JOINT SPECIAL MEETING AGENDA
BOARD OF DIRECTORS/CUSTOMER ADVISORY COMMITTEE
CITRUS HEIGHTS WATER DISTRICT
JUNE 29, 2021 beginning at 6:30 PM

DISTRICT ADMINISTRATIVE OFFICE
6230 SYLVAN ROAD, CITRUS HEIGHTS, CA

PHONE CALL IN: (253) 215-8782
PHONE MEETING ID: 859 7994 0917
COMPUTER AUDIO/LIVE MEETING PRESENTATIONS: https://us06web.zoom.us/j/85979940917

In compliance with the Americans with Disabilities Act, if you have a disability and need a disability-related modification or accommodation to participate in this meeting, please contact the General Manager at (916) 725-6873. Requests must be made as early as possible, and at least one full business day before the start of the meeting.

CALL TO ORDER:

Upon request, agenda items may be moved to accommodate those in attendance wishing to address that item. Please inform the General Manager.

ROLL CALL OF DIRECTORS:

PLEDGE OF ALLEGIANCE:

VISITORS:

PUBLIC COMMENT:

The Public shall have the opportunity to directly address the Board on any item of interest to the public before or during the Board's consideration of that item pursuant to Government Code Section 54954.3. Public comment on items of interest within the jurisdiction of the Board is welcome. The Presiding Officer will limit comments to three (3) minutes per speaker.

(A) Action Item (D) Discussion Item (I) Information Item

BUSINESS:

B-1. Discussion and Possible Action to Approve the Project 2030 Water Main Replacement Study (A)

Recommendations:

1. Board to consider the CAC recommendation to adopt the Project 2030 Study, which includes revised Alternative 5.4 as the strategy for water main replacements.
2. Board to provide consensus direction concerning the accompanying funding target specified in this Study.
3. Board to direct CHWD to develop an education and public engagement strategy supporting the adoption and implementation of Project 2030.

DIRECTOR'S AND REPRESENTATIVE'S REPORTS (I):

D-1. Other Reports.

ADJOURNMENT:

CERTIFICATION:
I do hereby declare and certify that this agenda for this Special Meeting of the Board of Directors of the Citrus Heights Water District was posted in a location accessible to the public at the District Administrative Office Building, 6230 Sylvan Road, Citrus Heights, CA 95610 at least 24 hours prior to the special meeting in accordance with Government Code Section 54956.

Brittney Moore

Dated: June 17, 2021

Brittney Moore, Management Analyst/Deputy Board Clerk

CITRUS HEIGHTS WATER DISTRICT

DISTRICT STAFF REPORT TO BOARD OF DIRECTORS
JUNE 29, 2021 MEETING

SUBJECT : DISCUSSION AND POSSIBLE ACTION TO APPROVE THE PROJECT 2030 WATER MAIN REPLACEMENT STUDY
STATUS : Action Item
REPORT DATE : June 10, 2021
PREPARED BY : Missy Pieri, Director of Engineering/District Engineer

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OBJECTIVE:
Consider the Project 2030 Water Main Replacement Study and discuss next steps.

BACKGROUND AND ANALYSIS:

Introduction and Background
The Citrus Heights Water District (District) was formed in the 1920's, initially as an irrigation district. As the area has urbanized, the District has grown to a near build-out service area of over 12 square miles. During the urban development, between 1960 and 1985, the majority of the District's infrastructure was installed by private developers and inspected by District staff. These water mains became donated assets to the District, and the District became responsible for operating, maintaining, and planning the replacement of these facilities. As the District looks ahead, a large amount of water main replacements is anticipated beginning in the year 2030 and carried forward for several years, as the water mains installed in the 1960's reach 70 years old, the average life of a typical water main.

In order to address the District's significant increase in water main replacements, the Citrus Heights Water District Board of Directors (Board) directed District staff to prepare a technical report (Project 2030 Water Main Replacement Study) to include a water main replacement strategy as well as a funding, phasing, implementation and public engagement strategy.

To ensure that the Project 2030 Water Main Replacement Study (Study) addresses the needs and input from the community, the District formed the Customer Advisory Committee (CAC). The 24-member CAC was selected by the Board through an application process to ensure customers from a variety of backgrounds and neighborhoods across the District were represented. The CAC consists of 15 residential, 4 commercial, and 4 institutional members and a District Board member. One of the CAC's responsibilities is to develop a recommendation for consideration by the Board for the District's water main replacement strategy.

Project 2030 Water Main Replacement Study
At the October 18, 2017 Board Meeting, the Citrus Heights Water District (CHWD) Board of Directors approved the Professional Services Agreement with Harris & Associates for the Study.

The building blocks of the Study include:

- Asset Inventory
- Water Demand Forecast
- Water Main Replacement and Costs
- Water Main Replacement Phasing Plan
- Funding Strategy/Rate Options Analysis
- Implementation Plan
- Market Research on the final 2 options

The Project Team presented these various building blocks to the CAC in Technical Memorandums (TMs) over ten meetings/workshops, including an orientation, from March 2018 to June 2021. The topics of the TMs along with any other key discussions presented at the workshops are summarized in Table 1.

Table 1
Summary of Customer Advisory Committee Workshops

Workshop #	Technical Memorandum No./Report & Title	Key Discussions
Orientation		Orientation
1	-	Presented District history, current operations & budget, overview of Project 2030 Study, & selected CAC Chair & Vice Chair.
2	TM No. 1: Water Demand Forecast	Provide overview of existing and future water demands for water main sizing.
3	TM No. 2: Infrastructure Challenges TM No. 3: Water Main Assessment	Discussed challenges that will likely impact the replacement of water mains. Discussed key assumptions & methodologies for water main assessment & replacement.
4	TM No. 4: Spending and Funding Options	Reviewed 21 Spending & Funding Alternatives.
5	TM No. 4: Spending and Funding Options	Completed further analysis of the 21 Alternatives and the CAC chose the top 5 Alternatives.
6	TM No. 4: Spending and Funding Options	Reviewed the top 5 Alternatives and the CAC chose the top 2 Alternatives. Provided an overview of market research.
7	TM No. 4: Spending and Funding Options	Reviewed the top 2 Alternatives. Received results of the market research of the top 2 Alternatives. The CAC voted Alternative 5.4 as the preferred Alternative.
8	TM No. 6: Phasing Plan TM No. 7: Implementation Plan	Reviewed Phasing & Implementation Plan for the preferred Alternative.
9	Draft Final Project 2030 Study	Reviewed the Study, discussed next steps, and provided an update of the preferred Alternative.

These Technical Memorandums along with 1) a summary of each workshop; 2) an overview of the CAC selected preferred Alternative 3) update of the CAC selected preferred Alternative and 4) next steps were compiled into the Study.

The key findings and recommendations of the Study are as follows:

- The CAC selected Alternative 5.4 as the preferred Alternative at the June 11, 2019, Workshop 7, which is summarized in Table 2.
- Since Workshop 7, CHWD's financial position has improved which changed the Project 2030 funding strategy. The revised CAC selected Alternative 5.4 is summarized in Table 2.

Table 2
Project 2030 Alternative 5.4 Comparison

Alternative	Funding Description	Project Cost (2018 $)	Average Annual Spending (2018 $)	Prefunding	Monthly Surcharge[1]	System Replaced by 2080
Original 5.4 (from Workshop 7)	PAYGO with prefunding and 4% debt	$390 million	$ 7.8 million	$22.5 million	$8.63	72%
Revised 5.4	PAYGO with prefunding and 4-6% debt	$390 million	$7.8 million	**$12.1 million**	**$5.25**	72%
Difference	—	—	—	$10.3 million	($3.38)	—

Notes: PAYGO = pay-as-you-go

[1]Monthly surcharge varies based on meter size. The amount shown is for a 1-inch water service.

- A new designated reserve (Water Main Replacement Reserve) was created to manage the prefunding dollars and will be a dedicated funding source for Project 2030.
- The District developed a communication and customer engagement strategy to inform customers about the technical and financial aspects of the project.
- An implementation and phasing plan was developed for the water main replacement.

On June 8, 2021, the Project Team presented a revised Alternative 5.4 to the CAC, which included an updated financial program. The CAC voted to:

1. Endorse and recommend the Project 2030 Study, which includes the revised Alternative 5.4 as the strategy for water main replacements, including the accompanying funding target specified in this Study.

2. Forward the above policy recommendations to the CHWD Board for discussion and possible action.

3. Recommend that the CHWD Board direct the development of an education and public engagement strategy supporting the adoption and implementation of Project 2030.

Next Steps
Should the Board approve the Study as proposed by the CAC, the next steps are as follows:

1. The Project 2030 prefunding component as outlined in the Study will be included as part of the 2022 budget development process for Board consideration.

2. An education and public engagement strategy, supporting the adoption and implementation of Project 2030, will be implemented.

3. As part of the Study's Project Preparation phase, a condition assessment of the District's transmission mains will begin in 2022 (2022 Strategic Planning Item - Goal: Manage the Efficient Improvement of and Reinvestment in District Infrastructure and Facilities, Objective 5).

RECOMMENDATION:
The CAC's recommendations for Board consideration are as follows:

1. Board to consider the CAC recommendation to adopt the Project 2030 Study, which includes revised Alternative 5.4 as the strategy for water main replacements.

2. Board to provide consensus direction concerning the accompanying funding target specified in this Study.

3. Board to direct the CHWD to develop an education and public engagement strategy supporting the adoption and implementation of Project 2030.

ATTACHMENTS:
Final Project 2030 Study (with Attachments)

Final Study

Project 2030 Water Main Replacement

June 29, 2021

Prepared for:

CITRUS HEIGHTS WATER DISTRICT

PROJECT 2030
WATER MAIN REPLACEMENT

6230 Sylvan Road
Citrus Heights, California 95610

Prepared by:

Harris & Associates

3620 American River Drive, Suite 175
Sacramento, California 95864

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Acronyms and Abbreviations

AB	Assembly Bill
ACP	Asbestos cement pipe
AWWA	American Water Works Association
Board	Citrus Heights Water District Board of Directors
CAC	Customer Advisory Committee
CHWD or District	Citrus Heights Water District
CIP	cast iron pipe
CML	cement mortar-lined
CMLC	cement mortar-lined and coated steel
COF	consequence of failure
DIP	cast/ductile iron pipe
DW	double walled
FY	fiscal year
GIS	geographic information system
GPCD	gallons per capita daily
GPD	gallons per day
LF	linear feet
LOF	likelihood of failure
LP	linear project
MGD	million gallons per day
NA	not applicable
PA	project area
PAYGO	pay-as-you-go
Project 2030 or project	Project 2030 – Water Main Replacement
Study	Project 2030 – Water Main Replacement Study
PVC	polyvinyl chloride
RWA	Regional Water Authority
SB	Senate Bill
SJWD	San Juan Water District

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Section 1 Executive Summary

The Citrus Heights Water District (CHWD or District) is currently using a 30-year Capital Improvement Plan that was developed in 1998 as a key planning tool to determine annual capital improvement projects, which include water main replacements. Because the plan is nearing the end of its term, the District is undertaking a process to review and refine its long-term water main replacement program: Project 2030 – Water Main Replacement (Project 2030 or project). Key elements of this Project 2030 – Water Main Replacement Study (Study) are shown on Figure 1-1, Project 2030 – Water Main Replacement Study Overview, and include (1) asset inventory and project polygon development; (2) water demand forecast; (3) water main assessment; (4) water main replacement phasing options and the preferred option; (5) project cost estimates; (6) funding strategy, including water rate options and debt service options; and (7) Implementation Plan.

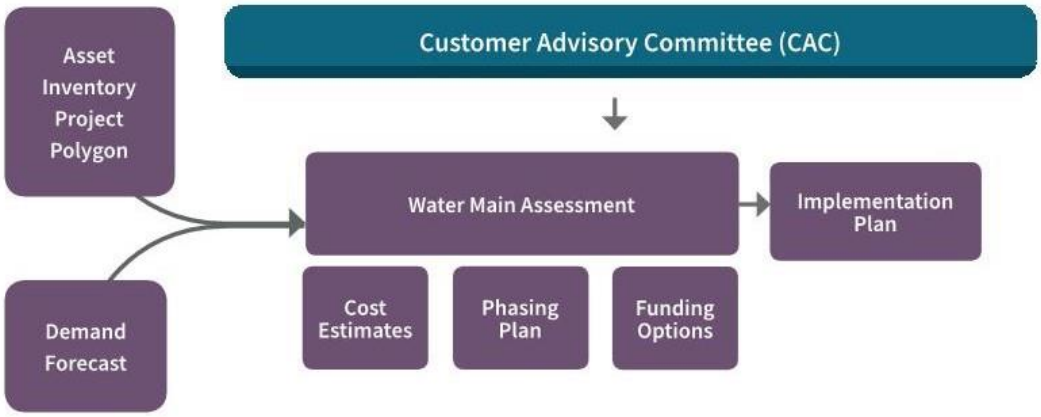

Figure 1-1. Project 2030 – Water Main Replacement Study Overview

1.1 Customer Advisory Committee

To ensure that the alternatives considered in this Study address the needs and input from the community, the CHWD formed the Customer Advisory Committee (CAC). The 24-member CAC was selected by the CHWD Board of Directors (Board) through an application process to ensure customers from a variety of backgrounds and neighborhoods across the District were represented. The CAC met 10 times during the Project 2030 term from March 2018 to June 2021.

1.2 Water Demand Forecast

Current water demands and usage trends were reviewed to estimate future water demands, understanding that the current and projected future water demands are "building blocks" for the water main assessment, Phasing Plan, cost estimates, and Implementation Plan.

Key assumptions used in this analysis include population change, land development, and predicted future water conservation levels:

- **Population:** The 2017 population in the CHWD was 69,964. In 2050, based on assumed population growth rates, the population is projected to be approximately 82,500.
- **Land Use:** Approximately 500 acres of vacant land are in the CHWD. In 2050, based on assumed population growth and a small increase in population density, approximately half of the vacant land (250 acres) is projected to be developed into single-family residences. Additionally, it is assumed that approximately 125 acres of commercial land will be redeveloped into multifamily residences.
- **Mandated Water Conservation:** Water efficiency is driven by state legislation and regulations. These regulations are currently imposed on water agencies and not on individual water users; however, these regulations are expected to lead to more efficient water use throughout the state and the CHWD. This factor is key in determining future water use in the District.
- **Future Water Projections:** The overall result of population increases, property development and redevelopment, and water efficiency forecasts a decrease in water use. This analysis determined future water demand will decrease between the years 2017 and 2050 to an estimated average daily water use range of 7.8 to 9.5 million gallons per day (MGD), representing an overall decrease of 3 percent to 20 percent since 2017.

By developing water use projections (including how much water will flow through the system) in different areas of the CHWD service area, the operational lifespan for different parts of the system can be estimated. In addition, future pipeline size will be determined based on these water demand projections.

1.3 Water Main Assessment

A desktop risk assessment was developed using Innovyze software InfoMaster (now called InfoAsset Planner). The risk assessment used a conventional practice of considering factors that contribute to the likelihood of failure (LOF) and consequence of failure (COF) of any given pipeline segment. Once the factors for both LOF and COF were determined, a scoring system was developed for each category, and factors were combined to create a total risk score. The factors and their weighting are summarized in Table 1-1.

Table 1-1. Likelihood of Failure and Consequence of Failure Factors and Weighting

LOF Factor	Weighting	COF Factor	Weighting
Pipe Age/Remaining Useful Life/ Survival Probability	50%	Transmission Pipelines	25%
Pipe Material	25%	Pipe Size	20%
Historical Main Breaks	15%	Pipe Flow	20%
Stream Crossings (Vulnerability)	10%	Critical Customers	10%
—	—	Stream Crossings (Environmental Impact)	10%
—	—	High Traffic Areas	10%
—	—	Difficult Access Areas (Backyard Mains)	5%
LOF Total	**100%**	**COF Total**	**100%**

Notes: COF = consequence of failure; LOF = likelihood of failure

The total risk scores were then used to create a prioritized Phasing Plan. The initial findings of this risk assessment indicate that the transmission mains are more vulnerable than non-transmission mains and that the COF of transmission mains are the most significant.

1.4 Replacement Cost Estimates

Planning-level cost estimates for water main replacement were developed and include construction costs and "other project costs" for engineering and management. Total replacement costs are high, but strategic investment and a proactive approach to water main replacement have much lower overall costs compared to reactive repairs and replacements due to leaks and breaks.

The BNi Public Works Costbook was used to estimate construction costs for water main replacement. Unit costs range from $1.2 million per mile for 6-inch pipes to $5.6 million per mile for 42-inch pipes.

After the addition of appurtenance (fire hydrants, etc.) costs and engineering and management costs, the total estimated system replacement cost is $540 million (in 2018 dollars).

1.5 Customer Advisory Committee Alternatives Consideration

Understanding that the total system replacement is not necessary, 21 spending and funding alternatives were evaluated and presented to the CAC in four workshops (workshops 4 through 7; see Sections 3.2 for details). The CAC workshops are available to view on-demand on YouTube at the CHWD's channel. Key considerations were compared for each alternative (see Appendix A for this analysis).

1.5.1 Spending Options

Seven different levels of spending between the years 2030 and 2080 were developed. The first spending option is to remain at the current spending level, which is $2 million annually (in 2018

dollars). This spending option represents the highest relative risk. The other bookend of the spending options is a $10.2 million annual rate of spending (in 2018 dollars). This represents the lowest relative risk because 94 percent of the water mains would be replaced by the year 2080.

1.5.2 Funding Options

There are many ways to fund ongoing capital needs: pay-as-you-go (PAYGO), debt financing, grants (when available), and advance funding (by appropriating available funds today for future needs). When determining available funding options for the seven different levels of spending, certain spending options include multiple funding options, including prefunding, debt financing, or a combination of both. As such, as the spending levels increased between spending options, up to four funding options were considered and compared.

1.6 Phasing Plan

A prioritized Phasing Plan was developed for the preferred spending and funding alternative (Alternative 5.4) chosen by the CAC at the June 11, 2019, workshop. However, since that time, the CHWD's financial position has improved along with the economic disruption of the COVID-19 pandemic, requiring that the Project 2030 funding strategy be updated. Below summarizes the Revised Alternative 5.4 based on the above conditions (Table 1-2).

Table 1-2. Project 2030 Revised Alternative 5.4

Alternative	Funding Description	Project Cost (2018 $)	Avg. Annual Spending (2018 $)	Prefunding	Monthly Surcharge[1]	System Replaced by 2080
Revised 5.4	PAYGO with prefunding and 4–6% debt	$390 million	$7.8 million	$12.1 million	$5.25	72%

Notes: PAYGO = pay-as-you-go

[1] Monthly surcharge varies based on meter size. The amount shown is for a 1-inch water service.

The majority of the Revised Alternative 5.4 funding elements have not changed from the Original. The main difference between the Original and the Revised Alternative 5.4 is the prefunding amount. The Revised Alternative 5.4 is projected to need less prefunding—$12.1 million versus the $22.5 million needed in the Original Alternative 5.4, which is a 46 percent reduction.

In addition, the Original Alternative 5.4 monthly surcharge amount was calculated at $8.63 for a 1-inch service to generate a prefunding revenue of $22.5 million. The Revised Alternative 5.4 will result in a monthly surcharge of $5.25 to generate a prefunding revenue of $12.1 million. This is a reduction of 39 percent.

Through the District's geographic information system (GIS) analysis and discussions with District staff, the water main replacements were broken into three linear projects (LPs) and 30 geography-based project areas (PAs). Implementation of Project 2030 using PAs is intended to take advantage

of economies of scale and to reduce disruption associated with construction by completing all pipeline replacements in one PA before working on another PA.

These projects were prioritized using the asset management model and grouped to meet the annual and decade spending of $7.8 million and $78 million, respectively.

Table 1-3 summarizes the per-decade estimated replacement costs.

Table 1-3. Water Main Replacement Costs per Decade

Decade Ending	Estimated Cost (2018 $)
2040	$77,452,500
2050	$76,810,000
2060	$79,589,000
2070	$77,423,000
2080	$76,118,000
Total	**$387,392,500**

1.7 Subsequent Actions and Next Steps

Following are actions and next steps for the project:

- A new designated reserve (Water Main Replacement Reserve) was created where prefunding and surcharge dollars will be placed.
- A communication and customer engagement strategy was developed to inform customers about the technical and financial aspects of the project on an ongoing basis and is described in Section 3 of this Study.
- A Funding and Expenditure Plan, including prefunding, has been identified and is incorporated into this Study. If the Board amends this existing option, further work on the Funding and Expenditure Plan will be required.
- The CAC reviewed the changes to Alternative 5.4 and provided feedback. The CAC voted on and endorsed the Revised Alternative 5.4. The Final Study will be presented for the Board's consideration and possible action to implement in 2022. More specifically, following are the recommended policy actions and implications from this Study:
    1. The Board to consider adoption of this Study, which includes the Revised Alternative 5.4 as the strategy for water main replacements
    2. The Board to provide consensus direction concerning the accompanying funding target specified in this Study
    3. The Board to direct the CHWD to develop an education and public engagement strategy supporting the adoption and implementation of Project 2030

If the Board decides to implement any rate increases or surcharges as they relate to Project 2030, the District will need to issue a Proposition 218 notice in 2021 for fiscal year (FY) 2022.

1.8 Implementation Plan

An Implementation Plan was developed for Alternative 5.4. Project preparation (2020–2029) and project implementation (2030–2079) include the following actions, with many of the actions occurring simultaneously:

- Asset management model refinement
- Pipe inspection, including stream crossings
- Hydraulic model coordination
- Financial planning
- Communications and customer engagement
- Coordination of capital planning with other jurisdiction
- Key water utility management trends monitoring
- Activity levels and resource needs projections

Section 2 Background

The CHWD is in the northeastern portion of Sacramento County and southern Placer County, California, approximately 15 miles northeast of Downtown Sacramento. The District was formed on October 25, 1920, under Division 11, the Irrigation District Act of the State of California Water Code. A three-member Board governs the District. Beginning in 2020, Board members are elected by District in the CHWD service area.

The CHWD provides water service to portions of the Cities of Citrus Heights and Roseville and portions of the unincorporated communities of Orangevale, Fair Oaks, and Carmichael in Sacramento County and a portion of unincorporated Placer County. The District initially used American River surface water supply from the North Fork Ditch Company to serve its customers. The customer base was initially composed of small family farms and limited urban areas. Concurrent with the completion of Folsom Dam in 1956, the San Juan Water District (SJWD) was formed and acquired North Fork Ditch Company's facilities and water rights. The SJWD also contracted for additional water from the U.S. Bureau of Reclamation and the Placer County Water Agency. The CHWD now receives surface water from the American River through the SJWD. Along with the CHWD, the SJWD provides treated surface water to Fair Oaks Water District, Orange Vale Water Company, portions of the City of Folsom, and the SJWD service area. These agencies are collectively referred to as the "SJWD Family of Agencies" or "wholesale customer agencies." The SJWD also provides treated surface water to the Sacramento Suburban Water District and the City of Roseville. The CHWD continues to supplement its surface water supply with groundwater for readiness-to-serve purposes and to meet peak, pressure, shortage, and emergency demands.

In the early years of the District, residential and agricultural growth were nominal. Since then, urban development has flourished to such a degree that, currently, no significant agricultural water use occurs in the District. The District is nearly built out and now serves a predominantly residential customer base.

It is important to note that the majority of urban development in the CHWD service area occurred between 1960 and 1985. Water mains were installed by private developers and inspected by District staff. These water mains became donated assets to the District, and the CHWD became responsible for operating, maintaining, and planning the replacement of these facilities. As the District looks ahead, a large amount of water main replacements may be needed beginning in the year 2030 and carried forward for several years as the water mains installed in the 1960s reach 70 years old.

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Section 3 Customer Advisory Committee

3.1 Background

To ensure that the alternatives considered in this Study address the needs and input from the community, the CHWD formed the CAC. The formation was adopted by Resolution No. 04-2018 by the Board on March 21, 2018. The CAC works with the CHWD staff and technical consultants to evaluate project options while considering key factors, such as financial and technical issues. After considering policy alternatives, the CAC will present its input on strategies to the Board.

3.1.1 Purpose

The purpose of the CAC is to provide customer feedback on various key District projects, with one project being this Study. As stated in Resolution No. 04-2018:

The general purpose of the CAC is to consider various alternatives, funding options and recommendations to develop a formal recommendation for CHWD's water main replacement strategy for consideration by the CHWD Board of Directors.

3.1.2 Customer Advisory Committee Selection and Structure

The 24-member CAC was selected by the Board through an application process to ensure customers from a variety of backgrounds and neighborhoods across the District were represented. The CAC consists of 15 residential, 3 commercial, and 5 institutional members and a CHWD Board member. Institutional members were originally ex-officio, non-voting members. On April 21, 2021, the Board passed Resolution 01-2021, allowing institutional members to vote. This change was implemented for the June 8, 2021, meeting. Table 3-1 includes a list the CAC members and their affiliations, and Figure 3-1, Project 2030 Residential Members, shows the CAC's geographic coverage for residential members. It should be noted that a few CAC members resigned during the Project 2030 term and were replaced by alternate members.

Table 3-1. Customer Advisory Committee Members

Member	Role	Member	Role
Kimberly Berg	Commercial	Richard Moore	Residential
Julie Beyers	Residential	Jenna Moser[1]	Residential
Ray Bohlke	Residential	Richard Moses[2]	Residential
Deborah Cartwright	Residential	Mike Nishimura	Commercial
Katherine Cooley	Institutional	Cyndi Price	Institutional
Wes Ervin	Commercial	Chris Ralston	Institutional
Michael Goble	Residential	Ray Riehle	CHWD Director
Suzanne Guthrie	Residential	Pamela Shulz	Residential
Andrew Johnson	Residential	Javed Siddiqui	Residential
Doug MacTaggart	Residential	Alan Utzig	Residential
Dave Mitchell	Institutional	Noe Villa	Institutional
James Monteton	Residential	Debra Walker	Residential

Notes: CHWD = Citrus Heights Water District

[1] Chair

[2] Vice Chair

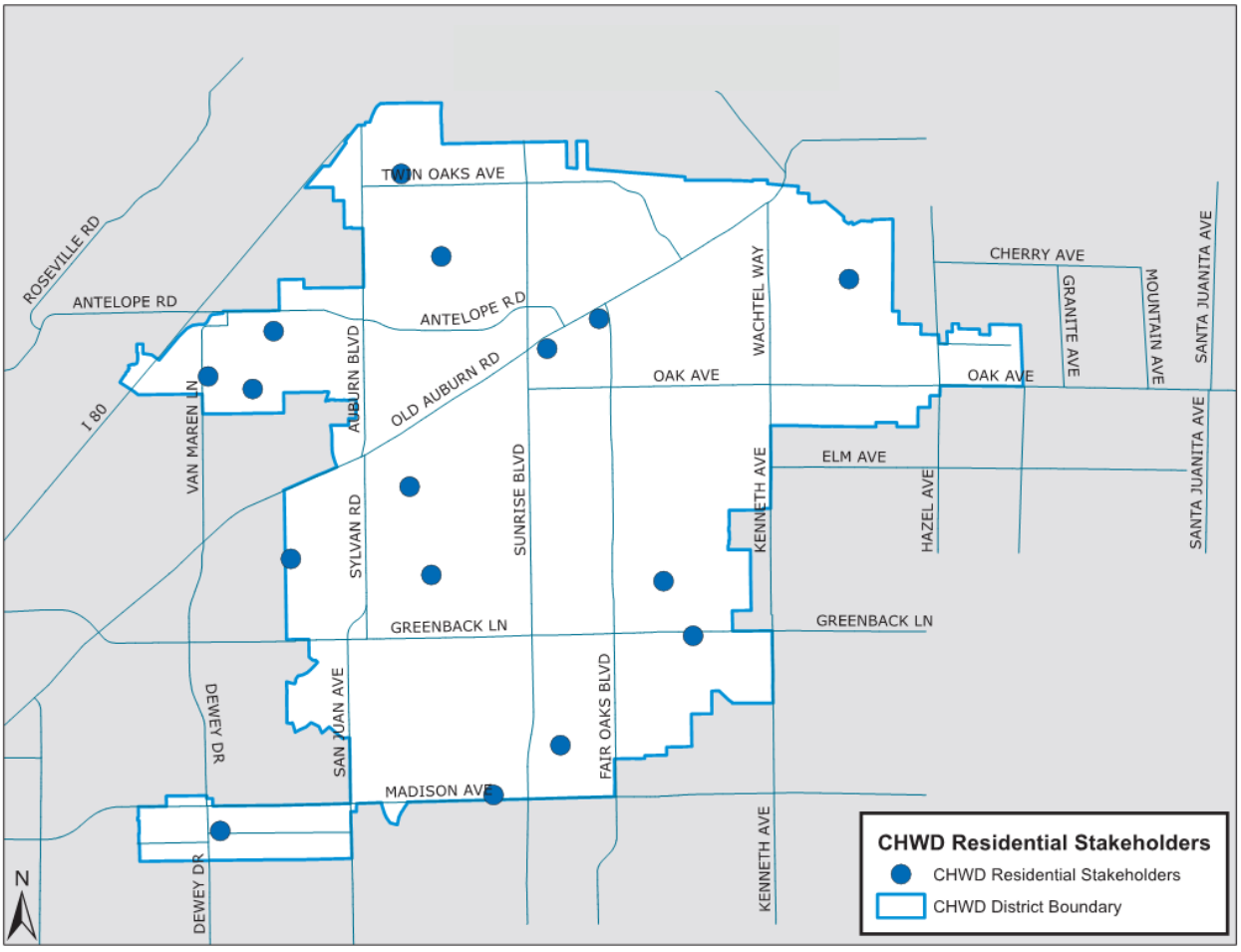

Figure 3-1. Project 2030 Residential Members

3.1.3 Responsibilities of the Customer Advisory Committee

The CAC's responsibilities set forth in Resolution No. 04-2018 specific to the Study are summarized below:

- Diligently review all documents and materials provided by the CHWD general manager or the general manager's designee relevant to the purpose in Section 3.1.1
- Serve as a forum for public input and feedback on issues related to the purpose in Section 3.1.1
- Develop a timely written recommendation for consideration by the Board for the CHWD's water main replacement strategy
- Provide stakeholder input on the development of the Meter Replacement Program
- Abide by relevant policies and procedures in District Policy No. 2100, Standards of Conduct for Directors and Officers, including participating in any training and making any disclosures that the CHWD deems necessary to ensure compliance with all laws

3.1.4 Customer Advisory Committee Information

Information sent to the CAC and from the CAC workshops, such as agendas and minutes, handouts, technical memoranda, and videos of the CAC workshops, is documented and stored in various formats for future reference. Below is a list of where information can be found on the internet:

- A dedicated webpage on the CHWD's website (http://chwd.org/customer-advisory-committee). The page is regularly updated with workshop information.
- A digital document library (https://chwd.org/customer-advisory-committee/) with the Board Resolution No. 04-2018, CAC participant directory, and Project 2030-related documents.
- The CHWD YouTube channel (https://www.youtube.com/channel/UCm5gveI3NDqqJ9W3HZhkjDQ) where past Project 2030 workshop recordings and other District videos are saved.

3.2 Project 2030 Role

The CAC met 10 times during the Project 2030 term from March 2018 to June 2021. Before the first workshop, the CAC attended an orientation that provided District background, Brown Act information, and CAC process and logistics. Figure 3-2, Project 2030 Customer Advisory Committee Workshop Overview, provides an overview of the workshops. Note that some of the workshop dates changed; however, the general layout of the workshops remained the same. The main role of the CAC for the Study is to bring forth their recommendation to the Board for consideration.

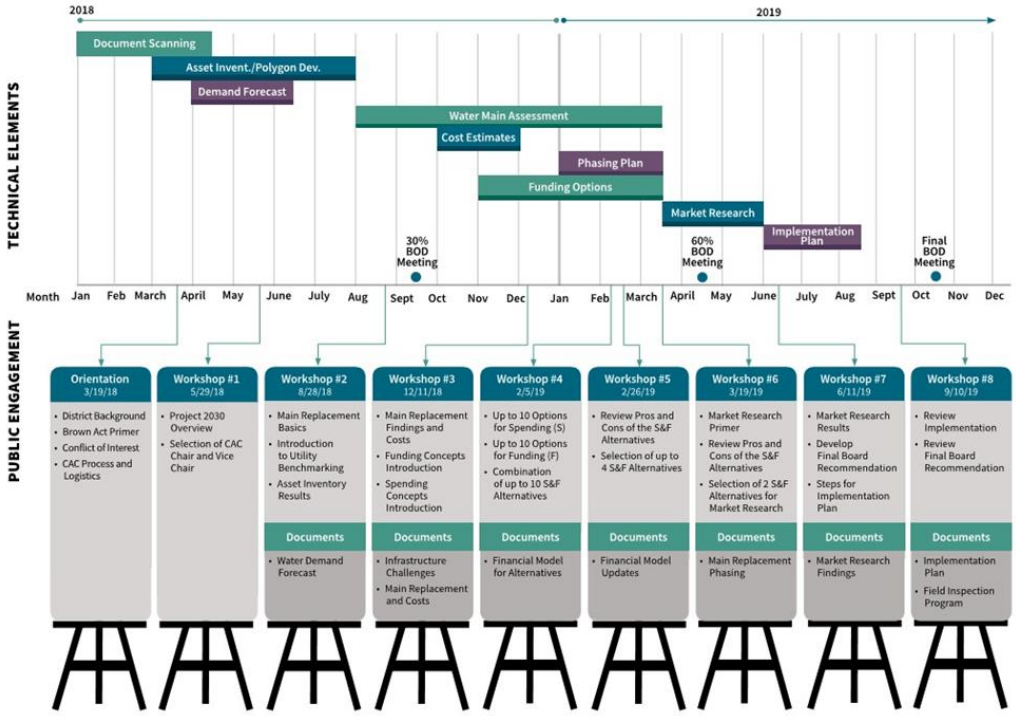

Figure 3-2. Project 2030 Customer Advisory Committee Workshop Overview

Below are summaries of the CAC workshops. Complete workshops are provide in Appendix B of this Study.

3.2.1 Workshop 1: May 29, 2018

The Project Team provided background information on the District and Project 2030. This information was provided to help the CAC members better understand the District's history and current operations and Project 2030.

Information on the Capital Improvement Plan, well development, water meter replacement, and pipe replacement was presented. A display of pipes, fittings, and equipment illustrated typical water connection infrastructure and materials.

3.2.2 Workshop 2: August 28, 2018

The Project Team provided a briefing on the water demand forecast, summarized in Technical Memorandum No. 1, Water Demand Forecast. This memorandum considers key assumptions, such as population change, land development, legislative and regulatory mandates, and other factors that could impact future District-wide water usage. The water demands will be used to determine future water main sizes proposed to be replaced and will assist in the prioritization of water main replacements.

3.2.3 Workshop 3: December 11, 2018

The Project Team provided a briefing on infrastructure challenges summarized in Technical Memorandum No. 2, Infrastructure Challenges, and the water main assessment summarized in Technical Memorandum No. 3, Water Main Assessment.

Technical Memorandum No. 2 identifies the infrastructure challenges, water supply challenges, and regulatory challenges that will likely impact water main replacement beginning in 2030 and beyond.

Technical Memorandum No. 3 summarizes the key assumptions and methodology used to create the water main assessment and replacement cost estimates. This information will serve as the foundation for developing water main replacement phasing options and associated funding strategies.

3.2.4 Workshop 4: February 5, 2019

The Project Team provided a briefing on the spending and funding options summarized in Technical Memorandum No. 4, Spending and Funding Options.

Technical Memorandum No. 4 identifies various spending and funding options and analyzes 21 unique spending and funding alternatives. The key considerations used to evaluate each alternative include but are not limited to the amount of water main replaced, revenue adjustments and fluctuations, and pipe survival probability and relative risk.

At this workshop, CHWD staff reviewed with the CAC each of the 21 unique alternatives and key considerations for each alternative and requested feedback on both Technical Memorandum No. 4 and the alternatives presented.

3.2.5 Workshop 5: February 26, 2019

The Project Team provided a brief background and reviewed previously presented information, including the 21 unique alternatives. Key considerations of each alternative were also reviewed. CAC members were broken into smaller groups to discuss the alternatives in detail. Access to the financial models were provided through computers with preloaded dashboards to better visualize and compare the data discussed in Technical Memorandum No. 4. Each small group had access to (rotating) members of the Project Team, selected their top alternatives, and briefly reported back to the full CAC their reasoning, priorities, and resulting top alternatives. The CAC workshop facilitator gathered and provided a visual summary of the small group selections. Finally, individual voting was used to gain consensus on the top alternatives to move forward to the next CAC workshop on March 19, 2019.

The top alternatives, including the results of the individual voting, are summarized in Table 3-2.

Table 3-2. Voting Results of Top Alternatives

Alternative	Funding Description	Project Cost (2018 $)	Annual Spending (2018 $)	% of System Replaced by 2080	Total Votes
4.4	Prefunding, with debt	$320 million	$6.4 million	59	10
5.2	Prefunding, no debt	$390 million	$7.8 million	72	9
5.4	Prefunding, with debt	$390 million	$7.8 million	72	12
6.4	Prefunding, with debt	$480 million	$9.6 million	89	10
7.4	Prefunding, with debt	$510 million	$10.2 million	94	6

3.2.6 Workshop 6: March 19, 2019

The Project Team facilitated the review of the top five alternatives. The Project Team provided a brief background and presented additional information on the top five alternatives, including key considerations of each alternative. CAC members broke into small groups to discuss the five alternatives in detail. Access to the financial models were provided through computers with preloaded dashboards to better visualize and compare the data. Each group selected its top two alternatives and gave brief reports on each small group's reasoning, priorities, and resulting top alternatives. The CAC workshop facilitator gathered and provided a visual summary of the small group selections. Finally, individual voting was used to select the top two alternatives to move forward for market research testing.

The CAC also received an overview of the market research testing process and schedule, and feedback was requested.

3.2.7 Workshop 7: June 11, 2019

The Project Team facilitated review of the top two alternatives and presented the results of the market research testing (Appendix C) of these alternatives. CAC members indicated their initial informal assessment of the two alternatives. Then, they officially voted for Alternative 5.4 as their top recommendation. The CAC members explained some of their reasons for choosing Alternative 5.4. The CAC determined that Alternative 5.4 will achieve an optimal balance among key factors, including cost to the customer, PAYGO versus debt financing, and percentage of system replaced (72 percent). The Project Team then prepared an Implementation Plan and a Phasing Plan for Alternative 5.4. The Project Team then highlighted the key steps to the Implementation Plan and Phasing Plan.

3.2.8 Workshop 8: September 10, 2019

The Project Team provided a briefing on the preferred alternative Phasing Plan summarized in Technical Memorandum No. 6, Phasing Plan, and Implementation Plan summarized in Technical Memorandum No. 7, Implementation Plan.

Technical Memorandum No. 6 provides a Phasing Plan on which water mains will be replaced and in what order for Alternative 5.4.

Technical Memorandum No. 7 identifies the recommended actions for project preparation leading up to year 2030 and during water main replacement starting in year 2030 and continuing through year 2080. Some actions include field inspections, computer model updates, financial planning, and public engagement.

3.2.9 Workshop 9: June 8, 2021

The Project Team presented the Final Study and provided an update to the CAC on the CAC-selected Alternative 5.4. As stated previously, at the June 11, 2019, Workshop 7, the CAC selected Alternative 5.4 as the preferred option, which has an estimated project cost of $390 million over 50 years. This includes a portion funded through debt (approximately 4–6 percent of total cost), cash/PAYGO (approximately 90 percent of total cost), and prefunding of $22.5 million (approximately 6 percent of total cost). The financial analysis assumed that a Project 2030 surcharge would be implemented starting in FY 2021 to generate the funds required to meet the prefunding target.

However since Workshop 7, a number of events have occurred, improving the CHWD's financial position and requiring that the Project 2030 funding strategy be updated:

- In late 2019 (after the CAC selected Alternative 5.4), the Board approved a rate increase of 11 percent for FY 2020. This Board action provided additional resources for Project 2030 not originally anticipated.
- Due to the hardships and uncertainty in the economy created by the COVID-19 pandemic, the District did not increase rates or implement separate funding for Project 2030 in FY 2021.
- The District successfully ended several budget years in a better net position than projected due to expense control. The PAYGO component of this alternative was bolstered, and less prefunding is required.

The changes above are summarized in Table 3-3.

Table 3-3. Project 2030 Alternative 5.4 Comparison

Alternative	Funding Description	Project Cost (2018 $)	Average Annual Spending (2018 $)	Prefunding	Monthly Surcharge[1]	System Replaced by 2080
Original 5.4 (from Workshop 7)	PAYGO with prefunding and 4% debt	$390 million	$ 7.8 million	$22.5 million	$8.63	72%
Revised 5.4	PAYGO with prefunding and 4–6% debt	$390 million	$7.8 million	$12.1 million	$5.25	72%
Difference	Up to 2%	—	—	$10.3 million	($3.38)	—

Notes: PAYGO = pay-as-you-go

[1] Monthly surcharge varies based on meter size. The amount shown is for a 1-inch water service.

The majority of the funding elements of Alternative 5.4 have not changed. The main difference between the Original and the Revised Alternative 5.4 is the prefunding amount. The Revised Alternative 5.4 is projected to need less prefunding—$12.1 million versus the $22.5 million needed in the Original Alternative 5.4—a reduction of 46 percent.

In addition, the Original Alternative 5.4 monthly surcharge amount was calculated at $8.63 for a 1-inch service to generate prefunding revenue of $22.5 million. The Revised Alternative 5.4 will result in a monthly surcharge of $5.25 to generate prefunding revenue of $12.1 million. This a reduction of 39 percent from the original prefunding estimate.

The CAC voted on and endorsed the following items:

1. Endorse and recommend the Project 2030 Study, which includes the Revised Alternative 5.4 as the strategy for water main replacements, including the accompanying funding target specified in this Study.
2. Forward the above policy recommendations to the CHWD Board for discussion and possible action.
3. Recommend that the CHWD Board direct the development of an education and public engagement strategy supporting the adoption and implementation of Project 2030.

3.3 Subsequent Actions and Next Steps

At the June 17, 2020, Board meeting, the Board approved a new designated reserve (Water Main Replacement Reserve). The prefunding and surcharge dollars will be placed in this reserve on an annual basis and will be a dedicated funding source for Project 2030.

Moreover, all technical memoranda (No. 1 through 7) were compiled to complete this Study. The District developed a communication and customer engagement strategy to inform customers about the technical and financial aspects of the project. The strategy consists of a mix of print and digital

media, including video segments, website content, newsletter updates, bill inserts, community meetings, and media outreach, and will be used in the lead up to 2030 and during implementation (2030–2079).

The detailed funding and expenditure planning, including prefunding, is essentially complete with the work that occurred in late 2020; however, further work may be needed if the Board chooses another option. In addition, further work will be required to provide detailed bi-monthly surcharge amounts for the various meter sizes.

The next steps will be for the CAC leadership and the Project Team to present the overall Project 2030 Study and the CAC-recommended Revised Alternative 5.4 for Board consideration and possible action to implement in 2022. More specifically, following are the recommended policy actions and implications from this Study:

- The Board to consider adoption of this Study, which includes the Revised Alternative 5.4 as the strategy for water main replacements
- The Board to provide consensus direction concerning the accompanying funding target specified in this Study
- The Board to direct the CHWD to develop an education and public engagement strategy supporting the adoption and implementation of Project 2030

If the Board decides to implement any rate increases or surcharges as they relate to Project 2030, the District will need to issue a Proposition 218 notice in 2021 for FY 2022.

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Section 4 Water Demand Forecast

4.1 Purpose

This section considers key assumptions and looks at various factors that could impact future District-wide water usage. By developing an estimate of how much water is expected to be used (and, therefore, will flow through the system) in different areas of the CHWD service area, the operational lifespan for different parts of the system can be estimated. In addition, future pipeline size will also be determined based on these water demand projections. This section summarizes the water demand forecast for the CHWD service area along with the key assumptions and methodology used to create the forecast.

4.2 Existing Conditions

4.2.1 Historical Water Demand

The District's historical water demand has varied significantly throughout the years, as shown on Figure 4-1, Citrus Heights Water District Historical Water Demand. The District's water demand steadily rose from the early 1970s until it reached a peak of 19.1 MGD in 1999. Since then, water usage has steadily declined. Water demand in 2015 was 8.3 MGD.

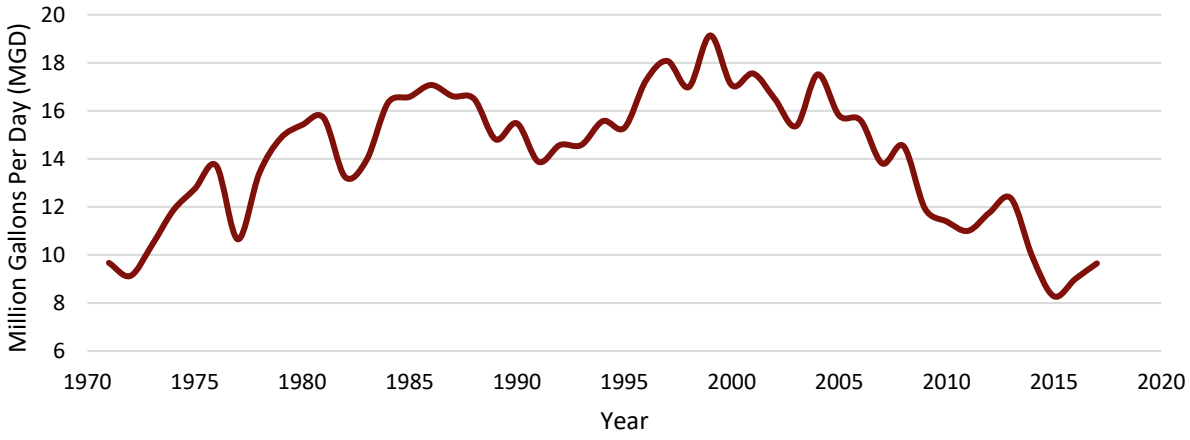

Figure 4-1. Citrus Heights Water District Historical Water Demand

4.2.2 Existing Land Use and Population

Land parcels in the CHWD service area, the total area of each land use category, the population, and the calculated population density for residential parcel types are summarized in Table 4-1. Appendix D includes a map of the CHWD service area organized by land use, including the location of demand nodes.

Table 4-1. 2017 Land Use and Population Distribution in the Citrus Heights Water District

Land Use Category	Area (acres)	% of Total Area	Population	Population Density (people/acre)
Single Family Residential Parcels[1]	4,430	65.5	49,380	11.1
Multifamily Residential Parcels[2]	506	7.5	20,584	40.7
Commercial Parcels[3]	606	9	—	—
Industrial Parcels[4]	16	0.2	—	—
Public Parcels[5]	178	2.6	—	—
Vacant Parcels[6]	503	7.4	—	—
Other Parcels[7]	528	7.8	—	—
Total	**6,767**	**100**	**69,964**	**NA**

Notes:

1 Single Family – One house per lot (possible accessory structures)

2 Multifamily – More than one house per lot (duplexes, condos, apartments)

3 Commercial – Includes all types of commercial (office, retail, service)

4 Industrial – Includes all types of industrial (warehouse and public storage)

5 Public – Public facilities (schools, community center, police station)

6 Vacant – Unused parcels available for development

7 Other – Includes uses not defined above (golf courses, churches, parks and trails, open spaces and streams, power substations, and cemeteries)

Residential parcel data provided by the CHWD was organized into two land use categories based on population density, single-family customers, and multifamily customers. Overall acreage of these two residential land use categories is approximately 73 percent of the CHWD service area. 2017 population information was obtained from the 2010 U.S. Census Block dataset. Because the CHWD service area encompasses several jurisdictions, including multiple counties, unincorporated areas, and cities, it was necessary to employ a mapping process to estimate the total population served by the CHWD. The 2010 U.S. Census dataset is the primary source of population data for the City of Citrus Heights, Sacramento County, and the other entities served by the CHWD. The 2010 U.S. Census Block dataset is the geospatial (digitally mapped) version of this population data. By using this geospatial version of the 2010 U.S. Census data, population counts were assigned to each parcel in the CHWD service area. By summing the population in each parcel, the population densities were estimated for the total service area and each land use category (see Table 4-1).

In 2017, the total population in the CHWD service area was estimated to be 69,964, as shown in Table 4-1. This is higher than the estimate in the 2015 Citrus Heights Urban Water Management Plan, which used the Department of Water Resources Population Tool to estimate a total population served of 65,093 in 2015. The Department of Water Resources Population Tool is an automated process that bases its estimate on U.S. Census Block data, the boundaries of the water district, and other land use assumptions (such as the density of residential parcels). One reason this estimate is higher is the population growth that occurred between 2015 and 2017. In addition, as

described previously, this method used a detailed parcel-level breakdown of population in the CHWD service area, which developed more precise per-area and per-capital water demand values for the CHWD (Figure 4-2, 2017 Land Uses in the Citrus Heights Water District).

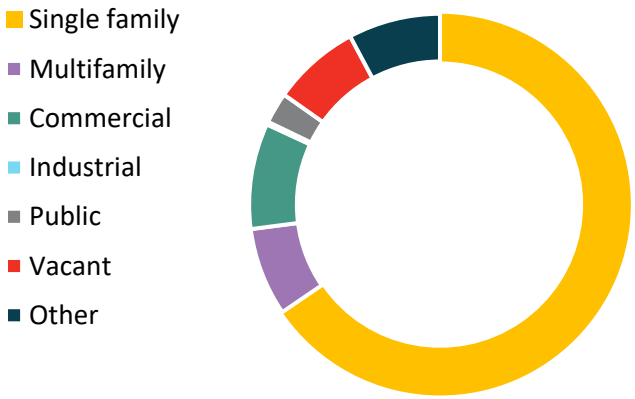

Figure 4-2. 2017 Land Uses in the Citrus Heights Water District

4.2.3 Existing Water Demands

Existing water demands were developed based on a combination of the District's 2016 and 2017 water demand data.

The District's 2016 water demand data was obtained from its billing data. Peak demands were provided at every demand node in the District's water hydraulic model, which was recently updated by West Yost Associates. Demand nodes are points in the water model where water demand is placed. Each node includes multiple individual water demands.

To adjust demands to annual average daily values, the peak demand values were divided by a peaking factor (based on data contained in the hydraulic model files).

Then, two adjustments were made to calibrate the 2016 node demand data with the provided 2017 District-wide production data. Since the 2016 water demands were lower than normal due to mandated water conservation restrictions, an upward adjustment was applied uniformly to all 2016 water demands. The District's water loss data was also reviewed, and based on a provided water loss rate of 7 percent, the 2017 average demands were reduced accordingly. This resulted in the existing 2017 water demands that more accurately reflect the current conditions.

By assigning a water demand to individual nodes, water use was mapped to customers and land use areas across the CHWD service area. Water demands by land use category are shown in Table 4-2 and on Figure 4-3, 2017 Average Annual Demand by Land Use. Table 4-2 also shows the calculated land use water factors and per-capita water use.

Table 4-2. 2017 Water Demands by Land Use Category

Land Use Category	Annual Average Demand (GPD)	% of Total Demand	Land Use Water Factor (GPD/acre)[1]	Per-Capita Water Use (GPCD)[2]
Single Family Residential	6,971,467	72	1,828	141
Multifamily Residential	1,348,553	14	3,095	66
Commercial	680,553	7	1,305	—
Industrial	10,527	0.1	748	—
Public	438,932	4.5	2,861	—
Vacant	51,465	0.4	119	—
Other	195,235	2	429	—
Total	**9,696,732**	**100**	**1,433[3]**	**139[3]**

Notes: GPCD = gallons per capita daily; GPD = gallons per day

[1] Based on acres for each land use category in Table 4-1

[2] Based on residential population for each land use in Table 4-1

[3] Values are total averages across the entire service area (total GPD per total acreage and total GPD per total population, respectively)

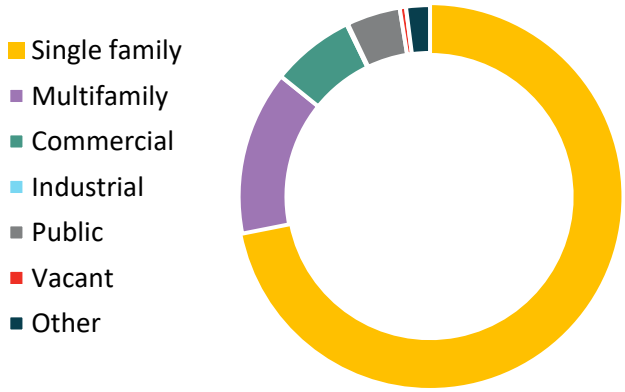

Figure 4-3. 2017 Average Annual Demand by Land Use

As shown in Table 4-2, per-capita demand in single-family residential areas is higher than per-capita demand in multifamily residential areas. Compared to the average residential water use in California, which was 85 gallons per person per day in 2016, the CHWD's overall average daily residential demand is higher, likely due to a large percentage of the population (72 percent) living in single-family residences with higher outdoor water use. Larger metropolitan areas, such as the San Francisco Bay Area or Los Angeles, have a smaller percentage of single-family residences or dwelling units with significant outdoor water use.

4.2.4 Factors Affecting Water Demand

Changes in water demand over time result from several factors:

- **Mandated Water Conservation by State and Federal Legislation –** Throughout the years, state and federal legislation has played a key role in water conservation. From mandating water meters to the use of low-flow toilets, water conservation legislation

continues to trend. Recently, the state legislature proposed the implementation of two new laws, Senate Bill (SB) 606 and Assembly Bill (AB) 1668. These bills require water agencies, including the CHWD, to develop new urban water efficiency standards for indoor and outdoor use, including appropriate variance for unique local conditions. The two bills were signed into law on May 31, 2018.

While these bills do not impose individual mandates for homeowners and businesses, they require urban water suppliers to meet their water use objectives. The indoor water use standard for residential is 55 gallons per capita daily (GPCD) until January 2025. The standard will decrease to 50 GPCD in January 2030. Proposed outdoor water use standards are being developed and will likely take into consideration ground cover, weather, and other factors. These standards are expected to be adopted by June 2022. Water conservation will be a driving factor in determining future water demands.

- **Annual Population Growth Estimated to Be 0.5 Percent –** This Study assumes a modest annual change in population in keeping with current Sacramento Area Council of Governments projections and the 2015 CHWD Urban Water Management Plan.
- **Assumed Development, Including Some Redevelopment, Will Accommodate the Population Growth –** The land use analysis identifies approximately 500 acres of vacant land remaining in the CHWD service area, which is approximately 7.4 percent of the District's total service area. These vacant parcels are in a combination of low-, medium-, and high-density neighborhoods. It is assumed that development projects, rather than redevelopment, will take place on these parcels. The Citrus Heights General Plan calls for the density of residential areas, particularly those with single-family units, to remain relatively constant. The Citrus Heights General Plan also calls for additional multifamily or mixed-use units to be developed within existing commercial transit corridors, which includes the Sunrise Mall/Marketplace, Auburn Boulevard, and Greenback Lane commercial corridors. These types of redevelopment projects are rare, and the City of Citrus Heights planning staff estimates that approximately 125 acres of vacant land could reasonably be converted to developed land by 2050. It was also confirmed that the 56-acre Sunrise Golf Course is expected to be converted to 33 acres of housing (single-family) and 23 acres of open space.
- **Median Household Income Growth Assumed to Track Inflation –** It is assumed that no appreciable increase in household income will occur compared to inflation. Thus, increased water use is not anticipated as a result of this economic factor.
- **District Water Loss Will Improve –** A slight decrease in water loss is assumed as a result of water main replacements. District water loss is estimated at 7 percent per the 2016 CHWD American Water Works Association (AWWA) water audit. Based on discussions with District staff, future water loss is expected to be 5 percent of total water supplied.

4.3 Future Water Projections

Future water demand is estimated through a multi-step process in which forecasted population growth and assumed water conservation conditions are used to develop adjustments in future land use allocations. The steps are as follows.

4.3.1 Step 1: Population Projections

Future demand is forecasted by assigning population growth to Single-Family and Multifamily Residential land use areas. An overall annual population growth rate of 0.5 percent is assumed. Table 4-3 shows an overall projected population increase of 18 percent between 2017 and 2050.

Table 4-3. Population Projections

Land Use Category	Population Growth Projection	
	2017	2050
Single Family Residential	49,380	55,481
Multifamily Residential	20,584	27,000
Total	**69,964**	**82,481 (+18%)**

4.3.2 Step 2: Water Conservation

Future water demand projections are impacted by future water conservation and efficiency trends. As discussed previously, this is mostly due to required conservation driven by state and federal legislation and regulations. Based on the Project Team's assessment of these conservation factors, an overall outdoor and indoor water consumption reduction of 10 percent per decade for single-family customers and a 5 percent per decade reduction in consumption for multifamily customers were used for the demand analysis between 2017 and 2050. Conservation factors were not applied to other land use categories. Table 4-4 shows a 28 percent reduction in per-capita water use between 2017 and 2050.

Table 4-4. Per-Capita Water Use Projections

Land Use Category	Per-Capita Projection	
	2017 (GPCD)	2050 (GPCD)
Single Family Residential	141	100
Multifamily Residential	66	55
CHWD Average	139	99 (−28%)

Notes: CHWD = Citrus Heights Water District; GPCD = gallons per capita daily

4.3.3 Step 3: Land Use Re-allocation

As mentioned previously, a key assumption is that the current population densities for Single Family and Multifamily Residential land uses remain fairly constant over the Study period. A 5 percent increase in population densities by 2050 is assumed based on discussions with City of

Citrus Heights planning staff. To accommodate the projected population growth, and assuming the CHWD service boundary remains unchanged, other land uses were converted to residential. For this analysis, total acreages for Commercial, Vacant, and Other land uses were assumed to decrease, and total acreages for Industrial and Public land uses were assumed to remain the same. Per discussions with City of Citrus Heights planning staff, 125 acres of Commercial area were converted to Multifamily Residential, and 310 acres of Vacant and Other areas were converted to Single Family Residential. This accounts for the Sunrise Golf Course redevelopment discussed previously. Table 4-5 presents this analysis.

Table 4-5. 2050 Projected Land Use Changes in the Citrus Heights Water District

Land Use Category	Population	2050 Per-Capita Water Use (GPCD)	Population Density (people/acre)	Re-Allocated Land Use (acres)	Adjusted Land Use Water Factor (GPD/acre)
Single Family Residential	58,214	100	11.7	4,740	1,167
Multifamily Residential	27,000	55	42.7	632	2,363
Commercial	—	—	—	481	1,123
Industrial	—	—	—	16	658
Public	—	—	—	178	2,466
Vacant	—	—	—	242	102
Other	—	—	—	478	370
Totals and Averages	**85,214**	—	—	**6,767**	**1,214**

Notes: GPCD = gallons per capita daily; GPD = gallons per day

4.3.4 Step 4: Final Land Use Based Demand Forecast

The resulting 2050 re-allocated land use acreages were multiplied by the 2050 land use water factors for each category to get the 2050 annual average daily water demand, as shown in Table 4-6.

Table 4-6. 2050 Water Demand Projections by Land Use Category

Land Use Category	2050 Land Use (acres)	2050 Land Use Water Factor (GPD/acre)	2050 Annual Average Water Demand (MGD)	Overall Change Between 2017 and 2050 (%)
Single Family Residential	4,740	1,167	5.53	−21
Multifamily Residential	632	2,363	1.49	11
Commercial	481	1,123	0.54	−21
Industrial	16	658	0.01	0
Public	178	2,466	0.44	0
Vacant	242	102	0.02	−52
Other	478	370	0.18	−10
Totals and Averages	**6,767**	**—**	**8.21**	**−15**

Notes: GPD = gallons per day; MGD = million gallons per day

This analysis resulted in an overall decrease of 15 percent in annual average water demand between 2017 and 2050. The decrease was influenced largely by single-family customers, although this methodology suggests an increase in demand among multifamily customers. This is due to the assumption that population growth will outpace additional water conservation in this category.

4.3.5 Step 5: Range in Assumed Conservation Levels

In recognition of possible higher or lower water use conservation (efficiency gains), a range of water demand projections for the CHWD through year 2050 is presented in Table 4-7. The demand forecast presented in Step 4 was based on an overall water use reduction of 10 percent per decade for single-family customers and 5 percent per decade for multifamily customers. Two other conservation levels were also evaluated. First, higher water use reductions, or "higher efficiency" gains, of 12 percent per decade for single-family customers and 6 percent per decade for multifamily customers were considered. The second conservation level evaluated was lower water use reductions, or "lower efficiency" gains, of 5 percent per decade for single-family customers and 2.5 percent per decade for multifamily customers.

Table 4-7. Range in 2050 Water Demand Projections

	2017	Demand Forecast[1]	Higher Efficiency[2]	Lower Efficiency[3]
Total Projected Water Use (MGD)	9.7	8.2	7.8	9.5
% Reduction versus 2017	NA	−15	−20	−3

Notes: MGD = million gallons per day; NA = not applicable

[1] Demand forecast = reduction of 10 percent per decade for single-family customers and 5 percent per decade for multifamily customers

[2] Higher efficiency = reduction of 12 percent per decade for single-family customers and 6 percent per decade for multifamily customers

[3] Lower efficiency = reduction of 5 percent per decade for single-family customers and 2.5 percent per decade for multifamily customers

It is expected the overall future water demand will decrease between the years 2017 and 2050 and could see a range in annual average daily water use of between 7.8 to 9.5 MGD, representing an overall decrease of 3 percent to 20 percent since 2017. Figure 4-4, Range in 2050 Water Demand Projections, depicts the range of water demand projections.

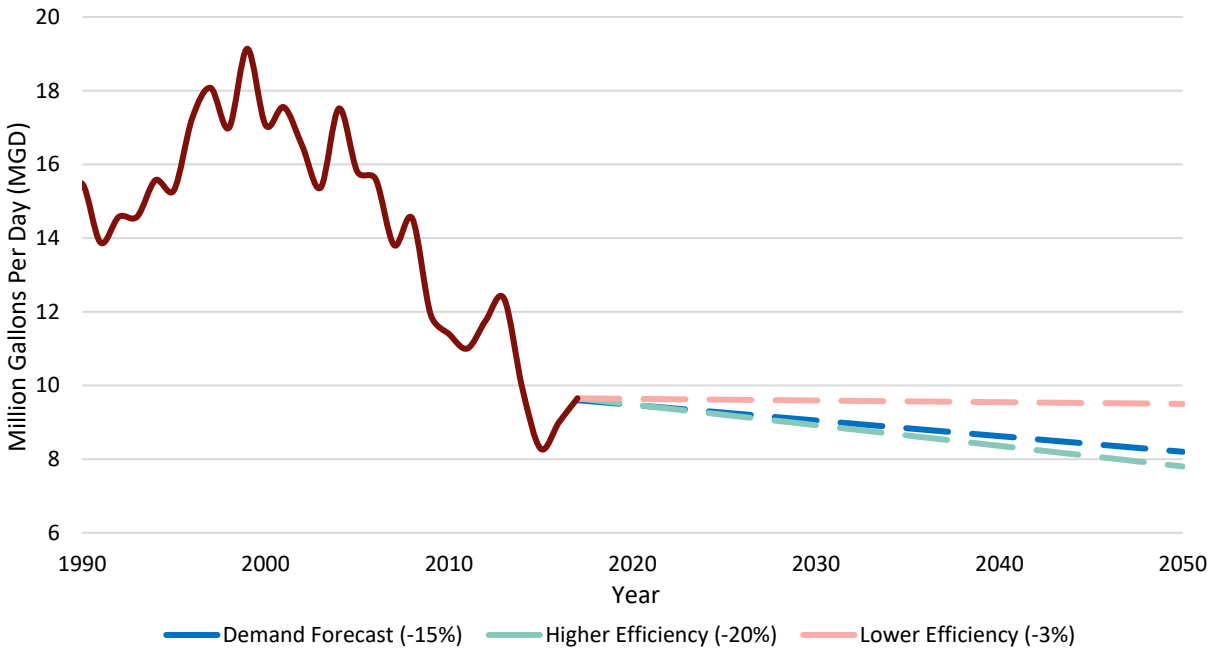

Figure 4-4. Range in 2050 Water Demand Projections

4.3.6 Monitoring Demand Trends – Recommendations

Changes to the key assumptions described in the previous analysis may produce significant changes to future demand projections. The CHWD should monitor several key metrics on a routine basis to enable the CHWD to adjust its demand projections when conditions warrant. These metrics include the following:

- **Monitor State Legislation and Regulatory Issues –** Monitor indoor and outdoor residential water use based on implementation of SB 606 and AB 1668. More aggressive conservation practices could further reduce the anticipated water use efficiency factors.
- **Review Population Growth –** Update the population estimates, including density values, after the 2020 U.S. Census is released to evaluate the rate of increased per-capita water use.
- **Track Construction Permits and Development** – Consider tracking construction permits and land use and zoning changes to capture the overall pace of development and density in the CHWD service area, which could lead to greater increases in per-capita water use.
- **Other Factors That Could Arise –** Consider tracking future issues that are unknown when this Study is finalized that could impact this demand forecast (e.g., COVID-19 pandemic, economic and regulatory impacts of the stay-at-home orders resulting in a spike in consumption).

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Section 5 Infrastructure Challenges

5.1 Purpose

The purpose of this section is as follows:

- Identify infrastructure challenges, water supply challenges, and regulatory challenges for the District and surrounding areas
- Provide a high-level overview of these areas with some context of why water main replacement is complex and requires consistent capital investment to safeguard its reliability

5.2 Infrastructure Challenges

A number of scientific and educational water associations exist to provide various tools to the international water community to improve water quality and supply. One such organization is the AWWA. The AWWA focuses on advancing water resources engineering research, policy, standards, and best practices. In 2012, the AWWA published its findings on the state of the country's water infrastructure in a landmark report called Buried No Longer: Confronting America's Water Infrastructure Challenges. The report begins as follows:

> *A new kind of challenge is emerging in the United States, one that for many years was largely buried in our national consciousness. Now it can be buried no longer. Much of our drinking water infrastructure, the more than one million miles of pipes beneath our streets, is nearing the end of its useful life and approaching the age at which it needs to be replaced.*

The report describes the state of water infrastructure integrity throughout the country on a region-by-region basis, examining the impacts of population, technological advancements in materials, diminishing water supplies, and an evolving regulatory environment. Key takeaways include application of a consistent analytical methodology and a set of key findings to assist local governments in facing infrastructure replacement challenges.

5.2.1 American Water Works Association Methodology

To gain an understanding of infrastructure challenges on a national level, the AWWA applies the following methodology:

- Understanding the timing of water system development in the United States
- Understanding the various materials from which pipes were made, and where and when the pipes of each material were likely to have been installed in various sizes
- Understanding the life expectancy of the various types and sizes of pipe in actual operating environments

- Understanding the replacement costs for each type and size of pipe
- Developing a probability distribution for the "wear-out" of each type and size of pipe grouping

5.2.2 American Water Works Association Key Findings

As identified in the AWWA's Buried No Longer: Confronting America's Water Infrastructure Challenges, review of the nation's water infrastructure yielded several key findings. These are discussed below from the District's perspective:

- **AWWA Key Finding 1: The Needs Are Large**
  Pipelines are the single largest set of assets the District owns. Maintaining and replacing pipelines is necessary for the reliable, high-quality service that ratepayers demand. The District has a responsibility to balance repair costs with replacement costs to make sure funds are used most effectively.
- **AWWA Key Finding 2: Household Water Bills Will Go Up**
  Annual water main replacement costs are expected to rise. As large historical expansions of pipelines reach the end of their expected service life, the District will enter into a phase of more intensive replacement. This phase will persist for decades, and for practical purposes, a more robust water main replacement program will be necessary.
- **AWWA Key Finding 3: There Are Important Regional Differences**
  Compared to other regions in the country, the West is characterized by continuous growth and relatively recently constructed infrastructure. Although the District is approaching buildout (i.e., there is very little undeveloped land remaining in the CHWD service area), neighboring cities and agencies are expanding, which puts pressure on regional sources of supply. Older cities in the rest of the countries are already experiencing a crisis surrounding infrastructure replacement, while the District still has time to prepare.
- **AWWA Key Finding 4: There Are Important Differences Based on System Size**
  Following AWWA's methodology, the District is considered a large system (i.e., serving a population greater than 50,000). Large systems, which typically have higher population densities, tend to require fewer miles of pipe and facilities per person than smaller systems, and costs can be spread over a larger population base.
- **AWWA Key Finding 5: The Costs Keep Coming**
  A more robust, long-term water main replacement program is expected. Growing systems typically have revenue from water sales and from development to pay for infrastructure improvements. However, growth in the District is slowing, and the system continues to age. As a result, funding for capital projects (i.e., water main replacement) must receive increased support from water sales.

- **AWWA Key Finding 6: Postponing Investment Only Makes the Problem Worse** Postponing investment has two negative impacts: the annual budget for capital replacement projects will increase, and more pipes will fail, threatening public health and safety. The District understands this concern and includes it as one of the primary drivers for this Study.

5.2.3 Approach to Water Main Replacement Planning

An adaptation of AWWA's approach to planning for the replacement of the specific inventory of the District's assets is at the heart of this Study.

The concept is to predict the time frame in which each pipe will become a liability to the District and to schedule its replacement in a way that minimizes risk, COFs, and rate impacts to customers. To assist with this planning process, the following information has been collected on every pipe in the District's distribution system and assembled into a GIS:

- **Useful Life Remaining –** This is the average service life of a pipe minus its years in service.
- **Location of Critical Facilities –** A critical facility is one whose continued water service is essential for public health and safety.
- **Vulnerable Locations –** These are pipes located in areas where the environment may cause them to deteriorate faster than normal or where they may be more difficult to repair.
- **High Traffic Intersections –** These are street crossings that have a high volume of vehicular traffic.

Database analysis, the above information, and other criteria will be used to generate a recommended pipe replacement priority list. This information is detailed in Section 6 and further analyzed in the Implementation Plan.

5.3 Water Supply Challenges

Water supply challenges are expected in high population growth areas. Water utility managers typically use multi-decade planning horizons for evaluating water supply options. The District collaborates with key organizations, such as the Regional Water Authority (RWA), whose mission is "protecting and enhancing the reliability, availability, affordability and quality of water resources." Its mission aligns closely with the three principle aspects of effective water supply management: availability, reliability, and sustainability:

- **Availability** refers to securing water rights and contracts for water supply service. For its primary source of supply, the District purchases surface water from the SJWD. The SJWD obtains its surface water through a combination of rights and contracts. The surface water supplies are withdrawn from Folsom Reservoir. For its secondary source of supply, the District owns and operates six high-capacity production wells (and plans to expand to up to 10 wells) to pump and provide groundwater to its customers. The

District is a member of the Sacramento Groundwater Authority, which coordinates regional groundwater programs and funding to complement the groundwater production on behalf of the District and the other member agencies. Maintaining strong relations with these entities promotes long-term water supply availability.

- **Reliability** refers to the capacity and operations of systems to produce and convey water supply as needed for normal operations and under emergency conditions. The District has two wholesale connections with the SJWD to receive treated surface water. "Two wholesale connections" means that there is redundancy built into this primary source of supply. In addition to its groundwater production wells, the District maintains 23 interconnections (and plans to increase to up to 25 interconnections) with neighboring water districts for enhanced reliability during events such as emergencies or droughts. By having multiple water sources and an active and ongoing maintenance program combined with a well-networked and looped system, long-term water system reliability is achievable.
- **Sustainability** refers to meeting the needs of existing customers without compromising the ability of future generations to meet future customers' needs. The District works cooperatively with the SJWD, RWA, and Sacramento Groundwater Authority on sustainability of local and imported water resources. In addition to focusing on the sustainability of its water supply, the District is also preparing to meet any future water demand requirements through its water efficiency program. An example of regional efforts regarding sustainability is a regional water supply project currently in the planning stages called the RiverArc Project (https://riverarcproject.com/). The project proposes to develop surface water from the Sacramento River as a new source. The District will be an indirect beneficiary of the project because the increase and diversification of supply will improve sustainability for the entire region. Cooperative water supply management and greater water use efficiency promote long-term sustainability.

5.4 Regulatory Challenges

Regulatory agencies develop policies and standards for a variety of water-related topics, including health and safety, environmental protection, emergency preparedness, and water conservation. Satisfying current regulatory requirements is built into the District's systems and operations. However, it is prudent to be aware of pending regulations and the challenges the District may face once new regulations are adopted and new requirements are issued. The additional challenge with many of these new regulations is that they often do not include new sources of funding. Therefore, many are "unfunded mandates" to the CHWD and its customers. Water conservation, also known as "water use efficiency," is a regulatory topic that is currently being revised at the state level and will likely require the District to implement additional measures to ensure regulatory compliance.

As a matter of state policy, water use efficiency began in earnest with the Water Conservation Act of 2009. Governor Schwarzenegger set the ambitious goal of achieving a 20 percent reduction in per-capita water use between 2010 and 2020 on a statewide basis through water conservation and the use of recycled water for irrigation and other non-potable water applications. At the time, the state anticipated achieving and maintaining this level of water use efficiency for 2020 and beyond.

However, the state has passed new legislation to pick up where the Water Conservation Act of 2009 left off. Per the State Water Resources Control Board (June 7, 2018), SB 606 and AB 1668 emphasize efficiency and stretching existing water supplies. According to the State Water Resources Control Board, efficient water use is the most cost-effective way to achieve long-term conservation goals and to provide the water supply reliability needed to adapt to the longer and more intense droughts climate change is causing in California.

As of this writing, the state is creating water use efficiency policies based on SB 606 and AB 1668. Until policies are adopted, the specific ramifications of these new laws are not known. However, it is anticipated that regulations will result in reduced consumption and possibly new "unfunded" mandates, such as the Water Budget utility billing system, requiring significant system conversion and implementation measures. In the event that the District's water use and efficiency programs do not meet the new objectives, additional water efficiency programs and projects to achieve the objectives will be required.

The CHWD can expect additional regulations that will affect the District's ability to provide services and manage its finances as the state continues to reduce local control through its legislation and regulations. For example, the recent water tax attempts to compete for the same ratepayer dollars as local water agencies for state-directed purposes. As a result, the CHWD, along with the RWA's members, agreed to pay higher dues for the RWA to add an in-house legislative and regulatory affairs program to its core services. The RWA monitors state actions that could impact its local water agency members and, when required, advocates for members' interests. The CHWD will continue to monitor state legislative and regulatory proposals and advocate when needed.

5.5 Conclusions

The District faces challenges at the local level in terms of maintaining infrastructure. It faces challenges at the regional level in terms of maintaining access to water supply. In addition, it faces challenges in achieving regulatory compliance with state requirements. Below is a summary of how the District is addressing these challenges.

5.5.1 Infrastructure Challenges

The District is aware of the upcoming challenges concerning water main replacement. Project 2030 was devised to analyze these challenges and to prepare a roadmap to help navigate its complexities.

For many years, the District has enjoyed the long service life of pipelines associated with past system expansion. By 2030, the service life for a large group of pipelines in the District's distribution system will expire. Strategic investment and a proactive approach to water main replacement are required.

The District will continue to research this topic and prepare reasonable, equitable, and responsible approaches to resolving critical issues as they arise.

5.5.2 Water Supply Challenges

Effective management of water supply challenges is complex and, therefore, can be costly. Redundancy and supply diversification have enormous benefits to the District and its customers but require investment in infrastructure, reliable equipment, and skilled operations personnel. Water efficiency extends the effectiveness of supply management by reducing stress on the sources of supply but requiring implementation of a comprehensive water efficiency program and the cooperation of end users. Continued investment in, and maintenance of, water supply infrastructure and programs is the best way to ensure the highest level of availability, reliability, and sustainability.

5.5.3 Regulatory Challenges

Based on past actions, the CHWD can expect additional regulations that will affect the District's ability to provide services and manage its finances as the state continues to reduce local control through legislation and regulations. The District will stay abreast of impending statutes and regulations to anticipate whether and how the District may need to adapt and continue to ensure compliance.

Section 6 Water Main Assessment

6.1 Purpose

This section summarizes the key assumptions and methodology used to create the water main assessment and replacement cost estimates. This information will serve as the foundation for developing water main replacement phasing options and associated funding strategies.

6.2 Existing System Description

The District has approximately 250 miles of distribution and transmission water mains ranging from 4 inches to 42 inches in size with pipe materials consisting of asbestos cement, polyvinyl chloride, cement mortar-lined steel, cast/ductile iron, and coal tar wrapped/coated steel. Distribution mains are pipes that are 12 inches and smaller in diameter, whereas transmission mains are classified as pipes 14 inches and larger in diameter. The majority (80 percent) of the District's water mains are distribution mains and are 6 inches and 8 inches in diameter. The larger water mains and transmission mains make up a small percentage of the District's total water mains but convey the majority of the water from its source (Folsom Lake) and distribute it throughout the service area. These transmission mains are considered the backbone of the water system.

As stated previously, the District has a wide range of pipe material; however, the majority of smaller pipelines or distribution mains are asbestos cement. The larger transmission pipes generally consist of cement mortar-lined and coated steel and cast/ductile iron.

The District receives surface water from Folsom Lake via gravity through a District-owned, 42-inch water transmission main and the 72-inch cooperative transmission pipeline. The gravity-fed system provides adequate pressure to serve the District's customers in the service area. Two areas on the western side of the District are controlled by pressure-reducing valves. Other pressure controls should be explored with replacement of transmission mains.

It is important to note that the 42-inch, 30-inch, and some of the 24-inch transmission mains were in place before any significant planned development. As subdivisions and properties were developed, the transmission mains were then positioned in side-yards, backyards, and in some cases, through the middle of properties. Initial installation of the water distribution mains was generally behind the back of sidewalks, but as the District replaces these facilities, new water mains are installed within rights-of-way to minimize impacts to property owners. The District has easements for the majority of the water mains that are outside county or city rights-of-way. Easements grant the District the legal right to operate and maintain its system, even though the utilities are on private property. The District has plans to review its easement portfolio. It is anticipated that additional easements need to be secured. This review will take place parallel to implementation of Project 2030.

6.3 Water Main Assessment

This section describes the methodology used to develop the water main risk assessment, type and evaluation of various risk factors and consequences, and initial overall risk profile for the CHWD's water distribution system. This information will serve as the foundation for developing water main replacement phasing and associated financial strategies.

6.3.1 Methodology

The assessment of risk to the CHWD regarding its underground pipeline assets and infrastructure considers factors that contribute to the LOF and COF of any given pipeline segment. LOF identifies the various factors that contribute to the possibility that a pipe will experience a failure, while COF identifies the various potential impacts of such a failure. The risk assessment considers "failure" to be the inability to use the asset (e.g., pipeline) for its intended purpose of conveying water to the CHWD customers for both short-term and long-term periods of time. Furthermore, a pipe failure is considered repairable so the pipe can ultimately be returned to service.

Once the factors for both LOF and COF are determined, a scoring system is developed for each category. To help standardize the scoring of LOF and COF factors, all scoring is based on a zero to 10 scale, with 10 reflecting the highest LOF or COF, 1 reflecting a negligible impact, and zero suggesting no risk in that particular factor. In the following sections of this Study, the description and definition for each LOF and COF factor are presented.

After the individual LOF and COF scores are determined, the scores for each factor are combined to create a total risk score. The combination of LOF and COF factors into a single risk score has been used by other utilities, including the East Bay Municipal Utility District. The conventional and accepted method of calculating a total risk score is to add up all individual LOF factors into a single LOF score, doing the same for the COF factors, and multiplying the two scores into a single risk score. The equation is as follows:

$$\text{Total Risk Score} = (\%_{LOF1} \times LOF_1 + \%_{LOF2} \times LOF_2 + \ldots) \times (\%_{COF1} \times COF_1 + \%_{COF2} \times COF_2 + \ldots)$$

The $\%_{LOF}$ and $\%_{COF}$ values that are multiplied with each individual LOF and COF factor are weighting factors that are used to further define the relative importance of these factors. The values of these weighting factors were developed by the Project Team and reflect the District's unique water system; they are presented in Section 6.3.4.

To further standardize the scoring, the $\%_{LOF}$ and $\%_{COF}$ weighting factors add up to 100 percent for both LOF and COF factors:

$$\%_{LOF1} + \%_{LOF2} + \ldots = 100\%$$
$$\%_{COF1} + \%_{COF2} + \ldots = 100\%$$

This illustrates the relative importance of the various factors to one another in developing the overall risk calculations.

6.3.1.1 Software

For this analysis, the CHWD used the InfoMaster software package developed by Innovyze. InfoMaster interfaces directly with the CHWD's own records and documentation, including its ArcGIS and Cityworks computer maintenance and work order systems, by accessing asset information for the CHWD's pipes. These records were updated by the CHWD and the Project Team and presented to the CAC at Workshop 2.

To develop a risk profile, the software user selects the desired COF and LOF factors (via check boxes) in the risk assessment setup screen as shown on Figure 6-1, InfoMaster Risk Assessment Setup Screen for 2030.

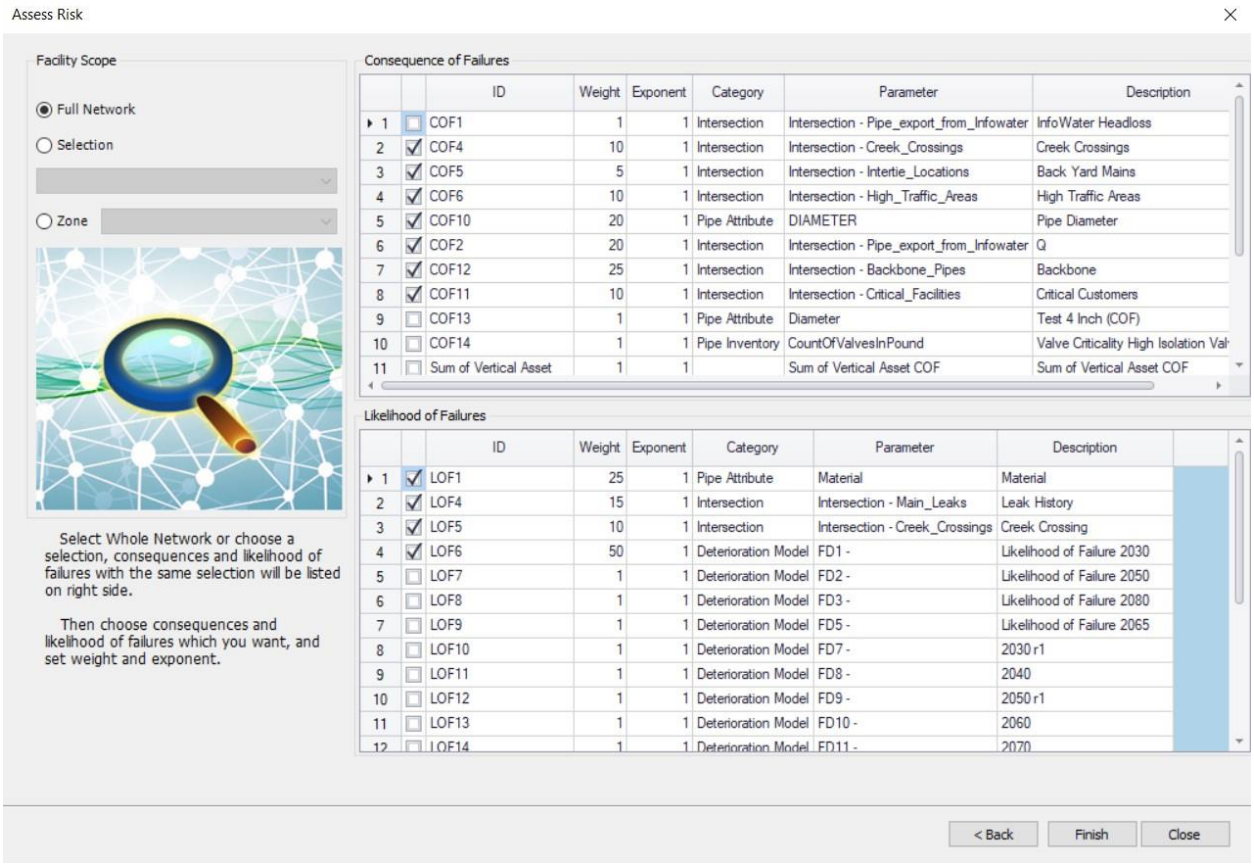


Figure 6-1. InfoMaster Risk Assessment Setup Screen for 2030

InfoMaster takes these records and, with the CHWD staff input on the various LOF and COF factors, calculates a risk score for all pipeline segments in the CHWD service area (nearly 14,000 segments equaling approximately 250 miles). These risk scores are then arranged in a matrix to form an overall risk profile, as shown on Figure 6-2, Overall Risk Matrix Setup. The profile is developed using a 1–5 scale defined as follows:

- 5 = "Extreme" Risk (High LOF and High COF)
- 4 = "High" Risk (Medium-to-High LOF and Medium-to-High COF)
- 3 = "Medium" Risk (Medium LOF and COF/Medium-to-High LOF with Low COF/Low LOF with Medium-to-High COF)
- 2 = "Low" Risk (Low-to-Medium LOF and Low-to-Medium COF)
- 1 = "Negligible" Risk (Low LOF and Low COF)

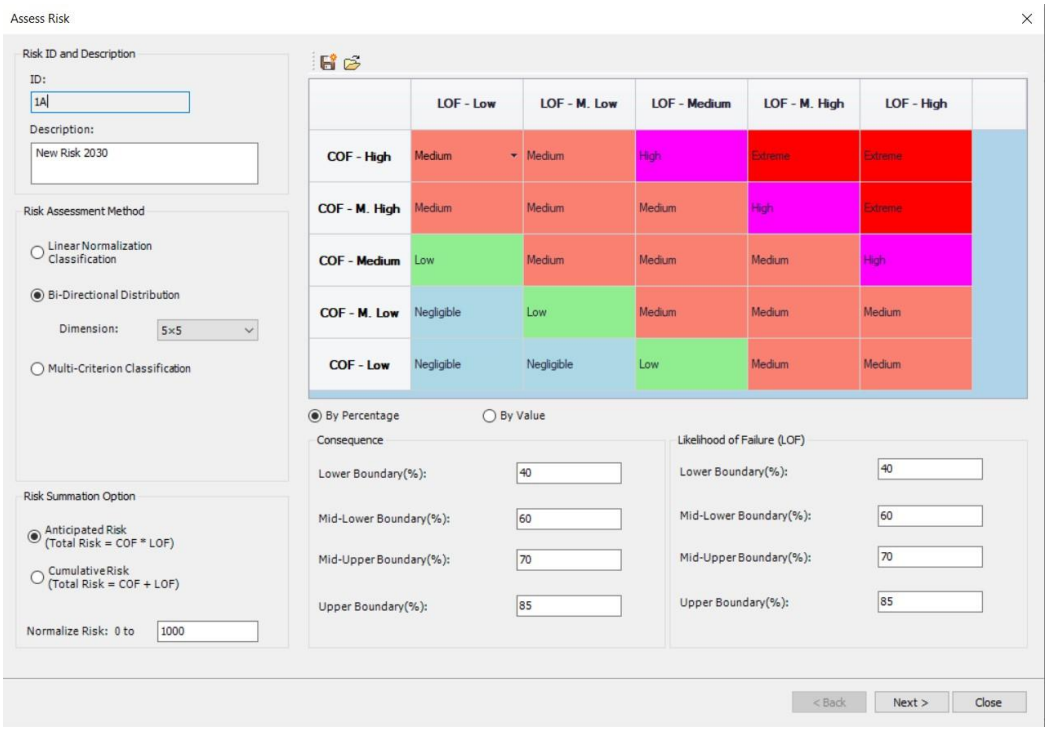


Figure 6-2. Overall Risk Matrix Setup

The risk profile or water main prioritization list is presented in Section 7.

6.3.2 Likelihood of Failure

LOF considers the primary risk factors that contribute to the likelihood that a pipeline will experience a failure leading to disruption of service to some CHWD customers. The four factors used to predict an increased risk relative to similar pipelines in the CHWD's distribution system are (1) pipe age/remaining useful life/survival probability, (2) pipe material (characteristics and performance), (3) pipeline vulnerability, and (4) historical water main breaks. These four LOF factors are discussed below.

6.3.2.1 LOF Factor 1 – Pipe Age/Remaining Useful Life/Survival Probability

It is easiest to consider the age of the pipeline assets when determining when they should be replaced. This includes looking at the year each pipeline was installed and assuming how many years that pipe should last. However, the more conventional method is to calculate the remaining useful life of the pipe that accounts for not only when the pipe was installed but also for the industry-based experience on pipeline life expectance, deterioration, and statistical survivability over time. Where available, specific data by the utility can be incorporated in this modeling; however, like many utilities, the CHWD currently has limited pipeline data due to the nature of how the system was originally built out. As part of the Implementation Plan for the project, the CHWD will collect additional pipeline condition assessment data to further refine this analysis in the future.

Table 6-1 shows the model output for the values ("Breaker" as identified by InfoMaster software setup) and ranges in calculated pipeline survival probability, which is defined as "the likelihood that the average pipe in a given cohort has not experienced a failure in a given year." It is important to note that such a pipeline failure is considered repairable and does not suggest that the entire pipeline segment cannot be used following such a repair.

Table 6-1. Risk Likelihood Scoring for Pipeline Survival Probability in 2030

Range (Breaker)	Score	Number of Pipes	Length (miles)
15% and less	10	19	0.73
15% to 25%	8	273	9.85
25% to 50%	6	6,160	141.82
50% to 75%	4	2,999	52.11
75% to 100%	2	3,097	44.63
Blank	0	35	0.45

The model suggests that, in 2030, 10.58 miles of pipeline will have a survival probability of less than 25 percent, 141.82 miles will have a survival probability between 25 and 50 percent, and 96.74 miles will have a survival probability greater than 50 percent. Over time, these values will change, with an increasing number of miles of pipeline moving into the ranges of less than 25 and 25–50 percent survival probability and a subsequent decrease of pipelines with a survival probability of greater than 50 percent. This is discussed further in Section 6.3.4.

6.3.2.2 LOF Factor 2 – Pipe Material: Characteristics and Performance

This factor considers that different pipeline materials have different risk elements that contribute to varying LOF. As presented in Section 6.2 of this report, asbestos cement pipe (ACP) is the material that was most commonly used in the District. ACP was commonly used by many utilities in the United States, primarily in the Southwest, during this time.

The scoring system used for the various pipeline materials is presented in Table 6-2. The lowest scores (lowest risk) were given to cast/ductile iron pipe (Breaker = DIP) and polyvinyl chloride pipe (Breaker = PVC), both of which have become the current standard for water utilities around the country, including the CHWD, and are noted for their long life and low failure rates. Some of the CHWD's older and larger diameter transmission (backbone) pipelines are steel with an interior cement mortar lining (Breaker = CML) and were given a relatively low risk score of 3. While the CHWD's experience with ACP (Breaker = ACP) has not been as troublesome as it has with other agencies, the CHWD acknowledges the failure risks associated with ACP in assigning it a moderate score of 6. These materials constitute the majority of the CHWD's pipelines. Other materials, generally older and no longer used for new construction, were given higher risk scores.

Table 6-2. Risk Likelihood Scoring for Pipe Material

Pipe Material (Breaker)	Score	Number of Pipes	Length (miles)
DW	10	52	0.89
ACP	6	7,154	155.86
Blank	5	19	0.24
Unknown	5	3	0.01
CIP	3	12	0.14
CML	3	328	13.52
CMLC	3	52	1.51
PVC	2	3,740	60.39
DIP	1	1,254	17.04

Notes: ACP = asbestos cement pipe; CIP = cast iron pipe; CML = cement mortar-lined; CMLC = cement mortar-lined and coated steel; DIP = cast/ductile iron pipe; DW = double walled; PVC = polyvinyl chloride

6.3.2.3 LOF Factor 3 – Pipeline Vulnerability

Unlike aboveground equipment and infrastructure that can potentially be vulnerable to a number of risk factors, such as accidents, vandalism, terrorism, or natural disasters, underground utilities are inherently better protected from external risks. Some places, particularly in high seismic risk regions, such as the San Francisco Bay Area and Los Angeles, have varying degrees of underground risk due to proximity to seismic faults. However, in the Sacramento region, such risks are generally low and uniform.

The CHWD has 17 locations throughout its system where pipelines cross a stream or are attached to bridges at those crossings and, therefore, are considered at greater risk of damage or failure. Several of these pipes, including the largest transmission pipelines in the CHWD's system, are older and were constructed in what is now considered a floodplain. These pipelines are vulnerable to either storm debris that can be trapped or entangled with the pipe when it is in contact with flood waters or whose ground supports could be damaged due to repeated erosion.

The scoring system used for pipeline vulnerability is presented in Table 6-3. Pipeline segments (24 total for the 17 locations) that are currently designated as a stream crossing were given a score of 10 (Breaker = True), constituting the highest risk score for this category. All buried pipeline assets in the CHWD system were given an LOF score of zero (Breaker = False) for this factor.

In recent years, the CHWD has replaced several small- and medium-sized pipeline segments at stream crossing locations by raising them out of the floodplain and attaching them to adjacent roadway bridges. These locations were given lower risk scores, although they remain vulnerable to damage due to automobile accidents, vandalism, or even terrorism. These will be assigned an intermediate score in the updated of risk calculations.

Table 6-3. Risk Likelihood Scoring for Pipeline Vulnerability

Stream Crossing (Breaker)	Score	Number of Pipes	Length (miles)
Yes (True)	10	24	1.43
No (False)	0	13,958	272.07

As discussed in Section 6.3.3, pipelines that cross a waterway are also assigned a COF score due to potential environmental impacts resulting from a pipe failure.

6.3.2.4 LOF Factor 4 – Historical Water Main Breaks

The CHWD provided historical water main break data based on repair orders (work orders) that had been logged in Cityworks by the CHWD staff from 2004 to 2018. This break data was geocoded into ArcGIS from Cityworks, which provided high accuracy for leak and break locations, as shown on Figure 6-3, Locations for Historical Water Main Breaks 2004–2018. The number of leaks and breaks can be quantified as approximately a dozen per year. Analysis of the leaks and breaks indicates that most (75 percent) reside on service lines to customers and not on distribution system pipes.

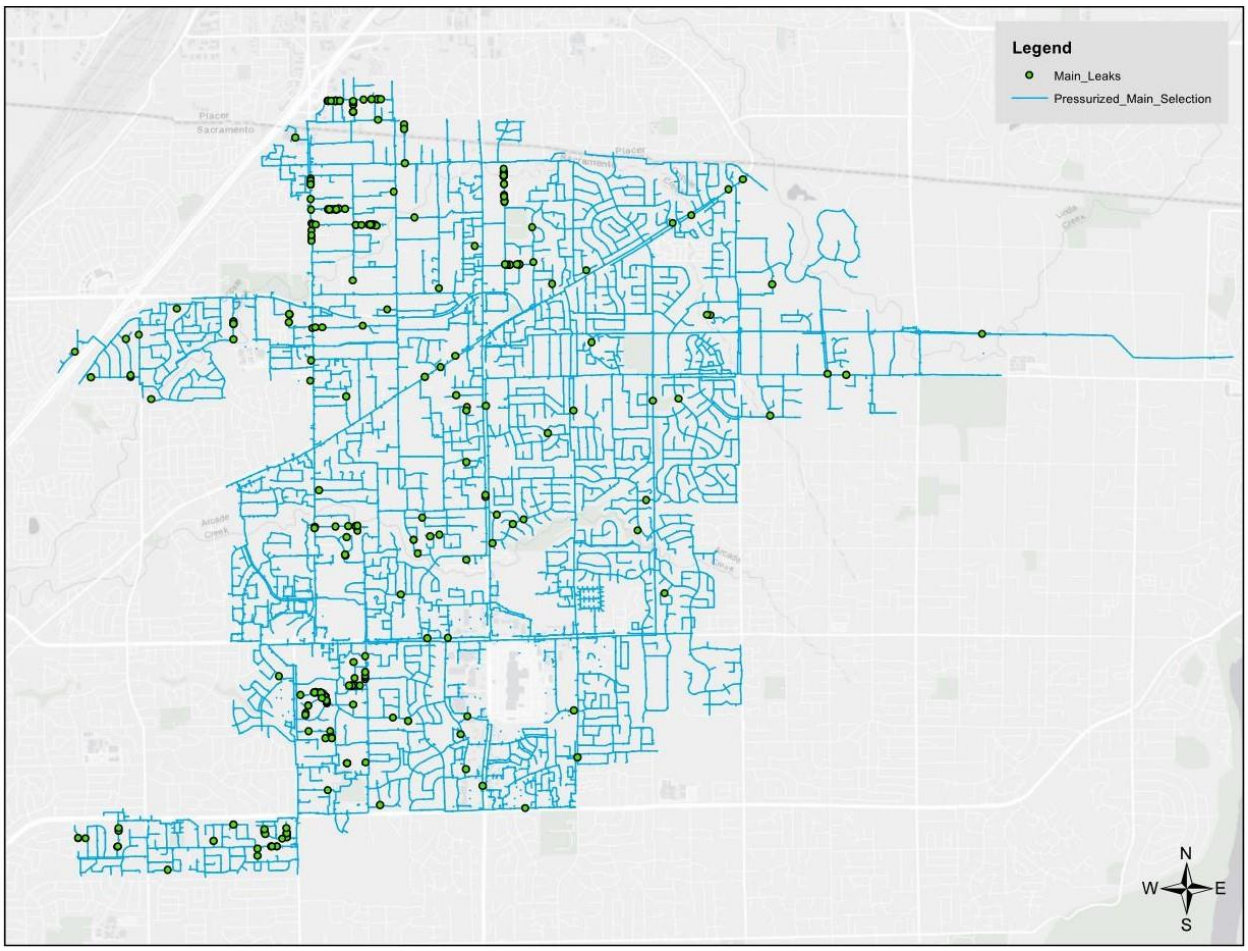


Figure 6-3. Locations for Historical Water Main Breaks 2004–2018

InfoMaster was used to associate the leaks and breaks with the closest distribution pipe. This provides a worst-case scenario analysis of the distribution network based on the limited leaks and breaks in the system. Pipe segments with recorded leaks and breaks were assigned a score of 10 (Breaker = True), while the rest of the system received a score of zero (Breaker = False) (Table 6-4).

Table 6-4. Risk Likelihood Scoring for Historical Water Main Breaks

Recorded Leak/Break	Score	Number of Pipes	Length (miles)
Yes (True)	10	284	9.67
No (False)	0	13,698	263.82

6.3.3 Consequence of Failure

The COF factors described below reflect the potential impact of a failure of any individual pipe segment. The District considered the following seven COF factors, which are discussed in further detail below: (1) pipe diamater, (2) pipe flow, (3) transmission pipelines, (4) critical facilities, (5) stream crossings (environmental impact), (6) high traffic areas, and (7) difficult access areas (backyard water mains).

While the analysis does not directly consider or measure the likely duration of the pipeline failure and subsequent repair or replacement, several COF factors indirectly take duration of the failure or outage (e.g., difficulty to access, location in high traffic areas) into account.

6.3.3.1 COF Factor 1 – Pipe Diameter

A significant consequence of a pipeline failure is tied to the amount of water that any individual segment conveys. There are several ways to assess this, including the amount of water that typically flows through each pipe (this is described in Section 6.3.3.2) and the actual size (diameter) of the pipeline. Pipe flow and diameter were scored as separate factors since some larger pipelines currently do not convey as much water as they were originally designed for (the inverse is also true, namely that some smaller pipes are carrying more water at a greater velocity than originally intended). Many of these instances can be attributed to changes in customer demand patterns (e.g., increased conservation and efficiency; refer to Section 4), newer aboveground infrastructure (groundwater wells, pump stations, and storage tanks), and changes in the way the CHWD operates the overall water distribution system. For that reason, COF was scored based on pipe size and flow.

The scoring system used for different pipe diameter sizes (Breaker) is shown in Table 6-5. This table also shows the number of pipeline segments and total lengths for each size in the CHWD service area.

Table 6-5. Risk Consequence Scoring for Pipe Diameter

Pipe Diameter (inches) (Breaker)	Score	Number of Pipes	Length (miles)
42	10	39	3.44
30	8	7	0.47
24	7	120	4.94
16	5	18	0.76
18	5	110	5.20
10	4	196	4.12
12	4	1,494	34.61
14	4	14	0.48
6	2	4,232	84.47
8	2	6,665	119.1
2	1	113	1.25
2.5	1	4	0.05
3	1	28	0.56
4	1	942	14.01

6.3.3.2 COF Factor 2 – Pipe Flow

As described previously, the flow of water through any given pipe and the loss of that capacity in the event of a pipe failure was scored as shown in Table 6-6.

Table 6-6. Risk Consequence Scoring for Pipe Flow

Range (GPM) (Breaker)	Score	Number of Pipes	Length (miles)
25 and less	1	5,639	105.26
25–100	2	4,618	90.42
100–150	3	1,208	22.53
150–250	4	996	19.51
250–500	5	686	14.71
500–750	6	278	5.47
750–1,000	7	113	2.23
1,000–2,500	8	172	5.43
2,500–5,000	9	134	5.91
5,000–10,000	10	16	0.55
—	0	122	1.47

Notes: GPM = gallons per minute

The flow values ("Breaker," expressed in gallons per minute) that served as the basis for the scoring were based on maximum (or peak) day conditions, which represent the highest average flow experienced over a 24-hour period. Flow data from 2013 in the CHWD's hydraulic model analysis done by West Yost Associates (June 16, 2017) was used for this scoring. 2013 flow data was used because this model represented a recent high consumption year. Section 4 developed several future demand forecasts and concluded that water demand will likely remain fairly consistent over the next several decades because population growth and increased customer demand will be offset by continued water efficiency gains and regulatory restrictions. Notwithstanding, as mentioned previously, the impact on demand from the COVID-19 pandemic will be monitored to determine if the pandemic had a long-term impact on the CHWD's demand forecast.

6.3.3.3 COF Factor 3 – Transmission Pipelines

Like many utilities, the CHWD's water distribution system is composed of both smaller distribution pipes that convey water to individual residences and neighborhoods and larger transmission pipelines that bring water from the various sources (e.g., Folsom Lake via the SJWD) and help transport it throughout the entire service area. The latter, also referred to as "backbone pipelines," serve a vital function and, therefore, were given a separate COF scoring value. These various scoring locations are presented on Figure 6-4, Transmission Pipelines, as dark blue highlighted pipe.

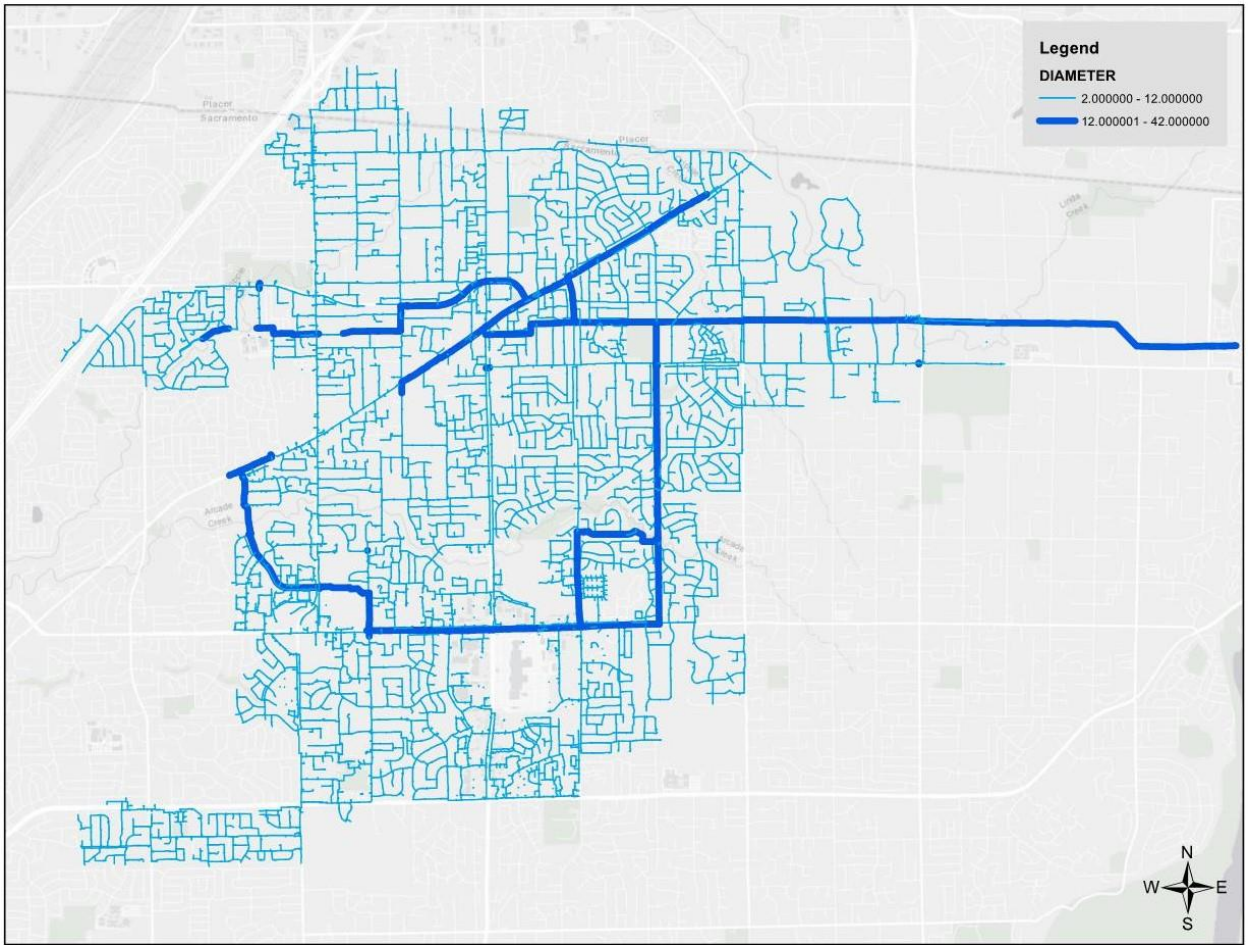


Figure 6-4. Transmission Pipelines

The scoring system used for this COF factor is listed in Table 6-7. Pipelines 14 inches in diameter or larger (Breaker in this table) were given a score of 10. All non-backbone pipelines were given a score of zero.

Table 6-7. Risk Consequence Scoring for Transmission Pipelines

Pipe Diameter (Breaker)	Score	Number of Pipes	Length (miles)
14	10	13	0.41
16	10	17	0.77
18	10	106	5.12
30	10	131	5.54
42	10	41	3.45

6.3.3.4 COF Factor 4 – Critical Facilities

The CHWD considers service to all customers important. However, this COF factor acknowledges that there are certain institutional or commercial facilities served by the CHWD that critically depend on uninterrupted water delivery. A common example for many utilities would be a large

hospital, although the CHWD currently does not directly serve any such large hospitals. Relevant examples of such customers in the CHWD service area include local surgery centers (dental), public safety agencies (police and fire), assisted living facilities, and schools. As presented in Table 6-8, different scores were given to various customer classes based on an assumed risk to the end users at these institutions. Scoring for various critical customer categories (Breaker in Table 6-8) ranges from 10 for dental and medical surgical centers to 1 for general commercially zoned areas. The majority of pipelines serving the CHWD customers not in any of these categories received a score of zero. The various scoring locations are presented on Figure 6-5, Critical Customers.

Table 6-8. Risk Consequence Scoring for Critical Customers

Facility (Breaker)	Score	Number of Pipes	Length (miles)
Dental Offices	10	6	0.10
Medical Facilities	10	2	0.01
Public Services	6	2	0.06
Assisted Living	5	119	1.85
Schools	4	242	3.91
Commercial Lots	1	603	9.63
—	0	13,008	257.92

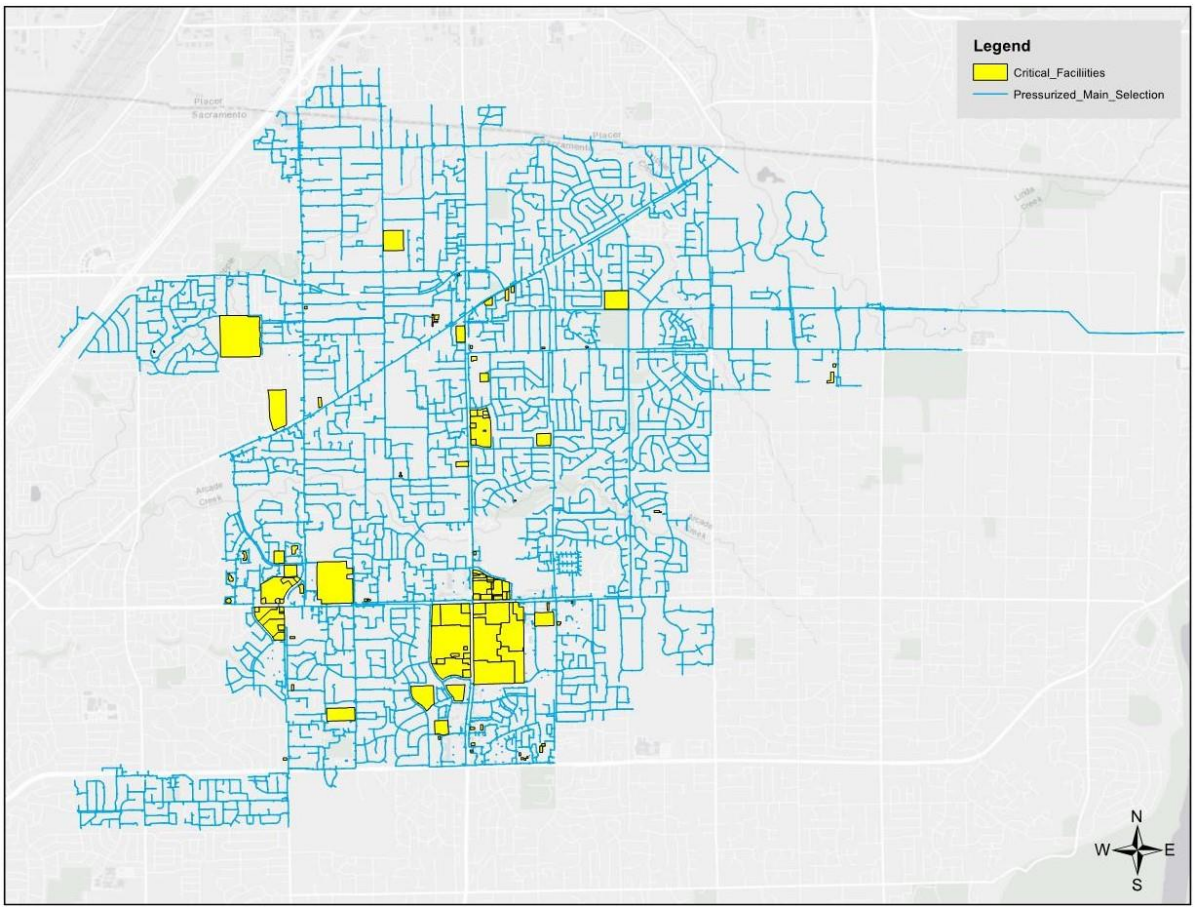


Figure 6-5. Critical Customers

6.3.3.5 COF Factor 5 – Stream Crossings (Environmental Impact)

Pipelines that cross a stream were given a COF score for potential environmental impacts resulting from a failure and release of drinking water that contains chlorine for disinfection and purification into a natural waterway. While the levels of chlorine are considered low for human consumption, these levels pose greater ecological hazards and subsequent regulatory (punitive) consequences. Unlike the LOF scoring, all stream crossing pipelines were given the same maximum score since, regardless of variable LOF vulnerability, the COF would be very similar. The CHWD may wish to perform future risk assessment studies to better quantify and distinguish the environmental impacts at these stream crossing.

The scoring system used for pipeline stream crossings is presented in Table 6-9. This scoring system is very similar to the pipeline vulnerability scoring in Table 6-3. Pipeline segments that are currently designated as stream crossings were given a score of 10 (Breaker = True), constituting the highest risk score for this category. All other pipeline assets in the CHWD system were given an LOF score of zero (Breaker = False) for this factor.

Table 6-9. Risk Consequence Scoring for Stream Crossings

Stream Crossing (Breaker)	Score	Number of Pipes	Length (miles)
Yes (True)	10	24	1.43
No (False)	0	13,958	272.07

6.3.3.6 COF Factor 6 – High Traffic Areas

Pipelines in high traffic commercial areas or in streets considered major arterials were given a higher score for this risk factor since the anticipated traffic disruption due to the initial pipe failure, as well as the ensuing emergency repairs, would be much more significant than it would be in residential areas. These various scoring locations are presented on Figure 6-6, High Traffic Areas.

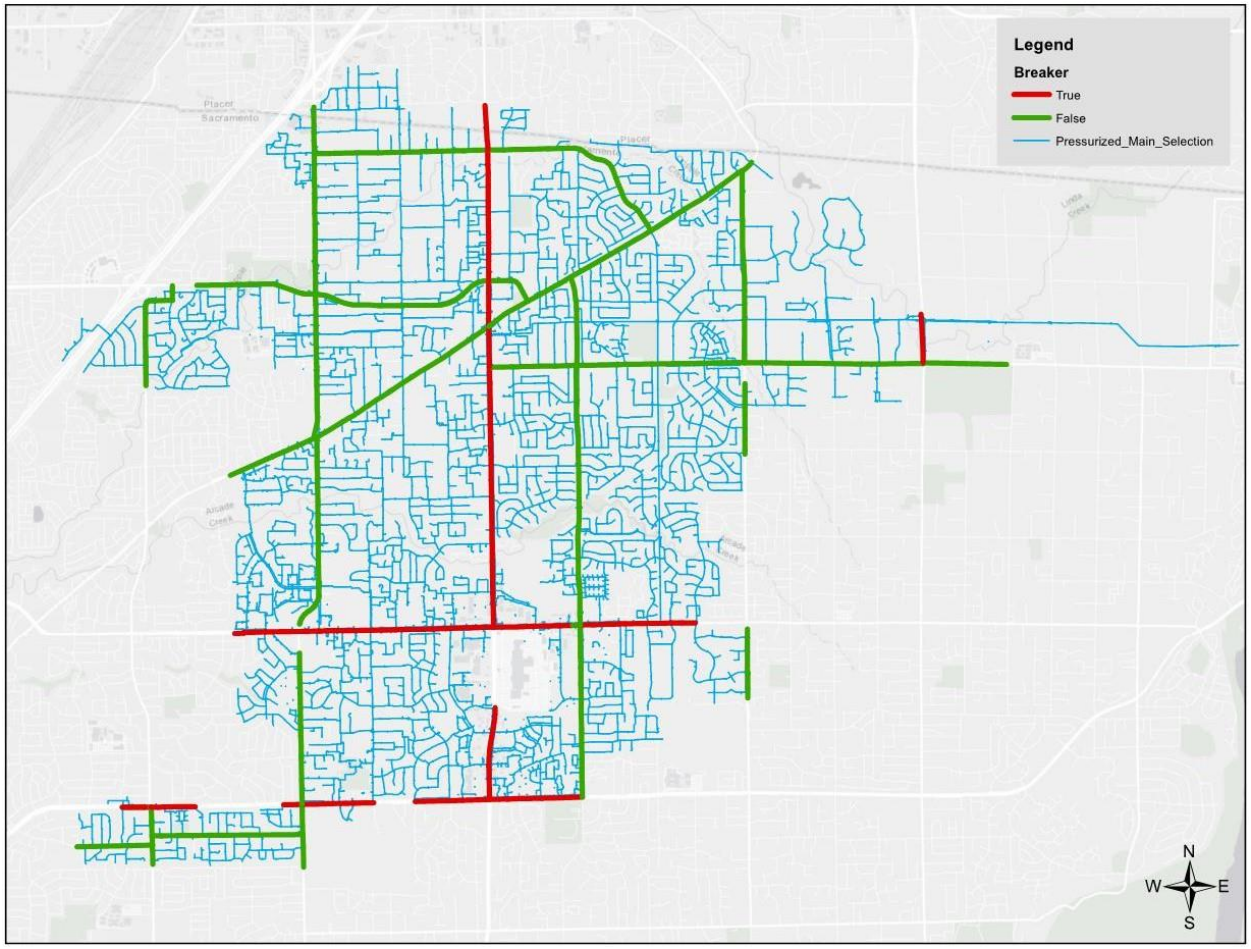


Figure 6-6. High Traffic Areas

The scoring system used for this COF factor is presented in Table 6-10. Pipeline segments (approximately 9.5 miles) that are currently identified as high traffic areas on Figure 6-6 were given a score of 10 (Breaker = True). These include pipelines located in major roadway arterials around the Sunrise Mall/Marketplace, including Greenback Lane, Madison Avenue, and Sunrise Boulevard (shown in red on Figure 6-6). All other pipelines were given an LOF score of zero (Breaker = False) for this factor.

For the next round of risk calculations, it is anticipated that a moderate score of 5 will be assigned to pipelines within other significant arterial streets (shown in green on Figure 6-6), including Oak Avenue, San Juan Avenue/Sylvan Road, Auburn Boulevard/Old Auburn Road, Fair Oaks Boulevard, and Hazel Avenue.

Table 6-10. Risk Consequence Scoring for High Traffic Areas

High Traffic Area (Breaker)	Score	Number of Pipes	Length (miles)
Yes (True)	10	389	9.49
No (False)	0	13,593	264

6.3.3.7 COF Factor 7 – Difficult Access Areas (Backyard Water Mains)

The majority of water pipelines were constructed under city streets and, therefore, in the public right-of-way, where access allows immediate repair and replacement work to occur. However, at various locations throughout the CHWD's distribution system, water mains are in residential backyards or other locations were immediate access may be more difficult. In most of these instances, the CHWD has a construction and utility easement giving it the right to enter the property and make repairs. Nevertheless, the CHWD's "good neighbor" policy dictates that it work closely with individual homeowners and customers to minimize disruption and property impacts.

Where feasible, the CHWD will likely consider relocating such pipeline segments to within the public right-of-way, but in many cases, such relocation can be costly or may be impractical. The importance of this factor is to help the CHWD identify these locations, plan replacement well before failure occurs, and conduct early feasibility assessments for potential relocation off private property. These various scoring locations are presented on Figure 6-7, Difficult Access Areas (Backyard Water Mains).

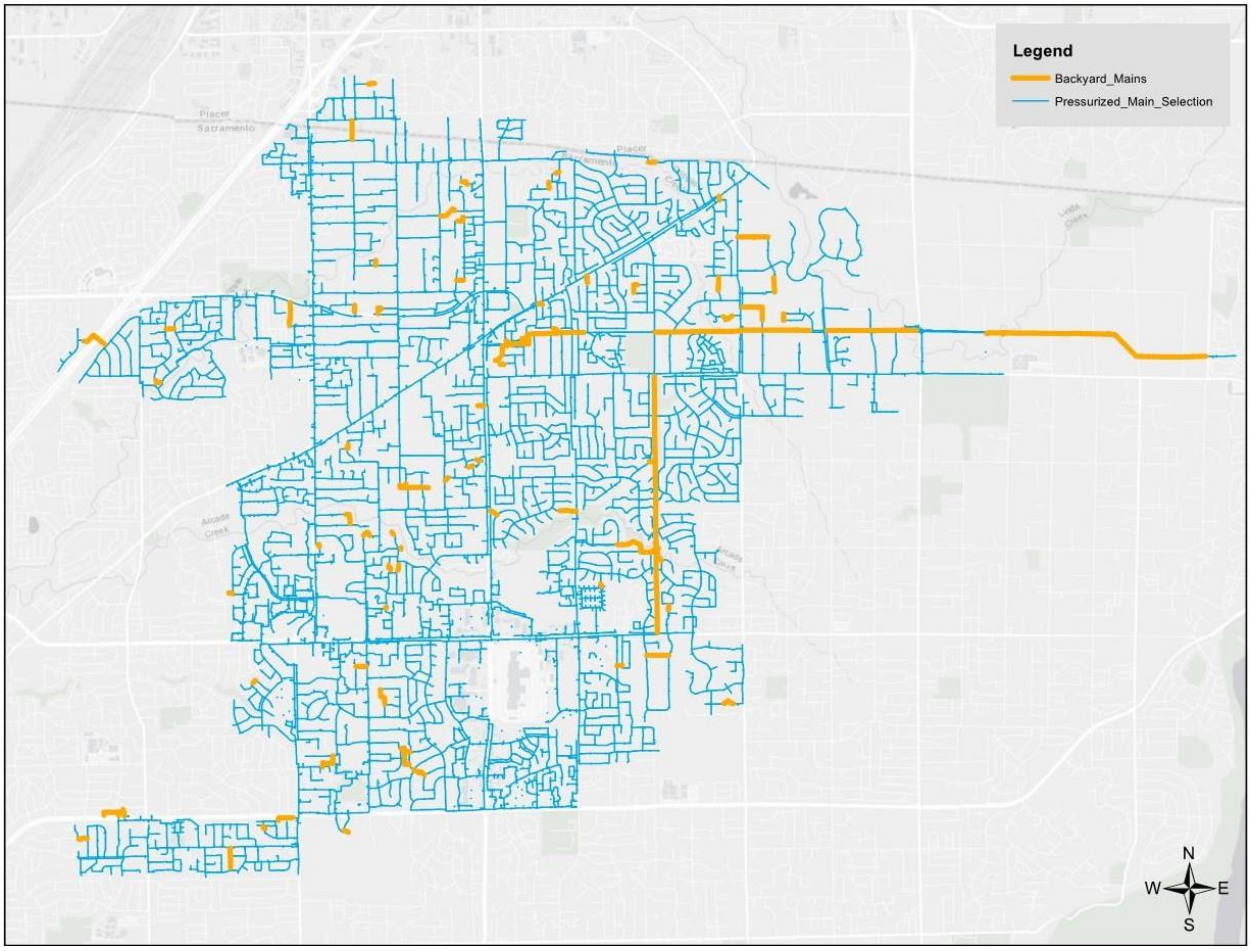


Figure 6-7. Difficult Access Areas (Backyard Water Mains)

Pipeline segments identified as located in private easements, backyards, or otherwise in areas with access challenges were given a score of 10 (Breaker = True). All other pipeline assets in the CHWD system were given a score of zero (Breaker = False) for this factor.

6.3.4 Likelihood of Failure and Consequence of Failure Weighting Factors

The weighting factors for the LOF and COF risk factors discussed in Sections 6.3.2 and 6.3.3 are shown in Table 6-11. The values of these weighting factors were developed by the Project Team and reflect the District's unique water system. It is common for there to be a greater number of COF factors, which identify the various impacts of a pipeline failure, than LOF factors, which affect the probability of failure. The software tool used for this analysis allows these weighting factors to be modified in the future as more detailed information (e.g., water main break data) is collected.

Table 6-11. Likelihood of Failure and Consequence of Failure Weighting Factors

LOF	Weighting	COF	Weighting
Pipe Age/Remaining Useful Life/Survival Probability	50%	Transmission Pipelines	25%
Pipe Material	25%	Pipe Size	20%
Historical Water Main Breaks	15%	Pipe Flow	20%
Stream Crossings (Vulnerability)	10%	Critical Customers	10%
—	—	Stream Crossings (Environmental Impact)	10%
—	—	High Traffic Areas	10%
—	—	Difficult Access Areas (Backyard Water Mains)	5%
LOF Total	**100%**	**COF Total**	**100%**

Notes: COF = consequence of failure; LOF = likelihood of failure

6.3.5 Initial Findings

Information in this section is considered preliminary. Some findings may change with further planned analysis. The following initial findings were reached based on the analysis performed to date:

- Transmission mains are more vulnerable, and COF may be significant.
- The pace of water main replacement will increase from the District's existing pace.
- There is an inherent trade-off between the planned pace of future water main replacements and overall risk of increasing pipe failures in the system.

6.4 Replacement Cost Estimates

The total cost to the District for water main replacement includes construction costs and "other project costs" for engineering and management. Estimates for construction costs include materials, labor, and equipment. Estimates for "other project costs" are based on percentages of construction costs based on experience. Total replacement costs are high, but strategic investments and a

proactive approach to water main replacement generally have much lower overall costs compared to reactive repairs and replacements due to breaks.

The following planning-level estimates are provided for financial planning and project phasing. Every individual project or phase will have unique costs based on economic and physical conditions. Several cost-saving alternatives may exist on a phase-by-phase basis, and those will be considered during specific project delivery planning. For this Study, a typical unit cost will be developed with the District based on typical conditions.

6.4.1 Construction Costs

Construction costs include all materials and labor required for water main replacement projects. These cost items include but are not limited to the following:

- Mobilization
- Traffic control
- Pavement saw-cutting
- Pavement demolition
- Pipe removal or abandonment
- Trench excavation
- Backfilling
- Pipe
- Valves
- Water services
- Fire hydrants
- Pavement replacement
- Flushing and testing
- Contractor overhead and profit

A typical water main replacement project is used to estimate unit costs (cost per foot). For the District, typical water main replacement projects are in developed areas and in existing paved roadways.

6.4.2 Other Project Costs

Other project costs, sometimes referred to as "soft costs," include other tasks and labor costs that occur before or after construction. These include the following:

- Cost contingency
- Project and construction management
- Engineering
- Permitting

- Inspections
- Easements where needed

Soft costs are estimated as percentages of construction costs based on experience. A 20 percent cost contingency was used in this Study to account for unknown and unexpected conditions and cost changes. Additionally, for project management, engineering, and permitting, 25 percent will be added to the total construction cost. This accounts for all CHWD staff and consultant time associated with project delivery.

6.4.3 Pipe Rehabilitation

Pipe rehabilitation is a way to reduce project costs. In many cases, a pipe's useful life can be extended by 30 to 50 years by using various rehabilitation methods. Methods and cost vary, but generally, any improvement to the pipe by repairing or lining the interior is considered pipe rehabilitation. These project decisions will be made for each project or phase and were not considered for project cost estimates.

6.4.4 Trenchless Pipe Replacement

Another construction technique that has proven advantages and possible cost savings is trenchless pipe replacement. Generally, trenchless pipe replacement is any technique that eliminates the need for excavation of the existing pipe. However, excavation is still needed at various points along the alignment (e.g., at the launching and receiving pits and at water service and fire hydrant connections). The main benefit and cost savings come from reduced disruptions and traffic flow and, therefore, lower traffic and pedestrian control costs.

The most common techniques are pipe bursting and microtunneling. Pipe bursting uses the existing pipe as a conduit to pull the new pipe through. An expander head is pulled through the existing pipe under force and breaks the existing pipe as it is pulled through. Trenchless pipe replacement was not considered for project cost estimates.

6.4.5 Unit Costs

The BNi Building News Public Works 2018 Costbook was used to estimate construction costs for water main replacement. The Costbook has been an industry tool for over 70 years and provides national averages for construction material and labor costs based on a compilation of actual up-to-the-minute costs. The national average is then multiplied by a geographic multiplier to account for regional variations. The District's construction cost database was used to confirm these regional variations.

These unit costs are used for estimating purposes only. Actual project costs will vary based on economic and physical conditions in 2030. Table 6-12 summarizes these unit costs.

Table 6-12. Unit Costs

Pipe Size (inches)	Pipe Type	Cost	Unit	Cost (million)	Unit
6	PVC	$230.95	Per LF	$1.22	Per mile
8	PVC	$252.24	Per LF	$1.33	Per mile
10	DIP	$306.43	Per LF	$1.62	Per mile
12	DIP	$336.70	Per LF	$1.78	Per mile
14	DIP	$394.39	Per LF	$2.08	Per mile
16	DIP	$444.08	Per LF	$2.34	Per mile
18	DIP	$485.21	Per LF	$2.56	Per mile
24	DIP	$630.77	Per LF	$3.33	Per mile
30	CML	$820	Per LF	$4.33	Per mile
42	CML	$1,066	Per LF	$5.63	Per mile

Notes: CML = cement mortar-lined; DIP = cast/ductile iron pipe; LF = linear feet; PVC = polyvinyl chloride
Costs are in 2018 dollars.
Unit costs were prepared based on the BNi Building News Public Works 2018 Costbook.
The total unit costs have been multiplied by the Sacramento multiplier of 118 to account for regional pricing.

6.4.6 System Replacement Costs

An estimated system cost is developed by combining the system improvements and applying the unit costs. Table 6-13 summarizes these results.

Table 6-13. Replacement Costs

Pipe Size or Appurtenance	Total (miles or each)	Unit Cost (miles or each)[1, 2]	Total Cost (million)[1]	Note
6-Inch	88.3	$1.22	$107.73	Includes 4-inch to be replaced with 6-inch
8-Inch	110.2	$1.33	$146.57	—
10-Inch	3.1	$1.62	$5.02	—
12-Inch	32.5	$1.78	$57.85	—
14-Inch	0.5	$2.08	$1.04	—
16-Inch	0.8	$2.34	$1.87	—
18-Inch	5.2	$2.56	$13.31	—
24-Inch	4.9	$3.33	$16.32	—
30-Inch	0.5	$4.33	$2.17	—
42-Inch	3.4	$5.63	$19.14	—
Fire Hydrant	2,352	$8,000	$18.82	—
Air Release Valve	210	$4,000	$0.84	—
Blowoff	650	$2,500	$1.63	—
Service	20,032	$2,000	$40.06	—
Construction Cost Subtotals	—	—	—	—
Distribution Mains	234.6		$317.16	12-inch and smaller

Table 6-13. Replacement Costs

Pipe Size or Appurtenance	Total (miles or each)	Unit Cost (miles or each)[1, 2]	Total Cost (million)[1]	Note
Transmission Mains	14.8		$53.85	14-inch and larger
Appurtenances	—	—	$61.35	—
Total Construction Cost	**—**	**—**	**$432.36**	**—**
Engineering, Management and Permitting (25%)	—	—	$108.09	Includes construction management and inspections
Total Replacement Costs	—	—	**$540.45**	—

Notes:

[1] Costs are in 2018 dollars.

[2] Unit costs are based on Table 6-12.

Based on the methodology summarized above, the total estimated system replacement cost in 2018 dollars is $540 million. The costs included in the total are planning-level estimates and should be continuously re-evaluated based on most recent cost data.

Section 7 Phasing Plan

7.1 Purpose

The purpose of this section is to provide a Phasing Plan for the prioritization of water main replacements from the year 2030 through 2080. The prioritization process is based on minimizing risk associated with output from the asset management model. As discussed in Section 6, the risk assessment used a conventional practice of considering factors that contribute to the LOF and COF of any given pipeline segment. The Phasing Plan is intended as a guide to allocate geographic groupings of pipe replacement projects to the appropriate decade.

7.2 Data Sources

7.2.1 Citrus Heights Water District Geographic Information System

Data from the District's GIS model, which includes all transmission and distribution pipeline elements in the system, was used as the data source for this analysis. Spatial relationships between the pipes, such as roadways and physical barriers (e.g., streams), were used to group the entire pipeline system into PAs. The following attributes associated with each pipe element are used in this analysis: installation date, pipe type, diameter, and length.

7.2.2 Model Output

Output from the CHWD asset management model is organized in five datasets that define projected risk for the decades ending in 2040, 2050, 2060, 2070, and 2080. The total risk and risk grading associated with each pipe segment for each dataset were used in cost estimation and prioritization.

As stated in Section 6, total risk is the product of the COF and the LOF assigned to the element, and risk grading is a ranking from 1 to 5, with 1 being low risk and 5 being high risk. In general, pipes with a higher risk will be replaced before pipes with a lower risk.

7.2.3 Cost Estimate

A present value was estimated and assigned to every pipeline element in the GIS. This value represents the replacement cost in 2018 dollars and is based on the cost-estimating tool specifically prepared for Project 2030. By determining the replacement cost for pipelines in the system, pipes can be grouped together to meet the water main replacement spending of $78 million dollars per decade per the preferred spending and funding alternative (Alternative 5.4).

7.3 Methodology

7.3.1 Delineation of Projects

Water mains throughout the District can be categorized into two general categories, LPs and PAs, which are described below.

7.3.1.1 Linear Projects

LPs consist of large diameter supply pipelines. Since the large diameter transmission pipelines supply large amounts of water from the source of supply (either from the surface water source of the SJWD's treatment plant or from the District's various wells) to the distribution system, replacement of the LPs must be meticulously planned to accommodate supply redundancy, specialized control valves, other supply-related infrastructure, and large, continuous excavations. Figure 7-1, Map of Linear Projects, provides a map of the LPs.

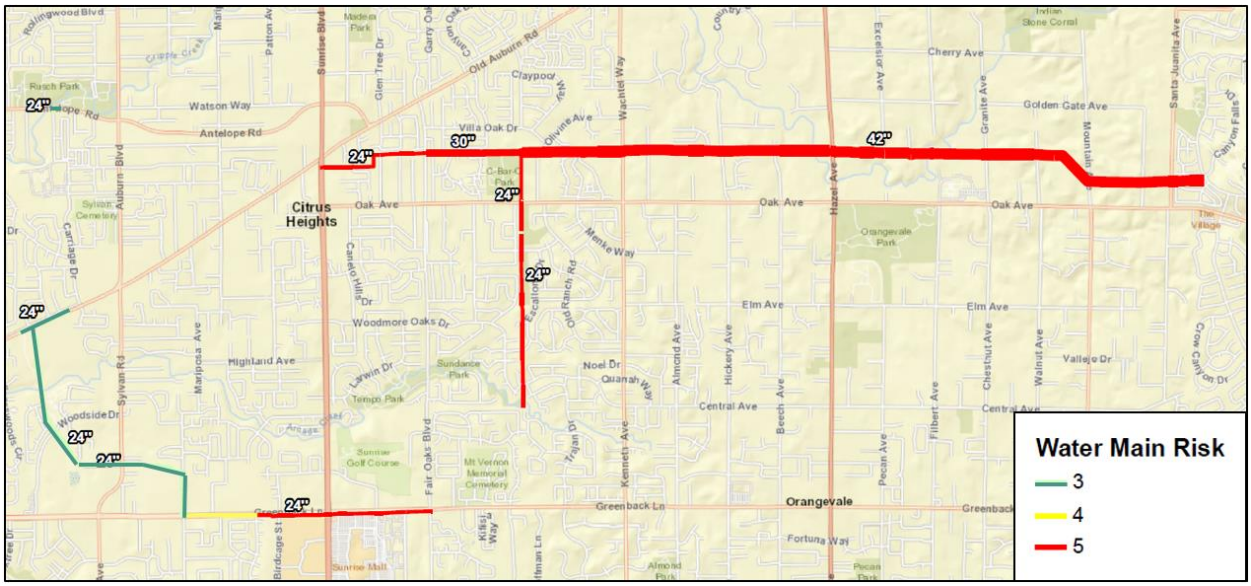
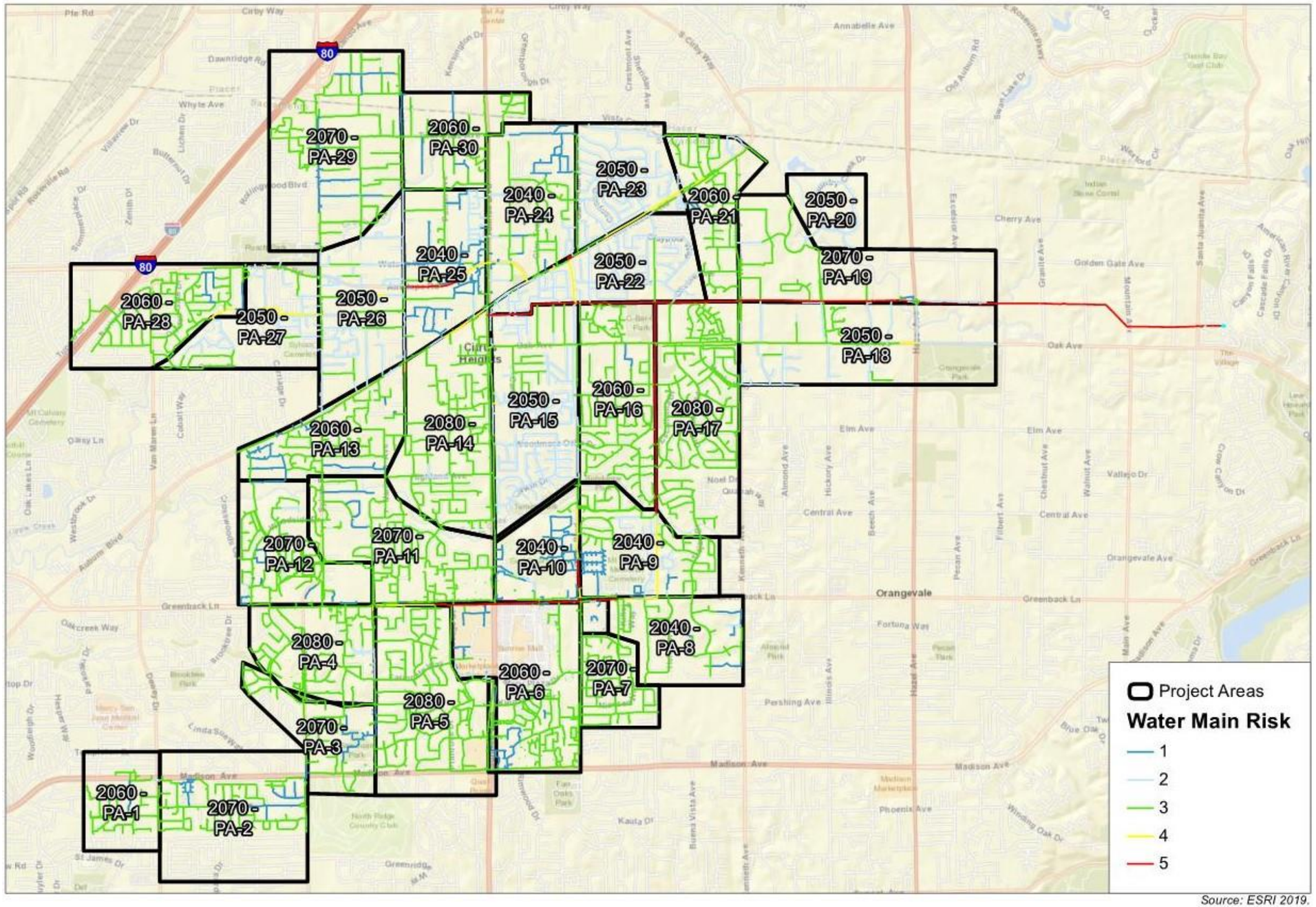


Figure 7-1. Map of Linear Projects

7.3.1.2 Project Areas

PAs are neighborhood-level areas consisting of smaller diameter transmission pipelines (14 inches, 16 inches, and 18 inches) and distribution pipelines (12 inches and smaller). PA boundaries are generally defined by major arterials, streams, and other similar continuous boundaries. PA implementation is intended to take advantage of economies of scale and to reduce disruption associated with construction by completing all pipeline replacements in one PA before moving on to another PA. Thirty PAs were identified though GIS analysis and discussions with District staff. Figure 7-2, Map of Project Areas, provides a map of the PAs. Appendix E provides more detailed maps of each PA. Risk scores are displayed for each pipe, colors are defined in the map legends, and risk scores are provided for the decade of replacement. For example, PA-18 (Appendix E) shows that all the pipes are risk grades 2, 3, and 4 in 2050, and PA-17 (Appendix E) shows that all the pipes are risk grade 3 in 2080.



Source: ESRI 2019.

Figure 7-2. Map of Project Areas

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7.3.2 Project Rank

The LPs are ranked independently from the PAs because these projects have very high COFs that tend to skew model outputs concerning total risk. The LPs are considered high priority projects.

The PAs are considered relative to each other. A weighted average of total risk was calculated for each PA by decade. In general, as pipes deteriorate as they age, their total risk increases. Figure 7-3, Project Area Weighted Average Total Risk, shows the weighted average total risk for each PA by decade.

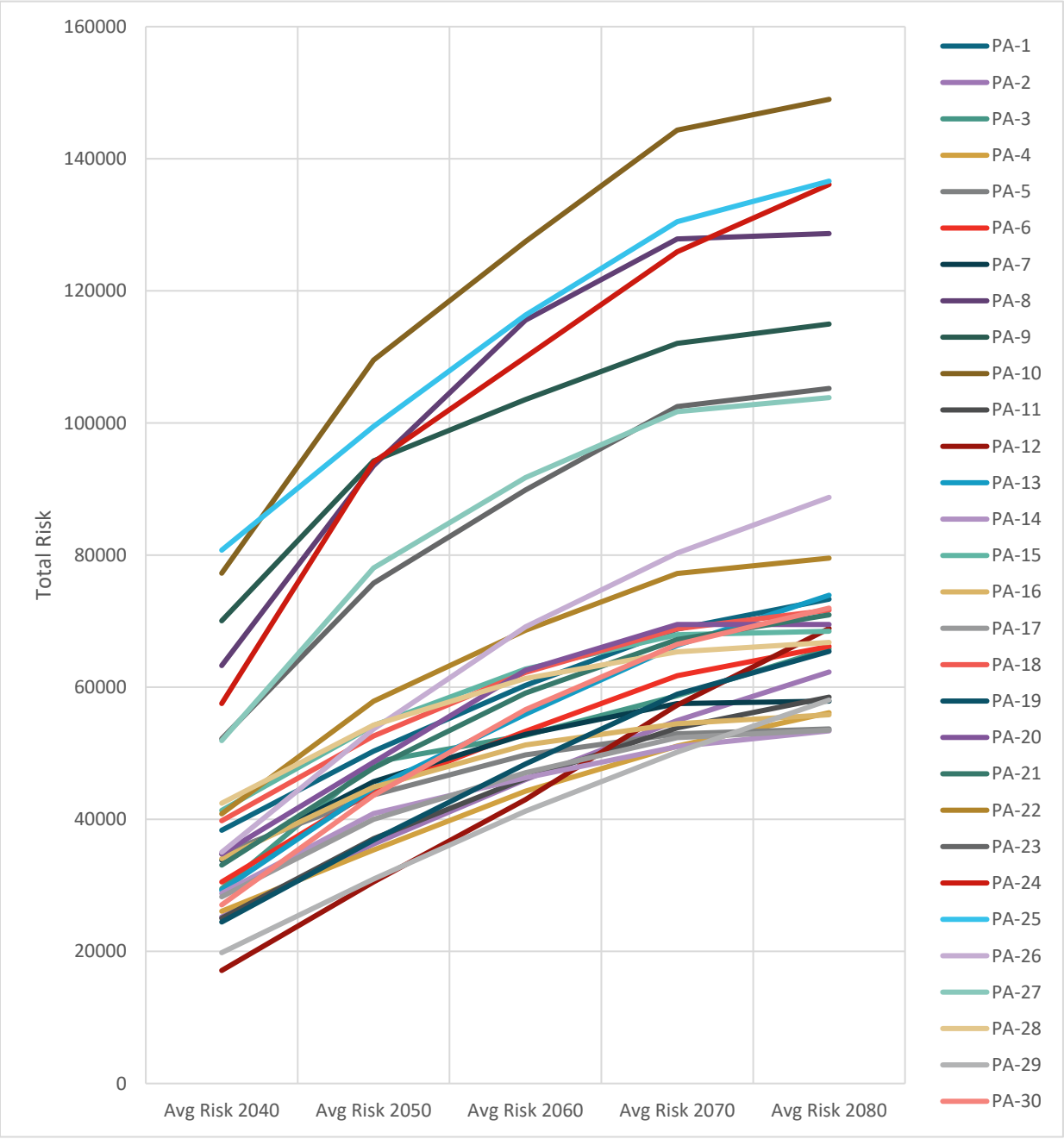

Figure 7-3. Project Area Weighted Average Total Risk

Note on Figure 7-3 how all PAs have increased total risk as they move through the decades, but the relative placement remains generally the same. This relative placement of PAs is then used to determine ranking—the highest risk PAs are scheduled for replacement first. The ranking is detailed in Section 7.4 per decade from top to bottom, matching the order on Figure 7-3.

7.3.3 Project Cost Profiles

A project cost profile including the following information was prepared for each PA:

- Pipe length by risk grading and decade
- Replacement cost by risk grading and decade

Table 7-1 is an example showing the estimated project cost profile for PA-18. Pipes with risk grade 3 and higher are the only pipelines included in the project costs and are outlined in red. These costs are used in Section 7.4 to estimate cost of replacement in the recommended decade. In Section 7.4, PA-18 is recommended for replacement in 2050. Based on Table 7-1, approximately 18,957 feet of pipe will need to be replaced at an estimated cost of $6,693,000.

Table 7-1. Project Cost Profile for PA-18

Risk Grade	Length (feet of pipe)					Estimated Cost (in 2018 $)				
	2040	2050	2060	2070	2080	2040	2050	2060	2070	2080
5	0	0	17	35	35	$0	$0	$12,000	$24,000	$24,000
4	0	125	143	125	125	$0	$51,000	$63,000	$51,000	$51,000
3	15,379	18,832	29,735	32,546	35,495	$5,449,000	$6,642,000	$9,912,000	$10,800,000	$11,721,000
2	9,764	17,594	6,656	3,845	896	$3,054,000	$5,434,000	$2,089,000	$1,201,000	$281,000
1	11,408	0	0	0	0	$3,575,000	$0	$0	$0	$0

7.4 Ranking

The following tables include the LPs and PAs allocated to each decade and the estimated costs over the 2030–2079 time period.

Table 7-2 shows projects recommended for replacement in the decade ending in 2040 and the estimated cost.

Table 7-2. 2040 Projects and Estimated Cost

Project	Estimated Cost (2018 $)
LP – 24 inches	$20,400,000
LP – 30 inches	$2,712,500
LP – 42 inches	$23,925,000
PA-8	$3,984,000
PA-9	$7,592,000
PA-10	$3,352,000

Table 7-2. 2040 Projects and Estimated Cost

Project	Estimated Cost (2018 $)
PA-24	$8,312,000
PA-25	$7,175,000
Total	**$77,452,500**

Table 7-3 shows projects recommended for replacement in the decade ending in 2050 and the estimated cost.

Table 7-3. 2050 Projects and Estimated Cost

Project	Estimated Cost (2018 $)
PA-27	$7,613,000
PA-23	$13,477,000
PA-26	$11,471,000
PA-22	$13,019,000
PA-20	$2,429,000
PA-18	$6,693,000
PA-15	$22,108,000
Total	**$76,810,000**

Table 7-4 shows projects recommended for replacement in the decade ending in 2060 and the estimated cost.

Table 7-4. 2060 Projects and Estimated Cost

Project	Estimated Cost (2018 $)
PA-28	$13,356,000
PA-1	$5,939,000
PA-21	$10,671,000
PA-30	$8,321,000
PA-13	$10,850,000
PA-6	$13,875,000
PA-16	$16,577,000
Total	**$79,589,000**

Table 7-5 shows projects recommended for replacement in the decade ending in 2070 and the estimated cost.

Table 7-5. 2070 Projects and Estimated Cost

Project	Estimated Cost (2018 $)
PA-3	$7,277,000
PA-12	$12,687,000
PA-7	$9,421,000
PA-2	$9,840,000
PA-11	$17,668,000
PA-19	$6,008,000
PA-29	$14,522,000
Total	**$77,423,000**

Table 7-6 shows projects recommended for replacement in the decade ending in 2080 and the estimated costs.

Table 7-6. 2080 Projects and Estimated Cost

Project	Estimated Cost (2018 $)
PA-5	$21,262,000
PA-14	$18,255,000
PA-17	$22,661,000
PA-4	$13,940,000
Total	**$76,118,000**

Section 8 Implementation Plan

8.1 Purpose

The purpose of this section is to provide the recommended actions for project preparation leading up to year 2030 and during water main replacement starting in 2030 and up to 2080. Recommendations are provided for managing and updating the asset management model, which was developed during the water main assessment element; updating the financial model; and planning public engagement efforts.

8.2 Project Preparation (2020–2029)

This section describes the recommended actions required to occur from 2020 to 2029 before actual water main replacements. Appendix F provides a 1-page summary and time frame for the tasks described below.

8.2.1 Refine Asset Management Model

The primary tool used for assessing risk and prioritizing project phasing is the asset management model. It is recommended that the District review and revise the various elements of the model as described below. It is further recommended that the model be reviewed and updated, if necessary, at intervals throughout the project implementation period (2030–2079) to ensure the results take into account new data the District collects throughout the project implementation period.

8.2.1.1 Clarify Risk Grading

Applying risk grading for each pipe segment led to the phasing decisions for the 2030–2079 time period. Risk grading was based on industry pipe performance data and applied using a simple matrix in the asset management model to generate risk grading on a scale of 1 to 5, with 1 representing low risk and 5 representing high risk. A result of this approach was an overwhelming percentage of grade 3 risks, which represents "medium" risk. It is recommended that the District refine COF factors to yield more granular results and additional spread to risk grading through the risk grading process.

8.2.1.2 Customize Deterioration Curves

As mentioned previously, the current asset management model contains limited pipe condition data specific to the District. Therefore, deterioration of pipe condition due to age is the primary variable accounting for risk over time. Deterioration is currently modeled based on data collected nation wide on pipes of similar material, diameter, and age. The District plans to develop customized pipe deterioration curves based on the District's own data over the next 8 years (2022–2030).

The data needed to customize the deterioration curves includes (1) the locations of leaks or breaks, (2) reasons for leaks or breaks, and (3) the associated costs to repair leaks or breaks. A Field Inspection Program prepared to assist the District with collection of this data over the next 10 years is included in Appendix G.

8.2.1.3 Integrate Economic Modeling Features

The District recently upgraded the asset management model software to InfoAsset Planner, which includes economic modeling features.

Some additional data and programming, including discount rate, inflation, estimated maintenance costs, unit costs, establishment of a base year for calculating present value, and other similar data and preferences as defined by the software, are required to perform economic modeling. These additional features will enable the District to better understand the total costs and benefits related to pipe replacement phasing and, therefore, make more informed decisions regarding future phasing and funding.

8.2.1.4 Periodically Update Model from Geographic Information System

GIS data in the asset management model is designed to be updated periodically. The District should update the asset management model GIS following routine comprehensive updates to the District GIS. This will ensure that decisions made using the asset management model reflect the most current system information.

8.2.2 Coordinate with Hydraulic Model

The hydraulic model and the asset management model are constructed on parallel platforms from a common source—Innovyze. The assumptions used for each model should be highly coordinated, and output from the two models should be used in future phasing recommendations.

In general, the asset management model assesses system condition, and the hydraulic model assesses system capacity. Any system component exhibiting deficient condition and deficient capacity should be made a high priority project.

8.2.2.1 Determine the Replacement Size

The asset management model currently assumes pipes will be replaced in kind (e.g., a 12-inch pipe will be replaced with a 12-inch pipe). Where the system would benefit from a change in pipe size as determined by updated hydraulic modeling, projects should be redefined with the updated pipe diameter.

8.2.2.2 Identify Opportunities for Realignment

The asset management model assumes pipes will be replaced in the same alignment. Where the system would benefit from a change in alignment as determined by updated hydraulic modeling or other means, projects should be redefined with the updated alignment.

8.2.2.3 Identify Opportunities for Redundancy

The asset management model assumes no additional pipes will be installed to support current customers. Where the system would benefit from greater redundancy as determined by updated hydraulic modeling (e.g., to meet fire protection requirements), projects should be redefined with the addition of the required pipe.

8.2.2.4 Complete Pressure Reduction Analysis

The District plans to complete a feasibility study to explore inline hydroelectric generation in conjunction with reduced pressures throughout the District. The feasibility study should be prepared before 2030 as a cost-saving measure to minimize retrofit of replacement pipelines whose design may need to be adjusted pending the feasibility study's conclusions.

8.2.3 Inspect Pipelines and Stream Crossings

As described previously, the Field Inspection Program will be used to refine the asset management model, which will be an indirect method of condition assessment. Additionally, stream crossing inspections are needed to confirm and monitor pipe conditions. Regular field inspections of the District's 17 stream crossings should be completed using a stream crossing condition assessment checklist. These pipes are ranked high in several areas of COF and, due to age, rank high in LOF. This combination places these pipes near the top of the risk grading. Regular field inspections, including establishing a baseline condition for each stream crossing, will assist the District in deciding when these pipes should be replaced.

8.2.4 Update Financial Planning

Through a series of workshops, the District evaluated 21 different water main replacement spending and funding alternatives and compared key considerations for each. The alternative selected by the CAC for implementation included a total spending amount of $390 million dollars (2018 dollars) over a 50-year time period. This level of spending will average approximately $7.8 million annually and include replacement of approximately 72 percent of the system over the 2030–2079 time period. For comparison, the District currently spends approximately $2 million per year on water main replacements.

The CAC-recommended alternative contains financial components including (1) debt financing, (2) cash/PAYGO, and (3) prefunding. During project preparation, these funding types were built into the comprehensive financial plan.

The Project 2030 prefunding target in the selected project alternative is (as revised) $12.3 million. Prefunding will need to be presented to the Board in the coming months for consideration and possible action to be programmed into the financial plan for implementation in 2022. Over the prefunding period, the District has several options for implementing the necessary rate adjustments, including the implementation of a multi-year rate increase approval or a specific flat fee increase for Project 2030. A Proposition 218 notice will need to be completed if the Board approves the prefunding concept.

8.2.5 Continue Communication and Public Engagement

The District made a substantial commitment to public engagement throughout this Study, holding eight CAC workshops to educate a group of customer representatives on the goals and objectives of this Study. A market research firm was also engaged by the District to collect additional customer feedback on the two final capital spending and funding alternatives and their corresponding impacts on future rates. Although the results did not indicate a statistically significant difference between the final alternatives, several important public awareness gaps were identified. Examples of these gaps are as follows:

- There is limited awareness of the District among registered voters. Public awareness is somewhat higher among non-voting ratepayers.
- Favorable results are indicated for District job performance and management of fiscal resources.
- Awareness of the Project 2030 is limited.

Limited awareness of the District, its job performance, and the Project 2030 indicates that there is a need for greater public outreach to explain the District's plan for water main replacements, specifically the key features and benefits of the plan, to the District's customer base. The District has begun planning its public outreach and overall communications strategy for Project 2030 with its communications team of in-house and consulting resources. Project 2030 outreach will include overall customer education opportunities and project updates.

Also included in these efforts will be a brand and identity review, development of communication channels, and a social media strategy. Further, these efforts will need to address goals and objectives, obstacles, key messages, media coordination, focused tone and timing, targeted use of spokespeople, and tracking of key performance indicators.

8.2.6 Coordinate Capital Planning with Other Jurisdictions

The District serves customers in the City of Citrus Heights and other local jurisdictions. These jurisdictions are responsible for maintaining the roads under which the District's pipe operate. As the District schedules pipe replacement projects in these jurisdictions, coordination with the local paving projects will reduce duplication of effort by both the local jurisdictions and the District, reduce potential

fines (if any), and generate incremental savings in overall paving costs that could be shared by the District and the local jurisdictions. The District currently coordinates its pipeline construction with cities and the counties that are in its service area.

The District should continue to coordinate the phasing of projects with local jurisdictions where possible.

8.2.7 Monitor Key Trends in Water Utility Management

Between now and Project 2030 implementation (year 2030), the water industry will continue to evolve and change in response to new regulations, workforce demographics, technology, climate change, stakeholder demands, and a host of other issues. The District will need to monitor the key trends directly impacting its service area and, in particular, how these trends might impact completion of Project 2030. The AWWA publishes an annual survey of key issues (see Table 8-1) of which renewal and replacement of aging water infrastructure is a high priority. This list is a good place to start to monitor specific impacts of other key issues on the District. Note that the results reflect responses across the country; California water utilities and specifically the District likely have different priorities than what is shown in the list. For example, climate change impacts typically rank higher in California utilities due to concerns with drought and fire damage to watersheds. Funding to address some of the other key issues could impact the District's ability to maintain its funding for Project 2030.

Table 8-1. Issues Facing the Water Industry in 2018 Ranked by Respondents (n=281)

Ranking	Category	Weighted Average	% Ranked Critically Important
1	Renewal and replacement of aging water and wastewater infrastructure	4.59	64
2	Financing for capital improvements	4.44	55
3	Public understanding of the value of water systems and services	4.37	50
4	Long-term water supply availability	4.30	50
5	Public understanding of the value of water	4.26	44
6	Watershed and source water protection	4.17	41
7	Aging workforce and anticipated retirements	4.16	43
8	Public acceptance of future water and wastewater rate increases	4.12	35
9	Emergency preparedness	4.10	34
10	Governing Board acceptance of future water and wastewater rate increases	4.09	35
11	Cost recovery (pricing water to accurately reflect its true cost)	4.09	32
12	Talent attraction and retention	4.08	33
13	Asset management	3.98	27
14	Cybersecurity issues	3.92	27
15	Data management	3.92	25
16	Improving customer, constituent, and community relationships	3.91	26

Table 8-1. Issues Facing the Water Industry in 2018 Ranked by Respondents (n=281)

Ranking	Category	Weighted Average	% Ranked Critically Important
17	Compliance with current regulations	3.91	25
18	Groundwater management and overuse	3.88	26
19	Compliance with future regulations	3.86	21
20	Certification and training	3.84	22
21	Water rights	3.77	27
22	Drought or periodic water shortages	3.74	23
23	Water loss control	3.73	17
24	Water conservation and efficiency	3.72	25
25	Energy use, efficiency, and cost	3.70	16
26	Physical security issues	3.58	15
27	Water quality issues from premise plumbing systems	3.56	12
28	Expanding water reuse and reclamation	3.46	18
29	Climate risk and resiliency	3.43	15
30	Financing for water research	3.40	12

8.3 Project Implementation (2030–2079)

Implementation of the project will result in an incremental increase in annual pipeline replacement activity. This section discusses the current level of activity and the resources required to support the project, the incremental change in activity between current and projected levels, and the continuation of project preparation efforts recommended in Section 8.2. Appendix H provides 1-page summary and timeframe for the tasks described below.

8.3.1 Current Level of Main Replacement

The District currently spends approximately $2 million annually on water main replacements. This equates to an annual replacement rate of less than 0.5 percent. Currently, this rate of replacement is sufficient since water mains are in good condition, as evidenced by minimum annual leaks and breaks per the District.

Main replacement projects are currently delivered through the CHWD Engineering Department. Led by the director of engineering, the team currently includes five full-time employees. See Figure 8-1, Engineering Department, for the current organizational chart of the CHWD Engineering Department.

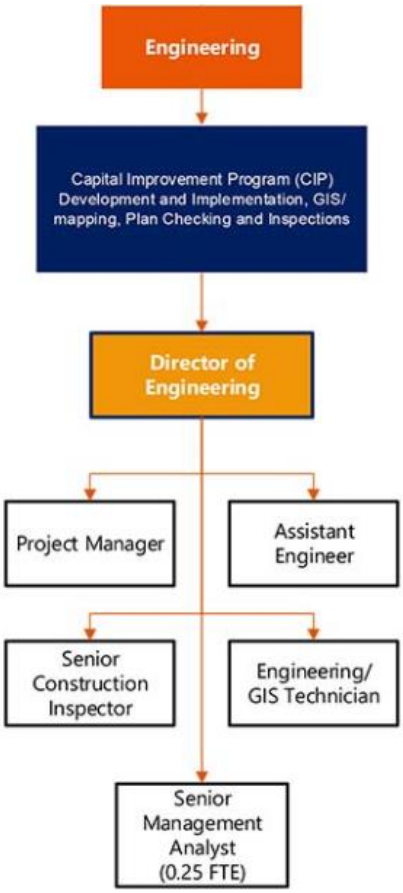

Figure 8-1. Engineering Department

It should be noted that other District departments, particularly the General Manager's Office and Administrative Services, play a role in water main replacement project planning and delivery.

Staff interviews should be conducted to further understand the current level of water main replacement and to create a baseline. These interviews could help identify the following:

- Existing processes for capital delivery (flow diagrams could be created)
- Existing bottlenecks
- Areas for improvement
- Current improvements being considered around additional staff, space, training, tools, systems, and technology
- Financial impacts
- Projected workloads, workload distribution among staff, and staffing levels that need to be evaluated further

8.3.2 Projected Level of Activity

The results of this Study indicate an annual average spending of $7.8 million for water main replacement over the course of the 50-year implementation period (2030–2079). Peaks in annual

spending are projected to account for several large projects as defined in the Phasing Plan. Delivering almost four times the capital projects on an annual basis will likely require an increase in the District's resources. This increase can be accomplished through growth in District employees or using consultants or both during peak capital project delivery years. The nature, timing, size, and complexity of the projects will have a material impact on the District's ability to implement the projects. Once the projects are programmed and planned for implementation, a capacity assessment should be done to determine what resources will be needed to deliver the projects. To the extent additional staffing or consulting resources are required, there may be a need to adjust the financial projections.

8.3.3 Resource Capacity Recommendations

As referenced earlier with regard to workload and workload distribution, all currently established staff positions will be impacted as the District moves from delivering approximately $2 million in capital projects annually to approximately $8 million annually. The District will need to identify team members who will be most impacted and may need to update job descriptions to account for the shift in focus. Additional staff and resources, such as more complex project controls and reporting systems, may be needed to manage the higher level of water main replacement planning, design, and construction. The costs of these additional resources are included in the project cost estimates.

The ability to execute and deliver planned projects is significant because it can have a large impact on the financial operations. Newly established rates for projected levels of water main replacement may cause excess reserves if the projects are not delivered as planned. Under these circumstances, ratepayers and Board members may lose confidence in the need for future rate increases, jeopardizing the District's ability to maintain the water system at the expected level of service.

8.3.4 Financial Planning and Monitoring

The comprehensive financial plan will be updated during the 10-year period leading up to project implementation in 2030 to ensure adequate funding for Project 2030.

Once Project 2030 begins, financial model assumptions, including capital cost estimates, funding scenarios, and operating costs, will need to be updated as actual project costs are collected. Additional costs related to expanding the capacity of the District to accomplish a higher level of annual capital projects as previously mentioned will need to be accounted for in the financial plan. Other metrics, including construction and other soft costs; feet of pipe replaced; percentage of system replaced; and effort (in hours) for procurement, design, project management, and construction inspection, should also be tracked annually to compare trends and assist with planning.

Future rate adjustments will reflect projected revenues under existing rates; operation and capital costs; and funding options, including bonds, state loans, grants, and levels of reserves. To the

degree rate adjustments diverge from planned adjustments, the reasons for the changes should be communicated to the Board and other stakeholders.

8.3.5 Public Engagement

Public engagement efforts centered on communication of Project 2030 plans and benefits should continue as discussed in Section 8.2.5. As the level of pipe replacement activity increases after 2030, the District should be ready to increase public engagement efforts. Plans, drawings, figures, and photographs posted to the District's website and through the District's other traditional and digital channels of communication will generate public awareness and interest. Establishing benchmarks for the project and regularly reporting on progress through the use of dashboards will build confidence in the project and demonstrate transparency and accountability.

Benchmarks, such as the following, for Project progress could be included on the District's website, such as the following:

- Miles of pipe replaced
- Mile of pipe planned to be replaced
- Schedule of pipe replacement showing a map of current and scheduled projects
- Total costs spent as a percent of planned costs

It will be important for the District to plan for emergency public engagement. This will address misinformation regarding the project or the District. A clear and consistent response to misinformation will be necessary. This can take the form of immediately directing readers to legitimate sources of information, starting with the District's website. Another valuable source in emergency public engagement is the CAC. CAC members are generally more informed than the average customer and can provide quick corrections to misinformation. The CAC should continue to meet regularly and be informed of project specifics. Other District stakeholders (e.g., customers who regularly attend water efficiency education programs or who volunteer for the District through programs like the recently launched Garden Corps) may also be helpful in communicating key messages to neighbors and customers.

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Appendix A. Spending and Funding Alternative Analysis

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Technical Memorandum No. 4 Spending and Funding Options

Project 2030 Water Main Replacement

February 2019

Prepared for:

6230 Sylvan Road
Citrus Heights, CA 95610

Prepared by:

(Spending)

(Funding)

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EXECUTIVE SUMMARY

This memorandum (Memo) summarizes the methodology on how various spending and funding options including rate revenue, pre-funding, debt, and a combination of the three were developed. By combining these various spending and funding options, a total of twenty-one (21) unique spending and funding alternatives were developed. These 21 alternatives will be analyzed and key considerations of the various alternatives will be discussed.

SPENDING

The Citrus Heights Water District (CHWD or District) currently spends approximately $2 million annually on water main replacement, which equates to an annual rate of replacement of less than 0.5%. As water mains age throughout the District, the likelihood of failure increases. Through the Project 2030 Study (Study), the District is evaluating various spending options to update its replacement program.

Seven (7) different levels of spending between the years 2030 and 2080 have been developed. The first spending option is to remain at current spending levels, $2 million annually (in 2018 dollars). This spending option represents the highest relative risk. The other bookend of the spending options is a $10.2 million annual rate of spending (in 2018 dollars). This represents the lowest relative risk as 94 percent of the water mains would be replaced by the year 2080.

FUNDING

The Citrus Heights Water District is currently reviewing the replacement of the utility's water mains, which will commence in 2030 and span decades to complete. This endeavor requires significant capital spending to achieve the full replacement of all water mains and development of a Long-Term Financial Plan (LTFP) which will assist the District to determine the most viable options available to consider for funding The Study. There are many ways to fund ongoing capital needs, which include pay-as-you-go (PAYGO), debt financing, grants (when available), and advance funding by appropriating available funds today for future needs. When developing a comprehensive financial plan for a utility, reviewing the agency's long-term capital plan is a critical component to ensure revenue needs of the utility over the long-term are part of what's considered when setting rates in the short-term.

When determining available funding options for the 7 different levels of spending, certain spending options include multiple funding options by including prefunding, debt financing, or both. As such, as the spending levels increase between spending options, up to four funding options are considered for review and comparison. Through the review and comparison of each spending/funding Alternative, the relative risk of the water system will vary based on level of reinvestment and the revenue requirements to achieve the water main reinvestment will impact the level of revenue increases, amount of debt incurred, and how setting aside funding now may mitigate and smooth out revenue increases over the project schedule. Each of the 21 alternatives are listed separately with a brief summary, specific metrics and key considerations.

NEXT STEPS

Through upcoming workshops, the District will evaluate the 21 different spending and funding alternatives and compare the key considerations of each. Through a series of Customer Advisory Committee (CAC) meetings, these 21 alternatives will be winnowed down to the top two (2) or three (3) alternatives. A market research firm will then conduct a hybrid internet and telephone survey of 500 District customers and property owners of the top 2 or 3 alternatives to provide additional input to the District and CAC members. With this information and through workshops, the District will develop an implementation plan to recommend to the District's Board of Directors for discussion and possible action.

INTRODUCTION

Renewal and replacement of infrastructure, funding of improvements and public understanding of the value of water are key issues to water system managers. The District is currently using a 30-year Capital Improvement Plan (Plan) that was developed in 1998 as a key planning tool in determining annual capital improvement projects, which includes water main replacement. As the above Plan is nearing the end of its term, the District is undertaking a process to review and refine its long term water main replacement program, which the District titled Project 2030 - Water Main Replacement Study (Study). Key elements of this Study include: 1) Asset Inventory and Project Polygon Development, 2) Water Demand Forecast, 3) Water Main Assessment, 4) Phasing Plan, 5) Cost Estimates, 6) Funding Options, including Water Rate Options and Debt Service Options, and 7) Implementation Plan (see Figure 1).

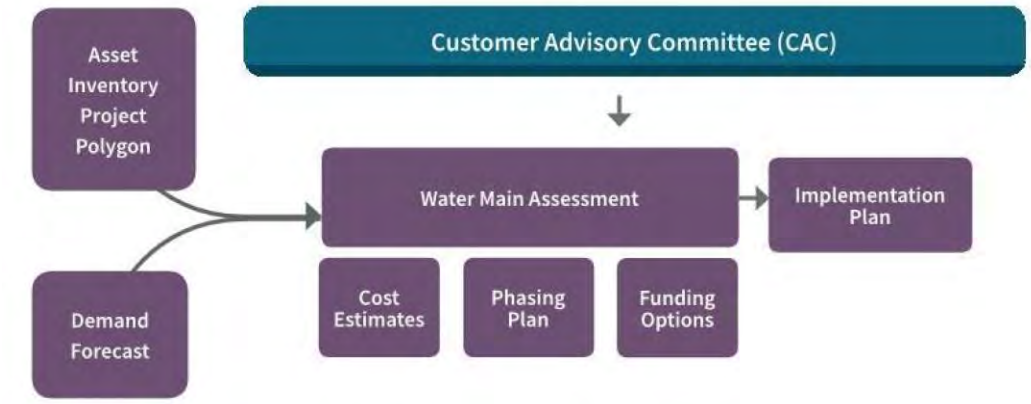


Figure 1. Water Main Replacement Study

This memorandum (Memo) summarizes the methodology on how various spending and funding options including rate revenue, pre-funding, debt, and a combination of the three (item 6 above) were developed. By combining these various spending and funding options, a total of twenty-one (21) unique spending and funding alternatives were developed. These 21 alternatives will be analyzed and key considerations of the various alternatives will be discussed.

This memorandum will be incorporated into the Final Project 2030 Plan.

ASSUMPTIONS

Below is a summary of the assumptions that were made for the spending and funding of the Study.

- All total and average annual spending costs in this section are expressed in 2018 dollars. This allows a meaningful comparison to current practices. In addition, total spending when expressed in 2018 dollars reflects a present construction value, which in turn represents a physical quantity of water main replacement, and therefore allows these values to be compared directly.
- Construction cost escalation (inflation) will be factored into the funding options analysis.
- The planning period for all of the spending and funding options is expressed over a 50-year planning period.
- An inflation rate of 3.2% was incorporated in all funding options, based on a 20-year average of the construction cost index.
- For debt financing, a 30-year term at 5% interest was used.

CURRENT MAIN REPLACEMENT PRACTICE

The District currently spends approximately $2 million annually on water main replacement. This equates to an annual rate of replacement of less than 0.5%. Currently, this rate of replacement is

sufficient since water mains are still in good condition; however, it is expected most of the District's water mains will require replacement over the next 60-years since the majority of the District's water mains were installed during the development boom from 1960 through the mid 1980's. Since the life of a water main ranges from 70 – 100 years, it is expected that starting in the year 2030 these water mains will need to be replaced.

METHODOLOGY

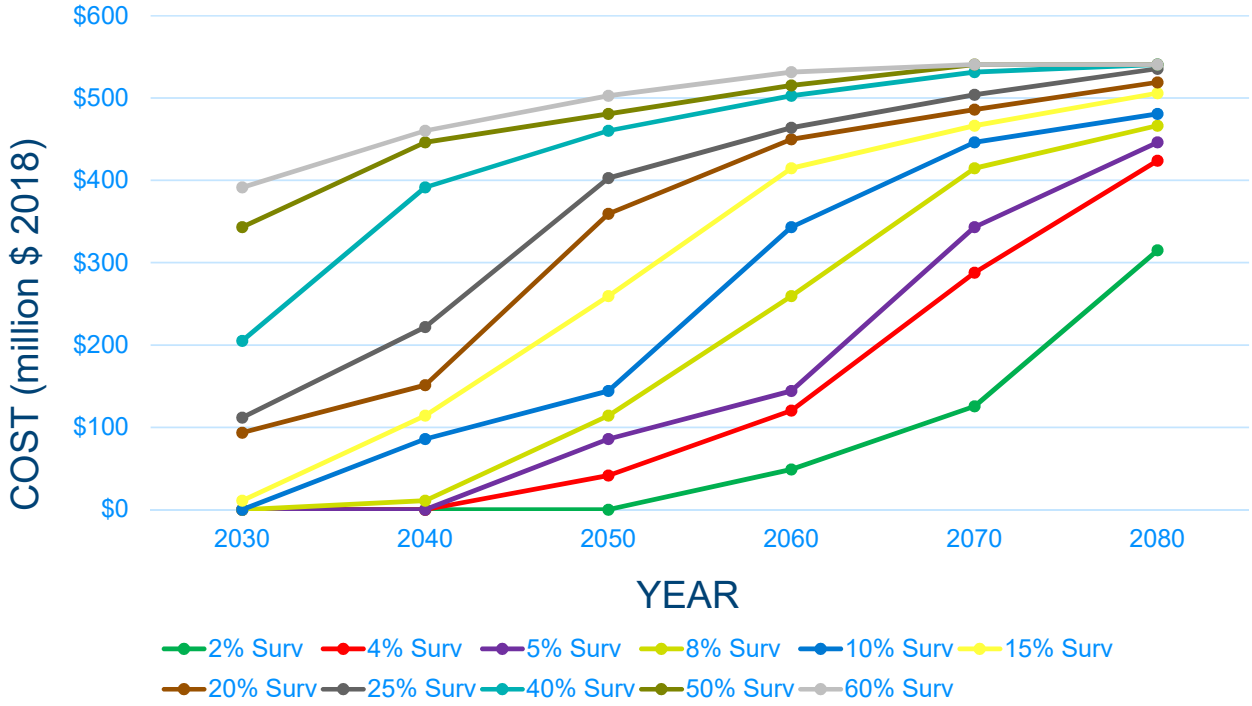
The Likelihood of Failure (LOF) factor for Pipe Age/Survival Probability (LOF #1, 50% weighting factor) was used as the primary tool to develop relative risk of different spending options. Survival Probability is defined as the likelihood that a pipe won't experience a "failure". The Survival Probability was determined using risk analysis software called InfoMaster by Innovyze. Survival Probabilities (SP) in the year 2080 (50-year Project Period) and relative risk are shown in Table 1. The lower the Survival Probability, the higher the likelihood of failure. Conversely, the higher the Survival Probability, the lower the likelihood of failure. The 2% Survival Probability is the Highest Risk of all curves; however, it is important to note the Survival Probability varies over the 50-year period as shown in Figure 1.

The Survival Probability curves along with the Relative Risk and Cost will be used to evaluate and compare the various spending options.

Table 1. Water Main Replacement Metrics for Various Survival Probabilities

Water Main Replacement by 2080	Relative Risk	Miles of Water Main Replaced through 2080	Cost (2018 $)	Incremental Cost (from row above)
2% Survival Probability	Highest	143	$315M	N/A
4% Survival Probability	Medium	195	$424M	$108M
5% Survival Probability	Medium	207	$446M	$22M
8% Survival Probability	Medium Low	216	$466M	$20M
10% Survival Probability	Medium Low	223	$480M	$14M
15% Survival Probability	Low	233	$506M	$25M
20% Survival Probability	Very Low	239	$519M	$13M
25% Survival Probability	Very Low	247	$535M	$16M
Total System Replacement	Lowest	250	$540M	$5M

Figure 1.5 Survival Probability Spending Curves



SPENDING OPTIONS

The spending options that will be evaluated are presented in Table 2. All spending options are assumed to begin in the year 2030 and span over a 50-year period.

Each spending option is presented along with the percent of the water system that would be replaced and the approximate survival probability of the system in the years 2040, 2060, and 2080. The District's current annual water main replacement rate of $2.0 million is included in the Spending Options as Option 1 and also named "Baseline". This Baseline option accounts for increased operational costs, other annual repair and replacement projects, and reserve funding, but does not include the planned meter replacement project.

Table 2. Spending Options

Spending Option Name	Average Annual Spending (2018 $)	Total Spending by 2080 (2018 $)	Percent of system replaced in 2080	Approx. Survival Probability in 2040	Approx. Survival Probability in 2060	Approx. Survival Probability in 2080
Option 1 (Baseline)	$2.0M	$100M	18%	7.8%	2.1%	less than 1%
Option 2 (1.5x Baseline)	$3.0M	$150M	28%	7.9%	2.4%	1.0%
Option 3 (2x Baseline)	$4.0M	$200M	37%	8.1%	3.9%	1.4%
Option 4	$6.4M	$320M	59%	9.4%	6.4%	2.1%
Option 5	$7.8M	$390M	72%	9.6%	7.3%	3.1%
Option 6	$9.6M	$480M	89%	11.2%	8.2%	10.0%
Option 7	$10.2M	$510M	94%	12.1%	8.6%	16.5%

FUNDING INTRODUCTION

Funding a Water Agency's Capital Improvement Plan (CIP) is a significant driver to the overall financial health of the utility. Agencies that adequately fund their repair and replacement needs on an annual basis are typically able to mitigate high rate increases and may gradually adjust rates to keep up with inflation. Conversely, agencies that do not fully fund their depreciating assets are more susceptible to higher construction costs resulting from fixing capital needs through a reactive approach and failures occur. As such, rate increases could spike in certain years as capital costs fluctuate with more variance from year-to-year.

FUNDING OPTIONS

There are many ways to fund ongoing capital needs, which include pay-as-you-go (PAYGO), debt financing, grants (when available), and advance funding by appropriating available funds today for future needs (Prefund). When developing a comprehensive financial plan for a utility, reviewing the agency's long-term capital plan is a critical component to ensure revenue needs of the utility over the long-term are part of what's considered when setting rates in the short-term. Doing so allows a more measured approach with revenue adjustments while minimizing a substantial increase in one particular year.

In this Study, the Citrus Heights Water District (District) will review the replacement of the utility's water mains, which will commence in 2030 and span decades to complete. This endeavor requires significant capital spending to achieve the full replacement of all water mains and the District is reviewing various funding options for the Study. The Study's capital costs are above and beyond current operations, existing debt and already scheduled capital. As part of the funding, the District is considering the impacts of issuing debt and how slowly increasing rates today can assist with offsetting costs from 2030 and beyond.

As described in the Spending Options Section, there are seven (7) different spending options which range from limited funding equal to $2M per year, based on what is currently set aside for water main line replacement, up to $510M with an annual spending amount of $10.2M per year. For consistency, each of the spending options span a 50-year time period with a commencement date of 2030.

When reviewing the funding options available for each spending option, one spending option could have up to four (4) alternative ways to fund the total project. These available funding options, include whether debt will be utilized and if the District will start prefunding the project today or wait until the project actually starts before adjusting revenue and corresponding rates. As such, funding alternatives include: 1) No Prefunding and no Debt, 2) Prefunding without Debt, 3) No Prefunding with Debt, and 4) Prefunding with Debt. Each funding alternatives will also include rate funding on a PAYGO basis. Figures 2-5 provides an illustration of how the various funding options may be applied to a specific spending option.

Figure 2.

Figure 3.

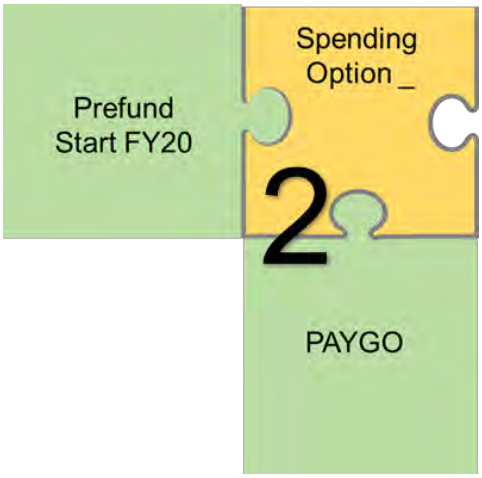


Figure 4.

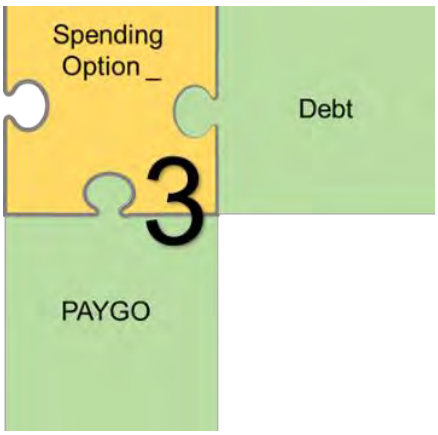
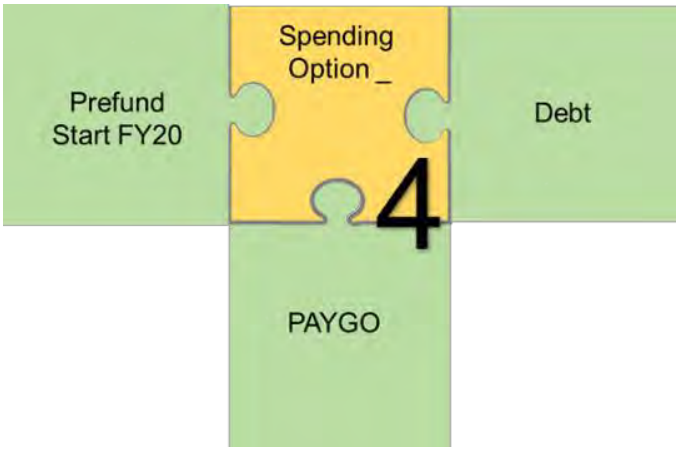


Figure 5.



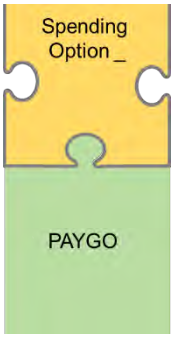
SPENDING AND FUNDING ALTERNATIVES

Through the selection of whether prefunding and debt financing will be incorporated as part of the funding for each spending option, 21 unique spending/funding alternatives were generated to review and consider. Each of the 21 alternatives are summarized and attached hereto as Exhibit A and includes the average rate increases necessary to meet the Study revenue requirements. Although our analysis extends through the project completion of 2080, it is important to note that revenue adjustments and setting corresponding rates are typically limited to no more than the next five (5) years and notices are required to be mailed to all customers pursuant to the provisions of Proposition 218. In addition, there are many independent variables that could impact the long-term forecast of each alternative, including, but not limited to: 1) new requirements and mandates from the State, 2) increases to costs outside District control, such as, purchased water and SMUD electricity charges. 3) water quality and increased treatment requirements, 4) drought emergencies, 5) population growth, 6) behavioral changes to consumption trends, and 7) technology efficiencies.

Below is a summary of each alternative which describes water main replacement investment including other obligations included as part of Baseline. See Exhibit A for a detailed summary.

Alternative 1: Baseline Funding

When evaluating a District's current financial position and future revenue needs, a long-term financial plan must be developed to account for all District expenses, including annual costs related to water supply, labor, power, materials, capital expenditures, operating and maintenance (O&M) expenses, reserve contributions, depreciation, and existing and proposed debt service payments. The resulting forecast reflect the District's expected revenue requirements over the planning horizon based on what is known today. Projecting revenue adjustments over a long planning horizon can illustrate future rate impacts and potential challenges to the District's financial situation. This will allow the District to adjust its capital project scheduling to smooth rate impacts while maintaining financial stability and adequate levels of reserves.

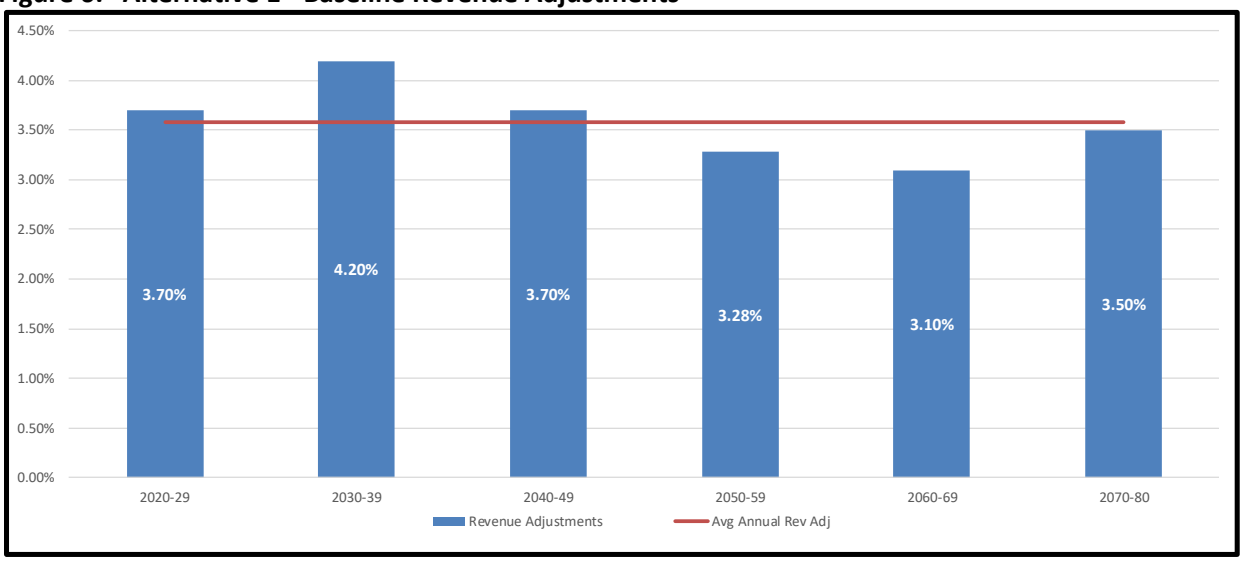


Before incorporating various spending options for the Study, the District's existing revenue requirements were modeled to generate a baseline level of funding needed based on the District's current budgetary expenses, planned capital, and reserve funding. With this multi-year cash flow analysis, anticipated revenue adjustments over the planning period were determined, while minimizing rate fluctuations. The Baseline Financial Plan requires an average annual revenue adjustment through 2080 of 3.58%, with a recommended adjustment of 3.7% for FY 2020 through FY 2029. The Baseline Alternative does not take into account prefunding or any debt. Table 3 provides a summary of the Baseline financial plan with key metrics in relation to the Study and Figure 6 identifies the expected revenue adjustments between 2020 through 2080.

Table 3. Baseline

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$100M	18%	less than 1%	3.58%	No	N/A

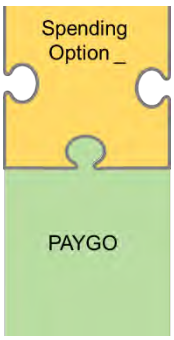
Figure 6. Alternative 1 - Baseline Revenue Adjustments



Key Considerations:

- Reflects current water main repair and replacement investment.
- Replaces 18% of the water main system by 2080.
- Minimum reinvestment generates a low survival probability with inherent high relative risk.

Alternative 2.1: $150M – 1.5x Baseline (No Prefunding and No Debt)

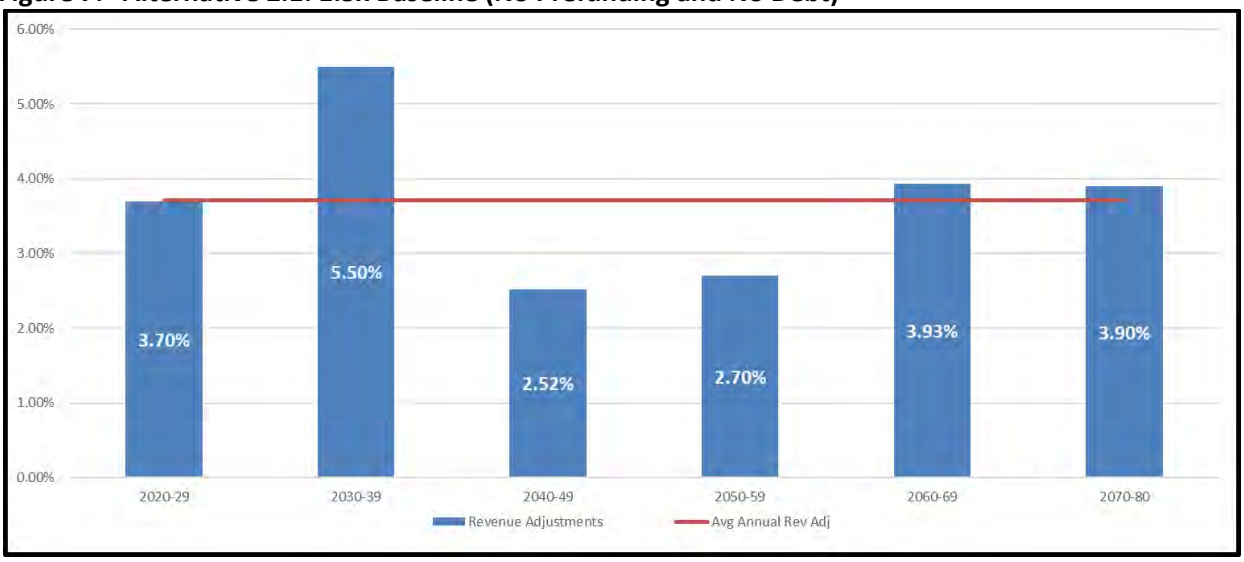


Alternative 2.1 slightly increases the reinvestment of water main replacement commencing in 2030 from $2M per year in 2018 dollars up to $3M a year in 2018 dollars and does not take into account prefunding or debt. With this level of spending, a slight increase in revenue would be required between 2030 and 2080 when compared to baseline since no prefunding is used in this alternative. When an Alternative does not include prefunding, revenue adjustments between FY 2020 and FY 2029 will be equivalent to the Baseline adjustments during that period which is equal to 3.7%. Table 4 provides a summary of Alternative 2.1 financial plan with key metrics in relation to the Study and Figure 7 identifies the expected revenue adjustments between 2020 through 2080.

Table 4. Alternative 2.1: 1.5x Baseline (No Prefunding and No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$150M	28%	1%	3.71%	No	No

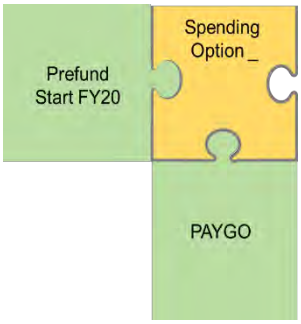
Figure 7. Alternative 2.1: 1.5x Baseline (No Prefunding and No Debt)



Key Considerations:

- No prefunding requires higher revenue adjustments between 2030-2039.
- Revenue adjustments fluctuate due to ramping up in early years of project.
- 10% more water main replacement when compared to Baseline.
- Survival probability is low with level of reinvestment, generating a high relative risk.

Alternative 2.2: $150M – 1.5x Baseline (Prefunding with No Debt)

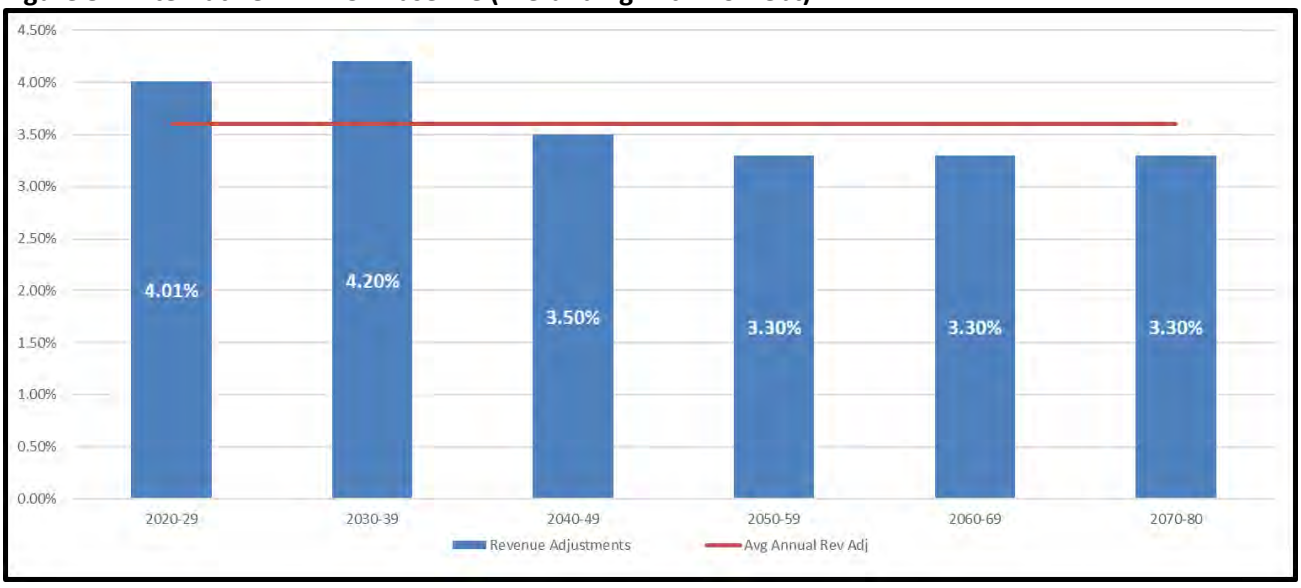


Alternative 2.2 is the same as Alternative 2.1, but with prefunding included. Prefunding permits a smoothing of future required revenue adjustments by building up funding in advance of the project without the need to ratchet up funding during the first year of project commencement. Therefore, Alternative 2.2 slightly increases revenue during FY 2020 through FY 2029 up to 4.01%, while mitigating the proposed increases in Alternative 2.1 during the first 10 years of the project down to 4.20%. Table 5 provides a summary of Alternative 2.2 financial plan with key metrics in relation to The Study and Figure 8 identifies the expected revenue adjustments between 2020 through 2080.

Table 5. Alternative 2.2: 1.5x Baseline (Prefunding with No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$150M	28%	1%	3.60%	No	**Yes**

Figure 8. Alternative 2.2: 1.5x Baseline (Prefunding with No Debt)



Key Considerations:

- Prefunding reduces higher revenue adjustments between 2030-2039.
- Overall annual revenue adjustments over project duration equals 3.60%.
- 10% more water main replacement when compared to Baseline while difference in average annual revenue adjustments is 0.02%.
- Survival probability is low with level of reinvestment, generating a high relative risk.

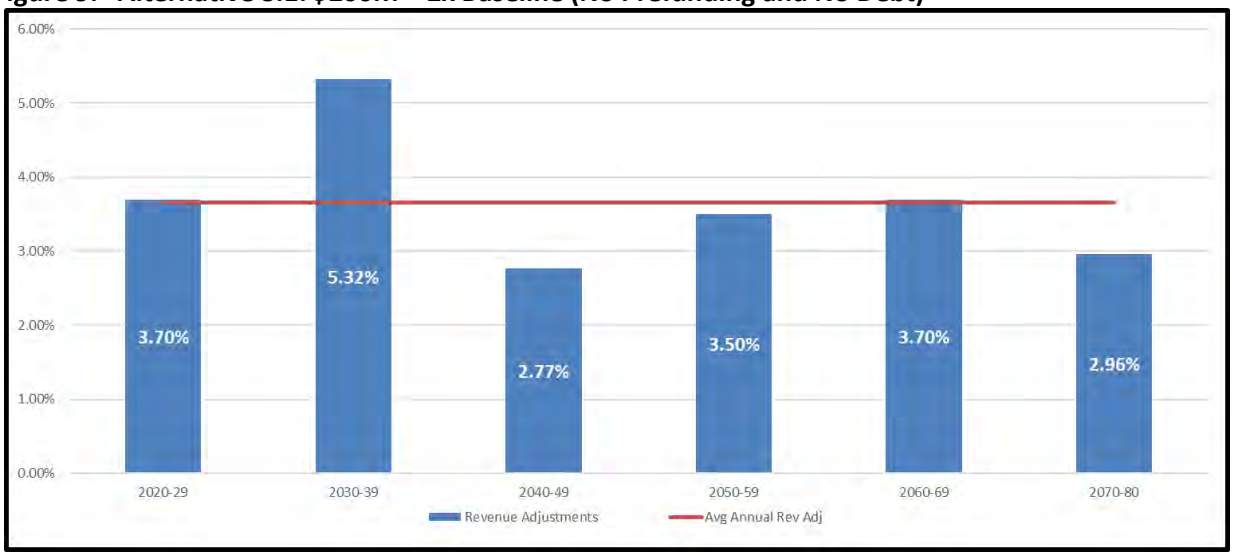
Alternative 3.1: $200M – 2x Baseline (No Prefunding and No Debt)

Alternative 3.1 doubles the current reinvestment of water main replacement commencing in 2030 from $2M per year in 2018 dollars up to $4M a year in 2018 dollars. With this level of spending, higher increases are needed when no prefunding is included as additional funding for the project starts when the project commences. As such, revenue adjustments between FY 2020 and FY 2029 are equivalent to the Baseline adjustments equal to 3.7% and a spike in funding is required equal to 5.32% each year between FY 2030 and FY 2039. However, due to cashflow needs and ensuring adequate District reserves remain intact, 9% revenue adjustments are required for the first three years of the project between FY 2030 and FY 2032. Table 6 provides a summary of Alternative 3.1 financial plan with key metrics in relation to the Study and Figure 9 identifies the expected revenue adjustments between 2020 through 2080.

Table 6. Alternative 3.1: $200M – 2x Baseline (No Prefunding and No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$200M	37%	1.4%	3.66%	No	No

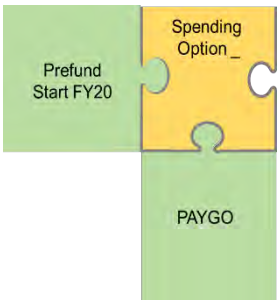
Figure 9. Alternative 3.1: $200M – 2x Baseline (No Prefunding and No Debt)



Key Considerations:

- No prefunding requires a spike in revenue adjustments between 2030-2039.
- 9% increases in FY 2030, FY 2031 and FY 2032
- Revenue adjustments fluctuate due to ramping up in early years of project.
- Approximately 20% more water main replacement when compared to Baseline.
- Survival probability is low with level of reinvestment, generating a high relative risk.

Alternative 3.2: $200M – 2x Baseline (Prefunding with No Debt)

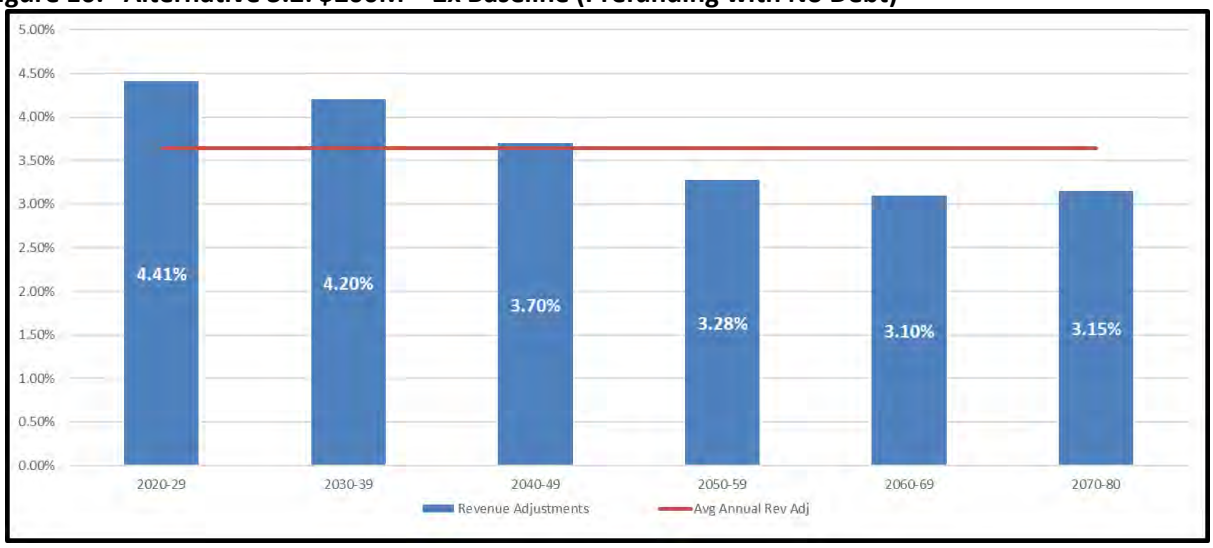


Alternative 3.2 is the same as Alternative 3.1, but with prefunding included. With slightly higher revenue adjustments in advance of the project during FY 2020 through FY 2029 of 4.41% annually, the projected revenue adjustments during the first 10 years of the project can be reduced to 4.20%. Table 7 provides a summary of Alternative 3.2 financial plan with key metrics in relation to the Study and Figure 10 identifies the expected revenue adjustments between 2020 through 2080.

Table 7. Alternative 3.2: $200M – 2x Baseline (Prefunding with No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$150M	28%	1%	3.64%	No	**Yes**

Figure 10. Alternative 3.2: $200M – 2x Baseline (Prefunding with No Debt)



Key Considerations:

- Prefunding smooths out required revenue adjustments between 2030-2039.
- Revenue adjustments are also more leveled throughout project.
- Approximately 20% more water main replacement when compared to Baseline.
- Survival probability is low with level of reinvestment, generating a high relative risk.

Alternative 4.1: $320M – (No Prefunding and No Debt)

Alternative 4.1 increases reinvestment to main line replacement up to $320M, resulting in annual spending equal to $6.4M in 2018 dollars. With Alternative 4.1, prefunding and debt are not included. Therefore, steeper increases are necessary to ramp up funding at the start of the project in 2030, equal to 6.8% revenue adjustments year-over-year. In addition, due to cashflow needs and maintaining adequate District reserves, a 50% revenue adjustment is required in FY 2030. Overall, the average annual rate increase through project completion at 4.03% is not much higher than Alternatives 3.1 and 3.2; but the revenue spike in FY 2030 would cause significant rate shock to customers. Table 8 provides a summary of Alternative 4.1 financial plan with key metrics in relation to the Study and Figure 11 identifies the expected revenue adjustments between 2020 through 2080.

Table 8. Alternative 4.1: $320M – (No Prefunding and No Debt)

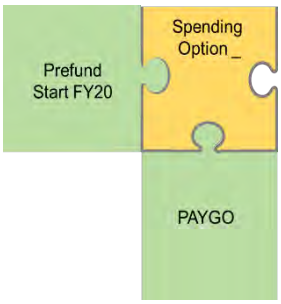
Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$320M	59%	2.10%	4.03%	No	No

Figure 11. Alternative 4.1: $320M – (No Prefunding and No Debt)

Key Considerations:

- No prefunding requires higher revenue adjustments between 2030-2039.
- 50% increase in required in FY 2030 to meet spending needs.
- Future increases from FY 2040 and beyond average 3.43% due to the ramp up in revenue during the first 10 years of construction.
- Revenue needs generate inter-generational inequity
- Revenue adjustments fluctuate due to ramping up in early years of project.
- More than 50% of water mains replaced.

Alternative 4.2: $320M – (Prefunding with No Debt)

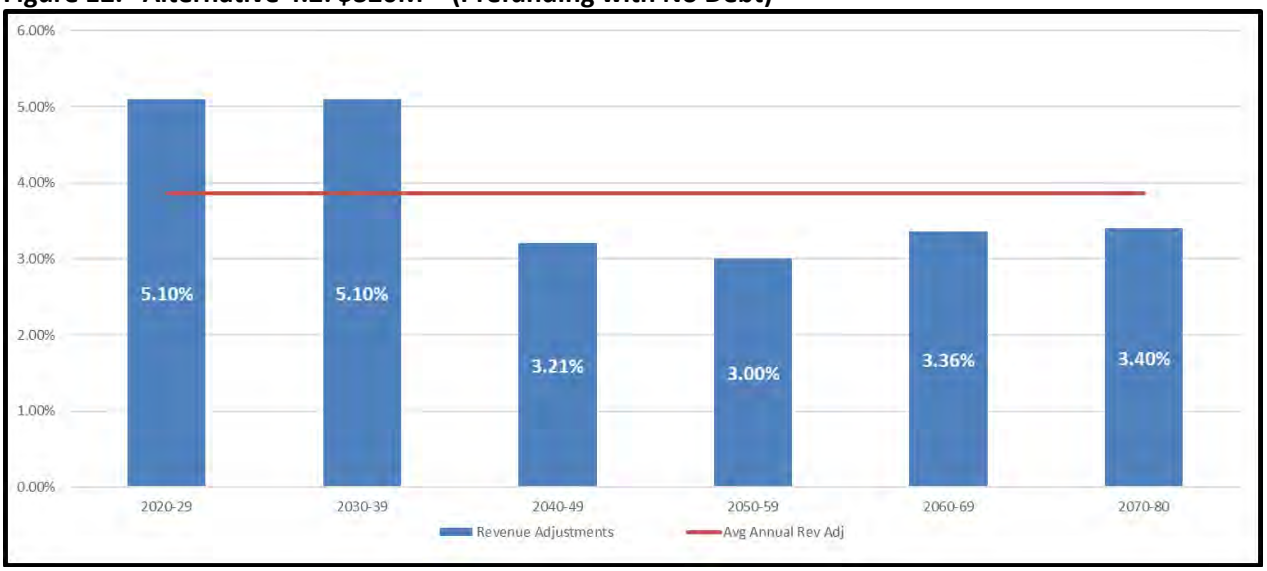


Alternative 4.2 is the same as Alternative 4.1, but with prefunding included. Prefunding primarily mitigates the increases during the first 10 years of the project shown in Alternative 4.1, while very modestly also reducing future revenue adjustments when compared to Alternative 4.1. Revenue adjustments increase up to 5.10% from FY 2020 through FY 20209 and reduces the 6.8% increases in Alternative 4.1 down to 5.1%. Table 9 provides a summary of Alternative 4.2 financial plan with key metrics in relation to the Study and Figure 12 identifies the expected revenue adjustments between 2020 through 2080.

Table 9. Alternative 4.2: $320M – (Prefunding with No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$320M	59%	2.10%	3.86%	No	**Yes**

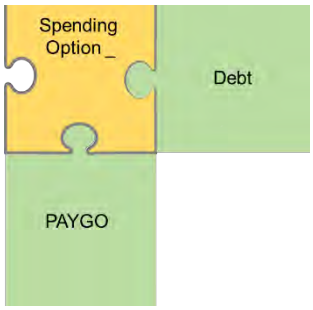
Figure 12. Alternative 4.2: $320M – (Prefunding with No Debt)



Key Considerations:

- Prefunding smooths out revenue adjustments during first 10 years of project.
- Annual revenue adjustments equal 5.10% for next 20 years.
- Future increases from FY 2040 and beyond average 3.24% due to the ramp up in revenue during the first 20 years of planning period.
- Revenue needs generate inter-generational inequity
- More than 50% of water mains replaced.

Alternative 4.3: $320M – (No Prefunding with Debt)

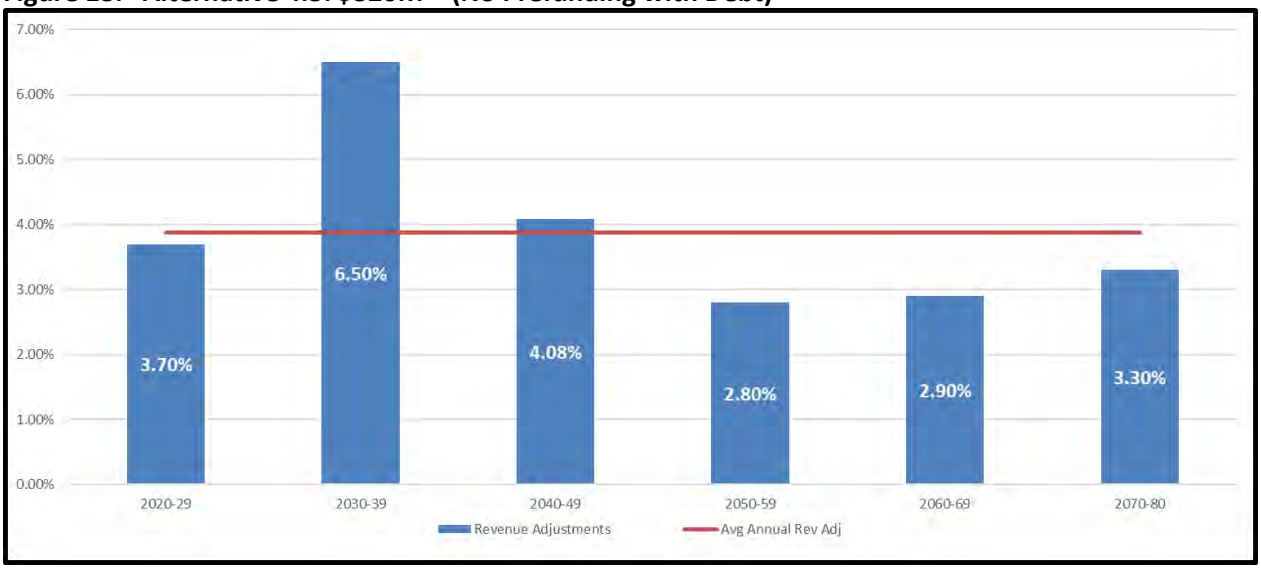


Alternative 4.3 is the first spending Alternative where debt is introduced to mitigate revenue increases by funding a portion of the Study cost with bond proceeds while incurring debt payments amortized over a 30-year amortization schedule. Within Alternative 4.3, 8% of the project is funded with debt with an initial bond issue in FY 2030 to reduce the revenue increase shown in Alternative 4.1. With the inclusion of debt, interest would add $78M to the total project cost; however, there may be opportunities to pay off debt early and eliminate future interest payments. Table 10 provides a summary of Alternative 4.3 financial plan with key metrics in relation to the Study and Figure 13 identifies the expected revenue adjustments between 2020 through 2080.

Table 10. Alternative 4.3: $320M – (No Prefunding with Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$320M	59%	2.10%	3.60%	8%	No

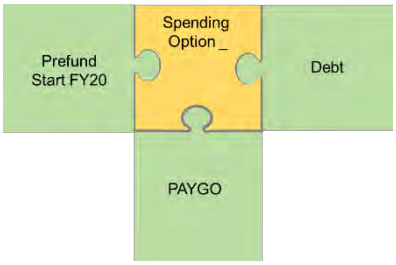
Figure 13. Alternative 4.3: $320M – (No Prefunding with Debt)



Key Considerations:

- Debt represents 8% of funding
- Slight reduced revenue needs during first 10 years of project when compared to Alternative 4.1.
- Interest on bonds adds $78M to project cost assuming no early redemption on bonds.
- More than 50% of water mains replaced.

Alternative 4.4: $320M – (Prefunding with Debt)

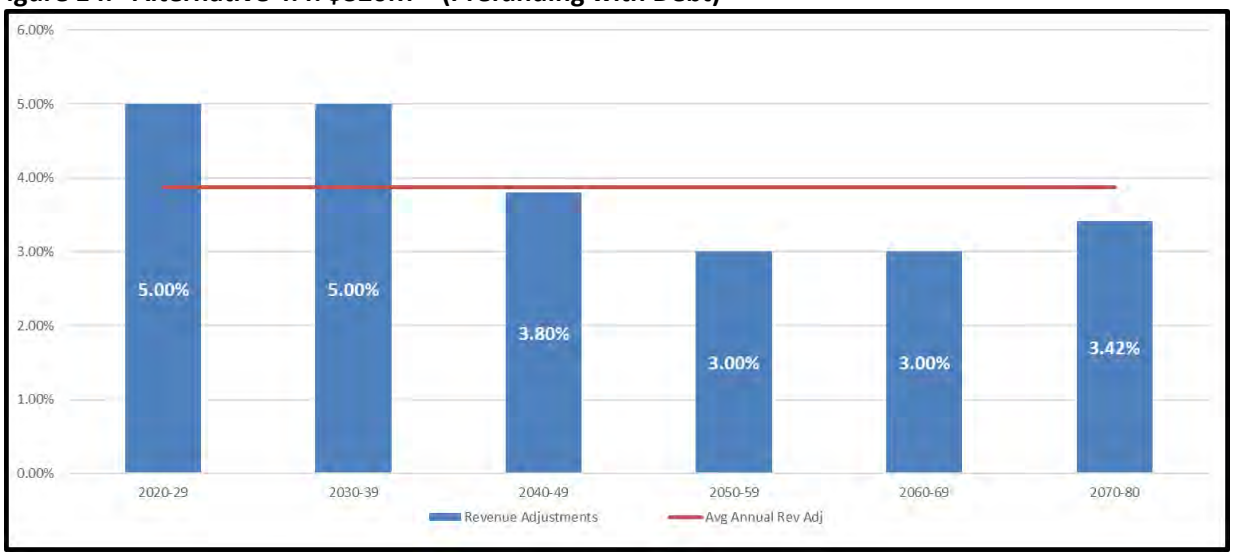


Alternative 4.4 includes both prefunding as well as debt. With the inclusion of prefunding, the amount of debt may be reduced and is primarily used to offset funding shortages and maintain reserves at adequate levels. Within Alternative 4.4, 5% of the project is funded with debt while funding is slowly increased commencing in FY 2020. With the inclusion of debt, interest would add $48M to the total project cost; however, there may be opportunities to pay off debt early and eliminate future interest payments. Table 11 provides a summary of Alternative 4.4 financial plan with key metrics in relation to the Study and Figure 14 identifies the expected revenue adjustments between 2020 through 2080.

Table 11. Alternative 4.4: $320M – (Prefunding with Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$320M	59%	2.10%	3.87%	5%	**Yes**

Figure 14. Alternative 4.4: $320M – (Prefunding with Debt)



Key Considerations:

- Average annual rate increase is slightly higher than Alternative 4.3, but interest reduced by $30M.
- Revenue needs in first 10 years of project reduced by prefunding.
- No significant revenue spikes in a specific year.
- Interest on bonds adds $48M to project cost assuming no early redemption on bonds.
- More than 50% of water mains replaced.

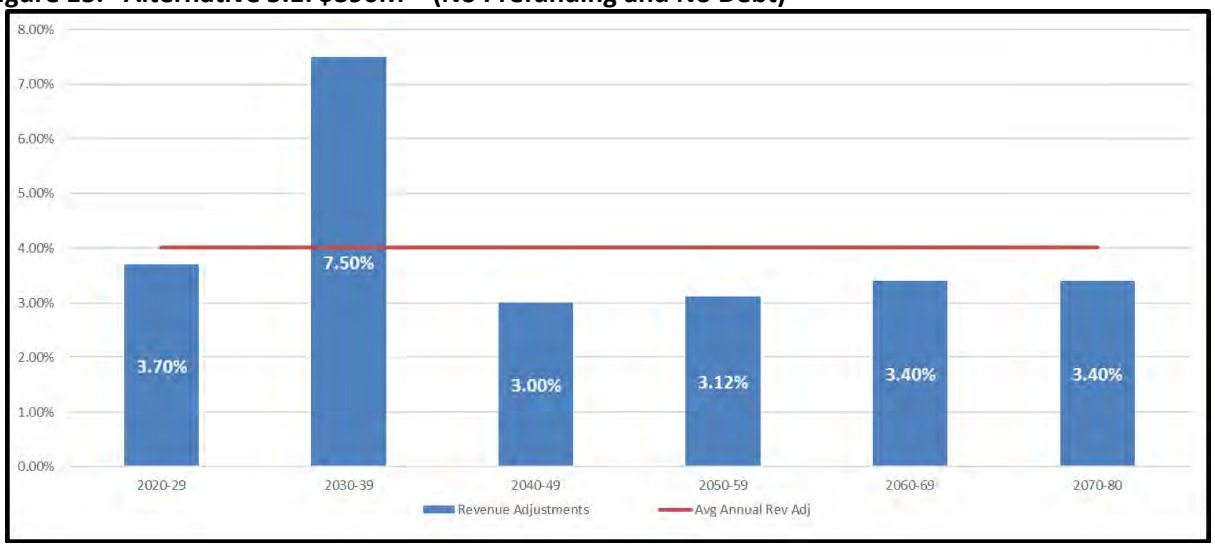
Alternative 5.1: $390M – (No Prefunding and No Debt)

Alternative 5.1 reflects a significant increase in water main replacement for a total project cost of $390M with annual spending of $7.8M in 2018 dollars. At this level of spending, the exclusion of Prefunding and Debt requires significant spikes in funding. During the first two years of construction, revenue would need to increase by 30% and 20% in FY 2030 and FY 2031, respectively. With these substantial increases, this funding Alternative approach for this level of spending would not be viable. Table 12 provides a summary of Alternative 5.1 financial plan with key metrics in relation to the Study and Figure 15 identifies the expected revenue adjustments between 2020 through 2080.

Table 12. Alternative 5.1: $390M – (No Prefunding and No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$390M	72%	3.10%	4.02%	No	No

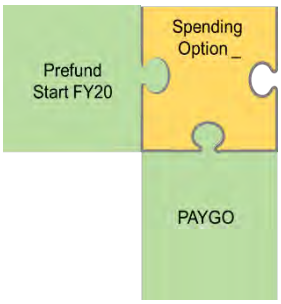
Figure 15. Alternative 5.1: $390M – (No Prefunding and No Debt)



Key Considerations:

- No prefunding requires higher revenue adjustments between 2030-2039.
- 30% increase in revenue required in FY 2030 followed by 20% increase in FY 2031.
- Revenue needs generate inter-generational inequity with existing customers primarily impacted.
- Revenue adjustments significantly fluctuate due to need to ramp up in early years of project.
- More than 72% of water mains replaced.

Alternative 5.2: $390M – (Prefunding with No Debt)

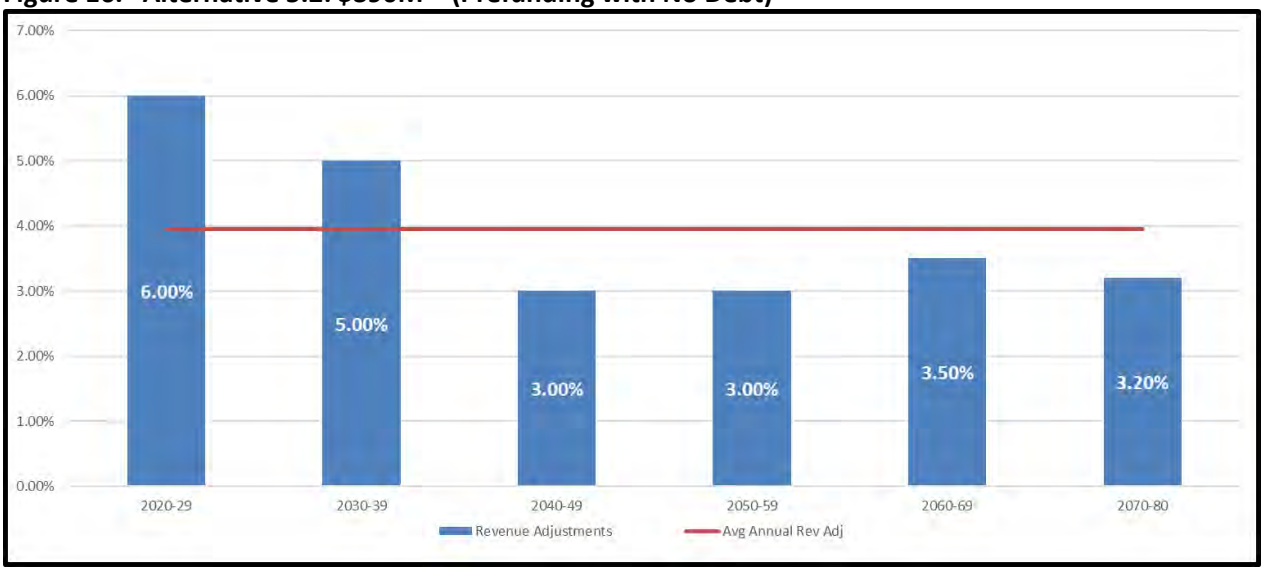


Alternative 5.2 incorporates prefunding with the primary goal to eliminate the significant revenue increases at the start of the project identified in Alternative 5.1. By adjusting revenue commencing in FY 2020, adjustments during the first 10 years of the project are reduced to 5% from 7.5% and eliminates the significant revenue spikes in FY 2030 and FY 2031. Table 13 provides a summary of Alternative 5.2 financial plan with key metrics in relation to the Study and Figure 16 identifies the expected revenue adjustments between 2020 through 2080.

Table 13. Alternative 5.2: $390M – (Prefunding with No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$390M	72%	3.10%	3.95%	No	**Yes**

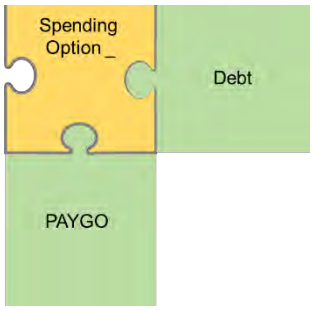
Figure 16. Alternative 5.2: $390M – (Prefunding with No Debt)



Key Considerations:

- Prefunding smooths out revenue adjustments during first 10 years of project.
- Eliminates significant increases in revenue in FY 2030 and FY 2031 identified in Alternative 5.1.
- Annual average revenue adjustments equal 3.95% over project completion.
- Future revenue increases from FY 2040 and beyond average 3.18% due to the ramp up in revenue during the first 20 years of planning period.
- More than 72% of water mains replaced.

Alternative 5.3: $390M – (No Prefunding with Debt)

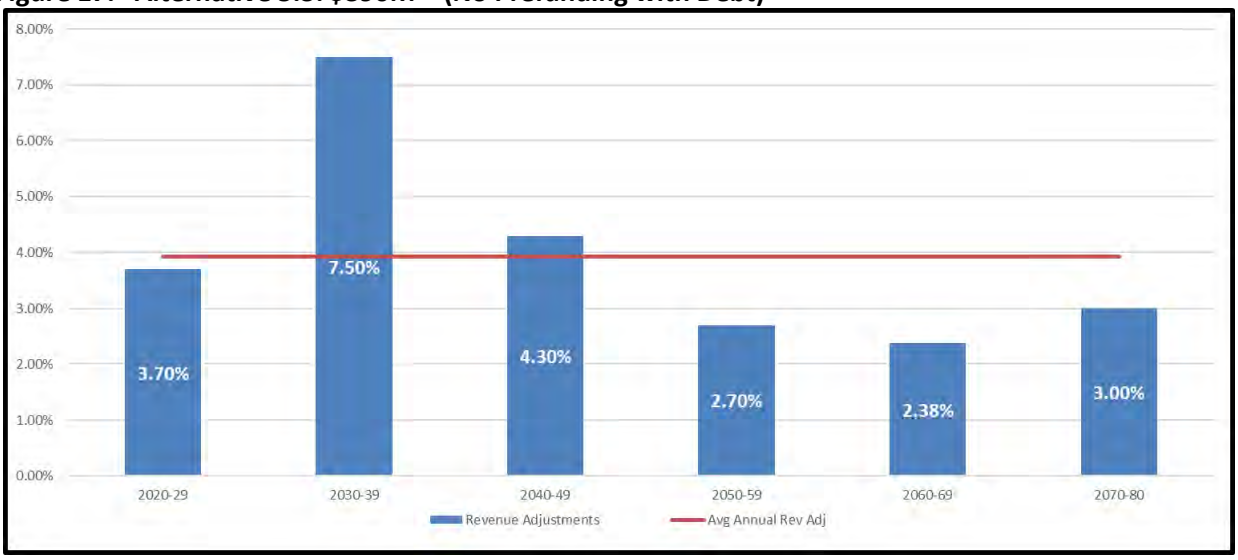


Alternative 5.3 removes prefunding but includes debt financing. Within Alternative 5.3, 10% of the project is funded with debt with an initial bond issue in FY 2030. This Alternative isn't much different from Alternative 5.1 when comparing average annual revenue adjustments of 4.02% in Alternative 5.1 to 3.93% in Alternative 5.3; however, the significant increases in FY 2030 and FY 2031 are eliminated with the introduction of debt financing. With the inclusion of debt, interest would add $122M to the total project cost; however, there may be opportunities to pay off debt early and eliminate future interest payments. Table 14 provides a summary of Alternative 5.3 financial plan with key metrics in relation to the Study and Figure 17 identifies the expected revenue adjustments between 2020 through 2080.

Table 14. Alternative 5.3: $390M – (No Prefunding with Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$390M	72%	3.10%	3.93%	10%	No

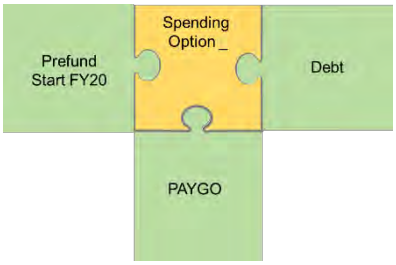
Figure 17. Alternative 5.3: $390M – (No Prefunding with Debt)



Key Considerations:

- Inclusion of debt eliminates revenue spikes in FY 2030 and FY 2031 as shown in Alternative 5.1.
- Debt represents 10% of funding
- Interest on bonds adds $122M to project cost assuming no early redemption on bonds.
- More than 72% of water mains replaced.

Alternative 5.4: $390M – (Prefunding with Debt)

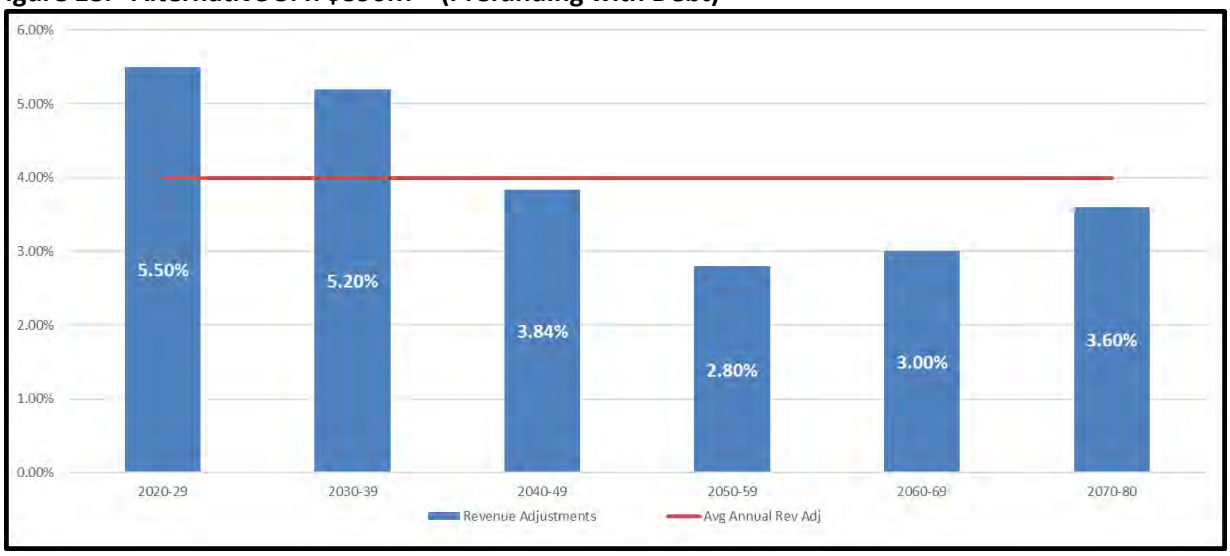


Alternative 5.4 includes both prefunding as well as debt. With the inclusion of prefunding, the amount of debt may be reduced and is primarily used to offset funding shortages for annual cashflow and maintain reserves at adequate levels. Within Alternative 5.4, 4% of the project is funded with debt as funding is slowly increased commencing in FY 2020. With the inclusion of debt, interest would add $48M to the total project cost; however, there may be opportunities to pay off debt early and eliminate future interest payments. Table 15 provides a summary of Alternative 5.4 financial plan with key metrics in relation to the Study and Figure 18 identifies the expected revenue adjustments between 2020 through 2080.

Table 15. Alternative 5.4: $390M – (Prefunding with Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$390M	72%	3.10%	3.99%	4%	Yes

Figure 18. Alternative 5.4: $390M – (Prefunding with Debt)



Key Considerations:

- Average annual rate increase is slightly higher than Alternative 5.3, but interest reduced by $74M.
- Revenue needs in first 10 years of project reduced by prefunding.
- No significant spikes in a specific year.
- Interest on bonds adds $48M to project cost assuming no early redemption on bonds.
- More than 72% of water mains replaced.

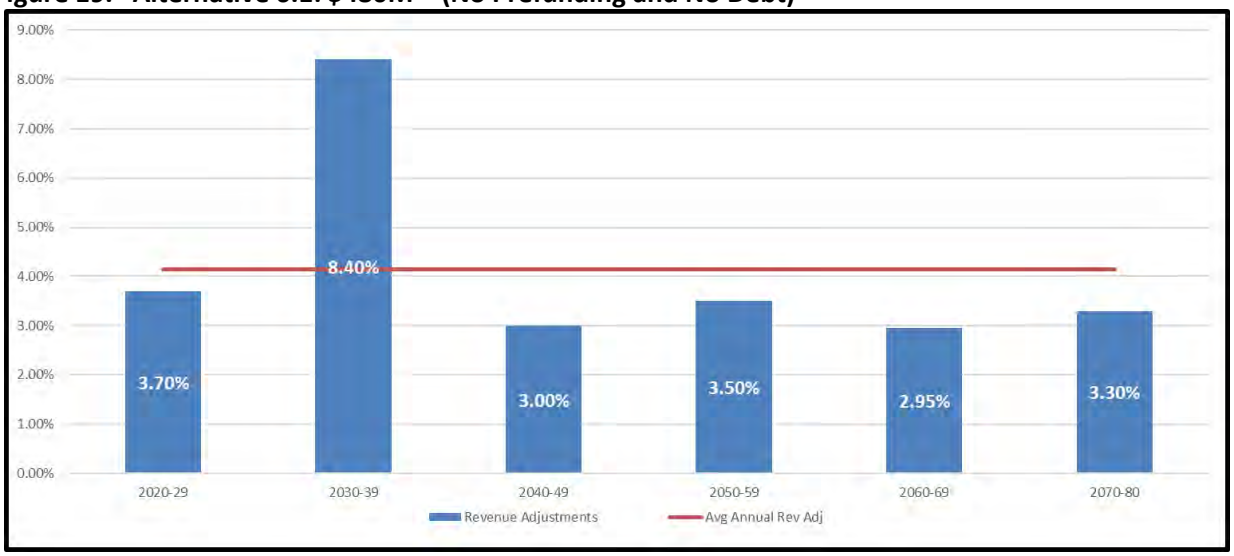
Alternative 6.1: $480M – (No Prefunding and No Debt)

Alternative 6.1 reflects a significant increase in water main replacement for a total project cost of $480M with annual spending of $9.6M in 2018 dollars. At this level of spending, the exclusion of prefunding and debt requires significant spikes in funding. During the first two years of construction, revenue would need to increase by 30% and 30% in FY 2030 and FY 2031, respectively. With these substantial increases, this funding Alternative approach for this level of spending would not be viable. Table 16 provides a summary of Alternative 6.1 financial plan with key metrics in relation to the Study and Figure 19 identifies the expected revenue adjustments between 2020 through 2080.

Table 16. Alternative 6.1: $480M – (No Prefunding and No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$480M	89%	10%	3.60%	No	No

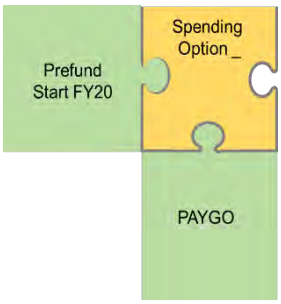
Figure 19. Alternative 6.1: $480M – (No Prefunding and No Debt)



Key Considerations:

- No prefunding requires higher revenue adjustments between 2030-2039.
- 30% increase in revenue required in FY 2030 and FY 2031.
- Revenue adjustments significantly fluctuate due to need to ramp up in early years of project.
- Revenue needs generate inter-generational inequity with existing customers primarily impacted
- More than 89% of water mains replaced.

Alternative 6.2: $480M – (Prefunding with No Debt)

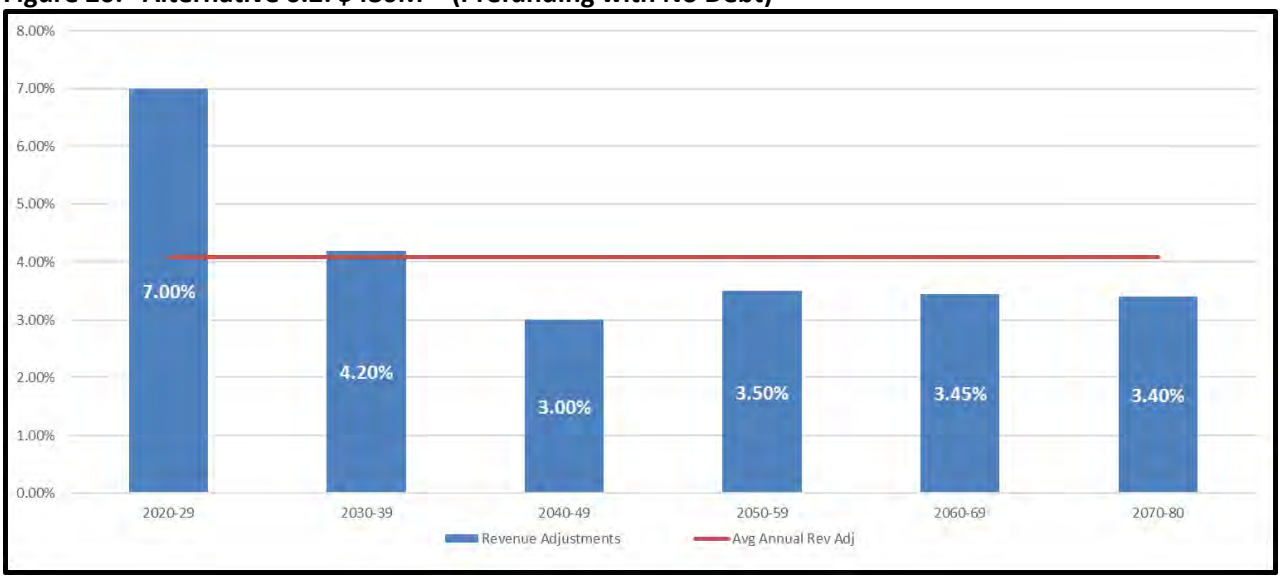


Alternative 6.2 incorporates prefunding with the primary goal to eliminate the significant revenue increases at the start of the project identified in Alternative 6.1. By adjusting revenue commencing in FY 2020, adjustments during the first 10 years of the project are reduced to 4.2% from 8.4% and eliminates the significant revenue spikes in FY 2030 and FY 2031. Table 17 provides a summary of Alternative 6.2 financial plan with key metrics in relation to the Study and Figure 20 identifies the expected revenue adjustments between 2020 through 2080.

Table 17. Alternative 6.2: $480M – (Prefunding with No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$480M	89%	10%	4.09%	No	**Yes**

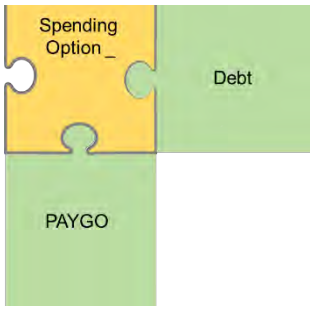
Figure 20. Alternative 6.2: $480M – (Prefunding with No Debt)



Key Considerations:

- Prefunding smooths out revenue adjustments during first 10 years of project.
- Eliminates significant revenue increases in FY 2030 and FY 2031 identified in Alternative 6.1.
- Annual average revenue adjustments equal 4.09% over project completion.
- Future revenue increases from FY 2040 and beyond average 3.34% due to the ramp up in revenue during the first 20 years of planning period.
- More than 89% of water mains replaced.

Alternative 6.3: $480M – (No Prefunding with Debt)



Alternative 6.3 removes prefunding but includes debt financing. Within Alternative 5.3, 6% of the project is funded with debt with an initial bond issue in FY 2030. This Alternative eliminates the significant increases in FY 2030 and FY 2031. However, without prefunding, revenue increases are still relatively high during the first ten years of the project to cover increased spending and additional debt serve payments. With the inclusion of debt, interest would add $96M to the total project cost; however, the debt service payments extend over 34 years and there may be opportunities to pay off debt early and eliminate future interest payments. Table 18 provides a summary of Alternative 6.3 financial plan with key metrics in relation to the Study and Figure 21 identifies the expected revenue adjustments between 2020 through 2080.

Table 18. Alternative 6.3: $480M – (No Prefunding with Debt)

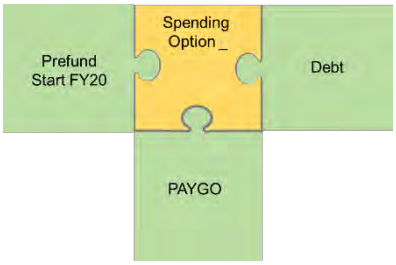
Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$480M	89%	10%	4.00%	6%	No

Figure 21. Alternative 6.3: $480M – (No Prefunding with Debt)

Key Considerations:

- Inclusion of debt eliminates revenue spikes in FY 2030 and FY 2031 as shown in Alternative 6.1.
- Revenue adjustments are still high for first 10 years due to no Prefunding
- Debt represents 6% of funding
- Interest on bonds adds $96M to project cost but extends over 34 years.
- More than 89% of water mains replaced.

Alternative 6.4: $480M – (Prefunding with Debt)



Alternative 6.4 includes both prefunding as well as debt. With the inclusion of prefunding, debt is slightly increased within this Alternative whereas in previous similar Alternatives, debt was reduced. With prefunding and 9% of the project funded through debt financing, the average annual revenue increase through project completion is 3.97%. Interest would add $132M to the total project cost; however, the debt service payments extend over 72 years and there may be opportunities to pay off debt early and eliminate future interest payments. Table 19 provides a summary of Alternative 6.4 financial plan with key metrics in relation to the Study and Figure 22 identifies the expected revenue adjustments between 2020 through 2080.

Table 19. Alternative 6.4: $480M – (Prefunding with Debt)

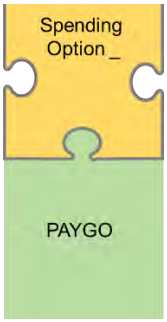
Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$480M	89%	10%	3.97%	9%	**Yes**

Figure 22. Alternative 6.4: $480M – (Prefunding with Debt)

Key Considerations:

- First 20 years, average annual revenue increase limited to 6%
- Future years, average annual revenue increase limited to 3%
- Revenue needs in first 10 years of project reduced by prefunding.
- No significant revenue spikes in a specific year.
- Interest on bonds adds $132M to project cost but extends over 72 years.
- More than 89% of water mains replaced.

Alternative 7.1: $510M – (No Prefunding and No Debt)

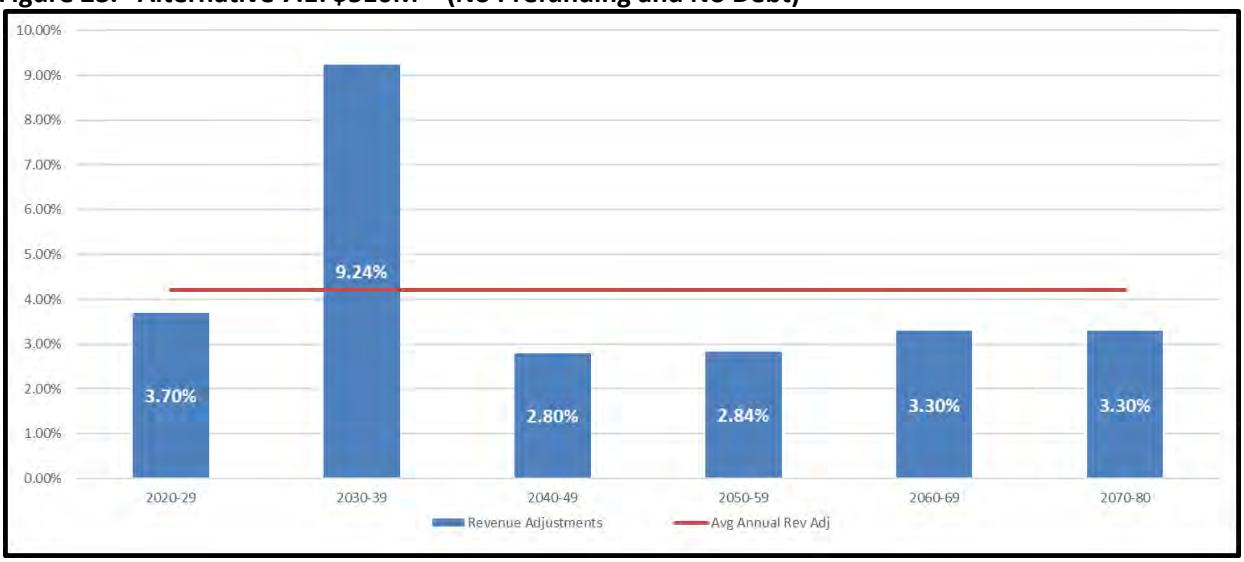


Alternative 7.1 reflects a greatest reinvestment in water main replacement for a total project cost of $510M with annual spending of $10.2M in 2018 dollars. At this level of spending, the exclusion of prefunding and debt requires significant spikes in funding. During the first two years of construction, revenue would need to increase by 35% for FY 2030 and FY 2031. With these substantial increases, this funding Alternative approach for this level of spending would not be a viable Alternative but is included for comparison purposes. Table 20 provides a summary of Alternative 7.1 financial plan with key metrics in relation to the Study and Figure 23 identifies the expected revenue adjustments between 2020 through 2080.

Table 20. Alternative 7.1: $510M – (No Prefunding and No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$510M	94%	16.50%	4.20%	No	Yes

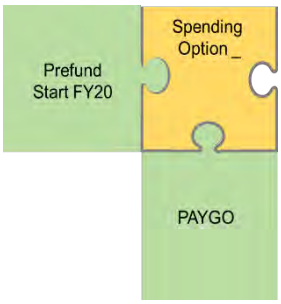
Figure 23. Alternative 7.1: $510M – (No Prefunding and No Debt)



Key Considerations:

- No prefunding requires significant revenue adjustments between 2030-2039.
- 35% increase in revenue required in FY 2030 followed by 20% increase in FY 2031.
- Revenue needs generate inter-generational inequity with existing customers primarily impacted
- Revenue adjustments significantly fluctuate due to need to ramp up in early years of project.
- Approximately 94% of water mains replaced.

Alternative 7.2: $510M – (Prefunding with No Debt)

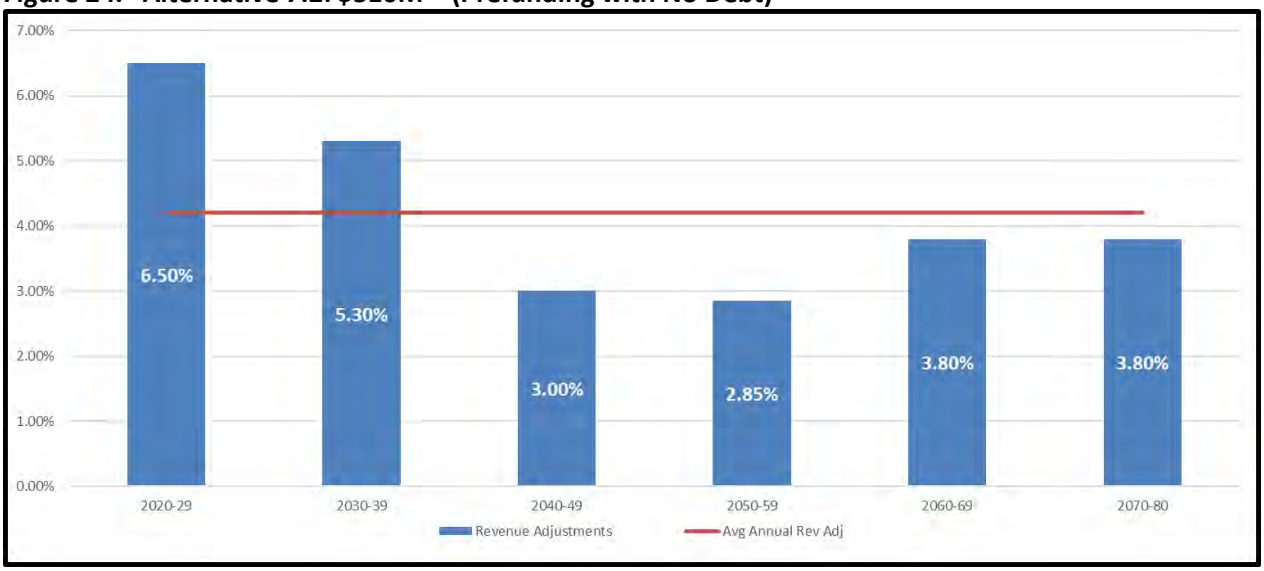


Alternative 7.2 incorporates prefunding with the primary goal to eliminate the significant revenue increases at the start of the project identified in Alternative 7.1. By adjusting revenue commencing in FY 2020, adjustments during the first 10 years of the project are reduced to 5.3% from 9.24% and eliminates the significant revenue spikes in FY 2030 and FY 2031. Table 21 provides a summary of Alternative 7.2 financial plan with key metrics in relation to the Study and Figure 24 identifies the expected revenue adjustments between 2020 through 2080.

Table 21. Alternative 7.2: $510M – (Prefunding with No Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$510M	94%	16.50%	4.21%	No	**Yes**

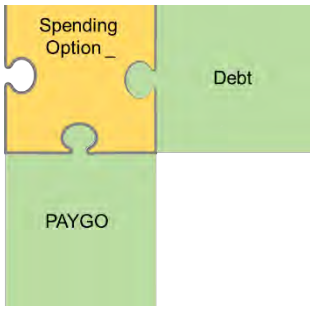
Figure 24. Alternative 7.2: $510M – (Prefunding with No Debt)



Key Considerations:

- Prefunding smooths out revenue adjustments during first 10 years of project.
- Eliminates significant revenue increases in FY 2030 and FY 2031 identified in Alternative 7.1.
- Revenue needs front loaded during first 20 years.
- Future revenue increases from FY 2040 and beyond average 3.36% due to the ramp up in revenue during the first 20 years of planning period.
- Approximately 94% of water mains replaced.

Alternative 7.3: $510M – (No Prefunding with Debt)

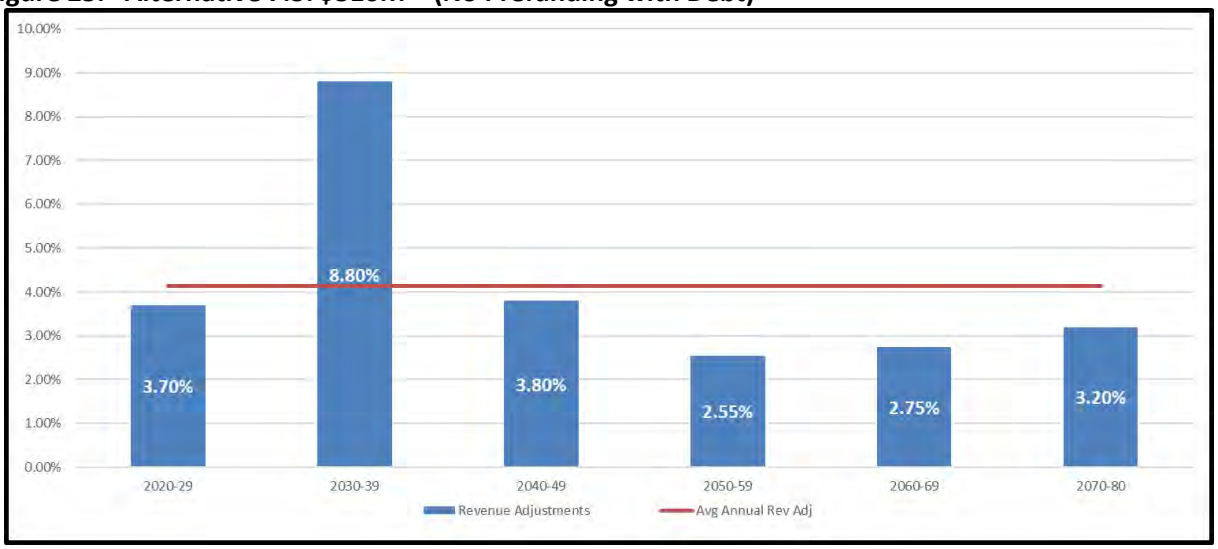


Alternative 7.3 removes prefunding but includes debt financing. Within Alternative 7.3, 6% of the project is funded with debt with an initial bond issue in FY 2030. This Alternative isn't much different from Alternative 7.1 when comparing average annual revenue adjustments of 4.20% in Alternative 7.1 to 4.13% in Alternative 7.3; however, the significant revenue increases in FY 2030 and FY 2031 are eliminated with the introduction of debt financing. With the inclusion of debt, interest would add $96M to the total project cost; however, there may be opportunities to pay off debt early and eliminate future interest payments. Table 22 provides a summary of Alternative 7.3 financial plan with key metrics in relation to the Study and Figure 24 identifies the expected revenue adjustments between 2020 through 2080.

Table 22. Alternative 7.3: $510M – (No Prefunding with Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$510M	94%	16.50%	4.13%	6%	No

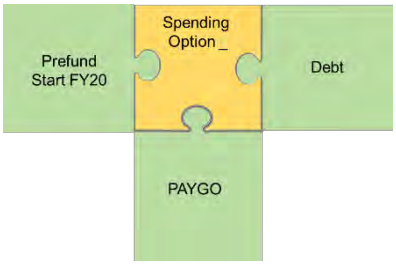
Figure 25. Alternative 7.3: $510M – (No Prefunding with Debt)



Key Considerations:

- Inclusion of debt eliminates revenue spikes in FY 2030 and FY 2031 as shown in Alternative 7.1.
- Debt represents 6% of funding.
- Interest on bonds adds $96M to project cost but extends over 34 years.
- Approximately 94% of water mains replaced.

Alternative 7.4: $510M – (Prefunding with Debt)

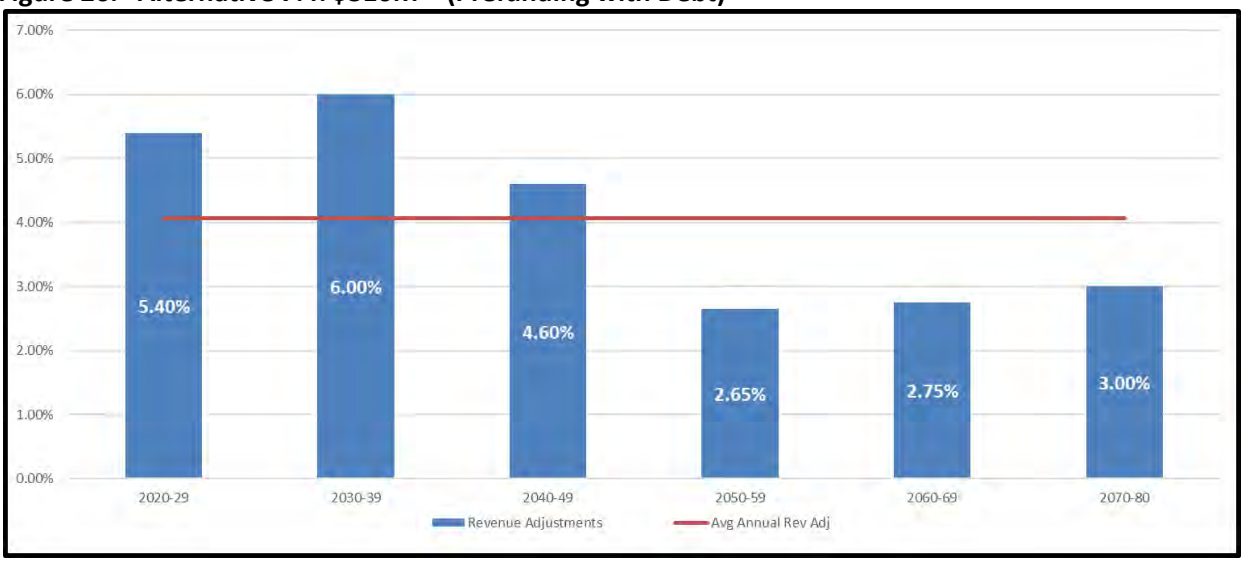


Alternative 7.4 includes both prefunding as well as debt. With the inclusion of prefunding, debt is slightly increased within this Alternative whereas in certain previous similar Alternatives, debt was reduced. With prefunding and 15% of the project funded through debt financing, the average annual revenue increase through project completion is 4.07%. Interest would add $249M to the total project cost over 74 years; however, there may be opportunities to pay off debt early and eliminate future interest payments. Table 23 provides a summary of Alternative 7.4 financial plan with key metrics in relation to the Study and Figure 26 identifies the expected revenue adjustments between 2020 through 2080.

Table 23. Alternative 7.4: $510M – (Prefunding with Debt)

Spending	Total Cost	Water Main % Replaced	2080 Survival Probability	Annual Rev Increase	Debt	Prefund
Baseline	$510M	94%	16.50%	4.07%	15%	**Yes**

Figure 26. Alternative 7.4: $510M – (Prefunding with Debt)



Key Considerations:

- First 20 years, average annual revenue increase limited to 5.7%
- Future years, average annual revenue increase limited to 3.25%
- Revenue needs in first 10 years of project reduced by prefunding.
- No significant revenue spikes in a specific year.
- Interest on bonds adds $249M to project cost but extends over 74 years.
- More than 89% of water mains replaced.

NEXT STEPS

Through upcoming workshops, the District will evaluate these 21 different spending and funding alternatives and compare the key considerations of each. Through a series of CAC meetings, these 21 alternatives will be winnowed down to the top two (2) or three (3) alternatives. A market research firm will then conduct a hybrid internet and telephone survey of 500 District customers and property owners of the top 2 or 3 alternatives to provide additional input to the District and CAC members. With this information and through workshops, the District will develop an implementation plan to recommend to the District's Board of Directors for discussion and possible action.

EXHIBIT A

		Spending			Funding									
Alternative	Funding Description	Project Cost 2018	Years to Complete	Annual Spending	Total Cost (Inflated)	Percent Debt	Interest	Avg Annual Rate Increase (2020-2029)	Avg Annual Rate Increase (2030-2039)	Avg Annual Rate Increase (2040-2049)	Avg Annual Rate Increase (2050-2059)	Avg Annual Rate Increase (2060-2069)	Avg Annual Rate Increase (2070-2080)	Avg Annual Rate Increase (Through 2079)
1	Baseline	$100	50	$2.0	$759	0%	$0	3.70%	4.20%	3.70%	3.28%	3.10%	3.50%	3.58%
2.1	No-Prefunding; No Debt	"	"	"	"	0%	$0	3.70%	5.50%	2.52%	2.70%	3.93%	3.90%	3.71%
2.2	Prefunding; No Debt	$150	50	$3.0	$507	0%	$0	4.01%	4.20%	3.50%	3.30%	3.30%	3.30%	3.60%
3.1	No-Prefunding; No Debt	"	"	"	"	0%	$0	3.70%	5.32%	2.77%	3.50%	3.70%	2.96%	3.66%
3.2	Prefunding; No Debt	$200	50	$4.0	$677	0%	$0	4.41%	4.20%	3.70%	3.28%	3.10%	3.15%	3.64%
4.1	No-Prefunding; No Debt	"	"	"	"	0%	$0	3.70%	6.80%	3.25%	3.60%	3.20%	3.65%	4.03%
4.2	Prefunding; No Debt	"	"	"	"	0%	$0	5.10%	5.10%	3.21%	3.00%	3.36%	3.40%	3.86%
4.3	No-Prefunding w/ Debt	"	"	"	$1,080	8%	$78	3.70%	6.50%	4.08%	2.80%	2.90%	3.30%	3.88%
4.4	Prefunding w/ Debt	$320	50	$6.4	$1,080	5%	$48	5.00%	5.00%	3.80%	3.00%	3.00%	3.42%	3.87%
5.1	No-Prefunding; No Debt	"	"	"	"	0%	$0	3.70%	7.50%	3.00%	3.12%	3.40%	3.40%	4.02%
5.2	Prefunding; No Debt	"	"	"	"	0%	$0	6.00%	5.00%	3.00%	3.00%	3.50%	3.20%	3.95%
5.3	No-Prefunding w/ Debt	"	"	"	$1,300	10%	$122	3.70%	7.50%	4.30%	2.70%	2.38%	3.00%	3.93%
5.4	Prefunding w/ Debt	$390	50	$7.8	$1,300	4%	$48	5.50%	5.20%	3.84%	2.80%	3.00%	3.60%	3.99%
6.1	No-Prefunding; No Debt	"	"	"	"	0%	$0	3.70%	8.40%	3.00%	3.50%	2.95%	3.30%	4.14%
6.2	Prefunding; No Debt	"	"	"	"	0%	$0	7.00%	4.20%	3.00%	3.50%	3.45%	3.40%	4.09%
6.3	No-Prefunding w/ Debt	"	"	"	$1,600	6%	$96	3.70%	9.30%	3.00%	2.60%	2.60%	2.80%	4.00%
6.4	Prefunding w/ Debt	$480	50	$9.6	$1,600	9%	$132	6.00%	6.00%	3.00%	3.00%	2.80%	3.00%	3.97%
7.1	No-Prefunding; No Debt	"	"	"	"	0%	$0	3.70%	9.24%	2.80%	2.84%	3.30%	3.30%	4.20%
7.2	Prefunding; No Debt	"	"	"	"	0%	$0	6.50%	5.30%	3.00%	2.85%	3.80%	3.80%	4.21%
7.3	No-Prefunding w/ Debt	"	"	"	$1,700	6%	$96	3.70%	8.80%	3.80%	2.55%	2.75%	3.20%	4.13%
7.4	Prefunding w/ Debt	$510	50	$10.2	$1,700	15%	$249	5.40%	6.00%	4.60%	2.65%	2.75%	3.00%	4.07%

Appendix B. Customer Advisory Committee Meeting Summaries

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Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

INTRODUCTION

Missy Pieri, District Engineer and Project 2030 Project Manager, called the meeting to order at 6:30 p.m. After welcoming the members of the Customer Advisory Committee (CAC), she turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda**:

1. Introductions
2. District and Project 2030 Background:
   a. District Historical Overview – where we've been
   b. Current District Operations and Finances – where we are now
   c. Project 2030 Overview – where we're headed
   d. CAC Risk Assessment activity
   e. Q&A
3. Public Comment
4. Election of CAC Chair and Vice Chair
5. Public Comment
6. Next Steps
7. Public Comment
8. Close

Laura reiterated that meeting materials will be provided electronically to the CAC members in advance of and following their meetings and will be posted on the CHWD website, Customer Advisory Committee section. In addition, meeting summaries that provide an overview of each of the CAC meetings and a video of the meetings will be available to CAC members and the general public via the website.

Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Patti Catalano	Residential Representative
Wes Ervin	Commercial Representative
Michael Goble	Residential Representative
Suzanne Guthrie	Residential Representative
Doug MacTaggart	Residential Representative
Porsche Middleton	Residential Representative
Dave Mitchell	Institutional Representative
James Monteton	Residential Representative
Richard Moore	Residential Representative
Jenna Moser	Residential Representative
Richard Moses	Residential Representative
Mike Nishimura	Commercial Representative
David Paige	Residential Representative
Aimee Pfaff	Residential Representative
Peg Pinard	Residential Representative
Cyndi Price	Institutional Representative
Chris Ralston	Institutional Representative
Ray Riehle	CHWD Director
Javed Siddiqui	Residential Representative
Colleen Sloan	Residential Representative
David Wheaton	Residential Representative

Julie Beyers, Residential Representative; Katherine Cooley, Institutional Representative; and Noe Villa, Institutional Representative were unable to attend.

CHWD Staff:

Chris Castruita	Management Services Supervisor/Chief Board Clerk
Paul Dietrich	Project Manager
Tamar Dawson	Assistant Engineer
David Gordon	Operations Manager
Madeline Henry	Management Services Specialist/Deputy Board Clerk
Rex Meurer	Water Efficiency Supervisor
Missy Pieri	Engineering Manager/District Engineer
Susan Sohal	Administrative Services Manager
Hilary Straus	General Manager

Consultants:

Roger Kohne	Harris & Associates
Laura Mason-Smith	Mason-Smith Success Strategies

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

DISTRICT AND PROJECT 2030 BACKGROUND

To build shared understanding among the CAC members, information was provided to help the CAC members better understand the District's history and current operations as well as the Project 2030—Water Main Replacement Study (please see the http://chwd.org/customer-advisory-committee/ for the slide presentation detail).

District Historical Overview –where we've been

David Gordon, District Operations Manager, provided an overview with historical photographs, maps, and graphs, of the founding of the District and the entities that proceeded it.

The District:

- Formed in the 1920's and served 225 farms
- Consisted of 4.7 square miles
- Purchased water from the North Fork Ditch Company
- Utilized various water pipe materials, including riveted steel, cast iron, and possibly redwood, the vast majority of which have been replaced
- Remained rural through the 1950's

Displaying a current District map, David explained that the District's current system relates to the suburban growth starting in the l960s through the mid l980s:

- 20,000 connections
- 13 square miles, and over 250 miles of pipeline:
  - Pipe materials including asbestos cement, PVC, and ductile iron
  - Several miles of thin-walled steel remain in use
  - Asbestos cement pipe and PVC are now 45-50 years old

David also reviewed the District's changing boundaries and water usage at various points in history. CAC members indicated when they had moved to the District, and David shared some of the District's historical milestones during each of those periods.

Current District Operations and Finances – where we are now

Susan Sohal, Administrative Services Manager, elaborated on the District's:

- Organizational structure
- Budget process
- Long-term financial model
- Strategic planning process
- 2018 Budget

Missy Pieri provided more in-depth information about the:

- Capital Improvement Program
- Well development
- Water Meter Replacement Program
- Transmission, distribution, and appurtenant replacement
  - A display of pipes, fittings, and equipment illustrated typical water connection infrastructure and materials.

Project 2030 Overview—where we're headed

Roger Kohne, Harris & Associates Project 2030 Manager, reviewed the project schedule and provided a more detailed outline of the Project 2030 Study:

- Key Issue -- Replace Aging Infrastructure:
  - 250+ miles of pipelines
  - Many of the water mains installed in the 1960's-1980's
  - Majority of the District's infrastructure was built by private developers
- Key Project 2020 Goals:
  - Develop an Asset Inventory
  - Develop a Comprehensive Water Main Replacement Program
  - Develop funding options and a funding recommendation
  - Inform and obtain feedback from District customers
  - CAC Risk Assessment Activity

CAC MEMBER QUESTIONS AND DISTRICT ANSWERS

Q1: Are there other ways to raise funds for the District? Is the District restricted in offering other services to raise revenue?

A: As an Irrigation District, CHWD is limited in how it can raise revenue. Staff will provide a memo detailing revenue options by the August 28th CAC Meeting.

Q2: Are there grant opportunities?

A: Grant opportunities are occasionally available through agencies such as the CALFED Bay-Delta Program or the Bureau of Reclamation. However, these grant opportunities are limited to multi-benefit projects (i.e., projects that contribute to the watershed or deliver water to a community that does not have clean water. These projects must already be in progress (i.e. approved plans, completed California Environmental Quality Act (CEQA) process, selected and purchased infrastructure). In addition, water districts are typically required to provide a 50% match to grant funding.

Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

Q3: Do we use meter readers, or are meters read electronically?
A: The District contracts with Alexander's Contract Services for touch read meter reading for a bulk of our meters. A small percentage of our meters are radio read.

Q4: What is a typical residential main line?
A: A typical pipeline in a residential subdivision is 6-8 inch in diameter. There are varying pipe types located throughout the District which include: PVC, Ductile Iron Pipe, Steel and Asbestos Cement.

Q5: Why are we building wells when we're selling water in a year of surplus water supplies?
A: CHWD is expanding the groundwater program for supply reliability and price stability. This is necessary for long term planning in terms of wet and dry years. Due to pricing and supply issues that vary annually, excess water is periodically available and can be sold to generate revenue in any given year. Factors that drive the sale of excess water include: hydrologic conditions and the availability of capacity to transfer water through the Delta from North to South.

Q6: Can we get a list of acronyms and terms?
A: A list of key water terms and acronyms will be provided to the CAC members for reference. Staff will provide a list for the August 28th CAC Meeting.

Q7: What will be the impact of the decline in water usage on revenue and rates?
A: The District's rate structure has two components: a fixed bi-monthly service charge and a volumetric usage charge. Almost a third of the District's revenue is generated from the volumetric usage charge. If there is a significant drop in per capita usage it would affect the District's budget. For example, in 2017 the volumetric usage charge made up $4.75 million out of $15.27 million in total revenue.

Q8: What are some of the issues out of our control that have an impact on our budget and operations?
A: Some issues that impact the District's budget and are outside of the District's control include: unfunded mandates, particularly state legislation and state regulatory action; water use; and weather conditions.

CAC MEMBER COMMENTS

C1: The staff has done an amazing job in presenting all the information tonight.

Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

C2: When the District is informing residents about Project 2030, residential users will want to know the cost of doing nothing (letting the system go and having ruptures) versus the cost of proactively replacing mains. This will need to be communicated in very lay language (not engineering terms) that speak to the serious downsides (what will happen if we don't move forward with the Project) as well as the benefits to the average residential user so that they will care and be willing to make the investment in the Project.

C3: It would be interesting to see the specific breakdown of the salaries portion of the District budget.

District Response: Salaries and benefits (total employer costs) make up 21.53% of total district expenses. CHWD has taken measures to keep overhead costs down, such as maintaining a flat organizational structure and keeping pension costs down through the District's pension formula and employee contributions. CHWD is also implementing a Board-directed strategy of accelerating the pay-off of the District's Unfunded Actuarial Liability (UAL) of its pension and Other Post Employment Benefit (OPEB) programs. The accelerated pay-off strategy will result in over one million dollars in cost savings to CHWD. The District maintains a competitive salary and benefits program to recruit and retain quality staff. To do this, CHWD benchmarks its salaries against 18 other water districts and similarly situated agencies. In addition, CHWD maintains a Pay-for-Performance System. This means there are no automatic merit-based salary adjustments; salary adjustments are based on financial conditions and individual performance.

C4: We need to put out maps as to where leaks are; it will be important for people to be able to see the data.

District Response: This information is included in the Project 2030 Scope of Work, and will be addressed. District staff anticipates this data will be available no later than CAC Meeting 3 on December 11, 2018.

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

CAC PROCESS AND LOGISTICS OVERVIEW

The CAC reviewed the upcoming CAC meeting schedule (see meeting materials on the website for the schedule graphic). The schedule for these after-dinner meetings and the high-level topics anticipated for each meeting are shown below.

Meeting #2: August 28, 2018, 6:30-9:15 pm, Citrus Heights Community Center
Main Replacement Basics Introduction to Utility Benchmarking Asset Inventory Results
Meeting #3: December 11, 2018, 6:30-9:15 pm, Citrus Heights Community Center
Main Replacement Findings and Costs Funding Concepts Introduction Selection of Main Replacement Options
Meeting #4: March 2019, 6:30-9:15 pm, Citrus Heights Community Center
Main Replacement Funding Analysis Market Research Primer Selection of two Main Replacement and Funding Packages for market research
Meeting #5 May 2019, 6:30-9:15 pm, Citrus Heights Community Center
Market Research Results Develop Final Board Recommendation Steps for Implementation Plan
Meeting #6: September 2019, 6:30-9:15 pm, Citrus Heights Community Center
Review Implementation

Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

ELECTION OF CAC CHAIR AND VICE CHAIR

The role of the CAC Chair and Vice Chair were reviewed:

Role of the CAC Chair

1. Call the CAC meetings to order.
2. Lead the Pledge of Allegiance.
3. Turn the meetings over to the facilitator for the agenda review and meeting facilitation.
4. Manage any voting processes during CAC meetings, as appropriate.
5. Manage the public comment portion of the CAC meetings.
6. Close the meetings.
7. Act as the official spokesperson for the CAC when presenting CAC Project 2030 updates at the CHWD Board meetings (at 30 percent and 60 percent through the Project 2030 study process).
8. Act as the official spokesperson for the CAC when presenting the CAC majority position on recommendations to the CHWD Board at the conclusion of the Project.

Role of the CAC Vice Chair

Act for the CAC Chair should that person be unable to serve.

Election Results

The four voting CAC members who had nominated themselves spoke to their interest in being considered for the position of a Chair and Vice Chair. After votes were tabulated, Jenna Moser was elected CAC Chair, and David Wheaton was elected CAC Vice Chair.

PREVIEW OF CAC MEETING #2

Laura Mason-Smith reviewed the key agenda topics for the CAC Meeting #2 scheduled for August 28, 2018, from 6:30-9:15 pm, at the Citrus Heights Community Center:

- Main Replacement Basics
- Introduction to Utility Benchmarking
- Asset Inventory Results

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #1 Summary

Tuesday, May 29, 6:30-9:15 pm

PUBLIC COMMENTS

None.

CLOSE

CAC Chair Jenna Moser thanked the CAC members and District staff for their participation and adjourned the meeting at 9:02 p.m.

APPROVED:

CHRISTOPHER CASTRUITA
Deputy Secretary
Citrus Heights Water District

JENNA MOSER, Chair
Customer Advisory Committee
Citrus Heights Water District

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

INTRODUCTION

Jenna Moser, Chair of the Customer Advisory Chair (CAC), called the meeting to order at 6:30 p.m. After welcoming the members of the CAC, she turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda:**

1. Introductions
2. Public Comment
3. Approve minutes of May 29, 2018 CAC Meeting #1
4. Water Demand Forecast, District Pipeline Asset Inventory, and Main Replacement Benchmarking
    a. Water Demand Forecast, Technical Memorandum 1-- *how projected changes in water usage will affect the way the District replaces and sizes water mains*
    b. District Pipeline Asset Inventory Results-- *age of the water system, various pipe types, and where they're located throughout the system*
    c. Main Replacement Basics and Benchmarking-- *major benchmarks to evaluate various options*
5. Public Comment
6. Next Steps
7. Close

Laura reiterated that meeting materials will be provided electronically to the CAC members in advance of and following CAC meetings and will be posted on the CHWD website, Customer Advisory Committee Section. In addition, meeting summaries that provide an overview of each of the CAC meetings as well as a video of the meetings will be posted to the website to be available to the CAC members and the general public.

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Patti Catalano	Residential Representative
Katherine Cooley	Institutional Representative
Wes Ervin	Commercial Representative
Michael Goble	Residential Representative
Suzanne Guthrie	Residential Representative
Doug MacTaggart	Residential Representative
Richard Moore	Residential Representative
Jenna Moser	Residential Representative and CAC Chair
Richard Moses	Residential Representative
Mike Nishimura	Commercial Representative
David Paige	Residential Representative
Aimee Pfaff	Residential Representative
Cyndi Price	Institutional Representative
Ray Riehle	CHWD Director
Colleen Sloan	Residential Representative
Noe Villa	Institutional Representative
David Wheaton	Residential Representative and CAC Vice Chair

Unable to attend were:

Julie Beyers	Residential Representative
Porsche Middleton	Residential Representative
Dave Mitchell	Institutional Representative
James Monteton	Residential Representative
Peg Pinard	Residential Representative
Javed Siddiqui	Residential Representative
Chris Ralston	Institutional Representative

CHWD Staff:

Chris Castruita	Management Services Supervisor/Chief Board Clerk
Tamar Dawson	Assistant Engineer
Paul Dietrich	Project Manager
David Gordon	Operations Manager
Madeline Henry	Management Services Specialist/Deputy Board Clerk
Rex Meurer	Water Efficiency Supervisor
Missy Pieri	Engineering Manager/District Engineer
Susan Sohal	Administrative Services Manager
Hilary Straus	General Manager

Consultants:

Roger Kohne	Harris & Associates
Andrew MacDonald	Harris & Associates
Eric Vaughan	Harris & Associates
Laura Mason-Smith	Mason-Smith Success Strategies

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

PUBLIC COMMENT

There was one public comment not related to the meeting agenda which was addressed with the customer individually by General Manager Hilary Straus.

APPROVAL OF MAY 29, 2018, CAC MEETING #1 MINUTES

The minutes of the May 29, 2018, CAC Meeting #1 were unanimously approved without comments or changes.

WATER DEMAND FORECAST, DISTRICT PIPELINE ASSET INVENTORY, AND MAIN REPLACEMENT BENCHMARKING

To continue to build shared understanding among the CAC members, Project 2030 Manager Missy Pieri outlined Project 2030 accomplishments thus far and where the Project is headed (please see http://chwd.org/cutomer-advisory-committee/ for the slide presentation detail).

Water Demand Forecast, Technical Memorandum 1-- *how projected changes in water usage will affect the way the District replaces and sizes water mains*

- Eric Vaughan and Roger Kohne reviewed and explained drivers of water demand and technical considerations. As outlined in Technical Memorandum #1, current and projected future water demands are one of the important "building blocks" for the Water Main Replacement Study.

- Chris Castruita reviewed State-mandated policy and regulatory impacts to water demand, specifically those incorporated in California Assembly Bill 1668 and Senate Bill 606.

- Roger Kohne reviewed how the Water Demand Forecast will be used as part of the Project 2030 Water Main Replacement Study.

- CAC members identified questions about the Technical Memorandum #1 which were then answered by the District Staff and Consultants (please see Pages 5-6 of this Summary for questions and answers).

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

District Pipeline Asset Inventory Results-- *age of the water system, various pipe types, and where they're located throughout the system*

Missy Pieri outlined the goal of the recently-completed Asset Inventory -- *to add key data to the District's GIS water facility map* -- and the results of completing the Pipeline Inventory.

- All paper maps have now been digitized.
- 99% of the District's pipe types and pipe age are now known and mapped (versus only 77% and 42%, known respectively prior to the Asset Inventory completion).
- The age and pipe type data will be used when prioritizing water main replacements in the Water Main Assessment/Risk Analysis step of Project 2030:
    - Generally replace older mains first, and
    - When comparing two pipes of the same year, pipe type may be a factor in determining which pipe is replaced first.

Main Replacement Basics and Benchmarking-- *major benchmarks to evaluate various options*

Roger Kohne explained:

- The role of District Operations and Engineering staff in assessing and replacing water mains.
- The elements contributing to main replacement costs.
- Benchmarking:
    - Acts as a standard by which something can be measured or judged, and
    - Enables tracking performance indicators and shows whether goals are being met.
- Why Utilities benchmark:
    - Prioritize main replacement.
    - Improve operational efficiency.
    - Optimize future capital investments.
    - Make informed decisions.
- Benchmarking steps.
- Performance versus main replacement investments.
- Next steps.

Customer Advisory Committee Meeting #2 Summary
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CAC MEMBER QUESTIONS AND DISTRICT ANSWERS

Q1: Is there any possibility of the District's service area expanding or decreasing, and what would be the impacts?

A1: *There is the possibility of limited and very minor changes to the District's service area, but any expected changes would be insignificant.*

Q2: What kind of goals or limitations will be coming from the State for outside water usage? How will those be enforced?

A2: *SB606/AB1668, which was passed in May 2018, provides a framework for the State Water Resources Control Board (SWRCB) to create water use regulations. The District is awaiting the details from the SWRCB on how they will implement those regulations. Customers can click here to view a fact sheet on the new water regulations, including frequently asked questions. The regulations will be enforced at the District-wide level, not on an individual basis.*

Q3: What is the minimum or maximum allowed use of water? Is there a baseline?

A3: *As noted in SB606/AB1668, there is maximum allowable indoor water use of 55 gallons of water per capita in 2022, going down incrementally to 50 gallons per capita in 2030. This regulation will be measured and enforced at the District level, and there is no requirement in the new laws that residents must meet a specific target or stop behavior like washing clothes and bathing.*

Q4: If the District exceeds mandated water consumption, what are the penalties, and how will they be enforced?

A4: *That has not yet been determined by the State Water Resources Control Board.*

Q5: What is the relationships between line size, flow rates, and other factors in determining the size of the lines to replace?

A5: *Flow rate and pipeline velocity will be used to help determine the size of water main replacements. In addition, the District is centrally located and has several interties with other neighboring water agencies which will assist in providing water to the District and the wider region for emergency purposes and other opportunities to collaborate for water management. Those interties may further optimize the sizing of water main replacements.*

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

Q6: What time of year are you measuring water use?

A6: *The data shown represents annual average water consumption, meaning it represents water use from throughout the year.*

Q7: What is the level of confidence in the predicted demand forecast, since it varies 17% between low and high?

A7: *The range in demand forecasts covers a reasonable level of change in demand over the next 30 years. It is based on an expectation that the state legislation passed in 2018 remains in effect through 2050, and on population increases used by planning agencies across the region.*

Q8: Does the San Juan Water District have future or strategic goals that impact this water demand forecast?

A8: *The District looked at the San Juan Water District Urban Water Management Plan for compatibility with this project, and found that our assumptions were consistent with their forecast and goals.*

Q9: How can we collect and filter rain water to supplement water supplies?

A9: *The District encourages homeowners to use water capture and efficiency practices that work best for their respective residences. However, rain water catchment is not considered a viable source of water supply for the region.*

Q10: Can we get a water pipeline to get water from flood-prone to drought-stricken areas?

A10: *This is a project that is beyond the scope District boundaries as it would need to be considered at a regional or statewide level.*

Q11: Are all diameters of pipe compatible with trenchless technology?

A11: *There are multiple trenchless technologies. The technologies that are going to be most relevant to the District would be more compatible with larger diameter pipelines.*

Q12: Is a residential water re-use program possible?

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

A12: *All of the regional waste water treatment plants that treat water to a level where it could be reused are a significant distance from the District service area. This makes it cost prohibitive to create such a program.*

Q13: How does the District regulate water pressure?

A13: *The majority of the District's water pressure is not regulated. However, there are two zones with higher water pressure, and the District uses pressure regulating valves to reduce pressure to an acceptable level in those areas. The scope of this project includes an analysis of regulating water pressure throughout the District. The pressure regulation analysis includes a potential power generation component.*

Q14: With the new State water usage regulations, how will the District differentiate between customers' indoor and outdoor use?

A14: *Neither the District nor the State currently have a way to differentiate between each customer's indoor and outdoor use. The water usage regulations will be carried out at the District level.*

Q15: How will the State regulations affect businesses, parks, and greenscapes? And, how will baselines be determined?

A15: *The State Water Resources Control Board is currently developing standards for both business and outdoor water use. These will be based in part on the amount of landscape and hardscape that currently exist.*

Q16: How will the elderly and physically challenged people handle the State mandates for water usage, both physically and regarding cost?

A16: *This is a good question that the State must grapple with as it develops the regulations. The District and other water agencies throughout the state are using the regulatory process to communicate the concerns of the elderly and physically challenged, along with other water users, to the SWRCB.*

Q17: What does the service fee on customers' bills cover?

A17: Customers water bills are about 70% fixed charges and 30% variable charges based upon water use. The fixed charges cover the costs to run the District and maintain infrastructure regardless of the amount of water that is used.

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

Q18: Is it more expensive to replace Asbestos Cement Pipe (ACP) pipe?

A18: *The District generally does not remove asbestos cement pipe, or any pipe material, from the ground. Therefore it is no more expensive to replace ACP pipe than any other pipe material.*

Q19: Do you expect to come up with multiple benchmarks; for example, pipe age, pipe type, etc.?

A19: *The District may make adjustments to a few benchmarks over time, rather than create many different benchmarks to keep record of. As industry trends continue, the District intends to revisit these benchmarks in order to judge performance.*

Q20: What are the intervals to check against the benchmarks to know if we're headed in the right direction?

A20: *A lot of the information is being collected in real time. The District would likely check these benchmarks on an annual basis, as we currently do with water loss. Over the long term, the District will look for trends in performance to compare with established benchmarks.*

Q21: How does the District coordinate with other agencies for water main replacement?

A21: *The District routinely checks with the City, County, and other regional agencies to coordinate water main projects and other infrastructure projects within and around our service area.*

Q22: What does water loss per household mean?

A22: *Water loss per household is based on an assumption of 1-4 people per residence. Calculated on a per capita basis, the water loss per household is approximately 1/4th of the water loss per residence.*

Q23: Is there any financial gain to selling water to another District?

A23: *Yes, there is financial gain to selling water to other agencies outside of the service area. Because of the unpredictable nature of these types of transactions, the District does not factor any projected revenue into its budget and long term financial model.*

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

Q24: Are there any other utilities that have gone through a process like this that we can learn from, or are most districts behind CHWD?

A24: *Yes, there are a number of utilities throughout the state who have gone through or are currently going through the process of asset management. We intend to use industry best practices in asset management. At the same time, we are implementing a very rigorous public engagement process that other agencies may wish to use in the future.*

CAC PROCESS AND LOGISTICS OVERVIEW

The CAC reviewed the upcoming CAC meeting schedule (see meeting materials on the website for the schedule graphic). These after-dinner meetings and the high-level topics anticipated for each of the meetings are shown below.

Meeting #3: December 11, 2018, 6:30-9:15 pm, Citrus Heights Community Center
Main Replacement Findings and Costs Funding Concepts Introduction Selection of Main Replacement Options
Meeting #4: March 2019, 6:30-9:15 pm, Citrus Heights Community Center
Main Replacement Funding Analysis Market Research Primer Selection of two Main Replacement and Funding Packages for market research
Meeting #5 May 2019, 6:30-9:15 pm, Citrus Heights Community Center
Market Research Results Develop Final Board Recommendation Steps for Implementation Plan
Meeting #6: September 2019, 6:30-9:15 pm, Citrus Heights Community Center
Review Implementation

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #2 Summary

Tuesday, August 28, 2018, 6:30-9:15 pm

CAC MEMBER COMMENTS

1. I appreciate the information provided
2. This collaboration effort is very good and good to see
3. The more I'm starting to learn, the more I don't know
4. It's very impressive to see the amount of work being done; I commend all the staff
5. I appreciate the background information for us lay people
6. Thank you for all the information to help us understand
7. I'm learning a lot
8. Thank you for the outstanding job; I'm learning a lot that is very helpful to understand the issues
9. Very informative—thank you
10. The projector needs to work better so that the Power Point slides are more readable
11. A lot of staff work has gone into preparing for this meeting and Project 2030
12. Very impressed by the logic and sequence of the Project
13. Appreciate the welcoming of CAC members' questions
14. I feel like a sponge tonight and hearing everyone's questions and clear answers
15. The extensive preparation and effort is very noticeable and helpful
16. The asset inventory was a massive undertaking
17. This is an important process
18. Appreciate everyone's thoughtful questions

PUBLIC COMMENTS

None

CLOSE

CAC Chair Jenna Moser thanked the CAC members and District staff and consultants for their participation and adjourned the meeting at 9:15 p.m.

APPROVED:

CHRISTOPHER CASTRUITA
Deputy Secretary
Citrus Heights Water District

JENNA MOSER, Chair
Customer Advisory Committee
Citrus Heights Water District

Customer Advisory Committee Meeting #3 Summary

Tuesday, December 11, 2018, 2018, 6:30-9:15 pm

INTRODUCTION

Jenna Moser, Chair of the Customer Advisory Committee (CAC), called the meeting to order at 6:32 p.m. After welcoming the members of the CAC, she turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda:**

1. Introductions
2. Public Comment
3. Approve minutes of August 28, 2018 CAC Meeting #2
4. Infrastructure Challenges, Main Replacement Findings and Costs, and Basic Financial Considerations
    a. Review of updated CAC Meeting Schedule for 2019
    b. Infrastructure Challenges (Technical Memorandum 2)
    c. Main Replacement Findings and Costs (Technical Memorandum 3)
    d. Basic Financial Considerations
5. Public Comment
6. Next Steps
7. Close

Laura reiterated that meeting materials are provided electronically to the CAC members in advance of and following their meetings and are posted on the CHWD website, Customer Advisory Committee Section. In addition, meeting summaries that provide an overview of each of the CAC meetings as well as a video of the meetings are posted to the website to be available to the CAC members and the general public.

Customer Advisory Committee Meeting #3 Summary

Tuesday, December 11, 2018, 2018, 6:30-9:15 pm

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Julie Beyers	Residential Representative
Ray Bohlke	Residential Representative
Deborah Cartwright	Residential Representative
Patti Catalano	Residential Representative
Jon Jacobs	Representing Wes Ervin, Commercial Representative
Michael Goble	Residential Representative
Suzanne Guthrie	Residential Representative
Doug MacTaggart	Residential Representative
Dave Mitchell	Institutional Representative
James Monteton	Residential Representative
Richard Moore	Residential Representative
Jenna Moser	Residential Representative and CAC Chair
Richard Moses	Residential Representative
Mike Nishimura	Commercial Representative
Aimee Pfaff	Residential Representative
Peg Pinard	Residential Representative
Cyndi Price	Institutional Representative
Ray Riehle	CHWD Director
Javed Siddiqui	Residential Representative

Not in Attendance:

Katherine Cooley	Institutional Representative
David Paige	Residential Representative
Chris Ralston	Institutional Representative
Noe Villa	Institutional Representative

CAC Alternates:

Bren Martinez
Andrew Johnson

CHWD Staff:

Chris Castruita	Management Services Supervisor/Chief Board Clerk
Tamar Dawson	Assistant Engineer
David Gordon	Operations Manager
Madeline Henry	Management Services Specialist/Deputy Board Clerk
Rex Meurer	Water Efficiency Supervisor
Missy Pieri	Engineering Manager/District Engineer
Susan Sohal	Administrative Services Manager
Hilary Straus	General Manager
Paul Dietrich	Project Manager

Consultants:

Roger Kohne	Harris & Associates
Andrew MacDonald	Harris & Associates
Habib Isaac	Raftelis Financial Consultants, Inc.
Laura Mason-Smith	Mason-Smith Success Strategies

Customer Advisory Committee Meeting #3 Summary

Tuesday, December 11, 2018, 2018, 6:30-9:15 pm

PUBLIC COMMENT

There was no public comment.

APPROVAL OF AUGUST 28, 2018, CAC MEETING #1 MINUTES

CAC Member Suzanne Guthrie motioned to approve the August 28, 2018 minutes. The motion was seconded by CAC Member Patti Catalano. The minutes of the August 28, 2018, CAC Meeting #2 were unanimously approved without comments or changes.

INFRASTRUCTURE CHALLENGES, MAIN REPLACEMENT FINDINGS AND COSTS, AND BASIC FINANCIAL CONSIDERATIONS

CHWD Engineering Manager/District Engineer and Project 2030 Project Manager Missy Pieri outlined the updated 2019 CAC Meeting Schedule and encouraged all CAC members to note the CAC Meeting dates on their calendars. To continue to build shared understanding among the CAC members, District Engineer Pieri outlined the Project 2030 Scope as well as those Project 2030 "Building Blocks" that were part of the evening's Meeting topics (please see the CHWD Website section on Project 2030 CAC Meeting #3 for the slide presentation detail).

Infrastructure Challenges, Technical Memorandum #2

Andrew MacDonald, Harris & Associates, reviewed and explained infrastructure challenges (what makes water main replacement challenging), supply challenges, and regulatory challenges, all of which are important Building Blocks for the Water Main Replacement Study.

Main Replacement Findings and Costs, Technical Memorandum #3

- Roger Kohne, Harris & Associates, reviewed another important Building Block, main replacement risk analysis findings, including:
  - How the risk-based approach will be used,
  - Summary of risk analyses for main replacements, and
  - Risk factors and their relative weighting.

- Andrew MacDonald reviewed the key components of water main replacement cost estimates, another Building Block for the Water Main Replacement Study:
  - Replacement cost estimates,

- Total pipeline replacement costs, and
- Spending over various phasing time periods.

- CAC members identified questions about the Technical Memorandums #2 and #3 which were answered by the District Staff and Consultants later in the Meeting.

Basic Financial Considerations

- Habib Isaac, Raftelis Financial Consultants, Inc, provided an overview of:
  - Citrus Heights Water District's capital costs,
  - How spending and funding options become alternatives,
  - Funding 101—the process for developing a funding strategy for Water Main Replacement,
  - Debt financing,
  - Spending and funding metrics, and
  - Next steps.

- CAC members identified additional questions about the Basic Financial Considerations which were then answered by the District Staff and Consultants (please see the summary of questions and answers below).

CAC MEMBER QUESTIONS AND DISTRICT ANSWERS

Q1: Is there peer analysis for the Study?
A1: *The District is reaching out to neighboring water districts on issues of mutual/related concern (e.g., future water demand projections and coordinating pipe purchases) and for both formal and informal reviews related to the Project 2030 Study.*

Q2: Are the replacement costs projected based on 2030 supply, or do they project for future cost increases?
A2: *The costs are in 2018 dollars for now. However, the financial model will account for adjustments based on proposed year of spending. In future meetings, inflation will be addressed as part of the revised cost estimates.*

Q3: Has the District looked at any correlation between where the pipes break and why? More referencing newer pipes?
A3: The District does try and determine why a pipe breaks every time a leak is identified. This data is inputted into the District's maintenance management software for history and analysis. For the purposes of the Project 2030 Study, pipe break data was considered and given a small weighting factor within the Risk Analysis software model since there was not a significant amount of pipe break data available. Analysis of pipe break data will continue to be analyzed during the implementation phase at the operational level, after the Project 2030 Study is complete. It is expected that the District

will update the Risk Analysis model including the various weighting factors at regular intervals (e.g., annual, 5-years) to ensure the model reflects current conditions.

Q4: Have you factored in inflation?
A4: *Inflation was not included in the initial cost estimate presented on December 11, 2018. However, the financial model will account for adjustments based on the proposed year of spending and as described above the various options presented in future meetings will include inflation-adjusted costs.*

Q5: This is a lot of pipe for only $540 million.
A5: *$540 million would be the cost to replace the entire distribution system, if we had to do so tomorrow. It is understood that approximately two-thirds to three-quarters of the District's pipes (to be determined with the CAC) will need to be replaced as part of Project 2030. Therefore cost estimates will be revised to reflect options and inflation factors associated with each option.*

Q6: Will there be increased District costs (i.e., new employees, etc.)?
A6: *Yes, there will be increased District operation and overhead costs. These costs were included in the cost projections and could be a combination of new employees and external resources.*

Q7: Knowing that other districts have already been through this, how do your educated guesses as far as weighting hold up?
A7: *The District is at the forefront of looking at this in this detailed of a manner. Most Districts do asset management, and some do weighting to determine which is more important. A lot of surrounding Districts have not taken this rigorous of an approach yet. One agency that is using this tool, East Bay Municipal Utility District, serves a much larger service area and are doing an extensive amount of work and scientific research on water main breaks. They are using a much higher weighting (30%) vs. our (10%) on breaks. Each water agency is unique and need to determine their own weighting factors.*

Q8: Do you expect to continue the $20 million per decade repairs?
A8: *Yes, the District currently has budgeted$2 million per year for pipeline replacement up to the year 2030. The District's financial model will be updated based on the outcomes of the Project 2030 Study.*

Q9: Has there been any research into a different delivery system instead of in the roadways?
A9: *After the Project 2030 Study, during the design phase of each project, the District will look at the best location for each pipeline installation (e.g., under sidewalks or under roads). Putting water mains in road ways has been a common practice due to right-of-way and easy accessibility, however there are cost considerations to keep in mind (e.g., pavement replacement or traffic control). Some of the District's water mains are located on private property which makes them difficult to repair and replace. For those private*

property locations, the goal will be to move them into the public right-of-way where feasible.

Q10: Can we figure a dollar cost for failures, factoring time, type of failure, location?
A10: *The District hasn't determined a dollar cost for a failure, as each failure is unique. Failures can be very expensive depending on where they are located. Failures are typically a lot more expensive than replacing the pipeline. The District's goal is to replace the water mains before there are significant failures.*

Q11: Did the District set aside replacement funds in past years?
A11: *We do have reserve accounts--the Capital Improvement Project reserve. We have these funds set aside in our financial model up to the year 2030. However, as has been highlighted in the Project 2030 Study, significant costs are ahead and funding strategies need to be identified. While funds are currently being set aside, additional funding will be needed to reduce or eliminate debt financing for the replacement of what will be a significant number of water mains that will age-out after the year 2030.*

Q12: Have there been any studies about how the pipes are laid in order to minimize breaks?
A12: *There is a lot of research with recommendations on pipeline installation (e.g., depth to bury, pipe bedding, the amount of traffic and weight loads, and how much you can deflect a pipe to keep it as strong as possible). We will look into any possible studies to see how we can reduce breaks, looking at approaches to pipeline installation.*

Q13: How will the District pay for the increases? Are there Federal grants to help pay for pipe replacement?
A13: *There are grants primarily for recycle and reuse but not typically for repair and replacement. Repair and replacement costs are more of a local obligation. The District will explore all possible non-rate-based funding options.*

Q14: Will some of the property taxes that the City will be receiving in 2022 be available to help fund Project 2030?
A14: *CHWD is an Irrigation District under state law and does not receive property tax or other sources of funding that cities receive.*

Q15: Will funding options include the percentage of rate increases/revenues required?
A15: *Any funding option, other than "do nothing", will likely include projected rate increases tied to pay-as-you-go, debt financing, or both. These funds would be set aside into their own account (designated reserve for water main replacements). These reserves are typically invested in the California Local Agency Investment Fund (LAIF), which currently generates an annual rate of return of approximately 2%.*

Q16: How will decreased water use (income decreases) affect this?
A16: *With conservation there will be a reduction in the revenue received by the District, because a portion of the District's rate remains volumetric, tied to customer's usage.*

Q17: When prefunding, is that money in an interest bearing account? Where does it get invested, and with what kind of return?
A17: *Yes it would be set aside in its own account (designated reserve for water main replacements). These reserves are typically invested in the California Local Agency Investment Fund (LAIF), which currently generates an annual rate of return of approximately 2%.*

Q18: Based on historical experience, is there a target percentage water districts have increased their rates that was acceptable by the community?
A18: *There is not a standard accepted amount as the circumstances and objectives of each agency vary based upon individual needs.*

Q19: Our community will not be able to rely on development to offset costs, so what are others' experiences in figuring out distribution of costs?
A19: *The District is substantially built-out, and the infrastructure costs are related to repair and replacement as opposed to accommodating new growth. Even if there is land for development on the horizon, the District would not recommend assuming the new homes / units be part of funding projections because they may not materialize, causing a funding shortfall for Project 2030 financial planning.*

Q20: When communities are not forecasting revenue increases tied to development, what has been your experience with how they handle it? What has worked, what hasn't?
A20: *Typically local funding, which is primarily rate-based funding is utilized to fund infrastructure replacements. The rates can support either debt financing, pay-as-you-go, or both.*

Q21: Are there cameras or videos to see inside the water main lines?
A21: *Cameras or video inspection have been used to inspect water mains but are more widely used on sewer lines as sewer lines are non-pressurized and require less preparation to perform an inspection. Video inspection for water mains generally requires the water main to be shut down and dewatered, access ports for camera insertion to be installed, and chlorination and repressurization of the water main to put it back in service. There are other types of water main inspection techniques that are non-invasive (e.g. visual, electromagnetic, ultrasonic). The District will develop an implementation plan with the Project 2030 Study that will include recommendations for water main inspections.*

Q22: How will CHWD coordinate with the city or county?
A22: *The District routinely checks with the City, County, and other regional agencies to coordinate water main projects and other infrastructure projects within and around our service area.*

Q23: What are the most vulnerable parts of the water mains after the creek crossings? *(Missy)*
A23: *While there are different opinions on this, the District finds that water mains located on private property are the most vulnerable.*

Q24: When will the $540 million funding will be gathered by?
A24: The timing for revenue and costs needs will be determined by the CAC and presented through various options.

Customer Advisory Committee Meeting #3 Summary

Tuesday, December 11, 2018, 2018, 6:30-9:15 pm

CAC PROCESS AND LOGISTICS OVERVIEW

The CAC reviewed the updated schedule of 2019 CAC Meetings). The meetings shown below are planning to be after-dinner meetings and the high-level topics for each meeting are listed below.

Workshop #4: February 5, 2019, 6:30-9:15 pm, Citrus Heights Community Center

Options for Spending
Options for Funding
Spending/Funding Alternatives

Workshop #5: February 26, 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Analysis of the Pros and Cons of the Spending/Funding Alternatives
- Selection of up to 4 Spending/Funding Alternatives

Workshop #6: March 19, 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Market Research Primer
- Review the Pros and Cons of the Spending/Funding Alternatives
- Selection of up to 2 Spending/Funding Alternatives for Market Research

Workshop #7: June 11, 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Market Research Results
- Develop Final Recommendation to the Board
- Steps for Implementation Plan

Workshop #8: September 10, 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Review Implementation
- Review Final Board Recommendation

CAC MEMBER COMMENTS

The CAC members indicated what they were taking away from the Meeting as:

1. I so appreciate the amount of work and effort by the District to do this
2. I appreciate that we're doing this now instead of later
3. There is an amazing amount of information the staff is putting out, and I thank them for this
4. I've learned a tremendous amount
5. All of this is starting to come together
6. Still processing all of the information and options, look forward to future meetings.
7. There are so many uncertainties, especially when dealing with the pipes on private property
8. This is what I expected; we're getting more and more details
9. I'm interested to learn more about the ranking possibilities
10. This is really dependent on the construction timeline
11. It is very interesting to look at when we replace the big pipes
12. There are lots of moving parts
13. We're all going to learn a lot
14. I'm looking forward to the financial piece
15. Some things are getting clearer and clearer
16. There are great opportunities now to reroute certain pipes
17. It will be interesting to see how we will handle this with an aging population, both for us and for future generations
18. I am really fascinated with the impressive process; it is really good
19. It would be helpful to get the Technical Memorandums sooner to be able to review the material we are considering
20. I look forward to reviewing the alternatives and funding options
21. It is very interesting that we are an irrigation district, and how we compare with cities and other districts
22. Pipe life expectancy versus survival probability is very interesting; I'd like to dig into this even more
23. This is a very informative process, and more information is being filled in
24. I look forward to the financial discussions
25. It will be important to think about how we'll be able to get the public involved before any rate increases
26. I have a realization of the depth and gravity of this vital issue
27. We all have a stake in this
28. This is scarier than Jaws, but we need to look at this now, and we can solve these problems
29. We have the best water in the world
30. I appreciate everyone for volunteering their time and for the staff providing the information and visuals

Customer Advisory Committee Meeting #3 Summary

Tuesday, December 11, 2018, 2018, 6:30-9:15 pm

PUBLIC COMMENTS

None

CLOSE

CAC Chair Jenna Moser thanked the CAC members and District staff and consultants for their participation and adjourned the meeting at 9:15 p.m.

APPROVED:

CHRISTOPHER CASTRUITA
Deputy Secretary
Citrus Heights Water District

RICHARD MOSES, Vice Chair
Customer Advisory Committee
Citrus Heights Water District

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #4 Summary

Tuesday, February 5, 2019, 6:30-9:15 pm

INTRODUCTION

Richard Moses, Vice Chair of the Customer Advisory Committee (CAC), called the meeting to order at 6:32 p.m. After welcoming the members of the CAC, he turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda:**

1. Introductions
2. Public Comment
3. Approve minutes of December 11, 2018 CAC Meeting #3
4. Spending and Funding Options (Technical Memorandum 4)
    a. Spending Overview
    b. Funding Overview
    c. Spending/Funding Alternatives
    d. Questions/Answers and Group Dialogue
5. Public Comment
6. Next Steps
7. Close

Laura reiterated that meeting materials are provided electronically to the CAC members in advance of and following their meetings and are posted on the CHWD website, Customer Advisory Committee Section. In addition, meeting summaries that provide an overview of each of the CAC meetings as well as a video of the meetings are posted to the website to be available to the CAC members and the general public.

Customer Advisory Committee Meeting #4 Summary

Tuesday, February 5, 2019, 6:30-9:15 pm

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Julie Beyers	Residential Representative
Ray Bohlke	Residential Representative
Patti Catalano	Residential Representative
Katherine Cooley	Institutional Representative
Michael Goble	Residential Representative
Suzanne Guthrie	Residential Representative
Andrew Johnson	Residential Alternate
Doug MacTaggart	Residential Representative
Bren Martinez	Residential Representative
Dave Mitchell	Institutional Representative
Richard Moses	Residential Representative and CAC Vice Chair
Mike Nishimura	Commercial Representative
David Paige	Residential Representative
Aimee Pfaff	Residential Representative
Peg Pinard	Residential Representative
Chris Ralston	Institutional Representative
Ray Riehle	CHWD Director
Noe Villa	Institutional Representative

Unable to attend were:

Deborah Cartwright	Residential Represent
Wes Ervin	Commercial Representative
James Monteton	Residential Representative
Richard Moore	Residential Representative
Jenna Moser	Residential Representative and CAC Chair
Cyndi Price	Institutional Representative
Javed Siddiqui	Residential Representative

CHWD Staff:

Chris Castruita	Management Services Supervisor/Chief Board Clerk
Tamar Dawson	Assistant Engineer
Paul Dietrich	Project Manager
David Gordon	Operations Manager
Madeline Henry	Management Services Specialist/Deputy Board Clerk
Rex Meurer	Water Efficiency Supervisor
Missy Pieri	Engineering Manager/District Engineer
Susan Sohal	Administrative Services Manager
Hilary Straus	General Manager

Consultants:

Roger Kohne	Harris & Associates
Andrew MacDonald	Harris & Associates
Habib Isaac	Raftelis Financial Consultants, Inc.
Laura Mason-Smith	Mason-Smith Success Strategies
Steve Winchester	Harris & Associates

Customer Advisory Committee Meeting #4 Summary

Tuesday, February 5, 2019, 6:30-9:15 pm

PUBLIC COMMENT

There was no public comment.

APPROVAL OF DECEMBER 11, 2018, CAC MEETING #1 MINUTES

The minutes of the December 11, 2018, CAC Meeting #3 were unanimously approved without comments or changes.

SPENDING AND FUNDING OPTIONS – Technical Memorandum #4

Project 2030 Manager Missy Pieri reviewed the 2019 CAC Meeting Schedule, progress to date, and the topics for the upcoming CAC meetings. She also referenced the Technical Memorandum #4 which outlined the background for the evening's meeting (please see the CHWD Website section on Project 2030 CAC Meeting #4 for the slide presentation detail).

Spending Overview

Roger Kohne provided a recap of previously discussed spending concepts such as risk factors (likelihood of failure and consequence of failure), benchmarks, replacement costs, and water main survival probability. He then outlined seven potential spending options.

Funding Overview

Habib Isaac provided a recap of previously discussed funding concepts:

- Funding 101 Review
- General Funding Example
- Funding Options
- Funding Applied to Spending

Spending/Funding Alternatives

Habib then reviewed with the CAC members twenty-one different spending/funding alternatives, how they would work, and their implications to the District and its customers.

CAC members identified questions about the spending/funding alternatives which were then answered by the District Staff and Consultants (please see the summary of questions and answers below).

CAC MEMBER QUESTIONS AND DISTRICT ANSWERS

Q1: What happens to water main replacements not completed after 2080?
A1: *The amount of water mains to be replaced varies based on the spending option selected by the CAC. The District will need to continue with main replacement work beyond 2080. The findings of this study will be revisited in the future. The District will continue to update the capital improvement program and revisit assumptions as necessary.*

Q2: Can the entire project be broken up into smaller scopes, which can have different funding/prefunding/debt options to better spread costs to specific expenses?
A2: *At this stage in the project, the Project Team has not gone into that level of detail. The phasing plan will show pipeline prioritization using principles derived with input by the CAC. This pipeline prioritization will continue to be analyzed during the implementation phase at the operational level, after the Project 2030 Study is complete.*

Q3: Does CHWD have a survival probability goal?
A3: *The District has not established a survival probability goal. There are benchmarks for replacement; however, there is not an industry standard for survival probability. To date, the Project Team has used the survival probability numbers as a point of comparison across the alternatives.*

Q4: What is the population expectation over 50 years?
A4: *Technical Memorandum 1 Water Demand Forecast covers population and water demand forecast through year 2050. This analysis was completed using Sacramento Area Council of Governments (SACOG) projections. There is a lot of variability in assumptions going into projections after 2050, and they become less accurate. The Technical Memorandum 1 Water Demand Forecast predicts a population increase of 18% by 2050.*

Q5: Would remaining bad pipe be replaced after 2080? We will still have 28% bad pipe?
A5: *Please refer to answer A2.*

Q6: How is the prefund rate calculated?
A6: *Prefunding is used to reduce impact to revenue adjustments in the first ten years of the project, as well as level out revenue adjustments throughout the project duration.*

Q7: Are funding increases placed in general fund or reserve?
A7: *Proposition 218 states that the District can only generate revenue based on costs incurred. Costs of the utility also include reserve funding. Anything above normal operating expenses goes into the reserve funds. Reserve policies are established by the Board, and targets are identified. If Project 2030 includes prefunding, the CAC could recommend that a designated reserve be established by the Board to set aside those funds.*

Q8: How much do we consider is sufficient for a prefunding reserve until 2030? Does that set the monthly impact at $2.85?
A8: *There are ten alternatives within the 21 provided that include prefunding which the CAC can review for consideration. The purpose of prefunding is explained in Q&A7. The monthly bill impact at the current baseline case is $2.85. Prefunding is not part of the baseline case.*

Q9: What is the rate increase in dollars for FY 30-40?
A9: *The Project Team could break it down for each decade but it would be a lot of information. Once the CAC has selected four options, the Project Team will provide this information for each decade. The Project 2030 Study is a long-term capital improvement program/financial strategy for water mains. A multi-year rate adoption could be recommended as part of the plan (a potential prefunding alternative). However, Proposition 218 only allows agencies to set rates over a five-year time period.*

Q10: What is the historic interest rate on bonds?
A10: *Over the past twenty years the interest rate on bonds has averaged in the low 4%. The model assumes a conservative interest rate on bonds at 5%. Given the District's current financial position, if the market increases and rates are higher the District may not need to issue debt if it is not advantageous.*

Q11: Could Board members be expected to vote for this constant increase without public "outcry?"

A11: *The project team would not speak for current or future Board Members, but based on experience when an agency's budget is tight and revenues are low, capital expenses are cut. Capital expenses do not go away, they just get deferred. That deferment becomes higher risk to the agency and its rate payers. Given that higher level of risk, reserves should be increased to address unplanned repairs in the system. Typically, agencies that need significant revenue adjustments do so to pay for capital improvements needs.*

Q12: What are the percentage increases related to actual bills? We need key numbers for a typical family of four for the various Alternatives.

A12: *Information was provided for all alternatives for 2020-2030, and can be viewed within all alternatives in the February 5, 2019 presentation posted at http://chwd.org/customer-advisory-committee/. Those monthly bill impacts reflect a typical single family residence with a one-inch meter using 20 units of water.*

Customer Advisory Committee Meeting #4 Summary

Tuesday, February 5, 2019, 6:30-9:15 pm

CAC PROCESS AND LOGISTICS OVERVIEW

The CAC reviewed the updated schedule of 2019 CAC meetings (see the CAC Document Library on the website for the schedule graphic). These after-dinner meetings and the high-level topics anticipated for each of the meetings are shown below.

Workshop #5: February 26, 2019, 6:30-9:15 pm, Citrus Heights Community Center
Analyze the Considerations Related to the Spending/Funding Alternatives Select up to 4 Spending/Funding Alternatives
Workshop #6: March 2019, 6:30-9:15 pm, Citrus Heights Community Center
Market Research Primer Review the Pros and Cons of the Spending/Funding Alternatives Selection of up to 2-3 Spending/Funding Alternatives for Market Research
Workshop #7: March 2019, 6:30-9:15 pm, Citrus Heights Community Center
Market Research Results Develop Final Recommendation to the Board Steps for Implementation Plan
Workshop #8: September 10, 2019, 6:30-9:15 pm, Citrus Heights Community Center
Review Implementation Review Final Board Recommendation

Executive Director Hilary Straus indicated that the Presentation Materials would be available on the Project 2030 website on Wednesday, February 6. In addition, he encouraged any of the Committee members who would like to review the topics further can call Missy Pieri or Chris Castruita to schedule a meeting. Ms. Pieri indicated that the Alternatives Matrix will be emailed to the CAC members and available online and in a hard-copy 11 x 17" format in the District Office.

Customer Advisory Committee Meeting #4 Summary

Tuesday, February 5, 2019, 6:30-9:15 pm

CAC MEMBER COMMENTS

The CAC members indicated what they were taking away from the Meeting as:

1. I appreciate everyone's active participation throughout this process.
2. This has been a lot of information to absorb and review.
3. I wonder if we should poll people at the beginning to narrow down our discussions.
4. I am disappointed to not be able to attend the meeting on February 26.
5. This is a lot to absorb, and I am curious which projects we will replace year by year.
6. We need to keep in mind that the Meter Replacement Project isn't incorporated in this project.
7. It would be clearer if we could see all other impacts at once (such as the Meter Replacement Project).
8. It will be very important to continue to demonstrate transparency in the funding process.
9. It is amazing how a small change in funding can make a big difference.
10. The preparation for this and the other CAC meetings has been outstanding, and it is always presented in an interesting way to help everyone understand and learn.
11. This complicated material has been presented in a well-thought-out way.
12. I appreciate seeing all twenty-one alternatives; it is a lot of information to digest.
13. I spent several days trying to figure this out, and it's been very helpful to get the explanations at tonight's meeting.
14. I'm thinking a lot about inter-generational equity and how we can best put the costs on those that will really benefit from the replacements.
15. I appreciate the group, the questions, and everyone's skills and abilities.
16. It was very helpful to have the handouts printed on paper so that we could take notes on them.
17. It was good to look at the numbers, the monthly rate increases, and the impact on different generations.
18. We had very interesting conversations with each other. Sixty years is a long time, and we need to face the reality of what we want to do and what the public will bear. This will be a hard sell. We need to determine a realistic replacement level and assess that reality over the next twenty-thirty years.
19. All that we've learned is starting to come together for me, and I'm looking forward to the next meeting.
20. I so appreciate the staff for their time and effort.

Customer Advisory Committee Meeting #4 Summary

Tuesday, February 5, 2019, 6:30-9:15 pm

PUBLIC COMMENTS

None

CLOSE

CAC Vice Chair Richard Moses thanked the CAC members, District staff, and consultants for their participation and adjourned the meeting at 9:15 p.m.

APPROVED:

CHRISTOPHER CASTRUITA
Deputy Secretary
Citrus Heights Water District

JENNA MOSER, Chair
Customer Advisory Committee
Citrus Heights Water District

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #5 Summary

Tuesday, February 26, 2019, 6:30-9:15 pm

INTRODUCTION

Jenna Moser, Chair of the Customer Advisory Committee (CAC), called the meeting to order at 6:38 p.m. After welcoming the members of the CAC, she turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda:**

1. Introductions

2. Public Comment

3. Approve minutes of February 5, 2019 CAC Meeting #4

4. Spending/Funding Alternatives Assessment:

    a. Background information and key considerations

    b. Working group assessment and identification of the initial top Spending/Funding Alternatives

    c. Final identification of the top Spending/Funding alternatives for further consideration at CAC Meeting #6 on March 19, 2019

5. Public Comment

6. Next Steps

7. Close

Laura reiterated that meeting materials are provided electronically to the CAC members in advance of and following their meetings and are posted on the CHWD website, Customer Advisory Committee Section. In addition, meeting summaries that provide an overview of each of the CAC meetings as well as a video of the meetings are posted to the website to be available to the CAC members and the general public.

Customer Advisory Committee Meeting #5 Summary

Tuesday, February 26, 2019, 6:30-9:15 pm

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Julie Beyers	Residential Representative
Ray Bohlke	Residential Representative
Deborah Cartwright	Residential Representative
Wes Ervin	Commercial Representative
Michael Goble	Residential Representative
Suzanne Guthrie	Residential Representative
Doug MacTaggart	Residential Representative
Bren Martinez	Residential Representative
James Monteton	Residential Representative
Richard Moore	Residential Representative
Jenna Moser	Residential Representative and CAC Chair
Mike Nishimura	Commercial Representative
Cyndi Price	Institutional Representative
Ray Riehle	CHWD Director
Javed Siddiqui	Residential Representative

Unable to attend were:

Patti Catalano	Residential Representative
Katherine Cooley	Institutional Representative
Andrew Johnson	Residential Alternate
Dave Mitchell	Institutional Representative
Richard Moses	Residential Representative and CAC Vice Chair
David Paige	Residential Representative
Aimee Pfaff	Residential Representative
Peg Pinard	Residential Representative
Chris Ralston	Institutional Representative
Noe Villa	Institutional Representative

CHWD Staff:

Chris Castruita	Management Services Supervisor/Chief Board Clerk
Tamar Dawson	Assistant Engineer
Paul Dietrich	Project Manager
David Gordon	Operations Manager
Madeline Henry	Management Services Specialist/Deputy Board Clerk
Rex Meurer	Water Efficiency Supervisor
Missy Pieri	Engineering Manager/District Engineer
Susan Sohal	Administrative Services Manager
Hilary Straus	General Manager

Consultants:

Roger Kohne	Harris & Associates
Andrew MacDonald	Harris & Associates
Habib Isaac	Raftelis Financial Consultants, Inc.
Andrea Boehling	Raftelis Financial Consultants, Inc.
Laura Mason-Smith	Mason-Smith Success Strategies

PUBLIC COMMENT

There was no public comment.

APPROVAL OF FEBRUARY 5, 2019, CAC MEETING #4 MINUTES

The minutes of the February 5, 2019, CAC Meeting #4 were unanimously approved without comments or changes.

SPENDING AND FUNDING ALTERNATIVES ASSESSMENT

Background Information

Project 2030 Manager Missy Pieri reviewed the 2019 CAC Meeting Schedule, progress to date, and the topics for the upcoming CAC meetings (please see the CHWD Website section on Project 2030 CAC Meeting #5 for the slide presentation detail).

Funding Overview

Habib Isaac provided a recap of previously discussed funding concepts. He then reviewed key considerations to be considered when assessing each of the Spending/Funding Alternatives:

- Annual Average Revenue Increase
- Pre-Funding
- Debt

Assessment of the 21 Spending/Funding Alternatives

CAC members moved into three table groups to utilize both hard-copy and computer based information and analyses to assess each of the 21 Spending/Funding Alternatives. After extensive discussion, CAC members identified their initial individual Top 4 Alternatives, and able spokespeople then reported out on the results of their table-group discussions and assessments. Some of the considerations cited by the table group spokespeople included:

- Prefunding:
  - Starts building today's dollars for the future
  - Provides compounding interest which can be used into the future
  - Eliminates or mitigates rate spikes
  - Is a more responsible approach

- Debt:
  - Balances funding sources
  - Helps mitigate spikes
  - Is beneficial to spread costs between current and future generations of users

- General comments:
  - Alternatives 1, 2, and 3 do not make enough progress toward water main replacements and defer the issue to beyond 2080

Each CAC voting member then cast their votes for their final Top 4 Spending/Funding Alternatives, which resulted in five Alternatives moving on for further consideration at the March 19, 2019 CAC Meeting #6. At CAC Meeting #6, the CAC voting members will narrow down the Alternatives to their Top 2, and these two Alternatives will move forward for Market Research along with the District's Current Baseline Spending/Funding level.

Spending/Funding Alternatives Moving Forward For Consideration at the March 19, 2019 CAC Meeting #6

Alt #	Funding Description	Project Cost-- 2018 $ Millions	Annual Spending 2018 $ Millions	% of System Replaced by 2080 (50 years starting in 2030)	Total Votes
4.4	Prefunding, with Debt	320	6.4	59%	10
5.2	Prefunding, No Debt	390	7.8	72%	9
5.4	Prefunding, with Debt	390	7.8	72%	12
6.4	Prefunding, with Debt	480	9.6	89%	10
7.4	Prefunding, with Debt	510	10.2	94%	6

Customer Advisory Committee Meeting #5 Summary

Tuesday, February 26, 2019, 6:30-9:15 pm

CAC PROCESS AND LOGISTICS OVERVIEW

The CAC reviewed the updated schedule of 2019 CAC meetings (see the CAC Document Library on the website for the schedule graphic). These after-dinner meetings and the high-level topics anticipated for each of the meetings are shown below.

Workshop #6: March 2019, 6:30-9:30 pm, Citrus Heights Community Center

- Review the considerations related to the Top 5 Spending/Funding Alternatives
- Select the Top 2 Spending/Funding Alternatives for Market Research (along with the District's current Baseline Spending/Funding level)
- Market Research Primer

Workshop #7: March 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Market Research Results
- Develop Final Recommendation to the Board
- Steps for Implementation Plan

Workshop #8: September 10, 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Review Implementation
- Review Final Board Recommendation

CAC MEMBER CLOSING COMMENTS

The CAC members indicated what they were taking away from the Meeting as:

1. This was a very interesting process
2. Fabulous exercise; people were so prepared and had very thoughtful insights
3. Excellent collaboration
4. Enjoyed the group discussions
5. Very productive discussion, and interesting process
6. Even with such diverse small groups, our voting confirmed our shared priorities
7. Appreciated having the staff members and consultants assigned to each of the small tables; they really helped by answering questions and providing insights
8. Everyone was so eager to speak their mind and share their opinions
9. Everyone was actively involved, which is so important since it will take all of us to make the final recommendations
10. Very good discussion
11. Lots of material to digest, and all of it was very well done
12. I had doubts about how this would work, and it worked very well
13. We had lots of questions, and it was very helpful to have the staff and consultants available to each of our groups
14. It really helped to have all the visuals and be able to assess the Alternatives in hard copy and on the computers at each table
15. Having homework was very helpful
16. The open discussion and information provided caused me to reconsider my previous opinions
17. We really appreciate the extensive work the staff has done to make this process so effective
18. Voting with the dots was fascinating
19. This was a fascinating and fun process

PUBLIC COMMENTS

None

CLOSE

CAC Chair Jenna Moser thanked the CAC members, District staff, and consultants for their participation and adjourned the meeting at 8:42 p.m.

Customer Advisory Committee Meeting #5 Summary

Tuesday, February 26, 2019, 6:30-9:15 pm

APPROVED:

CHRISTOPHER CASTRUITA
Deputy Secretary
Citrus Heights Water District

RICHARD MOSES, Vice Chair
Customer Advisory Committee
Citrus Heights Water District

INTRODUCTION

Richard Moses, Vice Chair of the Customer Advisory Committee (CAC), called the meeting to order at 6:32 p.m. After welcoming the members of the CAC, he turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda:**

1. Introductions
2. Public Comment
3. Approve minutes of February 26, 2019 CAC Meeting #5
4. Identify the top two Spending/Funding Alternative recommendations for market research
    - Background information and general considerations
    - Working group assessment and identification of their initial top two Spending/Funding Alternatives
    - Whole group discussion and final identification of the top two Spending/Funding Alternatives for market research
5. Research Primer
6. Public Comment
7. Next Steps
8. Close

Laura reiterated that meeting materials are provided electronically to the CAC members in advance of and following their meetings and are posted on the CHWD website, Customer Advisory Committee Section. In addition, meeting summaries that provide an overview of each of the CAC meetings as well as a video of the meetings are posted to the website to be available to the CAC members and the general public.

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Julie Beyers	Residential Representative
Ray Bohlke	Residential Representative
Deborah Cartwright	Residential Representative
Patti Catalano	Residential Representative
Katherine Cooley	Institutional Representative
Suzanne Guthrie	Residential Representative
Andrew Johnson	Residential Alternate
Doug MacTaggart	Residential Representative
James Monteton	Residential Representative
Richard Moore	Residential Representative
Richard Moses	Residential Representative and CAC Vice Chair
Mike Nishimura	Commercial Representative
Aimee Pfaff	Residential Representative
Chris Ralston	Institutional Representative
Ray Riehle	CHWD Director

Unable to attend were:

Wes Ervin	Commercial Representative
Michael Goble	Residential Representative
Bren Martinez	Residential Representative
Dave Mitchell	Institutional Representative
Jenna Moser	Residential Representative and CAC Chair
David Paige	Residential Representative
Peg Pinard	Residential Representative
Cyndi Price	Institutional Representative
Javed Siddiqui	Residential Representative
Noe Villa	Institutional Representative

CHWD Staff:

Chris Castruita	Management Services Supervisor/Chief Board Clerk
Tamar Dawson	Assistant Engineer
Paul Dietrich	Project Manager
David Gordon	Operations Manager
Madeline Henry	Management Services Specialist/Deputy Board Clerk
Rex Meurer	Water Efficiency Supervisor
Jeff Ott	Principal IT Analyst
Missy Pieri	Engineering Manager/District Engineer
Alberto Preciado	Accounting Supervisor/Assessor/Controller
Susan Sohal	Administrative Services Manager
Hilary Straus	General Manager

Consultants:

Andrew MacDonald	Harris & Associates
Steve Winchester	Harris & Associates
Roger Kohne	Harris & Associates
Habib Isaac	Raftelis Financial Consultants, Inc.
Charles Hester	Godbe Research
Laura Mason-Smith	Mason-Smith Success Strategies

PUBLIC COMMENT

There was no public comment.

APPROVAL OF FEBRUARY 26, 2019, CAC MEETING #5 MINUTES

The minutes of the February 26, 2019, CAC Meeting #5 were unanimously approved without comments or changes.

SPENDING AND FUNDING ALTERNATIVES ASSESSMENT

Background Information

Project 2030 Manager Missy Pieri reviewed the 2019 CAC Meeting Schedule, progress to date, and the topics for the upcoming CAC meetings (please see the CHWD Website section on Project 2030 CAC Meeting #6 for the slide presentation detail).

Top 5 Spending/Funding Alternatives and Additional Considerations

Andrew MacDonald and Habib Isaac reviewed the Top 5 Alternatives selected by the CAC at the February 26, 2019 Meeting #5 and provided additional information related to the Alternatives for CAC consideration:

- System replacement levels by decade
- Spending/Funding overview
- Prefunding overview and components
- Proposition 218 requirements
- Historical data and projections

Assessment of the 5 Spending/Funding Alternatives

CAC members moved into four table groups to utilize both hard-copy and computer based information and analyses to assess each of the remaining 5 Spending/Funding Alternatives. After extensive discussion, CAC members identified their initial individual Top 2 Alternatives, and table spokespeople then reported out on the results of their table-group discussions and assessments.

Each CAC voting member then cast their votes for their final Top 2 Spending/Funding Alternatives which will move forward for market research. At CAC Meeting #7, the market researchers will report on the research results.

Spending/Funding Alternatives Moving Forward For Market Research

Alt #	Funding Description	Project Cost--2018 $ Millions	Annual Spending 2018 $ Millions	% of System Replaced by 2080 (50 years starting in 2030)	Total Votes
5.4	Prefunding, with Debt	390	7.8	72%	11
6.4	Prefunding, with Debt	480	9.6	89%	8

RESEARCH PRIMER

Charles Hester, with Godbe Research, provided an informative overview of the market research process related to the two potential Spending/Funding Alternatives. A question and answer period also occurred after the overview to answer any CAC questions.

CAC PROCESS AND LOGISTICS OVERVIEW

The CAC reviewed the updated schedule of 2019 CAC meetings (see the CAC Document Library on the website for the schedule graphic). These after-dinner meetings and the high-level topics anticipated for each of the meetings are shown below.

Workshop #7: June 11, 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Review Market Research Results
- Develop Final Recommendation to the Board
- Review Implementation Plan Process

Workshop #8: September 10, 2019, 6:30-9:15 pm, Citrus Heights Community Center

- Review Implementation Plan
- Review Final Board Recommendation

CAC MEMBER CLOSING COMMENTS

The CAC members indicated what they were taking away from the Meeting as:

1. It's been really interesting to see the collaboration and how everyone has participated.
2. At our next meeting, it will be really interesting to see the research results.
3. This process has been so empowering for the CAC members.
4. I really appreciate this well-thought-out process.
5. It's been great to have such effective resources for our team's work.
6. I've really appreciated hearing other teams' thoughts too.
7. Looking back at the numbers, I'm comfortable with where the process is going.
8. It will be interesting to see the survey results.
9. I've been so happy to be armed with good information to be able to combat any resistance to this process in the community; now I will have good information to share.
10. I am so happy to be part of this process and learn from others.
11. It's so interesting to see and hear each other's reasoning.
12. I'm really looking forward to our next meeting.
13. Our CAC member votes seemed to align.
14. Any time there is a rate increase, people may not understand, but there are so many of us involved that I think there is a better chance for productive results.
15. I have LOVED this process, and I've learned a lot.
16. I came in not liking debt, but I learned that responsible debt gives the District flexibility, and I'm very comfortable with responsible debt now.
17. I've learned so much, and it's been an exciting and interesting process.
18. It's interesting to learn what goes into doing effective market research.
19. Through this process, we are being educated for life!
20. I am thankful for the thoughtfulness of this process and anxious for the survey results.
21. I appreciate everyone's participation and thank the staff for their preparation/assistance.
22. I've learned a lot from everyone, and I think we've done a very good job.

PUBLIC COMMENTS

None

CLOSE

CAC Vice Chair Richard Moses thanked the CAC members, District staff, and consultants for their participation and adjourned the meeting at 8:59 pm.

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #7 Summary

Tuesday, June 11, 2019, 6:30-9:30 pm

INTRODUCTION

Jenna Moser, Chair of the Customer Advisory Committee (CAC), called the meeting to order at 6:33 p.m. After welcoming the members of the CAC, she turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda:**

1. Public Comment
2. Introductions
3. Approve minutes of March 19, 2019 CAC Meeting #6
4. Review the Remaining Top Two Spending/Funding Alternatives
5. Review the Market Research Results
6. Determine the Top Alternative Recommendation
7. Preview CAC Meeting #8 on September 10, 2019
8. Public Comment
9. Close

Laura reiterated that meeting materials are provided electronically to the CAC members in advance of and following their meetings and are posted on the CHWD website, Customer Advisory Committee Section. In addition, meeting summaries that provide an overview of each of the CAC meetings as well as a video of the meetings are posted to the website to be available to the CAC members and the general public.

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #7 Summary

Tuesday, June 11, 2019, 6:30-9:30 pm

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Julie Beyers	Residential Representative
Ray Bohlke	Residential Representative
Deborah Cartwright	Residential Representative
Patti Catalano	Residential Representative
Michael Goble	Residential Representative
Suzanne Guthrie	Residential Representative
Bren Martinez	Residential Representative
Dave Mitchell	Institutional Representative
James Monteton	Residential Representative
Jenna Moser	Residential Representative and CAC Chair
Richard Moses	Residential Representative and CAC Vice Chair
Mike Nishimura	Commercial Representative
Peg Pinard	Residential Representative
Chris Ralston	Institutional Representative
Ray Riehle	CHWD Director
Javed Siddiqui	Residential Representative

Unable to attend were:

Katherine Cooley	Institutional Representative
Wes Ervin	Commercial Representative
Andrew Johnson	Alternate
Doug MacTaggart	Residential Representative
Richard Moore	Residential Representative
David Paige	Residential Representative
Aimee Pfaff	Residential Representative
Cyndi Price	Institutional Representative
Noe Villa	Institutional Representative

CHWD Staff and Board:

Chris Castruita	Management Services Supervisor/Chief Board Clerk
Tamar Dawson	Assistant Engineer
Paul Dietrich	Project Manager
David Gordon	Operations Manager
Madeline Henry	Management Services Specialist/Deputy Board Clerk
Rex Meurer	Water Efficiency Supervisor
Missy Pieri	Engineering Manager/District Engineer
Caryl Sheehan	CHWD Board Chair
Hilary Straus	General Manager
Susan Talwar	Administrative Services Manager

Consultants:

Andrew MacDonald	Harris & Associates
Roger Kohne	Technical Support
Habib Isaac	Raftelis Financial Consultants, Inc.
Bryan Godbe	Godbe Research
Laura Mason-Smith	Mason-Smith Success Strategies

PROJECT 2030
WATER MAIN REPLACEMENT

Customer Advisory Committee Meeting #7 Summary

Tuesday, June 11, 2019, 6:30-9:30 pm

PUBLIC COMMENT

Community member Sherland Clark, a resident and homeowner for over 42 years, thanked the District and the CAC for such a progressive public process and for providing the opportunity for community input. She recommended that the District minimize or rectify damage to any personal property when implementing the water main replacement project. It was confirmed by District Engineer Missy Pieri that there is a contingency built into all construction projects for these types of situations.

APPROVAL OF MARCH 19, 2019, CAC MEETING #6 MINUTES

The minutes of the March 19, 2019, CAC Meeting #6 were unanimously approved without comments or changes.

CAC PROCESS OVERVIEW

Missy Pieri, District Engineer and Project 2030 Manager, provided an overview of where the CAC is in the Project 2030 process and outlined what is still to come. Missy also thanked the CAC members for their ongoing thoughtful and active participation in the process.

REVIEW OF THE REMAINNG TWO SPENDING/FUNDING ALTERNATIVES

Habib Isaac reviewed the top two Spending/Funding Alternatives that the CAC had identified at their March 19, 2019 meeting and that had moved forward for Market Research:

Alt #	Funding Description	System Replaced by 2080	Project Cost-- 2018 $	Annual Spending 2018 $	Additional Interest
5.4	Prefunding ($22.5M), with Debt (4% of funding)	72%	$390M	$7.8M	$48M
6.4	Prefunding ($29.4M), with Debt (9% of funding)	89%	$480M	$9.6M	$132M

Alternative	Prefunding	Annualized (10 years)	Projected Monthly Meter Surcharge (1 inch)
5.4	$22.5 M	$2.25 M	$8.63
6.4	$29.4 M	$2.94M	$11.27

RESEARCH RESULTS

Bryan Godbe, with Godbe Research, provided a detailed overview of the market research results covering the following topics related to the Top Two Spending/Funding Alternatives:

1. Research objectives
2. Methodology overview
3. Key findings
4. Summary and recommendations

The key findings and summary of recommendations are available in Technical Memo No. 5. A question-and-answer period also occurred after the review to answer any CAC questions.

THE TOP ALTERNATIVE RECOMMENDATION

The CAC members indicated their initial informal assessment of the two Alternatives. They then officially voted for Alternative 5.4 as their Top Recommendation. The final voting results were 11 members for Alternative 5.4 and 3 members for Alternative 6.4; however, the members voting for Alternative 6.4 also indicated that they could support Alternative 5.4. Given that the market research results showed that both Alternatives 5.4 and 6.4 have a majority of research respondents' support that is not significantly different, the CAC members explained some of their reasons for choosing Alternative 5.4, as paraphrased below:

1. We had a couple of really great Alternatives, and I'm really pleased with either of those Alternatives. The next big challenge will be finding out and deciding on how the public education and engagement process will be done.

2. This increase in funding (via rate increase or surcharge), when it is implemented, will likely be only one of several increases of utility bills that customers may receive, so the gentler the increase the more likely the District will get more support.

3. The main deciding factor was the fact that at the end of the market research, there was no statistical difference between the two Alternatives. Therefore, I went with my opinion of what would be the best option for the community at large that I believe the majority would support.

THE TOP ALTERNATIVE RECOMMENDATION (continued)

4. If the survey respondents had been given the specific projected monthly rate increase amounts, I believe they would have given a more realistic response. That is why I chose Alternative 5.4.

5. I agree that, with no statistical difference, when the survey tested for rate sensitivity that flipped my support to the less expensive Alternative.

6. I agree with all those comments; each of the individual survey respondents provided input on one option and didn't have the opportunity to choose between the two options. So, I think the CAC should appear as the tie breaker since we know all the Alternatives, have been in this process for over a year, have been exposed to much more information about the issues surrounding Project 2030, and know much more than the survey respondents.

7. There was a very large percentage of respondents that indicated they didn't know or have an opinion, which is surprising; maybe they are overwhelmed by data. We've been in this process for over a year. If the respondents had all the facts we have been exposed to, I think they would sway toward the 5.4 Alternative.

8. I appreciate the rate sensitivity and the monthly surcharge information. We need to be sensitive to our population, some of whom are on fixed incomes, and the impacts to our rate payers.

9. I'm extremely confident in the integrity of the Citrus Heights Water District and the fact that the District will do the right thing for the community. I think the District will get way beyond the water main replacement goals and will want to do even more for the customers.

10. My concern on this is that I think it would have been more worthwhile to have chosen Alternative 6.4 to have 89% of the water mains replaced rather than 72%. I would have preferred the Alternative 6.4 to replace more pipes, but Alternative 5.4 is still fine.

11. I preferred the higher completion number of Alternative 6.4 and thought the difference in cost would be worth it, since water is an essential service. But I can also support Alternative 5.4.

Customer Advisory Committee Meeting #7 Summary

Tuesday, June 11, 2019, 6:30-9:30 pm

CAC PROCESS AND LOGISTICS OVERVIEW

The CAC reviewed the updated schedule of 2019 CAC meetings (see the CAC Document Library on the website for the schedule graphic). These after-dinner meetings and the high-level topics anticipated for each of the meetings are.

Workshop #8: September 10, 2019, 6:30-9:15 pm, Citrus Heights Community Center
• Review Implementation Plan • Review Final Board Recommendation

CAC MEMBER CLOSING COMMENTS

The CAC members indicated what they were taking away from the Meeting as:

1. The thoughtfulness of this group makes me confident that there are great quality people in this group who would be excellent candidates to serve on the CHWD Board of Directors.

2. I'm very satisfied with the outcome. I can talk with my neighbors and customers and feel really strong with the outcome of Alternative 5.4.

3. I found out tonight that community engagement and education with be extremely important and that the District needs to improve this. Flyers that come in the mail typically go into the trash; so there will need to be a lot more work done and a better approach for younger generations. One idea is to present to elementary schools to talk about water conservation efforts and teach them about infrastructure.

4. It's been a pleasure to be part of the discussion process.

5. I think there is a lot of momentum and energy in the right direction. I think that Alternative 5.4 has a good chance to get legs.

6. I am satisfied with the process. I've never participated in anything like this, so I have enjoyed learning and, when there is an increase, I will understand what's gone into it. Thank you.

7. I enjoyed being part of the process and am happy with the results. I may not be happy with a rate increase, but I think it will be justified.

CAC MEMBER CLOSING COMMENTS (continued)

8. It's been a good process, and there's been lots of education. I wish everybody could have this level of education, so we need to share what we've learned.

9. I enjoyed also learning the backside of the survey process; it is interesting to look at the questions and takeaways and how those inform the materials presented this evening. The pieces that help the decision making, such as rate sensitivity as part of the big picture, were very interesting.

10. A challenge is for the District to distinguish itself. It's probably useful to be "out of the gate" first to promote the District's assets—the great CHWD water, the reliability of our water (especially when electricity may not be reliable), and that we all have a share in maintaining our water.

11. Often it helps to listen and be the speaker at almost anything to talk about our Water District and how wonderful our water is. That's the kind of thing that will help get the word out.

12. This CAC process has really been great, and I feel surprised and good because the District made the process so informative and easy.

13. I'm really happy about the process overall and happy to be a participant, so thank you for that. I'm curious about the public outreach and would like to be able to hear feedback as the public gets more educated about the project. It would be nice to be able to hear that more and more people are on board with it in a positive way.

14. It's been an honor and privilege to be on the CAC and I've learned a lot as a result of this process. I agree that it will be easier to talk with other people who ask questions.

15. Thanks to everyone. I've taken a lot of education away from this experience, and it's been a great opportunity to serve our community. I hope everyone feels those same warm feelings of being able to give back in a really concrete way that we can tell other people about.

PUBLIC COMMENTS

None

Customer Advisory Committee Meeting #7 Summary

Tuesday, June 11, 2019, 6:30-9:30 pm

CLOSE

CAC Chair Jenna Moser thanked the CAC members, District staff, and consultants for their participation and adjourned the meeting at 8:28 pm.

APPROVED:

MADELINE HENRY
Deputy Secretary
Citrus Heights Water District

JENNA MOSER, Chair
Customer Advisory Committee
Citrus Heights Water District

INTRODUCTION

Jenna Moser, Chair of the Customer Advisory Committee (CAC), called the meeting to order at 6:33 p.m. After welcoming the members of the CAC, she turned the meeting over to Laura Mason-Smith, the CAC meeting facilitator, who reviewed with the CAC the **Meeting Agenda:**

1. Public Comment
2. Introductions
3. Approve minutes of June 11, 2019 CAC Meeting #7
4. Review of the Project 2030 Phasing and Implementation
5. Project 2030 Recap, including Recommendation to the Board and Next Steps
6. Preview of the Meter Replacement Project
7. Public Comment
8. Clarify Next Steps
9. Recognize Retiring CAC Members
10. Close

Laura reiterated that meeting materials are provided electronically to the CAC members in advance of and following their meetings and are posted on the CHWD website, Customer Advisory Committee Section. In addition, meeting summaries that provide an overview of each of the CAC meetings as well as a video of the meetings are posted to the website to be available to the CAC members and the general public.

ATTENDEES

CAC Members:

Kimberly Berg	Commercial Representative
Julie Beyers	Residential Representative
Ray Bohlke	Residential Representative
Deborah Cartwright	Residential Representative
Katherine Cooley	Institutional Representative
Wes Ervin	Commercial Representative
Michael Goble	Residential Representative
Suzanne Guthrie	Residential Representative
Andrew Johnson	Residential Representative
Doug MacTaggart	Residential Representative
Bren Martinez	Residential Representative
Dave Mitchell	Institutional Representative
James Monteton	Residential Representative
Richard Moore	Residential Representative
Jenna Moser	Residential Representative and CAC Chair
Richard Moses	Residential Representative and CAC Vice Chair
Mike Nishimura	Commercial Representative
Ray Riehle	CHWD Director

Unable to attend were:

Patti Catalano	Residential Representative
David Paige	Residential Representative
Aimee Pfaff	Residential Representative
Peg Pinard	Residential Representative
Cyndi Price	Institutional Representative
Chris Ralston	Institutional Representative
Javed Siddiqui	Residential Representative
Noe Villa	Institutional Representative

CHWD Staff and Board:

Tamar Dawson	Assistant Engineer
Paul Dietrich	Project Manager
David Gordon	Director of Operations
Madeline Henry	Management Analyst and Acting Chief Board Clerk
Rex Meurer	Water Efficiency Supervisor
Missy Pieri	Director of Engineering /District Engineer
Hilary Straus	General Manager
Susan Talwar	Director of Finance and Administrative Services

Consultants:

Andrew MacDonald	Harris & Associates
Michael McCormick	Harris & Associates
Eric Vaughan	Harris & Associates
Habib Isaac	Raftelis Financial Consultants, Inc.
Laura Mason-Smith	Mason-Smith Success Strategies
Roger Kohne	Technical Support

PUBLIC COMMENT

None.

APPROVAL OF JUNE 11, 2019 CAC MEETING #7 MINUTES

Michael Gobel made a motion to approve the June 11, 2019 meeting minutes. Julie Beyers seconded the motion. The minutes of the June 11, 2019, CAC Meeting #7 were unanimously approved without comments or changes.

CAC PROCESS OVERVIEW

Missy Pieri, District Engineer and Project 2030 Manager, provided an overview of where the CAC is in the Project 2030 process and outlined what is still to come. Missy also thanked the CAC members for their ongoing thoughtful and active participation in the process.

REVIEW OF PROJECT PHASING AND IMPLEMENTATION

Andrew MacDonald, of Harris & Associates, provided an overview of Project 2030 Phasing and Implementation which included:

1. Project 2030 building blocks
2. The Preferred Alternative
3. The Project Phasing Plan, as outlined in Technical Memo No. 6
4. The Project Implementation Plan, as outlined in Technical Memo No. 7

Questions of clarification were answered throughout the presentation.

PROJECT 2030 RECAP

Andrew MacDonald, of Harris & Associates, provided a Project 2030 recap, and Habib Isaac, of Raftelis Financial Consultants, Inc. reviewed the Project's funding analyses, considered alternatives, and CAC recommendation to the Board. Questions of clarification were answered throughout the presentations.

METER REPLACEMENT PROJECT PREVIEW

CHWD General Manager Hilary Straus introduced the Meter Replacement Program and the twelve-agency Regional Consortium that was initiated by and is being managed by Citrus Heights Water District. David Gordon, CHWD Director of Operations and overall Meter Replacement Program Project Manager, provided background information on the Project. Eric Vaughan, Harris & Associates' Project Manager, reviewed the:

1. Consultant team,
2. Seven phases of the Advanced Planning Study,
3. Project schedule,
4. High-level agenda for the Project's CAC Meeting #1, scheduled for Wednesday, October 23, 2019, at 6:30 pm, and
5. The benefits and importance of the Regional Consortium.

David Gordon reiterated that the purpose and importance of the CHWD Customer Advisory Committee (CAC) will be to provide:

1. Valuable input from the end users of the equipment,
2. Involvement in the long-range financial planning for the meter testing and replacement program, and
3. Involvement in the public engagement component of the study.

PUBLIC COMMENT

None

RECOGNITION OF RETIRING CAC MEMBERS

Director Riehle gave special thanks to the CAC members for their tireless work and invaluable input as part of the Committee and recognized retiring CAC members Bren Martinez, David Paige, Peg Pinard, and Aimee Pfaff.

CLOSE

CAC Chair Jenna Moser thanked the CAC members, District staff, and consultants for their participation and adjourned the meeting at 8:53 pm.

APPROVED:

MADELINE HENRY Deputy Secretary Citrus Heights Water District	JENNA MOSER, Chair Customer Advisory Committee Citrus Heights Water District

Appendix C. Market Survey Results

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GODBE RESEARCH
Gain Insight

TECHNICAL MEMORANDUM

June 26, 2019

TO: Citrus Heights Water District

FROM: Bryan Godbe
President
Godbe Research

RE: Project 2030 Water Main Replacement Survey – Summary of Results

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Executive Summary:

As part of Project 2030 Water Main Replacement Study (Study or Project 2030), a market research survey (Survey) was conducted to evaluate customer opinions on a variety of issues related to Citrus Heights Water District (CHWD or District) and the Study, including potential financial impacts. This memorandum (Memo) summarizes the methodology and key aspects of the Survey and provides recommendations to the District.

The results of the Survey show customers (voters and non-voters) have a favorable impression of the job the District is doing to provide services. District voters have a 4.4 to 1 favorable to negative impression of the District's job providing District services. The Survey also indicates that more than 60 percent of respondents were supportive of one of the two options presented for a rate adjustment to fund the District's water main replacements through the year 2080.

Introduction:

Renewal and replacement of infrastructure, funding of improvements and public understanding of the value of water are key issues to water system managers. The District is currently using a 30-year Capital Improvement Plan (Plan) that was developed in 1998 as a key planning tool in determining annual capital improvement projects, which includes water main replacement. As the above Plan is nearing the end of its term, the District is undertaking a process to review and refine its long term water main replacement program, otherwise known as the Project 2030 Water Main Replacement Study. Key elements of the Study include: 1) Asset Inventory and Project Polygon Development, 2) Water Demand Forecast, 3) Water Main Assessment, 4) Phasing Plan, 5) Cost Estimates, 6) Funding Options, including Water Rate Options and Debt Service Options, and 7) Implementation Plan.

Methodology Overview:

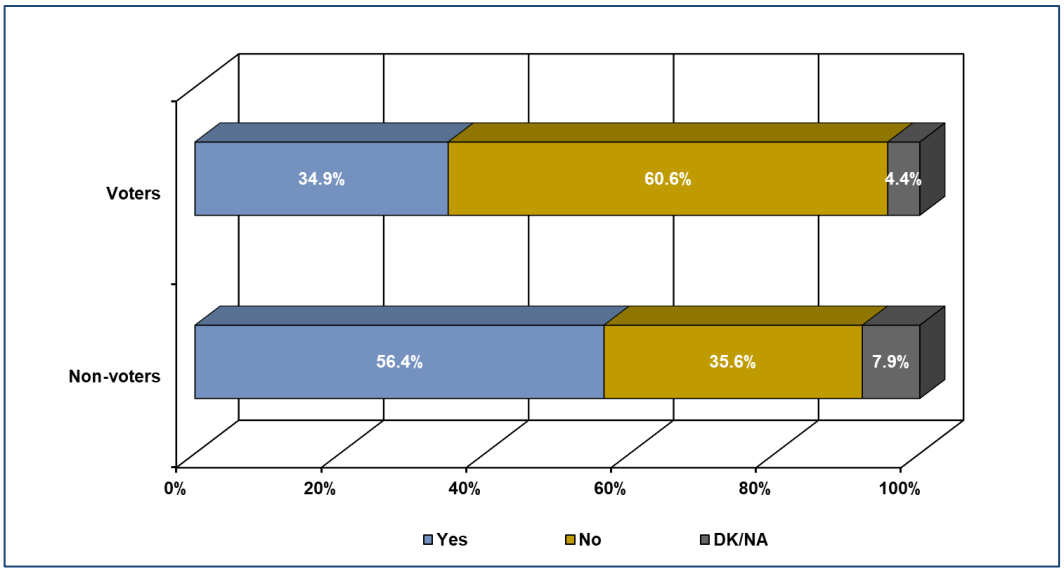
Telephone and online interviews were conducted from May 2 through May 8, 2019 and the average phone interview time was approximately 20 minutes. Methodological details included:

Data Collection	Landline (82), cell phone (29), and text to online (494) interviewing
Universe	35,194 Registered voters 4,912 Ratepayer non-voters
Fielding Dates	May 2 through May 8, 2019
Interview Length	20 minutes
Sample Size	n=504 Registered voters n=101 Ratepayer non-voters n=605 All respondents
Margin of Error	± 4.33% Registered voters ± 3.95% All respondents

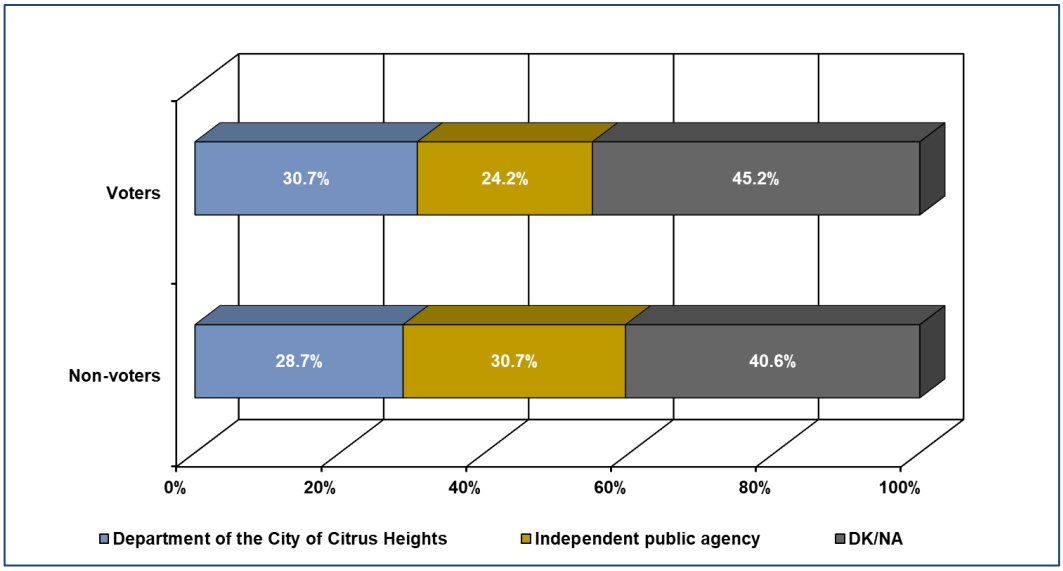
Additionally, the data has been weighted to reflect the actual population characteristics of voters in the Citrus Heights Water District in terms of their gender, age and political party.

Awareness of the Citrus Heights Water District

Thirty-five percent of voters and 56 percent of non-voters heard, seen or read about CHWD, and of those, roughly 40 percent of those who know about CHWD, learned about the District from newsletters, bill inserts and flyers.

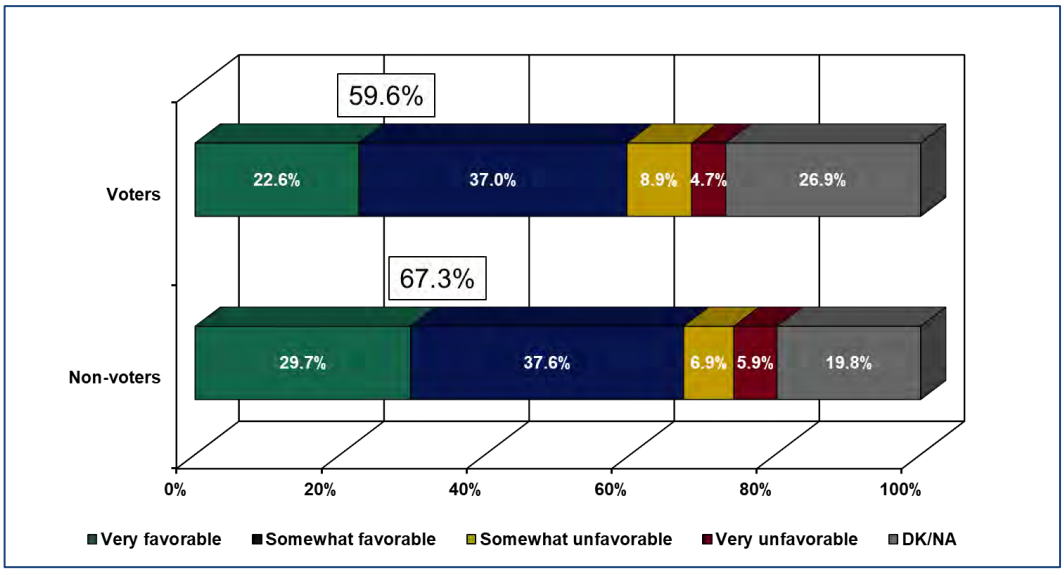


Among all respondents (voters and ratepayers), most do not know CHWD is an independent special District.

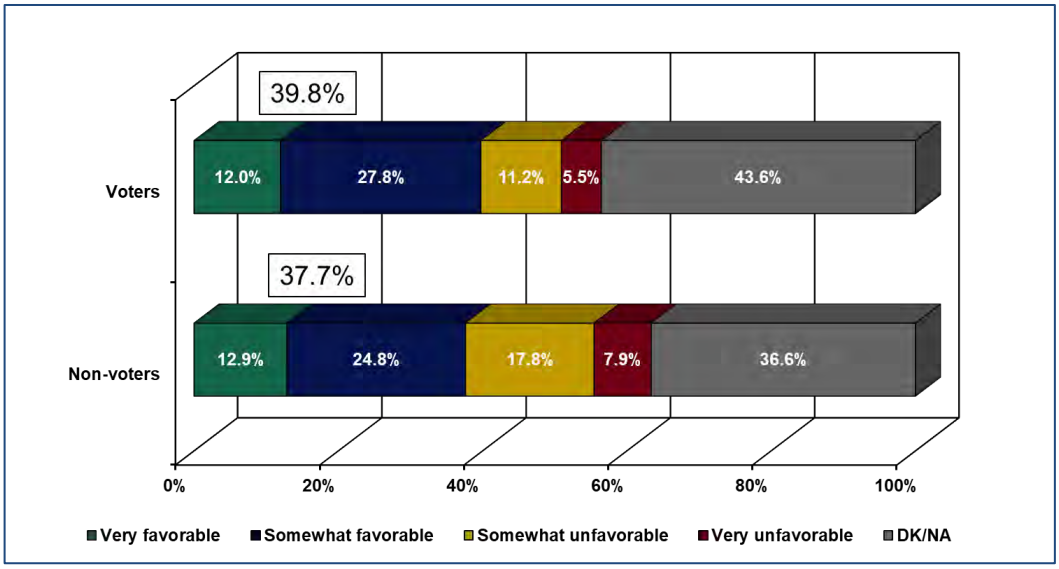


Satisfaction with the Citrus Heights Water District's Job Performance:

Non-voter ratepayers indicated a slightly higher level of satisfaction with the District's job performance than voters. Although, the ratio of favorable to unfavorable sentiments between of 4.4 to 1 (voters) and 5.2 to 1 (non-voters) were both very positive.



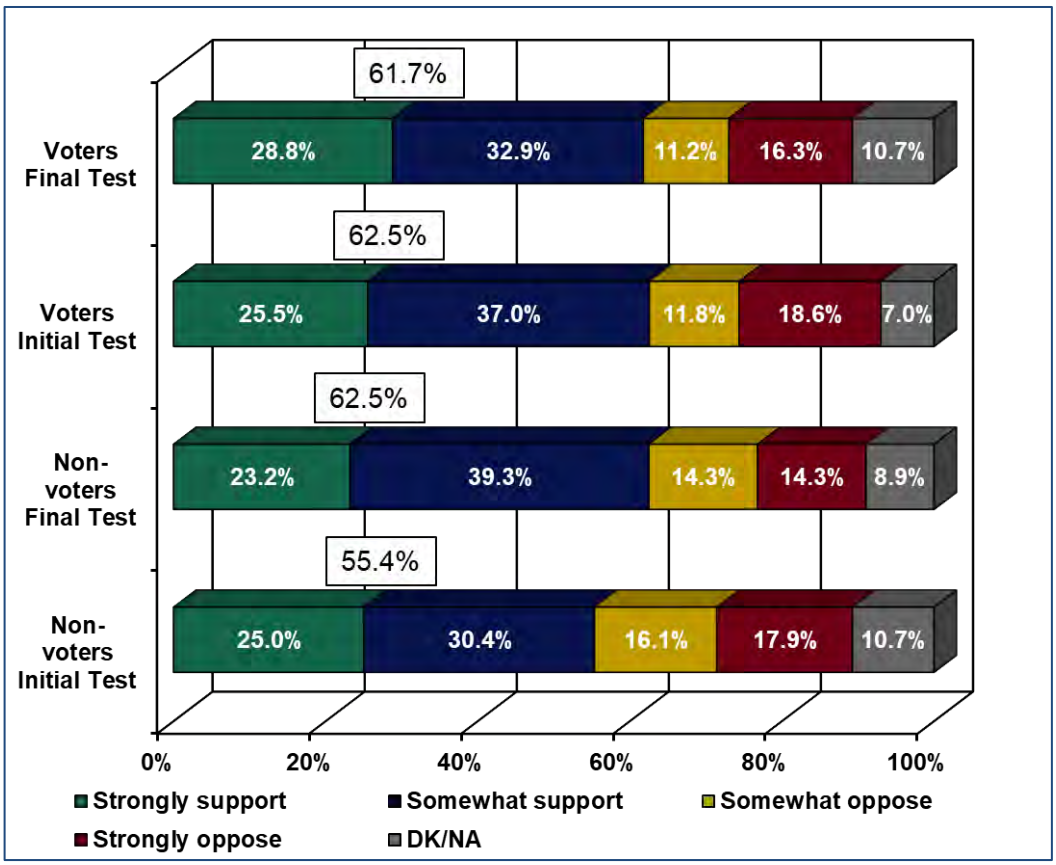
With respect to the job the District is doing to manage public funds (following page) the ratio of favorable to unfavorable between 2.4 to 1 (voters) and 1.5 to 1 (non-voters) was also reasonably positive, given that a good score is generally anything above a 1 to 1 ratio.



Support for Project 2030 Policy Alternatives

After information, both voters (61.7%) and non-voters (62.5%) supported policy Option 6.4 at solid levels.

Policy Option 6.4:

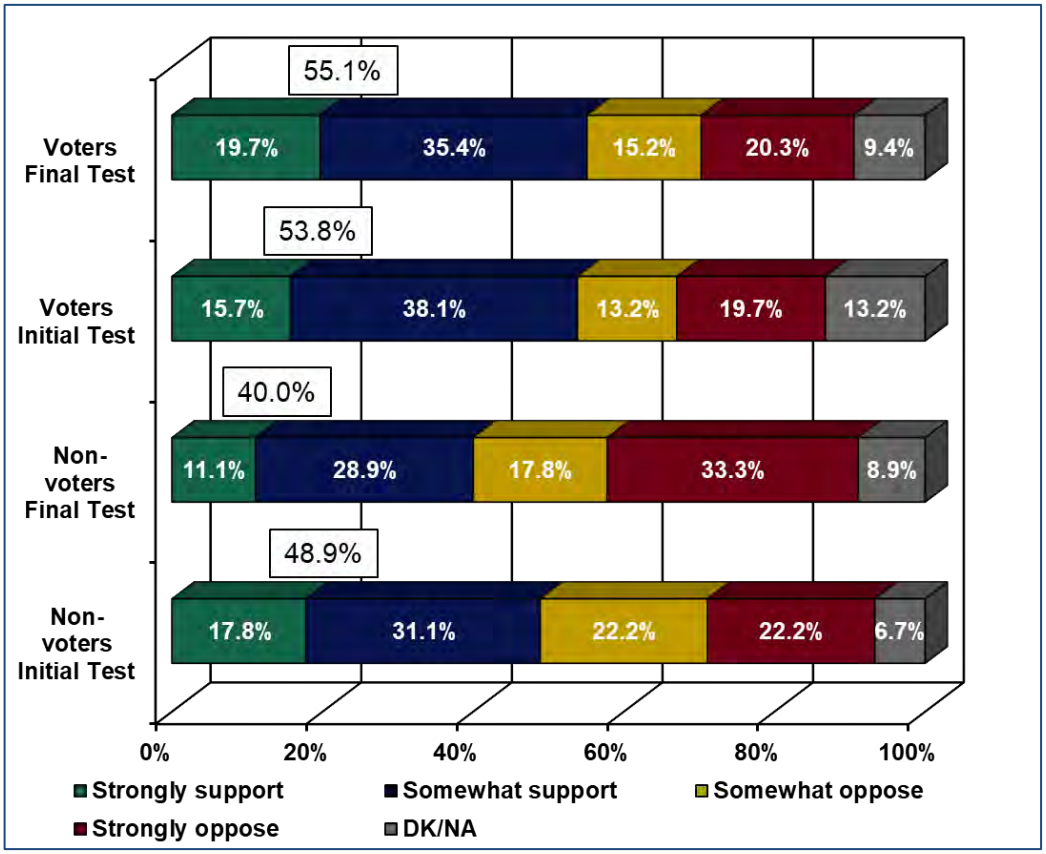


More specifically, support for the rate/surcharge increase in Option 6.4 was 62.5 percent on the first test and 61.8 percent on the second test, among registered voters.

However, when lowered by 1 percent to 2.97 percent, support for the rate/surcharge increased to 65.7 percent, but the difference is not statistically significant.

Like Option 6.4, support for the rate/surcharge increase in Option 5.4 was 53.8 percent on the first test and 55.1 percent on the second test, among registered voters.

Policy Option 5.4:

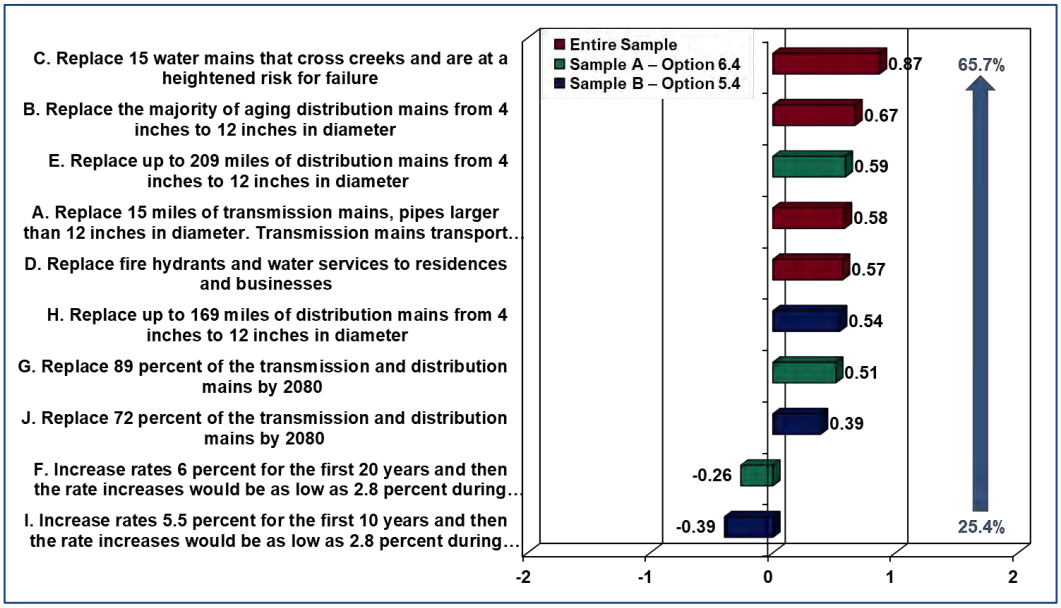


And, when lowered by 1 percent to 2.99 percent, support for the rate/surcharge increased to 62.8 percent, a larger numeric increase, but still not statistically significant.

Although within the survey's margin of error, it is important to note that there is not a statistically significant difference between the two options and the split sample for Option 5.4 was slightly more male and homeowner that for policy option 6.4, which may account for some of the variation between support for the two policies.

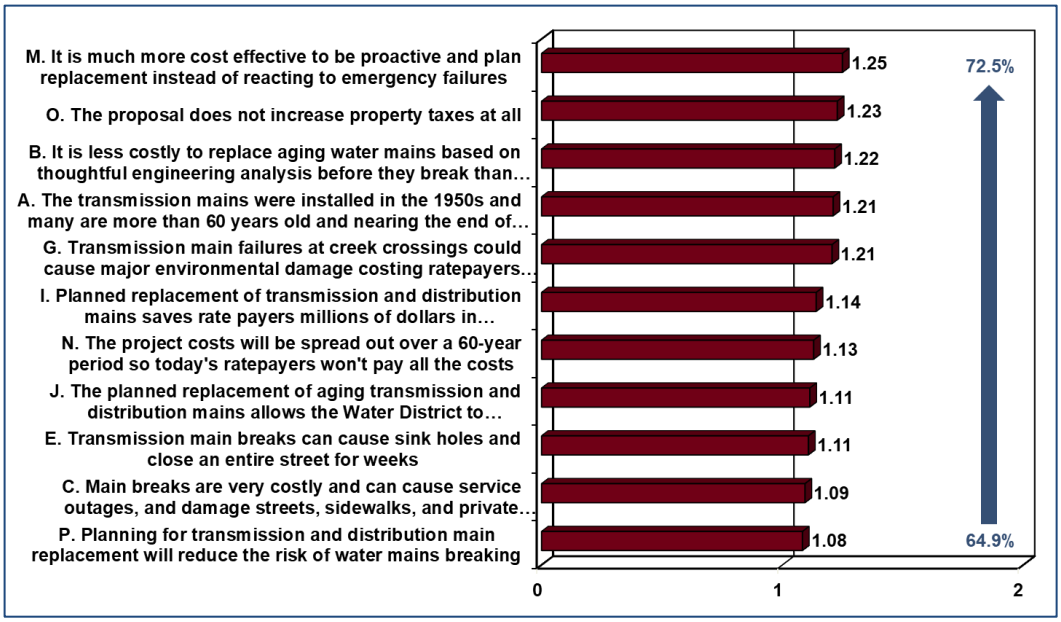
Features of the Proposal

Respondents were presented with individual components of Project 2030 to determine their importance and the survey results suggest clear priorities. The top priorities included: “15 water mains that cross creeks and are at a heightened risk for failure”, “The majority of aging distribution mains from 4 inches to 12 inches in diameter”, and “15 miles of transmission mains, with pipes larger than 12 inches in diameter”.



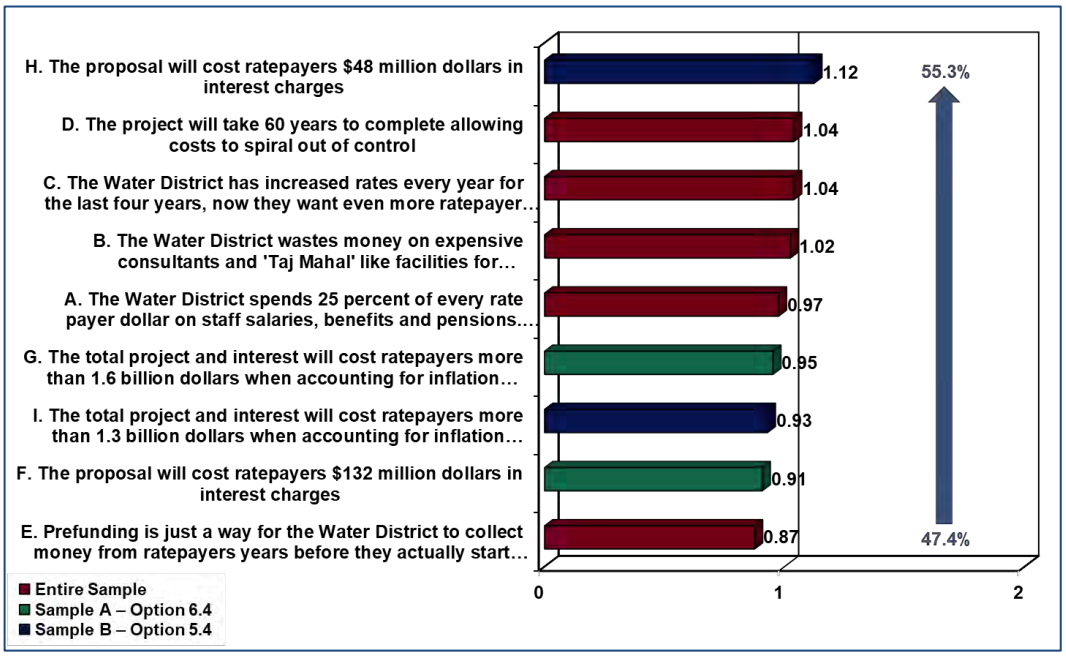
Informational Statements

Respondents were also presented with a variety of factual statements about the proposal. Topping this list of important items were: “It is much more cost effective to be proactive and plan replacement instead of reacting to emergency failures”, “The proposal does not increase property taxes at all”, and “It is less costly to replace aging water mains based on thoughtful engineering analysis before they break than incurring emergency replacement costs”.



Critical Statements

Critical statements were developed by the project team in order to test them. The District should be prepared to address potential critical opinions.



Summary & Recommendations

In summary, the survey results show:

- There is limited awareness of District among registered voters, although awareness is somewhat higher among the non-voter ratepayer segment.
- Favorability ratios for job performance and management of fiscal resources were good, but again large segments of registered voters do not have any opinion.
- Awareness of the “Project 2030 Water Main Replacement Project” is also limited.
- The survey revealed a base of voter support for a rate/surcharge increase.
  - Support for the rate/surcharge increase in Option 6.4 was 62.5 percent on the first test and 61.8 percent on the second test, among registered voters. When lowered by 1 percent to 2.97 percent, support for the rate/surcharge increased to 65.7 percent, but the difference is not statistically significant.
  - Similarly, support for the rate/surcharge increase in Option 5.4 was 53.8 percent on the first test and 55.1 percent on the second test, among registered voters. When lowered by 1 percent to 2.99 percent, support for the rate/surcharge increased to 62.8 percent, a larger numeric increase, but still not statistically significant.
  - There is not a statistically significant difference between the two options.
- Top tier features of the measure (listed below) were:
  - Replace 15 water mains that cross creeks and are at a heightened risk for failure.
  - Replace the majority of aging distribution mains from 4 inches to 12 inches in diameter.

- Replace up to 209 miles of distribution mains from 4 inches to 12 inches in diameter.
- Replace 15 miles of transmission mains, pipes larger than 12 inches in diameter. Transmission mains transport water from the local water treatment plant to the Citrus Heights Water District community.
- Replace fire hydrants and water services to residences and businesses.

- Key messages that voters would find of interest were:
  - It is much more cost effective to be proactive and plan replacement instead of reacting to emergency failures.
  - The proposal does not increase property taxes at all.
  - It is less costly to replace aging water mains based on thoughtful engineering analysis before they break than incurring emergency replacement costs.
  - The transmission mains were installed in the 1950s and many are more than 60 years old and nearing the end of their useful life.
  - Transmission main failures at creek crossings could cause major environmental damage costing ratepayers millions of dollars more to replace the main and repair the environmental damage, than replacing them before they fail.
- Potential areas of concern that were tested included:
  - The proposal will cost ratepayers $48 million dollars in interest charges.
  - The project will take 60 years to complete allowing costs to spiral out of control.
  - The Water District has increased rates every year for the last four years, now they want even more ratepayer money.
  - The Water District wastes money on expensive consultants and 'Taj Mahal' like facilities for administrators.
- Given the survey findings, Godbe Research believes that the Citrus Heights Water District Board of Directors should be confident enough in the level of community support to move the “Project 2030 Water Main Replacement Project” process forward.
- However, the limited awareness of the District, its job performance and the “Project 2030 Water Main Replacement Project” are clear indicators that a public outreach effort is essential to explaining the District’s plan for main replacement and the key features and benefits to the community.

Appendix D. Land Use Areas with Demand Nodes

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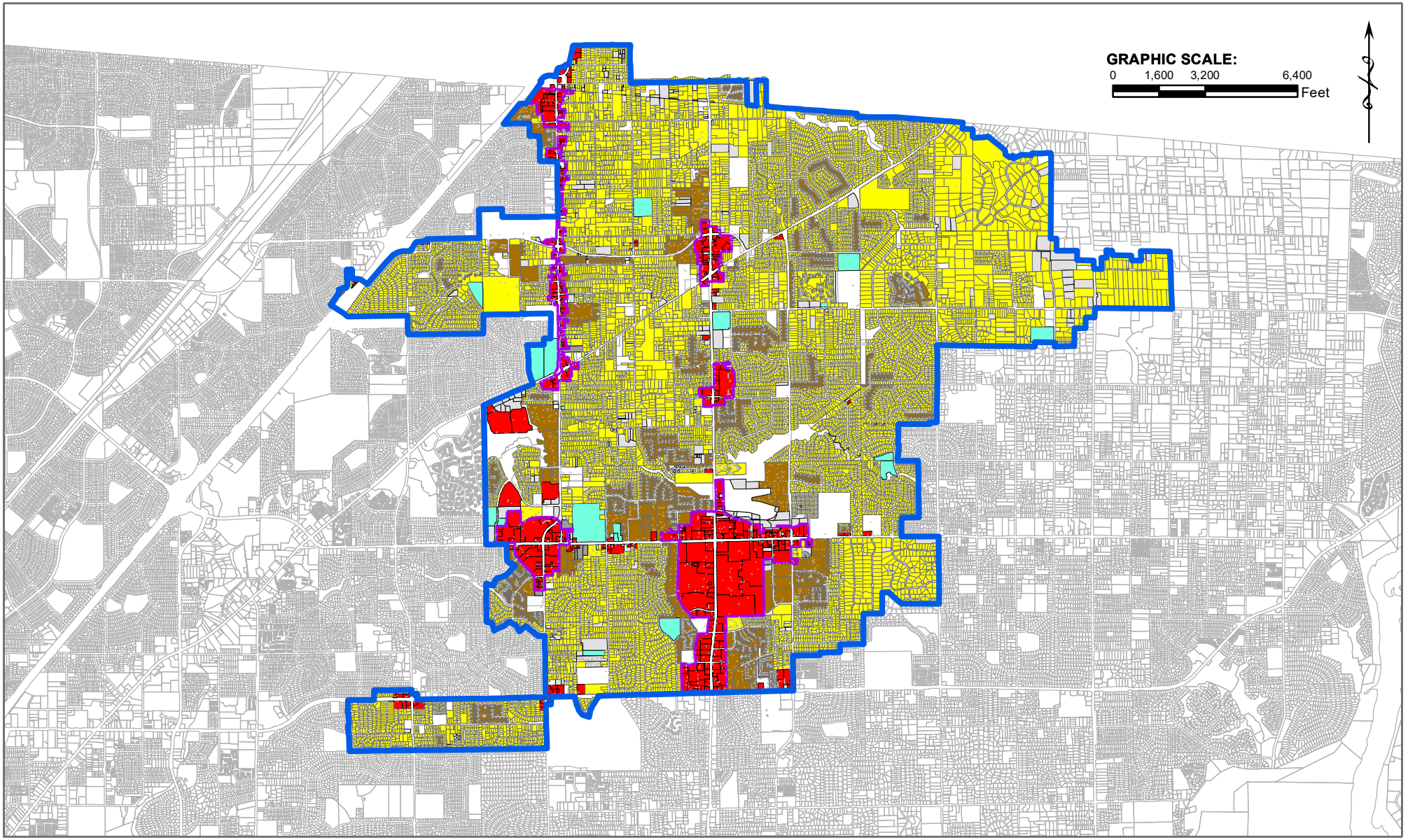
CITRUS HEIGHTS WATER DISTRICT
LAND USE AREAS WITH DEMAND NODES



LEGEND:

- Citrus Heights Water District Boundary

Citrus Heights Water District Parcels

- Single Family Residential
- Multi-Family Residential
- Commercial
- Industrial
- Public
- Vacant
- Other
- Commercial Boundaries
- Demand Node

NOTES:

REFERENCE IS HEREBY MADE TO THE MAPS OF RECORD IN THE OFFICE OF THE ASSESSOR OF THE COUNTY OF SACRAMENTO FOR A DETAILED DESCRIPTION OF THE LINES AND DIMENSIONS OF ANY PARCELS SHOWN HEREIN. THESE MAPS SHALL GOVERN FOR ALL DETAILS CONCERNING THE LINES AND DIMENSIONS OF SUCH PARCELS.

Harris & Associates
3620 AMERICAN RIVER DRIVE, SUITE 175
SACRAMENTO, CA 95864
916.996.2039 | WeAreHarris.com

DATE: JULY 2018

Appendix D

Appendix E. Maps of Project Areas

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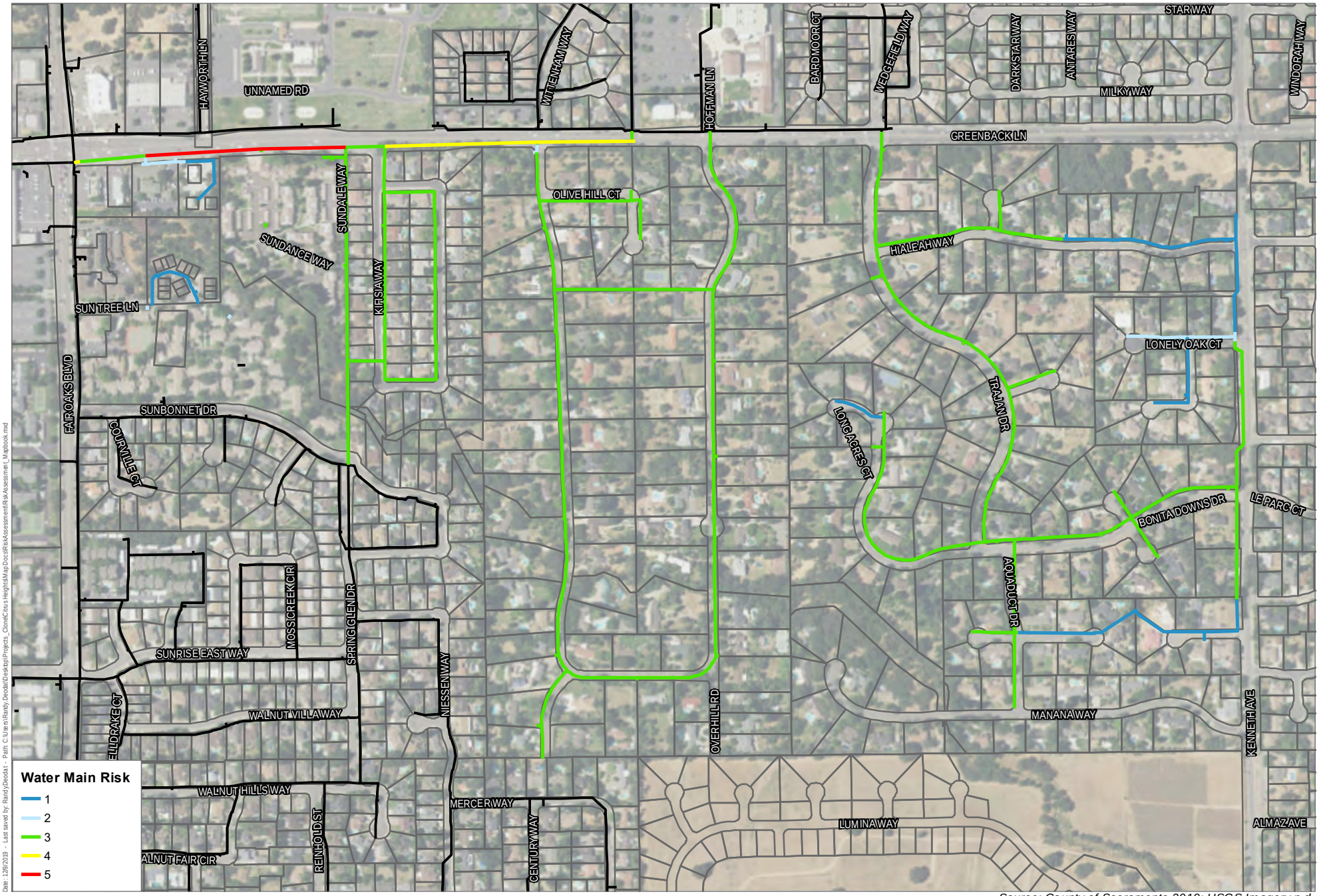

Source: County of Sacramento 2019; USGS Imagery n.d.

Harris & Associates

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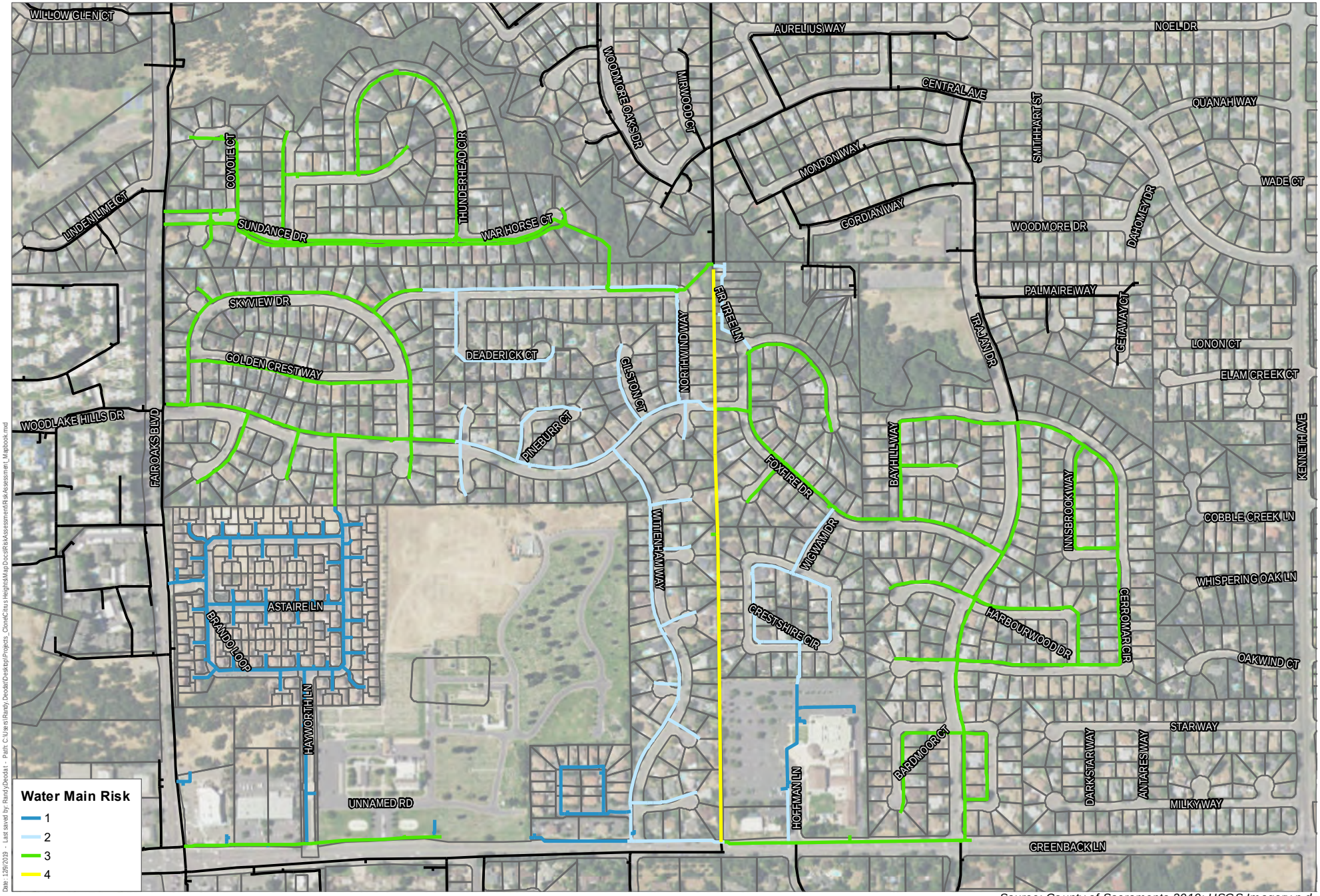
Appendix E Maps of Project Areas
Page 1 of 30

2040 - PA-8

Citrus Heights Water District Water Main Risk Overview



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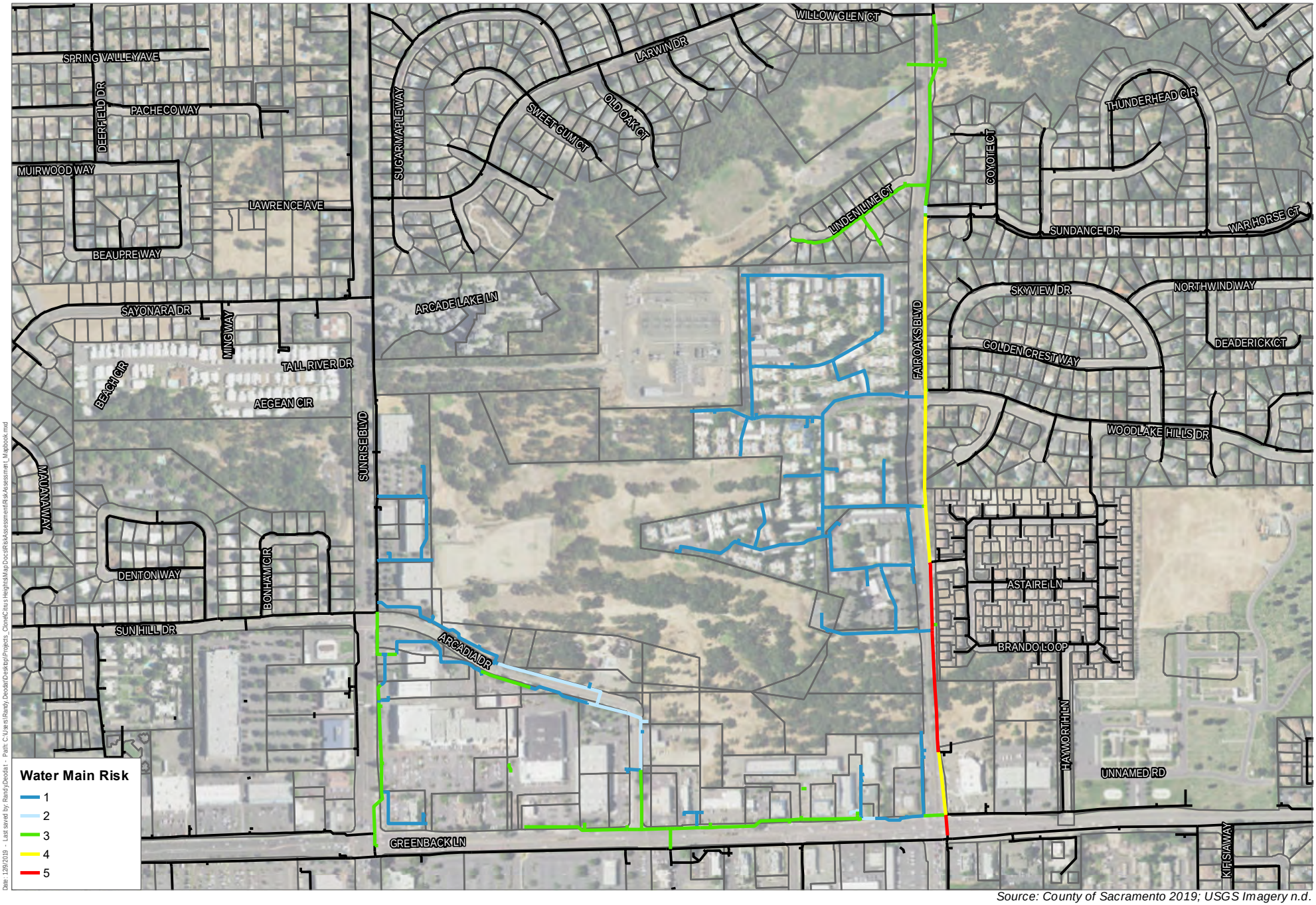
2040 - PA-9

Citrus Heights Water District Water Main Risk Overview



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Harris & Associates

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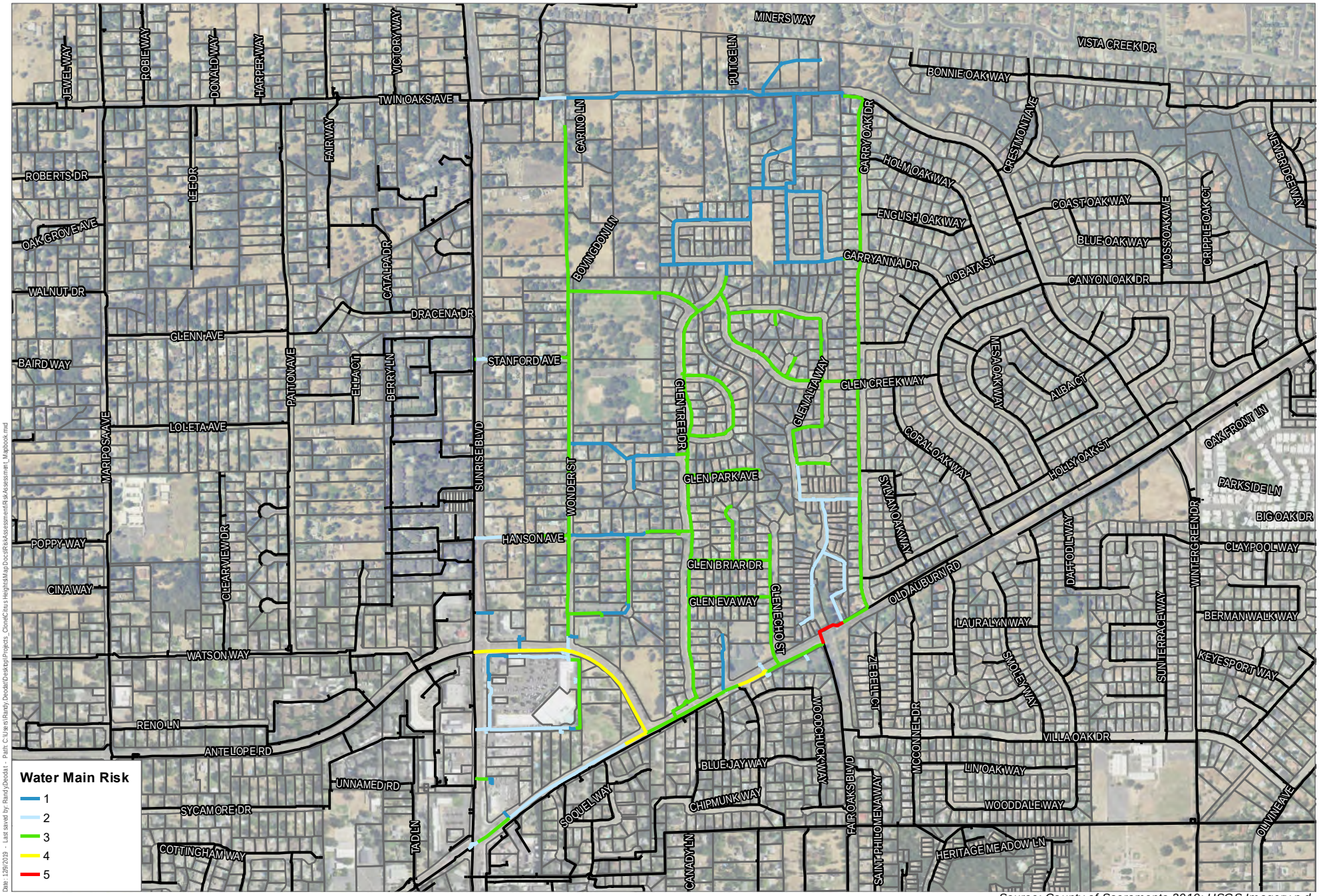
2040 - PA-10

Citrus Heights Water District Water Main Risk Overview



Source: County of Sacramento 2019; USGS Imagery n.d.

Harris & Associates

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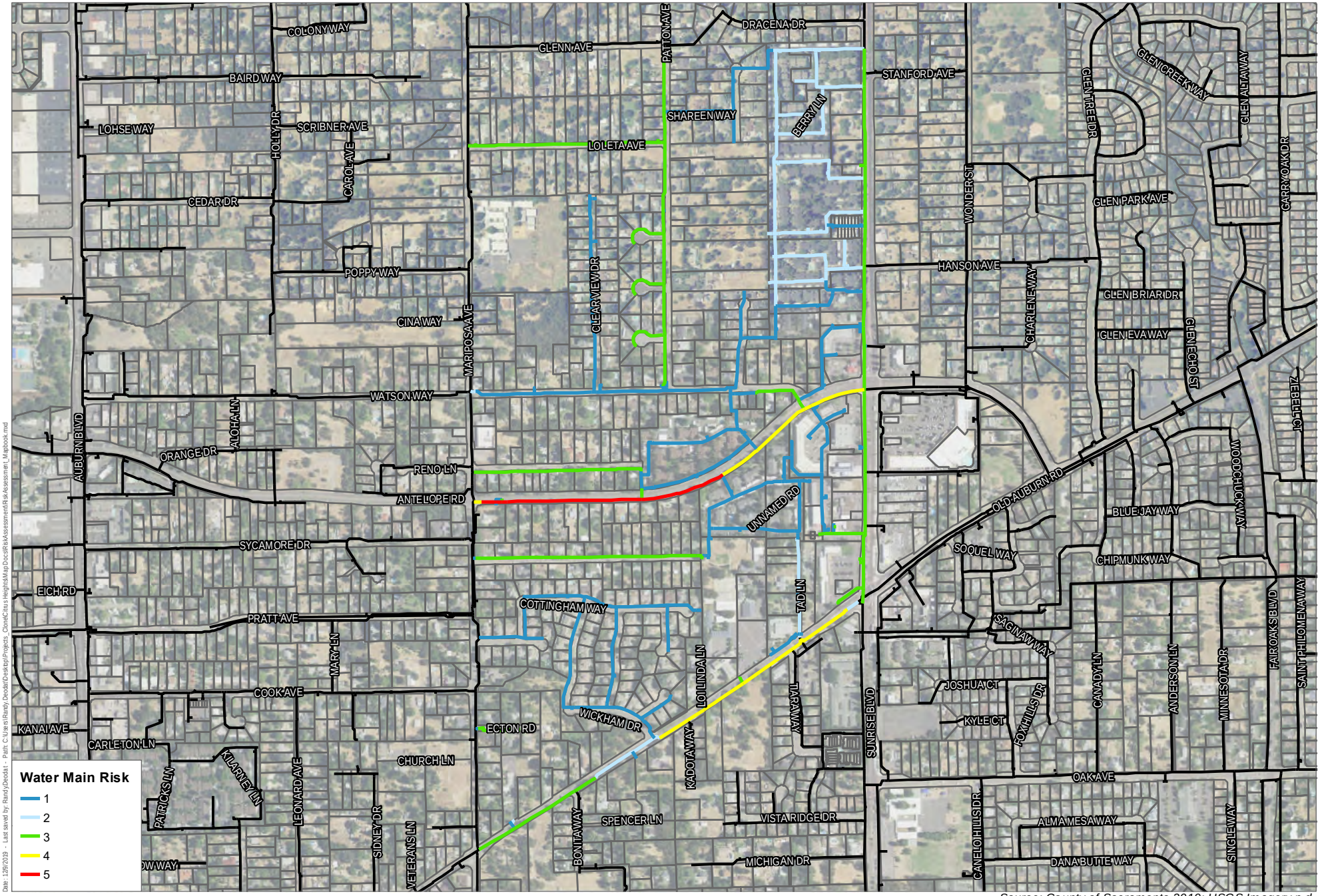
Appendix E Maps of Project Areas
Page 4 of 30

2040 - PA-24

Citrus Heights Water District Water Main Risk Overview



Source: County of Sacramento 2019; USGS Imagery n.d.

Harris & Associates

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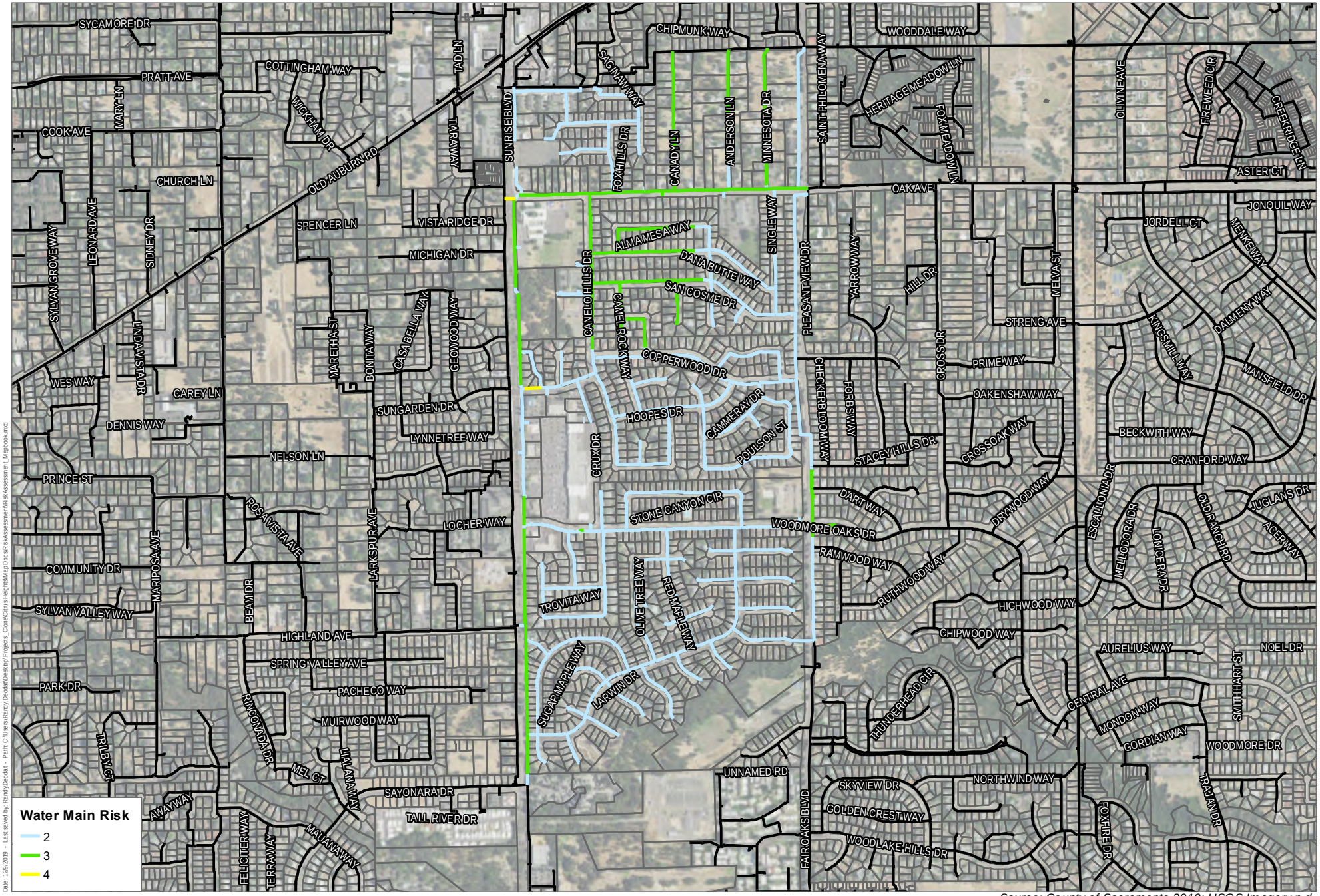
Appendix E Maps of Project Areas
Page 5 of 30

2040 - PA-25

Citrus Heights Water District Water Main Risk Overview



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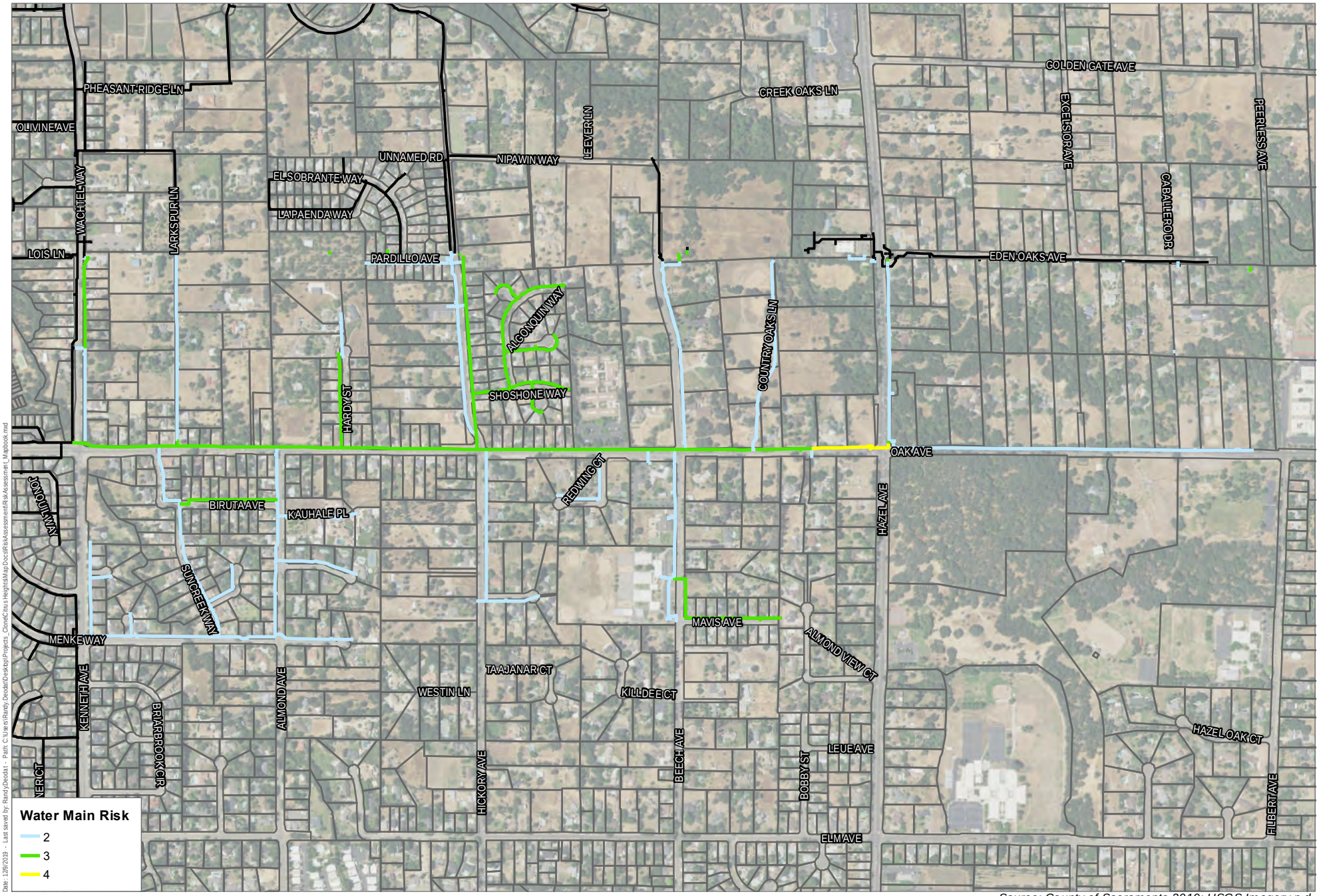
2050 - PA-15

Citrus Heights Water District Water Main Risk Overview



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Harris & Associates

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2050 - PA-18

Citrus Heights Water District Water Main Risk Overview

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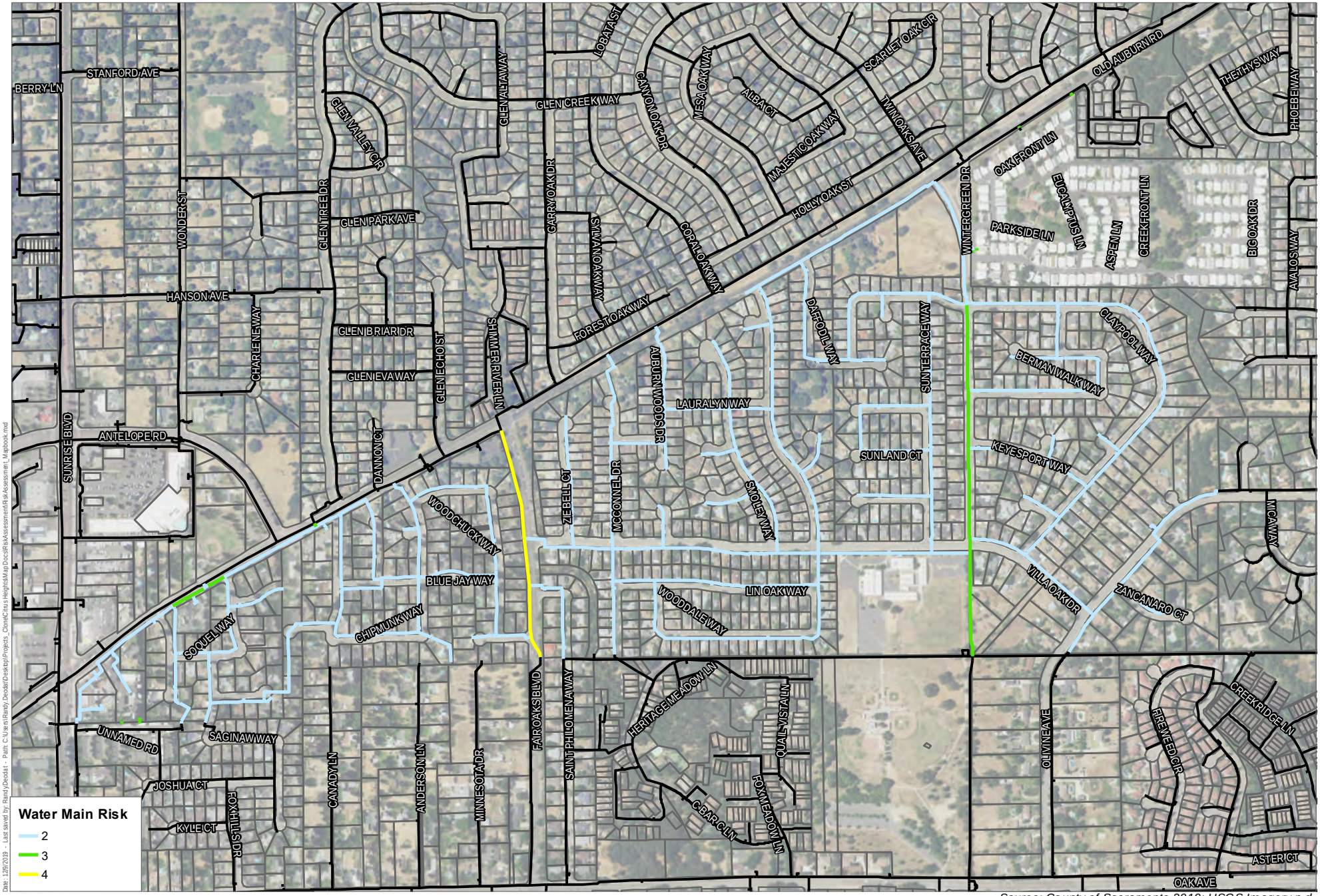
2050 - PA-20

Citrus Heights Water District Water Main Risk Overview



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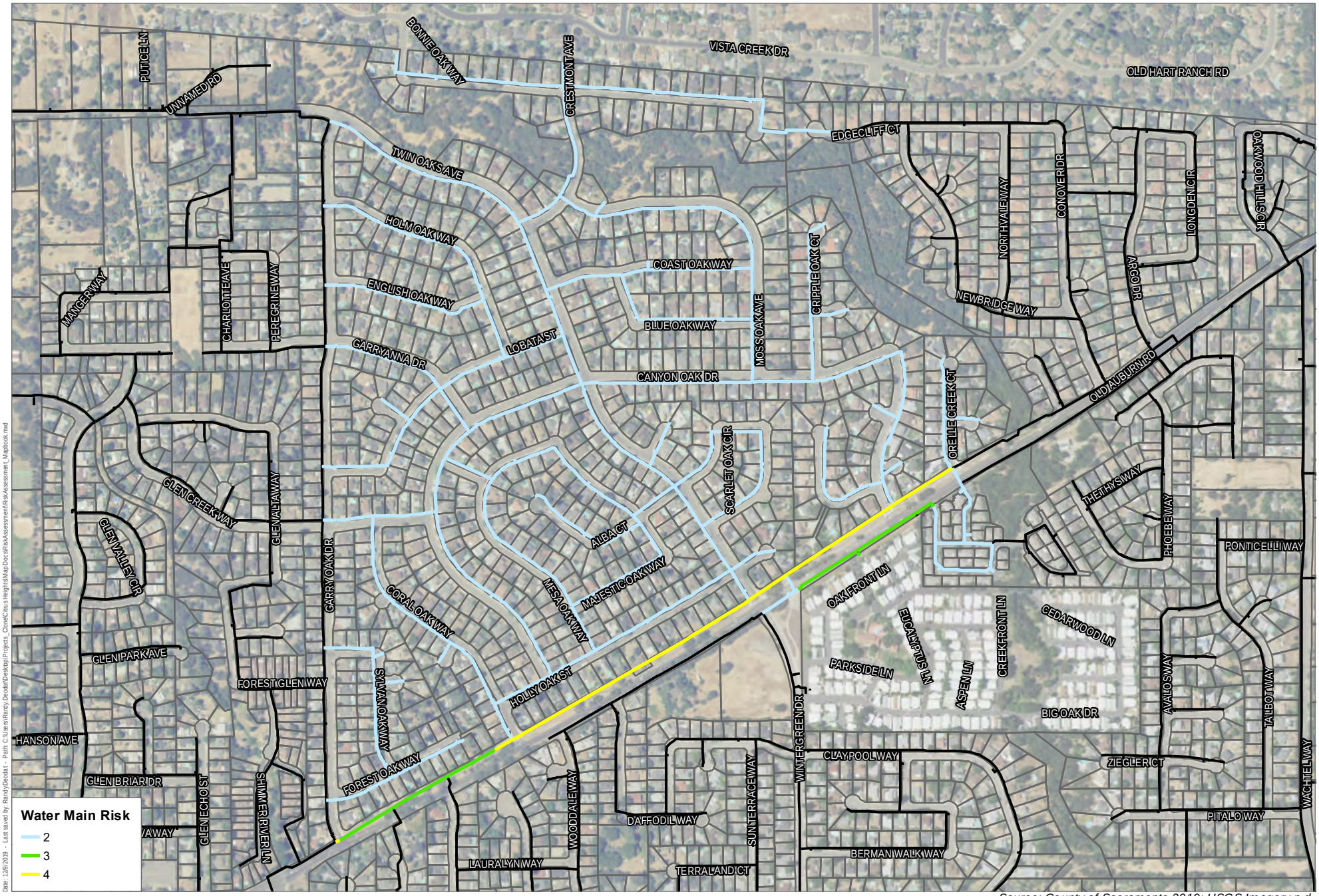
2050 - PA-22

Citrus Heights Water District Water Main Risk Overview



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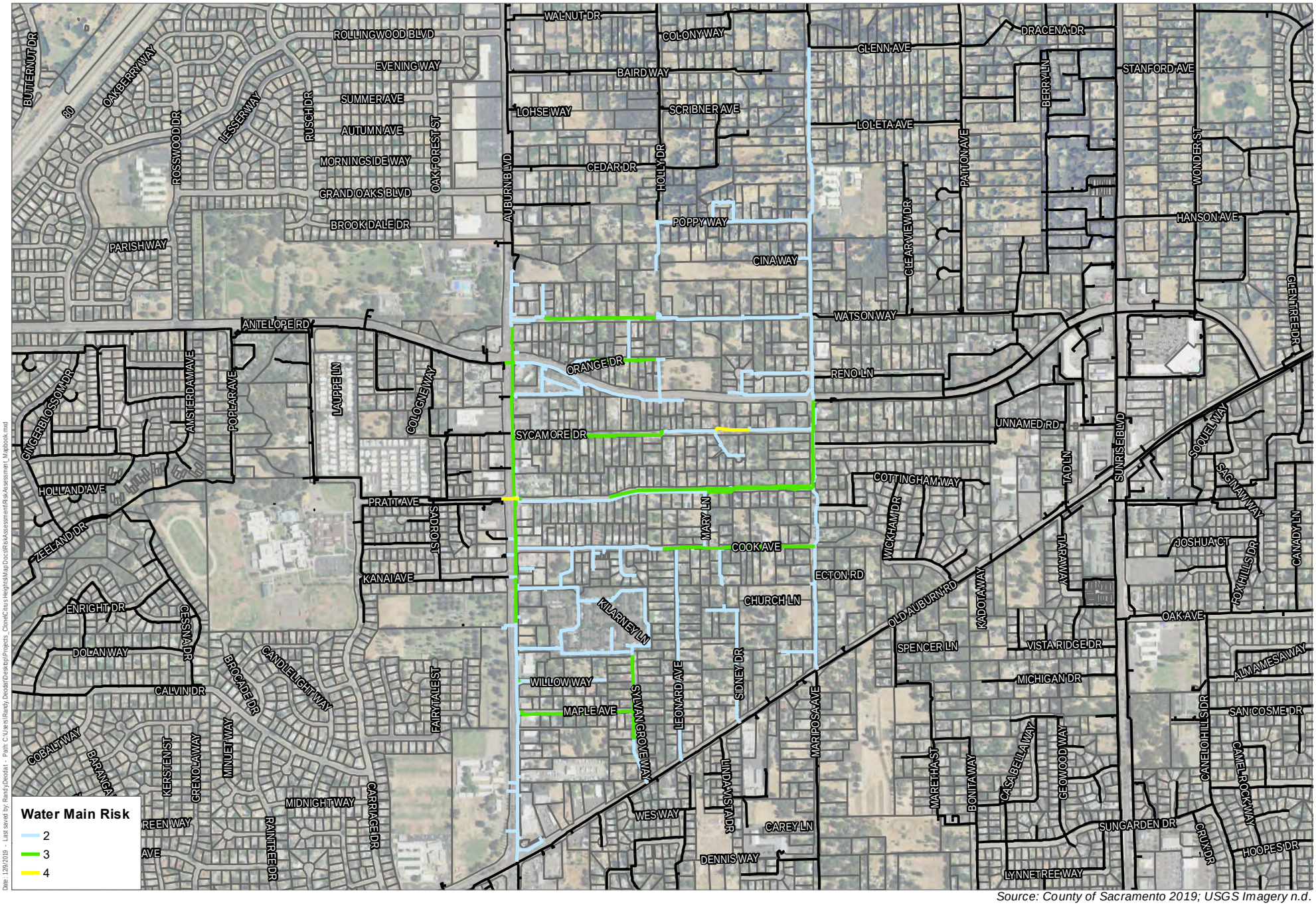
2050 - PA-23

Citrus Heights Water District Water Main Risk Overview



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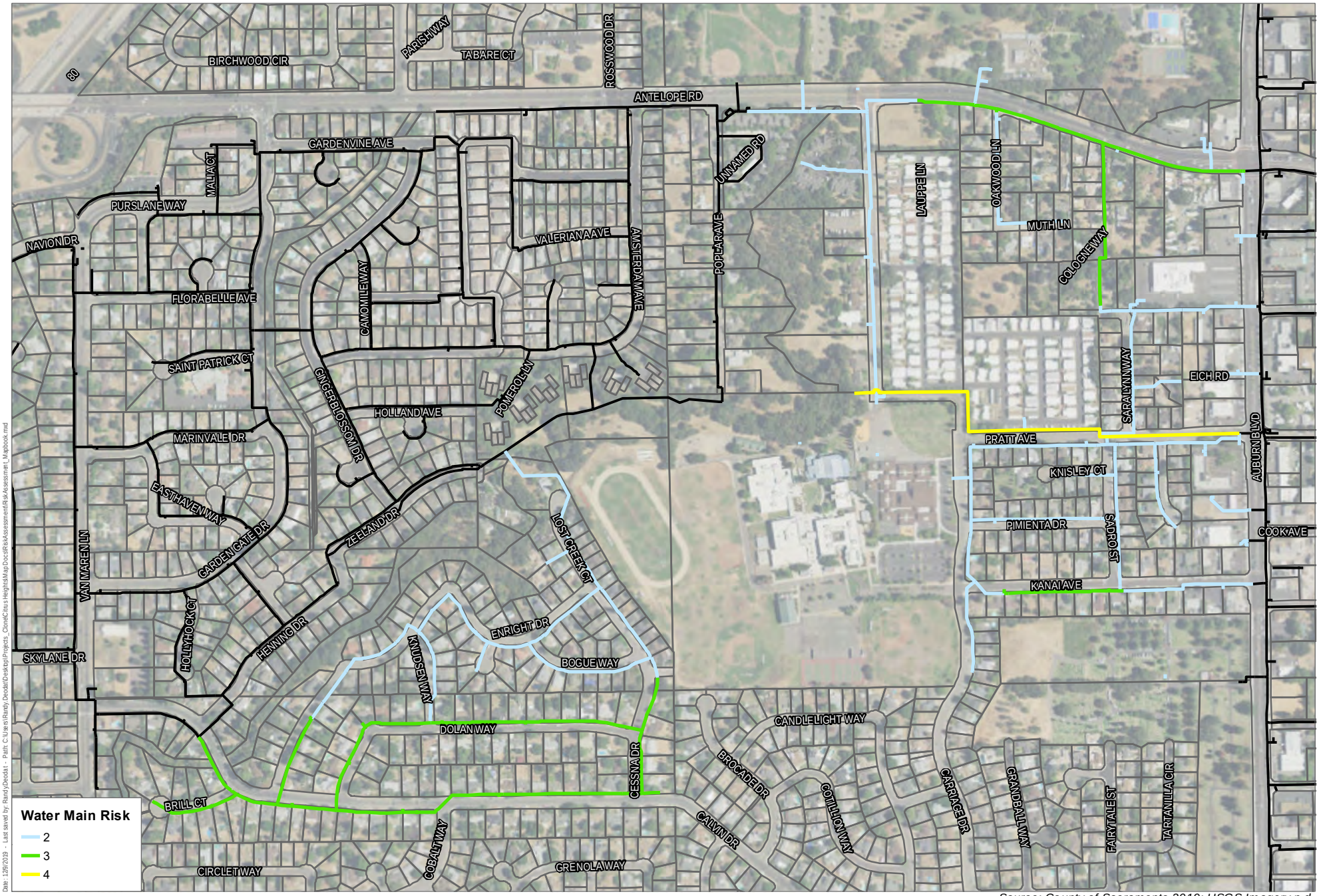
2050 - PA-26

Citrus Heights Water District Water Main Risk Overview



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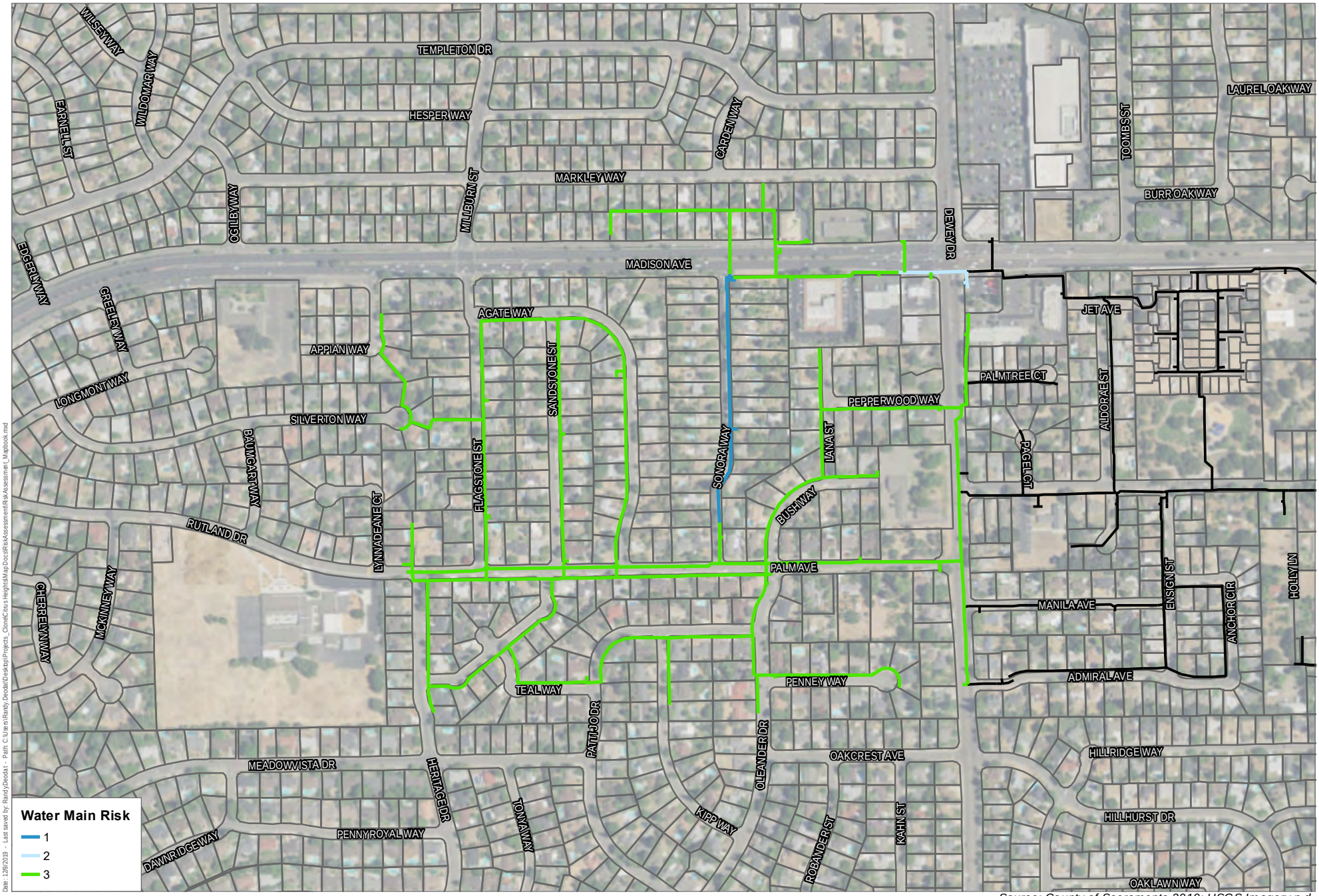
2050 - PA-27

Citrus Heights Water District Water Main Risk Overview



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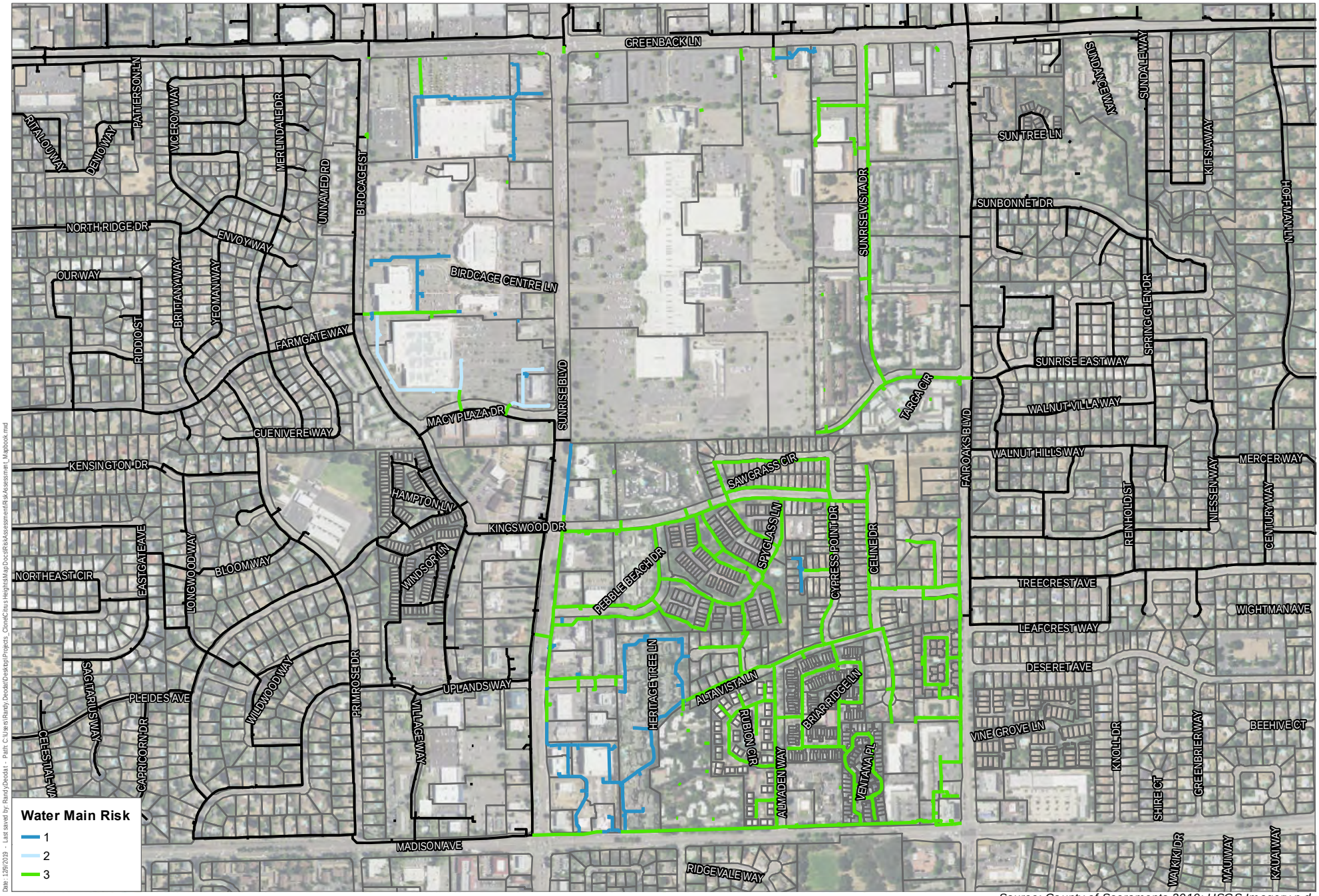
2060 - PA-1

Citrus Heights Water District Water Main Risk Overview



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Appendix E Maps of Project Areas
Page 14 of 30

2060 - PA-6

Citrus Heights Water District Water Main Risk Overview

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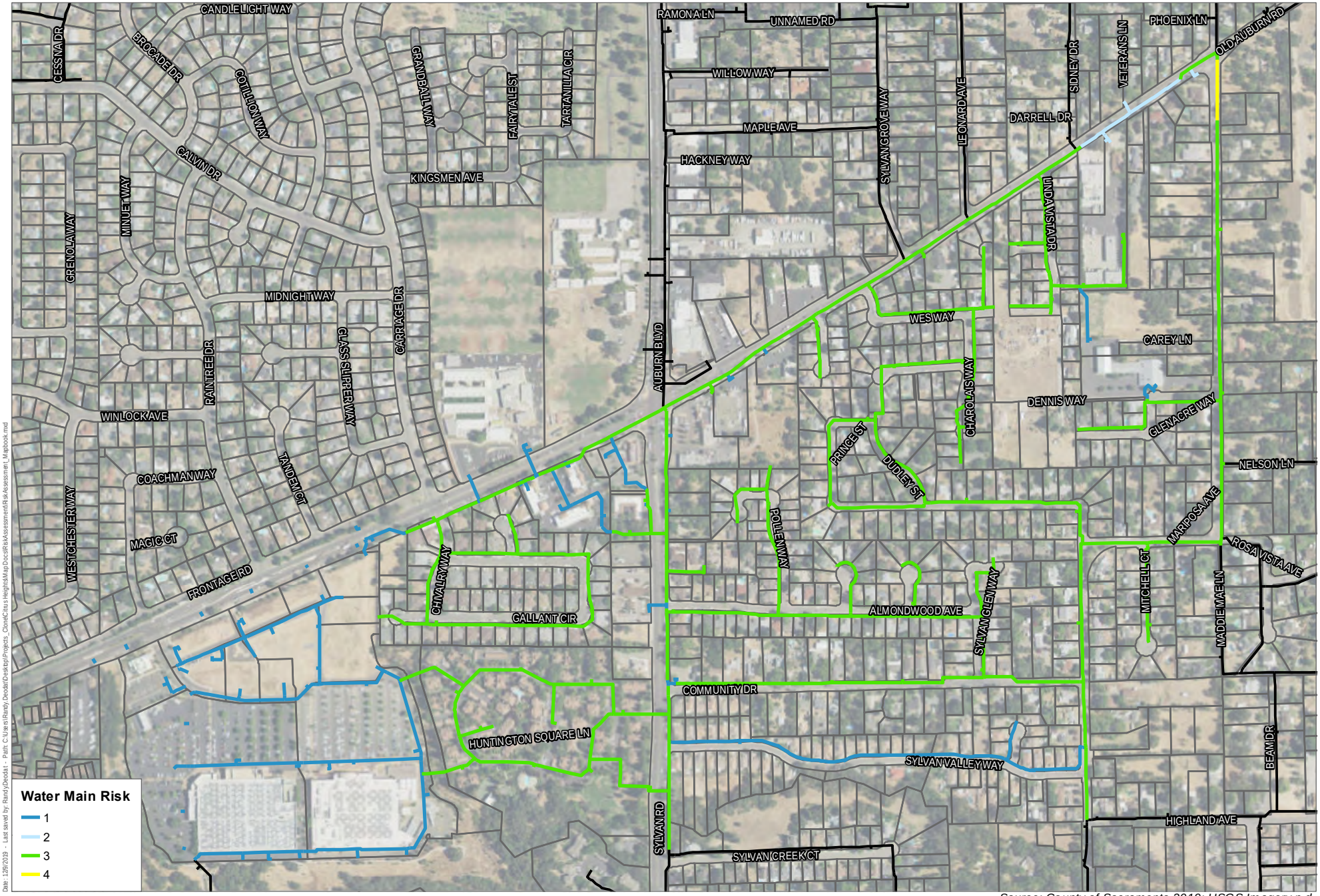

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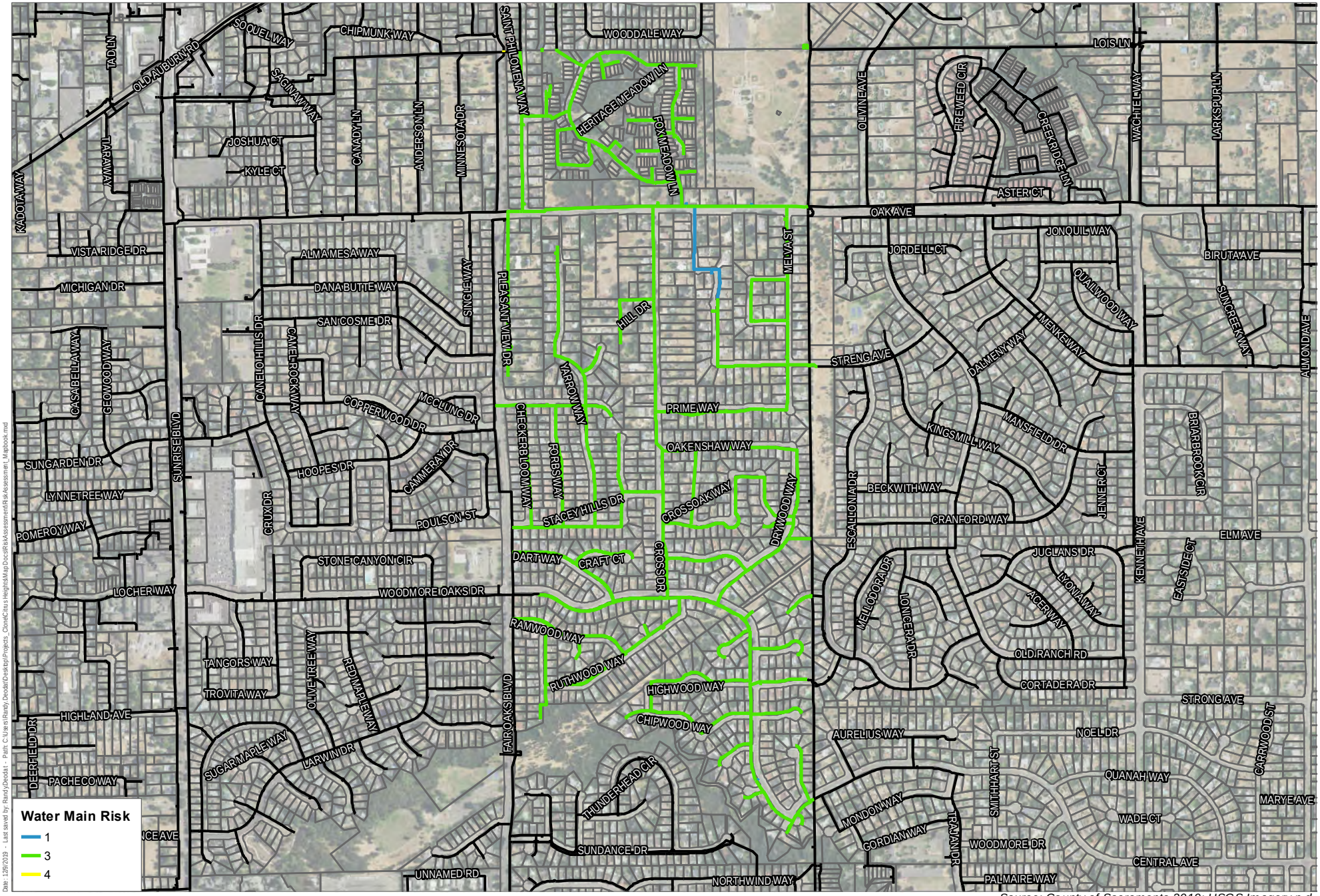
2060 - PA-13

Citrus Heights Water District Water Main Risk Overview



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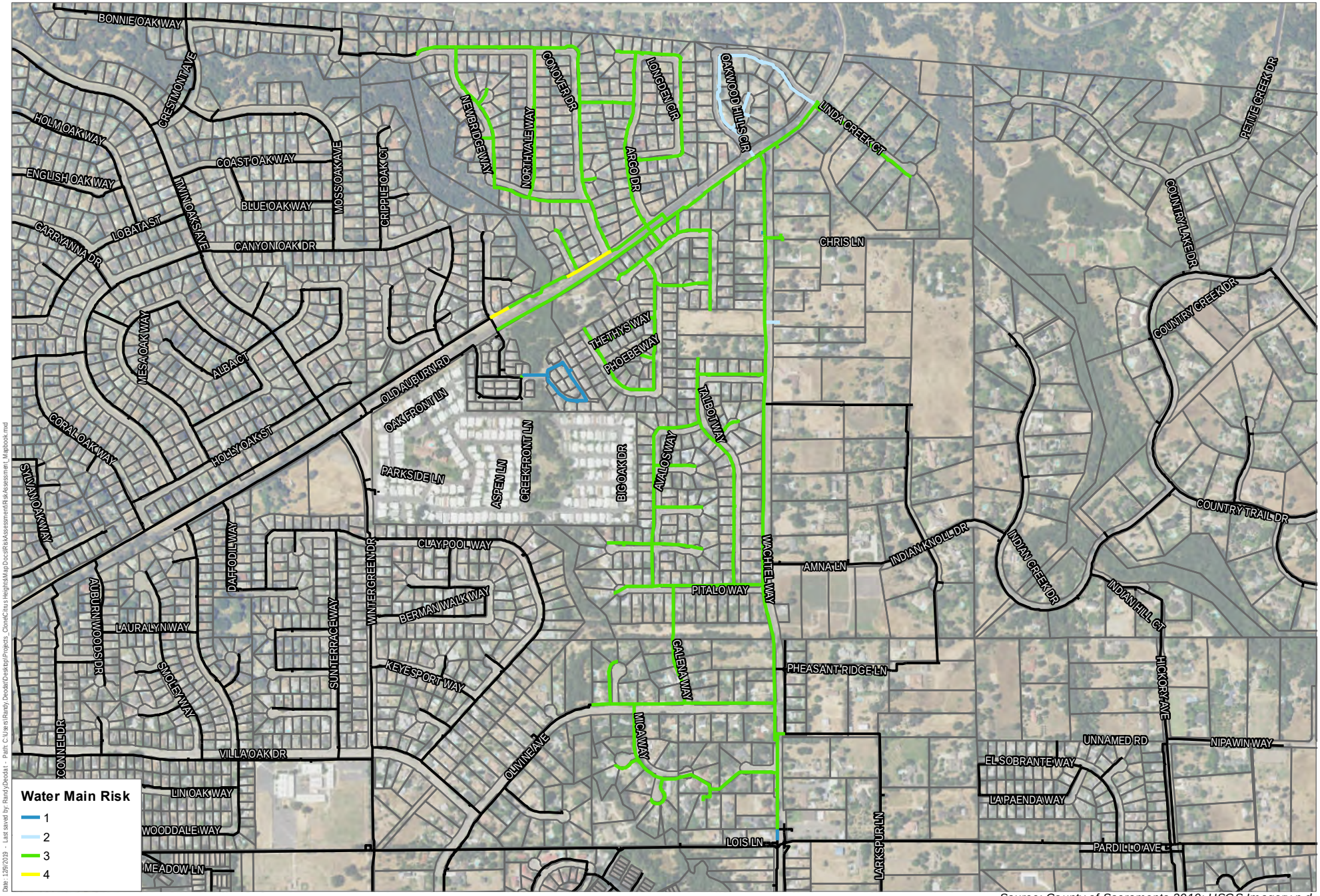
2060 - PA-16

Citrus Heights Water District Water Main Risk Overview



Source: County of Sacramento 2019; USGS Imagery n.d.

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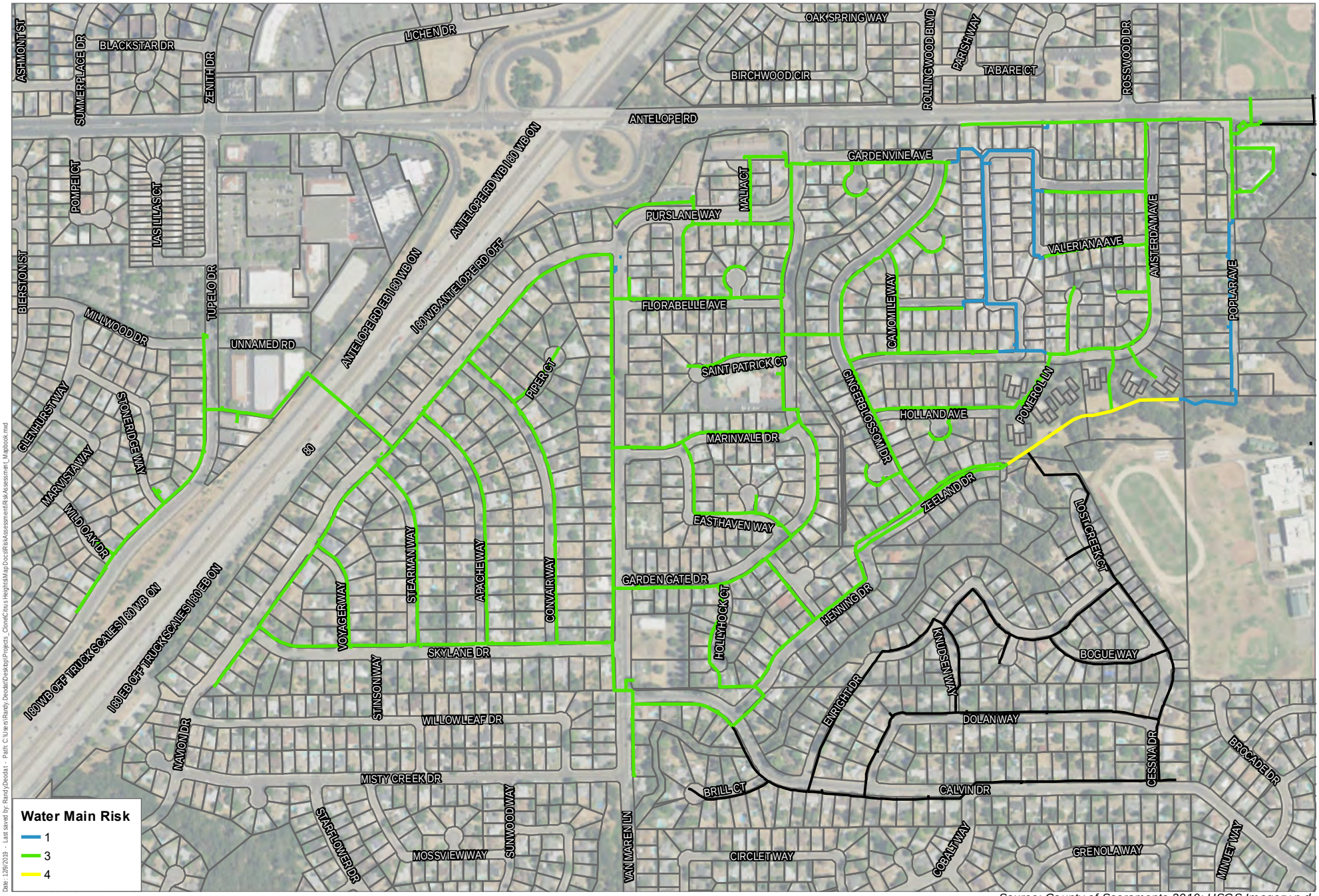
Appendix E Maps of Project Areas
Page 17 of 30

2060 - PA-21

Citrus Heights Water District Water Main Risk Overview



Source: County of Sacramento 2019; USGS Imagery n.d.

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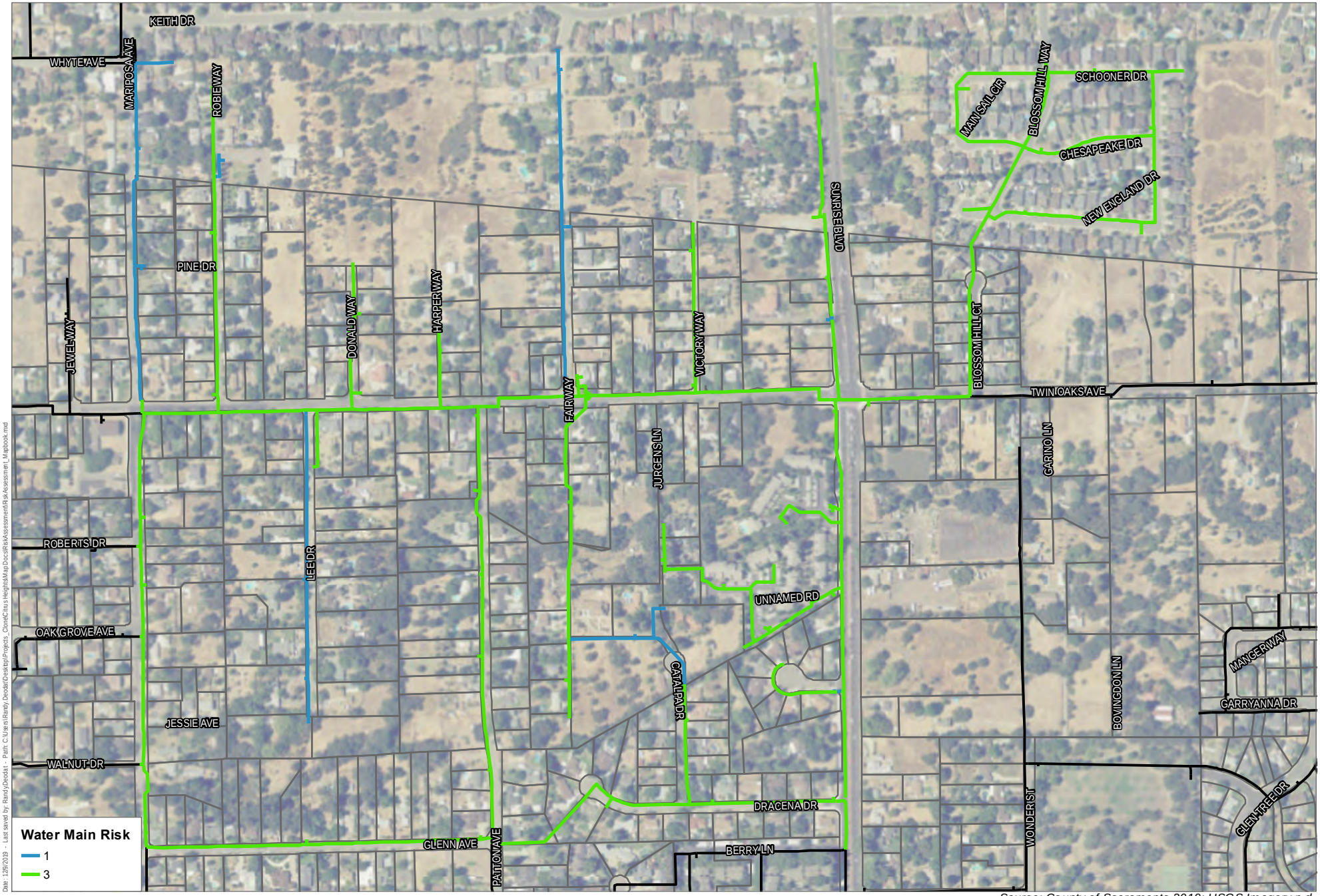
Appendix E Maps of Project Areas
Page 18 of 30

2060 - PA-28

Citrus Heights Water District Water Main Risk Overview



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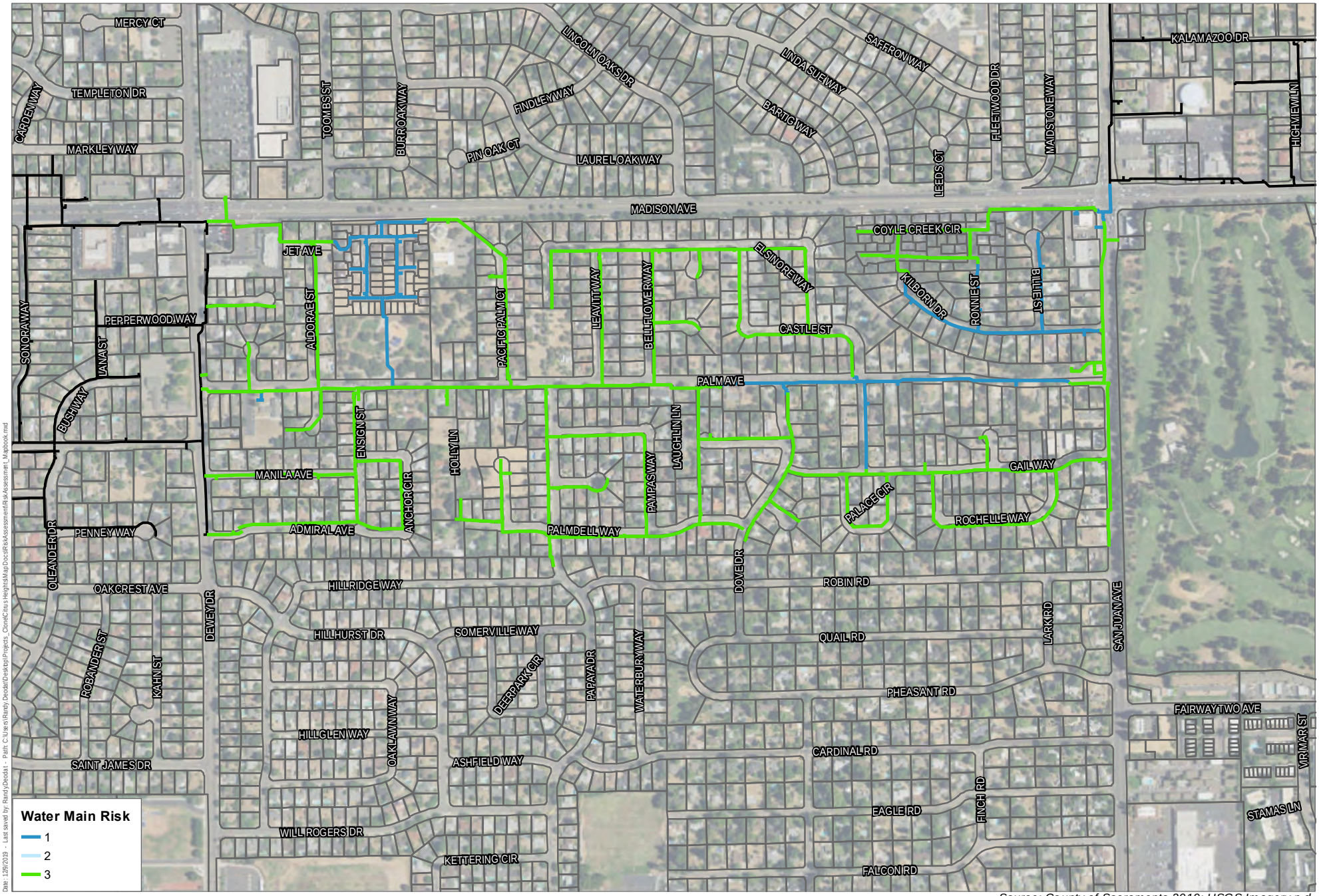
2060 - PA-30

Citrus Heights Water District Water Main Risk Overview



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Appendix E Maps of Project Areas
Page 20 of 30

2070 - PA-2

Citrus Heights Water District Water Main Risk Overview

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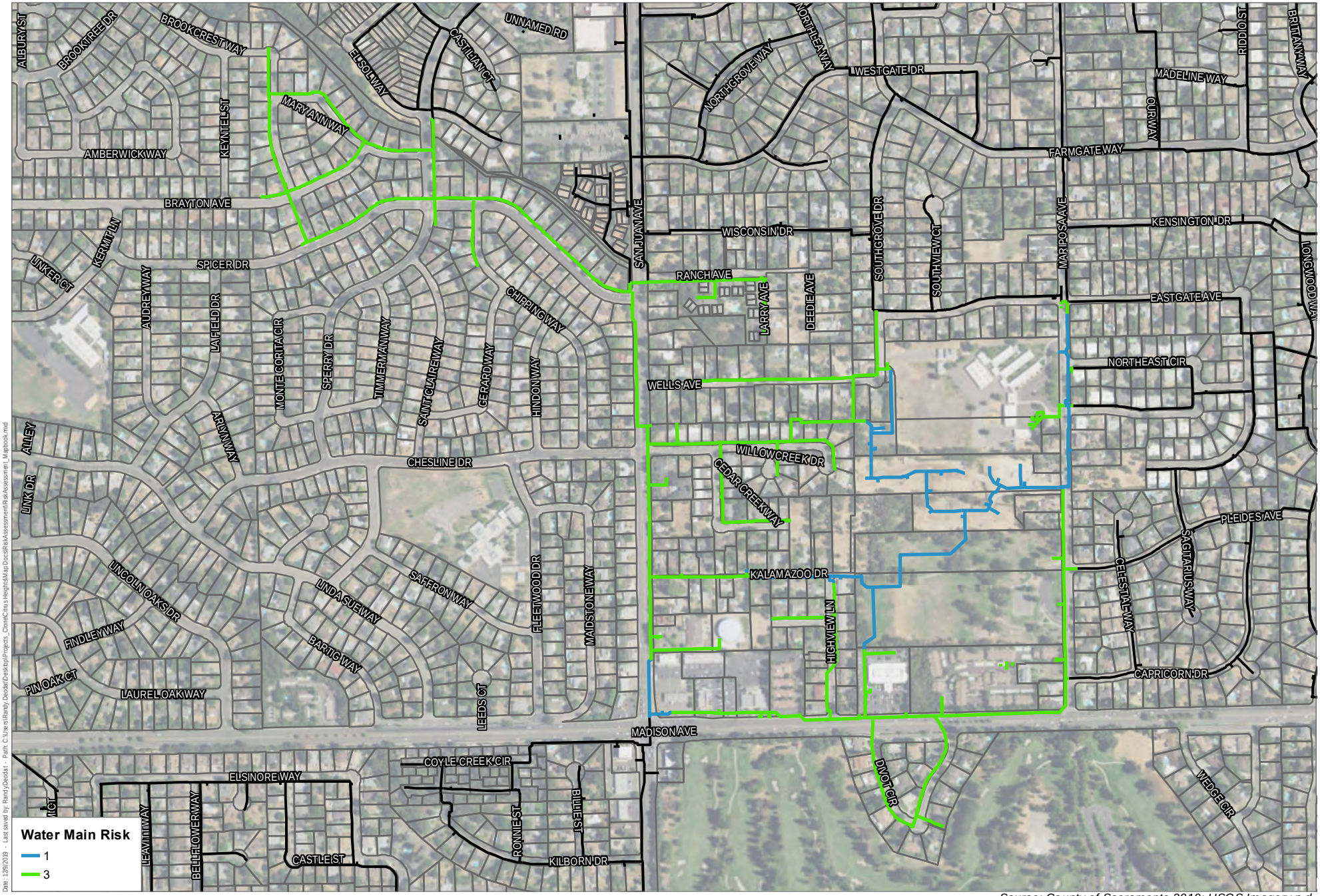

Source: County of Sacramento 2019; USGS Imagery n.d.

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Appendix E Maps of Project Areas
Page 21 of 30

2070 - PA-3

Citrus Heights Water District Water Main Risk Overview

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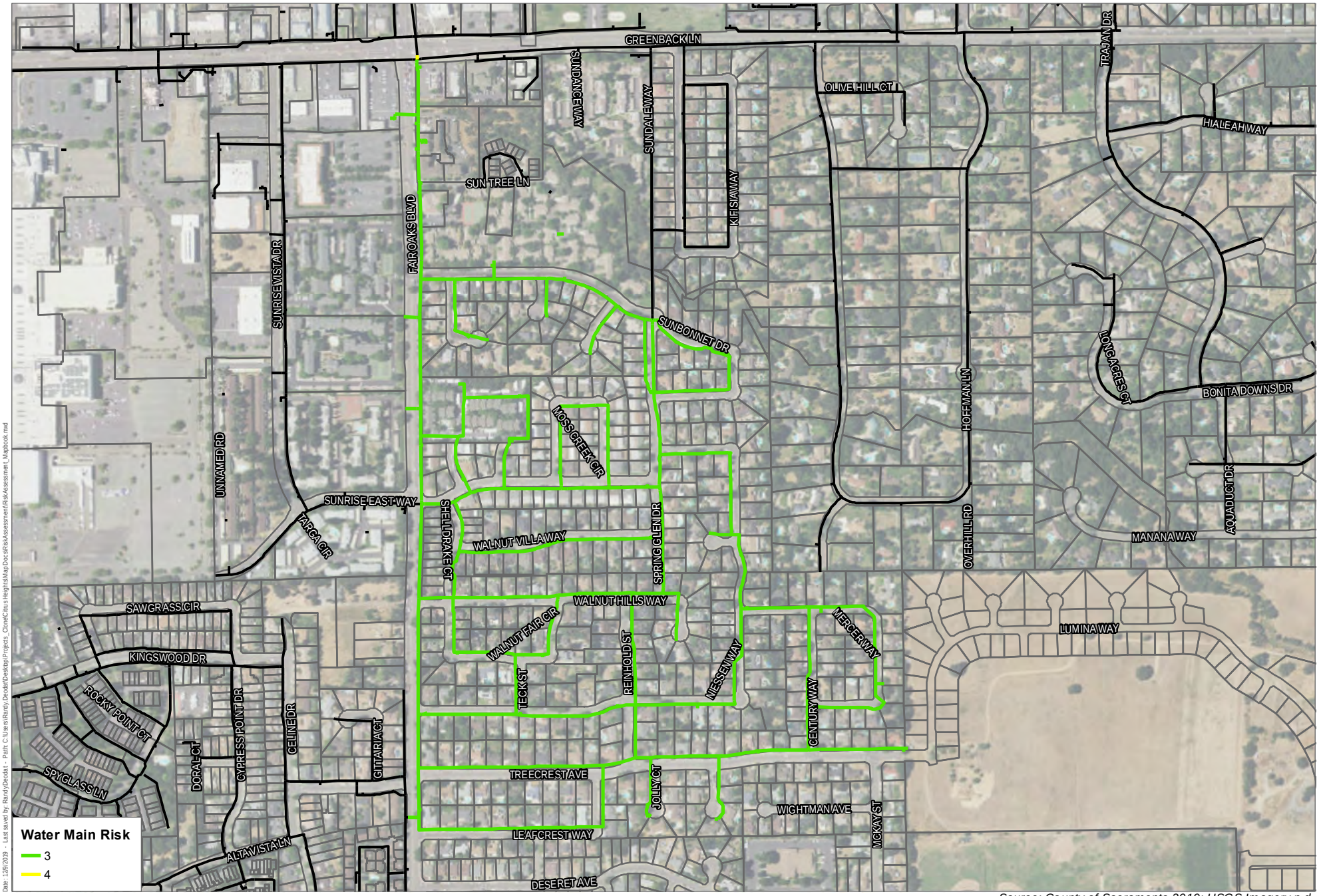

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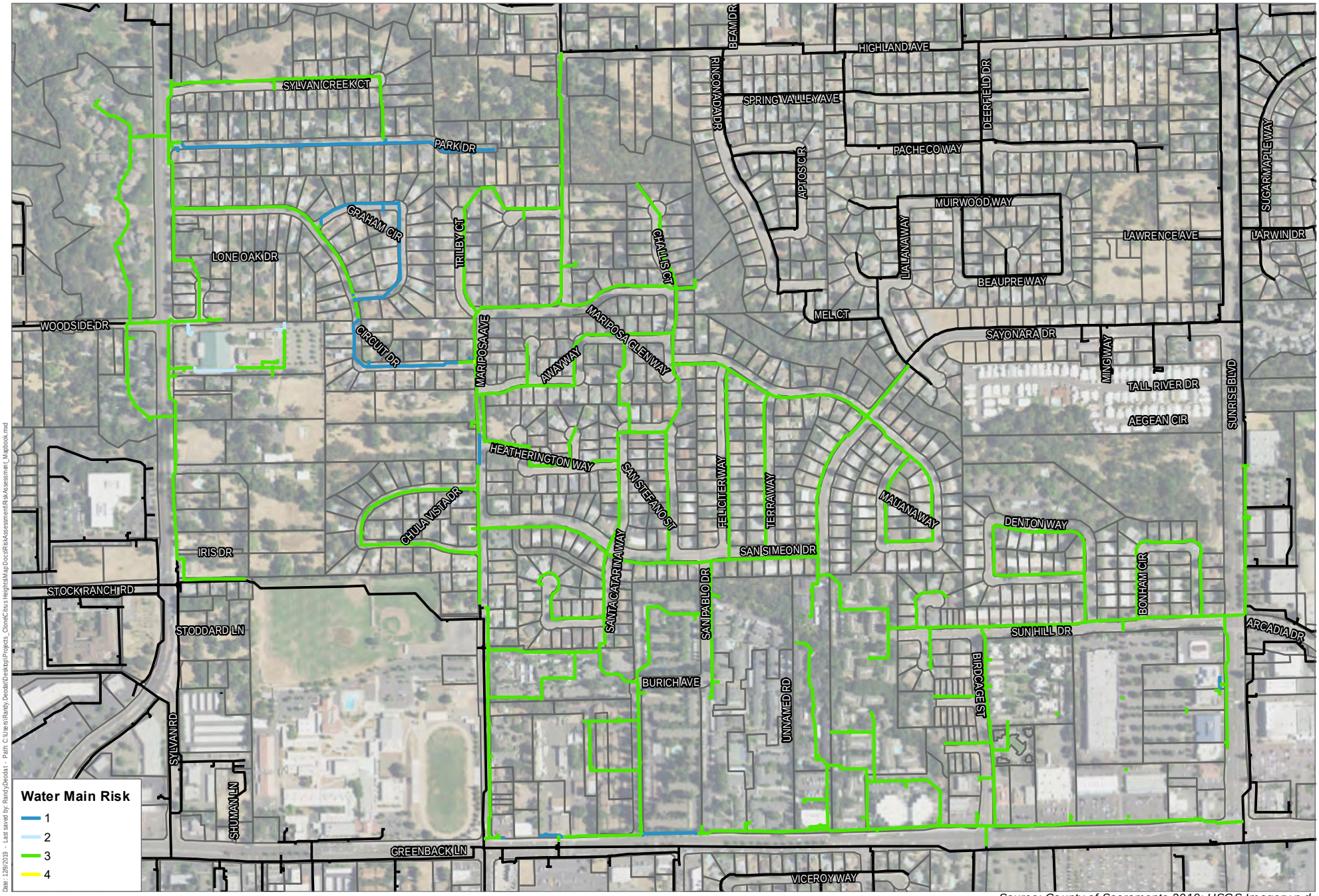
2070 - PA-7

Citrus Heights Water District Water Main Risk Overview



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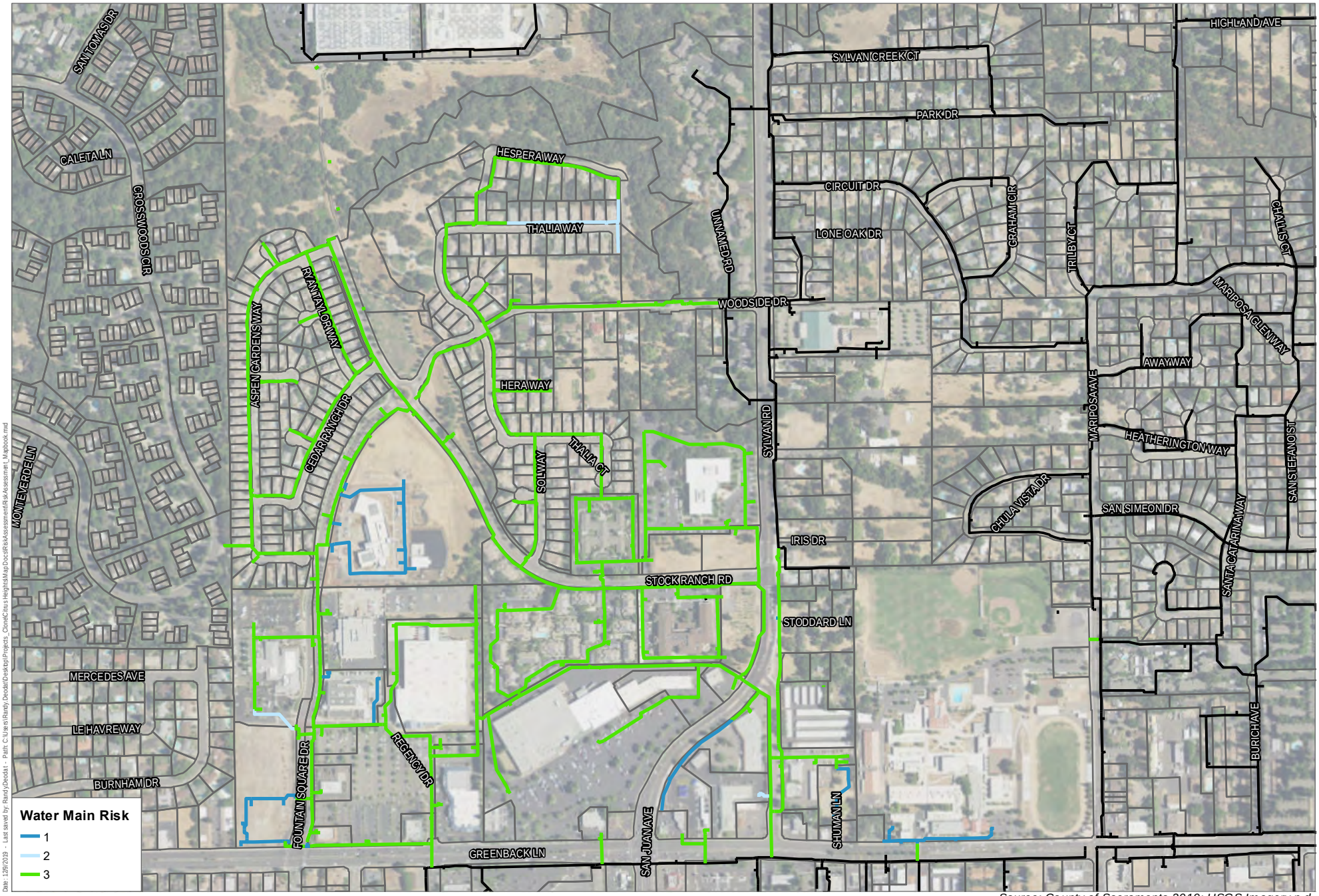
2070 - PA-11

Citrus Heights Water District Water Main Risk Overview



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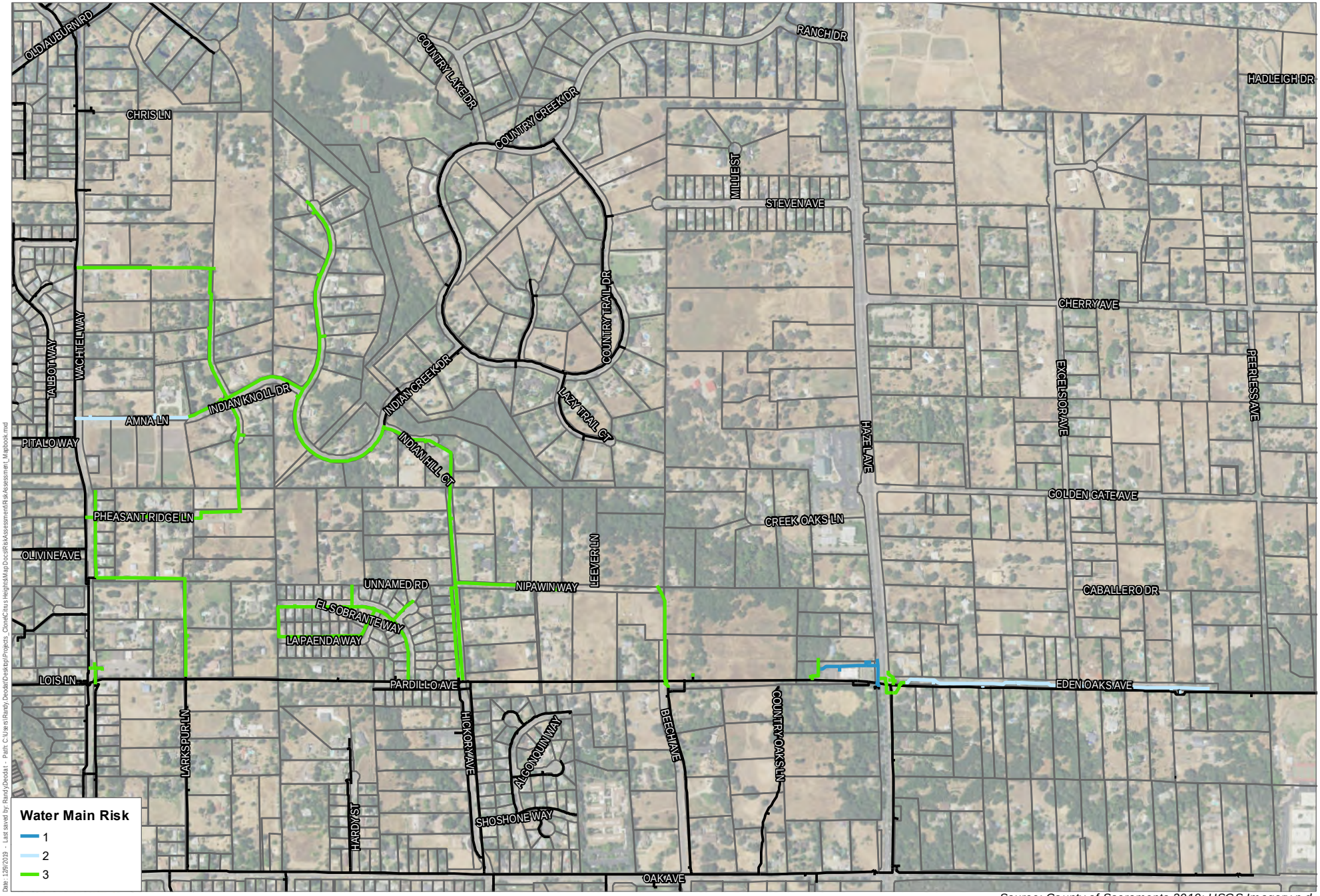
2070 - PA-12

Citrus Heights Water District Water Main Risk Overview



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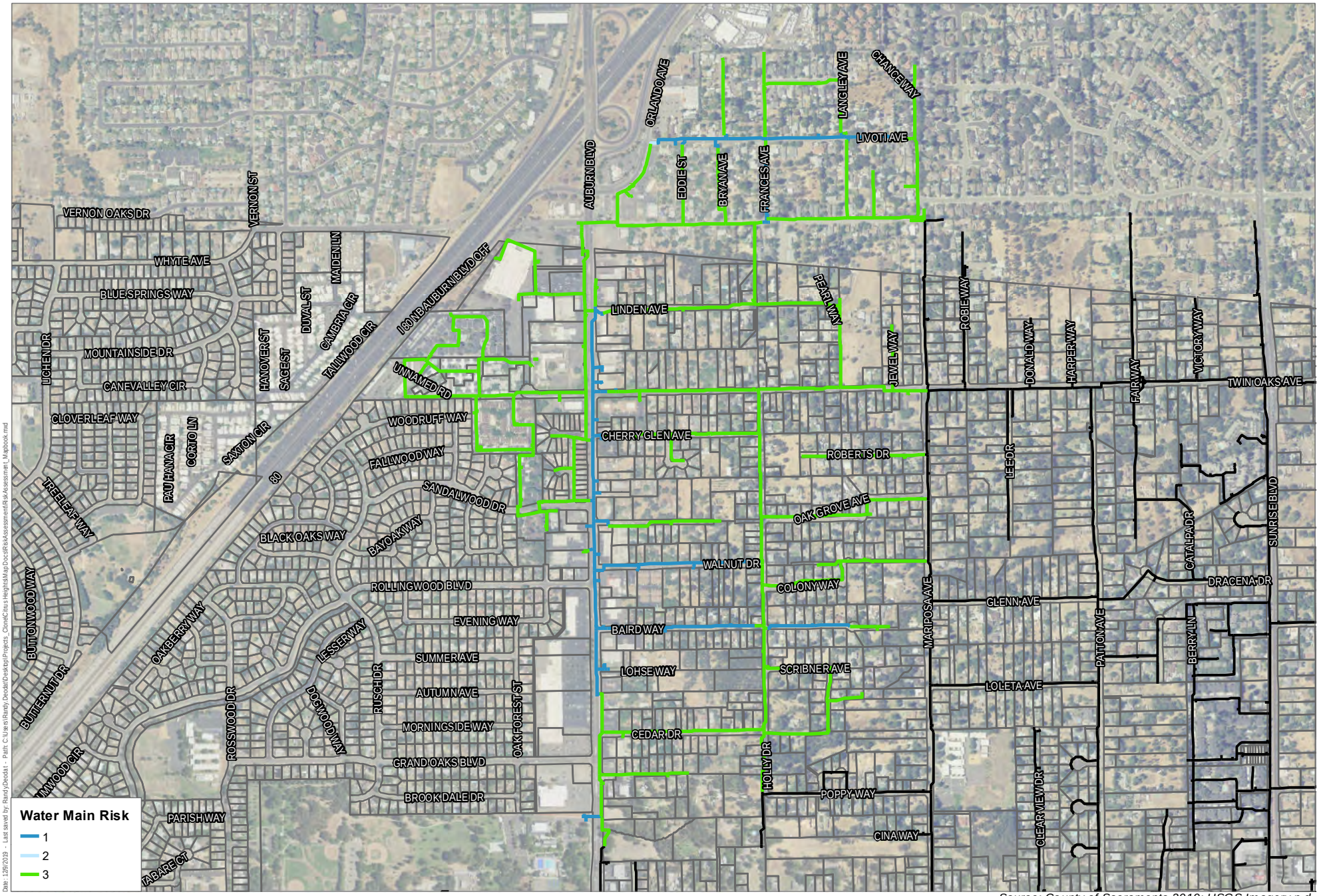
2070 - PA-19

Citrus Heights Water District Water Main Risk Overview



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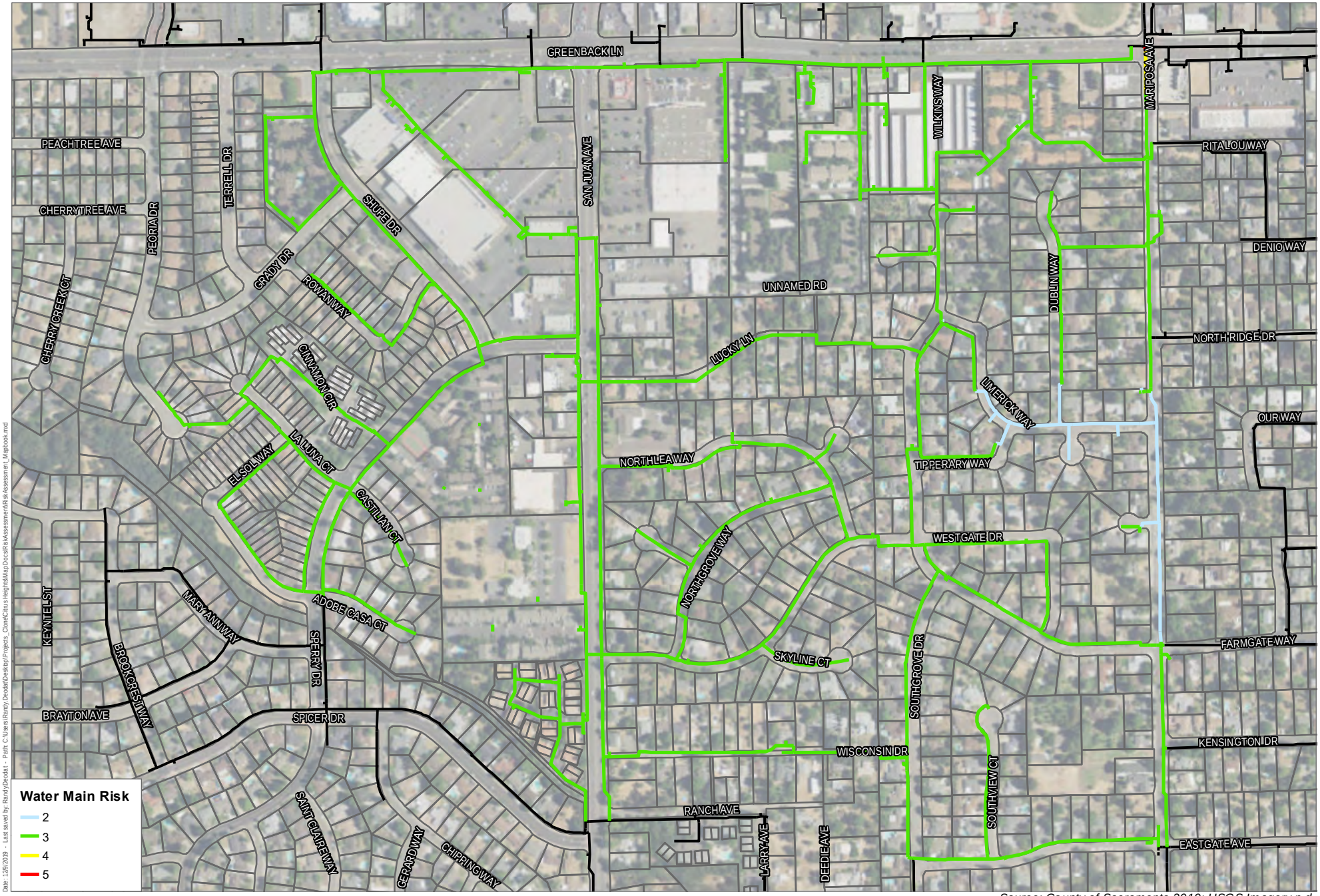
2070 - PA-29

Citrus Heights Water District Water Main Risk Overview



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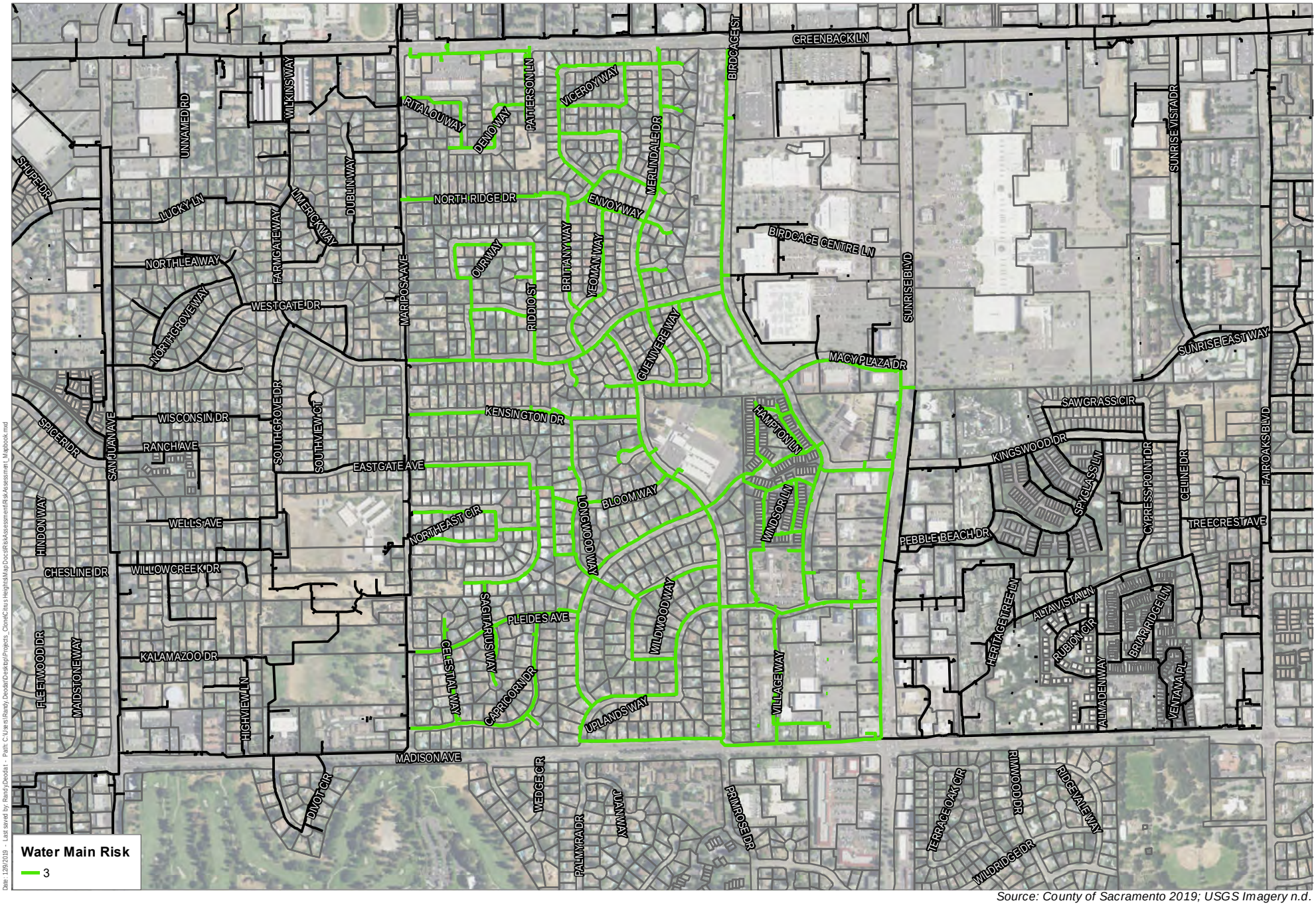
2080 - PA-4

Citrus Heights Water District Water Main Risk Overview



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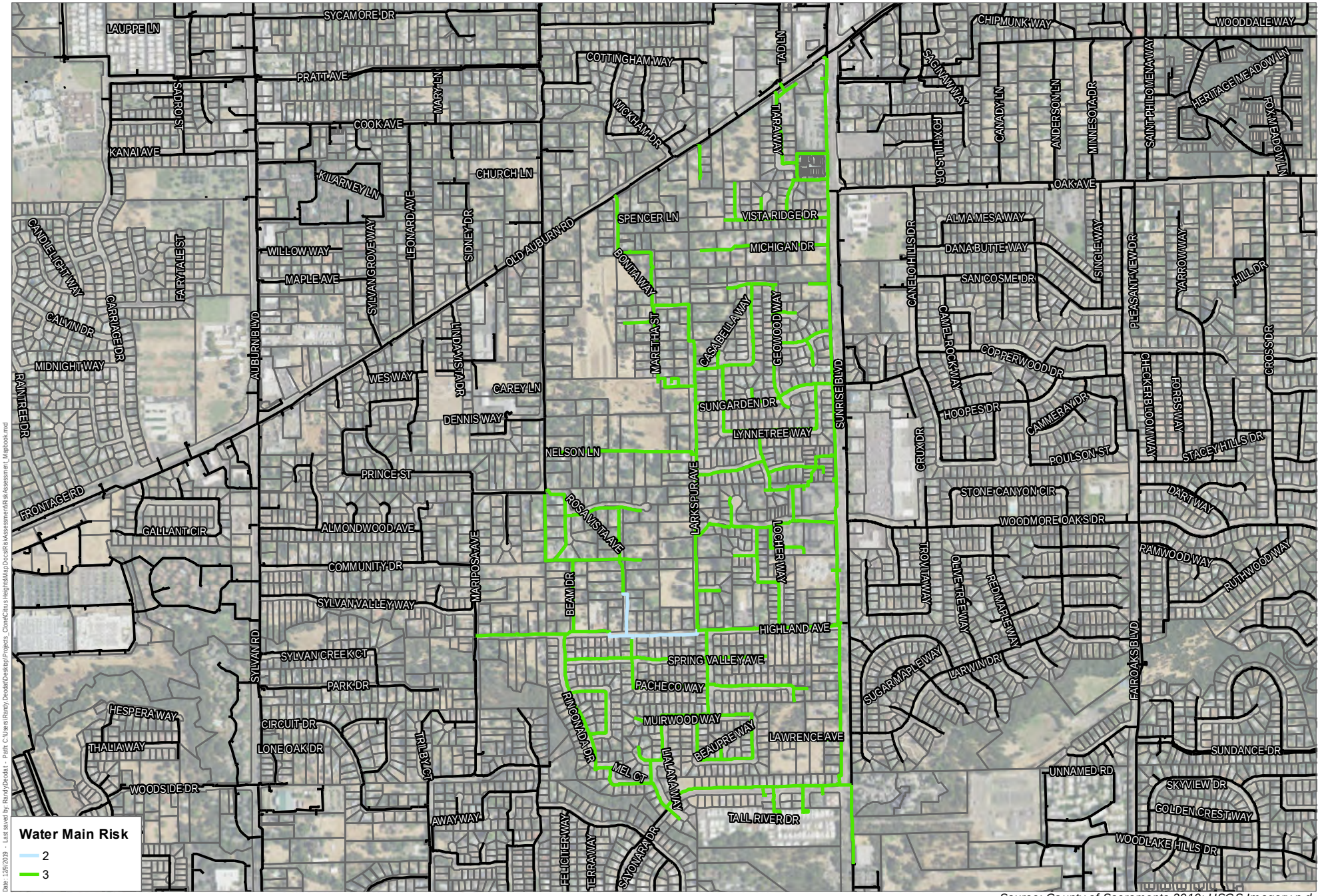
2080 - PA-5

Citrus Heights Water District Water Main Risk Overview



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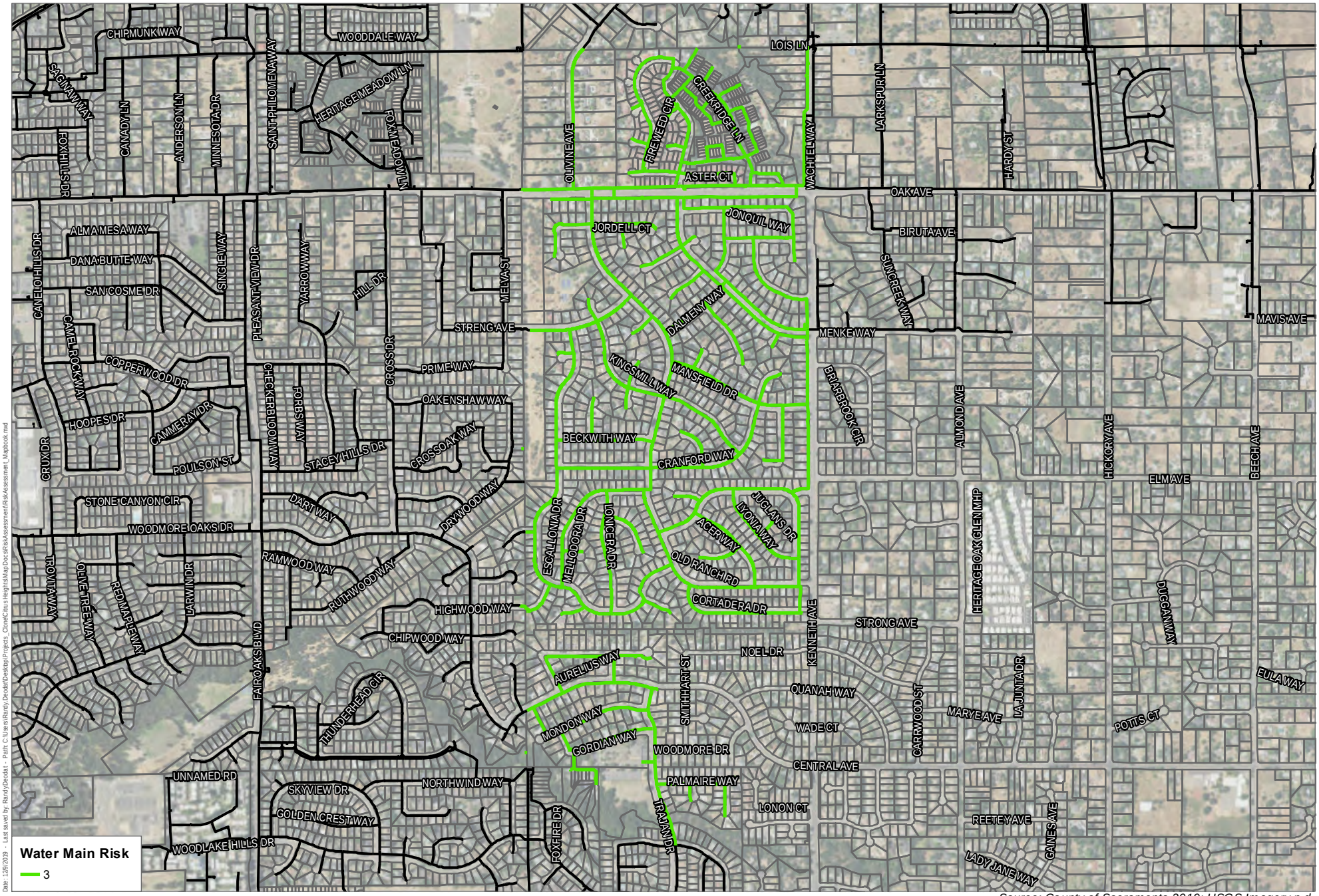
2080 - PA-14

Citrus Heights Water District Water Main Risk Overview



Source: County of Sacramento 2019; USGS Imagery n.d.

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2080 - PA-17

Citrus Heights Water District Water Main Risk Overview

Appendix F. Project Preparation Summary

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Project Preparation (2021-2029)
Summary

Project Preparation (2021-2029) - Action List

Task No.	Task/SubTasks	Start Date/Frequency	Lead	Comments
1	**Re-engage the Customer Advisory Committee (CAC) & present the updated Alternative. Discuss next steps.**	2021	CHWD (Communications & Public Engagement)	Obtain confirmation of the updated Alternative.
2	**Present Report & CAC Selected Alternative to the Board**	2021	CHWD/CAC	CAC to participate in the presentation to the Board.
3	**Board to Consider Adoption of the Project 2030 Study, which includes Alternative 5.4 as the strategy for the replacement of water mains**	2021	CHWD Board of Directors	Board to provide direction on pre-funding method.
4	**Board to provide consensus direction concerning Alternative 5.4 funding target**	2021	CHWD Board of Directors	Board to provide consensus direction on funding target.
5	**If Task No. 3 is adopted, prepare Prop 218 for Surcharge/Pre-funding**	2021	CHWD (Finance)/Legal	Annually verify Surcharge/Pre-funding is being allocated to the Water Main Replacement Reserve.
6	**Prepare Policy (or Amendment) to transfer Surcharge/Pre-funding to Water Main Replacement Reserve**	2021	CHWD (Finance)/Legal	Annually verify Surcharge/Pre-funding is being allocated to the Water Main Replacement Reserve.
7	**Begin Pre-funding Implementation (if adopted)**	2022/Annually	CHWD (Finance)	Billing to be prepared to provide line item on customers water bill.
8	**If Task No. 3 is adopted, Board to direct CHWD to develop a communication and public engagement strategy supporting the adoption and implementation of Alternative 5.4**	2021	CHWD Board of Directors	
	Provide CAC Communication regarding Project 2030	2021-2030	CHWD (Communications & Public Engagement)	Occasional updates (Quarterly/Annually as necessary)
	Provide education and public engagement regarding Project 2030	2021-2030	CHWD (Communications & Public Engagement)	Outreach to highlight Project 2030 and the benefits
9	**Refine Asset Management Model**	2025 and then every 3-5 Years	CHWD (Engineering)	CHWD Engineering to update the asset model as necessary to be consistent with the District goals.
	Clarify Risk Grading	2025 and then every 3-5 Years	CHWD (Engineering)	
	Customization of Deterioration Curves	2025 and then every 3-5 Years	CHWD (Engineering)	
	Integrate Economic Modeling Features	2025 and then every 3-5 Years	CHWD (Engineering)	
	Periodically Update Model from GIS	2025 and then every 3-5 Years	CHWD (Engineering)	
10	**Coordinate Asset Management Model with the Hydraulic Model**	2025 and then every 3-5 Years	CHWD (Engineering)	CHWD Engineering to update the asset model to remain consistent with the District's hydraulic model.
	Determine/Validate Water Main Replacement Size	2025 and then every 3-5 Years	CHWD (Engineering)	
	Identify Opportunities for Realignment	2025 and then every 3-5 Years	CHWD (Engineering)	
	Identify Opportunities for Redundancy	2025 and then every 3-5 Years	CHWD (Engineering)	
	Complete Pressure Reduction Analysis	Prior to 2030	CHWD (Engineering)	
11	**Inspect Pipelines and Stream Crossings**	2021 and Annually	CHWD (Engineering)	
	Transmission Main Inspection	2021-2025	CHWD (Engineering)	Perform inspection (20% annually of Transmission Mains)
	Stream Crossing Inspection	2020-2023 (Structural) and Annually	CHWD (Engineering)	Initial Inspection occurred in 2020. Further structural inspection to occur in Project Preparation Phase. Routine Annual Inspections to occur.
12	**Perform Pre-design/Alternatives Analysis of Key Transmission & Distribution Mains**	2022-2029	CHWD (Engineering)	Review annual projects as shown in Phasing Plan and perform analysis on Key Transmission & Distribution Mains
13	**Update District Budgets to coincide with the level of Project 2030 Preparation**	2022-2029	CHWD (Finance/Engineering)	CHWD Finance to coordinate annual budgets with the various type of work to be performed in Project 2030.
14	**Coordinate Capital Planning with Other Jurisdictions**	2022-2029	CHWD (Engineering)	Contact local agencies (City of Citrus Heights, County of Sacramento, City of Roseville) to discuss capital projects (road, storm drain improvements). This task applies more towards the beginning of Project 2030.
15	**Monitor Key Trends in Water Utility Management**	2022-2029	CHWD (Engineering)	CHWD Engineering to continue to monitor trends in AWWA and adjust the Project 2030 planning accordingly.

Appendix G. Field Inspection Program

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Field Inspection Program

Section 1 Purpose

The purpose of the Field Inspection Program (FIP) is to assist the Citrus Heights Water District (CHWD or District) in adding District-specific data to the Project 2030 – Water Main Replacement (Project 2030 or project) pipe replacement recommendations—specifically, to (1) identify District-specific main break and leak data to be collected to inform the asset management model and (2) guide targeted field inspections to justify pipeline replacement recommendations.

Section 2 Pipe Inventory Summary

Table 1 is the current system inventory by pipe type.

Table 1. System Inventory by Pipe Type

Pipe Type	Miles of Pipe	% of Total
ACP	156	62.4
PVC	60	24
DIP	17	6.8
CML	13	5.2
CMLC	2	0.8
DW	1	0.4
Unknown	1	0.4
Total	250	100

Notes: ACP = asbestos cement pipe; CML = cement mortar-lined; CMLC = cement mortar-lined and coated steel; DIP = cast/ductile iron pipe; DW = double walled; PVC = polyvinyl chloride

Table 2 is the current system inventory by decade of installation.

Table 2. System Inventory by Decade of installation

Decade of Installation	Miles of Pipe	% of Total
1950	19	7.6
1960	32	12.8
1970	88	35.2
1980	52	20.8
1990	16	6.4
2000	17	6.8
2010	12	4.8
Unknown	14	5.6
Total	250	100

Section 3 Collection of Main Break and Leak Data

The District currently collects information on main breaks and leaks and records it in its maintenance management system (Cityworks). Data has been logged in Cityworks by CHWD staff from 2004 to 2018. The break data was geocoded into ArcGIS from Cityworks, which provided high accuracy for break and leak locations. The number of breaks and leaks can be quantified as approximately a dozen per year. Analysis of the breaks and leaks indicates that most (75 percent) reside on service lines to customers and not on distribution system pipes.

No sufficient data exists at this time to predict pipe survival probability. The District should continue to collect this information so that, in the future, the information can be formalized and organized into data that can be populated into a District-specific asset management model that will consist of (1) pipe deterioration and (2) life cycle cost analyses. Both of these models will be developed within Innovyze InfoAsset Planner.

The following data should be collected:

1. Pipe characteristics (i.e., installation date, material, diameter)
2. Intensity (i.e., how much did it cost to repair or replace the pipe)
3. Service date or the date of main break or leak
4. Type (break or leak) and any other descriptive information

3.1 Pipe Deterioration Curves

Pipe deterioration curves are used in the risk model to determine individual pipe survival probability (likelihood of failure [LOF] Factor 1). Industry standard deterioration curves in the model need to be replaced with District-specific curves based on data collected. Use of District-specific curves will increase the confidence in local pipe survival probability.

Figure 1, Sample Failure Probability Curves, shows a sample of a normalized plot of pipe failure data organized by material. Similar curves constructed from the District data will be used for predictive analysis of failure density by pipe age in the model. With additional data collected, the District will generate similar curves.

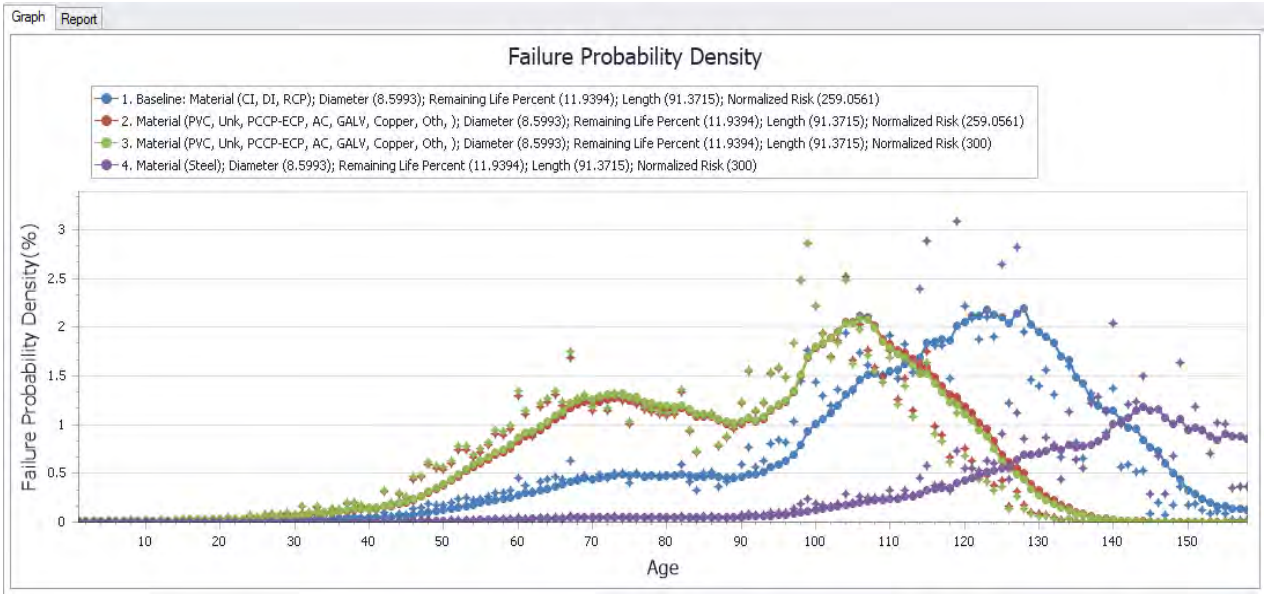

Figure 1. Sample Failure Probability Curves

3.2 Life Cycle Cost Analysis

Life cycle cost analysis is an added feature of Innovyze InfoAsset Planner. This analysis can be performed using the risk model and added repair cost data to forecast repair costs in the future. With the collection of additional data, the District will be able to perform this analysis and increase confidence is project selection and timing.

Figure 2, Simplified Life Cycle Cost Analysis Curve, shows a simplified curve for life cycle cost analysis. Similar curves constructed from District data will be used to justify replacement as a preferred alternative to repair at a point in time that minimizes life cycle cost.

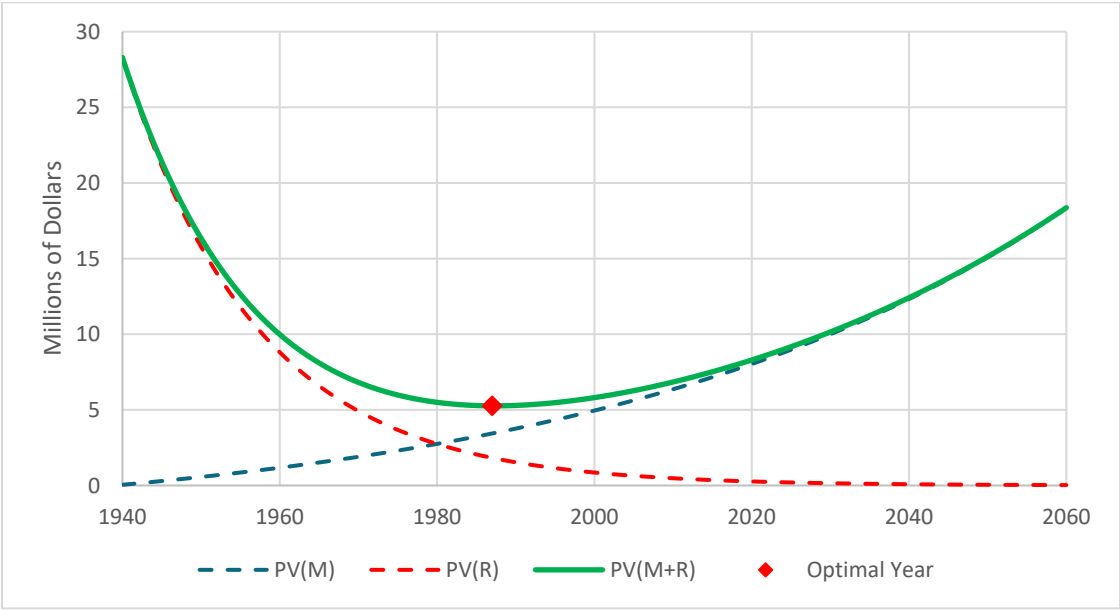

Figure 2. Simplified Life Cycle Cost Analysis Curve

Figure 3, Sample Comparison of Optimal and Repair Only Expenditures, is a sample graph comparing "optimal expenditures" to "repair only expenditures." The cost of a "repair only" strategy would increase year over year as break and leak frequency increases. By adding strategic replacements in addition to repairs (optimal expenditures), overall annual cost is lower. Similar graphs constructed from the District data are recommended to be used for life cycle cost analysis increase confidence in annual expenditures. Over time, the District will lower costs by replacing pipes at optimal times.

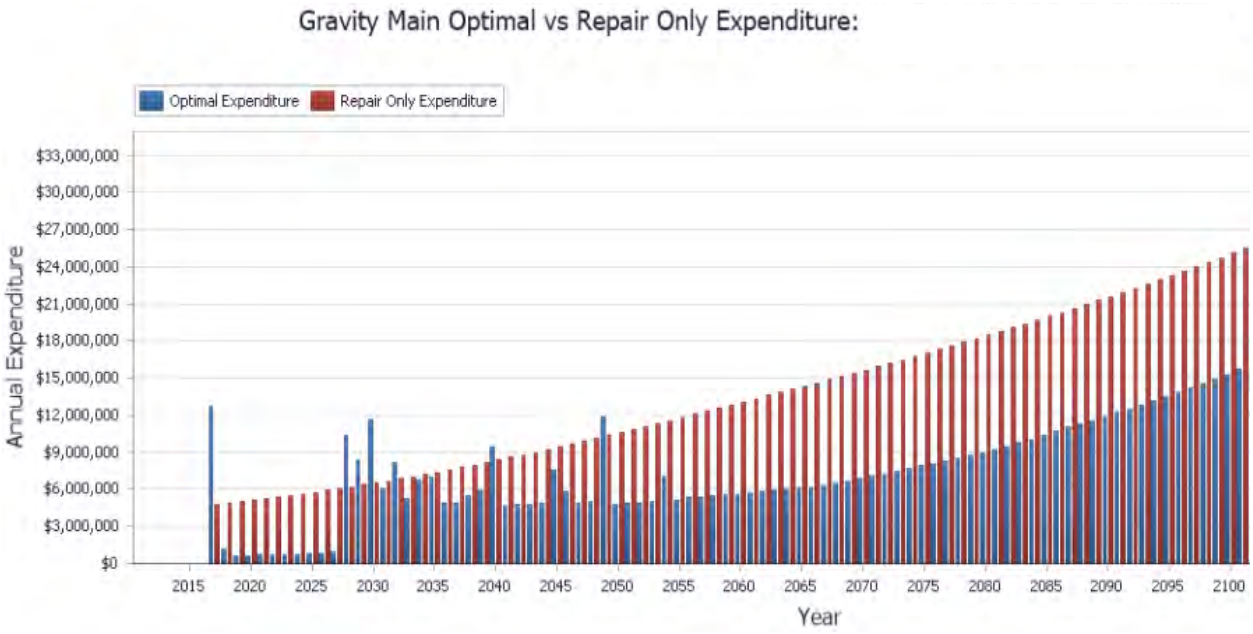

Figure 3. Sample Comparison of Optimal and Repair Only Expenditures

Section 4 Targeted Field Testing

The asset management model predicts which pipes pose the highest risk for failure and recommends those pipes for replacement at various intervals over the 2030–2079 time period. The determination of risk is based on a series of preliminary assumptions that were used to create the initial Project 2030 model. These assumptions were based on a combination of limited District data and other industry data.

To further refine replacement recommendations and possibly extend the replacement cycle, the District should field verify the modeled vulnerability of high-risk pipes based on the following process:

- For high-risk material (all sizes) (asbestos cement pipe [ACP], double walled [DW])
  - Due to well documented failure risks, no field testing before replacement is recommended. Replacement should occur per modeled phasing plan.
- For small diameter pipes (8 inches or less)
  - Due to lower modeled risk, no field testing is recommended before replacement. Replacement is based on life cycle cost analysis.

- For medium diameter pipes (10 inches to 18 inches)
  - A non-destructive testing method is recommended to verify pipe wall thickness every 500 feet. Ultrasonic thickness testing is a common example of this method and uses a digital gauge to measure wall thickness. This information can be used to determine remaining pipe strength.
  - Timing of testing should be several years in advance of scheduled pipe replacement. Replacement may be deferred for pipes that exceed the allowable wall thickness specification and, therefore, have adequate strength to remain in operation.
- For large diameter pipes (over 18 inches)
  - A non-destructive testing method is recommended to verify pipe wall thickness every 500 feet.
  - Additionally, a destructive testing method to further verify pipe integrity is recommended for each pipe segment every 1,000 feet. Pipe coupons can be removed for tension, bend, and compression testing in a laboratory.
  - Timing of testing should be several years in advance of scheduled pipe replacement. Replacement may be deferred for all pipes that exceed the allowable tension, bend, and compression specifications and, therefore, have adequate strength to remain in service.

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Appendix H. Project Implementation Summary

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Project Implementation (2030-2079)
Summary

Project Implementation (2030-2079) - Action List

Task No.	Task/SubTasks	Start Date/Frequency	Lead	Comments
1	**Continue communication and public engagement strategy supporting the adoption and implementation of Alternative 5.4**	2030-2079	CHWD (Communications & Public Engagement)	
	Provide CAC Communication regarding Project 2030	2030-2079	CHWD (Communications & Public Engagement)	Occasional updates (Quarterly/Annually as necessary)
	Provide education and public engagement regarding Project 2030	2030-2079	CHWD (Communications & Public Engagement)	Outreach to highlight Project 2030 and the benefits
2	**Refine Asset Management Model**	2030 and then every 3-5 Years	CHWD (Engineering)	CHWD Engineering to update the asset model as necessary to be consistent with the District goals.
	Clarify Risk Grading	2030 and then every 3-5 Years	CHWD (Engineering)	
	Customization of Deterioration Curves	2030 and then every 3-5 Years	CHWD (Engineering)	
	Integrate Economic Modeling Features	2030 and then every 3-5 Years	CHWD (Engineering)	
	Periodically Update Model from GIS	2030 and then every 3-5 Years	CHWD (Engineering)	
3	**Coordinate Asset Management Model with the Hydraulic Model**	2030 and then every 3-5 Years	CHWD (Engineering)	CHWD Engineering to update the asset model to remain consistent with the District's hydraulic model.
	Determine/Validate Water Main Replacement Size	2030 and then every 3-5 Years	CHWD (Engineering)	
	Identify Opportunities for Realignment	2030 and then every 3-5 Years	CHWD (Engineering)	
	Identify Opportunities for Redundancy	2030 and then every 3-5 Years	CHWD (Engineering)	
4	**Inspect Pipelines and Stream Crossings**	2030 and Annually	CHWD (Engineering)	
	Transmission Main Inspection	2030-2079	CHWD (Engineering)	All key Transmission Mains should be initially inspected prior to start of 2030. Follow-up testing to occur as needed from 2030-2079.
	Stream Crossing Inspection	2030-2079	CHWD (Engineering)	Routine Annual Inspections to occur throughout project life.
5	**Perform Pre-design/Alternatives Analysis of Key Transmission & Distribution Mains**	2030-2075	CHWD (Engineering)	Review annual projects as shown in Phasing Plan and perform analysis on Key Transmission & Distribution Mains as necessary to determine/refine replacement techniques.
6	**Update District Budgets to coincide with the level of Project 2030 Preparation**	2030-2079	CHWD (Finance/Engineering)	CHWD Finance to coordinate annual budgets with the various type of work to be performed in Project 2030.
7	**Coordinate Capital Planning with Other Jurisdictions**	2030-2079	CHWD (Engineering)	Contact local agencies (City of Citrus Heights, County of Sacramento, City of Roseville) to discuss capital projects (road, storm drain improvements)
8	**Assess CHWD staffing levels to match workload**	2030-2079	CHWD	Assess staffing and coordinate with CHWD team to ensure workload is consistent.
9	**Monitor Key Trends in Water Utility Management**	2030-2079	CHWD (Engineering)	CHWD Engineering to continue to monitor trends in AWWA and adjust the Project 2030 planning accordingly.