Advanced Metering Infrastructure Project

Bureau of Reclamation

WaterSMART: Water & Energy Efficiency Grant for Fiscal Year 2016

Funding Opportunity No. R16-FOA-DO-004

PREPARED FOR:

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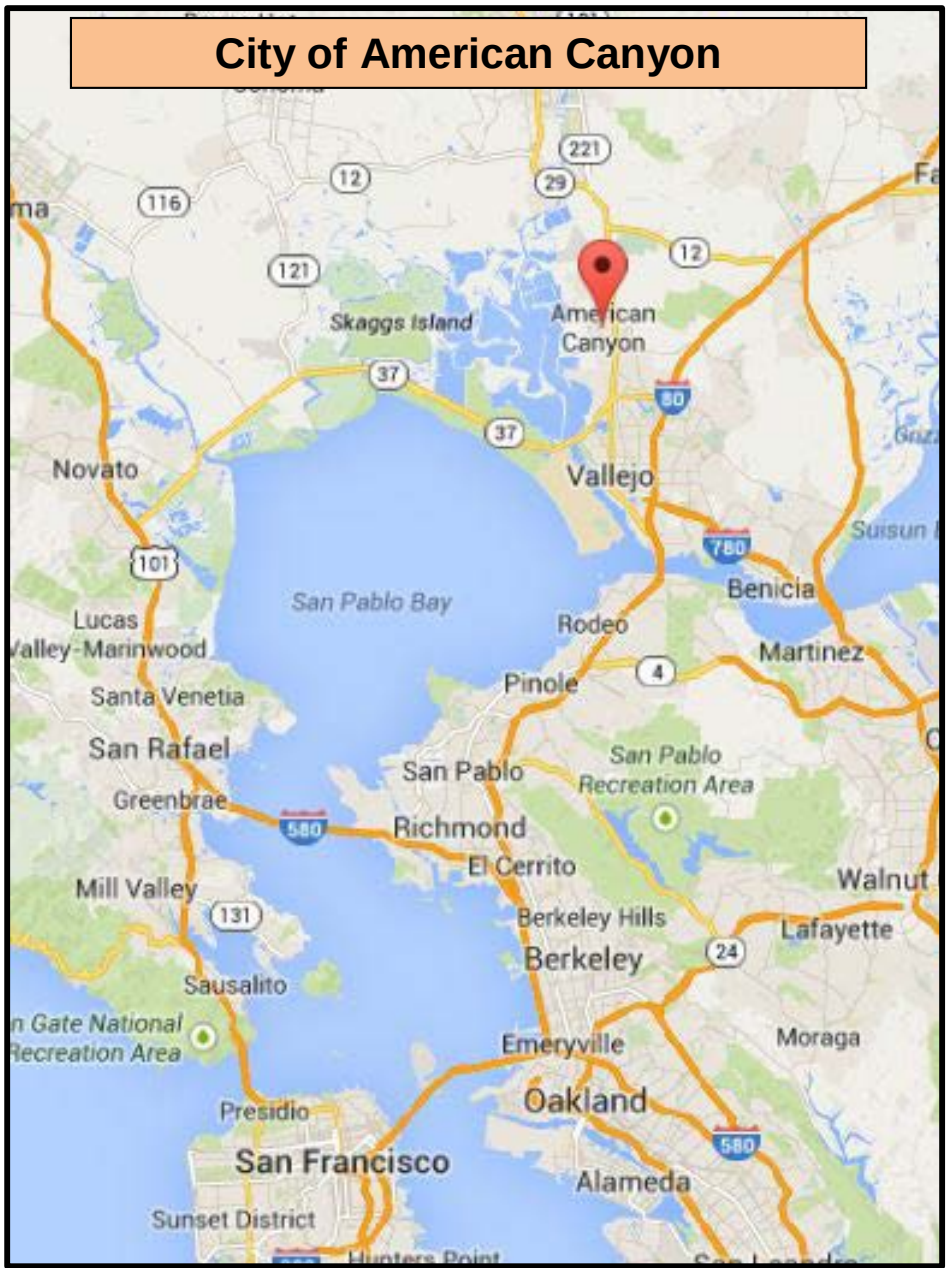
January 20, 2016



Leon Garcia, Mayor • Joan Bennett, Vice Mayor
Kenneth Leary, Councilmember • Mark Joseph, Councilmember
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Executive Summary

Date:	January 20, 2016
Applicant Name:	City of American Canyon
City, County, State:	City of American Canyon, Napa County, California
Estimated Timeline for Project:	July 1, 2016 – July 1, 2018 (24 months)
Project on Federal Facility:	No

The City of American Canyon (population 20,208) requests $297,895 (45% of total project cost) to implement a city-wide advanced metering infrastructure (AMI) project. **This project will convert 100 percent of the City's potable water connections, or approximately 5,500 meters, to an efficient, 'smart-meter,' AMI distribution system.** Our project will reduce the City's draw on imported State Water Project water by reducing residential, commercial, industrial, and agricultural potable water demand. The project will do this by employing an AMI system that will provide real-time water usage to customers, which is proven to reduce customer demand; and quickly alert the City and customers of leaks and problematic variances in the water system's pressure, eliminating the lag time between leaks and detection.

The proposed work is straightforward: 1) The project will install a Tower Gateway Base (TGB) station, or AMI tower, at 100 Napa Valley Junction for meter data reception. The tower will read meter data from 5,500 meter locations, and transmit data to a new, central computer network; 2) The project will include a regional network interface (RNI) and LOGIC meter data management (MDM) software to manage the TGB station and meter network; 3) A qualified contractor will design and launch a website that will allow mobile and desktop users (both City staff and water customers) to view water consumption and configure alert settings; and integrate the system into the City's website and online bill-paying services. Customers will be able to view hourly details of water use, set up personalized alerts, and receive important messages from the utility. Additionally, City staff will be alerted in real-time of changes in pipe pressure and water leaks, which will serve to curb our unbilled water losses (approximately 558 acre-feet in 2014, or 17% of total water demand); and 4) Currently, 2,000 of our City's meters are equipped with 'smart' Passive Integrated Transponders (PIT)s, which can be integrated into the proposed AMI system; thus the remaining 3,500 of 5,500 total meters will be retrofitted to enable the entire distribution system to integrate with the proposed advanced metering infrastructure.

The City has made exemplary strides in water conservation. Overall demand has been reduced from 3,612 AF in 2013 (peak demand) to 2,900 AFY in 2015 – a 20 percent decrease. The Bureau of Reclamation (BOR) funding opportunity will support the City's deployment of additional conservation measures. **As a direct result of the proposed AMI project, the City will save approximately 254 AFY of potable water per year, all of which is potable IMPORTED water from the State Water Project.**

Background Data

The City of American Canyon, California is located approximately 35 miles northeast of San Francisco at the southern border of Napa County. The Cities of Napa and Vallejo border American Canyon to the north and south, respectively. The City's economic health depends greatly on both agriculture and manufacturing, as vineyards, and wine packaging and shipping businesses are plentiful. The City's water service area (WSA) encompasses the City limits, as well as the industrial and commercial areas to the north of the City, which include the Napa Airport Industrial Park and Green Island Industrial District. (Please see Project Area Maps 1 and 2, on the following pages.) The service area is approximately five square miles and includes residential, commercial, industrial, and agricultural users. The water system is owned and operated by the City and governed by a five-member City Council.

The main source for our water supply is the Department of Water Resources' State Water Project (SWP) through the North Bay Aqueduct. Generally, this "raw water" is treated at the City's Water Treatment Plant (WTP) and then distributed to residents and businesses in the City's WSA. The City's water rights include the SWP and Vallejo Permit. Other available sources of water include Vallejo treated water, Vallejo emergency water, recycled water[1], and water from contracts including the Napa County Sanitation District.

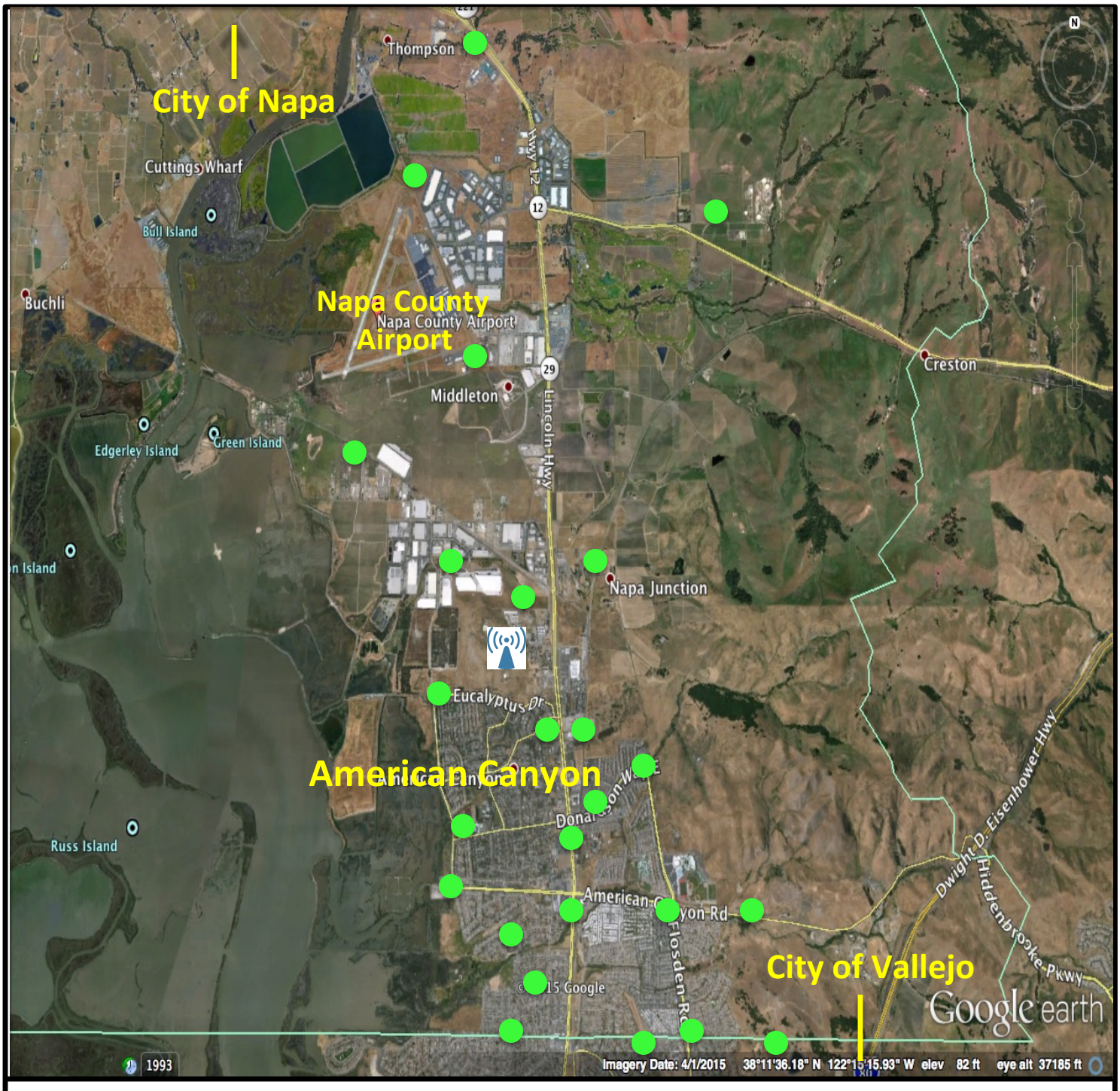
Water Conservation Policies

Population growth coupled with unprecedented drought and water shortages continue to threaten our water supply. In response to ongoing dire conditions, we employ stringent water use restrictions with our customers including a tiered pricing water system, recycled water infrastructure, and a 'Zero Water Footprint' (ZWF) policy, adopted in 2007. The ZWF policy requires that any new user to our water system – whether residential, business, commercial or agricultural – offset their planned water usage with a 'one-for-one' mitigation strategy. For example, if an individual proposes to build a home that will be served by our water system, by City ordinance, that individual must choose from a variety of options to offset their potential water usage. A customer could update plumbing fixtures in a building next door, contribute funds to our recycled water infrastructure projects, or choose from a variety of options provided by the City.

Additionally, the City has ordinances and policies in place that have goals to shift commercial, industrial, and new residential water demands from the State Water Project supply to more reliable alternative sources of water. Policies specifically reference recycled water and groundwater as possible alternative supplies and also provide for the development of an agricultural water conservation program. We believe that the real-time usage data offered by the proposed AMI system will encourage customers (especially large-landscaping and

[1] In 2014, six private and 14 City sites used recycled water for a total of 140.6 acre-feet of recycled water delivered.

Project Location Map

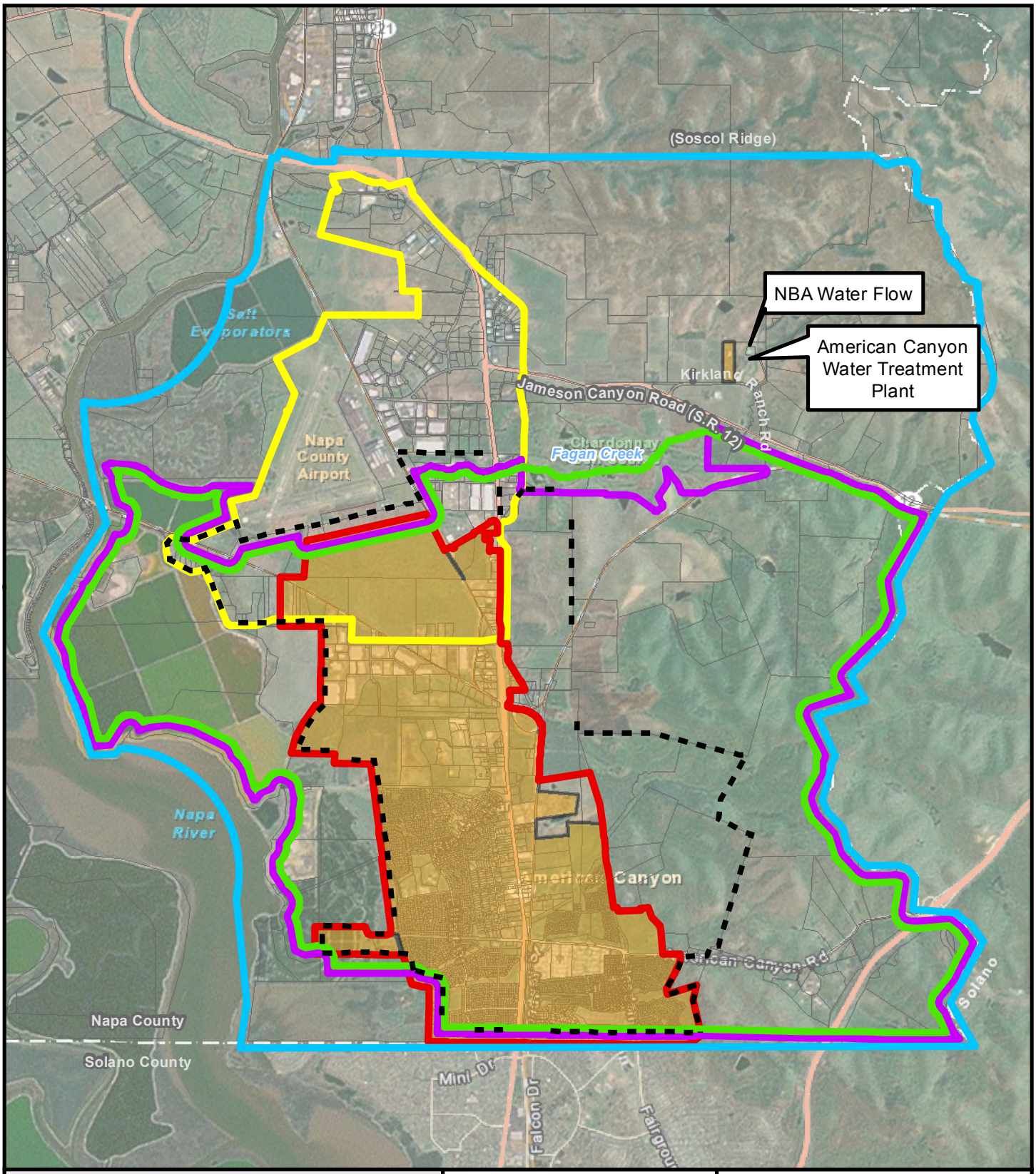


CITY OF AMERICAN CANYON

Pilot Meter Locations

Base Meter Tower

BOR WaterSMART- Water and Energy Efficiency Grant for Fiscal Year 2016
Funding Opportunity No. R16-FOA-DO-004
American Canyon – Advanced Metering Infrastructure Project



\\corp\WKProjects\SRO\02536 - American Canyon\02536-10-004 2010 UMWP\08-GIS\Maps\Figures\Figure 2.1 Water Service Area.mxd - 8/18/2011 - 6:37:52 PM

Cartography: AF

- Sphere of Influence
- Parcels
- Sewer Service Area
- Recycled Water Service Area
- City Limits
- Airport Industrial Area
- Proposed Urban Limit Line
- Water Service Area

0 2,500 5,000 ft

1 inch = 5,000 feet printed at 8.5x11

N

Sources: ESRI Basemap: Aerial and Transportation; City of American Canyon GIS: City Limits, Airport Industrial Area, Proposed Urban Limit Line, Water Service Area.

Figure 2.1
Water Service Area Map

City of American Canyon
2010 Urban Water Management Plan

WINZLER & KELLY
www.w-and-k.com

agricultural) to convert to our recycled water system for the majority of their watering needs. They will equate a high cost with over-use of potable water at the time of watering (rather than over one month later), and be able to compare the cost to the same amount of recycled water.

Water Demand

The City has approximately 5,500 water service connections. Total demand peaked in 2013 at 3,612 acre-feet. Demand in 2015 (2,900 acre-feet) was approximately 20 percent less due to the City's restrictions and in response to the drought. For the purposes of this grant application, we show water data from the year 2014, below, as an example of a typical year. Please see the Table 1, which shows the approximate water demand by user-type.

Table 1. Total Water Demand 2014

Account Type	Number of Accounts	Demand (Acre-Feet per Year)	Approx. % of Total Demand
Residential	4,846	1,458 AF	46%
Commercial/Industrial	248	804 AF	25%
Other (City parks, construction meters, private fires systems, raw water users like vineyards)	353	369 AF	12%
Total Billed		2,631 AF	83%
UNBILLED LOSSES (leaks, street sweeping, flow testing, sewer main cleaning, sampling, water main breaks, etc.)		558 AF	17%
Total Demand	5,447	3189 AF	100%

The City's water demand was 3,189 acre-feet in 2014. Potable water is divided among residential, commercial, "other," and unbilled loss categories. **There are approximately 4,846 residential accounts, which consumed 1,458 AF of water, making this the single largest group of users (46%).** This is important to note as a key objective of our proposed project is to curb residential water use through the availability of real-time water usage data and leak detection.

Unbilled Losses

As shown above, unbilled system losses accounted for approximately 558 AF (or 17% of the total potable water demand) in 2014. A portion of this unbilled water is attributable to street-sweeping, hydrant flushing, losses from fire services immediately after the Napa Earthquake, and **leaks from water mains, services and meters**; while the remainder is attributable to discrepancies in billing data and/or reduced performance of water meters. These unbilled losses are of particular concern. Unbilled water is calculated by subtracting a) the total amount of water use recorded at each of the City's water meters from b) the amount of water recorded

at the Department of Water Resource's meter at the City's Water Treatment Plant. *Overall, the unbilled demand increased by 151 AF when compared to 2013.* The exact reasons for the increase are still being determined and have been a top priority for 2015. Unfortunately, the process is not simple because the very nature of these losses is that they are unseen and the calculation itself is based upon information transcribed from two different data sets.

One known source of unbilled water is from leaking pipes. Repairing leaks is an important and challenging effort that remains ongoing. In 2014 the City repaired 48 residential service leaks and 16 water main leaks, saving an estimated 71 AF of water. Staff estimates unbilled losses due to residential service leaks are approximately 200 to 300 acre-feet each year, and much of this could be identified sooner and fixed more quickly, thereby further reducing these losses. Using the existing billing system, the City offers a "Leak Adjustment Policy" which forgives 60% of the estimated cost of a customer leak. The leak estimate is based on previous use and average use. With our current water distribution system, **a leak could flow continuously for more than a month without being detected** -- creating substantial losses for both the utility and customer. Our proposed project will address the problems stated above including unchecked leaks and billing issues.

The City of American Canyon encourages water conservation with several programs in place for customers; however, the only tool available for customer- and City-use to track consumption is the water meter. A customer, with significant effort, is able to read their own meter in single cubic foot increments; but the City is unable to provide any further details from the office beyond 100 cubic feet of incremental use. **There is no method in place to correlate customer activities and events with actual water use.**

Additionally, selective backflow prevention is the only measure in place to prevent water flowing into the water system from a customer's connection point (a.k.a. cross-connections/ backflow). There is no active monitoring of locations with or without backflow prevention devices for possible cross-connections with raw or reclaimed water, posing a risk for undetected contamination.

Projected Water Demand

The number of single-family residential accounts is projected to grow from 4,656 to 6,256 by 2025 as new multi-family residential infill units in the City center are built out. The number of commercial, industrial, and agricultural water accounts is projected to grow at the same rate as population growth thereafter. Because of the City's ZWF and Administrative Policy on the Management and Allocation of Recycled water, it is assumed there will be no new large landscape

Table 2. Projected Water Demand

Year	Accounts/ Connections	Acre Feet per Year
2015	*5,500*	*2,900 AFY*
2020	6,268	4,389 AFY
2025	6,848	4,887 AFY
2030	7,427	5,388 AFY
2035	8,008	5,890 AFY

accounts served by potable water, and instead will be connected to the recycled water delivery system. Table 2 shows the projected potable water demand for the next 20 years.

Potential Shortfalls in Water Supply

The City' SWP allocation in 2015 was 1,300 AF, or 25 percent of our requested amount (5,200 AF). Because the demand exceeded the supply, we had a shortfall and relied upon carry-over supplies from the SWP.

Water Delivery System

The City maintains 102 miles of water mains that run from the WTP to residents and businesses in the City's WSA, which extends from the Napa/Solano County line to Soscol Creek just north of the Napa Airport. We also maintain the recycled water distribution system, which was put into service in March 2010. The principal water mains in the distribution system range in size from 14 to 20 inches. Most of the distribution grid piping in the older sections of the City range in size from 4 to 8 inches, while the newer areas are served by pipes 8 to 12 inches in diameter.

As stated previously, the City has approximately 5,500 water service connections – all of them with the ability to emit data approximately 10 feet away. This means that a City staff member must drive to the meter location and gather data by driving within the 10-foot range. The process takes approximately one and one-half days to complete. Additionally, if a leak or pipe burst is detected (generally after sizable water loss), a staff member must be dispatched to the location and use traditional sound technology to pinpoint the disruption.

Once the meter is read this data is converted into a utility bill which arrives at the end of the subsequent month. Thus, volume delivered on the first day of the billing cycle are part of the next utility bill which arrive 45 to 60 days later. While common for the industry, such a lag can be a barrier for customers to track and associate certain water usage behaviors with usage data (or cost).

City staff worked with a local vendor to implement a pilot project with newer, up-to-date AMI technology. This technology includes more robust transponders (connected to the meters) which would transmit consumption data in real-time to a base station located at the approximate City center. From there this data would be stored off-site and made available to customers by way of a secure website portal. If they choose to participate, customers would be able to actively analyze water demands and their respective consumption patterns. This information would be helpful to customer in detecting unusual patterns such as large short-term demands in the early morning (i.e., unexpected sprinkler irrigation) or a constant demand all-day (i.e., leaking toilet). The study proved the proposed system to be efficient and ideal for our water needs.

Having a city-wide array of robust transponders would benefit the City as well as the customers. This is because the transponders can detect rapid changes in system pressure which can be indicative of the presence of a new leak in either the service or main. Thus, rather than having

to scour neighborhoods using traditional sounding technology, these advance transponders will pin-point leaks more quickly as they occur, thereby helping to reduce unbilled losses.

Disadvantaged Communities

SBx7-7 includes a requirement for identifying water-use projections for lower income households. Under the statute, a lower income household is defined under the California Health and Safety Code and is established to be 80 percent of the median income, adjusted for family size. Based on data from the County of Napa 2009 Selected Economic Characteristics: 2008, as well as City data from the 2000 Census, the percentage of households at 80 percent or less of the median income is 38 percent of the total households in the City's WSA.

Energy Use

The application includes a reduction of pumping from the State Water Project and a reduction in vehicle miles driven. Please see *Subcriterion No. B.2: Increasing Energy Efficiency in Water Management* for further details regarding energy efficiency elements.

Relationship with BOR

One hundred percent of our City's imported water is from the State Water Project (SWP) – or 58% of our total supply. If awarded grant funds from this current solicitation, this will be the City of American Canyon's first direct BOR grant, based on current staff's history and knowledge.

Technical Project Description

We propose to implement an Automated Metering Infrastructure (AMI) system. This advanced water system utilizes state-of-the-art water meters, equipped to wirelessly transmit water-usage data to a reception tower, via cellular and ultra-high radio frequencies. To fully implement the AMI system, we plan to install one base tower antenna, retrofit approximately 3,500 traditional meters, and create a secure, off-site network management system, with a secure website portal for individual user access. The web portal will allow individual customers access to their own water consumption data. ***Our plan to implement advanced water usage infrastructure is based on a successful 30-day case study in 2014***, and subsequent evaluation of a small test set of water meters equipped to transmit data remotely. During this pilot project, we placed a model base tower in the approximate City center, installed and activated a small number of "smart" water meters at varying locations within the service area, integrated sufficient portions of the required software to allow for data collection, and established a temporary web portal for the purpose of the test.

The proposed project will begin on July 1, 2016, and will be completed by July 1, 2018 (a total of 24 months). Upon execution of the grant award with the BOR, a contract will be awarded to the selected contractor who will manage all aspects of the project (including purchase, installation, integration, and testing of the AMI) with oversight from the City of American Canyon.

The proposed project includes the following tasks:

Task 1: Project Grant Agreement, Administration, and Reporting:
American Canyon staff will provide administrative oversight for the project. Activities will include reviewing and executing the grant agreement and contract, attending (and preparing for) requested meetings with the BOR, maintaining grant and project files, preparing and processing requests for reimbursements, preparing updates for the City Council, ensuring grant agreement compliance, completing and submitting quarterly and final programmatic and financial reports as outlined in the grant agreement, coordinating any audit request and/or examination of records by BOR or independent auditors, and maintaining all records for at least three years after the project is closed out.

Deliverables include:

- Executed grant agreement
- Meeting agendas and minutes
- Requests for reimbursement

- Quarterly and final reports
- Audit report (if applicable)

Task 2: Easement(s):
No easements are anticipated for this AMI installation project.

Task 3: Project Design/Engineering
A site for the permanent base tower (i.e., antenna) has been identified in a centralized location (address: 100 Napa Valley Junction), tested, and proven to meet the precise needs of the project. The base station is capable of reading meters up to 10 miles away. Specific water meters (n=3,500) have been identified for retrofitting with AMI transponders, and preliminary meetings between City staff and the contractor have been held to discuss the project design. Once the grant is executed and the contract is awarded, City staff and the contractor will develop a more detailed installation plan.

Deliverables include:

- Development of detailed installation plan
- Refined cost estimate for the required equipment and installation (if applicable)

Task 4: Environmental Documentation:
A California Environmental Quality Act (CEQA) evaluation conducted by the City has determined that the proposed project meets the requirements for CEQA exemption because the project will not result in individual or cumulatively significant environmental effects, and therefore falls within Section 43, Code of Federal Regulations, Part 46, Subsection 46.210(f):

> *Routine and continuing government business, including such things as supervision, administration, operations, maintenance, renovations, and replacement activities having limited context and intensity (e.g., limited size and magnitude or short-term effects)*.

A Notice of Exemption (NOE) will be filed after the grant is executed and the contract is awarded.

Deliverables include:

- Approved and adopted CEQA documentation (Categorical Exemption)
- Approved and adopted NEPA documentation (Categorical Exclusion, BOR to confirm)

Task 5: Permitting:

Not applicable. No permits are expected for the AMI Project.

Task 6: Project Implementation-AMI Installation:

The proposed AMI installation will be completed by the selected contractor. The implementation plan is simple and straightforward, as follows:

Task 6.1- Kick-Off Meeting. American Canyon will hold a kick-off meeting with the selected contractor to review the schedule (and make refinements, if necessary), the cost estimate, the detailed installation plan, and expectations.

Task 6.2: Customer Outreach. American Canyon and the contractor will coordinate efforts to alert the 5,500 customers of the system upgrade and provide education regarding the logistics and benefits of the new system. Outreach to these customers will include mailings, door-to-door direct communication, telephone outreach, and flyers in both English and Spanish.

Task 6.3: Equipment Installation. Contractor will install a permanent base station (i.e., antennae) to replace the temporary base station. The permanent unit will be placed in the same central location (address: 100 Napa Valley Junction), and will have no significant impact to local plant life, wildlife, or area aesthetics. The base station has a receiver sensitivity of -127 dBm, transmitter power of up to 35 watts, and is capable of reading meters up to 10 miles away. Technicians will also install 3,500 transponders on existing meters in the City of American Canyon. The transponders deliver two-way communication to the time-synchronized network (described below) to provide the City and customers with an hour-by-hour analysis of system water consumption at any point in time (2,000 customers are already outfitted with an equivalent transponder and will only require the activation of the AMI network to be connected to the City's new AMI infrastructure). Please see Figure 1 for a photo of a transponder.

Task 6.4: Development, Launch, and Testing of the Network Management System. A network management system will allow the City to remotely collect and analyze data from each meter and present an aggregated view of system data using simple dashboards, spreadsheets, and graphs. The network management system is the backbone of the proposed AMI system. The system will also be integrated with the City's billing system to unify the billing with the new AMI infrastructure, further simplify and automate billing processes, and allow customers to view hourly flow rates, total water consumed during a selected period, total consumption over a billing cycle, and side-by-side comparison of consumption during chosen time periods. The contractor will build a network management system that includes a storage cloud for data warehousing, hardware/software for the network interface and system analytics, alarm

features to detect water leaks and changes in water pressure, and a website and interface with a secure customer portal. The contractor will integrate existing data into the new system and fully test the system upon completion of the installation.

The network's analytical modeling tools will help operators understand the potential impact of changes in the network and analyze different responses and contingencies. Pattern detection algorithms can draw on historical data to help distinguish between false alerts and genuine concerns, and predictive analytics allows operators to consider likely future scenarios and respond proactively and effectively. Automation and control tools will enable the City to conduct network management tasks remotely and automatically, thus resulting in significant savings in City staff time. Specific types of data that will be available in real time include:

Fig. 1: Example of an AMI transponder attached to a water meter.

- Hourly Consumption (Interval Data): The water consumed during each hour is logged to enable correlation of time and date activities with actual water use.
- On-Demand Meter Reads: The read-on-demand function enables remote meter reading of any meter at any time.
- Unauthorized Consumption and Tampering Alerts: Alerts are sent based on theft or excessive use of water at any volumetric threshold for any specific meter, group of meters, or the system as a whole during specified or unspecified times.
- Leak Detection: The system is capable of identifying and notifying both the City and the customer of a leak within 24 hours of occurrence. This allows a leak to be identified and repaired prior to billing.
- Leak Analysis: Once a leak is identified by the system, easy-to-read bar graphs and tabular data will depict the duration and rate of flow for a leak, and the total water loss can be determined for accurate consideration in the City's Leak Adjustment Policy.
- Continuous Backflow Monitoring: Any reverse flow of water into the system from a connection point triggers an alert 24 hours a day to prevent contamination of the water supply.

Task 6.5: Training for City Staff. Contractor will provide an extensive, hands-on, 3.5-day onsite training to City staff, to include operation and maintenance of the transponders, overview and

operation of the network management system, and role-based network management system training. Training is essential for the AMI system to function optimally.

Deliverables include:

- Kick-off meeting agenda and minutes
- Revised project schedule (if applicable)
- Copies of customer outreach materials
- Base station and transponder installation inspection checklists
- Network management system site map and description
- Contractor invoices
- Training agenda and participant list
- Photographs of the installed base station and a sample of installed transponders
- Project completion verification

Evaluation Criteria

Evaluation Criterion A: Water Conservation

Subcriterion No. A.1: Quantifiable Water Savings

As a direct result of the proposed AMI project, the City will save approximately 254 AFY of potable water per year, all of which is potable IMPORTED water from the State Water Project. In 2014, demand from the City's 5,500 water service connections was 3,136 AF. Seventeen (17) percent of this demand stemmed from unbilled losses. The City estimates that between 200-300 AF of this was due to undetected leaks. The proposed system will significantly reduce the amount of unbilled losses by identifying leaks. In order to calculate the estimated amount of water conserved we made the following assumptions and calculations:

1) Of the City's 5,500 water service connections, 2,000 have already been retrofitted with smart meters, leaving 3,500 units left to retrofit. 5,500 meters - 2,000 AMI = 3,500 meters to be upgraded.
2) The City's total water consumption of 3,136 AFY divided by 5,500 water connections indicates an average of .57 AF per meter. 3,136 AFY / 5,500 meters = .57 AFY per meter.
3) Multiplying 3,500 AMI units to be installed by .57 AF per meter equals 1,995 AFY of water consumption. 3,500 meters x .57 = 1,995 AFY.
4) Based on 2014 reports, the City estimates it averages approximately 17% of unbilled water losses.
5) Multiplying 1,995 AFY by 17% equals 339 AFY of water losses. 1,995 AFY x 17% water loss = 339 AFY water loss from the 3,500 old meters.
6) According to the ***EPA Water Audits and Water Loss Control for Public Water Systems*** report (see Appendix A) "Average water loss in systems is 16 percent – up to 75 percent of that is recoverable." (Thornton, J., Sturm, R., Kunkel, G., *Water Loss Control Manual (2nd Edition)*, McGraw-Hill, 2008.)
7) Multiplying 339 AFY by 75% equals 254 AFY in recoverable losses. 339 AFY x 75% = 254 AFY of recoverable water due to undetected leaks.

Smart water networks can identify leaks early. This early detection reduces the amount of water that is wasted and saves utilities money that would otherwise be spent purchasing and treating additional water. By reducing the amount of water leaked, smart water networks can reduce the amount of money wasted on producing and/or purchasing water, consuming energy required to pump water and treating water for distribution.

The City's proposed project to convert the City's remaining 3,500 potable water meters to AMI technology will give the City and residents the ability to identify these common household leaks in real time and virtually eliminate this source of water loss.

In addition, all applicants should be sure to address the following:

- ***What is the applicant's average annual acre-feet of water supply?***

The average annual acre-feet of water supply for the City of American Canyon is estimated at **3,635 acre-feet per year (AFY).** The calculation is a five-year average of total water deliveries (except recycled water) between the years of 2006 to 2010. This calculation includes water losses.[2] Water demand has decreased over the past year due to conservations efforts with total demand of 3,189 AF recorded for 2014.

- ***Where is the water that will be conserved currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground, etc.)?***

Water loss caused by leakages or overuse by residents is wasted water that is currently seeping into the ground at the site. Upon completion of the AMI upgrade project, conserved water will directly contribute to the sustainability of the City's water supply by remaining at the source.

- ***Where will the conserved water go?***

The 254 AF of conserved water will remain at the source.

Municipal Metering Projects (No. 2 of Possible Project Types)

(a) How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.

The estimated average annual water savings of 254 AFY resulting from the project was determined using the following assumptions and calculations (also provided above in Subcriterion No. A 1):

1) Of the City's 5,500 water service connections, 2,000 have already been retrofitted with smart meters, leaving 3,500 units left to retrofit. 5,500 meters - 2,000 AMI = 3,500 meters to be upgraded.
2) The City's total water consumption of 3,136 AFY divided by 5,500 water connections indicates an average of .57 AF per meter. 3,136 AFY / 5,500 meters = .57 AFY per meter.
3) Multiplying 3,500 AMI units to be installed by .57 AF per meter equals 1,995 AFY of water consumption. 3,500 meters x .57 = 1,995 AFY.
4) Based on 2014 reports, the City estimates it averages approximately 17% of unbilled water losses.
5) Multiplying 1,995 AFY by 17% equals 339 AFY of water losses. 1,995 AFY x 17% water loss = 339 AFY water loss from the 3,500 old meters.
6) According to the ***EPA Water Audits and Water loss Control for Public Water Systems*** report (see Appendix A) "Average water loss in systems is 16 percent – up to 75 percent of that is recoverable." (Thornton, J., Sturm, R., Kunkel, G., *Water Loss Control Manual (2nd Edition)*, McGraw-Hill, 2008.)

[2] Data taken from American Canyon 2010 Urban Water Management Plan, Volume I, page 34.

7) Multiplying 339 AFY by 75% equals 254 AFY in recoverable losses. 339 AFY x 75% = 254 AFY of recoverable water due to undetected leaks.

(b) How have current distribution system losses and/or the potential for reductions in water use by individual users been determined?

Current distribution system losses were determined by calculating "unbilled water." Unbilled water is calculated by subtracting a) the total amount of water use recorded at each of the City's 5,465 water meters from b) the amount of water recorded at the DWR meter at the City's WTP. A portion of this unbilled water is attributable to street-sweeping, hydrant flushing, losses from fire services immediately after the Napa Earthquake, and leaks from water mains, services and meters, while the remainder is attributable to discrepancies in billing data and/or reduced performance of water meters. One known source of unbilled water is from leaking pipes. Repairing leaks is an important and challenging effort that remains ongoing. Last year the City repaired 48 residential service leaks and 16 water main leaks, saving an estimated 71 AF of water.

(c) For installing individual water user meters, refer to studies in the region or in the applicant's service area that are relevant to water use patterns and the potential for reducing such use. In the absence of such studies, please explain in detail how expected water use reductions have been estimated and the basis for the estimations.

While the City is not installing new meters, it is retrofitting 3,500 meters and updating an entire system of 5,500 meters.

The City has already reduced its overall potable water demand by 20 percent from 2013. This reduction was achieved through strategic city-led initiatives, ordinances, and policies, all delivered within the current distribution system. These results prove that our water customers respond positively to requirements for water conservation, including the tiered water rate system and Zero Water Footprint policy.

The City operated a small AMI pilot project with 25 active water meters and a Sensus Base Station for about 30 days during the months of May and June in 2015. This pilot project demonstrated the Sensus FlexNet AMI system's ability to effectively communicate with the entire service area and deliver in-depth details about water use and system events. The AMI pilot project automatically delivered meter reads, provided on-demand meter reads, detected leaks, monitored for backflow, identified efficient and inefficient irrigation patterns, and provided an hour-by-hour bar graph of customer water consumption viewable by date and time. **Pages 1-7 of the Pilot Project Report included; Full report is available upon request.**

A separate case study conducted in 2010-2011 involved the City of Sacramento installing AMI to 17,600 residencies. The City reported the following successes:

- 1,076 leaks were detected through AMI report.
- 75 percent of leaks were verified in the field.

- 367 million gallons (or 113 AFY) of aggregate annual water loss were calculated through AMI reports.
- 236 million gallons of water were saved, which equates to 72 AFY or 12.6 gallons per capita per day.[3] This equates to almost 75% of water loss recovered as noted in the ***EPA Water Audits and Water loss Control for Public Water Systems*** report (see Appendix A).

(d) If installing distribution main meters will result in conserved water, please provide support for this determination (including, but not limited to leakage studies, previous leakage reduction projects, etc.). Please provide details underlying any assumptions being made in support of water savings estimates (e.g., how leakage will be reduced once identified with improved meter data).

Not applicable. The City of American Canyon is not installing distribution main meters.

(e) What types (manufacturer and model) of devices will be installed and what quantity of each?

The proposed project includes the installation of one Sensus Model Metro50 FlexNet Base Station. The Metro50 FlexNet Base Station is the Tower Gateway Base (TGB) station, or AMI tower, that will be installed at 100 Napa Valley Junction for meter data reception.

Additionally, the project will install 3,500 Sensus 520M SmartPoint AMI Passive Integrated Transponder (PIT) Sets. The AMI PIT Set is the "End Point" that will be connected to 3,500 individual, existing water meters. Two thousand water meters in the City already have the PIT set attachment; thus the remaining 3,500 of 5,500 total meters will be retrofitted, to enable the entire distribution system to integrate with the proposed advanced metering infrastructure.

(f) How will actual water savings be verified upon completion of the project?

The water savings will be verified in two ways:

1) Gallons Per Capita Per Day (GPCD) - The City will compare 'before and after' average gallons per capita per day using 2013 data as the baseline (100 GPCD), comparing it to average gallons per capita per day using 2018 data post-project implementation. The City expects a 20% reduction in GPCD, or an average of 80 GPCD in 2018.

2) AFY Water Conserved via Early Leak Detection - The City will record the number of alarm bills generated during the first year of the new system's implementation, the number of leaks fixed, and the acre-feet of water conserved through early leak detection. The City expects a 5% decrease in overall water demand due to leaks.

[3] California Water Plan Update 2013 — Public Review Draft, Chapter 3, page 45.

Subcriterion No. A.2: Percentage of Total Supply

The project will save 254 AFY from the City's annual water supply (3,136 AFY), for a total of 8% of the City's water supply. 254 / 3,136 = .08.

V.A.2 Evaluation Criterion B: Energy-Water Nexus

Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery

Not applicable. The proposed project does not have any renewable energy components.

AND/OR

Subcriterion No. B.2: Increasing Energy Efficiency in Water Management

- ***Please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements?***
- ***Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.***
- ***Does the calculation include the energy required to treat the water?***

The proposed AMI project to install 3,500 meters is estimated to result in pumping energy savings of **56,642 kWh,** which translates to **$7,499.** These estimates were derived from the following assumptions.

The installation of 3,500 meters will conservatively result in estimated water savings of 254 AFY. The City currently receives 100 percent of its imported water from the State Water Project. Assuming 100 percent of the 254 AFY savings will be from imported water, we can estimate imported savings of 254 AFY. The City imports its water through the Barker Slough pumping station.

Imported Water Energy Estimates. Using California Department of Water Resources (DWR) established Energy Intensities for imported water, the following numbers were derived (please see Table 3).

Table 3. Imported Water Energy Estimate

(1) Pumping Plant for Imported Water	(2) DWR Energy Intensity kWh/AF	(3) Imported Water Estimated to be Saved by Project (AFY)	(4) Total kWh Saved = kWh/AF X AFY)
Barker Slough (SWP)	223	254	56,642

Total Estimated Pumping Energy Savings

According to the U.S. Energy Information Administration Form EIA-361 Annual Electric Power Industry Report, 2009, average California energy costs are estimated at .1324 per kWh. Therefore, we can calculate:

$0.1324 x 56,642 kWh = $7,499 Energy Savings for Imported Water

The project will save 56,642 kWH of energy resulting in a $7,499 cost savings.

- ***Will the project result in reduced vehicle miles driven, in turn reducing carbon emissions? Please provide supporting details and calculations. Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).***

Currently, one worker is responsible for metering activities such as monthly meter readings via a combination of walk-by/drive-by radio and touch meter reading; move-in/move-out meter reads; and service suspension, and another staff member drives the entire system four times a year for in-depth leak inspection by hand.

The project will result in approximately 1,434,528 kWh/year from reduced vehicle miles driven because the District's meter reader will not have to spend 1.5 days driving to read 5,500 meters within the District, and an additional staff member will not have to drive those same miles, four times per year, to inspect leaks by hand. This energy savings will also result in reduced carbon emissions. The following assumptions were used to calculate energy savings.

The following assumptions were used to calculate energy savings.

1) One meter reader drives approximately 102 miles per month[4] to read 3,500 meters. Another technician drives 102 miles four times per year to conduct leak detection by hand. This equals to (102 miles X 12 months = 1,224) + (102 miles X 4 months = 408) = **1,632 miles reduced.**
2) Meter Reader vehicle = 24 miles per gallon
3) U.S. Environmental Protection Agency parameters to convert gasoline savings to kWh: 1) Average heat content of gasoline is 1.25therms/gallon; 2) 1 therm equals 29.3 kWh.

Calculations are as follows: (1,632 miles/24 mpg = 39,168 gallons) x 1.25 therms = 48,960 therms per year x 29.3 kWh = **1,434,528 kWh/year.**

[4] The City has 102 lane miles. The City has 51 miles of roads, which are driven once in each direction to equal 102 lane miles.

In addition to energy saved from pumping and reduced driving, the City anticipates that improved efficiencies will be seen with the new meters. Currently over 80% of the meters that will be replaced are more than 10 years old and are past their useful life. This also means that they are not energy efficient and require more energy to operate. By changing to AMI meters, the City will also reduce energy use for the meters.

V.A.3 Evaluation Criterion C: Benefits to Endangered Species

- ***What is the relationship of the species to water supply?***
- ***What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?***

The proposed project directly aligns with the conservation goals outlined in California's State Wildlife Action Plan (CSWAP). Specifically, the proposed project seeks to improve conservation and restoration of 22 endangered species, including the salt harvest Suisun Marsh mouse and the federally-threatened Delta Smelt, by assisting private landowners to conserve water using advanced metering technology. The Bay Area is an internationally recognized biodiversity hotspot, recognized for its abundance of birds, plants, and marine species. Within the Bay Area lay several Critical Coastal Areas (CCAs), specially designated coastal lands where state, federal, and local government agencies coordinate expertise and resources to improve and/or protect water quality. The Delta, a CCA, is a vital migration path for salmon traveling to the Pacific Ocean to spawn. There is much concern regarding the Delta Smelt, which has been on the threatened species list since 1993 and is a major issue for American Canyon due to rising water demands and habitat degradation. This small, slender fish can affect the City's ability to pump water from the North Bay Aqueduct should its populations become concentrated in this area of the Delta. The Delta Stewardship Council created state-mandated coequal goals, which were codified in Section 85054 of the California Water Code. (i.e., providing a reliable water

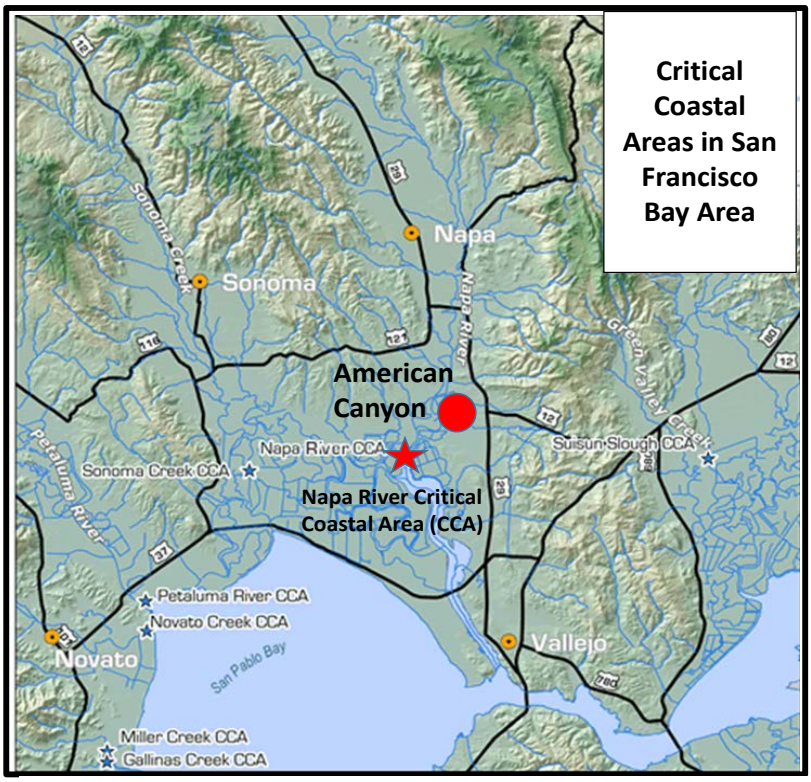


Fig. 2**: **Napa River Critical Coastal Area is shown above within the proposed project area.

supply for Californians, while concurrently protecting, enhancing, and restoring the evolving Delta ecosystem). The final Delta Plan was adopted in May, 2013. The Delta Plan contains 14 regulatory policies, and 73 recommendations, while non-regulatory, still deemed essential to achieve the coequal goals. Effective September 1, 2013, the State Office of Administrative Law approved the Plan's regulations. ***Contained in the approved regulatory language are polices that require those who use water from the Delta to certify in their water management plans that they are implementing all feasible efforts to use water efficiently and are developing additional local and regional water supplies.***

The proposed AMI project will help 5,500 users of Delta water control and conserve their water use. American Canyon's efforts to use water efficiently will conserve local water supplies, and contribute to the goals of the Delta Plan. Reduced water usage in American Canyon will contribute to preserving the Delta Smelt habitat, and help protect other species.

For projects that will directly accelerate the recovery of threatened or endangered species or address designated critical habitats, please include the following elements:

(1) How is the species adversely affected by a Reclamation project?

In 2008, the Fish and Wildlife Service issued a biological opinion which determined that the continued operation of the Central Valley Project (CVP) and State Water Project (a Reclamation facility) was likely to jeopardize the continued existence of the Delta Smelt and adversely modify its critical habitat (http://fws.gov/sfbaydelta). Delta Smelt, among other endangered species, are adversely affected by federal and state exportation of fresh water from the Delta (CVP/SWP). The Delta Smelt fish once thrived in the Northern California Bay area. In the 1970s, biologists from University of California Davis, studied the smelt fish for their abundance. Scientists now seek explanations for the species' dwindling numbers. The smelt fish is one of 22 federally recognized endangered species present in the North Bay. Recent population samples, in an area which typically yielded 50 to 100 smelt fish, now present only six fish, with increased water salinity cited as a major contributing factor.

Fig. 3: ***The federally threatened Delta Smelt fish.***

Numbers of Delta Smelt are diminishing, due in large part to dwindling water supply, and the corresponding effect of salinity levels of Delta water. Delta water salinity levels continue to increase, without sufficient fresh water replenishment. The Sierra snowcap supply is nearly depleted and typically, the snowcaps melt, creating fresh-water flow into the Delta. Under normal circumstances, the strong flow created by snowcap rivers

pushes salty ocean water out of the Delta, preserving fresh-water qualities for Delta species. Years of extreme drought conditions, and decreased fresh-water flow, allows increasing amounts of ocean water to mix into the Delta, dramatically increasing salinity levels. Federal and state water systems (CVP/SWP) pump the Delta's fresh water supply to 25 million Californians, another major contributing factor to the increase in water salinity.

(2) Is the species subject to a recovery plan or conservation plan under the ESA?

Yes. The Delta Smelt has long been a controversial subject of Delta area conservation efforts. The species was first listed as threatened in 1993. It was later featured in the United States Department of Fish and Wildlife Recovery Plan, 1996. As stated above, in 2008, the Fish and Wildlife Service issued a biological opinion which determined that the continued operation of the CWP and SWP was likely to jeopardize the continued existence of the Delta Smelt and adversely modify its critical habitat (http://fws.gov/sfbaydelta). 2010/2011 Adaptive Management Plans outlined the broad issue of Delta outflow management in order to improve the habitat and population growth rate of the Delta Smelt. Many years of litigation ensued, and most recently, Reclamation issued a memo to the U.S. Fish and Wildlife Service, requesting re-initiation of Endangered Species Act Consultation of the Coordinated Long-term Operation of the CVP and SWP to address Estimated Adult Delta Smelt Take for 2015 Operations. (FWS.gov) An FWS response memo acknowledged the re-initiation, and suggesting the need for a smelt population estimation approach that factors numbers of fish loss due to the effects of export pumping. Reducing water consumption in American Canyon will reduce export pumping, reduce smelt loss associated with export pumping, and improve conditions in the Sacramento, San-Joaquin River Delta.

(3) What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?

The proposed AMI project helps reduce water use, therefore placing less of a demand on imported water. As a result of reduced imported water, the Delta Smelt's habitat, as well as other endangered fish species, will be improved. **It is outside our jurisdiction to commit that the water savings will be used for instream flow efforts.**

V.A.4 Evaluation Criterion D: Water Marketing

The AMI project will not specifically develop a new external water market, however it will free up significant amounts of water for other entities allowing other supply needs to be met outside of the American Canyon service area. These water marketing benefits will be achieved in two main ways:

1) Based on empirical evidence, AMI will save water based upon leak detection and real-time data that allows leaks to be fixed immediately.
2) Enhanced water use data provided to customers will also serve as an incentive for some of American Canyon's largest water consumers to consider conversions to Recycled

Water use. Currently, there is a significant lag between water use and billing cycles that reflect recent water use data. It typically takes 45-60 days for customers to receive their bills following the month when the watering actually occurred, as stated previously. We believe that when our most intensive water users see their water data in real-time via their customer portal, they will begin to evaluate the value and feasibility of converting to recycled water.

Briefly describe any water marketing elements included in the proposed project. Include the following elements:

- ***Estimated amount of water to be marketed***

In addition to the 254 AFY of potable water saved, City Leaders and Water Managers in American Canyon believe the project will have the indirect benefit of providing an incentive for large water consumers to convert to recycled water. For example, the City has identified five of its top commercial and our four agricultural water consumers, who have the potential to convert irrigation or production water uses to reclaimed water. **If these top nine customers converted to recycled water, this would provide for an additional 123 AFY** (52 AF + 71 AF = 123 AFY)

Table 4. Potential Recycled Water Commercial Customers

Account Name	Potable Water Use (2015)	Account Type
Devlin Road Transfer Station (Refuse)	27 AFY	Dust control
Cultured Stone	19 AFY	Concrete product
Hydoconduit	2 AFY	Concrete product
Dynacraft	2 AFY	Landscaping
Napa Recycling Facility	2 AFY	Dust control
TOTAL	**52 AFY**	

- ***A detailed description of the mechanism through which water will be marketed (e.g., individual sale, contribution to an existing market, the creation of a new water market, or construction of a recharge facility)***

Because the majority of American Canyon's water is supplied by the ***State Water Project***, the water savings achieved through AMI will result in immediate contribution to the existing market for

Table 5. Potential Recycled Water Agricultural Customers

Account Name	Potable Water Use (2015)
Hess Collection	27 AFY
Sutter Home	19 AFY
Green Island Vineyard	14 AFY
Polson Rd Vineyard	11 AFY
TOTAL	**71 AFY**

hundreds of thousands of consumers who also rely on the SWP for water resources. The SWP is the nation's largest state-built water and power development and conveyance system. It captures, stores, and conveys water to 29 water agencies ("contractors"). On an annual basis, each of the 29 SWP contractors requests an amount of SWP water based on their anticipated yearly demand. However, in the past 10 years due to the drought conditions, the State Department of Water Resources (DWR) has only been able to deliver a small percentage of its water to contractors. Each year, DWR assesses the amount of water supply available based on precipitation, snow pack on northern California watersheds, volume of water in storage, projected carry-over storage, and Sacramento-San Joaquin Bay Delta regulatory requirements.

- ***Number of users, types of water use, etc. in the water market***

25 million people, more than two-thirds of the people of California rely partly or wholly on the SWP for water supplies (*Management of the California State Water Project*. Bulletin 123-11, December 2013.) **Every contribution to the highly valuable water market is significant.** However, the SWP is struggling to provide enough water to its contractors. In fact, none of the contractors has received a 100 percent allocation since 2006. The amount of State Water Project water actually disbursed compared to what the contractors have requested is provided in Table 6.

Table 6.
Percent of Allocation to Contractors by the State Water Project

Year	SWP Allocation
2016*	15%
2015	20%
2014	5%
2013	35%
2012	65%
2011	80%
2010	50%
2009	40%
2008	35%
2007	60%
2006	100%

*2016 initial allocations are set at 10% for customers of the SWP. This may be adjusted slightly based upon winter rain and snow amounts.[5]

Despite early season storms, California continues to face severe water shortages with record low levels in some reservoirs, including Folsom Lake near Sacramento. Lake Oroville in Butte County, the SWP's principal reservoir, is dipping toward its record low of 882,000 acre-feet set on September 7, 1977. Oroville, which supplies a percentage of the water for 25 million Californians and just under a million acres of irrigated farmland, today is holding only 929,151 acre-feet, 26 percent of its capacity of 3.5 million acre-feet and 43 percent of its historic average for the date. Even though forecasts

[5] http://www.water.ca.gov/news/newsreleases/2015/120115.pdf

predict a "wet" El Nino Winter in California, National and State Climatologists do not believe one season of El Nino conditions will end the drought.[6]

The state's major reservoirs, including Oroville, are significantly depleted and not likely to be filled by typical or even El Nino winter storms. DWR experts estimate that it will take roughly 150 percent of average precipitation for California to recover from the drought. The State's water conservation plans for the SWP and its Bay Delta source are predicated on the assumption that individual areas in California become more self-sufficient by investing heavily in water conservation, water-use efficiency, water recycling, and conjunctive use of a region's surface or underground storage. The City of American Canyon is working diligently to implement AMI and accelerate use of its local reclaimed water. This project reduces the need to purchase imported water and helps preserve the State Water Project water supplies.

Fig. 4**: **The California drought has exposed the bottom of Oroville Lake reservoir which is now at 26% of its capacity.

- ***A description of any legal issues pertaining to water marketing (e.g., restrictions under Reclamation law or contracts, individual project authorities, or State water laws)***

There are no known legal issues pertaining to this project.

- ***Estimated duration of the water market***

The AMI project and related conversion to additional recycled water use are expected to produce a long-term water market supply benefit to the SWP. It is a permanent strategy for water conservation through superior leak detection and reducing reliance on imported water resources. The estimated project life is 15 years and the City will build replacement costs into its future budget so the latest water management metering technology will be utilized.

V.A.5 Evaluation Criterion E: Other Contributions to Water Supply Sustainability

Subcriterion E.1: Addressing Adaptation Strategies in a WaterSMART Basin Study

- ***Identify the specific WaterSMART Basin Study where this adaptation strategy was developed. Describe in detail the adaptation strategy that will be implemented***

[6]http://www.usnews.com/cmsmedia/7d/c8/e9ba6e144d1fbafe2e17aa358947/151015-elninoprecipitation-editorial.jpg

through this WaterSMART Grant project and how the proposed WaterSMART Grant project would help implement the adaptation strategy.

The Sacramento-San Joaquin Rivers Basin Study (WaterSMART Basin Study) is under development to assess potential climate change impacts to the Basin's water supplies and demands. The study will specifically evaluate and identify adaptation strategies to address these impacts and involve a spectrum of stakeholders throughout the Sacramento and San Joaquin basins.

Adaptation strategies already identified in the San Francisco Bay Area IRWMP Plan are under evaluation for potential adoption into the Sacramento-San Joaquin Rivers Basin Study. Strategies being studied include restoring shoreline habitats, increasing use of recycled water, and improving levees and flood control structures.[7]

To ***restore shoreline habitats***, adaptation strategies include building upon lessons learned from other restoration efforts that evaluate the connectivity between submerged areas and adjacent tidal wetlands and creeks. Although this work is new, frequent monitoring will generate information to help balance shoreline protection, environmental impacts, and habitat needs. To assist with this strategy, the proposed AMI system will monitor water usage to reduce water consumption.

Adaptation strategies to ***increase use of recycled water*** include continuing water conservation efforts focused on reducing reliance on imported water, improving movement of water supplies among neighboring agencies during periods of extreme water shortage, diversifying water supplies through development of additional supplies and/or transfers, and providing additional water treatment options to respond to the water quality impacts. An AMI system will allow for quicker detection of water leaks than the current process of paid staff driving to multiple locations to obtain a meter read. Many of the City's industrial and commercial customers are in locations that could easily be serviced with, or already service with recycled water. We are confident that when our new system shows these customers their actual water usage (e.g., X gallons at Y), they will be motivated to switch to recycled water. This will drastically improve water conservation in addressing leaks before large amounts of water are wasted.

To ***improve levees and flood control structures***, adaptation strategies include providing additional storage to take advantage of rainy seasons, raising and maintaining flood control structures, elevating terraced levees, and implementing marsh restoration. AMI systems will work in conjunction with this strategy by monitoring water reserves available in flood control structures. American Canyon will be able to observe water reserve levels and apply the appropriate water restrictions to residents based upon water availability.

[7] Bay Area Integrated Regionall Water Management Plan, page 12-12, Table 12-3.

- ***Describe how the adaptation strategy and proposed WaterSMART Grant project will address the imbalance between water supply and demand identified by the Basin Study.***

The AMI project will provide a substantial contribution to the sustainability of the District's water supply. In 2014, American Canyon enforced a Stage 2 emergency measure. Unlike other cities in Napa Valley, American Canyon has no reservoirs and relies on water transported through the North Bay Aqueduct from the State Water Project, as mentioned throughout this application. With the State's severe water cutbacks, the City is scrambling to line up supplemental sources. With another lean year of water ahead, City leaders are considering securing new water sources to reduce American Canyon's heavy reliance on the State for water. To expand future water resources, the goal is to achieve a 20 percent water reduction. The City has already increased the use of recycled water to irrigate parks (amount of recycled water from UWMP). Residents are now restricted to irrigate their lawns only between midnight and 10 a.m. two days a week. Those who violate these rules may risk fines up to $500.

The proposed AMI project will provide residents the opportunity to take a proactive role in monitoring their water usage and adapting water conservation techniques to reduce water usage. The computerized interface AMI system will make electronic monitoring, leak detection, and water reporting available as an educational tool and training method for residents to be more aware of their water usage and provide opportunities to take part in conservation strategies. We are confident that measures including advanced metering infrastructure that will identify leaks and water main breaks early, and allow customers to monitor their own water usage in real-time, will be included in the Sacramento-San Joaquin Rivers Basin Study.

- ***Identify the applicant's level of involvement in the Basin Study (e.g., cost- share partner, participating stakeholder, etc.).***

The Sacramento-San Joaquin Rivers Basin Study will include agriculture interests, City and County water agencies, water user associations and environmental interests. **American Canyon will participate as a stakeholder in the development of this study.** The study will also explore potential opportunities for collaboration with the San Joaquin River Restoration Program, identified as one of the top priorities in California in the America's Great Outdoors 2011 50-State Report.

- ***Describe whether the project will result in further collaboration among Basin Study partners.***

As noted in the California Water Plan, coordination in water planning is essential for successful management of California's water system. Due to the growing demand and uncertainty regarding the availability of water from the Sacramento-San Joaquin Delta, the proposed project will be vital in further collaboration with Basin Study partners to evaluate water use and develop additional conservation measures.

Subcriterion E.2: Expediting Future On-Farm Irrigation Improvements

If the proposed projects will help expedite future on-farm improvements please address the following:

- ***Include a detailed listing of the fields and acreage that may be improved in the future.***

The City has four agricultural customers. They are all wine grape vineyards that will be integrated into the proposed AMI system, thereby receiving the customer benefits of real-time water usage data reports, efficient and timely leak detection, and side-by-side comparisons of potable versus recycled water use. The eventual goal is to shift these users off the potable water system.

Vineyards are listed in Table 7.

Table 7. American Canyon Agricultural Customers

Account Name	Potable Water Use (2015)
Hess Collection	27 AFY
Sutter Home	19 AFY
Green Island Vineyard	14 AFY
Polson Rd Vineyard	11 AFY
TOTAL	**71 AFY**

- ***Describe in detail the on-farm improvements that can be made as a result of this project. Include discussion of any planned or ongoing efforts by farmers/ranchers that receive water from the applicant. Fully describe the on-farm water conservation or water use efficiency benefits that would result from the enabled on-farm component of this project. Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.***

- ***Projects that include significant on-farm irrigation improvements should demonstrate the eligibility, commitment, and number or percentage of farmers/ranchers who plan to participate in any available NRCS funding programs. Applicants should provide letters of intent from farmers/ ranchers in the affected project areas.***

The proposed project serves to modernize American Canyon's water infrastructure throughout the entire service area, while simultaneously supporting the local agricultural economy. The

ability to capture real-time water usage data will expedite on-farm water-use efficiency and conservation, leading to *100 percent of irrigation water better managed*.

Access to real-time usage patterns, at no additional cost to the consumer, will provide robust data sets that eliminate the lag in time between actual usage and receiving the water bill. As mentioned previously, the City of Sacramento implemented a similar AMI system with 16,000 customers and saw that those who had access to real-time data and leak alarms saved 50 percent more water than customers without the technology. The City's policies also serve to encourage agricultural water users to shift from the raw, potable water they use today, to our recycled water system. The recycled water is less costly, and when the customer is able to see their real-time water usage and cost, compared to the cost of water from our recycled system, we are confident that more of these users will make the switch.

Additionally, the new AMI system may serve to facilitate water-smart irrigation methods such as drip irrigation. Many farmers and ranchers want to improve their irrigation systems, but are unsure how to start. Napa County's Mobile Irrigation Labs (MIL) offer farmers on-site evaluations of their irrigation systems, along with recommendations for improvements. Unfortunately, these onsite evaluations can be expensive, up to $2,000. Installation of smart meters will allow the farmers to more easily determine the precise level of irrigation to achieve crop success and water efficiency. They will have access to real-time data and leak detection, as well as the time and labor-saving ability to automate and adjust their water usage from a computer.

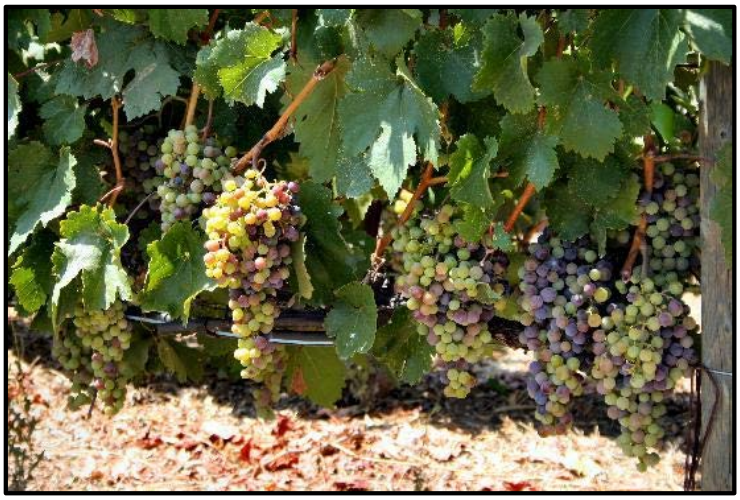


Fig. 5: Wine grapes on the vine in American Canyon vineyard.

- ***Provide a detailed explanation of how the proposed WaterSMART Grant project would help to expedite such on-farm efficiency improvements.***

The proposed WaterSMART grant project will expedite on-farm efficiency improvements by providing the equipment and technology to allow the farmers to easily access real-time water usage data, and receive concise and accurate documentation of their exact water usage.

Currently, American Canyon services approximately 5,500 traditional water connections. Four are agricultural service connections. Each metered connection gauges water volume delivery in gallon units. City staff travels to each meter throughout the region, a 1 ½ day process, to collect individual user data via short-distance transponders. Once the data is collected, each meter's output is converted into a utility bill. The customer receives the bill at the end of the subsequent month, approximately 45-60 days after the initial data capture. This significant lapse in time between data collection and billing creates ambiguity in that the customer must recall previous watering activities from months prior and correlate the activities with the current utility bill.

As described throughout this application, the improved AMI system eliminates the time lag between data capture and billing. The wireless data transmissions free staff from driving meter to meter, allowing them to focus on other tasks. Customers log on to the secure web portal to view and track water real-time water usage, eliminating the daunting task of retroactively reviewing water usage. Improved metering removes guess-work and allows farmers to scrutinize the precise amount of water used for specific tasks. The ease with which farmers will be capable of correlating each watering activity with real-time dollars saved will empower them to make irrigation adjustments, and immediately log on to see the cost benefits.

Residents of American Canyon, including local farmers, are committed to conserving precious water resources, and would be interested in participating in available NRCS funding programs. In fact, residents, including local farmers, are so dedicated to improving the City's dwindling water, they are willing to spend hard-earned wages to help conservation efforts. In 2008, American Canyon City Council formed a diverse "Blue Ribbon" committee of 35 people, including local farmers and business stakeholders, to gain input for the City's water management plan. Remarkably, after the committee and the public became educated about the looming water crisis, and necessary prevention measures, they recommended a plan, fully approved by the City, which included a 36 percent water and sewer rate increase, over 3 years. Only 1.8 percent of the City population cast protest ballots.

- ***Describe the extent to which this project complements an existing NRCS- funded project or a project that either has been submitted or will be submitted to NRCS for funding.***

This project is a stand-alone, independent project that does not include an existing NRCS-funded project. This project is not being submitted to the NRCS for funding consideration.

Subcriterion E.3: Other Water Supply Sustainability Benefits

- ***Will the project make water available to alleviate water supply shortages resulting from drought?***

Yes.

- ***Explain in detail the existing or recent drought conditions in the project area. Describe the impacts that are occurring now or are expected to occur as a result of drought conditions.***

California has experienced nearly four years of continuous and unprecedented drought conditions. Depletion of the Sierra Mountain snowpack and its associated waterways necessitated statewide mandatory conservation requirements. American Canyon receives nearly all its water from the SWP. In 2014, DWR notified the City that its SWP 2015 allocation would only be 25% of its requested amount. The drought has reduced the amount of water available for consumption by City customers, as well as City revenue from treated water sales. The agriculture economy has been significantly impacted, including lost crops and associated revenues, and loss of agriculture-related jobs. If the drought continues, the economic impacts are likely to impact not only the farmers, but also local businesses and related industries.

- ***Describe the severity and duration of drought conditions in the project area.***

The current drought conditions in the project area are extreme and prolonged. Governor Brown declared a state of emergency in 2015, and issued an executive order mandating all municipal water providers to reduce demands and implement restrictions on wasteful uses of water. The City Council adopted an Urgency Ordinance to provide water regulations on water conservations in order to meet the Executive Order's requirements. The City of American Canyon must reduce water consumption by 20% from 2013 levels, or face penalties from the state.

- ***Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by drought.***

The North Bay Aqueduct (part of the SWP) is a 28-mile, underground pipeline that pumps water to Napa and Solano Counties. It draws its water from Barker Slough, in Solano County. In addition to the previously mentioned drought impacts (decreased water supply, revenue, etc.) the North Bay Aqueduct is directly impacted by the drought's impact on the smelt fish. Extreme drought conditions have led to the near extinction of the already-endangered Delta Smelt fish. The species has been found near the Barker Slough pump. Cities that receive water from the North Bay Aqueduct fear that federal laws protecting endangered species could impose restrictions on pumping, or force shutdown of the Barker Slough pump, which is the only way the North Bay Aqueduct sources water from the Delta Bay. Even if the North Bay Aqueduct continues to receive water from the Barker Slough pump, because that particular area of water is home to the nearly-extinct species, it is a likely project site for SWA proposed tidal wetland habitat restoration.

- ***Provide a detailed explanation of how the proposed WaterSMART Grant project will improve the reliability of water supplies during times of drought.***

As mentioned previously, the proposed AMI project will improve the reliability of water supplies during times of drought by reducing potable water demand, and early leak detection will increase water supply and reduce wasted water.

Will the project make water available to address a specific concern? For example:

- ***Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?***

The proposed project will address both heightened competition for finite water supplies and over-allocation. American Canyon, and much of the Bay Area, lacks a groundwater supply. Therefore, the City's water supply depends on the Sierra Nevada Snowpack's reservoir flow into the Sacramento-San Joaquin Rivers, part of the Bay-Delta.

Competition for Finite Water Supplies

American Canyon receives its water from the previously mentioned State Water Project, via the North Bay Aqueduct. The North Bay Aqueduct pumps dead-end in Barker Slough. Unlike other SWP/CVP pumps, that draw their water resources from larger bodies of water, the amount of water that can be exported to American Canyon is limited by the amount of water that can be diverted from Barker Slough into the North Bay Aqueduct. Available water supply from this single source is made even more competitive due to federal operational restrictions associated with smelt protection and algae content in the water.

The proposed project will address finite water sources by allowing water users to directly correlate specific activities with their respective water use, and make adjustments to conserve water.

Over-Allocation

Between 1990 and 2000, American Canyon experienced the most rapid population growth in Napa County, with an approximate 26% increase. By 2010, the City population doubled from its 2000 population. To address the City's growing population, and increased water demands, in 2008, American Canyon adopted its "Zero Water Footprint" plan. This resolution addressed the growing concern for new development to conserve potable water supply while minimizing the impact and demand for existing users. The proposed project will address over-allocation and population growth by installing the water-smart meters in all existing metered connections, as well as future construction. The project seeks to helps residents with their current water conservation efforts, and also anticipate future water needs.

- ***Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by climate variation.***

American Canyon's water supply flows through a direct route that can be traced to its source in the Sierra Nevada snowpack. The Sierra snowpack, and each source of water in American

Canyon's supply chain, are directly impacted by climate variation. Roughly 80% of California's precipitation happens in the winter months. The precipitation is stored and used in summer months. Climate variation, including record high temperatures throughout January, February, and March, impact the snow levels. Exceptionally low snow reserves directly impact the amount of water that flows to Lake Oroville, the principal reservoir, and starting point of, the SWP. As of December, 2015, the reservoir holds only 26% of its 3.5 million acre-foot capacity, and 47% of its historical average. Climate change, and its associated depletion of the Sierra Nevada snowpack, impacts the amount of available water supplied from the Oroville Dam, as it flows through the SWP network of rivers before mixing in the Delta, to the North Bay Aqueduct, and eventually, to American Canyon.

- ***Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved?***

As mentioned earlier, the proposed project will help address the depletion of the endangered smelt fish. If unresolved, federal regulations authorize cessation of the pumping activities that are contributing to the species' demise. Because the SWP and North Bay Aqueduct are American Canyon's largest water supply source, the endangerment of the smelt fish is a very relevant issue that could potentially result in an interruption to water supply. The proposed project seeks to address this issue through increased water conservation, made possible by AMI metering technology.

- ***Will the project make additional water available for Indian tribes?***

Major benefits of the proposed project include reduced consumption of water from the Bay-Delta river systems. Decreased consumption by American Canyon leaves additional water resources, which would benefit Native American tribes that rely on the Delta water system, such as the Mishewal Wappo Indian Tribe.

- ***Will the project make water available for rural or economically disadvantaged communities?***

The project, and its associated water conservation, will make water available for unincorporated rural/disadvantaged communities, who rely on the Delta water sources.

- ***Does the project promote and encourage collaboration among parties?***

Yes. The City has a close working relationship and meets regularly with other water purveyors. In particular, the City meets at least monthly with its water wholesaler, the Napa County Flood Control and Water Conservation District (District) and with other SWP member units who purchase water from the District. Member units include the cities of American Canyon, Napa, Calistoga, St. Helena and the Town of Yountville. This monthly coordination has been instrumental in coordinating water supply and demand analyses for planning purposes. The City

also meets with the City of Vallejo for the purchase of Vallejo treated water and raw water. The proposed project will encourage continued collaboration among these parties.

- ***Is there widespread support for the project?***

Yes. Please see letters of support from U.S. Congressman Mike Thompson, State Assemblymember Bill Dodd, and our Mayor Leon Garcia. The Napa County community and Bay Area are united in water conservation efforts.

- ***What is the significance of the collaboration/support?***

The significance of our support illustrates that our elected officials are 100 percent supportive of our efforts and therefore will support the project by providing the required local match resources and will work hard to ensure continued support for BOR funding moving forward.

- ***Will the project help to prevent a water-related crisis or conflict?***

Yes, this project will help improve the significant water-related crisis in the State of California as a result of the significant drought conditions we are currently experiencing. Every resource must be implemented and this project represents another opportunity to realize water savings.

- ***Is there frequently tension or litigation over water in the basin?***

Yes. The City is subject to a federal biological decision (mentioned previously), as well as the "Wanger Decision." These constrain Delta operations due to sensitive marine life. This project will result in incrementally less water that needs to be pumped from the Delta, thus reducing tension over the biological constraints.

- ***Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?***

Yes, as already mentioned, it is possible that through this project, users may be encouraged to shift to recycled water use.

- ***Will the project increase awareness of water and/or energy conservation and efficiency efforts?***

Yes. The City will publish results of its conservation strategies on its website and through local media. In researching AMI technology and its benefits, the City found a lack of data from completed projects. The City will publish the measurable results from the project to help lead the way for other districts deciding whether to use AMI in their own systems.

- ***Will the project serve as an example of water and/or energy conservation and efficiency within a community?***

Yes, this project will definitely help serve as an example of water conservation and efficiency within American Canyon. As previously described in prior sections, the entire proposed project

is to conserve water by detecting leaks in real-time. Our outreach effort will ensure residents are educated on how to use the real-time features to check their water consumption use and either make positive changes in their water use habits or contact the City immediately to correct a leak.

- ***Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?***

Yes, this project is customer-driven. The success of the project will depend on the use of the real-time information and leak detection by our customers and water personnel.

- ***Does the project integrate water and energy components?***

Yes, water saved locally reduces the cost of pumping water, which in turn reduces energy consumption. Please see earlier discussion about the energy intensities saved as a result of this project.

V.A.6 Evaluation Criterion F: Implementation and Results

Subcriterion No. F.1: Project Planning

Does the project have a Water Conservation Plan, System Optimization Review (SOR), and/or district or geographic area drought contingency plans in place? Does the project relate/have a nexus to an adaptation strategy developed as part of a WaterSMART Basin Study)? Please self-certify, or provide copies of these plans where appropriate to verify that such a plan is in place.

Provide the following information regarding project planning:

(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Basin Study, drought contingency plan, or other planning efforts done to determine the priority of this project in relation to other potential projects.

The **2013 State of California Water Plan** outlines metering as a top Best Management Practice (BMP) in **Section 3: Urban Water Use efficiency**. AMI Systems assist in providing water conservation strategies inherent in the **State of California 20 x 2020 Water Conservation Plan** to help the State reach its goal of reducing per capita water consumption by 20 percent by the year 2020. (Due to the size of the CWP, the Plan is not included.

Please find the CWP, Section 3, at:

http://www.waterplan.water.ca.gov/docs/cwpu2013/2013-prd/Vol3_Ch03_UrbanWUE_PubReviewDraft_Final_PDFed_co.pdf

In 2010, the City completed an **Urban Water Management Plan** in accordance with Water Code Section 10610. The purpose of plan is coordinate water supplies, illustrate potential

consequences of drought conditions, and help agencies plan for long-term water supply needs and drought contingencies. The plan mentioned methods to simplify water monitoring and reporting that would provide the City with greater flexibility to implement Zero Water Footprint policies. The proposed project will assist the City and district in reducing water consumption, as an AMI system efficiently supports water adaptation strategies. (Due to the size of the UWMP, it is not attached to this application.

Please find the UWMP at:

http://www.cityofamericancanyon.org/home/showdocument?id=7790

(2) Describe how the project conforms to and meets the goals of any applicable planning efforts, and identify any aspect of the project that implements a feature of an existing water plan(s).

In the 2010 Urban Water Management Plan, the City amended five policy documents to outline its demand for management strategy within its corporate limits and water service area. These amendments included adoption and implementation of a Zero Water Footprint policy, new water sewer connections and services, allocation of raw water, and allocation of recycled water. The proposed project conforms with the City's Best Management Practices (BMP) in that an AMI system will allow the City to closely monitor water usage and improve daily operations. Real-time water use providing remote monitoring of water sites anywhere and anytime will be essential in the City's decision-making process to address the current water shortage.

Subcriterion No. F.2: Readiness to Proceed

Please see the **Project Schedule** on the following page.

Permits Needed

This is a project ready project. A pilot study has already been conducted by the City, using our own local resources, to ensure the proper location for infrastructure. We already researched and identified the specific equipment needs and vendors. **No permits will be required.**

City of American Canyon

Advanced Metering Infrastructure Project

Table 7 - City of American Canyon AMI Implementation Schedule													
Task No.	**Timeline Major Project Tasks**	***Quarters 2016***				***Quarters 2017***				***Quarters 2018***			
		1	*2*	*3*	*4*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*
0	BOR Awards Announced June 2016												
1	Project Grant Agreement, Administration, and Reporting												
2	Easements – ***Not Applicable***												
3	Project Design/Engineering												
4	Environmental Documentation (CE)												
5	Permitting – ***Not Applicable***												
6	Project Implementation-AMI Installation												
6.1	Kickoff Meeting												
6.2	Customer Outreach												
6.3	Equipment Installation and Testing												
6.4	Development, Launch, and Testing of the Network Management System												
6.5	Training for City staff												
Project Start: July 1, 2016 --- Project Completion: June 30, 2018 (24 months)													

Subcriterion No. F.3: Performance Measures

Proposed Data Collection Procedures, Schedule, and Reporting

The City will use a simple 'pre-post' design to quantify performance. Calendar year 2015 will serve as the preferred baseline, and earlier years will be used as the baseline when the use of 2015 data is not feasible.

The collection and analysis of performance data will be the responsibility of the City's Engineering and Water Division, working collaboratively. Data collection and analysis during Year 1 of the project will be two-fold:

1. Baseline Data. During Year 1, baseline data (i.e., data from calendar year 2015) will be collected for each of the performance measures named below. These data will be included in the Year 1 report (4th quarterly report), and presented both quarterly and annually.

2. Project Data. Also during Year 1, project performance data will be collected and compiled each quarter. This will allow for: a) incremental assessment of performance, which will be reported in the project's quarterly reports, and b) annual and two-year projections of performance.

Proposed Performance Measures

The performance of the proposed AMI project will be assessed using several measures:

3) Water Better Managed – The proposed project will result in 100% of potable water better managed. The entire City's potable water distribution system will be integrated to the new AMI technology, allowing for real-time data reading, early leak detection, detection of pressure changes, and a customer portal that will promote behavior change as customers see water usage in real time. As a result, one hundred percent of the water delivered through this system will be better managed.

4) Gallons Per Capita Per Day (GPCD) Saved - The City will compare 'before and after' average gallons per capita per day using 2013 data as the baseline (100 GPCD), comparing it to average gallons per capita per day using 2018 data post-project implementation. The City expects a 20% reduction in GPCD, or an average of 80 GPCD in 2018.

5) AFY Water Conserved via Early Leak Detection - The City will record the number of alarm bills generated during the first year of the new system's implementation, the number of leaks fixed, and the acre-feet of water conserved through early leak detection. Real-time monitoring can prevent a small leak from becoming a big leak, or worse, a water main break. The City expects a 5% decrease in overall water demand due to leaks.

4) Savings Due to the Elimination of On-Site Meter Reading. The City will calculate the dollar value of staff time, gasoline, and vehicle maintenance spent in 2015 reading meters manually (i.e., Public Works staff driving to meter locations throughout the City to read meters). This staff function will be completely eliminated after the proposed project as all meter reading will be conducted remotely and will be automated. This frees these staff to concentrate on more critical and long-term tasks. The City expects a 100% reduction in these staff costs.

5) Reduction in Backflow incidents. The City will calculate the number of backflow incidents that occurred in 2015 and estimate the amount of contamination resulting from these incidents. Backflow incidents should be nearly eliminated because the AMI system will trigger an alert 24 per day, allowing for quicker response. The City expects a 90% reduction in backflow incidents.

6) Reduction of Unauthorized Consumption and Water System Tampering. The AMI system will send alerts 24 hours per day for unauthorized or excessive system usage at any volumetric threshold. The City will be able to immediately shut down these connections to eliminate water waste, theft, and the effects of vandalism on the water system and customers' properties.

Subcriterion No. F.4: Reasonableness of Costs

The benefit of the proposed project in terms of cost per acre-feet is **less than a dollar** per acre foot of water saved over the project's useful life. One method for calculating the BC ratio is the estimated AFY in water saved multiplied by the project's useful life, divided by the total project cost:

Estimated Project Cost: $662,000 (rounded)

Estimated AFY in Water Savings: 254 AFY

Estimated Project Useful Life: 15

254 AFY x 15 years = 3,810 acre-feet of water saved over 15-year life of project

3,810 AF of water / $662,000 = $0.57

The project is proposed to save 3,810 AF of water over its useful life at a very small cost of $0.57 per acre-foot.

The estimated project life of 15 years has been confirmed by the proposed manufacturer.

Additionally, the retail cost of treated water is approximately $2,000 per acre-foot. By saving 3,810 AF of water over the next 15 years, the City will save $7,620,000 in costs of buying treated water.

V.A.7 Evaluation Criterion G: Additional Non-Federal Funding (4 points)

The City will provide $364,093 (55 percent) of the total $661,988 total project cost. This is five (5) percent above the required match.

V.A.8 Evaluation Criterion H: Connection to Reclamation Project Activities (4 points)

(1) How is the proposed project connected to Reclamation project activities?

The proposed project is connected to Reclamation project activities, because it benefits the same Delta region as the Central Valley Project (CVP), a federal project, managed by Reclamation, and the largest surface water storage/delivery in California. SWP and CVP share responsibility for in-basin use as well as sharing of surplus flows (1986 Coordinated Operations Agreement) and export capacity for project-specific priority pumping (State Water Board Right Decision, 1641 USFWS Biological Opinion (Dec 2008). The SWP and CVP each draw water from the Delta, where the Sacramento and San Joaquin Rivers meet. SWP water is then pumped through the North Bay Aqueduct, among others, while CVP water flows through its own distribution channels. SWP then supplies water to American Canyon, as the sole water source to 5,500 metered units. Water conservation at the end source will benefit all of the water recipients and suppliers up the chain of delivery, because decreased water demand from the residents of American Valley means a larger water supply for the rest of Delta water recipients.

(2) Does the applicant receive Reclamation project water?

Yes. As described above, the SWP exports water from the Delta at the North Bay Aqueduct, a shared source with the Central Valley Project.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

American Canyon (serviced by SWP) does not share facilities with CVP Reclamation facilities, but as described above, the project is on land directly connected to and involving Reclamation facilities.

(4) Is the project in the same basin as a Reclamation project or activity?

The City's basin is the Napa Sonoma Valley Groundwater Basin, the same basin as the North Bay Water Reuse Program (NBWRP – a regional water recycling project, currently in phase II, with financial assistance and input from BOR).

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

Yes. As described above, The North Bay Aqueduct is one of many SWP and CVP avenues for sourcing water that originates from the Delta. The combined export of water by the CVP and SWP (including North Bay Aqueduct) represents, on average, about 30% of the Delta inflow. (DWR Water Data Library Website (http://wdl.water.ca.gov). When SWP exports are high,

water levels in local channels can draw down, causing issues for agriculture farmers who rely on the streams and channels. The proposed project will increase water conservation throughout the region served, and therefore decrease the supply requested from SWP. The conservation effects will contribute to Reclamation projects by decreasing the amount of water drawn from the Delta.

(6) Will the project help Reclamation meet trust responsibilities to Tribes?

To the applicant's knowledge, this project is unknown as to whether it will help the BOR meet trust responsibilities to Tribes.

Performance Measures

As described under SubCriterion F.3, the project performance measures are as follows:

Proposed Data Collection Procedures, Schedule, and Reporting

The City will use a simple 'pre-post' design to quantify performance. Calendar year 2015 will serve as the preferred baseline, and earlier years will be used as the baseline when the use of 2015 data is not feasible.

The collection and analysis of performance data will be the responsibility of the Engineering and Water Divisions, collaboratively. Data collection and analysis during Year 1 of the project will be two-fold:

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~End of Technical Proposal~

Environmental and Cultural Resources Compliance

The project has been evaluated for both CEQA and NEPA compliance and it has been determined that the project is a Categorical Exemption for CEQA and a Categorical Exclusion for NEPA. The CEQA Categorical Exemption reference is Section 15301. Existing Facilities, part (b). The project is a Class I project which consists of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public and private structures, facilities, mechanical equipment, etc. The types of "existing facilities" is consistent with part (b) of Section 15301 which states "existing facilities of both investor and publicly-owned utilities used to provide electric power, natural gas, sewage, or other public utility services." For NEPA, we reviewed the list of Categorical Exclusions located in the Code of Federal Regulations for the Department of Interior and concluded that the project meets the following categorical exclusion definitions: "minor construction activities associated with authorized projects which....merely augment or supplement..." and "maintenance, rehabilitation, and replacement of existing facilities which may involve a minor change in size, location, and/or operation."

(1) Will the project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

No.

(2) Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

No.

(3) Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as “waters of the United States?” If so, please describe and estimate any impacts the project may have.

No.

(4) When was the water delivery system constructed?

The original delivery system was constructed in the 1960’s, and new parts and segments have been added as development occurred.

(5) Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

No.

(6) Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

No.

(7) Are there any known archeological sites in the proposed project area?

No.

(8) Will the project have a disproportionately high and adverse effect on low income or minority populations?

No.

(9) Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

No.

(10) Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

No.

Required Permits or Approvals

The City of American Canyon does not anticipate any permits for the proposed Advanced Metering Infrastructure project. All equipment will be attached to previously installed water meters and infrastructure. The City anticipates that any approvals necessary will be handled by City of American Canyon staff in an efficient and timely manner.

CITY OF AMERICAN CANYON

January 11, 2016

Bureau of Reclamation
Financial Assistant Management Branch
Attn: Ms. Janeen Koza
Mail Code: 84-27852
PO Box 25007
Denver, CO 80225

Subj: Advanced Metering Infrastructure (AMI) Grant Funds Request

Dear Ms. Koza:

On behalf of the City of American Canyon, California, I am pleased to support the enclosed grant funds to implement a City-wide Advanced Metering Infrastructure (AMI) system. This program will utilize smart technology to address water issues such as leak detection, and overuse of water. Improved water management and streamlined monitoring can mean tremendous annual savings for American Canyon and its residents, and less water waste.

The City of American Canyon receives nearly all its water from the State Department of Water Resources' State Water Project. The water is treated then distributed to approximately 5,500 water service connections for our 20,000 residents, as well as commercial, industrial, and agricultural users. Extreme drought and dwindling water supplies continue to cause major concern in our region. American Canyon and its residents are cognizant of the major drought, as are all Californians, and steadfast in water conservation efforts. Unfortunately, undetected leaks present an important and ongoing challenge. The project's improved infrastructure and data management platform will enhance water management, assist in early leak detection, and enhance our water conservation efforts.

Our City is eager to take proactive measures to ensure adequate water supplies. We continue to explore opportunities to more efficiently use and/or reduce the amount of potable water demand city-wide. To that end, we are implementing city-wide recycled water projects, and recently commissioned a small pilot project with the proposed AMI system upgrades. Based upon the findings of this pilot project, we anticipate immediate and long-term water conservation and cost-savings.

I appreciate your consideration of the City's request and urge you to support this important project.

Sincerely,

Leon Garcia

Leon Garcia, Mayor
American Canyon

STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0004
(916) 319-2004
FAX (916) 319-2104

EMAIL
Assemblymember.Dodd@assembly.ca.gov

Assembly
California Legislature

BILL DODD
ASSEMBLYMEMBER, FOURTH DISTRICT

COMMITTEES
AGRICULTURE
BUSINESS AND PROFESSIONS
RULES
TRANSPORTATION
WATER, PARKS AND WILDLIFE

SELECT COMMITTEES
CHAIR: WINE

January 14, 2016

Bureau of Reclamation
Financial Assistant Management Branch
Attn: Ms. Janeen Koza
Mail Code: 84-27852
PO Box 25007
Denver, CO 80225

RE: Letter of Support for American Canyon Advanced Metering Infrastructure (AMI) Grant

Dear Ms. Koza:

I am pleased to support the City of American Canyon in its efforts to obtain federal grant funding to implement an Advanced Metering Infrastructure (AMI) program. Installation of a permanent infrastructure and data management platform will allow both field and remote access to water-use information and diagnostic details, helping to reduce water usage over time by identifying and stopping leaks and over-usage. Customers will have access to the advanced diagnostic and usage data, allowing better control of residential water conservation and cost-savings.

California needs efficient, sustainable, and equitable water systems. To that end, I recently authored AB 401, which was signed into law by Governor Brown in October, 2015. This law requires the State Water Resources Control Board to establish framework for California's first statewide water rate assistance program for low-income residents.

California's exceptional drought conditions over the last four years underscore the need for advances in water conservation technology. The proposed AMI project will apply information technology systems to improve water management efficiency, and it will also help American Canyon comply with Governor Brown's statewide emergency directive for a 25% reduction of potable water use. In addition to its 20,000 residents, a number of Napa Valley's wineries rely on American Canyon's water supply for agricultural use. Ensuring adequate water supply while implementing conservation restrictions will require acute awareness of water resources in all areas.

I support American Canyon in its pursuit to help conserve precious water resources in the 4th Assembly District.

Sincerely,

Bill Dodd

Assemblymember Bill Dodd

MIKE THOMPSON
5TH DISTRICT, CALIFORNIA

COMMITTEE ON WAYS AND MEANS
SUBCOMMITTEE ON HEALTH
SUBCOMMITTEE ON SOCIAL SECURITY

PERMANENT SELECT
COMMITTEE ON INTELLIGENCE
RANKING MEMBER, SUBCOMMITTEE ON TERRORISM, HUMAN INTELLIGENCE, ANALYSIS AND COUNTERINTELLIGENCE

CONGRESS OF THE UNITED STATES
HOUSE OF REPRESENTATIVES
WASHINGTON, DC 20515

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(707) 226-9898

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VALLEJO, CA 94592
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2300 COUNTY CENTER DRIVE, SUITE A100
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(707) 542-7182

CAPITOL OFFICE:
231 CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-3311

WEB: http://mikethompson.house.gov

January 13, 2016

Bureau of Reclamation (BOR)
Financial Assistant Management Branch
Attn: Ms. Janeen Koza
Mail Code: 84-27852
PO Box 25007
Denver, CO 80225

Re: Grant Request – Advanced Metering Infrastructure (AMI) Project

Dear Ms. Koza:

I am writing in support of the City of American Canyon, California, in their efforts to obtain a WaterSMART: Water and Energy Efficiency Grant in order to install and implement an Advanced Metering Infrastructure (AMI) program.

This program will allow for accurate monitoring and remediation of leaks throughout the City's water distribution system, thereby minimizing previously unaccounted-for water loss and/or pipe breakage. Utilization of available information technology to decrease consumption and unintended water loss is a proven, practical way to address California's long-standing water shortages.

I am committed to protecting Northern California's reliable water supply. I believe that we must be innovative and consider water recycling, reuse, and efficiency in order to reduce the pressures on the Bay-Delta ecosystem. American Canyon's proposed infrastructure improvements are a step in this direction. It will allow for preservation and conservation methods which consider impacts on all stakeholders, while simultaneously improving water management efficiency.

I respectfully request full funding of the City of American Canyon's grant application for a WaterSMART: Water and Energy Efficiency Grant.

Thank you in advance for your consideration of this request. If I can answer any questions about this outstanding application, please contact me.

Sincerely,

Mike Thompson
Member of Congress

RESOLUTION NO. 2016-05

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF AMERICAN CANYON APPROVING AN AGREEMENT WITH THE NAPA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT TO FUND THE NAPA COUNTYWIDE STORM WATER POLLUTION PREVENTION PROGRAM

WHEREAS, the Federal Clean Water Act requires the City to comply with the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm water Discharges from Small Municipal Separate Storm Sewer Systems (MS4 Permit); and

WHEREAS, the City participates in the Napa Countywide Storm Water Pollution Prevention Program (NCSPPP) along with other jurisdictions within Napa County as a means to cost-effectively pool resources to jointly complete MS4 Permit requirements; and

WHEREAS, a *Cooperative Joint Powers Agreement* to Fund and Administer the NCSPPP for FY15-16 through FY17-18 has been submitted to the City for approval; and

NOW, THEREFORE, BE IT RESOLVED, the City Council of the City of American Canyon hereby approves the *Cooperative Joint Powers Agreement* with the Napa County Flood Control and Water Conservation District to fund the Napa Countywide Storm Water Pollution Prevention Program.

PASSED, APPROVED AND ADOPTED at a regular meeting of the City Council of the City of American Canyon held on the 19th day of January 2016, by the following vote:

AYES:	Councilmembers Joseph, Leary, Ramos, Vice Mayor Bennett and Mayor Garcia
NOES:	None
ABSTAIN:	None
ABSENT:	None

/s/
Leon Garcia, Mayor

ATTEST:

Dana Shigley
City Clerk

ATTEST
This document is a correct copy
of the original on file in the office of the
City Clerk of the City of American Canyon,
County of Napa, State of California
By _____ Date 1/20/16

EPA United States Environmental Protection Agency

WATER AUDITS AND WATER LOSS CONTROL FOR PUBLIC WATER SYSTEMS

This document provides an introduction to water loss control and information on the use of water audits in identifying and controlling water losses in public water systems. **Water audits** are the first step in a three-step process for controlling water loss. A water audit is followed by **intervention** to identify losses and implement solutions and then by an **evaluation** of intervention measures and the needs for further improvement. This document is intended for small and medium-sized water systems, as well as state programs and technical assistance providers that regulate or support these systems.

Introduction

The Water Loss Problem

Public water systems face a number of challenges including aging infrastructure, increasing regulatory requirements, water quantity and quality concerns and inadequate resources. These challenges may be magnified by changes in population and local climate. It has been estimated that:

- The United States. will need to spend up to $200 billion dollars on water systems over the next 20 years to upgrade transmission and distribution systems.[i]
- Of this amount, $97 billion (29 percent) is estimated to be needed for water loss control.[ii]
- Average water loss in systems is 16 percent - up to 75 percent of that is recoverable.[ii]

A water loss control program can help water systems meet these challenges. Although it requires an investment in time and financial resources, management of water loss can be cost-effective if properly implemented. The time to recover the costs of water loss control is typically measured in days, weeks, and months rather than years.[ii] A water loss control program will also help protect public health through reduction in potential entry points for disease-causing pathogens.

Understanding Water Use and Water Loss

Much of the drinking water infrastructure in the United States has been in service for decades and can be a significant source of water loss through leaks. In addition to leaks, water can be "lost" through unauthorized consumption (theft), administrative errors, data handling errors, and metering inaccuracies or failure. The International Water Association (IWA) and the American Water Works Association (AWWA) have developed standard terminology and methods to assist water systems in tracking water losses and in performing water audits. The standard terminology includes the terms authorized consumption, real loss, apparent loss and non-revenue water that are used in this document.

- **Authorized Consumption** is water that is used by known customers of the water system. Authorized consumption is the sum of billed authorized consumption and unbilled authorized consumption and is a known quantity. It also includes water supplied to other water systems.

- **Real Losses,** also referred to as physical losses, are actual losses of water from the system and consist of leakage from transmission and distribution mains, leakage and overflows from the water system's storage tanks and leakage from service connections up to and including the meter.
- **Apparent losses**, also referred to as commercial losses, occur when water that should be included as revenue generating water appears as a loss due to unauthorized actions or calculation error. Apparent losses consist of unauthorized consumption, customer metering inaccuracies, and systematic data handling errors in the meter reading and billing processes.
- **Non-Revenue Water** (NRW) is water that is not billed and no payment is received. It can be either authorized, or result from apparent and real losses. Unbilled Authorized Consumption is a component of NRW and consists of unbilled metered consumption and unbilled un-metered consumption.

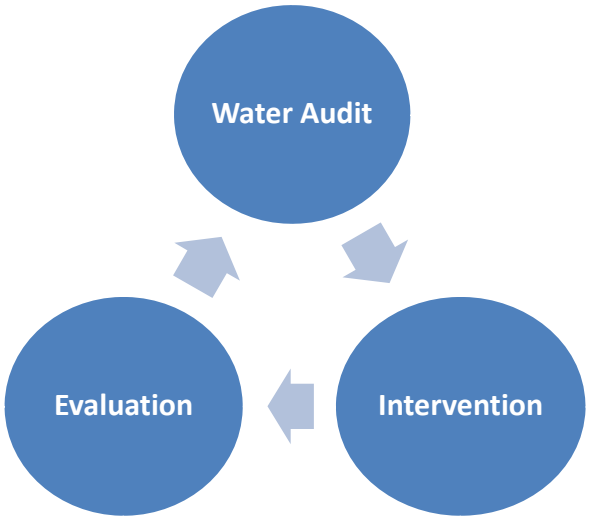
What are the Benefits of a Water Loss Control Program?

A water loss control program helps to identify real or physical losses of water from the water system and apparent losses, the water that is consumed but not accounted for. Real losses represent costs to a water system through the additional energy and chemical usage required to treat the lost water. Apparent losses represent a loss of revenue because the water is consumed but not accounted for and thus not billed. Once a water system identifies these real and apparent losses through a water loss control program, it can implement controls to reduce them. This can reduce the need for costly upgrades and expansions due to population growth and increased demand. By reducing the amount of water lost, the recovered water can be sold to consumers, generate revenue and meet water demands. In some cases this can reduce the need to find additional sources. *Water loss control programs are often the most economical solution to increasing demand, especially in the short term*.[i]

What Does a Water Loss Control Program Look Like?

A water loss control program consists of three major steps (see Figure 1). The critical first step is the ***water audit***. A *water audit* identifies and quantifies the water uses and losses from a water system. The ***intervention*** process addresses the findings of the *water audit* through implementation of controls to reduce or eliminate water losses. The ***evaluation*** step uses performance indicators to determine the success of the chosen intervention actions. Utilizing the standard terminology and the three steps of a water loss control program, systems can determine their baseline water use and loss, prioritize and implement water efficiency projects and operational changes, and evaluate and continuously improve their water loss

Figure 1. Components of a Water Loss Control Program



management.
Figure 2 provides a summary of the main data needs, action items and performance indicators for each step of a water loss control program. The following sections will go into more detail for each step.

Step 1 - Water Audit Data Needs	Step 2 - Intervention Action Items	Step 3 - Evaluation Performance Indicators
•Gathering information. •Determining flows into and out of the distribution system based on estimates or metering. •Calculating the performance indicators. •Assessing where water losses appear to be occurring based on available metering and estimates. •Analyzing data gaps. •Considering options and making economic and benefit comparisons of potential actions. •Selecting the appropriate interventions.	•Gathering further information, if necessary. •Metering assessment, testing, or a metering replacement program. •Detecting and locating leaks. •Repairing or replacing pipe. •Operation and maintenance programs and changes. •Administrative processes or policy changes. •No further action is necessary.	•Were the goals of the intervention met? If not, why not? •Where does the system need more information? •How often should the system repeat the *audit, intervention* and *evaluation* process? •Is there another performance indicator the system should consider? •How does the system compare to the last *audit, intervention* and *evaluation* process? •How can the system improve performance?

Figure 2. Summary of Data Needs, Action Items, and Performance Indicators of a Water Loss Program

The Importance of Metering

Water meters, both at the source and the service connection, are very important for all aspects of the water supply operations and make accurate water auditing possible. They make it possible to charge customers based upon the quantities of water that the customers consume. They record usage and make billing fair for all customers. They can encourage conservation by making customers aware of their usage as well as help detect leaks and establish accountability. Meter records provide historic demand and customer use data that is used for planning purposes to determine future needs. Unmetered water systems will need to consider some level of system metering to address water loss in the system.

A variety of meters exist and each type has its advantages and disadvantages. There is no single type of meter that will accurately measure flow for all applications. To select the proper meter for a specific application, a variety of factors should be considered in order for the meter to satisfy the location requirements and conditions where it will be installed. More information about the types and applications of meters can be found in EPA's *Control and Mitigation of Drinking Water Losses in Distribution Systems,* EPA 816-R-10-019, November 2010. The document is available at: http://water.epa.gov/type/drink/pws/smallsystems/technical_help.cfm.

Step 1 – How to Complete a Water Audit

A *water audit* is an accounting of all of the water in a water system resulting in a quantified understanding of the integrity of the water system and its operation. It is the first step in formulating an economically sound plan to address water losses. A preliminary water audit begins with the following information and simple calculations :[i]

1. Determine the amount of water added to the system, typically for a one year period,
2. Determine authorized consumption (billed + unbilled), and
3. Calculate water losses (water losses = system input – authorized consumption)
    a. Estimate apparent losses (unauthorized consumption + customer meter inaccuracies + billing errors and adjustments)
    b. Calculate real losses (real losses = water losses – apparent losses)

These steps are an example of a **top down audit**, which starts at the "top" with existing information and records. It may also be known as a desktop audit or paper audit since no additional field work is required. Water systems are dynamic. The water audit process and calculation of the water balance, when routinely performed, is a useful guide for a system's water loss control program. Water systems can get started using the data that is readily available, identify any data gaps and then work towards improving their data.

After performing an initial top down audit it may become evident that some of the numbers are rough estimates. The next action in the audit process is to improve any initial estimates and begin reducing non-revenue water losses. A **bottom up audit** is often implemented after several top down audits have been completed and can better quantify loss volumes that were not revealed by the top down audit. A bottom up audit will help find apparent and real losses and begins by looking at components or discrete areas in the utility's operations. A bottom up audit assesses and verifies the accuracy of the water loss data associated with individual components of the water system. A bottom up audit could include estimates of water used in municipal operations such as fire fighting, distribution system flushing and street cleaning, as well as metering of all authorized uses.[iii]

Bottom up audits are more costly since they are more labor and staff intensive. The top down audit can help to identify areas where bottom up audit efforts should be concentrated. There are several techniques and methods used to perform a bottom up analysis. They are described in detail in *Control and Mitigation of Drinking Water Losses in Distribution Systems,* EPA 816-R-10-019, November 2010, which can be found at: http://water.epa.gov/type/drink/pws/smallsystems/technical_help.cfm.

Additional data often needs to be collected to perform a *water audit*. Additional data collection can occur during the audit or intervention phase and may include the following: [i]

- ***Locating leaks and losses*** can be accomplished through an examination of billing records, flow monitoring, visual inspection or leak detection equipment (e.g., acoustic, thermal, electromagnetic, tracer). Through an examination of billing records, a water system may identify sudden changes in water usage at particular locations in the water system, which could indicate the need to investigate further for possible leaks or theft. Flow monitoring can be conducted by examining individual customer meter records, metered districts or through placement of temporary meters in suspect locations. These temporary meters clamp onto pipes and do not sacrifice the integrity of the pipelines.

- ***Condition assessment*** tools include traditional external visual inspections (e.g., periodic walk-over and opportunistic inspections of exposed mains), internal visual inspection technologies (e.g., closed circuit television (CCTV) camera inspections), pit depth measurements, destructive testing (e.g., test coupons) and non-destructive testing (e.g., ultrasonic testing).
- ***Hydraulic modeling*** can be used to predict locations of leaks in a water system based on physical and operating data of the water system. Calibration of these models to actual field data is essential to obtain realistic and usable results.

Water Audit Resources

- AWWA provides Free Water Audit Software©, available at: http://www.awwa.org/Resources
- Georgia Department of Natural Resources, *Georgia Water System Audits and Water Loss Control Manual*, Version 1.0 (2011), available at: http://www.gaepd.org/Files_PDF/GaWaterLossManual.pdf.
- The Maryland Department of the Environment's *Developing and Implementing a Water Conservation Plan*, includes water audit worksheets and describes the development of a water conservation plan. The information is available at: http://www.mde.state.md.us/programs/Water/WaterConservation/Documents/www.mde.state.md.us/assets/document/water_cons/WCP_Guidance2003.pdf.
- The Texas Water Development Board's *Water Loss Audit Manual* (2008) includes a water audit worksheet. The manual and worksheets are available at: http://www.twdb.state.tx.us/conservation/municipal/waterloss/.
- The New Mexico Office of the State Engineer provides examples of water audits of public water systems using the IWA/AWWA process. Information is available at: http://www.ose.state.nm.us/wucp_accounting.html.

Step 2 – The Intervention Phase

Interventions are actions taken by a water system to identify the specific sources of water loss and implement solutions. These actions can include :[i]

- Preventive measures such as design standards and effective maintenance
  - Reliable construction and design standards allow a water system to maintain maximum structural integrity throughout its operating life. Once a water system has been constructed according to appropriate design standards, effective maintenance can help to ensure the system operates at optimal performance throughout its lifespan and ensure that repairs are made proactively.
- Meter installation, testing and replacement
  - Accurate metering is important for all phases of a water audit. Meters record usage and monitor demand, encourage conservation, help detect leaks and make it possible to charge customers for the water they use.

- Leakage management

    - Detecting, pinpointing and repairing leaks generates event data that refines and confirms the water losses identified in the water audit.
    - Pressure management evaluates areas of excessive pressure and implements controls that reduce pressure to cut pressure-sensitive background leakage and reduce rupture rates.
- Pipe repair and replacement
    - Once a leak has been detected and located, the pipe can be repaired or replaced. Repairing and replacing pipes requires trained personnel, the right tools and the proper inventory of parts and materials.

Step 3 – The Evaluation Phase

The *evaluation* phase is important for ensuring an efficient and effective water loss control program. Comparison of the water system to industry benchmarks or past audits can document improvements in water loss control and allow a water system to track its progress. Use of performance indicators such as those mentioned above can help to ensure meaningful interpretations of the evaluation and to encourage continuous improvement. The evaluation will answer questions such as:

- Were the goals of the intervention met? If not, why not?
- Where do we need more information?
- How often should we repeat the *Audit, Intervention and Evaluation* process?
- Is there another performance indicator we should consider?
- How did we compare to the last *Audit, Intervention and Evaluation* process?
- How can we improve performance?

Benchmarking for Small Systems

Conducting a water audit allows a system to monitor its water loss performance over time and compare itself to other systems. This process is known as benchmarking and uses a collection of performance indicators to numerically evaluate different aspects of the water system. Performance indicators need to be consistent, repeatable and presented in meaningful standardized units. Some examples are breaks per mile of distribution main per year, gallons of water lost per service connection, and gallons of leakage per mile of distribution main per year. Because conditions at small systems can vary so greatly, benchmarking can become a difficult practice as many performance indicators may not be consistent or comparable across small systems. However, the basic steps of top-down water audits, metering and water loss control efforts can help small systems conserve their resources and improve their long term sustainability.

Resources

Performing a *water audit* and developing a complete water loss control program does not have to be overwhelming. By beginning with the basic steps and principles outlined in this document, any water system can begin the process of identifying and mitigating water losses. Additional resources available to assist water systems in performing *water audits* include the following:

- EPA Office of Ground Water and Drinking Water. http://www.epa.gov/drink/
- EPA Office of Water, Water Infrastructure*: Moving Toward Sustainability.* http://water.epa.gov/infrastructure/sustain/index.cfm
- Association of State Drinking Water Administrators. http://www.asdwa.org
- The Alliance for Water Efficiency . http://www.allianceforwaterefficiency.org
- American Water Works Association. http://www.awwa.org

Resources are also available to assist water system customers in conducting a water audit of their premises. These resources include the following:

- The Maryland Department of the Environment provides instructions on how to conduct a home water audit as well as a spreadsheet that calculates current use using customer entries. http://www.mde.state.md.us/programs/Water/WaterConservation/WaterAuditing/Pages/Programs/WaterPrograms/Water_Conservation/Water_Auditing/index.aspx
- Broward County Florida Water Services provides a worksheet for plumbing fixtures and appliances to calculate residential water use and provides average use for comparison. http://www.cob.org/documents/pw/environment/water-conservation/home-water-audit-worksheet.pdf
- The City of Corvallis, Oregon, Utilities Division provides information for residential customers on checking for leaks using the water meter, measuring or estimating flows in plumbing fixtures and measuring water used in landscaper irrigation. http://www.ci.corvallis.or.us/index.php?option=content&task=view&id=443&Itemid=384

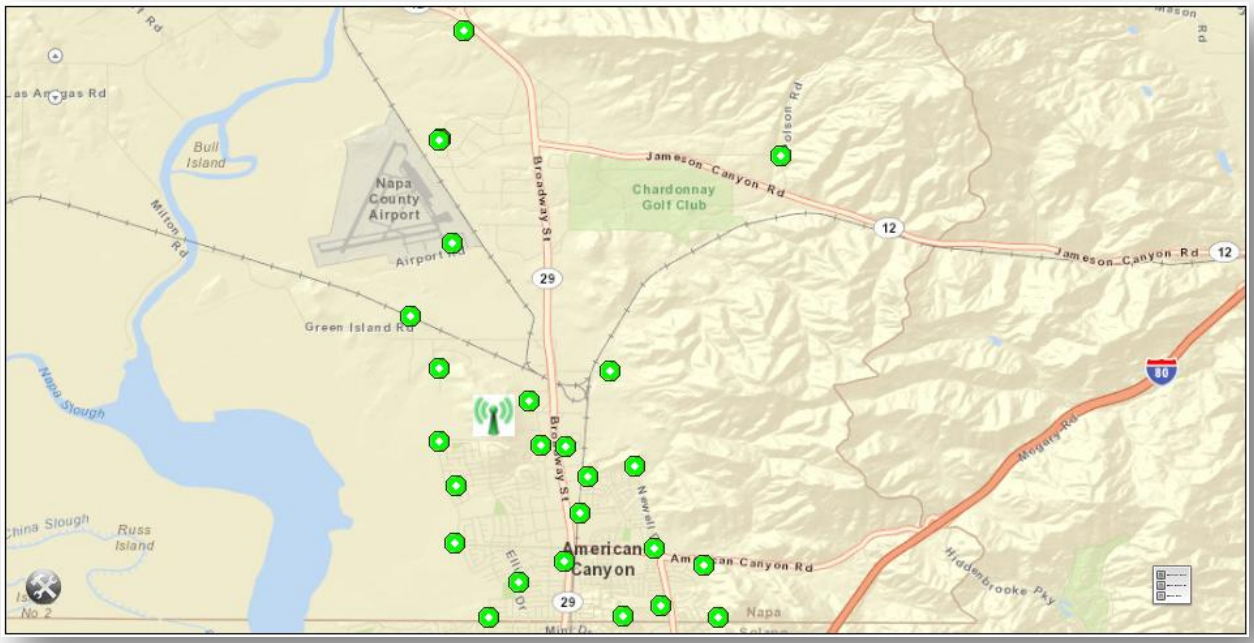
[i] U.S. Environmental Protection Agency. 2009. Drinking Water Infrastructure Needs Survey Fact Sheet , EPA 816-F-09-003. http://water.epa.gov/infrastructure/drinkingwater/dwns/factsheet.cfm.

[ii] Thornton, J., Sturm, R., Kunkel, G., *Water Loss Control Manual (2nd Edition)*, McGraw-Hill, 2008.

[iii] Texas Water Development Board, Water Conservation Task Force, *Water Conservation Best Management Practices Guide*, November 2004. http://savetexaswater.org/bmp/.

City of American Canyon

ADVANCED METERING INFRASTRUCTURE TEST



CONDUCTED MAY – JUNE 2014

by

GOLDEN STATE FLOW MEASUREMENT, INC.

Golden State Flow Measurement, Inc.
4821 Golden Foothill Parkway
El Dorado Hills, CA 95762

Phone: (916) 933-9554
Fax: (916) 933-9557
Email: Support@gsfminc.com

SENSUS
The Measure of the Future

Table of Contents

Summary

The City of American Canyon successfully tested Sensus Advanced Metering Infrastructure for a period of about 30 days (May 14th – June 16th 2014) as a proof of concept for citywide implementation.

During the test period leaks were detected, high water use and irrigation patterns were identified. The benefits of two-way communications and the array of tools within the Sensus AMI Suite demonstrated possible enhancements to customer service and new details for consideration to increase revenue and decrease operating costs.

This report is a summary of the AMI test performance in American Canyon with examples demonstrating some of the Sensus AMI System features which will enhance the water operations of the City.

Sensus AMI System Description

The pinnacle of Sensus AM technology is the powerful Base Station. Capable of reading meters 10s of miles away. The Sensus Base Station leads the industry with the only receiver sensitivity of -127 dBm and transmitter power up to 35 Watts on licensed Private Carrier Service channels.

A Sensus propagation study uses GPS locations to determine the best location and Base Station type to use. Upon certified installation, Sensus guarantees reception of a minimum of 98.5% of meter reads for the life of the system. Many components, including SmartPoint endpoints have a 20 year replacement warranty.

The Sensus AMI Solution is comprised of 5 primary pieces:

1. **Meter with 520M SmartPoint:** AMI pit set End Point.
2. **Tower Gateway Base (TGB):** AMI Tower for meter data reception. One model 'Metro' TGB is currently planned, pending completed propagation study.
3. **Regional Network Interface (RNI):** AMI Network Management System available as a hosted service or licensed installation and required for a TGB.
4. **LOGIC, Meter Data Management System (LOGIC MDM):** AMI Platform for meter data management; provides alarm monitoring, leak detection, integration to billing, and expands to include a Customer Web Portal, GIS, SCADA, and other operational functions.
5. **FlexNet Licensed Wireless Operations:** Annual "Support and Maintenance" for continued operation of RNI, TGB, and End Point components.

Test Equipment

Golden State Flow Measurement (GSFM) placed a Sensus "Metro" model Tower Gateway Base station at the hilltop tank in the approximate center of the city (100 Napa Valley Junction).

City of American Canyon successfully installed and activated 25/27 SmartPoint, water meter endpoints at locations primarily along the outer edges of the service area including locations bordering Napa, the Wetlands, Vallejo, and on Polson Road off Highway 12.

GSFM provided elementary integration of the LOCIC MDM and RNI; and established a Web Portal for the purpose of the test.

The Metro TGB and qty. 25, 520M SmartPoints operated continually for 1 month.

- Qty. 1 Sensus model "Metro" Base Station
- Qty. 25 Sensus model "520M" SmartPoints
- Qty. 25 Existing Water Meters, in Service
- Test Dates: March 14, 2014 – June 16, 2014
- Communications were well above minimum (SNR 12+) at all locations
- All locations communicated successfully for the duration of the test
- Measured 2 ½ Acre Feet of water use (109,430 CF / 819,630 Gallons)

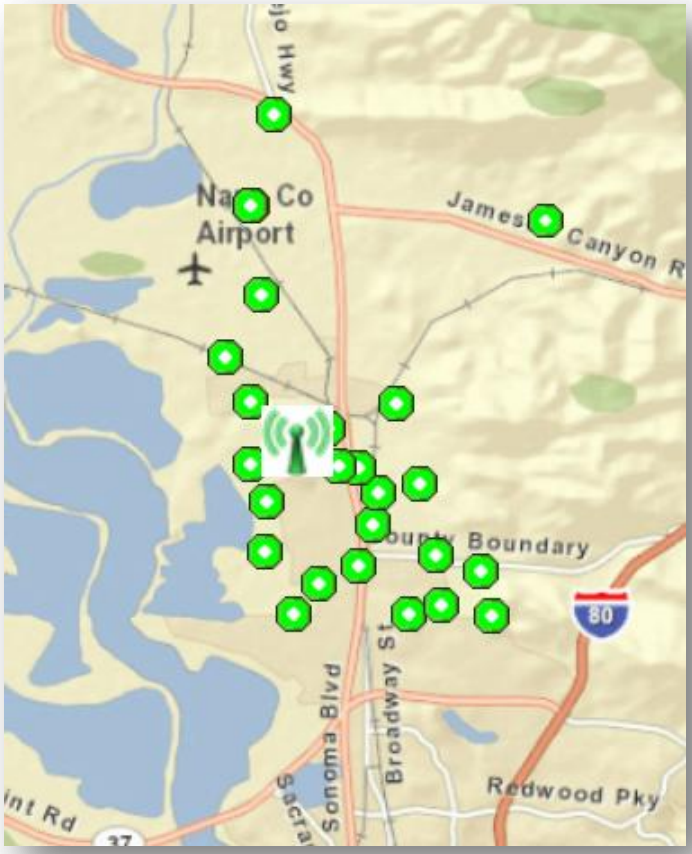


Figure 1: System overview as seen in LOGIC

Locations

The list of addresses below was used in the test. Additional analyses of the highlighted locations are provided on the following pages.

1.	102 BANBURY (72981014 - 131631)	9 units	(989 CF)
2.	1175 COMMERCE (44008798 - 120001)	1 Unit	(143 CF)
3.	120 LOS ALTOS (74866706 - 130974)	9 Units	(968 CF)
4.	1200 GREEN ISLAND (65771407 - 150002)	154 Units	(15,445 CF)
5.	129 DEVLIN (65611353 - 174452)	67 Units	(6,765 CF)
6.	2 CONDOR CT. (11089510 - 131898)	0.22 Unit	(22 CF)
7.	2 PALESTRINA (72209334 - 68172)	20 Units	(2,022 CF)
8.	2 RENWOOD (33416128 - 131645)	17 Units	(1,718 CF)
9.	2 TUSCAN OAK (56914890 - 131630)	17 Units	(1,751 CF)
10.	1960 N. KELLY (58310257 - 132200)	(Inactive during test)	
11.	205 WETLANDS EDGE (56891997 - 129301)	134 Units	(13,460 CF)
12.	2555 FLOSDEN #99 (72447065 - 131649)	6 Units	(651 CF)
13.	264 TAPESTRY (59270316 - 131900)	71 Units	(7,194 CF)
14.	280 NAPA JCT. L.L. (12676815 - 130001)	3 Units	(309 CF)
15.	311 CANTADA (65582535 - 92050)	26 Units	(2,699 CF)
16.	3500 AIRPORT (12639537 - 133300)	0.06 Unit	(6 CF)
17.	360 WATSON (72448635 - 111000)	16 Units	(1,619 CF)
18.	5001 MAIN ST. (61987934 - 131899)	153 Units	(15,331 CF)
19.	522 RIO DEL MAR (72344032 - 131647)	14 Units	(1,410 CF)
20.	531 TECHNOLOGY (72593920 - 131644)	(Inactive during test)	
21.	531 TECHNOLOGY pfp (77008607 - 131648)	0.82 Unit	(82 CF)
22.	531 TECHNOLOGY pfp (77008608 - 131897)	0.79 Unit	(79 CF)
23.	572 WETLANDS EDGE (55779079 - 106921)	20 Units	(2,029 CF)
24.	573 MARLA (72209325 - 131646)	13 Units	(1,397 CF)
25.	70 VIA PESCARA (33007338 - 80397)	0.22 Unit	(22 CF)
26.	KIMBERLY PARK R.W. (71435861 - 131906)	323 Units	(32,364 CF)
27.	POLSON RD. (72889761 - 140050)	9 Units	(954 CF)

Select Location Details

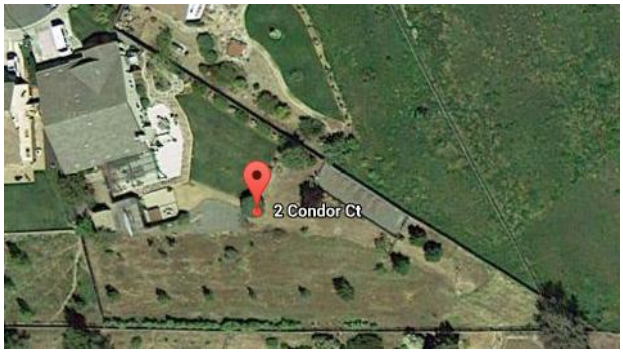
Interval Data for all locations in the test is included separately. The AMI data received provided many interesting details. Some examples are illustrated here.

2 Condor Court (<1 Unit during test- only 22 CF)

Efficient Irrigation Patterns

Interval data shows connection is most likely used for irrigation. There are 22 separate occasions where water was consumed, using only 1 CF each. Most watering is done at night. This is relatively efficient watering.

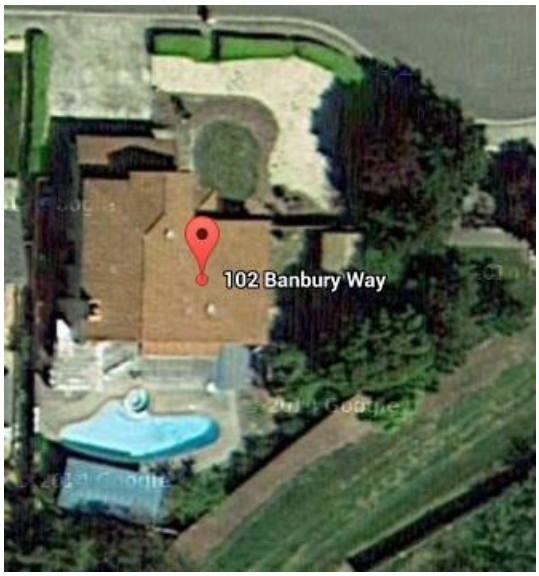
It appears there are 5 watering cycles (colored). The timing is adjusted several times- on occasion it seems changed and corrected.



METER_NAME	READ_DTM	READ_DTM_DST	READ_VALUE	UOM
2 CONDOR CT. (11089510 - 131898)	5/14/2014 4:00	5/14/2014 5:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/18/2014 4:00	5/18/2014 5:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/19/2014 4:00	5/19/2014 5:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/20/2014 23:00	5/21/2014 0:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/23/2014 3:00	5/23/2014 4:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/24/2014 22:00	5/24/2014 23:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/26/2014 1:00	5/26/2014 2:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/26/2014 14:00	5/26/2014 15:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/28/2014 3:00	5/28/2014 4:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/30/2014 3:00	5/30/2014 4:00	1	CF
2 CONDOR CT. (11089510 - 131898)	5/31/2014 18:00	5/31/2014 19:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/2/2014 3:00	6/2/2014 4:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/3/2014 12:00	6/3/2014 13:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/5/2014 8:00	6/5/2014 9:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/6/2014 3:00	6/6/2014 4:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/7/2014 19:00	6/7/2014 20:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/9/2014 3:00	6/9/2014 4:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/10/2014 8:00	6/10/2014 9:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/12/2014 3:00	6/12/2014 4:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/13/2014 4:00	6/13/2014 5:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/15/2014 4:00	6/15/2014 5:00	1	CF
2 CONDOR CT. (11089510 - 131898)	6/16/2014 3:00	6/16/2014 4:00	1	CF

102 Banbury Way (9 Units during test)

Residential with Swimming Pool

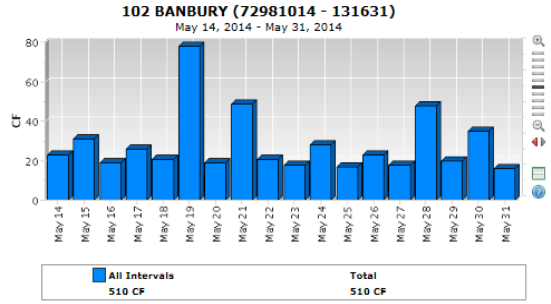


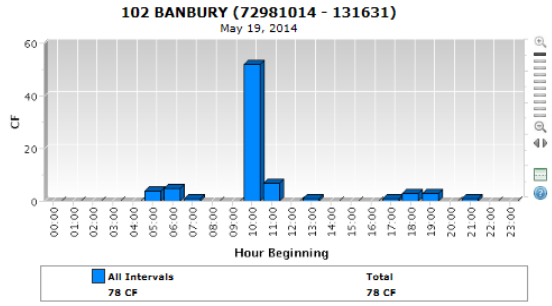
This location exemplifies typical residential use. There is a swimming pool and drought resistant landscape visible in Google Maps.

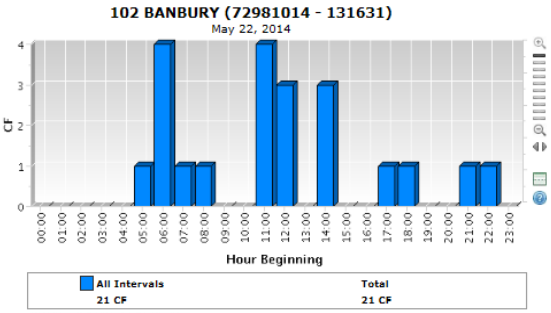
As the weather heats up, it can be observed that the pool was likely topped off May 19th between 9:30 and 11:30 a.m. using about 59 CF (equal to 3 days of household use).

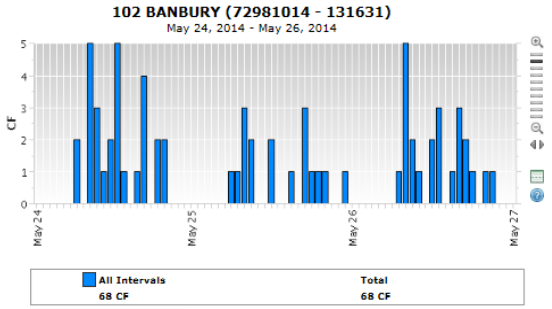
There are no regular irrigation patterns apparent; some of the other spikes may be from watering.

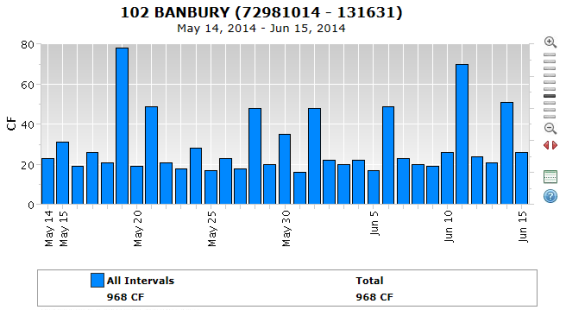
Typical daily usage for this location is about 20 CF with peak use in the morning, mid-day, and evenings.











ATTACHMENTS FORM

Instructions: On this form, you will attach the various files that make up your grant application. Please consult with the appropriate Agency Guidelines for more information about each needed file. Please remember that any files you attach must be in the document format and named as specified in the Guidelines.

Important: Please attach your files in the proper sequence. See the appropriate Agency Guidelines for details.

1) Please attach Attachment 1	BOR_WaterSMART_AmCan_AMI.pdf	Add Attachment	Delete Attachment	View Attachment
2) Please attach Attachment 2		Add Attachment	Delete Attachment	View Attachment
3) Please attach Attachment 3		Add Attachment	Delete Attachment	View Attachment
4) Please attach Attachment 4		Add Attachment	Delete Attachment	View Attachment
5) Please attach Attachment 5		Add Attachment	Delete Attachment	View Attachment
6) Please attach Attachment 6		Add Attachment	Delete Attachment	View Attachment
7) Please attach Attachment 7		Add Attachment	Delete Attachment	View Attachment
8) Please attach Attachment 8		Add Attachment	Delete Attachment	View Attachment
9) Please attach Attachment 9		Add Attachment	Delete Attachment	View Attachment
10) Please attach Attachment 10		Add Attachment	Delete Attachment	View Attachment
11) Please attach Attachment 11		Add Attachment	Delete Attachment	View Attachment
12) Please attach Attachment 12		Add Attachment	Delete Attachment	View Attachment
13) Please attach Attachment 13		Add Attachment	Delete Attachment	View Attachment
14) Please attach Attachment 14		Add Attachment	Delete Attachment	View Attachment
15) Please attach Attachment 15		Add Attachment	Delete Attachment	View Attachment