

LOMITA CITY COUNCIL WATER SYSTEM UPDATE / HAZEN & SAWYER AMENDMENT #3

November 7, 2017



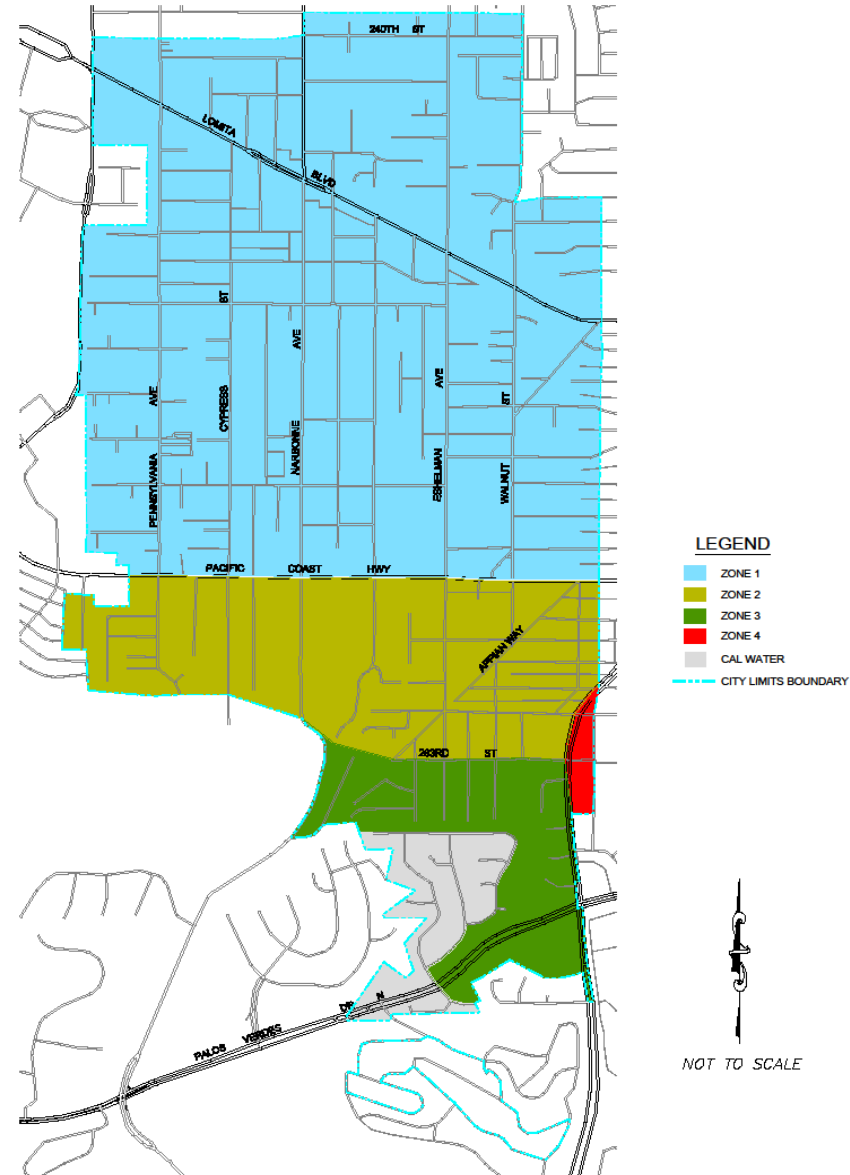
Presentation Overview

- Brief overview / recap of the water system
- Regulatory oversight and water quality testing
- Actions taken since May 2016
- Hazen & Sawyer Scope of Work
- Potential Phase 1 / Phase 2 CWPF Projects

Water System General Background

- 20,256 residents over a service area of 2 sq mi.
- Approximately 4,300 connections (4,000 residential, 300 non-residential).
- System consists of water mains ranging from 2” to 16” in diameter (~43 miles), 800 valves, 470 hydrants, 55 flushing points, two reservoirs (Harbor Hills 100K gal, Cypress St 5.3 MG), two imported water connections (WBMWD), two pressure reducing stations (Walnut St and Appian Way), two booster pumps (Appian Way and CWPF), and one groundwater well.
- Three emergency interconnections with LADWP (1) and Torrance (2).
- Water distribution mains installed between the early 1900s and today; 70 percent of the system was built between 1928 and 1970.
- The City's Water Division staff are certified by the State of California Operator Certification Program (a division of the State Water Resources Control Board) to operate, maintain and repair the water distribution system and CWPF.

Pressure Zones



Third Party Oversight & Regulation

- CalEPA
 - State Water Resources Control Board
 - CA Drinking Water Division
- Independent Laboratory Testing
 - Clinical Laboratory of San Bernardino, Inc.
 - Laboratory certified by State Water Resources Control Board Environment Laboratory Accreditation Program – Certification No. 1088
 - Other laboratories as required for additional sampling/testing
 - Daily, weekly, monthly, quarterly, annual, and other sampling/testing

Drinking Water Standards

- Drinking water standards are called maximum contaminant levels (MCLs), and they are found in Title 22 of the California Code of Regulations
- Primary MCLs address health concerns
 - California tends to be more stringent than the federal EPA
- Secondary MCLs address aesthetics, such as taste and odor, that are not health related
 - Taste, Odor, Total Dissolved Solids (TDS – minerals, salts)
- The City also tests for some items that are neither primary nor secondary MCLs, such as hardness (CaCO_3)

Secondary Water Standards (MCLs)

(Units are in milligram per liter (mg/L), unless otherwise noted.)

	MCL	
Aluminum	0.2	
Color	15	Units
Copper	1	
Foaming Agents (MBAS)	0.5	
Iron	0.3	
Manganese	0.05	
Methyl-tert-butyl ether (MTBE)	0.005	
Odor	3	Units
Silver	0.1	
Thiobencarb	0.001	
Turbidity	5	Units
Zinc	5	

	Recommended	Upper
Total Dissolved Solids (TDS)	500	1,000
Specific Conductance	900	1,600
Chloride	250	500
Sulfate	250	500

	Soft	Moderately Hard	Hard	Very Hard
Total Hardness	<75	75 - 150	150 - 300	>300

Water System Sources

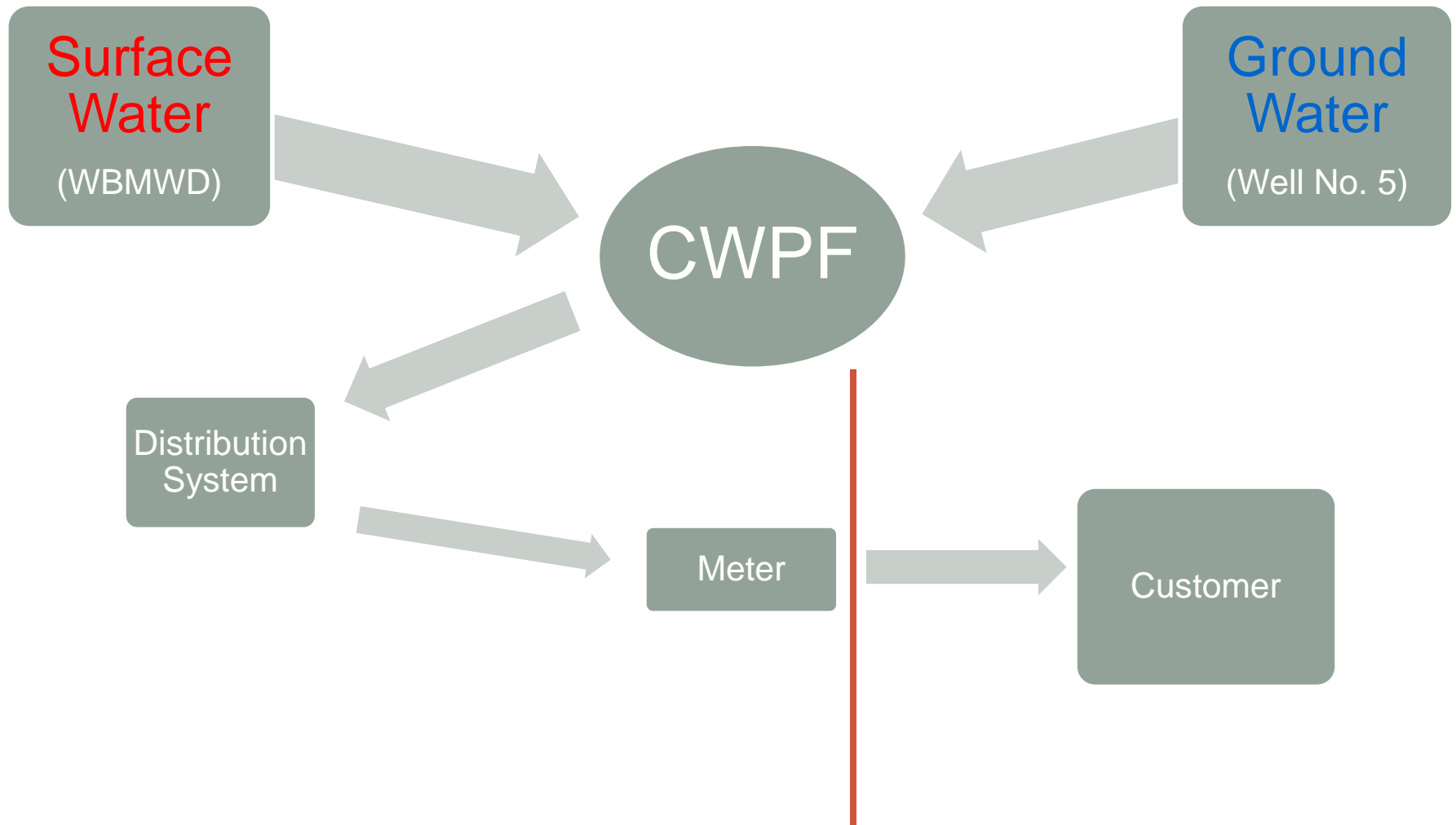
- Imported Surface Water
 - West Basin Municipal Water District
 - Metropolitan Water District
- Groundwater
 - West Coast Groundwater Basin
 - Lomita Well No. 5
 - Basin Managed by WRD
- Blended Operations
 - North of PCH – generally 50/50 mixture of surface and groundwater
 - South of PCH – generally 100% surface water



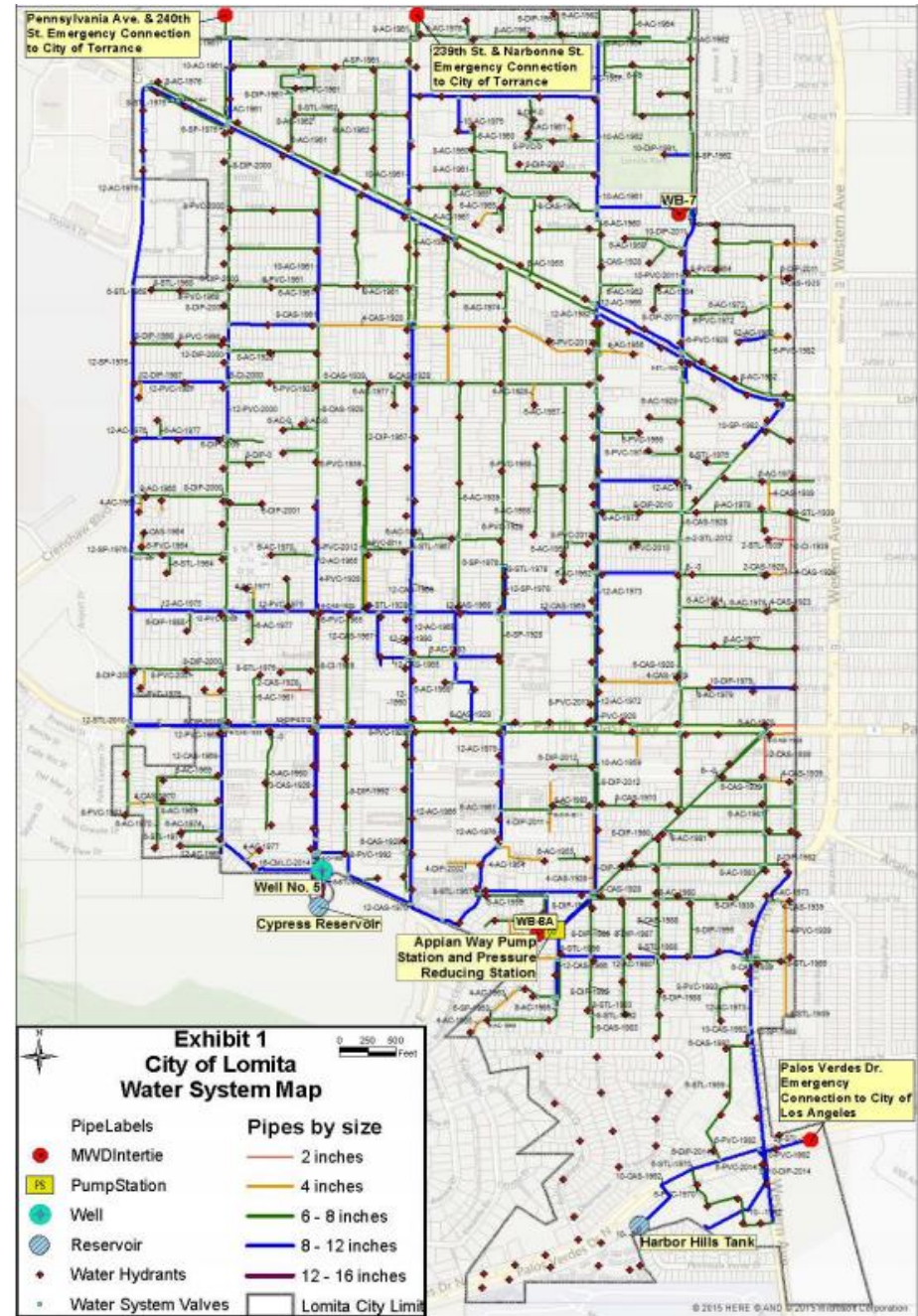
Water System Sources (cont'd)

- City owns 1,352 Acre Feet of Adjudicated Water Rights (allowable pumping) in the West Coast Groundwater Basin.
- One acre feet = 325,851 gallons (enough to serve two to three families per year)
- Maximum Surface Water Allocation (WBMWD) – Upper limit during the 2015-16 fiscal year of 1,663 Acre Feet due to drought allocation, though restriction has since been lifted
- Annual Citywide Demand – Varies between 2000 and 2400 Acre-Feet (changes annually based on conservation habits, drought conditions)

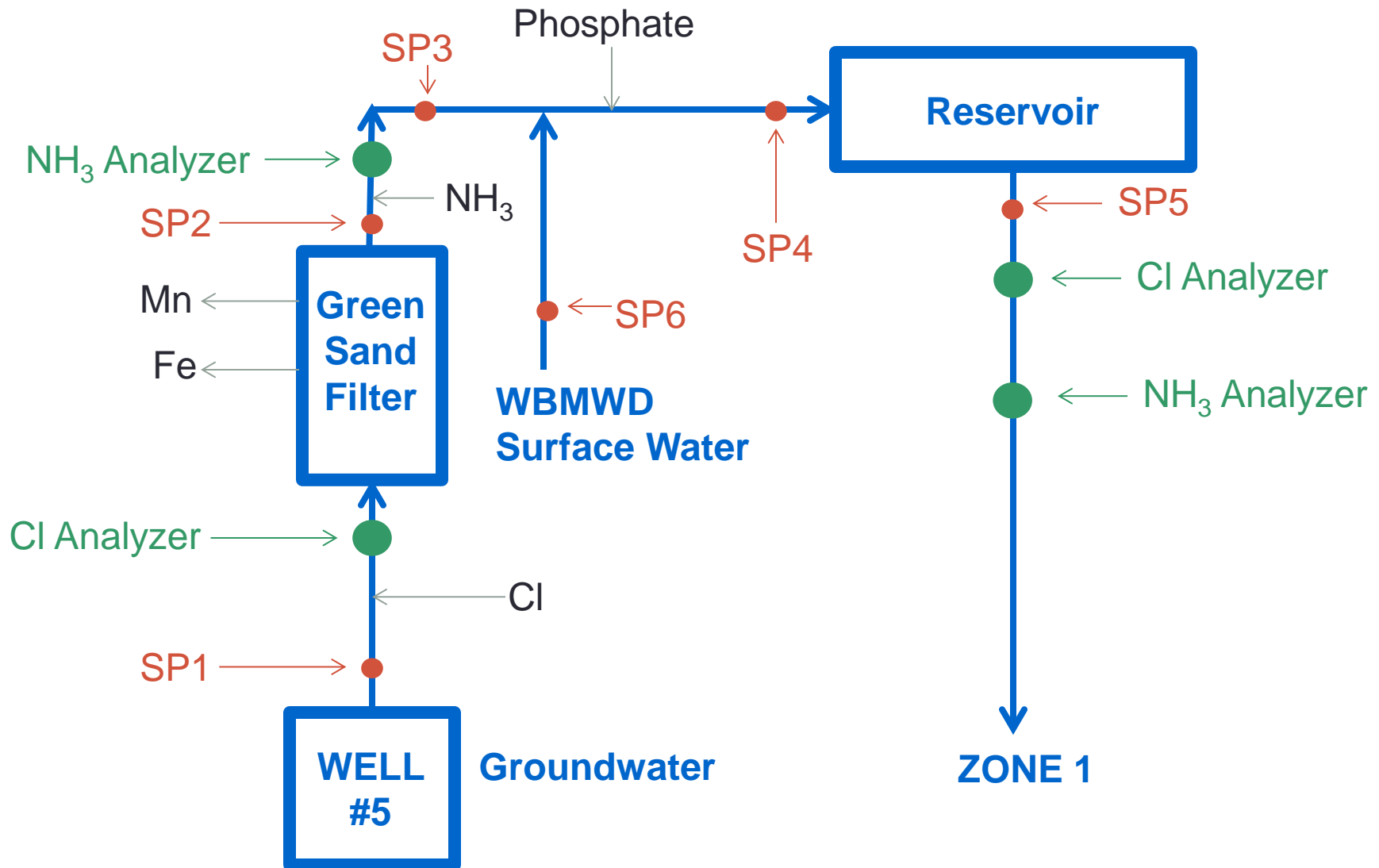
From Source to Tap



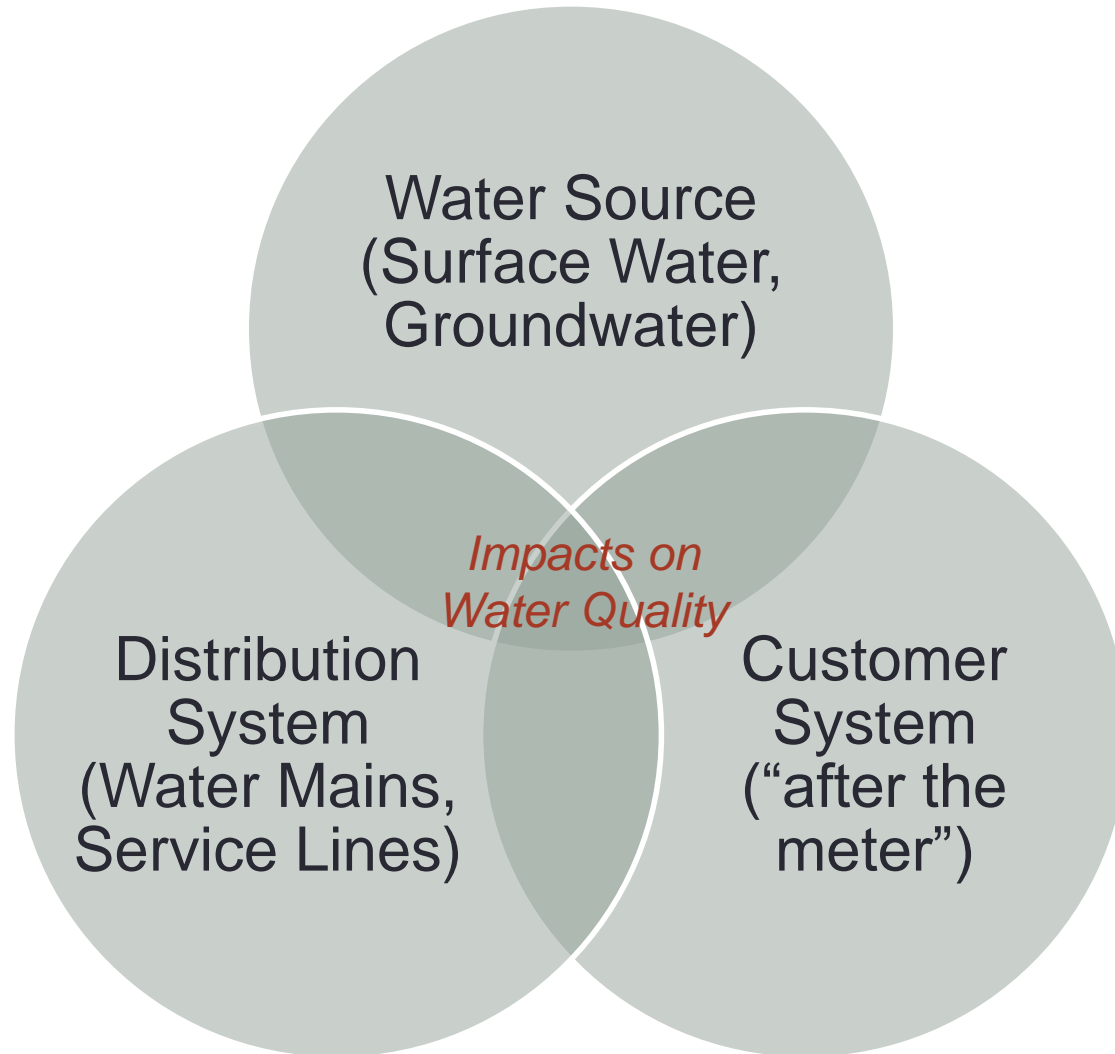
System Map



Cypress Water Production Facility



Impacts on Water Quality– 3 Factors



Actions Taken Since May 2016

- Four Public Water Subcommittee Meetings
 - June 2016, August 2016, November 2016, March 2017
- Maintenance at CWPF
 - Chlorine and Ammonia Analyzers
 - Chloramination Management
- Water System Operations
 - Pressure Reducing Valves Serviced
 - Greensand Filter Media Annual Testing/Service
 - Second Treatment Operator Position Added/Recruited
 - Fourth Distribution Operator Position Added/Recruited
 - SCADA Improvements Ongoing

Actions Taken Since May 2016 (cont'd)

- Capital Projects Update
 - Water Meter Replacement Project (complete)
 - Reed Street Water Main Replacement
 - Complete
 - Forrester Drive Water Main Replacement
 - Complete
 - PCH – Narbonne Ave to Eshelman Ave
 - Design Contract Awarded
 - 253rd St Area Improvements
 - Design Complete, Permit Process Underway
 - 250th St – Pennsylvania to Eshelman – 17/18 Budget
 - Walnut St – PCH to 253rd – 17/18 Budget
- Hazen and Sawyer Scope of Work Update
 - Completed Base Contract, and Amendments No. 1 and No. 2

Hazen Amendment No. 2 Recap:

- **Water Quality Data Review**
 - Last 3+ years of data, including lab results and odor complaints/history
- **Distribution System Sampling Plan**
 - Localized sampling and testing throughout the distribution system
 - Sampling and testing of four (4) private residences
 - Performed Sept-Oct 2016 and Feb 2017
- **Membrane Filtration Modeling**
 - Hybrid Reverse Osmosis / Nanofiltration Package
 - Feasible, controls TDS/Hardness but not odor, expensive
- **Evaluate GAC for Odor Removal at CWPF**
 - Granular Activated Carbon – 2 or 4 Vessels
 - Feasible, controls odor and DBPs, does not control TDS/Hardness
 - Cost is less expensive than membrane filtration, eligible for grant funding

Water Quality Data Review

- Recommendations
 - Continue Chlorine Residual Levels
 - 2 to 3 mg/L at Distribution System Entry Point
 - Optimal Chlorine to Ammonia Ratios
 - Between 4:1 and 5:1
 - Controls Potential Nitrification
 - Maintain Short Water Age
 - Distribution System Turnover
 - Monitor MWD Water Quality
 - Nitrites
 - Customer Outreach
 - Kitchen/bathroom drains may be causing odor
 - Stagnant or old water in house piping may need to be flushed
 - Replace washing machine and garden hoses that house bacteria
 - Hot water heater maintenance

Membrane Filtration (MF)

- Two Different MF Options, Hybrid Configuration
 - Reverse Osmosis (RO)
 - Nanofiltration (NF)
- Proprietary Software to Model the Membrane System
 - Membrane Vendor Software and Chemical Software
- Input Feed Water Quality (Well No. 5)
- Design Parameters
 - TDS – 500 mg/L
- Evaluated Results
 - TDS / Hardness – YES (estimated)
 - Taste Improvement – YES (estimated)
 - Sulfide / Odor – NO (estimated)

MF Conceptual Design

- Capital Cost – \$5.2 million (\$3 million connection fee)
- Annual O&M – \$350k
- Annualized Cost – \$234/Acre-foot
- Assumes 100% Groundwater Utilized
 - MF not effective at sulfide removal, and not likely to improve odor enough to allow for 100% groundwater usage
 - Blending operations would need to be continued after implementation of MF if no additional odor control implemented
 - Current TDS/Hardness levels have dropped due to Northern California water availability, which will likely continue for remainder of this year and part of next year pending MWD operations

Granular Activated Carbon (GAC)

- Groundwater aquifer has organics that can cause odor issues, such as “rotten-egg” or “sulfur” smell
- Bench testing of aeration showed that aeration alone was not sufficient to control odor
- Granular Activated Carbon (GAC) is effective at filtering out organics and improving odor; next step was to bench test different GAC filter media

GAC Pilot – Bench Testing

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GAC Pilot – Bench Testing



GAC Pilot – Bench Testing

- Testing Period: 11.9.16 through 1.24.17
- Evaluated Two Different GAC Media
 - Calgon Centaur 12x40 – Catalytic GAC
 - Calgon Filtrasorb 400 – Conventional GAC
- Treated 100% Groundwater
- Once, Daily, and Weekly Samples
 - Field – pH, temp, turbidity, sulfide, DO, ORP, FPA
 - Laboratory – TOC, iron, manganese, nitrate, TTHM, HAA5
- Evaluated Results
 - Sulfide Removal - YES
 - Odor Removal (FPA) – YES
 - Iron, manganese, turbidity, headloss, nitrate peaking – no concern

GAC Conceptual Design

- Capital Cost – \$1.7 million
- Annual O&M – \$450k
 - Based on two (2) month GAC media replacement estimate from pilot test results
 - Conservative estimate - larger GAC vessels likely to outperform pilot test vessels
- Annualized Cost – \$196/Acre-foot
- Funding Considerations
 - Utilization of additional groundwater reduces surface water costs
 - Adjudicated rights available for 80% of Zone 1 demand, and leasing rights for remaining 20% is available
 - Could also be expanded for Zone 2, and potentially Zone 3

Phase 1 (GAC) vs Phase 2 (MF)

- Water Subcommittee Recommendation:
 - Phase 1 – Construct GAC Facility at CWPF to achieve odor removal and improve DBP formation
 - Phase 2 – Construct membrane filtration facility, including nanofiltration and reverse osmosis, to remove TDS and Hardness
- Funding Considerations
 - Phase 1 results in increased groundwater usage, reduces imported water costs, which is built in source of funding
 - Phase 2 does not reduce imported water costs
 - Phase 1 should be first priority, but designed so as not to preclude future MF facility once future funding is identified

Phase 1 Project – CWPF GAC Facility

- Funding Plan for GAC Project
 - Capital Cost - \$1.7 million
 - CWPF Modifications - \$500k
 - Total Estimated Capital Cost - \$2.2 million
 - Does not include design, construction mgmt or project mgmt
- Funding Sources
 - Water Capital Fund
 - State Revolving Fund Loan
 - General Fund Loan
 - Other (Determined Not Eligible for MWD LRP)
- Reduced Imported Water Costs
 - Estimated between \$295k and \$500k, annually
 - These revenue savings would be utilized to pay off a portion or all of the GAC Project costs, over a set period of time

Phase 1 Project – Design

- Design Contract
 - The critical path in developing the Phase 1 project is design
 - Design includes development of the plans, specifications, and estimates package for a GAC Facility
 - Also includes coordination with the State Drinking Water Division
 - Design Cost of 15% of Capital Cost Estimate
 - \$330,000 Estimate
- Consultant Procurement Process
 - Standard RFP Process vs. Alternative Procurement
 - Alternative Procurement Chosen

Hazen Amendment No. 3

- Hazen Unique Understanding of CWPF
 - Integral part of the past 4 years meetings with State Drinking Water to understand required upgrades and modifications to CWPF and impacts on distribution system
 - Assisted in all water subcommittee meetings, performed water quality testing of the distribution system to fully understand how to meet the aesthetic standards to allow additional use of the City's groundwater
 - Performed third party review of the previous CWPF design, and were willing to "take over" said design to modify/add modifications per State requirements
- Purchasing Ordinance (MC 2-6.16 and 2-6.18) allows for sole source when economically advantageous, and when multiple proposals not feasible.
- Their previous scope and amendments have led to partial design of several components of the CWPF Phase 1 project
 - Lower resulting design cost
 - Avoids redo of project components
- Hazen Proposal
 - Fee of \$287,560 (13% of construction estimate)
 - Schedule – 34 weeks from Notice to Proceed (early summer 2018)

Questions?