

**REGULAR MEETING AGENDA OF THE
CUSTOMER ADVISORY COMMITTEE OF
CITRUS HEIGHTS WATER DISTRICT (CHWD)
TUESDAY, AUGUST 28, 2018 beginning at 6:30 PM**



**CITRUS HEIGHTS COMMUNITY CENTER
6300 FOUNTAIN SQUARE DRIVE, CITRUS HEIGHTS, CA**

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.

Customer Advisory Committee meetings are video recorded, and available for web streaming at www.chwd.org and www.youtube.com.

CALL TO ORDER:

ROLL CALL OF COMMITTEE MEMBERS:

PLEDGE OF ALLEGIANCE:

PUBLIC COMMENT:

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

REVIEW AND REORDERING OF THE AGENDA:

Agenda items may be moved to accommodate those in attendance wishing to address that item. Please inform staff at (916) 725-6873 or at cac@chwd.org, if you feel that you may need an accommodation.

(A) Action Item

(D) Discussion Item

(I) Information Item

BUSINESS:

B-1. Approval of Meeting #1 Summary Including Member Questions and District Answers--May 29, 2018 (A)

B-2. Briefing on the Water Demand Forecast, District Pipeline Asset Inventory, and Main Replacement Benchmarking (D)

Receive briefing on the Water Demand Forecast, District Pipeline Asset Inventory, and Main Replacement Benchmarking. Provide input and feedback on the Project 2030 Study Technical Memorandum No. 1: Water Demand Forecast.

COMMITTEE MEMBERS' AND FACILITATOR REPORTS:

- C-1. Facilitator's Report (I)
- C-2. Committee Members' Reports (I)

FUTURE CHWD CUSTOMER ADVISORY COMMITTEE MEETING DATES:

December 11, 2018	6:30 PM	Regular Meeting
March 2019	6:30 PM	Regular Meeting
May 2019	6:30 PM	Regular Meeting
September 2019	6:30 PM	Regular Meeting

ADJOURNMENT:

CERTIFICATION:

I do hereby declare and certify that this agenda for this Regular Meeting of the Customer Advisory Committee 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 and the Citrus Heights Community Center, 6300 Fountain Square Drive, Citrus Heights, CA 95610 at least 72 hours prior to the regular meeting in accordance with Government Code Section 54954.2.



Christopher Castruita, Management Services
Supervisor/Chief Board Clerk

Dated: August 22, 2018



Customer Advisory Committee Meeting #2

Tuesday, August 28, 2018

6:15 pm **Snacks Available**

6:30 pm **Welcome and Pledge**

Agenda Review and Brief Intro's

Public Comment

Approve Meeting Summary for May 29, 2018 CAC Meeting

Water Demand Forecast, District Pipeline Asset Inventory, and Main Replacement Benchmarking

- **Water Demand Forecast, Technical Memorandum 1--***How projected changes in water usage will affect the way the District replaces and sizes water mains*
- **District Pipeline Asset Inventory Results--***Age of the water system, various pipe types, and where they're located throughout the system*
- **Main Replacement Basics and Benchmarking--***Major benchmarks to evaluate various options*

Public Comment

Clarify Next Steps

9:15 pm **Close**



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



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 1960s through the mid 1980s:

- 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



Customer Advisory Committee Meeting #1 Summary

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

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

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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.



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



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

CITRUS HEIGHTS WATER DISTRICT

DISTRICT STAFF REPORT TO CUSTOMER ADVISORY COMMITTEE OF CITRUS HEIGHTS WATER DISTRICT AUGUST 28, 2018 REGULAR MEETING

SUBJECT : BRIEFING ON THE WATER DEMAND FORECAST, DISTRICT PIPELINE
ASSET INVENTORY, AND MAIN REPLACEMENT BENCHMARKING
STATUS : Action Item
REPORT DATE : August 20, 2018
PREPARED BY : Missy Pieri, Engineering Manager/District Engineer

OBJECTIVE:

Receive briefing on the Water Demand Forecast, District Pipeline Asset Inventory, and Main Replacement Benchmarking. Provide input and feedback on the Project 2030 Study Technical Memorandum No. 1: Water Demand Forecast.

BACKGROUND AND ANALYSIS:

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 Project 2030 Water Main Replacement Study (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.

As one of the building blocks of the Study, Technical Memorandum No. 1: Water Demand Forecast (Technical Memo No. 1) considers key assumptions such as population change, land development, legislative/regulatory mandates and other factors that could impact future District-wide water usage.

The projected water demands will be used in the next steps of the Study. In particular, the water demands will be used to determine future water main sizes that are proposed to be replaced and will assist in the prioritization of water main replacements.

At the August 28 meeting, staff will be requesting feedback on Technical Memo No. 1. The input will be used by staff and, where agreed, will be incorporated into the final version of Technical Memo No. 1.

RECOMMENDATION:

Provide input and feedback to be included in the Project 2030 Study Technical Memorandum No. 1: Water Demand Forecast.

ATTACHMENTS:

Technical Memorandum No. 1: Water Demand Forecast

PROJECT 2030

WATER MAIN REPLACEMENT



Technical Memorandum No. 1:

Water Demand Forecast

August 2018

DRAFT



Harris & Associates



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I. EXECUTIVE SUMMARY

As part of the Project 2030 Water Main Replacement Study, 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, Cost, and Implementation Plan.

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

Population: The 2017 population within Citrus Heights Water District (CHWD) was 69,964. In 2050, based on assumed population growth rates, the population is projected to be approximately 82,500.

Land Use: There is approximately 500 acres of vacant land within CHWD. In 2050, based on assumed population growth, and a small increase in population density, about half of the vacant land (250 acres) is projected to develop into single family residences. Additionally, it is assumed approximately 125 acres of commercial land will redevelop into multifamily residences.

Mandated Water Conservation: Water efficiency is being driven by State legislation and regulations. These regulations are currently being imposed at the water agency level and not on individual water users; however these regulations are expected to lead to more efficient water use throughout the State and CHWD. This factor is a key driver in determining future water use within 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 a range of estimated average daily water use of between 7.8 to 9.5 million gallons per day (MGD), representing an overall decrease compared with 2017 of between 3 percent and 20 percent.

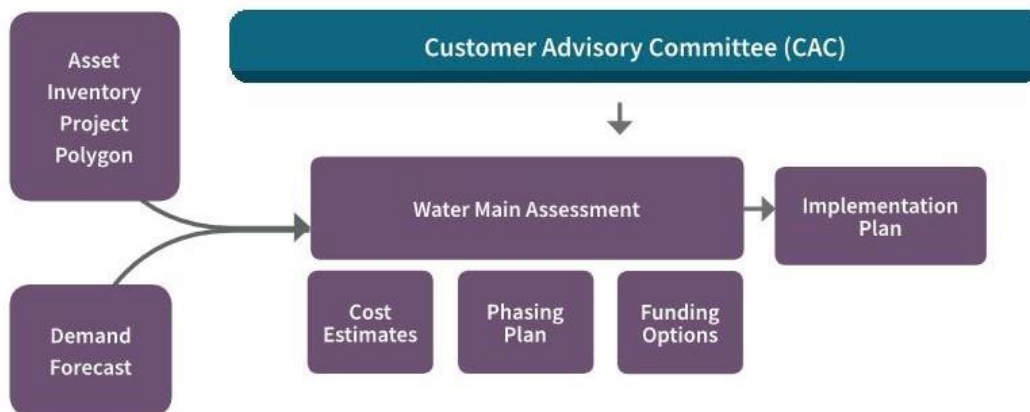
Next Steps: By developing an estimate of how much water is expected to be used (and therefore will flow through the system) in different areas of the CHWD service area, the operational lifespan for different parts of the system can be estimated. In addition, future pipeline size will also be determined based on these water demand projections.

II. INTRODUCTION AND PURPOSE

Renewal and replacement of infrastructure, financing of improvements and public understanding of the value of water are the most important issues to water system managers. 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 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. Key elements of this Study include: 1) Asset Inventory and Project Polygon Development, 2) Water Demand Forecast, 3) Water Main Assessment, 4) Water Main Replacement Phasing Options and Preferred Option, 5) Project Cost Estimates, 6) Funding Strategy, including Water Rate Options and Debt Service Options, and 7) Implementation Plan (see Figure 1-1).

Along with the Asset Inventory, Water Demand Forecasting serves as a “building block” for the next step in the Study, Water Main Assessment. Technical Memorandum No. 1: Water Demand Forecast considers key assumptions and will look 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 Memorandum summarizes the water demand forecast for the CHWD service area, along with the key assumptions and methodology used to create the forecast.

FIGURE 1-1. PROJECT 2030 WATER MAIN REPLACEMENT STUDY



III. REFERENCE DOCUMENTS

The following documents were reviewed in preparation of this memo:

1. *Residential Water Use Trends & Implications for Conservation Policy*, Ca. Legislative Analyst Office, 2017
2. *Water Efficiency Legislation Will Make California More Resilient to Impacts of Future Droughts*, California State Water Board Factsheet, 2018
3. *2016 Metropolitan Transportation Plan and Sustainable Communities Strategy Growth Forecast for 2012, 2020, and 2036*, SACOG (Sacramento Area Council of Governments)
4. *Citrus Heights Water District 2015 Urban Water Management Plan (UWMP)*, 2016, J. Crowley Group
5. *The Citrus Heights General Plan*, 2011
6. *2010 U.S. Census*

IV. BACKGROUND

The Citrus Heights Water District is located in the northeast portion of Sacramento County and south 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 of Directors elected at large from divisions within the District governs the District.

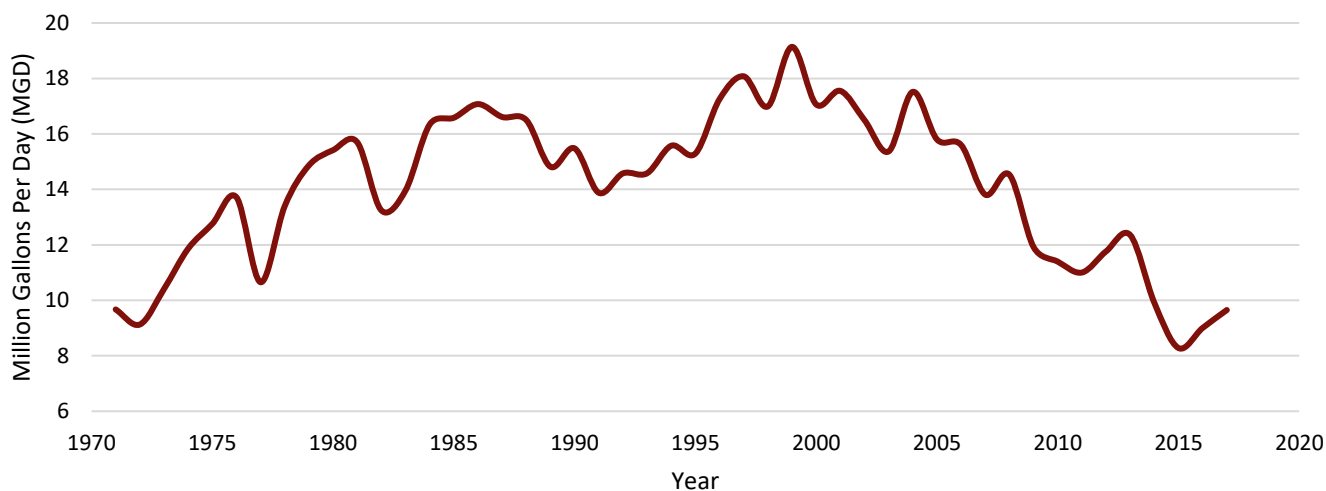
CHWD provides water service to portions of the Cities of Citrus Heights and Roseville, and portions of the unincorporated communities of Orangevale, Fair Oaks, Carmichael and a portion of unincorporated Placer County. The District initially used American River surface water supply from the North Fork Ditch Company to serve its customers. The customer base was initially comprised of small family farms and limited urban areas. Concurrently with the completion of Folsom Dam in 1956, the San Juan (Suburban) Water District (SJWD) was formed and acquired the facilities and water rights of the North Fork Ditch Company. SJWD has also contracted for additional water from the United States Bureau of Reclamation (USBR) and Placer County Water Agency (PCWA). Citrus Heights Water District now receives surface water from the American River through the San Juan Water District. Along with CHWD, SJWD provides treated surface water to Fair Oaks Water District, Orange Vale Water Company, portions of the City of Folsom, and SJWD's own retail service area. These agencies are collectively referred to as the SJWD Family of Agencies or wholesale customer agencies (WCAs). SJWD also provides treated surface water to Sacramento Suburban Water District and the City of Roseville. CHWD continues to supplement its surface water supply with groundwater for readiness-to-serve purposes and to meet peaking, 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 presently there is no significant agricultural water use within 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 within the District's service territory occurred between 1960-1985. Water mains were installed by private developers and inspected by District staff. These water mains became donated assets to the District, and it became CHWD's responsibility to operate, maintain, and plan for the replacement of these facilities. As the District looks ahead, a tidal wave of water main replacements may be needed beginning in the year 2030 and carrying several years forward, as the water mains installed in the 1960's reach 70 years old.

The District's historical water demand has varied significantly throughout the years, as shown in Figure 1-2 below. The District's water demand steadily rose from the early 1970's until it reached a peak of 19.1 million gallons a day (MGD) in 1999. Since that time, the water usage has steadily declined. Water demand in 2015 was 8.3 MGD.

FIGURE 1-2. CHWD HISTORICAL WATER DEMAND



V. EXISTING CONDITIONS

Existing Land Use and Population

Land parcels located within the CHWD service area are summarized in Table 1-1, along with the total area of each land use type, population and calculated population density for residential parcel types. A map of the CHWD service area organized by land use is shown in Appendix A, including the location of demand nodes. Please see Appendix B for a description of the different land use types.

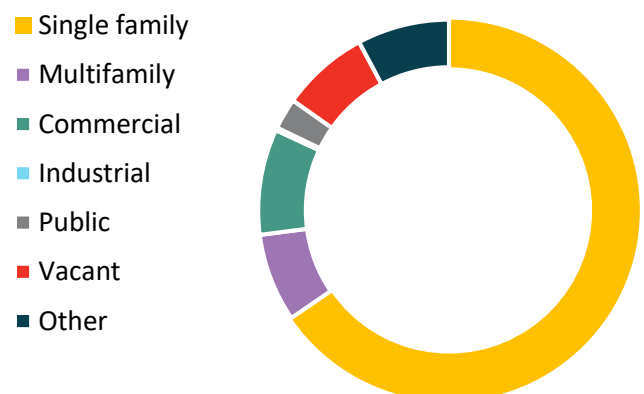
Residential parcel data provided by CHWD was organized into two land-use types based on population density, single family residential customers and multifamily residential customers. Overall acreage of these two residential land use types is approximately 73% of the CHWD's service area. 2017 population information was obtained from the 2010 US 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 CHWD. The 2010 US Census is the primary source of population data for the City of Citrus Heights, Sacramento County and the other entities served by CHWD. The Census Block dataset is the geospatial (digitally mapped) version of this population data. By using this geospatial version of the census data, population counts were assigned to each parcel within the CHWD service area. By summing the population in each parcel, the population densities were estimated for the total service area as well as for each land use type (see Table 1-1).

TABLE 1-1. 2017 LAND USE AND POPULATION DISTRIBUTION WITHIN CHWD

LAND USE TYPE	AREA (ACRES)	PERCENT OF TOTAL AREA	POPULATION	POPULATION DENSITY (PEOPLE/ACRE)
SINGLE FAMILY RESIDENTIAL PARCELS	4,430	65.5%	49,380	11.1
MULTIFAMILY RESIDENTIAL PARCELS	506	7.5%	20,584	40.7
COMMERCIAL PARCELS	606	9.0%	-	-
INDUSTRIAL PARCELS	16	0.2%	-	-
PUBLIC PARCELS	178	2.6%	-	-
VACANT PARCELS	503	7.4%	-	-
OTHER PARCELS	528	7.8%	-	-
TOTAL	6,767	100%	69,964	N/A

In 2017, the total population within the CHWD service area was estimated to be 69,964 as shown in Table 1-1. This is higher than the 2015 Citrus Heights UWMP, which employed the Department of Water Resources (DWR) Population Tool to estimate a total population served of 65,093 in 2015. The DWR Population Tool is an automated process that bases its estimation on US 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 because of population growth between 2015 and 2017. Also, as described above, this method used a detailed parcel-level breakdown of population within the service area which develops more precise per-area and per-capital water demand values for CHWD.

FIGURE 1-3. 2017 LAND USE WITHIN CHWD



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, 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 of the 2016 water demands. The District's water loss data was also reviewed, and based on a provided water loss rate of 7%, the 2017 average demands were reduced accordingly. This resulted in 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 1-2 and Figure 1-4. Table 1-2 also shows the calculated Land Use Water Factors and Per Capita Water Use.

TABLE 1-2. 2017 WATER DEMANDS BY LAND USE CATEGORY

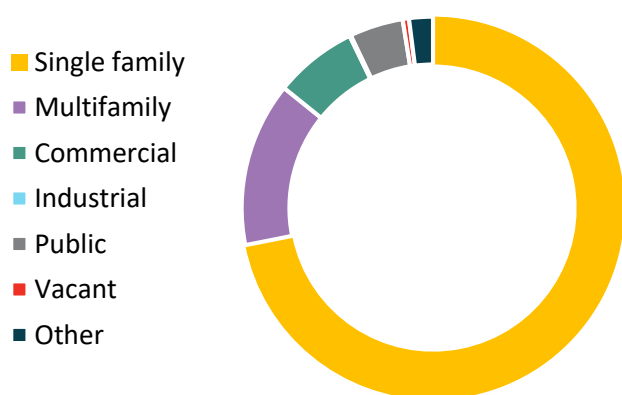
LAND USE CATEGORY	ANNUAL AVERAGE DEMAND (GPD)	PERCENT OF TOTAL DEMAND	LAND USE WATER FACTOR (GPD/ACRE) ¹	PER CAPITA WATER USE (GPCD) ²
SINGLE FAMILY RESIDENTIAL	6,971,467	72%	1,828	141
MULTIFAMILY RESIDENTIAL	1,348,553	14%	3,095	66
COMMERCIAL	680,553	7%	1,305	-
INDUSTRIAL	10,527	0.1%	748	-
PUBLIC	438,932	4.5%	2,861	-
VACANT	51,465	0.4%	119	-
OTHER	195,235	2%	429	-
TOTAL	9,696,732	100%	1,433³	139³

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

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

³ Values are total averages across the entire service area (Total GPD per Total Acreage and Total GPD per Total Population respectively)

FIGURE 1-4. 2017 AVERAGE ANNUAL DEMAND BY LAND USE



As shown in Table 1-2, per capita demand in single family residential areas is higher than in multifamily residential areas. Compared to the average residential water use in California, which was 85 gallons per person per day in 2016¹, CHWD's overall average daily residential demand is higher, likely due to a large percentage of the population (72%) living in single family homes with higher outdoor water use. Larger metropolitan areas, such as the Bay Area or Los Angeles, have a smaller percentage of single family homes or dwelling units with significant outdoor water use.

¹ Residential Water Use Trends and Implications for Conservation Policy, California Legislative Analyst's Office

Factors Affecting Water Demand

Changes in water demand over time result from several factors.

1. **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 be a trend. Recently, the State legislature proposed the implementation of two new laws, SB 606 and AB 1668. These bills will require water agencies, including 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 the bills will not impose individual mandates for homeowners and businesses, they will require urban water suppliers to meet their water use objectives. The indoor water use standard for residential will be 55 gallons per capita daily (GPCD) until January 2025; the standard will decrease to 50 GPCD in January 2030². Proposed outdoor water use standards are in the process of being developed and will likely take into consideration ground cover, weather, and other factors. This standard is expected to be adopted by June 2022.

Water Conservation will be a driving factor in determining future water demands.

2. **Annual Population Growth Estimated to be 0.5%** – This study assumes a modest annual change in population in keeping with current Sacramento Area Council of Governments (SACOG) projections³ and the 2015 CHWD Urban Water Management Plan⁴.
3. **Assumed Development, Including Some Redevelopment, Will Accommodate the Population Growth** – The land-use analysis identifies about 500 acres of vacant land remaining in the CHWD service area, which is about 7.4% of the District's total service area. These vacant parcels are located in a combination of low, medium, and high-density neighborhoods. It is assumed that development projects will first take place within these parcels rather than redevelopment. The Citrus Heights General Plan calls for the density of residential areas, particularly those with single family units to remain relatively constant⁵. The 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 Blvd, and Greenback Lane commercial corridors. These redevelopment projects are rare and the City of Citrus Heights planning staff estimates around 125 acres of vacant land could reasonably be converted to developed land by 2050⁶. It was also confirmed that the 56 acre Sunrise Golf Course is expected to convert to 33 acres of housing (single family) and 23 acres of Open Space.
4. **Median Household Income Growth Assumed to Track Inflation** – It is assumed there will be no appreciable increase in household income compared to inflation. As a result, increased water use is not anticipated as a result of this economic factor.
5. **District Water Loss Will Improve** – Slight decrease in water loss is assumed as a result of water main replacements. District water loss is estimated at 7% per 2016 CHWD AWWA Water Audit. Based on discussions with District staff, future water loss is expected to be 5% of total water supplied.

² Water Efficiency Legislation Will Make California More Resilient to Impacts of Future Droughts, California State Water Board Factsheet, 2018

³ 2016 Metropolitan Transportation Plan and Sustainable Communities Strategy Growth Forecast for 2012, 2020, and 2036, SACOG

⁴ Citrus Heights Water District Urban Water Management Plan 2015

⁵ The Citrus Heights General Plan

⁶ Confirmed by Citrus Heights Planning Division staff

VI. 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:

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% was assumed. Table 1-3 shows an overall projected population increase of 18 percent between 2017 and 2050.

TABLE 1-3. POPULATION GROWTH 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%)

Step 2. Water Conservation

Future water demand projections account for some future water conservation and efficiency trends. As discussed above this is mostly due to required conservation driven by State and Federal legislation. It was assumed an overall (outdoor and indoor) water reduction of 10 percent per decade on single family customers and 5 percent per decade on multifamily customers to account for these factors between 2017 and 2050. Conservation factors were not applied to other land use categories. Table 1-4 shows a 28 percent reduction in per capita water use between 2017 and 2050.

TABLE 1-4. 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%)

Step 3. Land Use Reallocation

As mentioned earlier, a key assumption is that the current population densities for single family and multifamily residential land use remains fairly constant over the study period. A 5 percent increase in population densities is assumed by 2050 based on discussion with City planning staff. In order to accommodate the projected population growth, and assuming the CHWD service boundary remains unchanged, some of the other land uses were converted to residential. For this analysis, total acreage for Commercial, Vacant and Other were assumed to decrease and Industrial and Public land uses were assumed to remain the same. Per discussions with City planning staff, 125 acres of Commercial area was converted to Multifamily Residential and 310 acres of Vacant and Other areas was converted to

Single Family Residential. This accounts for the Sunrise Golf Course redevelopment discussed earlier. Table 1-5 presents this analysis.

TABLE 1-5. PROJECTED LAND USE CHANGES WITHIN CHWD IN 2050

LAND USE CATEGORY	POPULATION	2050 PER CAPITA WATER USE (GPCD)	POPULATION DENSITY (PEOPLE/ACRE)	REALLOCATED 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	82,481			6,767	1,214

Step 4. Final Land Use Based Demand Forecast

The resulting 2050 reallocated Land Use acreages are multiplied by the 2050 Land Use Water Factors for each category to get 2050 Annual Average Daily Water Demand, as shown in Table 1-6.

TABLE 1-6. 2050 WATER DEMAND PROJECTIONS BY LAND USE TYPE

LAND USE CATEGORY	2050 LAND USE (ACRES)	2050 LAND USE WATER FACTOR (GPD/ACRE)	2050 ANNUAL AVERAGE WATER DEMAND (MGD)	OVERALL CHANGE BETWEEN 2017 - 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%

This analysis results in an overall decrease of 15% in annual average water demand between 2017 and 2050. The decrease is influenced largely by single family residential customers, though it is interesting to note that 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.

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 CHWD through the Year 2050 is presented in Table 1-7. The Demand Forecast presented in Step 4 above was based on an overall water use reduction of 10 percent per decade on single family customers and 5 percent per decade on multifamily customers. Two other conservation levels were also evaluated. First, a higher water use reduction or “Higher Efficiency” gains of 12 percent per decade on single family customers and 6 percent per decade on multifamily customers was considered. The second conservation level evaluated was a lower water use reduction or “Lower Efficiency” gains of 5 percent per decade on single family customers and 2.5 percent per decade on multifamily customers.

TABLE 1-7. RANGE IN 2050 WATER DEMAND PROJECTIONS

	2017	DEMAND FORECAST ¹	HIGHER EFFICIENCY ²	LOWER EFFICIENCY ³
TOTAL PROJECTED WATER USE (MGPD)	9.7	8.2	7.8	9.5
% REDUCTION VS 2017	n/a	-15%	-20%	-3%

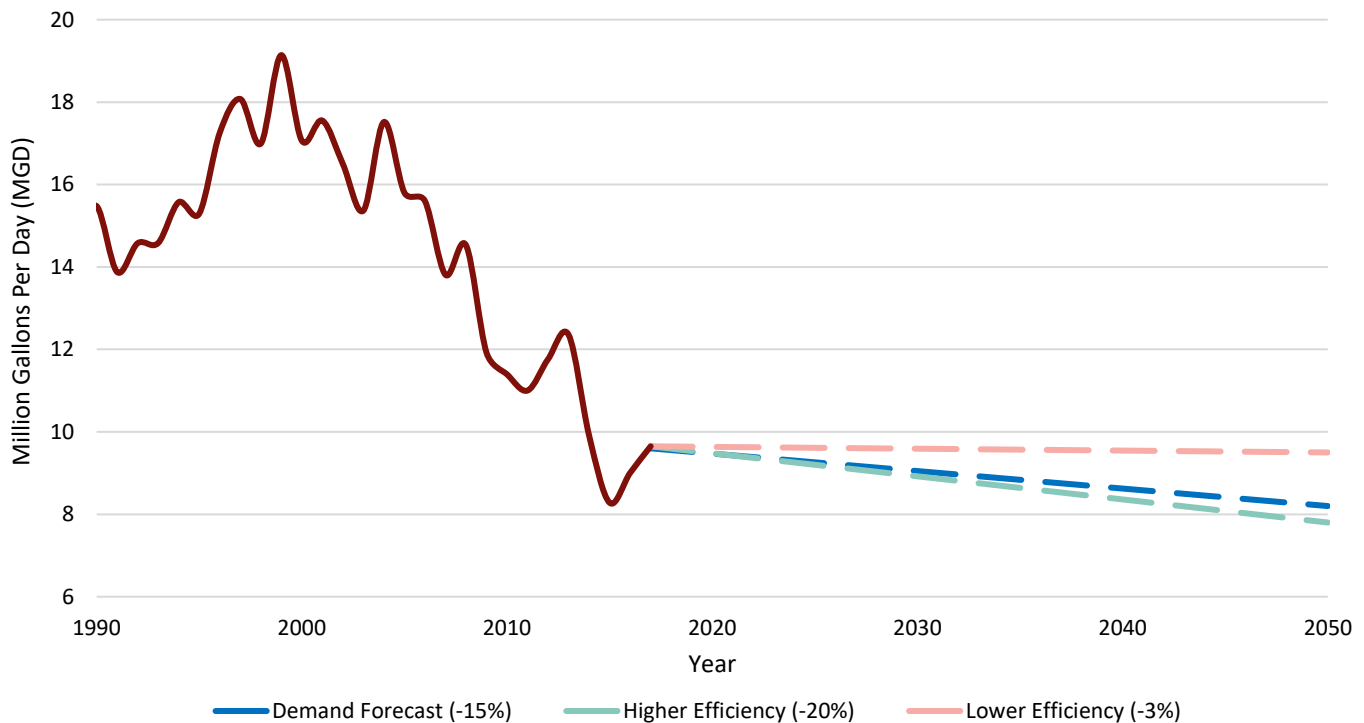
¹ Demand Forecast = reduction of 10% per decade for single family customers and 5% per decade for multifamily customers

² Higher Efficiency = reduction of 12% per decade for single family customers and 6% per decade for multifamily customers

³ Lower Efficiency = reduction of 5% per decade for single family customers and 2.5% 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 million gallons per day, representing an overall decrease compared with 2017 of between 3 percent and 20 percent. Figure 1-5 below depicts the range in water demand projections.

FIGURE 1-5. RANGE IN 2050 WATER DEMAND PROJECTIONS



Monitoring Demand Trends – Recommendations

Changes in any of the key assumptions described in the above analysis would produce significant changes to future demand projections. CHWD should monitor several key metrics on a routine basis. This will enable CHWD to adjust its demand projections when conditions warrant. These metrics include:

- 1. Monitor State Legislation and Regulatory Issues** – Monitoring indoor and outdoor residential water use will be tied to the implementation of AB 606 and 1668. More aggressive conservation practices could further reduce the anticipated water-use efficiency factors.
- 2. Review Population Growth** – Update the population estimates, including density values after the 2020 US Census is released in order to evaluate the rate of increased per capita water use.
- 3. Track Construction permits/Development** – Consider tracking construction permits to capture the overall pace of development in the service area which could lead to greater increases in per capita water use.

VII. NEXT STEPS

The Water Demand Forecast serves as a “building block” for the next step in the Study, which is the Water Main Assessment/Phasing Plan. By developing an estimate of how much water is expected to be used (and therefore flow through the distribution system) in different areas of the District, the operational lifespan of the water mains can be estimated. The three water demand options, “Demand Forecast”, “Higher Efficiency”, and “Lower Efficiency”, which range from 7.8 and 9.5 million gallons per day, will be used to determine future pipeline sizes and will be one of the factors used to prioritize water main replacement. The results of this analysis will be presented in Technical Memorandum No. 3: Main Replacement and Costs.



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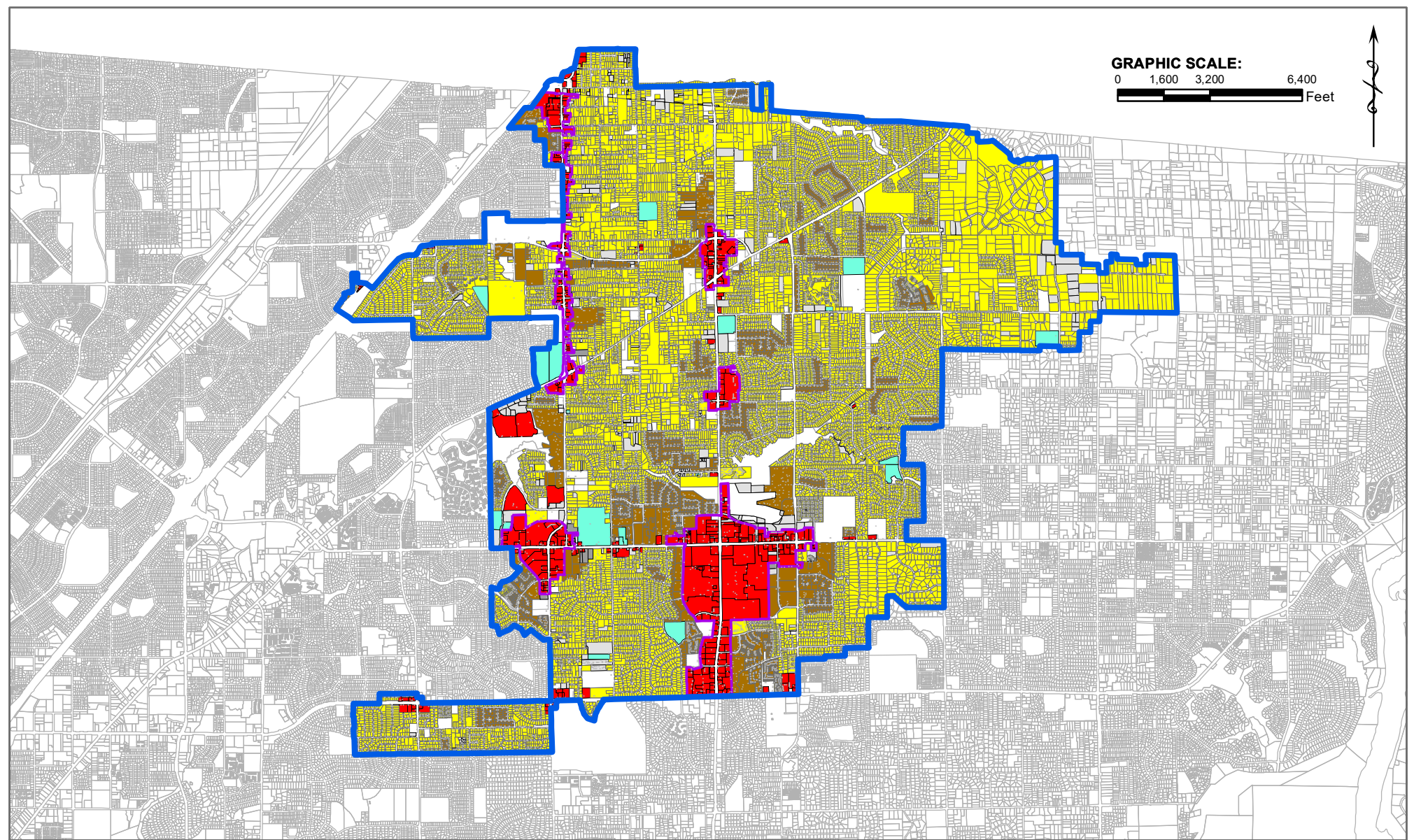
VIII. APPENDICES

Appendix A – Land Use Areas with Demand Nodes

Appendix B – Glossary of Terms

Appendix C – Unit of Measurement Definitions & Conversions

CITRUS HEIGHTS WATER DISTRICT LAND USE AREAS WITH DEMAND NODES



LEGEND:

 Citrus Heights Water District Boundary	 Vacant
Citrus Heights Water District Parcels	 Other
 Single Family Residential	 Multi-Family Residential
 Commercial	 Industrial
 Public	 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.



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DATE: JULY 2018

APPENDIX A

APPENDIX B

GLOSSARY OF TERMS

Water Demand	Water use measured by customer meters
Demand Node	Location within the water model where demand is placed. Each node includes multiple individual meters.
Peak demand	The maximum water used during any one day
GPD	Gallons per Day
GPCD	Gallon Per Capita per Day
MG	Million Gallons
MGD	Million Gallons per Day
Population Density	Population divided by area (People/Acre)
Land Use Category	
Single Family	One house per lot (possible accessory structures)
Multifamily	More than one house per lot (duplexes, condos, apartments)
Commercial	Includes all types of commercial (office, retail, service)
Industrial	Includes all types of industrial (warehouse and public storage)
Public	Public facilities (Schools, Community Center, Police Station)
Vacant	Unused Parcels available for development
Other	Includes use not defined above (golf courses, churches, parks and trails, open spaces and creeks, power substations and cemeteries)

APPENDIX C

UNIT OF MEASUREMENT DEFINITIONS AND CONVERSIONS

1 Acres = 43,560 Square Feet

1 Acre-foot = 325,851 Gallons (G)

1 Cubic Foot = 7.48 Gallons (G)

1 CCF = 100 Cubic Feet

1 CCF = 748 Gallons