MAPLETON WATER DISTRICT

Public Water System
OR 41-00507

LANE COUNTY, OREGON

Water System Master Plan

October 2024

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- Permit to Appropriate the Public Waters and Certificate of Water Right
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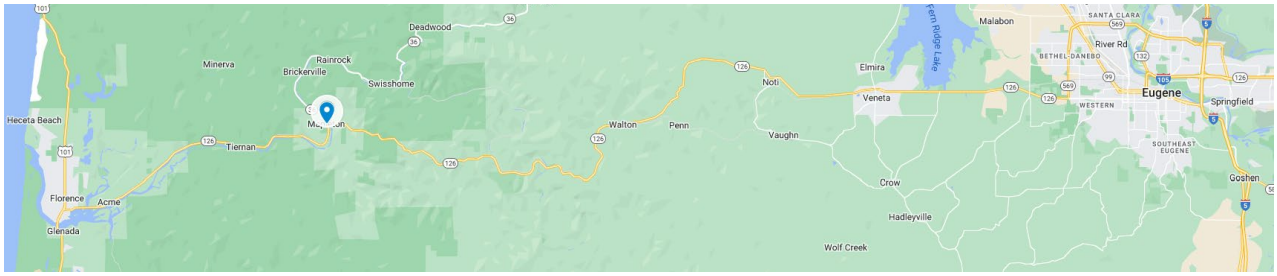
1 EXECUTIVE SUMMARY

1.1 Introduction and Overview

Mapleton is an unincorporated community in Lane County, Oregon, United States. It is located on Oregon Route 126 and the Siuslaw River, about 50 miles west of Eugene and 15 miles east of Florence. It is also the western terminus of Oregon Route 36. Refer to Figure 1-1 for proximity of the Mapleton Water District.

FIGURE 1-1: MWD PROXIMITY MAP



The Mapleton Water District ("MWD") was incorporated February 13, 1952. MWD is identified by public water system (PWS) ID number 41-00507 and classified as a community public water system. This water system supplies water to households, businesses, and the Mapleton K-12 school campus. The MWD currently has 250 connections and serves an approximate minimum of 547 residents within the water system's service area.

Civil West Engineering Services, Inc (CWES) was commissioned by MWD to complete this Water System Master Plan Update ("WMP") to determine the current state of the water system and to plan for future needs. There was a previous master water system plan by Systems West Engineers, Inc. in December 1995. This WMP is a 20-year planning document and complies with water system master planning requirements established under Oregon Administrative Rules (OAR) for Public Water Systems, Chapter 333, Division 61.

Funding in part for this study was from the American Rescue Plan Act and the Federal Environmental Protection Agency's Safe Drinking Water Revolving Loan Fund through the Sustainable Infrastructure Planning Projects program, co-administered by Oregon Health Authority and Oregon Business Development Department.

1.2 Purpose and Need

The purpose of this Plan is to document findings regarding MWD's current potable water system and make recommendations for improvements based upon providing reliable and secure safe drinking water, providing fire flows, and ensuring sufficient water storage.

The Plan will enable MWD to prepare for future growth and for water system improvements needed to address existing and future deficiencies such as system pressures, fire flows, deteriorating pipelines, storage, treatment, and redundancy.

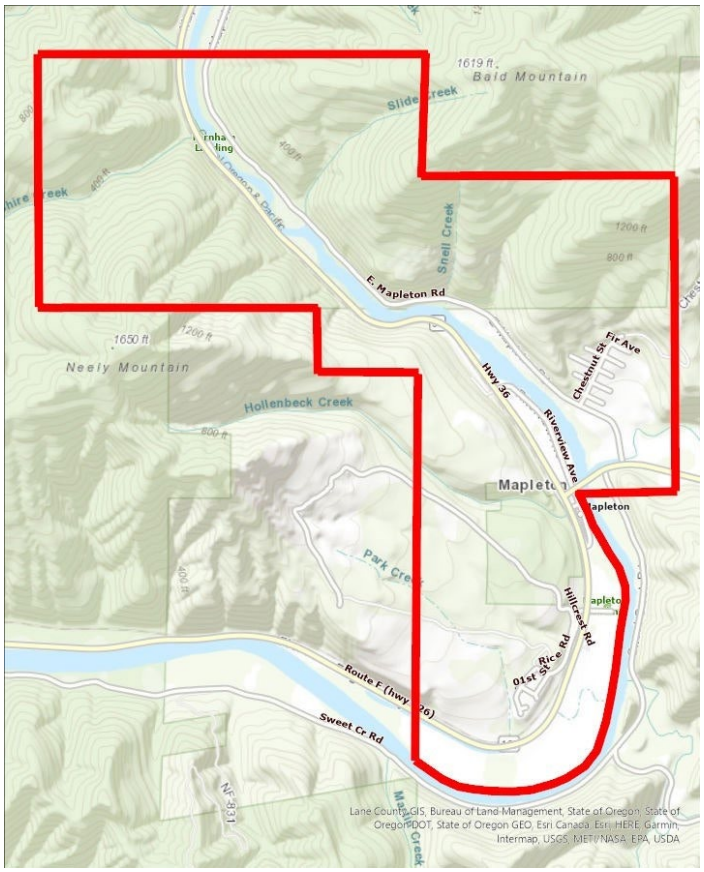
The goal of this master plan is to maintain safe drinking water for the area. This Master Plan includes:

- Basic information relevant to the water system.
- A review of the fundamental planning elements (design criteria) such as population, system capacity, water supply and demand, and fire flow requirements.
- A summary of each water system component and its existing condition and status.
- Identification of upgrades needed to address potential vulnerabilities and correct deficiencies.
- A summary of recommended capital improvements with anticipated costs for the improvements.
- Potential user rate impacts due to capital improvement projects.

1.3 Study Area/Service Area

The Study Area shown in Figure 1-2 encompasses the current water service area. The MWD is located at the intersection of State Hwy 36 and State Hwy 126. The water system extends to the north along Hwy 36 and to the south along Hwy 126. There is private property within the service area that could be developed.

FIGURE 1-2: MWD SERVICE AREA



1.4 Existing Water System and Recommended Improvements

The following is a summary of the existing water system and recommended capital improvements. Supporting information and additional details are found in Sections 3, 4, 5 and 6.

1.4.1 Water Rights

MWD has surface water rights and receives its drinking water from one source, Berkshire Creek. The water right is as follows:

Berkshire Creek Surface Water:

- Permitted Use Rate: 0.45cfs (202gpm) = 290,900 gallons/day
- Annual use – year-round community use
- Elevation: 300-feet +/-
- Priority Date: July 7, 1952

As of the current year (2024) and in the foreseeable future (2044), this water right is considered sufficient. Nevertheless, a redundant and backup source of water and associated water right away from Berkshire Creek is highly recommended.

1.4.2 Water Supply Source

Reportedly, the water supply from Berkshire Creek has been dependable and reliable since the existing system was installed. Berkshire Creek is an excellent source of water and has favorable qualities. However, due to landslides and other concerns, MWD faces an emergency situation that could impact the water supply, raw water storage, and the raw water transmission to the water treatment plant.

MWD is currently pursuing funding from USDA Rural Development through the Emergency Community Water Assistance Grants (ECWAG) Program to begin to make necessary improvements and upgrades to enhance the ability to safely and reliably deliver water (Phase 1). It is anticipated this funding source will not be sufficient to make all necessary improvements and a Phase 2 set of projects will be necessary.

1.4.3 Water Quality and Treatment Plant (WTP)

The water treatment plant is located in the northern portion of MWD adjacent to Berkshire Creek. The WTP sits at approximate elevation of 88-feet. Currently a new WTP is being constructed. The new WTP will include installation of a new packaged membrane filtration system provided by Filter Tech Systems Inc., a new onsite sodium hypochlorite generation system, and a new standby generator and automatic transfer switch.

There is no recommendation as this project has already been designed and currently in construction.

1.4.4 Water Storage

MWDs existing water storage consists of two 300,000-gallon tanks, both located on the same property in the southwestern part of the District. The elevation of the tanks is approximately 183 feet. Tank #1 is visibly corroded and is in dire need of repainting.

It is recommended Tank #1 (welded steel tank) and Tank #2 (bolted steel tank) be thoroughly inspected. Both tanks are anticipated to need varying degrees of maintenance and replacement of cathodic protection. Tank #1 must be repainted on the exterior and potentially on the interior (inspection results pending).

It is also recommended a new 300,000-gallon storage tank be constructed, preferably on the east side of the river near the school. Currently funding from FEMA and Lane County is available for this new tank.

1.4.5 Water Distribution System

Pipes from the 1950s still exist in the water system. The current Mapleton Water District water distribution system is largely composed of 70-year-old lines, which leak 67% of the water produced before it reaches the customers. This inefficiency places a unnecessary burden on the sole raw water source at a time when climate change is negatively impacting its volume of available water.

The best record of the existing system is from 1995 drawings done by Systems West Engineers, Inc. It appears they documented the system along with improvements and expansions at the time. From their description of the distribution system (which appears to be accurate today):

> "The current pipe distribution system which delivers water to the District customers is a mixture of various pipe materials, sizes and alignments. The water transmission and distribution system consists of about 6.7 miles of 1-inch through 12-inch pipe. The distribution of these pipe sizes is shown in Table 3-2. Over half of the pipe is 6-inch diameter and one quarter of the pipe is 8-inch. The District has installed PVC, steel, asbestos cement and cast iron pipe. Asbestos cement pipe was the original material installed when the District was formed and constituted almost 75 percent of the total pipe in the system (1995 Plan)."

The distribution system is losing a considerable amount of water, likely attributed to the age of the pipe and its material. The only booster pump station in the system, located on Chestnut Drive, is also old and has been poorly maintained.

It is recommended the booster pump station be replaced at the time the pipeline system is replaced. It is recommended the entire distribution system be replaced as quickly as funding can become available while keeping user rates within an acceptable tolerance. With the overall distribution system replacement being such a large and financially burdensome undertaking, it is recommended to create smaller projects. As such, the distribution system was divided into five smaller service areas and prioritized as follows:

1. Millview Addition (Rice Road) Neighborhood
2. Chestnut Street Neighborhood and School (including pipes from the existing tanks, river crossing, and pump station)
3. Riverview Avenue Neighborhood
4. Southern System Pipelines
5. Northern System Pipelines

1.5 Recommended Improvements and Costs

The Capital Improvement Plan (CIP) summarizes the recommended system improvements that are anticipated beyond routine maintenance practices. All improvements are wrapped up into four priorities. This CIP includes opinions of probable costs for the recommendations. For convenience, Tables 6-1, 6-2, and 6-3 are shown below.

Table 6-1 summarizes the completed set of current and recommended project improvements and opinions of probable costs for upgrading the water system. Refer to Sections 4 and 5 for detailed breakdown and justification for the specific improvements.

TABLE 6-1: ALL IMPROVEMENTS – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District Upgrades			
Description	**Total Cost**	**Grant Funding***	**District Cost**
Water Treatment Plant (WTP) Upgrades	$ 3,390,000.00	$ 1,890,000.00	$ 1,500,000.00
Raw Water Supply Improvements (ECWAG - Phase 1)	$ 1,000,000.00	$ 1,000,000.00	$ -
Raw Water Supply Improvements (Phase 2)	$ 2,500,000.00	$ -	$ 2,500,000.00
Water Storage (Tanks 1 and 2 Refurbishment)	$ 818,000.00	$ -	$ 818,000.00
New Water Storage Tank	$ 3,421,000.00	$ 2,700,000.00	$ 721,000.00
Distribution System	$ 18,181,000.00	$ 800,000.00	$ 17,381,000.00
Opinion of Probable Cost Total (rounded)	**$ 29,310,000.00**	**$ 6,390,000.00**	**$ 22,920,000.00**

The cost of making all the recommended improvements and upgrades at the same time would be a major financial burden. Therefore, priorities have been established and are presented in Sections 4, 5, and 6. As discussed and prioritized with MWD, Priority 1 include several projects that are already underway (WTP upgrades); pending successful funding (Raw Water Supply Improvements); needs to be done soon (Existing Water Storage Tanks Refurbish); and funding already in place (Millview Addition / Rice Road Neighborhood Distribution System). Table 6-2 Priority 1 is shown below for convenience.

TABLE 6-2: PRIORITY 1 – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District - Priority 1 Projects			
Description	**Total Cost**	**Grant Funding***	**District Cost**
Water Treatment Plant Upgrades	$ 3,390,000.00	$ 1,890,000.00	$ 1,500,000.00
Raw Water Supply Improvements (ECWAG - Phase 1)	$ 1,000,000.00	$ 1,000,000.00	$ -
Water Storage (Tanks 1 and 2 Refurbishment)	$ 818,000.00		$ 818,000.00
Distribution System - Rice Road Neighborhood	$ 854,000.00	$ 800,000.00	$ 54,000.00
Opinion of Probable Cost Total (rounded)	**$ 6,062,000.00**	**$ 3,690,000.00**	**$ 2,372,000.00**

Priority 2 (Table 6-3) consists of projects pending finalizing funding (new water storage tank, via FEMA) and continued improvements to the raw water supply system and more distribution pipeline replacement (both improvement projects need funding).

TABLE 6-3: PRIORITY 2 – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District - Priority 2 Projects			
Description	**Total Cost**	**Grant Funding**	**District Cost**
Raw Water Supply Improvements (Phase 2)	$ 2,500,000.00	$ -	$ 2,500,000.00
New Water Storage Tank	$ 3,421,000.00	$ 2,700,000.00	$ 721,000.00
Distribution System - Chestnut Street and School	$ 4,728,000.00	$ -	$ 4,728,000.00
Opinion of Probable Cost Total (rounded)	**$ 10,649,000.00**	**$ 2,700,000.00**	**$ 7,949,000.00**

Priorities 3 and 4 found in Tables 6-4 and 6-5 complete the distribution system improvements. It should be noted that the order of pipeline replacement is not critical. What pipelines are replaced and when will primarily be dependent on the number of repairs being experienced and other needs at that time, and what best fits and competes for grant funding.

1.6 Project Financing and User Rate Projections

For convenience, Tables 6-6 and 6-7 are shown below. The tables break down the financial impact of making all the recommended improvements or just Priority 1 respectively. Although the user rates presented in the first table are not practical, they do provide a magnitude of

impact that could exist without financial support. The improvements expenses are spread evenly over all existing 250 water service connections. The tables show different funding scenarios and the impact on user rates that grant funds would have. Refer to Table 6-8 for user rate increase projections from Priority 2.

TABLE 6-6: ALL IMPROVEMENTS – POTENTIAL AVERAGE WATER USER RATE

ALL Improvements	**No Grant, 2.00% Loan**	**25% Grant**	**50% Grant**
Capital Cost	$22,920,000	$22,920,000	$22,920,000
Loan Needed	$22,920,000	$17,190,000	$11,460,000
Interest Rate	2.000%	2.000%	2.000%
Loan Period (yrs)	30	30	30
Annual Annuity	$1,023,376.22	$767,532.16	$511,688.11
Monthly Income Required	$85,281.35	$63,961.01	$42,640.68
Monthly Income Reqd' w/ 20% reserve	$102,337.62	$76,753.22	$51,168.81
Number of EDUs (Current)	250	250	250
Monthly Cost per User	**$409.35**	**$307.01**	**$204.68**
Current Base Rate + Usage (Res.)	$100.97	$100.97	$100.97
New Average Residential Water Bill	**$510.32**	**$407.98**	**$305.65**

TABLE 6-7: PRIORITY 1 – POTENTIAL AVERAGE WATER USER RATE

Priority 1	**No Grant, 2.00% Loan**	**25% Grant**	**50% Grant**
Capital Cost	$2,372,000	$2,372,000	$2,372,000
Loan Needed	$2,372,000	$1,779,000	$1,186,000
Interest Rate	2.000%	2.000%	2.000%
Loan Period (yrs)	30	30	30
Annual Annuity	$105,909.62	$79,432.21	$52,954.81
Monthly Income Required	$8,825.80	$6,619.35	$4,412.90
Monthly Income Reqd' w/ 20% reserve	$10,590.96	$7,943.22	$5,295.48
Number of EDUs (Current)	250	250	250
Monthly Cost per User	**$42.36**	**$31.77**	**$21.18**
Current Base Rate + Usage (Res.)	$100.97	$100.97	$100.97
New Average Residential Water Bill	**$143.33**	**$132.74**	**$122.15**

1.7 Conclusion and Recommendations

1. There is an urgency to replace all the distribution system. It is highly recommended the District pursue all means to replace all pipelines:

    - Priority 1 Millview Addition Neighborhood. This is simply the first priority since there is already funding from EPA available for this work.
    - Priority 2 Chestnut Street neighborhood and school. This area serves a large portion of residents and the local school – improvements are imperative. Replacing and upgrading the Chestnut booster pump station is also critical.

- As time passes and funding is made available, the particular order and priority of remaining pipelines that are replaced around the District may change. However, Priority 3 has been developed to be used for the next round of funding pursuits.
- If possible, and should the opportunity present itself, replacing all the pipeline in a single project would be the most cost-effective approach.

2. Refurbish and paint the existing storage tanks.

3. Construct a new storage tank on the east side of the river.

4. It is highly recommended the District consider and pursue additional water right and an additional water source in a different location than Berkshire Creek.

5. Continue to apply for grants and loan forgiveness through the various funding sources.

2 DESIGN CRITERIA

2.1 General

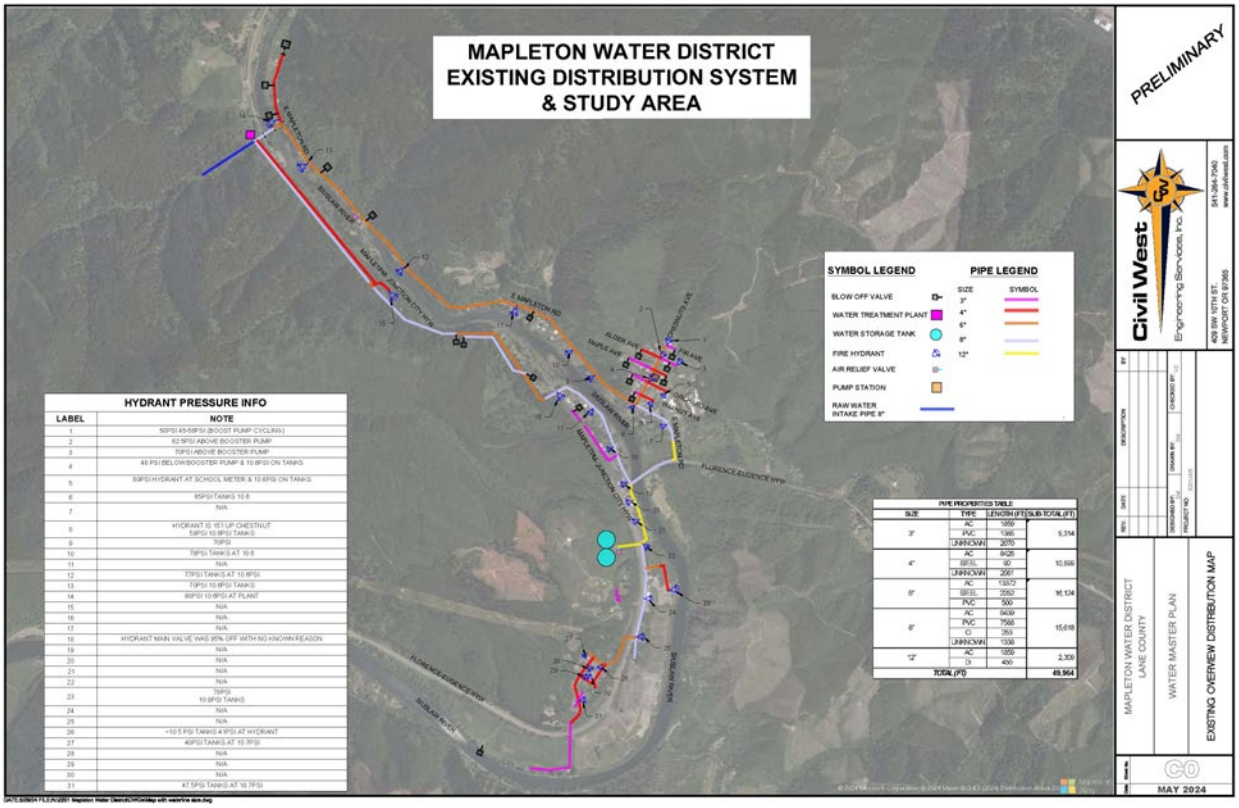
This section details the various parameters and design criteria the water system is evaluated against and serves as the basis for identifying needed improvements. These criteria include an evaluation of population, present and future potable water demands, and other factors affecting the water system.

2.2 Study Area and Planning Period

Mapleton Water District ("MWD") is in Lane County west of Eugene and is an unincorporated community. The MWD is located at the intersection of State Hwy 36 and State Hwy 126. The water system extends to the north along Hwy 36 and to the south along Hwy 126. The Study Area shown in Figure 1-2 encompasses the current water service area.

Research reveals there is no evidence of natural disasters affecting the water system in recent years. However, it is crucial to acknowledge the potential vulnerability of the water system to future natural disasters, particularly earthquakes that could induce landslides.

FIGURE 2-1: EXISTING DISTRIBUTION SYSTEM & STUDY AREA



2.3 Population Projections

2.3.1 Current and Future Population

MWD currently serves as the exclusive provider of water to the Mapleton community. As of the 2020 census, the immediate community of Mapleton had a total population of 493 (according to the American Community Survey Census Data the population in the census zip code area is 845). There are currently 250 active water accounts, of which 238 are residential homes. The water system serves the Mapleton School District year-round of approximately 147 students. Generally, an average home statistically consists of approximately 2.3 people. As such, as of 2024, the approximate population for the water district is 238 x 2.3 = 547 people.

Historical population data and growth trends for the community are not specifically documented. Growth rate estimate was obtained from the Coordinated Population Forecast 2021-2071 for Lane County prepared by the Population Research Center, Portland State University, June 30, 2021:

> "The anticipated Average Annual Growth Rate (AAGR) reaches 0.8% between 2021 and 2025 and the growth rate declines to about 0.4% by 2045. Recent trend showed the county-wide population growth rate varied between 0.6% to 1.1% since 2000, while the forecast indicates the growth rate remains under 1% in the next 50 years." (3.1 Historical Trend and Population Forecast)
>
> "Sub-area populations within and outside the urban growth boundaries (UGBs) are forecasted using the housing unit method. In general, populations within all the UGBs in Lane County will continue to grow through 2070. From 2020 to 2045, Lane County has AAGR of 0.6%." (3.7 Sub-Area Population)

0.6% growth rate will be used for purposes of this study. As such, a future 20-year population is projected to be 617 people, or approximately 268 active *residential* water customers (an increase of approximately 30 connections). Table 2-1 shows population growth over 5-year increments.

TABLE 2-1: CURRENT AND FUTURE POPULATION PROJECTION

	Year				
	2024	2029	2034	2039	2044
MWD Population	*547*	*564*	*581*	*599*	*617*
MWD Residential Water Customer	238	245	253	260	268
Commercial, other	12	*12*	*13*	*13*	*14*
TOTAL CONNECTIONS	250	258	265	273	282

2.4 Current and Future Water Demands

2.4.1 Current Water Demands

The information and data that follows was obtained from MWD and was used in determining current demand. Two total flows were obtained: Water Produced (meter at the water treatment plant) and Water Sold or consumed (total of all individual meters). Due to inaccurate water measurements from old and unreliable meters as well as previous issues surrounding the water

treatment plant, MWD only has two years of data. Table 2-2 shows both the Water Sold and Water Produced (along with the two highest users, Mapleton School District and Maple Lane RV Park, for information only).

TABLE 2-2: MWD WATER PRODUCED AND SOLD

Month	Annual Production		Annual Consumption Total Sold		Mapleton SD - Total Sold		Maple Lane RV - Total Sold	
	ft3	gallons (rounded up)	ft3	gallons (rounded up)	ft3	gallons (rounded up)	ft3	gallons (rounded up)
Jan-22	612,965	4,585,000						
Feb-22	565,972	4,234,000	261,701	1,958,000				
Mar-22	714,194	5,343,000	82,143	615,000				
Apr-22	694,555	5,196,000	115,685	866,000				
May-22	541,578	4,052,000	130,403	976,000				
Jun-22	526,055	3,935,000	133,486	999,000				
Jul-22	580,960	4,346,000	203,401	1,490,000	4,497	34,000	11,911	90,000
Aug-22	576,103	4,310,000	207,675	1,545,000	24,533	184,000	10,298	78,000
Sep-22	678,777	5,078,000	223,259	1,670,000	29,924	224,000	10,040	76,000
Oct-22	622,453	4,656,000	127,152	952,000	5,662	43,000	5,708	43,000
Nov-22	614,176	4,595,000	120,631	899,000	4,657	35,000	6,541	49,000
Dec-22	563,087	4,212,000	128,291	960,000	4,551	35,000	6,434	49,000
	Year Total	**54,542,000**	**Year Total**	**12,930,000**				
		149,500		**35,500**	**Average Daily Demand (ADD)**			
Jan-23	647,291	4,842,000	109,651	821,000	4,956	38,000	6,606	50,000
Feb-23	519,532	3,887,000	161,249	1,207,000	5,277	40,000	6,355	48,000
Mar-23	518,975	3,882,000	107,525	805,000	4,629	35,000	5,748	43,000
Apr-23	537,930	4,024,000	101,133	757,000	5,192	39,000	5,716	43,000
May-23	439,040	3,285,000	166,356	1,245,000	11,444	86,000	8,512	64,000
Jun-23	395,011	2,955,000	136,957	1,025,000	6,467	49,000	6,759	51,000
Jul-23	459,506	3,438,000	216,489	1,617,000	15,970	120,000	12,493	94,000
Aug-23	523,181	3,914,000	229,666	1,718,000	29,573	222,000	11,836	89,000
Sep-23	293,086	2,193,000	151,527	1,134,000	12,277	92,000	10,392	78,000
Oct-23	300,270	2,247,000	119,950	898,000	9,870	74,000	8,783	66,000
Nov-23	356,678	2,668,000	134,871	1,009,000	8,948	67,000	8,926	67,000
Dec-23	298,328	2,232,000	101,000	756,000	8,401	63,000	7,624	58,000
	Year Total	**39,567,000**	**Year Total**	**12,992,000**	**Year Total**	**925,000**	**Year Total**	**751,000**
		108,500		**35,600**	**Average Daily Demand (ADD)**			
Jan-24	371,382	2,778,000	121,839	912,000	7,492	57,000	8,654	65,000
Feb-24	317,159	2,373,000	120,830	917,000	10,095	76,000	8,757	66,000
Mar-24	353,808	2,647,000	111,215	832,000				
Apr-24	351,939	2,633,000	126,744	949,000				

The difference between water sold and produced is classified as “water loss,” typically associated with leaking pipes, water treatment operations and backwash, fire hydrant testing, and firefighting. Table 2-3 summarizes the water loss in the system.

TABLE 2-3: WATER LOSS (GALLONS)

	2022	2023
Water Produced	54,542,000	39,567,000
Water Sold	12,930,000	12,992,000
Difference	41,612,000	26,575,000
% Diff - Water Loss	**76%**	**67%**

Water loss is an unavoidable part of distribution systems, yet too much can stress the supply and efficiency of the system. The average water loss (unaccounted for water) for systems is estimated to range from 15% to 35% depending primarily on the age of the pipelines and the material of the pipeline. 10% to 20% water loss is the target.

With the high-water loss, the first thought would be accuracy of the meters and the management of the information. The District is confident with both the sold and produced water amounts. Other justification, therefore, for such severe water loss could be from: (1) a very porous distribution system and/or (2) unknown water users, people who have tapped into the system without the District's knowledge. Based on historical and ongoing experience from MWD personnel, the current water distribution pipelines would appear to be the primary culprit for such extreme water loss.

In a system, water must be produced sufficient to be able to deliver actual usage demand (water sold) plus account for water loss. Since there is such a large disparity between water produced and water sold and knowing upgrades to the distribution system is a critical high priority, for purposes of this study, an average of water produced and water sold will be used to calculate future water demand projections. Current water demand characteristics are summarized in Table 2-4.

TABLE 2-4: CURRENT WATER CHARACTERISTICS (GALLONS)

Water Demand Characteristics	Produced	Sold	Average
Average Annual Demand (AAD)	47,054,500	12,961,000	30,007,750
Average Daily Demand (ADD)	128,916	35,510	82,213
Average Maximum Daily Demand (MDD) @ 2.5x	322,291	88,774	205,533
Average Peak Hour Demand (PHD) @ 5x (gal/day)	644,582	177,548	411,065

2.4.2 Future Water Demands

Using the current water demand (Average from Table 2-4) and the future population (Table 2-1) provides an average future water demand for the water system, or the Average Annual Demand (AAD). From the AAD other general future water demand characteristics can be calculated as described below.

1. The **Average Daily Demand (ADD)** is the average daily water demand (AAD/365 days).

2. The **Average Maximum Daily Demand (MDD)** is experienced on the highest demand day of the year, such as July 4th. The MDD is commonly used in sizing facilities to provide capacity for periods of high demand. Daily demand data is not available to explicitly calculate the MDD; therefore, Peaking Factors are used. Peaking Factors are multipliers applied to the demand parameter in question. Peaking factors between 2 and 2.5 are commonly used for MDD. To be conservative a Peaking Factor of 2.5 was applied to the ADD to approximate the MDD.

3. The **Average Peak Hour Demand (PHD)** is the highest demand experienced during any given single hour. PHD is commonly experienced during the early morning hours when many water users are bathing, cooking, and engaging in other activities that require high water use. PHD is used to size facilities for short periods of extreme demand. Peaking factors between 3 and 5 are commonly used for PHD. To be conservative a Peaking Factor of 5 was applied to the ADD to approximate the PHD.

Table 2-5 summarizes the future water demand characteristics. The baseline demand quantities for MDD and PHD were calculated using peaking factors.

TABLE 2-5: FUTURE WATER DEMANDS

Demand Parameter	Peaking Factor	2024	2029	2034	2039	2044	2024 per capita
Average Annual Demand - AAD (gallons)		30,007,750	30,918,850	31,857,614	32,824,880	33,821,514	54,819
Average Daily Demand - ADD (gal/day)	1.0	82,213	84,709	87,281	89,931	92,662	150
Average Max. Day Demand - MDD (gal/day)	2.5	205,533	211,773	218,203	224,828	231,654	375
Average Peak Hour Demand - PHD (gal/day)	5.0	411,065	423,546	436,406	449,656	463,308	751
Maximum Monthly Demand (gal/day)	1.7	139,762	144,006	148,378	152,883	157,525	255

The maximum daily demand in 50 years is projected to be approximately 278,000 gallons.

According to American Water Works Association (AWWA) statistics, each person in a single-family home uses 74 gallons of water per day on average. According to The National Environmental Education Foundation Oregon residents use 113 gallons/day. Generally, water use around 100-120 gpd/capita is considered reasonable. The ADD/capita above is excessive even compared to 113gpd/capita, further substantiating severe water loss in the system.

2.5 Fire Protection

According to the 2022 Oregon Fire Code, the minimum fire-flow requirements for one- and two-family dwellings not exceeding 3,600 s.f. shall be 1,000gpm for a duration of 1 hour (Table B105.1(1)). When square footage exceeds 3,600 or for other types of buildings the minimum fire flow is 1,500gpm for a duration of 2 hours. When flows of 1,750gpm or less are required a single fire hydrant is required to be accessible within 250 feet (200 feet on dead-end streets) resulting in a maximum hydrant spacing of 500 feet (400 feet on dead-end streets).

For purposes of this study a fire flow of 3,000gpm for three hours was used to fight a fire at the school.

2.6 Water Storage Criteria

General recommendations and definitions for various storage components are presented here. Water storage needs encompass volume for equalization, emergency situations (such as water supply interruptions), and firefighting demands. It is recommended total storage be considered the sum of all three.

- **Equalization Storage (peaking storage)** is required to meet peak hour demands in excess of the supply pumping capacity. For planning purposes, equalization storage is typically set at 20-25% of the MDD for small water systems.

- **Emergency Storage** is required to protect against a total loss of water supply such as would occur with a broken transmission line between the sources and the tanks, equipment breakdown, or source contamination. Emergency storage should be an adequate volume to supply the system's ADD for the duration of a possible emergency. For most systems, emergency storage should be equal to one maximum day of demand or 2.5 to 3.0 times the ADD.

- **Fire Reserve** storage is needed to supply fire flow throughout the water system to fight a major fire. Per the 2022 Oregon Fire Code, the minimum fire-flow and duration requirements are based on the size and occupancy of the buildings. For the MWD community, a fire flow of 1,000-gpm for 1 hour is used for residential buildings. The minimum fire flow and flow duration for buildings other than one and two-family dwellings shall be determined according to Oregon Fire Code Appendix B. The required fire flow for a building shall not exceed the available GPM in the water delivery system at 20 psi.

Table 2-6 shows the maximum *future* water storage needs based on the above three water storage criteria.

TABLE 2-6: WATER STORAGE

Storage Type	Description	2044 Capacity Needs (gal)
Equalization Storage	25% of MDD	57,914
Emergency Storage	3 times ADD	277,985
Fire Reserve Storage	3,000 gpm for 3 hours	540,000
Total Storage - Fire Protection		**875,899**

The purpose of a water storage tank(s) is to maintain water service pressure, maintain emergency storage supply and pressure during power outages, and provide equalization volume to meet peak demands, such as fire flows and times of the day when water use is high. Storage provides increased operating conveniences by providing sources of supply throughout the night when utility employees may not typically be at work. Another benefit of ample storage is it can save on the wear-and-tear of pumps and treatment equipment in both operation and maintenance costs by reducing equipment cycling times.

2.7 Distribution Network Criteria

Distribution mains are typically sized to convey projected maximum day flows plus simultaneous fire flows while maintaining at least 20 psi at all connections or projected peak hourly flows while maintaining approximately 40 psi, whichever case is more stringent. Looped mains should be at least six (6) inches in diameter to provide minimum fire flow capacity. The State of Oregon requires a water distribution system be designed and installed to maintain a pressure of at least 20 psi at all service connections (at the property line) at all times, even during fire flow conditions. OAR 333-061-0050 governs the construction standards for water systems including distribution piping. The size and layout of pipelines must be designed to deliver the flows indicated above.

The installation of permanent dead-end mains and dependence of relatively large areas on a single main should be avoided. In all cases, except for minor looping using 6-inch or larger pipes, a hydraulic analysis (computer modeling) should be performed to ensure adequate sizing.

PVC pipe has a life expectancy of 50-75 years when properly designed and installed. PVC pipe does not have good seismic characteristics. The aim of standards for system pressures are to provide safe and reliable service to water users under a variety of system conditions. If pressures are too high, damage can occur within the distribution system and at points of use. If pressures are too low, a variety of issues arise, including potential for back flow contamination, and low or no water availability. The recommended distribution pressure standards for new connections are summarized in Table 2-7.

TABLE 2-7: RECOMMENDED DISTRIBUTION

System Scenario	Pressure (psi)	
Peak Hour Demand Event	40+	Minimum
Maximum Day Demand Plus Fire	20+	Minimum
Mainline Pressures	100	Maximum, w/o special pipe design
Pressure at service w/o Pressure Regulator	80	Maximum

2.7.1 Computer Hydraulic Model – Distribution System Evaluation

The District's water distribution system was modeled using AutoDesk WaterInfo Pro, a GIS based hydraulic modeling program. This model uses a system schematic and current and projected flow conditions to predict distribution system performance. In order to accurately define future capacity needs, identify current system issues, and describe projects to resolve those issues, a computer model of the distribution system was developed to mimic the system in spatial layout, elevation, storage tank locations, pump station function, and pipe sizes. The maps provided by the District were used to create a base map, Google Earth was used to determine system-wide elevations.

3 EXISTING WATER SYSTEM

Much of the existing water system is still from the 1950s, when the original infrastructure was constructed. There appears to be some improvements since then, in particular around 1995 when some new pipelines were installed and a new tank was in process of being constructed.

Systems West Engineers, Inc. prepared a Master Water System Plan in December 1995 ("1995 Plan"). As relevant, this WMP will be used to describe components and features of the water system and service area that still exists. Much of the improvements designed in 1995 are identified in this 1995 Plan.

This section describes the existing water system and its various components as best as can be established. In summary, the Maple Water District (MWD), PWS 41-00507, existing water system includes:

a) One surface water supply sources
    a. Berkshire Creek
b) Water treatment plant
c) Two storage tanks:
    a. 300,000 gallon welded steel (constructed 1952)
    b. 300,000 gallon bolted steel tank (constructed 1999)
d) Water pipeline distribution system with two pressure zones:
    a. One pressure zone serves most customers, with ground elevations ranging from approximately 80 to 100 feet above mean sea level (msl). Pipe sizes range from 2-inch to 12-inch.
    b. One distribution booster pumping station serving approximately 30 homes with the highest home at approximately 190 feet above msl.
e) Individual water meters
f) Fire hydrants throughout the community.

Information about this water system is available on Drinking Water Services' Data Online website:

https://yourwater.oregon.gov/inventory.php?pwsno=00507

Compliance status and water quality data reported to Oregon Health Authority can be found using the links at the bottom of the main page.

This Section will discuss the five key components of a water system:

1) Water Rights.
2) Source of supply, reliability, and access.
3) Water Quality/Treatment.
4) Water Storage.
5) Distribution System.

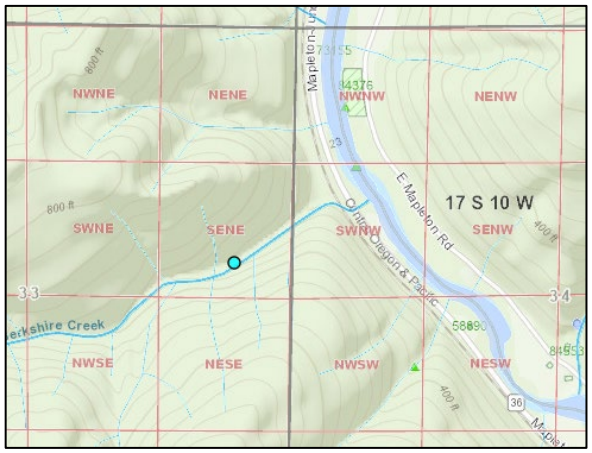
3.1 Water Rights

The only water source and therefore the only water right for MWD is on Berkshire Creek. Although it is rumored there is water right on Walker Creek, according to State records, there is no water right found. Information regarding MWD water rights was obtained from the Oregon Water Resources Department, Water Rights Information Query (website below).

https://apps.wrd.state.or.us/apps/wr/wrinfo/wr_details.aspx?snp_id=80059

- Application S-27426
- *Permit to Appropriate the Public Waters S-21595*
- Certificate of Water Right 27668)
- Priority Date: July 7, 1952.
- Permitted Use Rate: 0.45cfs (202gpm) = 290,900 gallons/day
- Annual use – year-round community use

FIGURE 3-1: MWD POD



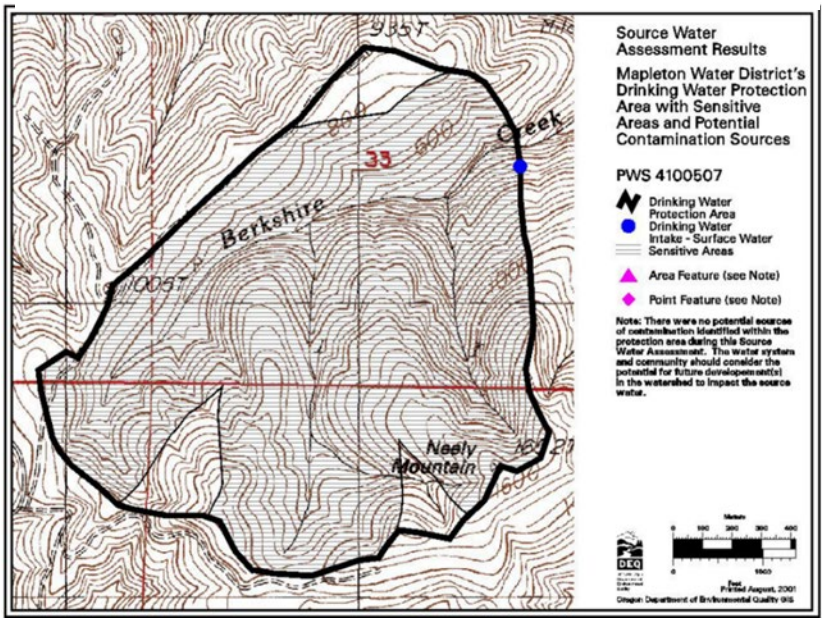
The Appendix has a copy of the Permit to Appropriate the Public Waters and Certificate of Water Right. Figure 3-1 illustrates with a green dot the Point of Diversion (POD) on Berkshire Creek.

According to 2.4.2 the maximum daily demand in 50-years could be as high as 278,000 gallons. The permitted water right is 290,900 gal/day. There is sufficient water right to provide water to the community for the foreseeable future.

3.2 Water Supply and Source Reliability

Reportedly, the water supply from Berkshire Creek has been dependable and reliable since the existing system was installed. Reportedly, the creek has never dried up. However, MWD has had periods in the late summer and fall when Berkshire Creek has not had sufficient flow to provide all of the community's needs. At such times voluntary rationing programs have been initiated to control demand. A stream gauge does not currently exist which would help quantify the annual yield of the watershed.

FIGURE 3-2: SOURCE WATER PROTECTION AREA



The boundaries of the Drinking Water Protection Area are illustrated on Figure 3-2. Per the Source Water Assessment Report, August 27, 2001:

> "The drinking water for Mapleton Water District is supplied by an intake on Berkshire Creek. This public water system serves approximately 750 citizens. The intake is located in the Lower

> Siuslaw River Watershed in the Siuslaw Sub-Basin of the Northern Oregon Coastal Basin. The geographic area providing water to Mapleton Water District's intake (the drinking water protection area) extends upstream approximately 2.5 miles in a westerly to southwesterly direction and encompasses a total area of 0.78 square miles. The elevation change from the upper edge of the watershed to the intake is approximately 1,350 feet. Mapleton Water District's intake is located at an approximate elevation of 300 feet as Berkshire Creek flows into the valley floor from the foothills."
>
> "The delineated drinking water protection area is dominated by public forestlands. No potential sources of contamination were identified within the protection area. One potential source of contamination, the possible development of an Asphalt Batch Plant within an existing rock quarry, was identified outside the drinking water protection area. This potential contaminant source is included in this assessment since it poses a relatively moderate risk to the drinking water supply. This provides a quick look at the existing potential sources of contamination that could, if improperly managed or released, impact the water quality in the watershed."

Berkshire Creek is an excellent source of water and has favorable qualities which include remote access yet close to the District service area. Its rugged terrain provides natural protection from many sources of contamination. Possibly the most negative aspect of the basin is its geology. The steep slopes have experienced numerous landslides including a slide in 1974 which caused considerable damage to the District's facilities. The Berkshire Creek basin is small (estimated 833 acres of drainage area to the system intake). As a result of its natural protection and small size, Berkshire Creek typically provides high quality water (1995 Plan).

An Updated Source Water Assessment (February 2017) supplements the original Source Water Assessment and is "intended to provide information and resources to assist you and your community to implement local drinking water protection efforts."

At the time of writing this report, MWD was pursuing funding from USDA Rural Development (RD) through the Emergency Community Water Assistance Grants Program (ECWAG) for access road improvements and raw water transmission main replacement.

> "While the District proceeds expeditiously with the planned WTP upgrades, they face an emergency situation associated with their failed settling basin and aging transmission pipeline that is impacting their ability to safely and reliably deliver water which meets the standards set forth by the Safe Drinking Water Act (SDWA). Key challenges facing the District include:
>
> 1. **Raw water turbidity spikes impacting the treatment system.** During storm events, raw water with very high turbidity inundates the current, temporary membrane water treatment system. Heavy storms in 2022 and 2023 caused a large tree to fall on the existing settling basin, and damaged the structure so that it no longer removes solids because it cannot be safely maintained and cleared of existing sediment. Even with a new membrane system, coarse solids removal from the raw water will be needed for any membrane system to function properly.
> 2. **Land movement along the access road and pipe alignment.** Landslides along the raw water transmission main route threaten the viability of the existing, aged raw water pipeline. It was recently damaged from a landslide and the risk of additional slides along the pipe alignment is substantial.

3. **Falling trees are a threat to infrastructure and personal safety.** A tree recently fell on the raw water settling basin, and several other trees are in danger of falling. The instability of these trees threatens the integrity of the raw water transmission main and access for maintenance.
4. **Failing culverts could potentially wash out the access road and the raw water transmission main.** An existing culvert along the access road is undersized and likely to very soon washout the roadway and raw water transmission main. During a recent storm, the culvert backed up, and stormwater overflowed onto the road and washed away most of the gravel, leaving the road impassible without a four-wheel drive vehicle.

"…recent emergency events have posed an immediate threat to MWD's raw water transmission pipeline and its ability to serve its customers. These emergency events and risk of imminent emergency events, which could cause a loss of water quality and quantity to their public water system, have caused the District to seek ECWAG funding to address the risks.

"In response to recent concerns about land movement along the access road above the WTP, the District commissioned a landslide hazard evaluation from Delve Underground Inc. (Delve). Section 3.1 below summarizes the investigation, and the Delve Landslide Hazard Evaluation Report is included as Appendix D.

"Delve conducted a site visit and landslide hazard investigation on October 18, 2023 to determine the cause of a recent slope failure observed by District staff and the potential hazard it may pose to the District's existing raw water pipeline. Delve's report, dated December 2023, concludes that risk of land movement along the full length of the access road where the District's raw pipeline is located, poses significant danger to the integrity of the pipeline, especially in the event of a seismic event. It was further determined that the existing culverts under the roadway pose a high risk of localized flooding and debris flow along the pipe alignment due to the steep slopes and narrow valley.

"Due to concerns associated with protecting the aged raw water pipeline in the area of current land movement as well as the potential for additional land movements along the full length of the access road and pipeline route, Delve recommends the raw water pipeline be replaced with a continuous high-density polyethylene (HDPE) pipeline with butt-welded joints or hazard resilient ductile iron pipe (HRDIP) that will better withstand future land movement." (Simplified Engineering Report, February 2024, Wes Yost)

3.3 Intake Structure and Raw Water Delivery

The intake structure was completed in the summer of 1953. The only description found of the original intake is from a faded "Description of Works" found on the Application for Permit to Appropriate the Public Waters of the State of Oregon. It appears the original intake structure was a "Catch basin of concrete with French Drain constructed…6-inch pipe outlet." Then in 1987 the inlet structure

was rebuilt along with reconstructing the 10,000 gallon storage/settling basin and installing a new 10-inch ductile iron pipeline between the inlet and storage structures.

The surface intake structure is approximately 1,820 feet upstream from the MWD treatment plant. The Intake elevation is approximately 330-feet +/- (approximately 250 feet above the WTP).

> "Raw water from the District's Berkshire Creek intake is routed to a 10,000-gallon concrete storage/settling basin located approximately 120 feet downstream of the intake. Raw water is delivered to the WTP through a 1,700 lineal foot (LF) pipeline which runs along an access road as shown in Figure 1. The District's raw water pipeline and access road are located in an easement on US Forest Service property. The existing raw water pipeline from the settling basin to the WTP is 8-inch asbestos cement (AC) pipe that is approximately 70 years old and well beyond its useful service life. Photos showing the existing access road along the raw water pipeline alignment are included in Appendix B. A schematic which shows the raw water intake and settling box is included in Appendix C." (Simplified Engineering Report, February 2024, Wes Yost)

There is currently a pending Emergency and Imminent Community Water Assistance Grants (ECWAG) through USDA Rural Development for the upgrade and improvements to the intake and transmission pipeline. The grant would help, among other things:

> **"1. Replace raw water transmission main.** Construct a new 10-inch dimension ratio (DR) 21 HDPE raw water transmission main with butt fusion welded joints along the full 1,700 lineal feet alignment…
>
> **"2. Repair access road in areas of land movement.** Stabilize slopes in areas along the access road experiencing local land movement and relocate the raw water transmission main within the existing roadway, where required, to increase the stability of the pipeline.
>
> **"3. Remove damaged settling basin.** Remove the damaged settling box located approximately 125 feet downstream of the Berkshire Creek intake. This settling basin has been irreparably damaged; it no longer performs its intended function and cannot be safely maintained by the District.
>
> **"4. Remove falling trees along access road.** Remove trees along the access road threatening the District's raw water infrastructure.
>
> **"5. Replace undersized culverts.** Replace the two existing undersized culverts along the access road that are in imminent danger of failing and washing out the existing raw water transmission main.
>
> **"6. Install Raw Water Pre-Filter Separator.** Install a Lakos centrifugal separator on the raw water transmission main at the WTP upstream of the treatment system to remove settleable solids from the incoming raw water and protect the existing and future downstream treatment system from high turbidity events to the maximum extent possible. The separator will perform the function which the settling basin was intended to perform, but it will be easily maintained by the District staff and will include a timed purge valve to continually remove solids from the base of the separator to avoid clogging.

> **"7. Install a flood protection wall around the WTP.** Install a short flood protection wall to divert overflows from Berkshire Creek away from the WTP building." (Simplified Engineering Report, February 2024, Wes Yost)

3.4 Drinking Water Quality and Regulatory Standard Compliance

When a specific rule requirement is not met, Oregon Health Authority issues a violation. At the time of writing this report, the water system had six (6) unaddressed rule violations, but no serious water contamination-related issues. Recent violations include pH excursions, likely due to faulty equipment, failure to complete annual testing, and late monthly reporting. Any violations that have been issued for this water system can be found at the following link:

https://yourwater.oregon.gov/violsum.php?pwsno=00507

The Cross Connection and Backflow Prevention Annual Summary Report is a requirement for all community water systems in Oregon. Community water systems must report the requested information on their cross-connection control programs each year to the Oregon Health Authority. It appears the District is up to date on this report.

MWD staff have completed the required 2024 Lead Service Line Inventory and results were submitted by the October 16th deadline.

3.5 Water Treatment Plant (WTP)

The water treatment plant is located in the northern portion of MWD adjacent to Berkshire Creek. The WTP sits at an approximate elevation of 88-feet. As of the time of writing this report, the existing WTP was being replaced and upgraded.

The current project is to replace the original Westech filter skid, installed November 2021, with a Filter Tech Systems-supplied Pentair Ultraflex filter skid (housing a pair of 8 module racks, each expandable to 10 modules). A pre-filter screen will be added as well as building modifications to remove an interior wall for the new filter skid. The existing chlorine contact basin will continue to be utilized, but the on-site hypochlorite generating system will be replaced with liquid sodium hypochlorite delivery using chemical feed pumps to be supplied by Filter Tech.

> "Treatment of raw water is currently provided with a temporary packaged membrane filtration system, not included in this grant application, rented from Westech Equipment for $10,000 per month. The temporary rental system is in poor operating condition, having been severely impacted by previous storms that caused excessively high turbidity in the raw water delivered to the plant for treatment. Disinfection is provided using an onsite sodium hypochlorite generation system and a pressurized chlorine contact basin that feeds water to the downstream transmission and distribution system.
>
> "West Yost has been working with the District since 2021 to design major upgrades to the WTP. The final design was recently completed and approval obtained from the Oregon Health Authority for the WTP Improvements Project, which includes installation of a new packaged membrane filtration system provided by Filter Tech Systems Inc. (Filter Tech), a new onsite sodium hypochlorite generation system, new standby generator and automatic transfer switch, expansion of the WTP building to accommodate the Filter Tech packaged filtration system and associated site, mechanical and electrical improvements." (Simplified Engineering Report, February 2024, Wes Yost)

3.6 Water Storage

FIGURE 3-3: EXISTING WATER STORAGE TANKS

MWDs existing water storage consists of two 300,000-gallon tanks, both located on the same property in the southwestern part of the District. The ground elevation of the tanks is approximately 183 feet, and the tanks are 28-feet high. It is reported that the tanks can only hold approximately three to four days' worth of water due to the high water loss in the system. Tank 1 is in dire need of maintenance and repainting. Specific information about the tanks follows:

Tank 1

- Welded Steel tank
- Built 1952
- Reportedly recoated internally in 1986
- Exterior paint work is very poor; exterior corrosion is obvious
- Cathodic protection has not been kept up so the tank is corroding
- Condition of interior paint is not known

Needs and deficiencies:

1. Inspection
2. Thorough sandblast and repaint
3. Cathodic protection replaced and improved

Tank 2

- Bolted Steel tank (42-feet diameter and 28-feet high)
- Built 1999

Needs and deficiencies:

1. Inspection
2. Cathodic protection replaced and improved

.

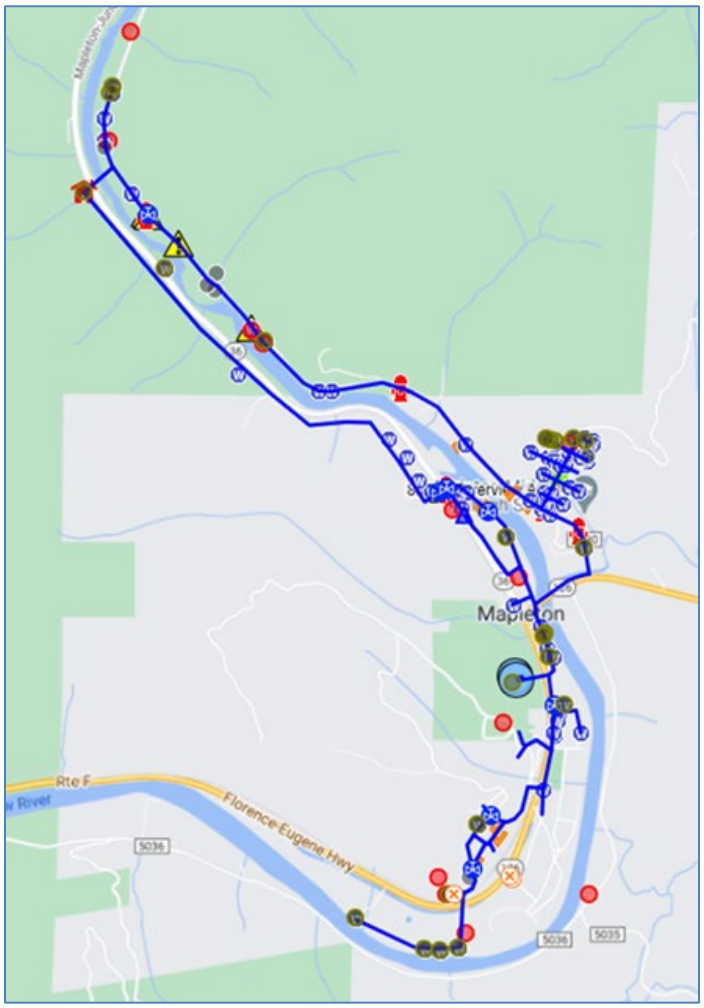
There is currently a $2.7M FEMA / BRIC grant available to MWD for a new storage tank. A minimum of a 10% match is required.

3.7 Water Distribution System

Figure 3-1 shows an overall view of the District mainline (6-inches or larger) distribution system. Many pipes from the 1950s still exist in the water system. The best record of the existing system is from 1995 drawings done by Systems West Engineers, Inc. It appears they documented the system along with improvements and expansions at the time. From their description of the distribution system (which appears to be mostly accurate today):

"The current pipe distribution system which delivers water to the District customers is a mixture of various pipe materials, sizes and alignments. The water transmission and distribution system consists of about 6.7 miles of 1-inch through 12-inch pipe. The distribution of these pipe sizes is shown in Table 3-2. Over half of the pipe is 6-inch diameter and one quarter of the pipe is 8-inch. The District has installed PVC, steel, asbestos cement and cast iron pipe. Asbestos cement pipe was the original material installed when the District was formed and constituted almost 75 percent of the total pipe in the system." (1995 Plan)

FIGURE 3-4: EXISTING DISTRIBUTION SYSTEM



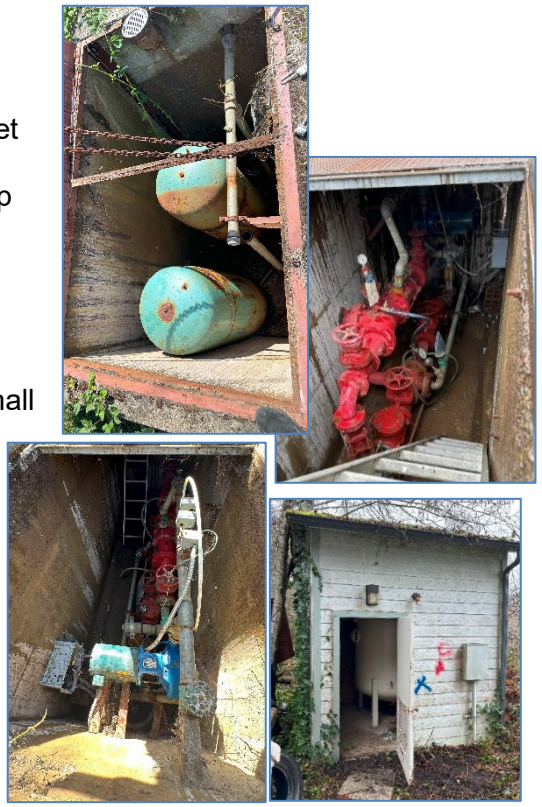
This WMP determined there to be approximately 8.7 miles of mainline pipe. In addition to the mainline pipes, there are 4-. 3-, 2-, and 1-inch pipes that also fall under the jurisdiction and responsibility of the District. From the 1995 Plan, approximately 6250-feet of smaller service pipeline exists in the District – which has since been determined to not be accurate. For purposes of cost estimating and based on vehicle odometer readings and Google earth map measurements, this WMP will use 13,000-feet of smaller pipeline:

Approximate Pipe Summary Table	
Pipe Size (in.)	Pipe Length (ft.)
6	6,040
8	22,120
10	11,400
12	6,200
Total	**45,760**
4-inch minus pipes	13,000
Total System Pipes	**58,760**
Approximate miles	11.13

With this backdrop of the age of the pipe and its predominant material, it stands to reason why the District is losing so much water. MWD makes five to eight repairs on pipelines a year. Repairs completed in-house are not usually formally documented, but here is a recent list of "contracted" repairs and costs to the District:

i.	August 2023 – Main repair under bridge	$43,000
ii.	August 2023 – Bank leak repair	$ 600
iii.	August 2023 – Lions Club leak repair	$ 900
iv.	August 2023 – E. Mapleton Repair	$ 5,500
v.	January 2024 – E. Mapleton Repair	$ 9,000
vi.	January 2024 – Repair at 126/Chevron Station	$ 3,500
vii.	March 2024 – Maple Avenue Leak Repair/Valve replacement	$ 3,000
viii.	September 2024 – 10756 Hwy 126 Main Upgrade (400' of main)	$67,650

3.7.1 Booster Pump Station – Chestnut Street



The District has one pump station on Chestnut Street (Chestnut Street and Orchard Avenue), which supports the distribution system in regulating pressures and residential and fire flows. This booster pump station serves the upper area on the east end of the District, approximately 30 connections. The ground elevation at the pump station is approximately 96-feet. The station consists of:

- Two 3-horsepower "residential" pumps. Hour meters are not available on the pumps. The pumps pump to the adjacent small bladder tanks.
- One 15-horsepower fire pump.
- Two pre-pressurized "bladder" tanks (one is currently disconnected for unknown reasons).
- One bladder tank at the end of Chestnut Street on Mapleton School property in a small shed. This tank is currently not connected to the system and is not operational.

There are no records of design on this pump station and no associated record of performance. This pump station was rebuilt and serviced around 1990 according to the1995 Plan.

The condition of the concrete structure is very poor. From visual observation, its useful life has been reached. The residential pumps look old and worn, one in particular looked very rusty and clearly hasn't been serviced for a while. From an interview with the new operator, the fire pump is rarely operated and appears to also not been maintained through the years. There is urgent concern regarding the condition and status of this booster station. Replacement of this station is a high priority.

It is highly recommended that all pumps be regularly exercised and maintained. The fire pump should be regularly operated, which could also be used to regularly flush out the distribution system.

3.7.2 Water Valves

The condition of the valves generally are unknown. The District reportedly does not have an established plan for regularly exercising all the valves. The valves are presumed old and beyond their service life.

3.7.3 Fire Hydrants

Many of the existing hydrants were installed at the time of the original distribution system – the original hydrants are old, rusty, and not compliant with today's standards. There are several locations throughout the system that do not have hydrants. The District is not able to provide secure fire protection to all of the system.

3.7.4 Water Meters

All water meters were replaced in the summer of 2022, 267 meters altogether. Currently, there are 250 active water meters servicing customers, and the others are inactive. A meter's life expectancy is approximately 15-20 years and then should be replaced.

The meter size and number of meters are as follows:

i. ¾" – 238
ii. 1" – 10 (four of the 1" meters are connected to residential units)
iii. 2" – 2

The District uses Kamstrup radio read meters. The meters appear to be accurate. Reportedly there have been no confirmed problems with the meters. The following is a summary of the larger water users, 1-inch and 2-inch meters:

1-Inch meter:

1005.03	Mixed Use Building-Comm/Res	88275 TERRITORIAL ROAD	10656 HWY 126
1015.02	Vacant Bank Building	1771 W. 34TH PLACE	10756 HWY 126
1016.03	COOS BAY RAIL LINE	PO BOX 1215	1 HWY 126
3035.03	Multifamily Residential	1577 OAK STREET	11007 E MAPLETON RD
5001.03	MAPLE LANE R.V. PARK, LLC	10730 HWY 126	10730 HWY 126
5061.01	PORT OF SIUSLAW	100 HARBOR STREET	87885 RIVERVIEW AVE

2-Inch meter:

1004.02	COAST ROAD CONSTRUCTION	PO BOX 337	10650 HWY 126
2030.01	MAPLETON SCHOOL DISTRICT #32	10868 E MAPLETON RD	10868 E MAPLETON RD

3.8 System Control

According to current MWD personnel, there is no connection between tank levels and WTP operation. The WTP is and will be manually started and stopped.

4 WATER SUPPLY AND TREATMENT EVALUATION AND RECOMMENDATIONS

4.1 Overview and Background

The purpose of the evaluation is to identify improvements and alternatives, where such exist, for meeting the anticipated needs of the community based on existing and future demands. The information presented in this section is meant to identify and make recommendations for existing and future water supply and quantity.

4.2 Water Rights

According to Section 3.1 there is projected to be sufficient water right for at least the next 50 years. However, the projected demand (278,000 gpd) starts to approach the current water right (290,900 gpd). Since water right permitting and/or finding another water source can take time, it is highly recommended the District pursue additional water right and an additional water source. It is highly recommended to find a source of water away from Berkshire Creek.

4.3 Water Supply Source

For redundancy and security, we recommend the District find and permit a secondary water source. It would be wise to find another source away from Berkshire Creek.

4.3.1 Raw Water Supply / Berkshire Creek Improvements (Phase 1)

This Study concurs with and further substantiates the need for the District to pursue funding to upgrade and improve the security and resiliency of the water source. Since a report by West Yost has already been created justifying improvements, making recommendations, and providing cost estimates, no attempt will be made here to elaborate or estimate costs. Recommended improvements from West Yost are expected to exceed the $1,000,000 ECWAG amount being pursued, thus Phase 2 improvements are anticipated. With regards to the West Yost recommendations, this Report offers some different thoughts to consider:

4.3.1.1 *Intake Structure*

On a field trip by CWES engineers in March 2024, it was recommended that the District keep clean the structure and enlarge it, if possible, to provide more raw water storage capacity. Additional raw water storage is simply another means to provide secure, consistent water to meet demands. Additional area also serves to slow the water down so better settling takes place.

4.3.1.2 *Raw Water Storage / Settling Basin*

We recommend consideration be given to keep the basin intact and upgrade/repair and expand (or replace and expand) the existing raw water settling basin for the same reasons mentioned for the intake structure. It would be worth inquiring from permitting agencies if an expansion or

upgrade is possible. Employing a mechanical device (e.g. centrifugal separator) to remove sediment inherently means continuous cost for operations and maintenance. Where gravity settlement is possible, gravity should be used.

4.3.1.3 *Raw Water Transmission Pipeline*

It is recommended to consider increasing the pipeline size in order to store more raw water. If expanding or improving the intake and settling basin is onerous or not possible, the volume within a pipeline is a legitimate way to increase water storage.

4.3.2 Raw Water Supply / Berkshire Creek Improvements (Phase 2)

It is fully anticipated that the needed improvements documented in West Yost's report will exceed the ECWAG funds. As such, what is not able to be done in Phase 1 will need to be completed in a Phase 2 project – magnitude and project particulars to be determined. Until a Phase 2 project can be defined, the cost presented in Section 6 is only an order of magnitude for budgeting and funding opportunity purposes.

4.4 Water Treatment Evaluation and Recommendations

At the time of writing this report a new water treatment plant (WTP) was in the process of being constructed. As such, no analysis of the proposed new WTP was done and therefore no recommendations are made herein.

However, it is recommended that automatic controls and communication between the WTP and tanks be installed to reduce manpower and alleviate the potential of the community running out of water.

The cost impact of the new WTP, as obtained from the District, will be included in Section 6 for the overall financial impact on the District.

5 WATER STORAGE AND DISTRIBUTION SYSTEM EVALUATION AND RECOMMENDATIONS

5.1 Overview and Background

The information presented in this section is meant to identify improvements based on the analysis of the water system data and make recommendations for existing and future storage and distribution systems.

5.2 Storage Evaluation and Recommendations

From Section 2.6, the recommended storage volume is approximately 900,000 gallons. The District currently has 600,000 gallons. The following recommendations are made:

5.2.1 Priority 1 – Existing Storage Tanks

Refurbishment of the existing tanks is a high priority. Tank 1 has essentially been left to corrode over the years; however, there is still some life in the tank if action is taken quickly to address several issues and apply a new coat of paint. Tank 2 can use some maintenance too. The priority actions for the existing tanks are:

1. Retain a diver to come out and inspect both tanks to see what the interior conditions are and to ascertain magnitude of refurbishment and maintenance. The diver should also look at the anodes for cathodic protection. The welded still tank needs maintenance otherwise the tank will be lost. The inspection company will provide a maintenance report from which the District should work from to improve the tanks condition.

2. Inspect and clean all tanks every five (5) years, including inspection and replacement, if necessary, of the cathodic protection. The cathodic protection must be kept up and replaced as needed.

3. It is anticipated the inspection report will include the recommendation to repaint and refurbish at least the existing welded steel tank (Tank #1).

The full magnitude of maintenance, repairs, and painting is not known. Therefore, Table 5.1 provides only an approximate budgetary cost.

TABLE 5-1 – TANK #1 AND TANK #2 REFURBISHMENT COST ESTIMATE

EXISTING Tanks #1 and #2 Misc. Repairs and Steel Tank Refurbishment					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization - Bonds, Insurance (5%)	LS	1	$ 32,500.00	$ 32,500.00
2	Site Prep (5%)	LS	1	$ 32,500.00	$ 32,500.00
3	Tank #1 Misc. Repairs, incl. Cathodic Protection	LS	1	$ 80,000.00	$ 80,000.00
4	Tank #1 Paint (prep and paint, interior and exterior)	LS	1	$ 520,000.00	$ 520,000.00
5	Tank #2 Misc. Repairs, incl. Cathodic Protection	LS	1	$ 50,000.00	$ 50,000.00
	Estimated Construction Costs			$	715,000.00
	Contingency (10%)			$	71,500.00
	Engineering Support (contracting, etc.) (4%)			$	31,500.00
	Estimated Project Total (rounded)			**$**	**818,000.00**

5.2.2 Priority 2 – New Storage Tank

A high priority is to construct a new tank and increase the District's storage capacity. The preferable location would be on the east side of the river to better serve that part of the system and the school. This project is only classified as Priority 2 because funding is still being finalized. MWD is currently moving forward with the funding for a new 300,000-gallon tank via the FEMA/BRIC program (EMS-2022-BR-006-0007). The BRIC application is a phased approach with Phase I involving such things as land acquisition and engineering design. The following work, in alignment with FEMA, is recommended as part of Phase 1 Design:

1. Evaluate and consider at least three practicable alternatives (preferred, alternate, no-action)
2. Research and evaluate potential tank sites; conclude on the preferred site; begin land acquisition.
   - Tank site criteria: same elevation as existing tanks; accessible to the water distribution system; land cost; and constructability – cost to develop the site.
3. Geotechnical evaluations of the preferred site to aid in design of a seismic resilient tank.
4. Go-No Go milestones include:
   a. Cost escalation by 20% or more and no additional funds acquired.
   b. Inability to secure site for tank (land and easement acquisition)
   c. Inability to secure any required permits

The cost of a new tank is contingent upon many things, such as land acquisition costs, constructability, inflation impacts, infrastructure costs to connect to the system, etc. Table 5.2 provides a cost estimate for a tank site that does not have excessive earthwork and site preparation and is in close proximity to connect to the existing distribution system.

TABLE 5-2 – NEW TANK COST ESTIMATE

NEW 300,000 gallon steel tank					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization / Demobilization (8%)	LS	1	$ 140,800.00	$ 140,800.00
2	Construction Facilities and Temporary Controls (8%)	LS	1	$ 140,800.00	$ 140,800.00
3	Demo and Site Prep (20%)	LS	1	$ 352,000.00	$ 352,000.00
4	Glass-Fused, Bolted Steel Tank	LS	1	$ 810,000.00	$ 810,000.00
5	Concrete Tank Foundation	LS	1	$ 230,000.00	$ 230,000.00
6	Earthwork, Grading, and Gravel Resurfacing	LS	1	$ 120,000.00	$ 120,000.00
7	Yard Piping, Valves, and Appurtenances	LS	1	$ 120,000.00	$ 120,000.00
8	Site Fencing and Access Gate	LS	1	$ 50,000.00	$ 50,000.00
9	Radio Telemtry to WTP	LS	1	$ 230,000.00	$ 230,000.00
10	Distribution Connection - 10-inch pipeline	LS	1	$ 200,000.00	$ 200,000.00
Estimated Construction Costs				$	2,393,600.00
	Administrative/Legal (1%)			$	24,000.00
	Construction Management (8%)			$	191,500.00
	Engineering, Geotechnical, Environmental (25%)			$	628,400.00
	Contingency (5%) per FEMA			$	119,700.00
	Land Acquisition / Rights-of-Way			$	43,000.00
	Inspections			$	20,000.00
Estimated Project Total (rounded)				**$**	**3,421,000.00**

The Mapleton Fire Department supports a new tank as declared in an emailed letter written to MWD on June 5, 2024:

> "In regards to the installation of a storage tank at the top of Huntington Addition, the bigger the better. This tank would provide redundancy in the case of the interruption of the water distribution lines at the bridge and near Farnham Landing. It would also create volume and pressure to the existing fire hydrants and standpipes. Additional fire hydrants installed at the elementary school would be advantageous to the fire department."

5.3 Distribution System Evaluation and Recommendation

It is urgent the entire distribution system be replaced to stop the excessive leakage and provide better fire protection and pressures throughout the service area. Based on the water model and design criteria established in Section 2, Figure 5-1 illustrates the breakdown of all the mainline pipe that needs to be replaced (a larger map size is found in the Appendix). The table to the side indicates the approximate length of mainline pipes to be replaced.

Approximate Pipe Summary Table	
Pipe Size (in.)	Pipe Length (ft.)
6	6,040
8	22,120
10	11,400
12	6,200
Total	**45,760**
4-inch minus pipes	13,000
Total System Pipes	**58,760**
Approximate miles	11.13

In addition to the mainline pipes, there are 4-. 3-, 2-, and 1-inch service pipes that also fall under the jurisdiction and responsibility of the District. From Section 3.7, 7,000-feet of smaller pipeline will be used as a length for replacement for budgetary purposes.

A cost estimate for the entire distribution system replacement is summarized in Table 5-3.

FIGURE 5-1: PROPOSED COMPREHENSIVE DISTRIBUTION SYSTEM

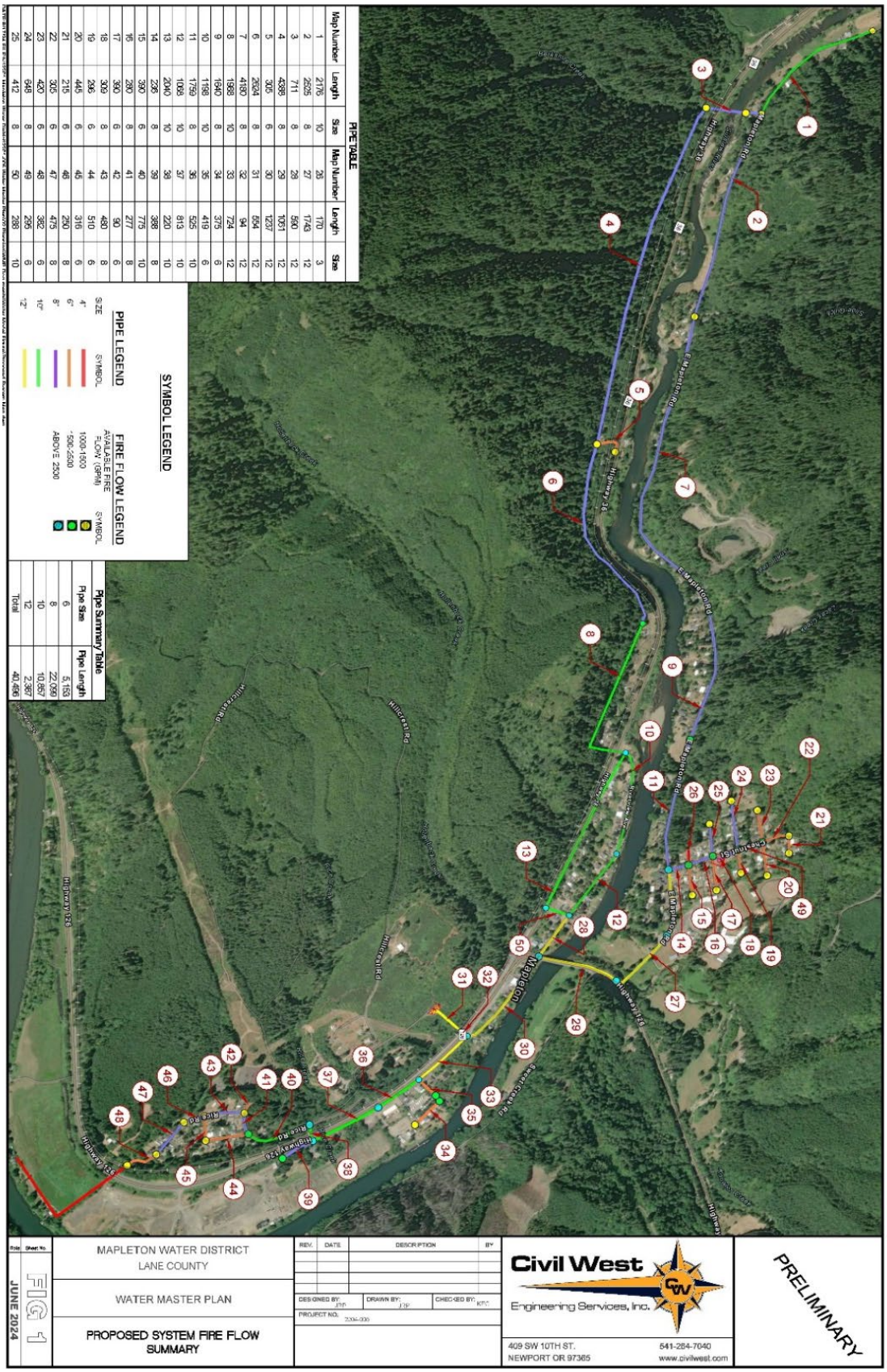


TABLE 5-3: NEW OVERALL DISTRIBUTION SYSTEM

Water Distribution System - Overhaul Existing System					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization - Bonds, Insurance (5%)	LS	1	$ 581,080.00	$ 581,080.00
2	Construction Facilities and Temporary Controls (5%)	LS	1	$ 581,080.00	$ 581,080.00
3	Demo and Site Prep (4%)	LS	1	$ 446,980.00	$ 446,980.00
4	12" HDPE Pipe w/ Trenching and Backfill	LF	6200	$ 176.00	$ 1,091,200.00
5	10" HDPE Pipe w/ Trenching and Backfill	LF	11400	$ 156.00	$ 1,778,400.00
6	8" HDPE Pipe w/ Trenching and Backfill	LF	22120	$ 112.00	$ 2,477,440.00
7	6" HDPE Pipe w/ Trenching and Backfill	LF	6040	$ 97.00	$ 585,880.00
8	12" Flanged Gate Valve	EA	20	$ 5,500.00	$ 110,000.00
9	10" Flanged Gate Valve	EA	30	$ 3,500.00	$ 105,000.00
10	8" Flanged Gate Valves	EA	50	$ 2,500.00	$ 125,000.00
11	6" Flaged Gate Valves	EA	22	$ 2,000.00	$ 44,000.00
12	Fire Hydrant Assembly	EA	92	$ 10,000.00	$ 920,000.00
13	Blow-off Assemblies	EA	14	$ 5,000.00	$ 70,000.00
14	Road / Asphalt Repair	SY	20975	$ 58.00	$ 1,216,550.00
15	Residential Service Connections (no meter)	EA	250	$ 2,500.00	$ 625,000.00
16	Residential Meters (possible replacements)	EA	27	$ 2,000.00	$ 54,000.00
17	Directional Drill under Siuslaw River (south crossing)	LS	1	$ 230,000.00	$ 230,000.00
18	Directional Drill under Siuslaw River (north crossing)	LS	1	$ 230,000.00	$ 230,000.00
19	Chestnut Drive Booster Station Replacement	EA	1	$ 352,000.00	$ 352,000.00
20	North System western pipeline surcharge	LF	9000	$ 35.00	$ 315,000.00
21	4-, 3-, 2-, 1-inch Pipe Replacement	LF	13000	$ 65.00	$ 845,000.00
	Estimated Construction Costs			$	12,783,610.00
	Administrative/Legal (1%)			$	127,900.00
	Permitting / Environmental			$	140,000.00
	District Admin and Inspection Fees (EPA project)			$	15,000.00
	Contingency (20%)			$	2,556,800.00
	Engineering (20%)			$	2,556,800.00
	Estimated Project Total (rounded)			**$**	**18,181,000.00**

With the overall distribution system replacement being such a large and financially burdensome undertaking, it is recommended to create smaller priority projects. How improvements are phased should be strategically determined to removed the greatest amount of leaks and align with the best possible funding opportunities. The distribution system was divided into five smaller service areas and prioritized.

5.3.1 Priority 1 – Millview Addition (Rice Road) Neighborhood Distribution System

MWD has $800,000 from the EPA Community Grants Program (Fiscal Year 2022 Congressionally Directed Spending, CDS, allocation). The District Board concluded to spend this money to improve the water system in the Millview Addition (Rice Road) Neighborhood (pipelines as depicted in Figure 5.2). Because of the immediate access to funding, this project is classified within Priority 1. The Mapleton Fire Department concurs with this decision and supports improvements to the Millview area as declared in an emailed letter written to MWD on June 5, 2024:

> "From the perspective of the Mapleton Fire Department, my (Robert Patterson, Fire Chief) recommendation would be to upgrade the mainline in the Millview Addition neighborhood. This would increase the reliability, water flow and pressure to all the existing hydrants on Rice Road and 1st Street."

Table 5-4 represents the cost and Figure 5-2 illustrates the extent of the project. It is anticipated the District will need to supplement this project.

TABLE 5-4: MILLVIEW ADDITION (RICE ROAD) NEIGHBORHOOD WATER PIPELINE REPLACEMENT

Millview Addition (Rice Road) Neighborhood - EPA Funded Project					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization - Bonds, Insurance (5%)	LS	1	$ 26,680.00	$ 26,680.00
2	Construction Facilities and Temporary Controls (5%)	LS	1	$ 26,680.00	$ 26,680.00
3	Demo and Site Prep (4%)	LS	1	$ 20,520.00	$ 20,520.00
4	12" HDPE Pipe w/ Trenching and Backfill	LF	0	$ 176.00	$ -
5	10" HDPE Pipe w/ Trenching and Backfill	LF	0	$ 156.00	$ -
6	8" HDPE Pipe w/ Trenching and Backfill	LF	1520	$ 112.00	$ 170,240.00
7	6" HDPE Pipe w/ Trenching and Backfill	LF	940	$ 97.00	$ 91,180.00
8	12" Flanged Gate Valve	EA	0	$ 5,500.00	$ -
9	10" Flanged Gate Valve	EA	0	$ 3,500.00	$ -
10	8" Flanged Gate Valves	EA	6	$ 2,500.00	$ 15,000.00
11	6" Flaged Gate Valves	EA	6	$ 2,000.00	$ 12,000.00
12	Fire Hydrant Assembly	EA	5	$ 10,000.00	$ 50,000.00
13	Blow-off Assemblies	EA	2	$ 5,000.00	$ 10,000.00
14	Road / Asphalt Repair	SY	1975	$ 58.00	$ 114,550.00
15	Residential Service Connections (no meter)	EA	20	$ 2,500.00	$ 50,000.00
16	Residential Meters	EA	0	$ 2,000.00	$ -
	Estimated Construction Costs			$	586,850.00
	Permitting / Environmental			$	17,000.00
	District Admin and Inspection Fees			$	15,000.00
	Contingency (20%)			$	117,400.00
	Engineering (20%)			$	117,400.00
	Estimated Project Total (rounded)			**$**	**854,000.00**

FIGURE 5-2: MILLVIEW ADDITION (RICE ROAD) PROJECT EXTENTS

Per Figure 5-1, the Rice Road project specifically consists of pipeline segments: 41, 42, 43, 44, 45, 46, 47.

5.3.2 Priority 2 – Chestnut Street Neighborhood and School

The District recently submitted for FEMA funding for this project. This cost estimate includes new pipeline from the existing storage tanks, north on the highway, across the Siuslaw River

towards the school, and into and through the Chestnut Street Neighborhood north of the school. Improvements also include replacement to the existing Chestnut Drive Booster Station.

TABLE 5-5: CHESTNUT STREET NEIGHBORHOOD AND SCHOOL

Chestnut Street Neighborhood and School					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization - Bonds, Insurance (5%)	LS	1	$ 151,320.00	$ 151,320.00
2	Construction Facilities and Temporary Controls (5%)	LS	1	$ 151,320.00	$ 151,320.00
3	Demo and Site Prep (4%)	LS	1	$ 116,400.00	$ 116,400.00
4	12" HDPE Pipe w/ Trenching and Backfill	LF	5400	$ 176.00	$ 950,400.00
5	10" HDPE Pipe w/ Trenching and Backfill	LF	0	$ 156.00	$ -
6	8" HDPE Pipe w/ Trenching and Backfill	LF	2000	$ 112.00	$ 224,000.00
7	6" HDPE Pipe w/ Trenching and Backfill	LF	3000	$ 97.00	$ 291,000.00
8	12" Flanged Gate Valve	EA	1	$ 5,500.00	$ 5,500.00
9	10" Flanged Gate Valve	EA	4	$ 3,500.00	$ 14,000.00
10	8" Flanged Gate Valves	EA	4	$ 2,500.00	$ 10,000.00
11	6" Flaged Gate Valves	EA	6	$ 2,000.00	$ 12,000.00
12	Fire Hydrant Assembly	EA	21	$ 10,000.00	$ 210,000.00
13	Blow-off Assemblies	EA	8	$ 5,000.00	$ 40,000.00
14	Road / Asphalt Repair	SY	5000	$ 58.00	$ 290,000.00
15	Residential Service Connections (no meter)	EA	80	$ 2,500.00	$ 200,000.00
16	Residential Meters	EA	8	$ 2,000.00	$ 16,000.00
17	Directional Drill under Siuslaw River	LS	1	$ 230,000.00	$ 230,000.00
18	Chestnut Drive Booster Station Replacement	EA	1	$ 352,000.00	$ 352,000.00
19	4-, 3-, 2-, 1-inch Pipe Replacement	LF	1000	$ 65.00	$ 65,000.00
	Estimated Construction Costs			$	3,328,940.00
	Administrative/Legal (1%)			$	33,300.00
	Permitting / Environmental			$	34,000.00
	Contingency (20%)			$	665,800.00
	Engineering (20%)			$	665,800.00
	Estimated Project Total (rounded)			**$**	**4,728,000.00**

Per Figure 5-1, the Chestnut Street and School project specifically consists of pipeline segments: 14-31 and 49. This project entails replacement of much of the 12-inch pipeline within the system.

5.3.3 Priority 3 – Northern Distribution System

This cost estimate is essentially everything north of Chestnut Street on the east of the river and everything north of Riverview Avenue on the west side of the river.

TABLE 5-6: NORTHERN DISTRIBUTION SYSTEM

Northern System (North of Riverview and Chestnut Neighborhoods)					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization - Bonds, Insurance (5%)	LS	1	$ 246,850.00	$ 246,850.00
2	Construction Facilities and Temporary Controls (5%)	LS	1	$ 246,850.00	$ 246,850.00
3	Demo and Site Prep (4%)	LS	1	$ 189,880.00	$ 189,880.00
4	12" HDPE Pipe w/ Trenching and Backfill	LF	0	$ 176.00	$ -
5	10" HDPE Pipe w/ Trenching and Backfill	LF	4300	$ 156.00	$ 670,800.00
6	8" HDPE Pipe w/ Trenching and Backfill	LF	18200	$ 112.00	$ 2,038,400.00
7	6" HDPE Pipe w/ Trenching and Backfill	LF	400	$ 97.00	$ 38,800.00
8	12" Flanged Gate Valve	EA	9	$ 5,500.00	$ 49,500.00
9	10" Flanged Gate Valve	EA	8	$ 3,500.00	$ 28,000.00
10	8" Flanged Gate Valves	EA	28	$ 2,500.00	$ 70,000.00
11	6" Flaged Gate Valves	EA	2	$ 2,000.00	$ 4,000.00
12	Fire Hydrant Assembly	EA	45	$ 10,000.00	$ 450,000.00
13	Blow-off Assemblies	EA	1	$ 5,000.00	$ 5,000.00
14	Road / Asphalt Repair	LS	7000	$ 58.00	$ 406,000.00
15	Residential Service Connections (no meter)	EA	80	$ 2,500.00	$ 200,000.00
16	Residential Meters	EA	7	$ 2,000.00	$ 14,000.00
17	Directional Drill under Siuslaw River (north crossing)	LS	1	$ 230,000.00	$ 230,000.00
18	North System western pipeline surcharge	LF	9000	$ 35.00	$ 315,000.00
19	4-, 3-, 2-, 1-inch Pipe Replacement	LF	3500	$ 65.00	$ 227,500.00
	Estimated Construction Costs			$	5,430,580.00
	Administrative/Legal (1%)			$	60,100.00
	Permitting / Environmental			$	62,000.00
	Contingency (20%)			$	1,086,200.00
	Engineering (20%)			$	1,086,200.00
	Estimated Project Total (rounded)			**$**	**7,726,000.00**

5.3.4 Priority 4 – Southern and Riverview Avenue Pipelines

The remaining two improvement areas are included in this Priority:

1. Compete the southern portion of the distribution system that serves and adjoins the Millview Addition. It is recommended to add a new 6-inch pipe to form a small loop, from pipe #34 and connect to pipe #36 – this new pipeline is included in the following cost estimate. Per Figure 5-1, the southern system project specifically consists of pipeline segments: 33-40 and 48 and the new 34a.

2. Riverview Avenue neighborhood. Per Figure 5-1, the Riverview system project specifically consists of pipeline segments: 10, 12, 13, and 50.

TABLE 5-7: SOUTHERN SYSTEM

Southern System (minus Millview Addition Neighborhood project)					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization - Bonds, Insurance (5%)	LS	1	$ 88,950.00	$ 88,950.00
2	Construction Facilities and Temporary Controls (5%)	LS	1	$ 88,950.00	$ 88,950.00
3	Demo and Site Prep (4%)	LS	1	$ 68,420.00	$ 68,420.00
4	12" HDPE Pipe w/ Trenching and Backfill	LF	800	$ 176.00	$ 140,800.00
5	10" HDPE Pipe w/ Trenching and Backfill	LF	2400	$ 156.00	$ 374,400.00
6	8" HDPE Pipe w/ Trenching and Backfill	LF	400	$ 112.00	$ 44,800.00
7	6" HDPE Pipe w/ Trenching and Backfill	LF	1700	$ 97.00	$ 164,900.00
8	12" Flanged Gate Valve	EA	8	$ 5,500.00	$ 44,000.00
9	10" Flanged Gate Valve	EA	12	$ 3,500.00	$ 42,000.00
10	8" Flanged Gate Valves	EA	12	$ 2,500.00	$ 30,000.00
11	6" Flaged Gate Valves	EA	8	$ 2,000.00	$ 16,000.00
12	Fire Hydrant Assembly	EA	11	$ 10,000.00	$ 110,000.00
13	Blow-off Assemblies	EA	2	$ 5,000.00	$ 10,000.00
14	Road / Asphalt Repair	SY	3000	$ 58.00	$ 174,000.00
15	Residential Service Connections (no meter)	EA	50	$ 2,500.00	$ 125,000.00
16	Residential Meters	EA	6	$ 2,000.00	$ 12,000.00
17	4-, 3-, 2-, 1-inch Pipe Replacement	LF	6500	$ 65.00	$ 422,500.00
	Estimated Construction Costs			$	1,956,720.00
	Administrative/Legal (1%)			$	19,600.00
	Permitting / Environmental			$	17,000.00
	Contingency (20%)			$	391,400.00
	Engineering (20%)			$	391,400.00
	Estimated Project Total (rounded)			**$**	**2,777,000.00**

TABLE 5-8: RIVERVIEW AVENUE NEIGHBORHOOD

Riverview Avenue Neighborhood					
Item No.	**Description**	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
1	Mobilization - Bonds, Insurance (5%)	LS	1	$ 67,300.00	$ 67,300.00
2	Construction Facilities and Temporary Controls (5%)	LS	1	$ 67,300.00	$ 67,300.00
3	Demo and Site Prep (4%)	LS	1	$ 51,770.00	$ 51,770.00
4	12" HDPE Pipe w/ Trenching and Backfill	LF	0	$ 176.00	$ -
5	10" HDPE Pipe w/ Trenching and Backfill	LF	4700	$ 156.00	$ 733,200.00
6	8" HDPE Pipe w/ Trenching and Backfill	LF	0	$ 112.00	$ -
7	6" HDPE Pipe w/ Trenching and Backfill	LF	0	$ 97.00	$ -
8	12" Flanged Gate Valve	EA	2	$ 5,500.00	$ 11,000.00
9	10" Flanged Gate Valve	EA	6	$ 3,500.00	$ 21,000.00
10	8" Flanged Gate Valves	EA	0	$ 2,500.00	$ -
11	6" Flaged Gate Valves	EA	0	$ 2,000.00	$ -
12	Fire Hydrant Assembly	EA	10	$ 10,000.00	$ 100,000.00
13	Blow-off Assemblies	EA	1	$ 5,000.00	$ 5,000.00
14	Road / Asphalt Repair	LS	4000	$ 58.00	$ 232,000.00
15	Residential Service Connections (no meter)	EA	20	$ 2,500.00	$ 50,000.00
16	Residential Meters	EA	6	$ 2,000.00	$ 12,000.00
17	4-, 3-, 2-, 1-inch Pipe Replacement	LF	2000	$ 65.00	$ 130,000.00
	Estimated Construction Costs			$	1,480,570.00
	Administrative/Legal (1%)			$	14,900.00
	Permitting / Environmental			$	10,000.00
	Contingency (20%)			$	296,200.00
	Engineering (20%)			$	296,200.00
	Estimated Project Total (rounded)			**$**	**2,098,000.00**

5.3.5 Booster Pump Station – Chestnut Street

The pressure pumps are old and the layout is inefficient. Replacement of the Chestnut Booster Pressure Station is a high priority.

5.3.6 Fire Hydrants

Many of the hydrants are old and rusty, and some areas do not have hydrants. The installation of new fire hydrants is highly recommended with the upgrades and upsizing of the distribution system. The cost to install fire hydrants is included in the cost estimate tables.

5.3.7 Meters

Meters have already been replaced. As such, a few meters have been included per the chance a meter needs to be replaced when the distribution pipeline is replaced.

6 CAPITAL IMPROVEMENT PLAN AND FINANCIAL ANALYSIS

6.1 Improvement Plan

This Section summarizes and quantifies water system capital improvements needed to properly serve MWD's needs over the next 20-years as determined by the detailed analyses in this Water System Master Plan. The Capital Improvement Plan (CIP) consists of various projects to maintain and protect existing water system assets, correct deficiencies, satisfy seismic-related concerns, and provide water system capacity for projected population growth.

The water system CIP is used to help establish funding needs, user rates, system development charges (SDCs), and to plan for and prioritize various project needs. The CIP can change over time as projects are completed and/or new unforeseen needs arise. An attempt should be made to annually update the CIP and keep the list of needs current.

The CIP summarizes the recommended system improvements that are anticipated beyond routine maintenance practices. This CIP includes opinions of probable costs for the recommendations.

Table 6-1 summarizes all the project improvements and opinions of probable costs for upgrading the entire water system with new pipeline, a new WTP (which is underway), improved and secure water supply, refurbishing the existing old tanks, and constructing a new water storage tank. There are grant funding opportunities already in place or being pursued as noted below. Refer to Sections 4 and 5 for detailed breakdown and justification for the specific improvements.

TABLE 6-1: ALL IMPROVEMENTS – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District Upgrades			
Description	**Total Cost**	**Grant Funding***	**District Cost**
Water Treatment Plant (WTP) Upgrades	$ 3,390,000.00	$ 1,890,000.00	$ 1,500,000.00
Raw Water Supply Improvements (ECWAG - Phase 1)	$ 1,000,000.00	$ 1,000,000.00	$ -
Raw Water Supply Improvements (Phase 2)	$ 2,500,000.00	$ -	$ 2,500,000.00
Water Storage (Tanks 1 and 2 Refurbishment)	$ 818,000.00	$ -	$ 818,000.00
New Water Storage Tank	$ 3,421,000.00	$ 2,700,000.00	$ 721,000.00
Distribution System	$ 18,181,000.00	$ 800,000.00	$ 17,381,000.00
Opinion of Probable Cost Total (rounded)	**$ 29,310,000.00**	**$ 6,390,000.00**	**$ 22,920,000.00**

*Business Oregon managed programs (Water/Wastewater Funds and ARPA)
*Raw Water Supply Improvements: ECWAG (USDA)
*New Water Storage Tank: FEMA/BRIC Program ($2.7M) and Lane County ($300,000)
*Distribution System: EPA ($800,000)

Tables 6-2 and 6-3 provide an opinion of probable cost for the first two priority phases discussed in the previous section.

TABLE 6-2: PRIORITY 1 – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District - Priority 1 Projects			
Description	**Total Cost**	**Grant Funding***	**District Cost**
Water Treatment Plant Upgrades	$ 3,390,000.00	$ 1,890,000.00	$ 1,500,000.00
Raw Water Supply Improvements (ECWAG - Phase 1)	$ 1,000,000.00	$ 1,000,000.00	$ -
Water Storage (Tanks 1 and 2 Refurbishment)	$ 818,000.00		$ 818,000.00
Distribution System - Rice Road Neighborhood	$ 854,000.00	$ 800,000.00	$ 54,000.00
Opinion of Probable Cost Total (rounded)	**$ 6,062,000.00**	**$ 3,690,000.00**	**$ 2,372,000.00**

TABLE 6-3: PRIORITY 2 – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District - Priority 2 Projects			
Description	**Total Cost**	**Grant Funding**	**District Cost**
Raw Water Supply Improvements (Phase 2)	$ 2,500,000.00	$ -	$ 2,500,000.00
New Water Storage Tank	$ 3,421,000.00	$ 2,700,000.00	$ 721,000.00
Distribution System - Chestnut Street and School	$ 4,728,000.00	$ -	$ 4,728,000.00
Opinion of Probable Cost Total (rounded)	**$ 10,649,000.00**	**$ 2,700,000.00**	**$ 7,949,000.00**

TABLE 6-4: PRIORITY 3 – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District - Priority 3 Projects			
Description	**Total Cost**	**Grant Funding**	**District Cost**
Distribution System - Northern System	$ 7,726,000.00	$ -	$ 7,726,000.00
Opinion of Probable Cost Total (rounded)	**$ 7,726,000.00**	**$ -**	**$ 7,726,000.00**

TABLE 6-5: PRIORITY 4 – COST SUMMARY WATER SYSTEM UPGRADES

Summary of Mapleton Water District - Priority 4 Projects			
Description	**Total Cost**	**Grant Funding**	**District Cost**
Distribution System - Southern System	$ 2,777,000.00	$ -	$ 2,777,000.00
Distribution System - Riverview Avenue	$ 2,098,000.00	$ -	$ 2,098,000.00
Opinion of Probable Cost Total (rounded)	**$ 4,875,000.00**	**$ -**	**$ 4,875,000.00**

6.2 Current Financial Status – Debt and Rates

The District currently has $1.5 million loan with Infrastructure Finance Authority (IFA) through Business Oregon (30 years at 1%) – the original $700,000 loan with an additional $800,000 loan awarded.

The District's water rate is:

- Effective October 2024, the residential Base Rate per month is $44 for zero (0) gallons. This rate does include loan payment of the above debt.
- $0.10 per cubic foot ($13.37 per 1000-gallons) residential usage in addition to the base rate.
- The District has a handful of commercial customers, most of which use about the same amount of water as residential customers. Commercial Base Rates for zero (0) gallons are:
    - 1-inch non-residential meters – $92/month
    - 2-inch non-residential meters – $107/month
    - 4-inch non-residential meters – $182/month

- The usage rate for commercial is the same as the residential

From Table 2-4, the Average Daily Demand (water Sold) is 142 gal/day per customer (35,510/250 connections). This equates to approximately 4,261 gallons/month/user. As such, this report will approximate an average residential water bill as $44.00 + ($13.37 x 4.261) = $100.97/month per District residential customer connection.

The District currently does not have System Development Charge (SDC) fees. The Mapleton Water District Ordinance, Section 7, says:

> "Whenever it shall become necessary in order to serve a particular location to extend any existing water main or pipeline of the district, such extensions shall be made at the expense of the applicant. All new development will be subject to a "system assessment fee" based on the size of the project. The District will install/supervise all pipe installations."

6.2.1 Current Funding Sources and Opportunities

The District has been very successful obtaining grants for various water system improvements The following is a summary of the grants received and pursing (as of August 2024):

1. Business Oregon (POC: Michelle Bilberry, Business Oregon)

- Project #Y21004 Water Treatment Facility Upgrades (water/wastewater fund).
  - Contract executed 10/26/20, contract expires 10/26/23.
  - **Original financing: $1,400,000 total award** (**$700,000 loan 1% 30 year plus $700,000 grant**).
  - **Additional (2024) financing: $800,000 loan and $50,000 grant.**
    TOTAL LOAN = $1,500,000
  - Disbursed $1,397,395 to date; will hold this project open in case MWD needs additional funds once project is bid (1% 30 year term and an increase to the award would be quicker than applying for funds).
  - Scope of work: design/purchase/installation of new filtration unit plus rental of temp treatment unit, replace water meters, repair leaking distribution lines (MWD is paying $10k/month for temp treatment plant since early 2021 and ~$5k/month for turbidity filtration unit).

- Project #SR2242 $1,140,000 Water Infrastructure Improvements (special allocation of federal American Rescue Plan Act, ARPA, funds).
  - Contract executed 5/3/2022, all funds must be committed by 12/30/2024 (project activities under contract) and project complete by 9/30/2026.
  - **$1,140,000 grant.**
  - ~$110,000 disbursed to date.
  - Scope of work: modify treatment plant building (to house new treatment equipment), replace water meters, repair leaking distribution lines), security fencing and cameras. *Scope of work will be revised after Business Oregon updates water/wastewater award.*
  - $66,000 to be used toward water master plan.

- Project #S23008 Sustainable Infrastructure Planning Project (SIPP) award to be used toward Water Master Plan.
  - **$20,000 forgivable loan**.
  - Funding contract released for signature 1/25/2024.

2. Congressionally Directed Spending / EPA Community Grant (POC: Amy Williams, EPA / Sam Rodriguez, RCAC)

- **$800,000 "grant"** to "Mapleton Water District for Distribution and Meter Project."
- MWD received match waiver (typically 20 percent match requirement).
- Millview Addition (Rice Road) area is the selected improvement project.

MWD received a Fiscal Year 2022 Congressionally Directed Spending (CDS) allocation of $800,000, facilitated by Sen. Merkley's Office, for the replacement of distribution pipelines. Below is the language of the original application:

> "This is a request for funds to replace the broken water distribution system in the unincorporated area of Mapleton, Oregon. During the Pandemic the unincorporated area of Mapleton suffered a forest fire, a flooding of the Siuslaw river and a breakdown of the water district. For 5 months of 2020 citizens had no potable water due to a failed water filtration plant. The MWD serves 244 residences & 6 businesses. This is a low income, rural area, 67% of the households are below the federal poverty level, over 50% of the residents have a high school diploma or less suggesting that many experienced job loss and food insecurity during the pandemic. Through Biz Oregon, the MWD received a Loan/Grant in the aggregate of 1,400.000 for design/build of a new water filtration system. The 1,400,000 is comprised of $700,000 Loan @ 1% int. for 30 years. The remaining $700,000 is a Grant…. Our system was originally installed in 1952-54. Our goal is to replace the distribution pipes, all meters with smart meters that provide leak detection…."

All $800k of the EPA grant must be used to replace the distribution pipes.

3. USDA-RD Emergency Community Water Assistance Grant (ECWAG) (POC: Holly Halligan, USDA)
   - **$1 million** application submitted to USDA-RD.
   - Project includes transmission line replacement from source to treatment plant, retaining wall, hillside stabilization.

4. FY22 FEMA BRIC award (POC: Alex Dreher, Lane County)
   - MWD will install a 300,000-gallon water storage tank to protect against flooding and improve water supply.
   - **$2.7 million grant award from FEMA** (based on an original $3.0M cost estimate). This master plan estimates the cost of the tank and connection to the distribution system at a higher cost.
   - Lane County is the applicant on behalf of MWD.
   - Business Oregon has issued a conditional award for non-federal match through SPWF. Max grant award is $500k.
   - Application submitted January 2023; conditionally moving on to next step in the application process. No timeline specified.

A FY 2023 sub-application in partnership with Lane County and OEM. This money was applied for in 9/2022. Below is the project description language of the initial application:

> "Mapleton Water District currently has two (2) 300,000 gallon water storage tanks located on a 1.87 acre property located in Lane County, Oregon with a right of way easement dated 1/17/2012 and recorded in Lane County on 2/7/2012. The storage capacity of these two aged existing tanks is insufficient for the water supply currently needed for the Mapleton community and the Mapleton Fire District. This property contains a road easement of .47 acres, tank area easement of 1.87 acres, and pipeline easement of .06 acres. The current property available is more than adequate for an additional tank placement (easement already obtained).
>
> "The proposed project would involve purchasing an additional 300,000 gallon water storage tank. This water storage tank will allow the Mapleton Water District to provide an adequate supply of useable water to the community and the Mapleton Fire District in the event that the Mapleton Water Plant is impacted by some natural disaster. This is the only alternative to ensure an adequate quantity of water for normal operations and in case of flooding or other disaster in this region. Due to the isolation of the Siuslaw River Valley during flooding events, additional storage capacity is essential for the health and well-being of the community. "

6.3 Potential Financial Obligation and Water Rate Adjustment

Once a new water system is installed, operation and maintenance (O&M) costs should be closely tracked and user rates adjusted as necessary. User rates should be looked at annually for any needed adjustments. It is very likely, given today's economic climate and escalating inflation, user rates (O&M) will increase.

Tables 6-5 through 6-8 break down the user financial impact relative to the extent of improvements made. The tables provide an indication of the potential individual average user rate the identified improvements would have if there was no funding and if 20% or 30% grant were obtained. The project expense is spread evenly over all existing 250 water service connections. In summary, the following criteria were assumed and used in the user rate calculations:

- Loan Interest Rate = 2.00%
- Loan Period = 30-years
- Equivalent Dwelling Units (EDUs) = 250 connections
- The "Monthly Cost per User" is the net monthly cost per user for the Capital Cost shown. This is the minimum payment for the loan needed.
- The $100.97 "Current Base Rate + Usage" in the following tables was used to represent O&M costs today and to already account for debt payment of the Business Oregon loan.
- The "New Average Residential Water Bill" is the combination of O&M and debt service.

TABLE 6-6: POTENTIAL AVERAGE USER RATE – ENTIRE SYSTEM

ALL Improvements	**No Grant, 2.00% Loan**	**25% Grant**	**50% Grant**
Capital Cost	$22,920,000	$22,920,000	$22,920,000
Loan Needed	$22,920,000	$17,190,000	$11,460,000
Interest Rate	2.000%	2.000%	2.000%
Loan Period (yrs)	30	30	30
Annual Annuity	$1,023,376.22	$767,532.16	$511,688.11
Monthly Income Required	$85,281.35	$63,961.01	$42,640.68
Monthly Income Reqd' w/ 20% reserve	$102,337.62	$76,753.22	$51,168.81
Number of EDUs (Current)	250	250	250
Monthly Cost per User	**$409.35**	**$307.01**	**$204.68**
Current Base Rate + Usage (Res.)	$100.97	$100.97	$100.97
New Average Residential Water Bill	**$510.32**	**$407.98**	**$305.65**

TABLE 6-7: POTENTIAL AVERAGE USER RATE – PRIORITY 1

Priority 1	**No Grant, 2.00% Loan**	**25% Grant**	**50% Grant**
Capital Cost	$2,372,000	$2,372,000	$2,372,000
Loan Needed	$2,372,000	$1,779,000	$1,186,000
Interest Rate	2.000%	2.000%	2.000%
Loan Period (yrs)	30	30	30
Annual Annuity	$105,909.62	$79,432.21	$52,954.81
Monthly Income Required	$8,825.80	$6,619.35	$4,412.90
Monthly Income Reqd' w/ 20% reserve	$10,590.96	$7,943.22	$5,295.48
Number of EDUs (Current)	250	250	250
Monthly Cost per User	**$42.36**	**$31.77**	**$21.18**
Current Base Rate + Usage (Res.)	$100.97	$100.97	$100.97
New Average Residential Water Bill	**$143.33**	**$132.74**	**$122.15**

TABLE 6-8: POTENTIAL AVERAGE USER RATE – PRIORITY 2

Priority 2	**No Grant, 2.00% Loan**	**25% Grant**	**50% Grant**
Capital Cost	$7,949,000	$7,949,000	$7,949,000
Loan Needed	$7,949,000	$5,961,750	$3,974,500
Interest Rate	2.000%	2.000%	2.000%
Loan Period (yrs)	30	30	30
Annual Annuity	$354,922.23	$266,191.67	$177,461.12
Monthly Income Required	$29,576.85	$22,182.64	$14,788.43
Monthly Income Reqd' w/ 20% reserve	$35,492.22	$26,619.17	$17,746.11
Number of EDUs (Current)	250	250	250
Monthly Additional Cost per User	**$141.97**	**$106.48**	**$70.98**

6.4 Potential Grant and Loan Services

The CIP listed several improvements that add up to a substantial dollar figure. In order to make the needed and necessary improvements, assistance from funding agencies will be necessary.

Funding for water system capital improvements occurs with loans, grants, principal forgiveness, bonds, or a combination thereof. Parameters such as the local and State median household income (MHI), existing debt service, water use rates, low/moderate income level percentages, financial stability, and project need are used by funding agencies to evaluate the types and levels of funding assistance that can be received by a community.

Although MWD has already received funding for distribution pipeline replacement, water treatment plant, and an additional tank, a significant amount of additional funding will be necessary to get the water system to a quality status it needs to be. Business Oregon and USDA are the more common avenues for project funding.

6.4.1 Business Oregon

Business Oregon administers resources aimed at community development activities primarily in the water and wastewater infrastructure areas. The Business Oregon Regional Coordinator for Lane County is Michelle Bilberry and any application process will begin by contacting her. The funding programs through Business Oregon include:

1. Community Development Block Grants (CDBG)
2. Safe Drinking Water Revolving Loan Fund (SDWRLF)
3. Special Public Works Funds
4. Water/Wastewater Financing

Block Grant assistance for MWD may be possible due to possibly meeting the national objectives for low and moderate-income persons.

The SDWRLF generally must be used to address a health or compliance issue and could potentially provide a loan up to $6 million per project. To receive a loan, the project must be ranked high enough on the Project Priority List in the Intended Use Plan developed by the State. A Letter of Interest (LOI) must be submitted before a project can be listed in the Intended Use Plan. The LOIs are accepted annually. Coordinate with the regional coordinator for LOI deadlines. Loan terms are typically 3-4% interest for 20 years, however “Disadvantaged Communities” may potentially qualify for 1% loans for 30 years as well as some principal forgiveness. To be considered a Disadvantaged Community the average residential water rate must be at or above the threshold rate and the area MHI must be less that the State MHI.

All recipients of SDWRLF awards need to complete an environmental review on every project in accordance with the State Environmental Review Process (SERP), pursuant to federal and state environmental laws. The Environmental Report typically required can cost $25,000 to $75,000 depending on the specific biological, cultural, waterway, and wetland issues that arise.

Loans and grants are also available through the Special Public Works Funds and Water/Wastewater Financing depending on need and financial reviews by Business Oregon.

The Drinking Water Source Protection Fund (DWSPF) is designed for the protection of drinking water sources. Funds are available through the DWSRF local assistance and other State programs set-aside. This set-aside allows states to provide loans (up to a maximum of $100,000) for certain source water assessment (SWA) implementation activities, including source water protection (SWP) land acquisition and other types of incentive-based source water quality protection measures.

States may also provide direct assistance in the form of a grant (up to $30,000 per eligible system) or technical support in the areas of SWP area delineation and assessment, wellhead protection programs, and capacity development strategy. Examples of activities eligible through this set-aside include the development of local SWP ordinances and implementation of public education programs to highlight the importance of wellhead protection.

6.4.2 USDA Rural Development

There are many programs that may apply to MWD. Holly Halligan is the contact person for USDA Rural Development. One such opportunity the District is currently pursuing is the Emergency and Imminent Community Water Assistance Grants (ECWAG).

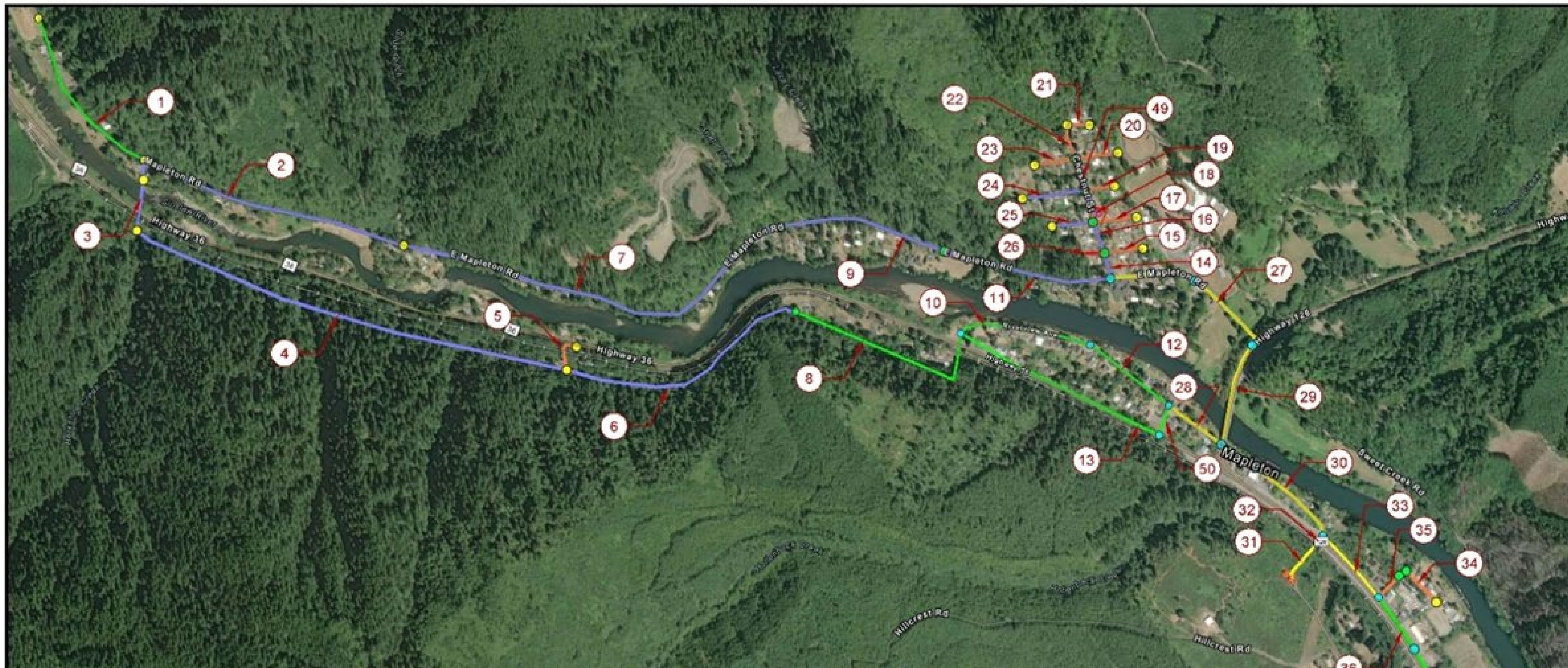
6.5 Conclusion and Next Steps

The water project improvements in this Plan are a significant undertaking. A project(s) of this magnitude will require public support and financial assistance. This Plan provides sufficient technical and financial information to prospective funding agencies or financing institutions for their initial review and consideration.

Should MWD desire to move forward with any or all improvements, it is recommended a One-Stop Financing Roundtable be arranged. Business Oregon facilitates a monthly meeting to quickly and efficiently find funding solutions for communities. One-stop participants will benefit from the combined experience of participants and gain valuable contacts. As a result of the One-Stop, participants will walk away with an understanding of the next steps needed for the project and be provided with a variety of funding scenarios. To make this project manageable, grants and loan-forgiveness money are important.

Continued involvement with the funding and regulatory consortium that has been created for the District has proven to be beneficial and fruitful.

APPENDIX



PIPE TABLE					
Map Number	Length	Size	Map Number	Length	Size
1	2176	10	26	170	3
2	2525	8	27	1743	12
3	711	8	28	590	12
4	4388	8	29	1061	12
5	305	6	30	1237	12
6	2624	8	31	554	12
7	4180	8	32	94	12
8	1988	10	33	724	12
9	1640	8	34	375	6
10	1198	10	35	419	6
11	1759	8	36	525	10
12	1068	10	37	813	10
13	2040	10	38	220	10
14	236	8	39	388	8
15	390	6	40	775	10
16	280	8	41	277	8
17	390	6	42	90	6
18	309	8	43	480	8
19	296	6	44	510	6
20	445	6	45	316	6
21	215	6	46	250	8
22	305	6	47	475	8
23	420	6	48	382	6
24	648	8	49	295	6
25	412	8	50	288	10

SYMBOL LEGEND

PIPE LEGEND

SIZE	SYMBOL
4"	red
6"	orange
8"	purple
10"	green
12"	yellow

FIRE FLOW LEGEND

AVAILABLE FIRE FLOW (GPM)	SYMBOL
1000-1500	yellow
1500-2500	green
ABOVE 2500	cyan

Pipe Summary Table	
Pipe Size	Pipe Length
6	5,153
8	22,099
10	10,857
12	2,387
Total	40,496

MAPLETON WATER DISTRICT
LANE COUNTY

WATER MASTER PLAN

PROPOSED SYSTEM FIRE FLOW SUMMARY

REV.	DATE	DESCRIPTION	BY

DESIGNED BY: JTP DRAWN BY: JTP CHECKED BY: KPC
PROJECT NO. 2204-006

Civil West Engineering Services, Inc.
409 SW 10TH ST.
NEWPORT OR 97365
541-264-7040
www.civilwest.com

FIG 1
JUNE 2024