DRAFT

CITY OF PENDLETON

Water System Master Plan

MSA Murray, Smith & Associates, Inc.
Engineers | Planners

MAY 2015

WATER SYSTEM MASTER PLAN

FOR

THE CITY OF PENDLETON

MAY 2015

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COMMON ENGINEERING ACRONYMS & ABBREVIATIONS

A

AACE	AACE International
ABF	activated biological filter
AC	asbestos cement
ADA	Americans with Disabilities Act
ADD	average daily demand
AF	acre-feet
AIA	Airport Industrial Area
AMCL	alternative maximum concentration level
AMI	automated metering infrastructure
AMR	automated meter reading
AMZ	asset management zone
AOR	actual oxygen required
APWA	American Public Works Association
ASR	aquifer storage and recovery
AWWA	American Water Works Association

B

BFP	belt filter press
BLI	buildable lands inventory
BOD	biochemical oxygen demand
BWF	base wastewater flow

C

C&R	construction and replacement
CAA	Clean Air Act
CAD	computer aided drafting
CAS	cast iron
ccf	100 cubic feet
CCI	Construction Cost Index
CCR	Consumer Confidence Report
CCTV	closed-circuit television
cf	cubic feet
cfs	cubic feet per second
CHL	clarifier hydraulic loading
CIA	current impact area
CIP	capital improvement program
CMOM	capacity, management, operation and maintenance
CN	curve number
COD	chemical oxygen demand
COMPASS	Community Planning Association of Southwest Idaho
COSM	Central Oregon Stormwater Manual
CP	concrete pipe

CPI-U	Consumer Price Index, Urban Consumers
CSL	clarifier solids loading
CSMP	Collection System Master Plan
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act

D

DBP	disinfection byproducts
d/D	depth to diameter ratio
D/DBP	disinfectants and disinfection byproducts
DEQ	Department of Environmental Quality
DIP	ductile iron pipe
DOD	depth of flow over diameter of pipe
DOE	Department of Ecology
DWF	dry weather flow

E

ENR	Engineering News Record
EOCI	Eastern Oregon Correctional Institution
EPA	U.S. Environmental Protection Agency
ERP	Emergency Response Plan
EUAC	Equivalent Uniform Annual Cost

F

FEMA	Federal Emergency Management Agency
FM	flow monitors
FMB	flow meter basin
FOG	fats, oils, grease
fps	feet per second
ft	foot, feet
FTE	full-time equivalent
FV	future value
FY	fiscal year

G

GAC	granular activated carbon
GBT	gravity belt thickener
GIS	geographical information system
gpapd	gallons per acre per day
gpcpd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
gpupd	gallons per unit per day
GWI	groundwater infiltration

H

HDPE	high-density polyethylene
HGL	hydraulic grade line
hp	horsepower
hr	hour
HRT	hydraulic retention time
HVAC	heating, ventilating and air conditioning

I

ID	inside diameter
IEEE	Institute of Electrical and Electronics Engineers
I/I	inflow/infiltration
in	inch, inches
IOC	inorganic compound

K

kVA	kilovolt-ampere
kW	kilowatt

L

L	liter
lb	pound
LCR	Lead and Copper Rule
lf	linear feet
LRAA	locational running annual averages
LS	lift station

M

M	million
ma	milliamp
MCL	maximum concentration level
MCLG	maximum concentration level goal
M/DBP	microbial and disinfection byproducts
MDD	maximum day demand
mg	milligram
MG	million gallons
mgd	million gallons per day
mgh	million gallons per hour
mg/L	milligrams per liter
MH	manhole
mL	milliliter
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
mm	millimeter
MRDL	maximum residual disinfectant levels
mrem	millirems

MSA	Murray, Smith & Associates, Inc.
MSL	mean sea level
N	
NPDES	National Pollutant Discharge Elimination System
NPV	net present value
O	
O&M	operations and maintenance
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
P	
%	percent (use with numerals – e.g., 13%)
PAL	provisionally accredited levee
pCi/L	picoCuries per liter
PDF	peak design flow
PDWF	peak dry weather flow
PER	Preliminary Engineering Report
PFP	Public Facility Plan
pH	measure of acidity of alkalinity
PHD	peak hour demand
ppb	parts per billion
ppm	parts per million
PRS	pressure-reducing stations
PRV	pressure reducing valve
psi	pounds per square inch
PSV	pressure-sustaining valve
PUD	public utility district
PV	present value
PVC	polyvinyl chloride
PWMP	Public Works Management Practices Manual
PWWF	peak wet weather flow
Q	
QA	quality assurance
QC	quality control
R	
RDII	rainfall dependent infiltration/inflow
ROW	right-of-way
RRF	resource recovery facility
RSSD	Rieth Sanitary Sewer District
S	
SBOD	soluble biochemical oxygen demand
SCADA	supervisory control and data acquisition
SDC	system development charge

SDR	standard dimension ratio
sec	second (measurement of time)
SOC	synthetic organic compound
SOW	scope of work
SRT	solids retention time
SSOAP	Sanitary Sewer Overflow Analysis and Planning
SVI	sludge volume index
SWMP	Stormwater Master Plan

T

TAZ	traffic analysis zones
Tc	time of concentration
TCR	Total Coliform Rule
TDH	total dynamic head
TMDL	total maximum daily load
TP	transite pipe
T/S	transit/storage
TSS	total suspended solids
Tt	travel time
TTHM	total trihalomethanes

U

UGA	urban growth area
UGB	urban growth boundary
UIC	underground injection control
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

V

VFD	variable-frequency drive
VCP	vitrified clay pipe
VFD	variable frequency drive
VOC	volatile organic compound
VSS	volatile suspended solids

W

WAS	waste-activated sludge
WFP	water filtration plant
WMCP	Water Management and Conservation Plan
WRF	water reclamation facility
WSMP	Water System Master Plan
WWTP	wastewater treatment plant

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Engineers/Planners

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SECTION 1
EXECUTIVE SUMMARY

Introduction

The City of Pendleton (City) owns and operates a public drinking water system. This Water System Master Plan (WSMP) documents key water system information and provides analysis and recommendations that inform infrastructure development and operational decisions by City staff.

How This Plan Should Be Used

This WSMP serves as the guiding document for future water system improvements, and should:

- Be reviewed annually to prioritize and budget needed improvement projects.
- Have its mapping updated regularly to reflect ongoing development and construction.
- Have its specific project recommendations regarded as conceptual. (The location, size and timing of projects may change as additional site-specific details and potential alternatives are investigated and analyzed in the preliminary engineering phase of project design.).
- Have its cost estimates updated and refined with preliminary engineering and final project designs.

Scope of Work

The City selected Murray, Smith & Associates, Inc. (MSA) to create master plans for the drinking water, stormwater, and sewer collection systems. The scope of work (SOW) for this WSMP includes the following major tasks and deliverables:

- Describe the City's existing water system.
- Develop and calibrate a hydraulic model.
- Develop population and water demand projections consistent with the City's 2011 Comprehensive Plan Update.
- Develop performance criteria.
- Evaluate the water system's hydraulic capacity to identify deficiencies for existing, 5-year, 10-year, 20-year, and build-out planning horizons.
- Conduct and summarize benchmarking data comparing the City's operations and maintenance (O&M) practices to similar municipalities.
- Review the City's current O&M program and present recommendations.
- Develop an ongoing repair and replacement program for distribution mains.

- Develop capital improvement program (CIP) recommendations and cost estimates for projects required through build-out.
- Develop a specific future improvement plan for the Airport Industrial Area (AIA) in northwest Pendleton.
- Develop a water system financial plan that identifies a funding strategy for the CIP, aging infrastructure repair and replacement, and staffing.

Organization of the WSMP

This WSMP is organized into seven sections, as described in Table 1-1. Detailed technical information and support documents are included in the appendices.

Table 1-1
WSMP Organization

Section	Description
1 – Executive Summary	Purpose and scope of the WSMP and summary of key components of each part of the plan.
2 – Existing System Description	Description of the service area and overview of the existing system and facilities.
3 – Population and Demand Projections	Population projections and water demand estimates for existing and future service area boundaries.
4 – System Analysis	Overview of system performance criteria. Discussion of supply, storage, and pumping capacity, and distribution system hydraulic analysis and deficiencies for existing and future planning horizons.
5 – Operations and Maintenance	Describes current operations and maintenance procedures, summary of benchmarking results comparing the City to similar municipalities, summary of recommendations.
6 – Capital Improvement Program	Improvement project recommendations including cost estimates and timeframe for implementation.
7 – Financial Plan	Strategy for funding water system improvements.

Existing System Description

The Public Works Director manages the City-owned water system and supervises the Water Division Superintendent, who oversees the system's operation. The existing Pendleton water system serves approximately 17,600 people at 5,800 residential and commercial service connections. The City's ultimate future water service area includes all land within the Urban Growth Boundary (UGB).

Pendleton draws its water supply from seven active groundwater wells located throughout the City and one well near the City of Mission that is filtered at the Water Filtration Plant (WFP) along with surface water from the Umatilla River. Five of the City's wells are configured for Aquifer Storage and Recovery (ASR). ASR is a water management tool whereby potable water is injected into a well during periods when excess and inexpensive surface water supply is available. This injected water is stored in the aquifer for use during periods of low surface water supply availability and high demands, generally in summer.

The City's water distribution system is divided into 13 pressure zones served by 8 distribution storage facilities, 13 booster pump stations (nine establish pressure zones and four are 4 within zones), and 9 pressure-reducing valves (PRV). The system includes approximately 107 miles of pipeline and approximately 700 fire hydrants.

Prior to the water master planning process, MSA and the City undertook an effort to create a Geographic Information System (GIS) database of the water, sewer, and stormwater systems. The new water system database was created based on existing hard copy and CAD maps showing the size and location of water mains and other facilities. This water system GIS was used to develop a hydraulic model of the distribution system. The City recently hired a GIS Coordinator who is working to improve the quality of the information in addition to collecting new data points and attributes.

Population and Water Demand Projections

Population growth and water demand projections were developed for; existing (2013), 5-year, 10-year, 20-year, and build-out planning horizons. Current water demands were estimated from historical customer billing records and water production data. The Eastern Oregon Correctional Institution, housing approximately 1,600 people, is the City's single largest water user with an average daily demand of 225 gallons per minute (gpm).

Future water demand projections were based on current water use characteristics, projected land development and forecasted population growth. Population growth was forecast based on current land use and zoning designations, estimated residential population density, vacancy rates and other assumptions consistent with the City's 2011 Comprehensive Plan Update.

The location and rate of anticipated development was based on a review of developable land and input from City staff. Projected water demands are used to assess the capacity of existing water system facilities and develop recommended water system improvements to serve anticipated growth. The timing of recommended system improvements should be scrutinized based on actual growth and water demand at the time the improvement is to be constructed. Population and water demand projections are presented in Table 1-2.

Table 1-2
Population and Water Demand Projections by Pressure Zone

Pressure Zone	Existing (2013)		5-Year		10-Year		20-Year		Build-Out	
	ADD (mgd)	MDD (mgd)	ADD (mgd)	MDD (mgd)	ADD (mgd)	MDD (mgd)	ADD (mgd)	MDD (mgd)	ADD (mgd)	MDD (mgd)
Airport	0.065	0.159	0.301	0.738	0.353	0.865	0.353	0.865	0.894	2.189
Airport NW 49th	0.009	0.021	0.009	0.022	0.009	0.022	0.031	0.076	0.196	0.479
Airport Road	0.0006	0.001	0.001	0.001	0.0006	0.001	0.0006	0.001	0.027	0.066
Airport NW 47th	0.004	0.010	0.004	0.010	0.004	0.010	0.004	0.010	0.208	0.510
Cemetery	0.463	1.139	0.623	1.525	0.708	1.736	0.912	2.233	1.369	3.355
Future 1420	-	-	-	-	-	-	-	-	0.006	0.014
Future 1570	-	-	-	-	0.035	0.085	0.035	0.085	0.067	0.164
Gravity	2.947	7.249	3.130	7.667	3.370	8.257	3.467	8.494	4.798	11.756
Jr. High	0.047	0.115	0.047	0.115	0.047	0.115	0.079	0.194	0.079	0.195
Mt. Hebron	0.025	0.061	0.025	0.061	0.025	0.061	0.025	0.061	0.030	0.073
Murietta	0.003	0.007	0.003	0.007	0.003	0.007	0.003	0.007	0.271	0.665
North	0.056	0.137	0.073	0.178	0.088	0.216	0.088	0.216	0.095	0.234
Royal Ridge	0.007	0.017	0.016	0.040	0.029	0.071	0.046	0.113	0.046	0.113
SE 20th	0.003	0.007	0.005	0.012	0.005	0.012	0.005	0.012	0.005	0.013
Skyline	0.269	0.662	0.291	0.712	0.305	0.748	0.309	0.756	0.364	0.892
Total Water Demand	**3.9**	**9.6**	**4.5**	**11.1**	**5.0**	**12.2**	**5.4**	**13.1**	**8.5**	**20.7**
Estimated System Population	17,611		19,716		21,897		23,970		31,324	

System Analysis

The water system analysis includes an evaluation of water supply, storage and pumping capacity. A calibrated hydraulic model was developed to assess existing pressure zones, service pressure and distribution main capacity. Proposed pressure zones to serve future development within the City's UGB were identified as part of this WSMP. The following general conclusions were developed through the water system analysis and subsequent validation with City staff:

Supply Capacity

- The City has adequate total and firm capacity (Well 5 out of service) to meet existing maximum day demands (MDD).
- ASR injection of approximately 885 million gallons (MG) into the City's aquifer in 2013 resulted in a 0.5 ft water level increase in the aquifer. This annual water level increase is projected to continue with the ASR program. This projected increase in aquifer water level will increase pumping capacity in the City's wells by approximately 0.21 mgd in 10 years and 0.41 mgd within the 20-year timeframe.
- An additional 0.12 mgd of firm supply capacity will be required within 5 years, 1.18 mgd within the 10-years, 1.97 mgd within 20-years and 9.57 mgd of additional firm supply capacity is required to meet forecast demands at build-out.
- The City's water rights are adequate to support the additional supply development identified in this WSMP, as documented in the City's 2012 Water Management and Conservation Plan.

Water Quality Goals

The City strives to deliver consistent water quality to its customers and to comply with all Safe Drinking Water Act requirements. The City provides an annual water quality report to customers that indicates consistent, high quality water and full compliance with all Safe Drinking Water Act requirements.

Pressure Zone Performance

- The City's 13 existing pressure zones provide adequate service pressures between 40 and 80 pounds per square inch (psi) to most water system customers.
- A new 1570 Zone is proposed to serve customers at high elevations north of the existing Skyline Zone, as well as some existing high-elevation Skyline customers with low service pressures.

Distribution Storage Capacity

- The City has adequate distribution storage to meet operational, equalization, fire and emergency storage requirements under existing demand conditions.

- The City has a system-wide future distribution storage deficit of 0.29 MG within the 20-year planning horizon and 1.04 MG at build-out.
- The Airport Pressure Zone has a projected 20-year distribution storage deficit of 0.17 MG and build-out deficit of 0.89 MG. This assumes that the zone will continue to be served from a constant pressure pump station.
- The Skyline Pressure Zone has a projected 20-year distribution storage deficit of 0.12 MG and build-out deficit of 0.15 MG.

Pumping Capacity

- Backup power is recommended at the pump stations serving zones without gravity storage. The City recently added backup power to Mt. Hebron Pump Station and is currently adding backup power at the Airport Pump Station. None of the other booster pump stations have backup power.
- Of the existing booster pump stations, six have existing capacity deficiencies. These deficiencies increase over the 20-year planning horizon. A seventh pump station is recommended to serve the proposed 1570 Zone.

Distribution System Performance

- Using the calibrated hydraulic model of the existing City water system developed for this analysis, six areas were identified in the distribution system which exhibit pressures below 20 psi under existing MDD plus fire flow conditions. Piping improvements are recommended to mitigate these deficiencies.
- Model results indicate that during ASR injection a reduction in service pressures of 9 to 12 psi occurs in the west end of the City's Gravity Zone from Northgate (Hwy 37) near the Rudy Rada Skate Park west to Pendleton Sanitary Services. The water system grid is limited in this area. A water main improvement to reduce service pressure fluctuations during ASR injection is recommended as described in the CIP.
- Proposed system looping is recommended to provide service to identified distribution system expansion areas consistent with anticipated development timeframes. Actual development patterns and timing may change the priority of future improvements.

Operations and Maintenance

Assessment of the City's water system O&M program included reviewing information from City staff, comparing with the O&M practices of similarly sized utilities and reviewing regulatory requirements. Staff from the City's water utility are responsible for the maintenance and operation of the distribution and treatment systems. Based on the system size, the state requires a Water Treatment Level 2 and Water Distribution Level 3 operator certification for the individual in direct charge of the system. The water utility is structured and currently operated with 5.5 full-time equivalent employees (FTEs).

Routine operations implement procedures to ensure that the facilities within the water system function efficiently and meet regulations. Ongoing procedures include inspecting system facilities, monitoring flow and reservoir-level recording, and responding to customer inquiries and complaints.

For a benchmark comparison, four other utilities in the region were surveyed in order to compare their O&M practices to the City's current program. The performance indicators show that each FTE in the City is responsible for more water supplied (daily average) and total length of the distribution system piping than the other utilities. In general, the City operates with fewer staff than the rest of the survey group.
The City is working to update their O&M program through pursuing Public Works Accreditation, which is the implementation of best practices as outlined in the American Public Works Association's *Public Works Management Practices Manual-8th Edition* (PWMP Manual). The following conclusions and recommendations are based on a review of the City's O&M practices, accreditation goals and benchmarking of other water systems:

- Develop a comprehensive water system O&M program based on incorporation of the PWMP Manual best management practices to provide for consistent long-term O&M.
- Hire 3.5 additional FTEs. Three FTEs to implement the flushing and valve exercising programs and for leak detection, and a partial FTE is required to implement the comprehensive water system O&M program and associated record keeping.
- Hire two additional FTEs, which will be part of a second crew of four full time staff with dedicated equipment to perform the ongoing pipe replacement program on a 100-year cycle. The other two FTEs on the crew would be shared and funded with the Sewer and Storm Utilities.

Advanced Metering Infrastructure Evaluation

As part of this WSMP, an assessment was completed to evaluate the cost effectiveness of converting the City's customer meter reading system from manual reading to advanced metering infrastructure (AMI); AMI's potential benefits were evaluated, and a summary of the findings and recommendations is presented below:

- The AMI financial analysis indicates that manual meter reading services will be more cost-effective if meters continue to be read nine months out of the year, but if the City switches to year-round meter reading, an AMI system is financially justified.
- The City has placed endpoints for handheld meter reading on approximately two-thirds of the customer meters, and it is recommended that the remainder of the endpoints should be "migrateable" models. This type of endpoint will allow the continued use of handheld probes, and should the City decide to convert to an AMI system, is fully compatible with mobile and fixed-data collectors. The cost of migrateable endpoints, which constitutes the majority an AMI system's expense, is similar to that of the endpoints the City is currently installing.

It is recommended that the City continue adding meter endpoints and consider using migrateable endpoints, which would support conversion to an AMI system in the future. Installation of automated data collection infrastructure should be reevaluated beyond the current 5-year timeframe.

Capital Improvement Program

The CIP describes projects identified to address existing and future capacity deficiencies and to plan for ongoing repair and replacement of aging infrastructure. Identified CIP projects are grouped into four implementation timeframes; 5-Year, 10-Year, 20-Year and Beyond 20 years. CIP projects are summarized in Table 1-3 and illustrated in Figure 1-1.

The CIP includes $14 million in improvement projects over the 5-year horizon and $60.9 million over the 20-year horizon. Through build-out, $162.1 million in improvements are identified to address existing deficiencies and provide for anticipated development and system expansion.

Supply and Transmission Projects

- To meet supply needs in the 5-, 10- and 20-year planning horizons, it is recommended that the City construct one 1,500 gpm (2.2 mgd)-well in the next 5 years at an estimated project cost of $1.5 million.
- The 30-inch diameter concrete transmission main from the Water Filtration Plant to the South Hills Reservoirs is nearing the end of its useful life and should be replaced with a new 24-inch diameter transmission main (CIP ID T-55) within the 10-year timeframe at an estimated project cost of $1.6 million.

Distribution Storage Projects

- Due to an existing storage deficit in the Airport Zone and anticipated near-term industrial expansion in this zone, it is recommended that existing Airport Reservoirs 1 and 2 be replaced by a single 2 MG reservoir (CIP ID R-1) within 10 years at an estimated project cost of $3.6 million.
- A new 0.5 MG Skyline Reservoir (CIP ID R-2) is recommended beyond the 20-year planning horizon to address condition issues with the existing reservoir and mitigate a projected future storage deficit at an estimated project cost of $906,000. The new Skyline Reservoir is recommended for construction at a new site as part of the Skyline and 1570 Zone reconfiguration.
- Inspect and clean all City reservoirs on a regular basis.

Pump Station Projects

- Review of the City's existing pump stations reveals a current pumping capacity deficit in almost every pressure zone. Recommended pump station improvement projects include both capacity upgrades when space for additional pumps is available and replacements

when a new facility is required to provide adequate capacity. Pump station upgrades and improvements have a total estimated project cost of $1.8 million within the 5-year horizon, $12.7 million between 6 and 10 years, $3.5 million between 11 and 20 years and $2.3 million beyond 20 years.

- Develop a plan to address pump life cycle replacement costs in future CIPs, after addressing capacity upgrades identified in current CIP.
- In addition to recently installing a generator at Mt. Hebron Pump Station and currently installing one at the Airport Pump Station, backup power generators are recommended in the next 10 years at three constant pressure pumps stations: Royal Ridge, Jr High and SE 20th at an estimated total project cost of $600,000.

PRV Projects

- Several PRV projects are recommended to eliminate dead-end mains through future development areas and provide fire flow, emergency redundancy and a means of circulating water between zones to mitigate potential water quality issues. PRV improvements have a total estimated project cost of $300,000 within the 20-year planning horizon. PRV projects beyond 20-years have a total estimated project cost of $750,000.

Water Main Projects

Water main projects are recommended to:

- Mitigate fire flow deficiencies identified through hydraulic modeling of the distribution system.
- Reduce pressure fluctuations at the western edge of the system during ASR injection.
- Create a new 1570 Zone to improve service pressure and fire flow for existing high-elevation Skyline Zone customers.
- Provide water service and system looping through future development areas.
- Provide ongoing repair or replacement of water mains consistent with a 100-year life cycle. The pipe replacement program has an annual CIP cost of $250,000 for the first five years, increasing to $970,000 annually.

Airport Industrial Area (AIA) CIP

- In order to provide adequate fire service to anticipated development in the AIA, it is recommended that the City construct two interim non-potable supply systems over the 5-year planning horizon at an estimated project cost of $5.4 million. These interim systems allow the City to make incremental investments in the water system infrastructure and serve significant fire suppression demands for near term development.
- As previously mentioned, a new Airport Reservoir and Pump Station are recommended to serve anticipated future development within 10 years at an estimated project cost of $12.5 million.

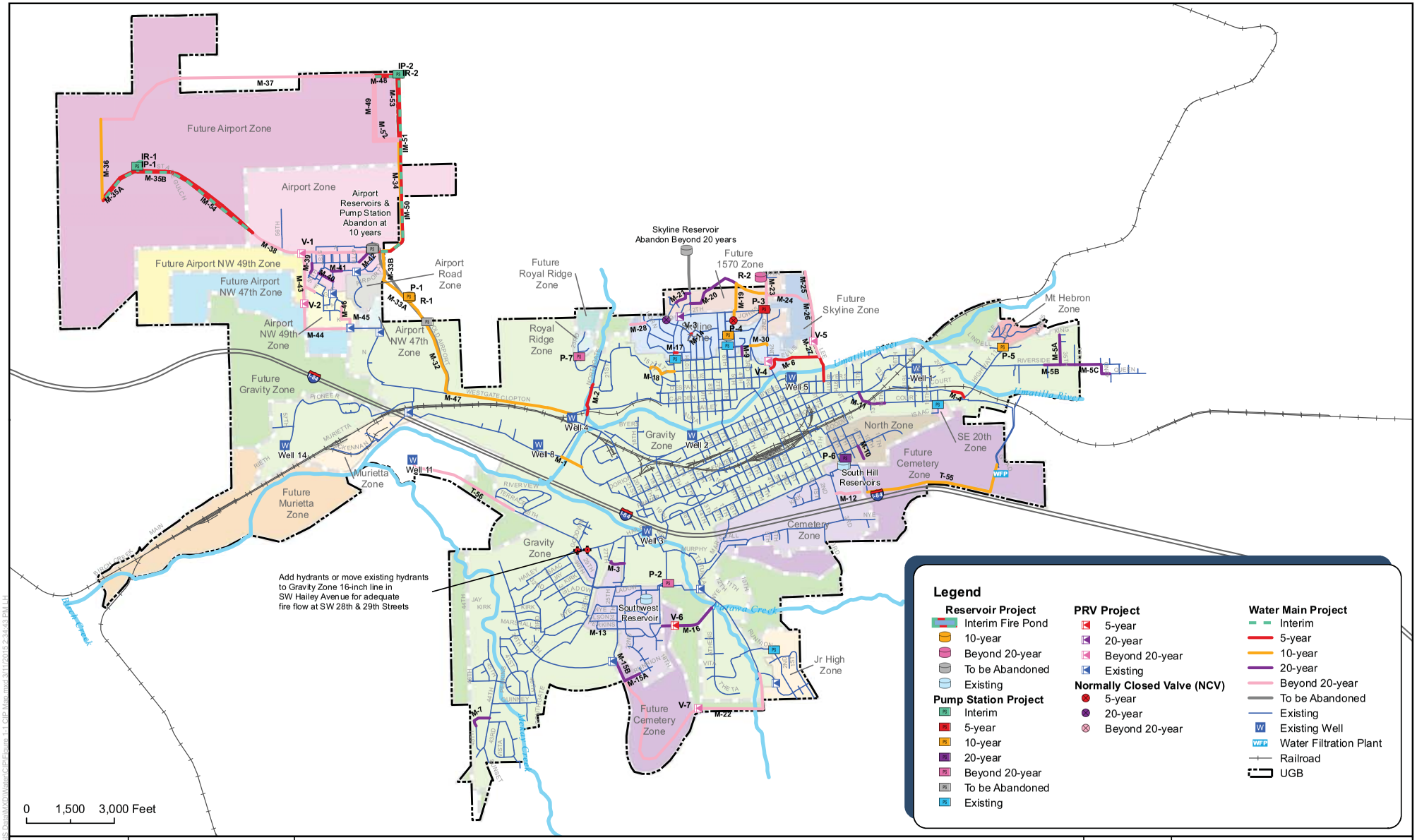
General Planning Projects

- Plan to update the City's Water System Master Plan approximately every five years.
- Update the City's Water Management and Conservation Plan as required by the State of Oregon.

Table 1-3
CIP Summary

Project Category	Project ID	Project Description	CIP Schedule and Project Cost Summary				
			5-Year	10-Year	20-Year	Beyond 20-Year	Total
Supply and Transmission		First additional well	$1,500,000				$1,500,000
		Additional groundwater capacity beyond 20 years				$3,000,000	$3,000,000
	T-56	Connect Well 11 to Gravity Zone distribution system				$1,850,000	$1,850,000
	T-55	WFP High Level transmission main to South Hill Reservoirs		$1,552,000			$1,552,000
Supply and Transmission Projects Subtotal			**$1,500,000**	**$1,552,000**		**$4,850,000**	**$7,902,000**
Distribution Storage	R-1	2 MG Airport Reservoir replacement		$3,625,000			$3,625,000
	R-2	0.5 MG Skyline Reservoir replacement				$906,000	$906,000
Distribution Storage Projects Subtotal				**$3,625,000**		**$ 906,000**	**$ 4,531,000**
Pump Station	P-1	Airport PS replacement		$8,900,000			$8,900,000
	P-2	Cemetery PS capacity upgrade				$1,192,000	$1,192,000
	P-3	Future 1570 Zone PS	$1,760,000				$1,760,000
	P-4	North Hill PS replacement		$2,080,000			$1,600,000
	P-5	Mt Hebron PS replacement		$1,760,000			$1,760,000
	P-6	SE 7th Street PS replacement			$3,520,000		$3,520,000
	P-7	Royal Ridge PS capacity upgrade				$1,080,000	$1,080,000
		Backup power	$200,000	$400,000			$600,000
Pump Station Projects Subtotal			**$1,960,000**	**$13,140,000**	**$3,520,000**	**$2,272,000**	**$20,892,000**
Water Mains	M-2, 4, 6, 13, 14, 17, 35B	5-Year	$2,655,000				$2,655,000
	M-1, 18, 19, 30, 32-34, 36, 47	10-Year		$6,012,000			$6,012,000
Water Mains	M-3, 5, 7, 9-11, 15, 16, 20, 21, 39-42	20-Year			$3,993,000		$3,993,000

Project Category	Project ID	Project Description	CIP Schedule and Project Cost Summary				
			5-Year	10-Year	20-Year	Beyond 20-Year	Total
Water Mains	M-12, 22-28, 37, 38, 43-46, 49, 52	Beyond 20-Year				$10,274,000	$10,274,000
	M-35A	Airport West interim non-potable main, permanent distribution main	$304,000				$304,000
	M-48	Airport East interim non-potable main, permanent distribution mains	$205,000				$205,000
	M-53		$448,000				$448,000
		Pipe Replacement Program	$1,250,000	$4,850,000	$9,700,000	$81,200,000	$97,000,000
Water Main Projects Subtotal			**$4,862,000**	**$10,862,000**	**$13,693,000**	**$91,474,000**	**$120,891,000**
PRV	V-1	53rd Ave - Airport 49th Zone				$150,000	$150,000
	V-2	53rd & H - Airport 47th Zone				$150,000	$150,000
	V-3	12th Dr - Skyline Zone			$150,000		$150,000
	V-4	2nd & Furnish - Gravity Zone				$150,000	$150,000
	V-5	Lee - Gravity Zone				$150,000	$150,000
	V-6	Perkins-Nye - Gravity Zone	$150,000				$150,000
	V-7	Southern Loop- Gravity Zone				$150,000	$150,000
PRV Projects Subtotal			**$150,000**		**$150,000**	**$ 750,000**	**$1,050,000**
Other	IR-2, IP-2, IM-50, IM-51	Airport East interim non-potable system – pond, supply main and pump station	$2,841,000				$2,841,000
	IR-1, IP-1, IM-54	Airport West interim non-potable system – pond, supply main and pump station	$2,520,000				$2,520,000
		Existing Airport Pump Station & Reservoir Demolition			$200,000		$200,000
		Update Water Master Plan	$150,000	$150,000	$300,000		$600,000
		Update Water Management & Conservation Plan	$50,000	$50,000	$100,000		$200,000
Other Projects Subtotal			**$5,561,000**	**$200,000**	**$600,000**		**$6,361,000**
Total			**$14,033,000**	**$29,379,000**	**$17,963,000**	**$100,252,000**	**$161,627,000**



MSA Murray, Smith & Associates, Inc.

CITY OF PENDLETON OREGON

City of Pendleton
Water System Master Plan

Figure 1-1
CIP Map

March 2015 13-1442

Financial Plan

Background

The water system is an enterprise fund of the City, and is supported by water system fees and charges, as opposed to general City revenues. The primary funding source is monthly water rates charged to customers inside and outside the City. Existing water rates include a base monthly charge that varies based on the type of customer or meter size (for most commercial and industrial customers), plus an additional volume rate per 100 cubic feet (ccf) or 748 gallons of water consumed. The current monthly bill for a typical residential customer with monthly water use of 15 ccf is $37.40 for a customer inside the City, and $56.15 for a residential customer outside the City.

The *2013 Washington/Oregon Water Rate Survey* by Raftelis Financial Consultants, Inc., found the City's residential water bill to be the eleventh lowest out of the 41 utilities surveyed. At the time of the survey, the median bill for utilities surveyed was $42.01 per month, compared to the City's monthly bill of $32.60. This represents just the water portion of monthly bills and does not include sewer or other service charges.

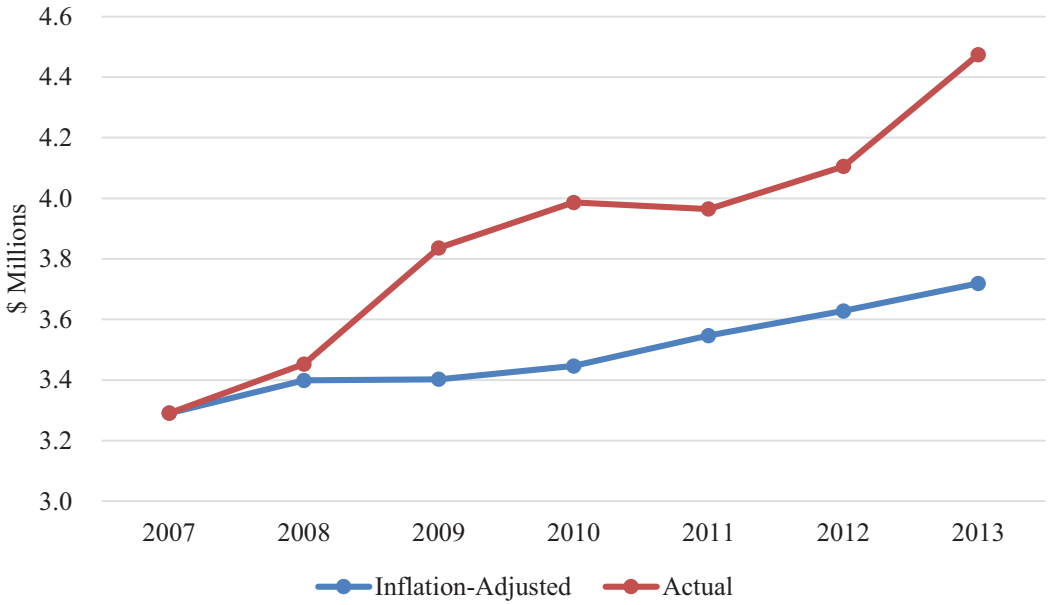
The City established an annual inflationary adjustment to its water and sewer rates in 2006. In April of each year, rates are adjusted by an amount equal to the lesser of either 3.5%, or the year-to-year percentage change in the Portland-Salem Consumer Price Index, Urban Consumers (CPI-U). Rate increases beyond inflationary adjustments have been limited to regulatory-driven cost increases. The 2014 increase was specifically targeted to fund new membranes at the WFP. Non-inflationary rate increases over the past ten years are as follows:

- 2005 – 12%
- 2013 – 5%
- 2014 – 7%

Financial Capacity

Since the inflationary adjustment was implemented in 2006, it has not kept pace with rising costs for water and sewer system operations. Figure 1-2 shows a comparison of inflation-adjusted operating expenses for the water and sewer systems combined, compared to actual historical expenses. The CPI-U (used to adjust rates annually) has increased at an average annual rate of 2.3% since 2007, compared to an average increase in operating costs of about 5.3%. This disparity is due to a number of factors, including higher cost escalation for electricity and chemicals (a large part of the system operating costs), franchise fees (related to non-inflationary rate increases), and City-allocated services costs (primarily personnel costs).

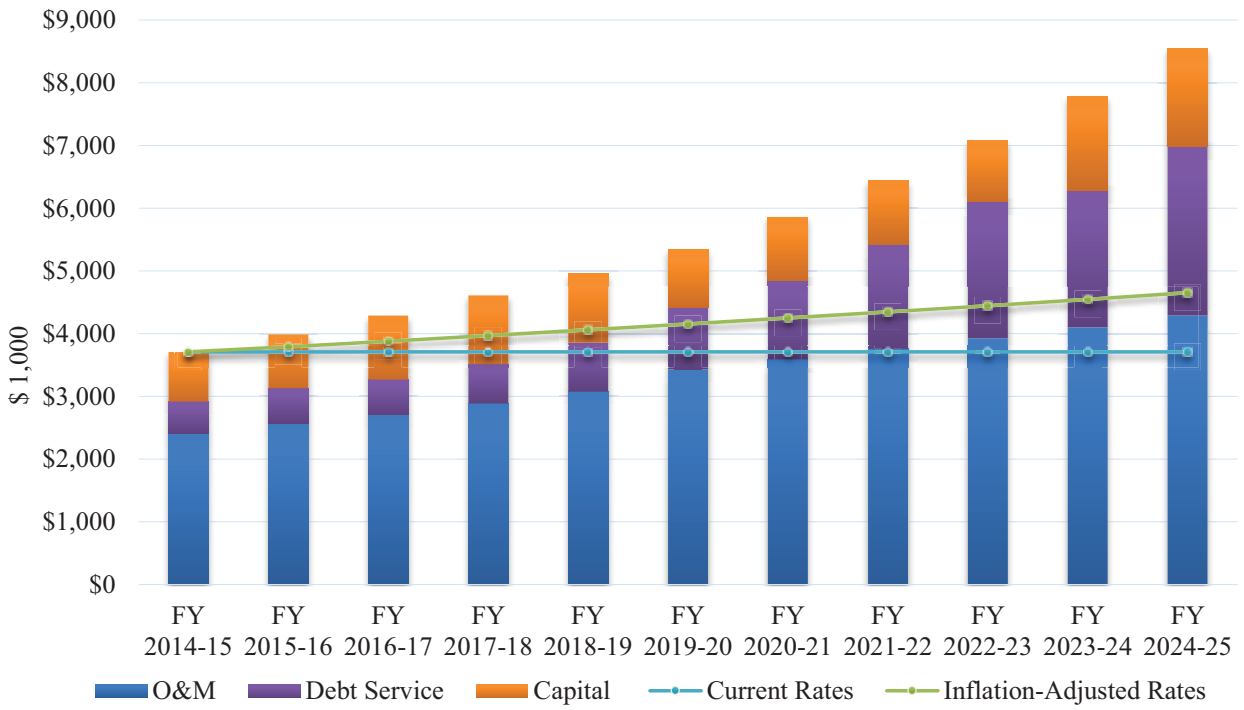
Figure 1-2
Historical Operating Expense Comparison (Combined Water & Sewer)



Given that the historical rate increases have not kept pace with operating cost inflation, and the City has had only one small increase in rates for non-CPI related cost increases (like funding capital improvements related to rehabilitation and repair, and capacity expansion) since 2005, the current rates do not provide sufficient financial capacity to address the future projected system needs (both operating and capital). Figure 1-3 shows the forecasted current and inflation-adjusted rate revenue, compared to projected annual operating, debt service, and capital outlay requirements for the next 10 years (capital requirements shown in this figure do not include improvements associated with Airport Industrial Area projects).

In FY2015-16, current rates adjusted for the historical average CPI of 2.3% would provide funding for about $325,000 of additional expenses over current operating costs (about $2.6 million), debt service ($550,000), and membrane replacement ($250,000). Given the significant capital improvement costs and additional staffing requirements identified in this WSMP, along with other repair and replacement needs for the WFP, wells and booster stations, additional revenue will be needed beginning in fiscal year 2015-16 to adequately fund the system. Although an annual transfer from the water fund to a fund intended for improvements at the WFP is included in the financial analysis, no evaluation of the improvements needed or adequacy of this funding amount for the WFP are included in this WSMP.

Figure 1-3
Projected Water System Revenue Requirements from Rates



General note: Debt Service and Capital Outlay do not include AIA projects.

It is recommended that the additional revenue come from both increases to the City's existing water rates, as well as implementation of new System Development Charges (SDCs). The City currently charges SDCs for the street system, but not for the water, wastewater, or stormwater systems, and is missing an important funding source for capital improvements. Following industry standards for development of SDCs, the recommended CIP would support an SDC of approximately $3,770 per equivalent residential unit. A recent survey by the League of Oregon Cities indicated the range for water SDCs is about $500 to $15,000, with the median equal to $2,730 per unit.

While SDCs are generally an important part of a capital funding strategy, they are only a portion of the solution, as rate increases will be needed to fund the majority of capital improvements related to rehabilitation and replacement, and remedying existing deficiencies, and all increases to operating costs (SDCs may not be used for system O&M). Table 1-4 shows the total percentage increase from current revenue needed for additional revenue requirements within the 10-year planning window. The system has experienced limited customer growth in recent years; if this trend continues, the majority of increased revenue will need to come from water rate increases. The required increases shown in Table 1-4 are total for the 10-year planning period.

Table 1-4
Additional Revenue Requirements (10-Year Period)

Item	Annual Cost	Required Percentage Increase
Current Rate Revenue	$3,706,050	
Additional Requirements[1]		
New Staff	$607,398	16%
Franchise Fee on Rate Increase	$381,879	10%
Other Operating Costs	$939,733	25%
Rate-supported CIP Costs	$145,930	4%
WFP Transfer	$150,000	4%
Debt Service		
AIA Projects	$399,699	11%
Other Projects	$2,347,345	63%
Reserve on New Debt	$567,452	15%
Total Additional Requirements	**$5,539,437**	**149%**

[1] *Annual amount needed in FY 2024-25 above current (FY 2014-15) requirements including projected inflation.*

Recommendations

The following recommendations related to funding the additional staffing and capital improvements as identified in the WSMP are offered for the City's consideration:

- Adopt a new SDC based on the growth-related portion of this WSMP CIP. Adjust the SDCs annually for inflation based on the Engineering News Record (ENR) Construction Cost Index (20 City average). Update SDCs as necessary to incorporate significant changes to the CIP, including additional source improvements.
- Budget an annual operating contingency equal to 30 to 90 days of O&M costs (consistent with industry standards).
- Change the index for annual inflation adjustments to rates from the CPI to the ENR. The current index has not kept pace with utility cost increases since it was adopted in 2006. The average annual increase in the ENR (20-city average) has been 3.0%, compared to 2.3% for the CPI.
- Increase revenues. Given the significant financial investments identified in this WSMP, additional debt funding will likely be needed for major projects in the 10-year planning period in order to minimize short-term rate impacts. The revenue increases shown in Table 1-4 assume approximately 75% of WSMP CIP costs will be funded through long-term debt in the first 10 years in order to mitigate short-term rate impacts. However, the City will need to evaluate available financing options as it implements specific CIP projects, and update the rate revenue requirements accordingly, as financing commitments are secured.

- Set water rates sufficient to fund additional cash reserves for ongoing repair and replacement of existing facilities beyond those included in this WSMP (currently estimated at $400,000 per year for WFP facilities, wells, and booster stations).
- Review the financial plan annually, and make modifications to planned rate increases and capital phasing as needed to meet system performance targets.

Summary and Overall WSMP Recommendations

This WSMP constituted a major investment of time and resources for City staff and the consultant team. The City and, in particular, the Public Works Department should be commended for its foresight in initiating such a comprehensive scope of work in order to successfully operate, maintain and improve the City's water system. This WSMP utilized industry standard approaches by compiling and converting information to a GIS database and utilizing hydraulic modeling software to identify system deficiencies and refine recommended improvement projects.

Prior to this WSMP no single water system inventory nor hydraulic model existed. Collecting and compiling system data allowed for a more accurate and comprehensive look at the water system as a whole than what was previously available. The hydraulic modeling allowed for the evaluation of water system alternatives based on system hydraulics. The capital projects that have been identified provide the City with a plan, phased over the next 20 years and beyond, that is affordable and implementable.

As a result of this WSMP, the following recommendations are made:

- Implement short term (1-10 years) improvements as identified in the CIP to address existing capacity and condition issues as well as provide for planned development in the AIA. In order to maintain infrastructure an annual repair and replacement program should be implemented.
- O&M programs should be implemented to increase the lifecycle of infrastructure and to reduce unplanned maintenance.
- Reassess long-term improvements (beyond 10 years) using future WSMP updates: the GIS, hydraulic model and water consumption and production data.
- Continue improving the quality of available water system information, specifically:
  - Continue to refine existing GIS water system information.
  - Track customer complaints and unplanned repair data and link to the GIS database to identify priorities for system maintenance and pipe replacement.
  - Continue utilizing the hydraulic model as a tool for testing the potential distribution system impact of future development and operational changes.

Policy Recommendations

In order to prevent unnecessary large expenditures in the future, it is recommended that the City reconsider its financial and planning review policies, as follows:

Planning Review Policies

Although planning documents have detailed water system upgrades, there are no policies in place requiring regular updates, public discussion, or review. Consequently, as updated information becomes available and changes in the system occur, planning may be altered and significant investments could be made when an alternative based on new information may be a better option. The following policy recommendations will better define the requirements of future water system planning and help future City councils and the public plan for investments long before they are needed:

- Require City staff to provide an annual review to Council on the status of the master plan.
- Provide an updated or new master plan to City Council every five years for adoption.

Once the City revises its policies, it is crucial that future City councils and staff understand the rationale behind these policies. To realize the potential impact of any future policy revisions, the historical context and reasoning behind existing policies must be clearly understood.