Elsinore Valley Municipal Water District

AGENDA

REGULAR STUDY SESSION
October 19, 2022
9:00 AM

DIRECTORS PRESENT: Burke ❑ Edmondson ❑ Morris ❑ Ryan ❑ Williams ❑

PUBLIC COMMENTS

Members of the public may make comments in-person, virtually, or submit a Public Comment Request Form located at https://www.evmwd.com/evmwd-publiccomment, no less than one hour prior to the posted start time of the meeting. Comments shall be made in an orderly manner and profanity, slanderous, or abusive language will not be tolerated. Please note, individuals have a limit of three (3) minutes to make comments and will have the opportunity when called upon by the presiding officer.

DISCUSSION ITEMS

1. Affordability Of Water Services and Determinates of Water Bill Delinquency

2. Software License Agreement and A Professional Services Agreement With Nexgen For The Purchase And Installation Of Computerized Maintenance Management System (CMMS) Software

3. Project Management Services for Enterprise Asset Management (EAM) System Implementation

4. Professional Services Agreement with Carollo Engineers, Inc. for Engineering Design Services for the Sedco Hills and Avenues Septic to Sewer Projects

5. Project Updates/Change Orders

6. Board Committee Updates

7. Other

8. Adjournment

To request a disability-related modification or accommodation regarding agendas or attendance, contact Terese Quintanar, at (951)674-3146, extension 8223 at least 48 hours before the meeting.

In the interest of public health and safety, this meeting will be conducted in accordance with provisions of the Brown Act and Assembly Bill 361. Participants who would like to join this meeting remotely can do so in one of the following ways:

For Online Participation:
Go to: www.zoom.us/join
Enter Meeting ID: 856 6421 7139
Meeting Password: 92530

For Call-in Only:
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Elsinore Valley Municipal Water District

STUDY SESSION
DISCUSSION OUTLINE

Date: **October 19, 2022**

Originator: **Christina Henry- Community Relations**

Subject: **AFFORDABILITY OF WATER SERVICES AND DETERMINATES OF WATER BILL DELINQUENCY IN EVMWD SERVICE AREA**

STRATEGIC GOAL

Maintain Financial Strength and Resiliency
Provide Excellent and Effective Customer Service

BACKGROUND AND RECOMMENDATION

Elsinore Valley Municipal Water District (EVMWD) partnered with Dr. Kurt Schwabe, Associate Dean and Professor at University of California, Riverside and Dr. Mehdi Nemati, Assistant Professor at University of California, Riverside to analyze water and sewer affordability as it compares to income and other socioeconomic factors for customers within EVMWD's service area. The study also examined the main factors associated with service disconnections and bill delinquency for single family residential households. Dr. Schwabe and Dr. Nemati will present their findings at today's meeting. Their final report is attached to this staff report.

ENVIRONMENTAL WORK STATUS

Not Applicable

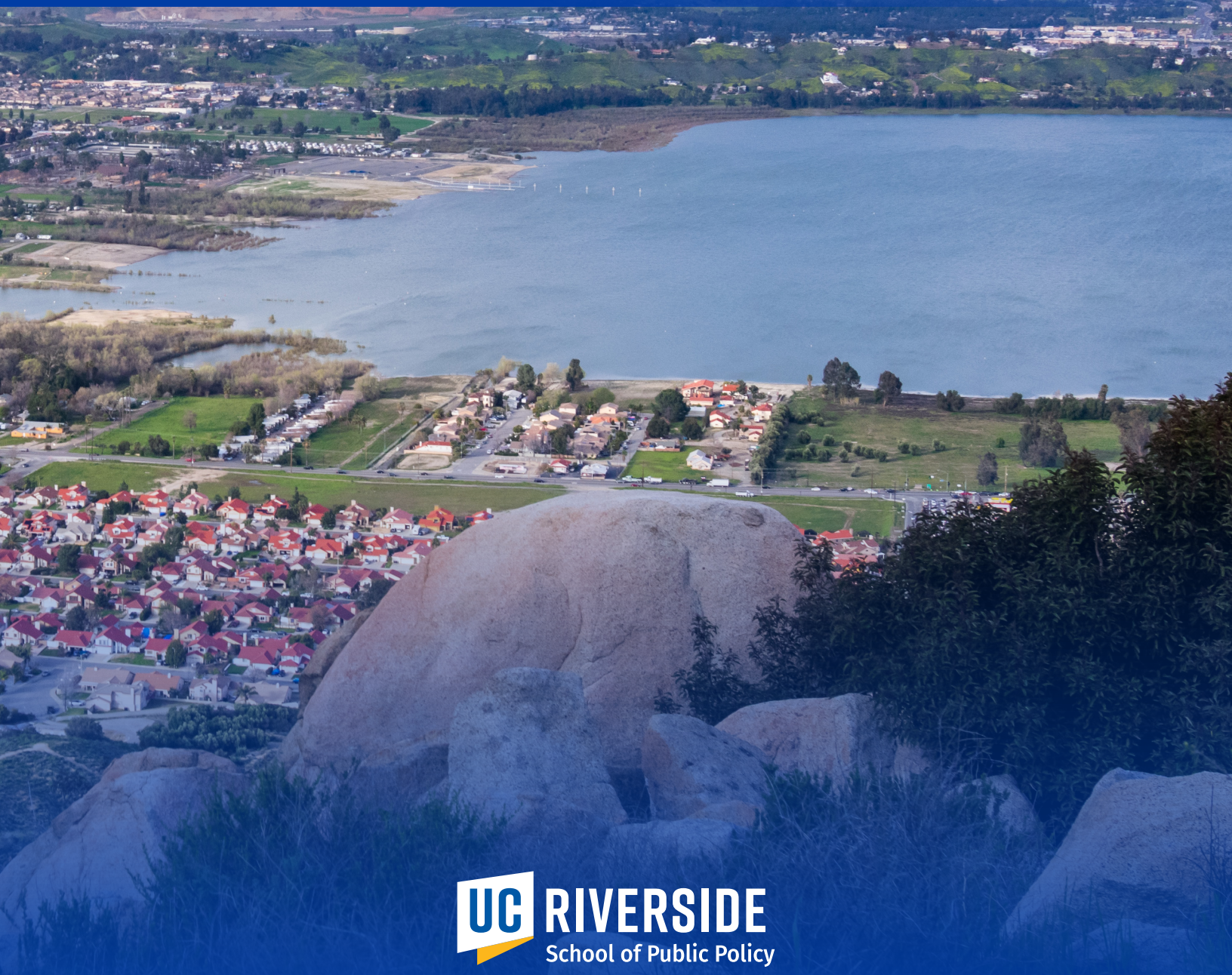
FISCAL IMPACT

Not Applicable

Attachments: Affordability of Water Report 2022
Presentation

AFFORDABILITY OF WATER SERVICES AND DETERMINANTS OF WATER BILL DELINQUENCY IN ELSINORE VALLEY MUNICIPAL WATER DISTRICT (EVMWD) SERVICE AREA

by Dr. Kurt Schwabe & Dr. Mehdi Nemati



UC RIVERSIDE
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ACKNOWLEDGMENTS:

The authors of this report would like to express their gratitude to the Elsinore Valley Municipal Water District (EVMWD) for supporting this research and to the EVMWD staff for providing data for the analysis.

ABOUT THE RESEARCH TEAM:

Kurt Schwabe, M.S., Ph.D.

Kurt Schwabe is Associate Dean and Professor of Environmental Economics and Policy at the School of Public Policy at the University of California, Riverside, an adjunct policy fellow at the Public Policy Institute of California's Water Policy Center, and an adjunct professor in the Center for Global Food and Resources at the University of Adelaide in Australia. Schwabe's research focuses on economic issues associated with water use, agricultural production, urban water conservation, ecosystem services, and environmental regulation. His papers have appeared in a wide range of peer-reviewed publications, including the *Proceedings of the National Academy of Sciences, Journal of Risk and Uncertainty*, and the *American Journal of Agricultural Economics*. He is co-editor of two recent books on water titled *Drought in Arid and Semi-Arid Regions: A Multi-Disciplinary and Cross-Country Perspective*, and *The Handbook of Water Economics*. Schwabe received a B.A. in mathematics and economics at Macalester College, an M.S. in economics at Duke University, and a Ph.D. in economics at the North Carolina State University.

Mehdi Nemati, M.S., Ph.D.

Mehdi Nemati is an assistant professor of Cooperative Extension n water resource economics and policy in the School of Public Policy at the University of California, Riverside. Nemati's role is to provide leadership throughout the state to develop mission-oriented research programs among colleagues and universities. He facilitates teamwork among government agencies, stakeholder groups, and private industry, focusing on promoting sustainable and cost-effective strategies for addressing water-related issues, such as water scarcity and drought. His policy-oriented research and extension program focuses on economic issues associated with urban and municipal water use and water conservation programs, including alternative pricing structures (e.g., budget-based tiered rates and drought pricing), and rebate programs (e.g., turfgrass removal); direct and indirect potable water reuse; design of enforcement and monitoring strategies; incentives for the adoption of conservation practices and technologies. His papers have appeared in a wide range of peer-reviewed publications, including *Nature Sustainability, Sustainability, Water, PLOS One, Journal of Agricultural and Resource Economics, Review of Development Economics,* and *ARE Update*. Nemati received his Ph.D. in agricultural economics and M.S. in economics at the University of Kentucky.

EXECUTIVE SUMMARY

This research evaluates how single-family residential (SFR) water and sewer expenditures compare to residents' income, and examines the factors associated with payment delinquency within the Elsinore Valley Municipal Water District's (EVMWD) service area. Our results respond to general concerns over water affordability confronting households throughout the United States. Water affordability is often expressed in terms of the percentage of income households must devote to water services, with particular attention to essential or basic needs water services. Considering the literature surrounding this issue, though, there is no uniform agreement or transparency regarding the services that are included in such water affordability measures. Furthermore, lower-income households may not be well represented by average or median household income (MHI) estimates that are often used in calculating such affordability metrics.

In response to this confusion and these concerns, we analyzed single-family residential water bills from more than 42,000 accounts composed of approximately five million billing records within EVMWD's service area from 2011 to 2020. To illustrate how such affordability measures can vary depending on the types of water services being evaluated, and to avoid confusion and subjectivity surrounding the term affordability, we calculated five different water expenditure ratios (WERs) for each household within the EVMWD service area. The WERs represent the percentage of income devoted to water and sewer services (as measured by the expenditures from customer-level water bills divided by income). The five different WERs we calculated are based on the water and sewer services associated with:

• Basic or essential needs use (defined by 35.66 gallons per capita per day),

• Indoor water use as measured by 55 gallons per capita per day, which is the indoor per person per day allocation identified by the state of California as an efficient level of indoor usage,

• Indoor water use as measured by average winter usage, which is an often used, albeit imperfect, measure of indoor water use,

• Budget-based indoor and outdoor use, which is the sum of both efficient indoor and outdoor usage given household characteristics as identified by the state of California, and

• Overall water use, which simply takes into account the residential customers' overall water use and the expenditures associated with such use.

Because researchers and agencies rarely have household-level income estimates, different summary measures are used to represent income within an area or water district. To illustrate how the WERs and discussions of affordability are impacted by the choice of income estimate, we present each WER by different income categories. We also illustrate how WERs, and thus affordability measures, vary by different socioeconomic characteristics.

In addition to analyzing affordability, we explore the issue of bill payment delinquency with the district. To do so, we combine billing information with the household level delinquency, rebate participation, and payment channel datasets to identify demographic, socioeconomic, payment channel, and other factors that might be associated or correlated with service disconnections and bill payment delinquency for single-family residential households. Specifically, we:

• Analyze the trends of bill payment delinquency over time among EVMWD's customers,

• Evaluate the heterogeneity in bill payment delinquency by water use terciles, and disadvantaged community status, and

• Identify the role of affordability measures, water budget status (efficient users), and rebate program participation on bill payment delinquency.

Overall Findings: Affordability

Water expenditure ratios (WERs) have risen, on average, from 2011 to 2020, although not significantly. Over this period, the basic needs WER rose from 1.21% to 1.40% of median household income (MHI). Indoor use, as measured by the 55 gallons per capita per day (GPCD) efficiency standard identified by the state of California, experienced an increase in its WER from 1.37% to 1.50% of MHI. In contrast, the WER associated with indoor use as measured by average monthly wintertime usage rose from 1.52% to 1.72%. While not considered essential or basic needs water use, overall water and sewer expenditures within EVMWD, as a percentage MHI, rose from 1.75% to 1.84% between 2011 and 2020. Interestingly, if households were to use the full budget as defined by the state regarding efficient indoor and outdoor use, overall water expenditures would increase as a percentage of income.

Water expenditure ratios can be significantly impacted by choice of income measure and vary inversely with income. A unique element of our analysis is to develop WER per household by dividing each household's water and sewer expenditures by the MHI associated with that household's particular US Census block group rather than, say, the MHI of the entire district. As an example of the significance of the choice of MHI, in 2019, the basic needs WER is 1.38% using the MHI at the block

group level. If we use the 20th percentile MHI, which is often the level that separates middle- from lower-income households, the WER for basic needs water increases to 1.78%, up from the 1.38% that is associated with using the block group MHI. If we use district-level MHI, the basic needs WER reduces to 1.25%, down from the 1.38% associated with using the block group MHI. Finally, we observe a strong inverse relationship between WER and income, supporting the concern that water affordability is more of an issue for lower-income households; conversely, as incomes rise, water comprises a smaller overall fraction of income. Thus, water affordability becomes a lesser concern for higher income households.

Water expenditure ratios in EVMWD are significantly lower than US EPA Affordability Thresholds for water and sewer services. The US EPA has published affordability thresholds for different types of water services, and has identified an affordability threshold of 4.5% for water and sewer services. While a number of significant issues and concerns regarding use of a single uniform threshold are discussed in the literature (e.g., see Teodoro 2018), the WER for all five of the water services considered here is well below the 4.5% threshold. The WERs for 2019, on average, ranged from 1.38% to 2.04% for the different water service metrics we analyzed. In 2019, 16 and 74 single-family residential (SFR) customers in our data set had a WER above the 4.5% threshold for either basic needs water or efficient indoor water use, respectively. Considering overall water use, which includes water services above and beyond basic or essential needs, only 0.6% (approximately 208 out of more than 40,000 households) had WERs above the US EPA's threshold.

Overall Findings: Bill Delinquency

From 2011 through 2019, approximately 17% of EVMWD single-family residential accounts were delinquent annually, a percentage that has remained relatively stable. In terms of understanding bill delinquency, we analyzed all single-family residential accounts from January 2011 through December 2019, primarily focusing on customers who received different delinquency notices (notice 1, notice 2, notice 3, and notice 4). On average, 17% of the customers failed to make payment and received their first notice, a percentage that drops to 12%, 10%, and 2% after receiving their second, third, and fourth delinquency notices. The trends in late payments from 2011 through 2019 did not change in any appreciable way, including across stages of delinquency and after 2015, when changes to EVMWD's notice policy were enacted.

Socioeconomic factors are strongly correlated with delinquency. Relative to those households that do not receive any delinquent payment notices, those that do receive delinquency notices typically live in areas with lower incomes, lower home values, and higher rents. Furthermore, the areas in which these households are located are characterized by higher unemployment levels, higher levels of public assistance, lower education and higher levels of poverty, and have more people living together in the households.

More efficient and lower water use, participation in district rebate programs, and more automated payment mechanisms are correlated with lower delinquency rates, although causation is not proven. Regarding water use, households that receive at least one delinquency notice on average tend to use more water, are more likely to be in disadvantaged community census blocks as defined by CalEPA, and are less likely to participate in rebate programs, including outdoor rebate programs. Such households are characterized by smaller irrigated areas, have been in EVMWD for fewer months, and are less likely to stay within their water budget. Perhaps not unexpected, the water expenditure ratios for households that receive delinquency notices are higher for every type of water service relative to households that do not receive any notice. When we investigated whether the payment mechanism might differ across these two groups, we found those that have never received a delinquency notice are more likely to use Rapid Pay, Autopay, or mail in their payment, and less likely to pay in person or over the phone. While the analysis illustrates the correlation between water use, rebate program participation, and automated payment mechanisms, further analysis would be required to show causation rather than simply correlation.

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LIST OF ABBREVIATIONS

BNWSER	Basic Needs Water and Sewer Expenditure Ratio
CCF	Hundreds of Cubic Feet
CPI	Consumer Price Index
ET	Evapotranspiration
EVMWD	Elsinore Valley Municipal Water District
GPCD	Gallons Per Capita Per Day
IWSER	Indoor Water and Sewer Expenditure Ratio
MHI	Median Household Income
OWSER	Overall Water and Sewer Expenditure Ratio
SFR	Single-Family Residential
WBWSER	Within Full Budget Water and Sewer Expenditure Ratio
WER	Water Expenditure Ratio
WWSER	Winter Water and Sewer Expenditure Ratio

1.1 Introduction, Background, and Rationale

Many water systems are grappling with aging and deteriorating infrastructure, changing customer bases, regulatory compliance, and climate change—all of which add to the growing costs of providing water services. At the same time, per capita water use has been declining, in part, because water agencies continue to put significant effort into increasing water use efficiency, particularly in the residential water use sector, and with impressive results. In California, on average, gallons per capita per day (GPCD) were reduced by 34% between 1994 and 2019 (Lee, Nemati, and Dinar 2021; Lee, Nemati, and Dinar 2022). Short-term water use reductions also have occurred, as evidenced by California's recent drought, during which time the state enacted a conservation mandate that required water agencies throughout the state to reduce water use so that overall statewide water use decreased by 25% relative to 2013 levels. While increased water efficiency and conservation efforts may help agencies and the state meet both short- and long-term water reduction goals, they also can jeopardize the stability of incoming revenues and compel systems to compensate with higher rates. With many agencies changing rates and rate structures in response to infrastructure needs, long-term water use targets, and short-term supply shocks (e.g., the recent drought), water affordability to residential customers is a significant concern, especially among lower-income households.

The focus of this research is evaluating the water affordability among single family residential (SFR) customers, with a particular emphasis on affordability to lower-income customers. This study evaluates water affordability within the Elsinore Valley Municipal Water District's (EVMWD) service area. EVMWD has a very diverse customer base with a wide range of incomes that will allow us to analyze how affordability varies across different socioeconomic and demographic groups. We will analyze alternatives to understand better how different water use measures impact affordability metrics. This sort of analysis addresses the likely intent surrounding discussions of water affordability—the cost of water that is used for human health and hygiene—and compares it to metrics that include efficient and overall water use. Conventional affordability indicators often rely on the actual dollar amounts households spend on water use and usually are at the aggregate (e.g., water agency, state, and county) levels. In contrast, we propose additional and more granular indicators that measure affordability in the context of meeting essential water needs requirements using household-level data. For comparison purposes, we estimate the fraction of income spent on different types of water use to accentuate the importance of clarity as to what sort of water services we are discussing in the context of affordability.

In addition to illustrating how the fraction of income spent on water use is sensitive to various types of water use and how income is measured, we highlight the degree to which this fraction—which we refer to as a water expenditure ratio (WER)—differs for lower-income households. To put these expenditure ratios into context, we calculate similar expenditure ratios for other essential services, including food, housing, transportation, health care, education, entertainment, natural gas, electricity, and telephone services using data from the US Bureau of Labor Statistics Consumer Expenditure Survey. Finally, to provide insight into how water affordability has varied over time, we estimate the water expenditure ratios for each year from 2011 to 2020 while providing some background information on how overall water costs and water prices have changed.

Like Teodoro (2018), we emphasize that "affordability" is a relative term and depends on many factors. As such, care is warranted in terms of the conclusions one can draw from developing affordability measures and how such measures are used. While in principle, affordability ratios are intended to signal the degree to which households may find it challenging to meet their water needs given their available income, affordability ratios—which are usually measured by calculating the faction of median household income (MHI) spent on essential water use—may not be a very informative metric for comparison over time or place if other factors that affect disposal income vary, which is likely the case.[1]

While much of the literature will use the term "water affordability ratio," the term affordability is very subjective and leads to significant confusion. As an alternative, then, in the analysis below, we develop a "water expenditure ratio" (WER) that calculates the fraction of MHI spent on different types of water services. Of course, widely publicized thresholds have been used (and misused) surrounding affordability criteria (Mack and Wrase 2017; Teodoro 2018). Given the attention these thresholds have received in both the academic and public domains, we will compare our WERs with these thresholds, but qualify the comparison with appropriate caveats as to the weaknesses of such comparisons when appropriate.

[1] For a more in-depth discussion of the limitations of using affordability ratios, see Teodoro (2018).

1.2 Methods

Below we calculate different WERs for different types of water services and use these WERs to discuss issues surrounding affordability. To calculate different WERs, we follow three steps: (i) calculation of the monthly water and sewer bill (expenditures) at the household level for EVMWD service area from 2011 to 2020; (ii) estimation of key socioeconomic and household characteristics (e.g., income, housing and rental costs at the census block group level, household size and landscape area); and (iii) calculation of the household-level WERs.

1.2.1 Calculating Expenditures for Water and Sewer Services

To calculate the water expenditures, we use the household-level monthly billing information for the SFR customers in the EVMWD service area from 2011 to 2020. This information includes total indoor, outdoor, and excessive monthly water consumption, water tier-based rates, water service charge, water supply reliability capital monthly charge, sewer service charge, sewer system capital projects monthly charge, and both landscape and household size.

1.2.2 Socioeconomic Parameters

To highlight how water expenditures vary across different user groups with attention to the affordability of water to disadvantaged communities, we merge the billing information for each customer with the MHI information using US Census data at the block group level. It is important to emphasize that since we estimate MHI at the block group level, and use these block group estimates as the denominator in our calculations (below), our WERs capture income variability in the district. EVMWD serves more than 40,000 single-family residential households with significant variation in income across these households. Figure 1.1 presents a graphical illustration of how income varies by the block groups[2] within the EVMWD service area. The MHI associated with the Census block groups in which these households reside ranged from $29,070 to $165,481 in 2019. As the figure highlights, significant heterogeneity occurs in incomes within EVMWD—a characteristic that illustrates the importance of using a much more granular measure of MHI than, say, the district, city, or county level.

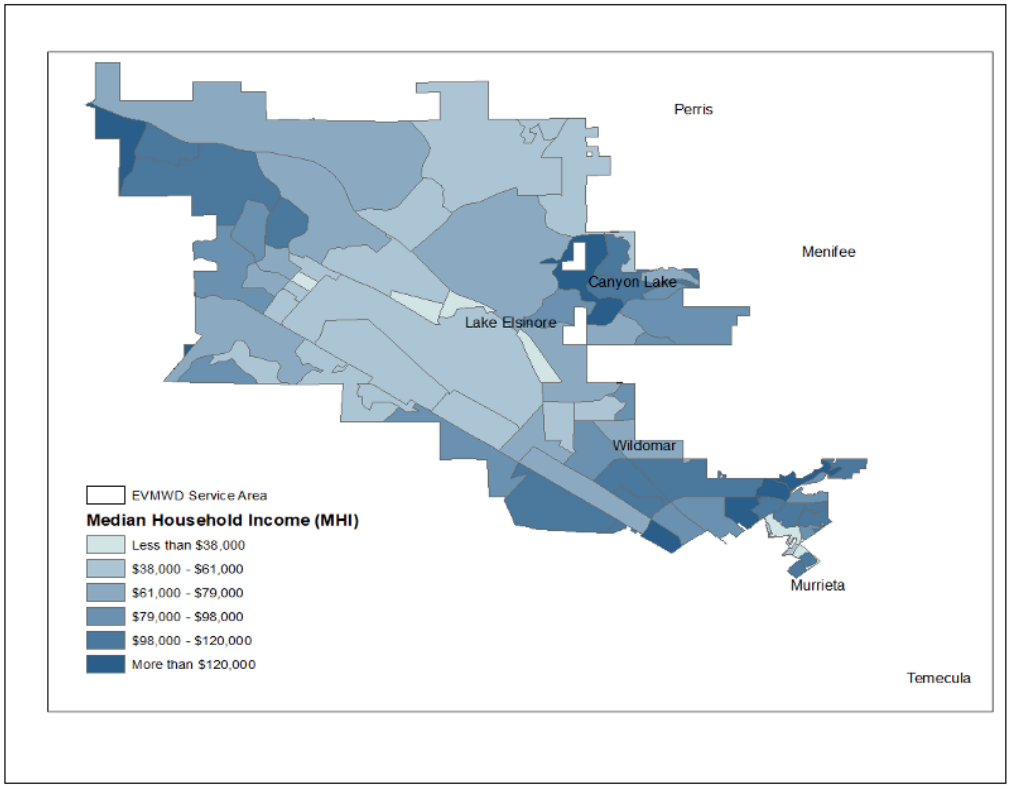


Figure 1.1. Inflation-adjusted median household income (MHI) distribution in the EVMWD service area (2019).[5]

[2] Our calculations indicate that there are 71 block groups in the EVMWD service area.

[5] We use the MHI data at the block group level, block group and city boundaries from the US Census, and the EVMWD service area boundaries from the CA Department of Water Resources (DWR) to generate the map.

To highlight how WERs vary across socioeconomic factors, we use the US Census Bureau's American Community Survey (ACS)[3] to obtain information annually from 2011 to 2020 on household characteristics and house/location characteristics at the Census tract level (2011 and 2012) and Census block group level (2013–2020)[4]. Each household is located within its block group. District level annual MHI in 2019 was $82,330, whereas block group level annual MHI in 2019 ranges from $29,070 to $165,481.

1.2.3 Alternative Water Expenditure Ratios (WER)

Using several different measures, a variety of water expenditure ratios are calculated at the household level. As noted above, we calculate the monthly water and sewage costs households confront—we label them water and sewer expenditures—as a percentage of household income. This calculation is standard within the water affordability literature. Since actual measures of individual-level household income are difficult to obtain, these affordability measures typically use the MHI of the area in which the household resides.[6]

A widely used, albeit increasingly debated and critiqued threshold for defining water affordability (Teodoro 2018; Kane 2018) comes from the Environmental Protection Agency (EPA). In considering monthly water use alone, the EPA has identified thresholds that have been used to indicate whether residential water expenditures, as a fraction of MHI, pose a challenge to households—particularly low-income households—in paying their water bills. The thresholds that have been identified as presenting affordability challenges to households are (i) if the costs of water services are more than 2% of MHI, and (ii) if the costs of water and sewer services are higher than 4.5% of MHI given that households must pay for both water and sewer services. In the measures we develop below, we calculate WERs for water and sewer services, along with WERs for different types of water and sewer services, including basic needs, indoor water use, efficient water use, and overall water use.[7] While outdoor water use and water use above what is considered efficient water use extends beyond what would be termed basic needs, essential, or a human right to water, it is instructive to understand the potential financial challenges households face in terms of the regular water expenditures they confront each month. With these concerns in mind, we calculate the following measures.

1.2.4 Basic Needs Water and Sewer Expenditure Ratio (BNWSER)

Because affordability typically relates to basic needs, we calculate the water expenditure ratio associated with what might be considered a basic needs level of water use (e.g., for cooking and hygiene). Multiple studies define the amount of water necessary for essential needs in terms of GPCD (e.g., Gleick 1996). In this study, we use 35.66 GPCD as our benchmark for basic needs, a benchmark which is defined and applied in more recent studies in the United States (Mack and Wrase 2017). The following WER is calculated, then, based on this essential, or basic needs level of water use. For each household *i*, year *y*, and block group *b*, we estimate:

$$(1) \qquad \mathrm{BNWSER}_{iy} = \frac{Basic\ needs\ water\ and\ sewer\ bill\ _{iy}}{MHI_{by}} * 100$$

1.2.5 Indoor Water Expenditure Ratio (IWSER)

Another measure that might represent what is a necessary amount of water for daily usage is one that considers a reasonable amount of indoor water use (and the expenditures associated with that use) per person. For those water agencies that use budget-based (or allocation-based) rates, this would be equivalent to their allocated indoor budget, which provides each household allocation of water per person for indoor usage. The indoor allocation of 55 GPCD for SFR customers in the EVMWD service area is also similar to the efficiency standards set by state law (California Department of Water Resources and State Water Resources Control Board 2018). It allows for a more generous allocation than what might be considered basic needs, yet is somewhat close to the 50 GPCD that Teodoro (2018) used. For each household *i*, year *y*, and block group *b*, we estimate:

$$(2) \qquad \mathrm{IWSER}_{iy} = \frac{Water\ use\ in\ tier\ 1\ and\ sewer\ bill\ _{iy}}{MHI_{by}} * 100$$

1.2.6 Winter Water and Wewer Expenditure Ratio (WWSER)

While the IWSER uses a pre-determined 55 GPCD to proxy for reasonable indoor water use and is based on the state recommendations, wintertime water usage is often considered a proxy for household-level indoor water usage given that outdoor irrigation needs are diminished or absent during this period. While this is an imperfect measure of indoor water usage, considering how often it is used as an indoor measure, we calculate the water expenditure ratio associated with average monthly wintertime water usage, averaged over the months of December through February, at the house-

[3] For more information see: https://www.census.gov/programs-surveys/acs/? [Accessed March 2019].

[4] Note that Census data is not available at the block group level for 2011 and 2012. Since there is no information available for 2020, we use 2019 Census data as a proxy for 2020.

[6] One of the unique elements of this research is to employ a much more granular measure of MHI that is more reflective of the income disparities that exist throughout the region and California. By using the MHI of the US Census Block Group that the household resides in rather than, say, the MHI for the agency, county or state, our WERs are more likely to accurately reflect the possible burden water services may impose on households than if the more aggregate MHI measures were used.

[7] Often a water bill excluding sewer costs is used in these calculations in the literature. Since EVMWD provides both services, and since sewer services are an essential service as well and often priced based on water use, we have bundled the two in this report. Analysis excluding sewage services are available from the authors upon request.

hold level.[8] For each household *i*, year *y*, and block group *b*, we estimate:

$$(3) \qquad WWSER_{iy} = \frac{Winter\ water\ use\ and\ sewer\ bill_{iy}}{MHI_{by}} * 100$$

1.2.7 Within Full Budget (Indoor and Outdoor) Water Expenditure Ratio (WBWSER)

The next measure differs from a focus on basic needs water services to water services that might be best described as efficient indoor and outdoor water uses. The state has developed definitions for indoor and outdoor water use efficiency that currently include a 55 GPCD indoor standard, and an outdoor standard based on the percentage of evapotranspiration (ET) for the amount of irrigated area a residential customer has to water. For agencies with budget-based (or allocation-based) water rates, the budget is defined by their indoor and outdoor (tier 1 plus tier 2) allocations. Agencies are now trying to encourage, even incentivize, households to remain within their "budget." The WBWSER represents the faction of MHI devoted to water and sewer expenditures associated with a household's water budget. Note that this measure assumes households will utilize their full budget but it is not a measure of actual water usage. For each household *i*, year *y*, and block group *b*, we estimate:

$$(4) \qquad WBWSER_{iy} = \frac{Water\ use\ for\ tier\ 1\ and\ 2\ and\ sewer\ bill_{iy}}{MHI_{by}} * 100$$

1.2.8 Overall Water and Sewer Expenditure Ratio (OWSER)

While not based on a basic needs level of water use, the final water expenditure ratio we calculate illustrates how the expenditures related to overall water use compared to the MHI. Because the expenditures we use to calculate the overall water expenditure ratio may include what would likely be defined by the state and water agency as inefficient or wasteful usage by some households, we emphasize that this ratio should not be used as a measure of water affordability as it relates to basic or essential needs or even efficient use. Rather, this ratio is illustrative in terms of providing information on what fraction of MHI is typically spent on water and sewer services each month. For each household *i*, year *y*, and block group *b*, we estimate:

$$(5) \qquad OWSER_{iy} = \frac{Total\ water\ and\ sewer\ bill_{iy}}{MHI_{by}} * 100$$

In addition, we calculate the above WER for summer and non-summer months to illustrate the role of outdoor water use in WERs. The summer months in this study are defined as July, August, and September.

[8] As water districts increasingly adopt technology to measure water flows into households rather than simply water flows entering the property line, more accurate measures of indoor water usage will be available.

1.3 Results

1.3.1 Water Affordability Calculations Over Time

Before presenting the water expenditure ratios for different water services and water user groups, we briefly discuss trends in water bills and prices. Within EVMWD residential service area, the average cost of basic needs water, in real terms (2011-dollar values), increased by approximately $1.20 from 2011 to 2020 (Table 1.1). In terms of indoor budget, average district-wide expenditures on water use increased by nearly 2.24% annually since 2011 (Table 1.1). For the expenditures associated with water use within a household's water budget—composed of both efficient indoor and outdoor water—average residential expenditures rose by less than 2%, or $0.98, over the 2011 to 2020 period within EVMW''s service area. Sewer costs reduced slightly by around 0.16% from 2011 to 2020. Finally, overall monthly water bills slightly reduced by an average annual rate of 0.17%.

To put these water expenditure trends into context, the overall inflation rate based on the consumer price index (CPI) for the Los Angeles area[16] rose by approximately 2.23% annually from 2011 to 2020.[17] However, changes in water expenditures are influenced by changes in prices and changes in water use. As indicated in Table 1.1, average water use was reduced by 2.70% annually, from 16.17 to 13.95 CCF. Indeed, as the last column from Table 1.1 illustrates, the percentage of households within budget increased from 2011 to 2020 by over 3%. Per capita water use, on average, dropped between 2011 and 2020, thereby reducing the overall water bill.

Table 1.2 summarizes the average WER for different water uses from 2011 to 2020. As indicated, these ratios are based on residential water use expenditures from over 30,000 households that are both water and sewer customers of EVMWD[18]. As shown, the WER for basic water and sewer services alone ranged from 1.21% to 1.40% of MHI. For indoor water use, defined at 55 GPCD, we see the WER for water and sewer services ranged from 1.37% to 1.50%. The general trend since 2011 is a slight increase in the WER for basic and indoor water use.

Table 1.1. Average monthly bill ($) in the EVMWD service area for water and sewer services[9]

Bill Year	Basic Needs Water Cost[10]	Indoor Budget Cost[11]	Within Budget Cost[12]	Sewer Cost	Overall Water Use Cost[13]	Average Water Use (CCF)[14]	Percent in Budget[15]	Inflation Rate
2011	$25.86	$34.81	$72.67	$41.79	$99.74	16.17	78.30	-
2012	$25.67	$34.76	$70.14	$41.03	$99.92	16.72	75.60	2.04
2013	$25.95	$35.08	$73.02	$40.45	$99.67	16.38	76.77	1.10
2014	$26.73	$36.44	$74.23	$40.55	$100.76	16.06	77.46	1.39
2015	$28.51	$37.29	$76.37	$40.45	$92.11	13.11	87.48	0.95
2016	$32.19	$40.33	$79.90	$40.13	$94.76	13.10	87.84	1.99
2017	$32.32	$40.10	$80.39	$39.19	$95.34	13.47	86.00	3.00
2018	$33.52	$41.28	$78.08	$40.20	$99.07	13.98	83.62	4.20
2019	$34.06	$40.27	$77.86	$40.68	$97.06	12.91	85.87	3.51
2020	$34.84	$41.06	$79.32	$39.69	$100.65	13.95	82.51	1.92
Average Annual Growth	$1.20 (4.02%)	$0.85 (2.24%)	$0.98 (1.30%)	-$0.16 (-0.40%)	-$0.17 (-0.18%)	-0.40 (-2.70%)	5.22 (3.04%)	2.23 (2.23)

[9] Real prices are in 2011 terms using U.S. Department of Labor Bureau of Statistics (BLS) Consumer Price Index (CPI) for Los Angeles area. CPIs relative to 1984 are: 2011=231.93; 2012= 236.65; 2013= 239.21; 2014= 242.43; 2015=244.63; 2016=249.25; 2017=256.21; 2018=265.96; 2019=274.11; and 2020=278.57.

[10] Basic needs cost is calculated using 35.66 /GPCD as essential water needs.

[11] Expenditures based on actual water use less than or equal to each household's indoor budget.

[12] Based on expenditures for each household's water use less than or equal to its overall water budget.

[13] Based on actual water usage and excludes sewer costs.

[14] Based on actual total water usage, which is averaged for each year.

[15] Numbers indicate the percentage of households at or below total budget allocation based on water use in July of each year.

[16] We use CPI for Los Angeles-Long Beach-Anaheim region rather than Riverside-San Bernardino-Ontario region because the CPI reporting for Riverside-San Bernardino-Ontario started at 2017 and we could not adjust the prices for 2011-2017.

[17] US Dept of Labor Bureau of Statistics (BLS Consumer Price Index for Los Angeles Area. Available at: https://www.bls.gov/regions/west/news-release/consumerpriceindex_losangeles.htm#table1

[18] In this report for the affordability analysis, we only included households that are both water and sewer customers and excluded "water only" customers. About 7,000 accounts in the EVMWD service area are "water only" customers.

Table 1.2. Water expenditure ratio for different types of water services from 2011 to 2020 in EVMWD[19]

Year	Total Number of Households[20]	Basic Needs Water & Sewer	Indoor Water & Sewer	Average Winter Water & Sewer	Full Budget Water & Sewer	Overall Water & Sewer
2011	29,869	1.21 (0.43)	1.37 (0.46)	1.52 (0.61)	1.95 (0.75)	1.75 (0.81)
2012	30,271	1.24 (0.39)	1.40 (0.41)	1.63 (0.59)	1.97 (0.67)	1.82 (0.80)
2013	31,051	1.23 (0.46)	1.38 (0.50)	1.53 (0.61)	1.97 (0.82)	1.79 (0.85)
2014	31,604	1.26 (0.49)	1.40 (0.50)	1.70 (0.73)	2.00 (0.81)	1.82 (0.85)
2015	32,180	1.28 (0.47)	1.42 (0.47)	1.58 (0.62)	2.01 (0.75)	1.67 (0.70)
2016	32,796	1.37 (0.50)	1.50 (0.51)	1.63 (0.61)	2.12 (0.81)	1.76 (0.72)
2017	33,544	1.35 (0.53)	1.50 (0.54)	1.62 (0.65)	2.11 (0.85)	1.75 (0.80)
2018	34,110	1.37 (0.55)	1.49 (0.54)	1.73 (0.71)	2.05 (0.83)	1.80 (0.81)
2019	34,326	1.38 (0.57)	1.47 (0.58)	1.64 (0.71)	2.04 (0.86)	1.75 (0.81)
2020	37,701	1.40 (0.58)	1.50 (0.59)	1.72 (0.74)	2.11 (0.89)	1.84 (0.86)

*Numbers in parentheses indicate the standard deviations. The median income is measured by US Census American Community Survey at the block group level.

If we focus on what households used, on average, during the winter months with the assumption that this is often used as an imperfect measure of indoor water usage, we see that the annual WER ranges from 1.52% to 1.72% of MHI over the 2011 to 2020 period. This is certainly up from the assumption of 55 GPCD—which controls for household size—suggesting that households are using more water in the wintertime than what the state has determined is an efficient amount for indoor use. Without data on actual metered flows into the household, whether the exceedance is due to indoor use beyond the 55 GPCD rate and/or from some outdoor use is indeterminate.

Focusing on the second to last column of Table 1.2, and not considering affordability, the average WER for households operating at the water budget is between 1.95% and 2.11% from 2011 to 2020. Focusing on the last column of Table 1.2 to determine what fraction of income is spent on water use overall, the average WER for overall water expenditures—including sewer expenditures—varies from 1.75% in 2011 to 1.84% in 2020. Comparisons of these last two columns illustrate how households operating at their full water budget would lead to an increase in the average WER within the district relative to what households are confronting given current water use.

Often discussions of water affordability center on disadvantaged or low-income communities. The averages presented in Table 1.2 include all households that are both water and sewer customers within the EVMWD service area, including both low- and high-income households. Teodoro (2018) identifies the 20th percentile income level as a lower bound on middle-class incomes and thus a reasonable place to start to investigate how water expenditures might present affordability challenges to households.

[19] *Basic Needs* is based on 35.6 GPCD, while *Indoor* is based on 55 GPCD, both accounting for household size. *Average Winter* is based on average water use over December, January, and February, while *Within Budget* is based on fully utilizing the indoor and outdoor water budget associated with an allocation-based rate structure.

[20] In this report for the affordability analysis, we only included households that are both water and sewer customers and excluded "water only" customers. There about 7,000 accounts in the EVMWD service area that are "water only" customers.

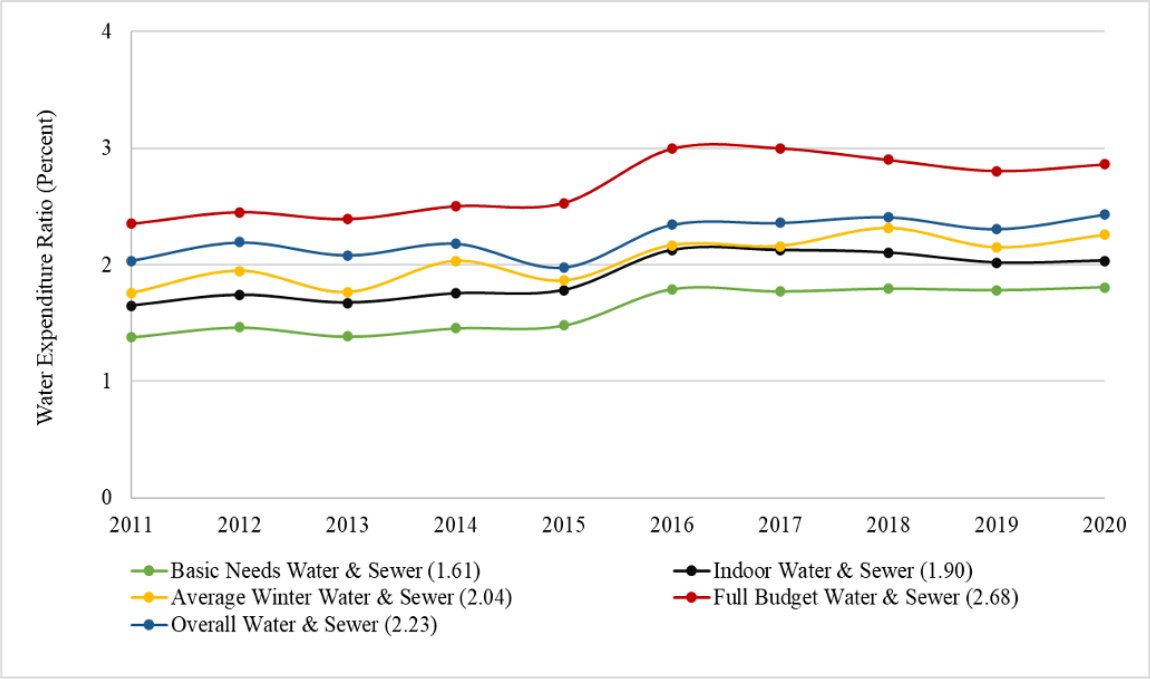


Figure 1.2. Comparing annual water expenditure ratio for the 20th percentile income over the study period (2011–2020)[21]

To illustrate how water affordability challenges may affect households at the 20th percentile of income, we estimate the WER for each of the water use categories above for each year from 2011 to 2020. Rather than using MHI within each block group we use the 20th percentile income level within each block group. As shown in Figure 1.2, the basic needs WER for households assuming a 20th percentile block group level income ranges from 1.38% (2011) to around 1.81% (2020), with an average over the period of 1.61%. As expected, these ratios are higher than those presented in the third column of Table 1.2 for basic needs water use that assumes an MHI by block group level. Considering a slightly more lenient allowance of water usage, the WER for indoor use rose from a low of around 1.65% (2011) to a high of around 2.30% (2020). Average wintertime WER assuming a 20th percentile income level rose from approximately 1.76% in 2011 to 2.26% in 2020.

Somewhat surprising is the relationship between the WER associated with a fully used, but not exceeded water budget relative to overall usage. As shown, the WER associated with fully utilizing the water budget ranges from slightly below 2.35% to around 2.86% between 2011 and 2020, with an average annual estimate of 2.68%. The WER associated with households' total water usage (and expenditures) varies from around 2.03% (2011) to 2.43% (2020), with an average annual WER of 2.23%.

[21] Numbers in parentheses show average WER from 2011 to 2020. WER is derived by calculating annual household expenditures related to water and sewer services relative to annual 20th percentile household median income. *Basic Needs* is based on 35.6 GPCD, while *Indoor* is based on 55 GPCD (while accounting for household size). *Average Winter* is based on average household level water use over December, January, and February months, while *Within Budget* is based on fully utilizing the indoor and outdoor water budget associated with an allocation-based rate structure. Overall water use is based on actual water use data from billing information.

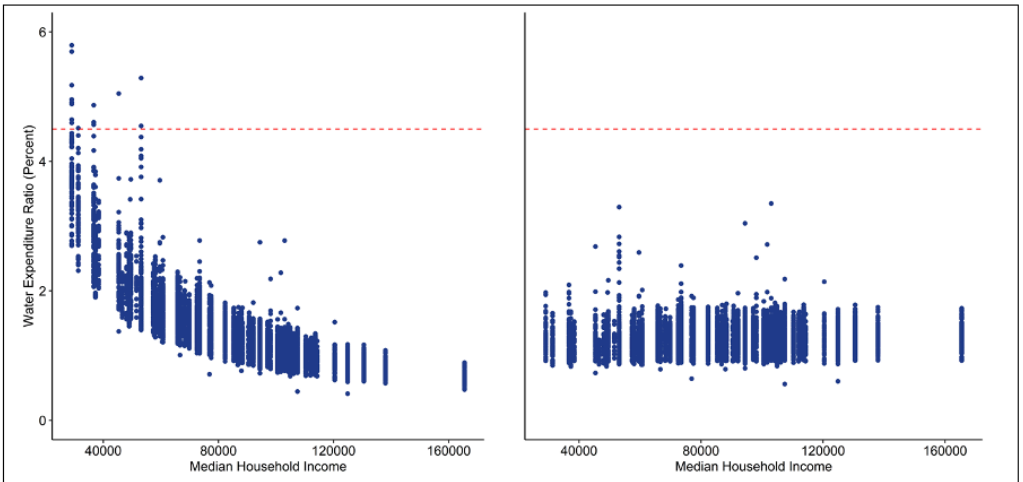
1.3.2 Basic Needs Water Expenditure Ratios

Of course, there is a wide range of incomes within EVMWD, both above and below the 20th percentile. As indicated earlier, the MHI for the full range of block groups in the EVMWD service area varied from a low MHI of $29,070 to $165,481 in 2019. (Figure 1.1). To understand how WERs vary with the full range of incomes within EVMWD, Figure 1.3a presents the WER for basic needs water and sewer services in 2019.[22] The median household income for each block group in EVMWD service is sorted along the x-axis in Figure 1.3a.

In contrast, the WER for each household is located within each household's MHI block group (each household in the EVMWD service area is represented by a single dot in Figure 1.3a). As indicated, as incomes increase, WERs generally decrease. This pattern certainly supports concerns that lower-income households confront more significant water affordability challenges than higher-income households. As shown, the average WER for basic needs water and sewer services for residential customers in the EVMWD service area in 2019 is 1.38%. Recalling that the thresholds the EPA identifies as generating concerns regarding affordability are 4.5% for water and sewer services (indicated by the red dotted horizontal lines in Figure 1.3a), it is clear that within the EVMWD service area, water expenditures as a fraction of MHI is significantly less than those thresholds for *basic needs* water in 2019. Only 16 households were above the EPA threshold for water and sewer services.

[22] Similar figures for 2011 to 2018 and 2020 are available from the authors upon request.

Regarding the consequences of using a more aggregate income measure than block group level MHI, we calculated and plotted the WERs for all households using the district-wide MHI for the 2019 year (Figure 1.3b). The average WER for basic needs water and sewer services for residential customers in the EVMWD service area in 2019 using district-level MHI is 1.25% relative to 1.38% if we use the block group-level MHI. Visual inspection and comparison of the scatterplots highlight the substantial difference in using a more aggregate measure of MHI. Furthermore, using district-level MHI to calculate the WERs could be misleading in two additional ways. First, we could not identify any household that falls above the EPA's 4.5% threshold. This is evidence that using district-level MHI does not fully identify households confronting higher WERs. Second, using district-level MHI to calculate the WERs identifies a different set of households at risk of water affordability challenges (i.e., closer to the EPA's 4.5% threshold), mainly households in higher-income block groups.



Notes: WER calculated as total annual costs for water and sewer services for basic needs as a percentage of MHI at the block group level in figure 1.3a, and MHI at the district level in figure 1.3b. The red dashed lines represent the US EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

Figure 1.3. Water expenditure ratio for basic needs water by income level in 2019[23]

1.3.3 Indoor Water Expenditure Ratios

Figure 1.4 presents a similar analysis as Figure 1.3 except for the water services associated with what might be considered indoor use. We develop two measures of indoor use. First, and as shown in Figures 1.4a and 1.4b, we assume an indoor water use of 55 GPCD, adjusted by household size. This 55 GPCD is higher than the basic needs allocation from Figure 1.3, yet is an allocation identified by the state as an efficient per person indoor use. Similar to the relationship identified in Figure 1.3, we see as incomes rise WERs generally fall. As far as affordability, at 55 GPCD and when we use block group-level MHI, 74 households are associated with a WER above the EPA threshold of 4.5%. In contrast, when we use district-level MHI, none of the households fall above the EPA's threshold.

A second potential measurement for indoor water use is during the winter months. While discussing the potential shortcomings above, water usage during the wintertime is most often measured as indoor use, given the lower ET and irrigation requirements for outdoor landscapes. As shown in Figures 1.4c and 1.4d, the WERs associated with wintertime usage is significantly higher than the WERs associated with assuming 55 GPCD. Furthermore, the slope of the WER-income relationship has flattened relative to the measures from Figures 1.3, 1.4a, and 1.4b. One possibility is that higher-income households reduce their outdoor watering less during the wintertime than lower-income households. In terms of affordability, this is a more complex assessment to make, since it is clear that households are using significantly more water in the wintertime, on average, than what would be considered an efficient—not basic needs—allocation suggested by the state (i.e., 55 GPCD).[24] That said, it is still helpful to understand the magnitude of WER during the wintertime, when overall water use is expected to be lower than other times of the year. Using the 4.5% threshold as a means of comparison, only 176 of the more than 34,000 households in the EVMWD service area have a WER above this threshold. Similar

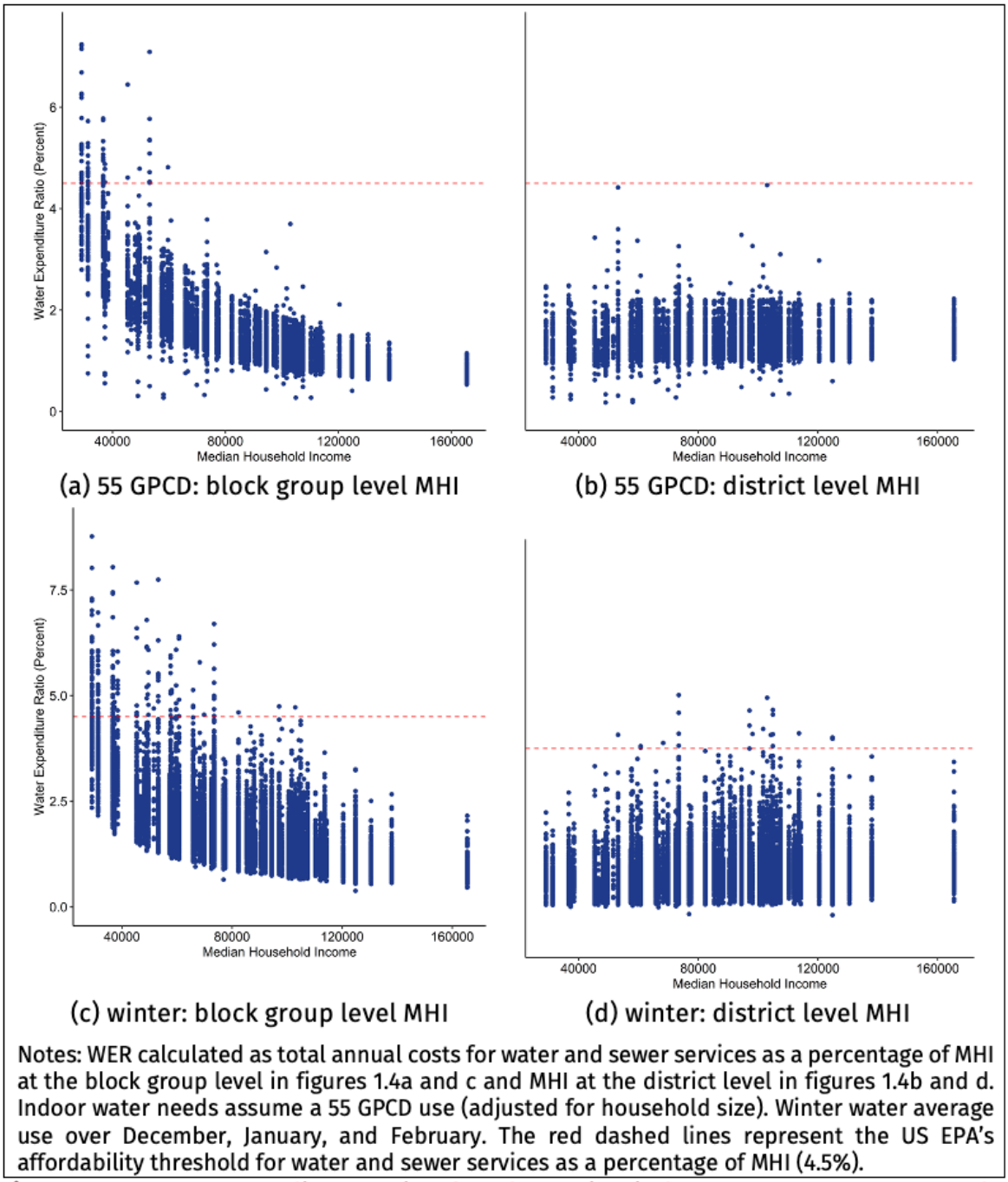
[23] Annual expenditure ratio is derived by calculating annual costs related to water and sewer services as percentage of median household income (MHI). Basic water needs calculated for 35.6 GPCD adjusted for household size. MHI is calculated at the US Census block group level for 2019. For Figure 3, red dashed lines represent US EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

[24] Another possibility is that as temperatures increase and precipitation becomes more variable under climate change, customers are responding with more intermittent wintertime outdoor watering.

to the findings above, when we use district-level MHI, only 22 households fall above the threshold. In addition, as illustrated in Figure 1.4d, these households are from block groups with low but also mid and high MHI, which indicates the misleading results that we can get when using district-level MHI in WER calculations.

1.3.4 Water Expenditure Ratios for Budget-Based Allocations and Overall Use

While the previous measures investigated the expenditures on water services that might be considered essential (basic needs) and reasonable (for indoor use), we now turn our attention to how those expenditures might change when considering outdoor use as part of the services households value. Many agencies, especially in Southern California and, more recently, the state of

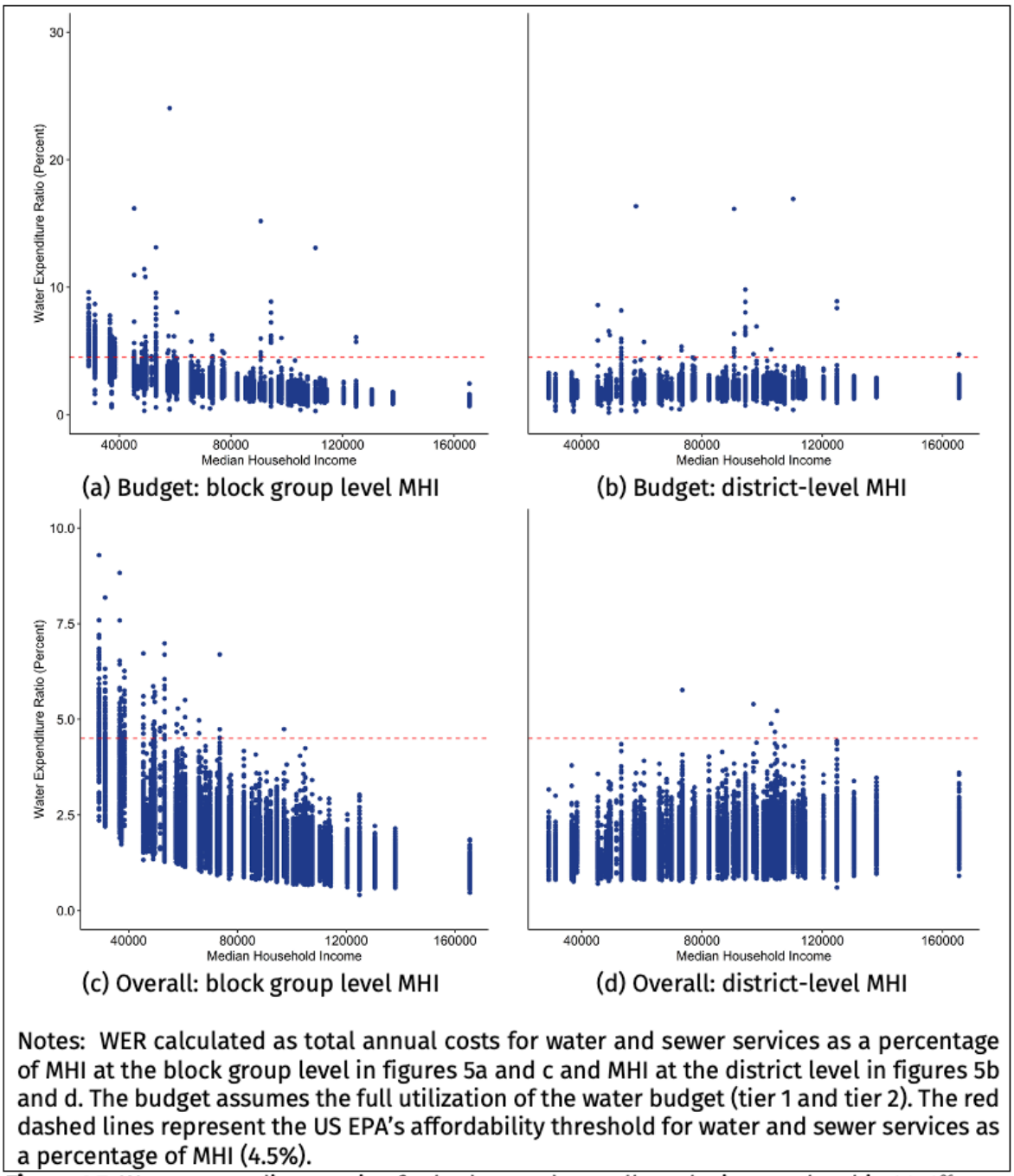


Notes: WER calculated as total annual costs for water and sewer services as a percentage of MHI at the block group level in figures 1.4a and c and MHI at the district level in figures 1.4b and d. Indoor water needs assume a 55 GPCD use (adjusted for household size). Winter water average use over December, January, and February. The red dashed lines represent the US EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

Figure 1.4. Water expenditure ratios for alternative indoor water use measures by income level in 2019[25]

[25] WER derived by calculating annual costs related to water and sewer services as percentage of MHI. Indoor water needs assume a 55 GPCD use (adjusted for household size). Winter water average use over December, January, and February. MHI calculated at the US Census Block Group level for 2019. The red dashed lines represent U.S. EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

California, have been promoting water budgets as a means to identify what might be considered a reasonable or efficient use of water for both indoor and outdoor use. Figures 5a and 5b present the relationship between the WER associated with individualized water budgets and income for each of the households in the EVMWD service area. It should be emphasized that these WERs are not based on actual use rather they are based on usage that would be associated with fully utilizing a household's indoor and outdoor allocations---no more, no less. This might be illustrative in understanding the implications on water affordability if households were to meet the budgets presented them. Note that the budgets differ by household size, irrigated area, and the ET associated with the micro-zone in which the household resides. As shown, the relationship between the WER and income is not as strong as in the previous cases—indeed, it is much more variable across and within income block groups, as shown in both Figures 1.4a and 1.4b. Given current tier 1 and tier 2 water prices, coupled with



Notes: WER calculated as total annual costs for water and sewer services as a percentage of MHI at the block group level in figures 5a and c and MHI at the district level in figures 5b and d. The budget assumes the full utilization of the water budget (tier 1 and tier 2). The red dashed lines represent the US EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

Figure 1.5. Water expenditure ratios for budget and overall use by income level in 2019[26]

[26] WER calculated as total annual costs for water and sewer services as percentage of MHI. Budget assumes full utilization of water budget (tier 1 and tier 2). Overall measures actual water expenditures for year. MHI calculated at the US Census Block Group level for 2019. The red dashed lines represent U.S. EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

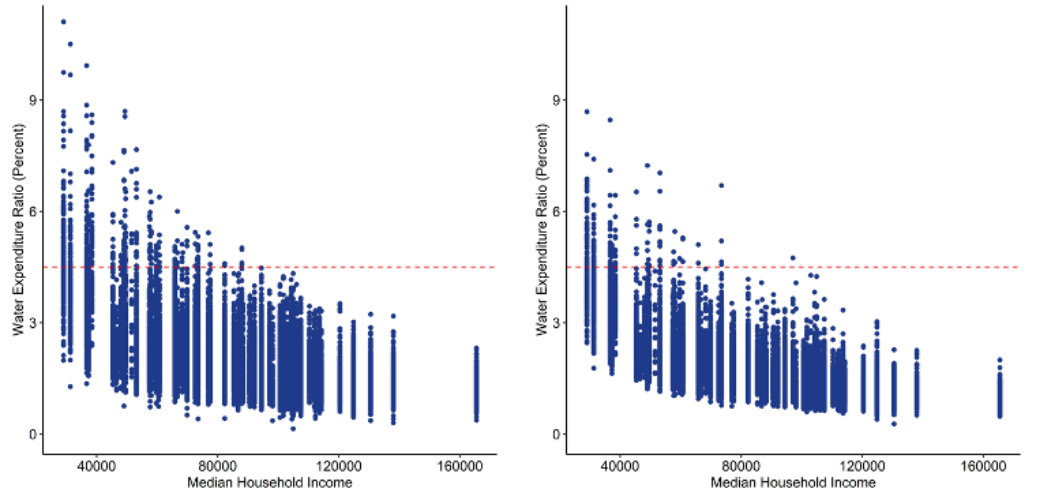
current sewer costs and block group level MHI, approximately 657 households within EVMWD would exceed the 4.5% affordability threshold if households were to use their full water budget. When we use district-level MHI, this number reduces to 40 households.

Figures 1.5c and 1.5d, alternatively, highlight how the WERs for total water use in 2019 vary over different income levels. Relative to the budget-based WERs, income groups have much less variability (Figures 1.5c and 1.5d). The average WER for the district associated with overall water use in 2019 is 1.75, while the budget-based WER is 2.04. The lower WERs, on average, also result in fewer households exceeding the EPA 4.5% threshold. In considering overall water use in 2019, which includes indoor and outdoor water usage, approximately 208 households exceeded the affordability threshold set by the EPA for water and sewer costs. While we are not suggesting that the affordability threshold was developed to identify water challenges associated with non-essential uses of water, it is informative to realize that even if we apply total water use rather than water use associated with essential or basic needs, less than 0.5% of the households will exceed that EPA threshold. When using district-level MHI to calculate the WERs for overall water use, only five households exceed the EPA's 4.5% threshold (compared to the 208 when using block group-level MHI). Notably, the households that are found to exceed the affordability threshold under the more aggregate MHI measure are primarily located in middle- and high-income block groups (Figure 1.5d).

In addition to the overall water use, we compare WERs for overall water use in the summer months (July–September) to non-summer months. As indicated in Figure 1.6, the average WER in the summer is 1.94%, and the winter months is 1.72%. Our results indicate that 426 households are above the EPA's 4.5% threshold when we use block group MHI to calculate the WERs for summer. For the non-summer months, this number reduces to 190 households.

1.3.5 Water Expenditure Ratios and Household Characteristics

While the above analysis highlights the general relationship of how WERs are related to income, understanding whether there are systematic factors that may impact the degree to which households confront water affordability issues can be useful in developing targeted strategies to address such issues. Table 1.3 presents a comparison between households whose WERs are above the 4.5% affordability threshold relative to households whose WERs are below the threshold.[28] Because of sample size issues in the comparison, we focus on the WERs associated with indoor water use (55 GPCD) and overall water use. We use 2019 for our comparisons, although there were no appreciable differences in our results from other years. Table 1.3 illustrates that households above the EPA's 4.5% threshold live in block groups represented by lower median home value, lower median gross rent, higher percentage renter-occupied, and higher median rent as a percentage of household income. The implications here could be significant since, as



(a) Overall summer months: block group level MHI

(b) Overall non-summer months: block group level MHI

Notes: WER calculated as total annual costs for water and sewer services as a percentage of MHI at the block group level. The red dashed lines represent the US EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

Figure 1.6. Water expenditure ratios for overall use in summer (July–September) and non-summer months by income level in 2019[27]

[27] WER calculated as total annual costs for water and sewer services as percentage of MHI. MHI calculated at the US Census block group level for 2019. The red dashed lines represent US EPA's affordability threshold for water and sewer services as a percentage of MHI (4.5%).

[28] For illustrative purposes we chose only one threshold, 4.5%, for this comparison. A more in-depth analysis of different thresholds would be informative yet goes beyond the focus of this report.

housing expenditures rise relative to income, households have less disposable income to spend on other essential services.

Because such a simple cross-comparison does not control for other factors that might influence water use and that potentially differ systematically across these two types of user groups, caution is suggested in drawing significant conclusions based on the results from each of the comparisons in Table 1.3 until a more in-depth (and multivariate) analysis of these differences is undertaken.[29]

1.3.6 Comparing Water Expenditure with Expenditures on Other Services

While examining the expenditures households confront for basic or essential water needs can help water agencies and the state understand whether there are significant affordability issues that require more attention, water is one of several essential services households need. Other services include food, housing, transportation, health care, education, entertainment, and energy, to name a few. To get an idea of how the expenditures on water compared to expenditures on other essential services, we used data from the US Bureau of Labor

Table 1.3. Average household characteristics by WER group (above and below 4.5%) for indoor and overall water use

	Indoor Water Use (55 gpcd)			Overall Water Use		
	Below 4.5%	Above 4.5%	Diff (2-1)	Below 4.5%	Above 4.5%	Diff (5-4)
	(1)	(2)	(3)	(4)	(5)	(6)
Water use characteristics						
Monthly water use (CCF)	13.99 [9.29]	17.13 [9.59]	3.14***	12.54 [9.18]	21.48 [12.02]	8.94***
Monthly water cost ($)	70.32 [38.16]	78.59 [42.10]	8.27***	65.49 [36.71]	101.94 [60.74]	36.45***
Percent efficient	85.40	93.00	7.60***	87.70	67.50	-20.02***
Income measures						
Median household income (1,000 $)	84.33 [25.87]	34.80 [4.59]	-49.53***	82.22 [26.19]	36.89 [9.65]	-45.33***
Percentage with income below Poverty level	10.89 [7.65]	30.45 [7.97]	19.56***	11.41 [8.00]	23.75 [8.53]	12.34***
Percent w/public assistance income	3.88 [3.93]	9.61 [6.19]	5.73***	3.97 [3.99]	9.44 [6.04]	5.47***
Median gross rent as a percentage of household income	32.18 [7.21]	36.31 [3.07]	4.13***	32.22 [7.19]	36.51 [3.58]	4.29***
House characteristics						
Median number of rooms	6.34 [1.03]	4.38 [0.47]	-1.96***	6.25 [1.05]	4.62 [0.75]	-1.63***
Median home value (1,000 $)	326.19 [25.87]	166.60 [38.50]	-159.59***	319.43 [93.89]	189.09 [63.89]	-130.34***
Percent renter occupied	28.04 [15.90]	60.50 [15.21]	32.46***	28.95 [16.38]	57.94 [15.81]	28.99***
Demographics						
Percent unemployed	10.10 [4.80]	16.11 [5.43]	6.01***	10.22 [4.85]	14.53 [5.59]	4.31***
Percent w/bachelor's degree/higher	20.96 [9.06]	6.77 [5.71]	-14.19***	20.34 [9.22]	9.16 [7.93]	-11.18***
Percent white	65.46 [14.88]	36.73 [17.98]	-28.73***	65.27 [15.01]	41.80 [20.88]	-23.47***
Median age	35.82 [8.66]	32.20 [9.52]	-3.62***	35.95 [9.10]	33.79 [10.27]	-2.16***

Notes: *** indicates the difference between the two values is statistically significant at the 1% level. Numbers in brackets are Standard Deviations.

[29] While our analysis has illustrated some potentially strong relationships between WER and various socioeconomic factors, some of the perceived strengths can be driven by association with another common factor—income. As such, our results highlight correlation and not causation. A more in-depth analysis of this issue using multivariate analysis is important but goes beyond the objectives of this present analysis to highlight how water service type and income measurement can affect affordability measures.

Statistics Consumer Expenditure Survey (BLS CES) to calculate several expenditure ratios for other essential services.

Table 1.4 provides information on the expenditure ratios for food, housing, transportation, health care, education[30], entertainment[31], natural gas, electricity, and telephone services based on the BLS CES from 2011–2020, which is the most recent year of the survey.[32] We should emphasize that the closest "region" to EVMWD's service area for which data on food, housing, transportation, health care, education, and entertainment was available in the Los Angeles Metropolitan Statistical Area (MSA), which includes LA, Orange, Riverside, and San Bernardino counties. For natural gas, electricity, and telephone services, the closest or most representative region for this granularity of data was the "West" region, which is composed of Alaska, Arizona, California, Guam, Hawaii, Idaho, Nevada, Oregon, and Washington.

As expected, we see that housing comprises the largest fraction of overall income (before taxes) with an average expenditure ratio of 32% from 2011 to 2020, followed by transportation and food expenditure ratios at 12.48% and 10.69%, respectively. Health care is the service that accounts for the next highest fraction of income expenditures at slightly below 5% of income, followed by entertainment at 3.46%, education at 2.23%, telephone services at 1.74%, and electricity at 1.60%. Finally, natural gas comprises approximately 0.47% of annual household income. Since the expenditures listed in the BLS CES are actual expenditures and not necessarily based on essential or basic needs, it seems more reasonable to use the overall WER for comparison purposes. As such, overall water expenditures in EVMWDs service area comprised approximately the same fraction of income as electricity services for the western United States and territories, on average. Yet, we see that water expenditures comprise a smaller proportion of income than expenditures on telephone services and significantly less than expenditures on health care, transportation, food, and housing.[33]

Table 1.4. Comparing essential needs cost as a percentage of income before taxes[34]

Panel (A): Los Angeles Metropolitan Statistical Area (MSA)						
Year	Food	Housing	Transportation	Health care	Education	Entertainment
2011	10.33	29.55	12.70	3.58	2.01	3.39
2012	10.79	29.98	12.70	3.89	2.11	3.44
2013	10.59	30.12	12.13	4.03	2.25	3.53
2014	10.53	31.11	12.03	4.60	2.32	3.51
2015	10.00	30.20	12.20	5.00	2.19	3.35
2016	10.37	30.36	13.13	4.96	2.03	3.46
2017	11.41	31.82	12.74	5.17	2.65	3.61
2018	13.17	35.71	13.61	5.71	3.43	4.19
2019	10.19	27.37	12.17	4.62	2.06	3.22
2020	9.49	27.42	11.43	4.64	1.27	2.89
Panel (B): West Region						
Year	Natural gas	Electricity	Telephone services	Water & other public services		
2011	0.58	1.67	1.71	0.91		
2012	0.53	1.70	1.75	0.92		
2013	0.53	1.76	1.81	0.96		
2014	0.54	1.75	1.87	0.97		
2015	0.47	1.63	1.79	0.93		
2016	0.39	1.47	1.70	0.88		
2017	0.40	1.48	1.70	0.90		
2018	0.41	1.57	1.73	0.96		
2019	0.41	1.5	1.68	0.92		
2020	0.41	1.46	1.61	0.92		

[30] Education expenditures include tuition, fees, textbooks, supplies, and equipment for public and private nursery schools, elementary and high schools, colleges and universities, and other schools. For more details see https://www.bls.gov/cex/csxgloss.htm

[31] Entertainment expenditures include fees and admissions for television, radio, sound equipment, pets, toys, hobbies, playground equipment, and other entertainment equipment and services such as indoor exercise equipment, bicycles, trailers, and electronic video games. For more details see https://www.bls.gov/cex/csxgloss.htm

[32] Table 1.4 provides estimates from 2011 to 2020. Note that the expenditure ratios in Tables 1.2 and 1.4 are based on actual expenditures from surveys of the populations within their respective regions. As such, they are not necessarily representative of the expenditures associated with basic needs.

[33] Our calculations do not account for differences in tax burdens across different income or geographic groups, nor differences in social program allowances that might contribute to income. These factors will affect the denominator in these calculations.

[34] Source: Consumer Expenditure Survey, US Bureau of Labor Statistics, US Census Bureau's ACS, and EVMWD billing information. Income for LA and West is based on the US Bureau of Labor Statistic's Consumer Expenditure Survey (CE). For the EVMWD service area, we use a weighted average of median household income from US Census Bureau's ACS data at the block group. Both incomes are before taxes. Note: Percentages associated with these categories do not comprise all the income categories and thus do not sum to 100.

1.4 Discussion

As a percentage of median household income (MHI), overall water and sewer expenditures within EVMWD rose from 1.75% to 1.84% between 2011 and 2020. Considering essential basic needs for water is assumed to be 35.6 GPCD adjusted for household size, the average annual WER rose from 1.21% to 1.40% of MHI. Alternatively, if we were to consider an efficient indoor use as a measure of basic needs or uses (i.e., 55 GPCD adjusted for household size), the WER rose from 1.37% to 1.50% of MHI. Somewhat surprisingly, if households were to use water at a level that met their indoor and outdoor water budget, the average annual WER would increase relative to what is currently observed based on their overall level of water and sewer expenditures. Such an outcome suggests that many households are operating within their water budgets.

Discussions of water affordability often revolve around basic or essential water needs for lower-income households. Using the 20th percentile median income within each household's US Census block group, we find that the average basic needs water expenditure ratio within the EVMWD service area from 2011 to 2020 was 1.38%, while 1.81% for indoor use. These annual averages are considerably below the 4.5% affordability threshold identified by the US EPA. Indeed, in considering the full range of income levels within EVMWD and using MHI within the household's US Census block group as the denominator for calculation of the WER, we find that only 16 households would exceed the US EPA affordability threshold for water and sewer services for the basic needs level of water use. Alternatively, if we use the average monthly wintertime water use in our calculation of the WER, 208 households in the EVMWD service area in 2019 would have exceeded the affordability threshold set by the US EPA. The takeaway from these comparisons and analyses is that different types of water services and assumptions surrounding the reference income level used matter substantially to the perceived affordability of water within any district or region.

CHAPTER 2: DETERMINANTS OF WATER BILL DELINQUENCY AND SERVICE DISCONNECTIONS IN EVMWD SERVICE AREA

2.1 Introduction, Background, and Rationale

While much discussion has occurred regarding regulations of residential water service disconnections (e.g., SB 998), very little to no systematic analyses have been conducted on the characteristics of the households that are delinquent in paying their water bills and/or face service disconnections. This research aims to parse out the main factors associated with service disconnection and bill delinquency, with particular attention focused on the status of lower-income and disadvantaged customers' overall water use, including water budget, payment channel, and seasonal factors.

Understanding the factors that are associated with service disconnection and bill delinquency can be useful for several reasons. First, an understanding of the factors that are associated with service disconnection and bill delinquency, especially for lower-income households, may help focus the water affordability discussion on the salient factors that influence whether water is "affordable" by using a measurable outcome—bill delinquency—rather than some measure of the fraction of income spent on the water. In particular, our analysis can identify the strength of association with income as well as other factors (i.e., water use, water rates, and housing characteristics, payment channel), including the degree to which the household's water use was within its water budget, and service disconnection and bill delinquency. From a policy perspective, such information is critical in understanding whether income-based measures of affordability alone will be sufficient in the state's efforts to develop a policy to address this issue. Second, understanding the potential role household-specific factors play in influencing service disconnection and bill delinquency can help local agencies develop more targeted programs to address this issue, which can both increase revenues (from households paying their bills) and decrease costs (associated with delayed payments, collection, and "truck rolls").

2.2 Methods

2.2.1 Data and Summary Statistics

The primary data used in this analysis are single-family residential billing records for EVMWD customers from January 2011 through December 2019. We use bill payment and delinquency information, monthly water use, fixed service fees and volumetric consumption rates for water and wastewater services, water bill payment method (i.e., in-person in EVMWD office, via phone, rapid pay, website, and automatically deducted from a bank account). Each residential address was spatially linked to its Census tract and block group. We use data from the US Census Bureau's American Community Survey (ACS) one-year estimates[35] to obtain information annually from 2011 to 2019 on median household income (MHI)[36] and at the smallest available unit, which is at the Census tract level for 2011 and 2012 and the Census block group level for 2013 through 2019.

On a monthly basis, we identify water and wastewater bill delinquency for each customer in the EVMWD service area using the information on the past due balance and the number of days the bill is past due. Customers in the EVMWD service area follow California regulations regarding past due bill notices and shut-offs. The number of notices and actions before service shut off is described in Table 2.1. Minimal fees are charged for accounts past due for all three policy periods, in which fees are added two days after the due date ($5 or 5%, whichever is greater) to the bill. After 2015, additional fees are associated with each notice.

In this analysis, water and wastewater bill delinquency is defined based on the number of notices each customer received related to past-due bills. First, we generate an identifier for each billing record that takes a value of 0–4, indicating if a customer paid before or on the due date (not delinquent). Otherwise, the indicator takes on the value 1, 2, 3, or 4 for customers that have a past-due bill and received bill delinquency notice 1, 2, 3 or 4, respectively. We identify the share of residential customers that have delinquent bills over time (See Figure 1). On average, 17% of single-family residential customers (6,627 households) in the EVMWD have a past-due bill each month and receive the first notice. This share reduces to 12% (3,999 households), 10% (6,627 households), and 2% (672 households) after the second, third, and last notice, respectively.

A few important observations. First, we do not see a significant change in the percentage of accounts with delinquent bills over time for any of the four categories. Second, we do not see a significant change in the share of delinquent accounts after the policy modifications in 2015. Finally, the most significant drop in delinquency is after the third notice before the shut-off. The most important group that potentially has a significant challenge in paying their water bills are the customers who receive notice three but do not pay the bill and conse-

[35] The ACS one-year estimates are based on the 12 months of collected data.

[36] MHI in this paper is based on the "income in the past 12 months" variable in ACS and measures "total income" before deductions were made for items such as taxes, bonds, pensions, union dues, etc. Total income is the sum of wage or salary income, self-employment income, interest, dividends, net rental or royalty income, or income from estates and trusts, Social Security or Railroad Retirement income, Supplemental Security Income (SSI), public assistance/welfare payments, retirement, survivor, or disability pensions, and all other income. (https://www2.census.gov/programssurveys/acs/tech_docs/subject_definitions/2019_ACSSubjectDefinitions.pdf)

quently receive a shut-off notice (notice 4). This group comprises 2% of the single-family residential customers in the EVMWD, approximately 670 customers, on average.

Table 2.1. Summary of delinquency and notice policies

Notice Number	Prior to 2015	From 2015–February 2020	February 2020–March 2022
Notice 1	Mailed 7 days after the due date of the bill	Mailed 7 days after the due date of the bill (delinquent notice fee: $.63)	Mailed 14 days after the due date of the bill (delinquent notice fee: .78)
Notice 2	Courtesy call made 14 days after the due date of the bill	Mailed 14 days after the due date of the bill (delinquent notice fee: $.63)	Mailed 28 days after the due date of the bill (delinquent notice fee: .78
Notice 3	2nd courtesy call made 17 days after the due date of the bill	Courtesy phone call sent approximately 17 days after the due date of the bill	Courtesy phone call sent approximately 43 days after the due date of the bill
Notice 4	Shut off notice– services were locked off ($30 interruption processing fee)	Turn off notice– services locked off ($30 interruption processing fee)	Door hanger notices–created 56 days after the due date of the bill. Delivered two business days after creation. (Door hanger fee: $15.05)
Notice 5	-	-	Turn off notice – services locked off (once services are locked off – customer must pay $45.00 reconnect fee)

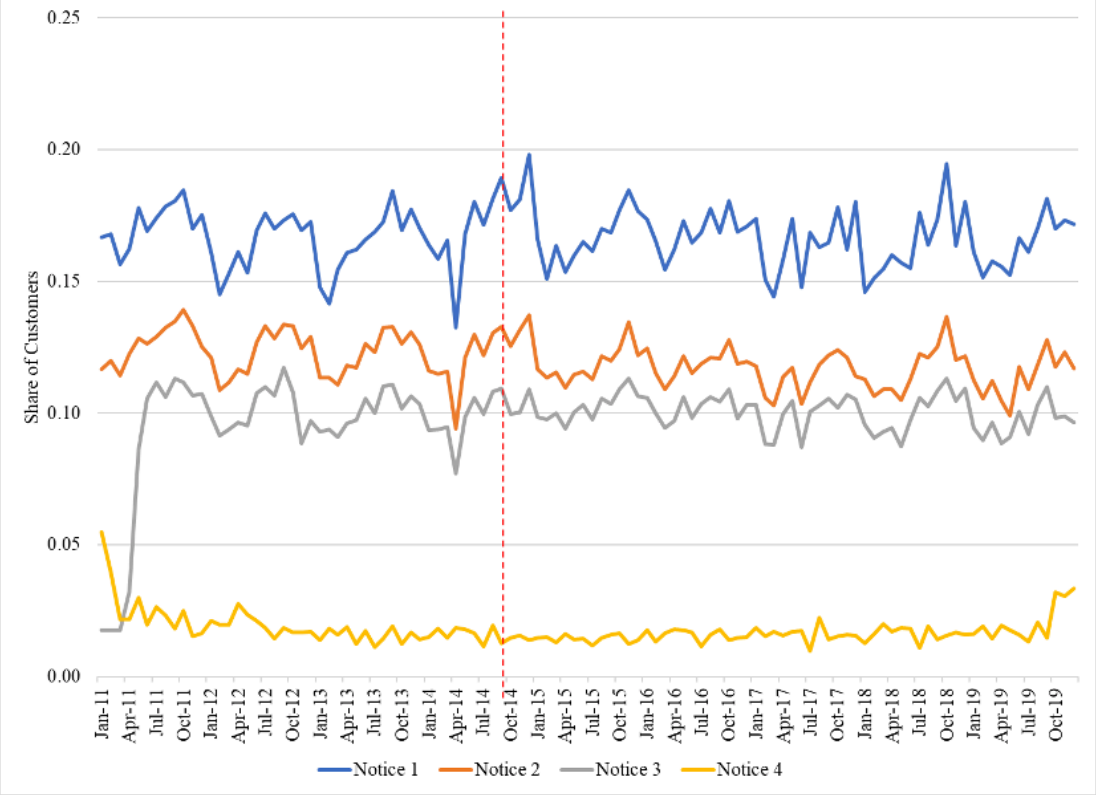


Figure 2.1. Share of customers with delinquent bills (January 2011–December 2019)

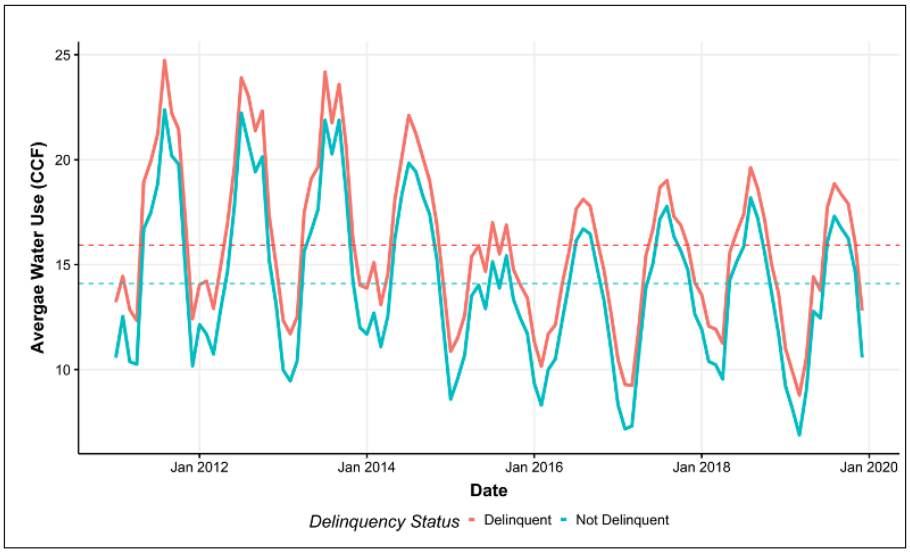


Figure 2.2. Average monthly water use (CCF/month) by delinquency status from 2011 through 2019
Notes: Dotted lines indicate the average water use by delinquent and not delinquent accounts that are equal to 14.10 and 15.93 ccf, respectively.

2.3 Results

2.3.1 Graphical Analysis

Using graphical analysis, we investigated the characteristics and share of delinquent accounts for two groups of customers: (i) Customers with no delinquent accounts, and (ii) customers who have delinquent accounts and receive any notice (1, 2, 3, or 4). Figure 2.2 presents average water consumption (CCF per month) by delinquency status defined above. This figure presents a visually distinct difference in average water use among customers who are delinquent in paying their bills relative to those who are not delinquent. Our analysis of water use differences among these groups indicates that, on average, water use in non-delinquent accounts (14.10 CCF) is about 2 CCF lower than those with delinquent accounts (15.93 CCF).

Next, we divided the customers into three groups (terciles) based on the water use in 2011. The terciles thresholds are 0–12 CCF as tercile one, 12–18 CCF as tercile two, and more than 18 CCF as tercile three. Approximately 13,300 households are in each of these three groups. Figure 2.3 presents the share of accounts in each of these water-use terciles with delinquent status (i.e., received any notice). As indicated in this figure, at any point from 2011 through 2019 we saw that a larger share of the accounts that belong to the highest water use tercile (tercile three) were delinquent relative to those in lower water use terciles. For the highest water users, 23.47% of accounts were delinquent on average. The share of delinquent accounts was lower for water users in tercile two, while those in the lowest water use tercile had the lowest delinquency rates on average. Specifically, 18.51% of households in the second water use tercile

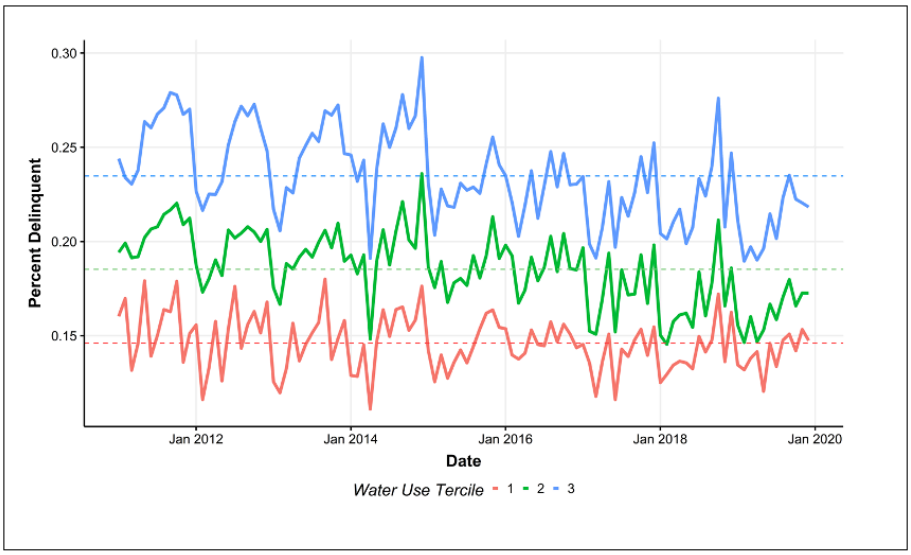


Figure 2.3. Percent of the accounts delinquent by baseline (2011) water use terciles from 2011 through 2019
Notes: Dotted lines indicate the average share of delinquent accounts by water use terciles one, two, and three, equal to 15, 19, and 24%, respectively.

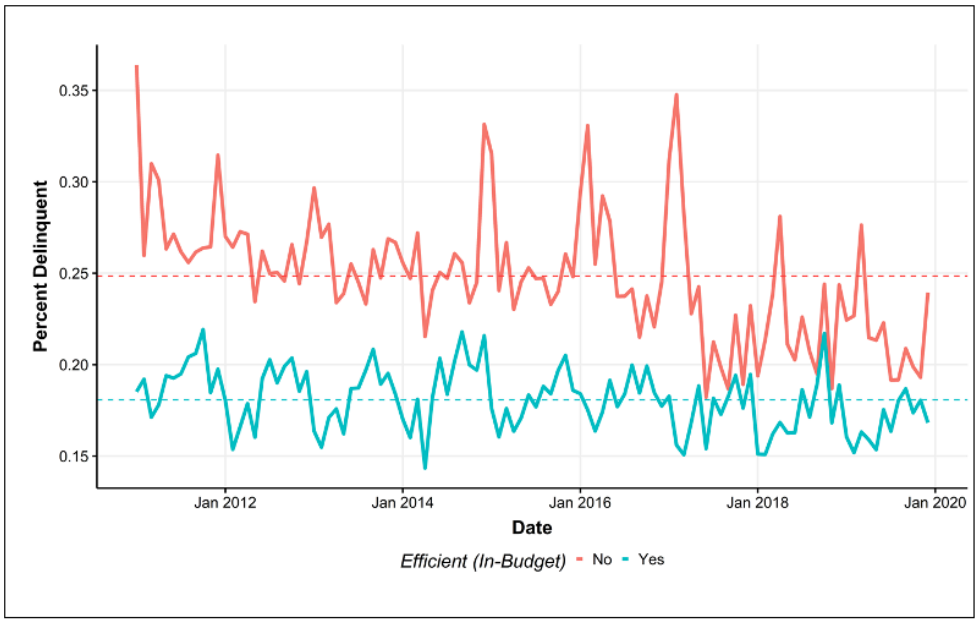


Figure 2.4. Percent of the accounts delinquent from 2011 through 2019 by efficiency (in-budget) status
Notes: Dotted lines indicate the average share of delinquent accounts by water use efficiency status, equal to 25 and 18%, respectively.

have delinquent accounts, on average, while for the lowest water use tercile, delinquency drops to 14.62%. Consequently, delinquency, on average, is positively correlated with water use.

We also explored bill delinquency by water use efficiency level. As indicated before, the EVMWD has a budget-based rate structure. For this analysis, we labeled each customer and every month in the study period as efficient (or in-budget) if their water use did not go beyond tiers 1 and 2; we labeled customers in tier 3 and above as not efficient. On average, 84% of the customers were efficient during the study period. In 2015 and 2016, this number was around 90%, which was the highest percentage of customers "in budget" during the study period. As indicated in Figure 2.4, on average, customers with water use beyond tiers one and two also had a larger share of delinquent accounts. On average, 24.85% of inefficient customers had delinquent bills, and only 18.08% of efficient customers had delinquent bills.

Furthermore, we compared rebate participation and delinquency status over time of households in the EVMWD service area. The EVMWD presented customers with multiple indoor (e.g., washing machines, dishwashers, showerheads, etc.) and outdoor (e.g., turf replacement,

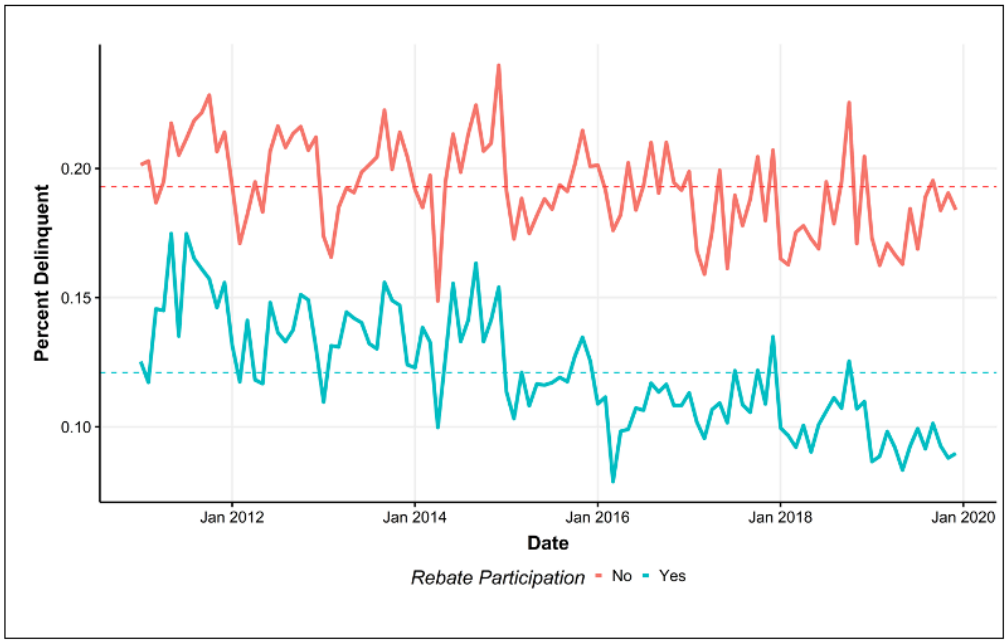


Figure 2.5. Percentage of the accounts delinquent by rebate program participation status (2011–19)
Note: Dotted lines indicate average share of delinquent accounts by rebate participation status, which are equal to 12% for those participated in the rebate programs and 19% for those that did not participate.

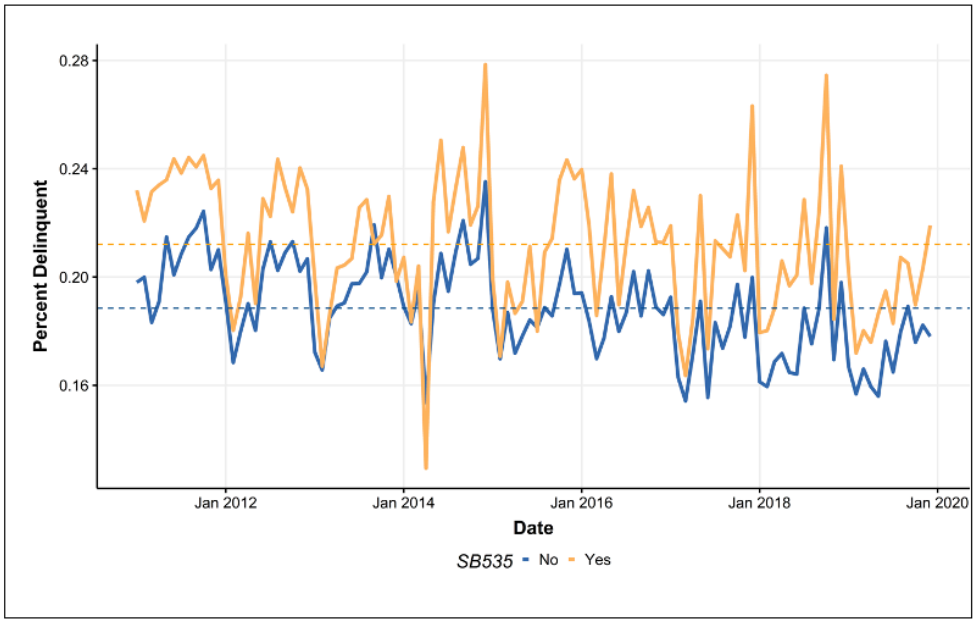


Figure 2.6. Percentage of the accounts delinquent from 2011 through 2019 by SB535 disadvantaged community designation status
Notes: Dotted lines indicate the average share of delinquent accounts for those in disadvantaged versus those in not-disadvantaged communities, which are equal to 21 and 19%, respectively.

weather-based irrigation controllers, etc.) rebate programs. Nearly 4,450 single-family customers participated in these programs during the study period. For this analysis, starting in 2011 we defined two groups: households that participated in one or more rebate programs on or before the current year were designated as one, and households that did not participate in a rebate program on or before current year was designated as zero. We compared the share of households with delinquent accounts in each group. As illustrated in Figure 2.5, on average, 19.29% of accounts that did not participate in rebate programs received delinquent notices. In contrast, only 12.10% of those who participated in a rebate program during the study period received delinquent notices. This graphic illustrates that rebate participation "may" have contributed to reducing delinquency rates.

Next, we explored the share of delinquent accounts in disadvantaged communities (census blocks) defined by SB 535 CalEnviroScreen[37] compared to households in block groups not labeled as disadvantaged communities. Figure 2.6 plots the share of households with delinquent accounts in disadvantaged block groups and those not in disadvantaged block groups. As indicated, a larger share of accounts in disadvantaged block groups is delinquent compared to accounts not in disadvantaged block groups. On average, 21.21% of accounts in disadvantaged communities had delinquent bills relative to 18.84% of the accounts that were not in the disadvantaged communities.

2.3.2 Bill Delinquency and Household Characteristics

The above analysis shows that delinquency is strongly correlated with water use, efficiency of water use, income, and participation in water conservation programs. We find that those households that do not receive delinquent notices use, on average, two fewer CCFs of water relative to those households that receive delinquent notices. The share of delinquent accounts for the highest water users, as defined by the upper tercile of water use, of slightly over 23% was nearly 9% greater than the share of delinquent accounts for the lowest (tercile) water users. In terms of efficiency of water use, the delinquency share of those households that were listed as "inefficient" (above their tier 1 and 2 budget) was nearly 25%, which dropped to around 18% for those households that remained within budget. One possible way to help customers remain in their budget is for them to participate in district water conservation programs. We find that customers who participate in the water conservation programs have delinquency rates nearly 9% lower (at 11.2%) than customers who do not participate in such programs. Finally, our results suggest that income has a strong correlation with delinquency rates. Over 21% of the households who are within census blocks designated as a disadvantaged community were delinquent, up from the nearly 19% of households in census blocks not listed as a disadvantaged community.

[37] See here for more details https://oehha.ca.gov/calenviroscreen/sb535

Table 2.2. Summary statistics by bill delinquency status

	Number of Notices Received:				
	None	One	Two	Three	Four
Demographics					
Median income ($1,000)	71.32	70.89	70.42	68.37	69.34
Median rent as percentage of income	34.07	34.30	34.71	34.70	34.44
Median home value ($1,000)	285.31	280.31	274.96	269.64	271.95
Percent renter occupied	27.68	28.66	28.38	29.56	30.64
Percent unemployed	12.19	12.41	12.83	12.86	12.78
Percent w/public assistance income	3.37	3.55	3.43	3.68	3.80
Percentage w/bachelor's degree or higher	20.00	19.22	19.07	18.38	18.00
Percent white	67.68	66.11	66.31	65.28	64.45
Percentage income below poverty level	10.79	11.23	11.09	11.76	12.42
Median age	35.57	34.32	33.91	33.74	33.73
Median household size (Census)	3.42	3.48	3.47	3.50	3.50
Mean household size (EVMWD)	4.19	4.39	4.39	4.51	4.45
Median number of rooms	6.26	6.23	6.23	6.16	6.09
Water Use, Bill, Rebates					
Water use (CCF/month)	13.72	15.43	15.53	15.87	15.47
Total allocated budget (CCF)	23.18	23.66	23.15	23.87	24.25
Indoor allocated budget (CCF)	9.69	10.15	10.29	10.47	10.30
Average monthly sewer bill ($)	35.91	37.74	37.24	37.71	36.91
Average monthly water bill ($)	60.21	65.84	64.65	66.07	67.05
Percentage participated in rebate programs	8.93	6.07	5.43	4.17	2.50
Percentage participated in outdoor rebate programs	3.38	1.98	1.73	1.30	0.83
Irrigated area (SQF)	2,624	2,468	2,451	2,289	2,116
Months with EVMWD	107	104	105	104	96
Percent efficient	85.20	81.82	80.48	80.86	81.54
Water Expenditure Ratios (Water & sewer)					
Basic needs	1.18	1.23	1.19	1.27	1.24
Efficient	1.67	1.80	1.74	1.87	1.81
indoor	1.44	1.53	1.49	1.60	1.55
Winter use	1.62	1.75	1.72	1.84	1.79
Actual monthly use	1.77	1.92	1.89	2.01	1.96
Payment Methods					
Mailed in	19.61	11.96	11.11	6.33	4.56
In person	5.35	11.85	16.41	21.17	22.47
Phone	5.14	16.38	20.39	29.07	27.97
Rapid pay	19.82	17.06	16.57	6.32	7.96
Website	25.23	41.47	34.54	36.41	35.78
Autopay	24.85	1.29	0.99	0.70	1.26

2.4 Discussion

Our analysis shows that both water affordability and delinquency are influenced by socioeconomic factors, such as income and water use. Those households in census blocks with lower incomes, or designated as a disadvantaged community, have higher water expenditure ratios and higher rates of delinquency. Similarly, and not surprisingly, we find that those households that are rated "inefficient" in their water usage have higher WERs and delinquency ratios. While water expenditure ratios, which we use as a measure of affordability, have increased only slightly over the period of analysis from 2011 through 2019, they are significantly lower than the affordability threshold metrics identified by the EPA.

Alternatively, the delinquency rates in the district have been quiet stable over the nine-year period analyzed, at approximately 17%. From a policy perspective, our results suggest households that remain within their water budget (tier 1 and tier 2) and participate in the water conservation programs offered by the district experience lower rates of delinquency. Developing strategies to help or incentivize households to reduce water use and/or remain in budget, perhaps through increased and more targeted outreach campaigns, may reduce delinquency within the district. Additionally, we found a negative relationship between delinquency and automated payments, which is another possible mechanism the district can consider to reduce delinquency. These measures—helping households reduce water use, remain under their water budget, and participate in more automated payment mechanisms—are strategies that can help reduce delinquency rates in disadvantaged communities that have higher delinquency rates than communities that are not listed as disadvantaged while also perhaps making water use more affordable.

REFERENCES

California Department of Water Resources, and State Water Resources Control Board. 2018. Making water conservation a alifornia way of life. https://water.ca.gov/LegacyFiles/wateruseefficiency/conservation/docs/20170407_EO_B-37-16_Final_Report.pdf.

Gleick, Peter H. 1996. "Basic water requirements for human activities: meeting basic needs." *Water international* 21 (2):83-92.

Kane, Joseph W. 2018. "Water affordability is not just a local challenge, but a federal one too." https://www.brookings.edu/blog/the-avenue/2018/01/25/water-affordability-is-not-just-a-local-challenge-but-a-federal-one-too/.

Lee, Juhee, Mehdi Nemati, and Ariel Dinar. 2021. "How has residential per capita water consumption in California changed between 1994–2019?" *ARE Update* 24 (5):5-8.

Lee, Juhee, Mehdi Nemati, and Ariel Dinar. 2022. "Historical trends of residential water use in California: effects of droughts and conservation policies." *Applied Economic Perspectives and Policy* 44 (1):511-530.

Mack, Elizabeth A, and Sarah Wrase. 2017. "A burgeoning crisis? A nationwide assessment of the geography of water affordability in the United States." *PloS one* 12 (1):e0169488.

Teodoro, Manuel P. 2018. "Measuring household affordability for water and sewer utilities." *Journal-American Water Works Association* 110 (1):13-24.

Zhou, Shuang Lin, Thomas Aquinas McMahon, Allan Walton, and Jane Lewis. 2000. "Forecasting daily urban water demand: a case study of Melbourne." *Journal of hydrology* 236 (3-4):153-164.

Affordability of Water Services & Determinates of Water Bill Delinquency in EVMWD Service Area

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Water affordability generating increasing attention

Water prices ↑ and income ↓

Discretionary Income=
(disposable) income - water bill
- the cost of other essential needs

Affordable?

- EPA Threshold: 2% & 4.5%
- United Nations: 3% & 5%

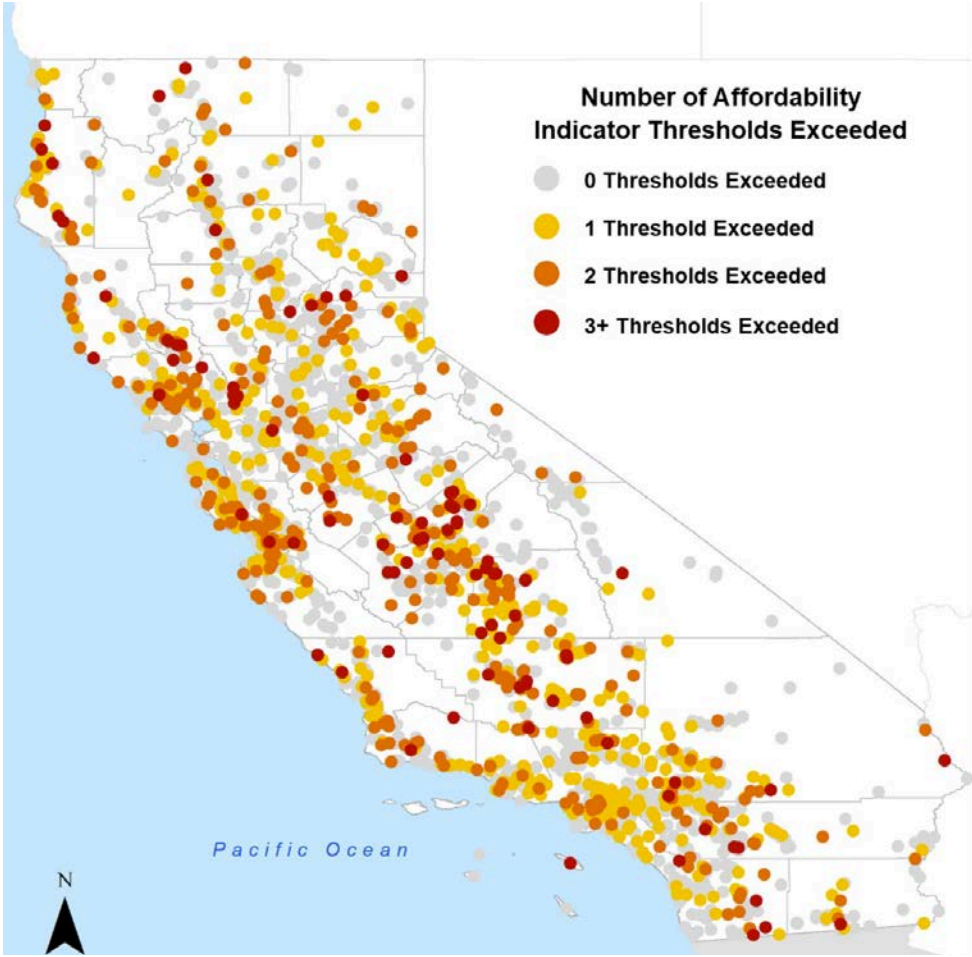

Figure 1. All water systems that exceeded an affordability indicator threshold
Source: SWRCB (2022)

Objectives & Outline

Affordability

- Evaluate how expenditures on water and sewer services within the EVMWD service area compare with the income that its residents have to spend on water and other essential services
- Highlight how “water affordability measures” are influenced by...
  - what sort of water services are being considered
  - what measure of income is being used
- Illustrate how expenditures on water compare to expenditures on other essential needs that households confront

Delinquency

- Identify demographic and socioeconomic factors associated with service disconnections and bill delinquency for single-family residential households.
- Evaluate heterogeneity in service disconnections and bill delinquency by season, water use quintiles, and disadvantaged community status
- Identify the role of agency conservation/affordability measures on bill delinquency.

Water Expenditure Ratio (WER)

Basic Metric: For a particular household "*i*," we want to estimate the amount of money they spend on *water services* relative to the amount of money they have to spend overall:

$$Water\ Expenditure\ Ratio\ (WER)_i = \frac{Household_i\ Expenditures\ on\ Water\ Services}{Household_i\ Income}$$

Two Questions Arise:

1. What sort of water services do we want to consider?
2. What sort of income do we want to use…and what can we reasonably measure?

Question 1: What type of water services do we want to consider (i.e., what goes in the numerator)?

Basic Needs

- 35.66 gpcd (Nemati & Schwabe, 2022; Mack and Wrase, 2017; Gleick 1996)
- Close to the 6 CCF per household (for the household of 4) specified in OEHHA

Indoor Use

a) Efficient water use: 55 gpcd (SWRCB, 2018; ACWA, 2018).
b) Winter-time water use (often a proxy)

Full Budget

- Efficient indoor and outdoor

Overall Use

- What we observe households using (choosing to use) using the billing system data

- ❖ Multiply the above by relevant water prices to get water expenditures and add any fixed fees and surcharges
- ❖ Include sewer service charges

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Question 2: What type of income do we want to use and can measure (i.e., what goes in the denominator)?

Issue 1: Difficult to get individual household level income data

Solution 1: Use the Median Household Income (MHI) within the "area."
- Often use state, county, or city-wide MHI

Issue 2: MHI can vary significantly within an area depending on the size of the area

Solution 2: Define MHI by a smaller geographic area that better "summarizes" income for a household in a particular area
- Define by a US Census Block Group => better represents income

Issue 3: What about low-income households? Does MHI at Census Block Group represent their challenges?

Solution 3: Use 20 Percentile Income Level by Block Group (Teodoro, 2018)

MHI in the EVMWD service area

- EVMWD serves more than 40,000 SFR households with significant variation in income across these households.
- The MHI associated with the Census block groups in which these households reside ranged from $29,070 to $165,481 in 2019.
- As the figure highlights, significant heterogeneity occurs in incomes within EVMWD.

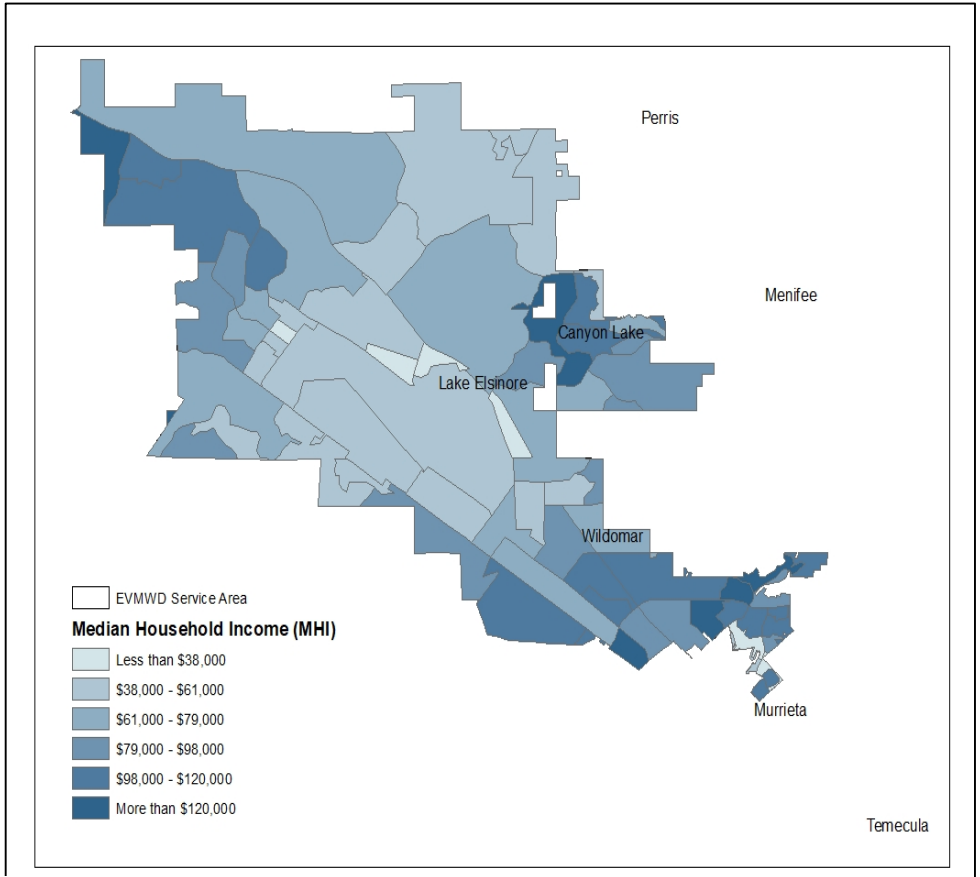


Figure 1. Inflation-adjusted MHI distribution in the EVMWD service area (2019) by census block group level
Source: Schwabe and Nemati (2022)

Data

- Clean the EVMWD data and keep only SFR from 2011 through 2020 [about 5M “monthly” observations]
- Merged EVMWD SFR household accounts with their respective Census Block Group data from 2011 through 2020 – brings in SES and Demographic data (e.g., MHI)
- Calculated: total bill and water use
- Calculated: affordability measures [***basic needs***, ***indoor budget***, ***winter***, ***efficient***, ***total***, ***full budget***] at the median income and 20% percentile of the median income (2011 to 2020)
- Identify each household whose “measure” > EPA threshold
- Merged above-cleaned data with bill delinquency data, payment channel data, rebate participation data

What's happened to water costs in EVMWD?

Table 1.1. Average monthly bill ($) in the EVMWD service area for water and sewer services[9]

Bill Year	Basic Needs Water Cost[10]	Indoor Budget Cost[11]	Within Budget Cost[12]	Sewer Cost	Overall Water Use Cost[13]	Average Water Use (CCF)[14]	Percent in Budget[15]	Inflation Rate
2011	$25.86	$34.81	$72.67	$41.79	$99.74	16.17	78.30	-
2012	$25.67	$34.76	$70.14	$41.03	$99.92	16.72	75.60	2.04
2013	$25.95	$35.08	$73.02	$40.45	$99.67	16.38	76.77	1.10
2014	$26.73	$36.44	$74.23	$40.55	$100.76	16.06	77.46	1.39
2015	$28.51	$37.29	$76.37	$40.45	$92.11	13.11	87.48	0.95
2016	$32.19	$40.33	$79.90	$40.13	$94.76	13.10	87.84	1.99
2017	$32.32	$40.10	$80.39	$39.19	$95.34	13.47	86.00	3.00
2018	$33.52	$41.28	$78.08	$40.20	$99.07	13.98	83.62	4.20
2019	$34.06	$40.27	$77.86	$40.68	$97.06	12.91	85.87	3.51
2020	$34.84	$41.06	$79.32	$39.69	$100.65	13.95	82.51	1.92
Average Annual Growth	$1.20 (4.02%)	$0.85 (2.24%)	$0.98 (1.30%)	-$0.16 (-0.40%)	-$0.17 (-0.18%)	-0.40 (-2.70%)	5.22 (3.04%)	2.23 (2.23)

Notes: 2011$ (CPI/BLS), Basic Needs is equal to 35.66 gpcd, "overall" does not include sewer costs.

Table 1.2. Water expenditure ratio for different types of water services from 2011 to 2020 in EVMWD[19]

Year	Total Number of Households[20]	Basic Needs Water & Sewer	Indoor Water & Sewer	Average Winter Water & Sewer	Full Budget Water & Sewer	Overall Water & Sewer
2011	29,869	1.21 (0.43)	1.37 (0.46)	1.52 (0.61)	1.95 (0.75)	1.75 (0.81)
2012	30,271	1.24 (0.39)	1.40 (0.41)	1.63 (0.59)	1.97 (0.67)	1.82 (0.80)
2013	31,051	1.23 (0.46)	1.38 (0.50)	1.53 (0.61)	1.97 (0.82)	1.79 (0.85)
2014	31,604	1.26 (0.49)	1.40 (0.50)	1.70 (0.73)	2.00 (0.81)	1.82 (0.85)
2015	32,180	1.28 (0.47)	1.42 (0.47)	1.58 (0.62)	2.01 (0.75)	1.67 (0.70)
2016	32,796	1.37 (0.50)	1.50 (0.51)	1.63 (0.61)	2.12 (0.81)	1.76 (0.72)
2017	33,544	1.35 (0.53)	1.50 (0.54)	1.62 (0.65)	2.11 (0.85)	1.75 (0.80)
2018	34,110	1.37 (0.55)	1.49 (0.54)	1.73 (0.71)	2.05 (0.83)	1.80 (0.81)
2019	34,326	1.38 (0.57)	1.47 (0.58)	1.64 (0.71)	2.04 (0.86)	1.75 (0.81)
2020	37,701	1.40 (0.58)	1.50 (0.59)	1.72 (0.74)	2.11 (0.89)	1.84 (0.86)

*Numbers in parentheses indicate the standard deviations. The median income is measured by US Census American Community Survey at the block group level.

How do water expenditures trend over time for SFR households in the 20th percentile of income?

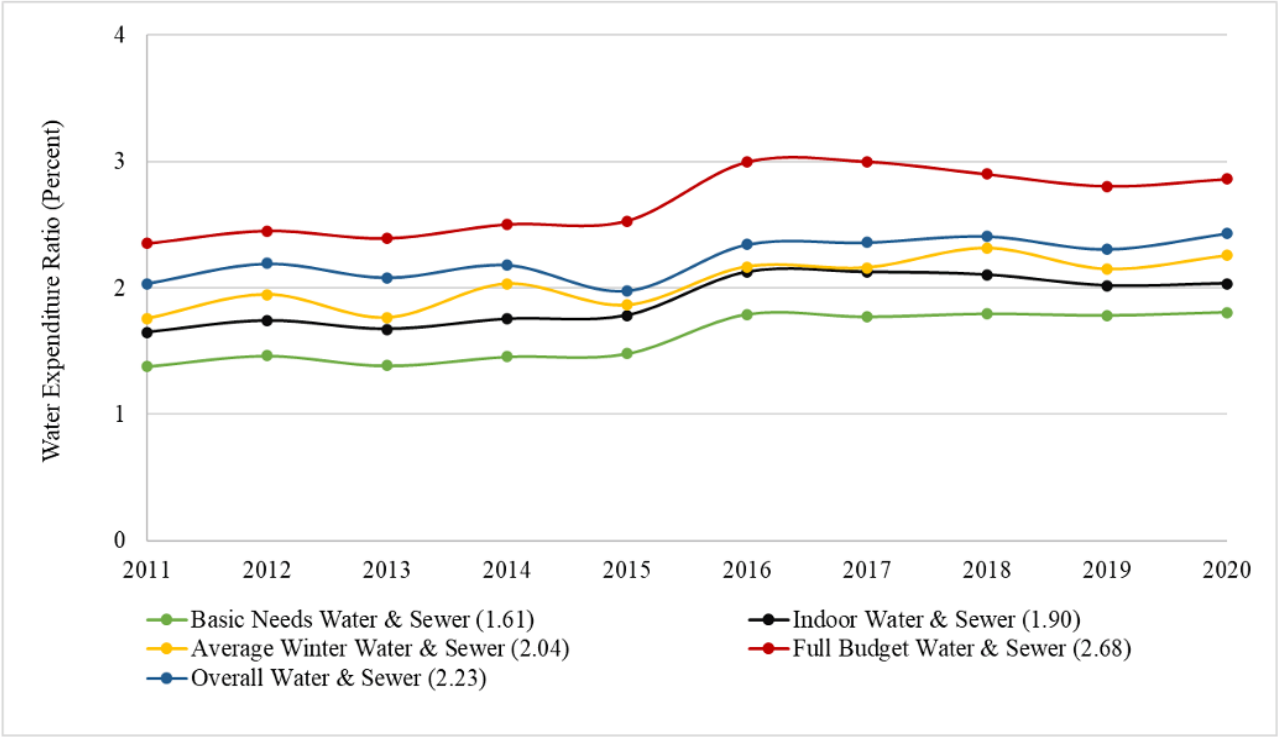
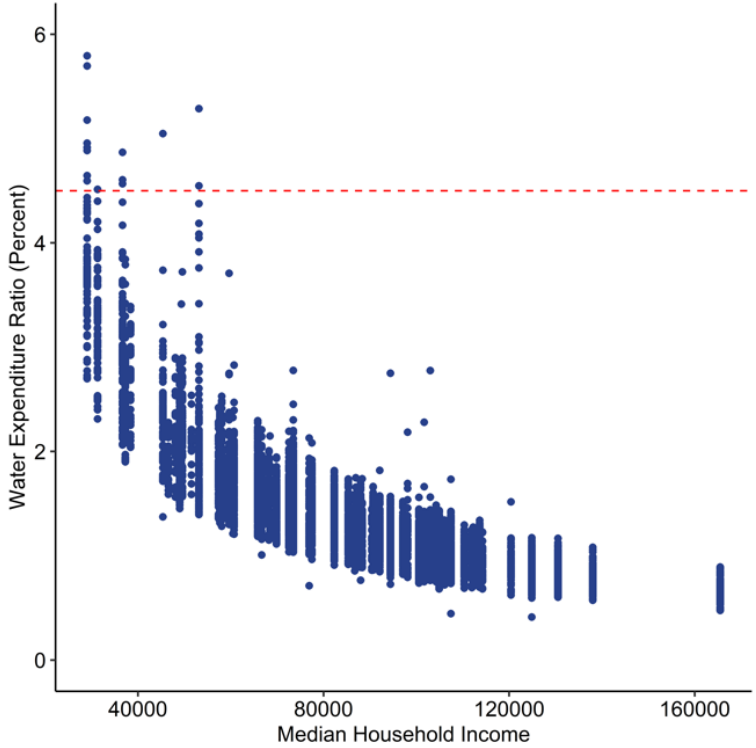
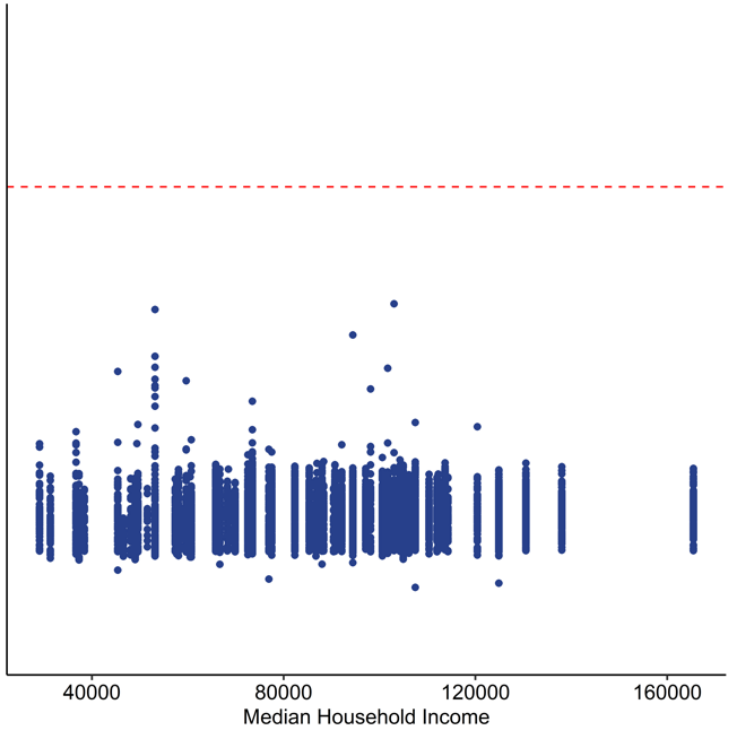


Figure 1.2. Comparing annual water expenditure ratio for the 20th percentile income over the study period (2011–2020)[21]

Basic Needs Measure (2019)

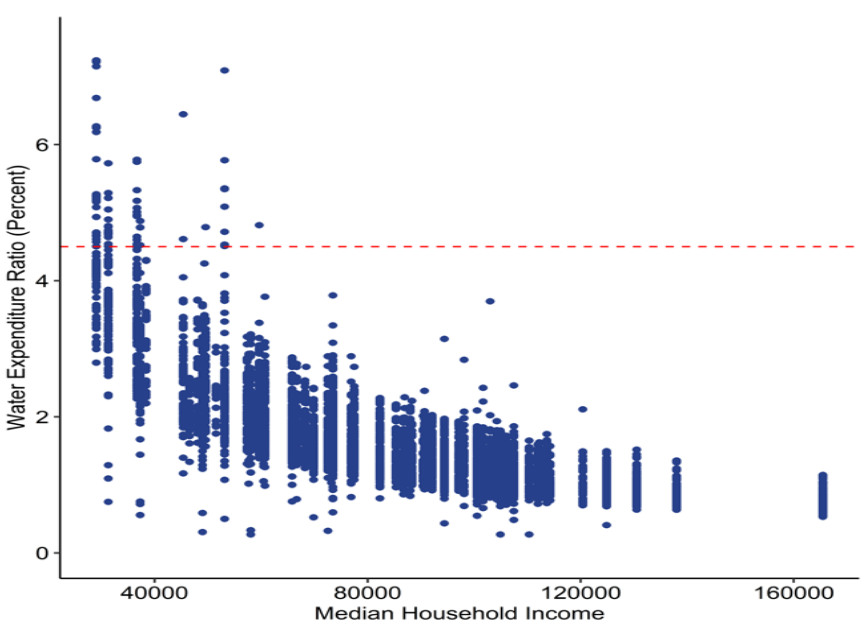


(a) Block group level MHI

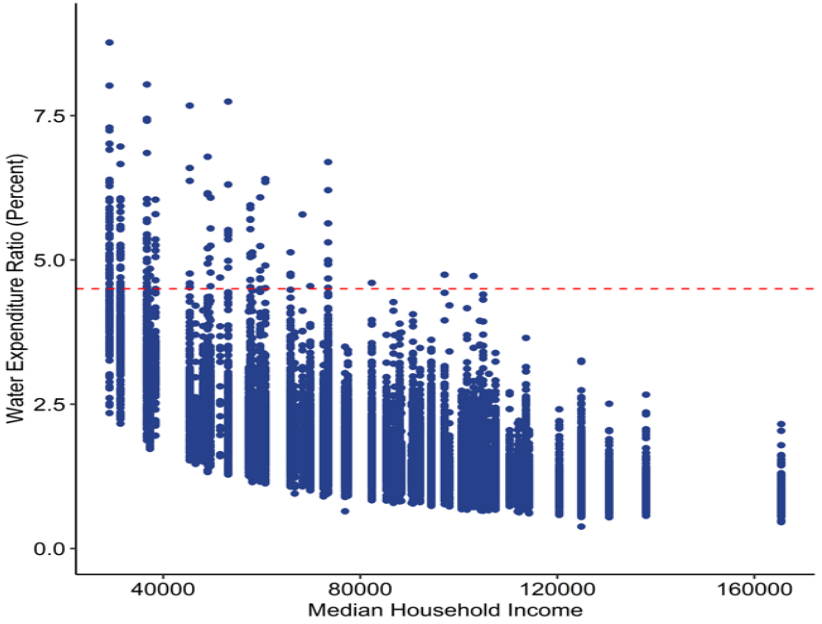


(b) District level MHI

Alternative Indoor Measures (2019)



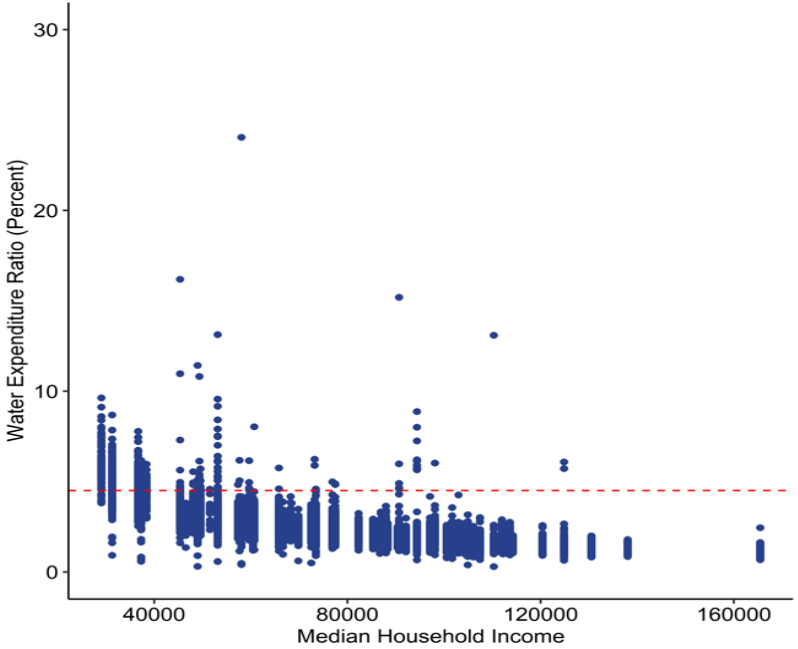
(a) 55 gpcd, block group level



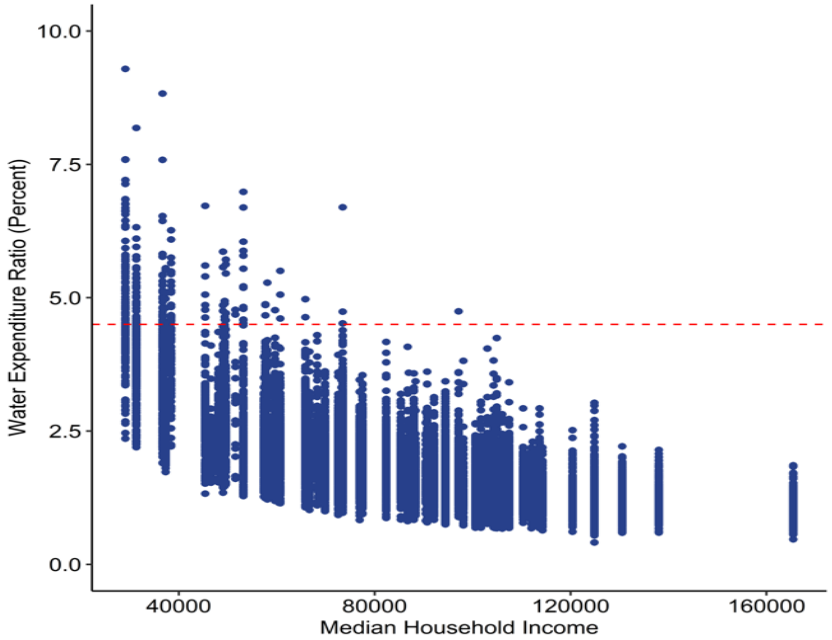
(b) Winter, block group level

- At 55 GPCD, only 74 households are associated with a WER above the EPA threshold of 4.5%.
- Using wintertime water use only 176 households in the EVMWD service area have WER above the EPA threshold

Alternative Overall Measures (2019)



(a) Full budget, block group level



(b) Overall, block group level

- **Budget-Based**: Simulated full budget use, only 657 households have WER above 4.5%.
- **Overall:** only 208 households (about 0.5% of the households) have WER exceeding the EPA threshold.

Household characteristics by WER for indoor and overall?

- Question: Are there are systematic factors that are strongly correlated ("signal") whether households may be susceptible to water affordability issues

  Can be useful in developing targeted strategies to address such issues

- Findings:

(1) less efficient and higher water use are correlated with households above the EPA's 4.5% threshold are, although causation is not proven

(2) Households above the EPA's 4.5% threshold live in block groups represented by:

  - Lower median household income
  - Lower education
  - Lower median home value
  - Lower median gross rent
  - Higher percentage with income below poverty level
  - Higher unemployment rate
  - Higher percentage of renter-occupied,
  - Higher median rent as a percentage of household income.

- Implications: Perhaps substantial…as housing expenditures rise relative to income, households have less disposable income to spend on other essential services.

How do water expenditures in EMWD compare with expenditures on other essential services in the region?

Table 1.4. Comparing essential needs cost as a percentage of income before taxes[34]

Panel (A): Los Angeles Metropolitan Statistical Area (MSA)

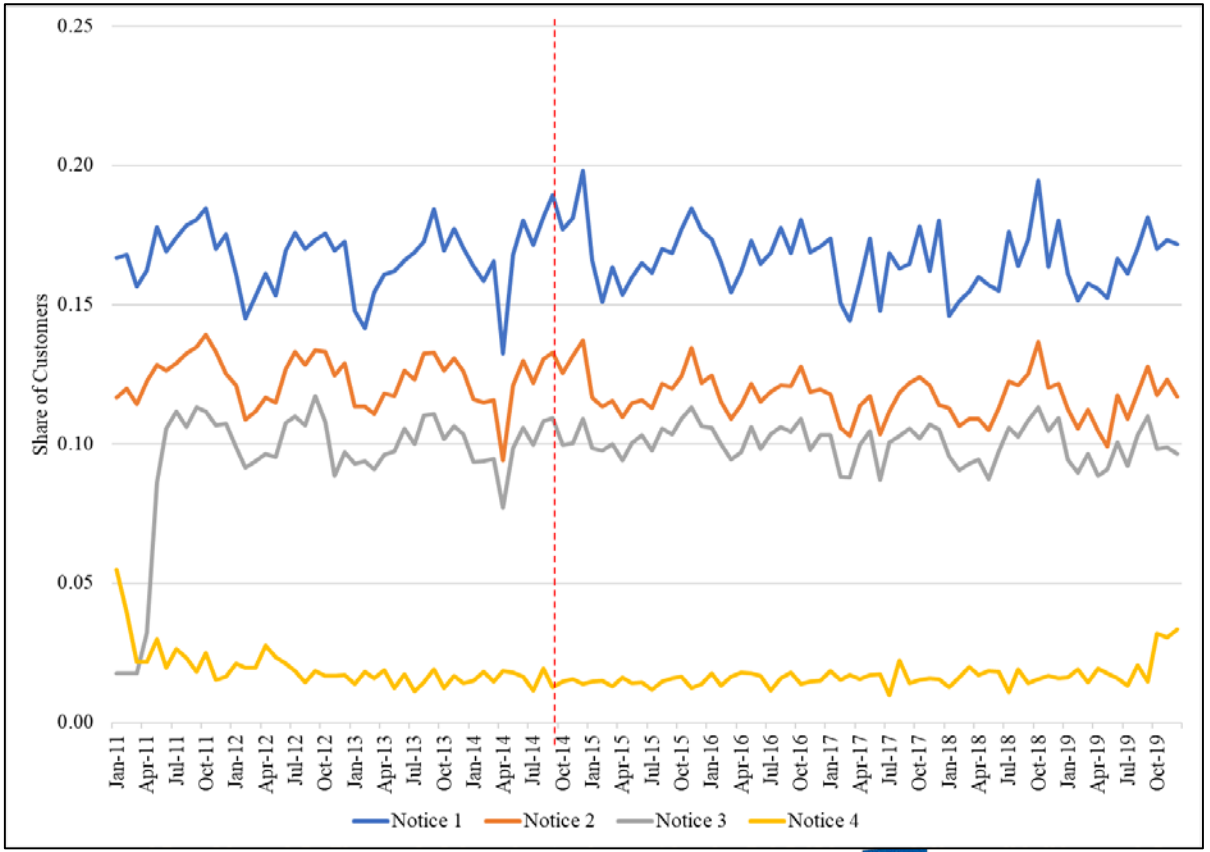
Year	Food	Housing	Transportation	Health care	Education	Entertainment
2011	10.33	29.55	12.70	3.58	2.01	3.39
2012	10.79	29.98	12.70	3.89	2.11	3.44
2013	10.59	30.12	12.13	4.03	2.25	3.53
2014	10.53	31.11	12.03	4.60	2.32	3.51
2015	10.00	30.20	12.20	5.00	2.19	3.35
2016	10.37	30.36	13.13	4.96	2.03	3.46
2017	11.41	31.82	12.74	5.17	2.65	3.61
2018	13.17	35.71	13.61	5.71	3.43	4.19
2019	10.19	27.37	12.17	4.62	2.06	3.22
2020	9.49	27.42	11.43	4.64	1.27	2.89

Panel (B): West Region

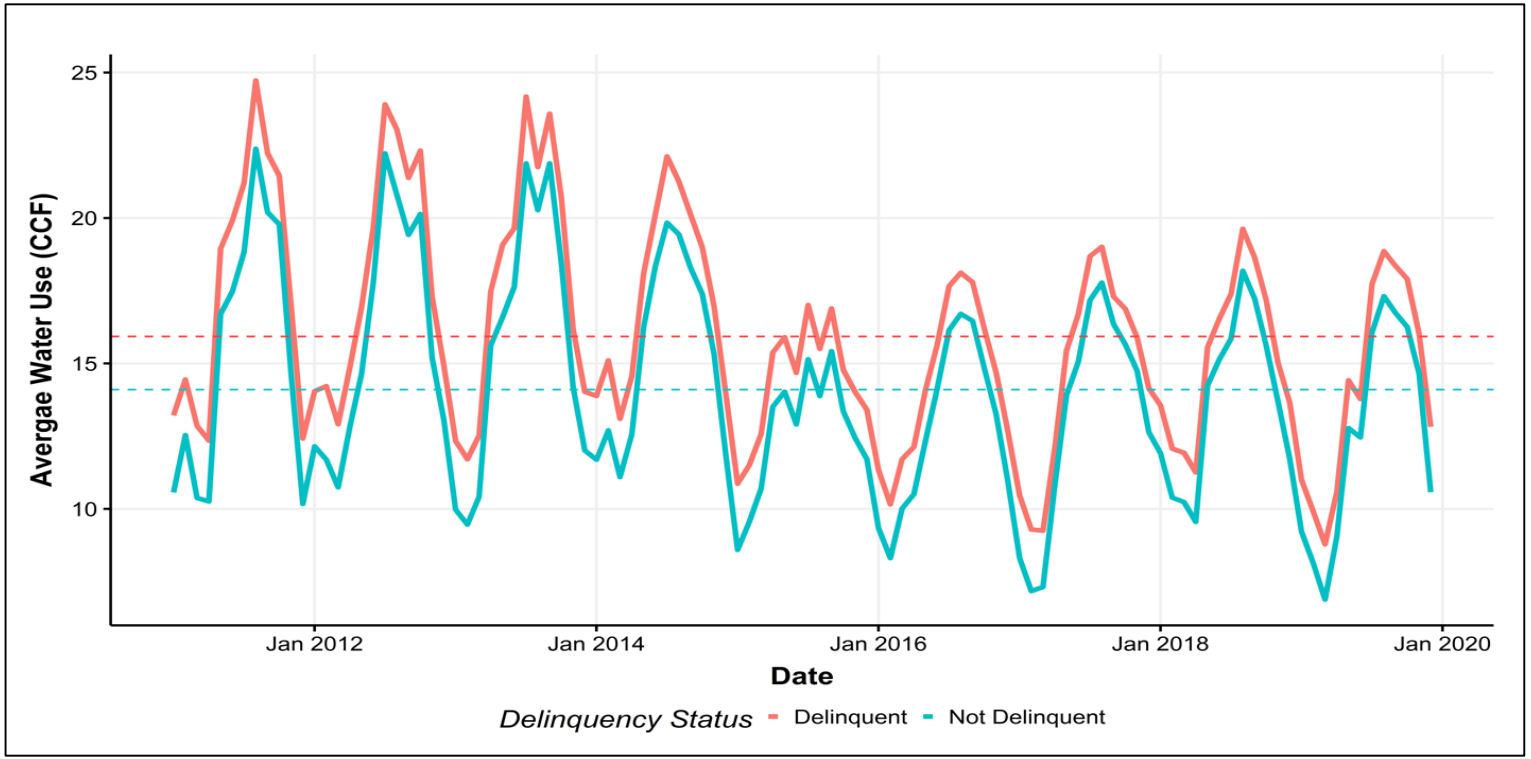
Year	Natural gas	Electricity	Telephone services	Water & other public services
2011	0.58	1.67	1.71	0.91
2012	0.53	1.70	1.75	0.92
2013	0.53	1.76	1.81	0.96
2014	0.54	1.75	1.87	0.97
2015	0.47	1.63	1.79	0.93
2016	0.39	1.47	1.70	0.88
2017	0.40	1.48	1.70	0.90
2018	0.41	1.57	1.73	0.96
2019	0.41	1.5	1.68	0.92
2020	0.41	1.46	1.61	0.92

Delinquent accounts over time (2011-2019)

- ~ 17% of SFR customers (6,627 households) have a *past-due* bill each month and receive the first notice.
- Share *past-due* reduces to 12% (3,999 households), 10% (6,627 households), and 2% (672 households) after the second, third, and last notice, respectively.

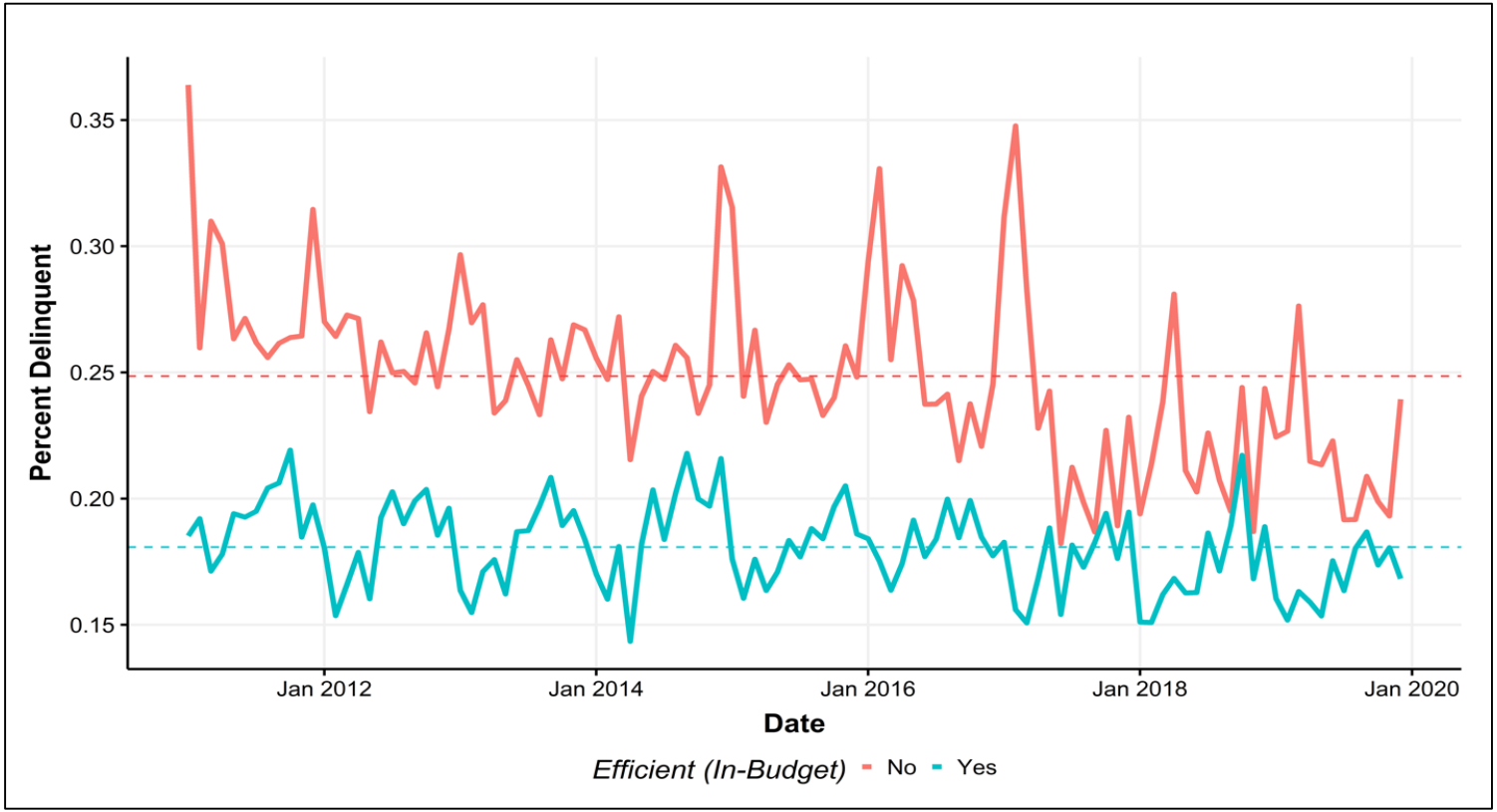


Water use by delinquency status)



Notes: Dotted lines indicate the average water use by delinquent and not delinquent accounts that are equal to 14.10 and 15.93 ccf, respectively.

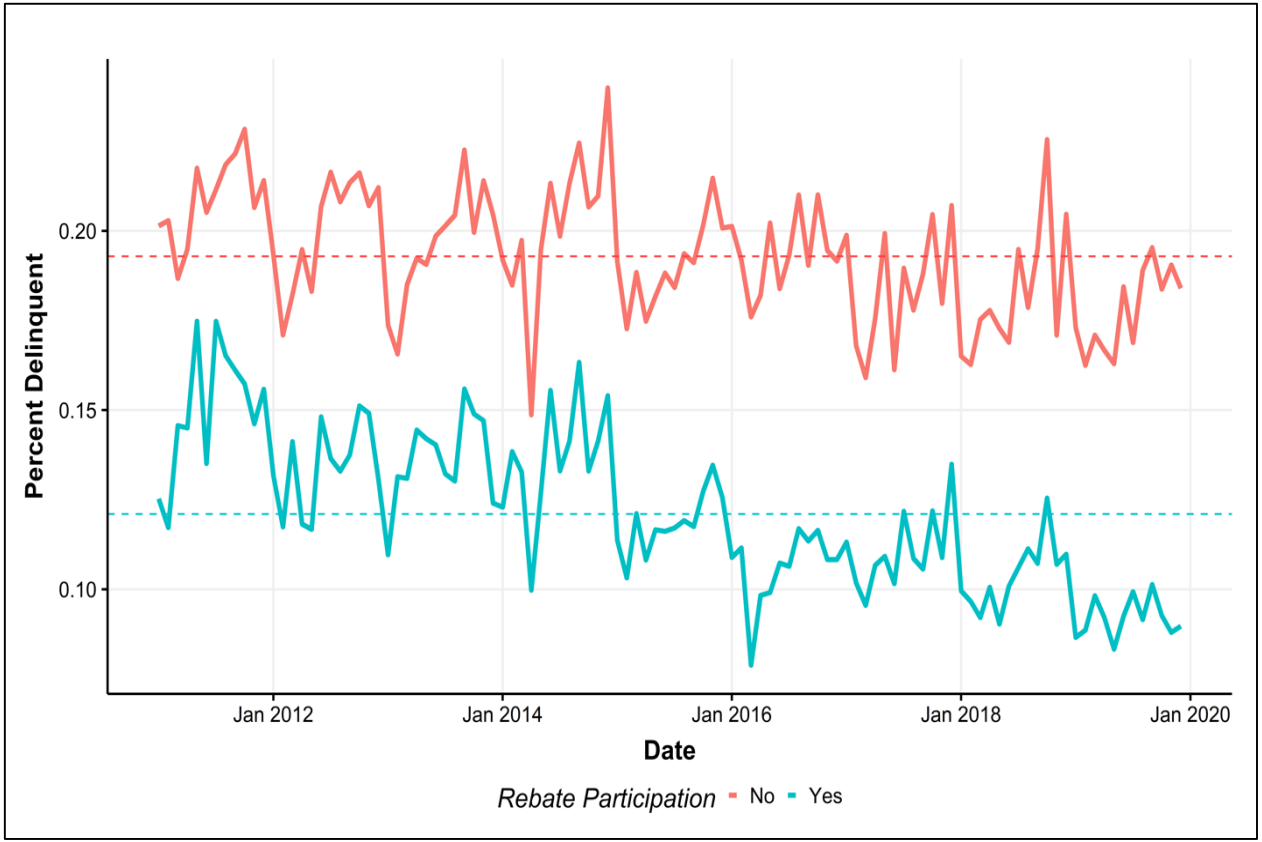
Water use efficiency and bill delinquency



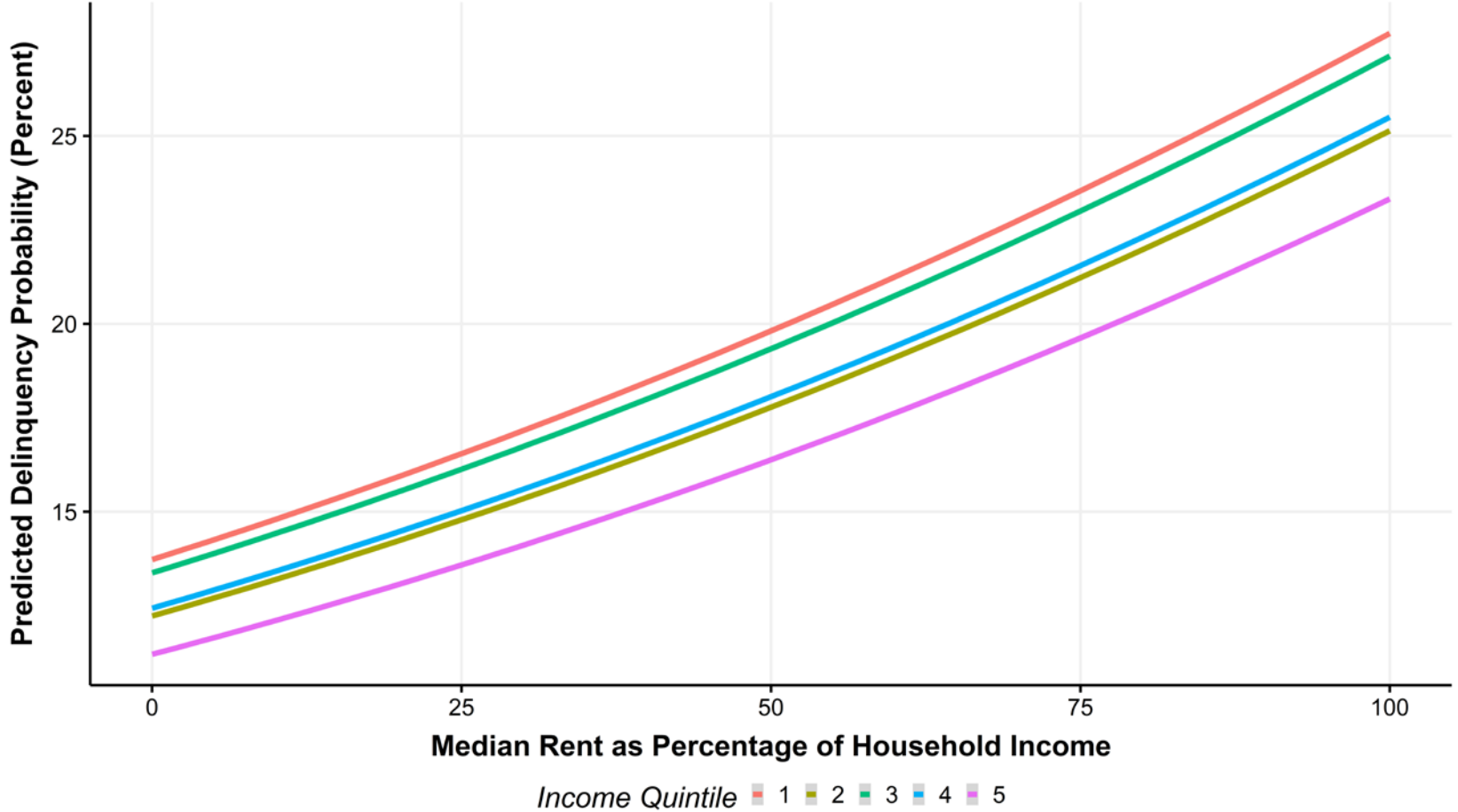
On average, 24.85% of inefficient customers had delinquent bills, and only 18.08% of efficient customers had delinquent bills.

Rebate participation and bill delinquency

- ~ 19.29% of accounts that did not participate in rebate programs received delinquent notices.
- Only ~ 12.10% of those who participated in a rebate program during the study period received delinquent notices.



Income, housing cost, and bill delinquency (simulated)



Household characteristics and bill delinquency

- From 2011 through 2019, approximately 17% of EVMWD single-family residential accounts were delinquent annually, a percentage that has remained relatively stable.
- More efficient and lower water use, participation in district rebate programs, and more automated payment mechanisms are correlated with lower delinquency rates, although causation is not proven.
- Findings suggest that households that do not receive delinquent notices use, on average, two fewer CCFs of water relative to those households that receive delinquent notices.

Take aways & concluding remarks

- **Water expenditure ratios (WERs) have risen, on average, from 2011 to 2020, although not significantly.**
  - Over this period, the basic needs WER rose from 1.21% to 1.40% of median household income (MHI)

- **Water expenditure ratios can be significantly impacted by the choice of income measure and vary inversely with income.**
  - Observe a strong inverse relationship between WER and income.

  Example (2019): Basic Needs WER
  1. Using MHI District Level: 1.38%
  2. Using MHI Block Group: 1.78%
  3. Using 20th Percentile MHI: 1.25%

- **Water expenditure ratios in EVMWD are significantly lower than US EPA Affordability Thresholds for water and sewer services**
  - 16 (74) SFR were above EPA's Thresholds for Basic Needs (Indoor) Water use

Take aways & concluding remarks

- **From 2011 through 2019, approximately 17% of EVMWD single-family residential accounts were delinquent annually, a percentage that has remained relatively stable.**
  - On average, 17% of the customers failed to make payment and received their first notice, a percentage that drops to 12%, 10%, and 2% after receiving their second, third, and fourth delinquency notices.
- **Socioeconomic factors are strongly correlated with delinquency.**
- **More efficient and lower water use, participation in district rebate programs, and more automated payment mechanisms are correlated with lower delinquency rates, although causation is not proven.**

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Elsinore Valley Municipal Water District

STUDY SESSION
DISCUSSION OUTLINE

Date: **October 19, 2022**

Originator: **M. Armstrong- Strategic Programs**

Subject: **REVIEW THE PROPOSED PURCHASE OF LICENSE SUBSCRIPTIONS AND INSTALLATION SERVICES OF NEXGEN ENTERPRISE ASSET MANAGEMENT (EAM) SYSTEM**

STRATEGIC GOAL

Maintain and Upgrade Infrastructure
Maintain and Upgrade Technology

BACKGROUND AND RECOMMENDATION

In March 2019, the Board approved a Professional Services Agreement (PSA) for the development of the first phase of an Asset Management Plan (AMP). The first phase consisted of the completion of four specific tasks which created the initial framework of the District's future AMP. The four specific tasks are as follows:

- Asset Categorization
- Risk Prioritization Plan
- Development of Capital Replacement Budget
- Software Evaluation

The efforts in the first phase were completed and presented to the Board at a Study Session in May 2020. The software evaluation task identified gaps in the configuration of the District's current EAM software which led to inconsistencies of usage in the various departments. These inconsistencies and the system configuration resulted in limitations on data extraction and reporting functions. The District has utilized the current software for many years, and currently, this software is not a product of choice for asset strategy development. Additionally, reconfiguration of the existing software will take the same amount of effort as implementing a new software.

In order to move forward with the next phases of the AMP, it is important that the District has the right EAM tool to house and build on all the asset maintenance information which

will be utilized to develop the next stages of the AMP. The first phase project report also recommended that the District procure a new EAM solution that can integrate with all the other systems currently in use. It was also recommended the new software should be more intuitive and flexible than the existing software. These recommendations will ensure a new software that is more user-friendly, which is of paramount importance for a successful software implementation.

In October 2020, the Board approved a PSA for a consultant to help the District with the evaluation and selection of a new EAM solution. The tasks under this project includes:

- Performing a needs assessment for a new CMMS solution
- Reviewing existing District systems and business practices
- Developing an EAM implementation plan
- Assisting in EAM RFP development and proposal evaluation
- Supporting EAM software demos and contract negotiation

In October 2021, the District posted a Request for Proposal (RFP) for a EAM software and implementation services utilizing PlanetBids. Seven firms responded to the RFP by the deadline. Staff reviewed the proposals based on the following predetermined evaluation criteria: Qualifications/Experience, Project Approach, Scope of Work & Schedule, Cost, and Overall Quality of the Proposal.

Among the seven proposals received, staff selected three firms to demonstrate their software and capabilities: Mentor, Nexgen, and TruPoint. Each of the product demonstrations were scheduled for eight hours. Staff members from Operations, Strategic Programs, Information Technology, Finance, Engineering, and Water Resources participated in the demonstrations, which also allows staff to ask questions related to the software capabilities. Each participating staff weighed in on the final evaluation and the vast majority of the staff concluded that Nexgen has the best and most user-friendly software.

The EAM software license agreement includes the subscription of software licenses with renewals and support for five years, effective after implementation of the software is completed. The PSA includes implementation services, staff training, and post “go-live” support. The project duration will be approximately 18 months, with a go live date in the summer of 2024. During this time, staff will work with Nexgen to add all sites, assets, condition ratings, preventative maintenance intervals, staff, equipment, and materials costs information, and preferred workflow settings to the software. Additionally, some data will be migrated from the existing CMMS system to preserve valuable asset history.

Next steps of the AMP will be the selection and implementation of a Decision Support System (DSS). Nexgen has this functionality, however, staff will evaluate others to ensure that it has the most robust system on the market. The DSS will utilize the maintenance, labor and material cost, and asset condition data housed in the Nexgen

EAM system to compile long term asset maintenance and replacement strategies. After three to five years of consistent capturing of data in the EAM system, the DSS will be able to provide a projected long-term Operations and Maintenance and Capital Replacement budget, and the benefits of the asset management strategy will begin to be realized.

The cost of the software implementation services is $856,592. This item, including overhead of $4,283, staff time (2,325 hours), and fringe benefit of $257,373 totals $1,118,248.

The Software License Subscription is $552,563 for a 5-year period. The first year of subscription dues is payable after the implementation is completed, anticipated to be in the second quarter of calendar year 2024. The cost of the software subscription will be incorporated in FY 2024 and future Operating Budgets.

This item is scheduled for November 10, 2022 meeting for Board consideration.

ENVIRONMENTAL WORK STATUS

Not Applicable

FISCAL IMPACT

Within Budget – Yes. In addition, annual software license subscription fees will be incorporated into future Operations and Maintenance budgets.

Attachments:

Scope of Work

NEXGEN Asset Management Software License Agreement
Elsinore Valley Municipal Water District

This Agreement, effective as of July 7th, 2022, ("Agreement") is between NEXGEN Asset Management ("NEXGEN"), and Elsinore Valley Municipal Water District ("LICENSEE"), a company with an office at 31315 Chaney St, Lake Elsinore, CA 92530.

RECITALS

Whereas, NEXGEN owns certain software programs, referred to collectively as the NEXGEN Asset Management® (NEXGEN AM) products;
Whereas, Licensee desires to use those programs, while protecting the copyrights, trade secrets, confidential information, and other valuable intellectual property contained in the programs.

Now, therefore, NEXGEN and Licensee agree as follows:

1. DEFINITIONS

"Program(s)" means the object code version of the software programs and related documentation provided by NEXGEN to Licensee at any time under terms of this agreement.
"Users" means the number of users (i.e., the number of users using the Program at one time) permitted to use a Program.
“Domains” means the number of individual database setups that can be accessed by a Program.

2. LICENSE GRANT

- License of Program(s). Subject to the terms and conditions of this Agreement NEXGEN grants Licensee a nonexclusive, nontransferable license to use the object code version of the Program(s) during the term of this Agreement.
- Limited Grant. Except as expressly set forth in this Section 2, NEXGEN grants and Licensee receives no right, title or interest in or to the Program(s) or any other deliverables provided by NEXGEN in connection with this Agreement.

3. LICENSE RESTRICTIONS

- No Reverse Engineering. Licensee will not disassemble, decompile, reverse analyze, or reverse engineer the Program(s).
- No Modification. Licensee will not modify the Program(s).
- No Copying. Licensee will not copy the Program(s), in whole or in part.
- No Third Party Use. Licensee will not use the Program(s) in any manner to provide services to any third parties.

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- NEXGEN Property. The Program(s), in whole and in part and all copies thereof, are and will remain the sole and exclusive property of NEXGEN.
- Proprietary Notices. Licensee will not delete or alter any copyright, trademark, and other proprietary rights notices of NEXGEN and its licensors appearing on the Program(s). Licensee agrees to reproduce such notices on all copies it makes of the Program(s).

5. CONFIDENTIAL INFORMATION

- Definition. "Confidential Information" refers to: (i) the Program(s), including, but not limited to their software source code, and any related documentation or technical or design information related to the Program(s); (ii) the business or technical information of NEXGEN, including but not limited to any information relating to NEXGEN's product plans, designs, costs, product prices and names, finances, marketing plans, business opportunities, personnel, research, development or know-how; (iii) any information designated by NEXGEN as "confidential" or "proprietary" or which, under the circumstances taken as a whole, would reasonably be deemed to be confidential; and (iv) the terms and conditions and existence of this Agreement.
- Confidential Information will not include information that: (i) is in or enters the public domain without Licensee's breach of this Agreement; (ii) Licensee receives from a third party without restriction on disclosure and without breach of a nondisclosure obligation; or (iii) Licensee develops independently, which it can prove with clear and convincing written evidence.
- Confidentiality Obligations. Licensee agrees to take all measures reasonably required in order to maintain the confidentiality of all Confidential Information in its possession or control, which will in no event be less than the measures Licensee uses to maintain the confidentiality of its own information of equal importance.
- Injunctive Relief. Licensee acknowledges that NEXGEN is a beneficiary of this Agreement and is specifically a beneficiary of this Section. Licensee further acknowledges that the Confidential Information of NEXGEN includes trade secrets of NEXGEN, the disclosure of which would cause substantial harm to NEXGEN that could not be remedied by the payment of damages alone. Accordingly, Licensee agrees that NEXGEN will be entitled to preliminary and permanent injunctive relief and other equitable relief for any breach of this Section.

6. MAINTENANCE AND SUPPORT

Maintenance or support is provided assuming the LICENSEE pays the annual maintenance and support fees in advance. Any new versions or modules of software provided to Licensee are automatically licensed according to provisions of this Agreement.

7. LIMITATIONS OF LIABILITY

- Licensee agrees that, as material consideration for NEXGEN extending to Licensee the license rights provided herein, in no event will NEXGEN be liable to Licensee or any third party under this Agreement for any Direct, Indirect, Special, Incidental, or Consequential Damages, whether based on breach of contract, tort (including

negligence), product liability, or otherwise, and whether or not NEXGEN has been advised of the possibility of such damage.

- The parties have agreed that the limitations specified in this Section 7 will survive and apply even if any limited remedy specified in this Agreement is found to have failed of its essential purpose.

8. TERM AND TERMINATION

- Term. This Agreement shall be for the period of one year from the effective date above and shall automatically renew for one year periods. This Agreement may be terminated by NEXGEN at any time at its sole discretion for any reason including but not limited to: (i) Licensee breaches any material term or condition of this Agreement; (ii) Licensee becomes the subject of a voluntary petition in bankruptcy or any voluntary proceeding relating to insolvency, receivership, liquidation, or composition for the benefit of creditors; or (iii) Licensee becomes the subject of an involuntary petition in bankruptcy or any involuntary proceeding relating to insolvency, receivership, liquidation, or composition for the benefit of creditors, if such petition or proceeding is not dismissed within sixty (60) days of filing.
- Effect of Termination. On termination of this Agreement, Licensee will immediately return to NEXGEN or (at NEXGEN's request) destroy all copies of the Program(s) in its possession or control, and an officer of Licensee will certify to NEXGEN in writing that it has done so.
- Survival. The provisions of Sections 4 (Proprietary Rights) and 5 (Confidential Information) will survive termination of this Agreement for any reason.
- Nonexclusive Remedy. The exercise by NEXGEN of any remedies under this Agreement will be without prejudice to its other remedies under this Agreement or otherwise.

9. GENERAL PROVISIONS

- Assignment. The parties shall not assign this Agreement, and any attempted assignment shall be void.
- Modifications. This Agreement may only be modified, or any rights under it waived, by a written document executed by NEXGEN and Licensee.
- Conflicting Terms. Purchase orders or similar documents relating to the Program(s) will have no effect on the terms of this Agreement.
- Notices. All notices under this Agreement will be deemed given when delivered personally or sent by U.S. certified mail, return receipt requested, to the address shown below or as may otherwise be specified by either party to the other in accordance with this Section.
- Severability. If any provision of this Agreement is found illegal or unenforceable, it will be enforced to the maximum extent permissible, and the legality and enforceability of the other provisions of this Agreement will not be affected.
- Waiver. No failure of either party to exercise or enforce any of its rights under this Agreement will act as a waiver of such rights.

- Entire Agreement. This Agreement is the complete and exclusive agreement between the parties with respect to the subject matter hereof, superseding and replacing any and all prior agreements, communications, and understandings (both written and oral) regarding such subject matter.
- Choice of Law. This Agreement will be governed by and construed in accordance with the laws of the State of California applicable to agreements entered into, and to be performed entirely, within California between California residents.
- otherwise.

10. SOFTWARE COST

- The software will be hosted by Amazon Web Services. The following annual cost is for 2022. LICENSEE has 10 concurrent users, 1 TB of storage limit and 10 GB/month of data transfer limit. The costs include every module on the web and mobile applications. The 311 Service Request Portal is for unlimited requesters. The annual maintenance and support fees include all the upgrades and technical support. NEXGEN has 2 major releases a year in April and October and potentially 2-4 additional mini releases to resolve bugs and improvements.

NEXGEN Cloud

Tier	Concurrent Users	Storage Limit	Data Transfer Limit	FY 2022-2023 Cost ($)
1. NEXGEN Cloud 330 (3TB/30GB)	50	4 TB	40 GB/Month	$100,000
2. NEXGEN Cloud 440 (4TB/40GB)	75	4 TB	40 GB/Month	$130,000
3. NEXGEN Cloud 550 (5TB/50GB)	100	5 TB	50 GB/Month	$150,000
4. NEXGEN Cloud 660 (6TB/60GB)	Unlimited	6 TB	60 GB/Month	$170,000
5. NEXGEN Cloud Site	Unlimited	Unlimited	Unlimited	$200,000

Note that the annual cost could increase no more than 5% a year

311 Service Request Portal and Mobile Application

Option	Users	Annual Maintenance Cost ($)
NEXGEN 311 Service Request Portal	Unlimited	$15,000

Note that the annual cost could increase no more than 5% a year

Contractor Portal and Mobile Application

Option	Users	Annual Maintenance Cost ($)
NEXGEN Contractor Portal & Mobile Application	Unlimited	$15,000

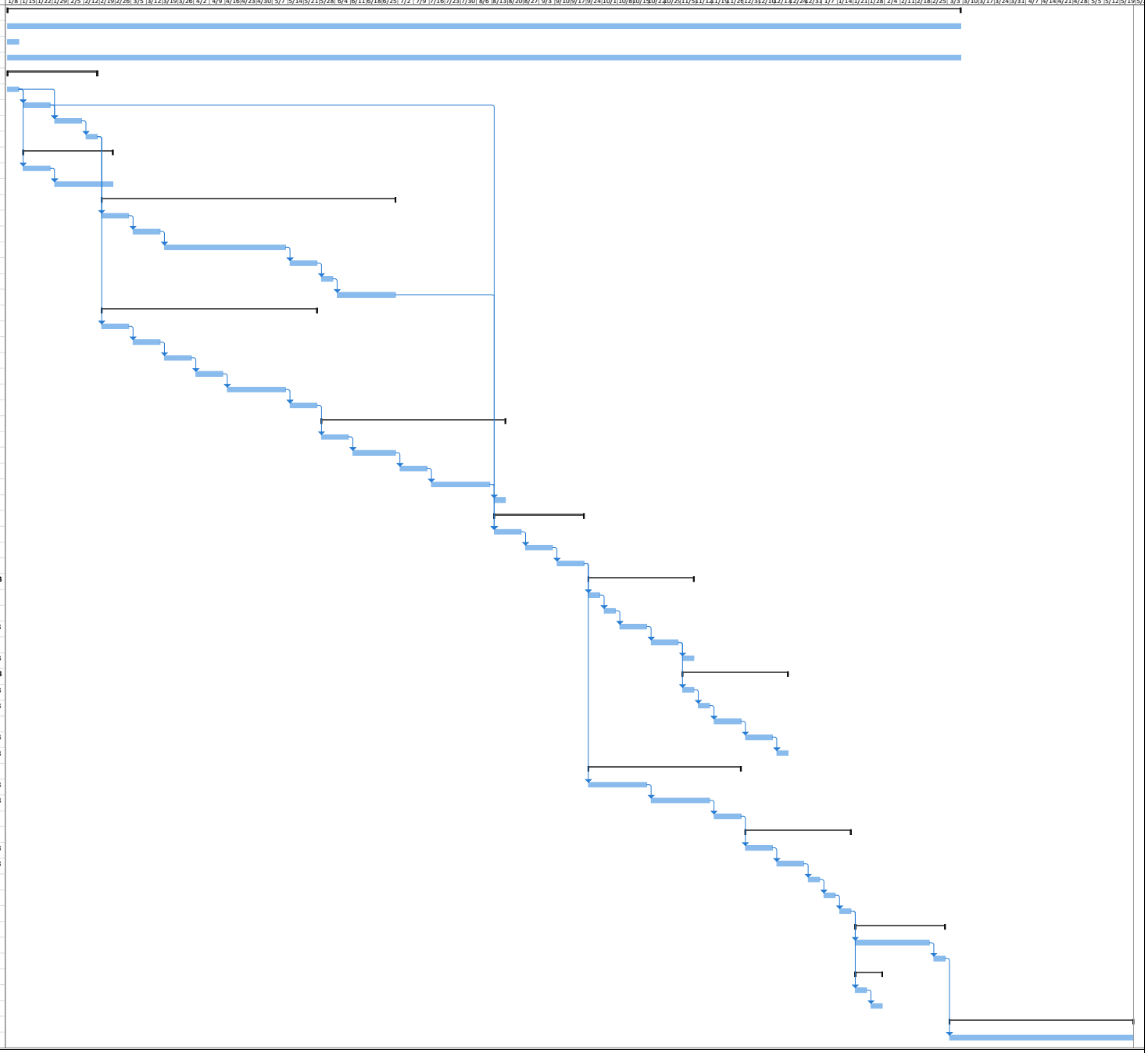
Note that the annual cost could increase no more than 5% a year

In Witness Whereof, the parties have caused this Agreement to be executed by their duly authorized representatives.

NEXGEN Asset Management	LICENSEE
By: _____	By: _____
Name: Vincent Yee, P.E.	Name: _____
Title: President	Title: _____
Date: _____	Date: _____

EVMWD Project Schedule

ID	Task Mode	Task Name	Duration	Start	Finish
1		**1. Project Management**	**305 days**	**Mon 1/9/23**	**Fri 3/8/24**
2		1a. Weekly Project Communication	61 wks	Mon 1/9/23	Fri 3/8/24
3		1b. Kickoff Meeting	1 wk	Mon 1/9/23	Fri 1/13/23
4		1c. Progress Updates	61 wks	Mon 1/9/23	Fri 3/8/24
5		**2.Implementation Plan**	**30 days**	**Mon 1/9/23**	**Fri 2/17/23**
6		2a. User requirement meetings	1 wk	Mon 1/9/23	Fri 1/13/23
7		2b. Develop business process maps	2 wks	Mon 1/16/23	Fri 1/27/23
8		2c. Document implementation plan	2 wks	Mon 1/30/23	Fri 2/10/23
9		2d. Develop TM on implementation plan	1 wk	Mon 2/13/23	Fri 2/17/23
10		**3. Data Security Plan**	**30 days**	**Mon 1/16/23**	**Fri 2/24/23**
11		3a. Develop Data Security Plan	2 wks	Mon 1/16/23	Fri 1/27/23
12		3b. Develop Disaster Reovery Plan	4 wks	Mon 1/30/23	Fri 2/24/23
13		**4. Configuration**	**95 days**	**Mon 2/20/23**	**Fri 6/30/23**
14		4a. Identify configuration details	2 wks	Mon 2/20/23	Fri 3/3/23
15		4b. Identify business process notifications	2 wks	Mon 3/6/23	Fri 3/17/23
16		4c. Configure NEXGEN to specifications	8 wks	Mon 3/20/23	Fri 5/12/23
17		4d. Create user groups & rights	2 wks	Mon 5/15/23	Fri 5/26/23
18		4e.Configure notifications & alerts	1 wk	Mon 5/29/23	Fri 6/2/23
19		4f. Review and test configurations	4 wks	Mon 6/5/23	Fri 6/30/23
20		**5. Data Migration**	**70 days**	**Mon 2/20/23**	**Fri 5/26/23**
21		5a. Review existing data	2 wks	Mon 2/20/23	Fri 3/3/23
22		5b. Develop data conversion plan	2 wks	Mon 3/6/23	Fri 3/17/23
23		5c. Establish locations & classes	2 wks	Mon 3/20/23	Fri 3/31/23
24		5d. Prepare data	2 wks	Mon 4/3/23	Fri 4/14/23
25		5e. Migrate data	4 wks	Mon 4/17/23	Fri 5/12/23
26		5f. Validate and test data	2 wks	Mon 5/15/23	Fri 5/26/23
27		**6. Integration**	**60 days**	**Mon 5/29/23**	**Fri 8/18/23**
28		6a. Integration SCADA	2 wks	Mon 5/29/23	Fri 6/9/23
29		6b. Integration USA 610	3 wks	Mon 6/12/23	Fri 6/30/23
30		6c. Integration GIS	2 wks	Mon 7/3/23	Fri 7/14/23
31		6d. Integration Infor Cloudsite	4 wks	Mon 7/17/23	Fri 8/11/23
32		6e. Integration ADFS	1 wk	Mon 8/14/23	Fri 8/18/23
33		**7. Configuration Documentation**	**30 days**	**Mon 8/14/23**	**Fri 9/22/23**
34		7a. Document business processes	2 wks	Mon 8/14/23	Fri 8/25/23
35		7b. Document configuration	2 wks	Mon 8/28/23	Fri 9/8/23
36		7c. Document Data Dictionary	2 wks	Mon 9/11/23	Fri 9/22/23
37		**8. System Testing**	**35 days**	**Mon 9/25/23**	**Fri 11/10/23**
38		8a. Prepare testing plan	1 wk	Mon 9/25/23	Fri 9/29/23
39		8b. Present testing plan to system testers	1 wk	Mon 10/2/23	Fri 10/6/23
40		8c.Perform System Testing	2 wks	Mon 10/9/23	Fri 10/20/23
41		8d. Resolve Testing Issues	2 wks	Mon 10/23/2	Fri 11/3/23
42		8e. System Testing Acceptance	1 wk	Mon 11/6/23	Fri 11/10/23
43		**9. User Acceptance Testing**	**35 days**	**Mon 11/6/23**	**Fri 12/22/23**
44		9a. Prepare testing plan	1 wk	Mon 11/6/23	Fri 11/10/23
45		9b. Present testing plan to users	1 wk	Mon 11/13/2	Fri 11/17/23
46		9c.Perform User Acceptance Testing	2 wks	Mon 11/20/2	Fri 12/1/23
47		9d. Resolve Testing Issues	2 wks	Mon 12/4/23	Fri 12/15/23
48		9e. User Testing Acceptance	1 wk	Mon 12/18/2	Fri 12/22/23
49		**10. Reporting**	**50 days**	**Mon 9/25/23**	**Fri 12/1/23**
50		10a. Identify report requirements	4 wks	Mon 9/25/23	Fri 10/20/23
51		10b. Develop custom reports	4 wks	Mon 10/23/2	Fri 11/17/23
52		10c. Schedule reports & train ad hoc	2 wks	Mon 11/20/2	Fri 12/1/23
53		**11. Training**	**35 days**	**Mon 12/4/23**	**Fri 1/19/24**
54		11a. Prepare training materials	2 wks	Mon 12/4/23	Fri 12/15/23
55		11b. Power User Training	2 wks	Mon 12/18/2	Fri 12/29/23
56		11c. Field Personnel Training	1 wk	Mon 1/1/24	Fri 1/5/24
57		11d. Adjust User Training	1 wk	Mon 1/8/24	Fri 1/12/24
58		11f. System Admin Training	1 wk	Mon 1/15/24	Fri 1/19/24
59		**12. Go Live Support**	**30 days**	**Mon 1/22/24**	**Fri 3/1/24**
60		12a. Post Deployment Office Hours	5 wks	Mon 1/22/24	Fri 2/23/24
61		12b. Post Deployment Training	1 wk	Mon 2/26/24	Fri 3/1/24
62		**13. Production Cut Over Plan**	**10 days**	**Mon 1/22/24**	**Fri 2/2/24**
63		13a. Develop production cut over plan	1 wk	Mon 1/22/24	Fri 1/26/24
64		13b. Migrate remaining data since data migrati	1 wk	Mon 1/29/24	Fri 2/2/24
65		**14. Follow Up Support**	**60 days**	**Mon 3/4/24**	**Fri 5/24/24**
66		14a. 3 months of post go live support	12 wks	Mon 3/4/24	Fri 5/24/24



Project: NEXGEN AM Implementa
Date: Wed 10/5/22

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Deadline | Progress | Manual Progress

Page 1

Wed 10/5/22

Phase II
Asset Management Plan - Enterprise Asset Management (EAM) System Replacement

Study Session

October 19, 2022

Overview

- Project background
- Process going forward
- Next steps

Project Background

- March 2019: Board approval of Phase 1 of Asset Management Plan
- May 2020 Study Session
  - Results of Phase 1 Asset Management Plan was presented
  - Part of Phase 1 task is to evaluate District's current CMMS
- CMMS is an important tool used to house
  - Asset information - description, location, age
  - Maintenance records for asset

Project Background - Continued

- Phase 1 project findings
  - Software no longer meets District needs
  - Software has not kept up with new technology
  - Vendor software support difficult to navigate
  - Asset hierarchy not intuitive
  - Minimal asset detail tracked
  - Inability to track true asset lifecycle costs
- Recommendation
  - Procure new CMMS solution
- Board supported recommendation
  - Instructed staff to proceed

Phase 2 – EAM Replacement

- October 2020
  - Board approval of PSA for consultant to help staff with Phase 2 of Asset Management Plan: Evaluation and selection of new EAM software
- November 2020 to September 2021
  - Perform a needs assessment for a new EAM software
  - Review existing District systems and business practices
  - Develop a EAM implementation plan
  - Develop Request for Proposal (RFP)
- October 2021
  - Issued RFP for EAM software

Phase 2 – EAM Replacement

- December 2021 to February 2022
  - Evaluated the 7 proposals received
  - Selected 3 vendors for product demonstrations
    - Mentor, TruPoint, and Nexgen
- March & April 2022
  - Software demonstrations & final vendor selection (Nexgen)
- May 2022 to September 2022
  - Reference checks
  - Contract negotiations
  - Finalize contract documents

Project Management Support Services

- Help manage staff with project implementation
  - Project Management and Monitoring
  - Project Communications and Reporting
  - Business Requirements Definition and Validation
  - General Support
- Requested proposal from Carollo Engineers, Inc.
  - Familiarity with District systems and staff
  - Experience with EAM system implementations

Next Steps

- Award PSA with Nexgen for implementation of software
  - $856,592 + overhead ($4,283) + staff time ($257,373) = $1,118,248
  - Implementation schedule: January 2023 to June 2024
- Approve Software License Agreement
  - $552,563 for 5 Years
  - 1st year payable after implementation is complete
- Award PSA with Carollo for Project Management Support
  - $106,500 + overhead ($533) = $107,033
- Scheduled for November 10 Board Meeting for consideration

Process going forward

- Implement Decision Support Functionality
  - Utilize maintenance information contained in the new system to project long term repair and replacement needs
  - Helps in prioritizing future Capital Improvement Budget (CIP) budgets
  - 3 to 5 years of information is needed in new system to more accurately forecast repair and replacement needs


THANK YOU
Elsinore Valley Municipal Water District

Elsinore Valley Municipal Water District

STUDY SESSION
DISCUSSION OUTLINE

Date: **October 19, 2022**

Originator: **Margie Armstrong – Strategic Programs**

Subject: **REVIEW OF PROPOSED PROJECT MANAGEMENT SERVICES FOR ENTERPRISE ASSET MANAGEMENT (EAM) SYSTEM IMPLEMENTATION**

STRATEGIC GOAL

Maintain and Upgrade Infrastructure
Maintain and Upgrade Technology

BACKGROUND AND RECOMMENDATION

In March 2019, the Board approved a Professional Services Agreement (PSA) for the development of the first phase of an Asset Management Plan (AMP). The first phase consisted of the completion of four specific tasks which created the initial framework of the District's future AMP. The four specific tasks are as follows:

- Asset Categorization
- Risk Prioritization Plan
- Development of Capital Replacement Budget
- Software Evaluation

The efforts in the first phase were completed and presented to the Board at a Study Session in May 2020. The software evaluation task identified gaps in the configuration of the District's current EAM software which led to inconsistencies of usage in the various departments. These inconsistencies and the system configuration resulted in limitations on data extraction and reporting functions. The District has utilized the current software for many years, and currently, this software is not a product of choice for asset strategy development. Additionally, reconfiguration of the existing software will take the same amount of effort as implementing a new software.

In order to move forward with the next phases of the AMP, it is important that the District has the right EAM tool to house and build on all the asset maintenance information which will be utilized to develop the next stages of the AMP. The first phase project report also

recommended that the District procure a new EAM solution that can integrate with all the other systems currently in use. It was also recommended the new software should be more intuitive and flexible than the existing software. These recommendations will ensure a new software that is more user-friendly, which is of paramount importance for a successful software implementation.

In October 2020, the Board approved a PSA for a consultant to help the District with the evaluation and selection of a new EAM solution. The tasks under this project include:

- Performing a needs assessment for a new EAM solution
- Reviewing existing District systems and business practices
- Developing an EAM implementation plan
- Assisting in EAM RFP development and proposal evaluation
- Supporting EAM software demos and contract negotiation

In October 2021, the District posted a Request for Proposal (RFP) for an EAM software and implementation services utilizing PlanetBids. Seven firms responded to the RFP by the deadline, and staff selected three firms to demonstrate their software and capabilities. Staff members from Operations, Strategic Programs, Information Technology, Finance, Engineering, and Water Resources participated in the demonstrations, and the vast majority of the staff concluded that Nexgen has the best and most user-friendly software.

EAM software implementations are complex undertakings that involve input from multiple departments and have to be carefully managed to ensure project success. In preparation for the implementation of the new EAM software, staff reached out to Carollo Engineers, Inc, and specifically Dan Baker, to provide a proposal for Project Management (PM) Services. He is very familiar with the District's technical systems, having been involved in many projects for the District for the past 15 years, such as the initial Lawson ERP implementation. Mr. Baker was instrumental in the RFP process for the Engineering department's permitting software and continues to provide support as a technical advisor on the implementation of the software, which is currently underway. Additionally, Mr. Baker has extensive experience with Asset Management and CMMS implementations, having been involved in 20 implementations over the last 20 years.

Because of his past experience working with the District, familiarity with District staff and resources to keep the project on track, as well as his experience of implementing EAM systems, staff recommends Carollo Engineers, Inc for Project Management services for the Nexgen EAM implementation.

The cost of the Project Management services is $106,500. This item, including overhead of $533.00, totals $107,033.00. Staff plans to present this item for consideration of approval on the November 10, 2022, Board meeting.

ENVIRONMENTAL WORK STATUS

Not applicable.

FISCAL IMPACT

Within Budget. Yes

Attachments:

PSA – Carollo Engineers, Inc.

Engineers...Working Wonders With Water®

5355 Mira Sorrento Place, Suite 270, San Diego, California 92121
P. 858.505.1020 F. 858.505.1015

October 4, 2022

Mr. Jase Warner
Elsinore Valley Municipal Water District
31315 Chaney Street
Lake Elsinore, CA 92531

Subject: Project Management Services Proposal for Enterprise Asset Management System Implementation

Dear Mr. Warner:

Carollo Engineers, Inc. (Carollo) is pleased to provide you with the attached Scope of Services and Fee Proposal to provide project management services for the implementation of a new Enterprise Asset Management System (EAMS) for the Elsinore Valley Municipal Water District (District). As you are aware, Carollo has provided similar information technology (IT) consulting services for water and wastewater agencies throughout the United States and has a proven track record in working with the District on several previous technology planning and implementation projects.

For this effort, we are proposing to provide the District with project management support services for the implementation of the District's EAMS based on the NEXGEN Asset Management software. Carollo's support resources will primarily consist of myself, Dan Baker, with additional specialty resources to be provided as required, based on the needs of the District. Carollo understands that our role on this project is to serve as the District's Project Manager (PM) and primary communication channel for NEXGEN, working with District operations, engineering, information technology and other management staff, to enable an implementation process that is collaborative, efficient, and ultimately successful.

We are excited to continue our work with the District, and we would like to thank you for your confidence in Carollo to provide excellent PM support for this important information technology project. Please don't hesitate to contact me with any questions or comments on the attached scope and fee proposal.

Sincerely,

CAROLLO ENGINEERS, INC.

Daniel P. Baker
Vice President

Mr. Jase Warner
Elsinore Valley Municipal Water District
October 4, 2022

Project Management Support for Enterprise Asset Management System (EAMS) Implementation Scope of Services

Overview

Elsinore Valley Municipal Water District (District) has selected a new Enterprise Asset Management System (EAMS) and is now embarking on the implementation of the NEXGEN asset management software with configuration and integration services provided by NEXGEN. The District has requested the services of Carollo Engineers, Inc. (Consultant) to support the EAMS implementation with overall project management (PM) services to ensure the project is a success.

In support of the EAMS implementation, the Consultant will assist in managing and monitoring the project efforts to meet its goals and objectives, while meeting targets for schedule, budget, quality, and end user satisfaction. The subtasks below describe the major activity areas that are intended to be provided under this Scope of Services, in order to meet the needs of the District. All PM support services provided by the Consultant will be coordinated with the District's Director of Operations and supportive of the District's EAMS stakeholders from operations, engineering, finance, information technology, and other related groups within the District.

Project Management and Monitoring

Consultant will assist in providing overall project management, administration, and monitoring for the EAMS implementation project over the duration of the system implementation, which is currently estimated at 14 months. This includes review of schedule, budget, and scope for the EAMS implementation project, and project support for NEXGEN to coordinate meetings, tasks, and deliverable reviews with District staff. Some of the specific tasks included in the project management effort are anticipated to include the following:

- Review of baseline schedule for the project, schedule updates, and progress toward schedule milestones as provided by NEXGEN.
- Review of baseline budget for the project, expenditures, and progress toward financial milestones.
- Review and monitor NEXGEN contract towards successful completion of the scope of services and deliverables.
- Serve as the District's project manager/coordinator for weekly NEXGEN project communication meetings to coordinate schedules, tasks, and resources.
- Assist in coordinating internal review meetings with District staff, based on availability of resources and in order to meet project schedules.
- Review of NEXGEN invoices to confirm requested payments match actual progress completed, prior to recommending approval to the District for payment processing.
- Review of all requested changes to software licensing and implementation support services contracts, scopes, and deliverables.
- Support maintenance of project documentation in accordance with standard file structure, document naming conventions, and District-standard document management processes.

Project Communications and Reporting

Consultant will support timely and effective communications on the EAMS implementation project with District staff, the software vendors, and other consulting resources. Under this task, Consultant will assist in preparing materials (e.g. agendas, presentations, reports) and support District staff in communicating and reporting to the District's Board and other stakeholders. As related to the EAMS implementation, Consultant will attend meetings with internal District staff to communicate the progress and planned activities for the project. Consultant will support the preparation of regular progress reports that detail the activities and progress towards schedule, budget, and scope for the EAMS implementation project.

Business Requirements Definition and Validation

Under this task, Consultant will provide assistance to the District and support to NEXGEN in the business analysis process and development of the requirements that define the EAMS configuration. Specific tasks that may be included in this effort include assistance with user requirements definition, business process mapping, system configuration validation, data interface design, and post-deployment adoption confirmation. Consultant will support meetings with District staff and NEXGEN consultants to gather information and define the configuration to support District work order, maintenance, and asset management activities.

General Support

Consultant will provide general information technology support for the District in requirements definition, configuration, testing, and post-deployment phases of the EAMS project. These activities will be directed by District IT staff in areas which effectively support NEXGEN's EAMS implementation activities. Examples of the support to be provided under this general task may include data extraction, conversion, and migration; workflow configuration and programming; reports development and formatting; and process automation and improvement.

Fee Estimate

Carollo's fee estimate to provide up to 336 hours total (average 24 hours per month) of information technology support services for the EAMS implementation for the anticipated 14 month project duration from January 1, 2023 through March 1, 2024 is $106,500, which includes labor, expenses, and other direct costs. All fees will be invoiced as expended, up to the total not-to-exceed contract amount. A detailed fee sheet is attached to this proposal.

FEE PROPOSAL

ELSINORE VALLEY MUNICIPAL WATER DISTRICT
PM SUPPORT SERVICES FOR EAMS IMPLEMENTATION

TASK	Senior Professional	Total Hours	Total Labor	Other Direct Costs[1]	Task Total
Project Management Support Services	336	336	$ 100,800	$5,700	$ 106,500
TOTAL HOURS	336	336			
RATE	$ 300				
TOTAL COST	**$ 100,800**		**$ 100,800**	$ 5,700	**$ 106,500**

Notes:

1. Other direct costs include estimates for travel and subsistence, project equipment communication expense (PECE), and other miscellaneous non-labor costs.

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Daniel P. Baker
Vice President

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In support of the EAMS implementation, the Consultant will assist in managing and monitoring the project efforts to meet its goals and objectives, while meeting targets for schedule, budget, quality, and end user satisfaction. The subtasks below describe the major activity areas that are intended to be provided under this Scope of Services, in order to meet the needs of the District. All PM support services provided by the Consultant will be coordinated with the District's Director of Operations and supportive of the District's EAMS stakeholders from operations, engineering, finance, information technology, and other related groups within the District.

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RATE	$ 300				
TOTAL COST	**$ 100,800**		**$ 100,800**	$ 5,700	**$ 106,500**

Notes:

1. Other direct costs include estimates for travel and subsistence, project equipment communication expense (PECE), and other miscellaneous non-labor costs.

NEXGEN

Elsinore Valley Municipal Water District

ENTERPRISE ASSET MANAGEMENT

10.19.2022

Elsinore Valley Municipal Water District

NEXGEN

Robust, comprehensive CMMS with powerful built-in asset management planning tools

- Established 2004, deployed 2008
- 2 releases/year (Apr, Oct)
- Web application – not dependent on any other database
- Mobile applications (iOS, Android)
- NEXGEN 311 – customer service request portal & application
- Contractor portal & mobile application
- Endless Integrations - ERP, GIS, SCADA, fleet management and many other software platforms
- ISO 27001 Security Certified
- Transparent pricing model – one cost for all modules

Agenda

- What is Asset Management?
- Why should EVMWD implement Asset Management?
- How would EVMWD deploy an Enterprise Asset Management program?
- Benefits to EVMWD

What is Asset Management?

What is Asset Management?

- ***Asset management is the practice of managing infrastructure capital assets to minimize the total cost of owning and operating these assets while delivering the desired service levels.***
  - Many utilities use asset management to pursue and achieve sustainable infrastructure.
  - A high-performing asset management program includes detailed asset inventories, operation and maintenance tasks, and long-range financial planning.

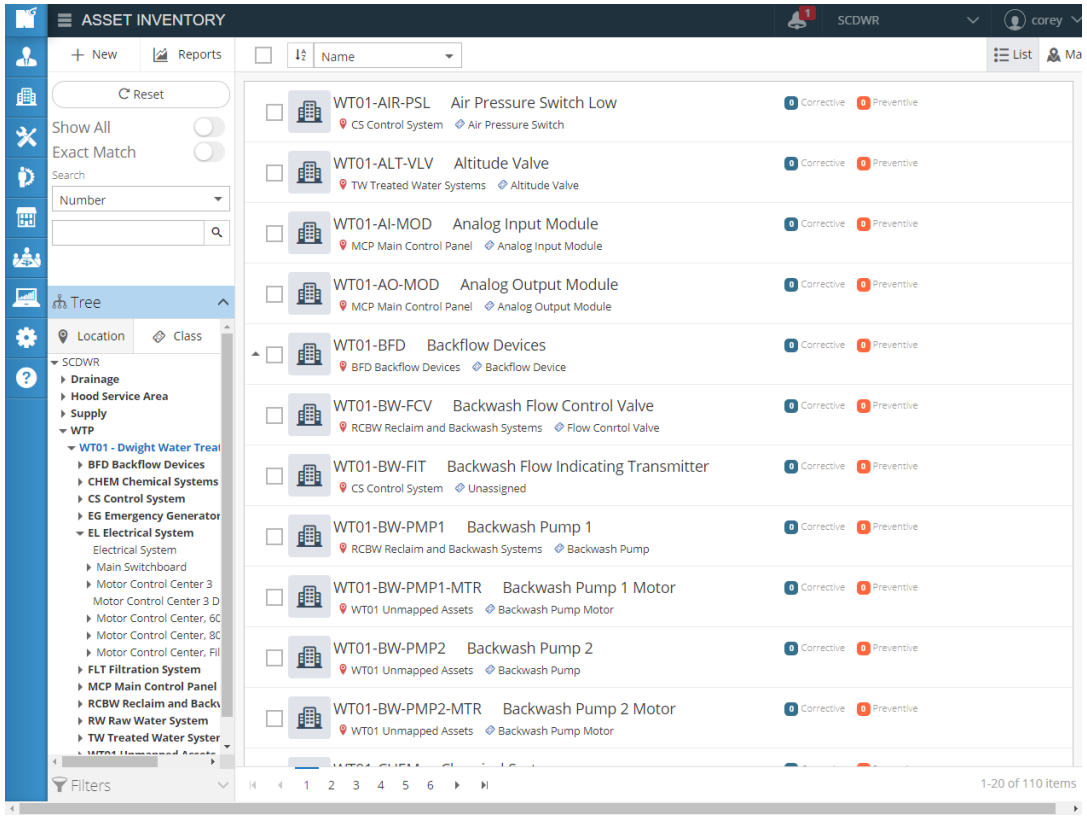
Elements of Asset Management Best Practices

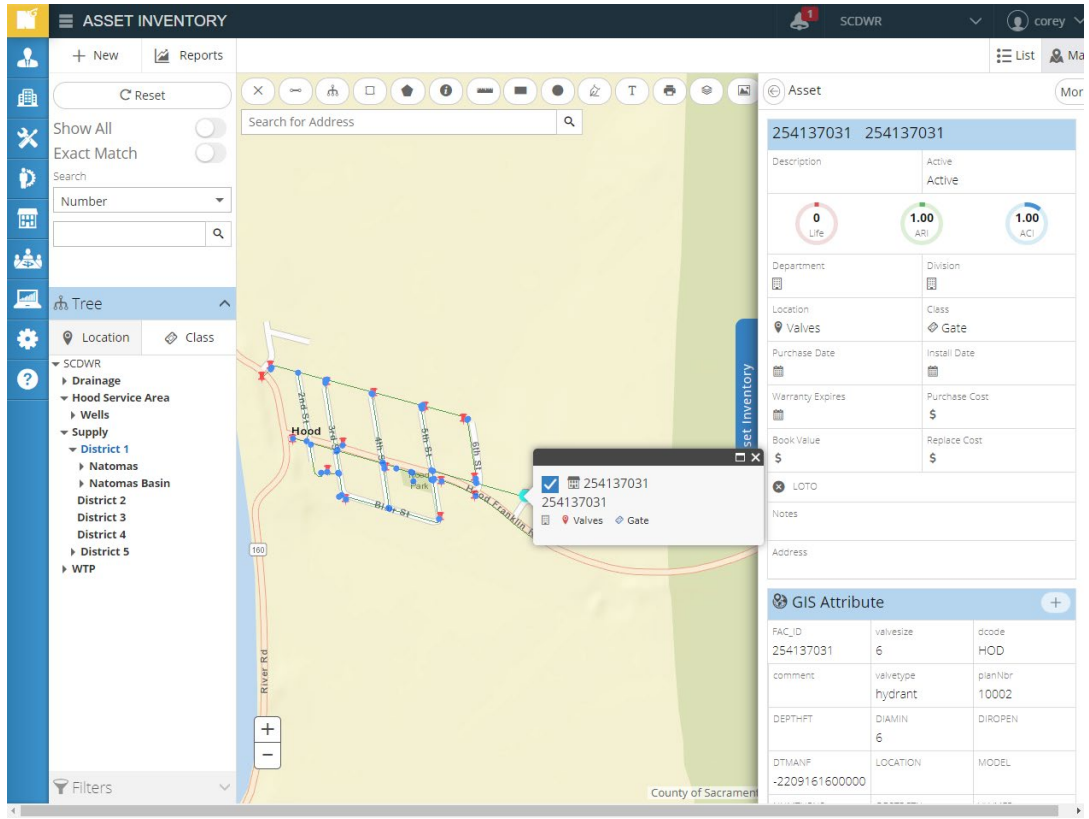
- Maintenance Management
  - Asset Inventory
  - Service Requests
  - Work Orders
  - Preventive Maintenance
  - Predictive Maintenance
  - Resource Management
  - Inventory Management
- Asset Management
  - Condition Assessments
  - Lifecycle Planning
  - Funding Forecast
  - Risk Management
  - Capital Prioritization

EVMWD is already practicing many of these of the maintenance management & some asset management elements

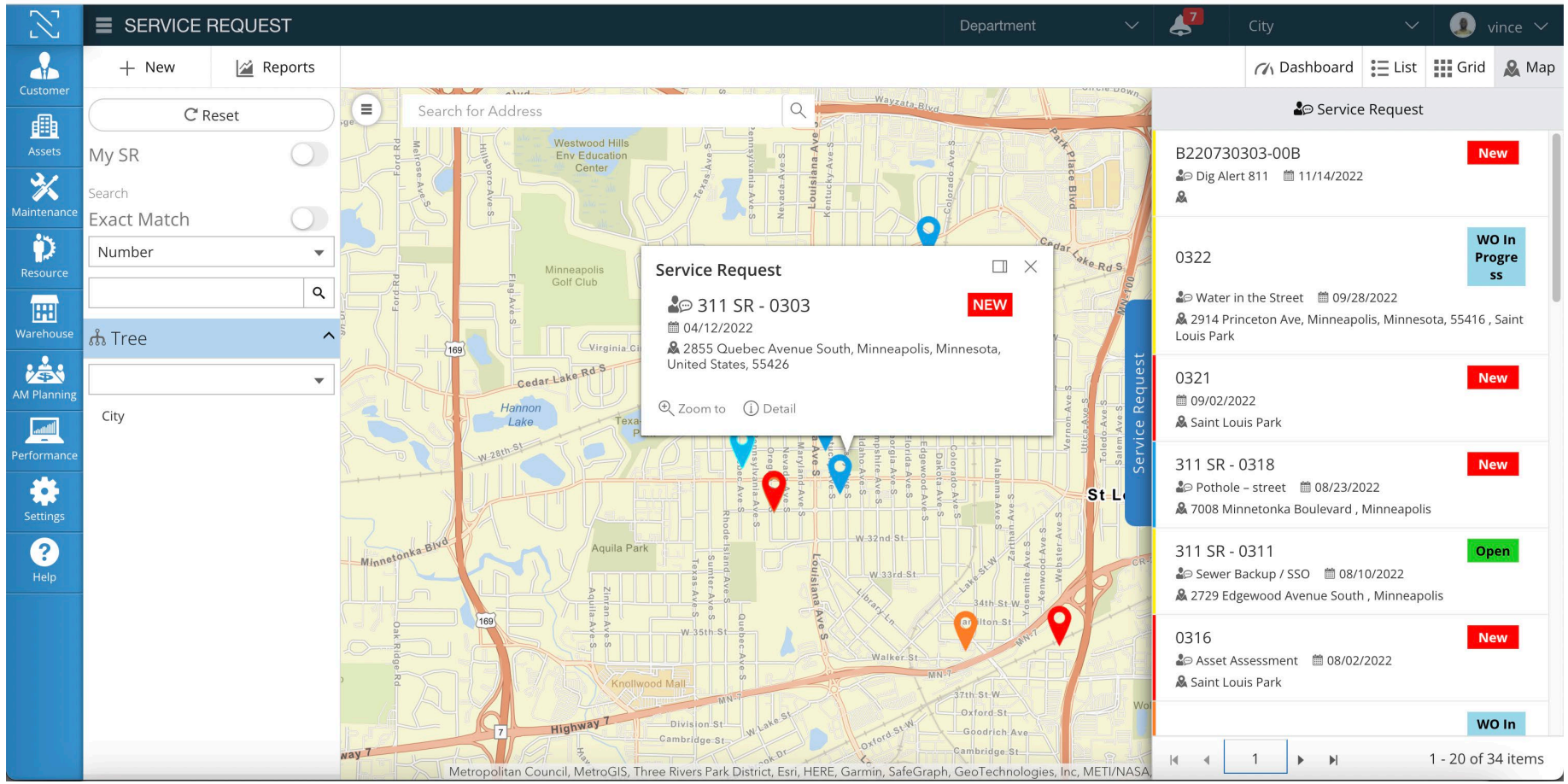
Asset Inventory & Geographic Information System in one single asset management system

Effectively Manages both Vertical and Horizontal Assets in a Single System

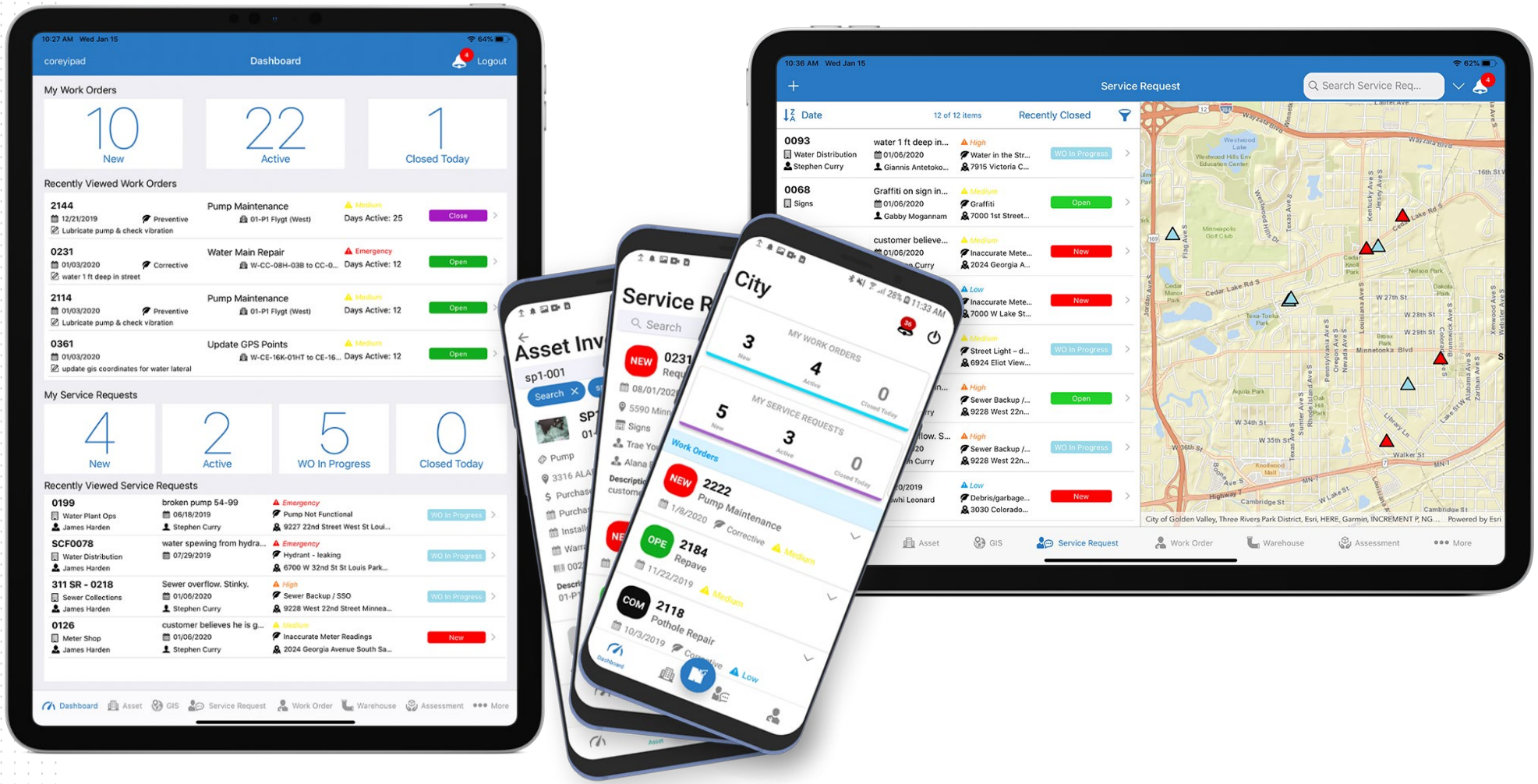




Effectively manage customers & service requests to meet service levels



Track Corrective, Preventive & Predictive Work Orders by Field Crews on Mobile

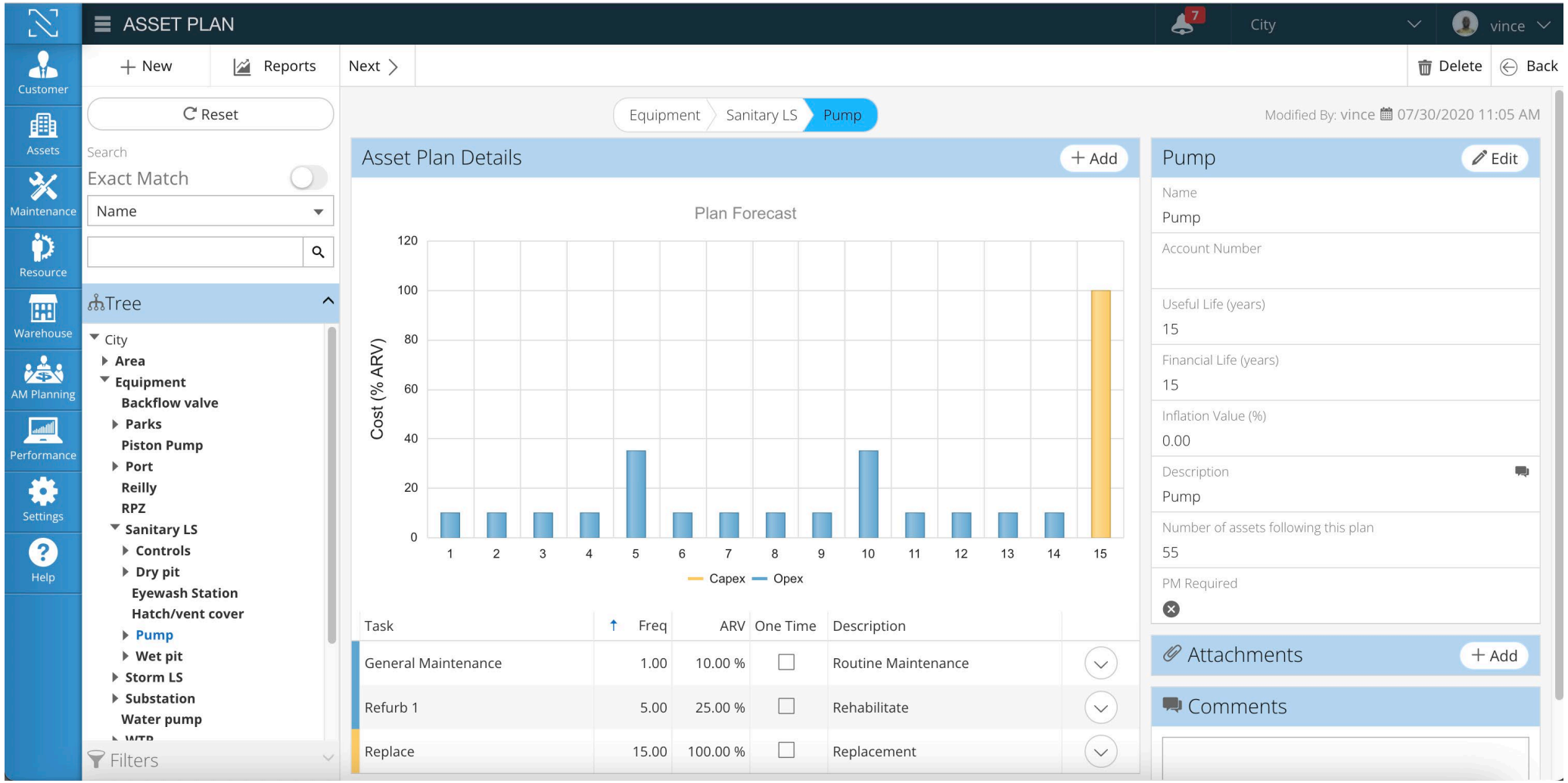


Download on the App Store

GET IT ON Google Play

Why Implement Asset Management?

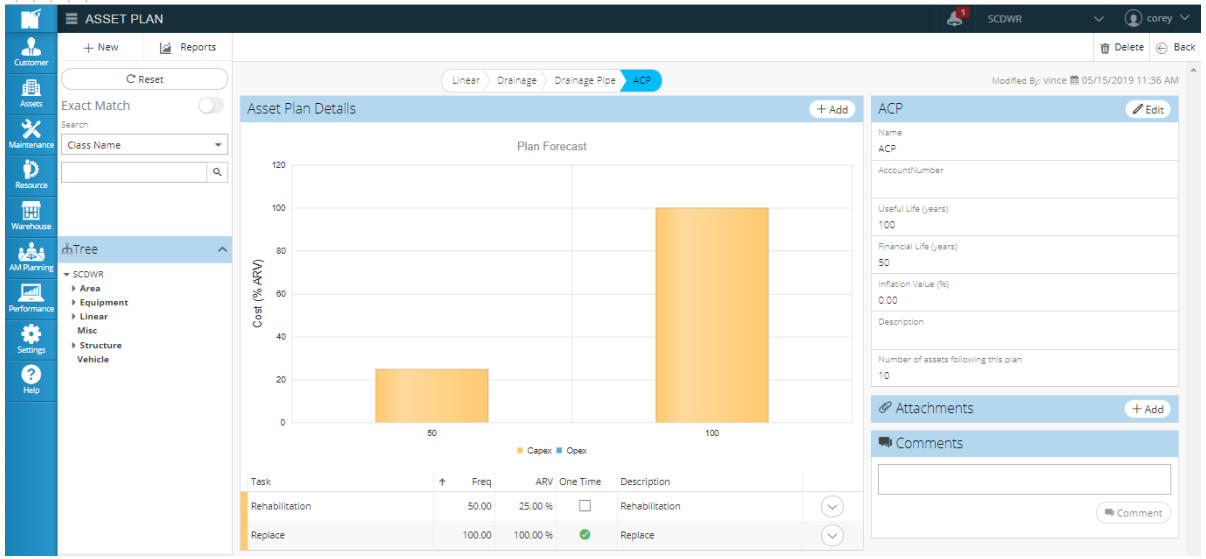
Asset Lifecycle Planning based on Useful Life & Asset Plans

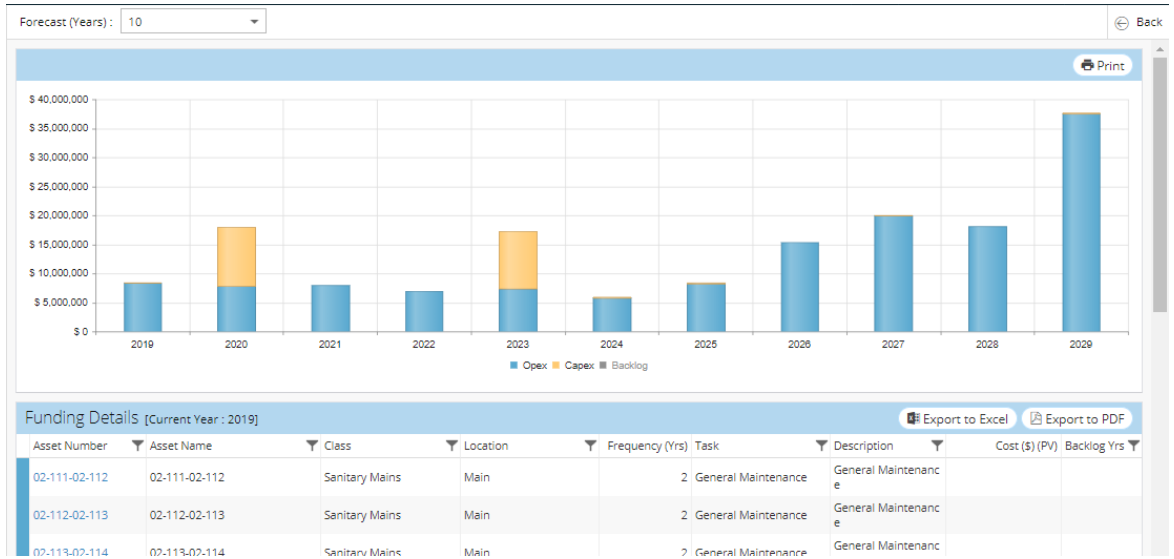


Funding Forecast ensures proper funding for long term planning & sustainability

Funding Forecast of Assets for Long Term Planning

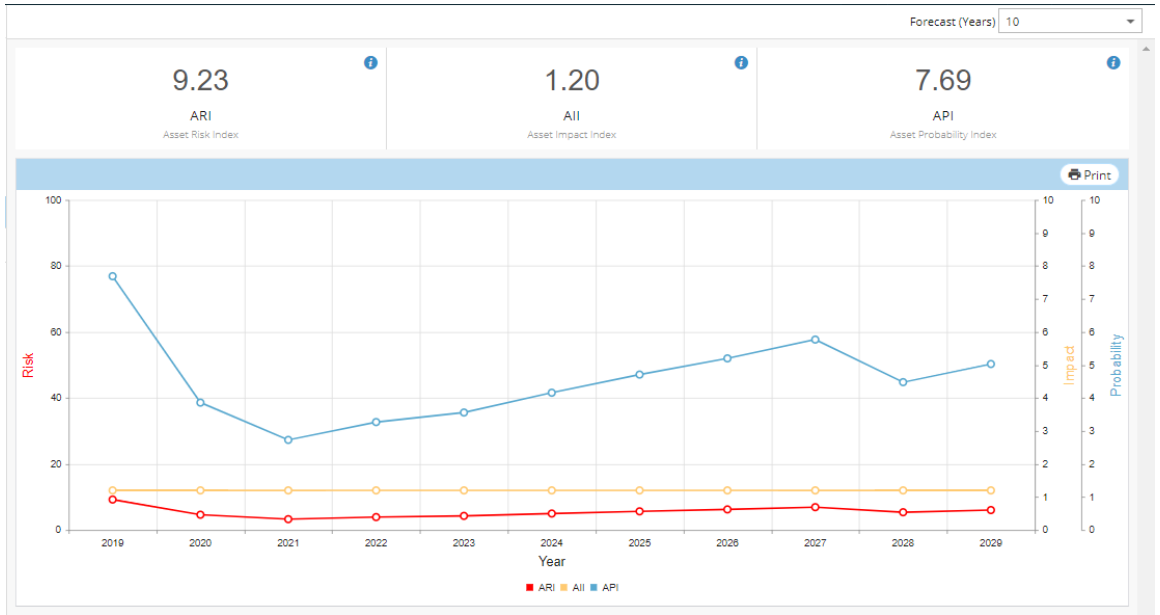
- Lifecycle plans for asset classes
- Funding forecast for 5,10,15,20,25 years with CAPEX & OPEX

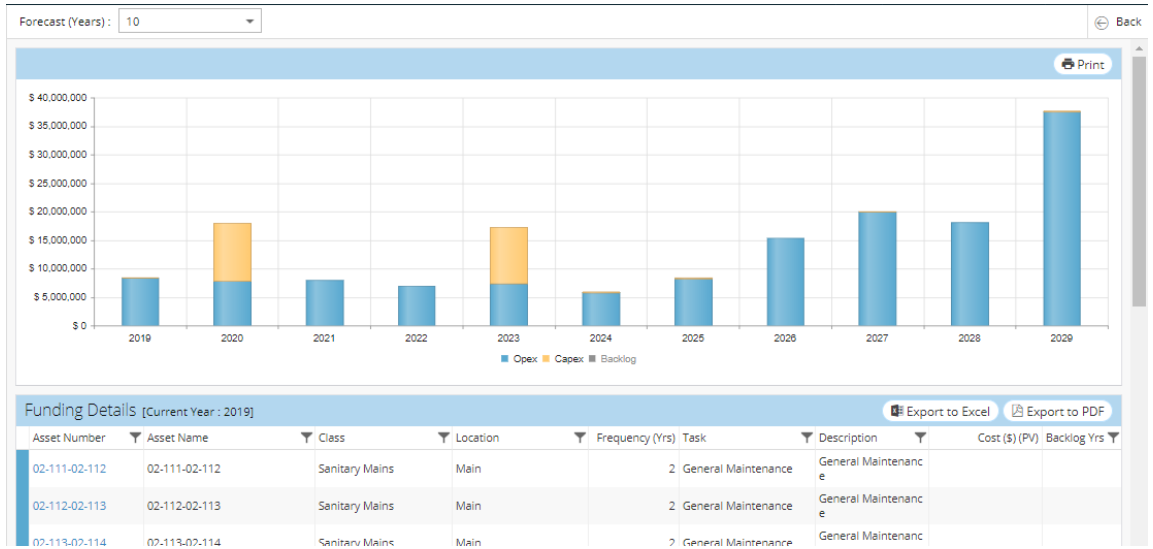




Capital Prioritization to minimize Risk

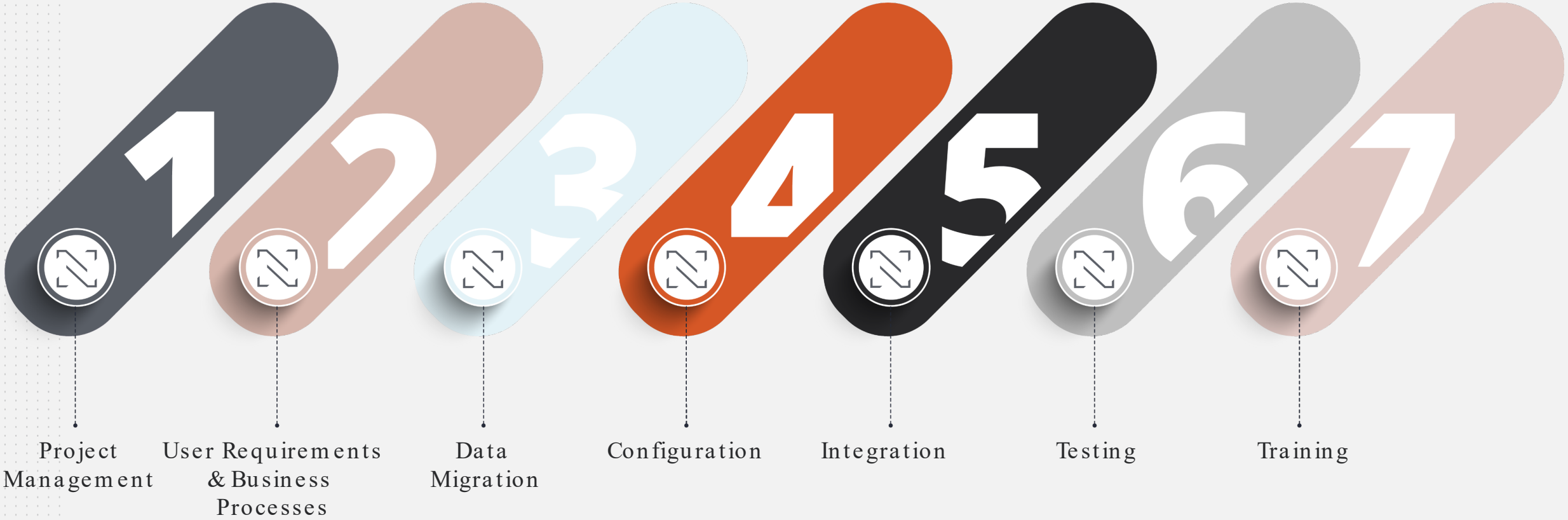
Risk and Funding Prioritize Spending Based on Asset Criticality





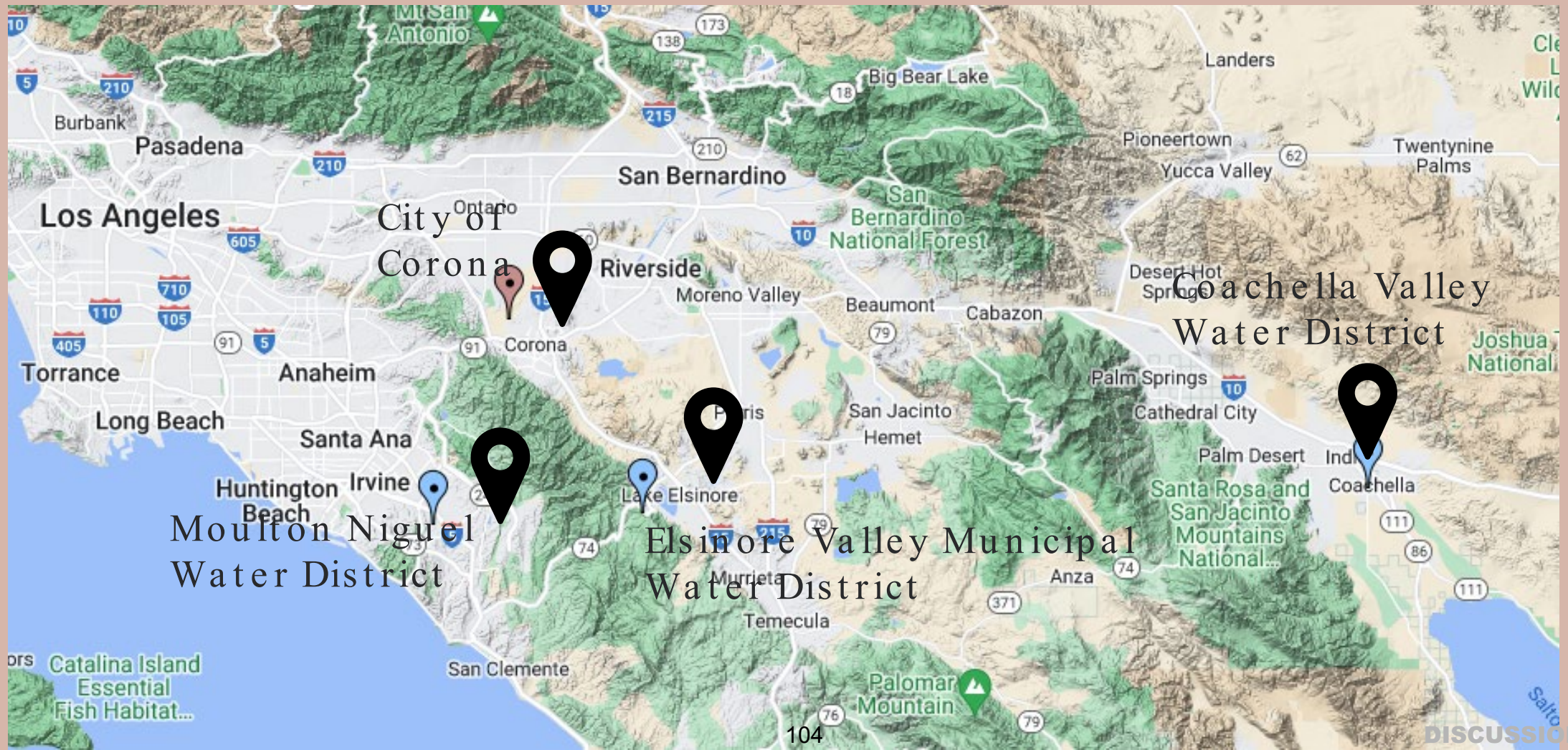
How to deploy an Enterprise Asset Management program?

Implementation approach that ensures successful deployment & change management



Change Management

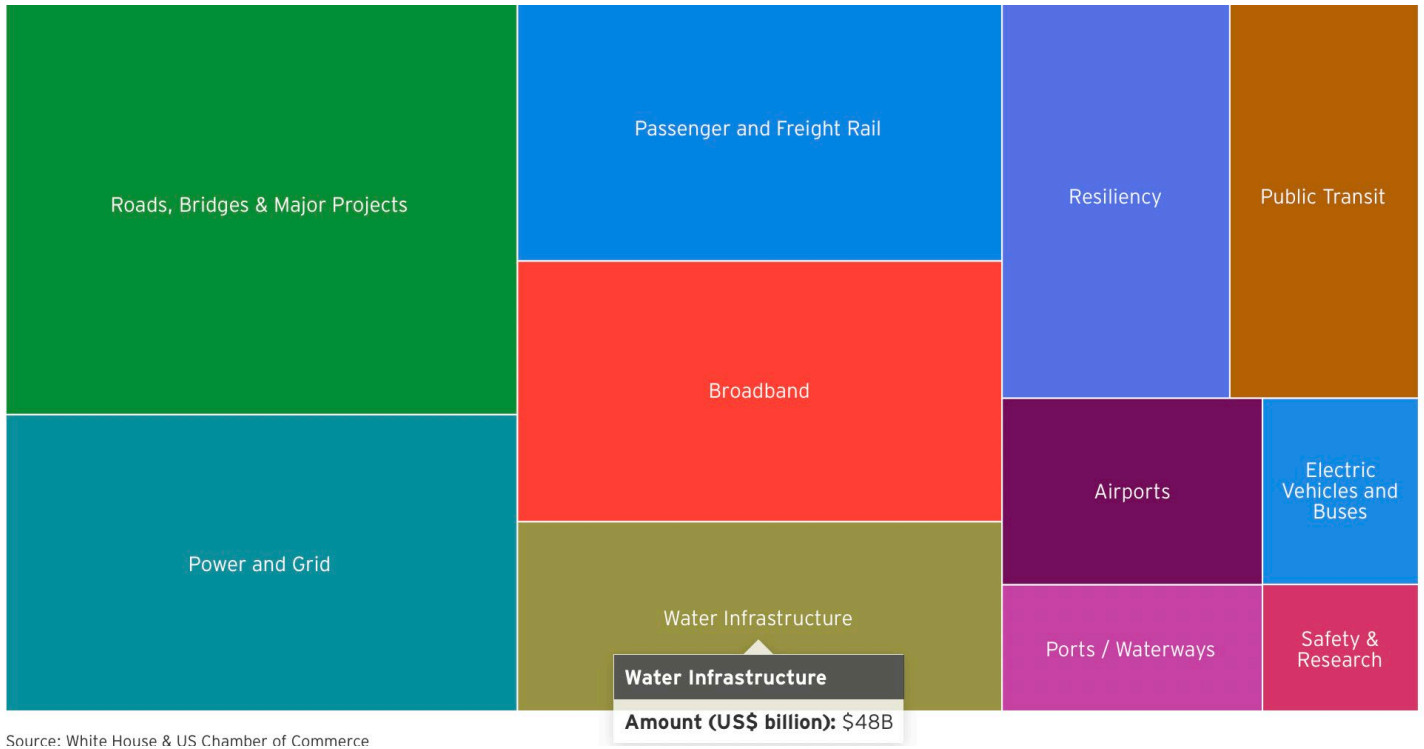
EVMWD is in Good Company with other NEXGENers in Southern California



Benefits of Asset Management to EVMWD

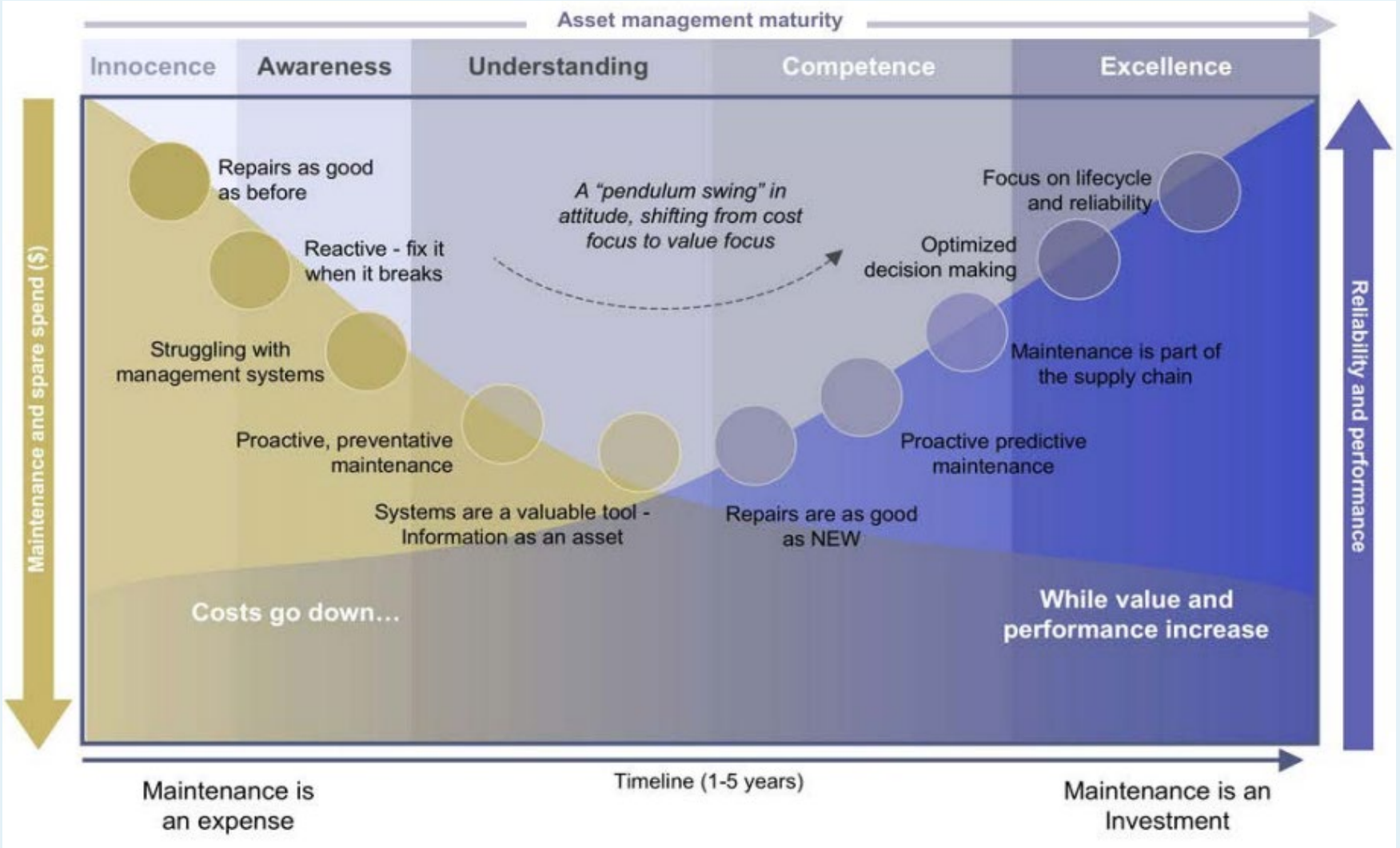
Position EVMWD for potential Infrastructure Bill Funding: Water $48B

- California State Revolving Fund is likely the organization that will be administering & distributing funds
- SRF requires “Fiscal Sustainability Plan” for all funding
- Asset Management Planning may better position EVMWD for potential funding



Source: White House & US Chamber of Commerce

Asset Management Journey results in some short term gains & long term improvements




NEXGEN
Asset The Future.
With NEXGEN you're fully prepared for the unexpected. Evolving towards a brighter future with market-leading software solutions that keep your organization well ahead of the tech curve.

Elsinore Valley Municipal Water District

STUDY SESSION
DISCUSSION OUTLINE

Date: **October 19, 2022**

Originator: **Matthew Bates- Engineering**

Subject: **PROFESSIONAL SERVICES AGREEMENT WITH CAROLLO ENGINEERS, INC. FOR ENGINEERING DESIGN SERVICES FOR THE SEDCO HILLS AND AVENUES SEPTIC TO SEWER PROJECTS**

STRATEGIC GOAL

Elevate Communications
Expand Collaboration, Innovation and Relationships
Maintain and Upgrade Infrastructure

BACKGROUND AND RECOMMENDATION

The Groundwater Management Plan (GWMP), prepared by Elsinore Valley Municipal Water District (EVMWD) in 2005, identified the impact that nitrate from septic systems may be having on several drinking water supply wells as an important water quality issue. The Groundwater Quality Sampling and Modeling Project was designed to assist in quantifying the magnitude of the septic system influence on the groundwater basin. This information would provide greater perspective for EVMWD decision-making regarding the septic system regulations and how they relate to groundwater management and production.

The modeling results and water quality sampling validated that septic systems impact the groundwater basin and contaminates migrating toward drinking water production wells. In general, water quality in all wells improves with depth, indicating the influence of land use and most importantly septic system discharges, may have a future impact on our groundwater quality. Based on the modeling results, the removal of the septic systems over a 20 to 40-year period, will produce significantly lower nitrate concentrations than if the septic systems remain in their current use. Furthermore, the analysis showed that early conversion of septic systems in the highest density areas will produce the highest benefit.

The 2016 Sewer System Master Plan recommends EVMWD implement a phased septic system removal program. As part of the phasing, it is recommended that all septic systems in Sedco Hills and the Avenues Areas be converted by the year 2035.

The State of California Water Resource Control Board Division of Financial Assistance contacted EVMWD in early 2022 about an opportunity for Clean Water State Revolving Fund grant to complete the Sedco Hills and Avenues Septic to Sewer conversion Projects. The project generally consists of:

- Sedco Hills Septic to Sewer
  The project is generally bound by Mission Trail and the I-15 Freeway from Malaga Road to Lemon Street in the City of Wildomar. The project consists of installing approximately 39,000 linear feet of gravity sewer to serve 750 residences. In addition to the gravity main system design, the design effort will include lateral installation and connection to each property and septic system and tank abandonment.

- Avenues Septic to Sewer
  The project is generally bound by Lakeshore Drive and Mills Street from Country Club Boulevard to Avenue 6 in the City of Lake Elsinore. The project consists of installing approximately 14,000 linear feet of gravity sewer to serve 250 residences. In addition to the gravity main system design, the design effort will include lateral installation and connection to each property and septic system and tank abandonment.

On November 8, 2018, the Board of Directors adopted a Resolution authorizing the General Manager to sign and file a Financial Assistance Application for CWSRF grant agreement with the SWRCB for the planning of the Sedco Hills Septic to Sewer Project

On July 28, 2022, the Board of Directors adopted a Resolution authorizing the General Manager to sign and file a Financial Assistance Application for CWSRF grant agreement with the SWRCB for the planning of the Avenues Septic to Sewer Project.

On September 22, 2022, the Board of Directors awarded a Professional Services Agreement for public outreach services with Kleinfelder Construction Services, Inc.

When approaching any project, especially projects of this magnitude and complexity, an experienced and competent professional engineering design firm is key to project success. To attract qualified engineering firms, Staff conducted an extensive engineering outreach effort prior to issuing the request for proposal. This effort engaged 20 engineering firms with 24 firm representatives who attended a virtual project presentation on June 30, 2022. Additionally, Staff met one-on-one with eight engineering firms on July 7, 2022 to review the project in more detail and answer any additional project related questions. The outreach efforts were very well received and many firms expressed interest in the project.

On July 19, 2022, the EVMWD solicited proposals for the Project through PlanetBids. On September 6, 2022, one proposal was received by the posted deadline. A review panel was established to evaluate the proposal. Based on firm qualifications, experience, and project understanding, staff concluded that Carollo Engineers, Inc. is qualified. Staff reviewed Carollo's proposal and determined they met the Good Faith Efforts (GFE) requirements outlined in the funding documents. The evaluation ratings are as follows:

Proposal Evaluation Criteria[1]	Cost Evaluation	Overall Quality of Proposal	Relevant Qualifications / Experience	Scope of Work and Schedule	Understanding of Project and Project Approach	Total Score
Weight	***10%***	***10%***	***25%***	***25%***	***30%***	***100%***
Carollo	88.33	91.67	241.67	225.00	275.00	**921.67**

[1] The evaluation criteria are recommended and approved by BB&K

The final scope of services and fee breakdown is as follows:

Project	Phase 1 – Preliminary Design Cost	Phase 2 – Final Design Cost (Optional Award)	Total Cost
Sedco Hills	$870,427	$2,085,713	$2,956,140
Avenues	$379,464	$854,581	$1,234,045
Total	$1,249,891	$2,940,294	$4,190,185

Staff has negotiated and Carollo has agreed with and understands that efforts will proceed with Phase 1 – Preliminary Design only. Phase 2 – Final Design efforts are specified in the contract as optional award and will be authorized after approval by the state. Staff recommends full contract approval due to the time-sensitive nature of the project.

Staff plans to present this item at the October 27, 2022 Board of Directors Meeting to recommend approval of a Professional Services Agreement with Carollo Engineers, Inc. in the amount of $4,190,185.00. This item, including overhead of $20,951.00, as well as staff time (3,150 hours) & fringe benefits of $725,288.00, totals $4,936,424.00.

ENVIRONMENTAL WORK STATUS

This item does not constitute a project under CEQA.

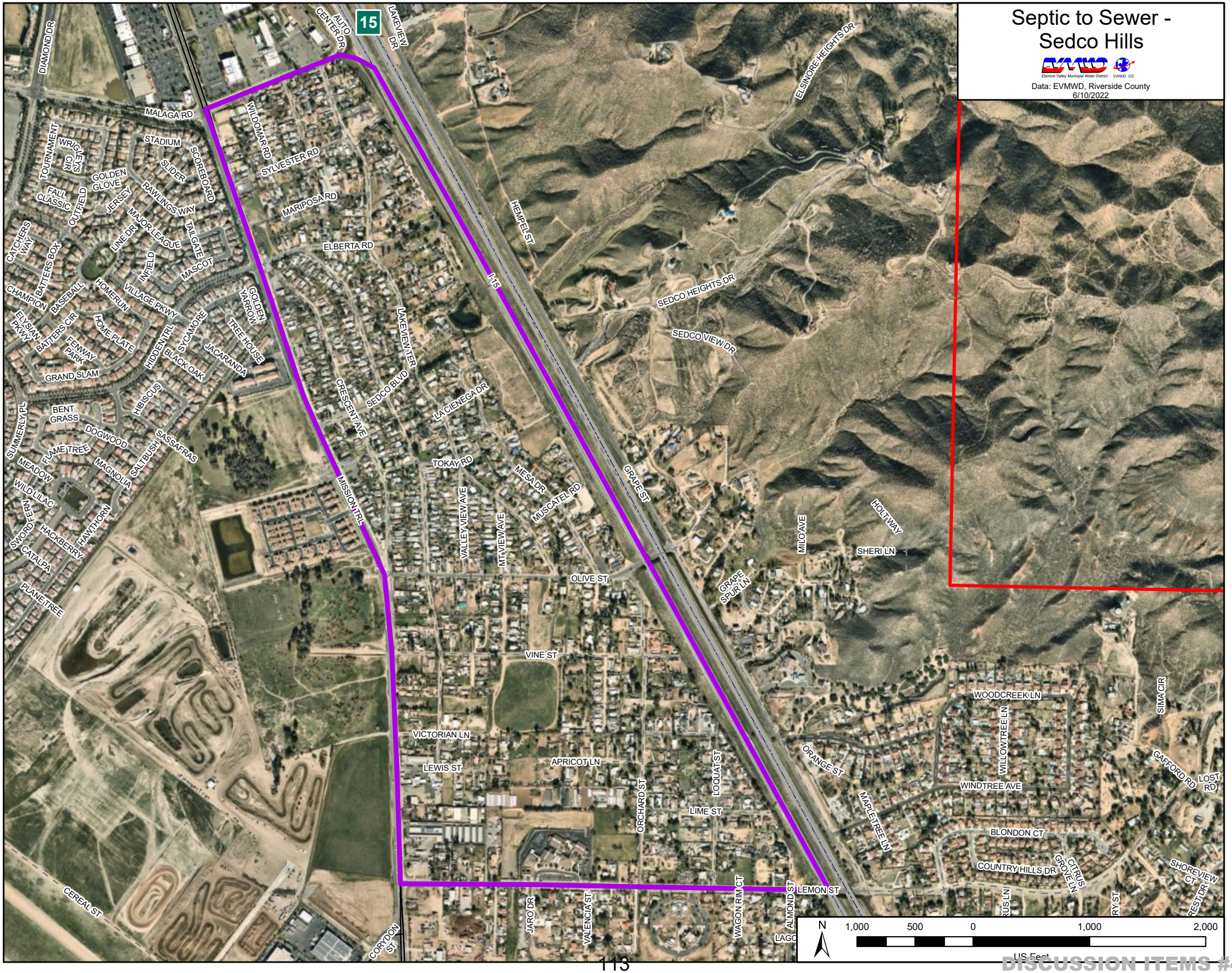
FISCAL IMPACT

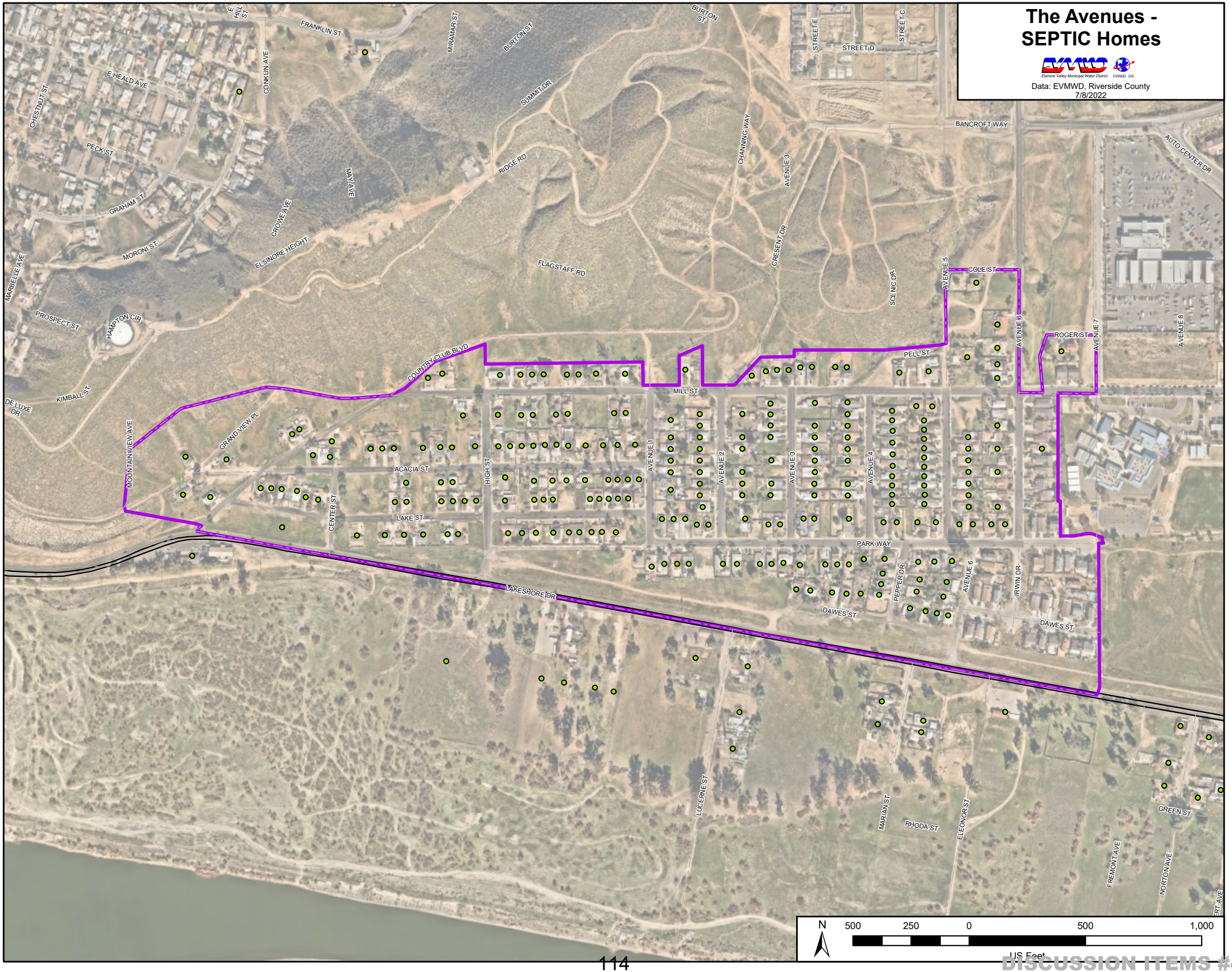
Within Budget – No. These projects are slated to be funded under the Clean Water State Revolving Fund's Small SDAC (severely disadvantaged community), Small DAC (disadvantaged community) and Wastewater Grant Eligible Construction Projects. The maximum amount of grant funding available for this project is $125,000 per connection. EVMWD will be responsible for all costs incurred prior to the funding agreement being

executed, at that time, EVMWD will then be eligible to request reimbursement for prior eligible costs incurred and any future costs eligible for reimbursement under the grant.

Attachments:

Location Exhibits





Sedco Hills and Avenues Septic to Sewer Project – Design PSA

Elsinore Valley Municipal Water District

Study Session – October 19, 2022

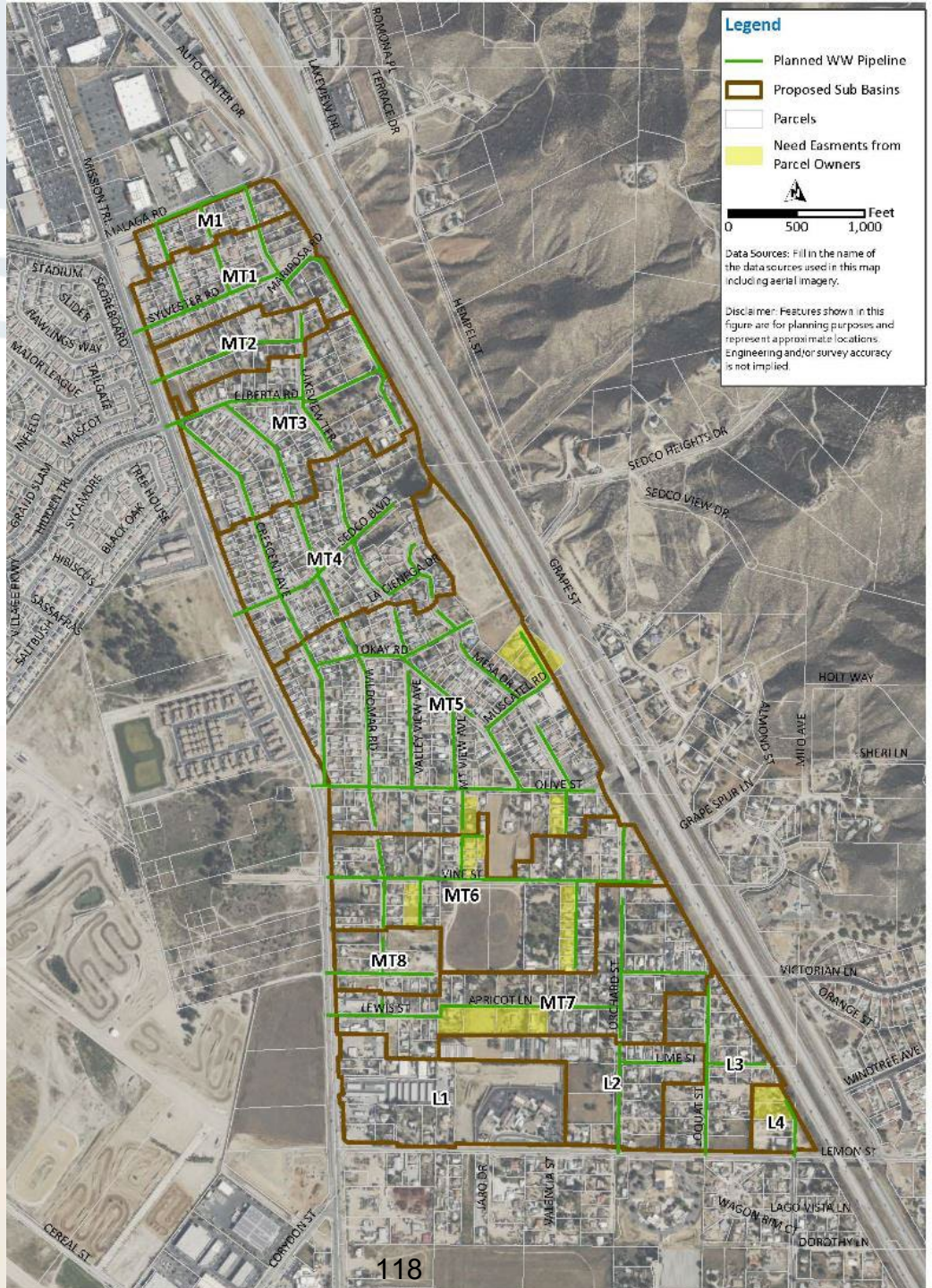
Background

- Both Planning Applications Submitted
  - Waiting for Approval
- Funding up to $125,000 per lot or max of $125,000,000 available
- December 2026 - Grant Completion Deadline
- June 2023 - Construction Application Submission
- CEQA and Public Outreach underway

Project Details

- Sedco Hills
  - Approx. 39,000 linear feet of gravity sewer
  - 750 properties
- Avenues
  - Approx. 14,000 linear feet of gravity sewer
  - 250 properties
- Lateral installation and connection to each property
- Septic system abandonment
- Estimated total project cost around $80 million

Sedco Hills


Legend
Planned WW Pipeline
Proposed Sub Basins
Parcels
Need Easments from Parcel Owners
Feet
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Data Sources: Fill in the name of the data sources used in this map including aerial imagery.
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.
M1
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MT7
L1
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L3
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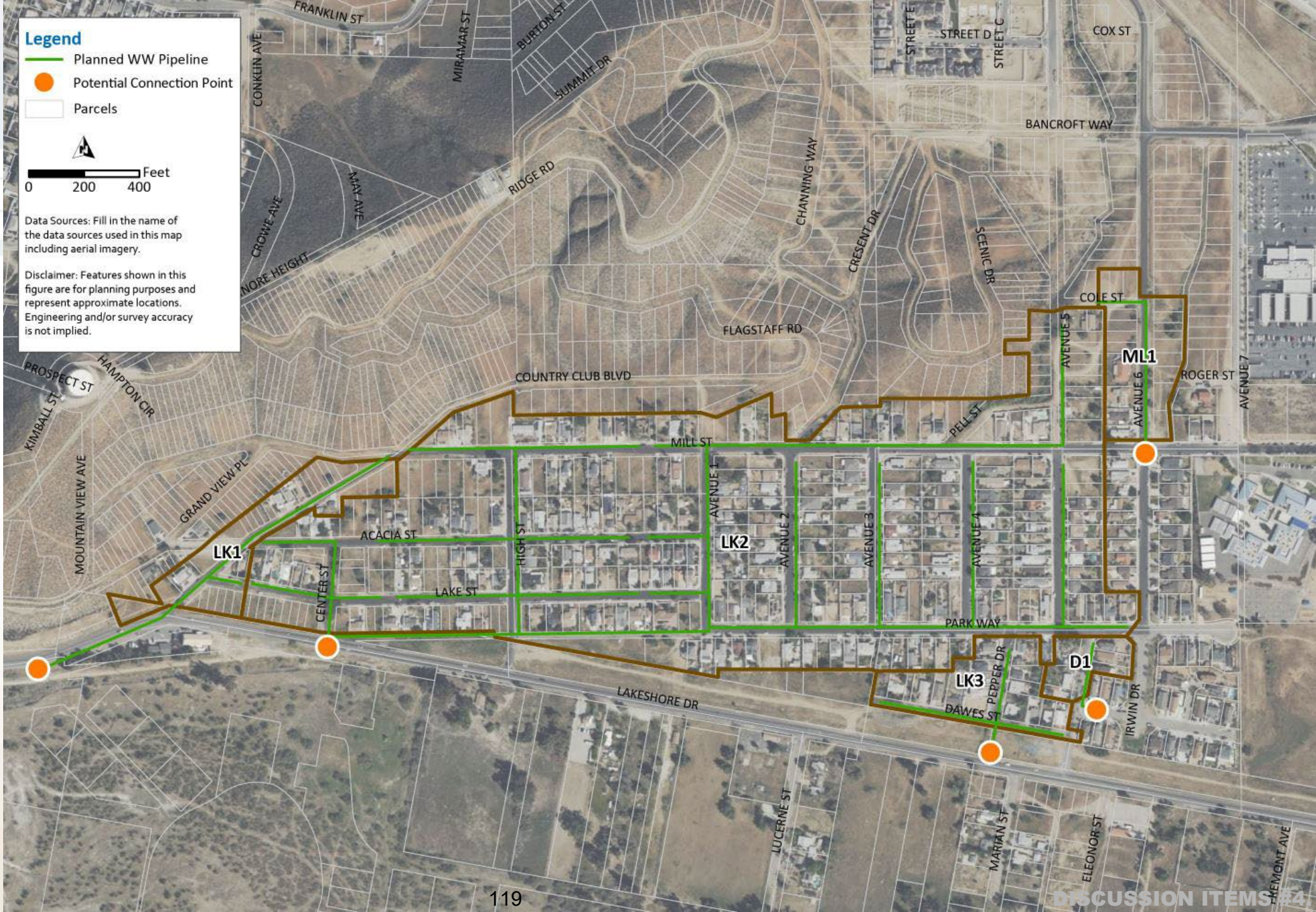
MALAGA RD
SYLVESTER RD
MARIPOSA RD
LIBERTA RD
LAKEVIEW TER
SEDCO BLVD
LA GENESA DR
OKAY RD
WILDEMAR RD
VALLEY VIEW AVE
MESA DR
MUSCATEL RD
OLIVE ST
VINE ST
APRICOT LN
LEWIS ST
LIME ST
ORCHARD ST
EQUAT ST
LEMON ST
LAGO DR
WAGON RIM CT
LAGO VISTA LN
DOROTHY LN
CEREAL ST
CORYDON ST
HEMPEL ST
GRAPE ST
SEDCO HEIGHTS DR
SEDCO VIEW DR
HOLT WAY
SHERI LN
GRAPE SPUR LN
VICTORIAN LN
ORANGE ST
WINSTREE AVE
AUTO CENTER DR
LAKEVIEW DR
ROMONA VISTA TERRACE DR
MISSION TRL
STADIUM
SCOREBOARD
SLIDER
RAWLINGS WAY
MAJOR LEAGUE
TAILGATE
INFIELD
MASCOT
GRAND SLAM
HIDDEN TRL
SYCAMORE
TREE HOUSE
BLACK OAK
HIBISCUS
SASSAFRAS
SALTBUSH
WILLOW PKWY
CRESCENT AVE

Avenues


Legend
Planned WW Pipeline
Potential Connection Point
Parcels
Feet
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Data Sources: Fill in the name of the data sources used in this map including aerial imagery.
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.
FRANKLIN ST
MIRAMAR ST
BURTON ST
SUMMIT DR
CONKLIN AVE
STREET E
STREET D
STREET C
COX ST
BANCROFT WAY
CHANNING WAY
CRESENT DR
SCENIC DR
RIDGE RD
CROWE AVE
MAY AVE
NORE HEIGHT
FLAGSTAFF RD
COLE ST
AVENUE 5
ML1
AVENUE 6
ROGER ST
AVENUE 7
PROSPECT ST
HAMPTON CIR
KIMBALL ST
COUNTRY CLUB BLVD
MILL ST
PELL ST
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GRAND VIEW PL
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PARK WAY
LK3
D1
PEPPER DR
IRWIN DR
DAWES ST
LAKESHORE DR
LUCERNE ST
MARIAN ST
ELEONOR ST
FREMONT AVE

Consultant Outreach

- New Project – Staff Conducted Extensive Outreach
- 20 Firms Contacted
- June 30 - 24 representatives attend presentation
- July 7 - 8 consultant 1:1 meetings
- July 19 - RFP released
- September 6 - 1 proposal received

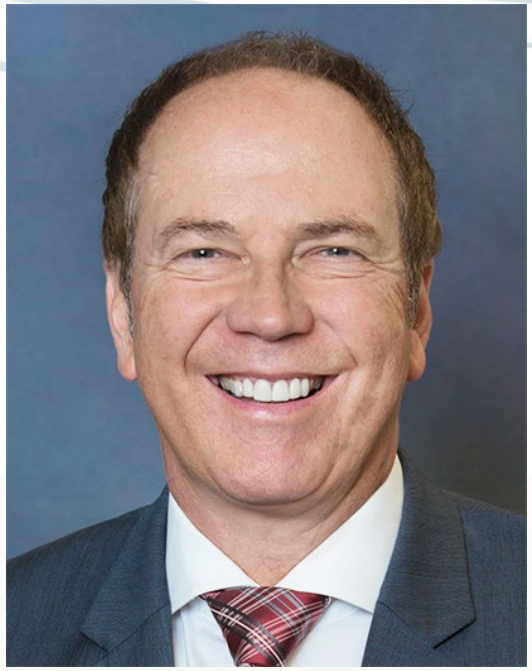
Carollo's Expertise and Team

- Successfully completed two similar projects
  - Hi-Desert Sewer Phase 1
  - Los Oso Septic to Sewer

CAL VADA SURVEYING, INC.

KSE DISABLED VETERAN-OWNED CONSTRUCTION COMPANY UNDERGROUND UTILITIES

CELEBRATING 35 YEARS Ninyo & Moore

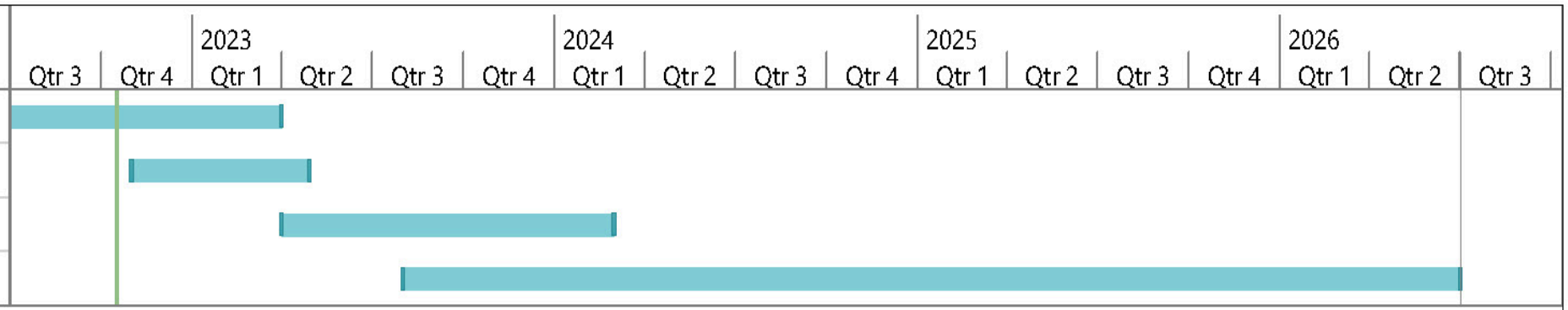


Jeff Thornbury, PE
Principle-in-Charge

Andrew Frost, PE
Project Manager

Schedule

ID	Task Mode	Task Name
1		IS/MND
2		Preliminary Design
3		Final Design
4		Construction



Contract Breakdown

Project	Phase 1 – Preliminary Design Cost	Phase 2 – Final Design Cost (Optional Award)	Total Cost
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Avenues	$379,464	$854,581	$1,234,045
Total	$1,249,891	$2,940,294	$4,190,185

- Phase 1 costs covered under Planning Application
- Phase 2 only upon State Approval of Construction Application

Staff Recommendation

- Award PSA to Carollo in the amount of $4,190,185
- BOD Consider at October 27, 2022 meeting
- Proceed with Phase 1 Scope of Work

Elsinore Valley Municipal Water District

Sedco Hills and Avenues Septic to Sewer Conversion Project

Public Outreach Approach and Implementation

Elsinore Valley Municipal Water District

California Water Boards
State Water Resources Control Board
Regional Water Quality Control Boards

Clean Water
State Revolving Fund

Goals

- Research, identify and understand needs of community
- Connect with community-based organizations
- Community outreach, education and engagement
- Digital and in-person outreach tactics
- Provide the community with transparency throughout the project
- Gain community acceptance and buy-in
- Track and measure success

Outreach To Date

- Kick-off Meeting
- Developed Public Outreach Plan
- Conducting Initial Research and Ascertainment
- Identified Key Stakeholders
- Set up Project Helpline
- Established Project Email
- Developing Educational Materials

Next Steps

- Direct Mailers
- Public Survey
- Project Website
- Community-Based Organizations
- Door-to-door Outreach
- School Outreach
- Project Banners
- Social Media Campaign
- Town Hall

Timeline

October

- Powerpoint
- Postcard
- Fact Sheet
- FAQ Sheet
- Project Site
- Community Survey

November

- Community-Based Organizations
- Door-to-door Outreach
- School Outreach
- Social Media Campaign
- Project Banners
- Town Hall

Elsinore Valley Municipal Water District

California Water Boards

Clean Water State Revolving Fund

Contact Information

(951) 200-4136

construction@evmwd.net

Greg Morrison, EVMWD Project Manager





Elsinore Valley Municipal Water District

California Water Boards

Clean Water State Revolving Fund