AZGFD and disturbance should be avoided until the young have fledged the nest.
Wetlands	The National Wetland Inventory identified a small number of riverine channels near the vicinity of the proposed Project. None of the mapped channels fall within the proposed disturbance footprint of the Project except for one intermittent riverine channel which crosses a very small portion of the existing water piping distribution system in the southwest portion of the Project area.	It is not anticipated that the proposed Project would impact the NWI identified wetlands as the proposed replacement distribution piping would follow the same alignment as the existing piping distribution system and disturbance would occur within the existing footprint of the current system.	No mitigation is recommended.
Floodplains	The proposed Project would not be constructed in a 100-year or 500-year floodplain.	No environmental impacts are anticipated.	No mitigation is recommended.

Resource	Affected Environment	Environmental Impacts	Mitigation
Coastal Areas, Zones, and Barriers	There are no coastal areas, zones or barriers within the proposed Project area.	No environmental impacts are anticipated.	No mitigation is recommended.
Important Farmland	The proposed Project is located in areas that are designated as prime farmland if irrigated and/or farmland of unique importance by the Natural Resources Conservation Service (NRCS)	The majority of the prime farmland if irrigated or farmland of unique importance identified in the Project area by the NRCS occur in already developed areas and proposed construction would consist of replacing the existing water distribution system and not new disturbance. In addition, the area is within an urbanized area and would be used for water distribution or storage. As a result, no impacts to important farmlands are anticipated.	No mitigation is recommended.
Environmental Risk Management	The proposed Project involves the replacement of the existing water storage and distribution system, as well as water treatment for arsenic.	It is not anticipated that the Project would include the use of hazardous materials or require waste handling. Construction crews are not expected to encounter hazardous material during construction. Any chemicals or material used for treatment would be stored in a approved location. There is the potential for vehicles used during construction to release oil, gasoline, diesel fuel or hydraulic fluid, but is considered negligible and similar to a normal construction site. No environmental impacts are anticipated.	No mitigation is recommended.
Water Resources	The Project is not located in key water resource areas such as sole source aquifers. There are no surface water bodies located within the Project area. The Welton-Mohawk canal is located to the north of the Project.	No environmental impacts are anticipated to water resources as the Project is not within a sole source aquifer and no surface water is within the Project area. It is not anticipated that additional groundwater pumping or surface water withdrawal would be required beyond existing conditions.	No mitigation is recommended beyond implementing appropriate storm water pollution prevention BMPs during construction.
Air Quality	Yuma County, Arizona is currently in a moderate nonattainment area for particulate matter 10 microns or less (PM_{10}) and marginal nonattainment for 8-hour ozone with the U.S. Environmental Protection Agency's National Ambient Air Quality Standards. Construction activities are anticipated	The proposed Project is not anticipated to require any new operations sources of air emissions. During Project construction, there would be a temporary increase in air emissions from Project construction activities due to an increase in diesel and gasoline powered vehicles and heavy machinery, as well as fugitive dust related to earthmoving activities. These impacts are considered short-term temporary and negligible. After completion of construction, disturbed areas would be void of vegetation which may result in increased wind	Yuma County recommended dust control Best Management Practices should be implemented during construction activities.

Resource	Affected Environment	Environmental Impacts	Mitigation
	to occur for approximately one year.	erosion, contributing to increased dust levels until the area is naturally revegetated. This would result in a long-term, negligible impact.	
Noise	The Project is located in a sparsely populated area with an existing water system.	No increase in noise levels are expected after construction of the project is completed as there is already an existing water system and this project does not propose anything that would increase noise levels after construction.	No mitigation is recommended.
Visual Impacts	The proposed Project would be located within an urban setting that currently has structures on the visual landscape.	Visual impacts from the Project are anticipated to be negligible, particularly if the color of the above ground storage tank uses a color similar to the surrounding environment.	It is recommended that the above ground storage tank uses a color similar to the surrounding environment.
Transportation	The Project is located in a sparsely populated area.	Traffic related impacts would only occur during construction and would cease once construction of the Project is finished.	Appropriate construction signage should be used during construction. No mitigation is recommended.

Mitigation efforts may be required if construction is underway during the migratory bird season (April through September) for an estimated cost of $20,000. If construction begins September through April, this will not be of concern, and this cost is listed as contingent on construction schedule.

1.D POPULATION TRENDS

Table 1.2 shows the total population for the Town of Tacna as recorded in the 2000 census, the 2010 census and estimated for 2018.

Table 1.2 Town of Tacna Population

	2000 Census	2010 Census	2018
Town of Tacna	555	602	674

While the overall population in the Tacna area has increased, the population within the town center (townsite) and the number of water system connections has decreased since 2000. Not all areas of Tacna counted in the population data are served by the Tacna water system. Per the Arizona Corporation Commission Annual Report for the water company, Sunstate Environmental Services (Sunstate), the water system has 175 connections of which 135 are currently in use, providing water to approximately 310 people.

It is anticipated that the population of Tacna using the existing water system will not significantly change in the future. It is not anticipated that more than the current 175 service connections will be installed.

1.E COMMUNITY ENGAGEMENT

The Tacna property owners have formed a Yuma County Improvement District 2017-02 to upgrade the water system. The purpose of the District will be to provide a revenue stream to repay any loan obligations. Loan obligations will result from loans that are acquired for the construction of the water system improvements. Yuma County staff is working with the community to assist with the search for funding to offset the high cost of development for the water system improvements.

2.0 EXISTING FACILITIES

2.A HISTORY

The existing water system in Tacna has been in place since 1980. It is owned by the Tacna Water Management Company. The system includes a groundwater well, piping, pumps and storage. Some system upgrades have been completed since 1980, including installation of a water intake on the Wellton-Mohawk canal and installation of water treatment in 2007 and repainting of the water storage tank.

Sunstate Environmental Services (Sunstate) in Yuma has maintained the water system since 2013.

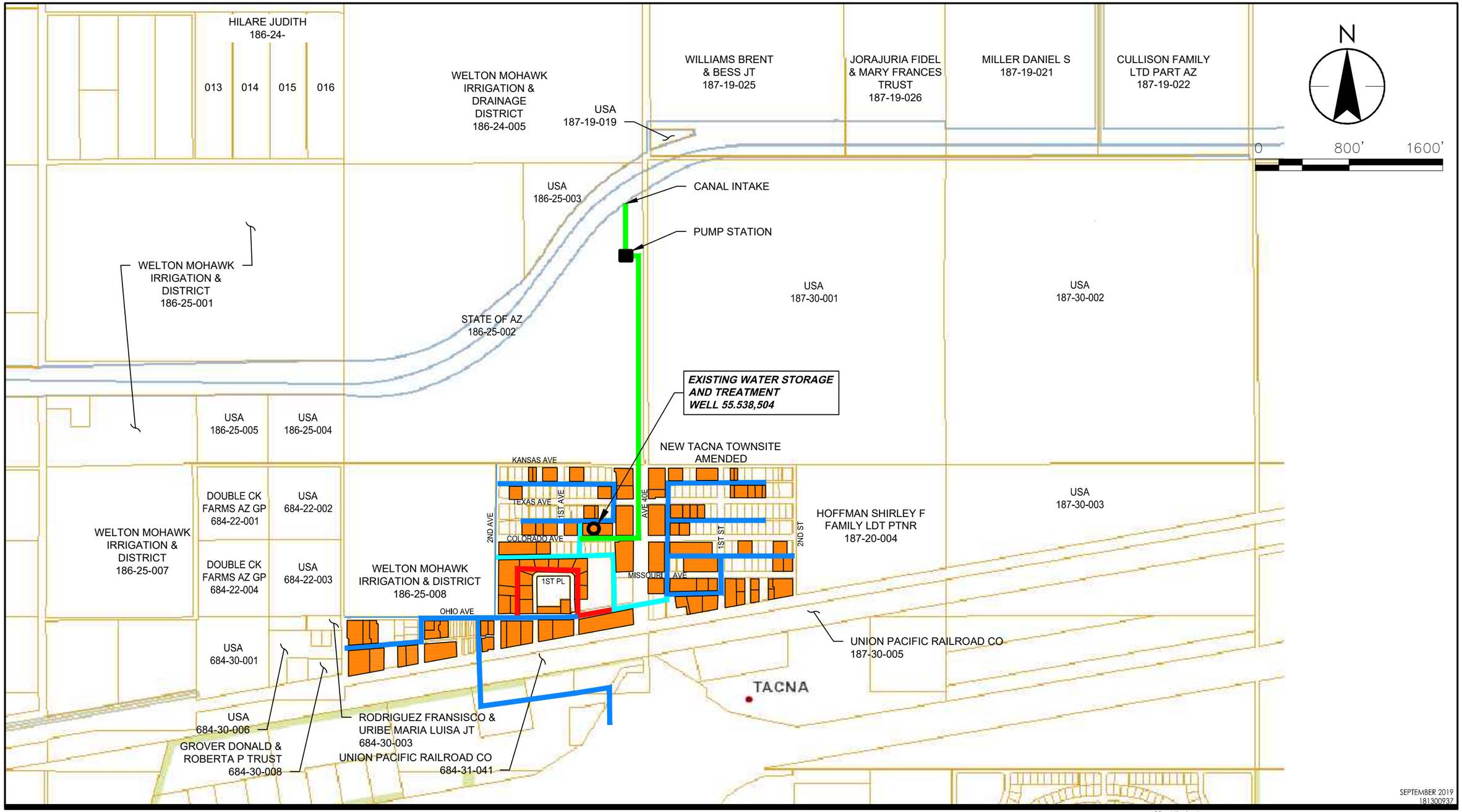
2.B CONDITION OF EXISTING FACILITIES

The existing water system serving the community of Tacna includes approximately 10,000 linear feet of 2-, 4-, and 6-inch PVC and transite (asbestos cement) pipe, an above ground welded steel water storage tank, a well, a booster pump, and an intake on the Wellton-Mohawk canal. The system includes 175 service connections and typically provides water to 135 to 160 customers (approximately 310 people). The well is reported by Arizona Department of Water Resources (ADWR) to be 200 feet deep with a capacity of 200 gpm. The Tacna Water Company annual report indicates that the water tank has a capacity of 325,000 gallons, however measurements of the tank size indicate that it may be closer to 150,000 gallons. A surface water intake was constructed on the Wellton Mohawk Irrigation and Drainage District (WMIDD) canal in 2007. This intake and water source are no longer used, and the filtration equipment that was installed to treat this water has been removed. The water system includes no fire hydrants and currently does not provide fire protection. No water treatment is currently provided. The piping, both the above ground at the storage site and underground in the distribution system, and the tank are reported to be in poor condition with evidence of leaks.

The water quality testing from the system indicates no issues with lead, copper or coliform. Arsenic levels are consistently above the maximum concentration level (MCL) required by EPA of 0.010 mg/L, ranging from 0.021 mg/L to 0.28 mg/L.

Copies of demand and quality data for the existing water system were obtained from Sunstate. Copies of the data are included in **Appendix A** for reference.

Information about the existing water system, based on limited existing data, is illustrated on **Figure 2.1.** The actual location of the pipes is unknown.



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Legend

- 2" PVC
- 4" ACP
- 4" PVC
- 6" ACP

Notes

1. WATERMAIN INFORMATION FROM SUNSTATE RECORDS.
2. WATERMAIN SIZES AND LOCATIONS HAVE NOT BEEN VERIFIED.

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PRELIMINARY ENGINEERING REPORT

Figure No.
2.1

Title
EXISTING WATER SYSTEM

2.C FINANCIAL STATUS OF ANY EXISTING FACILITIES

The water system is owned by the Tacna Management Company. As a privately-owned utility, the Arizona Corporation Commission oversees rates and regulatory requirements. The owner of the water company passed away and the water company remains under the probate process. Prior to the passing of the owner, the water company had filed for bankruptcy.

2.D WATER/ENERGY/WASTE AUDITS

There have not been any audits conducted on the current Tacna water system that are applicable.

3.0 NEED FOR PROJECT

3.A HEALTH, SANITATION, AND SECURITY

Tacna is served by a private community water system that supplies water to approximately 310 people. The water supply is a groundwater well which has arsenic levels higher than the MCL required by EPA. The system has been operating under an administrative order from Arizona Department of Environmental Quality (ADEQ) since 2012 due to the high arsenic levels. Water is delivered to residents without treatment, in exceedance of the arsenic MCL. Some water system components are more than 39 years old and the treatment campus is reported to be in poor condition.

The water system is owned by the Tacna Management Company. The owner of the water company passed away and the water company is under probate process. Sunstate Environmental Services currently operate the water system. The Tacna property owners have formed a Yuma County Improvement District 2017-02 to upgrade the water system.

3.B EXISTING INFRASTRUCTURE

The existing infrastructure was described in Section 2B. Due to the condition reports and the ownership issues, it is not anticipated that it will be practical to reuse the existing infrastructure.

3.C REASONABLE GROWTH

As mentioned in **Section 1.C**, no growth is anticipated for the area served by the water system.

4.0 SYSTEM REQUIREMENTS

4.A DESIGN CRITERIA

Water supply, treatment, distribution, and storage requirements were evaluated for each of the alternatives. It is anticipated that the new distribution system for all options will be the same and will parallel the existing pipe network as the most efficient route to reach all existing services. Therefore, the alternatives evaluation will focus on the water supply and treatment options. For all options, provision for a back-up water supply will be discussed.

Table 4.1 below summarizes the applicable design criteria for the Tacna water system. This criteria is based on ADEQ, Yuma County and EPA requirements.

Table 4.1 Water Design and Performance Criteria

Design/Performance Criteria	Unit	Criteria
Density (persons per connection)		2.3
Residential Average Water Usage Rate per person per day	gpcd	100
Peaking Factor: Max Day (MDD/ADD)		2
Peaking Factor: Peak Hour (PHD/ADD)		3
Peaking Factor: Peak Month (PMD/ADD)		1.5
ADD Minimum System Pressure	psi	40
PHD Minimum System Pressure	psi	35
Maximum System Pressure	psi	120
Minimum Pressure During Fire Flows	psi	20
Storage		
Maximum Day Demand during peak month		PMD
Fire Flow Capacity		FFC
Total	gal	PMD+FFC
Well Supply	gal	MDD
Water Treatment	gal	EPA Drinking Water Standards, MDD
Booster Station Capacity	gal	Max Day Demand + Fire Flow
Minimum Available Residential Fire Flow	gpm	1000
Minimum Available Commercial Fire Flow	gpm	n/a
Maximum Velocity During Peak Day Demand (pipes < 16")	fps	10
Minimum Diameter for Distribution Mains with Hydrants	in	6

ADD = Average Day Demand MDD = Maximum Day Demand PHD = Peak Hour Design
MDC = Maximum Day Capacity FFC = Fire Flow Capacity PHC = Peak Hour Capacity; PMD = Peak Maximum Demand

Tacna currently has a total of 14 business connections to their distribution system. These include 6 active and 2 inactive connections for small commercial properties, such as restaurants, at an equivalent dwelling units (EDU) of 10. There is one motel connection that is active though the motel has closed, for an EDU of 2. A small apartment complex (multifamily residential classification) has an EDU of 6. The post office, church, and fire department buildings each have a connection and represent a total EDU of 1 due low expected flows and intermittent use.

4.B WATER TREATMENT REGULATIONS

The following water treatment regulations apply to the water supply alternatives being evaluated for this project. Introducing surface water into the Tacna water supply portfolio will require adherence to new Federal Regulations under the Safe Drinking Water Act. The changes will include new contaminant limits, online analysis requirements, and contaminant monitoring/sampling.

Sourcing water from the Wellton-Mohawk Irrigation Canal will initiate compliance monitoring for turbidity and demonstration of filtration and disinfection credits for cryptosporidium, giardia, and viruses under the Surface Water Treatment Rule. Filtration alternatives are shown in **Table 4.2**.

Table 4.2 Surface Water Treatment Rule Filtration Credits and Turbidity Limits

Filtration Technology	CFE Turbidity (NTU)	Filtration Credit (Max Log)		
		Cryptosporidium	Giardia	Viruses
Conventional	0.3 / 1	> 2	2.5	2.0
Direct	0.3 / 1	> 2	2.0	1.0
Ultrafiltration	0.3 / 1	> 2	> 3.0	0
Nanofiltration	0.3 / 1	> 2	> 3.0	3.0
Reverse Osmosis	0.3 / 1	> 2	> 3.0	3.0

For public water systems using surface water or groundwater under the influence of surface water, the Disinfection/Disinfectant By-Product Rule applies, with requirements outlined below. Annual sampling is required for disinfection by-products and adequate disinfection residual in the distribution system for a public water system of Tacna's size.

<u>Disinfection / Disinfectant By-Product Rule</u>

- Systems less than 500 persons under Subpart H (Surface Water or GWUISW) or Groundwater sample two locations per monitoring period. The monitoring period for this population size category is once per year.
- Systems must monitor during the month of highest DBP concentrations. Very small systems must take individual samples (TTHM and HAA5) samples instead of dual sample set at locations with highest TTHM and HAA5 concentrations, respectively. If the locations of highest TTHM and HAA5 samples occur at the same location, then it can be a dual sample set.

- MCL for TTHM is 0.080 mg/L LRAA; MCL for HAA5 is 0.060 mg/L LRAA.
- Tacna may be eligible for a VSS waiver (very small system) and would not be required to conduct IDSE monitoring (initial distribution system evaluation). This would not exempt Tacna from quarterly monitoring.

Using groundwater as a primary or backup water supply means that the conditions for the Ground Water Rule must be met during use to limit exposure to fecal pathogens. Disinfection infrastructure will be in place to provide adequate pathogen removal, but well sampling may be required upon initial well approvals.

Ground Water Rule

- May or may not apply to this system based on the existing use of surface water onsite (rule does not apply to PWS that combine groundwater with surface water or GWUDISW).
- Goal of rule is to mitigate risk of exposure to fecal contamination from groundwater.

Both the introduction of the Wellton-Mohawk canal supply and transition of the existing well out of service and either one or two new well(s) drilled to provide the primary and/or back-up water supply, New Source Approval permits will be required. This permitting process includes a full suite of chemical and microbiological contaminants common to water supplies and inclusive of all regulated contaminants. This sampling effort will provide direction for further needs to monitor under the Ground Water Rule and/or Surface Water Treatment Rule based on the selected alternative.

4.C WATER DEMANDS

Based on the criteria above and the population presented in Section 1D, the following demands are estimated for the Tacna Water System.

Table 4.3 Water Demands

Design Parameter			Existing	Future
Population Served			310	403
No. Connections			135	175
People per connection			2.3	2.3
Water use per capita		gal/day	100	100
Average Day Demand (per 2017 usage data)	ADD	gal/day	30,916	
Average Day Demand (per calculations)	ADD	gal/day	31,000	40,300
		gpm	21.5	28.0
Maximum Day Demand (2x Average Day Demand)	MDD	gal/day	62,000	80,600
		gpm	43.1	56.0
Peak hour Demand (1.5 x Maximum Day Demand)	PHD	gpm	64.6	84.0

As noted in **Table 4.3** above, the average demands calculated compare well to the measured data for the existing population. Future demands assume that all existing 175 services are reestablished.

4.D WATER SUPPLY AND TREATMENT

There are two options available for water supply to the Town of Tacna, a groundwater well and a surface water intake from the WMIDD canal. The water supply, pumping and treatment system should be capable of meeting the maximum day demand.

A back-up water supply is recommended to allow for times when the primary source may be unavailable, but it is not required by Arizona law. Water system outages can occur due to power outages, when the pump fails, or there are other issues with the system. Power outages will impact the entire water system, not just the water supply, so no water would be available at that time without a back-up generator. Power is provided by WMIDD in this area and discussion with Yuma County and Sunstate indicates that the power is very reliable and neither entity can remember any power outages in this area. A transfer switch should be provided with the electrical system that would allow future connection of a temporary or full-time generator. Pump failures and system issues will occur, but the outage time can be minimized with good operators. Tacna is not far from Yuma, so electricians and pump installers are located close at hand. To minimize potential downtime, spare parts including a back-up pump could be maintained at the site or with the operators.

Another concern for the available water supplies in Tacna is canal maintenance. Discussion with WMIDD indicates that they have no regular scheduled maintenance or shutdown of the canal, so there are no known interruptions of service. Based on our experience with irrigation systems, it is possible that a maintenance shut down could occur at some time in the future.

Yuma County have indicated that a back-up water supply is desired for this community.

<u>Groundwater Well</u>

Based on a review of the water quality of wells in this area, it is anticipated that the depth and water quality for a new well would be similar to the existing well. Data for the water sample collected from the existing well on August 6, 2019 is provided in **Figure 4.1**. A copy of the water quality data is provided in **Appendix B**. Copies of the water quality data from Sunstate are also included for reference.

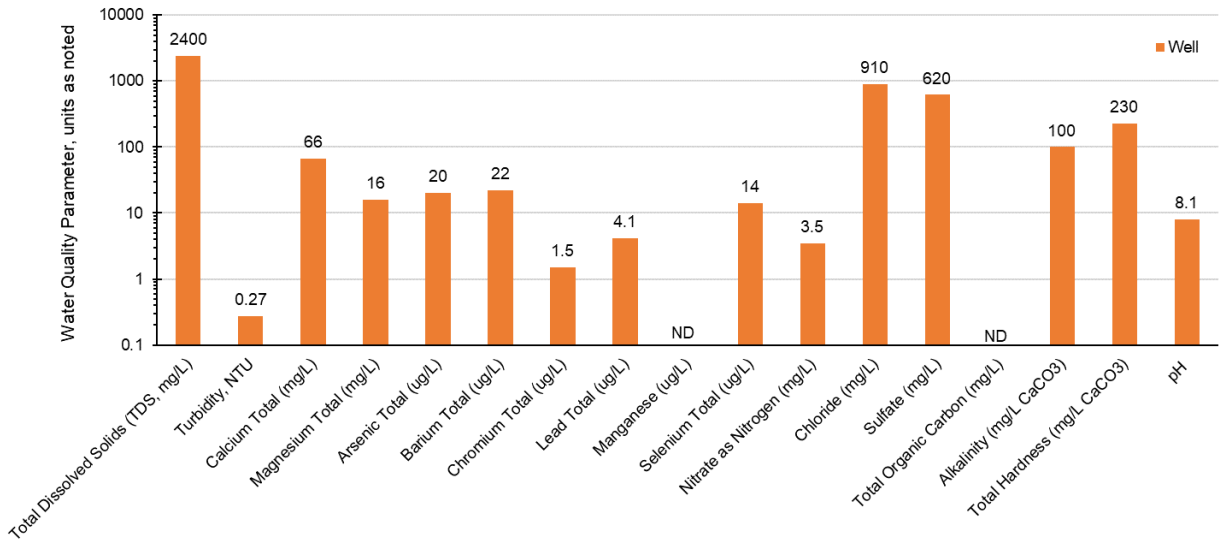


Figure 4.1 Well Water Quality (August 6, 2019)

The water quality data indicates that the well water is high in arsenic and Total Dissolved Solids (TDS). The arsenic level from the August 6th sample is comparable to the historic data for the well. Previous testing data did not test TDS, so no comparison is available. The arsenic level was measured at 0.021 mg/L and the allowable MCL is 0.010 mg/L, so arsenic treatment is required for this water. The TDS was measured at 2,400 parts per million (ppm). EPA's secondary regulations advise an MCL of 500 mg/L for TDS, but this is not regulated in Arizona. Based on the water quality test data, this water likely tastes bad and may have unpleasant odors. The TDS would also cause corrosion in hot water tanks. Nitrate measured at 3.5 mg/L (as nitrogen) in the sample collected, which is below the 10 mg/L MCL. However, a review of ADWR data indicates that high nitrates can also be experienced in this area, which may be of concern for a future well location.

A new groundwater well can be located adjacent to the proposed treatment and storage site depending on the site selected, similar to the current configuration. Wells must be located more than 100 ft from a septic system and spacing of at least 200 ft is recommended between two wells. An ADWR impact study would be recommended prior to well drilling to identify any conflicts.

Treatment systems consisting of adsorption, ion exchange, coagulation/coprecipitation, nanofiltration, ultrafiltration or reverse osmosis are typically used to treat water high in arsenic. **Table 4.4** outlines key advantages and disadvantages to the best available treatment techniques for Tacna's water quality. Adsorption and ion exchange systems are the lowest cost and easiest to operate but may not be as effective as required due to the anticipated high TDS levels. Nanofiltration and reverse osmosis will treat both arsenic and high TDS, but the costs and operating requirements are much higher. Ultrafiltration is the simplest least cost option to treat arsenic for water with high TDS, but additional chemical treatment may be required prior to the filtration to coagulate with the arsenic and provide adequate arsenic removal. All prospective treatment techniques could be implemented with raw water by-pass blending to meet MCLs and reduce costs of treatment (e.g., arsenic removal for 75% of flow, and 25% groundwater by-pass to meet

0.010 mg/L arsenic limit and decrease costs). Best practice is to include disinfection prior to distribution system entry point for all water.

Table 4.4 Treatment Alternatives for Groundwater Supply

Treatment Alternative	Treatment Target	Advantages	Disadvantages
Ion-exchange for arsenic removal	Arsenic < 7 mg/L (70% MCL)	• Single-use resin • Targeted arsenic treatment • Established treatment technique • No backwashing	• Does not mitigate TDS • Consumable resin replacement cost • Pretreatment may be required • Sensitive to high TDS, which limits efficacy
Arsenic adsorption media (metal oxide) filtration	Arsenic < 7 mg/L (70% MCL)	• Single-use resin • Targeted arsenic treatment • Established treatment technique • No backwashing or pretreatment	• Does not mitigate TDS • Consumable resin replacement cost • Sensitive to high TDS, which limits efficacy
Arsenic co-precipitation	Arsenic < 7 mg/L (70% MCL)	• Oxidant driven coagulation process • High recovery	• Requires pH, oxidation-reduction potential (ORP) to be controlled for coagulation • Regular operator involvement and high-flow backwash required • Sensitive to high TDS, which limits efficacy
Membrane Treatment: Ultrafiltration	Arsenic < 7 mg/L (70% MCL)	• Larger pore size reduces fouling potential • Low consumables	• Requires backwashing • Does not remove hardness or TDS • May require pre-treatment
Membrane Treatment: Nanofiltration	Arsenic < 7 mg/L (70% MCL) and Hardness	• Tighter pore size removes hardness • Treats nitrate, arsenic, and other large ions	• Requires pre-treatment • Pumping required
Membrane Treatment: Reverse Osmosis	Arsenic and TDS	• Produces pristine quality water that can be blended based on WQ goals.	• High pressure • Requires pre-treatment • Sensitive to fouling • Operator Intensive (Grade 4 required)

Surface water from WMIDD Canal

Discussion with WMIDD indicates that the Tacna Water Company ownership of the existing intake at the canal can be cancelled and then transferred to the new water system, so a new intake would not be required. The current contract allows for the delivery of up to 100 acre-feet of water per year, with flow not to exceed 1 cfs (448.8 gpm). Water will flow by gravity to a pump station where it will be pumped to the treatment system.

A water sample was collected from the WMIDD canal on August 6, 2019, as provided on **Figure 4.2**. A copy of this data is included in **Appendix B** for reference. Data from 2004 and 2005 from the design for the WMIDD intake are also included in **Appendix C**.

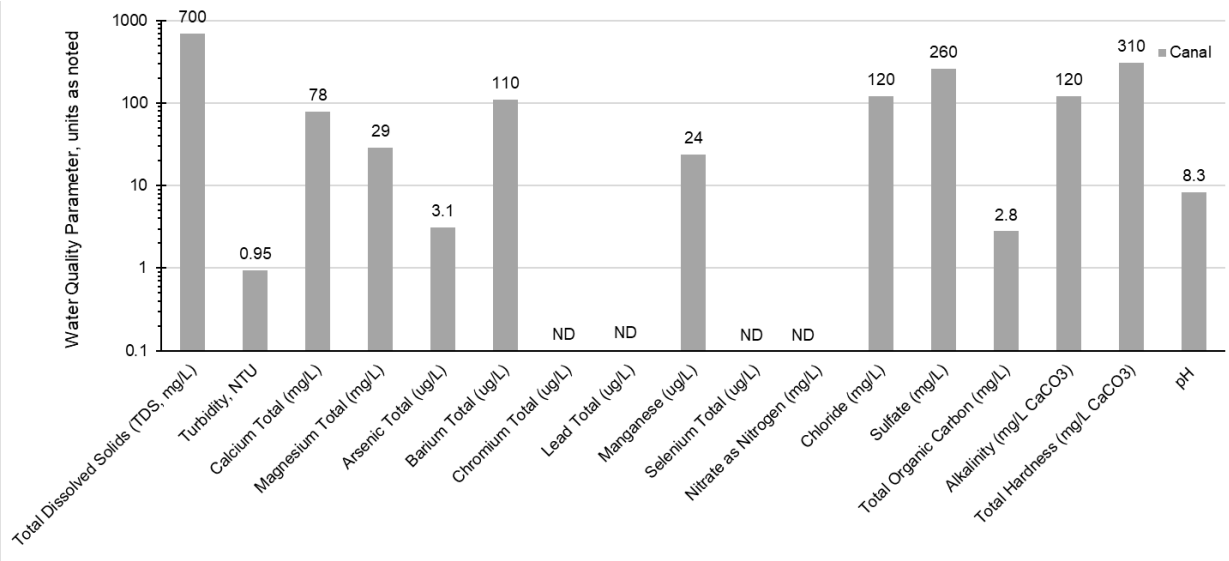


Figure 4.2 WMIDD Canal Water Quality (Aug. 6, 2019)

A review of the water quality for the canal water indicates that the water meets the MCL for all metals and chemicals, including arsenic. The TDS was measured at 700 mg/L, which exceeds the recommended EPA level but is much lower than the groundwater. The turbidity was measured at 0.95 NTU, which is low for surface water. It is anticipated that the turbidity would rise during any extended rainfall event, which could require chemical pretreatment to be implemented during such events.

Based on a review of water quality data from the WMIDD canal, filtration and disinfection will be required to comply with the Surface Water Treatment Rule. No arsenic or nitrate treatment is anticipated to be required for the canal water. **Table 4.5** defines advantages and disadvantages for treatment techniques appropriate for Tacna's water quality.

Table 4.5 Treatment Alternatives for Surface Water Supply

Treatment Alternative	Treatment Target	Advantages	Disadvantages
Filtration: Direct	Turbidity, Disinfection (Physical Removal Credit)	• Compact footprint compared to conventional • Works well with good quality, consistent source water	• Moderate turbidity removal • Low physical disinfection credits • Susceptible to upsets • ADEQ indicates there have been problems with these systems in the Tacna area
Filtration: Adsorption Clarification	Turbidity, Disinfection (Physical Removal Credit)	• Compact footprint packaged system • More control v. direct filtration • < 0.1 NTU and 2.5 log disinfection credit	• Multi-stage process may require periodic maintenance • Chemical addition required
Filtration: Ultrafiltration Membranes	Turbidity, Disinfection (Physical Removal Credit)	• Size exclusion • Can be operated without upstream chemical addition	• Requires backwashing • Fouling potential
Filtration: Nanofiltration Membranes	Turbidity, Disinfection (Physical Removal Credit)	• Removes polyatomic ions (nitrate, arsenic, etc.) • Size exclusion	• Requires pretreatment with UF for surface water treatment to remove foulants • Pumping required

Vendor information for the package treatment systems described above is included in **Appendix D** for reference.

Many of the potential treatment systems for groundwater and surface water will require a discharge location for backwash, drain or waste water in the case of ultrafiltration or reverse osmosis as indicated in **Table 4.4** and **Table 4.5**. There is no sanitary sewer system in Tacna, so a disposal pond will be required. An unlined pond would likely require the site to also have an Aquifer Protection Permit for groundwater percolation protection. A lined pond would rely exclusively on evaporation to eliminate liquids from backwash water, with further details presented as part of costing and site layout. Decant from backwash water could be returned to the head of the plant, which should be investigated as part of detailed design.

4.E WATER STORAGE

As it is anticipated that a new water system will be constructed to serve this community. Per discussion with the Yuma County Chief Building Official/ Fire Code Official, all new water systems must provide fire protection. However, as Tacna is a rural community, the Fire Marshall does not believe that it is necessary to provide as large a facility as would be required closer to the City of Yuma. The Fire Marshall identified that fire storage of 1,000 gpm for 2 hours is recommended but not required. As the new water supply will be capable of providing at least 200 gpm, this storage can be reduced. The community of Tacna has a volunteer fire department and owns a small fire truck. **Table 4.6** below illustrates the storage requirements recommended for Tacna based on the criteria discussed with the Fire Marshal.

Table 4.6 Water Storage

Water Storage Factors	Storage Capacity	
	Existing	Future
ADD (gal/day)	31,000	40,300
PMD (gal/day)	46,500	60,450
Fire Flow Rate (gpm)	1,000	1,000
Less Water supply	-200	-200
Fire Flow Duration (hr)	2	2
FFC (gal)	96,000	96,000
Minimum Required Storage = PMD+FCC (gal)	142,500	156,450

Based on the above calculations, a storage tank with a volume of approximately 150,000 gallons is required. Both steel and concrete tanks were investigated for implementation in Tacna. The initial capital cost and required frequency of shutdowns and tank maintenance were significant factors in the analysis, with costing projected out for tank maintenance over the lifecycle. Based on the life cycle costing and maintenance requirements for both tank types, it was decided to proceed with a concrete tank as the preferred option to minimize long-term costs and provide a lower-maintenance storage tank. Costing analysis to compare both tanks is provided in **Appendix E**.

4.F DISTRIBUTION SYSTEM

The new water distribution system will require replacement of the existing failing network of 6-inch asbestos cement pipe, 2-inch PVC pipe and services. It is anticipated that the new pipe locations will be similar to the existing to allow for connection to existing services. The minimum pipe main size is 6-inch diameter. Hydrant spacing will be approximately 1,500 ft, which is larger than normal spacing per conversations with the County Fire Marshal's recommendations for this small rural community.

5.0 DESIGN ALTERNATIVES

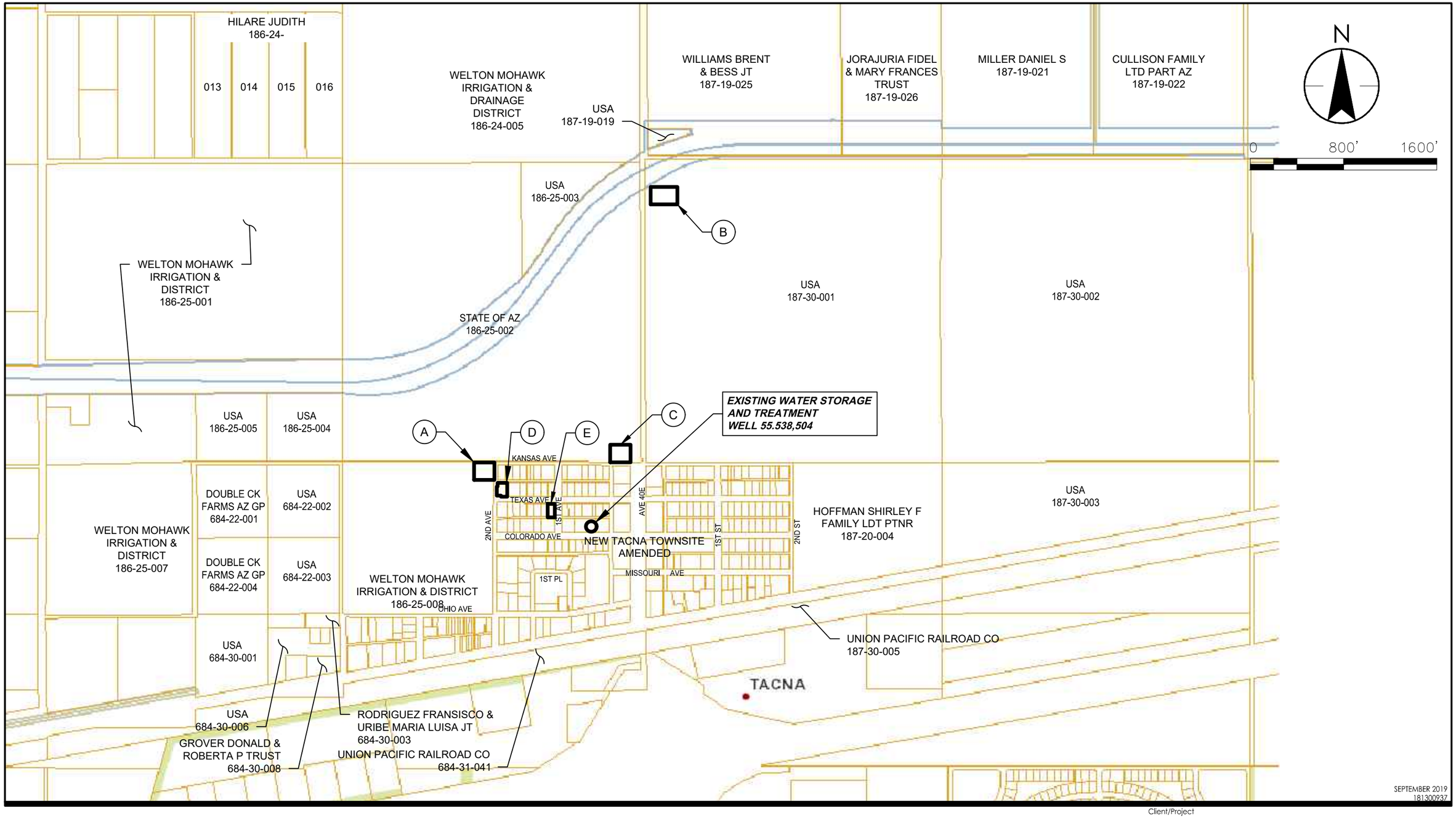
5.A DESCRIPTION OF ALTERNATIVES

The following alternatives were considered for a new water system to eliminate the health and safety risks associated with the quality of the water and the condition of the water infrastructure at the Town of Tacna:

- Alternative 1 Canal (surface water) with treatment with backup well with no treatment.
- Alternative 2 Canal (surface water) with treatment with backup well with treatment.
- Alternative 3 Canal (surface water) with treatment with no backup.
- Alternative 4 Well with treatment, with backup well.
- Alternative 5 Well with treatment, with no backup.
- Alternative 6 Existing Water System. No action.

Five potential sites were initially identified to house the new water treatment and storage facilities, as illustrated on **Figure 5.1**.

- Site A is located just west of the townsite at the southwest corner of 2nd Avenue and Kanas Avenue. This property is owned by WMIDD, who have indicated that they would provide the land to the new District for the facilities. This site is close to the community and will work well with either source option.
- Site B is located adjacent to the WMIDD canal. Just east of Avenue 40E. This is Federal land that is controlled by WMIDD. WMIDD indicate that it would be available for use for this project. This location best suits a canal surface water source.
- Site C is located just north of the townsite at the northeast corner of Avenue 40E and Kansas Avenue. The site is a bit north of the corner to avoid a conflict with the existing park. This is on the same property as Site A, which is owned by WMIDD. This site is very convenient to the townsite and a potential line from the canal.
- Sites D and E are private undeveloped lots in the townsite. Site D is located at the northeast corner of 2nd Avenue and Texas Avenue. It is a double lot, approximately 118-ft by 90-ft. Site E is located at the southwest corner of 1st Avenue and Texas Avenue. This is a single lot, approximately 108-ft by 62-ft. Site E is too small to house the treatment and storage, so will not be considered further. Site D could be possible but may be too small. Similar to Site A, this site will work with either source water option.



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POSSIBLE STORAGE AND TREATMENT SITE

EXISTING STORAGE AND TREATMENT SITE

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Figure No.
5-1

Title
POTENTIAL TREATMENT AND STORAGE SITES

These sites were reviewed with Yuma County staff at a meeting on September 6, 2019. Based on the size constraints with sites D & E and the County's preference for sites A, B and C, only sites A, B & C will be discussed further.

A description of each of the 6 alternatives presented above follows:

5.A.I Alternative 1 – Construct New WMIDD Intake, back-up well with no treatment, storage tank, treatment system and water distribution system

Alternative 1 includes using the existing WMIDD canal intake, extending a new 12" gravity pipe to a new pump station, extend a new 4" line from the pump station to the treatment and storage site. The treatment and storage site can be located at site A, B or C. Site B which is located adjacent to the intake will allow the pump station to be constructed at the same site as the treatment and storage. An additional site for the pump station adjacent to the intake will be required with Sites A and C.

The treatment and storage site will house the treatment system which will consist of filtration and disinfection as well as the storage tank and distribution pump system. A back-up well will also be located at the site. The back-up well will not be permanently connected to the water system. The fittings will allow for a manual connection as this well would only be used if the canal water is unavailable.

ADEQ indicate that this option would not be in compliance with ADEQ requirements. Any well connected to the system at any time would need to be fully permitted as a water source and meet all requirements. If a temporary connection was used, the system would be in violation.

5.A.II Alternative 2 – Construct New WMIDD Intake, back-up well with treatment, storage tank, treatment system and water distribution system

Alternative 2 is very similar to Alternative 1, but it includes treatment for the backup groundwater well, which would allow either source to be used at any time.

As discussed in Section 4.C, due the high TDS levels in the groundwater, not all forms of arsenic treatment will be effective. In addition, treating TDS is very expensive and difficult. Therefore, because this is a backup supply system, TDS treatment will not be included, and treatment will focus on removal of arsenic to meet the MCL. For the period of time that a surface water supply outage may occur, residents could drink bottled water if taste and odor are not satisfactory but drinking water provided will be safe from any MCL violations.

This option provides the most flexibility and the most reliable water supply.

5.A.III Alternative 3 – Construct New WMIDD Intake, storage tank, treatment system and water distribution system

Alternative 3, similar to options 1 and 2 includes using the existing WMIDD canal intake, extending a new 12" gravity pipe to a new pump station, extend a new 4" line from the pump station to the treatment and storage site. The treatment and storage site can be located at site A, B or C. Site B which is located adjacent to the intake will allow the pump station to be constructed at the same site as the treatment and storage. An additional site for the pump station adjacent to the intake will be required with Sites A and C.

The treatment and storage site will house the treatment system which will consist of filtration and disinfection as well as the storage tank and distribution pump system. This option has no back-up water supply.

5.A.IV Alternative 4 – Construct New Groundwater well, back-up groundwater well, storage tank, treatment system and water distribution system

Alternative 4 includes a new groundwater well as the primary source for the water system and a second groundwater well back-up. Treatment would include disinfection, arsenic removal, and mitigation of TDS. Because the groundwater TDS is expected to be high for the new wells, TDS removal would be included in treatment selection if groundwater is selected as the sole water supply for Tacna, requiring use of reverse osmosis.

Only sites A and C have been investigated for this alternative. Constructing new wells adjacent to the canal (Site B) is not practical as it would require additional pipe for no benefit. There is no significant difference between Site A or Site C. The amount of land required to provide evaporation ponds for reverse osmosis concentrate brine will significantly increase the site footprint and costs required from the previously described alternatives.

5.A.V Alternative 5 – Construct New Groundwater well, storage tank, treatment system and water distribution system

Alternative 5 is similar to option 4 but does not include a back-up well. This would be similar to the existing system but would include new components and treatment for the well water.

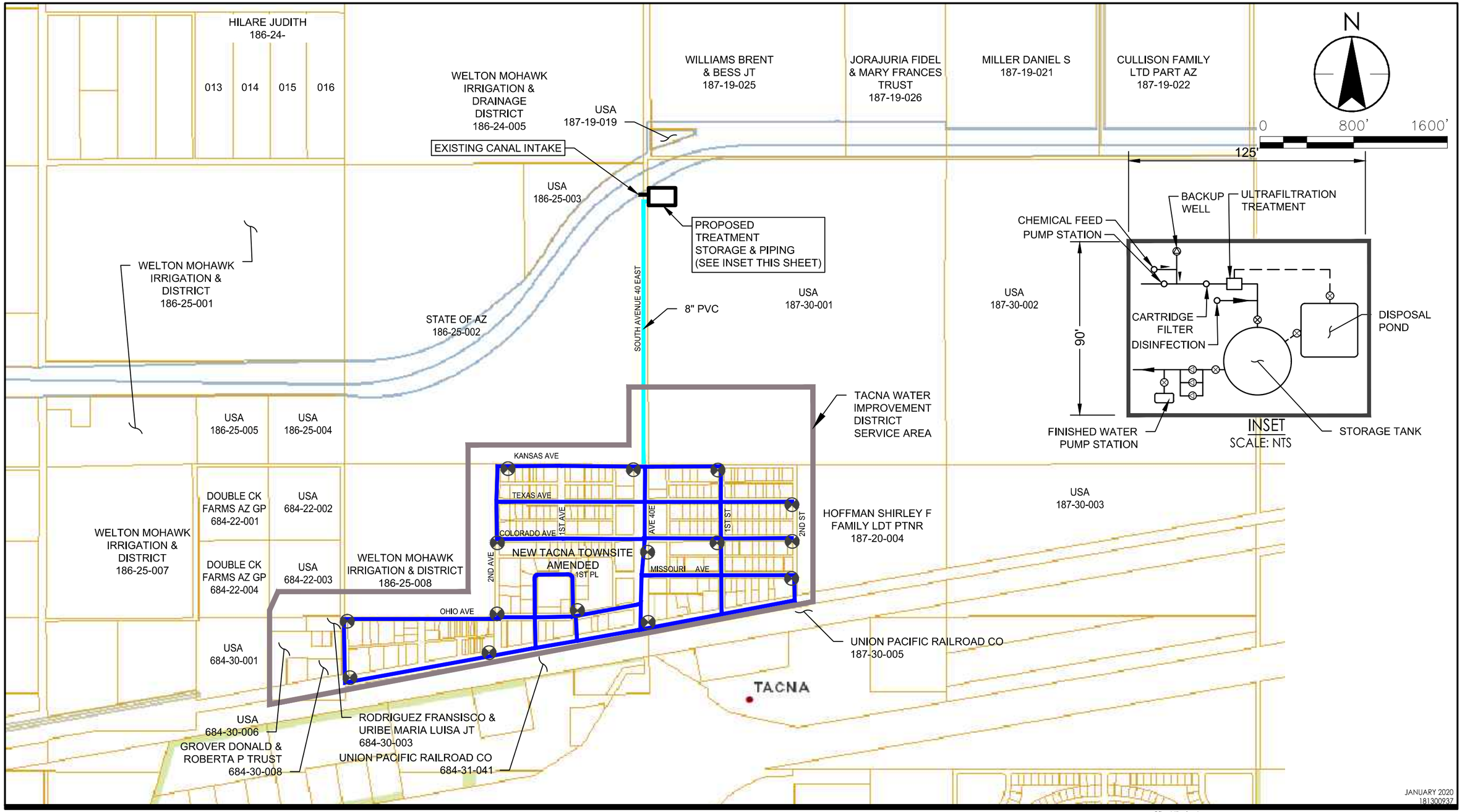
5.A.VI Alternative 6 – No Action

Taking no action would entail continuing with the operation of the existing water system. This alternative does not address the impacts of the deteriorating components nor does it address the water quality which does not meet EPA water quality requirements. Therefore, a no-action alternative is not considered feasible and has not be developed further.

5.B ALTERNATIVE DISCUSSION

Due to the remote location of Tacna, Yuma County have indicated that a back-up water supply is required. Therefore, Alternatives 3 and 5 will not be considered further. ADEQ have indicated that Alternative 1 is not in compliance, so it will not be considered further. There are no significant differences between the technical requirements for development with Sites A and C. Yuma County have indicated that both properties work well for them. For the purpose of this study, only Site C will be discussed further. The remaining options to be assessed include:

- Alternative 2 B Canal intake with treated well back up only, site by canal (**Figure 5.2**)
- Alternative 2 C Canal intake with treated well back up only, site by town (**Figure 5.3**)
- Alternative 4 C Treated well with back up well, site by town (**Figure 5.4**)



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- 8" PVC
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- TACNA WATER IMPROVEMENT DISTRICT SERVICE AREA

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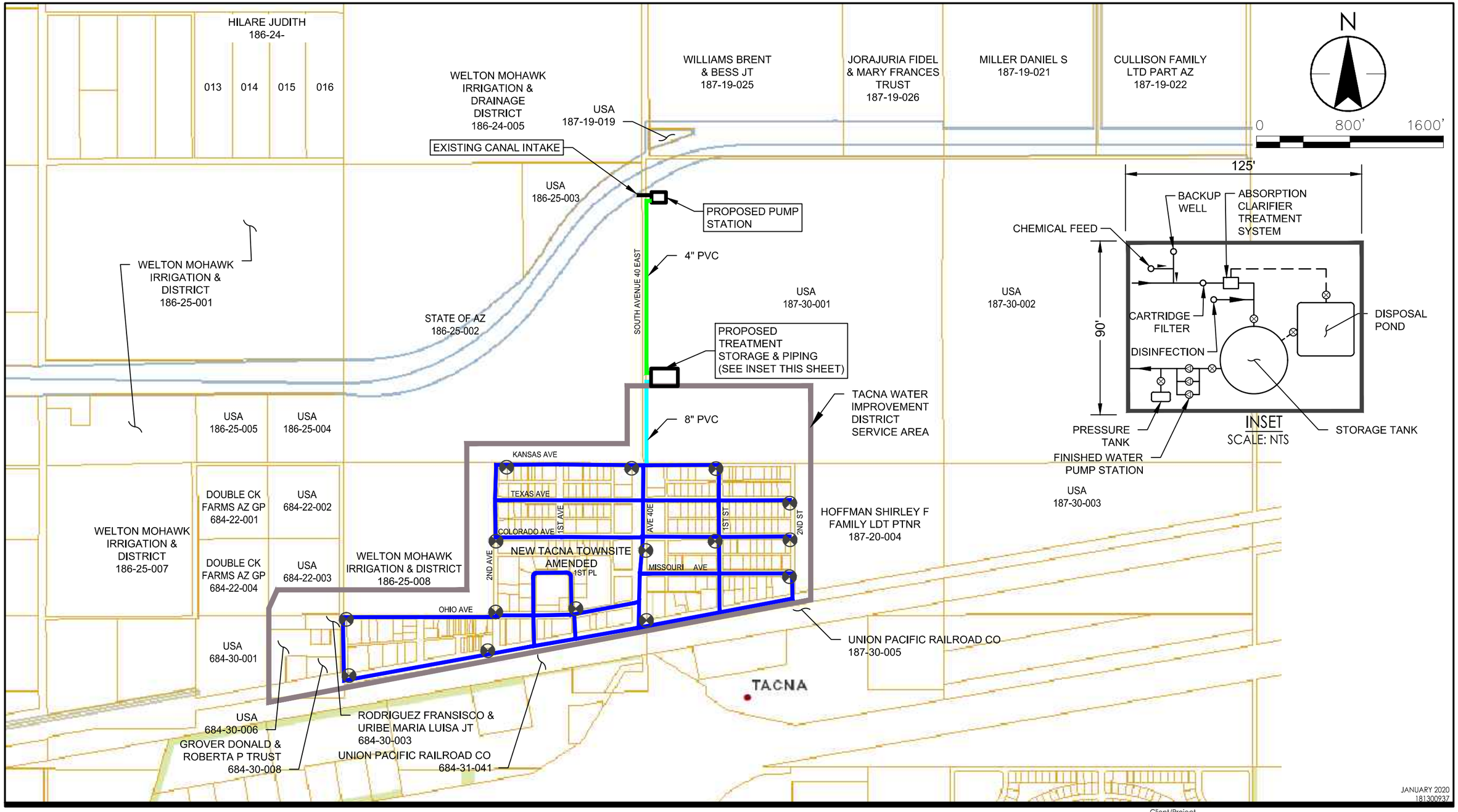
Figure No.
5.2

Title
OPTION 2B-CANAL INTAKE WITH BACKUP WELL AND TREATMENT NEAR CANAL



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PRELIMINARY ENGINEERING REPORT

Figure No.
5.3

Title
OPTION 2C-CANAL INTAKE WITH BACKUP WELL AND TREATMENT NEAR TOWN

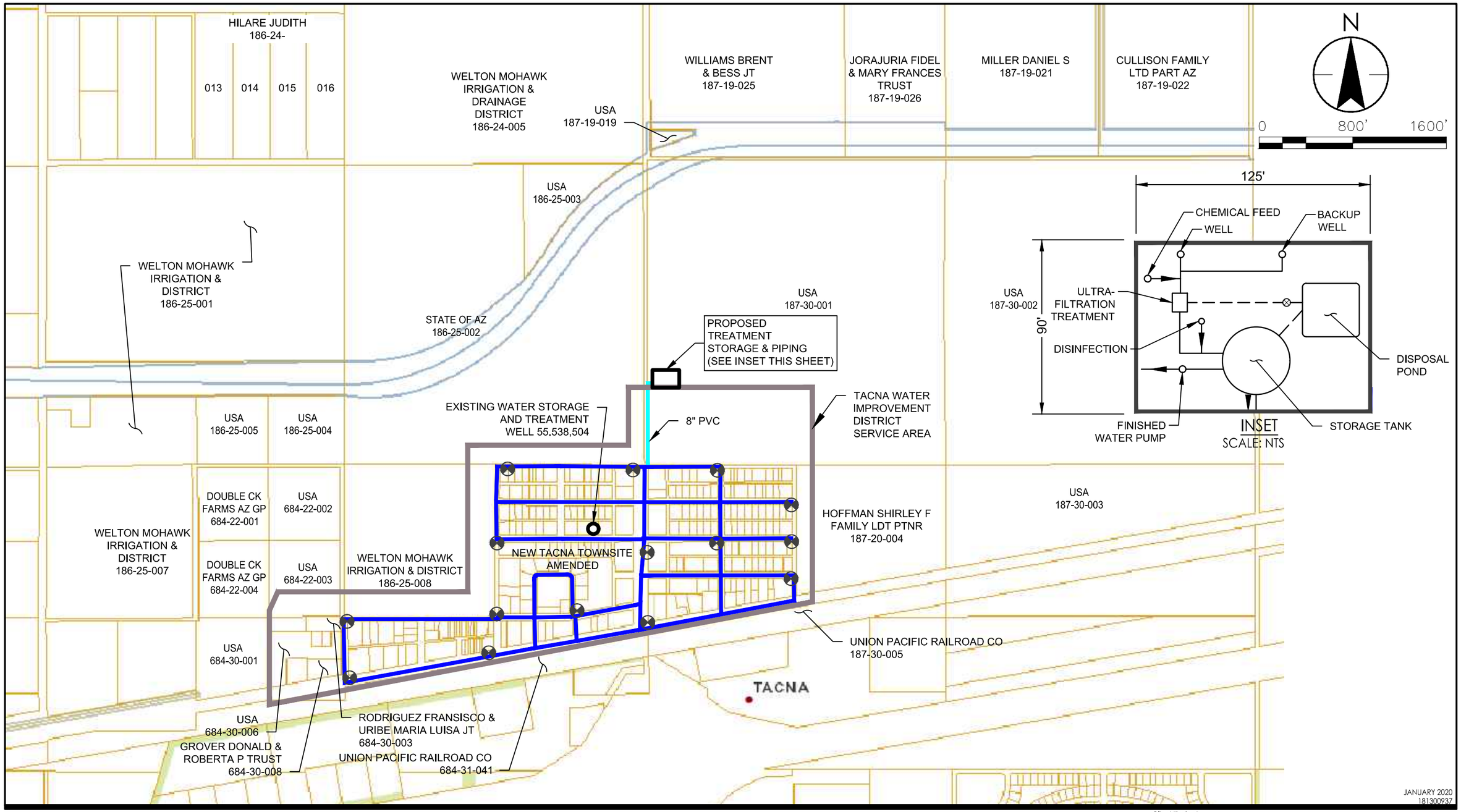

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Figure No.
5.4

Title
OPTION 4C-WELL WITH BACKUP WELL TREATMENT NEAR TOWN

5.B.I Alternative 2 B Canal intake with treated well back up only, site by canal

Alternative 2 B includes using the existing WMIDD canal intake, extending a new 12" gravity pipe to a new pump station, extend a new 4" line from the pump station to the treatment and storage site. The site will also house a back-up well. The treatment and storage site is located adjacent to the Canal.

The surface water supply pump station will be housed in a large diameter manhole and will consist of 2 pumps, piping and level controls. The level controls will prevent the pumps from operating if there is no water. The pumps will be sized to provide at least 200 gpm from the wet well through the treatment components to the water storage facility. It is anticipated that the pumps will likely be in the 5 hp range.

It is anticipated that the back-up well will be similar to the existing well, approximately 200-ft deep and provides approximately 200 gpm.

The treatment system will consist of filtration, disinfection and arsenic treatment. A package ultrafiltration system with pre-treatment for coagulation of the arsenic which will treat both the surface water and the arsenic is proposed. Alternate systems such as an adsorption clarifier to treat the surface water and an ion exchange to treat the groundwater arsenic were considered, but one system that can treat both provides consistency, it is a single package and it is less expensive than two systems. The ultrafiltration package is housed in a container approximately 8-ft wide by 40-ft long and 9-ft high. It would contain all parts of the treatment system. Disinfection is also required and can be located with the treatment package or outside the container. This option has the most flexibility as it allows either the canal intake or the back-up well to be used and will provide treated potable water to the users with either option. The controls will be set to operate the well and the arsenic treatment periodically, blending with the surface water, so that the well would be functional if required.

The distribution system would include a 150,000-gallon storage tank, a pump and pressure system, a fire pump and a network of 6-inch piping with hydrants. Service lines will be provided to the users from the mains. The tank will be a pre-stressed concrete, ground level tank, potential sizes as discussed previously. The distribution pump system would be a 3-pump system, 2 distribution pumps and 1 fire pump. Under normal operation only one pump would operate and they would alternate. The larger fire pump would only start if the pressure in the system dropped indicating an open fire hydrant. Similar to the well, the fire pump would be operated periodically to make sure it would be available when necessary. It is anticipated that the service lines will be 1-inch diameter and will connect to the existing line near the property line.

A retention basin would be required on site to capture backwash flows, well purge water and stormwater retention if an engineered solid handling system is not implemented. This would increase land area required for the site, but it would simplify the required processes to manage waste flows. Early estimates of minimum land requirements for an evaporation basin are between 0.5 acres to 1.25 acres with requirements to be revised based on final treatment process and manufacturer selection in detailed design.

5.B.II Alternative 2 C Canal intake with treated well back up only, site by town

Alternative 2 C is the same as option 2 B but the storage and treatment site is located near town instead of adjacent to the canal. The distribution system configuration and pipe sizing would remain the same, with the raw water piping length increased, and finished water piping to distribution system decreased.

5.B.III Alternative 4 C Treated well with back up well, site by town

Alternative 4 C includes using a new groundwater well as the primary source and a second groundwater well as a back-up water supply.

The treatment system will consist of disinfection and arsenic treatment. In order to treat the arsenic and provide improved safe water supply to the community it is necessary to reduce the TDS. To do this, a package system consisting of a nano-filtration or reverse osmosis system is proposed. A nano-filtration system will remove arsenic, as well as reducing hardness, and TDS. A nano-filtration or reverse osmosis system will require a large disposal area for reject water from the treatment system. The amount of land required to evaporate the liquids portion of the reverse osmosis concentrate brine is estimated at a minimum of six acres (operating at 80% recovery) or 10 acres (operating at 70% recovery). This assumes all raw water flow is treated through reverse osmosis. The capital costs and maintenance requirements would be higher for TDS removal from groundwater than the treatment systems for the canal water. A simpler adsorption or ion exchange system is not recommended as it is unlikely to be effective with the high TDS levels that exist in this water. This system will provide full back-up water supply and treatment.

The distribution system would match Options 2B and 2C.

5.C ENVIRONMENTAL IMPACTS

As previously mentioned, an ER has been prepared. The ER analyzed the proposed supply, treatment, storage and distribution system alternatives presented in this PER. The ER concluded that there will not be any significant environmental impacts for all locations where the collection system is proposed to be installed.

5.D LAND REQUIREMENTS

All of the options require land to be obtained to house the pump stations, treatment systems and storage tanks. For option 2 C, two properties will be required, one near the canal intake for a small pump station and one to house the remainder of the components. Option 4C will require more land to address the reject water disposal.

The water mains will be constructed within the existing road rights-of-way, so it is not anticipated that any land acquisition will be required for pipeline installation.

5.E POTENTIAL CONSTRUCTION PROBLEMS

The project is located within a populated area, so construction will impact the residents. The new water mains will be constructed adjacent to and within the roads which will impact access through the community for the residents. Also, based on the limited records available, some of the existing water lines are constructed at the back of the lots, therefore, some of the existing water services may need to be adjusted from the current routing. This would increase the impact to the residents of those lots. In order to minimize potential impacts, each parcel should be evaluated during the detailed design to determine the location of the existing water service line.

5.F SUSTAINABILITY CONSIDERATIONS

All the options considered include water treatment which will require a trained operator and ongoing maintenance to sustain the water quality. The pumps and treatment components will require replacement as well as regular maintenance.

Environmental

The new water system will eliminate the health issue due to the untreated water which has levels that exceed the MCL required by EPA. A new system will also eliminate the potential health issues due to a failing water system that could occur due to other contamination and the safety issues associated with a deteriorating system.

Social

In addition to eliminating the potential safety issues, the new water system will provide water for fire protection to the community and better tasting water.

Economic

The costs associated with the failing water system will be eliminated, but there will be new costs to cover the capital, operation and maintenance of the new system.

5.G COST ESTIMATES

Table 5.1 below presents a summary of the preliminary capital cost estimates for each of the three options presented below. Copies of the detailed estimates are included in **Appendix E** for reference.

Table 5.1 Preliminary Cost Estimate Summary Table

Item Descriptions	Alternative 2B	Alternative 2C	Alternative 4C
Distribution Piping	$ 2,215,460	$ 2,208,660	$ 2,026,420
Raw water pump station	$ 40,000	$ 50,000	$ -
Well	$ 70,000	$ 70,000	$ 130,000
Treatment	$ 620,000	$ 620,000	$ 820,000
Storage	$ 627,000	$ 627,000	$ 627,000
Finished water pumping	$ 57,500	$ 57,500	$ 57,500
Site Work	$ 431,055	$ 431,055	$ 1,622,250
Site Electrical	$ 115,000	$ 115,000	$ 115,000
Land Purchase allowance	$ 80,000	$ 80,000	$ 500,000
SUB-TOTAL	$ 4,256,015	$ 4,259,215	$ 5,898,170
Contingency, 30%	$ 1,276,805	$ 1,277,765	$ 1,769,451
Engineering allowance, 15%	$ 638,402	$ 638,882	$ 884,726
Environmental Mitigation	$ 20,000	$ 20,000	$ 20,000
Grand Total	**$ 6,191,222**	**$ 6,195,862**	**$ 8,572,347**

6.0 SELECTION OF AN ALTERNATIVE

The table below describes and compares each of the alternatives from Section 5.0. A brief description, advantages, and disadvantages are presented in **Table 6.1**.

Table 6.1 Summary Discussion of Alternatives

Alternative	Description	Advantages	Disadvantages
2B	• Intake on the WMIDD canal • Groundwater well back-up • Ultrafiltration with pre-treatment and disinfection • New storage tank, pump station, and a distribution system • Treatment site located adjacent to canal	• Reliable water supply from canal • Full back-up provided • Flexible option, using two different sources • Least expensive option	• Treatment required for both canal and well water • Additional monitoring required for ADEQ for surface water source
2C	• Intake on the WMIDD canal • Groundwater well back-up • Ultrafiltration with pre-treatment and disinfection • New storage tank, pump station, and a distribution system • Treatment site located adjacent to town	• Reliable water supply from canal • Full back-up provided • Flexible option, using two different sources	• Treatment required for both canal and well water • Two property purchases required, one for intake pump station and one for treatment and storage • Slightly more expensive than 2B due to line from canal • Additional monitoring required for ADEQ for surface water source
4C	• Two new groundwater wells • Nanofiltration disinfection • New storage tank, pump station, and a distribution system • Treatment site located adjacent to town.	• Back-up provided • Same treatment required for both wells	• Operational costs for treatment will be higher due to high TDS levels in water • Highest operator training required • Most expensive option • Largest land requirement for reject water disposal

The capital costs for option 4C are significantly higher than either 2B or 2C due to the higher land needs and the more complex treatment system. Option 2B is the option preferred by Yuma County and it has two primary advantages over the other options:

- All pumping, treatment and storage facilities are located at one site, only requiring purchase of one property.
- It provides full back-up and flexibility, using two different sources.

6.A LIFE CYCLE COSTS

Life Cycle Costs were assessed for Options 2B, 2C, and 4C. A summary of the results is presented below. The details are included in **Appendix E** for reference, including the comparison for the steel and concrete tank options.

Table 6.2 Life Cycle Cost Summary Table

Alternatives	Alternative 2B	Alternative 2C	Alternative 4C
A. Capital Cost	$6,191,222	$6,195,862	$8,572,347
B. Annual O&M (PRESENT WORTH)	$1,541,000	$1,541,000	$1,635,000
C. Annual SLA (PRESENT WORTH)	$1,668,000	$1,668,000	$1,779,000
D. Salvage Value (PRESENT WORTH)	$2,407,000	$2,407,000	$3,112,000
TOTAL (A+B+C-D)	**$6,993,222**	**$6,995,862**	**$8,874,347**

As indicated in **Table 6.2** above, Alternative 2B, Canal as primary source with well back-up and treatment facility by the canal with a concrete storage tank is the least cost option when considering life cycle costs.

7.0 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

7.A PRELIMINARY PROJECT DESIGN

7.A.I Water System Layout

Option 2B as described above and illustrated on **Figure 7.1** is recommended for Tacna. The water system will include an intake at the Wellton-Mohawk irrigation canal, a raw water pump station, treatment, storage, finished water storage and distribution piping as described in the following sections.

As the existing water system in Tacna is in probate and is in poor condition, only the intake on the Wellton-Mohawk irrigation canal will be reused. All other components will be replaced.

7.A.II Water Supply

A new primary water supply from the Wellton-Mohawk irrigation canal is proposed for this community. In the early 2000's, Tacna used surface water from this canal after construction of a WMID canal intake; the use of the existing canal intake is to be transferred by Wellton-Mohawk to the Improvement District instead of being replaced or re-sited. A groundwater well will be provided as a back-up water supply. The back-up well will be located at the treatment site, adjacent to the canal. Treatment is required for both the irrigation supply and the groundwater well as described in Section 7A.III. The water quality for the canal water meets all chemical parameters but requires disinfection and filtration. It is anticipated that the quality for a new well will be similar to the existing well as that is typical for the area. Accordingly, it is expected that the water will be high in arsenic and TDS but may also have high nitrate levels, which could require additional treatment.

Assuming a maximum buildout of 175 services in Tacna, the capacity of the water supply should meet the maximum day demand estimated for the community which is 80,600 gallons per day or 56. gpm. Based on the historic yield of the existing well at Tacna and the existing intake on the canal, it is anticipated that approximately 200 gpm will be provided from either the canal or the back-up well. The back-up well will contain a submersible well pump which is controlled from the control system at the treatment site.

7.A.III Treatment

The proposed treatment process will consist of a package ultra-filtration unit, with additional pre-treatment to remove the arsenic and disinfection. The system will be housed in a container approximately 8-ft wide by 40-ft long and 9.5-ft high. The ultra-filtration will include filtration membranes, a recirculation pump, a back-wash pump, a strainer, a compressed air system, chemical feed pumps, pH sensor, temperature sensor, turbidimeter, a flow meter, valves, piping, tanks, mixer, instrumentation and electrical controls. The system will be designed to operate automatically. Under normal circumstances, the groundwater well pump will be off, so the

coagulant will not be used. The system will be designed to automatically operate the well system and the coagulant treatment system periodically, so that it is available when needed. The treatment system supplier include start-up time with their quote to train the local operators. The controls for the system can be monitored remotely using a telephone connection, wifi or a cell phone service. This would allow the operator and the County to keep track of the system operation and maintenance. Three phase power will be required for the treatment system.

The treatment system capacity should meet the maximum day demand 56 gpm at a minimum, preferably the peak hour demand, 84 gpm.

Waste flows from the treatment process include backwash water and filter to waste streams for the membrane processes. Online instrumentation for process monitoring will also produce waste discharges. An onsite retention basin will be provided to manage onsite drainage and handle process waste flows.

Disinfection will be provided through delivery of sodium hypochlorite ahead of the finished water reservoir to allow for adequate contact time. Dosing should be advanced in detailed design but should limit production of disinfection by-products and provide adequate chlorine residual throughout the distribution system. Disinfection by-products have presented in adjacent Wellton, which indicates that treatment of this surface water may lead to DBP exceedances (TTHM in particular). Reduction of DOC and turbidity using the proposed treatment process should greatly reduce the DBP formation potential of the water prior to adding disinfectant.

7.A.IV Storage

A ground level pre-stressed concrete tank with a capacity of 150,00 gallons is proposed. The tank will be constructed with coatings suitable for a potable water system, approximately 36-ft diameter and 20-ft tall and will be housed at the treatment site. The tank which will be housed at the treatment site will include access hatches, vents, inlet piping, outlet piping, drain piping and an overflow.

7.A.V Pumping Stations

Two pumping stations are proposed for this project.

A raw water station will collect water from the canal and pump it to the treatment process. The station will be housed in a small manhole containing two pumps located at the treatment site. It is anticipated that each pump will have a capacity of 100 gpm. Under normal circumstances only one pump will operate. It is anticipated that the pumps will be in the order of 5 hp each.

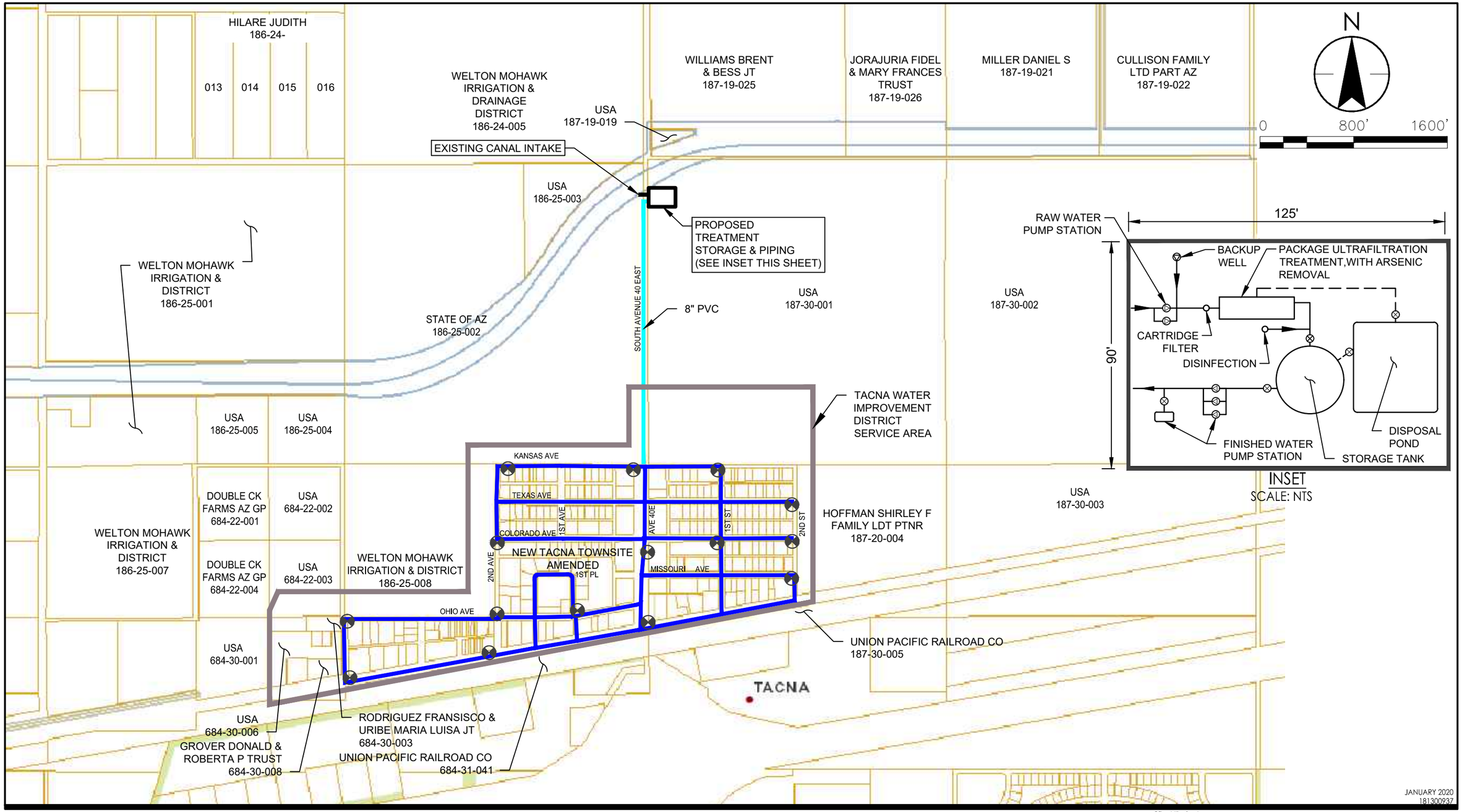
A finished water pump station will pump water from the storage tank to the distribution system. This station will also be located at the treatment site and will include three pumps, two domestic and one fire pump. The pump system will also include a pressure tank and compressor to pressurize the system. Under normal circumstances one pump will operate, but if the demands increase, the second domestic pump will start. If the pressure continues to drop indicating the

need for a higher flow from a hydrant due to a fire, the larger fire pump will start. Similar to the raw water pump station it is anticipated that the domestic pumps will each have a capacity of 100 gpm and be in the order of 5 to 7.5 hp each. The fire pump will be larger, designed to deliver approximately 800 gpm. It is anticipated that this pump will be 15 to 20 hp. Three phase power will be required for the pumps and is available along Avenue 40E across the road from the proposed site.

7.A.VI Distribution Layout

The distribution system includes a network of 6-inch pipe, 1-inch services and hydrants, located as shown on **Figure 7.2**. The 6-inch pipe will be PVC C900 pipe and will include isolation valves at intersections. The services will be 1-inch copper pipe and will include a saddle and corporation stop at the main, a curb stop and meter at the property line and connection to the existing service. The hydrants will include isolation valves.

All lines are shown on **Figure 7.2** with the exception of the supply lines from the new water supply and treatment system. It is proposed that the new piping will consist of PVC pipe. A finished water pump station will be required to distribute water to the community. The pump station will include two pumps for normal operation and one larger future pump to provide fire flows.



V:\1813\active\181300937\drawings\figures\Fig 7.1 Recommendated Option.dwg
2020/01/24 3:39 PM By: McClain, John

Stantec

3133 West Frye Road, Suite 300
Chandler, AZ 85226-5110
www.stantec.com

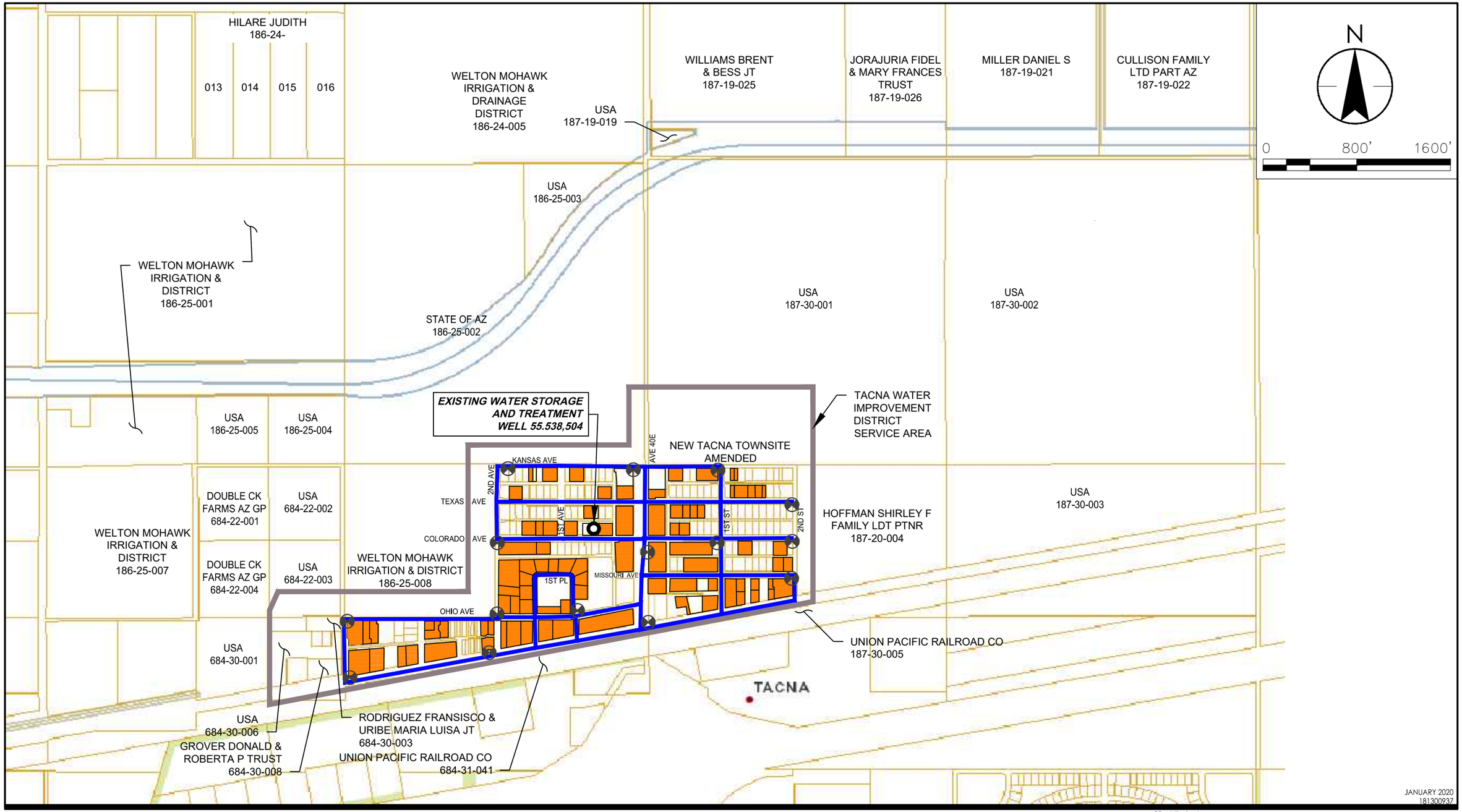
Legend

- 4" PVC
- 6" PVC
- 8" PVC
- FIRE HYDRANT
- TACNA WATER IMPROVEMENT DISTRICT SERVICE AREA

Client/Project
YUMA COUNTY
TACNA WATER PLANNING
PRELIMINARY ENGINEERING REPORT

Figure No.
7.1

Title
RECOMMENDED OPTION -CANAL INTAKE WITH BACKUP WELL & TREATMENT NEAR CANAL



V:\1813\active\181300937\drawings\figures\Fig 7.2 Proposed Distribution System.dwg
2020/01/24 2:18 PM By: McClain, John

Stantec

3133 West Frye Road, Suite 300
Chandler, AZ 85226-5110
www.stantec.com

Legend

- 6" PVC
- FIRE HYDRANT
- TACNA WATER IMPROVEMENT DISTRICT SERVICE AREA

Notes

1. WATER SUPPLY IS NOT SHOWN.
2. SEE FIGURES 5.2 TO 5.4 FOR WATER SYSTEM OPTION.

Client/Project
YUMA COUNTY
TACNA WATER PLANNING
PRELIMINARY ENGINEERING REPORT

Figure No.
7.2

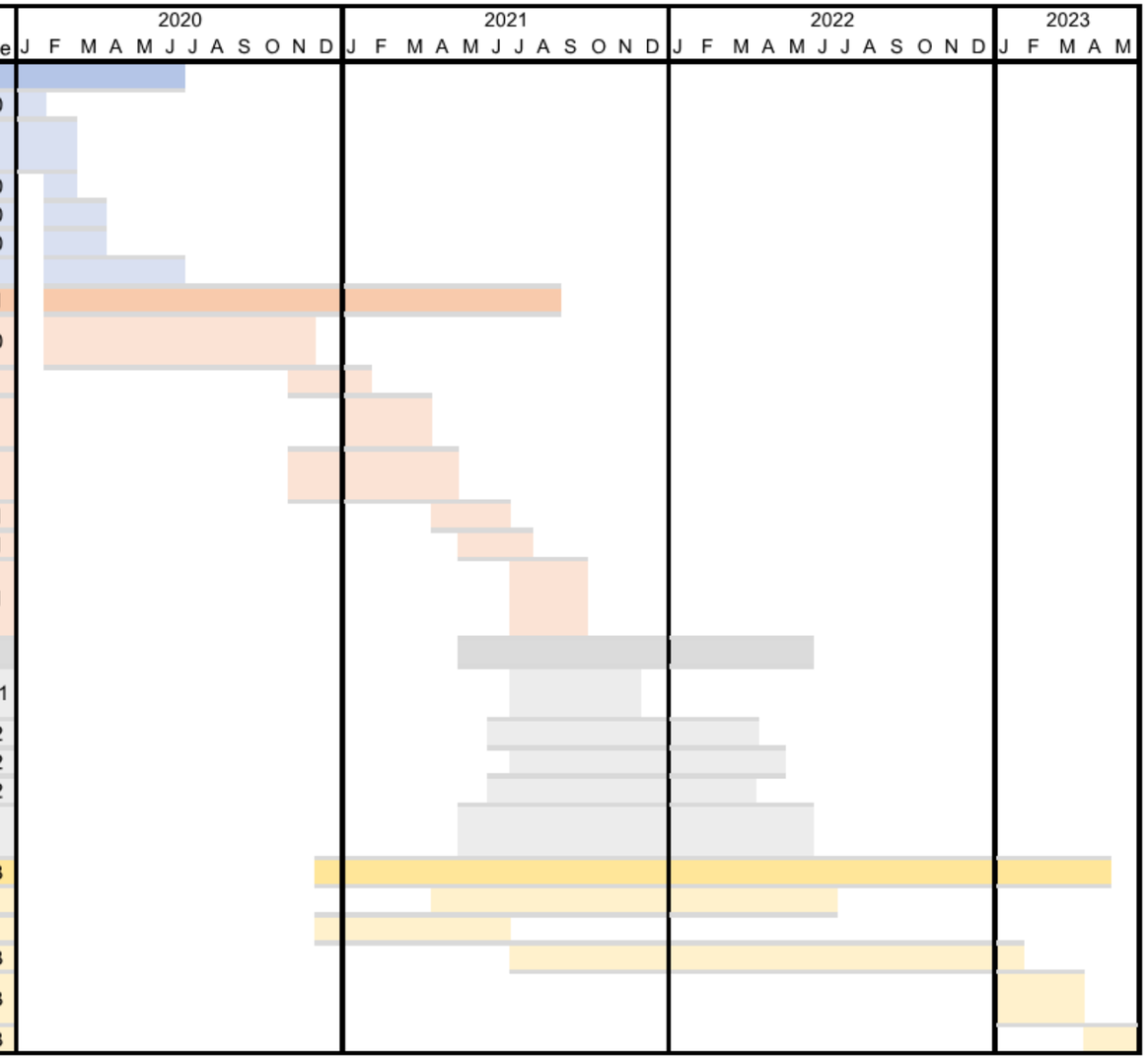
Title
PROPOSED DISTRIBUTION SYSTEM

7.B PROJECT SCHEDULE

Table 7.1 presents a preliminary schedule for the project duration.

Table 7.1Preliminary Project Schedule

Prepared For: Yuma County Prepared By: Stantec Consulting Services Inc.		Start Date	End Date
Preliminary Reports and Funding Applications		1/24/20	6/9/20
PER / ER Draft Submittal	Stantec	1/24/20	1/27/20
Yuma County PER/ER Review	Yuma County	1/27/20	2/3/20
PER/ER Finalization	Stantec	2/3/20	2/10/20
RD PER / ER Review	Rural Development	2/10/20	3/11/20
CDBG Application	Yuma County	2/3/20	3/31/20
RD Application	Yuma County	2/10/20	6/9/20
Procurement and Preliminary Design Activities		2/11/20	9/22/21
Prepare Pre-Design and Design SOQ	Yuma County	2/11/20	11/1/20
Design Procurement	Yuma County	11/1/20	1/1/21
SOQ Selection, Design Award	Yuma County	1/1/21	3/1/21
Treatment Campus Land Acquisition	Yuma County	11/1/20	4/1/21
Survey and Mapping	Designer	4/1/21	6/30/21
Well Drilling	Designer	5/1/21	7/30/21
Water Quality Testing For New Source Approval	Designer	7/1/21	9/22/21
Design		5/1/21	5/1/22
Well Design and Equipping	Designer	7/30/21	11/27/21
Surface Water Supply	Designer	6/30/21	3/27/22
Treatment and Storage	Designer	7/30/21	4/26/22
Distribution	Designer	6/30/21	3/27/22
Permitting	Designer / Yuma County	5/1/21	5/1/22
Construction and Procurement		12/6/20	5/31/23
Bidding	Yuma County	4/1/21	6/1/22
RD Loan Close	Yuma County	12/6/20	6/4/21
Construction	Contractor	7/30/21	1/29/23
Start-Up and Commissioning	Contractor	1/29/23	3/30/23
Project Closeout	All Parties	4/1/23	5/31/23



7.C PERMIT REQUIREMENTS

Table 7.2 identifies the permits that will be required to complete the construction of the water system.

Table 7.2 Required Permits

Agency	Permits
Yuma County	• Encroachment Permit • Traffic Control
ADEQ	• New water system, including proof of financial capability and business plan • New water supply (new source approval) • Approval to construct for new water treatment facility <0.1MGD • Approval to construct for a public water distribution system (151 to 300 service connections)
ADWR	• Well permit

7.D SUSTAINABILITY CONSIDERATIONS

As discussed in **Section 5 F**, the new Tacna water system will require operation and maintenance. The environmental, social and economic impacts of the new water system are as follows:

Environmental

Environmental, cultural and biological surveys indicated no adverse environmental impacts will be expected from development of the new water system. Development of a new lot near the Tacna Townsite will provide enough land area for water supply, treatment, and distribution needs. The new distribution system is planned to use existing right of way to limit additional land development.

Social

Residents in the Tacna Townsite will strongly benefit from the implementation of the new water system. Key outcomes of this new water system are to provide a safe and reliable water supply delivered to households for potable use. The water currently being delivered is double the federal standard for arsenic and has TDS above 2,000 mg/L. Providing a lower TDS and Safe Drinking Water Act compliant potable water to residents will not only allow them to safely drink tap water, but also make it palatable for both consumptive and household use.

Operability of the system is another social consideration. Providing a system that can be properly maintained and managed is essential to sustaining the system for years to come. Improving water quality requires equipment beyond what is currently provided, disinfection and well pumping only. The new system will likely require a higher-grade operator (Grade 3) to be staffed for the Townsite treatment system. Further, increased requirements for monitoring water quality will be imposed by ADEQ because of the use of surface water supply.

Based on the rapid formation of the Improvement District that will be responsible for the new water system under Yuma County, support of a new water system in the Townsite is evident. Improving residents' quality of life and long-term health outcomes through a new water supply is an important project driver. However, resident buy-in to the long-term operations phase represents a sustainability consideration for ongoing outreach and Improvement District feedback.

Economic

Financial considerations are a key component of this project, in part because the median income in the Townsite is estimated at below half the median income across the state of Arizona. Financial burden on homeowners for carrying costs of the water supply infrastructure, maintenance, and operations are critical to long term sustainability of the new water system. Balancing the upfront costs of a new system for capital improvements and the ongoing operations and maintenance costs (e.g., chemicals, consumables, replacement parts) can significantly impact the economic sustainability of the system. The formation of the Improvement District will help allow for costs to be centralized and payments scheduled according to affordability, consumptive use, and debt reduction.

7.E TOTAL PROJECT COST ESTIMATE (ENGINEER'S OPINION OF PROBABLE COST)

Table 7.3 Recommended Alternative - Alternative 2 B Cost Estimate

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
1	Distribution Piping				
	- 6/8" diameter pipe	22100	LF	$ 80	$ 1,768,000
	- 4" diameter pipe	0	LF	$ 70	$ -
	- Hydrants	15	EA	$ 3,500	$ 52,500
	- Road restoration	3274	SY	$ 40	$ 130,960
	- Service connections (meters)	132	EA	$ 2,000	$ 264,000
2	Raw water pump station				
	- Wet well	1	EA	$ 20,000	$ 20,000
	- pumps	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 10,000
3	Well				
	- Drilling	200	LF	$ 100	$ 20,000
	- pump and drop pipe	1	LS	$ 25,000	$ 25,000
	- above ground piping	1	LS	$ 15,000	$ 15,000
	- electrical	1	LS	$ 10,000	$ 10,000
4	Treatment				
	- Ultrafiltration	1	LS	$ 550,000	$ 550,000
	- disinfection	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 60,000	$ 60,000

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
5	Storage				
	- tank	1	LS	$ 500,000	$ 600,000
	- piping	1	LS	$ 20,000	$ 27,000
6	Finished water pumping				
	- pumps	3	ea	$ 10,000	$ 30,000
	- pipng	1	LS	$ 2,000	$ 2,000
	- flow meter	1	LS	$ 2,000	$ 2,000
	- pressure tank	1	LS	$ 10,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 13,500
7	Site Work				
	- Disposal Pond	1500	CY	$ 25	$ 50,625
	- Pond Lining	7260	SY	$ 18	$ 130,680
	- Paving	1700	SF	$ 50	$ 114,750
	- Gravel	8000	SF	$ 10	$ 108,000
	- Fence	400	LF	$ 50	$ 27,000
8	Site Electrical				
	- New pole adjacent to property	1	ea	$ 25,000	$ 25,000
	- Conduit and utility transformer	1	ea	$ 25,000	$ 25,000
	- Transformer and conductors	1	ea	$ 65,000	$ 65,000
9	Land Purchase allowance	2.00	ACRE	$ 40,000	$ 80,000
	SUB-TOTAL				**$ 4,141,015**
	Contingency, 30%				$ 1,242,305
	Engineering allowance, 15%				$ 621,152
	Environmental Mitigations				$ 20,000
	Grand Total				**$ 6,024,472**

Note: This opinion of probable construction cost was prepared based on the current level of design and scope of work and our professional experiences and our best judgment, and present information available to us. Because we have no control over the cost of labour, materials, equipment or services furnished by others, or over the bidding or market conditions, we cannot and do not guarantee our opinion of probable construction cost will not vary from the actual construction bids. This opinion of probable construction cost shall only be used for budgeting purpose. The estimated cost didn't include taxes, escalation, or any trade risk allowances.

The above cost estimate has been detailed and is the same overall as preliminary costs presented in **Table 5.1** for the recommended alternative.

7.F ANNUAL OPERATING BUDGET

7.F.I Income

The rates for the Tacna water users has not yet been established. It is anticipated that the rates will be similar to those currently used by the City of Yuma as outlined below:

- Base charge for a 1" meter - $28.67/month
- Usage rate – 2.07 per hundred cubic feet for the first 10 hundred cubic feet, 2.43 for 11 to 30 hundred cubic feet and 2.79 for 31 hundred cubic feet or higher, measured on a monthly basis

The estimated average water usage is 40,300 gallons per day which correlates to per household usage of 230 gallons per day or 6,900 gallons per month. Converting to cubic feet, the estimate water usage per household is 922 cubic feet per month. The estimated annual income is 922 x 175 x 2.09 + $28.67 x 175 or $342,239 for the 175 parcels.

7.F.II Annual O&M Costs

Table 7.4 lists the estimated operation and maintenance budget for the first year.

Table 7.4 Operations and Maintenance Costs for Preferred Alternative

Item	Budget
Operator *	$60,000
Labor *	$7,200
Truck	$10,000
Concrete Storage Tank	$250
Chemicals	$2,000
Monitoring	$3,600
Power	$13,070
Total	**$96,120**
Note: Operator and Labor Cost assume 1 full-time Grade 2 operator plus an assistant for an average of 40 hours per week.	

7.F.III Debt Repayments

Table 7.5 lists the debt repayment, with an estimated cost per connection of $, based on 100% loan funding from a federal agency. Interest has been estimated at 2.75% with a 25-year term.

Table 7.5 Estimate of Annualized Cost for Preferred Alternative

Item Description	Amount
Estimated Loan Cost (100% Loan)	$6,161,222*
Estimated Annual Loan Payment (2.75%, 25 years)	$344,042†
Estimated Reserve (10% of annual payment)	$34,404
Estimated O & M	$96,120‡
Estimated Annual Cost per Connection (135 connections)	$3,515§
Estimated Monthly Cost per Connection	$293‖

** Total Capital Cost from Table 7.3*

† $\frac{Rate\ Per\ Period \times Present\ Value}{1-(1+Rate\ Per\ Period)^{-Number\ of\ Periods}} = \frac{.0275 \times 6{,}161{,}222}{1-(1+.0275)^{-25}}$

‡ *Total O & M Cost from Table 7.4*

§ $\frac{Annual\ Loan\ Payment + Reserve + O\ \&\ M}{135\ Connections}$

‖ $\frac{Annual\ Cost\ per\ Connection}{12\ Months}$

7.F.IV Reserves

7.F.IV.1 Debt Service Reserve

A debt reserve of 10% of the annual loan payment is typical for projects funded by federal loans. This would be the recommended amount for the Tacna water system project.

7.F.IV.2 Short-Lived Asset Reserve

A short-asset reserve has been included for the pumps and treatment components.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The community of Tacna is drinking water that does not meet EPA standards. The system is in violation with ADEQ. In addition to not meeting standards, the system has very high total dissolved levels and is failing. A failure with the pipeline or storage tank could happen at any time, further impacting the availability and quality of water available to the community.

A number of alternatives and sites were assessed for a new water system to serve this community to replace the failing system that is also under probate. After a detailed analysis, Alternative 2 B, which will have a primary water supply from the Wellton Mohawk Irrigation canal, a back-up groundwater well supply, treatment for both surface water and the backup well, new storage tank and a new distribution system, was recommended for this community. This option provides the most flexibility and is the least cost option considered.

Appendix A WATER QUALITY AND DEMAND DATA – SUNSTATE ENVIRONMENTAL DOCUMENTS

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LEAD AND COPPER ANALYSIS REPORT

>>>> SYSTEM INFORMATION <<<<

PWS ID#: AZ04 14018

PWS Name: Tacna Water Company

Nancy Miller
Owner/Contact Person

(928) 341-9685
Owner/Contact Phone Number

(928) 341-9196
Owner/Contact Fax Number

SAMPLE COLLECTION POINT/ID
- ☐ Zone/Distribution
- Other - Direct from source
  - ☐ Surface
  - ☐ Well

Contaminant:	Lead (Pb)	Copper (Cu)
Action Level:	0.015 mg/l	1.3 mg/l
Analysis Methods:	EPA 200.8	EPA 200.7
Sample Type:	Grab	

Sample Type:
- ☐ Triennial (3 YR) Compliance
- ☐ Annual Compliance
- ☐ 6 Month Initial Compliance

Specimen #	Collection Point	Sample Date	Analysis Completion Date	Analyte	ADEQ Contaminant Code	Result (mg/L)
18J0338-01						
	Tacna (8632 Ave 40E)	9/27/2018	10/8/2018	Copper	1022	<0.0050 D1
	Tacna (8632 Ave 40E)	9/27/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-02						
	Tacna (39880 Ave 40 E.)	9/25/2018	10/8/2018	Copper	1022	0.0073 D1
	Tacna (39880 Ave 40 E.)	9/25/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-03						
	Tacna (39813 Colorado)	9/26/2018	10/8/2018	Copper	1022	0.024 D1
	Tacna (39813 Colorado)	9/26/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-04						
	Tacna (39829 Colorado)	9/25/2018	10/8/2018	Copper	1022	0.014 D1

Lab ID# AZ0004

90th % Calc (Lead): _____

90th % Calc (Copper): _____

I hereby certify that the information provided in this report is accurate and correct to the best of my knowledge:

Printed Name and Phone Number of Lab Contact: Barbara Frank **Phone #:** (602) 324-6100

Signature: Barbara Frank

Mail completed form to: ADEQ Water Quality Compliance Data Unit (MC 5415B-1), 1110 W. Washington St., Phoenix, AZ 85007.
For questions call: (602) 771-4513 or within AZ 1-800-234-5677 Ext. 4513. Fax: (602) 771-4505.
Copies of this form are available at http://www.azdeq.gov/function/forms/appswater.html#sdw, scroll down to laboratory reporting forms and click on DWAR 8: DW Lead and Copper Analysis Report.
Revised: 8/2008

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LEAD AND COPPER ANALYSIS REPORT

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- Other - Direct from source
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Analysis Methods:	EPA 200.8	EPA 200.7
Sample Type:	Grab	

Sample Type:
- ☐ Triennial (3 YR) Compliance
- ☐ Annual Compliance
- ☐ 6 Month Initial Compliance

Specimen #	Collection Point	Sample Date	Analysis Completion Date	Analyte	ADEQ Contaminant Code	Result (mg/L)
	Tacna (39829 Colorado)	9/25/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-05						
	Tacna (40202 Colorado)	9/25/2018	10/8/2018	Copper	1022	0.041 D1
	Tacna (40202 Colorado)	9/25/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-06						
	Tacna (39850 Colorado)	9/25/2018	10/8/2018	Copper	1022	0.0095 D1
	Tacna (39850 Colorado)	9/25/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-07						
	Tacna (39821 Colorado)	9/27/2018	10/8/2018	Copper	1022	<0.0050 D1
	Tacna (39821 Colorado)	9/27/2018	10/8/2018	Lead	1030	<0.0050 D1

Lab ID# AZ0004

90th % Calc (Lead): _____

90th % Calc (Copper): _____

I hereby certify that the information provided in this report is accurate and correct to the best of my knowledge:

Printed Name and Phone Number of Lab Contact: Barbara Frank **Phone #:** (602) 324-6100

Signature: Barbara Frank

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For questions call: (602) 771-4513 or within AZ 1-800-234-5677 Ext. 4513. Fax: (602) 771-4505.
Copies of this form are available at http://www.azdeq.gov/function/forms/appswater.html#sdw, scroll down to laboratory reporting forms and click on DWAR 8: DW Lead and Copper Analysis Report.
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  - ☐ Well

Contaminant:	Lead (Pb)	Copper (Cu)
Action Level:	0.015 mg/l	1.3 mg/l
Analysis Methods:	EPA 200.8	EPA 200.7
Sample Type:	Grab	

Sample Type:
- ☐ Triennial (3 YR) Compliance
- ☐ Annual Compliance
- ☐ 6 Month Initial Compliance

Specimen #	Collection Point	Sample Date	Analysis Completion Date	Analyte	ADEQ Contaminant Code	Result (mg/L)
18J0338-08						
	Tacna (39724 Colorado)	9/28/2018	10/8/2018	Copper	1022	0.0061 D1
	Tacna (39724 Colorado)	9/28/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-09						
	Tacna (39721 Texas)	9/26/2018	10/8/2018	Copper	1022	0.025 D1
	Tacna (39721 Texas)	9/26/2018	10/8/2018	Lead	1030	<0.0050 D1
18J0338-10						
	Tacna Water (40152 Texas)	9/27/2018	10/8/2018	Copper	1022	<0.0050 D1
	Tacna Water (40152 Texas)	9/27/2018	10/8/2018	Lead	1030	<0.0050 D1

Lab ID# AZ0004

90th % Calc (Lead): _____

90th % Calc (Copper): _____

I hereby certify that the information provided in this report is accurate and correct to the best of my knowledge:

Printed Name and Phone Number of Lab Contact: Barbara Frank **Phone #:** (602) 324-6100

Signature: Barbara Frank

Mail completed form to: ADEQ Water Quality Compliance Data Unit (MC 5415B-1), 1110 W. Washington St., Phoenix, AZ 85007.
For questions call: (602) 771-4513 or within AZ 1-800-234-5677 Ext. 4513. Fax: (602) 771-4505.
Copies of this form are available at http://www.azdeq.gov/function/forms/appswater.html#sdw, scroll down to laboratory reporting forms and click on DWAR 8: DW Lead and Copper Analysis Report.
Revised: 8/2008

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LEAD AND COPPER ANALYSIS REPORT

>>>> SYSTEM INFORMATION <<<<

PWS ID#: AZ04 14-018

PWS Name: Tacna Water Company

Nancy Miller
Owner/Contact Person

(928) 341-9685
Owner/Contact Phone Number

(928) 341-9196
Owner/Contact Fax Number

SAMPLE COLLECTION POINT/ID
- ☐ Zone/Distribution
- Other - Direct from source
  - ☐ Surface
  - ☐ Well

Contaminant:	Lead (Pb)	Copper (Cu)
Action Level:	0.015 mg/l	1.3 mg/l
Analysis Methods:	EPA 200.8	EPA 200.7
Sample Type:	Grab	

Sample Type:
- ☐ Triennial (3 YR) Compliance
- ☐ Annual Compliance
- ☐ 6 Month Initial Compliance

Specimen #	Collection Point	Sample Date	Analysis Completion Date	Analyte	ADEQ Contaminant Code	Result (mg/L)
18E1313-01						
	Tacna Water (8632 Ave 40E)	5/10/2018	5/14/2018	Copper	1022	0.036 D1
	Tacna Water (8632 Ave 40E)	5/10/2018	5/14/2018	Lead	1030	<0.0050 D1
18E1313-02						
	39813 Colorado	5/4/2018	5/14/2018	Copper	1022	<0.0050 D1
	39813 Colorado	5/4/2018	5/14/2018	Lead	1030	<0.0050 D1
18E1313-03						
	39829 Colorado	5/9/2018	5/14/2018	Copper	1022	<0.0050 D1
	39829 Colorado	5/9/2018	5/14/2018	Lead	1030	<0.0050 D1
18E1313-04						
	40202 Colorado	5/5/2018	5/14/2018	Copper	1022	0.16 D2

Lab ID# AZ0004

90th % Calc (Lead): _____

90th % Calc (Copper): _____

I hereby certify that the information provided in this report is accurate and correct to the best of my knowledge:

Printed Name and Phone Number of Lab Contact: Barbara Frank **Phone #:** (602) 324-6100

Signature: Barbara Frank

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Revised: 8/2008

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LEAD AND COPPER ANALYSIS REPORT

>>>> SYSTEM INFORMATION <<<<

PWS ID#: AZ04 14-018

PWS Name: Tacna Water Company

Nancy Miller
Owner/Contact Person

(928) 341-9685
Owner/Contact Phone Number

(928) 341-9196
Owner/Contact Fax Number

SAMPLE COLLECTION POINT/ID
- ☐ Zone/Distribution
- Other - Direct from source
  - ☐ Surface
  - ☐ Well

Contaminant:	Lead (Pb)	Copper (Cu)
Action Level:	0.015 mg/l	1.3 mg/l
Analysis Methods:	EPA 200.8	EPA 200.7
Sample Type:	Grab	

Sample Type:
- ☐ Triennial (3 YR) Compliance
- ☐ Annual Compliance
- ☐ 6 Month Initial Compliance

Specimen #	Collection Point	Sample Date	Analysis Completion Date	Analyte	ADEQ Contaminant Code	Result (mg/L)
18E1313-05	40202 Colorado	5/5/2018	5/14/2018	Lead	1030	<0.0050 D1
	39880 Ave 40E	5/5/2018	5/14/2018	Copper	1022	0.28 D2
	39880 Ave 40E	5/5/2018	5/14/2018	Lead	1030	<0.0050 D1
18E1313-06	39721 Texas	5/5/2018	5/14/2018	Copper	1022	0.083 D1
	39721 Texas	5/5/2018	5/14/2018	Lead	1030	<0.0050 D1
18E1313-07	29850 Colorado	5/9/2018	5/14/2018	Copper	1022	<0.0050 D1
	29850 Colorado	5/9/2018	5/14/2018	Lead	1030	<0.0050 D1

Lab ID# AZ0004

90th % Calc (Lead): _____

90th % Calc (Copper): _____

I hereby certify that the information provided in this report is accurate and correct to the best of my knowledge:

Printed Name and Phone Number of Lab Contact: Barbara Frank **Phone #:** (602) 324-6100

Signature: Barbara Frank

Mail completed form to: ADEQ Water Quality Compliance Data Unit (MC 5415B-1), 1110 W. Washington St., Phoenix, AZ 85007.
For questions call: (602) 771-4513 or within AZ 1-800-234-5677 Ext. 4513. Fax: (602) 771-4505.
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Revised: 8/2008

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LEAD AND COPPER ANALYSIS REPORT

>>>> SYSTEM INFORMATION <<<<

PWS ID#: AZ04 14-018

PWS Name: Tacna Water Company

Nancy Miller
Owner/Contact Person

(928) 341-9685
Owner/Contact Phone Number

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Owner/Contact Fax Number

SAMPLE COLLECTION POINT/ID
- ☐ Zone/Distribution
- Other - Direct from source
  - ☐ Surface
  - ☐ Well

Contaminant:	Lead (Pb)	Copper (Cu)
Action Level:	0.015 mg/l	1.3 mg/l
Analysis Methods:	EPA 200.8	EPA 200.7
Sample Type:	Grab	

Sample Type:
- ☐ Triennial (3 YR) Compliance
- ☐ Annual Compliance
- ☐ 6 Month Initial Compliance

Specimen #	Collection Point	Sample Date	Analysis Completion Date	Analyte	ADEQ Contaminant Code	Result (mg/L)
18E1313-08						
	40152 Texas	5/5/2018	5/14/2018	Copper	1022	0.10 D2
	40152 Texas	5/5/2018	5/14/2018	Lead	1030	<0.0050 D1
18E1313-09						
	39821 Colorado	5/7/2018	5/14/2018	Copper	1022	<0.0050 D1
	39821 Colorado	5/7/2018	5/14/2018	Lead	1030	<0.0050 D1
18E1313-10						
	39724 Colorado	5/6/2018	5/14/2018	Copper	1022	0.0055 D1
	39724 Colorado	5/6/2018	5/14/2018	Lead	1030	<0.0050 D1

Lab ID# AZ0004

90th % Calc (Lead): _____

90th % Calc (Copper): _____

I hereby certify that the information provided in this report is accurate and correct to the best of my knowledge:

Printed Name and Phone Number of Lab Contact: Barbara Frank **Phone #:** (602) 324-6100

Signature: Barbara Frank

Mail completed form to: ADEQ Water Quality Compliance Data Unit (MC 5415B-1), 1110 W. Washington St., Phoenix, AZ 85007.
For questions call: (602) 771-4513 or within AZ 1-800-234-5677 Ext. 4513. Fax: (602) 771-4505.
Copies of this form are available at http://www.azdeq.gov/function/forms/appswater.html#sdw, scroll down to laboratory reporting forms and click on DWAR 8: DW Lead and Copper Analysis Report.
Revised: 8/2008

LEGEND
Technical Services, Inc.

17631 North 25th Avenue • Phoenix, AZ 85023
P (602) 324-6100 • F (602) 324-6101
www.legend-group.com

16 May 2018

Nancy Miller
Sunstate Environmental Service
4743 E. 30th Place
Yuma, AZ 85365

RE: Tacna Water Company

Laboratory Work Order No.: 18E1313

Legend Technical Services of Arizona, Inc. is pleased to provide the enclosed analytical results for the aforementioned project. These results relate only to the items tested. This cover letter and the accompanying pages represent the full report for these analyses and should only be reproduced in full. Samples for this project were received by the laboratory on 05/11/18 12:40.

The samples were processed in accordance with the Chain of Custody document and the results presented relate only to the samples tested. The Chain of Custody is considered part of this report.

All samples will be retained by LEGEND for 30 days from the date of this report and then discarded unless other arrangements are made. Due to hold-time and method sample volume requirements, microbiological samples are not retained unless other arrangements are made.

This entire report was reviewed and approved for release by the undersigned. If you have any questions concerning this report, please feel free to contact me.

Sincerely,
LEGEND TECHNICAL SERVICES OF ARIZONA, INC.

Barbara Frank
Client Services Representative
(602) 324-6100

This laboratory report is confidential and is intended for the sole use of LEGEND and it's client.

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Type	Date Sampled	Date Received
Tacna Water (8632 Ave 40E)	18E1313-01	Drinking Water	Grab	05/10/18 10:00	05/11/18 12:40
39813 Colorado	18E1313-02	Drinking Water	Grab	05/04/18 08:30	05/11/18 12:40
39829 Colorado	18E1313-03	Drinking Water	Grab	05/09/18 07:00	05/11/18 12:40
40202 Colorado	18E1313-04	Drinking Water	Grab	05/05/18 07:35	05/11/18 12:40
39880 Ave 40E	18E1313-05	Drinking Water	Grab	05/05/18 08:38	05/11/18 12:40
39721 Texas	18E1313-06	Drinking Water	Grab	05/05/18 09:00	05/11/18 12:40
29850 Colorado	18E1313-07	Drinking Water	Grab	05/09/18 07:10	05/11/18 12:40
40152 Texas	18E1313-08	Drinking Water	Grab	05/05/18 07:10	05/11/18 12:40
39821 Colorado	18E1313-09	Drinking Water	Grab	05/07/18 05:50	05/11/18 12:40
39724 Colorado	18E1313-10	Drinking Water	Grab	05/06/18 07:00	05/11/18 12:40

Sample Condition Upon Receipt:

Temperature: 32.80 C

All samples were received in acceptable condition unless noted otherwise in the case narrative.

Case Narrative:

Holding Times: All holding times were met unless otherwise qualified.

QA/QC Criteria: All analyses met method requirements unless otherwise qualified.

Certifications: AZ(PHX)0004, AZ(TUC)OOO4, AIHA#102982, CDC ELITE Member.

Accreditation is applicable only to the test methods specified on each scope of accreditation held by LEGEND.

Comments: There were no problems encountered during the processing of the samples, unless otherwise noted.
All samples were analyzed on a "wet" basis unless designated as "dry weight".

Tacna Water (8632 Ave 40E) (18E1313-01) Drinking Water (Grab) Sampled: 05/10/18 10:00 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.036**	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:02	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:02	EPA 200.8	D1

39813 Colorado (18E1313-02) Drinking Water (Grab) Sampled: 05/04/18 08:30 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:05	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:05	EPA 200.8	D1

39829 Colorado (18E1313-03) Drinking Water (Grab) Sampled: 05/09/18 07:00 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:09	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:09	EPA 200.8	D1

40202 Colorado (18E1313-04) Drinking Water (Grab) Sampled: 05/05/18 07:35 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.16**	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:12	EPA 200.8	D2
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:12	EPA 200.8	D1

39880 Ave 40E (18E1313-05) Drinking Water (Grab) Sampled: 05/05/18 08:38 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.28**	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:15	EPA 200.8	D2
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:15	EPA 200.8	D1

39721 Texas (18E1313-06) Drinking Water (Grab) Sampled: 05/05/18 09:00 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.083**	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:19	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:19	EPA 200.8	D1

29850 Colorado (18E1313-07) Drinking Water (Grab) Sampled: 05/09/18 07:10 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						

29850 Colorado (18E1313-07) Drinking Water (Grab) Sampled: 05/09/18 07:10 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:29	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:29	EPA 200.8	D1

40152 Texas (18E1313-08) Drinking Water (Grab) Sampled: 05/05/18 07:10 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	**0.10**	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:32	EPA 200.8	D2
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:32	EPA 200.8	D1

39821 Colorado (18E1313-09) Drinking Water (Grab) Sampled: 05/07/18 05:50 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:42	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:42	EPA 200.8	D1

39724 Colorado (18E1313-10) Drinking Water (Grab) Sampled: 05/06/18 07:00 Received: 05/11/18 12:40

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	**0.0055**	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:45	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8E1224	05/14/18 15:44	05/14/18 21:45	EPA 200.8	D1

Total Metals - Quality Control

Legend Technical Services of Arizona, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8E1224 - EPA 200.8										
Blank (B8E1224-BLK1)				*Prepared & Analyzed: 05/14/18*						
Copper	<0.0010	0.0010	mg/L							
Lead	<0.0010	0.0010	mg/L							
LCS (B8E1224-BS1)				*Prepared & Analyzed: 05/14/18*						
Copper	0.025	0.0010	mg/L	0.0250		100	85-115			
Lead	0.025	0.0010	mg/L	0.0250		100	85-115			
LCS Dup (B8E1224-BSD1)				*Prepared & Analyzed: 05/14/18*						
Copper	0.026	0.0010	mg/L	0.0250		105	85-115	5	20	
Lead	0.025	0.0010	mg/L	0.0250		99	85-115	0.5	20	
Matrix Spike (B8E1224-MS1)		**Source: 18E1313-08**		*Prepared & Analyzed: 05/14/18*						
Copper	0.23	0.0050	mg/L	0.125	0.10	98	70-130			
Lead	0.12	0.0050	mg/L	0.125	0.0002	98	70-130			
Matrix Spike (B8E1224-MS2)		**Source: 18E1313-10**		*Prepared & Analyzed: 05/14/18*						
Copper	0.13	0.0050	mg/L	0.125	0.0055	97	70-130			
Lead	0.12	0.0050	mg/L	0.125	<0.0050	94	70-130			
Matrix Spike Dup (B8E1224-MSD1)		**Source: 18E1313-08**		*Prepared & Analyzed: 05/14/18*						
Copper	0.23	0.0050	mg/L	0.125	0.10	97	70-130	0.3	20	
Lead	0.12	0.0050	mg/L	0.125	0.0002	94	70-130	4	20	
Matrix Spike Dup (B8E1224-MSD2)		**Source: 18E1313-10**		*Prepared & Analyzed: 05/14/18*						
Copper	0.13	0.0050	mg/L	0.125	0.0055	97	70-130	0.6	20	
Lead	0.12	0.0050	mg/L	0.125	<0.0050	96	70-130	2	20	

Notes and Definitions

D2	Sample required dilution due to high concentration of target analyte.
D1	Sample required dilution due to matrix.
BLK	Method Blank
LCS/Dup	Laboratory Control Sample/Laboratory Fortified Blank/Duplicate
MS/Dup	Matrix Spike/Duplicate
Dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Sunstate Environmental Services

4743 E. 30th Place Yuma, AZ 85365
(928) 341-9685 • Fax (928) 341-9196 • EMail: info@sunstatees.com

CHAIN OF CUSTODY RECORD

Laboratory Sample No.: 18E1313

Please Print Clearly

Page 1 of 1

CLIENT INFORMATION

Client Name	Address	City	State	Zip	Phone	Fax
TACNA WATER	4743 E. 30th Pl	Yuma	AZ		928 341 9681	

Project Name	Project Number	Contact	P.O. No.	Fax Results ☐ QC Report ☐ Special Detection Limits ☐
	AZ0414 018	Rick Miller		

SAMPLE TYPE CODES
DW=Drinking Water, S=Soil/Solid, WW=Wastewater, T=Travel Blank, SW=Surface Water, F=Food, GW=Groundwater, G=Sludge, O=Other

TURN AROUND TIME
☐ Standard 10 - 15 Day
☐ Other
Laboratory Authorization Required for Rush ★ ★

REQUESTED ANALYSIS

Client's Sample Identification	Date	Time	Sample Location	Composite	Grab	Sample Type	Compliance	No. of Containers	Pb Cu	LAB NO
TACNA WATER	5-10-18	10Am	8632 Ave 40E		✓	D	✓	1	✓	01
	5-4-18	0830	39813 Colorado		✓	D	✓	1	✓	02
	5-9-18	0700	39829 Colorado		✓	D	✓	1	✓	03
	5-5-18	0735	40202 Colorado		✓	D	✓	1	✓	04
	5-5-18	0838	39880 Ave 40E		✓	D	✓	1	✓	05
	5-5-18	0900	39721 Texas		✓	D	✓	1	✓	06
	5-9-18	0710	39850 Colorado		✓	D	✓	1	✓	07
	5-5-18	0710	40152 Texas		✓	D	✓	1	✓	08
	5-7-18	0550	39821 Colorado		✓	D	✓	1	✓	09
	5-6-18	0700	39724 Colorado		✓	D	✓	1	✓	10

CORRECTION MADE BY CLIENT OR COURIER PRIOR TO SAMPLE RECEIPT AT LEGEND
AR 5/15/18

PRESERVED AT LAB

Comments / Special Instructions:
AR ✓ 5/11/18 14:11

SAMPLE CONDITION UPON RECEIPT	
No. of Containers	10
Temperature	32.8C
Custody Seals	Y (N)
Seals Intact	Y N
Preserved	Y (N)

WHITE-LAB YELLOW-LAB PINK-CLIENT

	RELINQUISHED BY		SAMPLES RECEIVED BY	
①	Signature / Sampler Printed Name Jeremy Duna	Date 5-10-18 Time 16:00	Signature / Printed Name UPS	Date 5-10-18 Time 16:00
②	Signature / Printed Name UPS	Date 5/11/18 Time 1240	Signature / Printed Name Natalie	Date 5/11/18 Time 1240
③	Signature / Printed Name	Date / Time	Signature / Printed Name	Date / Time

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LEGEND
Technical Services, Inc.

17631 North 25th Avenue • Phoenix, AZ 85023
P (602) 324-6100 • F (602) 324-6101
www.legend-group.com

10 October 2018

Nancy Miller
Sunstate Environmental Service
4743 E. 30th Place
Yuma, AZ 85365

RE: Tacna Water Company

Laboratory Work Order No.: 18J0338

Legend Technical Services of Arizona, Inc. is pleased to provide the enclosed analytical results for the aforementioned project. These results relate only to the items tested. This cover letter and the accompanying pages represent the full report for these analyses and should only be reproduced in full. Samples for this project were received by the laboratory on 10/03/18 10:00.

The samples were processed in accordance with the Chain of Custody document and the results presented relate only to the samples tested. The Chain of Custody is considered part of this report.

All samples will be retained by LEGEND for 30 days from the date of this report and then discarded unless other arrangements are made. Due to hold-time and method sample volume requirements, microbiological samples are not retained unless other arrangements are made.

This entire report was reviewed and approved for release by the undersigned. If you have any questions concerning this report, please feel free to contact me.

Sincerely,
LEGEND TECHNICAL SERVICES OF ARIZONA, INC.

Barbara Frank
Client Services Representative
(602) 324-6100

This laboratory report is confidential and is intended for the sole use of LEGEND and it's client.

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Type	Date Sampled	Date Received
Tacna (8632 Ave 40E)	18J0338-01	Drinking Water	Grab	09/27/18 10:00	10/03/18 10:00
Tacna (39880 Ave 40 E.)	18J0338-02	Drinking Water	Grab	09/25/18 08:00	10/03/18 10:00
Tacna (39813 Colorado)	18J0338-03	Drinking Water	Grab	09/26/18 09:30	10/03/18 10:00
Tacna (39829 Colorado)	18J0338-04	Drinking Water	Grab	09/25/18 07:00	10/03/18 10:00
Tacna (40202 Colorado)	18J0338-05	Drinking Water	Grab	09/25/18 05:00	10/03/18 10:00
Tacna (39850 Colorado)	18J0338-06	Drinking Water	Grab	09/25/18 07:00	10/03/18 10:00
Tacna (39821 Colorado)	18J0338-07	Drinking Water	Grab	09/27/18 09:30	10/03/18 10:00
Tacna (39724 Colorado)	18J0338-08	Drinking Water	Grab	09/28/18 08:00	10/03/18 10:00
Tacna (39721 Texas)	18J0338-09	Drinking Water	Grab	09/26/18 13:00	10/03/18 10:00
Tacna Water (40152 Texas)	18J0338-10	Drinking Water	Grab	09/27/18 06:35	10/03/18 10:00

Sample Condition Upon Receipt:

Temperature: 24.50 C

All samples were received in acceptable condition unless noted otherwise in the case narrative.

Case Narrative:

Holding Times: All holding times were met unless otherwise qualified.

QA/QC Criteria: All analyses met method requirements unless otherwise qualified.

Certifications: AZ(PHX)0004, AZ(TUC)OOO4, AIHA#102982, CDC ELITE Member.

Accreditation is applicable only to the test methods specified on each scope of accreditation held by LEGEND.

Comments: There were no problems encountered during the processing of the samples, unless otherwise noted.
All samples were analyzed on a "wet" basis unless designated as "dry weight".

Tacna (8632 Ave 40E) (18J0338-01) Drinking Water (Grab) Sampled: 09/27/18 10:00 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:12	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:12	EPA 200.8	D1

Tacna (39880 Ave 40 E.) (18J0338-02) Drinking Water (Grab) Sampled: 09/25/18 08:00 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.0073**	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:15	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:15	EPA 200.8	D1

Tacna (39813 Colorado) (18J0338-03) Drinking Water (Grab) Sampled: 09/26/18 09:30 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.024**	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:25	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:25	EPA 200.8	D1

Tacna (39829 Colorado) (18J0338-04) Drinking Water (Grab) Sampled: 09/25/18 07:00 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.014**	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:29	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:29	EPA 200.8	D1

Tacna (40202 Colorado) (18J0338-05) Drinking Water (Grab) Sampled: 09/25/18 05:00 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.041**	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:39	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:39	EPA 200.8	D1

Tacna (39850 Colorado) (18J0338-06) Drinking Water (Grab) Sampled: 09/25/18 07:00 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						
Total Metals									
Copper	**0.0095**	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:42	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:42	EPA 200.8	D1

Tacna (39821 Colorado) (18J0338-07) Drinking Water (Grab) Sampled: 09/27/18 09:30 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
			Legend Technical Services of Arizona, Inc.						

Tacna (39821 Colorado) (18J0338-07) Drinking Water (Grab) Sampled: 09/27/18 09:30 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:45	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:45	EPA 200.8	D1

Tacna (39724 Colorado) (18J0338-08) Drinking Water (Grab) Sampled: 09/28/18 08:00 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	**0.0061**	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:49	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:49	EPA 200.8	D1

Tacna (39721 Texas) (18J0338-09) Drinking Water (Grab) Sampled: 09/26/18 13:00 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	**0.025**	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:52	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:52	EPA 200.8	D1

Tacna Water (40152 Texas) (18J0338-10) Drinking Water (Grab) Sampled: 09/27/18 06:35 Received: 10/03/18 10:00

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
	Legend Technical Services of Arizona, Inc.								
Total Metals									
Copper	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:55	EPA 200.8	D1
Lead	<0.0050	0.0050	mg/L	1	B8J1223	10/08/18 09:14	10/08/18 23:55	EPA 200.8	D1

Total Metals - Quality Control

Legend Technical Services of Arizona, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8J1223 - EPA 200.8										
Blank (B8J1223-BLK1)				*Prepared & Analyzed: 10/08/18*						
Copper	<0.0010	0.0010	mg/L							
Lead	<0.0010	0.0010	mg/L							
LCS (B8J1223-BS1)				*Prepared & Analyzed: 10/08/18*						
Copper	0.027	0.0010	mg/L	0.0250		109	85-115			
Lead	0.026	0.0010	mg/L	0.0250		105	85-115			
LCS Dup (B8J1223-BSD1)				*Prepared & Analyzed: 10/08/18*						
Copper	0.027	0.0010	mg/L	0.0250		110	85-115	0.6	20	
Lead	0.026	0.0010	mg/L	0.0250		106	85-115	1	20	
Matrix Spike (B8J1223-MS1)		**Source: 18J0338-04**		*Prepared & Analyzed: 10/08/18*						
Copper	0.14	0.0050	mg/L	0.125	0.014	103	70-130			
Lead	0.14	0.0050	mg/L	0.125	0.0002	110	70-130			
Matrix Spike (B8J1223-MS2)		**Source: 18J0338-10**		*Prepared: 10/08/18 Analyzed: 10/09/18*						
Copper	0.13	0.0050	mg/L	0.125	0.0016	103	70-130			
Lead	0.14	0.0050	mg/L	0.125	<0.0050	109	70-130			
Matrix Spike Dup (B8J1223-MSD1)		**Source: 18J0338-04**		*Prepared & Analyzed: 10/08/18*						
Copper	0.14	0.0050	mg/L	0.125	0.014	103	70-130	0.4	20	
Lead	0.14	0.0050	mg/L	0.125	0.0002	110	70-130	0.7	20	
Matrix Spike Dup (B8J1223-MSD2)		**Source: 18J0338-10**		*Prepared: 10/08/18 Analyzed: 10/09/18*						
Copper	0.13	0.0050	mg/L	0.125	0.0016	103	70-130	0.03	20	
Lead	0.14	0.0050	mg/L	0.125	<0.0050	110	70-130	1	20	

Notes and Definitions

D1	Sample required dilution due to matrix.
BLK	Method Blank
LCS/Dup	Laboratory Control Sample/Laboratory Fortified Blank/Duplicate
MS/Dup	Matrix Spike/Duplicate
Dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Sunstate Environmental Services

4743 E. 30th Place Yuma, AZ 85365
(928) 341-9685 • EMail: info@sunstatees.com

CHAIN OF CUSTODY RECORD

Laboratory Sample No.: 18J0338

Please Print Clearly

Page 1 of 1

CLIENT INFORMATION

Client Name	Address	City	State	Zip	Phone	Fax
		TACNA	AZ		928 341 9685	

Project Name	Project Number	Contact	P.O. No.	Notes:
TACNA WATER	14 018	Nancy Miller		

SAMPLE TYPE CODES

DW=Drinking Water, S=Soil/Solid, WW=Wastewater, T=Travel Blank, SW=Surface Water, F=Food, GW=Groundwater, G=Sludge, O=Other_____

TURN AROUND TIME

☐ Standard 10-15 Day
☐ Other_____

Laboratory Authorization Required for Rush ★ ★

REQUESTED ANALYSIS

Client's Sample Identification	Date	Time	Sample Location	Composite	Grab	Sample Type	Compliance	No. of Containers		Pb Cu												LAB NO
TACNA	9-27-18	10:00	8632 Ave 40E		✓	DW	✓	1		✓												01
	9-25-18	0800	39880 Ave 40E		✓		✓	1		✓												02
	9-26-18	0930	39813 Colorado		✓		✓	1		✓												03
	9-25-18	0700	39829 Colorado		✓		✓	1		✓												04
	9-25-18	0500	40202 Colorado		✓		✓	1		✓												05
	9-25-18	0700	39850 Colorado		✓		✓	1		✓												06
	9-27-18	0930	39821 Colorado		✓		✓	1		✓												07
	9-28-18	0800	39724 Colorado		✓		✓	1		✓												08
	9-26-18	1pm	39721 Texas		✓		✓	1		✓												09
Tacna metr	9-27-18	0635	40152 Texas		✓		✓	1		✓												10

Comments / Special Instructions: PHV

SAMPLE CONDITION UPON RECEIPT		
No. of Containers	10	
Temperature	24.5°C	
Custody Seals	Y	N
Seals Intact	Y	N
Preserved	(Y)	N

WHITE-LAB YELLOW-LAB PINK-CLIENT

	RELINQUISHED BY			SAMPLES RECEIVED BY		
	Signature	Date 9-27-18	Signature	Date 9-27-18
①	Sampler Printed Name	Time 10:30	Printed Name Storage	Time 10:30
	Signature	Date 10-2-18	Signature UPS	Date 10-2-18
②	Printed Name Storage	Time 16:00	Printed Name	Time 16:00
	Signature	Date 10/8/18	Signature	Date 10/8/18
③	Printed Name UPS	Time 1000	Printed Name	Time 1000

17-24700XF 02150 2022

LEGEND
Technical Services, Inc.

17631 North 25th Avenue • Phoenix, AZ 85023
P (602) 324-6100 • F (602) 324-6101
www.legend-group.com

31 January 2019

Nancy Miller
Sunstate Environmental Service
4743 E. 30th Place
Yuma, AZ 85365

RE: Tacna Water Company

Laboratory Work Order No.: 19A1987

Legend Technical Services of Arizona, Inc. is pleased to provide the enclosed analytical results for the aforementioned project. These results relate only to the items tested. This cover letter and the accompanying pages represent the full report for these analyses and should only be reproduced in full. Samples for this project were received by the laboratory on 01/17/19 11:00.

The samples were processed in accordance with the Chain of Custody document and the results presented relate only to the samples tested. The Chain of Custody is considered part of this report.

All samples will be retained by LEGEND for 30 days from the date of this report and then discarded unless other arrangements are made. Due to hold-time and method sample volume requirements, microbiological samples are not retained unless other arrangements are made.

This entire report was reviewed and approved for release by the undersigned. If you have any questions concerning this report, please feel free to contact me.

Sincerely,
LEGEND TECHNICAL SERVICES OF ARIZONA, INC.

Barbara Frank
Client Services Representative
(602) 324-6100

This laboratory report is confidential and is intended for the sole use of LEGEND and it's client.

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Type	Date Sampled	Date Received
Tacna Water (POE 001)	19A1987-01	Drinking Water	Grab	01/16/19 10:55	01/17/19 11:00

Sample Condition Upon Receipt:

Temperature: 2.90 C

All samples were received in acceptable condition unless noted otherwise in the case narrative.

Case Narrative:

Holding Times: All holding times were met unless otherwise qualified.

QA/QC Criteria: All analyses met method requirements unless otherwise qualified.

Certifications: AZ(PHX)0004, AZ(TUC)OOO4, AIHA#102982, CDC ELITE Member.

Accreditation is applicable only to the test methods specified on each scope of accreditation held by LEGEND.

Comments: There were no problems encountered during the processing of the samples, unless otherwise noted.
All samples were analyzed on a "wet" basis unless designated as "dry weight".

Client notified of the MCL Violation via Excursion Alert on 01/30/19 BF

Tacna Water (POE 001) (19A1987-01) Drinking Water (Grab) Sampled: 01/16/19 10:55 Received: 01/17/19 11:00

Legend Technical Services of Arizona, Inc.

Analyte	Result	PQL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Total Metals									
Arsenic	**0.023**	0.0050	mg/L	5	B9A1766	01/28/19 10:39	01/28/19 16:19	EPA 200.8	D1

Total Metals - Quality Control

Legend Technical Services of Arizona, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B9A1766 - EPA 200.8										
Blank (B9A1766-BLK1)				*Prepared & Analyzed: 01/28/19*						
Arsenic	<0.0010	0.0010	mg/L							
LCS (B9A1766-BS1)				*Prepared & Analyzed: 01/28/19*						
Arsenic	0.027	0.0010	mg/L	0.0250		108	85-115			
LCS Dup (B9A1766-BSD1)				*Prepared & Analyzed: 01/28/19*						
Arsenic	0.027	0.0010	mg/L	0.0250		107	85-115	1	20	
Matrix Spike (B9A1766-MS1)		**Source: 19A1862-01**		*Prepared & Analyzed: 01/28/19*						
Arsenic	0.033	0.0010	mg/L	0.0250	0.0054	109	70-130			
Matrix Spike (B9A1766-MS2)		**Source: 19A1938-07**		*Prepared & Analyzed: 01/28/19*						
Arsenic	0.028	0.0010	mg/L	0.0250	<0.0010	110	70-130			
Matrix Spike Dup (B9A1766-MSD1)		**Source: 19A1862-01**		*Prepared & Analyzed: 01/28/19*						
Arsenic	0.033	0.0010	mg/L	0.0250	0.0054	110	70-130	0.5	20	
Matrix Spike Dup (B9A1766-MSD2)		**Source: 19A1938-07**		*Prepared & Analyzed: 01/28/19*						
Arsenic	0.027	0.0010	mg/L	0.0250	<0.0010	109	70-130	1	20	

Notes and Definitions

D1	Sample required dilution due to matrix.
BLK	Method Blank
LCS/Dup	Laboratory Control Sample/Laboratory Fortified Blank/Duplicate
MS/Dup	Matrix Spike/Duplicate
Dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Sunstate Environmental Services

4743 E. 30th Place Yuma, AZ 85365
(928) 341-9685 • EMail: info@sunstatees.com

CHAIN OF CUSTODY RECORD

Laboratory Sample No.: 19A1987

Page 1 of 1

Please Print Clearly

CLIENT INFORMATION

Client Name	Address	City	State	Zip	Phone	Fax

Project Name	Project Number	Contact	P.O. No.	Notes:
Tacna Water	14018	Rick Miller		

SAMPLE TYPE CODES

DW=Drinking Water, S=Soil/Solid, WW=Wastewater, T=Travel Blank, SW=Surface Water, F=Food, GW=Groundwater, G=Sludge, O=Other

TURN AROUND TIME

☐ Standard 10-15 Day
☐ Other

Laboratory Authorization Required for Rush ★ ★

REQUESTED ANALYSIS

Client's Sample Identification	Date	Time	Sample Location	Composite	Grab	Sample Type	Compliance	No. of Containers		Arsenic															LAB NO.
Tacna water	1-16-19	1055	PWS 001		X	DW	X	1		X															01

Comments / Special Instructions: PW 12470XP 1398330307

SAMPLE CONDITION UPON RECEIPT	
No. of Containers	1
Temperature	2.9°C
Custody Seals	Y N
Seals Intact	Y N
Preserved	Y N

	RELINQUISHED BY		SAMPLES RECEIVED BY	
①	Signature / Sampler Printed Name: Stanley Dunn	Date 1-16-19 Time 1440	Signature / Printed Name: Storage	Date 1-16-19 Time 1440
②	Signature / Printed Name: Storage	Date 1-16-19 Time 1800	Signature / Printed Name: UPS	Date 1-16-19 Time 16:00
③	Signature / Printed Name: UPS	Date 1/17/19 Time 1100	Signature / Printed Name: Michael	Date 1/17/19 Time 1100

WHITE-LAB YELLOW-LAB PINK-CLIENT

ADEQ
Arizona Department of Environmental Quality

Lead Consumer Notice (LCN) Certification Form

PWS ID #: AZ04 14 018

PWS NAME: Jacna Water Company

Monitoring period to which the notice applies:	2nd half 2018
Date(s) results were received from laboratory:	10/12/18
Date(s) results were provided to consumers:	10/24/18

The water system named above hereby certifies that its lead consumer notice has been provided to each person it serves at the specific sampling site from which the sample was tested. The water system also certifies that these results and the following information were provided to such persons within 30 days of receiving the test results from the laboratory:

- ☑ Individual tap results from lead tap water monitoring carried out under the requirements of 40 CFR §141.86.
- ☑ An explanation of the health effects of lead.
- ☑ Steps that consumers can take to reduce exposure to lead in drinking water.
- ☑ Contact Information for our water utility.
- ☑ The maximum contaminant level goals and action levels for lead, and the definitions of these two terms.

Certified by:

Name: Nancy Miller	
Title: manager	
Phone # 928 341 9685	Date: Oct 24 2018

(Instructions on Back)

ADEQ
Arizona Department of Environmental Quality

Lead Consumer Notice (LCN) Certification Form

PWS ID #: AZ04 14 018

PWS NAME: Jacna Water Company

Monitoring period to which the notice applies:	2nd half 2018
Date(s) results were received from laboratory:	10/12/18
Date(s) results were provided to consumers:	10/24/18

The water system named above hereby certifies that its lead consumer notice has been provided to each person it serves at the specific sampling site from which the sample was tested. The water system also certifies that these results and the following information were provided to such persons within 30 days of receiving the test results from the laboratory:

- ☑ Individual tap results from lead tap water monitoring carried out under the requirements of 40 CFR §141.86.
- ☑ An explanation of the health effects of lead.
- ☑ Steps that consumers can take to reduce exposure to lead in drinking water.
- ☑ Contact Information for our water utility.
- ☑ The maximum contaminant level goals and action levels for lead, and the definitions of these two terms.

Certified by:

Name: Nancy Miller	
Title: manager	
Phone # 928 341 9685	Date: Oct 24 2018

(Instructions on Back)

ADEQ
Arizona Department of Environmental Quality

DRINKING WATER ANALYSIS REPORTING FORM
MICROBIOLOGICAL/REVISED TOTAL COLIFORM RULE
*** Distribution System Only ***

*** PUBLIC WATER SYSTEM INFORMATION ***
>>>> TO BE FILLED OUT BY SYSTEM PERSONNEL <<<<

AZ 04-14018
PWS ID Number

Tacna Water
PWS Name

05/02/2019
Sample Date

09 : 52
Sample Time (24HR CLOCK)

Rick Miller
Owner/Contact Person

Owner/Contact Email Address

(928) 341 - 9685
Owner/Contact Phone Number

☐ **Special Purpose Sample for state information only (NOT FOR COMPLIANCE)**

REPEAT SAMPLES ONLY – Check One
* Use only if Routine Sample was Positive

Routine Positive Specimen ID [ ]
☐ Original Location (Distribution System)
☐ Upstream Location (Distribution System)
☐ Downstream Location (Distribution System)
☐ Dual Purpose Sample taken at the Well *
Well 55-_____ Cl_2 _____ mg/L
* Must have Regulatory Agency approval (Not for MRDL Reporting)

LOCATION ID:
RTCR001
(Ex. RTCR001)

SAMPLING SITE / TAP LOCATION:
8575 Ave 40 E
(Ex. 1234 Main St. Tap)

*** MICROBIOLOGICAL ANALYSIS ***
>>> TO BE COMPLETED BY LABORATORY PERSONNEL <<<

Specimen ID	3100 Total Coliform		3014 E. coli		Analysis Start		Analysis Complete	
	Method	Result	Method	Result	Date	Time	Date	Time
19122-35	9223-B	Absent			05/02/19	1302	05/03/19	1302
			9223-B	Absent	05/02/19	1302	05/03/19	1302

If reporting for Dual Purpose, **you must use method that provides E. coli as a result, and specify if E. coli is detected.**
In case of any E. coli detected, contact your Compliance Assistance Coordinator by end of the business day (5pm).

*** LABORATORY INFORMATION ***
>>> TO BE COMPLETED BY LABORATORY PERSONNEL <<<

19122-35
Specimen Number

Comment [ ]

Lab ID Number [AZ 0743] **Lab Name** [Agri Trend Lab & Consulting, Inc.] **Phone Number** [928-317-0456]

Lab Contact, Printed Name [MARIA RAMIREZ] **Authorized Signature** [MARIA RAMIREZ]

PWS Notification Date [ ] **PWS Person Notified** [ ]

Any positive routine or increased routine RTCR sample triggers the GWR and requires ADEQ notification:

ADEQ Notification Date [ ] **ADEQ Person Notified** [ ]

PLEASE DO NOT SUBMIT MULTIPLE TIMES

DWAR 1R: Revised 12/2017

Submit completed form to:
EMAIL: WQD_Compliance_Data@azdeq.gov **-or- MAIL:** ADEQ Water Quality Compliance Data Unit (MC 5415B-1), 1110 W. Washington St., Phoenix, AZ 85007.
For questions call: (602) 771-9200

eurofins | Eaton Analytical

MAP-2018

Acknowledgement of Samples Received

Addr: **Tacna Water Management Company**
4743 E. 30th Place
Yuma, AZ 85365

Client ID: MAP
Folder #: 730560
Project: AZ0414018
Sample Group: Annual A&D 2018

Attn: Nancy Miller
Phone: (928) 341-9685

Project Manager: Thomas.D.French
Phone: (480) 778-1558
Sampler: Zak Erickson

The following samples were received from you on **April 11, 2018** at **10:06**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical, LLC.

Sample #	Sample ID	Sample Date
201804110636	EPDS001	04/10/2018 0800

PWSID: AZ0414018
Well ID: 001
SDWIS PWSID: AZ0414018
SDWIS SAMPLE POINT ID: EPDS001

Asbestos by TEM - >10 microns	Sampling Event

Test Description

750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (866) 988-3757 www.EurofinsUS.com/Eaton

Arizona Department of Environmental Quality

Drinking Water Asbestos Analysis Report

Samples To Be Taken At Distribution System or At EPDS Only

AZ0414018
System ID

Tacna Water Management Company
System Name

04/10/2018 0800 (24 hr Clock) Nancy Miller
Sample Date Sample Time Owner/Contact Person

(928) 341-9196
Owner/Contact Fax Number

(928) 341-9685
Owner/Contact Phone Number

Sample Type
☑ Compliance Monitoring

Sample Collection Point
☑ Entry Point to Distribution System
(EPDS) # 001

EPDS001
Sampling Site ID

For MCL or Composite Level Exceedance

_____ Original Violation Specimen Number

Sample Type
☐ Confirmation
☐ Confirmation - Composite

***** ASBESTOS ANALYSIS *****

>>>To be completed by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Result	Exceeds MCL	Exceeds Reporting Limit
EPA 100.2	7 MFL	0.2	Asbestos	1094	04/11/2018	<0.2	☐	☐

Laboratory Information

>>>To be filled out by laboratory personnel<<<

Lab ID Number: AZ0778

Specimen Number: 201804110636A

Print Name nd Phone Number of Lab Contact: Thomas.D.French (480) 778-1558

Authorized Signature: Thomas D. French

Date Public Water System Notified: 4/25/2018

Comments:

MAP-2018Sampler Zak Erickson

*All units must be reported in million fibers per liter
(MFL) DWAR 2: Revised 06/2009

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MAP-2019

Acknowledgement of Samples Received

Addr: **Tacna Water Management Company**
4743 E. 30th Place
Yuma, AZ 85365

Client ID: MAP
Folder #: 799387
Project: AZ0414018
Sample Group: Annual 2019

Attn: Nancy Miller
Phone: 928-341-9685

Project Manager: Thomas.D.French
Phone: (480) 778-1558
Sampler: Michelle Tran

The following samples were received from you on **April 12, 2019** at **09:09**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical, LLC.

Sample #	Sample ID	Sample Date
201904120039	EPDS001	04/11/2019 1130

PWSID: AZ0414018
Well ID: 001
SDWIS PWSID: AZ0414018
SDWIS SAMPLE POINT ID: EPDS001

@551_EDB-DBCP	@ML5O5 C	@VOASDWA C
Antimony Total ICAP/MS	Arsenic Total ICAP/MS	Asbestos by TEM - >10 microns
Barium Total ICAP/MS	Beryllium Total ICAP/MS	Cadmium Total ICAP/MS
Chromium Total ICAP/MS	Cyanide	Fluoride
Mercury	Nickel Total ICAP/MS	Nitrate as Nitrogen by IC
Sampling Event	Selenium Total ICAP/MS	Sodium Total ICAP
Thallium Total ICAP/MS		

201904120040	TRAVEL BLANK - HOLD	04/11/2019 1130

@551_EDB_DBCP TB	@VOASDWA TB C

Test Description

@551_EDB_DBCP TB -- EDB/DBCP/HAN by EPA 551.1

@551_EDB-DBCP -- EDB/DBCP/HAN by EPA 551.1

@ML5O5 C -- Organochlorine Pesticides/PCBs

@VOASDWA C -- Volatile Organics by GCMS

@VOASDWA TB C -- Volatile Organics by GCMS

750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (866) 988-3757 www.EurofinsUS.com/Eaton

MAP-2019

Arizona Department of Environmental Quality

Drinking Water Synthetic Organic Chemical Analysis Report

****Entry Point To the Distribution System (EPDS) Only***

PWS ID#: AZ0414018

PWS Name: Tacna Water Management Company

04/11/2019 — Sample Date

1130 (24 hr Clock) — Sample Time

Nancy Miller — Owner/Contact Person

(928) 341-9196 — Owner/Contact Fax Number

928-341-9685 — Owner/Contact Phone Number

Sample Type:

☑ Compliance Monitoring

Sample Collection Point:

☑ EPDS # 001

EPDS001 — Sampling Site ID

For MCL or Composite Level Exceedance

_____ Original Violation Specimen Number

Sample Type:

☐ Confirmation ☐ Re-analysis

☐ Confirmation - Composite ☐ Re-sample

SYNTHETIC ORGANIC CHEMICAL ANALYSIS

>>>To be filled out by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
515.4	0.07	0.0001	2,4-D	2105			☐	☐
515.4	0.05	0.0002	2,4,5-TP (Silvex)	2110			☐	☐
505	0.003	0.001	Toxaphene	2020	04/18/2019	<0.0005	☐	☐
505	0.002	0.0002	Alachlor	2051	04/18/2019	<0.0001	☐	☐
525.2	0.003	0.0001	Atrazine	2050			☐	☐
531.2	0.04	0.0009	Carbofuran	2046			☐	☐
515.4	0.001	0.00004	Pentachlorophenol	2326			☐	☐
505	0.002	0.0002	Chlordane	2959	04/18/2019	<0.0001	☐	☐
551.1	0.0002	0.00002	Dibromochloropropane (DBCP)	2931	04/23/2019	<0.00001	☐	☐
551.1	0.00005	0.00001	Ethylene Dibromide (EDB)	2946	04/23/2019	<0.00001	☐	☐
505	0.0004	0.00004	Heptachlor	2065	04/18/2019	<0.00001	☐	☐
505	0.0002	0.00002	Heptachlor Epoxide	2067	04/18/2019	<0.00001	☐	☐
505	0.0002	0.00002	Lindane	2010	04/18/2019	<0.00001	☐	☐
525.2	0.0002	0.00002	Benzo(a)Pyrene	2306			☐	☐
515.4	0.2	0.001	Dalapon	2031			☐	☐
525.2	0.006	0.0006	Di(2-ethylhexyl)phthalate	2039			☐	☐
525.2	0.4	0.0006	Di(2-ethylhexyl)adipate	2035			☐	☐
515.4	0.007	0.0002	Dinoseb	2041			☐	☐

Specimen Number: 201904120039S

DWAR-3: Revised 1/2010

Arizona Department of Environmental Quality

Drinking Water Synthetic Organic Chemical Analysis Report Form

Entry Point to the Distribution System (EPDS) Only

PWS ID#: AZ0414018 PWS Name: Tacna Water Management Company

Sample Collection Point

☑ EPDS # 001

EPDS001

Sampling Site ID

SYNTHETIC ORGANIC CHEMICAL ANALYSIS

>>>To be completed by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
547	0.7	0.006	Glyphosate	2034			☐	☐
1613	3e-008	5e-009	2,3,7,8-TCDD(Dioxin)	2063			☐	☐
549.2	0.02	0.0004	Diquat	2032			☐	☐
548.1	0.1	0.009	Endothall	2033			☐	☐
505	0.002	0.00001	Endrin	2005	04/18/2019	<0.00001	☐	☐
525.2	0.001	0.0001	Hexachlorobenzene	2274			☐	☐
525.2	0.05	0.0001	Hexachlorocyclopentadine	2042			☐	☐
531.2	0.2	0.002	Oxamyl	2036			☐	☐
515.4	0.5	0.0001	Picloram	2040			☐	☐
525.2	0.004	0.00007	Simazine	2037			☐	☐
505	0.04	0.0001	Methoxychlor	2015	04/18/2019	<0.00005	☐	☐
	0.0005	0.0001	PCB (Polychlorinated Biphenyls)	2383			☐	☐

Laboratory Information

>>>To be completed by laboratory personnel<<<

Lab ID Number: AZ0778

Specimen Number 201904120039S

Name: Eurofins Eaton Analytical, LLC

Printed Name and Phone Number of Lab Contact Thomas.D.French (480) 778-1558

Authorized Signature: Thom.D.French

Date Public Water System Notified: 4/30/2019

Comments:

MAP-2019 Sampler: Michelle Tran

All units must be reported in milligrams per liter (mg/L)

DWAR-3: Revised 1/2010

Arizona Department of Environmental Quality
Drinking Water Aroclor Analysis Reporting Form
Entry Point to the Distribution System (EPDS) Only

PWS ID#: AZ0414018

PWS Name: Tacna Water Management Company

04/11/2019 — Sample Date

1130 (24 hr Clock) — Sample Time

Nancy Miller — Owner/Contact Person

(928) 341-9196 — Owner/Contact Fax Number

928-341-9685 — Owner/Contact Phone Number

Sample Type:

☑ Compliance Monitoring

Sample Collection Point:

☑ EPDS# 001

EPDS001

Samplling Site ID

AROCLOR (PCB SCREENING TEST)
>>>To be completed by laboratory personnel<<<

Analysis Method	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds Reporting Limit*
505	0.00008	Aroclor 1016	2388	04/18/2019	<0.00008	☐
505	0.02	Aroclor 1221	2390	04/18/2019	<0.0001	☐
505	0.0005	Aroclor 1232	2392	04/18/2019	<0.0001	☐
505	0.0003	Aroclor 1242	2394	04/18/2019	<0.0001	☐
505	0.0001	Aroclor 1248	2396	04/18/2019	<0.0001	☐
505	0.0001	Aroclor 1254	2398	04/18/2019	<0.0001	☐
505	0.0002	Aroclor 1260	2400	04/18/2019	<0.0001	☐

Laboratory Information

>>>To be completed by laboratory personnel<<<

Lab ID Number: AZ0778

Specimen Number: 201904120039P

Name: Eurofins Eaton Analytical, LLC

Printed Name and Phone Number of Lab Contact: Thomas.D.French (480) 778-1558

Authorized Signature: Thom D. French

Date Public Water System Notified: 4/30/2019

Comments:

MAP-2019 Sampler: Michelle Tran

* If any reporting limit is exceeded, then further testing for decachlorobiphenyl must be conducted.

All units must be reported in milligrams per liter (mg/L)
DWAR-3A: Revised 1/2010

MAP-2019

Arizona Department of Environmental Quality
Drinking Water Inorganic Chemical Analysis Report Form
Entry Point To the Distribution System (EPDS) Only

PWS ID#: AZ0414018

PWS Name: Tacna Water Management Company

04/11/2019 — Sample Date
1130 (24 hr Clock) — Sample Time

Nancy Miller
Owner/Contact Person

(928) 341-9196
Owner/Contact Fax Number

928-341-9685
Owner/Contact Phone Number

Sample Type
☑ Compliance Monitoring

Sample Collection Point
☑ EPDS# 001

EPDS001
Sampling Site ID

For MCL or Composite Level Exceedance

_____ Original Violation Specimen Number

Sample Type
☐ Confirmation
☐ Confirmation - Composite

INORGANIC CHEMICAL ANALYSIS
>>>To be completed by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name Method	Cont. Code	Analysis Run Date	Results	Exceeds MCL	Exceeds Trigger Limit	
200.8	0.010	0.005	Arsenic	1005	04/15/2019	0.021	☑		
200.8	2	1	Barium	1010	04/15/2019	0.023	☐		
200.8	0.005	0.0025	Cadmium	1015	04/15/2019	<0.0005	☐		
200.8	0.1	0.05	Chromium	1020	04/15/2019	0.0014	☐		
4500F-C	4	0.5	Fluoride	1025	04/16/2019	2.4	☐		
245.1	0.002	0.001	Mercury	1035	04/18/2019	<0.0002	☐		
300.0	10	2.5	Nitrate (as N)	1040	04/12/2019	3.2	☐	(5 mg/L)	☐
300.0	1	0.25	Nitrite	1041			☐	0.5 mg/L	☐
200.8	0.05	0.025	Selenium	1045	04/15/2019	0.014	☐		
200.8	0.006	0.003	Antimony	1074	04/15/2019	<0.001	☐		
200.8	0.004	0.002	Beryllium	1075	04/15/2019	<0.001	☐		
4500CN-F	0.2	0.1	Cyanide	1024	04/22/2019	<0.025	☐		
200.8	No MCL	0.05	Nickel*	1036	04/15/2019	<0.005	☐		
200.8	0.002	0.001	Thallium	1085	04/15/2019	<0.001	☐		
200.7	No MCL	10	Sodium*	1052	04/15/2019	750	☐		

Laboratory Information
>>>To be completed by laboratory personnel<<<

Lab ID Number: AZ0778
Specimen Number: 201904120039I
Name: Eurofins Eaton Analytical, LLC
Printed Name and Phone Number of Lab Contact: Thomas.D.French (480) 778-1558
Authorized Signature: Thom.D.French
Date Public Water System Notified: 4/30/2019
Comments:

MAP-2019 Sampler: Michelle Tran

All units must be reported in milligrams per liter (mg/L)
*Contaminants without an MCL
DWAR 2IN: Revised 8/2009

MAP-2019

Arizona Department of Enviromental Quality

Drinking Water Volatile Organic Chemical Analysis Report

Entry Point To the Distribution System (EPDS) Only

PWS ID#: AZ0414018 PWS Name: Tacna Water Management Company

04/11/2019 Sample Date

1130 (24 hr Clock) Sample Time

Nancy Miller Owner/Contact Person

(928) 341-9196 Owner/Contact Fax Number

928-341-9685 Owner/Contact Phone Number

Sample Type

☑ Compliance Monitoring

Sample Collection Point

☑ EPDS# 001

EPDS001

Sampling Site ID

FOR MCL OR REPORTING LIMIT EXCEEDANCE

_____ Original Violation Specimen Number

Sample Type

☐ Confirmation - MCL

☐ Confirmation - Composite

VOLATILE ORGANIC CHEMICAL ANALYSIS

>>>To be completed by laboratory personnel<<<

Analysis Method	MCL mg/L	Reporting Limit mg/L	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
524.2	0.007	0.0005	1,1 Dichloroethylene	2977	04/19/2019	<0.0005	☐	☐
524.2	0.2	0.0005	1,1,1-Trichlorethane	2981	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	1,1,2-Trichloroethane	2985	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	1,2-Dichloroethane	2980	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	1,2-Dichloropropane	2983	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	Benzene	2990	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	Carbon Tetrachloride	2982	04/19/2019	<0.0005	☐	☐
524.2	0.07	0.0005	cis-1,2 Dichloroethylene	2380	04/19/2019	<0.0005	☐	☐
524.2	0.7	0.0005	Ethylbenzene	2992	04/19/2019	<0.0005	☐	☐
524.2	0.1	0.0005	(mono) Chlorobenzene	2989	04/19/2019	<0.0005	☐	☐
524.2	0.6	0.0005	o-Dichlorobenzene	2968	04/19/2019	<0.0005	☐	☐
524.2	0.075	0.0005	para-Dichlorobenzene	2969	04/19/2019	<0.0005	☐	☐
524.2	0.1	0.0005	Styrene	2996	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	Tetrachloroethylene	2987	04/19/2019	<0.0005	☐	☐
524.2	1	0.0005	Toluene	2991	04/19/2019	<0.0005	☐	☐

Specimen Number: 201904120039V

DWAR-4: Revised 7/2009

Arizona Department of Environmental Quality

Drinking Water Volatile Organic Chemical Analysis Report

Entry Point To the Distribution System (EPDS) Only

PWS ID#: AZ0414018 PWS Name: Tacna Water Management Company

Sample Collection Point

☑ EPDS# 001

EPDS001

Sampling Site ID

VOLATILE ORGANIC CHEMICAL ANALYSIS

>>>To be completed by laboratory personnel<<<

Analysis Method	MCL mg/L	Reporting Limit mg/L	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
524.2	0.1	0.0005	Trans-1,2-Dichloroethylene	2979	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	Trichloroethylene	2984	04/19/2019	<0.0005	☐	☐
524.2	0.002	0.0005	Vinyl Chloride	2976	04/19/2019	<0.0003	☐	☐
524.2	10	0.0015	Xylenes, Total	2955	04/19/2019	<0.0005	☐	☐
524.2	0.07	0.0005	1,2,4-Trichlorobenzene	2378	04/19/2019	<0.0005	☐	☐
524.2	0.005	0.0005	Dichloromethane	2964	04/19/2019	<0.0005	☐	☐

Laboratory Information

>>>To be completed by laboratory personnel<<<

Lab ID Number: AZ0778

Specimen Number: 201904120039V

Name: Eurofins Eaton Analytical, LLC

Printed Name and Phone Number of Lab Contact: Thomas.D.French (480) 778-1558

Authorized Signature:

Date Public Water System Notified: 4/30/2019

Comments:

MAP-2019 Sampler: Michelle Tran

All units must be reported in milligrams per liter (mg/L)

DWAR-4: Revised 7/2009

MAP-2019

Arizona Department of Environmental Quality

Drinking Water Asbestos Analysis Report

Samples To Be Taken At Distribution System or At EPDS Only

AZ0414018
System ID

Tacna Water Management Company
System Name

04/11/2019 1130 (24 hr Clock) Nancy Miller
Sample Date Sample Time Owner/Contact Person

(928) 341-9196
Owner/Contact Fax Number

928-341-9685
Owner/Contact Phone Number

Sample Type
☑ Compliance Monitoring

Sample Collection Point
☑ Entry Point to Distribution System
(EPDS) # 001

EPDS001
Sampling Site ID

For MCL or Composite Level Exceedance

_____ Original Violation Specimen Number

Sample Type
☐ Confirmation
☐ Confirmation - Composite

***** ASBESTOS ANALYSIS *****

>>>To be completed by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Result	Exceeds MCL	Exceeds Reporting Limit
EPA 100.2	7 MFL	0.2	Asbestos	1094	04/12/2019	<0.2	☐	☐

Laboratory Information

>>>To be filled out by laboratory personnel<<<

Lab ID Number: AZ0778

Specimen Number: 201904120039A

Print Name nd Phone Number of Lab Contact: Thomas.D.French (480) 778-1558

Authorized Signature: Thomas D. French

Date Public Water System Notified: 4/30/2019

Comments:

MAP-2019Sampler Michelle Tran

*All units must be reported in million fibers per liter
(MFL) DWAR 2: Revised 06/2009

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MAP-2019

Acknowledgement of Samples Received

Addr: **Arizona Department of Environmental Quality**
1110 West Washington Street
Phoenix, AZ 85007

Client ID: MAP
Folder #: 799391
Project: COMPOSITE
Sample Group: SOC Composite

Attn: Mary Kay Black
Phone: (602) 771-4518

Project Manager: Thomas.D.French
Phone: (480) 778-1558
Sampler: Michelle Tran

The following samples were received from you on **April 12, 2019** at **09:27**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical, LLC.

Sample #	Sample ID	Sample Date
201904120047	COMP4 14018 (001), 14037 (001), 14044 (001), 14080 (001)	04/11/2019 0700
	PWS Code: AZ0414018	
	@525REG C, @DIQUAT C, @ML515.4, @ML531.2, Endothall, Glyphosate	
201904120050	COMP4 14018 (001), 14037 (001), 14044 (001), 14080 (001)	04/11/2019 0700
	PWS Code: AZ0414018	
	2,3,7,8-TCDD	
201904120051	TRAVEL BLANK HOLD	04/11/2019 0700
	@525AZ TBC	

Test Description

@525AZ TBC -- Semivolatiles by GCMS

@525REG C -- Semivolatiles by GCMS

@DIQUAT C -- Diquat and Paraquat

@ML515.4 -- Chlorophenoxy Herbicides

@ML531.2 -- Aldicarbs

750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (866) 988-3757 www.EurofinsUS.com/Eaton

MAP-2019

Arizona Department of Environmental Quality

Drinking Water Composite Synthetic Organic Chemical Analysis Reporting Form

****Entry Point To the Distribution System (EPDS) Only***

	PWS	EPDS#	Specimen Number	Sample Date	Time (24 hr)	System Name
1	AZ0414018	001	201904120047Sa	04/11/2019	11:30	Tacna Water Management Co.
2	AZ0414037	001	201904120047Sb	04/11/2019	07:00	Gadsen WC
3	AZ0414044	001	201904120047Sc	04/11/2019	14:30	Antelope Union High School
4	AZ0414080	001	201904120047Sd	04/11/2019	08:30	Tierra Mesa Estate Water
5					:	

	Owner/Contact Person	Phone Number	Fax Number
1	Nancy Miller	928-341-9685	
2	J. Deere	928-726-3999	
3	Antelope Union High Sch.	928-785-4588	
4	Tierra Mesa Estate Water	928-341-9685	
5			

COMPLIANCE SAMPLE TYPE ☒ ≤3.300 Population ☐ >3.300 Population

COMPOSITE SYNTHETIC ORGANIC CHEMICAL ANALYSIS

>>>To be completed by laboratory<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
515.4	0.07	0.0001	2,4-D	2105	04/18/2019	<0.0001	☐	☐
515.4	0.05	0.0002	2,4,5-TP (Silvex)	2110	04/18/2019	<0.0002	☐	☐
505	0.003	0.001	Toxaphene	2020			☐	☐
505	0.002	0.0002	Alachlor	2051			☐	☐
525.2	0.003	0.0001	Atrazine	2050	05/02/2019	<0.00005	☐	☐
531.2	0.04	0.0009	Carbofuran	2046	04/18/2019	<0.0005	☐	☐
515.4	0.001	0.00004	Pentachlorophenol	2326	04/18/2019	<0.00004	☐	☐
505	0.002	0.0002	Chlordane	2959			☐	☐
551.1	0.0002	0.00002	Dibromochloropropane (DBCP)	2931			☐	☐
551.1	0.00005	0.00001	Ethylene Dibromide (EDB)	2946			☐	☐
505	0.0004	0.00004	Heptachlor	2065			☐	☐
505	0.0002	0.00002	Heptachlor Epoxide	2067			☐	☐
505	0.0002	0.00002	Lindane	2010			☐	☐
525.2	0.0002	0.00002	Benzo(a)Pyrene	2306	05/02/2019	<0.00002	☐	☐
515.4	0.2	0.001	Dalapon	2031	04/18/2019	<0.001	☐	☐
525.2	0.006	0.0006	Di(2-ethylhexyl)phthalate	2039	05/02/2019	<0.0006	☐	☐
525.2	0.4	0.0006	Di(2-ethylhexyl)adipate	2035	05/02/2019	<0.0006	☐	☐
515.4	0.007	0.0002	Dinoseb	2041	04/18/2019	<0.0002	☐	☐

Specimen Number: 201904120047S

DWAR-12B: Revised 7/2009

Arizona Department of Environmental Quality

Drinking Water Composite Synthetic Organic Chemical Analysis Reporting Form

Entry Point to the Distribution System (EPDS) Only

	PWS ID:	EPDS#	Specimen Number	PWS Name:
1	AZ0414018	001	201904120047Sa	Tacna Water Management Co.
2	AZ0414037	001	201904120047Sb	Gadsen WC
3	AZ0414044	001	201904120047Sc	Antelope Union High School
4	AZ0414080	001	201904120047Sd	Tierra Mesa Estate Water
5				

COMPOSITE SYNTHETIC ORGANIC CHEMICAL ANALYSIS

>>>To be completed by laboratory<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
547	0.7	0.006	Glyphosate	2034	04/19/2019	<0.006	☐	☐
1613	3e-008	5e-009	2,3,7,8-TCDD(Dioxin)	2063			☐	☐
549.2	0.02	0.0004	Diquat	2032	04/16/2019	<0.0004	☐	☐
548.1	0.1	0.009	Endothall	2033	04/19/2019	<0.005	☐	☐
505	0.002	0.00001	Endrin	2005			☐	☐
525.2	0.001	0.0001	Hexachlorobenzene	2274	05/02/2019	<0.00005	☐	☐
525.2	0.05	0.0001	Hexachlorocyclopentadine	2042	05/02/2019	<0.00005	☐	☐
531.2	0.2	0.002	Oxamyl	2036	04/18/2019	<0.0005	☐	☐
515.4	0.5	0.0001	Picloram	2040	04/18/2019	<0.0001	☐	☐
525.2	0.004	0.00007	Simazine	2037	05/02/2019	<0.00005	☐	☐
505	0.04	0.0001	Methoxychlor	2015			☐	☐
	0.0005	0.0001	PCB (Polychlorinated Biphenyls)	2383			☐	☐

Laboratory Information

>>>To be completed by laboratory personnel<<<

Lab ID Number: AZ0778

Specimen Number: 201904120047S

Name: Eurofins Eaton Analytical, LLC

Printed Name and Phone Number of Lab Contact: Thomas D. French (480) 778 1558

Authorized Signature:

Date(s) Public Water System(s) were notified: #1 5/3/2019 /#2 5/3/2019

#3 5/3/2019 /#4 5/3/2019 /#5

Comments:

MAP-2019 Sampler: Michelle Tran

All units must be reported in milligrams per liter (mg/L)

DWAR 12B: Revised 7/2009'

MAP-2019

Arizona Department of Environmental Quality

Drinking Water Composite Synthetic Organic Chemical Analysis Reporting Form

****Entry Point To the Distribution System (EPDS) Only***

	PWS	EPDS#	Specimen Number	Sample Date	Time (24 hr)	System Name
1	AZ0414018	001	201904120050Sa	04/11/2019	11:30	Tacna Water Management Co.
2	AZ0414037	001	201904120050Sb	04/11/2019	07:00	Gadsen WC
3	AZ0414044	001	201904120050Sc	04/11/2019	14:30	Antelope Union High School
4	AZ0414080	001	201904120050Sd	04/11/2019	08:30	Tierra Mesa Estate Water
5					:	

	Owner/Contact Person	Phone Number	Fax Number
1	Nancy Miller	928-341-9685	
2	J. Deere	928-726-3999	
3	Antelope Union High Sch.	928-785-4588	
4	Tierra Mesa Estate Water	928-341-9685	
5			

COMPLIANCE SAMPLE TYPE ☒ ≤3.300 Population ☐ >3.300 Population

COMPOSITE SYNTHETIC ORGANIC CHEMICAL ANALYSIS

>>>To be completed by laboratory<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
515.4	0.07	0.0001	2,4-D	2105			☐	☐
515.4	0.05	0.0002	2,4,5-TP (Silvex)	2110			☐	☐
505	0.003	0.001	Toxaphene	2020			☐	☐
505	0.002	0.0002	Alachlor	2051			☐	☐
525.2	0.003	0.0001	Atrazine	2050			☐	☐
531.2	0.04	0.0009	Carbofuran	2046			☐	☐
515.4	0.001	0.00004	Pentachlorophenol	2326			☐	☐
505	0.002	0.0002	Chlordane	2959			☐	☐
551.1	0.0002	0.00002	Dibromochloropropane (DBCP)	2931			☐	☐
551.1	0.00005	0.00001	Ethylene Dibromide (EDB)	2946			☐	☐
505	0.0004	0.00004	Heptachlor	2065			☐	☐
505	0.0002	0.00002	Heptachlor Epoxide	2067			☐	☐
505	0.0002	0.00002	Lindane	2010			☐	☐
525.2	0.0002	0.00002	Benzo(a)Pyrene	2306			☐	☐
515.4	0.2	0.001	Dalapon	2031			☐	☐
525.2	0.006	0.0006	Di(2-ethylhexyl)phthalate	2039			☐	☐
525.2	0.4	0.0006	Di(2-ethylhexyl)adipate	2035			☐	☐
515.4	0.007	0.0002	Dinoseb	2041			☐	☐

Specimen Number: 201904120050S

DWAR-12B: Revised 7/2009

Arizona Department of Environmental Quality

Drinking Water Composite Synthetic Organic Chemical Analysis Reporting Form

Entry Point to the Distribution System (EPDS) Only

	PWS ID:	EPDS#	Specimen Number	PWS Name:
1	AZ0414018	001	201904120050Sa	Tacna Water Management Co.
2	AZ0414037	001	201904120050Sb	Gadsen WC
3	AZ0414044	001	201904120050Sc	Antelope Union High School
4	AZ0414080	001	201904120050Sd	Tierra Mesa Estate Water
5				

COMPOSITE SYNTHETIC ORGANIC CHEMICAL ANALYSIS

>>>To be completed by laboratory<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analysis Run Date.	Results	Exceeds MCL	Exceeds Reporting Limit
547	0.7	0.006	Glyphosate	2034			☐	☐
1613	3e-008	5e-009	2,3,7,8-TCDD(Dioxin)	2063	04/24/2019	<0.000000005	☐	☐
549.2	0.02	0.0004	Diquat	2032			☐	☐
548.1	0.1	0.009	Endothall	2033			☐	☐
505	0.002	0.00001	Endrin	2005			☐	☐
525.2	0.001	0.0001	Hexachlorobenzene	2274			☐	☐
525.2	0.05	0.0001	Hexachlorocyclopentadine	2042			☐	☐
531.2	0.2	0.002	Oxamyl	2036			☐	☐
515.4	0.5	0.0001	Picloram	2040			☐	☐
525.2	0.004	0.00007	Simazine	2037			☐	☐
505	0.04	0.0001	Methoxychlor	2015			☐	☐
	0.0005	0.0001	PCB (Polychlorinated Biphenyls)	2383			☐	☐

Laboratory Information

>>>To be completed by laboratory personnel<<<

Lab ID Number: AZ0780

Specimen Number: 201904120050S

Name: Eurofins Lancaster Laboratories

Printed Name and Phone Number of Lab Contact: Thomas D. French (480) 778 1558

Authorized Signature:

Date(s) Public Water System(s) were notified: #1 5/3/2019 /#2 5/3/2019

#3 5/3/2019 /#4 5/3/2019 /#5

Comments: Subcontracted to AZ0780

MAP-2019 Sampler: Michelle Tran

All units must be reported in milligrams per liter (mg/L)

DWAR 12B: Revised 7/2009'

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MAP-2019

Acknowledgement of Samples Received

Addr: **Tacna Water Management Company**
4743 E. 30th Place
Yuma, AZ 85365

Client ID: MAP
Folder #: 801805
Project: AZ0414018
Sample Group: Annual 2019

Attn: Nancy Miller
Phone: 928-341-9685

Project Manager: Thomas.D.French
Phone: (480) 778-1558
Sampler: Michelle Tran

The following samples were received from you on **April 26, 2019** at **15:23**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical, LLC.

Sample #	Sample ID	Sample Date
201904260298	EPDS001	04/25/2019 1400

PWSID: AZ0414018
Well ID: 001
SDWIS PWSID: AZ0414018
SDWIS SAMPLE POINT ID: EPDS001

Arsenic Total ICAP/MS	Sampling Event

Test Description

750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (866) 988-3757 www.EurofinsUS.com/Eaton

MAP-2019

Arizona Department of Environmental Quality
Drinking Water Inorganic Chemical Analysis Report Form
Entry Point To the Distribution System (EPDS) Only

PWS ID#: AZ0414018

PWS Name: Tacna Water Management Company

04/25/2019 (Sample Date) 1400 (Sample Time) (24 hr Clock)

Nancy Miller
Owner/Contact Person

(928) 341-9196
Owner/Contact Fax Number

928-341-9685
Owner/Contact Phone Number

Sample Type
☑ Compliance Monitoring

Sample Collection Point
☑ EPDS# 001

EPDS001
Sampling Site ID

For MCL or Composite Level Exceedance

201904120039I
Original Violation Specimen Number

Sample Type
☒ Confirmation
☐ Confirmation - Composite

INORGANIC CHEMICAL ANALYSIS
>>>To be completed by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name Method	Cont. Code	Analysis Run Date	Results	Exceeds MCL	Exceeds Trigger Limit	
200.8	0.010	0.005	Arsenic	1005	04/29/2019	0.024	☑		
200.8	2	1	Barium	1010			☐		
200.8	0.005	0.0025	Cadmium	1015			☐		
200.8	0.1	0.05	Chromium	1020			☐		
4500F-C	4	0.5	Fluoride	1025			☐		
245.1	0.002	0.001	Mercury	1035			☐		
300.0	10	2.5	Nitrate (as N)	1040			☐	(5 mg/L)	☐
300.0	1	0.25	Nitrite	1041			☐	0.5 mg/L	☐
200.8	0.05	0.025	Selenium	1045			☐		
200.8	0.006	0.003	Antimony	1074			☐		
200.8	0.004	0.002	Beryllium	1075			☐		
4500CN-F	0.2	0.1	Cyanide	1024			☐		
200.8	No MCL	0.05	Nickel*	1036			☐		
200.8	0.002	0.001	Thallium	1085			☐		
200.7	No MCL	10	Sodium*	1052			☐		

Laboratory Information
>>>To be completed by laboratory personnel<<<

Lab ID Number: AZ0778

Specimen Number: 201904260298I

Name: Eurofins Eaton Analytical, LLC

Printed Name and Phone Number of Lab Contact: Thomas.D.French (480) 778-1558

Authorized Signature: Thom.D.French

Date Public Water System Notified: 4/30/2019

Comments:

MAP-2019 Sampler: Michelle Tran

All units must be reported in milligrams per liter (mg/L)
*Contaminants without an MCL
DWAR 2IN: Revised 8/2009

AGRI-TREND

Sunstate Environmental
4743 E. 30th Street
Yuma, AZ 85365

System ID

Tacna Water
System name

06 / 12 / 19 0818 (24 hr clock)
Sample Date Sample Time

Rick Miller
Owner/Contact Person Name

928-341-9685
Owner/Contact Phone Number

928-341-9196
Owner/Contact Person Fax Number

T. Clark
Sampler I name

Lakeside *(37822 Turquoise)*
Sampling Site ID

MICROBIOLOGICAL WATER ANALYSIS

Analysis Method	Contaminant Name	Test Start Date / Time	Analysis Run Date / Time	Result
SM 9223 B	Total Coliform	06 / 12 / 19 / 1045	06 / 13 / 19 1045	***Absent***
SM 9223 B	E. Coli	06 / 12 / 19 / 1045	06 / 13 / 19 1045	***Absent***

LABORATORY INFORMATION

Specimen Number
19163-3

ID Number: #AZ0743 **Name:** [Agri Trend Lab & Consulting, Inc.]

Comments:

Authorized Signature: [Maria Ramos]

AGRI-TREND
LAB & CONSULTING, INC.
3337 East 33rd Place • Yuma, Arizona 85365
(928) 317-1127

CHAIN OF CUSTODY RECORD

Customer No:

Page 1 of 1

Customer: Sunstate

Address:

City, State, Zip:

Sampler Name (Print): Jakob

Sampler Name (Signature):

Public Water System Information

System Name: Tacna-citrus city

System ID: 14018

Owner/Contact Person Name: R miller

Owner/Contact Person Phone:

Owner/Contact Person Fax:

Owner/Contact Person E-Mail:

Sample Receipt

Temperature 3.8 °C

Total # of Containers: 1

Compliance Samples

Requires State Forms ☐ Yes

Non-Compliance Samples ☐ Yes

Sample Type Codes (Matrix)

DW – Drinking Water

WW – Waste Water

Other:

Comments

37822 Turquoise

Sample Information

Lab #	Sample Identification	Sample Date	Sample Time	Matrix	Total Coliform (P/A)	Fecal Coliform (MF)		
19163-3	R-168 001	6/12/19	0818	DW	X			

Instructions/Special Requirements:

Date	Time	Sample Relinquished By	Samples Received By
6/12/19	1015		MARIN

SUNSTATE FLOW INFORMATION
2017

Month	No. Users	Measured Flow	Daily	gpm	per connection per day	people per house	Average per capita
January	141	585620	18890.97	13.11873	133.9784946	2.3	58.2515194
Feb	140	709100	25325	17.58681	180.8928571	2.3	78.64906832
Mar	141	727100	23454.84	16.28808	166.3463738	2.3	72.32451036
Apr	140	1104010	36800.33	25.55579	262.8595238	2.3	114.2867495
May	138	902990	29128.71	20.22827	211.0776064	2.3	91.77287233
Jun	137	1032100	34403.33	23.8912	251.1192214	2.3	109.1822702
Jul	136	1268770	40928.06	28.42227	300.9416509	2.3	130.844196
Aug	139	997850	32188.71	22.35327	231.5734509	2.3	100.6841091
Sep	137	783610	26120.33	18.13912	190.6593674	2.3	82.89537713
Oct	138	884250	28524.19	19.80847	206.6970547	2.3	89.86828465
Nov	139	893940	29798	20.69306	214.3741007	2.3	93.20613075
Dec	140	852340	27494.84	19.09364	196.3917051	2.3	85.38769786
	138.8333	10741680	29429.26	20.43699	211.9754642	2.3	92.16324529

SUNSTATE FLOW INFORMATION
2016

Month	No. Users	Measured Flow	Daily	gpm	per connection per day	people per house	Average per capita
January	137	764319	24655.45	17.12184	179.9668001	2.3	78.24643482
Feb	137	1030820	36815	25.56597	268.7226277	2.3	116.8359251
Mar	139	770535	24855.97	17.26109	178.8199118	2.3	77.74778774
Apr	138	1065376	35512.53	24.66148	257.3371981	2.3	111.8857383
May	138	955432	30820.39	21.40305	223.3361384	2.3	97.10266886
Jun	138	1043406	34780.2	24.15292	252.0304348	2.3	109.5784499
Jul	137	1034385	33367.26	23.17171	243.5566282	2.3	105.8941862
Aug	135	1318940	**42546.45**	29.54615	315.1589008	2.3	137.0256091
Sep	136	1119585	37319.5	25.91632	274.4080882	2.3	119.3078645
Oct	139	1342520	43307.1	30.07437	311.5618473	2.3	135.4616727
Nov	141	1046158	34871.93	24.21662	247.3186761	2.3	107.5298592
Dec	141	1141592	36825.55	25.5733	261.174102	2.3	113.5539574
	138	12633068	34611.15	24.03552	250.8054	2.3	109.0458261

SUNSTATE FLOW INFORMATION
2015

Month	No. Users	Measured Flow	Daily	gpm	per connection per day	people per house	Average per capita
January	148	874370	28205.48	19.58714	190.5775937	2.3	82.85982336
Feb	146	691291	24688.96	17.14511	169.1024951	2.3	73.52282396
Mar	146	1121299	36170.94	25.11871	247.7461335	2.3	107.7157102
Apr	146	1828710	60957	42.33125	417.5136986	2.3	181.5276951
May	137	839666	27086	18.80972	197.7080292	2.3	85.96001269
Jun	133	1202193	40073.1	27.82854	301.3015038	2.3	131.0006538
Jul	131	1080772	34863.61	24.21084	266.1344496	2.3	115.7106303
Aug	131	938918	30287.68	21.03311	231.2036444	2.3	100.5233237
Sep	133	965127	32170.9	22.3409	241.8864662	2.3	105.1680288
Oct	133	1395140	**45004.52**	31.25314	338.3798205	2.3	147.1216611
Nov	134	586280	19542.67	13.5713	145.840796	2.3	63.40904175
Dec	134	693810	22380.97	15.54234	167.0221473	2.3	72.61832493
	137.6667	12217576	33472.81	23.24501	243.1439053	2.3	105.7147414

SUNSTATE FLOW INFORMATION
2014

Month	No. Users	Measured Flow	Daily	gpm	per connection per day	people per house	People per service	Average per capita
January	154	521	521000	16806.45	11.67114695	109.1328027	2.3	47.44904464
Feb	151	721	721000	23258.06	16.15143369	154.0269173	2.3	66.96822492
Mar	152	625	625000	20161.29	14.00089606	132.6400679	2.3	57.66959474
Apr	149	925	925000	29838.71	20.72132616	200.2597965	2.3	87.06947674
May	140	869	869000	28032.26	19.46684588	200.2304147	2.3	87.05670206
Jun	141	1017	1017000	32806.45	22.78225806	232.6698696	2.3	101.1608129
Jul	141	948	948000	30580.65	21.23655914	216.8840082	2.3	94.29739489
Aug	140	997	997000	32161.29	22.33422939	229.7235023	2.3	99.87978361
Sep	146	1039	1039000	**33516.13**	23.27508961	229.5625276	2.3	99.80979462
Oct	147	586	586000	18903.23	13.12724014	128.5933728	2.3	55.9101621
Nov	150	704	704000	22709.68	15.77060932	151.3978495	2.3	65.82515194
Dec	150	593	593000	19129.03	13.28405018	127.5268817	2.3	55.44647031
	146.75	9545	9545000	26150.68	18.16019787	178.1988752	2.3	77.47777181

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SUNSTATE FLOW INFORMATION
2014

Month	No. Users	Measured Flow	Daily	gpm	per connection per day	people per house	People per service	Average per capita
January	unk	unk	unk	unk	unk	unk	unk	unk
Feb	unk	unk	unk	unk	unk	unk	unk	unk
Mar	175	701	701000	22612.9	15.70341	129.2166	2.3	56.18113
Apr	175	1240	1240000	40000	27.77778	228.5714	2.3	99.37888
May	175	1298	1298000	41870.97	29.07706	239.2627	2.3	104.0272
Jun	175	1581	1581000	51000	35.41667	291.4286	2.3	126.7081
Jul	175	1671	1671000	53903.23	37.4328	308.0184	2.3	133.9211
Aug	175	1323	1323000	42677.42	29.6371	243.871	2.3	106.0309
Sep	175	1182	1182000	38129.03	26.47849	217.8802	2.3	94.73051
Oct	175	1061	1061000	34225.81	23.76792	195.576	2.3	85.03306
Nov	175	1849	1849000	**59645.16**	41.42025	340.8295	2.3	148.1867
Dec	175	1023	1023000	33000	22.91667	188.5714	2.3	81.98758
	145.8333	12929	12929000	35421.92	24.59855	242.8932	2.3	105.6057

1000

Appendix B WATER QUALITY DATA FROM AUGUST 6, 2019 SAMPLING EVENTS

eurofins | Eaton Analytical

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
Tel: (626) 386-1100
Fax: (866) 988-3757
1 800 566 LABS (1 800 566 5227)

ilac-MRA

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY
AT-1807

Laboratory Report

for

Stantec Consulting
3300 South Frye Road, Suite 300
Chandler, AZ 85226
Attention: Heather Tugaoen

NELAP ACCREDITED TNI LABORATORY
UTAH ELCP CA00006

Date of Issue
08/31/2019

Eurofins Eaton Analytical, LLC

TDF: Thomas.D.French

Project Manager

Report:820149
Project:TACNA-WQ
ADHS License #:AZ0778
Group:Tacna Water Quality

* Accredited in accordance with TNI 2016 and ISO/IEC 17025:2017.
* Laboratory certifies that the test results meet all **TNI 2016 and ISO/IEC 17025:2017** requirements unless noted under the individual analysis.
* Following the cover page are State Certification List, ISO/IEC 17025:2017 Accredited Method List, Acknowledgement of Samples Received, Comments, Hits Report, Data Report, QC Summary, QC Report and Regulatory Forms, as applicable.
* Test results relate only to the sample(s) tested.
* Test results apply to the sample(s) as received, unless EEA-M collected and analyzed the sample(s) as noted in the COC and final report.
* This report shall not be reproduced except in full, without the written approval of the laboratory.
* This report includes ISO/IEC 17025:2017 and non-ISO/IEC 17025:2017 accredited methods.

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STATE CERTIFICATION LIST

State	Certification Number	State	Certification Number
Alabama	41060	**Montana**	Cert 0035
Arizona	AZ0778	**Nebraska**	Certified
Arkansas	Certified	**Nevada**	CA000062018
California	2813	**New Hampshire ***	2959
Colorado	Certified	**New Jersey ***	CA 008
Connecticut	PH-0107	**New Mexico**	Certified
Delaware	CA 006	**New York ***	11320
Florida *	E871024	**North Carolina**	06701
Georgia	947	**North Dakota**	R-009
Guam	18-005R	**Oregon ***	CA200003-005
Hawaii	Certified	**Pennsylvania ***	68-565
Idaho	Certified	**Puerto Rico**	Certified
Illinois *	200033	**Rhode Island**	LAO00326
Indiana	C-CA-01	**South Carolina**	87016
Iowa - Asbestos	413	**South Dakota**	Certified
Kansas *	E-10268	**Tennessee**	TN02839
Kentucky	90107	**Texas ***	T104704230-18-15
Louisiana *	LA180000	**Utah (Primary AB) ***	CA00006
Maine	CA0006	**Vermont**	VT0114
Maryland	224	**Virginia ***	460260
Commonwealth of Northern Marianas Is.	MP0004	**Washington**	C838
Massachusetts	M-CA006	**EPA Region 5**	Certified
Michigan	9906	**Los Angeles County Sanitation Districts**	10264
Mississippi	Certified		

* NELAP/TNI Recognized Accreditation Bodies

The tests listed below are accredited and meet the requirements of ISO/IEC 17025 as verified by the ANSI-ASQ National Accreditation Board/ANAB.
Refer to Certificate and scope of accreditation (AT 1807) found at: https://www.eurofinsus.com/Eaton

SPECIFIC TESTS	METHOD OR TECHNIQUE USED	Environ-mental (Drinking Water)	Environ-mental (Waste Water)	Water as a Component of Food and Bev/Bev/ Bottled Water
1,2,3-TCP (5 PPT & 0.5 PPT)	CA SRL 524M-TCP	x		x
1,4-Dioxane	EPA 522	x		x
2,3,7,8-TCDD	Modified EPA 1613B	x		x
Acrylamide	In House Method (2440)	x		x
Algal Toxins/Microcystin	In House Method (3570)			
Alkalinity	SM 2320B	x	x	x
Ammonia	EPA 350.1		x	x
Ammonia	SM 4500-NH3 H		x	x
Anions and DBPs by IC	EPA 300.0	x	x	x
Anions and DBPs by IC	EPA 300.1	x		x
Asbestos	EPA 100.2	x	x	
BOD / CBOD	SM 5210B		x	x
Bromate	In House Method (2447)	x		x
Carbamates	EPA 531.2	x		x
Carbonate as CO3	SM 2330B	x	x	x
Carbonyls	EPA 556	x		x
COD	EPA 410.4 / SM 5220D		x	
Chloramines	SM 4500-CL G	x	x	x
Chlorinated Acids	EPA 515.4	x		x
Chlorinated Acids	EPA 555	x		x
Chlorine Dioxide	SM 4500-CLO2 D Palin Test	x		x
Chlorine -Total/Free/ Combined Residual	SM 4500-Cl G	x	x	x
Conductivity	EPA 120.1		x	
Conductivity	SM 2510B	x	x	x
Corrosivity (Langelier Index)	SM 2330B	x		x
Cyanide, Amenable	SM 4500-CN G	x	x	
Cyanide, Free	SM 4500CN F	x	x	x
Cyanide, Total	EPA 335.4	x	x	x
Cyanogen Chloride (screen)	In House Method (2470)	x		x
Diquat and Paraquat	EPA 549.2	x		x
DBP/HAA	SM 6251B	x		x
Dissolved Oxygen	SM 4500-O G		x	x
DOC	SM 5310C	x		x
E. Coli	(MTF/EC+MUG)	x		x
E. Coli	CFR 141.21(f)(6)(i)	x		x
E. Coli	SM 9223		x	
E. Coli (Enumeration)	SM 9221B.1/ SM 9221F	x		x
E. Coli (Enumeration)	SM 9223B	x		x
EDB/DCBP	EPA 504.1	x		
EDB/DBCP and DBP	EPA 551.1	x		x
EDTA and NTA	In House Method (2454)	x		x
Endothall	EPA 548.1	x		x
Endothall	In-house Method (2445)	x		x
Enterococci	SM 9230B	x	x	
Fecal Coliform	SM 9221 E (MTF/EC)	x		
Fecal Coliform	SM 9221C, E (MTF/EC)		x	
Fecal Coliform (Enumeration)	SM 9221E (MTF/EC)	x		x
Fecal Coliform with Chlorine Present	SM 9221E		x	
Fecal Streptococci	SM 9230B	x	x	
Fluoride	SM 4500-F C	x	x	x
Glyphosate	EPA 547	x		x
Glyphosate + AMPA	In House Method (3618)	x		x
Gross Alpha/Beta	EPA 900.0	x	x	x
Gross Alpha Coprecipitation	SM 7110 C	x	x	x
Hardness	SM 2340B	x	x	x
Heterotrophic Bacteria	In House Method (2439)	x		x
Heterotrophic Bacteria	SM 9215 B	x		x
Hexavalent Chromium	EPA 218.6	x	x	x

SPECIFIC TESTS	METHOD OR TECHNIQUE USED	Environ-mental (Drinking Water)	Environ-mental (Waste Water)	Water as a Component of Food and Bev/Bev/ Bottled Water
Hexavalent Chromium	EPA 218.7	x		x
Hexavalent Chromium	SM 3500-Cr B		x	
Hormones	EPA 539	x		x
Hydroxide as OH Calc.	SM 2330B	x		x
Kjeldahl Nitrogen	EPA 351.2		x	
Legionella	Legiolert	x		x
Mercury	EPA 245.1	x	x	x
Metals	EPA 200.7 / 200.8	x	x	x
Microcystin LR	ELISA (2360)	x		x
Microcystin, Total	EPA 546	x		x
NDMA	EPA 521 In house method (2425)	x		x
Nitrate/Nitrite Nitrogen	EPA 353.2	x	x	x
OCL, Pesticides/PCB	EPA 505	x		x
Ortho Phosphate	EPA 365.1	x	x	x
Ortho Phosphorous	SM 4500P E	x		x
Oxyhalides Disinfection Byproducts	EPA 317.0	x		x
Perchlorate	EPA 331.0	x		x
Perchlorate (low and high)	EPA 314.0	x		x
Perfluorinated Alkyl Acids	EPA 537	x		x
Perfluorinated Polutant	In house Method (2434)	x		x
pH	EPA 150.1	x		
pH	SM 4500-H+B	x	x	x
Phenylurea Pesticides/ Herbicides	In House Method, based on EPA 532 (2448)	x		x
Pseudomonas	IDEXX Pseudalert (2461)	x		x
Radium-226	GA Institute of Tech	x		x
Radium-228	GA Institute of Tech	x		x
Radon-222	SM 7500RN	x		x
Residue, Filterable	SM 2540C	x	x	x
Residue, Non-filterable	SM 2540D		x	
Residue, Total	SM 2540B		x	x
Residue, Volatile	EPA 160.4		x	
Semi-VOC	EPA 525.2	x		x
Silica	SM 4500-Si D	x	x	
Silica	SM 4500-SiO2 C	x	x	
Sulfide	SM 4500-$S^{=}$ D		x	
Sulfite	SM 4500-SO^3B	x	x	x
Surfactants	SM 5540C	x	x	x
Taste and Odor Analytes	SM 6040E	x		x
Total Coliform (P/A)	SM 9221 A, B	x		x
Total Coliform (Enumeration)	SM 9221 A, B, C	x		x
Total Coliform / E. coli	Colisure SM 9223	x		x
Total Coliform	SM 9221B		x	
Total Coliform with Chlorine Present	SM 9221B		x	
Total Coliform / E.coli (P/A and Enumeration)	SM 9223	x		x
TOC	SM 5310C	x	x	x
TOX	SM 5320B		x	
Total Phenols	EPA 420.1		x	
Total Phenols	EPA 420.4	x	x	x
Total Phosphorous	SM 4500 P E		x	
Triazine Pesticides & Degradates	In House (3617)	x		x
Turbidity	EPA 180.1	x	x	x
Turbidity	SM 2130B	x	x	
Uranium by ICP/MS	EPA 200.8	x		x
UV 254	SM 5910B	x		
VOC	EPA 524.2	x		x
VOC	In House Method (2411)	x		x
Yeast and Mold	SM 9610	x		x
Field Sampling	N/A			

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Acknowledgement of Samples Received

Addr: **Stantec Consulting**
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Client ID: STANTEC-PHX
Folder #: 820149
Project: TACNA-WQ
Sample Group: Tacna Water Quality

Attn: Heather Tugaoen
Phone: 480-687-6100

Project Manager: Thomas.D.French
Phone: (480) 778-1558

The following samples were received from you on **August 07, 2019** at **1323**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical, LLC.

Sample #	Sample ID	Sample Date
201908070977	CANAL	08/06/2019 1300

@ICP	Total Hardness as CaCO3 by ICP	@ANIONS28
@ANIONS48	Alkalinity in CaCO3 units	Antimony Total ICAP/MS
Arsenic Total ICAP/MS	Barium Total ICAP/MS	Beryllium Total ICAP/MS
Cadmium Total ICAP/MS	Chromium Total ICAP/MS	Copper Total ICAP/MS
Lead Total ICAP/MS	Manganese Total ICAP/MS	PH (H3=past HT not compliant)
Selenium Total ICAP/MS	Thallium Total ICAP/MS	Total Dissolved Solid (TDS)
Total Organic Carbon	Turbidity	

Sample #	Sample ID	Sample Date
201908070978	WELL	08/06/2019 1400

@ICP	Total Hardness as CaCO3 by ICP	@ANIONS28
@ANIONS48	Alkalinity in CaCO3 units	Antimony Total ICAP/MS
Arsenic Total ICAP/MS	Barium Total ICAP/MS	Beryllium Total ICAP/MS
Cadmium Total ICAP/MS	Chromium Total ICAP/MS	Copper Total ICAP/MS
Lead Total ICAP/MS	Manganese Total ICAP/MS	PH (H3=past HT not compliant)
Selenium Total ICAP/MS	Thallium Total ICAP/MS	Total Dissolved Solid (TDS)
Total Organic Carbon	Turbidity	

Test Description

@ICP -- ICP Metals

@ANIONS28 -- Chloride, Sulfate by EPA 300.0

@ANIONS48 -- Nitrate, Nitrite by EPA 300.0

750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (866) 988-3757 www.EurofinsUS.com/Eaton

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CHAIN OF CUSTODY RECORD

820149

750 Royal Oaks Drive, Suite 100
Monrovia, CA 91016-3629

Phone: 626 386 1100
Fax: 626 386 1101

800 566 LABS (800 566 5227)

Website: www.EatonAnalytical.com

EUROFINS EATON ANALYTICAL USE ONLY:

LOGIN COMMENTS: _____

SAMPLES CHECKED AGAINST COC BY: _____

SAMPLES LOGGED IN BY: _____

SAMPLES REC'D DAY OF COLLECTION? ☐ (check for yes)

SAMPLE TEMP RECEIVED AT:

☐ _____ (Other) IR Gun ID = _____ (Observation= _____ °C) (Corr.Factor _____ °C) (Final = _____ °C)

☐ Monrovia IR Gun ID = 6184 (Observation= 3.2 °C) (Corr.Factor 0.2 °C) (Final = 3.0 °C)

Compliance Acceptance Criteria: (Chemistry: 4 ± 2 °C) (Microbiology: < 10°C)

TYPE OF ICE: Real ✓ Synthetic ____ No Ice ____ **CONDITION OF ICE:** Frozen ✓ Partially Frozen ____ Thawed ____ N/A ____

METHOD OF SHIPMENT: Pick-Up / Walk-In / FedEx / UPS / DHL / Area Fast / Top Line / Other: _____

TO BE COMPLETED BY SAMPLER:

COMPANY/AGENCY NAME: Stantec

PROJECT CODE: 181300937

EEA CLIENT CODE:

COC ID:

SAMPLE GROUP:

COMPLIANCE SAMPLES ☐ (check for yes) - Requires state forms ☐

NON-COMPLIANCE SAMPLES ✓ (check for yes)

REGULATION INVOLVED: _____ (eg. SDWA, NPDES, etc.)

Type of samples (circle one): **ROUTINE SPECIAL CONFIRMATION**

SEE ATTACHED KIT ORDER FOR ANALYSES ☒ (check for yes), ***OR***

List ALL ANALYSES REQUIRED (enter number of bottles sent for each test for each sample)

TAT requested: rush by adv notice only STD ___ 1 wk ___ 3 day ___ 2 day ___ 1 day ___

SAMPLE DATE	SAMPLE TIME	SAMPLE ID	CLIENT LAB ID	MATRIX *	FIELD DATA	FIELD DATA	Total Organic C	Anions 28 Lab	Turbidity	Alkalinity	GICP Metals	TDS									SAMPLER COMMENTS
8-6	1pm	CANAL		RSW			1	1	1	1	1	1									RSW - CANAL
8-6	2pm	WELL		RGW			1	1	1	1	1	1									RGW - WELL
								4													

TRK# 1113 9426 9412

* **MATRIX TYPES:** **RSW** = Raw Surface Water **CFW** = Chlor(am)inated Finished Water **SEAW** = Sea Water **BW** = Bottled Water **SO** = Soil **O** = Other - Please Identify
RGW = Raw Ground Water **FW** = Other Finished Water **WW** = Waste Water **SW** = Storm Water **SL** = Sludge

	SIGNATURE	PRINT NAME	COMPANY/TITLE	DATE	TIME
SAMPLED BY:	[signature]	Taylor Ahrensdorf	Stantec / Civil Engineer	8-6-19	2pm
RELINQUISHED BY:					
RECEIVED BY:					
RELINQUISHED BY:					
RECEIVED BY:	[signature]	YUDI	EEA	8/7/19	13:23

QA FO 0029.2 (Version 2) (08/28/2014)

PAGE ____ OF ____

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Kit Order for Stantec Consulting

Thomas.D.French is your Eurofins Eaton Analytical, LLC Service Manager

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
(626) 386-1100 FAX (866) 988-3757

Note: Sampler Please return this paper with your samples

Kit #: 240328

Created By: Thomas.D.French - [TDF]
Deliver By: 08/02/2019
STG: Bottle Orders
Ice Type: W

Client ID: STANTEC-PHX
Project Code: TACNA-WQ Bottle Orders
Group Name: Tacna Water Quality
PO#/JOB#:
Description: No Schedule

Ship Sample Kits to
Stantec Consulting
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Attn: Heather Tugaoen
Phone: [illegible]-6100

Send Report to
Stantec Consulting
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Attn: Heather Tugaoen
Phone: 480-687-6100

Billing Address
Stantec Consulting
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Attn: Heather Tugaoen
Phone: 480-687-6100

#		Bottle Qty - Type [preservative information]	Total	UN DOT #
-	Total Organic Carbon	1 - 125ml amber glass [0.5 ml H2SO4 (50%)]	2	UN1830
2	@ANIONS28, @ANIONS48	1 - 125ml poly [no preservative]	2	
2	Turbidity	1 - 125ml poly [no preservative]	2	
2	Alkalinity in CaCO3 units, PH (H3=past HT not compliant)	1 - 250ml poly [no preservative]	2	
2	@ICP, Antimony Total ICAP/MS, Arsenic Total ICAP/MS, Barium Total ICAP/MS, Beryllium Total ICAP/MS, Cadmium Total ICAP/MS, Chromium Total ICAP/MS, Copper Total ICAP/MS, Lead Total ICAP/MS, Manganese Total ICAP/MS, Selenium Total ICAP/MS, Thallium Total ICAP/MS	1 - 500ml acid poly [2ml HNO3 (18%)]	2	UN2031
2	Total Dissolved Solid (TDS)	1 - 500ml poly [no preservative]	2	

Sum Tests: 12

Sum Bottles: 12

Comments

2 samples; Group bottles together for each. COC, bags for use of wet ice for sample refrigeration upon return sihpment. General Sampling/Packing for Inorganics, Wet Ice packing instructions.

Client is responsible for ovemight return sihpment to Eurofins Eaton Analytical LLC 750 Royal Oaks Drive, Monrovia, CA 91016

Code	Status	Date Shipped	Via	Tracking #	# of Coolers	Prepared By

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Tel: (626) 386-1100
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1 800 566 LABS (1 800 566 5227)

Laboratory Comments

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting
Heather Tugaoen
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Flags Legend:

BA - Target analyte detected in method blank at or above the laboratory minimum reporting limits (MRL), but analyte not present in the sample.

The Comments Report may be blank if there are no comments for this report.

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Laboratory Hits

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting
Heather Tugaoen
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Samples Received on:
08/07/2019 1323

Analyzed	Analyte	Sample ID	Result	Federal MCL	Units	MRL
	201908070977	**CANAL**				
08/08/2019 05:39	Alkalinity in CaCO3 units		120		mg/L	2.0
08/30/2019 10:35	Arsenic Total ICAP/MS		3.1	10	ug/L	1.0
08/30/2019 10:35	Barium Total ICAP/MS		110	2000	ug/L	2.0
08/09/2019 13:03	Calcium Total ICAP		78		mg/L	1.0
08/09/2019 01:57	Chloride		120	250	mg/L	2.5
08/09/2019 13:03	Magnesium Total ICAP		29		mg/L	0.10
08/30/2019 10:35	Manganese Total ICAP/MS		24	50	ug/L	2.0
08/08/2019 05:39	PH (H3=past HT not compliant)		8.3		Units	0.10
08/09/2019 01:57	Sulfate		260	250	mg/L	2.5
08/08/2019 22:23	Total Dissolved Solids (TDS)		700	500	mg/L	10
08/09/2019 16:10	Total Hardness as CaCO3 by ICP (calc)		310		mg/L	3.0
08/23/2019 00:18	Total Organic Carbon		2.8		mg/L	0.30
08/07/2019 23:25	Turbidity		0.95	5	NTU	0.10
	201908070978	**WELL**				
08/08/2019 05:31	Alkalinity in CaCO3 units		100		mg/L	2.0
08/22/2019 18:31	Arsenic Total ICAP/MS		20	10	ug/L	1.0
08/22/2019 18:31	Barium Total ICAP/MS		22	2000	ug/L	2.0
08/08/2019 15:36	Calcium Total ICAP		66		mg/L	1.0
08/08/2019 16:42	Chloride		910	250	mg/L	12
08/22/2019 18:31	Chromium Total ICAP/MS		1.5	100	ug/L	1.0
08/22/2019 18:31	Lead Total ICAP/MS		4.1	15	ug/L	0.50
08/08/2019 15:36	Magnesium Total ICAP		16		mg/L	0.10
08/07/2019 16:18	Nitrate as Nitrogen by IC		3.5	10	mg/L	1.0
08/07/2019 16:18	Nitrate as NO3 (calc)		16	45	mg/L	4.4
08/08/2019 05:31	PH (H3=past HT not compliant)		8.1		Units	0.10
08/22/2019 18:31	Selenium Total ICAP/MS		14	50	ug/L	5.0
08/07/2019 16:18	Sulfate		620	250	mg/L	5.0
08/08/2019 22:24	Total Dissolved Solids (TDS)		2400	500	mg/L	10
08/08/2019 16:45	Total Hardness as CaCO3 by ICP (calc)		230		mg/L	3.0
08/07/2019 16:18	Total Nitrate, Nitrite-N, CALC		3.5		mg/L	0.10
08/07/2019 23:23	Turbidity		0.27	5	NTU	0.10

SUMMARY OF POSITIVE DATA ONLY

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Tel: (626) 386-1100
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1 800 566 LABS (1 800 566 5227)

Laboratory Data

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting
Heather Tugaoen
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Samples Received on:
08/07/2019 1323

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
CANAL (201908070977)						**Sampled on 08/06/2019 1300**			
		EPA 200.8 - ICPMS Metals							
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Antimony Total ICAP/MS	ND (BA)	ug/L	1.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Arsenic Total ICAP/MS	3.1	ug/L	1.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Barium Total ICAP/MS	110	ug/L	2.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Beryllium Total ICAP/MS	ND	ug/L	1.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Cadmium Total ICAP/MS	ND	ug/L	0.50	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Chromium Total ICAP/MS	ND	ug/L	1.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Copper Total ICAP/MS	ND	ug/L	2.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Lead Total ICAP/MS	ND	ug/L	0.50	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Manganese Total ICAP/MS	24	ug/L	2.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Selenium Total ICAP/MS	ND	ug/L	5.0	1
08/08/19	08/30/19 10:35	1189114	1193340	(EPA 200.8)	Thallium Total ICAP/MS	ND	ug/L	1.0	1
		EPA 200.7 - ICP Metals							
08/08/19	08/09/19 13:03	1189114	1189608	(EPA 200.7)	Calcium Total ICAP	78	mg/L	1.0	1
08/08/19	08/09/19 13:03	1189114	1189608	(EPA 200.7)	Magnesium Total ICAP	29	mg/L	0.10	1
		SM 5310C - Total Organic Carbon							
	08/23/19 00:18		1192670	(SM 5310C)	Total Organic Carbon	2.8	mg/L	0.30	1
		SM 2340B - Total Hardness as CaCO3 by ICP							
	08/09/19 16:10			(SM 2340B)	Total Hardness as CaCO3 by ICP (calc)	310 (c)	mg/L	3.0	1
		EPA 300.0 - Nitrate, Nitrite by EPA 300.0							
	08/07/19 16:30		1189125	(EPA 300.0)	Nitrate as Nitrogen by IC	ND	mg/L	0.20	2
	08/07/19 16:30		1189125	(EPA 300.0)	Nitrate as NO3 (calc)	ND	mg/L	0.88	2
	08/07/19 16:30		1189125	(EPA 300.0)	Nitrite Nitrogen by IC	ND	mg/L	0.10	2
	08/07/19 16:30		1189125	(EPA 300.0)	Total Nitrate, Nitrite-N, CALC	ND	mg/L	0.10	1
		EPA 300.0 - Chloride, Sulfate by EPA 300.0							
	08/09/19 01:57		1189555	(EPA 300.0)	Chloride	120	mg/L	2.5	5
	08/09/19 01:57		1189555	(EPA 300.0)	Sulfate	260	mg/L	2.5	5
		SM 2320B - Alkalinity in CaCO3 units							
	08/08/19 05:39		1189517	(SM 2320B)	Alkalinity in CaCO3 units	120	mg/L	2.0	1
		E160.1/SM2540C - Total Dissolved Solids (TDS)							
08/08/19	08/08/19 22:23	1189248	1189552	(E160.1/SM2540C)	Total Dissolved Solids (TDS)	700	mg/L	10	1
		SM4500-HB - PH (H3=past HT not compliant)							
	08/08/19 05:39		1189523	(SM4500-HB)	PH (H3=past HT not compliant)	8.3	Units	0.10	1
		EPA 180.1 - Turbidity							
	08/07/19 23:25		1189245	(EPA 180.1)	Turbidity	0.95	NTU	0.10	1

Rounding on totals after summation.
(c) - indicates calculated results. Analysis is a calculated result. Reported results are not rounded until the final step before reporting. Therefore methods that use a test result with further calculation may have slight differences in final result than the component analyses.

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1 800 566 LABS (1 800 566 5227)

Laboratory Data

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting
Heather Tugaoen
3300 South Frye Road, Suite 300
Chandler, AZ 85226

Samples Received on:
08/07/2019 1323

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
WELL (201908070978)							**Sampled on 08/06/2019 1400**		
		EPA 200.8 - ICPMS Metals							
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Antimony Total ICAP/MS	ND	ug/L	1.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Arsenic Total ICAP/MS	20	ug/L	1.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Barium Total ICAP/MS	22	ug/L	2.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Beryllium Total ICAP/MS	ND	ug/L	1.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Cadmium Total ICAP/MS	ND	ug/L	0.50	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Chromium Total ICAP/MS	1.5	ug/L	1.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Copper Total ICAP/MS	ND	ug/L	2.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Lead Total ICAP/MS	4.1	ug/L	0.50	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Manganese Total ICAP/MS	ND	ug/L	2.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Selenium Total ICAP/MS	14	ug/L	5.0	1
08/08/19	08/22/19 18:31	1189114	1192531	(EPA 200.8)	Thallium Total ICAP/MS	ND	ug/L	1.0	1
		EPA 200.7 - ICP Metals							
08/08/19	08/08/19 15:36	1189114	1189358	(EPA 200.7)	Calcium Total ICAP	66	mg/L	1.0	1
08/08/19	08/08/19 15:36	1189114	1189358	(EPA 200.7)	Magnesium Total ICAP	16	mg/L	0.10	1
		SM 5310C - Total Organic Carbon							
	08/23/19 03:06		1192672	(SM 5310C)	Total Organic Carbon	ND	mg/L	0.30	1
		SM 2340B - Total Hardness as CaCO3 by ICP							
	08/08/19 16:45			(SM 2340B)	Total Hardness as CaCO3 by ICP (calc)	230 (c)	mg/L	3.0	1
		EPA 300.0 - Nitrate, Nitrite by EPA 300.0							
	08/07/19 16:18		1189125	(EPA 300.0)	Nitrate as Nitrogen by IC	3.5	mg/L	1.0	10
	08/07/19 16:18		1189125	(EPA 300.0)	Nitrate as NO3 (calc)	16	mg/L	4.4	10
	08/07/19 16:18		1189125	(EPA 300.0)	Nitrite Nitrogen by IC	ND	mg/L	0.12	10
	08/07/19 16:18		1189125	(EPA 300.0)	Total Nitrate, Nitrite-N, CALC	3.5	mg/L	0.10	1
		EPA 300.0 - Chloride, Sulfate by EPA 300.0							
	08/08/19 16:42		1189362	(EPA 300.0)	Chloride	910	mg/L	12	25
	08/07/19 16:18		1189128	(EPA 300.0)	Sulfate	620	mg/L	5.0	10
		SM 2320B - Alkalinity in CaCO3 units							
	08/08/19 05:31		1189517	(SM 2320B)	Alkalinity in CaCO3 units	100	mg/L	2.0	1
		E160.1/SM2540C - Total Dissolved Solids (TDS)							
08/08/19	08/08/19 22:24	1189248	1189552	(E160.1/SM2540C)	Total Dissolved Solids (TDS)	2400	mg/L	10	1
		SM4500-HB - PH (H3=past HT not compliant)							
	08/08/19 05:31		1189523	(SM4500-HB)	PH (H3=past HT not compliant)	8.1	Units	0.10	1
		EPA 180.1 - Turbidity							
	08/07/19 23:23		1189245	(EPA 180.1)	Turbidity	0.27	NTU	0.10	1

Rounding on totals after summation.
(c) - indicates calculated results. Analysis is a calculated result. Reported results are not rounded until the final step before reporting. Therefore methods that use a test result with further calculation may have slight differences in final result than the component analyses.

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Laboratory QC Summary

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting

Nitrate, Nitrite by EPA 300.0

Analytical Batch: 1189125 — **Analysis Date: 08/07/2019**

201908070977	CANAL	Analyzed by: TR7W
201908070978	WELL	Analyzed by: TR7W

Chloride, Sulfate by EPA 300.0

Analytical Batch: 1189128 — **Analysis Date: 08/07/2019**

201908070978	WELL	Analyzed by: TR7W

Turbidity

Analytical Batch: 1189245 — **Analysis Date: 08/07/2019**

201908070977	CANAL	Analyzed by: BM2O
201908070978	WELL	Analyzed by: BM2O

ICP Metals

Prep Batch: 1189114 Analytical Batch: 1189358 — **Analysis Date: 08/08/2019**

201908070978	WELL	Analyzed by: 6Q4

Chloride, Sulfate by EPA 300.0

Analytical Batch: 1189362 — **Analysis Date: 08/08/2019**

201908070978	WELL	Analyzed by: TR7W

Alkalinity in CaCO3 units

Analytical Batch: 1189517 — **Analysis Date: 08/08/2019**

201908070977	CANAL	Analyzed by: BM2O
201908070978	WELL	Analyzed by: BM2O

PH (H3=past HT not compliant)

Analytical Batch: 1189523 — **Analysis Date: 08/08/2019**

201908070977	CANAL	Analyzed by: BM2O
201908070978	WELL	Analyzed by: BM2O

Total Dissolved Solids (TDS)

Prep Batch: 1189248 Analytical Batch: 1189552 — **Analysis Date: 08/08/2019**

201908070977	CANAL	Analyzed by: TJ52
201908070978	WELL	Analyzed by: TJ52

Chloride, Sulfate by EPA 300.0

Analytical Batch: 1189555 — **Analysis Date: 08/09/2019**

201908070977	CANAL	Analyzed by: TR7W

ICP Metals

Prep Batch: 1189114 Analytical Batch: 1189608 — **Analysis Date: 08/09/2019**

201908070977	CANAL	Analyzed by: 6Q4

ICPMS Metals

Prep Batch: 1189114 Analytical Batch: 1192531 — **Analysis Date: 08/22/2019**

201908070978	WELL	Analyzed by: LUPE

Total Organic Carbon

Analytical Batch: 1192670 — **Analysis Date: 08/23/2019**

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Laboratory QC Summary

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

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201908070977	CANAL	Analyzed by: B6ZC

Total Organic Carbon

Analytical Batch: 1192672 **Analysis Date: 08/23/2019**

201908070978	WELL	Analyzed by: B6ZC

ICPMS Metals

Prep Batch: 1189114 Analytical Batch: 1193340 **Analysis Date: 08/30/2019**

201908070977	CANAL	Analyzed by: LUPE

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Laboratory QC

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
Nitrate, Nitrite by EPA 300.0 by EPA 300.0									
Analytical Batch: 1189125							**Analysis Date: 08/07/2019**		
LCS1	Nitrate as Nitrogen by IC		2.5	2.53	mg/L	101	(90-110)		
LCS2	Nitrate as Nitrogen by IC		2.5	2.52	mg/L	101	(90-110)	20	0.40
MBLK	Nitrate as Nitrogen by IC			<0.05	mg/L				
MRL_CHK	Nitrate as Nitrogen by IC		0.05	0.0481	mg/L	96	(50-150)		
MRLLW	Nitrate as Nitrogen by IC		0.013	0.0142	mg/L	114	(50-150)		
MS_201908070818	Nitrate as Nitrogen by IC	ND	2.6	3.00	mg/L	113	(80-120)		
MS_201908070977	Nitrate as Nitrogen by IC	ND	2.6	2.84	mg/L	108	(80-120)		
MSD_201908070818	Nitrate as Nitrogen by IC	ND	2.6	3.00	mg/L	113	(80-120)	20	0.010
MSD_201908070977	Nitrate as Nitrogen by IC	ND	2.6	2.86	mg/L	109	(80-120)	20	0.55
LCS1	Nitrite Nitrogen by IC		1	1.02	mg/L	102	(90-110)		
LCS2	Nitrite Nitrogen by IC		1	1.01	mg/L	101	(90-110)	20	0.99
MBLK	Nitrite Nitrogen by IC			<0.025	mg/L				
MRL_CHK	Nitrite Nitrogen by IC		0.05	0.0497	mg/L	99	(50-150)		
MRLLW	Nitrite Nitrogen by IC		0.013	0.0143	mg/L	114	(50-150)		
MS_201908070818	Nitrite Nitrogen by IC	ND	1	0.870	mg/L	87	(80-120)		
MS_201908070977	Nitrite Nitrogen by IC	ND	1	1.02	mg/L	102	(80-120)		
MSD_201908070818	Nitrite Nitrogen by IC	ND	1	0.865	mg/L	87	(80-120)	20	0.63
MSD_201908070977	Nitrite Nitrogen by IC	ND	1	1.02	mg/L	102	(80-120)	20	0.39
Chloride, Sulfate by EPA 300.0 by EPA 300.0									
Analytical Batch: 1189128							**Analysis Date: 08/07/2019**		
LCS1	Chloride		25	26.0	mg/L	104	(90-110)		
LCS2	Chloride		25	25.8	mg/L	103	(90-110)	20	0.39
MBLK	Chloride			<0.25	mg/L				
MRL_CHK	Chloride		0.5	0.449	mg/L	90	(50-150)		
MS_201908070977	Chloride		13	ND	mg/L	90	(80-120)		
MSD_201908070977	Chloride		13	ND	mg/L	86	(80-120)	20	0.60
LCS1	Sulfate		50	51.4	mg/L	103	(90-110)		
LCS2	Sulfate		50	51.2	mg/L	102	(90-110)	20	0.39
MBLK	Sulfate			<0.125	mg/L				
MRL_CHK	Sulfate		1	0.984	mg/L	98	(50-150)		
MRLLW	Sulfate		0.25	0.268	mg/L	107	(50-150)		
MS_201908070977	Sulfate		25	ND	mg/L	93	(80-120)		
MSD_201908070977	Sulfate		25	ND	mg/L	90	(80-120)	20	0.67

Spike recovery is already corrected for native results.
Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
(S) - Indicates surrogate compound.
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Laboratory QC

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
Turbidity by EPA 180.1									
Analytical Batch: 1189245							**Analysis Date: 08/07/2019**		
DUP1_201908070157	Turbidity	ND		0.0660	NTU		(0-20)	20	9.5
DUP2_201908070155	Turbidity	ND		0.0580	NTU		(0-20)	20	1.7
LCS1	Turbidity		20	19.3	NTU	97	(90-110)		
LCS2	Turbidity		20	19.2	NTU	96	(90-110)	20	0.0
MBLK	Turbidity			<0.10	NTU				
MRLHI	Turbidity		0.1	0.0700	NTU	70	(50-150)		
ICP Metals by EPA 200.7									
Analytical Batch: 1189358							**Analysis Date: 08/08/2019**		
LCS1	Calcium Total ICAP		50	49.8	mg/L	100	(85-115)		
LCS2	Calcium Total ICAP		50	49.5	mg/L	99	(85-115)	20	0.60
MBLK	Calcium Total ICAP			<0.5	mg/L				
MRL_CHK	Calcium Total ICAP		1	0.970	mg/L	97	(50-150)		
MS_201908060434	Calcium Total ICAP	16	50	65.6	mg/L	100	(70-130)		
MS2_201908070427	Calcium Total ICAP		50	62.7	mg/L	125	(70-130)		
MSD_201908060434	Calcium Total ICAP	16	50	70.1	mg/L	109	(70-130)	20	6.6
MSD2_201908070427	Calcium Total ICAP		50	67.1	mg/L	**134**	(70-130)	20	6.7
LCS1	Magnesium Total ICAP		20	19.4	mg/L	97	(85-115)		
LCS2	Magnesium Total ICAP		20	19.3	mg/L	97	(85-115)	20	0.52
MBLK	Magnesium Total ICAP			<0.05	mg/L				
MRL_CHK	Magnesium Total ICAP		0.1	0.0954	mg/L	95	(50-150)		
MS_201908060434	Magnesium Total ICAP	3.8	20	23.6	mg/L	99	(70-130)		
MS2_201908070427	Magnesium Total ICAP		20	21.2	mg/L	106	(70-130)		
MSD_201908060434	Magnesium Total ICAP	3.8	20	25.5	mg/L	108	(70-130)	20	7.7
MSD2_201908070427	Magnesium Total ICAP		20	22.8	mg/L	114	(70-130)	20	7.5
Chloride, Sulfate by EPA 300.0 by EPA 300.0									
Analytical Batch: 1189362							**Analysis Date: 08/08/2019**		
LCS1	Chloride		25	25.5	mg/L	102	(90-110)		
LCS2	Chloride		25	25.5	mg/L	102	(90-110)	20	0.0
MBLK	Chloride			<0.25	mg/L				
MRL_CHK	Chloride		0.5	0.501	mg/L	100	(50-150)		
MS_201907230865	Chloride	1300	650	2020	mg/L	109	(80-120)		
MS_201908070981	Chloride	3	13	16.1	mg/L	105	(80-120)		
MSD_201907230865	Chloride	1300	650	2000	mg/L	107	(80-120)	20	0.84
MSD_201908070981	Chloride	3	13	16.2	mg/L	105	(80-120)	20	0.58

Spike recovery is already corrected for native results.
Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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(I) - Indicates internal standard compound.

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Laboratory QC

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS1	Sulfate		50	50.8	mg/L	102	(90-110)		
LCS2	Sulfate		50	50.7	mg/L	101	(90-110)	20	0.20
MBLK	Sulfate			<0.125	mg/L				
MRL_CHK	Sulfate		1	1.08	mg/L	108	(50-150)		
MRLLW	Sulfate		0.25	0.265	mg/L	106	(50-150)		
MS_201907230865	Sulfate	1600	1250	2980	mg/L	110	(80-120)		
MS_201908070981	Sulfate	3.2	25	29.0	mg/L	103	(80-120)		
MSD_201907230865	Sulfate	1600	1250	2960	mg/L	108	(80-120)	20	0.77
MSD_201908070981	Sulfate	3.2	25	29.1	mg/L	104	(80-120)	20	0.51

Alkalinity in CaCO3 units by SM 2320B

Analytical Batch: 1189517 **Analysis Date: 08/08/2019**

LCS1	Alkalinity in CaCO3 units		100	96.1	mg/L	96	(90-110)		
LCS2	Alkalinity in CaCO3 units		100	97.5	mg/L	98	(90-110)	20	1.5
MBLK	Alkalinity in CaCO3 units			<1	mg/L				
MRL_CHK	Alkalinity in CaCO3 units		2	2.07	mg/L	103	(50-150)		
MS_201908060736	Alkalinity in CaCO3 units	170	100	241	mg/L	**67**	(80-120)		
MS_201908070956	Alkalinity in CaCO3 units	160	100	267	mg/L	106	(80-120)		
MSD_201908060736	Alkalinity in CaCO3 units	170	100	239	mg/L	**64**	(80-120)	20	0.87
MSD_201908070956	Alkalinity in CaCO3 units	160	100	266	mg/L	105	(80-120)	20	0.26

PH (H3=past HT not compliant) by SM4500-HB

Analytical Batch: 1189523 **Analysis Date: 08/08/2019**

DUP_201908060736	PH (H3=past HT not compliant)	8.0		8.00	Units		(0-20)	20	0.25
DUP_201908070956	PH (H3=past HT not compliant)	7.4		7.10	Units		(0-20)	20	1.8
LCS1	PH (H3=past HT not compliant)		6	5.94	Units	99	(98-102)		
LCS2	PH (H3=past HT not compliant)		6	5.94	Units	99	(98-102)	20	0.0

Total Dissolved Solids (TDS) by E160.1/SM2540C

Analytical Batch: 1189552 **Analysis Date: 08/08/2019**

DUP_201908060706	Total Dissolved Solid (TDS)	360		368	mg/L		(0-10)	10	1.6
DUP_201908070390	Total Dissolved Solid (TDS)	190		184	mg/L		(0-10)	10	1.1
LCS1	Total Dissolved Solid (TDS)		175	172	mg/L	98	(80-114)		
LCS2	Total Dissolved Solid (TDS)		700	690	mg/L	99	(80-114)		
MBLK	Total Dissolved Solid (TDS)			<5	mg/L				
MRL_CHK	Total Dissolved Solid (TDS)		10	7.00	mg/L	70	(50-150)		

Chloride, Sulfate by EPA 300.0 by EPA 300.0

Analytical Batch: 1189555 **Analysis Date: 08/08/2019**

LCS1	Chloride		25	25.5	mg/L	102	(90-110)		

Spike recovery is already corrected for native results.
Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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Laboratory QC

Report: 820149
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Group: Tacna Water Quality

Stantec Consulting

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Chloride		25	25.5	mg/L	102	(90-110)	20	0.0
MBLK	Chloride			<0.25	mg/L				
MRL_CHK	Chloride		0.5	0.496	mg/L	99	(50-150)		
MS_201908081104	Chloride	140	130	272	mg/L	109	(80-120)		
MS_201908081264	Chloride	98	65	166	mg/L	108	(80-120)		
MSD_201908081104	Chloride	140	130	275	mg/L	111	(80-120)	20	1.1
MSD_201908081264	Chloride	98	65	168	mg/L	111	(80-120)	20	1.3
LCS1	Sulfate		50	50.6	mg/L	101	(90-110)		
LCS2	Sulfate		50	50.6	mg/L	101	(90-110)	20	0.20
MBLK	Sulfate			<0.125	mg/L				
MRL_CHK	Sulfate		1	1.10	mg/L	110	(50-150)		
MRLLW	Sulfate		0.25	0.269	mg/L	108	(50-150)		
MS_201908081104	Sulfate	85	250	348	mg/L	105	(80-120)		
MS_201908081264	Sulfate	140	125	272	mg/L	107	(80-120)		
MSD_201908081104	Sulfate	85	250	350	mg/L	106	(80-120)	20	0.69
MSD_201908081264	Sulfate	140	125	274	mg/L	109	(80-120)	20	0.76

ICP Metals by EPA 200.7

Analytical Batch: 1189608 **Analysis Date: 08/09/2019**

LCS1	Calcium Total ICAP		50	49.4	mg/L	99	(85-115)		
LCS2	Calcium Total ICAP		50	49.4	mg/L	99	(85-115)	20	0.0
MBLK	Calcium Total ICAP			<0.5	mg/L				
MRL_CHK	Calcium Total ICAP		1	0.985	mg/L	99	(50-150)		
MS_201908070868	Calcium Total ICAP	3.4	50	53.1	mg/L	100	(70-130)		
MS2_201908070977	Calcium Total ICAP	78	50	124	mg/L	93	(70-130)		
MSD_201908070868	Calcium Total ICAP	3.4	50	53.9	mg/L	101	(70-130)	20	1.4
MSD2_201908070977	Calcium Total ICAP	78	50	125	mg/L	95	(70-130)	20	0.68
LCS1	Magnesium Total ICAP		20	19.6	mg/L	98	(85-115)		
LCS2	Magnesium Total ICAP		20	19.6	mg/L	98	(85-115)	20	0.0
MBLK	Magnesium Total ICAP			<0.05	mg/L				
MRL_CHK	Magnesium Total ICAP		0.1	0.0965	mg/L	97	(50-150)		
MS_201908070868	Magnesium Total ICAP	0.29	20	19.9	mg/L	98	(70-130)		
MS2_201908070977	Magnesium Total ICAP	29	20	49.0	mg/L	100	(70-130)		
MSD_201908070868	Magnesium Total ICAP	0.29	20	20.2	mg/L	99	(70-130)	20	1.4
MSD2_201908070977	Magnesium Total ICAP	29	20	49.2	mg/L	101	(70-130)	20	0.42

ICPMS Metals by EPA 200.8

Analytical Batch: 1192531 **Analysis Date: 08/22/2019**

LCS1	Antimony Total ICAP/MS		50	46.8	ug/L	94	(85-115)		

Spike recovery is already corrected for native results.
Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and Dup are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.
RPD not calculated for LCS2 when different a concentration than LCS1 is used.
RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
(S) - Indicates surrogate compound.
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Laboratory QC

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
LCS2	Antimony Total ICAP/MS		50	49.2	ug/L	98	(85-115)	20	5.0
MBLK	Antimony Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Antimony Total ICAP/MS		1	0.985	ug/L	99	(50-150)		
MS_201908070860	Antimony Total ICAP/MS	ND	50	50.5	ug/L	101	(70-130)		
MS2_201908090635	Antimony Total ICAP/MS	ND	50	49.7	ug/L	99	(70-130)		
MSD_201908070860	Antimony Total ICAP/MS	ND	50	50.6	ug/L	101	(70-130)	20	0.14
MSD2_201908090635	Antimony Total ICAP/MS	ND	50	53.4	ug/L	107	(70-130)	20	7.1
LCS1	Arsenic Total ICAP/MS		50	52.2	ug/L	104	(85-115)		
LCS2	Arsenic Total ICAP/MS		50	54.5	ug/L	109	(85-115)	20	4.3
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	1.06	ug/L	106	(50-150)		
MS_201908070860	Arsenic Total ICAP/MS	2.2	50	58.9	ug/L	113	(70-130)		
MS2_201908090635	Arsenic Total ICAP/MS	2.4	50	57.0	ug/L	109	(70-130)		
MSD_201908070860	Arsenic Total ICAP/MS	2.2	50	58.9	ug/L	113	(70-130)	20	0.010
MSD2_201908090635	Arsenic Total ICAP/MS	2.4	50	61.8	ug/L	119	(70-130)	20	8.1
LCS1	Barium Total ICAP/MS		50	49.7	ug/L	99	(85-115)		
LCS2	Barium Total ICAP/MS		50	52.3	ug/L	105	(85-115)	20	5.1
MBLK	Barium Total ICAP/MS			<1	ug/L				
MRL_CHK	Barium Total ICAP/MS		2	1.97	ug/L	99	(50-150)		
MS_201908070860	Barium Total ICAP/MS	39	50	91.8	ug/L	106	(70-130)		
MS2_201908090635	Barium Total ICAP/MS	160	50	212	ug/L	103	(70-130)		
MSD_201908070860	Barium Total ICAP/MS	39	50	91.4	ug/L	105	(70-130)	20	0.42
MSD2_201908090635	Barium Total ICAP/MS	160	50	216	ug/L	111	(70-130)	20	1.6
LCS1	Beryllium Total ICAP/MS		25	25.2	ug/L	101	(85-115)		
LCS2	Beryllium Total ICAP/MS		25	26.9	ug/L	108	(85-115)	20	6.5
MBLK	Beryllium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Beryllium Total ICAP/MS		1	0.985	ug/L	99	(50-150)		
MS_201908070860	Beryllium Total ICAP/MS	ND	25	27.4	ug/L	109	(70-130)		
MS2_201908090635	Beryllium Total ICAP/MS	ND	25	29.2	ug/L	117	(70-130)		
MSD_201908070860	Beryllium Total ICAP/MS	ND	25	27.4	ug/L	110	(70-130)	20	0.18
MSD2_201908090635	Beryllium Total ICAP/MS	ND	25	31.8	ug/L	127	(70-130)	20	8.6
LCS1	Cadmium Total ICAP/MS		25	24.8	ug/L	99	(85-115)		
LCS2	Cadmium Total ICAP/MS		25	26.2	ug/L	105	(85-115)	20	5.5
MBLK	Cadmium Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Cadmium Total ICAP/MS		0.5	0.487	ug/L	97	(50-150)		
MS_201908070860	Cadmium Total ICAP/MS	ND	25	26.3	ug/L	105	(70-130)		
MS2_201908090635	Cadmium Total ICAP/MS	ND	25	26.0	ug/L	104	(70-130)		
MSD_201908070860	Cadmium Total ICAP/MS	ND	25	26.4	ug/L	106	(70-130)	20	0.77

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Laboratory QC

Report: 820149
Project: TACNA-WQ
Group: Tacna Water Quality

Stantec Consulting

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MSD2_201908090635	Cadmium Total ICAP/MS	ND	25	27.5	ug/L	110	(70-130)	20	5.6
LCS1	Chromium Total ICAP/MS		50	51.1	ug/L	102	(85-115)		
LCS2	Chromium Total ICAP/MS		50	53.7	ug/L	107	(85-115)	20	5.0
MBLK	Chromium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Chromium Total ICAP/MS		1	1.04	ug/L	104	(50-150)		
MS_201908070860	Chromium Total ICAP/MS	ND	50	53.1	ug/L	106	(70-130)		
MS2_201908090635	Chromium Total ICAP/MS	ND	50	51.2	ug/L	102	(70-130)		
MSD_201908070860	Chromium Total ICAP/MS	ND	50	53.1	ug/L	106	(70-130)	20	0.041
MSD2_201908090635	Chromium Total ICAP/MS	ND	50	55.6	ug/L	111	(70-130)	20	8.2
LCS1	Copper Total ICAP/MS		50	51.2	ug/L	102	(85-115)		
LCS2	Copper Total ICAP/MS		50	53.2	ug/L	106	(85-115)	20	3.8
MBLK	Copper Total ICAP/MS			<1	ug/L				
MRL_CHK	Copper Total ICAP/MS		2	2.02	ug/L	101	(50-150)		
MS_201908070860	Copper Total ICAP/MS	ND	50	52.2	ug/L	104	(70-130)		
MS2_201908090635	Copper Total ICAP/MS	2.3	50	51.9	ug/L	99	(70-130)		
MSD_201908070860	Copper Total ICAP/MS	ND	50	51.4	ug/L	102	(70-130)	20	1.5
MSD2_201908090635	Copper Total ICAP/MS	2.3	50	56.2	ug/L	108	(70-130)	20	7.9
LCS1	Lead Total ICAP/MS		50	50.7	ug/L	101	(85-115)		
LCS2	Lead Total ICAP/MS		50	54.1	ug/L	108	(85-115)	20	6.5
MBLK	Lead Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Lead Total ICAP/MS		0.5	0.515	ug/L	103	(50-150)		
MS_201908070860	Lead Total ICAP/MS	ND	50	52.9	ug/L	106	(70-130)		
MS2_201908090635	Lead Total ICAP/MS	ND	50	52.7	ug/L	105	(70-130)		
MSD_201908070860	Lead Total ICAP/MS	ND	50	53.5	ug/L	107	(70-130)	20	1.1
MSD2_201908090635	Lead Total ICAP/MS	ND	50	57.1	ug/L	114	(70-130)	20	7.9
LCS1	Manganese Total ICAP/MS		100	102	ug/L	103	(85-115)		
LCS2	Manganese Total ICAP/MS		100	108	ug/L	108	(85-115)	20	4.7
MBLK	Manganese Total ICAP/MS			<1	ug/L				
MRL_CHK	Manganese Total ICAP/MS		2	2.07	ug/L	103	(50-150)		
MS_201908070860	Manganese Total ICAP/MS	ND	100	106	ug/L	106	(70-130)		
MS2_201908090635	Manganese Total ICAP/MS	8.9	100	114	ug/L	105	(70-130)		
MSD_201908070860	Manganese Total ICAP/MS	ND	100	107	ug/L	107	(70-130)	20	1.1
MSD2_201908090635	Manganese Total ICAP/MS	8.9	100	121	ug/L	112	(70-130)	20	6.3
LCS1	Selenium Total ICAP/MS		50	51.2	ug/L	102	(85-115)		
LCS2	Selenium Total ICAP/MS		50	53.5	ug/L	107	(85-115)	20	4.4
MBLK	Selenium Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Selenium Total ICAP/MS		5	5.10	ug/L	102	(50-150)		
MS_201908070860	Selenium Total ICAP/MS	6.7	50	63.7	ug/L	114	(70-130)		

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RPD not calculated for Duplicates when the result is not five times the MRL (Minimum Reporting Level).
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Laboratory QC

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Stantec Consulting

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MS2_201908090635	Selenium Total ICAP/MS	ND	50	58.1	ug/L	114	(70-130)		
MSD_201908070860	Selenium Total ICAP/MS	6.7	50	63.4	ug/L	113	(70-130)	20	0.52
MSD2_201908090635	Selenium Total ICAP/MS	ND	50	62.8	ug/L	124	(70-130)	20	7.8
LCS1	Thallium Total ICAP/MS		50	51.2	ug/L	102	(85-115)		
LCS2	Thallium Total ICAP/MS		50	54.2	ug/L	108	(85-115)	20	5.7
MBLK	Thallium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Thallium Total ICAP/MS		1	1.04	ug/L	104	(50-150)		
MS_201908070860	Thallium Total ICAP/MS	ND	50	53.3	ug/L	107	(70-130)		
MS2_201908090635	Thallium Total ICAP/MS	ND	50	54.3	ug/L	109	(70-130)		
MSD_201908070860	Thallium Total ICAP/MS	ND	50	54.7	ug/L	109	(70-130)	20	2.6
MSD2_201908090635	Thallium Total ICAP/MS	ND	50	58.1	ug/L	116	(70-130)	20	6.8
Total Organic Carbon by SM 5310C									
Analytical Batch: 1192670						**Analysis Date: 08/22/2019**			
LCS1	Total Organic Carbon		5	5.15	mg/L	103	(90-110)		
LCS2	Total Organic Carbon		5	5.15	mg/L	103	(90-110)	20	0.0
MBLK	Total Organic Carbon			<0.15	mg/L				
MRL_CHK	Total Organic Carbon		0.2	0.251	mg/L	125	(50-150)		
MS_201908070581	Total Organic Carbon	ND	4	4.12	mg/L	102	(80-120)		
MS2_201908070977	Total Organic Carbon	2.8	2	4.80	mg/L	98	(80-120)		
MSD_201908070581	Total Organic Carbon	ND	4	4.04	mg/L	99	(80-120)	20	1.9
MSD2_201908070977	Total Organic Carbon	2.8	2	4.81	mg/L	99	(80-120)	20	0.29
Total Organic Carbon by SM 5310C									
Analytical Batch: 1192672						**Analysis Date: 08/23/2019**			
LCS1	Total Organic Carbon		5	5.12	mg/L	102	(90-110)		
LCS2	Total Organic Carbon		5	5.15	mg/L	103	(90-110)	20	0.58
MBLK	Total Organic Carbon			<0.15	mg/L				
MRL_CHK	Total Organic Carbon		0.2	0.249	mg/L	124	(50-150)		
MS_201908081145	Total Organic Carbon	3.0	4	6.89	mg/L	98	(80-120)		
MS2_201908081155	Total Organic Carbon	3.8	2	5.70	mg/L	96	(80-120)		
MSD_201908081145	Total Organic Carbon	3.0	4	6.90	mg/L	98	(80-120)	20	0.14
MSD2_201908081155	Total Organic Carbon	3.8	2	5.68	mg/L	95	(80-120)	20	0.39
ICPMS Metals by EPA 200.8									
Analytical Batch: 1193340						**Analysis Date: 08/30/2019**			
LCS1	Antimony Total ICAP/MS		50	47.6	ug/L	95	(85-115)		
LCS2	Antimony Total ICAP/MS		50	47.2	ug/L	95	(85-115)	20	0.84
MBLK	Antimony Total ICAP/MS			**1.14**	ug/L				

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Laboratory QC

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Group: Tacna Water Quality

Stantec Consulting

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Antimony Total ICAP/MS		1	1.05	ug/L	105	(50-150)		
MS_201908010380	Antimony Total ICAP/MS	ND	50	48.6	ug/L	97	(70-130)		
MS2_201908010513	Antimony Total ICAP/MS		50	47.4	ug/L	95	(70-130)		
MSD_201908010380	Antimony Total ICAP/MS	ND	50	48.7	ug/L	97	(70-130)	20	0.14
MSD2_201908010513	Antimony Total ICAP/MS		50	49.8	ug/L	100	(70-130)	20	5.2
LCS1	Arsenic Total ICAP/MS		50	53.7	ug/L	107	(85-115)		
LCS2	Arsenic Total ICAP/MS		50	53.3	ug/L	107	(85-115)	20	0.75
MBLK	Arsenic Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Arsenic Total ICAP/MS		1	1.15	ug/L	115	(50-150)		
MS_201908010380	Arsenic Total ICAP/MS	2.4	50	55.8	ug/L	107	(70-130)		
MS2_201908010513	Arsenic Total ICAP/MS		50	56.6	ug/L	113	(70-130)		
MSD_201908010380	Arsenic Total ICAP/MS	2.4	50	56.4	ug/L	108	(70-130)	20	1.0
MSD2_201908010513	Arsenic Total ICAP/MS		50	57.9	ug/L	116	(70-130)	20	2.2
LCS1	Barium Total ICAP/MS		50	51.4	ug/L	103	(85-115)		
LCS2	Barium Total ICAP/MS		50	50.6	ug/L	101	(85-115)	20	1.4
MBLK	Barium Total ICAP/MS			<1	ug/L				
MRL_CHK	Barium Total ICAP/MS		2	2.14	ug/L	107	(50-150)		
MS_201908010380	Barium Total ICAP/MS	97	50	149	ug/L	104	(70-130)		
MSD_201908010380	Barium Total ICAP/MS	97	50	150	ug/L	105	(70-130)	20	0.84
LCS1	Beryllium Total ICAP/MS		25	25.1	ug/L	100	(85-115)		
LCS2	Beryllium Total ICAP/MS		25	24.3	ug/L	97	(85-115)	20	3.2
MBLK	Beryllium Total ICAP/MS			<0.5	ug/L				
MRL_CHK	Beryllium Total ICAP/MS		1	0.914	ug/L	91	(50-150)		
MS_201908010380	Beryllium Total ICAP/MS	ND	25	26.3	ug/L	105	(70-130)		
MS2_201908010513	Beryllium Total ICAP/MS		25	25.9	ug/L	104	(70-130)		
MSD_201908010380	Beryllium Total ICAP/MS	ND	25	26.0	ug/L	104	(70-130)	20	1.1
MSD2_201908010513	Beryllium Total ICAP/MS		25	28.2	ug/L	113	(70-130)	20	8.3
LCS1	Cadmium Total ICAP/MS		25	25.4	ug/L	102	(85-115)		
LCS2	Cadmium Total ICAP/MS		25	25.2	ug/L	101	(85-115)	20	0.79
MBLK	Cadmium Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Cadmium Total ICAP/MS		0.5	0.501	ug/L	100	(50-150)		
MS_201908010380	Cadmium Total ICAP/MS	ND	25	25.2	ug/L	100	(70-130)		
MS2_201908010513	Cadmium Total ICAP/MS		25	24.3	ug/L	97	(70-130)		
MSD_201908010380	Cadmium Total ICAP/MS	ND	25	25.5	ug/L	102	(70-130)	20	1.4
MSD2_201908010513	Cadmium Total ICAP/MS		25	25.6	ug/L	102	(70-130)	20	5.3
LCS1	Chromium Total ICAP/MS		50	50.7	ug/L	101	(85-115)		
LCS2	Chromium Total ICAP/MS		50	50.6	ug/L	101	(85-115)	20	0.20
MBLK	Chromium Total ICAP/MS			<0.5	ug/L				

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Stantec Consulting

QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Chromium Total ICAP/MS		1	1.00	ug/L	100	(50-150)		
MS_201908010380	Chromium Total ICAP/MS	ND	50	50.6	ug/L	100	(70-130)		
MS2_201908010513	Chromium Total ICAP/MS		50	50.6	ug/L	101	(70-130)		
MSD_201908010380	Chromium Total ICAP/MS	ND	50	51.4	ug/L	102	(70-130)	20	1.6
MSD2_201908010513	Chromium Total ICAP/MS		50	52.4	ug/L	105	(70-130)	20	3.5
LCS1	Copper Total ICAP/MS		50	52.4	ug/L	105	(85-115)		
LCS2	Copper Total ICAP/MS		50	52.4	ug/L	105	(85-115)	20	0.0
MBLK	Copper Total ICAP/MS			<1	ug/L				
MRL_CHK	Copper Total ICAP/MS		2	2.23	ug/L	112	(50-150)		
MS2_201908010513	Copper Total ICAP/MS		50	50.6	ug/L	101	(70-130)		
MSD2_201908010513	Copper Total ICAP/MS		50	52.2	ug/L	104	(70-130)	20	3.1
LCS1	Lead Total ICAP/MS		50	51.6	ug/L	103	(85-115)		
LCS2	Lead Total ICAP/MS		50	51.3	ug/L	103	(85-115)	20	0.58
MBLK	Lead Total ICAP/MS			<0.25	ug/L				
MRL_CHK	Lead Total ICAP/MS		0.5	0.574	ug/L	115	(50-150)		
MS_201908010380	Lead Total ICAP/MS	ND	50	49.6	ug/L	99	(70-130)		
MS2_201908010513	Lead Total ICAP/MS		50	48.7	ug/L	98	(70-130)		
MSD_201908010380	Lead Total ICAP/MS	ND	50	50.0	ug/L	100	(70-130)	20	0.75
MSD2_201908010513	Lead Total ICAP/MS		50	51.0	ug/L	102	(70-130)	20	4.5
LCS1	Manganese Total ICAP/MS		100	104	ug/L	104	(85-115)		
LCS2	Manganese Total ICAP/MS		100	104	ug/L	104	(85-115)	20	0.0
MBLK	Manganese Total ICAP/MS			<1	ug/L				
MRL_CHK	Manganese Total ICAP/MS		2	2.03	ug/L	101	(50-150)		
MS_201908010380	Manganese Total ICAP/MS	110	100	203	ug/L	96	(70-130)		
MS2_201908010513	Manganese Total ICAP/MS		100	114	ug/L	114	(70-130)		
MSD_201908010380	Manganese Total ICAP/MS	110	100	209	ug/L	102	(70-130)	20	3.0
MSD2_201908010513	Manganese Total ICAP/MS		100	118	ug/L	118	(70-130)	20	3.1
LCS1	Selenium Total ICAP/MS		50	54.4	ug/L	109	(85-115)		
LCS2	Selenium Total ICAP/MS		50	54.1	ug/L	108	(85-115)	20	0.55
MBLK	Selenium Total ICAP/MS			<2.5	ug/L				
MRL_CHK	Selenium Total ICAP/MS		5	5.17	ug/L	103	(50-150)		
MS_201908010380	Selenium Total ICAP/MS	ND	50	49.7	ug/L	97	(70-130)		
MS2_201908010513	Selenium Total ICAP/MS		50	52.2	ug/L	104	(70-130)		
MSD_201908010380	Selenium Total ICAP/MS	ND	50	50.2	ug/L	98	(70-130)	20	1.1
MSD2_201908010513	Selenium Total ICAP/MS		50	54.5	ug/L	109	(70-130)	20	4.3
LCS1	Thallium Total ICAP/MS		50	51.9	ug/L	104	(85-115)		
LCS2	Thallium Total ICAP/MS		50	51.2	ug/L	102	(85-115)	20	1.4
MBLK	Thallium Total ICAP/MS			<0.5	ug/L				

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QC Type	Analyte	Native	Spiked	Recovered	Units	Yield (%)	Limits (%)	RPDLimit (%)	RPD%
MRL_CHK	Thallium Total ICAP/MS		1	1.02	ug/L	102	(50-150)		
MS_201908010380	Thallium Total ICAP/MS	ND	50	50.3	ug/L	100	(70-130)		
MS2_201908010513	Thallium Total ICAP/MS		50	49.3	ug/L	99	(70-130)		
MSD_201908010380	Thallium Total ICAP/MS	ND	50	50.3	ug/L	101	(70-130)	20	0.068
MSD2_201908010513	Thallium Total ICAP/MS		50	51.3	ug/L	103	(70-130)	20	4.0

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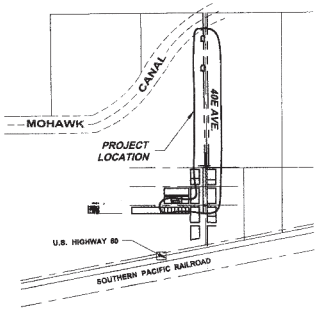
Appendix C DESIGN DOCUMENTS FROM WMIDD INTAKE

TACNA, ARIZONA
TACNA WATER COMPANY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS

GENERAL NOTES

1. UTILITIES.
   IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT THE BLUE STAKE CENTER AT 1-800-STAKE-IT TO EXACTLY LOCATE THE UNDERGROUND UTILITIES WITHIN THE CONSTRUCTION AREA 72 HOURS BEFORE ANY EXCAVATION BEGINS. OMISSION FROM, OR THE INCLUSION OF UTILITY LOCATIONS ON THE PLANS IS NOT TO BE CONSIDERED AS THE NONEXISTENCE OF, OR A DEFINITE LOCATION OF, EXISTING UNDERGROUND UTILITIES. THE LOCATION OF UNDERGROUND UTILITIES ILLUSTRATED ON THE PLANS IS APPROXIMATE. THE CONTRACTOR SHALL ASSUME COMPLETE RESPONSIBILITY FOR DAMAGED UTILITIES.
2. AS- BUILT DRAWINGS.
   THE CONTRACTOR SHALL MAINTAIN ONE SET OF PLANS ON THE JOB SITE AND SHALL RECORD IN RED COLORED PENCIL ALL CASES WHERE ACTUAL FIELD CONSTRUCTION DIFFERS FROM WORK SHOWN ON THE PLANS. ALL CONCEALED WORK AND UTILITY LOCATIONS SHALL BE DIMENSIONED AND REFERENCED. THE MARKED-UP SET OF DRAWINGS SHALL BE DELIVERED TO THE ENGINEER UPON COMPLETION OF THE WORK WHICH SHALL REFLECT "AS BUILT" MODIFICATIONS.
3. DUST CONTROL.
   DUE TO THE LOCATION OF THE WORK THE CONTRACTOR SHALL MAKE SPECIAL EFFORTS TO CONTROL DUST DURING THE PROCESS OF THE WORK. DUST SHALL BE MAINTAINED TO A MINIMUM BY REGULAR APPLICATIONS OF WATER AS NECESSARY AND AS DIRECTED BY THE ENGINEER. AT THE CONCLUSION OF THE PROJECT, THE CONTRACTOR SHALL SWEEP THE STREETS TO REMOVE ALL LOOSE DIRT AND DUST RESULTING FROM THE CONSTRUCTION OPERATIONS.
4. SIGNS AND STRIPING.
   STOP SIGNS, YIELD SIGNS AND ALL OTHER TRAFFIC SIGNS SHALL BE MOVED IF NECESSARY DURING THE CONSTRUCTION PROCESS AND BE REPOSITIONED TEMPORARILY IN A LOCATION DETERMINED BY THE INSPECTOR. STOP SIGNS AND YIELD SIGNS SHALL NOT BE TAKEN OUT OF SERVICE BUT RATHER RELOCATED IN A VISIBLE LOCATION. OTHER SIGNS SHALL BE STORED BY THE CONTRACTOR DURING THE CONSTRUCTION PHASE OF THE PROJECT. AT THE CONCLUSION OF THE PROJECT ALL SIGNS SHALL BE POSITIONED IN A PERMANENT LOCATION AS DETERMINED BY THE ENGINEER. STOP SIGNS AND STREET NAME SIGNS ARE TO BE POSITIONED AT INTERSECTIONS AS ILLUSTRATED ON THE PLANS.
5. CLEANUP.
   THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL UNCLASSIFIED EXCAVATION MATERIAL, EXISTING PAVEMENT, CONCRETE DEBRIS AND ALL OTHER MATERIAL RESULTING FROM DEMOLITION ACTIVITIES.
6. SANITARY FACILITIES.
   IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE SANITARY FACILITIES ON THE LOCALE OF THE PROJECT FOR USE BY THE CONTRACTOR'S EMPLOYEES.
7. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO PROVIDE AND MAINTAIN PROPER SIGNS, BARRICADES AND WARNINGS LIGHTS TO CONTROL THE TRAFFIC AND TO ASSURE THE PUBLIC'S HEALTH, WELFARE AND SAFETY. ALL DEVICES MUST CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN TO THE YUMA COUNTY.
8. CHANGES.
   THE CONTRACTOR SHALL NOTIFY THE CITY OF YUMA AND YUMA COUNTY OR THE ENGINEER IMMEDIATELY OF ANY CONDITIONS REQUIRING CHANGE TO THE PLANS.
9. ACCESS TO ADJACENT PROPERTY.
   ACCESS TO ADJACENT PROPERTIES, CROSS STREETS OR USE OF STREETS SCHEDULED FOR IMPROVEMENT MUST BE REASONABLY MAINTAINED FOR NORMAL ACCESS AND LOCAL RESIDENTS.
10. CONSTRUCTION STAKING.
    ALL CONSTRUCTION STAKING WILL BE PROVIDED BY THE ENGINEER.
11. MONUMENTS.
    ANY SURVEY MONUMENT DISTURBED DURING CONSTRUCTION SHALL BE REPLACED IN ACCORDANCE WITH YUMA COUNTY STANDARD DETAILS BY THE CONTRACTOR AT NO EXTRA COSTS. CONTRACTOR TO UTILIZE AN ARIZONA REGISTERED LAND SURVEYOR TO REFERENCE MONUMENTS PRIOR TO DISTURBANCE AND TO ASSURE PROPER PLACEMENT OF SAID MONUMENT AFTER DISTURBANCE.
12. FRAME AND COVERS.
    ALL MANHOLE FRAMES AND COVERS, WATER VALVE BOXES AND LIDS AND OTHER SIMILAR EXISTING UTILITIES SHALL BE RAISED TO THE GRADE OF THE FINISHED PAVEMENT SURFACE BY THE CONTRACTOR. MANHOLE FRAME AND COVERS AND WATER VALVE LIDS SHALL BE RAISED AFTER PAVING OPERATIONS HAVE OCCURRED IN ACCORDANCE WITH THE DETAILS SHOWN ON THE PLANS.
13. ANY ITEM OF WORK CALLED OUT BY THE CONTRACT PLANS OR SPECIFICATIONS AND NOT SPECIFICALLY NOTED AS A BID ITEM ON THE PROPOSAL SHALL BE CONSIDERED INCIDENTAL TO SAID BID ITEM.
14. SPECIFICATIONS.
    ALL CONSTRUCTION WILL BE PERFORMED TO YUMA COUNTY CONSTRUCTION STANDARDS & SPECIFICATIONS VOLUMES I, II AND III, AND TO THE CITY OF YUMA PUBLIC WORKS STANDARDS, AND SHALL BECOME THE TECHNICAL DOCUMENTS FOR THIS PROJECT UNLESS SPECIFICALLY ALTERED OR DESIGNATED DIFFERENTLY IN THE DESIGNED DOCUMENT. THE SPECIFICATIONS CONTAINED WITHIN THESE PLANS SHALL PREVAIL IF SPECIFICATION CONFLICTS EXIST BETWEEN THE ABOVE LISTED DOCUMENTS.
15. CONSTRUCTION OBSERVATION & INSPECTION WILL BE BY THE YUMA COUNTY DEPARTMENT OF DEVELOPMENT SERVICES OR THEIR AUTHORIZED REPRESENTATIVES. ALL WORK PERFORMED WITHOUT THE KNOWLEDGE OF AND OBSERVATION BY THE YUMA COUNTY AND THE CITY OF YUMA OR THE ENGINEER OR HIS AUTHORIZED REPRESENTATIVE IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
16. OBSERVATION OF A PORTION OF THE WORK IN PROGRESS DOES NOT GUARANTEE ITS FINAL ACCEPTANCE. TESTING AND EVALUATION MAY CONTINUE UNTIL WRITTEN FINAL ACCEPTANCE OF THE WORK. ANY ACCEPTANCE AND WHICH IN THE WORK WITHIN ONE (1) YEAR FROM THE DATE OF ACCEPTANCE AND WHICH ARE DUE TO WORKMANSHIP OR MATERIALS SUPPLIED SHALL BE CORRECTED BY OR AT THE EXPENSE OF THE CONTRACTOR.
17. PERMITS.
    THE CONTRACTOR WILL OBTAIN ALL PERMITS NECESSARY FOR CONSTRUCTION AND PROVIDE COPIES OF SAME TO THE OWNER.
18. CONTRACTOR SHALL POT HOLE EXISTING UTILITIES SUFFICIENTLY AHEAD OF HIS CONSTRUCTION TO ALLOW FOR ANY ADJUSTMENTS IN GRADE LINE AND TO VERIFY PIPE TYPES FOR ORDERING PROPER TRANSITION AND/OR TIE-IN FITTINGS WHICH MAY BE REQUIRED.
19. FOR RELOCATION OR OTHER WORK AFFECTING EXISTING UTILITIES, THE CONTRACTOR IS TO PLAN HIS WORK SO AS TO MINIMIZE DOWN TIME TO THE AFFECTED PROPERTY OWNERS AND BUSINESSES AND TO NOTIFY THE OCCUPANTS OF SUCH 24 HOURS IN ADVANCE OF ALL SERVICE INTERRUPTIONS



LOCATION MAP

NTS

SHEET INDEX

SHEET NUMBER	TITLE
1	COVER SHEET
2	LEGEND AND ABBREVIATIONS
3	WATERLINE PLAN VIEW
4	WATERLINE RAW WATER INLET DETAIL
5	CONSTRUCTION DETAILS

AS-BUILT
SIGNATURE _____ DATE: 11/13/08

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

JDA PROJECT: TWC-01

REV	DATE	REVISION DESCRIPTION	BY

DESIGNED BY: E. VERA
DRAWN BY: W. STEWART
APPROVED BY: J. DAVEY
PROJECT NO.: TWC-01
DRAWING: Water Line-Rev2.dwg
PLOT DATE: 10/29/2008

TACNA WATER COMPANY
TACNA, ARIZONA 85352
928.3419885

JDA
JAMES DAVEY AND ASSOCIATES, INC.
CONSULTING ENGINEERS
1022 N. WATER RESOURCES SPECIALISTS
YUMA, ARIZONA 85364 YUMA, AZ 85365
PHONE: (928) 782-7928 FAX: (928) 782-7928

TACNA WATER COMPANY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
TACNA, ARIZONA

COVER SHEET

SHEET 1 OF 7

ABBREVIATIONS

@	AT
AB	AGGREGATE BASE
ABC	AGGREGATE BASE COURSE
ABDN	ABANDONED
ABUTMT	ABUTMENT
AC	ASPHALTIC CONCRETE, ALUMINUM CAP, ASBESTOS CEMENT
ACI	AMERICAN CONCRETE INSTITUTE
ACP	ASBESTOS CEMENT PIPE
ADDL	ADDITIONAL
ADJ	ADJACENT, ADJUSTABLE
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
AFF	AT FINISH FLOOR
AG	AGRICULTURAL
AGGR	AGGREGATE
AISC	AMERICAN INSTITUE OF STEEL CONSTRUCTION
ALUM	ALUMINUM
ANG	ANGLE
APPRX.	APPROXIMATE, APPROXIMATELY
APS	ARIZONA PUBLIC SERVICE
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
ASSY	ASSEMBLY
AUTO	AUTOMATIC
AUX	AUXILIARY
AVE	AVENUE
AVG	AVERAGE
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BRASS CAP/BACK CURB
BEG	BEGIN, BEGINNING
BF	BLIND FLANGE, BOTTOM FACE
BK	BACK
BLDG	BUILDING
BM	BENCHMARK
BOTT	BOTTOM
BRG	BEARING
BTWN	BETWEEN
BV	BALL VALVE, BUTTERFLY VALVE
BVC	BEGINNING OF VERTICAL CURVE
BW	BARBED WIRE
C/L	CHAINLINK
C, CONC	CONCRETE, CENTER
CAP	CAPACITY
CATV	CABLE TELEVISION
CB	CATCH BASIN
CCP	CONCRETE CYLINDER PIPE
CD	CROSS-DRAINAGE STRUCTURE
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CI	CAST IRON
CJ	CONSTRUCTION JOINT
℄	CENTERLINE
CLR	CLEAR, CLEARANCE
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNITS
C.O.	CLEANOUT
CO.	COUNTY
CONN	CONNECTION, CONNECT
CONST	CONSTRUCTION, CONSTRUCT
CONT	CONTINUOUS
COORD	COORDINATE
COY	CITY OF YUMA
CP	CONTROL POINTS
CPLG	COUPLING
CC,	CENTER TO CENTER
CTR	CENTER
CTRD	CENTERED
CU	CUBIC
CULV	CULVERT
CV	CHECK VALVE
CWS	CALCULATED WATER SURFACE
D/W	DRIVEWAY
D	DEPTH
DBL	DOUBLE
DC	DEPRESSED CURB
DEG	DEGREE
DEMO	DEMOLITION
DG	DOWN GUY
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DOI	U.S. DEPARTMENT OF THE INTERIOR
DN	DOWN
DR	DRIVE
DW	DRIVEWAY
DWG	DRAWING
DWS	DESIGN WATER SURFACE
E	EAST, ELECTRIC
EA	EACH
EASE	EASEMENT
EB	EASTBOUND
ECC	ECCENTRIC
EF	EACH FACE
EG, EX, GR	EXISTING GRADE
EL, ELEC	ELECTRIC, ELECTRICAL
ELB	ELBOW
ELEV	ELEVATION
ENGR	ENGINEER
EP	EDGE OF PAVEMENT
EQPMT	EQUIPMENT
EVC	END OF VERTICAL CURVE
EW	EACH WAY
EX., EXIST.	EXISTING
EXP	EXPOSED
EXP JT	EXPANSION JOINT
FAB	FABRICATION
FC	FLEXIBLE COUPLING
FCA	FLANGED COUPLING ADAPTER
FD	FOUND
F.D.C.	FIRE DEPARTMENT CONNECTION
FDN	FOUNDATION
F.F.	FINISHED FLOOR ELEVATION
FG	FINISH GRADE
FH	FIRE HYDRANT
FIG.	FIGURE
FL	FLOW LINE
FLEX	FLEXIBLE
FLG	FLANGE
FLR	FLOOR
F.O.	FIBER OPTIC
FOW	FACE OF WALL
FT	FOOT, FEET
FTG	FOOTING, FILLING
FWD	FORWARD
G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
G. I.	GALVANIZED IRON
G.S.	GALVANIZED STEEL
GB	GRADE BREAK
GC	GROOVED COUPLING
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRTG	GRATING
GSP	GALVANIZED STEEL PIPE
GSRBM	GILA & SALT RIVER BASE & MERIDIAN
GT, GTR	GUTTER
GV	GATE VALVE, GAS VALVE
HC	HANDICAPPED
HB	HOSE BIB
HDPE	HIGH DENSITY POLYETHYLENE
HDWR	HARDWARE
HDWL	HEADWALL
HGL	HYDRAULIC GRADE LINE
HGT	HEIGHT
HH	HAND HOLE
HORIZ	HORIZONTAL
HP	HORSEPOWER
HWS	HIGH WATER SURFACE
HWY	HIGHWAY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IN.	INCH
INSTM	INSTRUMENTATION
INSUL	INSULATE
INT	INTERIOR
INV.	INVERT
IRR	IRRIGATION
JT	JOINT
L	LENGTH
LAT	LATERAL
LB	POUND
LF	LINEAR FEET
LH	LEFT HAND
LN	LANE
LR	LONG RADIUS
LS	LAND SURVEYOR
LT	LIGHT, LEFT
M	MEASURED
MAINT	MAINTENANCE, MAINTAIN
MATL	MATERIAL
MAX	MAXIMUM
MB	MAIL BOX
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
M&I	MUNICIPAL AND INDUSTRIAL
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MO	MONTH
MON	MONUMENT
MTD	WALL MOUNTED
MTG	MOUNTING
MTL	METAL
MW	MONITORING WELL
MWS	MAXIMUM WATER SURFACE
N/A	NOT APPLICABLE
N	NORTH
NAD	NORTH AMERICAN DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
NB	NORTHBOUND
NE	NORTHEAST
NIC	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
NORM	NORMAL
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
NW	NORTHWEST
NWS	NORMAL WATER SURFACE
O/H	OVERHEAD
O&M	OPERATION & MAINTENANCE
OC	ON CENTER
OD	OUTSIDE DIAMTER
OF	OUTSIDE FACE, OVERFLOW
OPNG	OPENING
OPP	OPPOSITE
O TO O	OUT TO OUT
OVFL	OVERFLOW
P&ID	PROCESS AND INSTRUMENTATION DIAGRAM
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONC, POINT OF COMMAND CURVATURE
PE	POLYETHYLENE
PERM	PERMANENT
PI	POINT OF INTERSECTION
PJF	PREMOLDED JOINT FILLER
PL	PROPERTY LINE
POB	POINT OF BEGINNING
POC	POINT OF CURVATURE
POE	POINT OF ENDING
POT	POINT OF TANGENT
PP	POWER POLE
PRC	POINT OF REVERSE CURVE
PREFAB	PREFABRICATED
PRESS.	PRESSURE
PRI	PRIMARY
PROP	PROPERTY
PS	PUMP STATION, PRESSURE SWITCH
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH, GAUGE
PT	POINT, POINT OF TANGENCY
PV	PLUG VALVE, PRESSURE VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PVT	POINT OF VERTICAL TANGENCY
Q	FLOW RATE (CFS)
QUAD	QUADRANT
QTY	QUANTITY
ROW	RIGHT OF WAY
R	RECORD, RIGHT, RANGE
RAD	RADIUS
RB	REBAR
RC	REINFORCED CONCRETE
R.C.&G.	ROLL CURB AND GUTTER
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RED	REDUCER
REF	REFER, REFERENCE
REHAB	REHABILITATED, REHABILITATION
REINF	REINFORCE, REINFORCED, REINFORCING
REQD	REQUIRED
RESIL	RESILIENT
RGRCP	RUBBER GASKET REINFORCED CONCRETE PIPE
RM	ROOM
RR	RAILROAD
RTN	RETURN
S	SEWER, SOUTH
SB	SOIL BORING, SOUTHBOUND
SCHED	SCHEDULE
SD	STORM DRAIN
SE	SOUTHEAST
SEC	SECTION
SF	SQUARE FEET
SH	SHEET
SIM	SIMILAR
SL, $	SECTION LINE, SURVEY LINE, STREET LIGHT
SMH	SEWER MANHOLE
SP	SPACE, SPACES
SPEC	SPECIFICATIONS
SPEC'D	SPECIFIED
SPLY	SUPPLY
SQ	SQUARE
SR	STATE ROUTE
SS	SANITARY SEWER
SST, SS	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STRL	STRUCTURAL
STRUCT	STRUCTURE
SUSP	SUSPEND
SW	SOUTHWEST
SYMM	SYMMETRICAL
T	TANGENT, TOWNSHIP, TELEPHONE
T&B	TOP AND BOTTOM
TB	TRUST BLOCK
TBM	TEMPORARY BENCH MARK
TC	TOP OF CONCRETE, TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TDH	TOTAL DYNAMIC HEAD
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPORARY
TF	TOP FACE
THD	THREAD
THK	THICK
THRD	THREADED
TMH	TELEPHONE MANHOLE
T.O.	TOP OF, TURNOUT
TOB	TOP OF BANK
TOL	TOP OF LINING
TOP	TOP OF PIPE
TORL	TOP OF RAISED LINING
TP	TELEPHONE POLE, TEST PIT, TURNING POINT
TPI	TURNOUT POINT OF INTERSECTION
TRANS	TRANSITION
TRS	TRAFFIC SIGNAL
TS	TRAFFIC SIGN, TOP OF SLOPE
TW	TOP OF WALL
TYP.	TYPICAL
U/G	UNDERGROUND
UBC	UNIFORM BUILDING CODE
UNK	UNKNOWN
UNO	UNLESS NOTED OTHERWISE
USBR	UNITED STATES BUREAU OF RECLAMATION
VC	VERTICAL CURVE
V.C.&G.	VERTICAL CURVE AND GUTTER
VG	VALLEY GUTTER
VERT	VERTICAL
VOL	VOLUME
VPI	VERTICAL POINT OF INTERSECTION
VTR	VENT THRU ROOF
W/	WITH
W	WATER, WEST
WB	WESTBOUND
WI	WROUGHT IRON
WM	WATER METER
WMIDD	WELLTON MOHAWK IRRIGATION AND DRAINAGE DISTRICT
WS	WATER STOP, WATER SURFACE
WSEL	WATER SURFACE ELEVATION
WSP	WELDED STEEL PIPE
WWF	WELDED WIRE FABRIC
WV	WATER VALVE
XFMR	ELECTRICAL TRANSFORMER
YC	YUMA COUNTY
YCWUA	YUMA COUNTY WATER USERS' ASSOCIATION
YD	YARD
YID	YUMA IRRIGATION DISTRICT
YMC	YUMA MESA CONDUIT
YMIDD	YUMA MESA IRRIGATION AND DRAINAGE DISTRICT
YR	YEAR

NOTES:

1) THIS IS A STANDARD ABBREVIATION AND LEGEND SHEET; THEREFORE, SOME SYMBOLS OR ABBREVIATIONS MAY APPEAR ON THIS SHEET AND NOT ON THE DRAWINGS.

2) CONTACT THE ENGINEER FOR ABBREVIATIONS NOT LISTED OR REFER TO 'ABBREVIATIONS FOR USE ON DRAWINGS AND TEXT' PUBLISHED BY THE AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).

LEGEND

- NEW DRIVEWAY ENTRANCE WITH DEPRESSED CURB (D.C.) (20' D.C.)
- EXIST. DRIVEWAY ENTRANCE/ HANDICAP RAMP
- EXIST./NEW STRUCTURE
- EXIST. ASPHALT PAVEMENT
- NEW ASPHALT PVMT. AS NOTED
- EXIST. CONST. TO BE REMOVED
- NEW CONCRETE SIDEWALK OR SLAB (HATCH OPTIONAL)
- EXIST. CONCRETE SIDEWALK OR SLAB (HATCH OPTIONAL)
- NEW VERTICAL CURB & GUTTER (VC&G)
- EXIST. VERTICAL CURB & GUTTER (VC&G)
- NEW ROLL CURB & GUTTER (RC&G)
- EXIST. ROLL CURB & GUTTER (RC&G)
- NEW CONCRETE VALLEY GUTTER
- EXIST. CONCRETE VALLEY GUTTER
- GUTTER CATCH BASIN
- FLUSH CATCH BASIN
- EXIST./NEW PROPERTY LINE ℙ – P
- EXIST./NEW CENTER LINE ℄ – C
- EXIST./NEW RIGHT–OF–WAY LINE – R/W
- EXIST./NEW WOOD FENCE
- EXIST./NEW WIRE FENCE
- EXIST./NEW MASONRY FENCE
- EXIST./NEW CHAIN LINK FENCE
- EXIST./NEW WROUGHT IRON FENCE
- NEW DITCH AS NOTED
- EXIST. DITCH AS NOTED
- NEW IRRIGATION OR STORM DRAIN PIPE
- EXIST. IRRIGATION OR STORM DRAIN PIPE
- EXIST. STAND PIPE
- NEW STAND PIPE
- EXIST. IRRIGATION OR DRAINAGE JUNCTION BOX
- NEW IRRIGATION OR DRAINAGE JUNCTION BOX
- EXIST./NEW IRRIGATION/SPRINKLER VALVE
- EXIST. SANITARY SEWER PIPE
- NEW SANITARY SEWER PIPE
- EXIST. SANITARY CLEAN OUT
- NEW SANITARY CLEAN OUT
- EXIST. MANHOLE AS NOTED
- EXIST. MANHOLE TO BE BROUGHT TO GRADE
- NEW MANHOLE
- DRAINAGE DIVIDE
- EXIST. SLOPES
- NEW SLOPES
- EXIST. GAS LINE
- NEW GAS LINE
- EXIST./NEW DOWN GUY
- EXIST. POWER POLE
- NEW POWER POLE
- EXIST. TELEPHONE POLE
- NEW TELEPHONE POLE
- EXIST. WATER LINE
- NEW WATER LINE
- EXIST. FIRE HYDRANT (F.H.)
- NEW FIRE HYDRANT
- EXIST. FIRE DEPARTMENT CONNECTION (F.D.C.)
- NEW FIRE DEPARTMENT CONNECTION
- EXIST. VALVE
- EXIST. VALVE TO BE BROUGHT TO GRADE
- NEW VALVE & VALVE BOX
- EXIST. THRUST BLOCK
- NEW THRUST BLOCK
- NEW WATER METER BOX
- EXIST. WATER METER BOX (W.M.)
- EXIST. W.M. BOX TO BE RELOCATED
- EXIST. TRAFFIC SIGN
- NEW TRAFFIC SIGN
- EXIST. STREET SIGN
- NEW STREET SIGN
- EXIST. STREET LIGHT
- NEW STREET LIGHT
- EXIST./NEW BARRICADE
- ROCK RIPRAP (AS NOTED)
- EXIST. TREE, PALM OR SHRUB
- EXIST. HEDGE (AS NOTED)
- EXIST. STORM DRAIN PIPE
- NEW STORM DRAIN PIPE
- EXIST. MAIL BOX
- EXIST. MAIL BOX TO BE RE-SET
- EXIST. SURVEY MONUMENT & COVER
- NEW SURVEY MONUMENT & COVER NO. 4-040 OR 4-050
- EXIST. SURVEY MONUMENT COVER TO BE BROUGHT TO GRADE
- NEW SURVEY MONUMENT, AS NOTED
- NEW SURVEY MONUMENT No. 4-080
- FOUND SURVEY MONUMENT
- (CP10) SURVEY CONTROL POINT
- PROJECT BENCH MARK/TEMPORARY BENCHMARK
- (20) NEW CONSTRUCTION NOTE
- [15] REMOVAL NOTE

SECTION AND DETAIL STANDARDS:

DETAIL (NUMERAL) DESIGNATION ON DRAWING WHERE DETAIL IS TAKEN — 1 / C-6

SECTION (LETTER) DESIGNATION ON DRAWING WHERE SECTION IS TAKEN. ARROW INDICATES DIRECTION OF SECTION — A / -

DRAWING NUMBER (OR LINE IF TAKEN AND SHOWN ON SAME DRAWING) ON DRAWING WHERE SECTION OR DETAIL IS SHOWN

SCREENING:

SCREENED ELEMENTS ON AREA MAPPING REPRESENT EXISTING FACILITIES OR ELEVATIONS.

SCREENED BACKGROUNDS ON OTHER DRAWINGS CAN REPRESENT EXISTING FACILITIES OR FACILITIES TO BE CONSTRUCTED UNDER THIS CONTRACT, WHICH, IF DRAWN IN SOLID LINES, WOULD OBSCURE THE PARTICULAR DETAILS BEING SHOWN. CONSULT THE ENGINEER IF SCREENING OF ANY ELEMENTS IS NOT SELF-EXPLANATORY.

STANDARD DETAILS:

STANDARD DETAIL CALLOUTS ARE SHOWN TO INDICATE DETAIL REQUIRED AT SPECIFIC LOCATIONS. AT ALL LOCATIONS WHERE A STANDARD DETAIL CALLOUT IS NOT SHOWN, THE CONTRACTOR SHALL USE THE STANDARD DETAIL MOST APPLICABLE AND CONSISTENT WITH OTHER WORK UNDER THIS CONTRACT.

AS-BUILT

SIGNATURE: [signature] DATE: 11/3/08

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

JDA PROJECT: TWC-01

REV.	DATE	REVISION DESCRIPTION	BY

PROFESSIONAL ENGINEER (CIVIL) — CERTIFICATE NO. 20802 — JAMES V. DAVEY — Date Signed — ARIZONA, U.S.A. — Registered — Expires 9-30-2011

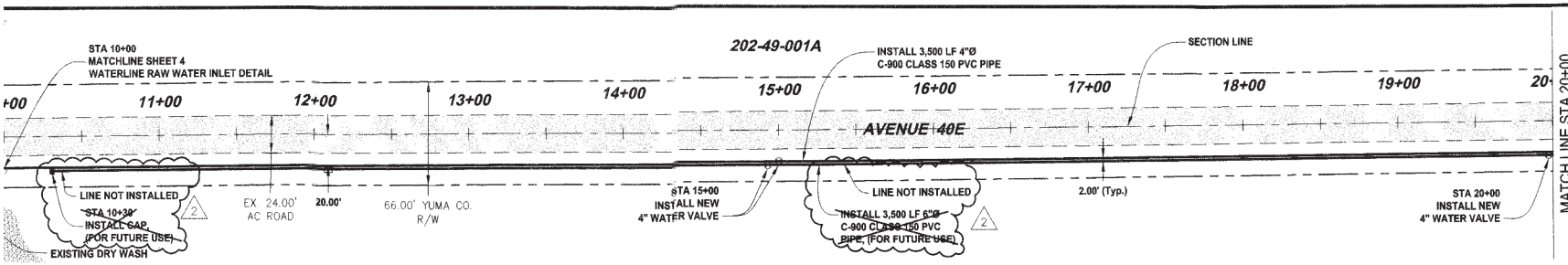
DESIGNED BY: E. VERA
DRAWN BY: W. STEWART
APPROVED BY: J. DAVEY
PROJECT NO.: TWC-01
DRAWING: Water Line-Rev2.dwg
PLOT DATE: 10/29/2008

TACNA WATER COMPANY
TACNA, ARIZONA 85352
928.341.9885

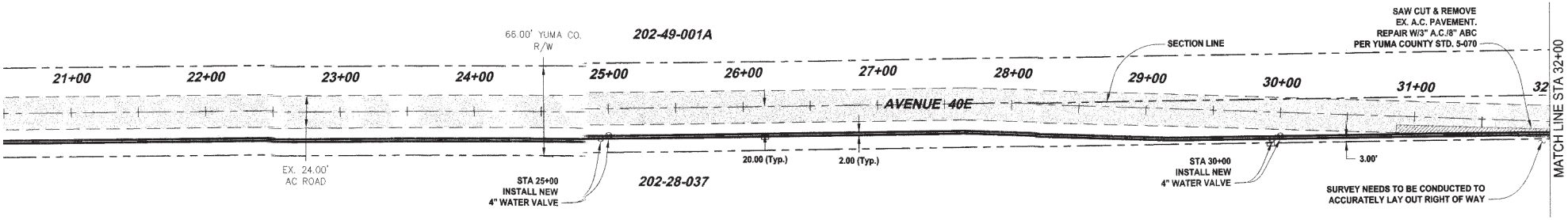
JDA
JAMES DAVEY AND ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
WATER RESOURCES SPECIALISTS
1025 W. 24TH ST, STE #2 YUMA, ARIZONA 85364
PHONE: (928) 782-7926 FAX: (928) 782-7928

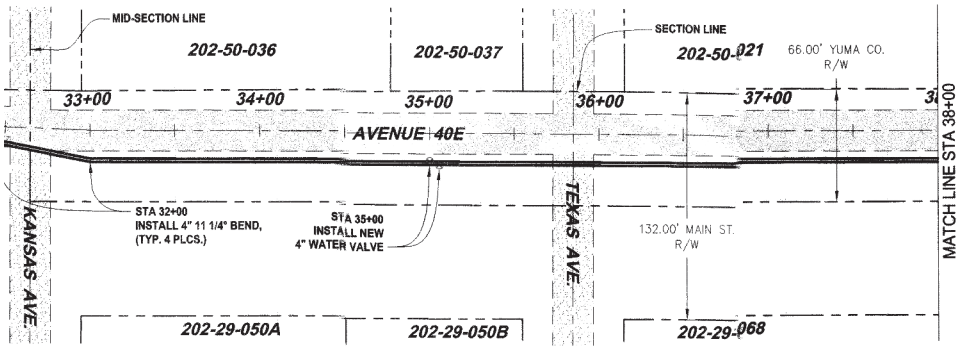
TACNA WATER COMPANY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
TACNA, ARIZONA

LEGEND AND ABBREVIATIONS



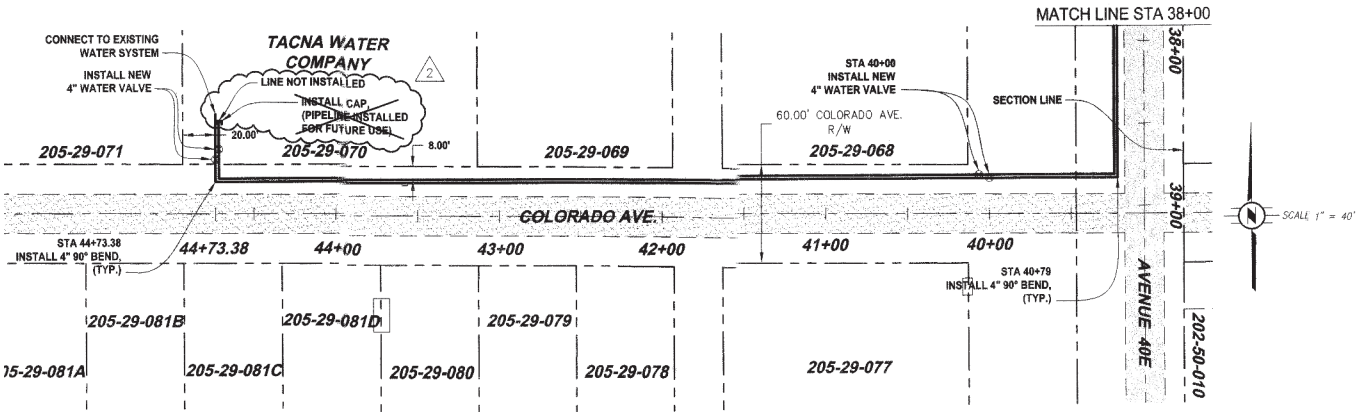
PLAN VIEW





NOTE: RIGHT OF WAY IS PER ASSESORS MAPS. NO SURVEY FOR DESIGN WAS CONDUCTED.

NOTE:
ONLY ONE 4"Ø LINE WAS INSTALLED.
4"Ø LINE FOR FUTURE USE WAS
OMITTED FROM CONSTRUCTION.



WATER NOTES:

TACNA WATER COMPANY SHALL SUBMIT ALL NECESSARY DOCUMENTATION TO THE A.D.E.Q. IN ORDER TO RECEIVE A PERMIT TO CONSTRUCT THE PROPOSED WATER FACILITY FROM A.D.E.Q. CONSTRUCTION OF THE FACILITY SHALL NOT COMMENCE UNTIL TACNA WATER COMPANY RECEIVES APPROVAL FROM BOTH A.D.E.Q. AND YUMA COUNTY.

TACNA WATER COMPANY SHALL ADVISE YUMA COUNTY DEPARTMENT OF DEVELOPMENT SERVICES – ENGINEERING DIVISION OF THE DATE OF THE START OF CONSTRUCTION AND THE NAME OF THE CONTRACTOR(S) PRIOR TO COMMENCING CONSTRUCTION.

DAVEY–CAIRO ENGINEERING INC. WILL PROVIDE DETAILED CONSTRUCTION INSPECTION SERVICES FOR THE PROPOSED PROJECT. UPON COMPLETION OF THE PROJECT, DAVEY–CAIRO ENGINEERING INC. SHALL COMPLETE THE A.D.E.Q. ENGINEER'S "CERTIFICATE OF COMPLETION" DOCUMENTATION AND FORWARD SAME TO THE APPROPRIATE O.W.W.Q.M. REGIONAL OFFICE. CONCURRENTLY, DAVEY–CAIRO ENGINEERING INC. SHALL FORWARD A COPY OF THIS DOCUMENTATION AND ONE (1) SET OF VELLUMS, REPRODUCIBLE, AS–BUILT DRAWINGS TO YUMA COUNTY, PUBLIC WORKS DEPARTMENT – ENGINEERING DIVISION FOR REVIEW AND FILING.

TACNA WATER COMPANY SHALL PROVIDE YUMA COUNTY A BREAKDOWN OF CONSTRUCTION COSTS FOR THE FACILITY TO BE ACCEPTED. A GENERIC EXAMPLE OF THE REQUIRED COST BREAKDOWN HAS BEEN PROVIDED.

UPON COMPLETION OF ALL THE ABOVE ITEMS AND ISSUANCE OF THE APPROVAL OF CONSTRUCTION BY THE A.D.E.Q., FINAL ACCEPTANCE OF THE FACILITY WILL BE ACKNOWLEDGED BY YUMA COUNTY AND THE CONTRACTOR ONE–YEAR WARRANTY PERIOD SHALL COMMENCE.

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE YUMA COUNTY STANDARDS AND SPECIFICATIONS, ADOT STANDARDS AND SPECIFICATIONS, AND SHALL WHERE APPLICABLE BE IN ACCORDANCE WITH A.D.E.Q. REGULATIONS AND CITY OF YUMA STANDARDS. SUCH SHALL INCLUDE MAINTAINING CLEARANCE BETWEEN WATER AND SEWER AND WATER AND RECLAIMED WATER LINES IN ACCORDANCE WITH THE CITY OF YUMA STANDARD 5–060 AND A.A.C. R18–4–211.C.

WATER MAINS AND VALVES SHALL BE FLUSHED AND DISINFECTED BY THE "GENERAL METHOD" DESCRIBED IN A.D.E.Q. BULLETIN NO. 8. THE CONTRACTOR SHALL SUBMIT DISINFECTION AND PRESSURE TEST RESULTS TO THE ENGINEER. SEE SPECIAL CONDITIONS.

REPRESENTATIVES OF YUMA COUNTY AND DAVEY–CAIRO ENGINEERING INC. SHALL BE PRESENT WHEN THE WATER LINES ARE BOTH FLUSHED AND PRESSURE TESTED.

WATER MAIN LINE SHALL BE C–900 CLASS 150 PVC AND SHALL BE AWWA RATED FOR POTABLE WATER. WATER TRANSMISSION LINE INSTALLATION MUST MEET OR EXCEED THE STANDARDS OF A.D.E.Q. BULLETIN NO. 10. THRUST BLOCK ALL ELBOWS, TEES, BENDS, HYDRANTS AND DEAD–END PLUGS WITH CAST–IN–PLACE CONCRETE PER DETAILS.

ALL VALVES ARE TO BE RESILIENT WEDGE GATE VALVES. ACCEPTABLE VALVES ARE WATEROUS SERIES 500 RESILIENT WEDGE, CLOW RESILIENT WEDGE OR AMERICAN DARLING 80 CSR RESILIENT WEDGE. VALVE BODIES AND FLANGE BOLTS SHALL BE PROTECTED BY 10 MIL POLYETHYLENE WRAP.

THE TESTING OF WATERLINES SHALL BE UNDERTAKEN AS FOLLOWS AND IN DESCENDING ORDER OF PRECEDENCE:

1. ALL VISIBLE LEAKS SHALL BE REPAIRED, REGARDLESS OF THE AMOUNT OF LEAKAGE AND REGARDLESS OF WHETHER THE LEAK DEVELOPS UNDER TEST PRESSURE OR LINE PRESSURE.
2. INITIAL PRESSURES FOR BOTH THE PRESSURE TEST AND ALLOWABLE LEAKAGE TEST SHALL BE A MINIMUM OF 150 PSI.
3. A PRESSURE TEST WILL BE DEEMED AS SUCCESSFUL IF IT PASSES THE CRITERIA SET FORTH BY AWWA C–600, SECTION 4 (CURRENT EDITION) AND THAT CRITERIA NOTED ABOVE.
4. SHOULD THE PRESSURE TEST BE UNSUCCESSFUL, THE CONTRACTOR HAS THE OPTION OF ATTEMPTING AN ALLOWABLE LEAKAGE TEST. THIS TEST WILL BE DEEMED SUCCESSFUL IF IT PASSES THE CRITERIA SET FORTH IN AWWA C–600, SECTION 4 (CURRENT EDITION) OR AWWA M–23 (CURRENT EDITION), WHICHEVER IS MORE RESTRICTIVE, AND THAT CRITERIA NOTED ABOVE.

AS-BUILT
SIGNATURE: DATE:

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

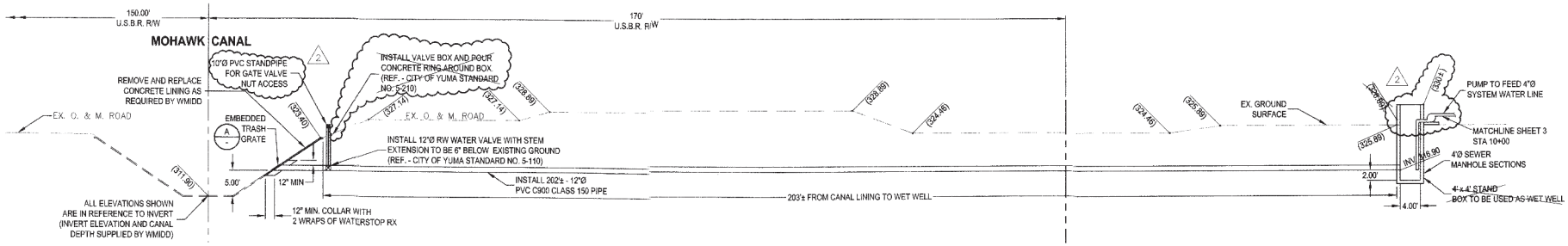
JDA PROJECT: TWC-01

REV.	DATE	REVISION DESCRIPTION	BY
REV. 1	3-1-06	REVISED PIPE SIZE &	JVC

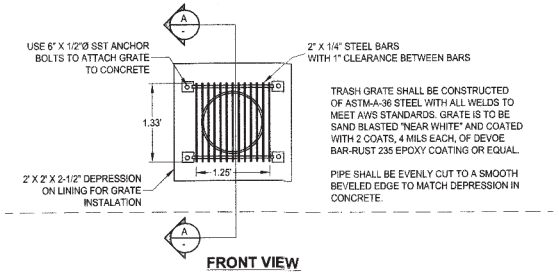
DESIGNED BY: E. VERA
DRAWN BY: W. STEWART

TACNA WATER COMPANY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS

SH



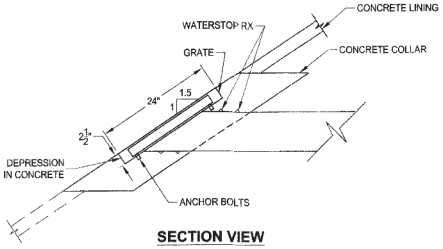
SECTION VIEW
SCALE: 1" = 10'



TRASH GRATE SHALL BE CONSTRUCTED OF ASTM-A-36 STEEL WITH ALL WELDS TO MEET AWS STANDARDS. GRATE IS TO BE SAND BLASTED "NEAR WHITE" AND COATED WITH 2 COATS, 4 MILS EACH, OF DEVOE BAR-RUST 235 EPOXY COATING OR EQUAL.

PIPE SHALL BE EVENLY CUT TO A SMOOTH BEVELED EDGE TO MATCH DEPRESSION IN CONCRETE.

FRONT VIEW



SECTION VIEW

A — TRASH GRATE DETAIL
SCALE: NTS

HYDRAULIC CALCULATIONS
FROM CANAL TO WET WELL

PRESSURE AT PIPE INLET = 0.81 P.S.I. (1.87' OF HEAD)
PRESSURE AT PIPE OUTLET = 0.00 P.S.I.
ELEVATION AT PIPE INLET = 100' (ASSUMED)
ELEVATION AT PIPE OUTLET = 100' (ASSUMED)
LENGTH OF PIPE = 203'
PIPE = 12" DIAMETER PVC

DISCHARGE AT PIPE OUTLET = 5.16 CFS
= 3,334,995 GAL/DAY

HYDRAULIC CALCULATIONS
FROM PUMP (WET WELL) TO TREATMENT PLANT

PRESSURE AT PUMP OUTLET (PIPE INLET) = 80 P.S.I.
PRESSURE AT PIPE OUTLET = 20 P.S.I.
ELEVATION AT PIPE INLET = 100' (ASSUMED)
ELEVATION AT PIPE OUTLET = 150' (ASSUMED)
LENGTH OF PIPE = 4,500'
PIPE = 4" DIAMETER PVC

DISCHARGE AT PIPE OUTLET = 0.43 CFS
=277,916 GAL/DAY
ENOUGH SUPPLY FOR 1,852 PEOPLE

AS-BUILT
SIGNATURE: DATE: 11/5/08

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

JDA PROJECT: TWC-01

REV.	DATE	REVISION DESCRIPTION	BY
REV. 1	3-1-06	REVISED PIPE SIZE	JVD
REV. 2	10-29-08	AS-BUILT	MDS

DESIGNED BY: E. VERA
DRAWN BY: W. STEWART
APPROVED BY: J. DAVEY
PROJECT NO.: TWC-01
DRAWING: Water Line-Rev2.dwg
PLOT DATE: 10/29/2008

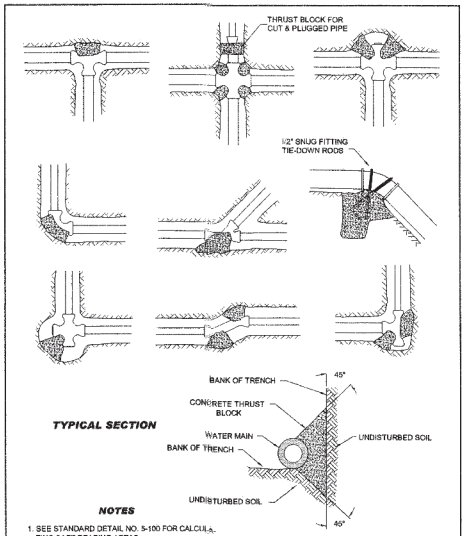
TACNA WATER COMPANY
TACNA, ARIZONA 85352
928.3419885

JDA
JAMES DAVEY AND ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
1021 W. 24TH ST., STE #2 YUMA, ARIZONA 85364
PHONE: (928) 782-7262 FAX: (928) 782-7263

TACNA WATER COMPANY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
TACNA, ARIZONA

WATERLINE RAW WATER INLET DETAIL

SHEET 4 OF 7



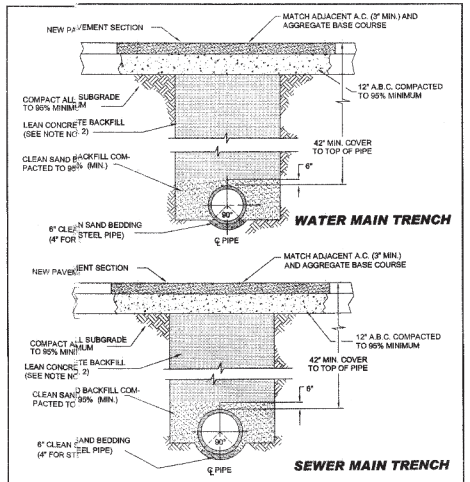
NOTES

1. SEE STANDARD DETAIL NO. 5-100 FOR CALCULATING SAFE BEARING AREAS.
2. ALL FERROUS FITTINGS, PIPE, CONNECTORS, AND APPURTENANCES SHALL RECEIVE A 10 MIL (MIN.) POLYETHYLENE WRAP TO PREVENT DIRECT CONTACT WITH SOIL.
3. THRUST BLOCKS SHALL CONSIST OF CLASS "B" CONCRETE.
4. CONCRETE SHALL NOT COME IN DIRECT CONTACT WITH PIPE.
5. TIE-DOWN RODS REQUIRED FOR PIPE LARGER THAN 8".

Issued: October 2001

CITY OF YUMA
CONSTRUCTION STANDARD DETAIL DRAWINGS

STANDARD NO. 5-090
TYPICAL
THRUST BLOCK INSTALLATION



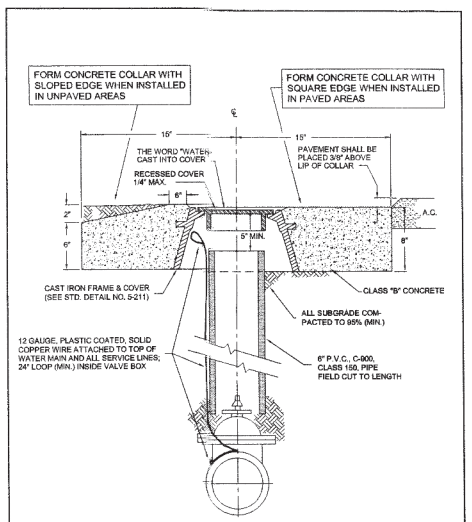
NOTES

1. NATIVE SOIL MAY BE USED FOR BACKFILL WHEN APPROVED BY THE CITY ENGINEER.
2. LEAN CONCRETE SHALL BE A ONE SACK CEMENT PER CUBIC YARD OF SAND SLURRY MIXTURE.
3. BEDDING SHALL BE A MINIMUM STANDARD FOR SHALLOW TRENCHES AND ACCEPTABLE NATIVE BASE. EXACT TYPE OF BEDDING SHALL BE DETERMINED BY THE CITY ENGINEER.
4. DITCH SIDES SHALL BE SLOPED OR SHORED AS REQUIRED PER O.S.H.A. STANDARDS.
5. ALL TRENCHES SHALL BE COLD-PATCHED IF LEFT OPEN TO TRAFFIC. ALL TRENCHES SHALL BE PAVED (HOT-MIX) WITHIN 2 WEEKS FROM IT'S EXCAVATION.

Issued: October 2001

CITY OF YUMA
CONSTRUCTION STANDARD DETAIL DRAWINGS

STANDARD NO. 5-080
TYPICAL WATER & SEWER
MAIN TRENCH BACKFILL



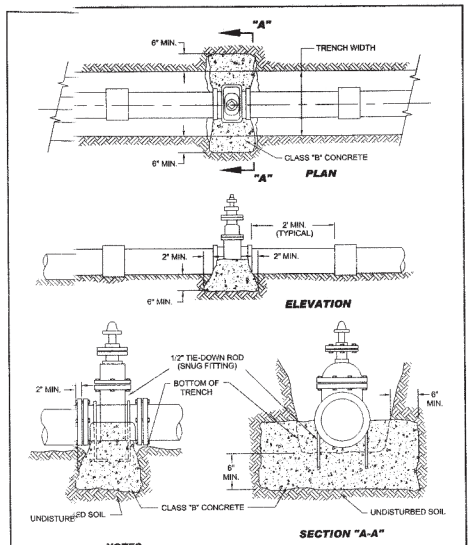
NOTE

1. 12 GAUGE SOLID COPPER WIRE SHALL EXTEND INTO THE FRAME OF EACH IN-LINE VALVE, AIR RELEASE VALVE, BLOWOFF, ETC.

Issued: October 2001

CITY OF YUMA
CONSTRUCTION STANDARD DETAIL DRAWINGS

STANDARD NO. 5-210
VALVE BOX INSTALLATION



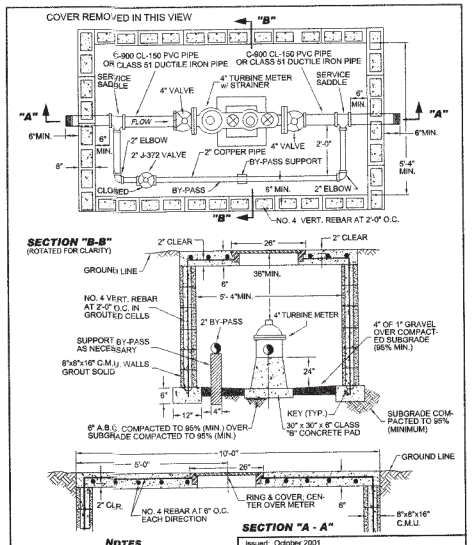
NOTES

1. THIS DETAIL COVERS WATER VALVES 4" OR LARGER.
2. ALL BURIED IRON AND FERROUS FITTINGS SHALL RECEIVE A 10 MIL (MIN.) POLYETHELENE PLASTIC WRAP TO PREVENT DIRECT CONTACT WITH SOIL.
3. TIE DOWN RODS REQUIRED FOR PIPES LARGER THAN 8".
4. CONCRETE SHALL NOT COME IN CONTACT WITH WATER PIPE.

Issued: October 2001

CITY OF YUMA
CONSTRUCTION STANDARD DETAIL DRAWINGS

STANDARD NO. 5-110
VALVE ANCHORS



NOTES

1. VAULT FOR 6" AND 8" METERS SHALL BE THE SAME SIZE AS THE 4" VAULT BUT PIPE SIZES / DIMENSIONS WILL VARY.
2. METER SUPPORT SHALL BE MADE OF CONCRETE WITH AN 18" SQUARE BASE AND A 12" SQUARE TOP.
3. FRAME & COVER SHALL BE A FORD NO.10 ROUND PIT OR APPROVED EQUAL.
4. ALL NON-MECHANICAL JOINTS SHALL BE RESTRAINED WITH "MEGALUG" OR APPROVED EQUAL TO A DISTANCE OF 20' OUTSIDE OF THE VAULT.

Issued: October 2001

CITY OF YUMA
CONSTRUCTION STANDARD DETAIL DRAWINGS

STANDARD NO. 5-154
WATER METER VAULT
4" THROUGH 8" METERS

AS-BUILT
SIGNATURE: DATE:

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

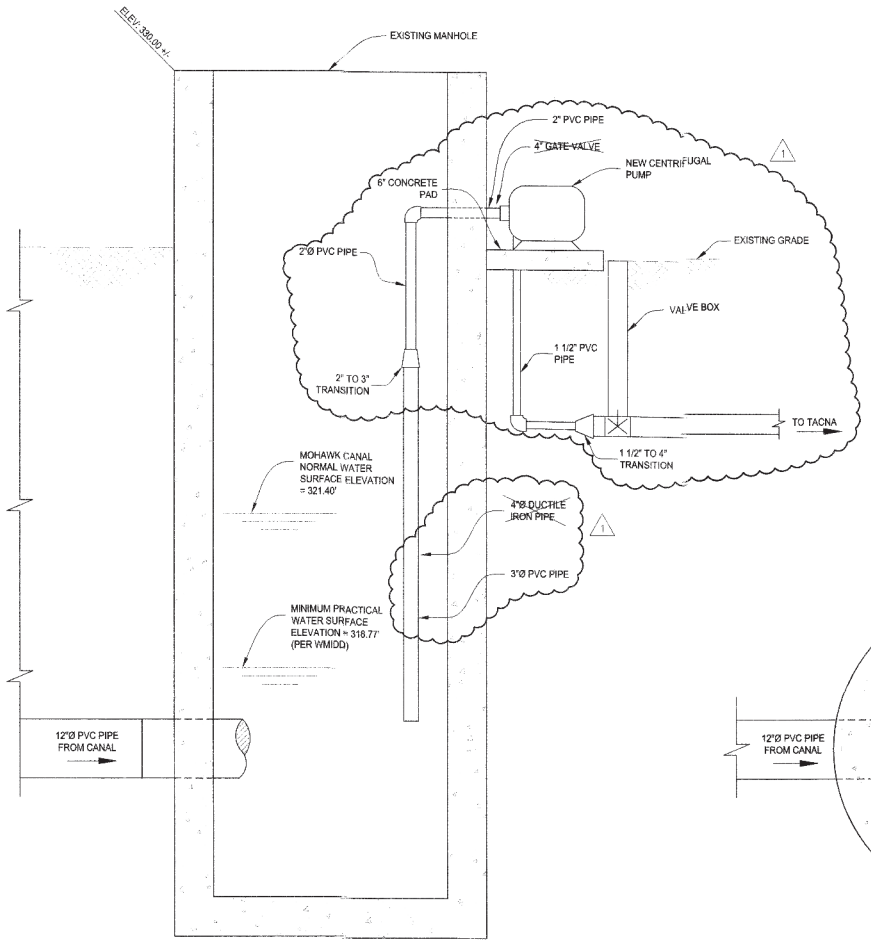
JDA PROJECT: TWC-01

REV.	DATE	REVISION DESCRIPTION	BY

DESIGNED BY: E. VERA
DRAWN BY: W. STEWART

TACNA WATER COMPANY
WATER SYSTEM IMPROVEMENTS

SH



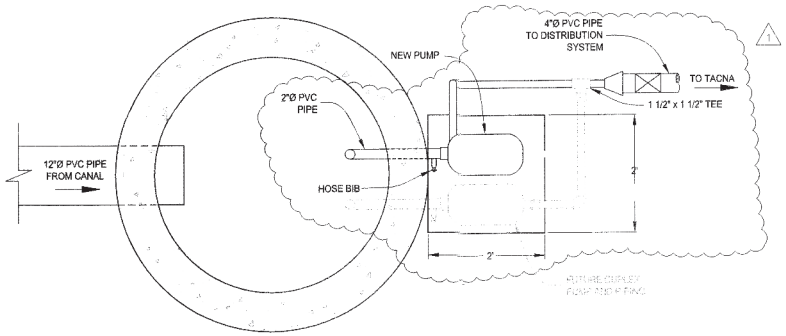
SECTION VIEW
SCALE: 1" = 2'

PUMP SIZING CRITERIA:

DESIGN FLOW = 100 GPM
REQUIRED PRESSURE AT WATER TREATMENT PLANT = 40 PSI
ELEVATION DIFFERENCE BETWEEN WATER TREATMENT PLANT AND PUMP OUTLET = 50'
ELEVATION DIFFERENCE BETWEEN PUMP OUTLET AND PUMP INLET = 12'
PIPE FRICTION LOSSES = 20'
(3,475' OF 4"Ø PVC PIPE AT 100 GPM)

TOTAL LOSS = 82' OF HEAD = 36 PSI
REQUIRED PRESSURE AT PUMP OUTLET = 75 PSI

PUMP HORSEPOWER REQUIRED FOR 100 GPM AT 75 PSI = 5.5 HP
(ASSUMING 80% EFFICIENCY)



NOTE: ALL ABOVE GROUND PIPING TO BE DUCTILE IRON PIPE OR COPPER.

PLAN VIEW
SCALE: 1" = 2'

AS-BUILT
SIGNATURE: DATE: 1/13/08

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

JDA PROJECT: TWC-01

REV	DATE	REVISION DESCRIPTION	BY
REV 1	10-29-08	AS-BUILT	MJS

DESIGNED BY: E. VERA
DRAWN BY: W. STEWART
APPROVED BY: J. DAVEY
PROJECT NO.: TWC-01
DRAWING: WATERLINE-R+3.DWG
PLOT DATE: 10/29/2008

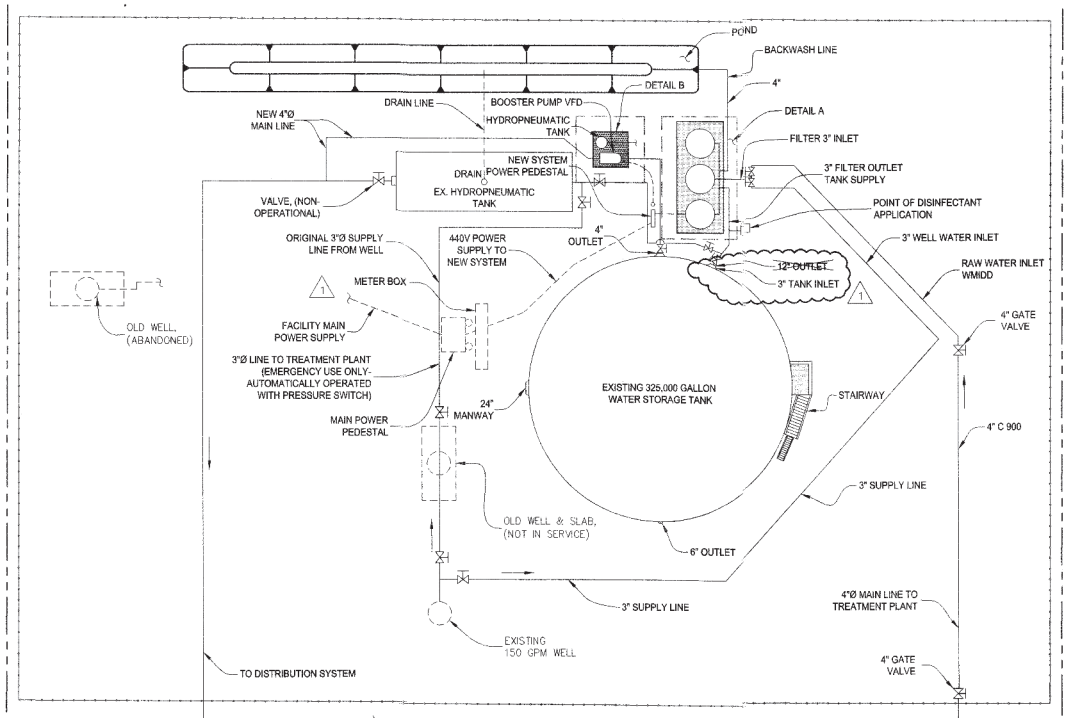
TACNA WATER COMPANY
TACNA, ARIZONA 85352
928.3419885

JDA
JAMES DAVEY AND ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERS
1028 W. 24TH ST. STE #2 YUMA, ARIZONA 85364
PHONE: (928) 782-7908 FAX: (928) 782-7928

TACNA WATER COMPANY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
TACNA, ARIZONA

CANAL PUMP STATION LAYOUT

SHEET 6 OF 7



SCALE 1" = 10'

TACNA WATER COMPANY
WATER TREATMENT FACILITY SITE PLAN

GENERAL

A FILTRATION SYSTEM BY "GE COM" IS GOING TO BE INSTALLED BY TACNA WATER COMPANY TO TREAT CANAL WATER AND PROVIDE POTABLE WATER TO THE TOWN OF TACNA.

WHEN DEMAND INCREASES TO REQUIRE WELL WATER TO BE TREATED AND BE USED IN CONJUNCTION WITH THE TREATED CANAL WATER, AN ADDITIONAL WATER FILTRATION SYSTEM WILL BE INCORPORATED INTO THE PROCESS FOR ARSENIC REMOVAL.

GENERAL WATER SYSTEM NOTES

THE OWNER/DEVELOPER SHALL SUBMIT ALL NECESSARY DOCUMENTATION TO THE A.D.E.Q. IN ORDER TO RECEIVE A PERMIT TO CONSTRUCT THE PROPOSED WATER FACILITY FROM A.D.E.Q. CONSTRUCTION OF THE FACILITY SHALL NOT COMMENCE UNTIL THE OWNER/DEVELOPER RECEIVES APPROVAL FROM A.D.E.Q.

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH ADEQ STANDARDS AND SPECIFICATIONS.

WATER MAINS AND VALVES SHALL BE FLUSHED AND DISINFECTED BY THE "GENERAL METHOD" DESCRIBED IN A.D.E.Q. BULLETIN NO. 8. THE CONTRACTOR SHALL SUBMIT DISINFECTION AND PRESSURE TEST RESULTS TO THE OWNER'S ENGINEER.

CONTRACTOR MUST VERIFY EXISTENCE, LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES PRIOR TO TRENCHING. CALL ARIZONA BLUE STAKE -1-800-STAKE-IT.

THE TESTING OF WATERLINES SHALL BE UNDERTAKEN AS FOLLOWS AND IN DESCENDING ORDER OF PRECEDENCE:

1. ALL VISIBLE LEAKS SHALL BE REPAIRED, REGARDLESS OF THE AMOUNT OF LEAKAGE AND REGARDLESS OF WHETHER THE LEAK DEVELOPS UNDER TEST PRESSURE OR LINE PRESSURE.

2. INITIAL PRESSURES FOR BOTH THE PRESSURE TEST AND ALLOWABLE LEAKAGE TEST SHALL BE A MINIMUM OF 150 PSI.

3. A PRESSURE TEST WILL BE DEEMED AS SUCCESSFUL IF IT PASSES THE CRITERIA SET FORTH BY AWWA C-600, SECTION 4 (CURRENT EDITION) AND THAT CRITERIA NOTED ABOVE.

4. SHOULD THE PRESSURE TEST BE UNSUCCESSFUL, THE CONTRACTOR HAS THE OPTION OF ATTEMPTING AN ALLOWABLE LEAKAGE TEST. THIS TEST WILL BE DEEMED SUCCESSFUL IF IT PASSES THE CRITERIA SET FORTH IN AWWA C-600, SECTION 4 (CURRENT EDITION) OR AWWA M-23 (CURRENT EDITION), WHICHEVER IS MORE RESTRICTIVE, AND THAT CRITERIA NOTED ABOVE.

BOOSTER PUMPS

PUMPS SHALL BE RATED AT 100 GPM AT 60 PSI AND SHALL BE SKID MOUNTED WITH INTERNAL CONTROLS.

PUMPS TO BE SET AS FOLLOWS
PUMP 1 - ON - 50 PSI, OFF - 60 PSI. PUMPS SHALL BE AUTOMATICALLY ALTERNATED. PUMPS SHALL BE ABLE TO OPERATE SIMULTANEOUSLY DURING PEAK DEMAND IF NECESSARY.

WATER SUPPLY PUMP CONTROLS

PROVIDE WARRICK CONTROLS, SERIES 1 CONTROLS.

MAIN PUMP (AT CANAL)
PUMP ON - 284,000 GALLON LEVEL IN STORAGE TANK.
PUMP OFF - 324,000 GALLON LEVEL IN STORAGE TANK.

LOW LEVEL ALARM - 240,000 GALLONS (RED LIGHT)

WELL PUMP (EMERGENCY CASE ONLY)
PUMP ON (MANUALLY) - 25,000 GALLON LEVEL IN STORAGE TANK.
PUMP OFF (MANUALLY)- 100,000 GALLON LEVEL IN STORAGE TANK.

BOOSTER PUMPS
PUMPS OFF - 15,000 GALLON LEVEL IN STORAGE TANK
PUMPS ON - 20,000 GALLON LEVEL IN STORAGE TANK.

MISC. VALVES AND FITTINGS
ALL VALVES, TEES, ELBOWS, REDUCERS, CHECK VALVES, ETC., SHALL BE OF COPPER OR BRONZE CONSTRUCTION AND CERTIFIED FOR POTABLE WATER USE AND RATED FOR 150 PSI WORKING PRESSURE. VALVES TO BE OF FULL FLOW BALL TYPE APOLLO OR APPROVED EQUAL.

PVC

FITTINGS NOT DETAILED BUT NEEDED TO COMPLETE THE SYSTEM SHALL BE PROVIDED SUCH AS TO ENSURE A COMPLETE AND FUNCTIONAL WATER SYSTEM.

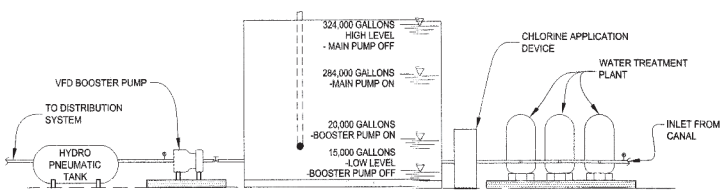
PROVIDE DIELECTRIC BUSHINGS AT ALL CONNECTIONS TO STEEL PIPING.

PROVIDE UNIONS AS NEEDED FOR MAINTENANCE OF SYSTEMS.

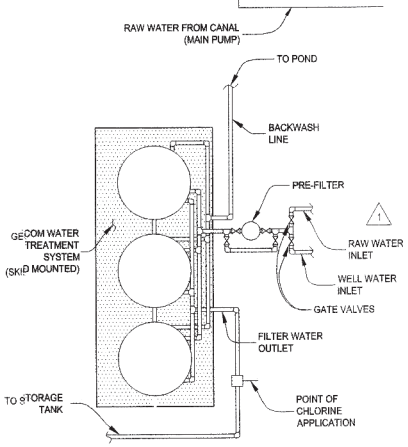
ELECTRIC PLANS
ELECTRICAL PLANS PREPARED BY A REGISTERED ELECTRICAL ENGINEER ARE REQUIRED.

NEW PUMP NOTES, (AT CANAL)
RATED @100 GPM @ 70 PSI (APPROX. 5.5 HP)

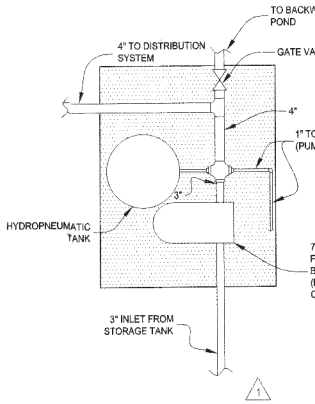
STORAGE AND SUPPLY
WITH 150 HOMES IN TACNA AND ASSUMING EACH HAVING 3 PEOPLE WITH EACH HAVING A DAILY DEMAND OF 150 GALLONS, THERE IS AN ASSUMED DAILY DEMAND OF 67,500 GALLONS IN THE TOWN OF TACNA. THE 325,000 GALLON STORAGE TANK IN THE SYSTEM SHOULD HAVE 4.8 DAYS OF STORAGE IN CASE OF A WATER OUTAGE IN THE CANAL. WATER OUTAGES IN WELLTON-MOHAWK IRRIGATION AND DRAINAGE DISTRICT CANALS TYPICALLY LAST UP TO 3 DAYS ONLY.



ELEVATION



DETAIL A



DETAIL B

NOTE:
BOOSTER OPERATED BY DAN FOSS COMPUTER VFD ON 45 PSI SUPPLY. PUMP STATION AT CANAL OPERATED BY SONAR SENSOR IN TANK - (DC VOLT), HARD WIRED TO PUMP AND AUTOMATIC SWITCH & RELAYS.

AS-BUILT
SIGNATURE: DATE: 11/3/08

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

JDA PROJECT: TWC-01

REV.	DATE	REVISION DESCRIPTION	BY
REV. 1	10-29-08	AS-BUILT	WDS

DESIGNED BY: E. VERA
DRAWN BY: W. STEWART
APPROVED BY: J. DAVEY
PROJECT NO.: TWC-01
DRAWING: WATER TREATMENT FACILITY.DWG
PLOT DATE: 10/29/2008

TACNA WATER COMPANY
TACNA, ARIZONA 85352
928.341.9885

JDA
JAMES DAVEY AND ASSOCIATES, INC.
CIVIL ENGINEERS & LAND SURVEYORS
WATER RESOURCES SPECIALISTS
1028 W. WASHINGTON, SUITE #2 YUMA, AZ 85364
PHONE: (928) 782-7928 FAX: (928) 782-7938

TACNA WATER COMPANY
WATER DISTRIBUTION SYSTEM IMPROVEMENTS
TACNA, ARIZONA

WATERLINE PLAN VIEW

SHEET 7 OF 7

TACNA WATER COMPANY

Sample Datetime	Dis-solved oxygen, mg/L	pH, water, unfltrd field, std units	pH, water, unfltrd lab, std units	Residue total at 105 deg. C, sus-pended, mg/L	Ammonia water, fltrd, mg/L as N	Nitrite water, fltrd, mg/L as N	Nitrite + nitrate water fltrd, mg/L as N	Inor-ganic carbon, suspnd sedimnt total, mg/L	Organic carbon, suspnd sedimnt total, mg/L	Total carbon, suspnd sedimnt total, mg/L	Arsenic water, fltrd, ug/L	Arsenic water unfltrd ug/L	Turbdty white light, det ang 90+/-30 corrctd NTRU	Sus-pended sedi-ment concen-tration mg/L	Turbid-ity, wat unf lab, Hach 2100AN NTU
8/24/2004 8:10	5.4	8	8.1		0.131	0.032	0.416	< .1	0.5	0.5	3.4			11	4.3
8/24/2004 8:11	5.4	8	8.1	< 10	0.12		0.42				3.2	3		11	4.2
7/25/2005 8:30	5.5	8	8.2		0.13	0.019	0.47	< .1	0.9	1	2.8		9.2	34	
7/25/2005 8:31	5.5	8	8.2	17	0.12		0.46				3	3	11	34	
8/25/2005 8:40	4.7	7.9	7.8		0.087	0.017	0.603	< .1	0.9	1	3.5		12	30	
8/25/2005 8:41	4.7	7.9	8	14	0.08		0.62				3.5	3.3	11	30	

Appendix D PACKAGED TREATMENT SYSTEM VENDOR CUT SHEETS

Tacna

Arizona

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WesTech Opportunity Number: 1930528Rev3
Thursday, January 16, 2020

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Item A – Ultrafiltration System

Item B – Reverse Osmosis System

Commercial Proposal

Item A – One (1) AltaPac™ Ultrafiltration System, Model UFT41C

Design Overview		
Description	**Unit**	**Dimension/Capacity**
Application	-	Municipal Drinking Water
WesTech System Model	-	UFT41C, AltaPac™ System
Membrane Module	-	Toray HFUG-2020AN
Net Product Flow Rate	gpm	56
Redundancy and Unit Quantity	-	1 x 100%
Approximate Dimensions	UF Unit Containerization	9’-10” L x 4’-10” W x 10’-6 1/2” H 40’ High Cube
Number of Modules	Per Unit	3 installed, 3 capacity

The AltaPac™ system is fully skid-mounted and containerized with interconnecting piping to minimize field work. System components and valving, including an integral clean-in-place system, are pre-configured to maintain a compact footprint and allow for error-free commissioning. Controls are fully-automated and completed by in-house electrical engineers and process automation experts.

Thousand Trails WTP Plant at a remote resort in Chehalis Washington*, including direct feed coagulant dosing, feed and backwash tanks, an AltaPac ultrafiltration system, chemical disinfection, and a neutralization system.*

Design Information

Water Quality

WesTech UF/MF systems will consistently produce high purity treated water even with variation in the feed source due to a small nominal pore size in an absolute barrier configuration.

Feed Water Quality*

Description	Unit	Concentration
Source	-	Well Water
pH	-	6.5 – 8.5
Temperature	°C	10 – 20
Turbidity	NTU	< 5
Total Suspended Solids	mg/L	< 5
Total Organic Carbon	mg/L	< 3
Iron	mg/L	< 0.3
Manganese	mg/L	< 0.05

*Values are assumed and should be verified. It is noted that the use of charged polymeric flocculant aids increases risk of irreversible membrane fouling and should be discussed with WesTech, and this risk is applicable to all polymeric MF/UF membrane manufacturers. The presence of oil and grease in the source water should also be minimized.

Treated Water Quality

Description	Unit	Concentration
Turbidity	NTU	≤ 0.10 NTU 95% of the time with a maximum turbidity of 0.3 NTU
Total Suspended Solids	mg/L	< 1
Silt Density Index	-	≤ 3
Giardia Removal*	-	≥ 4 log (99.99%)
Cryptosporidium Removal*	-	≥ 4 log (99.99%)
Virus Removal*	-	≥ 1.0 log removal (90.00%)
Certification Standards		NSF 61, NSF 419, UL 508A Listed

*Challenge-testing certification is provided by independent evaluation through NSF/ANSI 419. Typical removal levels exceed the certification level and are often on the order of 6-log. Additionally, the UF membranes achieve 1.5 log removals of viruses, though virus removal certification is only recognized up to 1.0 log by CDDW for any membrane filter.

Process Description

Described in this proposal is the preliminary process and design of the WesTech membrane filtration system. The preliminary system design consists of one (1) membrane filtration unit sized to achieve a net production capacity of 80,000 gpd with turndown to 40,000 gpd.

The filtration process is an outside/in, pressure-driven process to remove suspended solids and turbidity, and to achieve 4-log reduction of pathogens like *Giardia* and *Cryptosporidium*. Ultrafiltration membranes can also achieve >1.5 log reduction of waterborne viruses. Raw water from the water source is subject to pretreatment by chemical addition for oxidation of metals and coagulant addition. VFD-controlled feed pumps direct the source water to a 200 µm pre-strainer for removal of larger debris.

Filtrate is sent to the backwash supply tank. Backwashing is used to remove accumulated foulants by reversed inside/out flow at an interval of 20 - 60 minutes with air scour for increased agitation. A drain or filter-to-waste step is used to remove any additional accumulated material. Membrane integrity testing is conducted automatically once every 24 hours. The pressure decay test (PDT) is capable of detecting a single fiber break.

Maintenance cleans (MCs)/chemically-enhanced backwashes (CEBs) and clean-in-place (CIP) procedures are automated chemical cleaning processes used to recover membrane permeability. MCs/CEBs are typically performed with NaOCl once per day to once per week. The automated clean-in-place procedure is designed to occur no more frequently than once per month, is conducted with either NaOCl or acid, and is initiated when membrane permeability decreases to a specified value.

Following chemical cleaning procedures, the membrane units are drained by gravity or a pressurized drain-to-waste, and waste is subsequently sent to be neutralized and discharged. A rinse step and backwashing are used to remove residual chemical prior to resuming production.

Process Design Summary

Design Summary

Parameter	Value
Number of Units in Operation	1
WesTech System Model	1
Installed Modules per Unit	UFT41C, AltaPac III
Total Module Capacity per Unit	3
Module Model	Toray HFUG-2020AN
Membrane Area per Module	969 ft^2
Membrane Area in Operation	2,907 ft^2
Design Temperature	50.0 °F
Production Cycle Time	30 min
Flux Rates	
Instantaneous Flux at Design Temp.	31.7 gfd
Normalized Flux (20°C) at Design Temp.	41.5 gfd
Flow Rates	
Instantaneous Flow Rate	64 gpm
Average Gross Flow Rate	58 gpm
Average Net Filtrate	56 gpm
Backwash Flow Rate	70 gpm
Approx. Net Filtrate Production per Day	80,010 gpd
Backwash Waste Volume per Day	1,519 gpd
Influent Used for Rinsing/Draining per Day	2,087 gpd
Water Recovery	> 95%
Estimated Maintenance Clean Frequency	Daily to Weekly
Estimated Clean-In-Place Frequency	> 30 Days

Scope of Supply

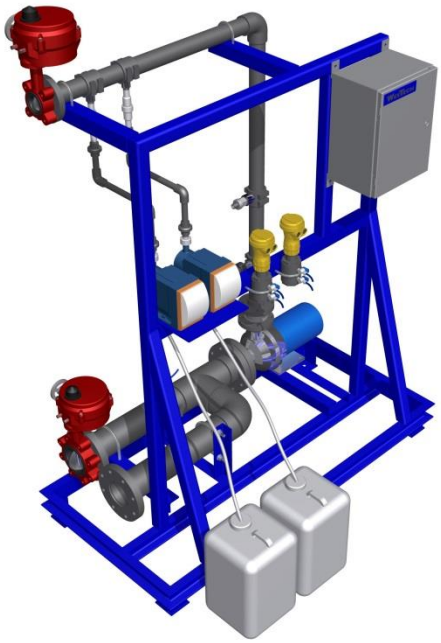
Scope of Supply - AltaPac™ Packaged System			
Item	**Quantity**	**Description**	**Brand (or Equal)**
Membrane Modules	3	Hollow-fiber, outside-in UF, PVDF/TIPS, 0.01 µm	Toray
Skid Frames	1	Welded carbon steel, baked powder-coat	-
Manifold and Supply Piping	-	Schedule 80 PVC 2" feed/filtrate connections	-
Feed / CIP Recirculation Pump	1	-	Goulds
Backwash Pump	1	-	Goulds
Pre-strainer	1	200 micron, automatic backwashing	Valve and Filter
Compressed Air System	1	Compressor, receiver, oil filter, and dryer	Quincy
Clean-In-Place System		*Integral to Packaged System*	
NaOCl Dosing Pump	1/unit	CIP/MC process	ProMinent
Citric Acid Dosing Pump	1/unit	CIP/MC process	ProMinent
CIP Tank	1/unit	HDPE	Tamco
Heater	1/unit	-	Chromalox
pH Sensor/Transmitter	1/unit	-	GF Signet
Temperature Transmitter	1/unit	-	GF Signet
Turbidimeter	1 common feed 1/unit filtrate 2 total	TU5300 sc TU5300 sc	Hach Hach
Flow Meters	1	Bi-directional magnetic flow meter with transmitter	Siemens
Pressure Instrumentation	-	Transmitters, switches, gauges	Wika, Ashcroft
Valves / Actuators	-	Manual and actuated valves	Bray
Electrical Controls	1 Master Panel	NEMA 4, 480 V, 3 ph, PLC, HMI	-
Tanks	By WesTech	Feed, backwash HDPE with level measurement	-
Feed Chemical Addition			
Oxidant Dosing Pump	1	-	Watson Marlow
Coagulant Dosing Pump	1	-	Watson Marlow
Static Mixer	1	-	Komax

Neutralization System

A chemical neutralization system is included in the scope of supply. With this equipment, the CIP and MC waste would be sent to a neutralization tank. From there, a recirculation pump mounted on skid would recirculate the chemical solution through the neutralization skid piping for mixing. During this mixing step, sodium bisulfite or sodium hydroxide, as needed, is dosed by chemical metering pumps to neutralize the cleaning solutions. This process is automatic, and inline pH and ORP sensors verify the solution is sufficiently neutralized.

Neutralization Skid Details

Item	Quantity	Description	Brand (or equal)
Skid Frame	1	Powder-coated carbon steel	-
Piping	-	Schedule 80 PVC	-
Valves	-	Pneumatic valves	Bray
Neutralization Mixing Pump	1	End Suction Centrifugal, ½ HP	Goulds
Sodium Bisulfite Pump	1	For NaOCl quenching	ProMinent
Sodium Hydroxide Pump	1	For acid neutralization	ProMinent
pH Sensor	1	-	GF Signet
ORP Sensor	1	-	GF Signet
Neutralization Tank	1	500 gallons, 4’-0” D / 5’-11½“	Peabody



Neutralization Skid Dimensions:
5’-9”H x 2’-6”W x 5’-7”L

Containerization Details

As part of a complete scope of supply, WesTech will provide containerization of the ultrafiltration equipment. Drawings illustrating equipment layout and interconnecting piping are shown in the attachment section.

Containerization Details

Parameter	Value
Container*	40’ High Cube (8’ W x 40’ L x 9’-6” H) w/ 6’ x 6’ x 2.5’ watertight metal cap for UF module height
Features	Insulation – 2” R-14 closed cell spray-applied polyurethane foam 2T BARD HVAC unit w/10kW electric heat (208/230 V single phase) Programmable thermostat 3’-0” x 6’-8” double-bore galvannealed steel exterior door Coated wood floor with (2) 12” grated floor drains (2) grated cutouts Electrical outlets Electrical switch 3 channel breaker Personnel door Lighting
Equipment Accounted For	AltaPac III Neutralization Skid and Tank Feed and Backwash Tanks Air Compressor Intake and Treated Water Connections
Current Paint Specification	Industrial alkyd enamel on sides and roof

*Shipping container may have minor dents

Additional Services

On-Site Technical Assistance and Training

WesTech has included on-site technical assistance during construction, pre-commissioning and start-up to ensure the equipment is installed and commissioned per WesTech and sub-suppliers requirements. All service visits will be completed by certified field technicians that are qualified and have experience working with WesTech equipment.

Any additional trips that the customer may request can be purchased at the standard WesTech daily rates plus travel and living expenses.

On-Site Technical Service

Service	Number of Trips	Number of Days
Installation and Start-Up Commissioning Assistance, Operator Training	3	15
Total Included Service	3	15

To supplement the above noted technical assistance, WesTech will provide the additional services.

- Technical support during WesTech office hours with a direct phone number to reach a qualified and involved project representative during the equipment warranty period.
- Access to a 24-hour on-call emergency support line.

Item B – Reverse Osmosis System, Model Number ROT41B

Design Overview		
Description	**Unit**	**Dimension/Capacity**
Application	-	Targeted Contaminant Removal
Net Product Flow Rate	gpd	80,000
Anticipated Recovery	%	70
Redundancy and Unit Quantity	-	1 x 100%, (1) total unit
Approximate Dimensions	Per Unit	194” L x 41” W x 78” H
Array	-	2:1 4M

Features & Benefits

WesTech reverse osmosis (RO) systems are designed for ease of installation, straightforward operation, and long-term reliability. WesTech systems are provided as skid-mounted, factory-tested units to minimize field assembly. Major equipment and valving are pre-configured on the skids for efficient and error-free commissioning. System controls are fully automated.

WesTech Membrane Filtration Experience

WesTech has supplied membrane filtration systems for over 15 years. Our membrane filtration group has designed systems for more than 85 facilities in North America. As a company, WesTech has more than 18,000 process equipment installations throughout the world. This experience translates into reliable, time-tested equipment.

Complete Process Experience

WesTech can offer pre- and post-treatment equipment for consolidation of equipment sourcing and process responsibility.

Design Information

Technology Description

Reverse osmosis technology uses semi-permeable membranes for removal of dissolved contaminants, such as TDS, chlorides, and hardness from water. The basic principle of RO involves application of high pressure to counteract natural osmotic pressure to drive water from a more concentrated, feed solution to a pure water permeate. Dissolved impurities are removed during this process.

Water Quality

The single pass RO system is designed to remove dissolved contaminants from an inlet water source with a silt density index (SDI) consistently < 3 and a turbidity < 1 NTU. Waters that do not meet these criteria may require pretreatment, such as ultrafiltration. The overall system recovery is targeted at 60%. This recovery may be improved or hampered by changes in the water quality and fluctuations in dissolved constituent concentrations, like TDS. The RO system has a nominal rejection rate of 99% of dissolved materials including hardness and TDS.

Water Quality*

Description	Unit	Feed	Concentrate	Permeate
Source	-	Groundwater	-	-
Silt Density Index	-	< 5	-	-
Calcium	mg/L	66	219.5	0.17
Magnesium	mg/L	16	53.2	0.04
Sodium	mg/L	829.7	2,749	6.8
Barium	mg/L	0.02	0.07	Non-detect
Sulfate	mg/L	620	2,061	2.3
Chloride	mg/L	911.3	3,017	8.5
Bicarbonate	mg/L	121.9	397.6	1.4
TDS	mg/L	2,570	8,516	19.3
Temperature	°C	10	10	10
pH	-	8.1	8.3	6.1

*Values are assumed and should be verified. Permeate water quality values are projected estimates, not guaranteed values. Water quality may be improved or hampered by changes in the water quality and fluctuations in dissolved constituent concentrations. It should be noted that the use of upstream charged polymeric flocculant aids increases risk of irreversible membrane fouling and should be discussed with WesTech, and this risk is applicable to all polymeric membranes. The presence of oil and grease in the source water should also be avoided.

The single pass RO system is designed to remove dissolved contaminants from the inlet water source with a silt density index (SDI) consistently of 5 or lower, such as ultrafiltration.

The recovery of the system is preliminarily designed as 70%, but may be improved or hampered by changes in the water quality and fluctuations in dissolved constituent concentrations, like TDS. The RO system has a nominal rejection rate of 95 – 99% of dissolved materials including hardness and TDS. Arsenic rejection can range from approximately 70% - 99% depending on speciation.

Process Description

Described in this proposal is the preliminary process and equipment design of a WesTech reverse osmosis membrane filtration system. The system consists of one (1) membrane filtration unit sized to achieve a net production capacity of 80,000 gpd. Each unit is designed as a single-pass, two-stage system in a 2:1 4M configuration with 12 elements installed. The overall system recovery is targeted as 70%.

Reverse osmosis technology uses semi-permeable membranes for removal of dissolved contaminants, such as TDS, chlorides, and hardness from water. The basic principle of RO involves application of high pressure to counteract natural osmotic pressure to drive water from a more concentrated, feed solution to a pure water permeate. Dissolved impurities are removed during this process.

The process utilizes cross-flow filtration to remove dissolved contaminants from the feed stream, producing a purified water stream (permeate) and a high-solute waste stream (concentrate). Feed water quality will determine the amount of permeate capable of being recovered from feed water. Raw water from the water source is transferred to the feed tank. VFD-controlled feed pumps (by others) direct the source water to a 5-µm cartridge filter for removal of larger debris. VFD-controlled high-pressure pumps boost the feed pressure provided by the feed pumps and drive water through the membranes.

Clean-in-place (CIP) procedures are automated chemical cleaning processes used to recover membrane permeability. The automated clean-in-place procedure is conducted with either sodium hydroxide or hydrochloric acid. A CIP is initiated when normalized permeate flow decreases by ≥10%, normalized salt passage increases by ≥10%, or normalized differential pressure increases by ≥15%.

Following chemical cleaning procedures, the membrane units are flushed to remove residual chemical prior to resuming production. If desired, chemical cleaning waste can be captured and neutralized prior to discharge.

Process Design Summary

System Operating Parameters

Parameter	Value
Daily Treated Production	80,000 gpd
Average Flux	16.6 gpm
Overall Recovery	70%
Array	2:1 - 4M
Total Number of Elements	12
Total Surface Area	4,800 ft^2
Maximum Operating Pressure	203 psi
Maximum Feed TDS	< 10,000 mg/L
Nominal Rejection	99% dissolved solids
Design Operating Temperature	40-85°F

Scope of Supply

Scope of Supply – RO System		
Item	**Quantity**	**Description**
Membrane Elements	12/skid	8” Low Energy Membrane Elements
Element Housings	3 /skid	8" Fiberglass Membrane Housings w/ Stainless Steel Side Ports - 300 psi
Skid Frame	1 x 100%	Powder Coated Carbon Steel Frame
High Pressure Pump*	1/skid	Efficient Vertical Stainless Steel Multi-Stage Booster Pump
Prefilters	1/skid	Multi-Cartridge 304L Stainless Steel Cartridge Housing w/ 5-micron Sediment Cartridge Filters
Pressure Switches	-	Low Pressure Shut-off Switch High Pressure Shut-off Switch
Pressure Instrumentation	-	Pre- and Post-Filter / Pump / Concentrate
Flow Sensors	-	Permeate / Concentrate Rotameters
TDS Monitoring	-	Feed / Permeate
Piping	-	Sch 80 PVC Piping
Valves	-	Composite Feed Solenoid Valve Stainless Steel Globe Throttling Valve
Electrical Controls	-	S-200 Preprogrammed Computer Controller with Variable Frequency Drive (VFD)
Tank	By WesTech	Feed
Permeate Sample Ports	-	-
Clean-In-Place (CIP) Ports	Included	1” FNPT
Chemical Feed	-	Ports & Power Outlet
Chemical Dosing	By WesTech	Antiscalant and SBS pre-treatment pump

CIP System

Scope of Supply – CIP System		
Item	**Quantity**	**Description**
Filter	1	Polypropylene Bag Filter Housing with 10-micron Sediment Bag Filter
Skid Frame	1	Mobile skid with caster wheels
Pressure Instrumentation	-	316L Stainless Steel
Piping	-	Schedule 80 PVC
Mixing Loop with Valve	1	-
Tank	1	Polyethylene Solution Tank with Tank Level Switches
Temperature Gauge	1	-
Flow Meter	1	-
Hose Kit	1	-

Containerization Details

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Containerization Details

Parameter	Value
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Equipment Accounted For	RO System and Feed Tank CIP Skid and Tank Intake and Treated Water Connections
Current Paint Specification	Industrial alkyd enamel on sides and roof

*Shipping container may have minor dents

Additional Services

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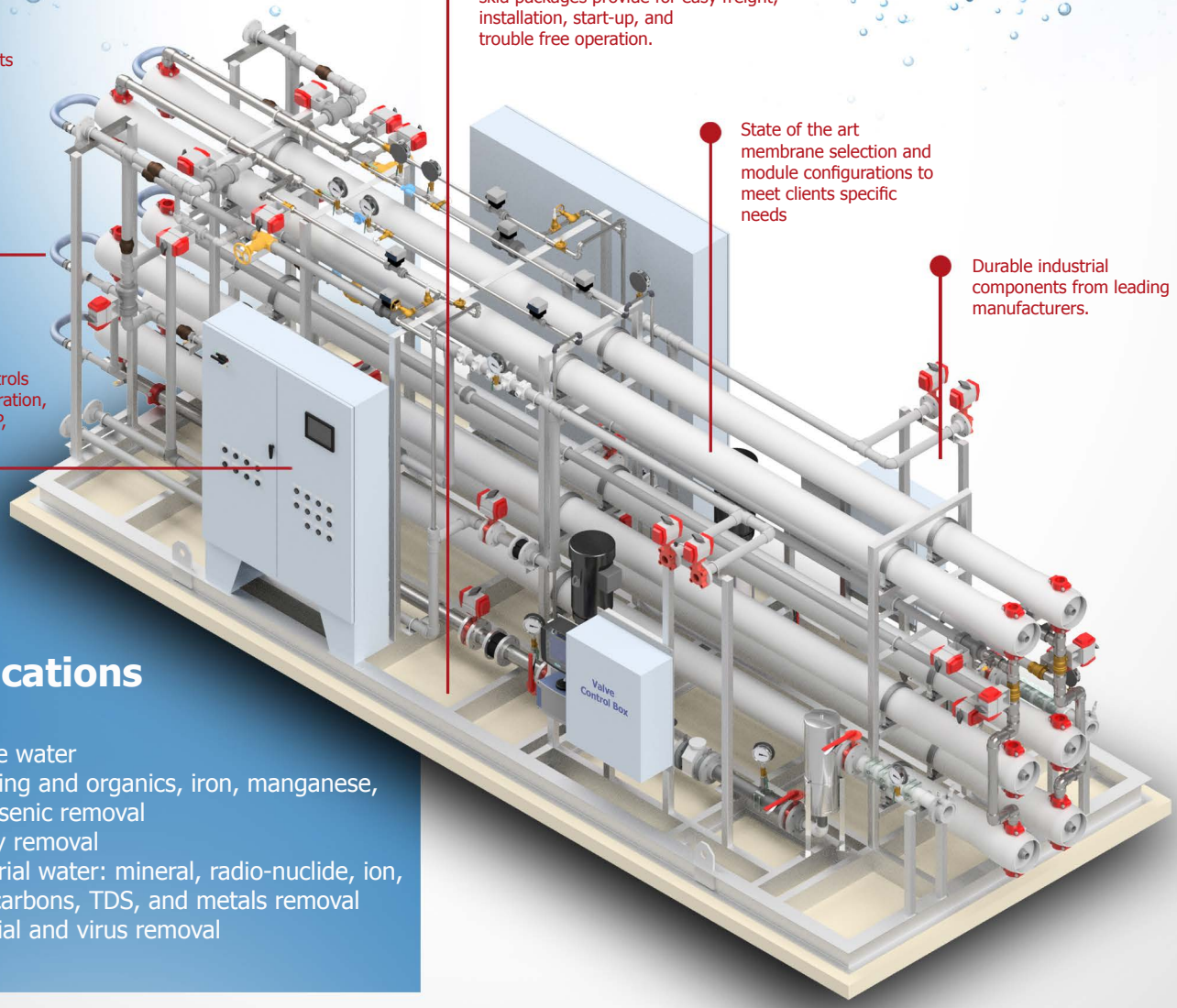
- Access to a 24-hour on-call emergency support line.

This proposal has been reviewed and is approved for issue by Chelsea Stewardson on January 16, 2020

WATER SOLUTIONS LTD.

REVERSE OSMOSIS NANO FILTRATION (RO/NF)

AWC offers packaged, containerized, and modular water and wastewater treatment systems including Reverse Osmosis (RO) and NanoFiltration (NF) technology. These treatment solutions are custom designed using membrane elements from leading suppliers. For each project, advanced performance models are used to select membranes that optimize treatment quality, energy performance, and operational efficiency. Uniquely, AWC also provides conventional or membrane-based pretreatment systems to protect the membranes and improve life cycle costs. Treatment capacities from 5 gpm to 500 gpm per train are available.



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- Single point of responsibility for the entire system including pretreatment, membranes and controls for reduced risk and faster deliveries.
- Advanced controls, instrumentation, and SCADA capabilities improves system accessibility and performance.
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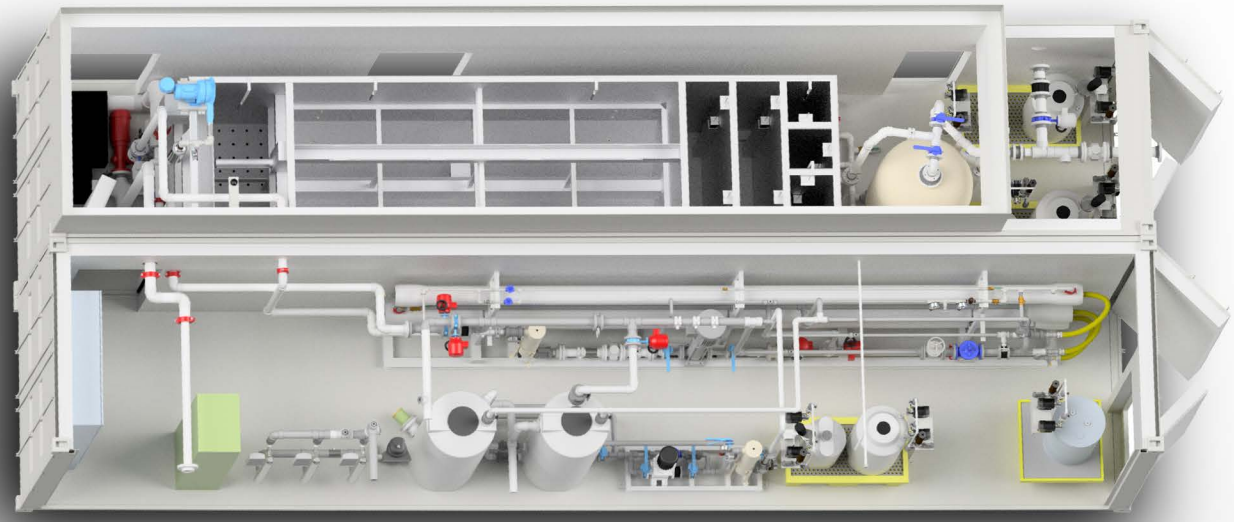

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DN Tanks Informational Package for:

Heather Tugaoen, EIT, Ph.D.
Civil Engineer
Stantec

Shown Above: 2.0 MG Type III Tank – Safford, AZ

SEAN SUDOL, P.E.

REGIONAL MANAGER, ARIZONA

SCOTTSDALE, AZ 85251

Phone: (619) 820-5327| Sean.Sudol@dntanks.com

www.dntanks.com

Generations Strong
P.O. Box 696, El Cajon, CA 92022 | 619.440.8181 | Fax 619.440.8653

June 1, 2020

Heather Tugaoen, EIT, Ph.D.
Civil Engineer
Stantec
3133 W Frye Rd #300
Chandler, AZ 85226

REFERENCE: Prestressed Concrete Tank Informational Package
Tacna Water Management - Clearwell

Mrs. Tugaoen,

DN Tanks is pleased to provide information and budgeting for the proposed Prestressed Concrete water storage tank. The tank will be designed in accordance with all local and national building codes, and national standards including but not limited to: AWWA D110, ASCE 7-16, ACI 350, IBC, etc.

To assist you in your review and evaluation, we included the following attachments:

A. Benefits of a DN Tanks Prestressed Concrete Tank
B. Life Cycle Analysis
C. Welded Steel Maintenance Bid Results
D. Example Photos of Prestressed Concrete Tanks
E. Prestressed Concrete Tank Budget Letter

Thank you for the opportunity to submit this information. We look forward to working with you further on your upcoming tank project. If you have any questions or need additional information, please call me at (619) 820-5327.

Sincerely,
DN TANKS | *Generations Strong*

Sean Sudol, PE
Regional Manager – Arizona
Mobile: (619) 820-5327

Attachment A

Benefits of a DN Tanks Prestressed Concrete Tank

DYK and Natgun
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June 1, 2020

Heather Tugaoen, EIT, Ph.D.
Civil Engineer
Stantec

Thank you for your interest in prestressed concrete tanks. We have prepared this letter to demonstrate the value of selecting a DN Tanks Prestressed Concrete Tank for your proposed projects in Yuma County, AZ. This letter highlights the benefits of a prestressed concrete tank, includes information about DN Tanks, and addresses concerns of welded steel tanks.

BENEFITS OF A PRESTRESSED CONCRETE TANK

Concrete Provides Enhanced Water Quality – Reducing Stratification Concerns:
In warm weather climates it has been observed that steel tanks will transfer heat to the water, creating stratification due to the warmer water rising to the top of the tank. This stratification can create dead zones at the top of the tank leading to water quality issues. A prestressed concrete tank's total wall thickness is typically 8-12", meaning it provides enhanced insulation properties. This insulation keeps the water cooler and assists in maintaining a more consistent temperature, thus increasing overall water quality. For example, the City of Henderson in Clark County, NV had noted that the prestressed concrete tanks in their system were maintaining water temperatures as much as 7 degrees cooler than that of their all steel tanks, and also maintained higher chlorine residual levels due to these cooler temperatures.

Reduced Site Work Costs For the Project:
For constructability, the concrete tank requires only 12' temporary track from the outside face of the tank wall for the prestressing application. A welded steel tank typically requires a permanent 15'-20' maintenance track around the exterior of the tank foundation. Furthermore, if a steel tank is placed in a depression, it will require expensive retaining walls to allow for these permanent maintenance tracks. By selecting a concrete tank, the Owner can significantly reduce the amount of excavation required for the project due to the track's reduction.

Differentially Backfilled Prestressed Concrete Tank

Concrete tanks can also be partially and differentially buried without adding significant cost to the tank. This can assist in balancing the sites excavated material, thus reducing site work costs. Partially burying the tank will also help blend the tank into its natural surroundings, enhancing the aesthetics of the tank, with or without the selection of exterior aesthetic treatments. Partially or fully buried tanks also have the option to utilize multiple use roof structures.

Steel Tank Coating Concerns and Maintenance Costs:
Prestressed concrete tanks offer reliable, no maintenance service for the life of the tank. The selection of a DN Tanks Prestressed Concrete Tank is made to provide a water storage facility that does not require expensive long-term maintenance and disruption to the servicing area. DN Tanks, while typically slightly higher in initial construction cost, will provide the Owner with the lowest long-term ownership costs.

The life cycle analysis included with this package depicts a comparison of the impact of an initial construction cost along with maintenance costs between a prestressed concrete tank and a welded steel tank.

The comparison is shown for two sizes, but in this letter, we will base the analysis on a 150,000 gallon tank with a 100 year life term expectancy. We assume the steel tank is designed in accordance with AWWA D100, Section 3 with the additional required corrosion allowance. A typical maintenance cycle of a welded steel tank requires a sandblast and recoating of the tank's surface area. We have estimated the maintenance for both the interior and the exterior of a welded steel tank using the average steel tank painting cost of $15.00 / $15.00 respectively per square foot at these sizes.

As shown in the Life Cycle Analysis for the 150,000 gallon tank, by choosing a DN Tanks Prestressed Concrete Tank, the Owner is expected to save approximately $142,722 (in today's costs) every 20 years, and $570,000 over the expected life span of the tank. This costly maintenance is a requirement of steel tanks, as steel tank life is dependent upon the prevention of corrosion and the performance of said maintenance. You will notice that a prestressed concrete tank often becomes the more economical option within one maintenance cycle for the steel tank.

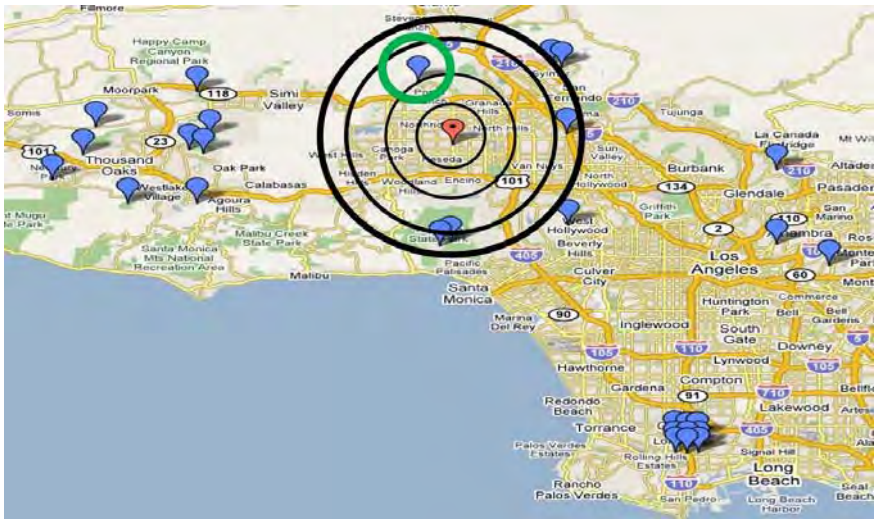
In additional to these mandatory coating costs, the issue of coatings for steel tanks seems to have become considerably more controversial as of late. The traditional coatings have fallen out of favor in many parts of the country due to the health and taste problems sometimes attributed to volatile organics leaching out of the coatings and into the water. Furthermore, the maintenance requirements for a steel tank dictate that the tank be removed from service while undergoing its maintenance. This can typically last about 1 to 2 months and is usually done during the summer months when the water storage is needed most. The selection of a DN Tank eliminates the need to take the tank out of service. Lastly, many new coatings experience much shorter lifespans due changes in coating chemistry mandated by environmental regulations, which has also negatively impacted coatings costs.

Concrete Reinvests 70% of Tank Cost Into Local Involvement:
An additional benefit of constructing a DN Tank is the high degree of local involvement. When the investment is made in a prestressed concrete tank, a large portion of the construction cost is immediately reinvested into the local economy. While we supply the supervisory personnel and key specialty skills and equipment, the majority of the material and expense cost for construction of the concrete tank is from local sources including concrete suppliers, lumber yards, equipment rentals, and local labor. The economy within and around the Owner's area shares with us the investment in the water storage tank. The majority of the cost of a steel tank, on the other hand, is in the manufacturing and shipping of the steel plates, which results in very little stimulus to the local economy.

Reduced Freeboard Requirements (Pertinent to high seismic regions):
For welded steel tanks, per AWWA D100, the amount of freeboard typically matches that of the calculated sloshing wave height. Prestressed concrete tanks can be designed to resist a portion of the sloshing wave due to the concrete roof structure. For a Prestressed Concrete Tank, freeboard can typically be **reduced** by 2.0' to 7.0' depending on the roof type, seismic accelerations, and connection detailing. Because of this resistance to sloshing, concrete tank roofs have lower overall profiles, which are ideal in projects located in residential areas or wherever overall structure heights are a concern.

Seismic Reliability (Pertinent to high seismic regions):
Prestressed concrete tanks have shown outstanding seismic performance for several decades. The design of prestressed concrete tanks takes into consideration vertical and horizontal accelerations, the sloshing of the water, and overturning moments. With numerous prestressed concrete tanks located in the Western United States in areas of high seismic activity, DN Tanks has never experienced any earthquake-induced structural problems. For example, a significant number of our tanks were located just a few miles from the epicenter of both of the San Fernando earthquakes (1971 and 1994). None of our tanks experienced any damage during these earthquakes and are still serving well today. Alternatively, several steel tanks located near the epicenters of these two earthquakes had their walls buckle inducing catastrophic failures.

As further tribute to the ductility of prestressed concrete tank walls, during the 1994 Northridge earthquake one of our tanks, located within a mile of the hard hit downtown area, experienced no damage whatsoever. Several houses adjacent to the tank site, however, were severely damaged.



Pictured to the Left:

The 6.8M Northridge Earthquake of 1994. The red pin represents the epicenter of the earthquake and the black circles represent the areas most affected by it. The blue pins depict local DN Tanks and the circled blue pin is our 10.0 MG Susana Water Storage Tank that experienced no damage.

INFORMATION ON TANK DESIGNER AND BUILDER

DN Tanks is a tank manufacturer specializing in the design and construction of prestressed concrete tanks. DN Tanks has constructed more than 3,000 tanks since 1930's with capacities ranging from 40,000 gallons to upwards of 42,000,000 gallons and has been working with clients for over 80 years to deliver the highest quality tanks, on-time and within budget throughout the United

Local DN Tanks' headquarters located in El Cajon, CA

States and around the world. DN Tanks has significant experience in the high seismic regions of the Pacific Rim and Southwest. To date, all of DN Tanks 800 Southwest tank structures have performed successfully in every major earthquake since our first project built.

DN Tanks designs and constructs a strand-wound, circular prestressed concrete potable water storage tank as defined as Type I in ANSI/AWWA Standard D110. The tank is designed and constructed in accordance with the following standards and codes: ANSI/AWWA D110; ACI 350; ACI 350.1; ACI 350.3; ACI 372R, ASCE 7, CBC, International Building Code and Local Codes.

Design:
DN Tanks' California based in-house engineering staff includes **14 Professional Engineers registered in California & Arizona, 4 EITs and 4 CAD designers** who are available to support the design or inspection processes. Having local engineering resources available at any time allows our Engineering staff to quickly and efficiently complete the tank design and shop drawings. The engineering team assigned to your project will be led by our Engineering Manager who has over 20 years of design and construction experience in the Southwest.

Construction:
DN Tanks has **46 tank construction crews, 17 of which are Southwest based.** Our on-site superintendents have an average of over 10 years of experience with DN Tanks. In addition, our San Diego, CA corporate office houses our project management, engineering, procurement, safety, warehousing, accounting, etc. All of the vital support services that are key to a successful project. In summary, our expertise and resources will allow for the project to move forward expeditiously with a focus on quality and safety. In addition, any tank construction questions will be quickly addressed by DN Tanks while we work in partnership with your team to find solutions that best fit the project needs.

Safety:
DN Tanks is committed to safety in all aspects of our tank construction. Our safety team is led by a Safety Director who is also located in our California Corporate office. DN Tanks takes the safety of our employees and all persons on the job site with the utmost priority. We have developed and implemented an extensive safety program that addresses all aspects of our tank construction activities to ensure our employees remain safe at all times.

Proven Premium Product:
Prestressed concrete tanks are considered a premium product in the water industry due to many of the benefits described in this letter. DN Tanks' long and successful track record of experience is the result of a proven quality tank product designed for long-term durability and exposure to actual climate conditions.

<u>Benefits of Prestressed Concrete Tanks in Summary:</u>

A. Concrete tanks require less down-time for maintenance (down-time will cost you more money and could present operational and safety problems).

B. No safety or liability problem from having an open pit around the tank if it is placed in a depression. Steel tanks will often require expensive retaining walls to allow for permanent maintenance tracks.

C. No potential health, taste or liability problems from interior coatings.

D. Prestressed Concrete Tanks are less conductive, and therefore less susceptible to exterior temperature fluctuations, enhancing water quality.

E. Lower profile since the roofs can be flat and can resist sloshing.

F. Partially or fully buried structures with multiple use roof structures.

G. Aesthetically pleasing since architectural treatment can be added.

H. Less susceptible to sabotage damage such as from rifle shooting.

I. Less susceptible to fire damage.

J. Less susceptible to earthquakes since the wall, roof and footings do not have "fixed" connections, which allow all three components of the tank structure to move independently of each other in an earthquake.

K. Concrete tanks require only a temporary 10' wide work road around the tank where steel tanks require a permanent 15'-20' wide maintenance track. For some sites the requirement for a maintenance track can lead to costly retaining walls for steel tank installations.

Thank you for the opportunity to provide this package. If you have further questions on any of the above information, please feel free to contact me directly at (619) 820-5327.

Sincerely,

DN TANKS | *Generations Strong*

Sean Sudol, PE
Regional Manager – Arizona
Mobile: (619) 820-5327
Email: sean.sudol@dntanks.com

Attachment B

Life Cycle Analysis

150,000 Gallon Life Cycle Cost Analysis
Welded Steel Tank vs. Prestressed Concrete Tank

Tank Dimensions For Usable Water Volume

Tank Diameter =	36.0	FT.
Side Water Depth =	20.00	FT.
Usable Tank Capacity (Floor Slope 0%) =	**0.16**	MG

NOTE: Usable is defined as the full side water depth (Finish floor to overflow)

Welded Steel Tank Dimensions

Assumed Freeboard =	1	FT.
Total Steel Tank Volume =	**0.16**	MG
Assumed Steel Tank Cost =	$ 350,000.00	DOLLARS

Prestressed Concrete Tank Dimensions

Assumed Freeboard =	1	FT.
Total Prestressed Concrete Tank Volume =	**0.16**	MG
Assumed Prestressed Concrete Tank Cost =	$ 500,000.00	DOLLARS

Welded Steel Tank Maintenance Costs

Return Period	Maintenance Scheduled	Sq Ft	Unit Price	Total Price
20	Blast exterior and re-application of coating	3,456	$15.00	$51,840.00
20	Blast interior and re-application of coating	4,473	$15.00	$67,095.00
20	Engineering Design Cost (Estimate 10%)			$11,893.50
20	Construction Management / Inspection Cost (Estimate 10%)			$11,893.50
TOTAL MAINTENANCE COST PER 20 YEAR RETURN PERIOD				**$142,722.00**

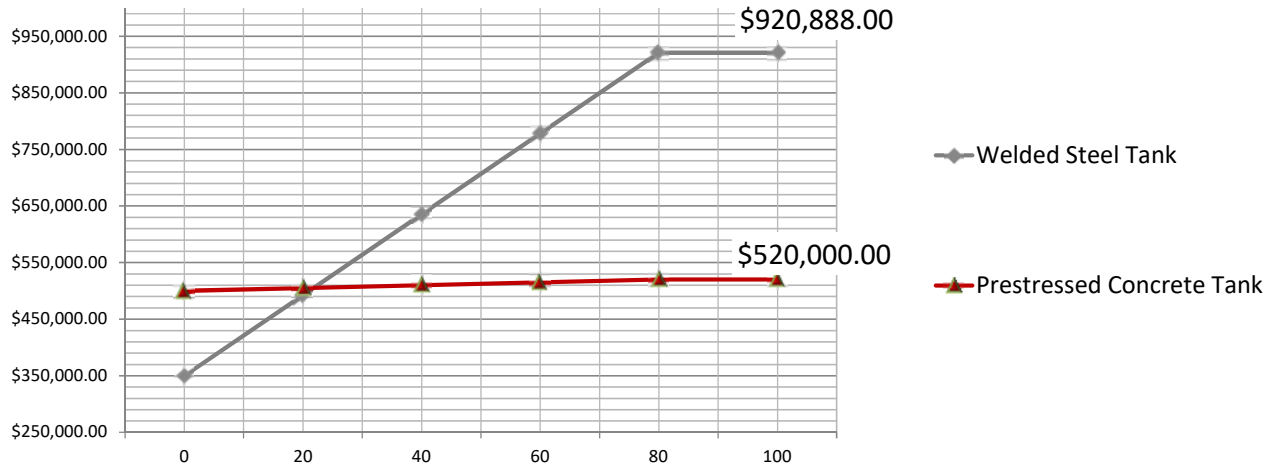
Prestressed Concrete Tank Maintenance Costs

Return Period	Maintenance Scheduled	LS	Unit Price	Total Price
20	Powerwashing, Routine Maintenance, and Inspection	LS	$5,000.00	$5,000.00
TOTAL MAINTENANCE COST PER 20 YEAR RETURN PERIOD				**$5,000.00**

100 Year Total Cost of Ownership Comparison

	Capital and Maintenance Cost Schedule		Cumulative Total Cost of Ownership	
Year	Prestressed Concrete	Welded Steel	Prestressed Concrete	Welded Steel
0	$500,000.00	$350,000.00	$500,000.00	$350,000.00
20	$5,000.00	$142,722.00	$505,000.00	$492,722.00
40	$5,000.00	$142,722.00	$510,000.00	$635,444.00
60	$5,000.00	$142,722.00	$515,000.00	$778,166.00
80	$5,000.00	$142,722.00	$520,000.00	$920,888.00
100			**$520,000.00**	**$920,888.00**

100 Year Total Cost of Ownership Comparison By Tank Type



Attachment C

Welded Steel Maintenance Bid Results

PWP-WA-2020-038

2019/2020 Tank Improvements

				Farr Construction Corp dba Resource Development Co		Paso Robles Tank - Brown-Minneapolis Tank, Inc.	
				Total Price	**$924,180.00**	**Total Price**	**$997,000.00**
Line #	**Description**	**QTY**	**UOM**	**Unit**	**Extended**	**Unit**	**Extended**
1	**STMGID 3 TANK**	**1**		**$414,180.00**	**$414,180.00**	**$446,500.00**	**$446,500.00**
1.1	1A. Mobilization, Insurance, Bonds, Submittals, and Permits as Required. This item is to include only items necessary and preliminary to performance of the work. Obviously unbalanced bids may be considered to be unresponsive. See Section 7.01 of the General Conditions for details.	1	LS	**$15,000.00**		**$15,000.00**	
1.2	2A. Modify Existing Ladder. The existing ladder on this tank is vulnerable to climbing, and shall receive a cage of expanded metal over the lower 8-ft of the existing cage as shown on the ladder detail in the Improvement Plans.	1	LS	**$3,000.00**		$10,500.00	
1.3	3A. Seal Unused/Abandoned Penetrations. This item includes removal of such items as the existing level indicator and pressure sender from the roof, sealing of supplementary vent openings, and cutting pipe and conduit penetrations flush with the roof. All openings shall be sealed by continuous welding of plate matching or exceeding the thickness of the host tank plate.	1	LS	**$2,500.00**		$8,500.00	
1.4	4A. Air Gap. This item includes construction of an air gap to prevent backflow and contamination through the existing 6 overflow pipe. The existing overflow pipe outlet is fitted with a rubber duckbill just above a storm drain inlet that is to be removed and replaced with pipe. See Improvement Plans for complete details.	1	LS	**$4,000.00**		$10,500.00	
1.5	5A. Install New Inward-Swing 36 Manways. The existing bolted, outward-swing manways are to be removed and replaced with inward-swing manways as shown on the Improvement Plans. This bid item shall include removal and disposal of the existing manway, and modifying the shell opening to accommodate the new manway.	2	EA	$9,900.00		**$8,500.00**	
1.6	6A. Tank Vent. Contractor shall provide and install an AWWA center roof vent, gasket, and hardware as shown on the Improvement Plans. The tank center vent pipe and flange shall be modified as necessary to accommodate the vent diameter, gasket, and bolt pattern. The vent shall be sized to accommodate the air flow shown on the Improvement Plans.	1	EA	$8,500.00		**$5,500.00**	
1.7	7A. Roof Railing and Safety Cable. Install wing extensions to the existing roof railing at the top of the ladder; install welded roof posts; thread stainless steel cable through posts and secure at each end. See Improvement Plans for details.	1	LS	$7,500.00		**$5,000.00**	
1.8	8A. Paving. This bid item includes removal of excess material, final grading, placement and compaction of Type 2 Class B aggregate base, and placement and compaction of AC pavement to the limits shown on the Improvement Plans.	5800	Sq Ft	$9.60		**$7.50**	

PWP-WA-2020-038

2019/2020 Tank Improvements

				Farr Construction Corp dba Resource Development Co		Paso Robles Tank - Brown-Minneapolis Tank, Inc.	
				Total Price	$924,180.00	Total Price	$997,000.00
Line #	Description	QTY	UOM	Unit	Extended	Unit	Extended
1.9	9A. Drainage Swale. The Contractor shall cut a drainage swale along the edge of the proposed paved area to catch and divert runoff. The Improvement Plans show details and alignment.	250	LF	**$90.00**		$120.00	
1.10	10A. Install New 36 Square Roof Hatch. Contractor shall fabricate and install a new 36 square roof hatch meeting the requirements of AWWA D100. This bid item shall include removal and disposal of the existing hatch, and modifying the roof opening to accommodate the new hatch. See the Improvement plans for details.	1	EA	**$3,500.00**		$5,000.00	
1.11	11A. Sample Tap. This tank will require the installation of a two-tap water quality sampling station in the tank shell with valves and internal tank piping. Both taps are to be located in the same hand hole. The taps will require fabrication and assembly as detailed in the Improvement Plans.	1	EA	**$3,400.00**		$3,500.00	
1.12	12A. New Liquid Level Indicator Vault. Install a new concrete vault with lid to house the new liquid level indicator pressure transducer provided as part of Bid Item 13A. This item includes all work shown on the liquid level indicator vault detail of the Improvement Plans including the new stainless steel piping into the tank, and final grading. This work under and around the edge of the tank is critical, and shall be coordinated with, and supervised by the TMWA Project Representative.	1	EA	**$19,500.00**		$35,000.00	
1.13	13A. Telemetry Work. This bid item includes all conduit, conductors, pull boxes, equipment, and appurtenances complete and in-place per the Improvement Plans. TMWA staff will terminate/land all conductors. Any equipment not specifically called out as TMWA-provided shall be provided and installed by the Contractor.	1	LS	$37,200.00		**$30,000.00**	
1.14	14A. Exterior Blasting and Painting. This bid item includes complete blasting of all exterior steel surfaces including the removal of all mill scale, surface staining, and rust to SSPC-SP6 commercial. All welds and irregularities are to be stripe coated by hand, and the specified coating system is to be applied per manufacturers recommendations. Also to be included are dehumidification and/or heating in the event that weather does not allow completion of all Work prior to the contract completion date. All metal surfaces of the tank, except piping, valves, and electrical conduit shall be coated and painted. Electrical flex conduit shall not be painted. It may not be required to remove existing metal conduit attached to the tank prior to blasting and coating.	1	LS	**$52,300.00**		$65,000.00	

PWP-WA-2020-038

2019/2020 Tank Improvements

				Farr Construction Corp dba Resource Development Co		Paso Robles Tank - Brown-Minneapolis Tank, Inc.	
				Total Price	**$924,180.00**	**Total Price**	**$997,000.00**
Line #	**Description**	**QTY**	**UOM**	**Unit**	**Extended**	**Unit**	**Extended**
1.15	15A. Interior Blasting and Coating. This bid item includes complete interior blasting of all steel surfaces beams, columns, and appurtenances to near white, stripe-coating of all welds by hand, spray application of specified coating system per manufacturers recommendations, and final interior washdown. The contractor shall expect areas of heavy rust and mill scale, and is directed to include removal of these and all contaminants in this bid item. Also to be included are dehumidification and/or heating in the event that weather will not allow completion of the Work prior to the project completion date.	1	LS	$159,300.00		**$155,000.00**	
1.16	16A. Demobilization including cleanup, as-builts, and project closeout.	1	LS	**$500.00**		$7,500.00	
2	**STMGID 5 Tank**	**1**		**$510,000.00**	**$510,000.00**	**$550,500.00**	**$550,500.00**
2.1	1B. Mobilization, Insurance, Bonds, Submittals, and Permits as Required. This item is to include only items necessary and preliminary to performance of the work. Obviously unbalanced bids may be considered to be unresponsive. See Section 7.01 of the General Conditions for details.	1	LS	**$15,000.00**		**$15,000.00**	
2.2	2B. Modify Existing Ladder. The existing ladder on this tank is vulnerable to climbing, and shall receive a cage of expanded metal over the lower 8-ft of the existing cage as shown on the ladder detail in the Improvement Plans.	1	LS	**$3,000.00**		$10,500.00	
2.3	3B. Seal Unused/Abandoned Penetrations. This item includes removal of such items as the existing level indicator and pressure sender from the roof, sealing of supplementary vent openings, and cutting pipe and conduit penetrations flush with the roof. All openings shall be sealed by continuous welding of plate matching or exceeding the thickness of the host tank plate.	1	LS	**$2,500.00**		$8,500.00	
2.4	4B. Air Gap. This item includes construction of an air gap to prevent backflow and contamination through the existing 12 overflow pipe. See Improvement Plans for complete details.	1	EA	**$4,000.00**		$10,500.00	
2.5	5B. Install New Inward-Swing 36 Manways. The existing bolted, outward-swing manways are to be removed and replaced with inward-swing manways as shown on the Improvement Plans. This bid item shall include removal and disposal of the existing manway, and modifying the shell opening to accommodate the new manway.	2	EA	$9,900.00		**$8,500.00**	
2.6	6B. Tank Vent. Contractor shall provide and install an AWWA center roof vent, gasket, and hardware as shown on the Improvement Plans. The tank center vent pipe and flange shall be modified as necessary to accommodate the vent diameter, gasket, and bolt pattern. The vent shall be sized to accommodate the air flow shown on the Improvement Plans.	1	EA	$8,500.00		**$5,500.00**	

PWP-WA-2020-038

2019/2020 Tank Improvements

				Farr Construction Corp dba Resource Development Co		Paso Robles Tank - Brown-Minneapolis Tank, Inc.	
				Total Price	$924,180.00	Total Price	$997,000.00
Line #	Description	QTY	UOM	Unit	Extended	Unit	Extended
2.7	7B. Roof Railing and Safety Cable. Modify the existing roof railing at the top of the ladder including the installation of wing extensions to the existing roof railing at the top of the ladder; install welded roof posts; thread stainless steel cable through posts and secure at each end. See Improvement Plans for details.	1	LS	$7,500.00		**$5,000.00**	
2.8	8B. Drainage Swale Riprap. The Contractor shall place riprap in existing drainage swales as shown on the Improvement Plans.	50	CY	$520.00		**$300.00**	
2.9	9B. Modify Existing 36 Square Roof Hatch. Contractor shall remove the existing 36 roof hatch lid, rotate it 180-degrees, and reattach. Also included is a hold-open chain latch. See the Improvement plans for details.	1	EA	**$3,500.00**		$5,000.00	
2.10	10B. Sample Tap. This tank will require the installation of a two-tap water quality sampling station in the tank shell with valves and internal tank piping. Both taps are to be located in the same hand hole. The taps will require fabrication and assembly as detailed in the Improvement Plans.	1	EA	**$3,400.00**		$3,500.00	
2.11	11B. New Liquid Level Indicator Vault. Install a new concrete vault with lid to house the new liquid level indicator pressure transducer provided as part of Bid Item 13A. This item includes all work shown on the liquid level indicator vault detail of the Improvement Plans including the new stainless steel piping into the tank, and final grading. This work under and around the edge of the tank is critical, and shall be coordinated with, and supervised by the TMWA Project Representative.	1	EA	**$32,900.00**		$35,000.00	
2.12	12B. Telemetry Work. This bid item includes all conduit, conductors, pull boxes, equipment, and appurtenances complete and in-place per the Improvement Plans. TMWA staff will terminate/land all conductors. Any equipment not specifically called out as TMWA-provided shall be provided and installed by the Contractor.	1	LS	$32,600.00		**$30,000.00**	

PWP-WA-2020-038

2019/2020 Tank Improvements

				Farr Construction Corp dba Resource Development Co		Paso Robles Tank - Brown-Minneapolis Tank, Inc.	
				Total Price	$924,180.00	Total Price	$997,000.00
Line #	Description	QTY	UOM	Unit	Extended	Unit	Extended
2.13	13B. Exterior Blasting and Painting. It was determined from pre-design XRF testing that some areas of the exterior coating of the STMGID5 tank contains small amounts of lead (less than or equal to 0.19 mg/sq cm). This is NOT lead-based paint, but localized lead-containing paint. Due to the proximity of this tank to residences, and the nature of abrasive blasting, the Contractor will be required to submit and comply with an OSHA lead compliance plan for this site. The plan and associated Work shall be accounted for in this bid item. This bid item includes complete blasting of all exterior steel surfaces including the removal of all mill scale, surface staining, and rust to SSPC-SP6 commercial. All welds and irregularities are to be stripe coated by hand, and the specified coating system is to be applied per manufacturers recommendations. Also to be included are dehumidification and/or heating in the event that weather does not allow completion of all Work prior to the contract completion date. All metal surfaces of the tank, except piping, valves, and electrical conduit shall be coated and painted. Electrical flex conduit shall not be painted. It may not be required to remove existing metal conduit attached to the tank prior to blasting and coating.	1	LS	**$96,200.00**		$170,000.00	
2.14	14B. Interior Blasting and Coating. This bid item includes complete interior blasting of all steel surfaces beams, columns, and appurtenances to near white, stripe-coating of all welds by hand, spray application of specified coating system per manufacturers recommendations, and final interior washdown. The contractor shall expect areas of heavy rust and mill scale, and is directed to include removal of these and all contaminants in this bid item. Also to be included are dehumidification and/or heating in the event that weather will not allow completion of the Work prior to the project completion date.	1	LS	$254,600.00		**$210,000.00**	
2.15	15B. Demobilization including cleanup, as-builts, and project closeout.	1	LS	**$500.00**		$10,000.00	

Town of Florence
Bid Tabulation Sheet

[ ] Verbal (only allowed when $5,000 of less)

[ ] Written/Fax (mandatory when over $5,000; attach bids)

[x] Formal Sealed Bid: # N/A **WATER SYSTEM REHABILITATION & PROTECTIVE COATING FOR WATER STORAGE TANKS**

Date Prepared:

Prepared By: Maria Hernandez, Deputy Town Clerk

Bid Due Date: 11-3-16 Bid Due Time: 2:00 pm

Item (include quality, brand, model, color)

Vendor name Contact Person Phone/Fax	1 original 4 copies	Bid Form	Bid Schedule	Acknowledgement of Addenda	List of Subcontractors	Statuatory Bid Bond	Resolution of Board of Directors	Non-Collusive Bidding Certificaton	W-9 Form	TOTAL *Alternates not included in base bids	COMMENTS
1 TMI Coating, Painting & Restoration Contractors 3291 Terminal Drive St. Paul MN 55121 PH #	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**$431,000.00**	
2 Riley Industrial Services, inc. P O Box 2014/2615 San Juan Blvd. Farmington NM 87499-2014 PH # 505-327-4947	Yes, 1 extra copy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**$474,070.00**	
3 Utiltiy Service Co, Inc. 535 Coutney Hodges Blvd. Perry GA 31069 PH #	1 complete packet; 5 partial packets	Yes	Yes	Yes	Yes	Yes	Yes	No	No	**$530,780.00**	
4 Superior Tank Solutions 8560 Lucas Ranch Road Rancho Cucamonga CA 91730 PH #	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**$359,950.00**	
5 Revolution Industrial 6793 W. Willis Road Chandler AZ 85226 PH #	1 complete packet; 5 partial packets	Yes	Yes	Yes	Yes	Yes	Remitted, but not completed	Yes	Yes	**$334,931.00**	
6 MMI Tank and Industrial Services 3240 S. 37th Avenue Phoenix AZ 85009 PH #	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Not commpleted	Yes	**$511,718.00**	

Attach additional page(s), if necessary

Vendor Selected _____ **Address** _____

Justification (if not lowest price) _____

Department Head Approval _____ Date: _____

Finance Director Approval _____ Date: _____

Town Manager Approval _____ Date: _____

*If over $25,000, must go to Town Council for approval.
Attach this approved for to purchase request with written quotes, if applicable.

Attachment D

Example Photos of Prestressed Concrete Tanks

MUIR
BEACH
GOLDEN GATE
DN
TANKS

DN
TANKS

DN
TANKS

DN
TANKS

DN
TANKS

DN
TANKS

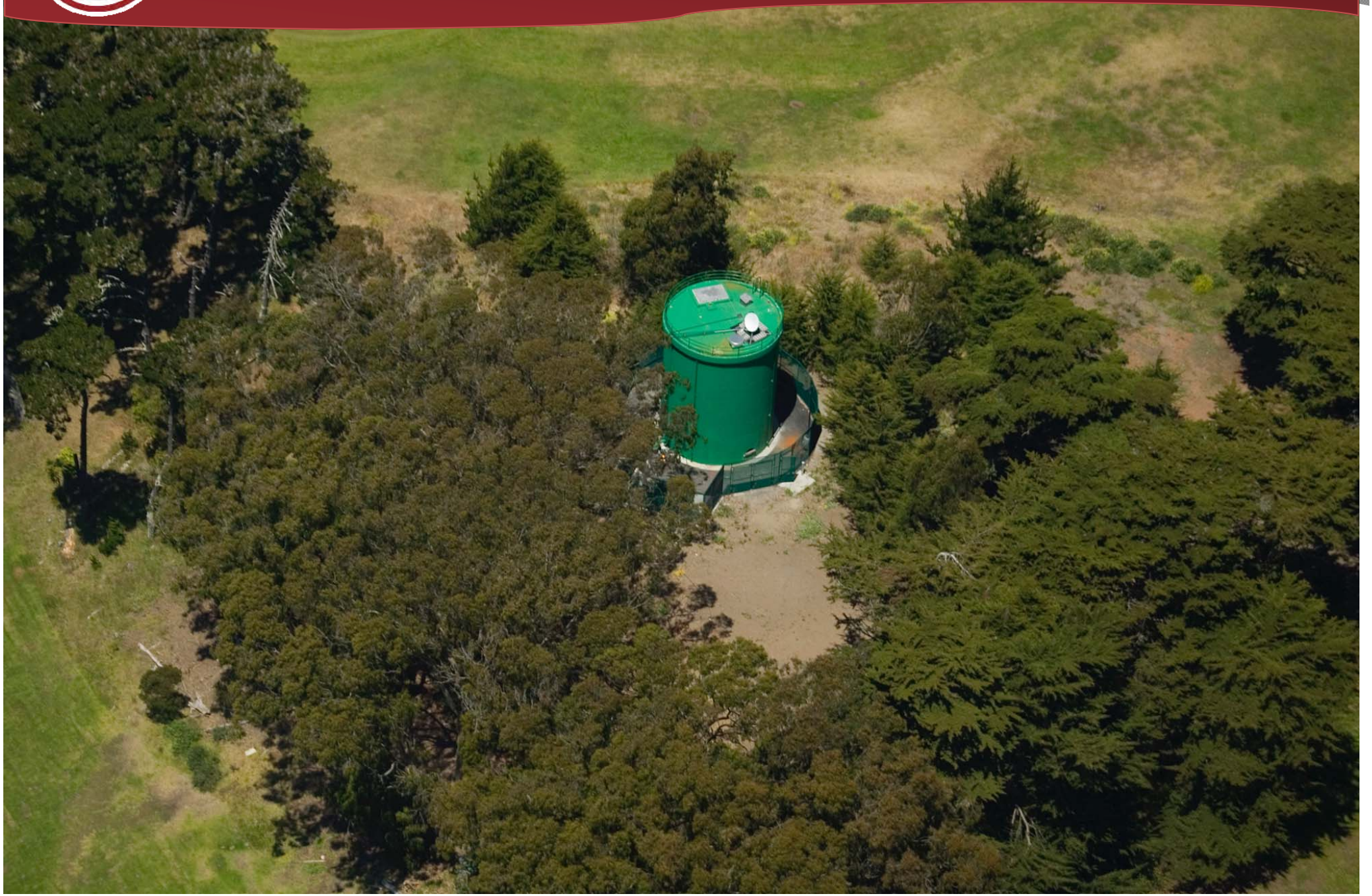
500,000 Galloon Corvallis, OR

80,000 and 290,000 Gallon Corvallis, OR

500,000 Gallon Scottsdale, AZ

100,000 Gallon San Francisco, CA

100,000 Gallon San Francisco, CA



Safford, AZ—2.12 MG

Safford, AZ—3.0 MG

Safford, AZ—2.0 MG

DN
TANKS
0.6 MG Mesa, AZ Year Built: 1985

2.0 MG Avondale, AZ , Year Built: 2005

Scottsdale, AZ—0.5 MG

Scottsdale, AZ—1.0 MG

Carefree, AZ—1.0 MG

Avondale, AZ—1.0 MG

Oro Valley, AZ—1.5 MG

Buckeye, AZ—1.735 MG

Chandler, AZ—2.0 MG

Chandler, AZ—2.0 MG

Peoria, AZ—2.5 MG

Scottsdale, AZ—3.0 MG

Peoria, AZ—1.5 MG and 2.5 MG

Tucson, AZ—5.0 MG

Scottsdale, AZ—7.0 MG

Attachment E

Prestressed Concrete Tank Budget Letter

Generations Strong
P.O. Box 696, El Cajon, CA 92022 | 619.440.8181 | Fax 619.440.8653

June 1, 2020

Heather Tugaoen, EIT, Ph.D.
Civil Engineer
Stantec

REFERENCE: Prestressed Concrete Tank Budget Letter
Tacna Water Management Company – Treatment Plant

Mrs. Tugaoen,

Thank you for your interest in a prestressed concrete water storage tank. Please find below a budget level estimate for the design and construction of an AWWA D110 circular prestressed concrete tank for the potential project in Tacna, AZ.

Tank Budgeting Information for Prestressed Concrete Tank					
Nominal Capacity	**Roof Type**	**Inside Diameter**	**Side Water Depth**	**Assumed Freeboard**	**Tank Estimate**
150,000 Gallons	Free Spanning Concrete Dome	36’	20’	1’	$500,000
300,00 Gallons	Free Spanning Concrete Dome	41.5’	30’	1.0’	$600,000

The above tank is designed and constructed in accordance with AWWA D110, ACI 350, ASCE 7, IBC, Local Building Codes, and National Standards. The budget-estimating figures include tank structure complete with a standard spread footing, reinforced concrete membrane floor slab, wall footing, free spanning concrete dome roof, permanently compressed prestressed tank walls, and shotcrete cover. The estimate assumes competent soils, if a deep foundation or structural floor slab is required, the estimate would need to be revised. Once a site-specific geotechnical report is available, we are happy to refine our estimate. The above also includes typical tank appurtenances such as vent, 4’ x 8’ hatch, 6” roof sleeve, exterior & interior aluminum ladder, and overflow.

The figures above exclude site work, subgrade preparation, deep foundations, piping, SCADA, exterior aesthetics coatings, etc. Please let me know if you would like a revised estimate with any specific additional appurtenances.

Thank you for this opportunity to be of service. Please feel free to contact me if you have any questions or if I can be of any further assistance.

Sincerely,
DN TANKS | *Generations Strong*

Sean Sudol, PE
Regional Manager – Arizona
Mobile: (619) 820-5327

Appendix E DETAILED COST ESTIMATE

Alternatives Summary - Concrete Tank Option
(details on subsequent pages)

Item Descriptions	Alternative 2B	Alternative 2C	Alternative 4C
Distribution Piping	$ 2,215,460	$ 2,208,660	$ 2,026,420
Raw water pump station	$ 40,000	$ 50,000	$ -
Well	$ 70,000	$ 70,000	$ 130,000
Treatment	$ 620,000	$ 620,000	$ 820,000
Storage	$ 627,000	$ 627,000	$ 627,000
Finished water pumping	$ 57,500	$ 57,500	$ 57,500
Site Work	$ 431,055	$ 431,055	$ 1,622,250
Site Electrical	$ 115,000	$ 115,000	$ 115,000
Land Purchase allowance	$ 80,000	$ 80,000	$ 500,000
SUB-TOTAL	$ 4,256,015	$ 4,259,215	$ 5,898,170
Contingency, 30%	$ 1,276,805	$ 1,277,765	$ 1,769,451
Engineering allowance, 15%	$ 638,402	$ 638,882	$ 884,726
Environmental Mitigations	$ 20,000	$ 20,000	$ 20,000
Grand Total	$ 6,191,222	$ 6,195,862	$ 8,572,347

Preliminary Cost Estimate - Alternative 2B, WMIDD Intake and treated back-up well - treatment and storage by canal

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
1	Distribution Piping				
	- 6/8" diameter pipe	22100	LF	$ 80	$ 1,768,000
	- 4" diameter pipe	0	LF	$ 70	$ -
	- Hydrants	15	EA	$ 3,500	$ 52,500
	- Road restoration	3274	SY	$ 40	$ 130,960
	- Service connections (meters)	132	EA	$ 2,000	$ 264,000
2	Raw water pump station				
	- Wet well	1	EA	$ 20,000	$ 20,000
	- pumps	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 10,000
3	Well				
	- Drilling	200	LF	$ 100	$ 20,000
	- pump and drop pipe	1	LS	$ 25,000	$ 25,000
	- above ground piping	1	LS	$ 15,000	$ 15,000
	- electrical	1	LS	$ 10,000	$ 10,000
4	Treatment				
	- Ultrafiltration	1	LS	$ 550,000	$ 550,000
	- disinfection	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 60,000	$ 60,000
5	Storage				
	- tank	1	LS	$ 600,000	$ 600,000
	- piping	1	LS	$ 20,000	$ 27,000
6	Finished water pumping				
	- pumps	3	ea	$ 10,000	$ 30,000
	- pipng	1	LS	$ 2,000	$ 2,000
	- flow meter	1	LS	$ 2,000	$ 2,000
	- pressure tank	1	LS	$ 10,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 13,500
7	Site Work				
	Disposal Pond	1500	CY	$ 25	$ 50,625
	Pond Lining	7260	SY	$ 18	$ 130,680
	Paving	1700	SF	$ 50	$ 114,750
	Gravel	8000	SF	$ 10	$ 108,000
	Fence	400	LF	$ 50	$ 27,000
8	Site Electrical				
	-New pole adjacent to property	1	ea	$ 25,000	$ 25,000
	-Conduit and utility transformer	1	ea	$ 25,000	$ 25,000
	-Transformer and conductors	1	ea	$ 65,000	$ 65,000
9	Land Purchase allowance	2.00	ACRE	$ 40,000	$ 80,000
	SUB-TOTAL				**$ 4,256,015**
	Contingency, 30%				$ 1,276,805
	Engineering allowance, 15%				$ 638,402
	Environmental Mitigations				$ 20,000
	Grand Total				**$ 6,191,222**

Note: This opinion of probable construction cost was prepared based on the current level of design and scope of work and our professional experiences and our best judgment, and present information available to us. Because we have no control over the cost of labour, materials, equipment or services furnished by others, or over the bidding or market conditions, we cannot and do not guarantee our opinion of probable construction cost will not vary from the actual construction bids. This opinion of probable construction cost shall only be used for budgeting purpose. **The estimated cost didn't include taxes, escalation, or any trade risk allowances.**

Preliminary Cost Estimate - Alternative 2C, WMIDD Intake and treated back-up well - treatment and storage by town

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
1	Distribution Piping				
	- 6/8" diameter pipe	19900	LF	$ 80	$ 1,592,000
	- 4" diameter pipe	2400	LF	$ 70	$ 168,000
	- Hydrants	15	EA	$ 3,500	$ 52,500
	- Road restoration	3304	SY	$ 40	$ 132,160
	- Service connections (meters)	132	EA	$ 2,000	$ 264,000
2	Raw water pump station				
	- Wet well	1	EA	$ 20,000	$ 20,000
	- pumps	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 20,000	$ 20,000
3	Well				
	- Drilling	200	LF	$ 100	$ 20,000
	- pump and drop pipe	1	LS	$ 25,000	$ 25,000
	- above ground piping	1	LS	$ 15,000	$ 15,000
	- electrical	1	LS	$ 10,000	$ 10,000
4	Treatment				
	- Ultrafiltration	1	LS	$ 550,000	$ 550,000
	- disinfection	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 60,000	$ 60,000
5	Storage				
	- tank	1	LS	$ 500,000	$ 600,000
	- piping	1	LS	$ 20,000	$ 27,000
6	Finished water pumping				
	- pumps	3	ea	$ 10,000	$ 30,000
	- pipng	1	LS	$ 2,000	$ 2,000
	- flow meter	1	LS	$ 2,000	$ 2,000
	- pressure tank	1	LS	$ 10,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 13,500
7	Site Work				
	Disposal Pond	1500	CY	$ 25	$ 50,625
	Pond Lining	7260	SY	$ 18	$ 130,680
	Paving	1700	SF	$ 50	$ 114,750
	Gravel	8000	SF	$ 10	$ 108,000
	Fence	400	LF	$ 50	$ 27,000
8	Site Electrical				
	-New pole adjacent to property	1	ea	$ 25,000	$ 25,000
	-Conduit and utility transformer	1	ea	$ 25,000	$ 25,000
	-Transformer and conductors	1	ea	$ 65,000	$ 65,000
9	Land Purchase allowance	2.00	ACRE	$ 40,000	$ 80,000
	SUB-TOTAL				**$ 4,259,215**
	Contingency, 30%				$ 1,277,765
	Engineering allowance, 15%				$ 638,882
	Environmental Mitigations				$ 20,000
	Grand Total				**$ 6,195,862**

Note: This opinion of probable construction cost was prepared based on the current level of design and scope of work and our professional experiences and our best judgment, and present information available to us. Because we have no control over the cost of labour, materials, equipment or services furnished by others, or over the bidding or market conditions, we cannot and do not guarantee our opinion of probable construction cost will not vary from the actual construction bids. This opinion of probable construction cost shall only be used for budgeting purpose. **The estimated cost didn't include taxes, escalation, or any trade risk allowances.**

Preliminary Cost Estimate - Alternative 4C, Well and back-up well - treatment and storage by town

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
1	Distribution Piping				
	- 6/8" diameter pipe	19900	LF	$ 80	$ 1,592,000
	- 4" diameter pipe	0	LF	$ 70	$ -
	- Hydrants	15	EA	$ 3,500	$ 52,500
	- Road restoration	2948	SY	$ 40	$ 117,920
	- Service connections (meters)	132	EA	$ 2,000	$ 264,000
2	Raw water pump station				
	- Wet well	0	EA	$ 20,000	$ -
	- pumps	0	EA	$ 5,000	$ -
	- electrical	0	LS	$ 20,000	$ -
3	Well				
	- Drilling	400	LF	$ 100	$ 40,000
	- pump and drop pipe	1	LS	$ 50,000	$ 50,000
	- above ground piping	1	LS	$ 25,000	$ 25,000
	- electrical	1	LS	$ 15,000	$ 15,000
4	Treatment				
	- Filtration and RO	1	LS	$ 750,000	$ 750,000
	- disinfection	1	EA	$ 5,000	$ 5,000
	- electrical	1	LS	$ 65,000	$ 65,000
5	Storage				
	- tank	1	LS	$ 500,000	$ 600,000
	- piping	1	LS	$ 20,000	$ 27,000
6	Finished water pumping				
	- pumps	3	ea	$ 10,000	$ 30,000
	- pipng	1	LS	$ 2,000	$ 2,000
	- flow meter	1	LS	$ 2,000	$ 2,000
	- pressure tank	1	LS	$ 10,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 13,500
7	Site Work				
	Disposal Pond	14000	CY	$ 25	$ 472,500
	Pond Lining	50000	SY	$ 18	$ 900,000
	Paving	1700	SF	$ 50	$ 114,750
	Gravel	8000	SF	$ 10	$ 108,000
	Fence	400	LF	$ 50	$ 27,000
8	Site Electrical				
	-New pole adjacent to property	1	ea	$ 25,000	$ 25,000
	-Conduit and utility transformer	1	ea	$ 25,000	$ 25,000
	-Transformer and conductors	1	ea	$ 65,000	$ 65,000
9	Land Purchase allowance	12.50	ACRE	$ 40,000	$ 500,000
	SUB-TOTAL				**$ 5,898,170**
	Contingency, 30%				$ 1,769,451
	Engineering allowance, 15%				$ 884,726
	Environmental Mitigations				$ 20,000
	Grand Total				**$ 8,572,347**

Note: This opinion of probable construction cost was prepared based on the current level of design and scope of work and our professional experiences and our best judgment, and present information available to us. Because we have no control over the cost of labour, materials, equipment or services furnished by others, or over the bidding or market conditions, we cannot and do not guarantee our opinion of probable construction cost will not vary from the actual construction bids. This opinion of probable construction cost shall only be used for budgeting purpose. **The estimated cost didn't include taxes, escalation, or any trade risk allowances.**

Project	**Tacna - Recommended Option**			Alt 2B Canal/Well - by canal	Alt 2C Canal/Well - by town	Alt 4C Well/Well - by town
Life Cycle Period		20 years				
OMB A-94 Real Interest Rate	0.20%	Escalation Rate	2.00%			

http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c

A. Initial Cost (Capital Cost)

1. Construction	$4,176,015	$4,179,215	$5,398,170
2. Non-Construction	$2,015,207	$2,016,647	$3,174,177
Total Initial Costs	**$6,191,222**	**$6,195,862**	**$8,572,347**

B. Operations and Maintenance (O&M)

O&M (does not include debt or replacements-SLA)	$96,120	$96,120	$101,987
Total Annual Costs	$96,120	$96,120	$101,987
Present Worth Factor	16.0340	16.0340	16.0340
Present Worth of RECURRENT COSTS	**$1,541,000**	**$1,541,000**	**$1,635,000**

C. Replacement Reserve - Short Lived Assets (SLA)

	Average Life per SLA worksheet	17.9	17.9	16.1
Short Lived Assets (SLA), per attached	Total Cost for Replacements/Repair	$1,139,200	$1,139,200	$1,349,200
(use avg yearly SLA calculation w/o escalation)	Yearly Cost	$94,933	$94,933	$112,433
	Present Worth Factor	17.5722	17.5722	15.8245
Present Worth of REPLACEMENTS		**$1,668,000**	**$1,668,000**	**$1,779,000**

D. Salvage Value

	NOTES	Numbers below need refinement -	Numbers below need refinement	Numbers below need refinement
Useful Life (years)		50	50	50
Construction Cost - Treatment and Distribution		$4,176,015	$4,179,215	$5,398,170
Salvage Value (assume straight-line of construction cost)		$2,505,609	$2,507,529	$3,238,902
TOTAL CONSTRUCTION COST		$4,176,015	$4,179,215	$5,398,170
TOTAL SALVAGE VALUE		$2,505,609	$2,507,529	$3,238,902
Present Worth Factor		0.9608	0.9608	0.9608
Present Worth of SALVAGE VALUE		**$2,407,000**	**$2,409,000**	**$3,112,000**

LIFE CYCLE - PRESENT WORTH SUMMARY

A. Capital Cost	$6,191,222	$6,195,862	$8,572,347
B. Annual O&M (PRESENT WORTH)	$1,541,000	$1,541,000	$1,635,000
C. Annual SLA (PRESENT WORTH)	$1,668,000	$1,668,000	$1,779,000
D. Salvage Value (PRESENT WORTH)	$2,407,000	$2,409,000	$3,112,000
G TOTAL PRESENT WORTH COST (A+B+C-D)	**$6,993,222**	**$6,995,862**	**$8,874,347**
FINAL PW COSTS	Least Expensive	More Expensive	Most Expensive

Tacna - Concrete Tank Option
Options 2B & 2C

Complete System Summary·of Short Lived Assets						
System Asset	Quantity	Unit	Projected Life (Yrs)	Replacement Cost*/Unit		Annualized Reserve*
Well Pumps	1	EA	15	$24,000	$24,000	$1,600
15 Hp Booster Pump	1	EA	10	$10,000	$10,000	$1,000
5 Hp Booster Pump	4	EA	10	$7,000	$28,000	$2,800
Bladder Tanks	1	EA	15	$15,000	$15,000	$1,000
Water Meters	132	EA	15	$350	$46,200	$3,080
Hydrants	15	LS	15	$2,000	$30,000	$2,000
Gate Valves	10	EA	15	$600	$6,000	$400
Inline Flow Meter	1	LS	15	$3,000	$3,000	$200
Treatment Package	1	LS	10	$400,000	$400,000	$40,000
Storage Tank	1	LS	50	$577,000	$577,000	$11,540
ANNUAL REQUIRED SLA RESERVE			17.9		$1,139,200	$63,620

$13.25
SLA/User/Month (400 EDU / active users)

Tacna - Concrete Tank Option
Option 4C

Complete System Summary·of Short Lived Assets						
System Asset	Quantity	Unit	Projected Life (Yrs)	Replacement Cost*/Unit	Replacement Cost	Annualized Reserve*
Well Pumps	2	EA	15	$24,000	$48,000	$3,200
15 Hp Booster Pump	1	EA	10	$10,000	$10,000	$1,000
5 Hp Booster Pump	2	EA	10	$7,000	$14,000	$1,400
Bladder Tanks	1	EA	15	$15,000	$15,000	$1,000
Water Meters	132	EA	15	$350	$46,200	$3,080
Hydrants	15	LS	15	$2,000	$30,000	$2,000
Gate Valves	10	EA	15	$600	$6,000	$400
Inline Flow Meter	1	LS	15	$3,000	$3,000	$200
Treatment Package	1	LS	10	$600,000	$600,000	$60,000
Storage Tank	1	LS	50	$577,000	$577,000	$11,540
ANNUAL REQUIRED SLA RESERVE			16.1		$1,349,200	$83,820

$17.46
SLA/User/Month (400 EDU / active users)

Tacna Concrete Tank Option
Options 2B & 2C

Operation and Maintenance				
System Asset	Quantity	Unit	Unit Cost	Total Estimated Cost
Operator *	1	annual salary	$60,000	$60,000
Labor *	480	hr	$15	$7,200
Truck	1	yr	$10,000	$10,000
Concrete Storage Tank	1	ea	$250	$250
Chemicals	200	gal	$10	$2,000
Monitoring	12	month	$300	$3,600
Power	130699.2	kw	$0.10	$13,070
ANNUAL ESTIMATED O&M				$96,120

* assume 1 full-time Grade 2 operator, plus an assistant for an average of 40 hours per month

Tacna Concrete Tank Option
Option 4C

Operation and Maintenance				
System Asset	Quantity	Unit	Unit Cost	Total Estimated Cost
Operator *	1	annual salary	$65,000	$65,000
Labor *	480	hr	$15	$7,200
Truck	1	yr	$10,000	$10,000
Concrete Storage Tank	1	ea	$250	$250
Chemicals	200	gal	$10	$2,000
Monitoring	4	quarterly	$300	$1,200
Power	163374	kw	$0.10	$16,337
ANNUAL ESTIMATED O&M				$101,987

* assume 1 full-time Grade 2 operator, plus an assistant for an average of 40 hours per month

USDA, RURAL DEVELOPMENT
SUMMARY OF PROJECT USERS

Applicant Name: Yuma County

Project Type: Water Treatment Plant and Distribution System Replacement

Project Cost: $6,191,222

	Number of Users		**Number of EDU's**	
Type of Users	Before Project (1)	After Project (2)	Before Project	After Project (3)
Single Family Residential	135	135	135	135
Multi-Family Residential # of units	1	2	6	6
Small Commercial	8	8	40	40
Large Commercial	0	0	0	0
Public Buildings	2	2	1	1
Industrial	0	0	0	0
TOTAL (Based on usage of system)	**146**	**147**	**182**	**182**

Notes:

1. Show number of users (meters, families, hook ups, etc.) on existing water/sewer system.
2. Show number of users who will be connected to system immediately after construction.
3. Show number of Equivalent Dwelling Units. Consulting Engineer should assist in determining this number based upon level of service provided to a typical rural residential dwelling.
4. Show churches, lodges, etc. as small commercial if 3/4" water meter serves or would serve the facility. Show as large commercial if larger meter serves or would serve the facility.

I certify the above information to be correct according to the latest sources of information available to me.

Heather Tugaoen July 10, 2020
Signature Date

Civil Engineer in Training
Title

Alternatives Summary - Steel Tank Option
(details on subsequent pages)

Item Descriptions	Alternative 2B	Alternative 2C	Alternative 4C
Distribution Piping	$ 2,215,460	$ 2,208,660	$ 2,026,420
Raw water pump station	$ 40,000	$ 50,000	$ -
Well	$ 70,000	$ 70,000	$ 130,000
Treatment	$ 620,000	$ 620,000	$ 820,000
Storage	$ 483,000	$ 483,000	$ 483,000
Finished water pumping	$ 57,500	$ 57,500	$ 57,500
Site Work	$ 431,055	$ 431,055	$ 1,622,250
Site Electrical	$ 115,000	$ 115,000	$ 115,000
Land Purchase allowance	$ 80,000	$ 80,000	$ 500,000
SUB-TOTAL	$ 4,112,015	$ 4,115,215	$ 5,754,170
Contingency, 30%	$ 1,233,605	$ 1,234,565	$ 1,726,251
Engineering allowance, 15%	$ 616,802	$ 617,282	$ 863,126
Environmental Mitigations	$ 20,000	$ 20,000	$ 20,000
Grand Total	$ 5,982,422	$ 5,987,062	$ 8,363,547

Preliminary Cost Estimate - Alternative 2B, WMIDD Intake and treated back-up well - treatment and storage by canal

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
1	Distribution Piping				
	- 6/8" diameter pipe	22100	LF	$ 80	$ 1,768,000
	- 4" diameter pipe	0	LF	$ 70	$ -
	- Hydrants	15	EA	$ 3,500	$ 52,500
	- Road restoration	3274	SY	$ 40	$ 130,960
	- Service connections (meters)	132	EA	$ 2,000	$ 264,000
2	Raw water pump station				
	- Wet well	1	EA	$ 20,000	$ 20,000
	- pumps	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 10,000
3	Well				
	- Drilling	200	LF	$ 100	$ 20,000
	- pump and drop pipe	1	LS	$ 25,000	$ 25,000
	- above ground piping	1	LS	$ 15,000	$ 15,000
	- electrical	1	LS	$ 10,000	$ 10,000
4	Treatment				
	- Ultrafiltration	1	LS	$ 550,000	$ 550,000
	- disinfection	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 60,000	$ 60,000
5	Storage				
	- tank	1	LS	$ 380,000	$ 456,000
	- piping	1	LS	$ 20,000	$ 27,000
6	Finished water pumping				
	- pumps	3	ea	$ 10,000	$ 30,000
	- pipng	1	LS	$ 2,000	$ 2,000
	- flow meter	1	LS	$ 2,000	$ 2,000
	- pressure tank	1	LS	$ 10,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 13,500
7	Site Work				
	-Disposal Pond	1500	CY	$ 25	$ 50,625
	-Pond Lining	7260	SY	$ 18	$ 130,680
	-Paving	1700	SF	$ 50	$ 114,750
	-Gravel	8000	SF	$ 10	$ 108,000
	-Fence	400	LF	$ 50	$ 27,000
8	Site Electrical				
	-New pole adjacent to property	1	ea	$ 25,000	$ 25,000
	-Conduit and utility transformer	1	ea	$ 25,000	$ 25,000
	-Transformer and conductors	1	ea	$ 65,000	$ 65,000
9	Land Purchase allowance	2.00	ACRE	$ 40,000	$ 80,000
	SUB-TOTAL				**$ 4,112,015**
	Contingency, 30%				$ 1,233,605
	Engineering allowance, 15%				$ 616,802
	Environmental Mitigations				$ 20,000
	Grand Total				**$ 5,982,422**

Note: This opinion of probable construction cost was prepared based on the current level of design and scope of work and our professional experiences and our best judgment, and present information available to us. Because we have no control over the cost of labour, materials, equipment or services furnished by others, or over the bidding or market conditions, we cannot and do not guarantee our opinion of probable construction cost will not vary from the actual construction bids. This opinion of probable construction cost shall only be used for budgeting purpose. **The estimated cost didn't include taxes, escalation, or any trade risk allowances.**

Preliminary Cost Estimate - Alternative 2C, WMIDD Intake and treated back-up well - treatment and storage by town

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
1	DistributionPiping				
	- 6/8" diameter pipe	19900	LF	$ 80	$ 1,592,000
	- 4" diameter pipe	2400	LF	$ 70	$ 168,000
	- Hydrants	15	EA	$ 3,500	$ 52,500
	- Road restoration	3304	SY	$ 40	$ 132,160
	- Service connections (meters)	132	EA	$ 2,000	$ 264,000
2	Raw water pump station				
	- Wet well	1	EA	$ 20,000	$ 20,000
	- pumps	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 20,000	$ 20,000
3	Well				
	- Drilling	200	LF	$ 100	$ 20,000
	- pump and drop pipe	1	LS	$ 25,000	$ 25,000
	- above ground piping	1	LS	$ 15,000	$ 15,000
	- electrical	1	LS	$ 10,000	$ 10,000
4	Treatment				
	- Ultrafiltration	1	LS	$ 550,000	$ 550,000
	- disinfection	2	EA	$ 5,000	$ 10,000
	- electrical	1	LS	$ 60,000	$ 60,000
5	Storage				
	- tank	1	LS	$ 380,000	$ 456,000
	- piping	1	LS	$ 20,000	$ 27,000
6	Finished water pumping				
	- pumps	3	ea	$ 10,000	$ 30,000
	- pipng	1	LS	$ 2,000	$ 2,000
	- flow meter	1	LS	$ 2,000	$ 2,000
	- pressure tank	1	LS	$ 10,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 13,500
7	Site Work				
	Disposal Pond	1500	CY	$ 25	$ 50,625
	Pond Lining	7260	SY	$ 18	$ 130,680
	Paving	1700	SF	$ 50	$ 114,750
	Gravel	8000	SF	$ 10	$ 108,000
	Fence	400	LF	$ 50	$ 27,000
8	Site Electrical				
	-New pole adjacent to property	1	ea	$ 25,000	$ 25,000
	-Conduit and utility transformer	1	ea	$ 25,000	$ 25,000
	-Transformer and conductors	1	ea	$ 65,000	$ 65,000
9	Land Purchase allowance	2.00	ACRE	$ 40,000	$ 80,000
	SUB-TOTAL				**$ 4,115,215**
	Contingency, 30%				$ 1,234,565
	Engineering allowance, 15%				$ 617,282
	Environmental Mitigations				$ 20,000
	Grand Total				**$ 5,987,062**

Note: This opinion of probable construction cost was prepared based on the current level of design and scope of work and our professional experiences and our best judgment, and present information available to us. Because we have no control over the cost of labour, materials, equipment or services furnished by others, or over the bidding or market conditions, we cannot and do not guarantee our opinion of probable construction cost will not vary from the actual construction bids. This opinion of probable construction cost shall only be used for budgeting purpose. **The estimated cost didn't include taxes, escalation, or any trade risk allowances.**

Preliminary Cost Estimate - Alternative 4C, Well and back-up well - treatment and storage by town

Item No	Item Descriptions	Quantities	Unit	Unit Cost	Installed Item Costs
1	DistributionPiping				
	- 6/8" diameter pipe	19900	LF	$ 80	$ 1,592,000
	- 4" diameter pipe	0	LF	$ 70	$ -
	- Hydrants	15	EA	$ 3,500	$ 52,500
	- Road restoration	2948	SY	$ 40	$ 117,920
	- Service connections (meters)	132	EA	$ 2,000	$ 264,000
2	Raw water pump station				
	- Wet well	0	EA	$ 20,000	$ -
	- pumps	0	EA	$ 5,000	$ -
	- electrical	0	LS	$ 20,000	$ -
3	Well				
	- Drilling	400	LF	$ 100	$ 40,000
	- pump and drop pipe	1	LS	$ 50,000	$ 50,000
	- above ground piping	1	LS	$ 25,000	$ 25,000
	- electrical	1	LS	$ 15,000	$ 15,000
4	Treatment				
	- Filtration and RO	1	LS	$ 750,000	$ 750,000
	- disinfection	1	EA	$ 5,000	$ 5,000
	- electrical	1	LS	$ 65,000	$ 65,000
5	Storage				
	- tank	1	LS	$ 380,000	$ 456,000
	- piping	1	LS	$ 20,000	$ 27,000
6	Finished water pumping				
	- pumps	3	ea	$ 10,000	$ 30,000
	- pipng	1	LS	$ 2,000	$ 2,000
	- flow meter	1	LS	$ 2,000	$ 2,000
	- pressure tank	1	LS	$ 10,000	$ 10,000
	- electrical	1	LS	$ 10,000	$ 13,500
7	Site Work				
	Disposal Pond	14000	CY	$ 25	$ 472,500
	Pond Lining	50000	SY	$ 18	$ 900,000
	Paving	1700	SF	$ 50	$ 114,750
	Gravel	8000	SF	$ 10	$ 108,000
	Fence	400	LF	$ 50	$ 27,000
8	Site Electrical				
	-New pole adjacent to property	1	ea	$ 25,000	$ 25,000
	-Conduit and utility transformer	1	ea	$ 25,000	$ 25,000
	-Transformer and conductors	1	ea	$ 65,000	$ 65,000
9	Land Purchase allowance	12.50	ACRE	$ 40,000	$ 500,000
	SUB-TOTAL				**$ 5,754,170**
	Contingency, 30%				$ 1,726,251
	Engineering allowance, 15%				$ 863,126
	Environmental Mitigations				$ 20,000
	Grand Total				**$ 8,363,547**

Note: This opinion of probable construction cost was prepared based on the current level of design and scope of work and our professional experiences and our best judgment, and present information available to us. Because we have no control over the cost of labour, materials, equipment or services furnished by others, or over the bidding or market conditions, we cannot and do not guarantee our opinion of probable construction cost will not vary from the actual construction bids. This opinion of probable construction cost shall only be used for budgeting purpose. **The estimated cost didn't include taxes, escalation, or any trade risk allowances.**

Project	**Tacna - Steel Tank Alternative**			Alt 2B Canal/Well - by canal	Alt 2C Canal/Well - by town	Alt 4C Well/Well - by town
Life Cycle Period		20 years				
OMB A-94 Real Interest Rate	0.20%	Escalation Rate	2.00%			

http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c

A. Initial Cost (Capital Cost)

1. Construction	$4,032,015	$4,035,215	$5,254,170
2. Non-Construction	$1,950,407	$1,951,847	$3,109,377
Total Initial Costs	**$5,982,422**	**$5,987,062**	**$8,363,547**

B. Operations and Maintenance (O&M)

O&M (does not include debt or replacements-SLA)	$102,870	$102,870	$108,737
Total Annual Costs	$102,870	$102,870	$108,737
Present Worth Factor	16.0340	16.0340	16.0340
Present Worth of RECURRENT COSTS	**$1,649,000**	**$1,649,000**	**$1,744,000**

C. Replacement Reserve - Short Lived Assets (SLA)

	Average Life per SLA worksheet	14.8	14.8	13.7
Short Lived Assets (SLA), per attached	Total Cost for Replacements/Repair	$969,200	$969,200	$1,179,200
(use avg yearly SLA calculation w/o escalation)	Yearly Cost	$80,767	$80,767	$98,267
	Present Worth Factor	14.5337	14.5337	13.5358
Present Worth of REPLACEMENTS		**$1,174,000**	**$1,174,000**	**$1,330,000**

D. Salvage Value

	NOTES	Numbers below need refinement -	Numbers below need refinement	Numbers below need refinement
Useful Life (years)		30	30	30
Construction Cost - Treatment and Distribution		$4,032,015	$4,035,215	$5,254,170
Salvage Value (assume straight-line of construction cost)		$1,344,005	$1,345,072	$1,751,390

TOTAL CONSTRUCTION COST	$4,032,015	$4,035,215	$5,254,170
TOTAL SALVAGE VALUE	$1,344,005	$1,345,072	$1,751,390
Present Worth Factor	0.9608	0.9608	0.9608
Present Worth of SALVAGE VALUE	**$1,291,000**	**$1,292,000**	**$1,683,000**

LIFE CYCLE - PRESENT WORTH SUMMARY

A. Capital Cost	$5,982,422	$5,987,062	$8,363,547
B. Annual O&M (PRESENT WORTH)	$1,649,000	$1,649,000	$1,744,000
C. Annual SLA (PRESENT WORTH)	$1,174,000	$1,174,000	$1,330,000
D. Salvage Value (PRESENT WORTH)	$1,291,000	$1,292,000	$1,683,000
G TOTAL PRESENT WORTH COST (A+B+C-D)	**$7,514,422**	**$7,518,062**	**$9,754,547**
FINAL PW COSTS	Least Expensive	More Expensive	Most Expensive

Tacna - Steel Tank Option
Options 2B & 2C

Complete System Summary·of Short Lived Assets						
System Asset	Quantity	Unit	Projected Life (Yrs)	Replacement Cost*/Unit		Annualized Reserve*
Well Pumps	1	EA	15	$24,000	$24,000	$1,600
15 Hp Booster Pump	1	EA	10	$10,000	$10,000	$1,000
5 Hp Booster Pump	4	EA	10	$7,000	$28,000	$2,800
Bladder Tanks	1	EA	15	$15,000	$15,000	$1,000
Water Meters	132	EA	15	$350	$46,200	$3,080
Hydrants	15	LS	15	$2,000	$30,000	$2,000
Gate Valves	10	EA	15	$600	$6,000	$400
Inline Flow Meter	1	LS	15	$3,000	$3,000	$200
Treatment Package	1	LS	10	$400,000	$400,000	$40,000
Storage Tank	1	LS	30	$407,000	$407,000	$13,567
ANNUAL REQUIRED SLA RESERVE			14.8		$969,200	$65,647

$13.68
SLA/User/Month (400 EDU / active users)

Tacna - Steel Tank Option
Option 4C

Complete System Summary·of Short Lived Assets						
System Asset	Quantity	Unit	Projected Life (Yrs)	Replacement Cost*/Unit	Replacement Cost	Annualized Reserve*
Well Pumps	2	EA	15	$24,000	$48,000	$3,200
15 Hp Booster Pump	1	EA	10	$10,000	$10,000	$1,000
5 Hp Booster Pump	2	EA	10	$7,000	$14,000	$1,400
Bladder Tanks	1	EA	15	$15,000	$15,000	$1,000
Water Meters	132	EA	15	$350	$46,200	$3,080
Hydrants	15	LS	15	$2,000	$30,000	$2,000
Gate Valves	10	EA	15	$600	$6,000	$400
Inline Flow Meter	1	LS	15	$3,000	$3,000	$200
Treatment Package	1	LS	10	$600,000	$600,000	$60,000
Storage Tank	1	LS	30	$407,000	$407,000	$13,567
ANNUAL REQUIRED SLA RESERVE			13.7		$1,179,200	$85,847

$17.88
SLA/User/Month (400 EDU / active users)

Tacna Steel Tank Option
Options 2B & 2C

Operation and Maintenance				
System Asset	Quantity	Unit	Unit Cost	Total Estimated Cost
Operator *	1	annual salary	$60,000	$60,000
Labor *	480	hr	$15	$7,200
Truck	1	yr	$10,000	$10,000
Steel Storage Tank	1	ea	$7,000	$7,000
Chemicals	200	gal	$10	$2,000
Monitoring	12	month	$300	$3,600
Power	130699.2	kw	$0.10	$13,070
ANNUAL ESTIMATED O&M				$102,870

* assume 1 full-time Grade 2 operator, plus an assistant for an average of 40 hours per month

Tacna Steel Tank Option
Option 4C

Operation and Maintenance				
System Asset	Quantity	Unit	Unit Cost	Total Estimated Cost
Operator *	1	annual salary	$65,000	$65,000
Labor *	480	hr	$15	$7,200
Truck	1	yr	$10,000	$10,000
Steel Storage Tank	1	ea	$7,000	$7,000
Chemicals	200	gal	$10	$2,000
Monitoring	4	quarterly	$300	$1,200
Power	163374	kw	$0.10	$16,337
ANNUAL ESTIMATED O&M				$108,737

* assume 1 full-time Grade 2 operator, plus an assistant for an average of 40 hours per month