City of Eagle Point

Jackson County, Oregon

WATER SYSTEM MASTER PLAN

March 2013

August 2013

Civil West
Engineering Services, Inc.

Civil West Engineering Services, Inc. • 486 E Street • Coos Bay, Oregon 97420

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REGISTERED PROFESSIONAL ENGINEER
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OREGON
JULY 9, 2001
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EXPIRATION DATE: 12/31/14

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Executive Summary

Section ES

ES.1 Introduction

The City of Eagle Point has water rights to sources of water but pays the Medford Water Commission (MWC) to treat and distribute their drinking water. MWC has worked diligently to maximize the existing water resources available to the City of Eagle Point. Since MWC's inception in 1926, the Commission has developed and maintained comprehensive plans that outline current and future water needs and resources, with a focus on watershed management. The City purchases water from MWC and was the first city to become a customer in 1936. MWC provides water to residential, commercial, and industrial customers within the 1,775-acre Urban Growth Boundary (UGB) of Eagle Point. The City is certified as Public Water System (4100267) by the Oregon Health Authority as defined by the Oregon Administrative Rule (OAR) 333-061-0020.

A Water Comprehensive Plan Supplemental Report was completed in 2001 by Hardey Engineering and Associates. To reevaluate the current situation in light of regulatory issues and rules in place today, and to refine improvement needs and a Capital Improvement Plan, a new Water System Master Plan was commissioned. This Master Plan investigates the needs within the current UGB plus areas encompassing the raw water supply and transmission facilities for a 20-year period into the future, ending in the year 2033.

The estimated full-time service population of 8,550 persons (2012 figure) is projected to grow to 15,938 persons by the year 2033. The growth projections are based on a 3.01% average annual growth as indicated by the City of Eagle Point Planning Office.

ES.2 Water Demand

ES.2.1 Current Water Demand

The City of Eagle Point has records for metered usage dating from January 2000 to October 2012. Approximately 2.9 million gallons of water were used in the year 2000 and 5.0 million gallons were used during 2011. This shows an increase of 174% over the eleven years of records. A summary of the current water demand is presented below. See Section 3.2 for more details.

City of Eagle Point 2012 Data			8,550 persons	
Unit	ADD	MMD	MDD	PHD
gpd	1,893,108	3,376,188	4,728,408	7,572,432
Peaking Factor	1.0	1.8	2.5	4.0
gpcd	217	387	542	868

ADD - Average Daily Demand *MMD - Maximum Monthly Demand*
MDD - Maximum Daily Demand *PHD - Peak Hourly Demand*

Although the City of Eagle Point purchases an average of 217 gallons per capita per day (gpcd), meter consumption is actually 163 gpcd. The difference is due to leaks in the water system, including tanks, lines, flushing, etc. This unaccounted water is discussed in the report in Section 3.2.4.

ES.2.2 Future Water Demand

Water demand projections over the planning period of 20 years are estimated by multiplying an average per capita demand of 217 gpcd by the projected future population estimates. By the end of the planning period, the ADD is projected to increase to nearly 3.5 mgd while the MDD is projected to increase to 8.6 mgd. See Section 3.3 for more information

City of Eagle Point 2033 Data			15,938 persons	
Unit	ADD	MMD	MDD	PHD
gpd	3,458,541	6,225,375	8,638,396	13,834,184
Peaking Factor	1.0	1.8	2.5	4.0
gpcd	217	391	542	868

Based on the 20-year water demand projections, supply and treatment facilities must be designed to deliver at least 8.6 million gallons per day or 6,000 gallons per minute.

ES.3 Existing Water System

ES.3.1 Water Supply

Raw water is supplied from two pipelines from Big Butte Springs, east of Butte Falls, during the winter months, and during summer months from the Duff Water Treatment Plant on the Rogue River. Both sources provide a high-quality stable water supply year round. Water is treated and delivered to the City of Eagle Point by MWC.

The City water department operates and maintains the City's water infrastructure, including:

- Three pump stations (Highway 62, Bellerive and Eagle Point)
- Three reservoirs (3.6 million gallon, 4.0 million gallon and 200,000 gallon tank)
- All internal water mains (approximately 45 miles)
- All water meters (approximately 3,042 meters)

ES.3.2 Water Treatment

Water Treatment is provided by the Medford Water Commission. Currently, the City of Eagle Point does not provide any treatment, however, additional chlorine can be added at the Highway 62 pump station if needed. See Section 4.2.2 for more information.

ES.3.3 Treated Water Storage

The City has a total storage capacity of 7.4 million gallons which includes the following:

- 3.6 million gallons at Eagle Point Hill;
- 200,000 gallons on Radar Hill near Riley Road; and
- 4.0 million gallons (3.6 million gallon capacity) at the Veterans Administration (VA) reservoir near Riley Road.

The Eagle Point Hill storage tank has a 3.6 million gallon capacity and was built in late 1996. The tank currently services approximately 2700 customers and is located within Pressure Zone 1, as defined by the 2001 Comprehensive Plan.

The Radar Hill storage tank has a capacity of 200,000 gallons and is located near Riley Road. The tank currently services approximately 260 customers and is located within Pressure Zone 2, as defined by the 2001 Comprehensive Plan.

The City's other storage tank is a 4.0 million gallon tank located near Riley Road at the Eagle Point National Cemetery. It was built in the 1940's as an adjunct to the Veterans Administration Domiciliary at White City, about four miles away. The 4.0 million gallon water tank was sold to the City of Eagle Point in 1990 for $1.00. The City has completed many upgrades to the tank including a new roof, upgrades to the telemetry system, and structural upgrades to the floor and the walls of the inside of the tank. The new concrete raised the floor by 12 inches and increased the width of the walls by 6 inches. This reduced the capacity of the tank from 4.0 million gallons to approximately 3.6 million gallons. For clarity, the tank will be referred to nominally, as the 4.0 million gallon tank in this report. The tank is located 20 feet lower than the 3.6 million gallon tank and is only partially full.

See Section 6.2.7 for more details.

ES.3.4 Distribution System

The City's water distribution system consists of piping ranging in size from 1 to 16 inches in diameter and three pump stations. Pipe materials within the water system include asbestos cement (transite), ductile iron, polyvinyl chloride (PVC), and galvanized steel.

The pump stations are located at:

- Highway 62 (3-100 hp and 1-40 hp pumps) – pumps water from MWC facilities to Eagle Point;
- Bellerive (2-20 hp pumps) - supplies the 200,000 gallon reservoir on Radar Hill; and
- Eagle Point – (2 – 5 hp pumps) - pumps to four residences uphill.

Currently, there are three separate pressure zones. The 3.6 million gallon storage reservoir and the Highway 62 pump station regulate water to Zone 1 and the 200,000 gallon tank feed water to Pressure Zone 2. Zone 3 currently provides water from the 4.0 million gallon storage reservoir. See Section 6.4 for more information.

ES.4 Improvement Needs

ES.4.1 Water Supply

The City is interested in developing additional water supplies that can complement the Medford Water Commission supply or replace it. City staff indicated that there may be a high-producing artesian well in the area west of Highway 62. It is recommended that a test well be installed to evaluate this aquifer and its ability to produce large amounts of water. See Section 7.1 for more details.

ES.4.2 Water Treatment

The City of Eagle Point does not provide water treatment but can provide disinfection at the Highway 62 pump station, when needed.

ES.4.3 Treated Water Storage

The storage goal is to provide storage for 3 average days of water demand plus equalization volume (to account for the regular daily fluctuation in tank level) plus fire storage. For the schools and other significant commercial structures, fire storage equal to at least 3500 gpm for 3 hours is recommended.

Since existing storage totals equal 7.4 MG, the City has enough storage capability to last until the year 2014.

Currently, the 4.0 million gallon (nominal) tank is being operated with less than 50% of designed storage to maintain water quality and adequate chlorine residual. This means that a portion of storage is not available so the City is actually deficient in water storage by 3.5 million gallons. It is of primary importance that the 4.0 million gallon tank be 100% utilized to meet the City of Eagle Point's fire protection and storage capacity needs. Additionally, the City will need to build more water storage tanks in the near future to meet the demands of an increasing population. See Section 7.3 for more information.

To address the storage need after 2014, two new storage tanks are recommended. The first, a 1.6 MG tank should be built within the next few years and is proposed to be placed near the 0.2 MG tank. The second tank, a 3.6 MG tank, should be built within the next 5 to 10 years and is proposed to be placed east of town on a high hill. See Section 7.3 for more information.

ES.4.4 Distribution System

Computer hydraulic modeling was developed for the entire distribution system. Per OAR, the system must maintain at least 20 psi at all service connections (at the property line) at all times, even during fire flow events. In addition, at least 40 psi is typically desirable at any structure during normal peak flows but is not expected during fire flows. Piping deficiencies exist in several areas of the system resulting in inadequate fire flow availability. Some water lines within the City are asbestos-cement lined and need to be replaced. See Section 7.5 for more information on pipe deficiencies.

Figure 6.4.3-1 shows the various hydrant locations. The City currently has excellent coverage.

To remedy the flow restrictions and provide for proper fire flows, numerous piping improvements are recommended. The various piping improvements are shown in Figure 7.4.5-1.

The Bellerive pump station is in need of two additional pumps to provide for increased demands in Zone 2. This pump station also requires back-up power. In the case of a fire, the 200,000 gallon tank will not be able to maintain the necessary supply of water. It was determined the best option for this pump station is to relocate it. By moving the Bellerive Pump Station up near the 4.0 MG tank and upgrading the pumps it makes it possible to use the system as designed, with three zones. See Section 7.2.1 for more details.

Additionally, an emergency generator is recommended for the Highway 62 pump station. See Section 7.2.2 for more information.

ES.5 Capital Improvement Plan

The various improvements recommended in the Master Plan are prioritized and separated into 4 phases or priorities of work as shown below. The total cost for all improvement in the Capital Improvement Plan (CIP) is just under $17 million.

Four priority categories have been identified and they are described as follows:

Priority 0 projects include the upgrades to the pump stations, construction of a 1.6 million gallon tank, installation of pressure reducing valves (if required) and construction of some water lines.

Priority 1 projects include the construction of a 3.6 million gallon tank and replacements of water lines.

Priority 2 and 3 projects are primarily water line replacements of asbestos-cement piping.

ES.6 Financing

Existing water rates in Eagle Point are low. Based on 2011 water sales records, the average single-family dwelling uses an average of 8,795 gallons of water per month. Under the existing rate structure this average home has a monthly water bill of $24.89 ($0.00283 per gallon). Funding agencies often use a value of 7,500 gallons per month as the normal residential use. Under the current rate structure, the average residential rate per EDU then becomes $23.27 for 7,500 gallons.

Funding assistance for municipal water improvements in Oregon primarily comes through programs administered through the Infrastructure Finance Authority (IFA) – which formerly was known as the Oregon Economic and Development Department (OECDD) – and USDA Rural Development Rural Utilities Service (RUS). Programs through IFA include Block Grants, the Safe Drinking Water Revolving Loan Fund, Special Public Works Fund, and Water/Wastewater Financing. Federal money is available with grant and loans through RUS. Each program has various advantages and disadvantages and various requirements. To determine which programs are available to the City for any specific project or projects, a "One-Stop" financing meeting should be conducted once this Master Plan is adopted and a decision to move forward on specific improvements is made. The One-Stop meetings are held in Salem once per month and it is recommended that this step be initiated as soon as possible after Master Plan adoption.

To qualify for grant assistance for any water system improvements it is likely that water rates must first meet the Oregon State average for a residential water bill which is approximately $55 per month. Eagle Point charges 55% less than the average Oregonian pays. By raising water consumption rates, the City of Eagle Point may fund all of the Capital Improvement Projects listed which results in an average monthly bill of $50.81 for each equivalent dwelling unit (EDU). This figure is still well below the average monthly water bill for an Oregon resident. See Section 9.4 and the table below for more information.

Cost	Full CIP	Priority 0	Priority 1	Priority 2	Priority 3
Capital Cost	$16,952,264	$5,524,386	$7,101,006	$1,779,556	$2,547,317
Loan Needed	$16,952,264	$5,524,386	$7,101,006	$1,779,556	$2,547,317
Interest Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Loan Period (yrs)	20	20	20	20	20
Annual Annuity	$1,191,304.57	$388,221.08	$499,016.55	$125,056.64	$179,010.30
Monthly Income Required	$99,275	$32,352	$41,585	$10,421	$14,918
Monthly Income Required	$109,203	$35,587	$45,743	$11,464	$16,409
Number of EDU's (8,795)	4,213	4,213	4,213	4,213	4,213
Monthly Cost per EDU	$25.92	$8.45	$10.86	$2.72	$3.89

Introduction

Section 1

1.1 Background and Need

1.1.1 Community Background

The City of Eagle Point is located in Jackson County, Oregon ten (10) miles east of Interstate 5 and six (6) miles northeast of Medford, Oregon along State Highway 62. Eagle Point is the "Gateway to the Lakes" in Jackson County, sitting at the junction of State Highway 140 to Klamath Falls, Lake of the Woods, Fish Lake Reservoir, Four Mile Lake, and Klamath Lake and State Highway 62 to Crater Lake, Lost Creek Reservoir, and Diamond Lake. The City water system serves residential, commercial, and industrial customers through 3042 water service connections. Figure 1.1.1-1 shows the location of Eagle Point. The study area is described in Section 2.

During the gold rush days of the 1850s, Eagle Point was known for its rich agricultural production and became the food basket to the Rogue Valley. The regional importance of this area was solidified in 1872 when the Snowy Butte Mill was built along the banks of the nearby Little Butte Creek. The grist mill quickly became an economic hub for the area where wagons lined the road to the mill for miles waiting to have their grain ground into flour. Although the mill was frequented by local farmers, Native Americans would travel more than 90 miles over the old military trail to Fort Klamath to trade leather and berries for flour.

As a result of the arrival of the Pacific and Eastern Railroad in the early 1900's, the City became incorporated in 1911 with a strong commercial center. As Eagle Point blossomed, it became the home to several hotels, a livery stable, blacksmith shop, saloons, and dance halls known for their rowdy behavior and bootleggers. Three of the original brick buildings are now home to modern businesses.

1.1.2 Water Rights

Water for the City of Eagle Point is obtained from the Medford Water Commission (MWC). MWC holds water rights at Big Butte Springs and the Rogue River, treats the water as required, and sells the water to select cities in Jackson County. Additionally, the City of Eagle Point has its own water rights at Four Mile Lake and has had these rights since 1910. These serve as additional water supplies for the City during the summer months when irrigation needs are highest.

Development within the City limits has negated the use of irrigation districts needing water and the City is in the process of transferring water rights from several irrigation districts to the City for municipal use.

With ongoing water rights purchases, the City of Eagle Point has purchased additional water rights to supplement summer demands and future growth. Table 1.1.1 provides a summary of the water rights held by the City of Eagle Point. This topic is discussed in more detail in Section 6 of this report.

Table 1.1.1 – Water Rights Summary

Certificate Number	Maximum Authorized Rate (cfs)	Maximum Authorized Volume (ac-ft)	Completion Date	Water Source
T-9973	0.9	321.3	10-01-2011	Four Mile Lake and Fish Lake Reservoirs
T-10527	0.5	181.5	10-01-2013	Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir
85409	1.25	356.94	03-31-1910	Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir
T-10614	1.15	273.7	10-01-2015	Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir
T-10960	1.77	520.3	10-01-2016	North and South Forks of Little Butte Creek and Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir

1.1.3 Need for Plan

Hardey Engineering and Associates, Inc. prepared a plan titled *City of Eagle Point, 2001 Water Comprehensive Plan Supplemental* Report, dated October 2002. Over ten years have elapsed since the analysis was completed. At this point, the City considers it prudent to reevaluate overall system needs and to complete a new 20-year Water System Master Plan in accordance with OAR 333-061-0060(5). In conjunction with this new Master Plan, additional investigations are being conducted to evaluate raw water supplies.

1.1.4 Plan Authorization

The City secured the services of Civil West Engineering to complete a Water Master Plan in October of 2012.

1.1.5 Past Studies and Reports

Eagle Point is currently participating in a multi-agency evaluation of water conservation strategies. The goal of the Southern Oregon Municipal Water Conservation Workgroup, funded by a grant from the Oregon Department of Water Resources, is to evaluate and define water conservation strategies for the Medford Water Commission service area. The plan will provide a list of strategies, that if adopted by multiple participating entities, could reduce water demands and delay the need for costly infrastructure expansion and/or water right acquisitions. The analysis also includes a leak detection component, and a large meter testing program that could be implemented to reduce water losses. Recommendations of the study could be incorporated into a future updated Water Management and Conservation Plan for the City of Eagle Point. The study is expected to be completed in September of 2013.

Additional resources utilized for this planning effort include:

- City of Eagle Point 2001 Water Comprehensive Plan Supplemental Report – Hardey Engineering and Associates, Inc.
- City of Eagle Point Buildable Lands Inventory (Draft), April 2009
- Eagle Point Buildable Lands Analysis, June 2001, Community Planning Workshop

1.2 Study Objective

The purpose of the Water System Master Plan is to furnish Eagle Point with a comprehensive planning document that provides engineering assessment of system components and guidance for future planning and management of the water system over the next 20 years.

Principal plan objectives include:

- Description and mapping of existing water system
- Prediction of future population and water demands
- Creation of a digital hydraulic model based on available mapping
- Evaluation of existing water system components
- Evaluation of the capability of the existing system to meet future needs and regulations
- Recommendations for improvements needed to meet future needs and/or address deficiencies
- Background provisions to support updated water System Development Charges (SDC's) (to be completed at a later date)

This Plan details infrastructure improvements required to maintain compliance with State and Federal standards as well as provide for anticipated growth. Capital improvements are presented as projects with estimated costs to allow the City to plan and budget as needed.

1.3 Scope of Study

1.3.1 Planning Period

The planning period for this Water System Master Plan must be at least 20 years in accordance with OAR 333-061-0060(5)(b) and OAR 690-086-0170. The period must be short enough for current users to benefit from system improvements, yet long enough to provide reserve capacity for future growth and increased demand. Existing residents should not pay an unfair portion for improvements sized for future growth, yet it is not economical to build improvements that will be undersized in a relatively short period of time. The end of the planning period for this Master Plan is the year 2033, or 20 years from the completion of the Plan.

1.3.2 Planning Area

The Master Plan planning area is that contained within the Eagle Point Urban Growth Boundary (UGB) and the planned UGB expansion areas. The area within the UGB includes approximately 1,755 acres. Additional information and maps for the planning area are presented in Section 2.

1.3.3 Work Tasks

In compliance with Drinking Water program standards, this plan provides descriptions, analyses, projections, and recommendations for the water system over the planning period. The following elements are included:

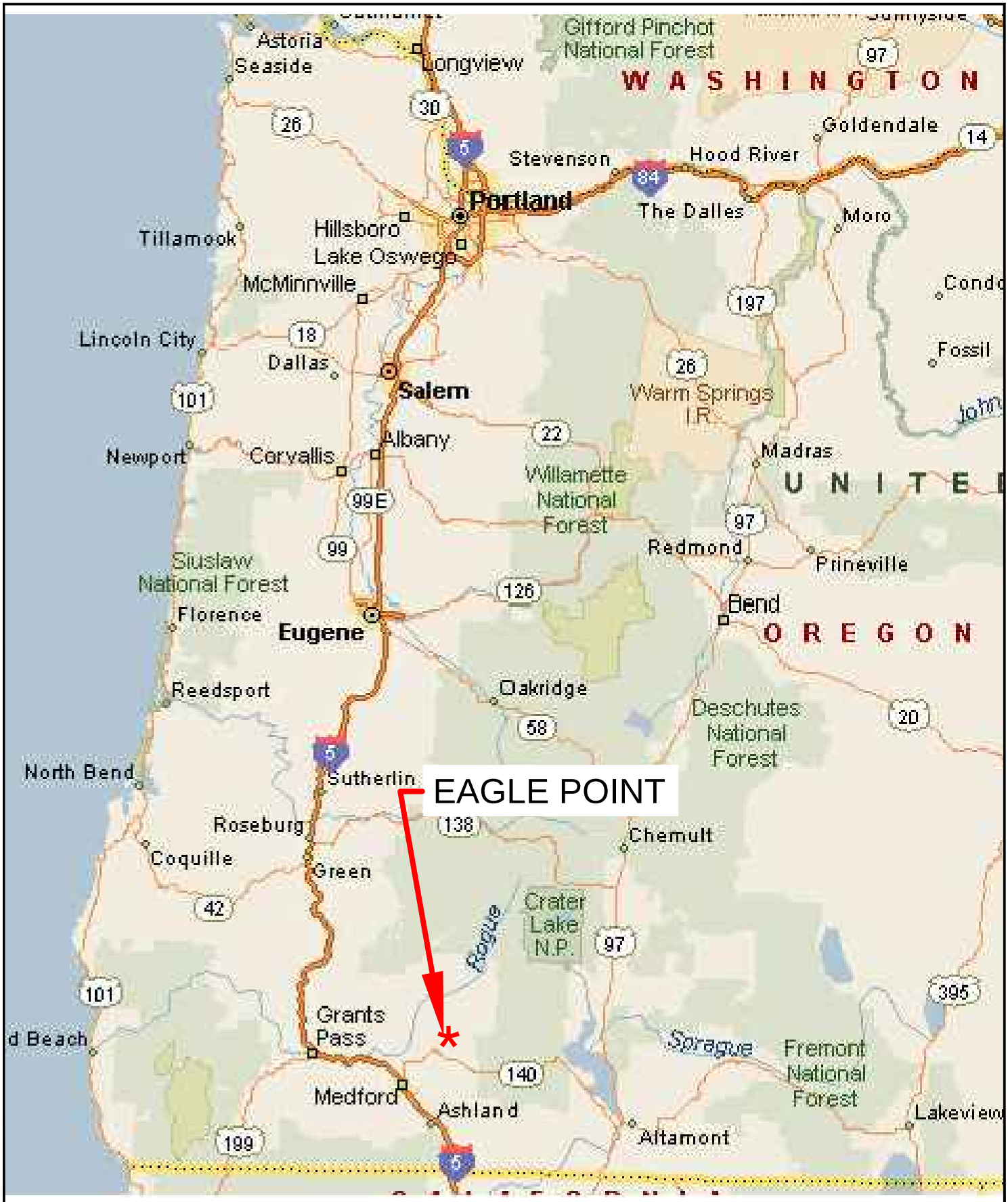
- Study area characteristics, including land use and population trends and projections
- Description of the existing water system including transmission, storage and distribution
- Existing regulatory environment including regulations, rules and plan requirements
- Current water usage quantities and allocations
- Projected water demands
- Existing system capacity analysis and evaluation

- Improvement alternatives and recommendations with associated costs
- A summary of recommendations with a Capital Improvement Plan
- Funding options
- Maps of the existing system and recommended improvements

1.4 Acknowledgments

Various members of the City Staff have contributed efforts to ensure complete information and proper planning of the community's water system needs. Water treatment operators, water distributions staff, billing records personnel, the public works director and the City manager have all helped to complete this effort. We wish to acknowledge and thank the following persons in particular:

Henry Lawrence – City Administrator
Robert Miller – Public Works Director
Gary Shipley – Public Works Supervisor
Mike Upston – Principal Planner
Cordy Johnson – Lead Worker



Civil West Engineering Services, Inc.	Drawn By: LFC Date: 03-06-2013	0 1"	**Location Map**	FIGURE
	Water Master Plan		City of Eagle Point Jackson County, OR	1.1.1-1

Study Area

Section 2

2.1 Physical Environment

2.1.1 Planning Area Location

The city of Eagle Point is located in Jackson County Oregon ten (10) miles east of Interstate 5 and six (6) miles northeast of Medford, Oregon along State Highway 62. The City is located at 42º28'4"N, 122º48'6"W in Township 36S, Range 1W. The existing Urban Growth Boundary (UGB) extends from Alta Vista Road in the south to Barton Road to the north. The western boundary is approximately defined by Highway 62 and the eastern boundary varies from Riley Road to Reese Creek Road. The current UGB encompasses 1,755 total acres or 2.74 square miles.

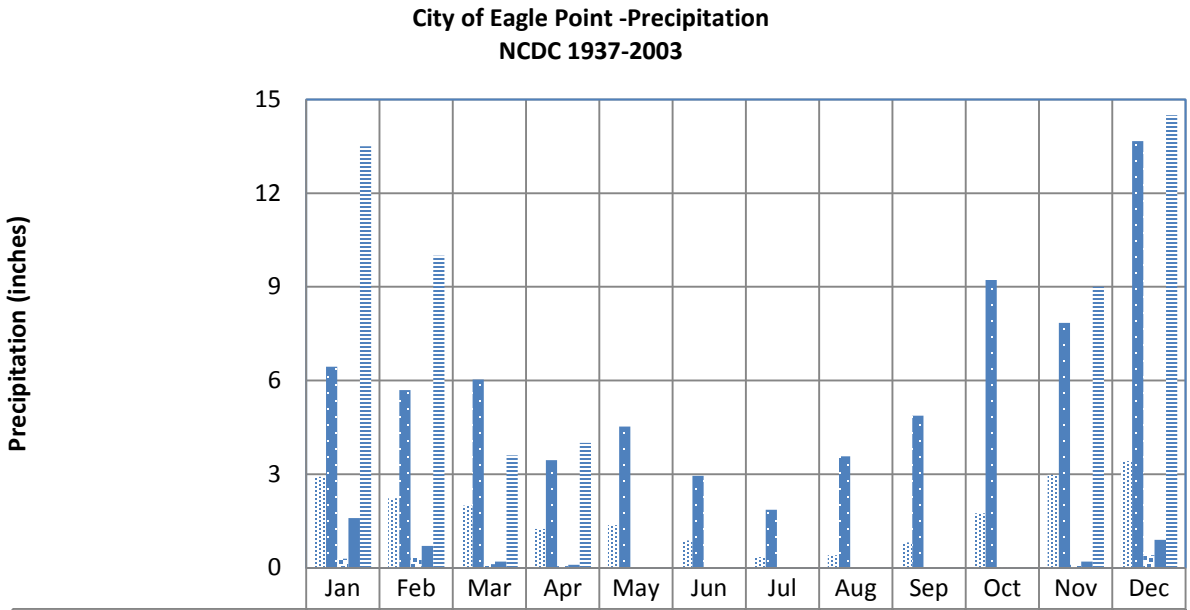
This Master Plan planning area is primarily that contained within the Eagle Point UGB. Also considered are the Urban Reserve Areas (URAs) as identified by the City of Eagle Point Comprehensive Plan, 2012. The URAs comprise approximately 6900 acres of additional land outside the UGB. Of that, The Greater Bear Creek Valley Regional Plan for Jackson County, Oregon estimates that 1,873 acres are generally unconstrained for building. A map of the City is provided in Figure 2.1.1-1.

2.1.2 Climate

Climate data was obtained using long-term records collected at the Medford Station (Station 355424) as reported by the National Climatic Data Center. The Medford Station is the closest weather recording station to the City.

Average snowfall is approximately 3.95 inches in Eagle Point. Record low and high snowfall years recorded were 0.7 in 1979-1980 and 23.5 in 1964-1965. On average, the majority of snowfall occurs from November to February. No statistically significant increasing or decreasing trend in annual snowfall is evident.

Average annual precipitation is approximately 18.9-inches in Eagle Point. Record low and high precipitation years recorded were 11.7-inches in 1959 and 28.9-inches in 1964. The maximum recorded 24-hour rainfall was 4.99-inches on November 19, 1996. On average the majority of rainfall occurs from November to February. No statistically significant increasing or decreasing trend in annual rainfall is evident. Based on the NOAA Atlas 2, Volume X Isopluvial maps, the 5-year storm 24-hour rainfall is 3.0 inches.

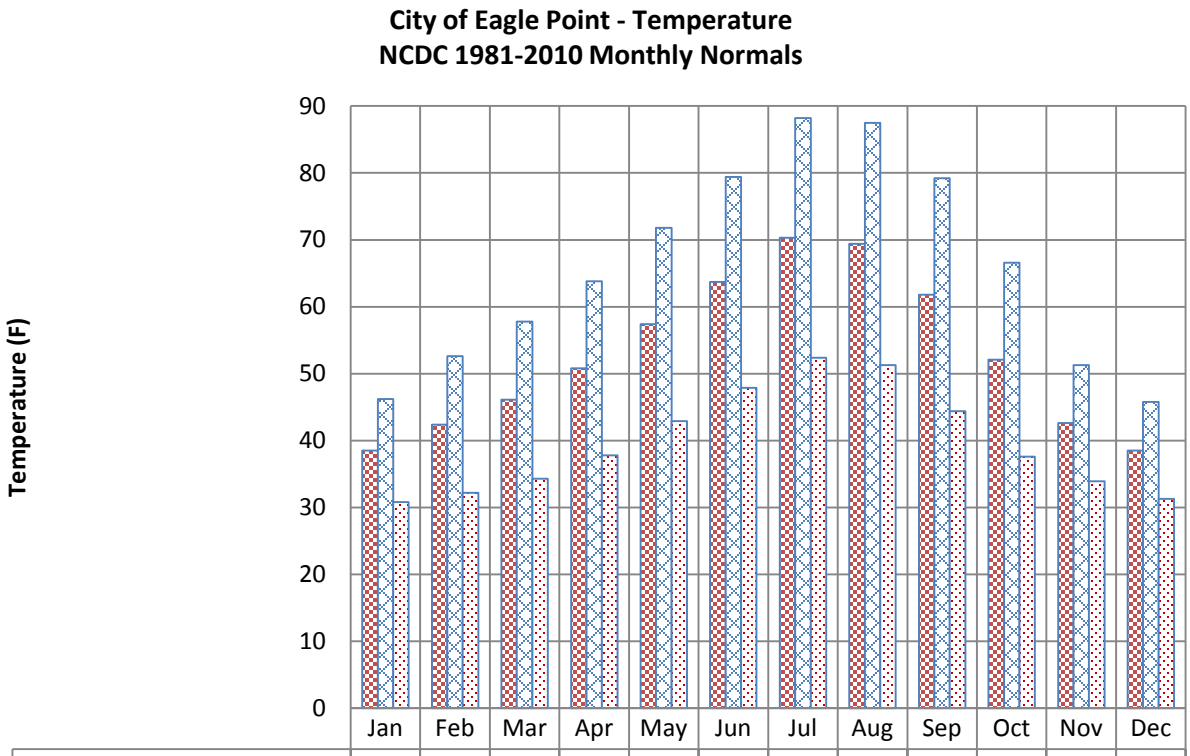


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Precipitation (in.)	2.92	2.23	2	1.25	1.37	0.88	0.35	0.41	0.82	1.75	2.98	3.42
High Precipitation (in.)	6.44	5.69	6.03	3.45	4.53	2.95	1.86	3.57	4.87	9.22	7.85	13.67
Low Precipitation (in.)	0.29	0.33	0.12	0.06	0	0	0	0	0	0.01	0.1	0.41
Mean Snowfall (in.)	1.6	0.7	0.2	0.1	0	0	0	0	0	0	0.2	0.9
High Snowfall (in.)	13.5	10	3.6	4	0	0	0	0	0	0	9	14.5

Month

Figure 2.1.2-1 – Precipitation Normals, NCDC 1937-2003

The average annual temperature in Eagle Point ranges from 41.3° to 67.2º F with an annual mean of 54° F. A record high temperature of 115° F was recorded in July 1946. A record low temperature of -6°F was recorded in December, 1972. July is statistically the warmest month with a mean of 72.9° F while December is the coldest with a mean of 38.1° F.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Temperature (F)	38.5	42.4	46.1	50.8	57.4	63.7	70.3	69.4	61.8	52.1	42.6	38.5
High Mean Temperature (F)	46.2	52.6	57.8	63.8	71.8	79.4	88.2	87.5	79.2	66.6	51.3	45.8
Low Mean Temperature (F)	30.8	32.2	34.3	37.8	42.9	47.9	52.4	51.3	44.4	37.6	33.9	31.3

Figure 2.1.2-2 – Temperature Normals, NCDC 1981-2010

2.1.3 Land Use

Land use within Eagle Point is a mixture of residential (60%), commercial (25%), public (15%), and industrial (1%). Eagle Point became a major trade center when Snowy Butte Mill was built in 1872 and a commercial district developed when the P&E railroad arrived. In 1912, the City of Eagle Point was incorporated. Robert Trent Jones, Jr. created the Eagle Pointe Golf Course which opened in 1996 and draws visitors from all around. Additionally, a large residential community surrounds the golf course. A map showing the different land uses has been provided as Figure 2.1.3-1.

2.1.4 Zoning Information

Much of the City is zoned as some type of residential use with a mixture of low density residential on the northern and southern borders of the UGB and some high density residential near South Royal Avenue and Shasta Avenue. A great portion of the City is zoned as R-1-8, Single Family Residential with 8,000 square foot lots. There is a large commercial zone located in the center of the City and some smaller zones on the eastern, southern, and western edges. There is one area that is zoned as light industrial on the west side of the City. A Zoning Map is provided as Figure 2.1.4-1.

2.1.5 Floodplains

Areas within the City are within the 100-year floodplain. Floodplain areas occur along Little Butte Creek and its tributaries. FEMA FIRM map data for the City area is included at the end of this Section in Figure 2.1.5-1.

2.1.6 Wetlands

The National Wetlands Inventory shows a jurisdictional wetland within Eagle Point located along Candis Drive near the intersection of Crystal Drive. Additionally, there are wetland areas along Little Butte Creek. Previous reports state over 5 acres of wetlands exist within Eagle Point. The Eagle Point Golf Course has constructed wetlands within it to treat storm water. A Wetland Map is included at the end of this Section in Figure 2.1.6-1.

2.1.7 Cultural Resources

According to the National Register of Historic Places, three historical sites are listed for Eagle Point as shown in Table 2.1.7. No other historical sites or structures are listed.

Table 2.1.7-1 – Archaeological and Historic Sites

Historic Property/Site Name	Street Address	Period of Significance	Listed Date	NR Number
Antelope Creek Covered Bridge	Intersection of Main Street and Royal Avenue	1900-1924, 1925-1949	2012	12001091
Dead Indian Soda Springs Shelter	Near end of South Fork Little Butte Creek Road	1925-1949	2000	00000498
Snowy Butte Flour Mill	402 N. Royal Ave.	1850-1874	1976	76001581

2.1.8 Biological Resources

Biological resources in the area include numerous fish, birds and mammals. Fish species include coho salmon, chinook salmon, and sea-run cutthroat trout. Little Butte Creek, despite being moderately polluted, is one of the best salmon-producing tributaries of the Rogue River. Twenty-two species of birds are known to breed in the chaparral forest including wrens, blackbirds, and sparrows. Mammals such as beaver, black bear, mink, black-tailed deer, raccoon, and Roosevelt Elk inhabit this area.

2.1.9 Coastal Resources

Eagle Point is located outside of the Coastal Zone.

2.2 Population

2.2.1 Historic and Existing Population

According to data provided by the City, the population of Eagle Point was 8,550 at the beginning of the year 2012. In 2000, the census data reported a population of 4,797 which is a 178% change. Other 2011 US Census Data for Eagle Point includes:

2.83 persons per occupied housing unit
89.5% of housing units occupied
10.5% of housing units vacant

2.2.2 Projected Population

There are several sources that predict the future population of the City of Eagle Point. The 2009 Buildable Lands Inventory predicts that Eagle Point will have 17,000 residents by the year 2029. The Jackson County Comprehensive Plan projects the same amount of residents by the year 2026, 21,000 residents by 2040, and 26,000 residents by the year 2060.

The Greater Bear Creek Valley Regional Plan for Jackson County, Oregon indicates an average annual population increase of 3.01% for Eagle Point from 2005-2040. This number was used to project population growth until the year 2040.

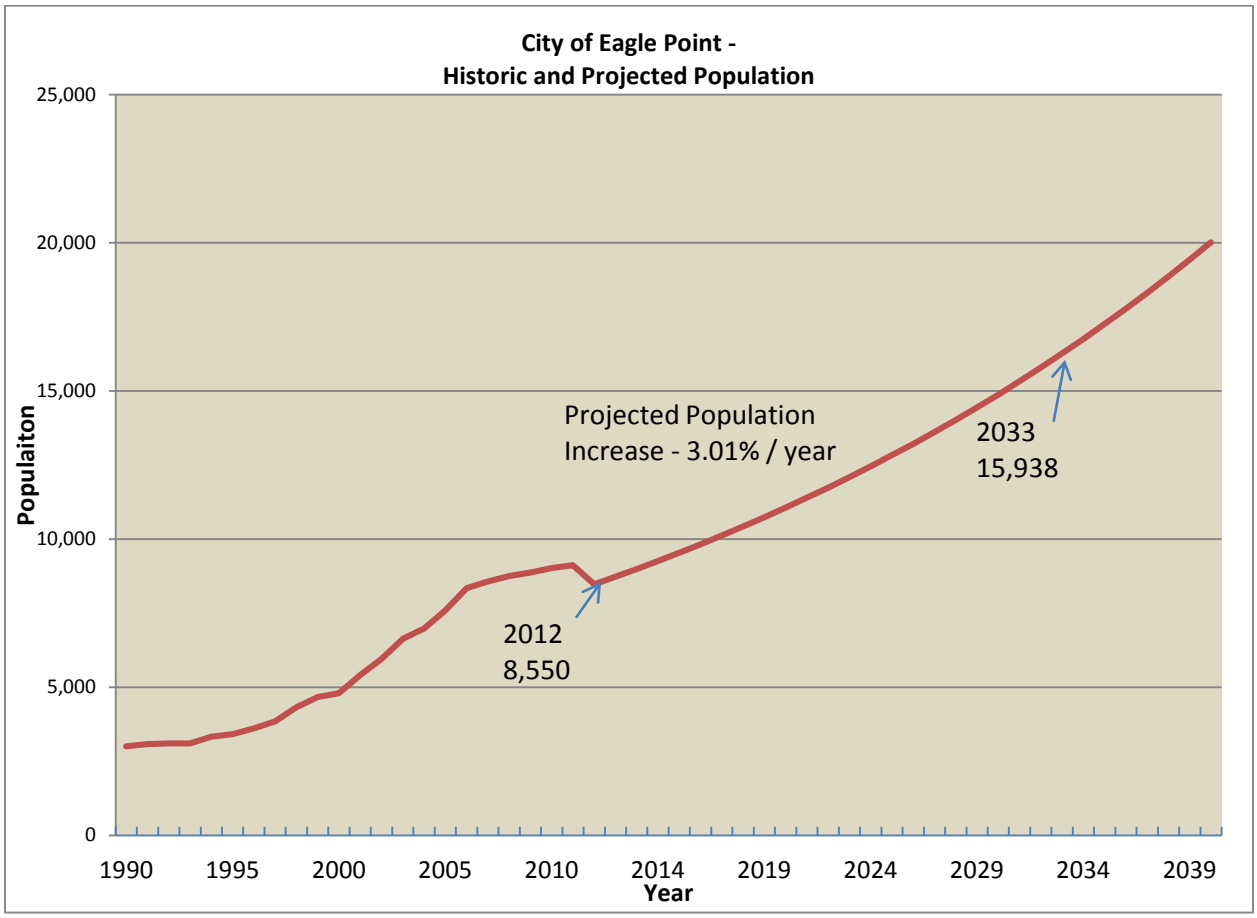


Figure 2.2.2-1 – Eagle Point Historic and Projected Population

For the 20-year planning period ending in the year 2033, the estimated population of Eagle Point is 15,938 persons. This shows a less aggressive population growth than both the Jackson County Comprehensive Plan and the 2009 Buildable Lands Inventory. However, in the year 2040, as seen in Table 2.2.2-1, predictions using the 3.01% growth rate show nearly 20,000 residents which is close to the number of residents predicted by the Jackson County Comprehensive Plan.

If the growth did not meet the expected 3.01% and was reduced to 2.0%, the population of the City would be 13,227. This is a reduction of approximately 3,000 people and would impact future demand and water supply needs. However, the published growth rate of 3.01% was used in this report to calculate all future demand and water supply needs.

To accommodate this growth and using the same ratio of 2.83 persons per occupied unit, approximately 2,750 new housing units will be required in Eagle Point by 2033, or 138 new units per year.

Table 2.2.2-1 – Historic and Projected Population

Year	Population	Year	Population	Year	Population	Year	Population
1990	3,088	**2003**	6,630	**2016**	9,627	**2029**	14,155
1991	3,075	**2004**	6,980	**2017**	9,917	**2030**	14,581
1992	3,100	**2005**	7,585	**2018**	10,215	**2031**	15,020
1993	3,100	**2006**	8,340	**2019**	10,523	**2032**	15,472
1994	3,325	**2007**	8,565	**2020**	10,839	**2033**	15,938
1995	3,415	**2008**	8,748	**2021**	11,166	**2034**	16,418
1996	3,605	**2009**	8,866	**2022**	11,502	**2035**	16,912
1997	3,850	**2010**	9,019	**2023**	11,848	**2036**	17,421
1998	4,325	**2011**	8,469	**2024**	12,204	**2037**	17,945
1999	4,665	**2012**	8,550	**2025**	12,572	**2038**	18,485
2000	4,797	**2013**	8,807	**2026**	12,950	**2039**	19,042
2001	5,410	**2014**	9,072	**2027**	13,340	**2040**	19,615
2002	5,950	**2015**	9,346	**2028**	13,742		

Civil West Engineering Services, Inc.	DRAWN BY: LFC DATE: 03-06-2013	0 1"	City Map	FIGURE
	WATER MASTER PLAN		CITY OF EAGLE POINT JACKSON COUNTY, OR	2.1.1-1

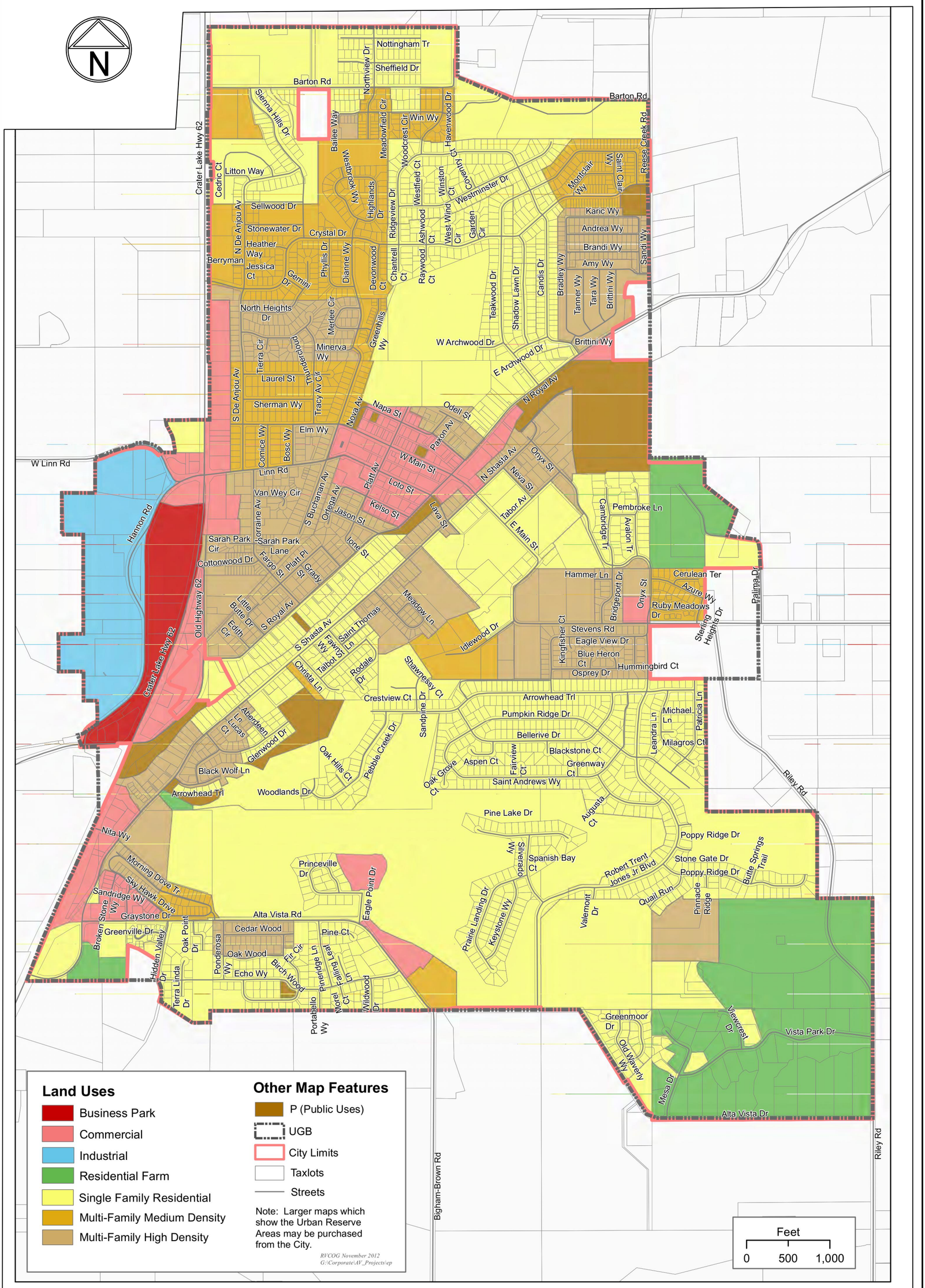


FIGURE 2.1.3-1

0 1"
1" = 1000'

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DATE: FEB 28, 2013

Land Use Map

WATER SYSTEM MASTER PLAN

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

Civil West Engineering Services, Inc.

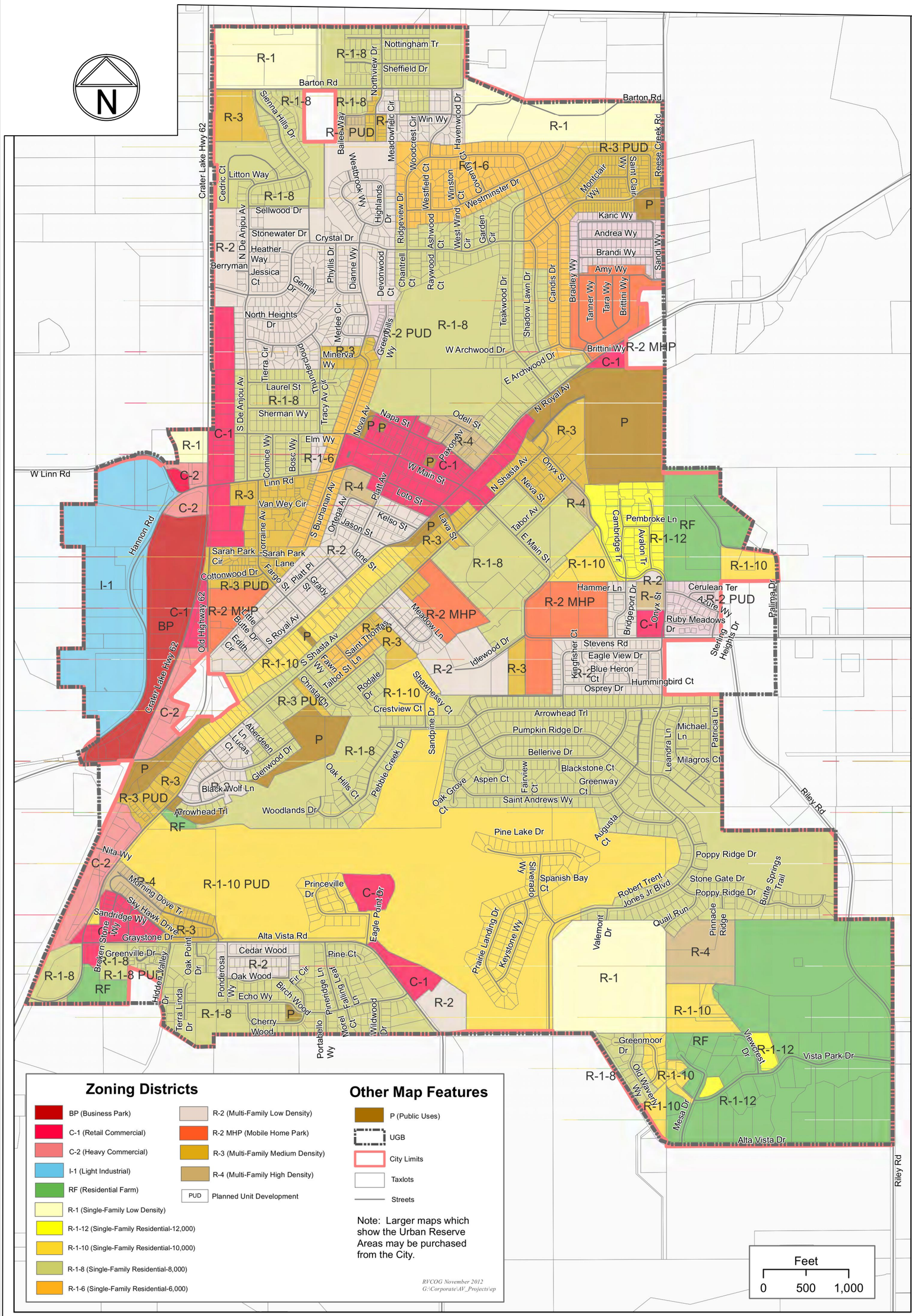

FIGURE 2.1.4-1

0 1"
1" = 1000'

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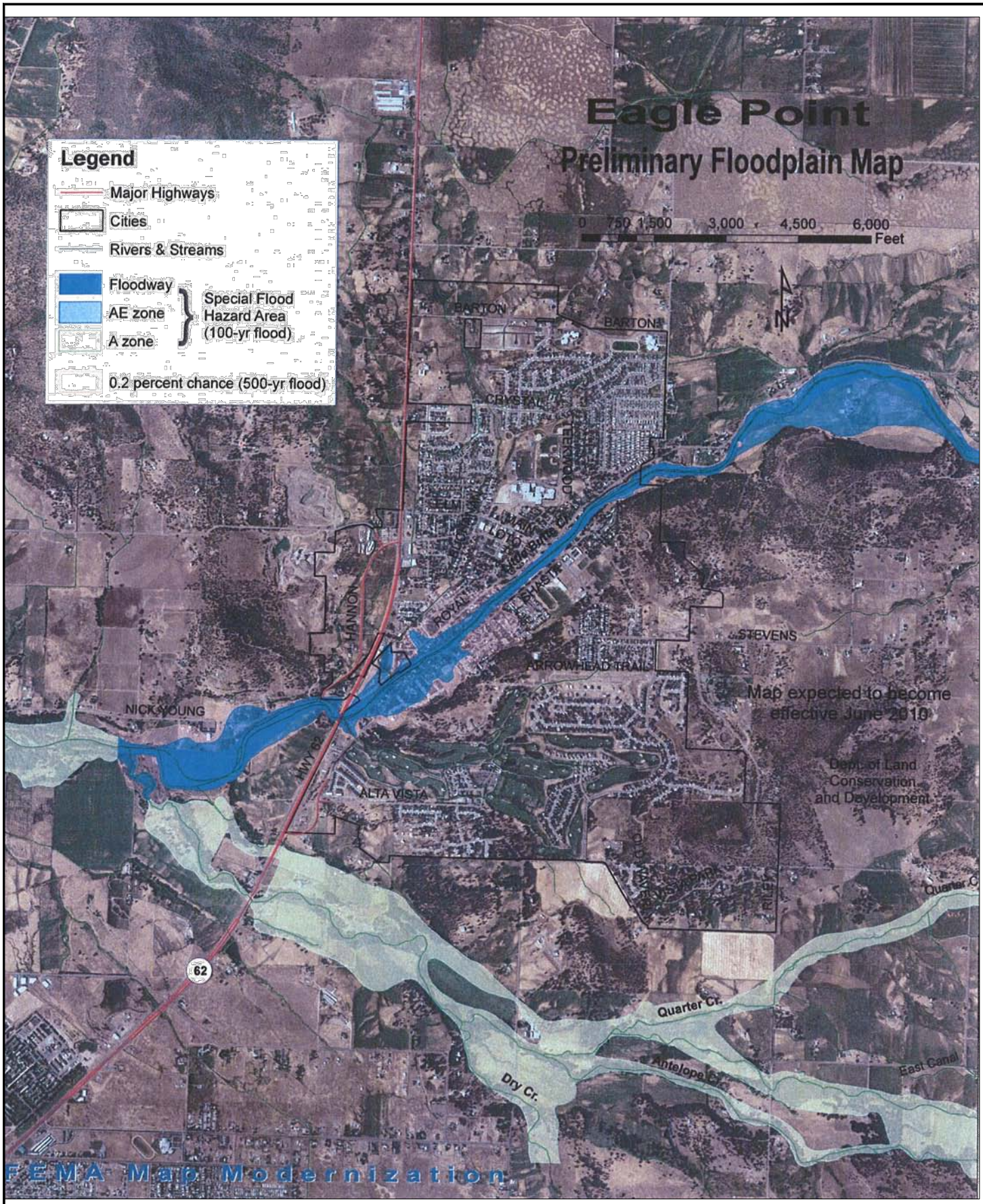
Zoning Map

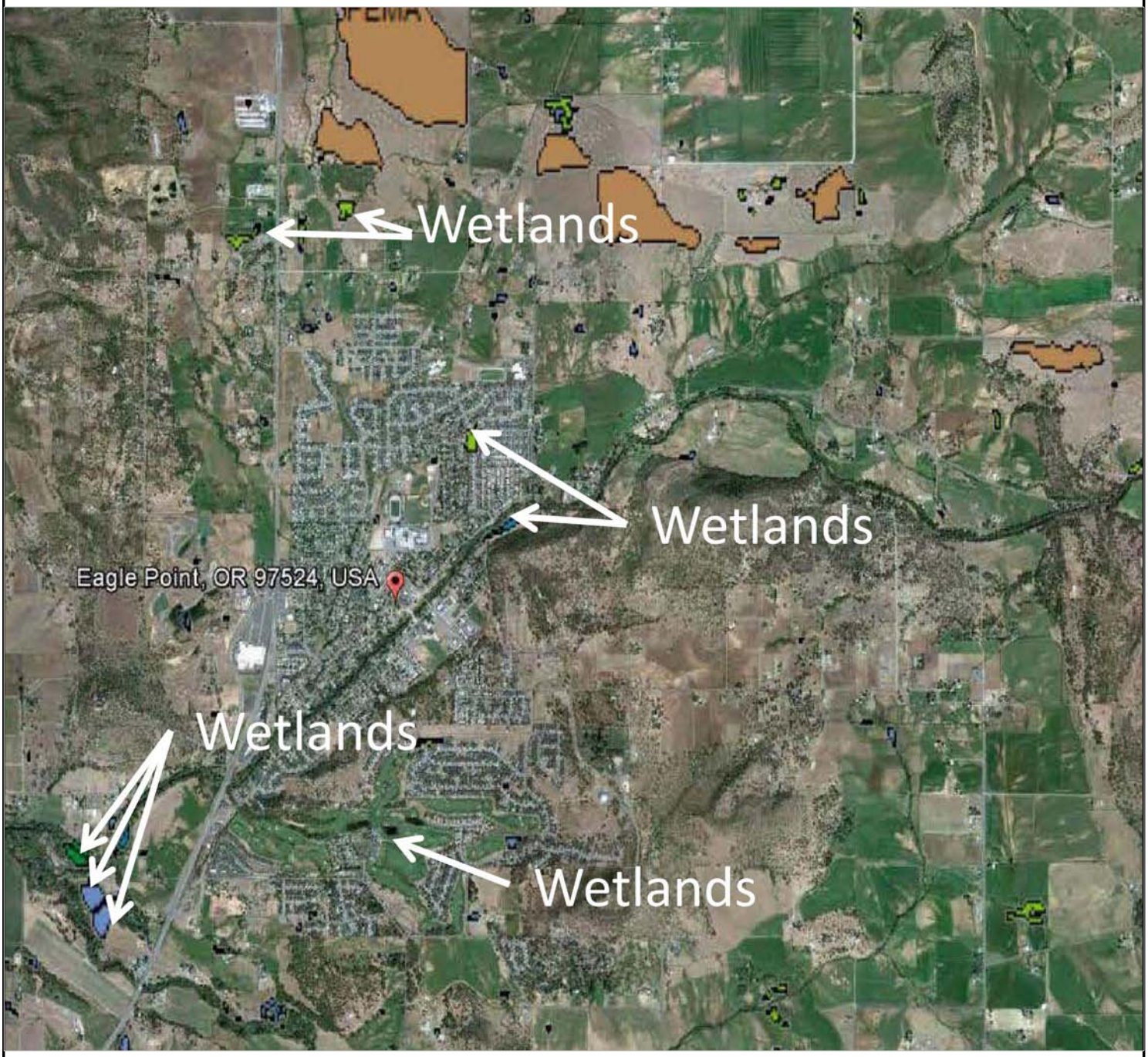
WATER SYSTEM MASTER PLAN

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

Civil West Engineering Services, Inc.



Civil West Engineering Services, Inc.	Drawn By: LFC Date: 03-06-2013	0 1"	**Flood Map**	FIGURE
	Water Master Plan		City of Eagle Point Jackson County, OR	2.1.5-1



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Civil West Engineering Services, Inc.	Drawn By: LFC Date: 03-06-2013	0 1"	**Wetlands Map**	FIGURE
	Water Master Plan		City of Eagle Point Jackson County, OR	2.1.6-1

Water Demand Analysis

Section 3

3.1 Definitions

System water demand is the quantity of water that must enter the system in order to meet all water needs in the community. Water demand includes water delivered to the system to meet the needs of consumers as well as water used for fire-fighting and system flushing, and other unaccounted water. Additionally, virtually all systems have a certain amount of leakage that cannot be economically removed and thus total demand typically includes some leakage. The difference between the amount of water metered and sold and the total amount delivered to the system is referred to as unaccounted water. Unaccounted water is discussed later in this Section. Water demand varies seasonally with the lowest usage in winter months and the highest usage during summer months. Variations in demand also occur with respect to time of day. Diurnal peaks typically occur during the morning and early evening periods, while the lowest usage occurs during nighttime hours.

The objective of this section is to determine the current water demand characteristics and to project future demand requirements that will establish system component adequacy and sizing needs. Water demand is described in the following terms:

Average Annual Demand (AAD) - The total volume of water delivered to the system in a full year expressed in gallons. When demand fluctuates up and down over several years, an average is used.

Average Daily Demand (ADD) - The total volume of water delivered to the system over a year divided by 365 days. The average use in a single day expressed in gallons per day.

Maximum Month Demand (MMD) - The gallons per day average during the month with the highest water demand. The highest monthly usage typically occurs during a summer month.

Peak Weekly Demand (PWD) - The greatest 7-day average demand that occurs in a year expressed in gallons per day. Not commonly determined or used in water planning.

Maximum Day Demand (MDD) - The largest volume of water delivered to the system in a single day expressed in gallons per day. The water supply and treatment facilities should be designed to handle the maximum day demand.

Peak Hourly Demand (PHD) - The maximum volume of water delivered to the system in a single hour expressed in gallons per day or gallons per minute. Distribution systems should be designed to adequately handle the peak hourly demand or maximum day demand plus fire flows, whichever is greater. During peak hourly flows, storage reservoirs supply the demand in excess of the maximum day demand.

Demands described above, expressed in gallons per day (gpd), can be divided by the population or Equivalent Dwelling Units (EDUs) served to come up with a demand per person or per capita which is expressed in gallons per capita per day (gpcd), or demand per EDU (gpd/EDU). These unit demands can be multiplied by future population or EDU projections to estimate future water demands for planning purposes.

3.2 Current Water Demand

3.2.1 Eagle Point Consumption Records

The City of Eagle Point buys their water from Medford Water Commission. Annual volumes purchased from the Medford Water Commission from 2008 to 2011 are summarized in the table and graph below.

Table 3.2.1-1 – Purchased Water from MWC – 2008-2011

Year	Annual Volume (MG)	
2008	544.4	**Average Annual Volume = 613.8 MG**
2009	616.4	**Highest Annual Volume = 670.4 MG**
2010	624.1	
2011	670.4	

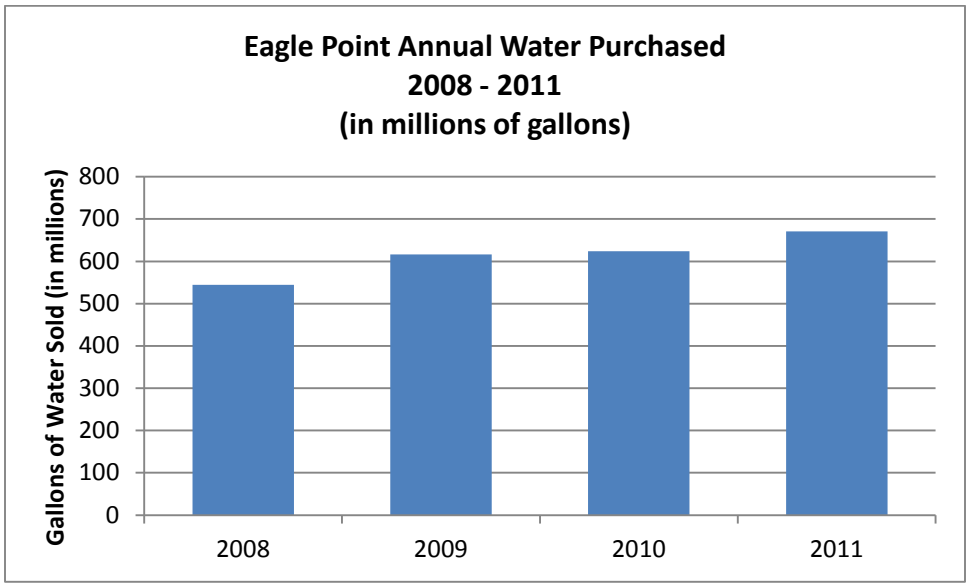


Figure 3.2.1-1 – Purchased Water from MWC – 2008-2011

Records from the Medford Water Commission show that the purchase of water by the City of Eagle Point has increased by over 100 million gallons since 2008.

3.2.2 Current Demand Summary

Based on the water demand records discussed and shown graphically in previous parts of this Section and the population estimates discussed in Section 2, the following water demand summary applies to the system for conditions occurring in 2012.

Table 3.2.2-1 – Current Water Demand Summary

City of Eagle Point 2012 Data			8,550 persons	
Unit	ADD	MMD	MDD	PHD
gpd	1,893,108	3,376,188	4,728,408	7,572,432
Peaking Factor	1.0	1.8	2.5	4.0
gpcd	217	387	542	868

Peaking Factor is multiple of ADD and is assumed to be 4.0 for PHD

Water use in America is documented by the U.S. Department of the Interior in the 2000 U.S. Geological Survey - Circular 1268, updated last in 2005. According to the study, the average per capita water use (ADD) for Oregon is 207 gallons per capita per day (gpcd) including domestic, commercial, industrial, public use and loss. Of the total 207 gpcd, 63% is residential, commercial and public use/loss; 34% is industrial; and 3% is related to thermoelectric power generation. Note that the ADD value for Eagle Point (217 gpcd) is just a little above the State average as documented in the USGS Survey. Nearby Medford in comparison has an ADD value of 246 gpcd which exceeds the State average with large water use by the commercial and industrial sectors. In addition, the City of Medford houses the majority of the region's institutional customers, including two hospitals and most state and county government offices.

3.2.3 Water Sales Records

As is typical for most communities, the quantity of water sold in the Eagle Point system is less than the quantity of water entering the system (water demand) due to leakage and other unaccounted water losses. Whereas 670.4 million gallons of water was sold to Eagle Point in 2011, only 502.1 million gallons of water per year was sold to customers. The next Section 3.2.4 discusses unaccounted water in Eagle Point.

Based on sales records from January 2006 to December 2008, out of the 502 million gallons of water sold per year, 87% of water went to residential use, 1% to churches, 3% to commercial use, 3% to irrigation, and 4% to schools. Approximately 2% of water use was not charged for, although the data for 2011 shows that 98 million gallons of water was uncharged in May. Because of the high value, it was removed from the data and an average uncharged water use for the month of May was used. A table view and a graphical representation of this distribution of water sold is shown in Table 3.2.3-1 and Figure 3.2.3-1 respectively.

Table 3.2.3-1 – Monthly Billed Water Usage (in thousands of gallons)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2000	13,898	12,475	12,373	15,034	22,792	30,460	38,013	44,468	24,762	27,177	33,545	13,074
2001	25,984	13,919	14,110	17,297	33,319	32,850	47,327	50,566	49,583	28,646	25,837	14,353
2002	26,431	27,435	15,486	19,154	25,909	46,634	62,579	56,249	38,343	44,335	31,837	22,191
2003	20,095	17,008	18,434	21,175	31,869	58,350	64,057	61,298	52,895	53,203	29,687	18,014
2004	19,936	17,177	22,199	26,077	37,178	50,868	67,055	73,620	45,794	38,065	21,944	20,381
2005	21,415	19,640	23,607	24,530	30,756	44,331	73,047	81,436	57,218	34,978	24,201	22,239
2006	24,546	21,723	19,952	22,354	48,372	51,065	81,913	73,973	62,142	39,693	24,232	19,022
2007	24,753	20,416	21,019	28,770	46,447	68,602	77,438	81,848	60,353	33,300	31,905	29,738
2008	26,246	18,423	20,942	26,767	51,273	56,079	71,018	72,255	57,429	49,941	18,561	17,218
2009	19,255	17,104	16,103	23,838	40,531	50,779	69,794	78,904	63,584	35,849	18,453	18,697
2010	19,817	17,846	16,787	21,006	25,052	39,556	68,858	83,279	50,281	36,867	18,681	16,985
2011	20,477	18,289	16,608	18,651	24,330	38,122	63,384	70,385	66,132	29,966	19,350	17,470
2012	18,999	16,999	15,785	19,185	34,623	48,229	59,057	70,333	66,656	37,809	19,794	17,846
Average	21,681	18,343	17,954	21,836	42,416	47,398	64,888	69,124	53,398	37,681	24,464	19,018

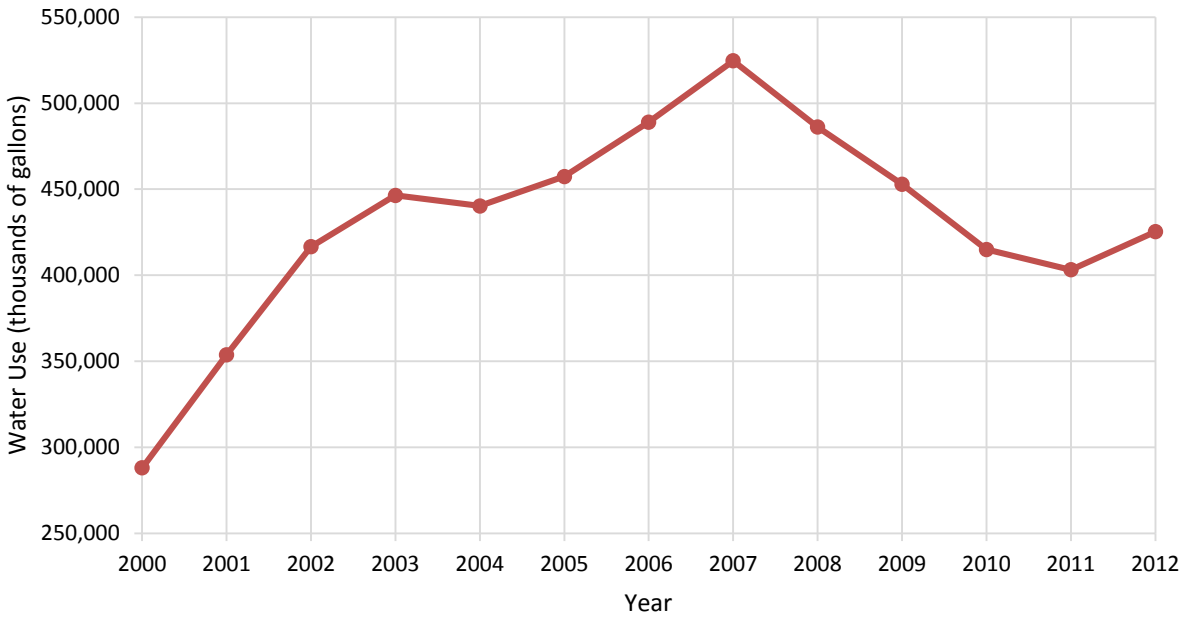


Figure 3.2.3-1 – Total Water Usage of Eagle Point by year (in thousands of gallons)

In general, the City shows an increased usage of water from the year 2000 to 2007 but the water use declines until 2011. Then the year 2012 shows a slight increase in water usage. Over the recent years a large water conservation effort by the City combined with loss reduction has begun and is expected to continue in keeping the overall water usage in the 2010-2012 range.

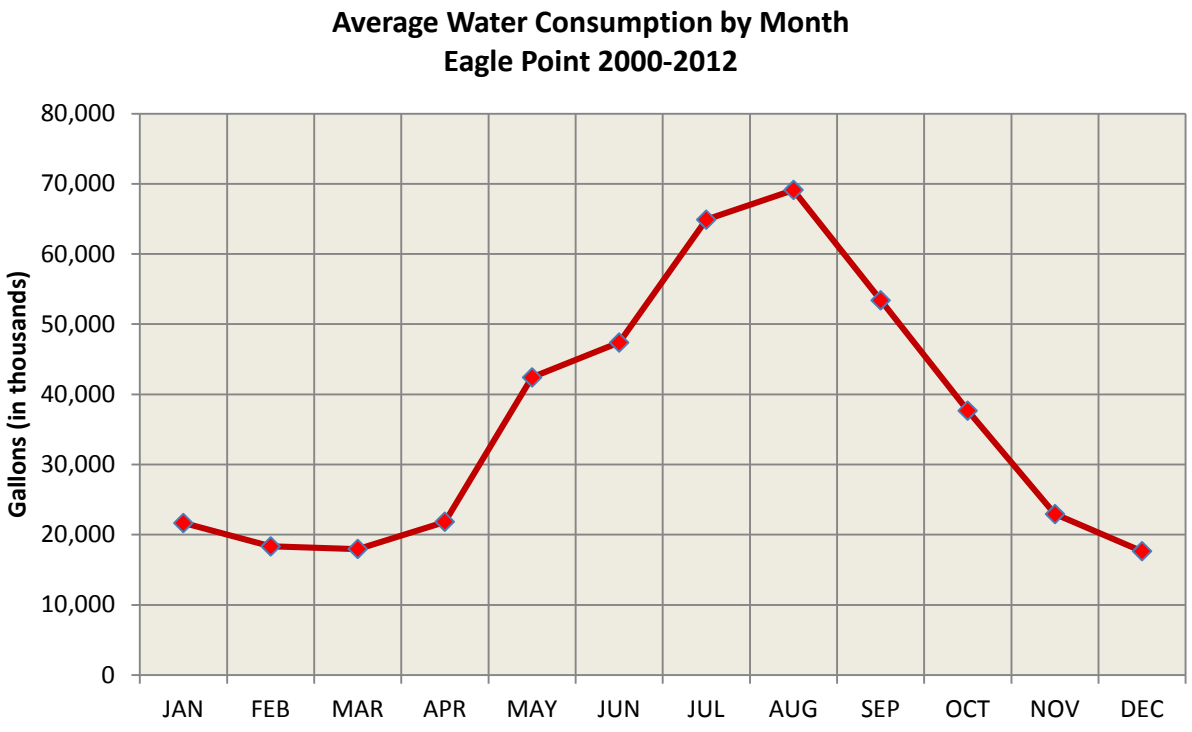


Figure 3.2.3-2 – Monthly Billed Water Usage (in thousands of gallons)

The table and graph above show that, as expected, the greatest amount of water usage occurs during the summer months. The pie chart below illustrates the distribution of water sold in Eagle Point to different types of customer accounts.

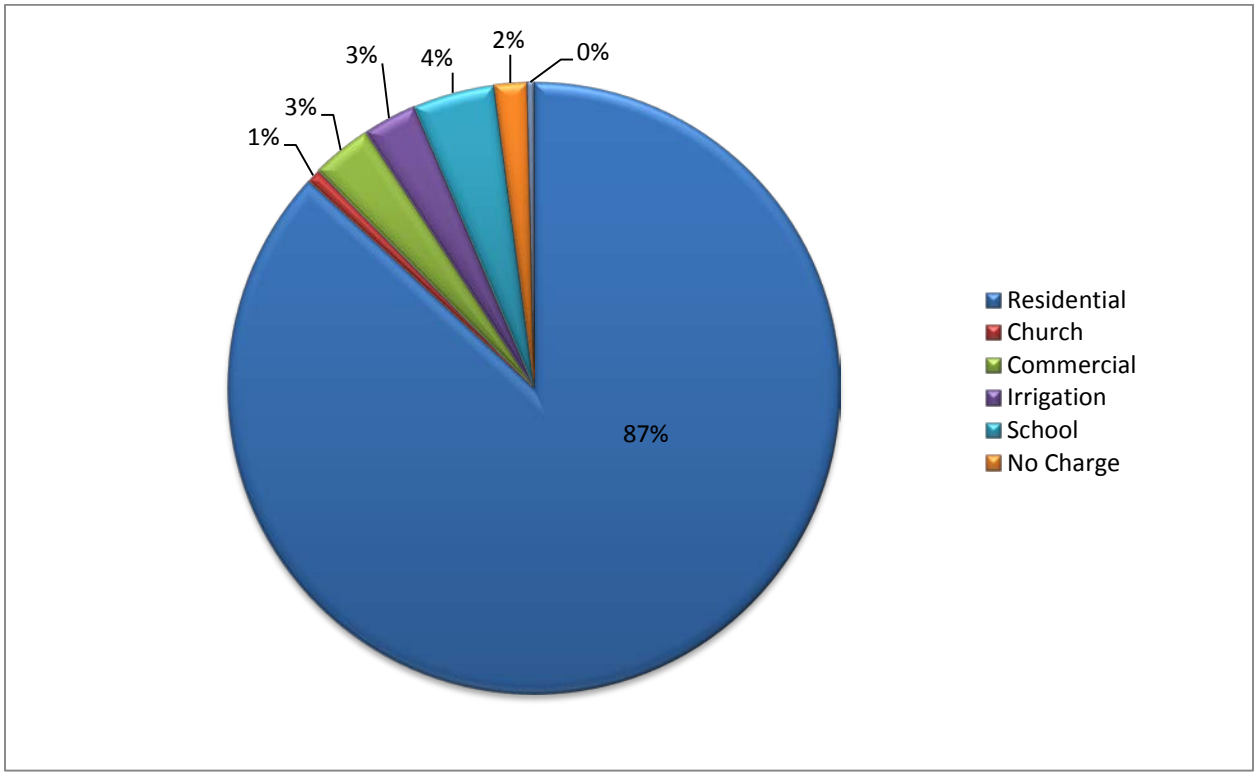


Figure 3.2.3-3 – Distribution of Water Volume Sold, 2011

3.2.4 Unaccounted Water

The difference between the quantity of water purchased from the Medford Water Commission (water demand) and the quantity of water billed to consumers is defined as "unaccounted water". This comparison is typically called a "water balance". Measured water exiting the system is primarily that measured through individual customer water meters (water sold). Other sources of exiting water include authorized non-consumptive uses such as pipeline flushing and firefighting and unauthorized uses such as water theft, line breaks, and leakage.

In addition to "real" water loss resulting from leakage, unmetered flushing, etc., unaccounted water can also include "apparent" water loss due to meter inaccuracies or meter reading errors. In general, as water meters age they tend to read lower resulting in higher "apparent" water loss.

If there were no leakage in the system, all water meters were 100% accurate, and every drop of water used for firefighting and system flushing was measured, there would be zero unaccounted water. In reality every water system has a certain amount of leakage, water meters are not 100% accurate, and it is rare for every drop of water used in town to be metered and measured. Therefore virtually every community water system has unaccounted water.

The volume of unaccounted water varies significantly month by month due to meter discrepancies, differences in dates of reading master meters versus individual customer meters, and the number of days in takes to read individual meters. In the City of Eagle Point, it usually takes one day to read all of the meters. However, there are differences between MWC billing dates and the dates that Eagle Point reads

customer's meters. These factors make monthly unaccounted water comparisons of little value and annual comparisons (annual water audits) are used to offset the impact of these variables. Table 3.2.4-1 below present the 3-year amounts of MWC purchased water and water sold to metered customers.

Table 3.2.4-1 – Water Purchased and Sold, 2009-2011

Year	MWC Purchased Water (MG)	Water Sold to Eagle Point Customers (MG)	Difference (MG)	Lost Water as a Percentage of MWC Purchased Water
2009	616.4	452.9	163.5	27%
2010	624.1	415.0	209.1	34%
2011	670.4	502.1	168.3	25%
Average	637.0	456.7	180.3	28%

The information presented above shows that there is an approximate average of 28% unaccounted water in the City of Eagle Point.

According to OAR 690-086 (Water Resources Department – Water Management and Conservation Plans), if the annual water audit indicates leakage exceeding 10%, a regularly scheduled and systematic program should be in place to detect leaks in the transmission and distribution system using methods and technology appropriate to the size and capabilities of the municipal water supplier. Other provisions in OAR 690-086 can require system-wide leak repair or line replacement programs to reduce leakage to no more than 15% under certain circumstances such as water permit extension requests or water diversion expansions or initiations.

In May of 2012, Civil West was retained to determine the cause of leakage in the 3.6 million gallon reservoir. Initial leakage rates were determined to be approximately 33 gallons per minute or 50,000 gallons per day. Civil West "seeded" the tank which consisted of emptying the tank, filling the cracks on the bottom with cement, and then refilling the tank to allow the cement to bond with the existing concrete. Crack injection was also accomplished at this time. After the work was done, the leakage was determined to be approximately 2 gallons per minute or 2,880 gallons per day. This work eliminated approximately 95% of the leakage from the tank. Also during the summer of 2011, the City performed two major leak repairs on water mains.

As recently as this year, the City has found and fixed problems with the City's billing software that was vastly underestimating the use of water by some of the City's customers that have compound meters. Another one of Eagle Point's high water users was not being billed correctly for the amount of water it was used. This error has been fixed and future water accounting information will include all of the customer's water use in the future. Additionally, the City is planning to have a consultant inspect approximately twenty miles of water lines for leaks. All of this work will contribute to a lower amount of unaccounted water that will most likely be seen as the records for 2012 and 2013 are obtained and examined.

As of the writing of this report, the impact on unaccounted water is unknown and the repair work on the tank is not currently reflected in the table above. Records are not yet available to determine how much unaccounted water there is now and how much of it is actually due to leakage. Some of the unaccounted water can be attributed to system flushing through hydrants, and meter inaccuracies. It is almost certain that a portion of the unaccounted water is from leakage. The City should continue efforts to detect and repair leaks when discovered. Efforts should also be made to measure and record water used for flushing and other authorized non-metered uses.

3.2.5 EDU Analysis

Based on water sales records for the last 10 years, the average quantity of water sold to a typical single-family dwelling unit inside the City of Eagle Point (5/8" single family residential meter) is 8,795 gallons per month. This volume sold per month becomes the basis for Equivalent Dwelling Unit (EDU) calculations with 1 EDU = 8,795 gallons per month in metered sales. Other users can then be described as an equivalent number of EDUs based on their relative water consumption. For example, a commercial business that had an average metered consumption of 17,590 gallons per month uses twice the amount of water as the typical single-family dwelling and can be considered 2 EDUs.

Table 3.2.5-1 shows sales data and total EDU numbers month by month for the last 3 years. The current total number of system EDU's in Eagle Point is estimated at 4,213.

Water in the "No Charge" category includes water for parks.

Table 3.2.5-1 – Monthly Sales and Total EDU's

Customer Class	Average Monthly Use	EDU
Apartment	1,033,019	117.46
Church	256,390	29.15
Commercial	1,089,331	123.86
Split Duplex	518,090	58.91
Duplex	791,974	90.04
Eagle Cove Retirement	158,994	18.08
Fire Hydrant	302,500	34.40
Fourplex	533,864	60.71
Irrigation	1,083,195	123.16
Multiple Dwellings-One Lot	432,780	49.21
Mobile Home Park	3,260,200	370.69
No Charge	1,018,000	115.75
Other	76,175	8.66
Single Family Residence	25,062,680	2,849.65
School	1,272,838	144.73
Tri-Plex	160,097	18.23
Totals	**37,050,120**	**4212.64**
Total Estimated EDU's = 4,213		
1 EDU (gal/month) = 8,795		

3.3 Future Water Demand

3.3.1 Basis for Projections

Water demand estimates for future years are determined by multiplying the current unit demand values (gallons per person or per EDU) by the projected number of future users in the water system. It is assumed new users added to the system will consume water at the same rate as current users. Population projections are presented in Section 2.2.2. The unit water demand values are presented in Section 3.2.3. The projections are based on an average annual growth rate of 3.01%.

3.3.2 Water Demand Projections

The water demand projections for the planning period are presented in Table 3.3.2-1. The Average Daily Demand (ADD) was calculated by multiplying the expected population by the average water use of 217 gallons per capita per day. The Maximum Daily Demand (MDD) was calculated by multiplying the expected population for that year by the ADD and the peaking factor of 2.5 that was presented in Table 3.2.2-1. These numbers are presented in Table 3.3.2-1. Figure 3.3.2-1 shows the same numbers but in graphic form.

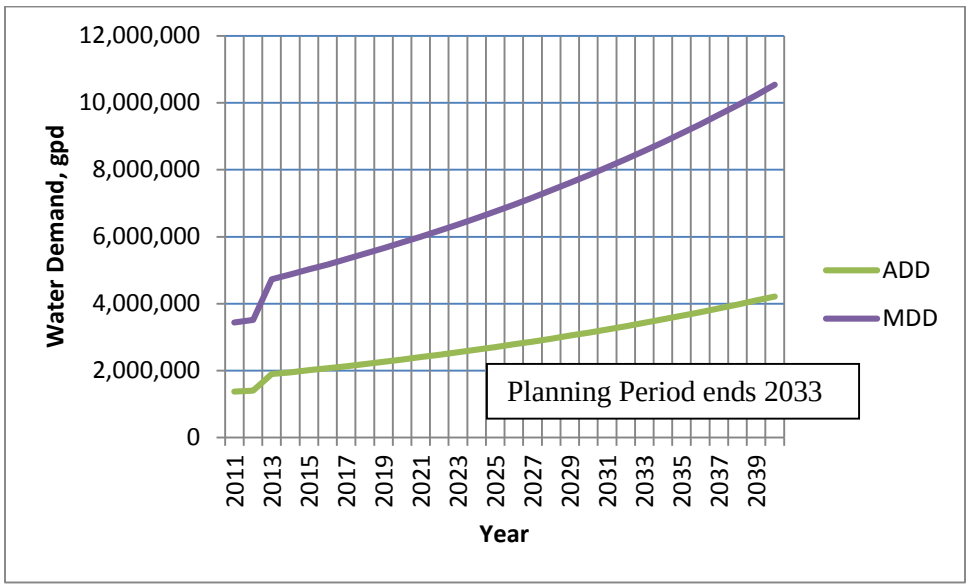


Figure 3.3.2-1 – Maximum Day Water Demand Projections

Table 3.3.2-1 – Water Demand Projections

Year	Population	ADD	MDD
2012	8,550	1,855,350	3,339,630
2013	8,807	1,911,196	3,440,153
2014	9,072	1,968,723	3,543,701
2015	9,346	2,027,982	3,650,367
2016	9,627	2,089,024	3,760,243
2017	9,917	2,151,903	3,873,426
2018	10,215	2,216,676	3,990,016
2019	10,523	2,283,398	4,110,116
2020	10,839	2,352,128	4,233,830
2021	11,166	2,422,927	4,361,269
2022	11,502	2,495,857	4,492,543
2023	11,848	2,570,982	4,627,768
2024	12,204	2,648,369	4,767,064
2025	12,572	2,728,085	4,910,553
2026	12,950	2,810,200	5,058,360
2027	13,340	2,894,787	5,210,617
2028	13,742	2,981,920	5,367,457
2029	14,155	3,071,676	5,529,017
2030	14,581	3,164,134	5,695,441
2031	15,020	3,259,374	5,866,873
2032	15,472	3,357,481	6,043,466
2033	15,938	3,458,541	6,225,375
2034	16,418	3,562,643	6,412,758
2035	16,912	3,669,879	6,605,782

3.3.3 Design Values

For the 20-year planning period ending in the year 2033, the following water demand design values result from the analysis:

Table 3.3.3-1 – 20-Year Water Demand Values – 3.0% Growth

City of Eagle Point 2033 Data			15,938 persons	
Unit	ADD	MMD	MDD	PHD
gpd	3,458,541	6,225,375	8,638,396	13,834,184
Peaking Factor	1.0	1.8	2.5	4.0
gpcd	217	391	542	868

Based upon these numbers, the City will need 8.6 million gallons per day or a water flow of 13.4 cubic feet per second (cfs) based upon maximum daily demand requirements. Average daily demand requirements are projected to be approximately 3.5 million gallons per day at the end of the planning period.

The numbers presented above were calculated based upon a growth rate of 3.01%. If a growth rate of 2.0% was realized, the results are the demand values presented in Table 3.3.3-2.

Table 3.3.3-2 – 20-Year Water Demand Values – 2.0% Growth

City of Eagle Point 2033 Data			13,227 persons	
Unit	ADD	MMD	MDD	PHD
gpd	2,870,259	5,171,757	7,169,034	11,481,036
Peaking Factor	1.0	1.8	2.5	4.0
gpcd	217	391	542	868

As can be seen, the MDD drops by about 1.5 million gallons if a slower growth rate is predicted for the City of Eagle Point.

4.1 Design Life of Improvements

The design life of a water system component is the time that the component is expected to be viable based on its intended use and required function. Design life is sometimes referred to as service life or life expectancy. Actual realized design life can depend on factors such as the type and intensity of use, type and quality of materials used in construction, and maintenance and repair practices and the quality of workmanship during installation. The estimated and actual design life for any particular component may vary depending on the above factors. The establishment of a design life provides a realistic projection of service upon which to base an economic analysis of new capital improvements.

The planning period for a water system and the design life for its components may not be identical. The typical 20-year planning period is utilized due to the need to limit economic burdens on current generations and inaccuracies that result from attempts at projecting needs too far into the future. Design life can be greater to or less than the planning period. For example, a properly maintained steel storage tank may have a design life of 60 years, but the projected fire flow and consumptive water demand for a planning period of 20 years determines its size. At the end of the initial 20-year planning period, water demand may be such that an additional storage tank is required; however, the existing tank with a design life of 60 years would still be useful and remain in service for another 40 years. A discussion of the typical design life for system components is provided below.

4.1.1 Equipment and Structures

Equipment used in water systems such as pumps, valves, and other major treatment related equipment is sized for a 20-year demand and has a similar 20-year expected design life. Minor equipment such as less expensive chemical feed pumps, turbidimeters, and other instrumentation sometimes must be replaced or updated when less than 20-years old, typically at 10 to 15 years old. The useful life of some equipment can be extended with proper maintenance if sufficient capacity still exists. It is not uncommon to see larger pumps still in service after 30 years or more if properly maintained.

Major structures used in water systems such as concrete basins and intake wetwells can last 50 years or more when properly constructed and maintained.

4.1.2 Transmission and Distribution Piping

Water transmission and distribution piping should easily have a useful life of 50 to 60 years if quality materials and workmanship are incorporated into the construction and the pipes are adequately sized. Steel piping used in the 1950's and 60's that has been buried, commonly exhibits significant corrosion and leakage within 30 years. Cement mortar lined ductile iron piping can last up to 100 years when properly designed and installed. PVC and HDPE pipe manufacturers claim a 100-year service life for pipe as well. The City of Eagle Point has asbestos/cement piping that has a design life of 50 years. Most of the pipe was installed in the 1960's so the piping is at the end of its predicted useful life.

4.1.3 Treated Water Storage

Distribution storage tanks should have a design life of 60 years (painted steel construction) to 80 years (concrete construction). Steel tanks with a glass-fused coating can have a design life similar to concrete

construction. Actual service life will depend on the quality of materials, the workmanship during installation, and the timely administration of maintenance activities. Several practices, such as the use of cathodic protection, regular cleaning and painting can extend or assure the service life of steel reservoirs. Painting intervals for steel tanks is 15 to 25 years. The life of steel tanks is greatly reduced if not repainted periodically as needed.

4.2 Sizing and Capacity Criteria and Goals

The 20-year projected water demands presented in Section 3 are used to size improvements. Various components of the system demand are used for sizing different improvements. Methods and demands used are discussed below.

4.2.1 Water Supply

The current water supply, including pumping capacity, should at minimum be sufficient to meet the projected 20-year maximum daily demand (MDD). Considering the difficulty in obtaining new water rights, raw water supply should meet a longer-term need and it is not unreasonable to plan today for 60-year demand water sources. Currently the MDD is 4.73 million gallons per day (mgd) or 8.78 cubic feet per second (cfs). At the end of the 20-year planning period, the projected MDD is 8.6 mgd or 13.4 cfs. In order to plan for long-term water supply options, projections beyond the planning period are shown assuming the same growth rate as the planning period.

Immediate Supply Capacity Goal – 20-year MDD of 8.6 mgd (13.4 cfs)
Supply Capacity Goal – 40-year MDD of 15.5 mgd (28.80 cfs)
Supply Capacity Goal – 60-year MDD of 28.0 mgd (52.03 cfs)

The City must consider how far in to the future they wish to plan for water rights requirements. Currently, the City can access 600 gallons per minute from both Big Butte Springs lines from October through April. Typically, this access point is at the 3.6 million gallon tank but in an emergency, this can be accessed by any of the three storage tanks within the City. The current contract with MWC is included as Appendix C.

4.2.2 Water Treatment

Water treatment is provided by the Medford Water Commission at the Duff Water Treatment Plant. Big Butte Springs (BBS) has been the MWC's primary source of drinking water since 1927. Providing 26.4 million gallons per day, the springs are one of the community's most valuable and significant resources. The springs discharge water of exceptional quality. It is consistently cold and clear with natural chemical and physical characteristics which place this source in a "pristine" classification. No man-made contaminants have ever been detected in the spring's water. The water is low in turbidity and has an average temperature of 43 degrees F. It requires no filtration or treatment other than disinfection, which is accomplished with chlorination on-site. The current state-of-the-art treatment facility was completed in 1993. Spring flows are collected underground and never see the light of day until emerging from customers' taps.

During the peak-use summer months, water from the Rogue River is used to supplement the springs' supply. The river water is also of high quality but additional treatment performed at the Robert A. Duff Water Treatment Plant (Duff WTP) is required to meet drinking water standards. Treatment of this surface water supply consists of coagulation, settling, and filtration, followed by disinfection. The addition of ozone in 2002 provided a dramatic reduction in musty taste and odors occasionally found in the river water. Ozonation also provides additional disinfection benefits. Duff WTP uses high rate multimedia filters and chlorine as primary disinfectants. The plant currently can purify up to 45 mgd.

The intake facility is located on the Rogue River and consists of a concrete structure on the edge of the river that houses screens and pumping units.

When both sources are used, treated water from Duff WTP and the Big Butte Springs water are blended within the distribution system. The blend of water differs in areas with some receiving more water from one source than the other. The finished water from both supplies is very similar, with temperature being the most detectable difference. The blend can vary continuously depending on the demand for treated water from the Duff WTP.

Big Butte Springs and Rogue River water are very similar in chemical characteristics; both are classified as moderately soft and neutral in pH. Hardness ranges from 32 to 45 parts per million (ppm) and sodium content varies from 4 to 6 ppm in both sources.

Monitoring the quality of the water supply is performed on a regular basis. This includes testing of the raw source water, the treated water in the distribution network, and in some cases of customers' tap water.

Sampling ensures that the distributed water meets the criteria established by the Environmental Protection Agency (EPA). The EPA sets strict standards for drinking water quality and requires monitoring for more than 120 potential contaminants. Regular testing is performed for organic and inorganic chemicals, volatile organic compounds, radioactive substances, microbiological contaminants, disinfection byproducts, and a variety of other chemical and physical quality parameters. Many parameters are monitored continuously both at the treatment plant and in the distribution system. In Oregon, the Oregon Health Authority/Drinking Water Program is responsible for compliance and enforcement of these standards. The water supplied by MWC has always exceeded all health-based standards.

Every year, MWC publishes the federally mandated Water Quality Report (Consumer Confidence Report or CCR), which is delivered to all water users in the service area. This publication includes the latest annual water quality test results along with detailed explanatory material and resources.

4.2.3 Fire Protection

According to the 2010 Oregon Fire Code, the minimum fire-flow requirements are as follows:

Table 4.2.3-1 – Fire Flow Requirements

Description of Facility	Minimum Fire Flow Requirements
One and two family dwellings not exceeding 3600 square feet	1,000 gallons per minute
Square footage is greater than 3,601 square feet and less than 4800 square feet	1,750 gallons per minute
Square footage is greater than 4,801 square feet and less than 6,200 square feet	2,000 gallons per minute

Table 4.2.3-2 – Fire Flow and Duration Requirements

Fire Flows	Required Duration
1,000 gallons per minute or less	1 hour
Between 1,000-2,750 gallons per minute	2 hours
Between 3,000-3,750 gallons per minute	3 hours
4,000 gallons per minute and above	4 hours

When flows of 1,750 gpm 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 structures which require 4,000 gpm, at least 4 hydrants must be available and spaced not more than 350 feet apart.

Table 4.2.3-3 – Fire Flow Capacity Goals

Fire Flow Capacity Goals	
Residential Only Outlying Areas	1,500 gallons per minute
General Commercial Areas	1,750 gallons per minute
Central Town Area, Industrial, and Schools	3,500 gallons per minute

There are several locations throughout the City where large homes exist and require a higher fire flow capacity than can be delivered by a hydrant. It is recommended that in these areas, the City add fire hydrants or require the home owner to provide their own fire protection beyond what can be provided at the hydrant.

4.2.4 Treated Water Storage

Total storage capacity must include reserve storage for fire suppression, equalization storage, and emergency storage. In larger communities it is common to provide storage capacity equal to the sum of equalization storage plus the larger of fire storage or emergency storage. In small communities it is recommended that total storage be the sum of fire plus equalization plus emergency storage. This is considered prudent since it is possible for fire danger to increase during water emergencies, such as power failures when alternative sources of heating and cooking might be used.

Equalization storage is typically set at 20-25% of the MDD to balance out the difference between peak demand and supply capacity. When peak hour flows are known, equalization storage is the difference between the MDD and PHD for a duration of 8 hours [PHD-MDD x 8 hrs.]. Equalization storage typically rises and falls daily or hourly as storage tank water levels fluctuate normally.

Emergency storage is required to protect against a total loss of water supply such as would occur with a broken transmission line, an electrical outage, equipment breakdown, or source contamination. Emergency storage should be an adequate volume to supply the system's average daily demand 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 times the average day demand.

Fire reserve storage is needed to supply fire flow throughout the water system to fight a major fire. The fire reserve storage is based on the maximum flow and duration of flow required to confine a major fire. Fire flows are discussed in Section 4.2.3.

With many miles of water transmission piping separating the MWC water supply from the main pump station in Eagle Point, it is considered prudent to set emergency storage equal to 3 normal days of water demand. Since the PHD is estimated for Eagle Point with peaking factors rather than being measured the equalization storage should be set to 20% of the MDD (PHD-MDD x 8 hrs. is overly conservative). Fire storage volume is 3500 gpm for 3 hours. In addition to the basic volume needs calculations, storage locations and hydraulic distribution must be considered to assure each area of the system has sufficient flow and volume. Currently storage is calculated to be:

Table 4.2.4-1 - 2013 Storage Capacity Needs

Equalization Storage	Emergency Storage	Fire Reserve Storage	Estimated Storage Required in 2013 (gallons)
0.2 * MDD	3.0 * ADD	3 hours * 3500 gpm	**7,051,619**
688,031	5,733,588	630,000	

The City currently has three storage tanks that are identified as a 4.0 million gallon tank, 3.6 million gallon tank, and a 200,000 gallon tank. However, improvements were made to the 4.0 million gallon tank that decreased the capacity to 3.6 million gallons. As a result, the City currently has 7.4 million gallons of storage. According to the table above, the City of Eagle Point currently has enough storage capacity. However, the current storage is estimated to be inadequate by the end of year 2014. Table 4.2.4-2 shows the storage needs for each year up to 2033 if the growth rate and the use of water remains the same as currently reported.

Table 4.2.4-2 – Storage Capacity Goals to 2033

Year	Equalization (gallons)	Emergency (gallons)	Fire Reserve (gallons)	Total (gallons)	Water Storage Deficit (gallons)
2013	688,031	5,733,588	630,000	7,051,619	(348,381)
2014	708,740	5,906,169	630,000	7,244,909	(155,091)
2015	730,073	6,083,945	630,000	7,444,018	44,018
2016	752,049	6,267,072	630,000	7,649,120	249,120
2017	774,685	6,455,710	630,000	7,860,396	460,396
2018	798,003	6,650,027	630,000	8,078,031	678,031
2019	822,023	6,850,193	630,000	8,302,216	902,216
2020	846,766	7,056,384	630,000	8,533,150	1,133,150
2021	872,254	7,268,781	630,000	8,771,035	1,371,035
2022	898,509	7,487,571	630,000	9,016,080	1,616,080
2023	925,554	7,712,947	630,000	9,268,501	1,868,501
2024	953,413	7,945,107	630,000	9,528,520	2,128,520
2025	982,111	8,184,255	630,000	9,796,365	2,396,365
2026	1,011,672	8,430,601	630,000	10,072,273	2,672,273
2027	1,042,123	8,684,362	630,000	10,356,485	2,956,485
2028	1,073,491	8,945,761	630,000	10,649,252	3,249,252
2029	1,105,803	9,215,029	630,000	10,950,832	3,550,832
2030	1,139,088	9,492,401	630,000	11,261,489	3,861,489
2031	1,173,375	9,778,122	630,000	11,581,497	4,181,497
2032	1,208,693	10,072,444	630,000	11,911,137	4,511,137
2033	1,245,075	10,375,624	630,000	12,250,699	4,850,699

Table 4.2.4-3 - 2033 Storage Capacity Goals – 3.01% Growth Rate

Equalization Storage	Emergency Storage	Fire Reserve Storage	Estimated Storage Needed By 2033 (gallons)
0.2 * MDD	3.0 * $ADD_{20\text{-year}}$	3 hours * 3500 gpm	**12,250,699**
1,245,075	10,375,624	630,000	

If a growth rate of 2% is realized instead of the 3.01% predicted by Jackson County, 2033 estimated storage is as presented Table 4.2.4-4.

Table 4.2.4-3 - 2033 Storage Capacity Goals – 2% Growth Rate

Equalization Storage	Emergency Storage	Fire Reserve Storage	Estimated Storage Needed By 2033 (gallons)
0.2 * MDD	3.0 * $ADD_{20\text{-year}}$	3 hours * 3500 gpm	**10,172,188**
1,022,377	8,519,810	630,000	

As can be seen in the above table, the total storage for a 2% growth rate estimated for 2033 is about 2 million gallons less than the estimated growth rate of 3.01%. This would eliminate the construction of 2 million gallons of water storage by the year 2033. These numbers are provided for information only and are not the planning numbers used for the remainder of this report.

Another important design parameter for treated water storage is the elevation of the tanks. Efforts should be made to locate all tanks at the same elevation when possible within a pressure zone. As a consistent water surface is maintained in all tanks, the need for altitude valves, pressure reducing valves (PRVs), booster pumps, and other control devices may be minimized. Distribution tanks should also be located at an elevation that maintains adequate water pressure throughout the system, sufficient water pressures at high elevations and reasonable pressures at lower elevations. The ideal pressure range for a distribution system is between 40 and 80 psi.

For subdivisions at higher elevations than allowed within the main pressure zone, storage tanks should be required when possible rather than hydropneumatic booster pump stations. Tank size needs to be determined on a case-by-case basis as part of the design review. Fire pumps with a capacity of at least 1,000 gpm together with standby generators should be provided when a storage tank is not possible. Minimum tank size should be 120,000 gallons fire storage (1,000 gpm for 2 hours) plus 1 times the MDD per EDU. For very small developments, individual sprinkler systems may be more appropriate.

4.2.5 Distribution System

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. The City standard is 40 psi. Looped mains should be at least six inches in diameter to provide minimum fire flow capacity. City Standards, however, require a minimum size of eight inch water lines. The State of Oregon requires that 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 pipe, a hydraulic analysis should be performed to ensure adequate sizing.

Distribution Capacity Goal – Worst Case of projected MDD + fire flow with at least 20 psi residual pressure or Projected PHD with 40 psi residual pressure

4.2.6 Transmission Piping

When un-looped transmission piping is designed, such as raw water supply mains or long runs of treated water transmission along rural routes, it is often prudent to size this piping to convey quantities beyond the 20-year demands. Since it is likely that the pipe itself will be in good condition in 20 years, and the cost increase to upsize slightly is small (approximate same labor cost with small increase in material cost), it may be desirable to ensure the piping can adequately convey 40 or 50 year design flows.

4.3 Basis for Cost Estimates

The cost estimates presented in this Plan will typically include four components: construction cost, engineering cost, contingency, and legal/non-engineering project management costs. Each of the cost components is discussed in this section. The estimates presented herein are preliminary and are based on the level and detail of planning presented in this Study. Construction costs are based on competitive bidding as public works projects with State prevailing wage rates. As projects proceed and as site-specific information becomes available, the estimates may require updating.

4.3.1 Construction Costs

The estimated construction costs in this Plan are based on actual construction bidding results from similar work, published cost guides, and other construction cost experience. Construction costs are preliminary budget level estimates prepared without design plans and details.

Future changes in the cost of labor, equipment, and materials may justify comparable changes in the cost estimates presented herein. For this reason, common engineering practices usually tie the cost estimates to a particular index that varies in proportion to long-term changes in the national economy. The Engineering News Record (ENR) construction cost index (CCI) is most commonly used. This index is based on the value of 100 for the year 1913. Average yearly values for the past 10 years are summarized in Table 4.3.1-1.

Table 4.3.1-1 – ENR Index 2003-2013

YEAR	INDEX	% CHANGE/YR
2003	6695	2.40%
2004	7115	6.27%
2005	7446	4.65%
2006	7751	4.10%
2007	7649	2.79%
2008	8310	4.31%
2009	8570	3.13%
2010	8801	2.70%
2011	9070	3.06%
2012	9309	2.64%
Mar 2013	9456	1.58%
Average since 2003		3.42%

Cost estimates presented in this Plan are based on the average of March 2013 dollars with an ENR CCI of 9456. For construction performed in later years, costs should be projected based on the then current year ENR Index using the following method:

Updated Cost = Plan Cost Estimate x (current ENR CCI / 9456)

4.3.2 Contingencies

A contingency factor equal to approximately twenty percent (20%) of the estimated construction cost has been added to the budgetary costs estimated in this Plan. In recognition that the cost estimates presented are based on conceptual planning, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, unanticipated specialized investigation and studies, and other difficulties which cannot be foreseen at this time but may tend to increase final costs. Upon final design completion of any project, the contingency can be reduced to 10%. A contingency of at least 10% should always be maintained going into a construction project to allow for variances in quantities of materials and unforeseen conditions.

4.3.3 Engineering

The cost of engineering services for major projects typically includes special investigations, predesign reports, surveying, foundation exploration, preparation of contract drawings and specifications, bidding services, construction management, inspection, construction staking, start-up services, and the preparation of operation and maintenance manuals. Depending on the size and type of project, engineering costs may range from 18 to 25% of the contract cost when all of the above services are provided. The lower percentage applies to large projects without complicated mechanical systems. The higher percentage applies to small or complicated projects.

Engineering costs for basic design and construction services presented in this Plan are estimated at 20% of the estimated total construction cost. Other engineering costs such as specialized geotechnical exploration, easement research and preparation, and/or specific pre-design reports will typically be in addition to the basic engineering fees charged by firms.

4.3.4 Legal and Management

An allowance of five percent (5%) of construction cost has been added for legal and other project management services. This allowance is intended to include internal project planning and budgeting, funding program management, interest on interim loan financing, legal review fees, advertising costs, wage rate monitoring, and other related expenses associated with the project that could be incurred.

4.3.5 Land Acquisition

Some projects may require the acquisition of additional right-of-way, property, or easements for construction of a specific improvement. The need and cost for such expenditures is difficult to predict and must be reviewed as a project is developed. Effort was made to include costs for land acquisition, where expected, within the cost estimates included in this Plan.

Regulatory Conditions

Section 5

5.1 Responsibilities as a Water Supplier

The City of Eagle Point currently purchases water from the Medford Water Commission but is responsible for selling that water to the residents of the City. The regulations presented in this Section are those that the Medford Water Commission has to meet in order to be a water supplier. This is important to the City of Eagle Point because the City may one day develop their own water supply and will be responsible for treating to the Oregon Regulations. Additionally, it is important that the City knows what the Medford Water Commission is regulated to provide to Eagle Point.

Per OAR 333-061-0025, water suppliers are responsible for taking all reasonable precautions to assure that the water delivered to water users does not exceed maximum contaminant levels, to assure that water system facilities are free of public health hazards, and to assure that water system operation and maintenance are performed as required by these rules. This includes, but is not limited to, the following:

- Routinely collect and submit water samples for laboratory analyses at the frequencies and sampling points prescribed by OAR 333-061-0036 “Sampling and Analytical Requirements”;
- Take immediate corrective action when the results of analyses or measurements indicate that maximum contaminant levels have been exceeded and report the results of these analyses as prescribed by OAR 333-061-0040 “Reporting and Record Keeping”;
- Continue to report as prescribed by OAR 333-061-0040, the results of analyses or measurements which indicate that maximum contaminant levels (MCLs) have not been exceeded;
- Notify all customers of the system, as well as the general public in the service area, when the maximum contaminant levels have been exceeded;
- Notify all customers served by the system when the reporting requirements are not being met, or when public health hazards are found to exist in the system, or when the operation of the system is subject to a permit or a variance;
- Maintain monitoring and operating records and make these records available for review when the system is inspected;
- Maintain a pressure of at least 20 pounds per square inch (psi) at all service connections at all times (at the property line);
- Follow-up on complaints relating to water quality from users and maintain records and reports on actions undertaken;
- Conduct an active program for systematically identifying and controlling cross connections;
- Submit, to the Drinking Water Program (DWP), plans prepared by a professional engineer registered in Oregon for review and approval before undertaking the construction of new water

systems or major modifications to existing water systems, unless exempted from this requirement;

- Assure that the water system is in compliance with OAR 333-061-0205 "Water Personnel Certification Rules - Purpose" relating to certification of water system operators.

- Assure that Transient Non-Community water systems utilizing surface water sources or sources under the influence of surface water are in compliance with OAR 333-061-0065 "Operation and Maintenance" (2)(c) relating to required special training.

5.2 Public Water System Regulations

Water providers should always be informed of current standards, which can change over time, and should also be aware of pending future regulations. As of this writing, OAR Chapter 333, Division 61 covering Public Water Systems is over 370 pages in length and the latest effective version is dated September 10. 2012. This Section is not meant to be a comprehensive list of all requirements but a general overview of the requirements.

Specific information on the regulations concerning public water systems may be found in the Oregon Administrative Rules (OAR), Chapter 333, Division 61. The rules can be found on the Internet at http://egov.oregon.gov/DHS/ph/dwp/rules.shtml where copies of all the rules and regulations can be printed out or downloaded for reference. Details of the Oregon Drinking Water Protection Program can be found on the Internet at http://www.deq.state.or.us/wq/dwp/dwp.htm.

Drinking water regulations were established in 1974 with the signing of the Safe Drinking Water Act (SDWA). This act and subsequent regulations were the first to apply to all public water systems in the United States. The Environmental Protection Agency (EPA) was authorized to set standards and implement the Act. With the enactment of the Oregon Drinking Water Quality Act in 1981, the State of Oregon accepted primary enforcement responsibility for all drinking water regulations within the State. Requirements are detailed in OAR Chapter 333, Division 61. The SDWA and associated regulations have been amended several times since inception with the goal of further protection of public health.

SDWA requires the EPA to regulate contaminants which present health risks and are known, or are likely, to occur in public drinking water supplies. For each contaminant requiring federal regulation, EPA sets a non-enforceable health goal, or maximum contaminant level goal (MCLG). This is the level of a contaminant in drinking water below which there is no known or expected health risk. The EPA is then required to establish an enforceable limit, or maximum contaminant level (MCL), which is as close to the MCLG as is technologically feasible, taking cost into consideration. Where analytical methods are not sufficiently developed to measure the concentrations of certain contaminants in drinking water, the EPA specifies a treatment technique instead of an MCL to protect against these contaminants.

Water systems are required to collect water samples at designated intervals and locations. The samples must be tested in State approved laboratories. The test results are then reported to the State, which determines whether the water system is in compliance or violation of the regulations. There are three main types of violations:

(1) MCL violation — occurs when tests indicate that the level of a contaminant in treated water is above the EPA or State's legal limit (states may set standards equal to, or more protective than, EPA's). These violations indicate a potential health risk, which may be immediate or long-term.

(2) Treatment technique (TT) violation — occurs when a water system fails to treat its water in the way prescribed by EPA (for example, by not disinfecting). Similar to MCL violations, treatment technique violations indicate a potential health risk to consumers.

(3) Monitoring and reporting violation — occurs when a system fails to test its water for certain contaminants or fails to report test results in a timely fashion. If a water system does not monitor its water properly, no one can know whether or not its water poses a health risk to consumers.

If a water system violates EPA/State rules, it is required to notify the State and the public. States are primarily responsible for taking appropriate enforcement actions if systems with violations do not return to compliance. States are also responsible for reporting violation and enforcement information to the EPA quarterly.

To comply with the regulations, water systems must provide adequate treatment techniques, operate treatment processes to meet performance standards, and properly protect treated water to prevent subsequent contamination after treatment.

5.3 Current Standards

There are now EPA-established drinking water quality standards for 91 contaminants, including 7 microbials and turbidity, 7 disinfectants and disinfection byproducts, 16 inorganic chemicals (including lead and copper), 56 organic chemicals (including pesticides and herbicides), and 5 radiologic contaminants. These standards either have established MCLs or treatment techniques. In addition, there are secondary contaminant levels for 16 contaminants that represent desired goals, and in the case of fluoride, may require special public notice.

Total Coliform Rule

The total coliform rule was established by the EPA in 1989 and revisions were completed in December 2012. Compliance date for the rule requirements is April 16, 2016. This rule was introduced to reduce the risk of waterborne illness resulting from disease-causing organisms associated with animal or human waste. Routine samples collected by Oregon public water suppliers are analyzed for total coliform bacteria. The number of monthly samples required varies based on population served. For the City of Eagle Point, a minimum of 10 samples per month from 30 separate sample points is required.

Compliance is based on the presence or absence of total coliforms in any calendar month. Sample results are reported as “coliform-absent” or “coliform-present”. If any routine sample is coliform-present, a set of at least three repeat samples must be collected within 24 hours. If any repeat sample is total coliform-present, the system must analyze that culture for fecal coliforms or *E. coli*, and must then collect another set of repeat samples, unless the MCL has been violated and the system has notified the State. Following a positive routine or repeat total coliform result, the system must collect a minimum of five routine samples the following month.

Systems which collect fewer than 40 samples per month are allowed no more than one coliform-present sample per month including any repeat sample results. Larger systems (40 or more samples per month) are allowed no more than five percent coliform-present samples in any month including any repeat sample results. Confirmed presence of fecal coliform or *E. coli* presents a potential acute health risk and requires immediate notification of the public to take protective actions such as boiling or using bottled water. Any fecal coliform-positive repeat sample or *E. coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal or *E. coli*-positive routine sample is a violation of the MCL.

Surface Water Treatment Rules

All water systems using surface water must provide a total level of filtration and disinfection treatment to remove/inactivate 99.9 percent (3-log) of *Giardia lamblia*, and to remove/inactivate 99.99 percent (4-log) of viruses. In addition, filtered water systems must physically remove 99 percent (2-log) of *Cryptosporidium.* Systems with source water *Cryptosporidium* levels exceeding specified limits must install and operate additional treatment processes.

Filtered water systems must meet specified performance standards for combined filter effluent turbidity levels, and water systems using conventional and direct filtration must also record individual filter effluent turbidity and take action if specified action levels are exceeded. When more than 1 filter exists, each filter's effluent turbidity must be monitored continuously and recorded at least every 15 minutes. The combined flow from all filters must have a turbidity measurement at least every four hours by grab sampling or continuous monitoring. Turbidity monitoring must occur prior to any storage such as a clearwell or contact tank. Turbidity monitoring equipment must be calibrated using an approved method at least once per quarter. General requirements for systems utilizing conventional or direct filtration are:

- Individual filter turbidity monitored continuously and recorded every 15 minutes or less
- Combined filter turbidity monitored continuously or grab sample taken at least every 4 hours
- Combined filter turbidity less than 1 Nephelometric Turbidity Unit (NTU) in 100% of measurements
- Combined filter turbidity less than or equal to 0.3 NTU in 95% of measurements in a month
- Specific follow-up actions if individual filter turbidity exceeds 1.0 NTU twice

General requirements for systems utilizing slow sand, and alternative filtration (membrane filtration and cartridge filtration) are:

- Combined filter turbidity monitored continuously or grab sample taken at least every 4 hours Department may reduce to once per day if determined to be sufficient
- Combined filter turbidity less than 5 NTU in 100% of measurements
- Combined filter turbidity less than or equal to 1 NTU in 95% of measurements in a month
- Department may require lower turbidity values if the above levels cannot provide the required level of treatment

All water systems must meet specified CxT [concentration x time] requirements for disinfection, and meet required removal/inactivation levels. In addition, a disinfectant residual must be maintained in the distribution system.

- Continuous recording of disinfectant residual at entry point to the distribution system. Small system may be allowed to substitute 1-4 daily grab samples.
- Daily calculation of CxT at highest flow (peak hourly flow)
- Provide adequate CxT to meet needed removal/inactivation levels
- Maintain a continuous minimum 0.2 mg/L disinfectant residual at entry point to the distribution system
- Maintain a minimum detectable disinfectant residual in 95% of the distribution system samples (collected at coliform bacteria monitoring points)

Filtered water systems that recycle spent filter backwash water or other waste flows must return those flows through all treatment processes in the filtration plant. Systems wishing to recycle filter backwash water must provide notice to the State including a plant schematic showing the origin, conveyance, and return location of recycled flows. Design flows, observed flows, and typical recycle flows are also required along with a state-approved plant operating capacity.

Disinfectants and Disinfection Byproducts

Disinfection treatment chemicals used to kill microorganisms in drinking water can react with naturally occurring organic and inorganic matter in source water, called DBP precursors, to form disinfection byproducts (DBPs). Some disinfection byproducts have been shown to cause cancer and reproductive effects in lab animals and suggested bladder cancer and reproductive effects in humans. The challenge is to apply levels of disinfection treatment needed to kill disease-causing microorganisms while limiting the levels of disinfection byproducts produced. The primary disinfection byproducts of concern in Oregon are the total trihalomethanes (TTHM) and the haloacetic acids (HAA5).

Disinfection byproducts must be monitored throughout the distribution system at frequencies of daily, monthly, quarterly, or annually, depending on the population served, type of water source, and the specific disinfectant applied, and in accordance with an approved monitoring plan. Disinfectant residuals must be monitored at the same locations and frequency as coliform bacteria.

Total organic carbon (TOC) is an indicator of the levels of DBP precursor compounds in the source water. Systems using surface water sources and conventional filtration treatment must monitor source water for TOC and alkalinity monthly and practice enhanced coagulation to remove TOC if it exceeds 2.0 mg/L as a running annual average.

Compliance is determined based on meeting maximum contaminant levels (MCLs) for disinfection byproducts and maximum levels for disinfectant residual (MRDLs) over a running annual average of the sample results, computed quarterly.

- TTHM/HAA5 monitoring required in distribution system. One sample per quarter for systems serving 50,000-99,999 persons. One sample per year in warmest month required for systems serving less than 50,000.
- MCL for TTHM is 0.080 mg/L. MCL for HAA5 is 0.060 mg/L.
- Any system having TTHM > 0.064 mg/L or HAA5 > 0.048 based on a running annual average must conduct disinfection profiling.
- TOC and alkalinity monitoring in source water monthly. Enhanced coagulation if TOC greater than 2.0 mg/L
- Comply with MRDLs. Limit for chlorine (free Cl_2 residual) is 4.0 mg/L. Limit for chloramines is 4.0 mg/L (as total Cl_2 residual). Limit for chlorine dioxide is 0.8 mg/L (as ClO_2)
- Bromate MCL of 0.010 mg/L
- Chlorite MCL of 1.0 mg/L

Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)

LT2ESWTR was published by the U.S. EPA on January 5, 2006. The Oregon rule was due by January 5, 2010. The rule requires source water monitoring for public water systems that use surface water or ground water under the influence of surface water. Based on the system size and filtration type, systems must monitor for *Cryptosporidium*, *E. coli*, and turbidity. Source water monitoring data will be used to categorize the source water *Crypto* concentration into four "bin" classifications that have associated treatment requirements. Systems serving 10,000 or more people are required to conduct 24 months of *Crypto* monitoring. Systems serving fewer than 10,000 people are required to conduct 12 months of *E. coli* monitoring and 12-24 months of *Crypto* monitoring if E. coli trigger levels are exceeded. The rule provides other options to comply with the initial source water monitoring that include either submitting previous *Crypto* data meeting (grandfathered data) the requirements or committing to provide a total of at least 5.5-log treatment for *Cryptosporidium*. A second round of source water monitoring will follow 6 years after the system makes its initial bin determination.

Critical Deadlines for LT2ESWTR for systems serving less than 10,000 persons include:

Comply with Rule:_____October 1, 2014
Begin second round of source water monitoring: _____Oct. 1, 2017 (April 1, 2019*)
** Cryptosporidium monitoring - applies to filtered systems that exceed E. coli trigger*

Critical Deadlines for LT2ESWTR for systems serving 10,000 to 49,999 persons include:

Comply with Rule:_____October 1, 2013
Begin second round of source water monitoring: _____October 2016

Stage 2 Disinfectants and Disinfection Byproducts Rule

The Stage 2 DBPR was published by the U.S. EPA on January 4, 2006. The rule builds on existing regulations by requiring water systems to meet disinfection byproduct (DBP) MCLs at each monitoring site in the distribution system. Whereas the Stage 1 Rule controls average DBP levels across distribution systems, the Stage 2 Rule controls the occurrence of peak DBP levels within distribution systems.

The rule requires all community water systems to conduct an Initial Distribution System Evaluation (IDSE). The goal of the IDSE is to characterize the distribution system and identify monitoring sites where customers may be exposed to high levels of TTHM and HAA5. There are four ways to comply with the IDSE requirements: Standard Monitoring, System Specific Study, 40/30 Certification, and Very Small System (VSS) Waiver.

Standard monitoring (SM) is one year of increased monitoring for TTHM and HAA5 in addition to the data being collected under Stage 1 DBPR. These data will be used with the Stage 1 data to select Stage 2 DBPR TTHM and HAA5 compliance monitoring locations. Any system may conduct standard monitoring to meet the Initial Distribution System Evaluation (IDSE) requirements of the Stage 2 DBPR. The number of monitoring sites, the monitoring periods, and monitoring frequency vary depending on population served.

Systems that have extensive TTHM and HAA5 data (including Stage 1 DBPR compliance data) or technical expertise to prepare a hydraulic model may choose to conduct a system specific study (SSS) to select the Stage 2 DBPR compliance monitoring locations.

The term “40/30” refers to a system that during a specific time period has all individual Stage 1 DBPR compliance samples less than or equal to 0.040 mg/L for TTHM and 0.030 mg/L for HAA5 and no monitoring violations during the same period. These systems have no IDSE monitoring requirements, but will still need to conduct Stage 2 DBPR compliance monitoring.

The Very Small System (VSS) Waiver applies to systems that serve fewer than 500 people and have eligible TTHM and HAA5 data. The VSS eligibility does not depend on the actual TTHM and HAA5 sample results. These systems also have no IDSE monitoring requirements, but will still need to conduct Stage 2 DBPR compliance monitoring. 40/30 certifications were previously due for systems larger than 10,000 persons. For systems less than 10,000 persons, the 40/30 due date was April 1, 2008.

Critical Deadlines for Stage 2 DBPR for systems serving less than 10,000 persons include:

Begin Compliance Monitoring:_____October 1, 2013

The City of Eagle Point conforms to the Medford Water Commission testing schedule.

Lead and Copper

Excessive levels of lead and copper are harmful and rules exist to limit exposure through drinking water. Lead and copper enter drinking water mainly from corrosion of plumbing materials containing lead and copper. Lead comes from solder and brass fixtures. Copper comes from copper tubing and brass fixtures. Protection is provided by limiting the corrosivity of water sent to the distribution system. Treatment alternatives include pH adjustment, alkalinity adjustment, or both, or adding passivating agents such as orthophosphates.

Samples from community systems are collected from homes built prior to the 1985 prohibition of lead solder in Oregon. One-liter samples of standing water (first drawn after 6 hours of non-use) are collected at homes identified in the water system sampling plan. Two rounds of initial sampling are required, collected at 6-month intervals. Subsequent annual sampling from a reduced number of sites is required after demonstration that lead and copper action levels are met. After three rounds of annual sampling, samples are required every 3 years. The number of initial and reduced samples required is dependent on the population served by the water system.

In each sampling round, 90% of samples from homes must have lead levels less than or equal to the Action Level of 0.015 mg/L and copper levels less than or equal to 1.3 mg/L. Water systems with lead above the Action Level must conduct periodic public education, and either install corrosion control treatment, change water sources, or replace plumbing.

- Have Sampling Plan for applicable homes
- Collect required samples
- Meet Action Levels for Lead and Copper (0.015 mg/L for Lead and 1.3 mg/L for Copper)
- Rule out source water as a source of significant lead levels
- If Action Levels not met, provide corrosion control treatment and other steps

On October 10, 2007 EPA published the 2007 Final Revisions to the Lead and Copper Rule. The rule addresses confusion about sample collection by clarifying language that speaks to the number of samples required and the number of sites from which samples should be collected. The rule also modifies definitions for monitoring and compliance periods to make it clear that all samples must be taken within the same calendar year. Finally, the rule adds a new reduced monitoring requirement, which prevents water systems above the lead action level to remain on a reduced monitoring schedule.

Inorganic Contaminants

The level of many inorganic contaminants is regulated for public health protection. These contaminants are both naturally occurring and can result from agriculture or industrial operations. Inorganic contaminants most often come from the source of water supply, but can also enter water from contact with materials used for pipes and storage tanks. Regulated inorganic contaminants include arsenic, asbestos, fluoride, mercury, nitrate, nitrite, and others. A possible future MCL for Nickel is currently being evaluated by EPA.

Compliance is achieved by meeting the established MCLs for each contaminant. Systems that cannot meet one or more MCL must either install treatment systems (such as ion exchange or reverse osmosis) or develop alternate sources of water.

- Sample quarterly for Nitrate (reduction to annual may be available)
- Communities with Asbestos Cement (AC) pipe must sample every 9 years for Asbestos
- Sample annually for Arsenic. New MCL of 0.010 mg/L effective January 2006

- Sample annually for all other inorganics. Waivers are available based on monitoring records showing three samples below MCLs. MCLs vary based on contaminant

Organic Chemicals

Organic contaminants are regulated to reduce exposure to harmful chemicals through drinking water. Examples include acrylamide, benzene, 2,4-D, styrene, toluene, and vinyl chloride. Major types of organic contaminants are Volatile Organic Chemicals (VOCs) and Synthetic Organic Chemicals (SOCs). Organic contaminants are usually associated with industrial or agricultural activities that affect sources of drinking water supply, including industrial and commercial solvents and chemicals, and pesticides. These contaminants can also enter from materials in contact with the water such as pipes, valves and paints and coatings used inside water storage tanks.

At least one test for each contaminant from each water source is required during every 3-year compliance period. Public water systems serving more than 3,300 people must test twice during each 3-year compliance period for SOCs. Public water systems using surface water sources must test for VOCs annually.

Compliance is achieved by meeting the established MCL for each contaminant. Quarterly follow up testing is required for any contaminants that are detected above the specified MCL. Only those systems determined by the State to be at risk must monitor for dioxin. Water systems using polymers containing acrylamide or epichlorohydrin in their water treatment process must keep their dosages below specified levels. Systems that cannot meet one or more MCL must either install or modify water treatment systems (such as activated carbon and aeration) or develop alternate sources of water.

- At least one test for each contaminant (for each water source) every 3-year compliance period
- Sample twice each compliance period for each SOCs when system over 3,300 people
- Test VOCs annually
- Quarterly follow up testing required for any detects above MCL
- Maintain polymer dosages in treatment process below specified levels
- MCLs vary based on contaminant

Radiologic Contaminants

Radioactive contaminants, both natural and man-made, can result in an increased risk of cancer from long-term exposure and are regulated to reduce exposure through drinking water. Rules were recently revised to include a new MCL for uranium (30 µg/L), and to clarify and modify monitoring requirements. Initial monitoring tests, quarterly for one year at the entry point from each source, were to be completed by December 31, 2007 for gross alpha, radium-226, radium-228 and uranium. A single analysis for all four contaminants collected between June 2000 and December 2003 will substitute for the four initial samples. Gross alpha may substitute for radium-226 if the gross alpha result does not exceed 5 picocuries/liter (pCi/L) and may substitute for uranium monitoring if the gross alpha result does not exceed 15 pCi/L. Subsequent monitoring is required every three, six, or nine years depending on the initial results, with a return to quarterly monitoring if the MCL is exceeded. Compliance with MCLs is based on the average of the four initial test results, or subsequent quarterly tests. Community water systems than cannot meet MCLs must install treatment (such as ion exchange or reverse osmosis) or develop alternate water sources.

Radon Rule

All community water systems using groundwater sources will conduct quarterly initial sampling at distribution system entry points for one year. Subsequent sampling will occur once every 3 years. The

Radon MCL is expected to be 300 pCi/L. An alternative MCL (AMCL) of 4,000 pCi/L is proposed if the State develops and adopts an EPA-approved statewide Multi-Media Mitigation (MMM) program. Local communities may have the option of developing an EPA-approved local MMM program in the absence of a statewide MMM program, and meeting the AMCL.

Distribution Rule

Under this rule, current requirements for coliform bacteria will be revised, emphasizing fecal coliforms and *E. coli*, and focusing on protection of water within the distribution system. The rule will apply to all public water systems and will involve identifying and correcting sanitary defects and hazards in water systems and using best management practices for disinfection to control coliform bacteria in the system.

5.4 Future Water System Regulations

The 1996 Safe Drinking Water Act (SDWA) requires EPA to review and revise as appropriate each current standard at least every six years. Data is continually collected on contaminants currently unregulated in order to support development of future drinking water standards. Drinking water contaminant candidate lists (CCL) are prepared and revised every five years. The first DWCCL (CCL1) was published on March 2, 1998 which included 51 chemicals and 9 microbials. In 2003, EPA decided not to regulate any of the 9 microbials from the initial list. In 2005 EPA published the second CCL (CCL2) consisting of the remaining 51 contaminants from the first list. The Agency published the preliminary regulatory determinations for 11 of the 51 contaminants listed on the second CCL in April of 2007. In 2008 EPA published the draft third Contaminant Candidate List (CCL3) to help identify unregulated contaminants that may require a national drinking water regulation in the future. In September 2009 EPA finalized CCL3which includes 104 chemicals or chemical groups and 12 microbiological contaminants. The EPA must publish a decision on whether to regulate at least five contaminants from the CCL every 5 years. As a result, additional contaminants can become regulated in the future.

In addition, rule revisions and new rules will occur to further address health risks from disinfection byproducts and pathogenic organisms. Rules such as the Long-Term Stage 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) and the Stage 2 Disinfectants/Disinfection Byproducts Rule (Stage 2 DBPR) have recently gone into effect at the federal level and require systems to begin planning for compliance. New and revised drinking water quality standards are mandated under the 1996 federal SDWA. Recent standards (and their likely EPA promulgation date) include:

- Radon Rule (2009); and
- Distribution Rule, including revised coliform bacteria requirements (2010).

Water suppliers should be aware of and familiar with these mandates and deadlines, and plan strategically to meet them. DHS, under the Primacy Agreement with the EPA, has up to two years to adopt each federal rule after it is finalized. Water suppliers generally have at least three years to comply with each federal rule after it is finalized; however, some of these rules will likely establish a significant number of compliance dates for water suppliers that will occur prior to state adoption of the rules. These “early implementation” dates will likely have to be implemented in Oregon directly by the EPA, because the state program will not yet have the rules in place or the resources to carry them out.

5.5 Water Management and Conservation Plans

The Municipal Water Management and Conservation Planning (WMCP) program provides a process for municipal water suppliers to develop plans to meet future water needs. Municipal water suppliers are

encouraged to prepare water management and conservation plans, but are not required to do so unless a plan is prescribed by a condition of a water use permit; a permit extension; or another order or rule of the Commission. These plans will be used to demonstrate the communities' needs for increased diversions of water under the permits as their demands grow. A master plan prepared under the requirements of the Oregon Health Authority Drinking Water Program or the water supply element of a public facilities plan prepared under the requirements of the Department of Land Conservation and Development which substantially meets the requirements of OAR 690-086-0125 to 690-086-0170 may be submitted to meet the requirements for WMCPs. Rules for WMCPs are detailed in OAR 690, Division 86.

A WMCP provides a description of the water system, identifies the sources of water used by the community, and explains how the water supplier will manage and conserve supplies to meet future needs. Preparation of a plan is intended to represent a pro-active evaluation of the management and conservation measures that suppliers can undertake. The planning program requires municipal water suppliers to consider water that can be saved through conservation practices as a source of supply to meet growing demands if the saved water is less expensive that developing new supplies. As such, a plan represents an integrated resource management approach to securing a community's long-term water supply.

Many of the elements required in a plan are also required under similar plans by the Drinking Water Section of the state Oregon Health Authority (water system master plans) and Department of Land Conservation and Development (public facilities plans). Water providers can consolidate overlapping plan elements and create a single master plan that meets the requirements of all three programs.

Every municipal water supplier required to submit a WMCP shall exercise diligence in implementing the approved plan and shall update and resubmit a plan consistent with the requirements of the rules as prescribed during plan approval. Progress reports are required showing 5-year benchmarks, water use details, and a description of the progress made in implementing the associated conservation or other measures.

The WMCP shall include the following elements:

1) Water System Description including infrastructure details, supply sources, service area and population, details of water use permits and certificates, water use details, customer details, system schematic, and leakage information.

2) Water Conservation Element including description of conservation measures implemented and planned, water use and reporting program details, progress on conservation measures, and conservation benchmarks.

3) Water Curtailment Element including current capacity limitations and supply deficiencies, three or more stages of alert for potential water shortages or service difficulties, levels of water shortage severity and curtailment action triggers, and specific curtailment actions to be taken for each stage of alert.

4) Water Supply Element detailing current and future service areas, estimates of when water rights and permits will be fully exercised, demand projections for 10 and 20 years, evaluation of supply versus demand, and additional details should an expansion of water rights be anticipated.

Failure to comply with rules for WMCPs can result in enforcement actions by the Water Resources Department Director. Enforcement actions can include requirements for additional information and planning, water use regulation, cancellation of water use permits, or civil penalties under OAR 690-260-

0005 to 690-260-0110. The City should implement a WMCP to educate consumers on responsible use of water as well as to limit the amount of water use per person as water becomes more expensive.

5.6 Regulations Summary for Eagle Point

Since Eagle Point does not have a surface or groundwater treatment facility, the surface and groundwater treatment rules do not apply. Eagle Point is required to conduct distribution sampling as other communities do including samples for Disinfection By-Products (DBP), Lead and Copper, Coliform, and other regulated chemicals.

The City of Eagle Point is responsible to particularly watch the requirement to maintain 20 psi or higher at all times to all points in the system, the requirement to have stamped, engineering plans approved prior to piping installations (except for minor repairs and replacing old pipe with new pipe of the same size), and the need to maintain a formal cross-connection program to identify and eliminate cross connection hazards. Currently, the City meets the Oregon State Standard of 20 psi but is limited in some areas where pipe improvements are recommended in Section 7.

Failure to comply with rules can result in investigations by the Oregon Health Authority with potential penalties, forced improvements, moratoriums, or even orders to cease operation of a water system (see ORS 448.175, 448.250, and 448.255).

Existing Water System

Section 6

6.1 Water Supply

6.1.1 Water Sources

The City of Eagle Point holds water rights on Four Mile Lake and obtains treated water from Medford Water Commission (MWC). MWC primarily uses Big Butte Springs as a source which only requires disinfectant treatment. Big Butte Springs is located about thirty miles northeast of Medford and five miles east of the town of Butte Falls. MWC had an intergovernmental agreement with the City of Eagle Point that expired April 12, 2010. This agreement was to provide a maximum of 900 gallons per minute (gpm) to the City in the winter and 2,100 gpm maximum in the summer. This is equal to 1.3 million gallons per day (MGD) and 3.0 MGD, respectively.

In October 2011, MWC agreed to supply surplus water of 1,350 gallons per minute from October through April and treat and transport water up to a combined maximum of 3,125 gallons per minute from May through September. In the case of an emergency, MWC agrees to increase the supply of the system, with prior notification. This agreement will expire in October 2016 and the City has the option to extend the term of this agreement for three additional five-year periods until the year 2031

Using a growth rate of 3.0%, the maximum daily demand for the City of Eagle Point is 8.8 million gallons per day in the year 2033 or 6,111 gallons per minute. This is 3,000 gallons less than the agreed upon supply. The City of Eagle Point should obtain additional water rights to meet their summertime demands and develop its own water management and conservation plan. This work has already been started by the City.

6.1.2 Water Rights

Water rights held by the City of Eagle Point include approximately 356 acre-feet per year from Four Mile Lake. This water right has been held by the City since 1910. The City is in the process of transferring water rights from Eagle Point Irrigation District to the City for municipal use. This is mainly due to the development of residences and commercial outlets on properties that were once agricultural.

Table 6.1.2-1 – Water Rights Summary

Certificate Number	Maximum Authorized Rate (cfs)	Maximum Authorized Volume (ac-ft)	Completion Date	Water Source
85409	1.25	356.94	03-31-1910	Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir
T-9973	0.9	321.3	10-01-2011	Four Mile Lake and Fish Lake Reservoirs
T-10527	0.5	181.5	10-01-2013	Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir
T-10614	1.15	273.7	10-01-2015	Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir
T-10960	1.77	520.3	10-01-2016	North and South Forks of Little Butte Creek and Four Mile Lake and waters draining into Cascade Canal and Fish Lake Reservoir

Four Mile Lake, named because it was erroneously assumed to be four miles long, is a large natural lake scenically located at the foot of Mount McLoughlin near the divide between the Klamath River and Rogue River basins. At 5,744 feet above sea level, it is one of the highest lakes in Oregon. The lake was enlarged artificially by the construction of a rock-faced, earth fill dam completed in 1922. Natural outflow is into Four Mile Creek, but a considerable amount of water is diverted into the Cascade Canal and transported to the Rogue River basin where it discharges into a lava bed above Fish Lake. Here the flow sinks into the hardened lava and reappears as springs at the head of Fish Lake. Water then flows into the North Fork of Little Butte Creek which is a tributary of the Rogue River. Water is taken from the Rogue River and conveyed to Duff Water Treatment Plant where it is treated by MWC and sold to Eagle Point for municipal use.

6.2 System Component Description

6.2.1 General

The City operates a public drinking water system (Public Water System Identification Number: 4100267). Currently, the City's source of potable water supply is stored water from Four Mile Lake and water purchased from the MWC. MWC's water comes from Big Butte Springs and this source is supplemented by water from Four Mile Lake when demands exceed the supply capacity of the springs. Water from Big Butte Springs requires no treatment beyond disinfection and water from Four Mile Lake is treated at MWC's Duff WTP. The City shares a point of diversion with MWC. Water primarily enters the system from the Highway 62 pump station. October through April, the City pulls 600 gallons per minute off of the Big Butte Springs lines. City staff reports that there were times in the winter of 2012-2013 that the City did not need to pump any water through this pump station.

The City of Eagle Point has three reservoirs, three pump stations, and one valve station further described below.

6.2.2 Highway 62 Pump Station

Highway 62 Pump Station

Water from the Medford Water Commission enters the City of Eagle Point by way of the Highway 62 Pump Station. This station was built and put into use in 2006. There are four pumps housed within the station which consists of a pre-manufactured building on a concrete slab. Three of the four pumps are 100 Hp centrifugal pumps made by Peerless. The fourth pump is 40 Hp centrifugal pump. When two large pumps are running, approximately 3000 gallons per minute of water enters the City of Eagle Point's water system. When one pump is running, approximately 2000 gallons per minute enters the system. At the time of the visit, 1900 gallons per minute were passing through the pump station at a pressure of 145 psi. Two pipes leave the pump station; one with a diameter of 16-inches and the other with a diameter of 12-inches.

6.2.3 Nita Way Valve Station

Vault View at Nita Way Valve Station

The Nita Way Valve Station is located just north of the Highway 62 pump station at the intersection of Nita Way and Highway 62. It was constructed in 2010. Both pipes leaving the Highway 62 pump station come together before the valve station and enter as one. After this station, there are two pipes that provide water to the City of Eagle Point; one is 14-inches in diameter and one is 12-inches in diameter. This very complicated system is connected through a supervisory control and data acquisition (SCADA) system that opens and closes the valves according to the water levels of the reservoirs and the pressure readings at the two other pump stations.

6.2.4 Eagle Point Pump Station

The Eagle Point Pump Station was constructed in 1996 at the same time the 3.6 million gallon tank was constructed. The station pumps water from the 3.6 million gallon tank and boosts pressure to serve a small number of homes in a high elevation subdivision near the site. There are two alternating 5 Hp pumps that pressurize a 152 gallon hydro-pneumatic tank that serves 4 residential customers on Palima Drive.

Eagle Point Pump Station

The pump station building is made of cement block and painted green. The building structure appeared to be in good condition. Surrounding the building is a chain link fence with a lockable gate. The ground around the building is showing signs of settling and erosion is taking place in some areas of the fence.

Located adjacent to the pump station is a flow meter and valve vault allowing Big Butte Springs to connect into the distribution system to fill the 3.6 million gallon tank. At some times of the year, the City is allowed to divert 600 gallons per minute from Big Butte Springs into the distribution system.

6.2.5 Bellerive Pump Station

The Bellerive Pump Station was constructed in 2006 and is located in the northeast section of the City near the intersection of Pumpkin Ridge Drive and Bellerive Drive. The station is located behind a row of houses along Robert Trent Jones Boulevard. The Bellerive pump station consists of two 20 Hp G&L Goulds pumps. The pumps are capable of pumping up to 600 gallons per minute (gpm) with both of them running and 380 gpm with one pump running. At the time of the visit, the pumps were producing a pressure of 124 psi on the discharge side with an incoming pressure of 53 psi.

This pump station lifts water from the main pressure zone to fill the 200,000 gallon reservoir. City staff has indicated that the pumps in this station are always running due to the fact that the 200,000 gallon reservoir is undersized. There is room and accommodations in this pump station for two more pumps which would help fill the 200,000 gallon reservoir quicker and reduce the load on the two existing pumps.

This pump station pulls water from Pressure Zone 3 which is controlled by the 4.0 million gallon tank.

Bellerive Pump Station Building

Bellerive Pump Station

6.2.6 3.6 Million Gallon Tank

The 3.6 million gallon tank was constructed in 1996 and is located in the northeastern portion of the City at the north end of Avalon Drive and Cambridge Street. The tank is a pre-stressed concrete tank by DYK located at an elevation of 1503 feet above sea level. This tank is filled by the Highway 62 pump station. The tank appeared to be in good condition during the time of the inspection. Subsidence of ground around the tank site was noted though the tank does not appear to be compromised.

During the summer of 2012, Civil West was contracted to locate the cause of a leak in this tank. No obvious failure was detected in the structure of the tank but it was recommended that the floor of the tank be "seeded" to fill cracks and eliminate leaks. The seeding process consists of emptying the tank and taking it off line. Raw, dry cement was placed on the floor of the tank and spread around to fill the cracks. The tank was then filled with water. The logic behind this process is that the cement would activate with the water and bond to the existing concrete to fill the cracks and stop leaking through the floor.

3.6 Million Gallon Tank

Before the seeding of this tank took place, the City measured an average leakage rate of 35 gallons per minute. Also at this time, crack injection was completed to stop the leakage. After processes were completed and allowing a few days for the chemical reaction to take place between the cement, water, and concrete, the City measured a leakage rate of less than 2 gallons per minute. The seeding effort eliminated 95% of the leakage from the tank.

Since construction in 1996, the surface of the tank has weathered and is in need of maintenance. The surface was treated with a stucco-like concrete that has a rough texture and was painted green. Some cracking is apparent in the surface due to temperature differentials and general weathering. Though normal, the cracks should not be allowed to get wider and propagate. The tank should be resurfaced with an exterior coating such as Loxon XP, A24 Series from Sherwin Williams. This coating is available in a variety of colors.

Additionally, soil movement around the fencing and gates is occurring and is most likely due to creep of the overlying soils caused by seasonal changes in moisture. This should be addressed as the City has resources to do so.

6.2.7 4.0 Million Gallon Tank

4.0 Million Gallon Tank

The 4.0 million gallon tank is a concrete tank that was built for the residents of Camp White and the Veterans Administration area in the 1940's. The City of Eagle Point purchased the tank for storage use and has completed many improvements to the tank such as install a new roof, upgrade its telemetry system, and provide seismic upgrades.

Other upgrades to the tank included raising the floor by at least 12 inches and placing six inches of concrete on the walls. This has reduced the volume of the tank from 4.0 million gallons to 3.6 million gallons. For the purposes of this report, it will be referred to as a 4.0 million gallon tank but all storage capacity calculations will only include 3.6 million gallons.

The tank is located at an elevation of 1484 feet above sea level which is at a lower elevation (approximately 20 feet) than the 3.6 million gallon tank and the 200,000 gallon tank (approximately 200 feet).

An altitude valve controls the level of tank. The altitude valve will remain open while the tank is not full, allowing water to flow into the tank. Once the tank is full or reaches its maximum level, the valve will close and will not allow water to overflow or overfill the tank. This is done automatically and requires no power source.

The 4.0 million gallon tank was recently placed online when the repairs were undertaken on the 3.6 million gallon tank. During that time, several residents of Eagle Point noticed a drop in their water pressure. This is due to the fact that the 4.0 million gallon tank is approximately 20 feet lower in elevation than the 3.6 million gallon tank. This difference caused a noticeable drop – almost 9 psi - in the water pressure in several homes and businesses throughout Eagle Point.

When the repairs on the 3.6 million gallon tank were complete, the tank was placed back online. This alleviated the pressure drops that were noticed throughout the City.

Additionally, the inlet and outlet pipes that convey water to and from the tank are located in very close proximity to each other, therefore causing fresh water that was being pumped into the tank to leave the tank immediately while the remaining water in the tank grew stagnant.

6.2.8 200,000 Gallon Tank

The 200,000 gallon tank in use is located in the southeastern portion of the City on Radar Hill. It is located on a hill just south of Pinnacle Ridge and just west of Riley Road at an elevation of 1685 feet above sea level. It is an Aquastore tank that was constructed in October 1996. The tank appeared to be in excellent condition at the time of inspection. As mentioned previously, this tank is filled by the Bellerive Pump Station but can also be filled by an emergency tap to the Medford Water Commission line (Big Butte Springs) that is located along Viewcrest Drive which is southwest of the tank.

200,000 Gallon Tank

This tank was intended to feed the small development near the tank that is elevated above the main pressure zone. Over time, however, increased development in this part of the City has placed greater demands upon this tank. Bellerive Pump Station has had a difficult time keeping this tank full due to a greater number of residents in this area. It is recommended that a larger tank be installed in the same pressure zone as this small tank to assist with the supply of water to this rapidly growing customer base.

6.3 Distribution System

6.3.1 Pressure Zones

A computer analysis of the existing water distribution system was completed using the software program WaterCAD v8i. Using information obtained from the City of Eagle Point, the model was built with pipe sizes, lengths, and materials that are present within the City. Tank sizes and elevations were also placed in the model as well as elevation of the many pipe junctions throughout the City. The pump stations were modeled according to the existing pumps. Fire flow requirements were placed into the model along with demand data at the various junctions. Using existing information, the model evaluated pressures and fire flows throughout the system.

The Eagle Point water system was originally designed to operate in two pressure zones. One pressure zone was to be fed by the 3.6 million gallon tank and the other one was to be fed by the 200,000 gallon tank. The addition of the 4.0 million gallon tank resulted in the creation of a third pressure zone for the City. As described previously, the 4.0 million gallon tank is approximately 20 feet lower in elevation than the 3.6 million gallon tank. The 4.0 million gallon tank has been intentionally underutilized until a solution to this problem can be developed. This solution is presented in Section 7.2.5. The existing two pressure zones are shown in Figure 6.3.1-1.

The main pressure zone which serves the majority of the City is fed by the 3.6 MG tank and is known as Pressure Zone 1. Pressure Zone 2 is located in the southeast part of the City and is fed by the 200,000 gallon tank. The 4.0 million gallon tank operates its own Pressure Zone 3.

Table 6.3.1-1 – Pressure Zones

Pressure Zone	Hydraulic Grade Control	Hydraulic Grade	Maximum Service Elevation (~25 psi static)	Ideal Service Elevation (40 psi to 100 psi)
1	3.6 MG Reservoir	1526 feet	1467 feet	1270 – 1433 feet
2	0.2 MG Reservoir	1699 feet	1641 feet	1453 – 1606 feet
3	4.0 MG Reservoir	1484 feet	1425 feet	1228 – 1395 feet

It is of utmost importance that the 4.0 million gallon tank be on line to provide enough storage capacity for the City of Eagle Point to meet the residents' needs. A recommendation to operate the system as three pressure zones is made in Section 7.2.5.

6.3.2 Piping System Summary

The City of Eagle Point water system includes over 240,000 feet (over 45 miles) of piping over 2-inches in diameter. A summary of the type and size of piping present within the City of Eagle Point is provided in Table 6.3.2-1.

Table 6.3.2-1 – Water System Piping Inventory (lengths are in ft.)

	1"	2"	3"	4"	6"	8"	10"	12"	14"	16"	Total
Asbestos Cement Pipe		350		265	4,540	17,602					**22,757**
Ductile Iron					2,652	1,094		61,436	1,687	10,633	**77,502**
PVC	220	527	1,085	5,488	17,666	84,691	999	27,621			**138,297**
Steel		185			1,568*						**1,753**
Total	**220**	**1,062**	**1,085**	**5,753**	**26,426**	**103,387**	**999**	**89,057**	**1,687**	**10,633**	**240,309**

*** = This length of pipe is from the 3.6 MG tank to the Big Butte Springs water source.**

The system includes over 100,000 feet of 8-inch piping in the distribution grid with numerous fire hydrants served from this piping. According to the table above, asbestos cement pipe comprises a little less than 10% of the Eagle Point water system and is generally located in the older parts of town. The main distribution lines from the Highway 62 pump station to the reservoirs are ductile iron.

An existing water system map is included as Figure 6.3.2-1.

6.3.3 Fire Protection

The City of Eagle Point has over 440 fire hydrants. All hydrant assemblies are connected to pipe that is at least 6-inches in diameter. Fire protection coverage is very good within the City limits with just a few areas that need additional coverage.

Fire code requires a minimum flow of 1,000 gallons per minute (gpm) from each hydrant with a minimum residual pressure of 20 psi. Based on past fire flow tests received from the City, all fire hydrants consistently met minimum flow and pressure. Based on the calculated hydraulic model though, various junctions within the system did not meet the required fire flow. The junctions with deficiencies range from flow problems to pressure problems or a combination of both. By upsizing the pipe in these areas, the model showed that fire flows could be met. The hydraulic model showed these improvements. The pipe improvements are discussed in Section 7.4 of this report. It should be noted that the fire flows that resulted in completion of the hydraulic model are the flows in the pipe below the hydrant. A

significant amount of head and friction loss occurs as water travels through the hydrant, into a fire hose, and out a nozzle.

There are several homes within Eagle Point with a square footage that requires more than the 1,000 gpm that a hydrant would be able to provide. These homes are mainly located in the pressure zone that is controlled by the 4.0 million gallon tank. The City of Eagle Point is required to provide a minimum of 1,000 gpm from each hydrant with a maximum hydrant spacing of 500 feet as discussed in Section 4.2.3. Any additional fire flows required for the square footage needs to be provided by the home owner.

In cases where there are existing homes, it may be necessary to install additional fire hydrants to provide the required flows. However, all further development with square footages that exceed 3,600 square feet should be required to install their own fire protection beyond what the closest fire hydrants can provide.

The existing fire hydrants within the City are shown on Figure 6.3.3-1. Circles with a radius of 250 feet are drawn around each fire hydrant to illustrate the coverage provided by each fire hydrant. As can be seen, fire protection coverage of the City is very good with overlapping regions of influence for each hydrant visible in most parts of the City.

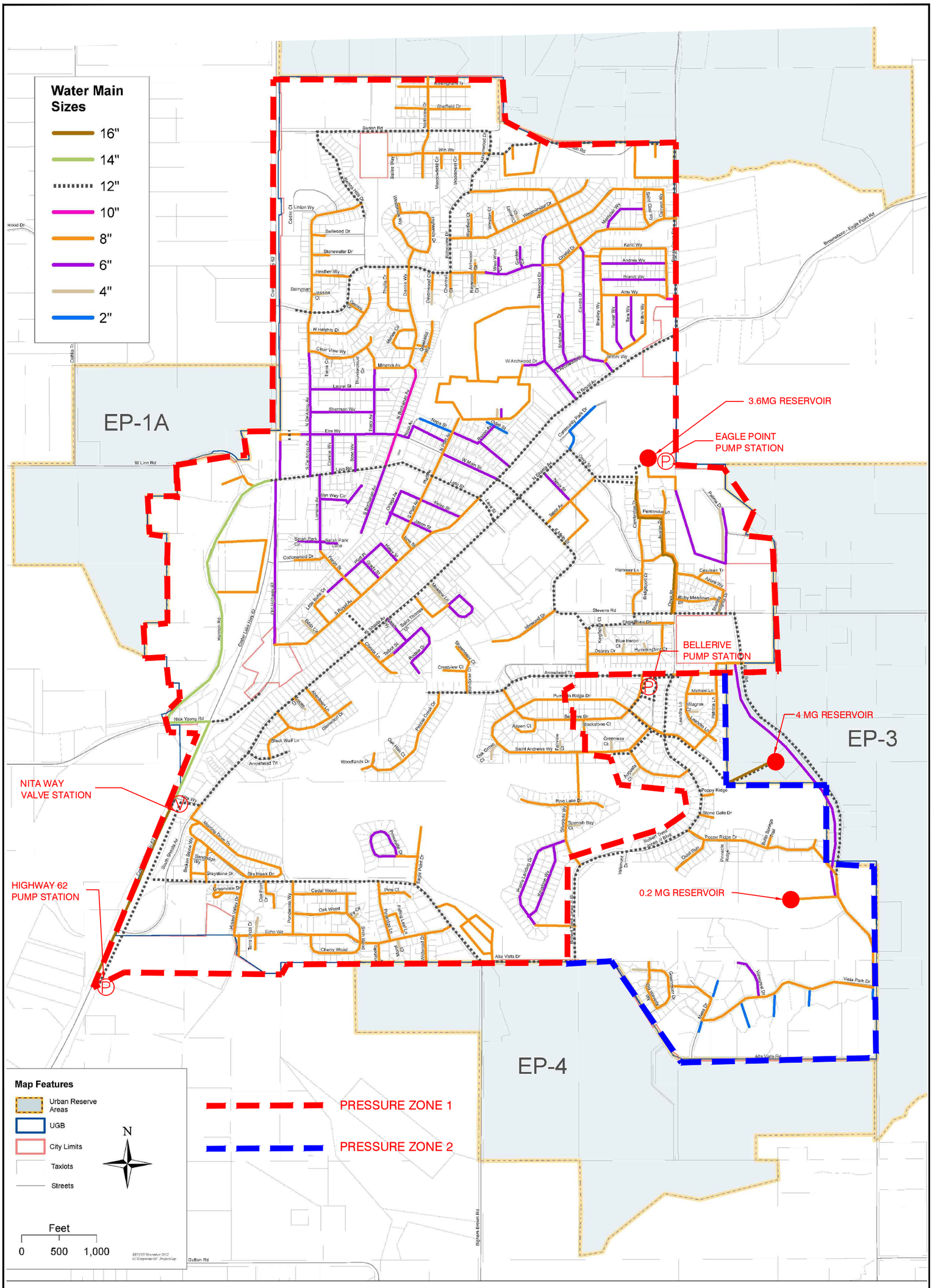


FIGURE 6.3.1-1

0 1"
1" = 1200'

DRAWN BY: LFC
DATE: FEB 28, 2013

Existing Pressure Zones

WATER SYSTEM MASTER PLAN

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

Civil West Engineering Services, Inc.

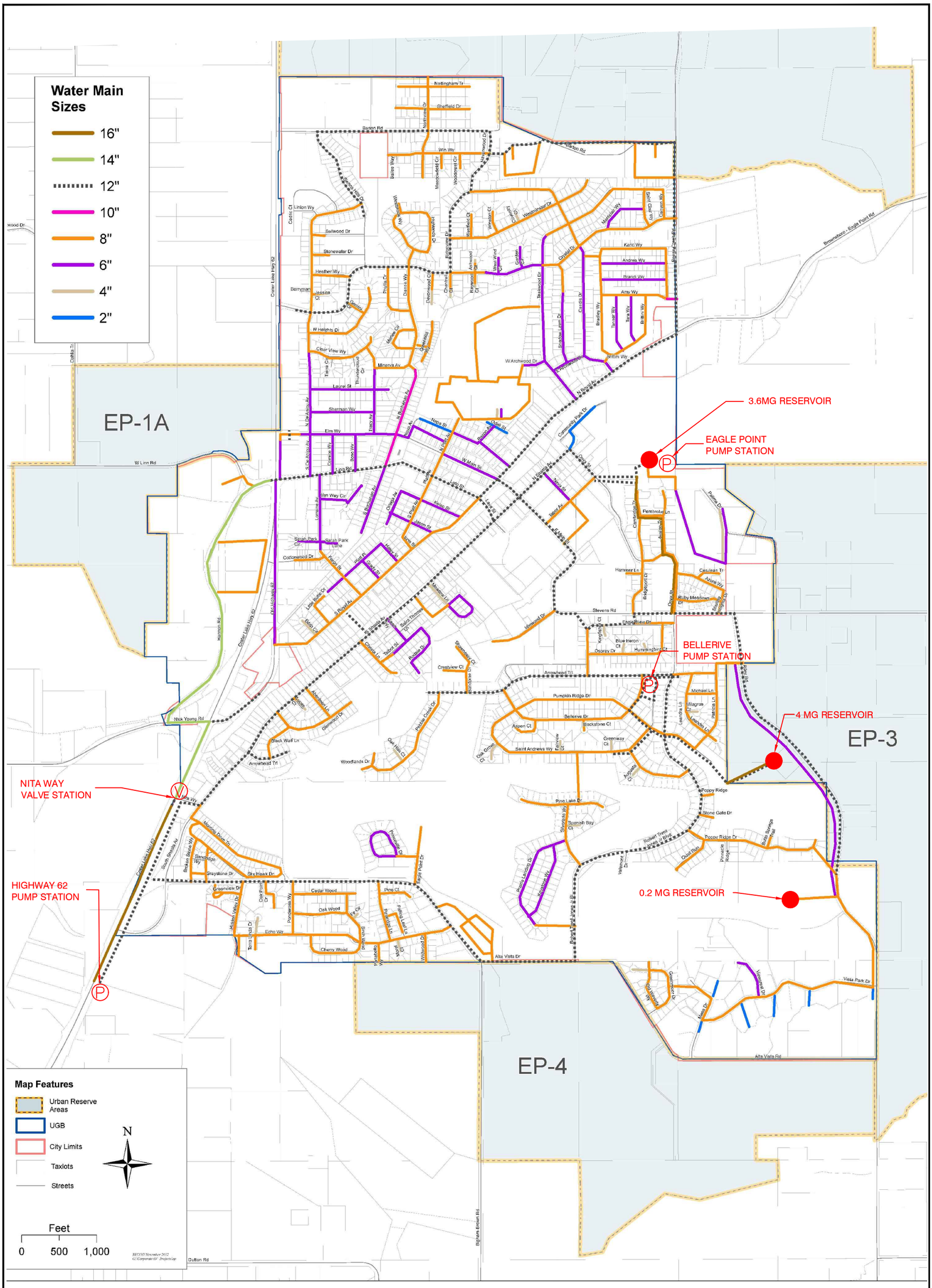


FIGURE 6.3.2-1

0 1"
1" = 1200'

DRAWN BY: LFC
DATE: FEB 28, 2013

Existing Water System Map

WATER SYSTEM MASTER PLAN

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

Civil West Engineering Services, Inc.

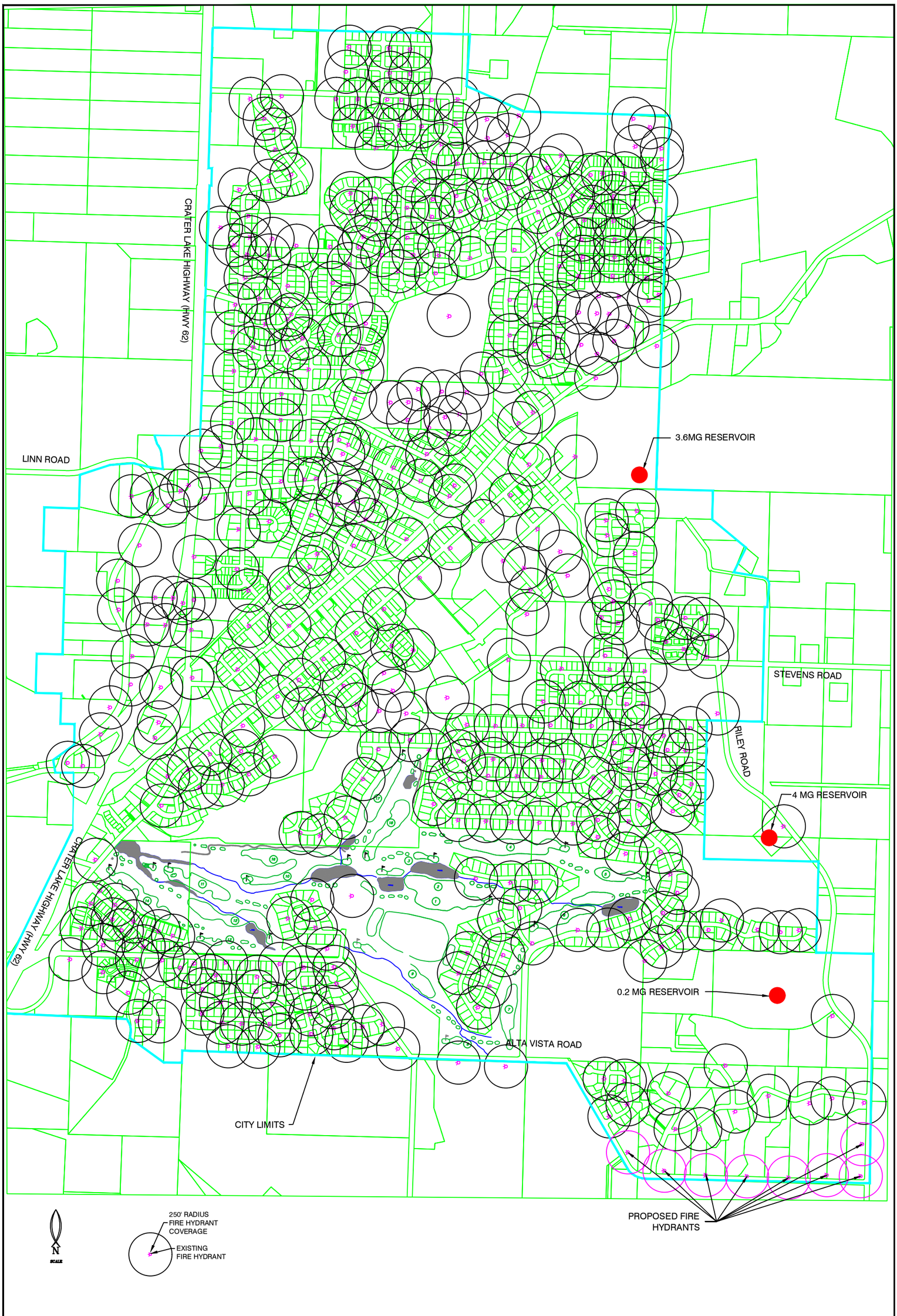


FIGURE 6.3.3-1

0 1"
1" = 1000'

DRAWN BY: LFC
DATE: FEB 28, 2013

Fire Hydrant Coverage

WATER SYSTEM MASTER PLAN

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

Civil West Engineering Services, Inc.

7.0 Improvement Alternatives Introduction

Improvements presented in this section were developed using the following information:

1. Site Inspection;
2. Conversations with City Staff; and
3. Results of Hydraulic Modeling Efforts.

They are organized and presented in the following order:

1. Pump and Valve Stations;
2. Water Storage; and
3. Water Distribution.

In order to keep track of the many projects that are presented, they have been numbered in chronological order with a two or three letter acronym in front to identify the type of project. The acronyms are defined below:

PS – Pump Station
VS – Valve Station
WS – Water Storage
WDS – Water Distribution System
WAC – Replacement of asbestos/cement pipe
TW – Test Well

The locations of the projects are presented in the figures at the end of this section.

Four different priority categories have been developed and each of the projects below has been placed in one of the categories. These are presented in Section 8 by project number.

7.1 Water Supply Needs and Alternatives

7.1.1 Water Supply Needs

The City of Eagle Point purchases water from the Medford Water Commission who has, so far, had water to sell to supply to local and neighboring cities such as Eagle Point. The projections for the maximum daily demand (MDD) by the City of Eagle Point in the year 2033 indicate that the City will require 8.82 million gallons per day or 13.65 cubic feet per second (cfs). As mentioned in Section 6 of this report, the City has a current agreement with Medford Water Commission to provide 3,125 gallons per minute from May through September. The City of Eagle Point will have to develop its own water sources in order to keep up with the growth of the City. However, if the City did not experience the 3.01% growth as predicted, was able to limit the amount of unaccounted water to 15%, and implemented water conservation measures, the City may have enough water supply to get them through this planning period.

Eagle Point is currently participating in a multi-agency evaluation of water conservation strategies. The goal of the Southern Oregon Municipal Water Conservation Workgroup, funded by a grant from the

Oregon Department of Water Resources, is to evaluate and define water conservation strategies for the Medford Water Commission service area. The plan will provide a list of strategies, that if adopted by multiple participating entities, could reduce water demands and delay the need for costly infrastructure expansion and/or water right acquisitions. The analysis also includes a leak detection component, and a large meter testing program that could be implemented to reduce water losses. Recommendations of the study could be incorporated into a future updated Water Management and Conservation Plan for the City of Eagle Point.

City staff indicates that there is a producing aquifer west of Highway 62, in or near the existing industrial zoned area. Apparently, there was a gravel pit in this area with a high producing artesian well. City staff stated that there was enough groundwater to warrant running a dewatering pump 24 hours a day. The State of Oregon Water Resources Department keeps well logs for every well drilled in the State of Oregon. Well logs for Township 36S, Range 1W, Section 3 were consulted by using their web accessible data (http://apps.wrd.state.or.us/apps/gw/well_log/Default.aspx). There were no records of a well in this area that produced large enough amounts of water to add to the City's water system in a meaningful way.

The production of the well depends on a variety of factors that should be taken into consideration. One factor to be considered is the amount of people and the type of land use the well will serve. If the well is intended to serve only the industrial park, then a lower flow rate is required than if it were to serve a large, residential population. The depth of the well, amount of head, and size of the pump are also factors that should be considered. Additionally, the ability of the aquifer to produce a sustainable flow as well as the quality of the water are important concerns. Because of the large amount of variables, it is difficult to estimate the cost of a producing well in this area.

It is recommended that a test well be installed in this location to evaluate the possibility of a reliable water supply in this area. A well source study would need to be completed as well as laboratory testing of the water quality before this well was developed.

TW-1 -Test Well West of Highway 62				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$5,000.00	$5,000
Well Drilling	ea	1	$25,000.00	$25,000
Water Quality Testing	ea	1	$5,000.00	$5,000
Well Source Study	ea	1	$15,000.00	$15,000
Construction Cost Total				$50,000
Contingency (20%)				$10,000
Engineering (20%)				$10,000
Project Management and Legal (5%)				$2,500
Total Project Budget Estimate				$72,500

Once the test well is evaluated, it may be necessary to amend the Water Master Plan and the Capital Improvement Plan to reflect further development of the water source. If the high producing artesian well can be found and utilized, it will be necessary to develop this source by gaining water rights to the source, installing pumps, distribution lines, and other appurtenances.

The costs presented above are only for exploration of the area for a high producing well. These do not include development of the well for municipal use.

7.2 Pump Station Needs and Alternatives

7.2.1 Bellerive Pump Station

Bellerive Pump Station currently has two 20 Hp G&L Goulds pumps with a capability of pumping up to 600 gallons per minute (gpm) with both pumps running. These pumps fill the 200,000 gallon reservoir. As mentioned previously, the 200,000 gallon reservoir serves a larger population than originally intended. As a result, the pumps at the Bellerive Pump Station are on much of the time to fill the 200,000 gallon tank because of the demands.

It is recommended that the Bellerive Pump Station be relocated to the 4MG tank site which will accomplish two main goals. The first is that it will alleviate the continuous running of the two existing pumps and allow for the upgrade to larger pumps if needed. Moving this pump station will also help with fulfilling the needs of the new zone. As mentioned previously, the area that the 200,000 gallon serves has had more growth than anticipated.

The second thing this achieves, and the more important one, is it will allow this tank to begin cycling better and be used as intended. It will be able to cycle since the pumps will be drawing from this tank to fill the 200,000 gallon tank.

In the process of moving this pump station it is also recommended that the pumps be sized up to meet the fire needs. The two existing 400 gpm pumps could be replaced with four 1000 gpm pumps. This would make an additional fire pump unnecessary and still make it possible to meet the needs of fire flow and residential demands. This relocation should be completed within the next year or two to help fill the 200,000 gallon reservoir quicker and allow the 4 MG tank to function properly.

PS-1 - Bellerive Pump Station, Relocate, Rezone and Upgrade to 1000 gpm				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$23,500.00	$23,500
12" DI Pipe, Inlet & Outlet	lf	350	$120.00	$42,000
Crane for 1 day & move	day	1	$18,000.00	$18,000
Bypass Pumping	week	1	$2,500.00	$2,500
Replace w/4 pumps at 1000 gpm, fire capacity	ea	4	$12,000.00	$48,000
Mechanical Piping Modifications	ls	1	$47,000.00	$47,000
Electrical Work / Controls	ls	1	$36,000.00	$36,000
Site Preparation	ea	1	$2,500.00	$2,500
Misc. restoration & clean-up	ls	1	$10,000.00	$10,000
Tank outlet installation in existing vault	ea	1	$5,000.00	$5,000
Construction Cost Total				$234,500
Contingency (20%)				$46,900
Subtotal				$281,400
Engineering (20%)				$56,280
Project Management and Legal (3%)				$8,442
Total Project Budget Estimate				$346,122

The Bellerive Pump Station needs backup power in the case of an emergency. Since water from this station fills the 200,000 gallon reservoir, in the case of a power outage, several homes would be without

water should the power outage last longer than the water in the 200,000 gallon tank. The generator would only provide power for the Bellerive Pump Station and its four pumps. It was assumed that all four pumps would be running. In this worst case scenario, the generator would need to be sized to provide 100 KW.

PS-2 - Bellerive Pump Station Back-up Power				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$5,400	$5,400
Outdoor Diesel Generator 100KW	ea	1	$44,000	$44,000
Electrical Work	ls	1	$10,000	$10,000
Construction Cost Total				$59,400
Contingency (20%)				$11,880
Engineering (20%)				$11,880
Project Management and Legal (5%)				$2,970
Total Project Budget Estimate				$86,130

Fuel sources were discussed during the master planning process with three alternatives identified. The first alternative was to provide a generator with propane as its fuel source. The second option was to provide a generator with liquid natural gas as its fuel source. Both of these options have low initial costs but can be costly to keep in service. Propane is an expensive fuel source and the connection alone to liquid natural gas can range from $100-$150 / month without any usage. Additionally, manufacturers do not routinely size a generator as big as 100 KW that is powered by natural gas. The cost is dramatically higher than conventional systems. For these reasons, it is recommended that diesel be used as a fuel source.

7.2.2 Eagle Point Pump Station

As mentioned previously, there is some earth movement in the area of the Eagle Point pump station building which needs to be addressed. The stoop of the pump station building has pulled away from the building. Additionally, there is some erosion that is taking place within the confines of the fence. It is recommended that a geotechnical study be completed and earth retention work be done to stop present damage to the building.

The pump station has two below grade valve boxes adjacent to the building. One vault contains an intertie with the MWC's Big Butte Springs line. The second valve box contains an electronically controlled valve and actuator. This valve vault often fills with water as there is no gravity drain in the vault. Water fills the valve vault on occasion and the electronic valve actuator has gotten wet or been totally submerged. As an actuator is not typically intended to be submerged, the water has caused the actuator to fail.

In a memo to the City from Civil West, dated 26 July 2012, an explanation of the problems with the valve vaults and actuators was provided along with costs to install a sump pump and a new actuator in the valve vault next to the 3.6 million gallon tank. A sump pump is recommended to drain the water from the vault but the replacement of the actuator is optional. This memo is included in this report as Appendix B. Improvements to the Eagle Point Pump Station are presented below.

PS-3 - Eagle Point Pump Station Upgrades				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$3,000	$3,000
Submersible Sump Pump, 10 hP	ea	1	$5,000	$5,000
Electrical Work	ls	1	$3,000	$3,000
Actuator (Optional)	ea	1	$12,000	$12,000
Geotechnical Work/Earth Stabilization	ls	1	$7,500	$7,500
Construction Cost Total				$30,500
Contingency (20%)				$6,100
Engineering (20%)				$6,100
Project Management and Legal (5%)				$6,100
Total Project Budget Estimate				$48,800

7.2.3 Highway 62 Pump Station

Water from the Medford Water Commission enters the City of Eagle Point distribution system at the Highway 62 pump station. In the case of a power outage, the entire city would be out of water once the water in the tanks was exhausted. Because this pump station supplies the entire city with water, it is necessary to provide emergency power to this pump station.

It may be possible to utilize the connections to the Big Butte Springs lines that do not require pumping. This will add a little bit of water to the system for a short time but will not supply the entire City with its required water needs as a long term solution.

As mentioned previously, there are three 100 Hp pumps and one 40 Hp pump at this station. Since the pumps are relatively large, a 200 kW generator was identified as meeting the power requirements for this station. Three options for emergency power were identified: (1) Propane; (2) Natural Gas; and (3) Diesel. It is known that a natural gas line runs along Highway 62 and this might be a viable option for a power source. However, the size of the generator is too big for the natural gas option. As a result, it is recommended that a diesel generator be utilized at the pump station.

PS-4 - Highway 62 Pump Station Upgrades				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$8,000	$8,000
Generator - 200 KW	ea	1	$68,000	$68,000
Electrical Work / Automatic Transfer Switch	ls	1	$12,000	$12,000
Construction Cost Total				$88,000
Contingency (20%)				$17,600
Engineering (20%)				$17,600
Project Management and Legal (5%)				$4,400
Total Project Budget Estimate				$127,600

7.3 Treated Water Storage Needs and Alternatives

7.3.1 Water Storage Needs Analysis

As discussed in Section 4, the goal for treated water storage is to have 3 average days of emergency water (3 x ADD), a modest amount of equalization storage to provide for diurnal fluctuations in tank water levels (20% of one MDD), plus fire storage sufficient to supply 3500 gpm for 3 hours. Existing storage is equal to 7.4 MG between all three tanks assuming the tanks are 100% full. **However, without the use of the full capacity of the 4.0 million gallon tank (3.6 million gallons actual capacity), the City is deficient in storage capacity**. It is of utmost importance that the City utilize the full 4.0 million gallon tank (3.6 million gallons capacity) as quickly as possible to meet the current storage needs of the community.

Based on the aforementioned storage goals, the City requires approximately 7.0 million gallons (MG) of storage today which leaves a surplus of approximately 400,000 gallons. However, by the end of the planning period in 2033, the City will require approximately 12.25 million gallons of storage. If no additional storage is added and growth projections are met, the City will be 4.85 million gallons short by the end of the planning period. In this case, an additional 4.85 MG storage tank is needed to supplement the existing storage facilities within Eagle Point. See Table 7.3.1-1 below for a detailed list of storage needs for the next 20 years.

The City of Eagle Point has enough storage to last until the end of 2014 if the growth rate of 3.01% is maintained. Additional water storage will be needed after that. It is recommended that a 1.6 million gallon tank be built near the 200,000 gallon tank in Pressure Zone 2 as one of the first priorities of the Capital Improvement Project. This additional water storage will provide enough water for 8 years into the planning period, until 2021, if the growth rate continues at its expected rate. Once this tank is in use, the current water use and the growth of the City can be reevaluated to determine whether additional storage is needed beyond this tank.

In addition to more storage volume being needed, the existing storage facilities must be maintained. The expected coating life of the epoxy-based coatings on the existing tanks is 20 to 25 years when properly applied. It is expected that 3.6 million gallon tank will need a new coating by the year 2020.

Table 7.3.1-1 – Eagle Point Storage Needs to 2033

Year	Equalization (gallons)	Emergency (gallons)	Fire Reserve (gallons)	Total (gallons)	Water Storage Deficit (gallons)
2013	688,031	5,733,588	630,000	7,051,619	(348,381)
2014	708,740	5,906,169	630,000	7,244,909	(155,091)
2015	730,073	6,083,945	630,000	7,444,018	44,018
2016	752,049	6,267,072	630,000	7,649,120	249,120
2017	774,685	6,455,710	630,000	7,860,396	460,396
2018	798,003	6,650,027	630,000	8,078,031	678,031
2019	822,023	6,850,193	630,000	8,302,216	902,216
2020	846,766	7,056,384	630,000	8,533,150	1,133,150
2021	872,254	7,268,781	630,000	8,771,035	1,371,035
2022	898,509	7,487,571	630,000	9,016,080	1,616,080
2023	925,554	7,712,947	630,000	9,268,501	1,868,501
2024	953,413	7,945,107	630,000	9,528,520	2,128,520
2025	982,111	8,184,255	630,000	9,796,365	2,396,365
2026	1,011,672	8,430,601	630,000	10,072,273	2,672,273
2027	1,042,123	8,684,362	630,000	10,356,485	2,956,485
2028	1,073,491	8,945,761	630,000	10,649,252	3,249,252
2029	1,105,803	9,215,029	630,000	10,950,832	3,550,832
2030	1,139,088	9,492,401	630,000	11,261,489	3,861,489
2031	1,173,375	9,778,122	630,000	11,581,497	4,181,497
2032	1,208,693	10,072,444	630,000	11,911,137	4,511,137
2033	1,245,075	10,375,624	630,000	12,250,699	4,850,699

7.3.2 Water Storage Improvement Alternatives / Additional Storage

As stated above, the City of Eagle Point currently has enough storage to meet the City's needs. However, the 3.6 million gallons of storage capacity in the 4.0 million gallon tank is not used to the full extent. Additionally, the 4.0 million gallon (nominal) tank is located at an elevation of 1484 feet above sea level which is lower than the 3.6 million gallon tank by 20 feet and the 0.2 million gallon tank by 200 feet. As discussed in previous sections, the 4.0 million gallon tank was used when the 3.6 million gallon tank was being repaired and there was insufficient pressure at the Bellerive Pump Station and residents' homes. When the 3.6 million gallon tank was repaired and placed back online, the 4.0 million gallon tank was used briefly but filling the tank required City Staff to manually switch valves off and on.

In order to meet the storage requirements predicted in the year 2033, the City of Eagle Point will need 4.85 million gallons of additional storage. All of the growth will not be occurring in one location and all at the same time; it is recommended that at least two new tanks be used to meet the storage requirements over the next twenty years. Both tanks will service the Pressure Zone 2 and should be placed at or near the same elevation of the 0.2 million gallon tank (±1700 feet).

It is recommended that the first tank be built near the 0.2 million gallon tank as land is available. It is recommended that the first tank be a glass-fused, bolted steel tank that will have a capacity of 1.6 million gallons. By building a tank of this size in the next year it will provide enough storage for the City for eight years into the planning period or until the year 2021. This allows time for the City to reevaluate the water usage and the growth rate over the next ten years while ensuring that storage needs are met. The initial design of the tank is 30 feet high with a diameter of 95 feet. The base elevation of the tank is designed to be 1680 with an overflow elevation of 1710.

WS-1 - New 1.6 million gallon tank				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, and Profit	ls	1	$200,000	$200,000
Glass-Fused, Bolted Steel Tank, 30'H X 95'	ls	1	$1,300,000	$1,300,000
Earthwork, Grading	ls	1	$75,000	$75,000
Gravel Surfacing/Base	sf	20,000	$1.50	$30,000
Site Piping and Vaults	ls	1	$45,000	$45,000
System Connection Piping, 12"	lf	500	$110	$55,000
Level Transducer and Telemetry Panel	ls	1	$20,000	$20,000
Flushing and Disinfection	ls	1	$8,500	$8,500
Construction Cost Total				$1,733,500
Contingency (20%)				$346,700
Engineering (20%)				$346,700
Geotechnical Investigation				$20,000
Land Acquisition				$150,000
Project Management and Legal (5%)				$86,675
Total Project Budget Estimate				$2,683,575

The City may want to consider building a slightly larger tank to enhance its storage capacity for a longer period of time. A 2.0 million gallon tank built in Pressure Zone 2 would help the City's storage last until the year 2022. The cost for a glass-fused, bolted steel tank is below. The height of the tank would be 56 feet and have a diameter of 84 feet.

WS-1a - New 2.0 million gallon tank				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, and Profit	ls	1	$190,000	$190,000
Glass Fused, Bolted Steel tank, 56'H x 84'	ls	1	$1,600,000	$1,600,000
Earthwork, Grading (Site)	ls	1	$100,000	$100,000
Gravel Surfacing/Base	sf	30,000	$1.50	$45,000
Site Piping and Vaults	ls	1	$45,000	$45,000
System Connection Piping, 12"	lf	500	$110	$55,000
Level Transducer and Telemetry Panel	ls	1	$20,000	$20,000
Flushing and Disinfection	ls	1	$10,000	$10,000
Construction Cost Total				$2,065,000
Contingency (20%)				$413,000
Engineering (20%)				$413,000
Geotechnical Investigation				$25,000
Land Acquisition				$250,000
Project Management and Legal (5%)				$103,250
Total Project Budget Estimate				$3,269,250

It is recommended that an additional 3.6 million gallon tank be built during the planning period to help the City meet its storage needs. At the time of this master plan, it was thought that this tank would best be placed east of the City on a large hill with an average elevation of 1700. It is recommended that this tank be made of pre-stressed concrete. To provide the volume required, the tank will be 30 feet high and 224 feet in diameter.

WS-2 - New 3.6 million gallon tank				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, and Profit	ls	1	$350,000	$350,000
DN Pre-Stressed Concrete Tank - 3.6 MG	ls	1	$2,800,000	$2,800,000
Earthwork, Grading (Site)	ls	1	$120,000	$120,000
Gravel Surfacing/Base	sf	30,000	$1.50	$45,000
Site Piping and Vaults	ls	1	$65,000	$65,000
System Connection Piping, 12"	lf	3,000	$110	$330,000
Gravel Road to Site	lf	3,000	$32	$96,000
Level Transducer and Telemetry Panel	ls	1	$20,000	$20,000
Flushing and Disinfection	ls	1	$22,500	$22,500
Construction Cost Total				$3,848,500
Contingency (20%)				$769,700
Engineering (20%)				$769,700
Geotechnical Investigation				$25,000
Land Acquisition				$250,000
Project Management and Legal (5%)				$192,425
Total Project Budget Estimate				$5,855,325

Figure 7.3.2-1 shows the recommended potential locations of these two tanks.

The valve vault adjacent to the 200,000 gallon tank is encountering the same problems as the Eagle Point Pump Station vault. The vault is below grade and does not drain, thus the actuator gets wet and/or submerged. The costs to upgrade this valve box are presented below.

WS-3 - 200,000 Gallon Tank Valve Vault Upgrades				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$2,500	$2,500
Submersible Sump Pump, 10 hP	ea	1	$5,000	$5,000
Electrical Work	ls	1	$3,000	$3,000
Actuator	ea	1	$12,000	$12,000
Construction Cost Total				$22,500
Contingency (20%)				$4,500
Engineering (20%)				$4,500
Project Management and Legal (5%)				$1,125
Total Project Budget Estimate				$32,625

To eliminate any dead zones that may be occurring in the 4.0 million gallon tank due to the close proximity of the inlet and outlet pipes, a header system can be installed on the inlet pipe to allow for even distribution of the incoming water and provide complete mixing of the water in the tank.

WS-4 - 4 Million Gallon Tank Upgrades				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$4,200	$4,200
Header Pipe	ea	1	$30,000	$30,000
Nozzles	ea	6	$2,000	$12,000
Construction Cost Total				$46,200
Contingency (20%)				$9,240
Engineering (20%)				$9,240
Project Management and Legal (5%)				$2,310
Total Project Budget Estimate				$66,990

7.4 Distribution System Needs and Alternatives

7.4.1 Water Distribution System Hydraulic Analysis

The system contains some undersized piping which limits fire flow performance. In order to accurately investigate potential problems and determine the most economical solutions, a computer model of the system was developed to simulate the actual physical system in spatial layout, elevation, storage tank locations, and pipe sizes. A program called Bentley WaterCAD V8i was used to model the system. The GIS data layers provided by the City were used as the base map to determine elevations and layout.

The modeling was used to confirm that the goals outlined in Section 4 are met. In general those goals include:

1) During Peak Hourly Demands, the system maintains at least 40 psi at all service connections; and
2) During Fire Flow Demands plus Maximum Day Demands, the system maintains at least 20 psi at all service connections.

Existing conditions and future conditions were modeled to determine deficiencies and solutions. As is typical, pipe size needs are almost entirely dictated by fire flow goals with normal domestic water demands having little impact. Fire flow availability is limited by the rule which requires at least 20 psi in all parts of the system at all times. The model predicts the maximum flow that can be withdrawn at any location before pressures either at that location or anywhere else in the system fall below 20 psi.

7.4.2 Water Distribution System Pipe Deficiencies

With 14% of the distribution piping being 6-inches in diameter and smaller, fire flows are limited in several areas. The results of the model indicate that several areas within the City do not have sufficient fire flows. They are listed with costs to upgrade these lines in Section 7.4.4.

7.4.3 Fire Hydrant Deficiencies

There are over 440 fire hydrants in the Eagle Point water system with fairly uniform coverage. According to the Oregon Fire Code, fire hydrant spacing should not exceed 500 feet. Figure 6.3.3-1 shows the locations and coverage of fire hydrants in the system based on a 250 foot hose reach (500 foot diameter or hydrant spacing) at each hydrant. Areas with no coverage can be clearly seen in the Figure and additional hydrants should be considered for placement in these areas. New fire hydrant assemblies are proposed in some locations throughout the City such as Napa Street. Additionally, eight new fire hydrants are proposed along Alta Vista Drive in the southeast portion of the City. The areas where these are proposed are identified in the Section 7.4.4.

7.4.4 Water Distribution System Improvement Recommendations

Before the 4.0 million gallon tank was placed on line, the City of Eagle Point functioned under two pressure zones: the lower zone controlled by the 3.6 million gallon tank and the higher zone controlled by the 200,000 gallon tank. When the 4.0 million gallon tank was placed on line, there were reports of low water pressures in some parts of the City.

The City may wish to install two pressure reducing valve stations (PRVs) within the City water system at key spots between the 3.6 million gallon and 4 million gallon tanks. The rest of the system will remain disconnected with all other valves closed. Water will be released from the Highway 62 pump station and fill the 3.6 million gallon tank and also the 4.0 million gallon tank. Since the tanks will be linked, they will drain at the same rate even though one is higher in elevation than the other.

By installing these pressure reducing valves and closing some flow control valves, the Eagle Point water system will be able to function as three pressure zones as originally intended when the 4.0 million gallon tank was added to the system. Figure 7.4.4-1 shows the three pressure zones and the locations of the valves that need to be closed.

WDS-1 - Installation of 2 Pressure Reducing Valve Stations				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$20,000	$20,000
Site Work (complete)	ls	2	$10,000	$20,000
Pressure Reducing Valves and Vaults	ea	2	$65,000	$130,000
Construction Cost Total				$170,000
Contingency (20%)				$34,000
Engineering (20%)				$34,000
Project Management and Legal (5%)				$8,500
Total Project Budget Estimate				$246,500

The City of Eagle Point has approximately 240,000 feet or 45 miles of water distribution pipe installed throughout the City. Approximately 34,500 feet of pipe has a diameter of six inches or below. In instances where the pipe diameter inhibits fire flows, it is recommended that the pipe be upgraded to an 8-inch Ductile Iron pipe (minimum) in accordance with new City regulations.

Approximately 23,000 feet of pipe is constructed of asbestos-cement that was installed during the 1960's and is nearing the end of its useful life. It is recommended that this pipe be replaced with 8-inch Ductile Iron as needed or as project needs develop.

The water distribution system improvements were developed using the computerized hydraulic modeling software, WaterCAD. The model was evaluated under existing conditions and deficiencies in fire flow were noted. In the cases where there were deficiencies, the size of the pipe was increased to allow more flow to areas where the flow was lacking. Dead end pipes and closed loops that did not provide enough flow were also eliminated where appropriate. As stated above, in some instances when the pipe was upsized, it was noted that there were no hydrant assemblies. In these cases, fire hydrant assemblies were added to the cost estimate.

The locations of the water line improvement recommendations are shown on Figures 7.4.4-2 and 7.4.4-2A at the end of this Section with costs presented here.

The 2-inch PVC pipe at the west end of Napa Street should be updated to an 8-inch Ductile Iron line with a fire hydrant placed on this line. This would allow for this area of the City to have adequate fire protection.

WDS-2 - Distribution Piping – West end of Napa Street				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$6,500.00	$6,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	527	$90.00	$47,430
Asphalt Patching	lf	530	$20.00	$10,600
Fire Hydrant Assemblies	ea	1	$3,750.00	$3,750
Construction Cost Total				$68,280
Contingency (20%)				$13,656
Engineering (20%)				$13,656
Project Management and Legal (5%)				$3,414
Total Project Budget Estimate				$99,006

Odell Street currently has a 4-inch PVC line that should be upgraded to an 8-inch Ductile Iron line to feed the customers along this street. It is recommended that two fire hydrant assemblies be installed along this line.

WDS-3 - Distribution Piping – Odell Street				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$3,500.00	$3,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	175	$90.00	$15,750
Asphalt Patching	lf	175	$20.00	$3,500
Hydrant Assemblies	ea	2	$3,750	$7,500
Construction Cost Total				$30,250
Contingency (20%)				$6,050
Engineering (20%)				$6,050
Project Management and Legal (5%)				$1,513
Total Project Budget Estimate				$43,863

Coral Ridge Drive currently has an 8-inch PVC line that feeds three fire hydrants. The WaterCAD analysis showed that the line did not have enough capacity to feed the hydrants in the case of a fire. It is recommended that this pipe is changed to a 12-inch Ductile Iron pipe to provide the capacity required.

WDS-4 - Distribution Piping – Coral Ridge Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$9,000.00	$9,000
12-inch DI Pipe, Trenching, and Gravel Backfill	lf	680	$110.00	$74,800
Asphalt Patching	lf	680	$20.00	$13,600
Construction Cost Total				$97,400
Contingency (20%)				$19,480
Engineering (20%)				$19,480
Project Management and Legal (5%)				$4,870
Total Project Budget Estimate				$141,230

Edith Circle currently has a 4-inch asbestos cement line that dead ends. This line should be upgraded to an 8-inch Ductile Iron pipe and a hydrant added to the end of the street to provide fire protection for the homes that are outside the radius of the existing fire hydrant at the intersection of Edith Circle and South Royal Avenue.

WDS-5 - Distribution Piping – Edith Circle				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$3,500.00	$3,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	265	$90.00	$23,850
Asphalt Patching	lf	265	$20.00	$5,300
Fire Hydrant Assemblies	ea	1	$3,750.00	$3,750
Construction Cost Total				$36,400
Contingency (20%)				$7,280
Engineering (20%)				$7,280
Project Management and Legal (5%)				$1,820
Total Project Budget Estimate				$52,780

The 2-inch piping along Saint Thomas Lane needs to be upgraded to an 8-inch Ductile Iron line with a fire hydrant added to the southwest end of the road to provide fire coverage for these few lots at this end of the street.

WDS-6 - Distribution Piping – Saint Thomas Lane				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$4,500.00	$4,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	350	$90.00	$31,500
Asphalt Patching	lf	350	$20.00	$7,000
Fire Hydrant Assemblies	ea	1	$3,750.00	$3,750
Construction Cost Total				$46,750
Contingency (20%)				$9,350
Engineering (20%)				$9,350
Project Management and Legal (5%)				$2,338
Total Project Budget Estimate				$67,788

The 6-inch Ductile Iron piping along Prairie Landing Drive should be updated to an 8-inch Ductile Iron line. Additionally, a fire hydrant should be added at the northwest corner of Prairie Landing Drive to provide fire protection for the two lots at this corner.

WDS-7 - Distribution Piping – Prairie Landing Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$6,900.00	$6,900
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	550	$90.00	$49,500
Asphalt Patching	lf	550	$20.00	$11,000
Fire Hydrant Assemblies	ea	1	$3,750.00	$3,750
Construction Cost Total				$71,150
Contingency (20%)				$14,230
Engineering (20%)				$14,230
Project Management and Legal (5%)				$3,558
Total Project Budget Estimate				$103,168

The 6-inch line along Viewcrest Drive should be updated to a 12-inch Ductile Iron line to improve fire flows in this area. The existing line will have to remain in service while the new water line is being placed. An existing tap to the Big Butte Springs water line is at the end of the Viewcrest line and this connection needs to be maintained at all times in the case of an emergency.

WDS-8 - Distribution Piping – Viewcrest Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$7,000.00	$7,000
12-inch DI Pipe, Trenching, and Gravel Backfill	lf	551	$110.00	$60,610
Asphalt Patching	lf	555	$20.00	$11,100
Construction Cost Total				$78,710
Contingency (20%)				$15,742
Engineering (20%)				$15,742
Project Management and Legal (5%)				$3,936
Total Project Budget Estimate				$114,130

The 4-inch line that leads east of the City along Brownsboro Highway should be upgraded to an 8-inch Ductile Iron line as the City develops in this area. Additionally, four (4) fire hydrants should be installed to reach the rear portion of lots along this road.

WDS-9 - Distribution Piping – Brownsboro Highway				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$13,500.00	$13,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	1088	$90.00	$97,920
Asphalt Patching	lf	1100	$20.00	$22,000
Fire Hydrant Assemblies	ea	4	$3,750.00	$15,000
Construction Cost Total				$148,420
Contingency (20%)				$29,684
Engineering (20%)				$29,684
Project Management and Legal (5%)				$7,421
Total Project Budget Estimate				$215,209

The 8-inch piping along Graystone Drive should be upgraded to 12-inch Ductile Iron piping to provide for proper fire flows. This area consists of multi-family dwellings so the pipe upgrade is necessary to ensure that fire flows are met while still meeting the high-density demands. Sandridge Way is in the same area as Graystone Drive. This pipe will need to be upgraded as well.

WDS-10 - Distribution Piping – Graystone Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$2,100.00	$ 2,100
12-inch DIPipe, Trenching, and Gravel Backfill	lf	158	$110.00	$ 17,380
Asphalt Patching	lf	160	$20.00	$ 3,200
Construction Cost Total				$ 22,680
Contingency (20%)				$ 4,536
Engineering (20%)				$ 4,536
Project Management and Legal (5%)				$ 1,134
Total Project Budget Estimate				$ 32,886

WDS-11 - Distribution Piping - Sandridge Way				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$2,800.00	$2,800
12-inch DI Pipe, Trenching, and Gravel Backfill	lf	210	$110.00	$23,100
Asphalt Patching	lf	210	$20.00	$4,200
Construction Cost Total				$30,100
Contingency (20%)				$6,020
Engineering (20%)				$6,020
Project Management and Legal (5%)				$1,505
Total Project Budget Estimate				$43,645

The 8-inch piping along Pebble Creek Drive should be upgraded to 12-inch Ductile Iron piping to provide for proper fire flows.

WDS-12 - Distribution Piping – Pebble Creek Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$20,000.00	$20,000
12-inch DI Pipe, Trenching, and Gravel Backfill	lf	1,533	$110.00	$168,630
Asphalt Patching	lf	1550	$20.00	$31,000
Construction Cost Total				$219,630
Contingency (20%)				$43,926
Engineering (20%)				$43,926
Project Management and Legal (5%)				$10,982
Total Project Budget Estimate				$318,464

Arrowhead Trail is a roadway within the City of Eagle Point that is bisected by undeveloped master planned subdivision land. Currently, there is a 12-inch line in both sides of the roadway that do not connect and dead end on either side of the planned subdivisions. It is recommended that a 12-inch water line be placed from east to west to provide a connected system that has no dead ends. This could be constructed with development.

WDS-13 - Distribution Piping – Arrowhead Trail Connection				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$25,000.00	$25,000
12-inch DI Pipe, Trenching, and Gravel Backfill	lf	2,000	$110.00	$220,000
Turf Patching	lf	2000	$1.00	$2,000
Construction Cost Total				$247,000
Contingency (20%)				$49,400
Engineering (20%)				$49,400
Project Management and Legal (5%)				$12,350
Total Project Budget Estimate				$358,150

Woodland Drive is a short road off of Pebble Creek Drive that ends at undeveloped master planned subdivision land. It is recommended that a connection line be installed at the end of Woodland Drive to the new Arrowhead Trail 12-inch line that is described as Project WDS-13 above. This line would increase the availability of water in this area for fire flows as there are large houses in this area that require additional fire flow, and could also be constructed with development.

WDS-14 - Distribution Piping – Woodland Tie to Arrowhead Trail				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$6,500.00	$6,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	420	$90.00	$37,800
Turf Patching	lf	420	$1.00	$420
Construction Cost Total				$44,720
Contingency (20%)				$8,944
Engineering (20%)				$8,944
Project Management and Legal (5%)				$2,236
Total Project Budget Estimate				$64,844

In order to provide more fire flow to the southwestern portion of the City, it is recommended that the City construct a 12-inch ductile iron pipe from Nita Way to Alta Vista Road. This 12-inch pipe will allow for a greater looping system to provide adequate water to these neighborhoods in the case there is a fire in another portion of the City.

WDS-15 - Distribution Piping – Nita Way to Alta Vista Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$15,000.00	$15,000
12-inch DI Pipe, Trenching, and Gravel Backfill	lf	1,098	$110.00	$120,780
Asphalt Patching	lf	1098	$20.00	$21,960
Construction Cost Total				$157,740
Contingency (20%)				$31,548
Engineering (20%)				$31,548
Project Management and Legal (5%)				$7,887
Total Project Budget Estimate				$228,723

The southeastern portion of the City is without any water fire protection. This area is located along Alta Vista Road. An 8-inch ductile iron pipe is proposed for this area with eight fire hydrants to provide these lots with adequate fire protection. Construction of this line would also benefit future expansion.

WDS-16 - Distribution Piping – Vista Park Drive to Alta Vista to Greenmoor Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$55,000.00	$55,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	4,400	$90.00	$396,000
Asphalt Patching	lf	4400	$20.00	$88,000
Fire Hydrant Assemblies	ea	8	$3,750.00	$30,000
Construction Cost Total				$539,000
Contingency (20%)				$107,800
Engineering (20%)				$107,800
Project Management and Legal (5%)				$26,950
Total Project Budget Estimate				$781,550

The southeastern corner of the City has an unfinished loop. It is proposed to finish out the pipeline run between Quail Run and Old Waverly Way. An 8-inch DI pipe is proposed with 12 hydrants in order to provide adequate fire coverage. A new PRV would also be located just off of Robert Trent Jones Blvd in order to provide adequate pressure to the area. The pipeline and hydrants could be constructed with development in the area.

WDS-17 - Distribution Piping – Between Quail Run & Old Waverly Way plus one PRV				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$55,000.00	$55,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	4,000	$90.00	$360,000
Pressure Reducing Valve & Vault	ea	2	$65,000.00	$130,000
Fire Hydrant Assemblies	ea	12	$3,750.00	$45,000
Construction Cost Total				$590,000
Contingency (20%)				$118,000
Engineering (20%)				$118,000
Project Management and Legal (5%)				$29,500
Total Project Budget Estimate				$855,500

Prioritization of these improvements into five phases/priorities is shown in Section 8.

A portion of the Eagle Point water system consists of asbestos cement piping. This piping was installed during the 1940's, 1950's, and 1960's. Asbestos cement (A/C) pipe lasts approximately 50 years and may be nearing the end of its useful life. As presented in Section 6, approximately 22,750 feet of pipe within the City of Eagle Point consists of A/C pipe and needs to be replaced at some point in the future. The following table, Table 7.4.4-1, shows the locations and lengths of known existing A/C pipe sections in Eagle Point.

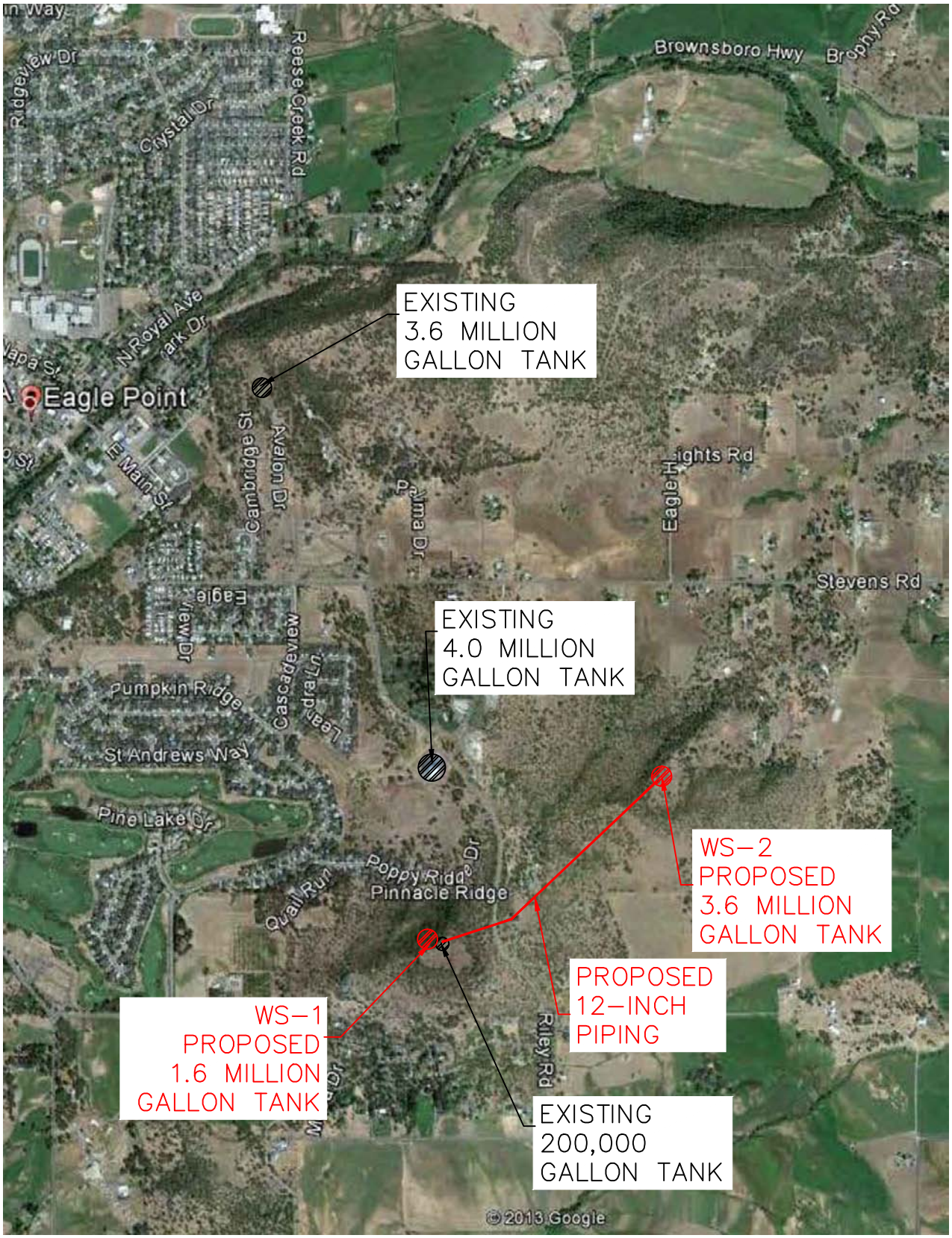
It is unknown the condition of the A/C pipe. In some areas, the pipe may be functioning well and in others areas, it could be deteriorating and leakage could be occurring. Efforts should be made to determine the areas of piping that need replacement and work in those places. Additionally, the replacement of A/C pipe can be accomplished in conjunction with other projects such as roadway or other utility projects.

Table 7.4.4-1 – Asbestos Cement Pipe Replacements

Project Number	Location	Size (inch)	Length (feet)	Cost to Replace
WAC-1	N Deanjou Avenue from Elm to Clearview	8	1,100	$192,850
WAC-2	Meadow Lane Water Line Replacement	8	1,311	$230,855
WAC-3	Talbot Street Water Line Replacement	8	213	$37,454
WAC-4	S. Royal Avenue from Ione Street to Haley Street	8	872	$153,584
WAC-5	Shadow Lawn Drive Water Line Replacement	8	725	$127,238
WAC-6	Teakwood Drive Water Line Replacement	8	850	$145,075
WAC-7	E Archwood from Teakwood to Shadow Lawn Drive	8	223	$39,194
WAC-8	S. Shasta to Meadow Lane Water Line Replacement	8	690	$121,075
WAC-9	Ione Street Water Line Replacement	8	292	$51,649
WAC-10	Sherman Way Water Line Replacement	8	845	$148,553
WAC-11	Kelso Street from South Platt to Ortega	8	311	$54,680
WAC-12	West Archwood from Teakwood to High School	8	330	$58,000
WAC-13	Fawn Way Water Line Replacement	8	385	$67,933
WAC-14	West Main Street Water Line Replacement	8	686	$120,292
WAC-15	Elm Way Water Line Replacement	8	850	$149,350
WAC-16	Idlewood Drive Water Line Replacement	8	538	$94,511
WAC-17	South Royal from Grady to Haley Water Line Replacemen	8	256	$45,037
WAC-18	Rodale Drive Water Line Replacement	8	1,080	$189,660
WAC-19	South Royal Avenue Water Line Replacement	8	646	$113,477
WAC-20	Van Wey Circle Water Line Replacement	8	458	$80,446
WAC-21	Old Crater Lake Highway Water Line Replacement	8	2,500	$442,250
WAC-22	Tracy Avenue Water Line Replacement	8	889	$156,006
WAC-23	Nova Avenue north of Main Street Water Line	8	166	$29,232
WAC-24	S. Deanjou from Elm to E. Linn Water Line	8	561	$98,470
WAC-25	Comice Way Water Line Replacement	8	522	$91,959
WAC-26	Bosc Way Water Line Replacement	8	484	$85,173
WAC-27	Laurel from Tracy to Deanjou Water Line	8	847	$148,727
WAC-28	Lorraine Avenue from Linn to Sarah Water Line	8	894	$157,093
WAC-29	Laurel Circle (east end of Laurel Street) Water Line	8	192	$33,669
WAC-30	South Buchanan Water Line Replacement	8	1,411	$248,255
WAC-31	South Platt from Kelso to Loto Water Line Replacement	8	350	$61,625
WAC-32	West end of South Royal Avenue Water Line	8	576	$101,297

For the purposes of brevity in this report, a detailed breakdown of the asbestos cement pipe replacement costs is provided in Appendix A of this Master Plan.

All pipe improvements are shown, with project number, on Figure 7.4.4-2 at the end of this section.



Civil West Engineering Services, Inc.	Drawn By: LFC Date: 3 Mar 2013	0 1"	**Proposed Tank Locations**	FIGURE
	Water System Master Plan		EAGLE POINT JACKSON COUNTY, OR	7.3.2-1

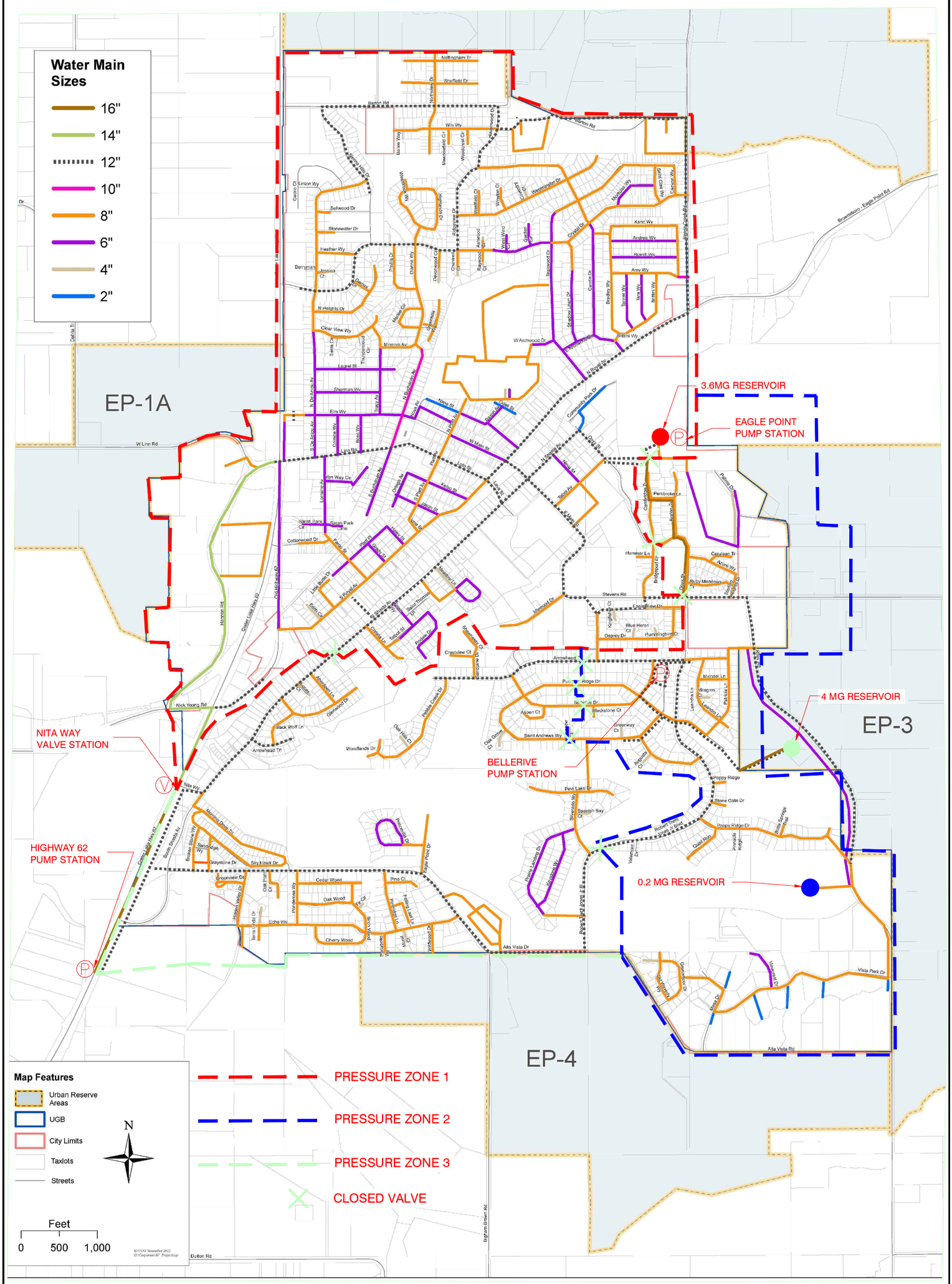


FIGURE 7.4.4-1

0 1"
1" = 1200'

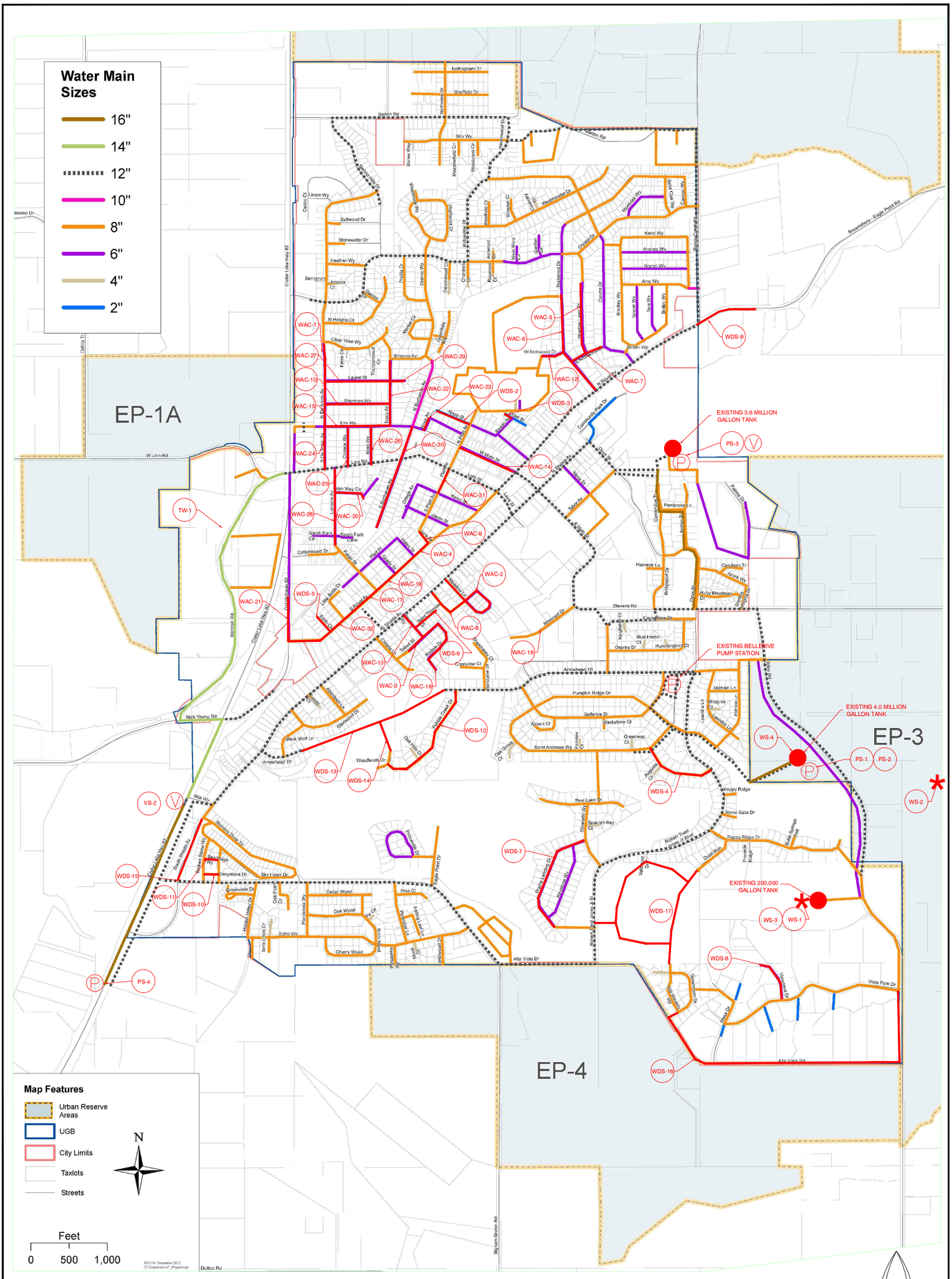
DRAWN BY: LFC
DATE: FEB 28, 2013

Proposed Pressure Zones

WATER SYSTEM MASTER PLAN

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

Civil West Engineering Services, Inc.



SEE KEYNOTE LEGEND
FIGURE 7.4.4-2A

N

FIGURE 7.4.4-2

0 1"
1" = 1200'

DRAWN BY: LFC
DATE: MAR 13, 2013

Proposed Pipe Upgrades

WATER SYSTEM MASTER PLAN

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

Civil West Engineering Services, Inc.

PS-1	BELLERIVE PUMP STATION RELOCATION/UPGRADE
PS-2	BELLERIVE EMERGENCY POWER
PS-3	EAGLE POINT PUMP STATION UPGRADES
PS-4	HIGHWAY 62 PUMP STATION UPGRADES
VS-2	EAGLE POINT EXISTING VALVE STUDY
WS-1	NEW 1.6 MILLION GALLON TANK
WS-2	NEW 3.6 MILLION GALLON TANK
WS-3	200,000 GALLON TANK VALVE BOX UPGRADES
WS-4	4.0 MILLION GALLON TANK UPGRADES
WDS-1	INSTALLATION OF 2 PRESSURE REDUCING VALVE STATIONS
WDS-2	NAPA STREET WATER LINE REPLACEMENT
WDS-3	ODELL STREET WATER LINE REPLACEMEN T
WDS-4	CORAL RIDGE DRIVE WATER LINE REPLACEMENT
WDS-5	EDITH CIRCLE WATER LINE REPLACEMENT
WDS-6	SAINT THOMAS LINE WATER LINE REPLACEMENT
WDS-7	PRAIRIE LANDING DRIVE WATER LINE REPLACEMENT
WDS-8	VIEWCREST DRIVE WATER LINE REPLACEMENT
WDS-9	BROWNSBORO HIGHWAY WATER LINE REPLACEMENT
WDS-10	GRAYSTONE DRIVE WATER LINE REPLACEMENT
WDS-11	SANDRIDGE WAY WATER LINE REPLACEMENT
WDS-12	PEBBLE CREEK DRIVE WATER LINE REPLACEMENT
WDS-13	ARROWHEAD TRAIL WATER LINE REPLACEMENT
WDS-14	WOODLAND TIE TO ARROWHEAD TRAIL WATER LINE REPLACEMENT
WDS-15	NITA WAY TO ALTA VISTA DRIVE WATER LINE REPLACEMENT
WDS-16	VISTA PARK DRIVE TO ALTA VISTA TO GREENMOOR DRIVE WATER LINE REPLACEMENT
WDS-17	NEW WATER LINE BETWEEN QUAIL RUN & OLD WAVERLY WAY PLUS PRVS
WAC-1	NORTH DEANJOU FROM ELM TO CLEARVIEW WAY WATER LINE REPLACEMENT
WAC-2	MEADOW LANE WATER LINE REPLACEMENT
WAC-3	TALBOT STREET WATER LINE REPLACEMENT
WAC-4	SOUTH ROYAL FROM IONE TO HALEY WATER LINE REPLACEMENT
WAC-5	SHADOWLAWN DRIVE WATER LINE REPLACEMENT
WAC-6	TEAKWOOD DRIVE WATER LINE REPLACEMENT
WAC-7	EAST ARCHWOOD FROM TEAKWOOD TO SHADOWLAWN DRIVE WATER LINE REPLACEMENT
WAC-8	SOUTH SHASTA TO MEADOW LANE WATER LINE REPLACEMENT
WAC-9	IONE STREET WATER LINE REPLACEMENT
WAC-10	SHERMAN WAY WATER LINE REPLACEMENT
WAC-11	KELSO STREET FROM SOUTH PLATT WATER LINE REPLACEMENT
WAC-12	WEST ARCHWOOD FROM TEAKWOOD TO HIGH SCHOOL WATER LINE REPLACEMENT
WAC-13	FAWN WAY WATER LINE REPLACEMENT
WAC-14	WEST MAIN STREET WATER LINE REPLACEMENT
WAC-15	ELM WAY WATER LINE REPLACEMENT
WAC-16	IDLEWOOD DRIVE WATER LINE REPLACEMENT
WAC-17	SOUTH ROYAL FROM GRADY TO HALEY WATER LINE REPLACEMENT
WAC-18	RODALE DRIVE WATER LINE REPLACEMENT
WAC-19	SOUTH ROYAL AVENUE WATER LINE REPLACEMENT
WAC-20	VAN WEY CIRCLE WATER LINE REPLACEMENT
WAC-21	OLD CRATER LAKE HIGHWAY WATER LINE REPLACEMENT
WAC-22	TRACY AVENUE WATER LINE REPLACEMENT
WAC-23	NOVA AVENUE NORTH OF MAIN STREET WATER LINE REPLACEMENT
WAC-24	SOUTH DEANJOU FROM ELM TO EAST LINN WATER LINE REPLACEMENT
WAC-25	COMICE WAY WATER LINE REPLACEMENT
WAC-26	BOSC AVENUE WATER LINE REPLACEMENT
WAC-27	LAUREL FROM TRACY TO DEANJOU WATER LINE REPLACEMENT
WAC-28	LORRAINE ROAD FROM LINN TO SARAH WATER LINE REPLACEMENT
WAC-29	LAUREL CIRCLE (EAST END OF LAUREL STREET) WATER LINE REPLACEMENT
WAC-30	SOUTH BUCHANAN WATER LINE REPLACEMENT
WAC-31	SOUTH PLATT FROM KELSO TO LOTO WATER LINE REPLACEMENT
WAC-32	WEST OF SOUTH ROYAL WATER LINE REPLACEMENT
TW-1	TEST WELL WEST OF HIGHWAY 62

Civil West Engineering Services, Inc.

CITY OF EAGLE POINT
JACKSON COUNTY, OREGON

KEY NOTE LEGEND

WATER SYSTEM MASTER PLAN

0 1"

DRAWN BY: LFC
DATE: MAR 13, 2013

FIGURE
7.4.4-2A

8.1 Capital Improvement Plan Purpose and Need

This Section summarizes the water system capital improvements needed to properly serve the community'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 a number of projects to maintain and protect existing water system assets, projects to correct deficiencies, and projects necessary to increase water system capacity to serve the growing population.

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. Additionally, the CIP can change if growth rates are not as high as expected (i.e. 3.01%), unaccounted water drops to lower levels, and/or water conservation measures are employed. The City should evaluate and update the CIP annually to ensure they are properly managing their critical water infrastructure.

8.2 Capital Improvement Plan Projects

8.2.1 CIP Summary

Based on the alternatives developed in Section 7, we have assembled a Capital Improvement Plan comprised of recommended projects that the City should undertake during the planning period to maintain and upgrade their water system. The various water supply, water treatment, water storage, and water distribution system projects recommended in this Water System Master Plan for the 20-year planning period are summarized below and on the following pages in Table 8.2.1-1.

Table 8.2.1-1 CIP Project Summary

Item	Description	Estimated Project Budget
PS-1	Bellerive Pump Station Relocation	$346,122
PS-2	Bellerive Emergency Power	$86,130
PS-3	Eagle Point Pump Station Upgrades	$48,800
PS-4	Highway 62 Pump Station Upgrades	$127,600
TW-1	Test Well West of Highway 62	$72,500
WS-1	1.6 Million Gallon Tank - Glass Fused Steel	$2,683,575
WS-2	3.6 Million Gallon Tank - DN Concrete	$5,855,325
WS-3	200,000 Gallon Tank Valve Box Upgrades	$32,625

Table 8.2.1-1 CIP Project Summary (continued)

Item	Description	Estimated Project Budget
WS-4	4 Million Gallon Tank Upgrades	$66,990
WDS-1	Installation of PRV's	$246,500
WDS-2	Napa Street Water Line Replacement	$99,006
WDS-3	Odell Street Water Line Replacement	$43,863
WDS-4	Coral Ridge Drive Water Line Replacement	$141,230
WDS-5	Edith Circle Water Line Replacement	$52,780
WDS-6	Saint Thomas Lane Water Line Replacement	$67,788
WDS-7	Prairie Landing Drive Water Line Replacement	$103,168
WDS-8	Viewcrest Drive Water Line Replacement	$114,130
WDS-9	Brownsboro Highway Water Line Replacement	$215,209
WDS-10	Graystone Drive Water Line Replacement	$32,886
WDS-11	Sandridge Way Water Line Replacement	$43,645
WDS-12	Pebble Creek Drive Water Line Replacement	$318,464
WDS-13	Arrowhead Trail Connection	$358,150
WDS-14	Woodland Tie to Arrowhead Trail Connection	$64,844
WDS-15	Nita Way to Alta Vista Drive	$228,723
WDS-16	Vista Park Drive to Alta Vista to Greenmoor Drive	$781,550
WDS-17	Quail Run to Old Waverly Way and PRVs	$855,500
WAC-1	North Deanjou from Elm to Clearview Way Water Line Replacement	$192,850
WAC-2	Meadow Lane Water Line Replacement	$230,855
WAC-3	Talbot Street Water Line Replacement	$37,454
WAC-4	South Royal from Ione to Haley Water Line Replacement	$153,584
WAC-5	Shadow Lawn Drive Water Line Replacement	$127,238
WAC-6	Teakwood Drive Water Line Replacement	$145,075
WAC-7	E. Archwood from Teakwood to Shadow Lawn Water Line Replacement	$39,194
WAC-8	S. Shasta to Meadow Lane Water Line Replacement	$121,075
WAC-9	Ione Street Water Line Replacement	$51,649
WAC-10	Sherman Way Water Line Replacement	$148,553
WAC-11	Kelso Street from South Platt to Ortega	$54,680
WAC-12	West Archwood from Teakwood to High School	$58,000
WAC-13	Fawn Way Water Line Replacement	$67,933
WAC-14	West Main Street Water Line Replacement	$120,292

Table 8.2.1-1 CIP Project Summary (continued)

Item	Description	Estimated Project Budget
WAC-15	Elm Way Water Line Replacement	$149,350
WAC-16	Idlewood Drive Water Line Replacement	$94,511
WAC-17	South Royal from Grady to Haley Water Line Replacement	$45,037
WAC-18	Rodale Drive Water Line Replacement	$189,660
WAC-19	South Royal Avenue Water Line Replacement	$113,477
WAC-20	Van Wey Circle Water Line Replacement	$80,446
WAC-21	Old Crater Lake Highway Water Line Replacement	$442,250
WAC-22	Tracy Avenue Water Line Replacement	$156,006
WAC-23	Nova Avenue north of Main Street Water Line	$29,232
WAC-24	S. Deanjou from Elm to E. Linn Water Line	$98,470
WAC-25	Comice Way Water Line Replacement	$91,959
WAC-26	Bosc Way Water Line Replacement	$85,173
WAC-27	Laurel from Tracy to Deanjou Water Line	$148,727
WAC-28	Lorraine Avenue from Linn to Sarah Water Line	$157,093
WAC-29	Laurel Circle (east end of Laurel Street) Water Line	$33,669
WAC-30	South Buchanan Water Line Replacement	$248,255
WAC-31	South Platt from Kelso to Loto Water Line Replacement	$61,625
WAC-32	West of South Royal Water Line Replacement	$101,297

8.2.2 CIP Priorities

The improvements recommended for the 20-year planning period have been categorized into five categories or priorities.

Priority	Summary	Cost
0	Projects should be undertaken immediately but no later than 1-3 years from the beginning of the planning period. By providing upgrades to the pump and valve station and adding to the City's storage system (1.6 million gallon tank), the City's water needs can be met.	$5,524,386
1	Projects should be undertaken within the next 3 to 10 years. By adding to the City's water storage (3.6 million gallons) and upgrading the lines, the City's distribution system and fire protection system will be enhanced.	$7,101,006
2	Projects are mostly replacements of asbestos/cement lines with some upgrades to the pipe network. These should be undertaken in the next 5 to 15 years.	$1,779,556
3	Projects are mainly replacements of asbestos/cement lines that should be undertaken in the next twenty years as needed or as funding becomes available. The project on Brownsboro Highway is listed in Priority 4 to be undertaken if growth necessitates the upsizing of this line in this area of the City.	$2,547,317
	TOTAL	$16,952,264

The priority list and the projects which comprise them is only a suggestion as to how the projects should be accomplished. While preparing the report, analyzing the model results, and discussing the water distribution system with City staff, recommendations were formed regarding the projects and when they should be completed. This list belongs to the City and as such, they have the right to change the projects around at will and without permission from the State to meet the needs of their water supply customers.

The following pages provides summary and breakdowns of detailed costs. As mentioned before, if the City deems it necessary to move a water line replacement from Priority 3 to a construction project that will be completed within the next year, it would be prudent for the City to do that. Additionally, the construction of the 1.6 million gallon tank in Priority 0 could be replaced with construction of two 1.6 million gallon tanks or even a larger one if the City finds land and an opportunity to cut costs by building two tanks simultaneously.

Table 8.2.2-1 provides a summary of each priority and their total engineering, contingency, and other costs.

Table 8.2.2-2 provides a detailed list of projects by priority with costs.

8.2.3 CIP Updates

Periodically the Capital Improvement Plan should be updated and evaluated regularly. It is suggested that every 3 to 5 years the CIP be evaluated and modified as necessary to reflect current development trends, system needs, and prior accomplishments. The City may modify the CIP at any time under ORS 223.309(2).

Table 8.2.2-1 – Summary of Priorities and Cost

	Priority	Description	Construction Costs	Engineering Costs	Contingency	Other	Total
Overall Summary	**0**	Upgrades to Pump Stations and Construction of 1.6 million gallon tank	$3,685,320	$746,444	$737,064	$355,558	$5,524,386
	1	Water Line Replacements and Construction of 3.6 million gallon tank	$4,707,590	$941,518	$941,518	$510,380	$7,101,006
	2	Water Line Replacements	$1,227,280	$245,456	$245,456	$61,364	$1,779,556
	3	Installation of PRV's, Water Line Replacements	$1,756,770	$351,354	$351,354	$87,839	$2,547,317
	TOTALS		$11,376,960	$2,284,772	$2,275,392	$1,015,140	$16,952,264

Table 8.2.2-2 – Phased CIP Approach

Priority	Project Number	Description	Construction Costs	Engineering Costs	Contingency	Other	Total	Priority Total
0	PS-1	Bellerive Pump Station Relocation	$234,500	$56,280	$46,900	$8,442	$346,122	
	PS-2	Bellerive Emergency Power	$59,400	$11,880	$11,880	$2,970	$86,130	
	PS-3	Eagle Point Pump Station Upgrades	$30,500	$6,100	$6,100	$6,100	$48,800	
	PS-4	Highway 62 Pump Station Upgrades	$88,000	$17,600	$17,600	$4,400	$127,600	
	WS-3	200,000 Gallon Tank Valve Box Upgrades	$22,500	$4,500	$4,500	$1,125	$32,625	
	TW-1	Test Well West of Highway 62	$50,000	$10,000	$10,000	$2,500	$72,500	$5,524,386
	WDS-13	Arrowhead Trail Connection	$247,000	$49,400	$49,400	$12,350	$358,150	
	WDS-14	Woodland Tie to Arrowhead Trail	$44,720	$8,944	$8,944	$2,236	$64,844	
	WS-1	1.6 Million Gallon Tank - Glass Fused Steel	$1,733,500	$346,700	$346,700	$256,675	$2,683,575	
	WS-4	4 Million Gallon Tank Upgrades	$46,200	$9,240	$9,240	$2,310	$66,990	
	WDS-16	Vista Park Drive to Alta Vista to Greenmoor	$539,000	$107,800	$107,800	$26,950	$781,550	
	WDS-17	Quail Run to Old Waverly Way and PRVs	$590,000	$118,000	$118,000	$29,500	$855,500	

Priority 0 projects include upgrades to the pump stations and storage facilities. Project Number WS-1 lists the construction of the 1.6 million gallon tank. Three water distribution lines are part of this priority to increase the amount of water flow to areas where the flow may be compromised if there is a fire elsewhere in the City.

Table 8.2.2-2 – Phased CIP Approach (continued)

Priority	Project Number	Description	Construction Costs	Engineering Costs	Contingency	Other	Total	Priority Total
1	WDS-10	Graystone Drive Water Line Replacement	$22,680	$4,536	$4,536	$1,134	$32,886	
	WDS-11	Sandridge Way Water Line Replacement	$30,100	$6,020	$6,020	$1,505	$43,645	
	WDS-7	Prairie Landing Drive Water Line Replacement	$71,150	$14,230	$14,230	$3,558	$103,168	
	WDS-8	Viewcrest Drive Water Line Replacement	$78,710	$15,742	$15,742	$3,936	$114,130	
	WDS-4	Coral Ridge Drive Water Line Replacement	$97,400	$19,480	$19,480	$4,870	$141,230	
	WDS-3	Odell Street Water Line Replacement	$30,250	$6,050	$6,050	$1,513	$43,863	
	WDS-2	Napa Street Water Line Replacement	$68,280	$13,656	$13,656	$3,414	$99,006	$7,101,006
	WDS-12	Pebble Creek Drive Water Line Replacement	$219,630	$43,926	$43,926	$10,982	$318,464	
	WS-2	3.6 Million Gallon Tank - DN Concrete	$3,848,500	$769,700	$769,700	$467,425	$5,855,325	
	WDS-5	Edith Circle Water Line Replacement	$36,400	$7,280	$7,280	$1,820	$52,780	
	WDS-6	Saint Thomas Lane Water Line Replacement	$46,750	$9,350	$9,350	$2,338	$67,788	
	WDS-15	Nita Way to Alta Vista Drive Pipe	$157,740	$31,548	$31,548	$7,887	$228,723	

Priority 1 projects include the construction of a 3.6 million gallon tank to supplement the City's water storage capacity. From the information presented in Section 4.2.4, the City will have storage deficit during this plan. If the 1.6 million gallon tank is constructed, the City will run out of storage capacity by the year 2021. This tank should be constructed within the next 3 to 8 years to meet the City population needs.

Additional projects in this priority include new water lines and water line replacements to increase flow to areas where fire protection is lacking.

Table 8.2.2-2 – Phased CIP Approach (continued)

Priority	Project Number	Description	Construction Costs	Engineering Costs	Contingency	Other	Total	Priority Total
2	WAC-18	Rodale Drive Water Line Replacement	$130,800	$26,160	$26,160	$6,540	$189,660	
	WAC-16	Idlewood Drive Water Line Replacement	$65,180	$13,036	$13,036	$3,259	$94,511	
	WAC-4	Replacement	$105,920	$21,184	$21,184	$5,296	$153,584	
	WAC-32	West of South Royal Water Line Replacement	$69,860	$13,972	$13,972	$3,493	$101,297	
	WAC-11	Kelso Street from South Platt to Ortega	$37,710	$7,542	$7,542	$1,886	$54,680	
	WAC-14	West Main Street Water Line Replacement	$82,960	$16,592	$16,592	$4,148	$120,292	
	WAC-27	Laurel from Tracy to Deanjou Water Line	$102,570	$20,514	$20,514	$5,129	$148,727	
	WAC-19	South Royal Avenue Water Line Replacement	$78,260	$15,652	$15,652	$3,913	$113,477	$1,779,556
	WAC-23	Nova Avenue north of Main Street Water Line	$20,160	$4,032	$4,032	$1,008	$29,232	
	WAC-24	S. Deanjou from Elm to E. Linn Water Line	$67,910	$13,582	$13,582	$3,396	$98,470	
	WAC-25	Comice Way Water Line Replacement	$63,420	$12,684	$12,684	$3,171	$91,959	
	WAC-1	North Deanjou from Elm to Clearview Way Water Line Replacement	$133,000	$26,600	$26,600	$6,650	$192,850	
	WAC-10	Sherman Way Water Line Replacement	$102,450	$20,490	$20,490	$5,123	$148,553	
	WAC-26	Bosc Way Water Line Replacement	$58,740	$11,748	$11,748	$2,937	$85,173	
	WAC-28	Lorraine Avenue from Linn to Sarah Water Line	$108,340	$21,668	$21,668	$5,417	$157,093	

Priority 2 projects consist mainly of water line replacements for undersized pipes and asbestos-cement pipes. These are projects that can be constructed any time road or utility work is being done in the area of replacement.

Table 8.2.2-2 – Phased CIP Approach (continued)

Priority	Project Number	Description	Construction Costs	Engineering Costs	Contingency	Other	Total	Priority Total
	WAC-21	Old Crater Lake Highway Water Line Replacement	$305,000	$61,000	$61,000	$15,250	$442,250	
	WAC-22	Tracy Avenue Water Line Replacement	$107,590	$21,518	$21,518	$5,380	$156,006	
	WAC-9	Ione Street Water Line Replacement	$35,620	$7,124	$7,124	$1,781	$51,649	
	WAC-13	Fawn Way Water Line Replacement	$46,850	$9,370	$9,370	$2,343	$67,933	
	WAC-30	South Buchanan Water Line Replacement	$171,210	$34,242	$34,242	$8,561	$248,255	
	WAC-29	Laurel Circle (east end of Laurel Street) Water Line	$23,220	$4,644	$4,644	$1,161	$33,669	
	WAC-3	Talbot Street Water Line Replacement	$25,830	$5,166	$5,166	$1,292	$37,454	
	WAC-2	Meadow Lane Water Line Replacement	$159,210	$31,842	$31,842	$7,961	$230,855	
	WAC-5	Shadow Lawn Drive Water Line Replacement	$87,750	$17,550	$17,550	$4,388	$127,238	
3	WAC-6	Teakwood Drive Water Line Replacement	$93,500	$18,700	$18,700	$4,675	$135,575	
	WAC-7	Water Line Replacement	$27,030	$5,406	$5,406	$1,352	$39,194	$2,547,317
	WAC-8	S. Shasta to Meadow Lane Water Line Replacement	$83,500	$16,700	$16,700	$4,175	$121,075	
	WAC-12	West Archwood from Teakwood to High School	$40,000	$8,000	$8,000	$2,000	$58,000	
	WAC-15	Elm Way Water Line Replacement	$103,000	$20,600	$20,600	$5,150	$149,350	
	WAC-17	Replacement	$31,060	$6,212	$6,212	$1,553	$45,037	
	WAC-31	Replacement	$42,500	$8,500	$8,500	$2,125	$61,625	
	WAC-20	Van Wey Circle Water Line Replacement	$55,480	$11,096	$11,096	$2,774	$80,446	
	WDS-1	Installation of PRV's	$170,000	$34,000	$34,000	$8,500	$246,500	
	WDS-9	Brownsboro Highway Water Line Replacement	$148,420	$29,684	$29,684	$7,421	$215,209	

Priority 3 projects include water line replacements for asbestos-cement pipes. Some of these pipes may be in fine condition while others could be deteriorating. These projects have been identified as Priority 3 only because there is not an overriding need to replace the pipes as yet. The installation of PRV's is also included in this Priority as the City may not need these. However, as City resources become available, these pipes should be replaced at some time during the planning period.

9.1 Existing Water Rates and Charges

9.1.1 Existing Rate Structure

The City of Eagle Point adjusted water rates in October of 2003. The adjustments included a 29% increase on the facilities charge and a $0.04 charge on every 10,000 gallons of water. During the course of this plan the water rates were in need of another adjustment. The current rate structure has an increasing facilities charge based on the size of water meter installed and has fixed service and use charges regardless of the amount of water used. The existing rate structure went into effect June 2013 and is summarized in Table 9.1.1-1.

Table 9.1.1-1 – Current Water Rate Structure – Eagle Point

Gallons Consumed	Charges
Normal Usage	
0-Base Rate	$14.31
1-1,000	$16.23
1,001-2,000	$18.15
2,001-3,000	$20.07
3,001-4,000	$21.99
4,001-5,000	$23.91
5,001-6,000	$25.83
6,001-7,000	$27.75
7,001-8,000	$29.67
8,001-9,000	$31.59
9,001-10,000	$33.51
10,001-11,000	$35.93
11,001-12,000	$38.35
12,001-13,000	$40.77
13,001-14,000	$43.19
14,001-15,000	$45.61
15,001-16,000	$48.03
16,001-17,000	$50.45
17,001-18,000	$52.87
18,001-19,000	$55.29
19,001-20,000	$57.71

The current rate structure results in an average monthly water bill of $31.59 with an average residential water use of 8,795 gallons per month (see Section 3.2.5) per typical single-family dwelling. When using the statewide typical consumption of 7,500 gallons per month per household as often cited by funding agencies as the “average residential water bill”, the monthly charge is $29.67 ($0.004/gallon).

The average water bill in the state of Oregon is approximately $55.00 per EDU. According to the rate structure above, Eagle Point charges 43% less than the average resident in Oregon pays.

Like most communities, a connection fee is charged when a new water service is installed within the service boundary where no previous connection existed. The connection fee varies by meter size and is meant to match the actual cost of labor, equipment, and material furnished by the City as required for

providing and installing the service line and meter. Typical connection charges for small residential service connections are $300 to $400 and are typically adjusted yearly.

The City also has a water System Development Charge (SDC) in place established by ordinance and based upon a written methodology developed with past engineering analysis and costs estimates together with an economic and financial analysis of the system. The current SDC for a new basic residential water connection in the City of Eagle Point is $4,487.27 including $3,011 for Eagle Point and $1,476.27 for MWC.

9.1.2 Water Fund Budget

Information posted on May 18, 2012 showed that the water fund decreased from $2,508,631 to $2,114,254 for the fiscal year of 2011-2012. The decrease, as stated in the report, is due to the completion of several project activities but primarily due to a decrease in cash balance being used to operate the fund.

Without an increase in the rate structure over the next years, the water fund is struggling to keep up with increasing operational costs.

9.2 Revenue Increase Needed

9.2.1 Capital Improvement Costs

The Capital Improvement Plan (CIP) listed in Section 8 has a total estimated cost of $16.95 million dollars.

9.2.2 Additional Annual Revenue Required

The following table shows potential revenue increases needed to fund the CIP based on average standard funding terms including a 3.5% interest rate and a 20-year payback. The analysis assumes the worst case scenario of no grant, no city funds, and all the money acquired from a loan. Table 9.2.2-1 provides an indication of how much money will be needed to fund the full CIP and each Priority. This information is provided for information only and as one option to consider as the City evaluates all the funding opportunities available.

Table 9.2.2-1 – Potential Revenue Increases Required

Cost	Full CIP	Priority 0	Priority 1	Priority 2	Priority 3
Capital Cost	$16,952,264	$5,524,386	$7,101,006	$1,779,556	$2,547,317
Loan Needed	$16,952,264	$5,524,386	$7,101,006	$1,779,556	$2,547,317
Interest Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Loan Period (yrs)	20	20	20	20	20
Annual Annuity	$1,191,304.57	$388,221.08	$499,016.55	$125,056.64	$179,010.30
Monthly Income Required	$99,275	$32,352	$41,585	$10,421	$14,918

9.3 Potential Grant and Loan Sources

9.3.1 Background Data for Funding

Funding for municipal 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.

The average residential water bill in Eagle Point is currently $31.59 per month or $379.08 annually (based on 8,795 gallons use per month). Eagle Point's water rates are lower than many similar communities and significantly lower than other small communities faced with large capital improvement needs. The current average water bill in the State of Oregon is $55 per month per EDU. Currently, the City of Eagle Point charges 43% less for the same amount of water.

The calculation for the water user rate can incorporate, when applicable, fee-equivalents derived from other local funding sources that are or will be used to pay for the water system, including any special levy on taxable property within the system's territory.

9.3.2 Infrastructure Finance Authority (IFA)

Recent restructuring in the State has resulted in the creation of the Oregon Business Development Department (OBDD) / Infrastructure Finance Authority (IFA) from what previously was the Oregon Economic and Community Development Department.

IFA administers resources aimed at community development activities primarily in the water and wastewater infrastructure areas. The IFA Regional Coordinator for Jackson County is Fumi Schaadt (503-986-0027) and any application process should begin by contacting her. The funding programs through IFA include:

- Community Development Block Grants (CDBG)
- Safe Drinking Water Revolving Loan Fund (SDWRLF)
- Special Public Works Funds
- Water/Wastewater Financing

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 and the process is open year round. Loan terms are typically 3-4% interest for 20 years, however, "Disadvantaged Communities" can potentially qualify for 1% loans for 30 years as well as some principal forgiveness.

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 available through the Special Public Works Funds and Water/Wastewater Financing depending on need and financial reviews by IFA.

9.3.3 Rural Development / Rural Utilities Service (RUS)

The United States Department of Agriculture (USDA) Rural Utilities Service (RUS) has a Water Programs Division which provides loans, guaranteed loans, and grants for water infrastructure projects for towns of less than 10,000 persons. Grants are only available when necessary to keep user costs to

reasonable levels (very similar to IFA threshold rate). Loans can be made with repayment periods up to 40 years. Interest rates vary but often are around 4% for design/construction loans. Environmental reporting is required similar to that for the SDWRLF but with slightly different criteria.

9.3.4 Bond Sales

A brief summary of the types of bonds that are available is presented below.

General Obligation Bonds. General obligation or GO bonds are municipal bonds that are "backed" by the full faith and credit of the issuer. GO bonds are generally repaid through an increase in property taxes. For a community such as Eagle Point, the GO bonds can be an attractive option as the property tax payments are tax deductible, are not based on water use, and are collected whether a customer occupies the home full or part time. GO bonds guarantee a stable and consistent stream of revenue. As they are considered a lower risk investment, the interest rates on GO bond issues is generally lower than other alternatives. GO bonds require voter approval for issuance.

The City of Eagle Point could benefit from getting a GO bond and raising the property taxes. As most property owners do not want to risk losing their property for unpaid tax bills, they will generally pay their increased taxes and the City will be able to pay back the GO bond. Additionally, the GO bond generally has a low interest rate so the cost of borrowing the money is lessened. A GO bond also does not take into account the price of water within the City as compared to the State average.

Revenue Bonds. Revenue bonds differ from GO bonds in that they are repaid through a municipality's revenue stream or by user rates. The full faith of the issuer is not behind revenue bonds; therefore, the interest rate on revenue bonds is generally higher than GO bonds. One advantage of revenue bonds is that they do not require voter approval.

A revenue bond is supported by the revenue from a specific project. They are used to finance an income-producing project within a municipality. As most of the projects recommended in Section 7 are not income-producing and general improvements to the water system, this source of funding may not be the best for the City of Eagle Point.

9.4 Potential Water Rate Increases

Because of the various options in funding programs and requirements for contact and communication with the Regional Coordinators prior to applications, the recommended first step in exploring funding options is to attend a "One-Stop" financing meeting. The One-Stop meeting is held in Salem once a month with the goal of gathering the State and federal funding agencies together at one time and one place to discuss all potential funding possibilities and issues. No funding commitments are made at the meeting, but probable funding sources and details are provided to enable the City to choose the best alternatives possible at that time and to initiate funding application steps.

To start this analysis, it was assumed that the existing water rates and the existing expenses are equal to each other. This analysis is only for the Capital Improvement Projects that are presented in this report and does not include any other factors. The existing water fund budget and any shortfalls or profits were not considered.

Since Eagle Point's definition of an EDU uses 8,795 gallons per month per EDU, there are 4,213 total EDUs in Eagle Point. The following table shows a possible scenario with the needed increase in revenue spread evenly over all 4,213 EDUs. To be conservative, the same number of EDUs were used throughout the planning period even though the number will likely increase as time passes.

Table 9.4.1-1 – Potential Eagle Point Revenue Increase Needed

Cost	Full CIP	Priority 0	Priority 1	Priority 2	Priority 3
Capital Cost	$16,952,264	$5,524,386	$7,101,006	$1,779,556	$2,547,317
Loan Needed	$16,952,264	$5,524,386	$7,101,006	$1,779,556	$2,547,317
Interest Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Loan Period (yrs)	20	20	20	20	20
Annual Annuity	$1,191,304.57	$388,221.08	$499,016.55	$125,056.64	$179,010.30
Monthly Income Required	$99,275	$32,352	$41,585	$10,421	$14,918
Monthly Income Required	$109,203	$35,587	$45,743	$11,464	$16,409
Number of EDU's (8,795)	4,213	4,213	4,213	4,213	4,213
Monthly Cost per EDU	$25.92	$8.45	$10.86	$2.72	$3.89

Based upon the information and analysis presented above, a total cost of $25.92 per EDU per month is needed to fund the entire Capital Improvement Plan. This results in a total monthly bill of $57.51 for 8,795 gallons ($0.007/gallon). This puts the city right around the State average of $55.00 per EDU per month.

As stated previously, this information is provided for information only and is one option to consider while the City evaluates funding the entire CIP over a period of 20 years and/or each Priority.

Most funding agencies will require the City to be at or above the state average before receiving a grant or low interest loan support. Rather than raising water rates, a private option or GO bond sale may be preferred by the City of Eagle Point. As stated above, the City could keep water rates low and obtain a GO bond but raise property taxes to pay the bond.

9.5 SDC's

SDCs are charged to new customers to retire investments required to provide capacity for new customers to join the system. The City of Eagle Point currently utilizes a SDC program to collect revenues from new customers to aid in upsizing facilities for growth. The disadvantage of using SDCs for infrastructure investment include that the revenue stream from SDCs varies with the economy and with the development market. As such, it is not reliable. Also, projects often have to be funded through other means as SDCs are often not collected until after an improvement is constructed. This requires interim or bridge funding that can often not be retired by SDCs in a timely manner. It is also important to understand that financial institutions, including public funding agencies, do not loan against SDCs.

With the growth projected in Eagle Point, SDC's have the potential to be a good source of revenue to pay for the planned Capital Improvement Projects.

The City of Eagle Point needs to update their methodology to reflect the new CIP and the planning criteria. It is recommended that this work be started soon.

APPENDIX A

WAC-1 - N Deanjou Avenue from Elm to Clearview				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$12,000.00	$12,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	1100	$90.00	$99,000
Asphalt Patching	lf	1100	$20.00	$22,000
Construction Cost Total				$133,000
Contingency (20%)				$26,600
Engineering (20%)				$26,600
Project Management and Legal (5%)				$6,650
Total Project Budget Estimate				$192,850

WAC-2 - Meadow Lane				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$15,000.00	$15,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	1311	$90.00	$117,990
Asphalt Patching	lf	1311	$20.00	$26,220
Construction Cost Total				$159,210
Contingency (20%)				$31,842
Engineering (20%)				$31,842
Project Management and Legal (5%)				$7,961
Total Project Budget Estimate				$230,855

WAC-3 - Talbot Street				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$2,400.00	$2,400
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	213	$90.00	$19,170
Asphalt Patching	lf	213	$20.00	$4,260
Construction Cost Total				$25,830
Contingency (20%)				$5,166
Engineering (20%)				$5,166
Project Management and Legal (5%)				$1,292
Total Project Budget Estimate				$37,454

WAC-4 - South Royal				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$3,700.00	$3,700
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	328	$90.00	$29,520
Asphalt Patching	lf	328	$20.00	$6,560
Construction Cost Total				$39,780
Contingency (20%)				$7,956
Engineering (20%)				$7,956
Project Management and Legal (5%)				$1,989
Total Project Budget Estimate				$57,681

WAC-5 - Shadow Lawn Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$8,000.00	$8,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	725	$90.00	$65,250
Asphalt Patching	lf	725	$20.00	$14,500
Construction Cost Total				$87,750
Contingency (20%)				$17,550
Engineering (20%)				$17,550
Project Management and Legal (5%)				$4,388
Total Project Budget Estimate				$127,238

WAC-6 - Teakwood Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$9,500.00	$9,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	850	$90.00	$76,500
Asphalt Patching	lf	850	$20.00	$17,000
Construction Cost Total				$93,500
Contingency (20%)				$18,700
Engineering (20%)				$18,700
Project Management and Legal (5%)				$4,675
Total Project Budget Estimate				$145,075

WAC-7 - East Archwood from Teakwood to Shadowlawn				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$2,500.00	$2,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	223	$90.00	$20,070
Asphalt Patching	lf	223	$20.00	$4,460
Construction Cost Total				$27,030
Contingency (20%)				$5,406
Engineering (20%)				$5,406
Project Management and Legal (5%)				$1,352
Total Project Budget Estimate				$39,194

WAC-8 - S. Shasta to Meadow Lane				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$7,600.00	$7,600
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	690	$90.00	$62,100
Asphalt Patching	lf	690	$20.00	$13,800
Construction Cost Total				$83,500
Contingency (20%)				$16,700
Engineering (20%)				$16,700
Project Management and Legal (5%)				$4,175
Total Project Budget Estimate				$121,075

WAC-9 -Ione Street				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$3,500.00	$3,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	292	$90.00	$26,280
Asphalt Patching	lf	292	$20.00	$5,840
Construction Cost Total				$35,620
Contingency (20%)				$7,124
Engineering (20%)				$7,124
Project Management and Legal (5%)				$1,781
Total Project Budget Estimate				$51,649

WAC-10 - Sherman Way				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$9,500.00	$9,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	845	$90.00	$76,050
Asphalt Patching	lf	845	$20.00	$16,900
Construction Cost Total				$102,450
Contingency (20%)				$20,490
Engineering (20%)				$20,490
Project Management and Legal (5%)				$5,123
Total Project Budget Estimate				$148,553

WAC-11 - Kelso Street from S. Platt to Ortega				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$3,500.00	$3,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	311	$90.00	$27,990
Asphalt Patching	lf	311	$20.00	$6,220
Construction Cost Total				$37,710
Contingency (20%)				$7,542
Engineering (20%)				$7,542
Project Management and Legal (5%)				$1,886
Total Project Budget Estimate				$54,680

WAC-12 - West Archwood from Teakwood to High School				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$3,700.00	$3,700
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	330	$90.00	$29,700
Asphalt Patching	lf	330	$20.00	$6,600
Construction Cost Total				$40,000
Contingency (20%)				$8,000
Engineering (20%)				$8,000
Project Management and Legal (5%)				$2,000
Total Project Budget Estimate				$58,000

WAC-13 - Fawn Way				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$4,500.00	$4,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	385	$90.00	$34,650
Asphalt Patching	lf	385	$20.00	$7,700
Construction Cost Total				$46,850
Contingency (20%)				$9,370
Engineering (20%)				$9,370
Project Management and Legal (5%)				$2,343
Total Project Budget Estimate				$67,933

WAC-14 - W Main Street				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$7,500.00	$7,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	686	$90.00	$61,740
Asphalt Patching	lf	686	$20.00	$13,720
Construction Cost Total				$82,960
Contingency (20%)				$16,592
Engineering (20%)				$16,592
Project Management and Legal (5%)				$4,148
Total Project Budget Estimate				$120,292

WAC-15 - Elm Way				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$9,500.00	$9,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	850	$90.00	$76,500
Asphalt Patching	lf	850	$20.00	$17,000
Construction Cost Total				$103,000
Contingency (20%)				$20,600
Engineering (20%)				$20,600
Project Management and Legal (5%)				$5,150
Total Project Budget Estimate				$149,350

WAC-16 - Idlewood Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$6,000.00	$6,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	538	$90.00	$48,420
Asphalt Patching	lf	538	$20.00	$10,760
Construction Cost Total				$65,180
Contingency (20%)				$13,036
Engineering (20%)				$13,036
Project Management and Legal (5%)				$3,259
Total Project Budget Estimate				$94,511

WAC-17 - South Royal from Haley to Grady				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$2,900.00	$2,900
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	256	$90.00	$23,040
Asphalt Patching	lf	256	$20.00	$5,120
Construction Cost Total				$31,060
Contingency (20%)				$6,212
Engineering (20%)				$6,212
Project Management and Legal (5%)				$1,553
Total Project Budget Estimate				$45,037

WAC-18 - Rodale Drive				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$12,000.00	$12,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	1080	$90.00	$97,200
Asphalt Patching	lf	1080	$20.00	$21,600
Construction Cost Total				$130,800
Contingency (20%)				$26,160
Engineering (20%)				$26,160
Project Management and Legal (5%)				$6,540
Total Project Budget Estimate				$189,660

WAC-19 - South Royal Avenue				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$7,200.00	$7,200
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	646	$90.00	$58,140
Asphalt Patching	lf	646	$20.00	$12,920
Construction Cost Total				$78,260
Contingency (20%)				$15,652
Engineering (20%)				$15,652
Project Management and Legal (5%)				$3,913
Total Project Budget Estimate				$113,477

WAC-20 - Van Wey Circle				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$5,100.00	$5,100
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	458	$90.00	$41,220
Asphalt Patching	lf	458	$20.00	$9,160
Construction Cost Total				$55,480
Contingency (20%)				$11,096
Engineering (20%)				$11,096
Project Management and Legal (5%)				$2,774
Total Project Budget Estimate				$80,446

WAC-21 - Old Crater Lake Highway				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$30,000.00	$30,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	2500	$90.00	$225,000
Asphalt Patching	lf	2500	$20.00	$50,000
Construction Cost Total				$305,000
Contingency (20%)				$61,000
Engineering (20%)				$61,000
Project Management and Legal (5%)				$15,250
Total Project Budget Estimate				$442,250

WAC-22 - Tracy Avenue				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$9,800.00	$9,800
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	889	$90.00	$80,010
Asphalt Patching	lf	889	$20.00	$17,780
Construction Cost Total				$107,590
Contingency (20%)				$21,518
Engineering (20%)				$21,518
Project Management and Legal (5%)				$5,380
Total Project Budget Estimate				$156,006

WAC-23 - Nova Avenue north of Main Street				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$1,900.00	$1,900
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	166	$90.00	$14,940
Asphalt Patching	lf	166	$20.00	$3,320
Construction Cost Total				$20,160
Contingency (20%)				$4,032
Engineering (20%)				$4,032
Project Management and Legal (5%)				$1,008
Total Project Budget Estimate				$29,232

WAC-24 - S Deanjou Avenue				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$6,200.00	$6,200
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	561	$90.00	$50,490
Asphalt Patching	lf	561	$20.00	$11,220
Construction Cost Total				$67,910
Contingency (20%)				$13,582
Engineering (20%)				$13,582
Project Management and Legal (5%)				$3,396
Total Project Budget Estimate				$98,470

WAC-25 - Comice Way				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$6,000.00	$6,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	522	$90.00	$46,980
Asphalt Patching	lf	522	$20.00	$10,440
Construction Cost Total				$63,420
Contingency (20%)				$12,684
Engineering (20%)				$12,684
Project Management and Legal (5%)				$3,171
Total Project Budget Estimate				$91,959

WAC-26 - Bosc Way				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$5,500.00	$5,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	484	$90.00	$43,560
Asphalt Patching	lf	484	$20.00	$9,680
Construction Cost Total				$58,740
Contingency (20%)				$11,748
Engineering (20%)				$11,748
Project Management and Legal (5%)				$2,937
Total Project Budget Estimate				$85,173

WAC-27 - Laurel from Tracy to Deanjou				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$9,400.00	$9,400
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	847	$90.00	$76,230
Asphalt Patching	lf	847	$20.00	$16,940
Construction Cost Total				$102,570
Contingency (20%)				$20,514
Engineering (20%)				$20,514
Project Management and Legal (5%)				$5,129
Total Project Budget Estimate				$148,727

WAC-28 - Lorraine Avenue from Linn to Sarah				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$10,000.00	$10,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	894	$90.00	$80,460
Asphalt Patching	lf	894	$20.00	$17,880
Construction Cost Total				$108,340
Contingency (20%)				$21,668
Engineering (20%)				$21,668
Project Management and Legal (5%)				$5,417
Total Project Budget Estimate				$157,093

WAC-29 - Laurel Circle				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$2,100.00	$2,100
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	192	$90.00	$17,280
Asphalt Patching	lf	192	$20.00	$3,840
Construction Cost Total				$23,220
Contingency (20%)				$4,644
Engineering (20%)				$4,644
Project Management and Legal (5%)				$1,161
Total Project Budget Estimate				$33,669

WAC-30 - South Buchanan				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$16,000.00	$16,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	1411	$90.00	$126,990
Asphalt Patching	lf	1411	$20.00	$28,220
Construction Cost Total				$171,210
Contingency (20%)				$34,242
Engineering (20%)				$34,242
Project Management and Legal (5%)				$8,561
Total Project Budget Estimate				$248,255

WAC-31 - South Platt from Kelso to Loto				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$4,000.00	$4,000
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	350	$90.00	$31,500
Asphalt Patching	lf	350	$20.00	$7,000
Construction Cost Total				$42,500
Contingency (20%)				$8,500
Engineering (20%)				$8,500
Project Management and Legal (5%)				$2,125
Total Project Budget Estimate				$61,625

WAC-32 - West End of S. Royal				
Item Description	**Unit**	**Quantity**	**Unit Cost**	**Item Cost**
Mobilization, Overhead, Profit	ls	1	$6,500.00	$6,500
8-inch DI Pipe, Trenching, and Gravel Backfill	lf	576	$90.00	$51,840
Asphalt Patching	lf	576	$20.00	$11,520
Construction Cost Total				$69,860
Contingency (20%)				$13,972
Engineering (20%)				$13,972
Project Management and Legal (5%)				$3,493
Total Project Budget Estimate				$101,297

APPENDIX B

Civil West
Engineering Services, Inc.

486 'E' Street
Coos Bay, OR 97420

July 26, 2012

Mr. Robert Miller
Public Works Director
City of Eagle Point
17 Buchanan Ave South
Eagle Point, OR 97524

RE: Final Closeout Memorandum on 3.6 MG Tank Project

Dear Robert:

On behalf of Civil West, I want to thank you and the City of Eagle Point for the opportunity to provide engineering support on the recent project to address leakage and other deficiencies at the City's 3.6 MG tank. The purpose of this memorandum is to provide a final accounting of our success with the project, provide final recommendations, and generally closeout the project.

Background

Civil West and our team of subconsultants were directed to evaluate the City's 3.6 MG tank and make recommendations to improve the facility. This included determining its current ability to be in service as well as what can be done to reduce leakage from the tank and extend its useful life.

We completed two separate site visits to evaluate the inside and the outside of the tank. We observed some surface ground movement around the tank and cracking within the tank that was mostly isolated to the floor. We surveyed and monitored the conditions and used this information to complete an evaluation.

A Triage Memorandum was prepared and submitted to City Staff and the City Council in June 2012. The memorandum suggested the following actions regarding the tank:

1. The tank did not appear to be facing and catastrophic or progressive failure pattern. Nobody on our team could see any reason why the tank could not be placed back into service. This could alleviate some of the problems the City was having with system pressures in various parts of the community.

2. The emergency valve operators had been out of service for some time and their benefit was questionable. For the time being, it was not recommended that their replacement be a high priority.

3. Before placing the tank back online, the City should undertake a "seeding" process in an effort to "heal" the floor of the tank. The seeding process involved spreading raw, dry cement on the floor of the tank then filling the tank with water. The concept is that the cracks in the floor

would pull the cement into the cracks and the cement would bond in the cracks and heal the floor, thus reducing leakage.

4. The reason for the floor cracking was still not clear to our team though we had theories that may be confirmed with additional evaluations, testing, and monitoring.

A presentation was made to the City Council and the Council authorized the City to move forward with the seeding process as recommended.

Report on Results of Seeding Effort

The seeding effort was completed right around the middle of the month of June (2012) and the tank was allowed to heal for several days. The history on the leakage rates of the tank are roughly as follows:

- Initial leakage rates measured by City ..... ~35 gpm (~50,000 gal/day)
- Leakage after the crack sealing effort by Contech Services ..... ~17 gpm (~25,000 gal/day)
- Leakage rate immediately after "seeding" ..... ~2.5 gpm (~3,600 gal/day)
- Latest leakage rates reported after "seeding" ..... ~1.7 gpm (~2,500 gal/day)

Based on these measurements, the combined effort of seeding and crack sealing (performed before our involvement) has been an overwhelming success reducing leakage in the tank by 95%.

The City has been directed to monitor and record the leakage rate from the foundation drain twice weekly for an indefinite period. If there is a change if rate, turbidity, or other factor, we should be notified immediately.

While the rate of leakage should not be considered the only indicator for the health and viability of the tank, the results of this effort should be considered a success story.

Follow Up on Tank Emergency Valve Operators/Actuators

When originally constructed, the engineer included an electronically controlled valve on the outlet of the tank. It appears that the intent of this valve was to automatically close in the event of a downstream pipeline failure.

The pump station building, adjacent to the valve vault at the tank site, includes a PLC (programmable logic controller or computer) that controlled the automated valve. According to staff, the PLC would monitor the tank level and the rate at which the tank level changed. If the tank level fell a predetermined amount over a set period of time, the PLC would interpret that as a potential downstream pipe failure and would direct the valve to the closed position. Staff would have to reset the alarm condition to reopen the valve once the "all clear" was given.

The problem with this scenario or operation is that the PLC has no way of determining if there is a pipe failure, major leak, or major firefighting effort in the community. In fact, the smaller (200k gallon) tank has a similar system that would constantly alarm and close the emergency valve under normal peak operating conditions. This regular false alarm was a problem for operations personnel as they would have to reset the alarm to reopen the valve and get water to the system.

The vaults housing these valves and actuators were designed and constructed with a significant flaw. Neither vault (3.6 MG or 200k gallon) was designed or constructed with a method of removing water from within the vault. Normally, a vault would be constructed with a drain that would "daylight" to

gravity. If water would collect or leak into the vault, it would simply drain away. If a gravity drain is not possible, a vault should be designed with a sump and pumping system to remove water from the vault.

As neither vault had a system to remove water, they have, reportedly many times over the years, filled with water for one reason or another. When this happened, the electronic valve actuators got wet or were fully submerged. As they were not designed to be submerged, this caused both actuators to fail. It is unclear how long the actuators have been out of service, but it appeared to be for many years.

We considered several options to address the valve issue at each tank site. To summarize:

Option 1: Do Nothing - Under this option, we would acknowledge that the operating strategy of the valves is not very useful to the City. Without additional sophistication or metering, it is difficult to tell the difference between a major leak or pipe failure and a firefighting effort. It must also be acknowledged that the City has been operating for many years without this redundant safety system in place as the actuators were damaged by water many years ago.

Some communities install electronic control valves and tie them into seismic sensors with the idea that they would close in the event of a major earthquake. While this approach is more practical than the City's current operating strategy for alarms, there are few smaller communities in Oregon that utilize automated valves at their tanks.

Therefore, it is possible that the City could just do nothing and continue to operate without these automated valves at the tank sites.

Option 2: Replace the Actuators: Electronic actuators are very expensive pieces of equipment. Each actuator will cost the City between $6,000 and $8,000 to replace, not including installation. If additional upgrades are required for programming or electrical improvements, it is possible that a project to replace both damaged actuators could have a budget of $25,000 or more.

Also, if the City went through the expense of installing new actuators, they should install a system to ensure that water does not build up again in the vault. This would include installing a new sump pump, running an electrical circuit for the pump, installing a redundant alarm to warn if the pump fails or cannot keep up with water in the vault, and piping to eject the water to the outside and downhill away from the vault. While sump pump systems are not necessarily expensive, the City should expect to pay a few thousand dollars.

Considering all things, a budget of around $30k is recommended for this option if the City elects to replace both damaged valve actuators. For this amount, seismic sensors could be added to the controls to sense an earthquake and alarm under that condition also.

Option 3: Combination: Under this option, the City would choose to do nothing with the replacement of the actuators, but would install a sump pump system in each vault to facilitate operations and eliminate the need to pump the vaults manually when the crew needs to enter to do maintenance.

Under this option, the City should budget between $4k-$5k to install sump pump systems at both vaults. If the City utilizes in-house forces, the budgeted costs could be less.

Recommendation: Unless the City wishes to make a significant investment to increase the sophistication of the emergency valves to consider flow, seismic input, or more robust data feedback from the tank, the existing operating strategy has not served the City well. Therefore, it is not recommended that the City invest to restore the existing system. The City has operated for many years

without the emergency valves and they have not even noticed. We do not recommend the City invest in new valve actuation at this time. While it can always be added in the future, it does not appear to be the best use of City water funds at this time.

We do, however, recommend that the City install a sump pump system at each vault to prevent the buildup of water in the vault. It will pay dividends in both operating and capital costs by keeping the vaults free of water. The City should budget and install the sump pump systems as soon as they are able.

Follow up on Internal Tank Sealing or Painting

During the evaluation, we asked coating suppliers and application experts to inspect the inside and outside of the tank and provide their opinion on what they would recommend to eliminate leakage in the 3.6 MG tank. In addition to those that visited the tank site, we contacted several others to seek opinions and input on what has worked for other similar facilities.

We received a number of proposals and recommendations for coating systems. These ranged from thick rubberized coatings (Liquid Boot) to thinner flexible coatings like Sherflex from Sherwin Williams.

The general approach for each of the coating specialists was to coat all surfaces in the tank including the floor, walls, columns, and piping penetrations. Because we could not definitively identify the source of leakage, they recommended encapsulating everything.

The major problem with a coating system is that nothing is permanent. No matter how durable or reliable, a coating system becomes a maintenance item once it is applied.

It is the opinion of our team that concrete does not require a coating to be water tight. Therefore, our attention turned toward addressing the cracking in the floor as evidence suggested the cracks were actively leaking. The seeding effort was our recommendation rather than a coating system.

Based on the results of the seeding effort presented previously in this memo, no additional coating effort is required or recommended for the interior of the reservoir.

Follow up on External Tank Painting and Maintenance

The 3.6 MG tank was originally constructed in 1996. The exterior surface of the tank is finished with a stucco-like concrete or “shotcrete” surfacing that has a rough, popcorn-like texture. The surface was originally painted green for cosmetic reasons and to protect the concrete surface from the elements.

Over the past 16 years, the surface of the tank has weathered and is showing a need for some maintenance. The shotcrete surface has some minor cracking over the entire surface. This is likely a result of years of temperature differentials, weathering, and wet conditions. Though normal, the cracks should not be allowed to get wider or allow water to penetrate below the exterior surface as this could damage the wall section.

Larger cracks should be sealed with an appropriate caulk or silicone-type sealant to prevent water from penetrating below the surface. Within the next few years, the City should budget to recoat the surface of the tank with an appropriate and durable coating that is intended for concrete, stucco or other porous or rough surfaces.

A product such as Loxon XP, A24 Series from Sherwin Williams would be a good choice for the exterior coating of the tank. Loxon XP is available in a variety of colors and is widely used in this type of application.

When undertaken, the City should develop a performance specification that will include detailed requirements for preparation of the surface, application, and cleanup. There are a number of qualified painting contractors in the area capable of completing this task for the City.

The City should be prepared to undertake this project with a budget of around $65,000 to undertake this maintenance project.

Follow up on Other Tank Maintenance Issues

During the evaluation, several other issues were noted or discussed regarding the tank site. Most notable is the movement of the fencing, gates, concrete stoop in front of the pump station, and other ground movement issues.

Generally speaking, we felt that most of these issues were a result of shallow ground movement or creep of the overlying soils caused by seasonal changes in moisture and other factors.

These items should be considered as maintenance items and addressed as the City has funding and time to do so. They do not, necessarily affect the operation of the reservoir unless the fencing no longer provides the level of security desired for the facility.

Follow up on Water Modeling and General Water System Issues

As part of this initial phase of evaluation, we completed some water modeling activities and evaluation of the existing water system. While just an initial evaluation, it is worthwhile to provide a report on the status of that effort at this time.

Water Model: The City's previous consultant had developed a computerized water model (WaterCAD) for the City's system. As part of this project, we met with the previous consultant and obtained a digital copy of the model and other materials that they felt would be useful to us during modeling.

With a little difficulty, we were able to convert the older file into the current WaterCAD format. In general, the model was in good condition though there were many parts of the City and newer subdivisions and piping systems that had not been entered into the model. It appeared that it had been several years since the model was updated.

We worked with staff to identify the missing areas and we updated the model to include all known piping sections, subdivisions, and facilities. We also corrected numerous errors or items that have changed in recent years due to projects and upgrades to the system.

Upon running the model, it was able to output several more errors or problems that we were able to correct. We are relatively confident now that the current model represents the existing system with a reasonable level of accuracy. This is important as the model can be used to evaluate the existing conditions as well as consider changes to the existing conditions and the effect (positive or negative) those changes would have if implemented.

The model is in a position now where it can be used as a tool for master planning and evaluation of the system. Working with hydraulic models can take a great deal of skill and insight but the benefits of "testing" the system in a digital environment are worth a great deal.

Water Pressure and Pressure Zones: It was very clear that the City experienced problems with system pressure while the 3.6 MG reservoir was offline. This was largely due to the fact that the system was operating via the 4.0 MG tank which sits approximately 30 feet lower than the 3.6 MG tank. That difference in elevation was enough to impact pressures throughout the system.

Once the 3.6 MG tank was placed back online, most of the pressure problems dissipated. However, the 4.0 MG tank is having difficulty with turnover as a result of its relationship with the higher tank.

This problem is fixable though more time needs to be spent in the model to determine what should be done to address the issue.

Bellerive Pump Station Issues: While the 4.0 MG tank was offline, the Bellerive Pump Station (BPS) experienced a number of operational problems. They could most accurately be described as low suction pressure or "pump starving" issues. Based on the preliminary system modeling, it is difficult to say exactly why the pump station is not operating properly. However, when the 3.6 MG was placed back online, the operational issues at the pump station dissipated as well.

200,000-Gallon Tank and Service Area Issues: During our preliminary evaluation, it was clear that the service area that is currently served by the 200k-gallon tank is too large for the reservoir. The demand placed on the reservoir is far greater than is reasonable from a water planning and operational perspective. This issue needs further evaluation and consideration of additional growth and expansion within the existing reservoir service area and the potential for growth to the north and west of the service area as the City is anticipating will take place.

Distribution System Deficiencies: During our preliminary evaluation, there were numerous missing "loop" closures and interconnections in the distribution system that would clearly enhance or improve the operation of the system. As part of a more refined evaluation, these deficiencies should be identified and recommendations developed to address them.

Need for Updated Planning: During the initial evaluation, we studied the Cities previous Water Master Plan (Hardie Engineering, 2002) in detail to learn what we could from the planning effort. There is little information or recommendations in the 2002 planning effort that are applicable to the City today. In general, the planning effort is no longer a useful or viable planning document.

Many of the issues mentioned above would best be evaluated in a new water master plan. The new plan should take an overall, holistic approach to the City's water issues from source, to distribution, to storage, to the end users. The new plan should include the following elements:

- Detailed evaluation of existing facilities and conditions
- Identification of existing demands and future projected demands and needs
- Identification of deficiencies that are existing and those that are projected
- Development of alternatives to address deficiencies
- Preparation of cost estimates for viable alternatives
- Recommendations of best alternatives to address deficiencies
- Assembly of a new capital improvement plan
- Evaluation of funding scenarios and potential impacts to rate payers

While these would be considered typical components of a water master plan, many communities seek to expand the planning effort to include optional or extended planning components such as the following:

- Water Management and Conservation Planning
- SDC Methodology Update
- Rate Study

Based upon the cursory review that was completed during this phase of planning for the City, it is apparent that updated and "big picture" planning is needed for the Eagle Point water system. In order to avoid "picking at the edges" of the problems, it is recommended that the City undertake a water master planning effort in the very near future. If desired, the optional or extended planning components can be added at a later date.

Given the work we have completed to date, Civil West is in an excellent position to provide these planning services to the City at this time. We would be pleased to prepare a more detailed scope of services and engineering proposal for this activity upon request.

Follow up on Further Geotechnical and Structural Evaluations

Our scope of work originally included an evaluation and study after the completion of the initial Triage Evaluation. The intent of the follow up evaluation was to undertake more detailed and specific structural and geotechnical evaluations in an effort to determine why the tank floor has cracked and if additional improvements are needed to ensure the viability of the tank for many more years to come.

The additional services that were planned included geotechnical drillings and borings of the soils around the tank, the installation of piezometers to monitor groundwater conditions over a year's time, and inclinometers to monitor the movement of ground over a year's period of time. Upon completion of these geotechnical explorations, a detailed geotechnical report would be produced with findings and more interpretation of the conditions and how they may have or may be affecting the tank.

In addition to the above geotechnical evaluation, the follow up study was to include additional structural calculations, evaluations, and investigations to further evaluate the structural issues related to the tank.

Based on the preliminary evaluation of the Triage Report and the success of the seeding project, the City has elected to postpone or, perhaps, completely eliminate these additional follow up steps and evaluations.

It is understood that there is no guarantee that these additional evaluations will result in any new information or hard evidence regarding the cause for the cracking of the tank floor or whether other movement or damage can be expected within the remaining life of the tank. We further understand that these additional evaluations are costly and those funds could be used in a variety of other ways. However, it must also be understood that conditions at the tank could worsen over time given the information we currently possess. The City should diligently monitor the leakage rates, ground movement, and survey the tank levels regularly to ensure that if something changes, the City can react in a timely manner.

The geotechnical and structural consultants on the project wished to provide final memorandums to clarify their positions and perspective regarding the importance of additional evaluation and testing. Copies of those letters have been provided with this memorandum for your consideration.

Final Budget Status Summary

Due to the elimination of the additional studies on the project and general project efficiencies, the project will be completed under budget. For the purposes of accounting for the budget status, the following final budget summary is provided: (note: final balances are approximate as of the completion of this memorandum)

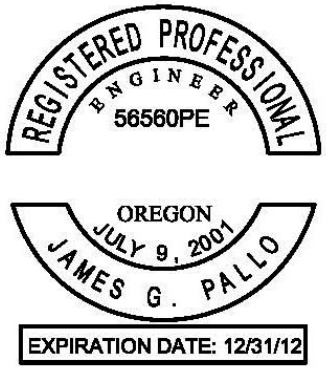
- Original project budget $80,102
- Amount earned to date (including subs) $33,450
- Amount under budget $46,652

The remaining funds could be utilized by the City to complete water master planning, tank painting, or other water system improvements.

We are grateful for the opportunity to undertake this project for the City. We are pleased with the results and feel that the City is in an excellent position to move forward with additional planning and improvements for the Eagle Point water system.

Please feel free to contact me if there are any questions about this final memorandum or if Civil West can provide additional services to the City at this time with any of your infrastructure needs.

Respectfully,
Civil West Engineering Services, Inc.



J. Garrett Pallo, PE
Principal

Attachments:

1. PSE Final Memorandum
2. PBS Final Memorandum

APPENDIX C

WATER SERVICE AGREEMENT

THIS WATER SERVICE AGREEMENT, (hereinafter referred to as Agreement), made and entered in duplicate on the 19 day of Oct 2011, by and between the City of Eagle Point, a municipal corporation of the State of Oregon, acting as purchaser (hereinafter referred to as CITY), and the City of Medford, a municipal corporation of the State of Oregon, acting by and through its Board of Water Commissioners, acting as vendor (hereinafter referred to as MWC),

WITNESSETH:

WHEREAS, MWC has wintertime (October through April) surplus water available in its water system, and

WHEREAS, CITY desires to purchase said surplus water from MWC, and treat and transport services for City's own permitted or certificated water rights during summertime (May through September) from MWC, and

NOW, THEREFORE, for and in consideration of the foregoing and of the mutual promises hereinafter expressed, and intending to be legally bound hereby, the parties hereto mutually agree as follows:

ARTICLE 1. SCOPE OF WATER SUPPLY SERVICE

MWC agrees to continue to supply surplus water up to a combined (from all connections) maximum of 1,350 gallons per minute (GPM) for the months of October through April, and treat and transport water up to a combined (from all connections) maximum of 3,125 GPM for the months of May through September. In the case of an emergency, MWC agrees, with prior MWC notification, to increase the supply within the limits of the system. CITY shall immediately take all necessary steps to remedy the emergency.

ARTICLE 2. MWC CONNECTIONS

The CITY's water supply is provided by the following connections:

White City: One 6-inch and one 8-inch meter at Avenue G and Highway 62.

The CITY's emergency water is provided by the following connections:

MWC Big Butte Springs Transmission Mains: Two 4 inch and one 8 inch connections in and near Eagle Point.

MWC agrees to supply water to the City at the Avenue G and Highway 62 connections in White City for utilization on a year-round basis. The parties have agreed the CITY may request activation of the MWC Big Butte Springs connections during the months of October through

April, at a combined (from the three Big Butte Springs transmission main connections) maximum rate of 600 gallons per minute (GPM) **UNLESS** the Robert A. Duff Water Treatment Plant is operating in which case the Big Butte Springs connections may need to be turned off. Both parties acknowledge that sometime in the future the Robert A. Duff Water Treatment Plant will run continuously all year.

The CITY shall give MWC as much notification as possible whenever emergency connections are needed. MWC will activate the Big Butte Springs connections as soon as reasonably possible to avoid a water shortage. CITY shall use due diligence in making repairs or other improvements necessary in order to remedy the need for the emergency connection.

All Big Butte Springs emergency connection piping, meters, appurtenances and backflow prevention (including annual testing of meters and backflow devices), downstream of the emergency connections control valves shall be owned by and the responsibility of CITY.

ARTICLE 3. WATER SERVICE FROM MWC BIG BUTTE SPRINGS TRANSMISSION LINES

MWC will keep CITY notified of any changes in operation, maintenance, water quality, water quantity, or Federal/State regulations that may affect the ability of MWC to continue to supply water from the Big Butte Springs transmission mains.

ARTICLE 4. RULES AND REGULATIONS

All rules and regulations of the Board of Water Commissioners relating to water users outside the City of Medford, specifically Other Cities, as now in effect or as the Board of Water Commissioners of the City of Medford may time to time prescribe, shall be deemed a part of this Agreement, and CITY agrees to comply with such rules and regulations. No such rules or regulations shall relieve MWC of its obligation to supply water in accordance with terms of this Agreement except as may be dictated by Federal/State regulations or other items beyond the control of MWC. Nothing contained in this Agreement shall be deemed to modify, alter, or repeal any such regulations now or hereinafter adopted.

ARTICLE 5. URBANIZATION POLICY

CITY agrees that water supplied to its customers is an "urban" service and should be confined to current or future CITY residents, businesses, schools and those customers otherwise within CITY's geographical boundaries, or as otherwise currently exists as approved by MWC. The general water service boundary map for the CITY is attached to this Agreement. This map is intended to be modified as urban boundaries change due to regional and local planning decisions. CITY agrees to not allow the extension of water service outside of CITY limits unless the property requesting service is within its urban growth boundary, has signed an irrevocable

consent to annex to the CITY, or as otherwise approved by the MWC. CITY also agrees to notify MWC in writing of all annexations to the CITY.

ARTICLE 6. MEETING FUTURE WATER DEMANDS

CITY understands that this agreement calls for supplying wintertime surplus water and summertime treat and transport water from MWC. CITY understands and agrees that additional sources of water may be required to meet future summertime demands, specifically by Year 2030. Even though it is several years away until the current summertime MWC surplus water is fully utilized by MWC's own inside/outside users, plans and actions are needed now to avoid future water shortages. CITY agrees to maintain a water resource plan and financial plan to purchase additional water supplies as needed, and maintain the required demand water rights in perpetuity. MWC agrees to coordinate and cooperate on the perfection of any water rights currently permitted in City's name or obtained in the name of Eagle Point to meet these demands. Demand projections for the future will be reviewed on the renewal date of this Agreement, and may require additional water rights as needed to meet those demands.

MWC has included the service area of CITY on water right permits made to the Oregon Water Resources Department (OWRD); however, CITY acknowledges that the surplus water used by MWC to supply CITY demands comes from water right certificates and permits issued by OWRD to MWC. CITY acknowledges that these permits and certificates therefore belong to MWC. CITY also acknowledges that MWC has discretion to lawfully re-designate or change areas of service of noted surplus water for future agreements.

MWC maintains water-measuring equipment at the Duff Water Treatment Plant for recording the amount of water withdrawn from the Rogue River covering all water rights, and all data required is of public record. MWC also monitors two (2) master water meters at Avenue G and ~~at~~ Highway 62 in White City and three (3) metered connections on the Big Butte Springs Transmission Mains in and near Eagle Point to record the amount of water used by the CITY. MWC provides on a monthly bill the usage of water by CITY pertaining to this Agreement.

ARTICLE 7. PAYMENTS TO MWC

CITY shall pay monthly to MWC for all water thus purchased from MWC at MWC's regularly scheduled rates for water service to Other Cities in effect at a particular time. MWC reserves right to change said rate at any time upon sixty (60) days written notice to CITY. MWC will notify CITY annually, at least two months prior to the end of the calendar year of MWC's opinion as to the need for rate adjustment during the subsequent year.

ARTICLE 8. TERM OF AGREEMENT

This term of Agreement shall be five (5) years from the date hereof. CITY may, at its option, extend the term for three additional five-year periods, which periods would run through 2021, 2026, and 2031 respectively. Written notice of the election to exercise a five-year extension of the contract must be given to MWC not later than January 1st of the year in which the agreement would expire if there was no extension. MWC has every intention of selling water to CITY as long as CITY desires to purchase water from MWC. MWC agrees to negotiate in good faith with CITY for renewal of the Agreement. In the event the CITY does not renew the Agreement, then the current Agreement will continue in effect as long as reasonably necessary to allow CITY to secure other sources of water. However, Section 19 of the Charter of the City of Medford limits the term of water service contracts to 20 years and, therefore, the obligations of MWC under this Agreement shall not, under any circumstances, exceed that period of time. CITY shall make no assignment of the rights or interests herein granted without written permission from MWC, except as otherwise dictated by Federal/State laws. In the event of any occurrence rendering the CITY incapable of performing under this agreement, any successor of the CITY, whether the result of legal process, assignment, or otherwise, shall succeed to such right of the CITY hereunder.

ARTICLE 9. WATER CURTAILMENT PLAN

MWC, on March 4, 2009, passed Resolution No. 1345 adopting a Water Curtailment Plan for the MWC service area. This plan calls for the curtailment of water use by all types of MWC users that MWC is providing water to during periods of drought or emergency. The MWC Water Curtailment Plan is hereby incorporated into and made a part of this Agreement by this reference, unless CITY's own state-approved and CITY-adopted Water Curtailment Plan is in effect. During emergency or drought periods, the MWC shall give CITY as much advance warning as possible prior to curtailment of water supplies. The level of curtailment shall be determined by MWC based on the severity of the proposed shortage. The CITY shall be responsible for enforcing the MWC curtailment plan in its service area.

ARTICLE 10. INDEMNITY AND COMPLIANCE WITH LAWS AND REGULATIONS

To the extent CITY or MWC is to perform work pursuant to the terms of this Agreement, each party agrees that it will be solely responsible for any damage or trespass to or upon adjacent property or injury thereto and any and all other liability or damages resulting from or in connection with its operation, and that it will hold each other harmless from any claim, liability, damages or obligation arising there form and indemnify each other for the amount of any obligation it may incur on account thereof or arising there from. Provided also that CITY and

MWC shall not be required to indemnify each other against liability or damage arising out of death or injury to persons or damage to property caused in whole or in part by the negligence of either party, except to the extent that the death or bodily injury to persons or damage to property arises out of the fault of either party's agents, representative, or subcontractors.

To the extent CITY or MWC is to perform work pursuant to the terms of this Agreement, both parties shall at all times observe and comply with all Federal/State laws, ordinances and regulations, in any manner affecting the conduct of the work, and all such orders or decrees as exist at the present and those which may be enacted later by bodies or tribunals having any jurisdiction or authority over the work, and shall indemnify and save harmless each other and all of each parties' officers, agents and servants against any claim or liability arising or based on the violation of any such law, ordinance, regulation, order or decrees, whether by themselves or their employees.

ARTICLE 11. PARTIAL INVALIDITY

If any term, covenant, condition, or provision of this Agreement is found by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder of the provisions hereof shall remain in force and effect, and shall in no way be affected, impaired, or invalidated thereby.

ARTICLE 12. INTEGRATION

This Agreement represents the entire understanding of MWC and CITY as to those matters contained herein. No prior oral or written understanding shall be of any force of effect with respect to those matters covered herein. This Agreement may not be modified or altered except in writing signed by both parties.

ARTICLE 13. JURISDICTION

This agreement shall be administered and interpreted under the laws of the State of Oregon. Jurisdiction arising out of litigation arising from this Agreement shall be in that state.

ARTICLE 14. DEFAULT

It is further understood and agreed by and between the parties hereto that this Agreement is conditioned upon the faithful performance by CITY of all terms and provisions hereof, which, on its part, are to be kept and performed and any failure to do so or any default which is not remedied within thirty days after the mailing of written notice from MWC to CITY specifying the particulars of the alleged default, shall give the MWC the right to terminate this Agreement. Notwithstanding the foregoing, CITY shall not be deemed in default hereunder if the default is

such a nature that it cannot be fully remedied within thirty days and CITY proceeds in good faith to cure such default.

IN WITNESSETH WHEREOF, the parties hereto have caused these present to be signed by their proper officers the day and year first written above.

MWC:
THE CITY OF MEDFORD
BY AND THROUGH ITS
BOARD OF WATER COMMISSIONERS

Chair

Karen M Sprouatt
City Recorder – Deputy

10/19/11
Date

CITY:
THE CITY OF EAGLE POINT

Mayor

City Recorder

10-11-2011
Date