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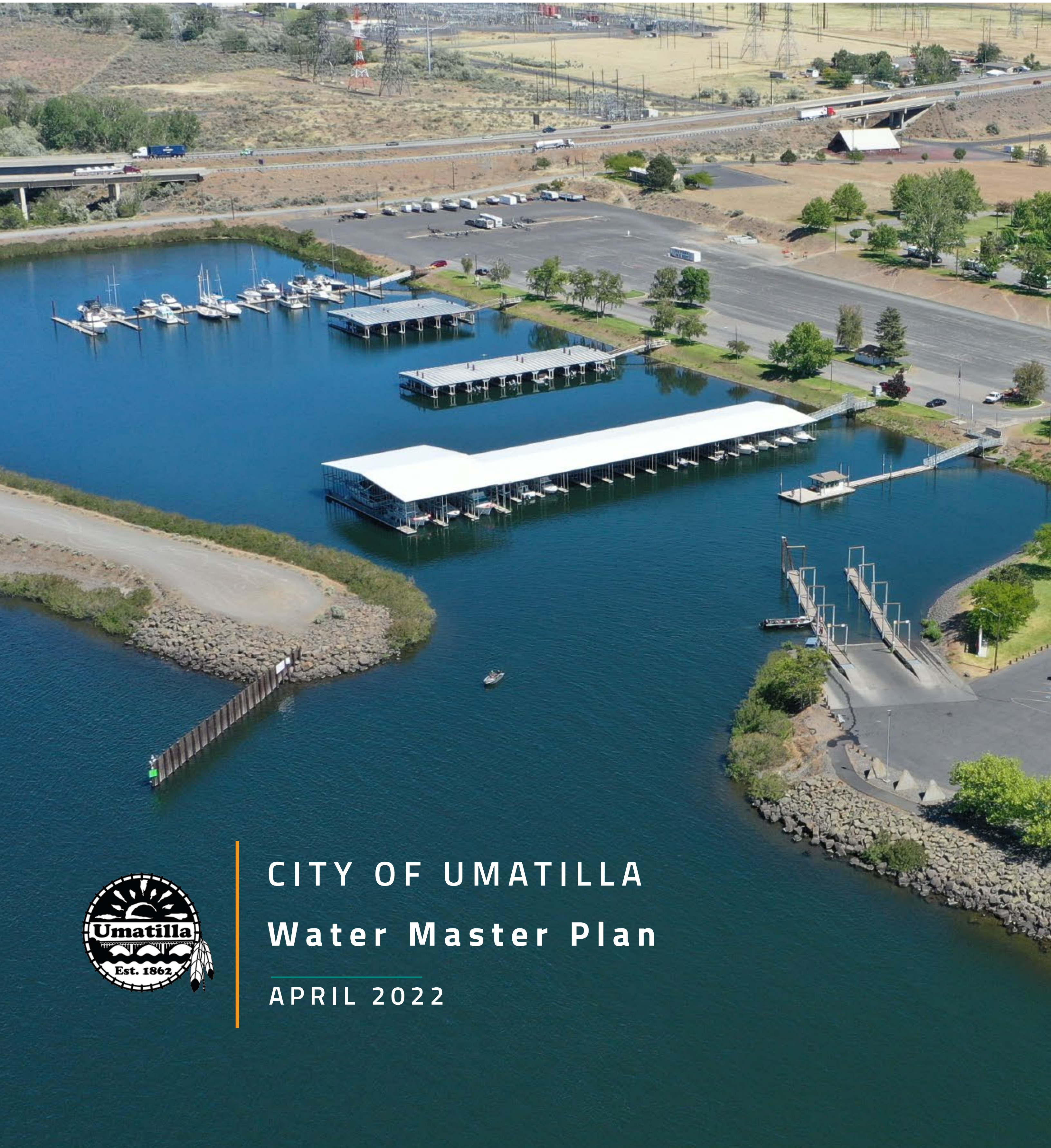

CITY OF UMATILLA
Water Master Plan

APRIL 2022

WATER MASTER PLAN

CITY OF UMATILLA

OR41 00914

APRIL 2022

REGISTERED PROFESSIONAL ENGINEER
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OREGON
MARCH 10, 2020
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Executive Summary

Introduction

The City of Umatilla's (City) 2021 Water Master Plan (WMP) has been prepared to update the City's previous water system master plan, prepared in 2008. Per the Oregon Health Authority's (OHA) requirements, the WMP's 20-year planning period is through 2041 but contains high level planning of a 40-year planning period, through 2061, per the City's request. In accordance with OHA guidelines, the following are goals for this WMP:

- Update existing system information including system history, capital improvement projects completed since the previous WMP; and incorporate information from agreements, reports, studies, and City objectives since the last WMP.
- Incorporate planning criteria used in the Coordinated Population Forecast for Umatilla County (2019-2069) and consider the impacts of changes in growth patterns and land use projections.
- Review the existing capabilities, limitations, and deficiencies of the system and establish a schedule of system improvements recommended to meet the needs of the existing and future users.
- Examine the City's operations and make recommendations as necessary to allow the City to improve routine operations and maintenance as well as their response in emergency situations.

The existing system generally meets current standards, the areas of exception are noted in the body of the plan and recommendations are made to bring the existing areas up to conditions that would meet the current standards. This WMP will be used by the City to make upgrades and improve the reliability of the system as well as meeting the demands of the ongoing growth and development within the service area. The WMP will benefit current and future users by improving the service available with the existing system, as well as preparing for the anticipated growth of the 20-year and 40-year planning periods.

Overview

The City's 2020 population was 8,195, which includes 1,685 inmates at the Two Rivers Correctional Institution (TRCI). Currently, the City pumps all of their water from four groundwater wells (Port Well, Golf Course Well, Intertie Well, and McFarland Well) located throughout the City and ranging in depth from 785 feet to 1,134 feet. The four wells currently have a combined pumping capacity of 4,638 gallons per minute (6.7 million gallons per day). The wells have the ability to provide water to various pressure zones due to the system's connectivity. Water from each well is treated with chlorine gas and stored in six reservoirs with a total storage capacity of 4.78 million gallons.

The City has both groundwater and surface water rights; the City owns two groundwater rights and has an agreement in place with the Port of Umatilla for a third groundwater right until the year 2040. These three groundwater rights authorize the City to withdraw 23.5 cubic feet per second (cfs) (10,551 gpm). The City's surface water right authorizes 23.0 cfs (10,322 gpm) from the Columbia River, however, the City does not currently have any infrastructure in place to put this surface water to beneficial use. The combination of groundwater and surface water rights provide adequate water rights to the City for both the 20-year and 40-year planning periods, however, the decline of the aquifer that the wells pump out of combined with the expiration of the Port Well lease agreement in 2040 will put the City in a deficient state in terms of their source capacity if they don't put the surface water right to beneficial use within the 20-

year planning period. With the decline of the aquifer, it is recommended that the City install infrastructure that utilizes the Columbia River surface water right.

Demand Projections

Using water meter data provided by the City for the years 2017-2020, existing demands were determined based on an average of those three years. In combination with the anticipated population trends and land use changes future demands were projected for the 20-year (2041) and 40-year (2061) planning periods. The average day demands (ADD) for 2021, 2041, and 2061 in millions of gallons per day (MGD) are: 1.42 MGD; 1.72 MGD; and 2.29 MGD respectively. Peaking factors based on the various user classifications were used to project the peak day demands (PDD) and peak hourly demands (PHD) of the system.

Existing System Evaluation

The City's existing water rights appear adequate for the 20-year and 40-year planning periods; however, the source capacity of the City's aquifer is rapidly declining. The system will require additional source and storage to meet future demands, beginning with the 20-year planning period.

The distribution system was analyzed with hydraulic modeling software in order to identify deficiencies in the distribution piping system relative to current and future conditions. The existing system has areas requiring improvements to reduce high pressures and improve safety in newer developing parts of the City. To correct this, it is recommended to reconfigure the pressure zone elevations and installation of several pressure reducing valves (PRVs) to decrease high pressure areas in the system. Hydraulic modeling also helped determine sizing of future pipes for the growth projected to occur within the next 40 years. Most portions of the system can provide adequate fire suppression flows per the local fire authority's requirements. For those areas that did not meet the fire suppression flows, improvement projects for line size upgrades were recommended to meet the fire suppression flow goals.

In addition to the distribution system analysis, a storage analysis was performed on the system as a whole as well as zone by zone. The system currently has adequate storage system wide, however, over the 20-year and 40-eyar planning periods various zones will be storage deficient, therefore various storage improvements were recommended to meet the storage needs of the next 40 years.

Although the system is hydraulically connected, several improvements were recommended to improve the system reliability and eliminate some of the complexities of the system's current operation. With the recommended change to surface water instead of groundwater, the system's conveyance of water will be changed drastically. Improvements to convey the new surface water throughout the system are recommended to ensure the long-term City goals are met. A figure depicting the locations of the improvement projects is included in Chapter 7, see Figure 7-1. A summary of the Capital Improvement Plan (CIP) is shown in the following tables:

20-Year CIP Schedule (2021-2041)

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
Source Improvements					
SR-1	CTUIR River Intake Pump Station Expansion	$8,000,000	$8,324,000	TBD	2023
SR-2	New Non-Potable Water Treatment Plant	$37,200,000	$38,703,000	DF	2023
SR-3	New Potable Water Treatment Plant	$23,000,000	$31,575,000	TBD	2037
SR-4	New Regional Booster Pump Station	$1,260,000	$1,730,000	TBD	2037
SR-5	SCADA Telemetry Improvements	$60,000	$65,000	TBD	2025
Storage Improvements					
ST-1	Replace sacrificial anodes in Port Reservoir (2-3 years)	$21,000	$22,000	TBD	2022
ST-2	Recoat interior of Golf Course Reservoir (5-10 years)	$900,000	$937,000	TBD	2023
ST-3	Recoat interior of Port Reservoir (5-10 years)	$60,000	$67,000	TBD	2026
ST-4	Recoat interior of McFarland Steel Reservoir (5-10 years)	$250,000	$293,000	TBD	2029
ST-5	New Golf Course Reservoir #2	$1,300,000	$1,380,000	TBD	2024
ST-6	New McFarland Reservoir #3	$700,000	$924,000	TBD	2035
ST-7	Abandon McFarland Steel/Concrete Reservoirs	$60,000	$80,000	TBD	2035
ST-8	New 395 Corridor Reservoir	$4,000,000	$5,601,000	TBD	2038
ST-9	New Coyote Reservoir #2	$2,300,000	$2,749,000	TBD	2030
ST-10	8-inch water main - downsize Coyote Reservoir inlet piping	$69,000	$83,000	TBD	2030
Distribution System Improvements					
DS-1	Adjust Monroe Street PRV Pressures	-	-	N/A	2022
DS-2	18-inch Umatilla River water main replacement	$6,500,000	$6,630,000	TBD	2022
DS-3	8-inch water main Umatilla Port of Entry	$88,000	$92,000	TBD	2023
DS-4	8-inch water main in Locust Street	$116,000	$121,000	TBD	2023
DS-5	8-inch water main in Division Street (Locust St. - 3rd St.)	$558,000	$581,000	TBD	2023

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-6	8-inch water main in L Street (7th St. - 6th St.)	$56,000	$61,000	TBD	2025
DS-7	8-inch water main in 7th Street (L St. - Randall St.)	$417,000	$452,000	TBD	2025
DS-8	8-inch water main in Yerxa Avenue (6th St. - 7th St.)	$77,000	$84,000	TBD	2025
DS-9	8-inch water main in 6th Street (Yerxa Ave. - Sloan Ave.)	$110,000	$120,000	TBD	2025
DS-10	8-inch water main in Switzler Avenue (3rd St. - 6th St.)	$436,000	$492,000	TBD	2027
DS-11	8-inch water main in 3rd Street (WWTP - Cline Ave.)	$791,000	$891,000	TBD	2027
DS-12	8-inch water main in Cline Avenue (3rd St. - 2nd St.)	$77,000	$87,000	TBD	2027
DS-13	10-inch water main at WWTP (3rd St. - Hydrant)	$182,000	$205,000	TBD	2027
DS-14	8-inch water main in Oliver Avenue (2nd St. - 3rd St.)	$77,000	$91,000	TBD	2029
DS-15	8-inch water main in Patterson Street (2nd St. - 3rd St.)	$77,000	$91,000	TBD	2029
DS-16	8-inch water main in Quincy Avenue (1st St. - 3rd St.)	$154,000	$181,000	TBD	2029
DS-17	8-inch water main in 2nd Street (Oliver Ave. - Quincy Ave.)	$220,000	$258,000	TBD	2029
DS-18	8-inch water main in 1st Street (Umatilla Marina Park)	$286,000	$336,000	TBD	2029
DS-19	8-inch water main in Stephens Avenue	$312,000	$381,000	TBD	2031
DS-20	8-inch water main in Tucker Avenue	$306,000	$374,000	TBD	2031
DS-21	8-inch water main in J Street (Stephens Ave. - Tucker Ave.)	$44,000	$54,000	TBD	2031
DS-22	Install Eagle Avenue PRV	$113,000	$116,000	TBD	2022
DS-23	Install Powerline Road PRV	$113,000	$116,000	TBD	2022
DS-24	24-inch transmission main (CTUIR River Intake Pump Station - WTP)	$12,900,000	$13,422,000	TBD	2023
DS-24	24-inch transmission main (CTUIR River Intake Pump Station - WTP)	$3,300,000	$4,531,000	TBD	2037

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-25	24-inch transmission main (WTP Booster Station - Golf Course Reservoirs)	$180,000	$248,000	TBD	2037
DS-26	24-inch water main for Data Centers (Wanapa Rd.)	$900,000	$937,000	DF	2023
DS-27	12-inch transmission main in U.S. 730 (Willamette St. - 2nd Ave.)	$760,000	$1,003,000	TBD	2035
DS-28	8-inch water main in 2nd Avenue (Lewis St. - U.S. 730)	$28,000	$37,000	TBD	2035
DS-29	8-inch water main near Willamette Street (Lewist St. - U.S. 730)	$34,000	$45,000	TBD	2035
DS-30	16-inch transmission main in U.S. 730 (Lind Rd. - Columbia Blvd.)	$954,000	$1,259,000	TBD	2035
DS-31	16-inch transmission main in Lind Road (U.S. 730 - Intertie Reservoir)	$1,485,000	$1,960,000	TBD	2035
DS-32	Install Intertie Reservoir Altitude Valve	$130,000	$172,000	TBD	2035
DS-33	8-inch water main in Cherry Street	$330,000	$344,000	TBD	2023
DS-34	8-inch water main in Brownell Boulevard and Robinnet Street	$89,000	$93,000	TBD	2023
DS-35	Remove McFarland Reservoirs Altitude Valve	$10,800	$15,000	TBD	2035
DS-36	8-inch water main loop near Dean Avenue (Townhomes)	$381,000	$381,000*	DF	MD
DS-37	New 395 Corridor Booster Station	$1,370,000	$1,426,000	TBD	2023
DS-38	16-inch water main connecting new 395 Corridor Reservoir	$2,985,000	$4,180,000	TBD	2038
DS-39	16-inch water main in Lind Road	$3,413,000	$3,551,000	TBD	2023
DS-40	8-inch water main in Union Street	$224,000	$234,000	TBD	2023
DS-41	8-inch water main near Union Street and U.S. 395	$255,000	$266,000	TBD	2023
DS-42	12-inch water main Lind Road to U.S. 395	$372,000	$388,000	TBD	2023

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-43	12-inch water main along U.S. 395	$440,000	$458,000	TBD	2023
DS-44	8-inch water main along U.S. 395	$45,000	$47,000	TBD	2023
DS-45	8-inch water main in Power City Road	$286,000	$298,000	TBD	2023
DS-46	8-inch water main in Marian Avenue	$143,000	$149,000	TBD	2023
DS-47	12-inch water main in Margaret Avenue	$329,000	$343,000	TBD	2023
DS-48	12-inch water main in Powerline Road (Eagle Ave. - Dark Canyon Ave.)	$401,000	$401,000*	DF	MD
DS-49	12-inch water main connecting new Coyote Reservoir #2	$748,000	$894,000	TBD	2030
DS-50	16-inch McFarland Booster Station suction piping replacement	$115,000	$152,000	TBD	2035
DS-51	Install Powerline Road PRV #2	$113,000	$113,000*	TBD	MD
DS-52	12-inch water main for SFR Ballard Property Development	$799,000	$799,000*	DF	MD
DS-53	8-inch water main for SFR Ballard Property Development	$2,421,000	$2,421,000*	DF	MD
DS-54	8-inch water main for Medium Density Residential Area east of Cheryl's Place	$1,137,000	$1,137,000*	DF	MD
DS-55	8-inch water main for Vandalay Meadows Development	$281,000	$281,000*	DF	MD
DS-56	8-inch water main for Medium Density Residential Area at Powerline Road/Canal Road	$401,000	$401,000*	DF	MD
DS-57	8-inch water main for SFR Ballard Property Development	$1,528,000	$1,528,000*	DF	MD
DS-58	12-inch water main for SFR Ballard Property	$361,000	$361,000*	DF	MD

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
	Development in Pine Tree Ave				
DS-59	12-inch water main for SFR Ballard Property Development from Powerline Road PRV	$882,000	$882,000*	DF	MD
DS-60	12-inch water main to SFR development in Grant Street	$647,000	$647,000*	TBD	MD
DS-61	8-inch water main near Roosevelt Street (Elementary School)	$181,000	$181,000*	DF	MD
DS-62	8-inch water main for SFR development near Roosevelt Street	$2,200,000	$2,200,000*	DF	MD
DS-63	8-inch water main in Powerline Road (Dark Canyon Ave. - Radar Rd.)	$330,000	$330,000*	TBD	MD
DS-64	16-inch water main in Powerline Road (South of Radar Rd.)	$1,384,000	$1,384,000*	TBD	MD
DS-65	8-inch water main for Vandalay Meadows Development	$181,000	$181,000*	DF	MD
DS-66	8-inch water main for Cheryl's Place in Riley Avenue	$171,000	$171,000*	DF	MD
DS-67	8-inch water main for Cheryl's Place in Renee Avenue	$131,000	$131,000*	DF	MD
DS-68	8-inch water main for Cheryl's Place in Blue Jay Street	$101,000	$101,000*	DF	MD
DS-69	8-inch water main for Cheryl's Place in High Desert Loop	$81,000	$81,000*	DF	MD
DS-70	8-inch water main for Cheryl's Place	$441,000	$441,000*	DF	MD
DS-71	8-inch water main for Medium Density Residential Area east of Cheryl's Place	$581,000	$581,000*	DF	MD
DS-76	12-inch water main in Powerline Road (North of Radar Rd.)	$117,000	$117,000*	TBD	MD

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-77	24-inch transmission main (CTUIR River Intake Pump Station - Wanapa Rd)	$4,100,000	$5,628,500	TBD	2037

1. Escalated costs were projected to the year of implementation at a 2.0% inflation rate per year.
2. DF = Developer Funded, MD = Market Dependent, TBD = To Be Determined.
* Costs were not escalated.

40-Year CIP Schedule (2042-2061)

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
Source Improvements					
SR-6	Golf Course Well Pump Improve Capacity	$390,000	$692,600	TBD	2050
SR-7	Golf Course Well/Golf Course Booster Pump Station Auxiliary Power Replacement	$170,000	$273,500	TBD	2045
SR-8	Intertie Well Improve Capacity	$570,000	$1,012,300	TBD	2050
SR-9	Intertie Well Auxiliary Power	$170,000	$273,500	TBD	2045
SR-10	McFarland Well Improve Capacity	$60,000	$106,600	TBD	2050
Storage Improvements					
ST-11	New Coyote Reservoir #3	$1,500,000	$2,412,700	TBD	2045
Distribution System Improvements					
DS-72	8-inch water main in Powerline Road (U.S. 730 - Dean Ave.)	$407,000	$722,800	TBD	2050
DS-73	8-inch water main in U.S. 730 (Shady Rest Mobile Home Park - Powerline Rd.)	$417,000	$740,600	TBD	2050
DS-74	8-inch water main loop (Shady Rest Mobile Home Park)	$487,000	$864,900	TBD	2050
DS-75	16-inch water main in Powerline Road (South of Radar Rd.)	$1,410,000	$1,410,000*	TBD	MD

1. Escalated costs were projected to the year of implementation at a 2.0% inflation rate per year.
2. DF = Developer Funded, MD = Market Dependent, TBD = To Be Determined.
* Costs were not escalated.

Financial Information

The FCS Group created a Utility Rate and System Development Charge Study for the City in 2020, see Appendix N. In the study the FCS Group reviewed the City's system development charge (SDC) methodology and recommended utility rates for the City's water utilities. The study will need to be amended to incorporate the costs related to the capital improvement projects identified in this water master plan. The escalated costs for the projects identified for implementation within the next 10 years are provided in the table below.

10-Year CIP Plan (2021-2031)

Improvement Number	Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
ST-1	Replace sacrificial anodes in Port Reservoir		$22,000									
DS-1	Adjust Monroe Street PRV Pressures		$-									
DS-2	18-inch Umatilla River water main replacement		$6,630,000									
DS-22	Install Eagle Avenue PRV		$113,000									
DS-23	Install Powerline Road PRV		$113,000									
SR-1	CTUIR River Intake Pump Station Expansion			$8,324,000								
SR-2	New Non-Potable Water Treatment Plant			$38,703,000								
ST-2	Recoat interior of Golf Course Reservoir			$937,000								
DS-3	8-inch water main Umatilla Port of Entry			$92,000								
DS-4	8-inch water main in Locust Street			$121,000								
DS-5	8-inch water main in Division Street (Locust St. - 3rd St.)			$581,000								
DS-24	24-inch transmission main (CTUIR River Intake Pump Station - WTP)			$13,422,000								
DS-26	24-inch water main for Data Centers (Wanapa Rd.)			$937,000								
DS-33	8-inch water main in Cherry Street			$344,000								
DS-34	8-inch water main in Brownell Boulevard and Robinnet Street			$93,000								

Improvement Number	Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
DS-37	New 395 Corridor Booster Station			$1,426,000								
DS-38	16-inch water main connecting new 395 Corridor Reservoir			$3,551,000								
DS-39	16-inch water main in Lind Road			$234,000								
DS-40	8-inch water main in Union Street			$266,000								
DS-41	8-inch water main near Union Street and U.S. 395			$266,000								
DS-42	12-inch water main Lind Road to U.S. 395			$388,000								
DS-43	12-inch water main along U.S. 395			$458,000								
DS-44	8-inch water main along U.S. 395			$47,000								
DS-45	8-inch water main in Power City Road			$298,000								
DS-46	8-inch water main in Marian Avenue			$149,000								
DS-47	12-inch water main in Margaret Avenue			$343,000								
ST-5	New Golf Course Reservoir #2				$1,380,000							
SR-5	SCADA Telemetry Improvements					$65,000						
DS-6	8-inch water main in L Street (7th St. - 6th St.)					$61,000						
DS-7	8-inch water main in 7th Street (L St. - Randall St.)					$452,000						
DS-8	8-inch water main in Yerxa Avenue (6th St. - 7th St.)					$84,000						

Improvement Number	Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
DS-9	8-inch water main in 6th Street (Yerxa Ave. - Sloan Ave.)					$120,000						
ST-3	Recoat interior of Port Reservoir						$67,000					
DS-10	8-inch water main in Switzler Avenue (3rd St. - 6th St.)							$492,000				
DS-11	8-inch water main in 3rd Street (WWTP - Cline Ave.)							$891,000				
DS-12	8-inch water main in Cline Avenue (3rd St. - 2nd St.)							$87,000				
DS-13	10-inch water main at WWTP (3rd St. - Hydrant)							$205,000				
ST-4	Recoat interior of McFarland Steel Reservoir									$293,000		
DS-14	8-inch water main in Oliver Avenue (2nd St. - 3rd St.)									$91,000		
DS-15	8-inch water main in Patterson Street (2nd St. - 3rd St.)									$91,000		
DS-16	8-inch water main in Quincy Avenue (1st St. - 3rd St.)									$181,000		
DS-17	8-inch water main in 2nd Street (Oliver Ave. - Quincy Ave.)									$258,000		
DS-18	8-inch water main in 1st Street (Umatilla Marina Park)									$336,000		
ST-9	New Coyote Reservoir #2										$2,749,000	
ST-10	8-inch water main - downsize Coyote Reservoir inlet piping										$83,000	
DS-49	12-inch water main connecting new Coyote Reservoir #2										$894,000	
DS-18	8-inch water main in Stephens Avenue											$381,000

Improvement Number	Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
DS-20	8-inch water main in Tucker Avenue											$374,000
DS-21	8-inch water main in J Street (Stephens Ave. - Tucker Ave.)											$54,000
Total 10-Year CIP (Escalated Costs)		**$0 $6,878,000 $1,380,000 $67,000 $0 $3,726,000** **$70,980,000 $782,000 $1,250,000 $809,000**										

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Abbreviations and Acronyms

AC	Asbestos Cement
ADD	Average Day Demand
AWWA	American Water Works Association
BGS	Below Ground Surface
CBU	Claim of Beneficial Use
CCR	Consumer Confidence Reports
CF	Cubic Feet
CFS	Cubic Feet per Second
CIP	Capital Improvement Plan
CMU	Concrete Masonry Unit
D/DBP	Disinfectants/Disinfection-By-Products
DEQ	Department of Environmental Quality
DF	Developer Funded
DHS	Department of Human Services
DRC	Direct Responsible Charge
DS	Distribution System
DSL	Distribution System Leakage
DWP	Drinking Water Program
DWS	Drinking Water Services
EPA	Environmental Protection Agency
ERU	Equivalent Residential Units
ES	Equalizing Storage
ESA	Endangered Species Act
FCC	Federal Communications Commission
FPS	Feet Per Second
FSS	Fire Suppression Storage
FT	Feet
GIS	Geographic Information System
GPCD	Gallons Per Capita per Day
GPD	Gallons Per Day
GPM	Gallons Per Minute

GWR	Groundwater Rule
GWUDI	Groundwater Under the Direct Influence of Surface Water
HAA5	Haloacetic Acids
HP	Horsepower
IFC	International Fire Code
IDSE	Initial Distribution System Evaluation
IOC	Inorganic Chemicals
ISO	International Organization for Standardization
LCR	Lead and Copper Rule
LF	Linear Foot
LID	Local Improvement Districts
LRAA	Locational Running Annual Averages
MCL	Maximum Contaminant Levels
MD	Market Dependent
MFR	Multi-Family Residence
MG	Millions of Gallons
Mg/L	Milligrams per Liter
MGD	Million Gallons per Day
MOU	Memorandum Of Understanding
MRDL	Maximum Residual Disinfectant Level
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NMFS	National Marine Fisheries Service
OAR	Oregon Administrative Rules
OBDD	Oregon Business Development Department
OFM	Office of Financial Management
OHA	Oregon Health Authority
OS	Operational storage
OWRD	Oregon Water Resources Department
PDD	Peak Day Demand
PHD	Peak Hourly Demand
PLC	Programmable Logic Controller

PNR	Public Notification Rule
PRV	Pressure Reducing Valve
PSV	Pressure Sustaining Valve
PSI	Pounds per Square Inch
RAA	Running Annual Average
RES	Resolution
RWFCP	Regional Water Forecast and Conservation Plan
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SDC	System Development Charge
SFR	Single Family Residence
SIS	Separate Irrigation System
SM	System Management
SN	System Needs
SOC	Synthetic Organic Chemicals
SR	Source
ST	Storage
TCR	Total Coliform Rule
TDH	Total Dynamic Head
THM	Trihalomethanes
TRCI	Two Rivers Correctional Institution
UAW	Unaccounted-for Water
UGB	Urban Growth Boundary
UMC	Umatilla Municipal Code
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Chemicals
WDOH	Washington State Department of Health
WEID	West Extension Irrigation District
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Plan
WMP	Water Master Plan

WSDM	Water System Design Manual
WTP	Water Treatment Plant
WUE	Water Use Efficiency
WWTP	Waste Water Treatment Plant

Chapter 1 - Introduction and Acknowledgements

1.1 Purpose of the Plan

In accordance with Oregon Administrative Rule (OAR) 333-061-0060, the City of Umatilla (City) is submitting this Water Master Plan (WMP) that evaluates the present and future water supply, storage, and distribution system capacity and compliance deficiencies of the City's portable water system. The WMP also identifies the City's water quality and service goals. The WMP includes recommendations to achieve the City's goals and to correct the system deficiencies, including an implementation schedule and facility costs. This WMP evaluates the City's needs for the 20-year and 40-year planning periods.

The City's Water Quality and Service goals are:

- Achieving and maintaining long-term water capacity sustainability.
- Being good stewards of funds and resources for the public.
- Pursuing partnership opportunities that keep these goals in mind, including:
    - Confederated Tribes of the Umatilla Indian Reservation (CTUIR),
    - Port of Umatilla,
    - Umatilla County; and
    - Private Parties.
- The Oregon Health Authority (OHA) requires a 20-year planning period, the City would like to be conscientious of a 40-year planning period.

1.2 Ownership and Management

The City of Umatilla, a municipality, currently owns, operates, and maintains its community water system (#OR41 00914). Responsibility for the water system is assigned to the Public Works Director:

Scott Coleman
Public Works Director
City of Umatilla
700 Sixth Street
Umatilla, Oregon 97882

A copy of the current water facility inventory is provided in Appendix A.

1.3 System Background

1.3.1 History

The City's original water system was constructed between 1935 and 1943. The original source well was constructed at an unknown date, assumed to be around 1935. During the system's early years, the service area included the downtown area of the Low-Level System and grew east with the acquisition of McNary water distribution system. Overtime, the City's system has also grown south of the Umatilla River due to development in the South Hill area. The following is a brief summary of the major events in the water system history:

- 1935-1943 – Original water system was constructed.
- 1935 – Concrete McFarland Reservoir was constructed.
- 1943 – The "River Well" was constructed.
- 1947 – McFarland Well was constructed adjacent to the McFarland Concrete Reservoir.
- 1954 – Ground-level steel reservoir was added near the McFarland Well and McFarland Concrete Reservoir.
- 1968 – Port Reservoir was constructed.
- 1975-76 – The City of Umatilla took over a portion of the U.S. Army Corps of Engineer's McNary water distribution system. The Port of Umatilla also took over a portion of the Corp's system.
- 1976 – McNary Booster Station was constructed.
- 1977-78 – Major water system improvements project added the Intertie Reservoir, Coyote Reservoir, McFarland Booster Station, and a number of water distribution lines.
- 1978 – Golf Course Well construction complete.
- 1979 – Intertie Well construction complete.
- 1994 – The City took over a portion of the Port of Umatilla's water system, this included the elevated Port Reservoir and the distribution system.
- 1995-96 – Golf Course Well was refurbished. A diesel generator and motor was installed on for emergency use.
- 1995-96 – 1.8 MG Golf Course Reservoir was constructed.
- 1995-96 – Golf Course Booster Station was constructed. Diesel generators and motors were installed for emergency use.
- 1995-96 – New distribution piping, valves, and fire hydrants were installed to replace the old McNary Township distribution system. Service meters were installed on all users in the system.
- 1999 – An automatic intertie valve and flowmeters were installed at the McNary Booster Station, connecting the McNary High Level System with the Low-Level System.
- 2000 – The Coyote Booster Station was constructed in 2000 to serve the new Powerline High Level System pressure zone.
- 2001 – The Port Well (drilled in 1967) was transferred to the City of Umatilla on a 40-year lease set to expire in 2040.
- 2001 – New booster pumps and emergency generator upgrades were made at the McFarland Booster Station.
- 2001 – New telemetry controls and monitoring systems at each pump station and reservoir were installed.

1.4 Inventory of Existing Facilities

The City's water system consists of six storage reservoirs (McNary, Port, Intertie, McFarland (concrete), McFarland (steel), and Coyote). The total active storage volume is approximately 4.8 MG. Sources include four wells that can provide a total pumping capacity of 4,638 gpm. Based on the City's records, the existing distribution system consists of approximately 48 miles of water mains. Table 1-1 summarizes the pipe breakdown for each size of pipe. The service area and UGB are shown in Figure 2-1.

Table 1-1 System Inventory by Pipe Diameter

Diameter (inches)	Length (ft)	Length (miles)
≤ 2	28,300	5.4
3	900	0.2
4	17,300	3.3
6	65,300	12.4
8	53,900	10.2
10	6,000	1.1
12	56,600	10.7
14	100	0.02
16	14,900	2.8
18	10,500	2.0
20	600	0.1
Total	**253,800**	**48.1**

Based on City's GIS database and record drawings.

1.5 Related Plans

Other plans that are pertinent to this Water Master Plan are:

- 2008 City of Umatilla Water System Plan
- 2013 City of Umatilla Comprehensive Land Use Plan
- 2018 City of Umatilla Beneficial Reuse Feasibility Analysis
- 2020 Water Management and Conservation Plan Update
- 2020 Utility Rate and System Development Charge Study
- 2021 Risk and Resilience Assessment

1.6 Acknowledgements

The City of Umatilla recognizes the following for their contributions and efforts to develop this Water Master Plan:

- Oregon Infrastructure Finance Authority of the Business Development Department (OBDD)

Chapter 2 - Project Planning

The purpose of this Section is to define the current and future domestic water usage for the City of Umatilla for planning of future water needs. Water use is related to population density, land use, and availability of irrigation water in the City's water service area. How these current and anticipated trends shape the projected water demand is presented below. The planning years used for this document are 20-year (Year 2041), and 40-year (Year 2061).

2.1 Service Area and Characteristics

The City of Umatilla is a relatively small community located along the Columbia River in northeast Oregon. The City has a mix of residential, commercial, and industrial land uses. Approximately 91% of the current water connections are residential, 5% are Commercial, 1% are Industrial, and 3% are City operated connections. The zoning that corresponds to each of these designations is shown in Table 2-1. The City has experienced relatively high growth in residential and industrial water demands and expects this trend to continue. The Two Rivers Correctional Institution (TRCI) is an Oregon State prison located in the City and is zoned as "Industrial". The TRCI is an educational and work facility for long-term inmates. For the purposes of this report, the TRCI water demands are shown separately as its own customer class.

The City's water service area is defined by the City Limits (see Figure 2-1). The Urban Growth Boundary (UGB) represents the limit to where public facilities will be extended. The City can provide water service outside of the UGB in very limited circumstances such as service to the Army Depot and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). The City's Comprehensive "Plan Map" designates current zoning and provides a framework for what type of growth can occur outside the City limits.

Table 2-1 Zoning Designations

Comprehensive Plan Map Designations	Zoning
Residential	Single-Family Residential (R-1), Medium Density Residential (R-2), Multi-Family Residential (R-3), Downtown Residential (DR)
Commercial	Neighborhood Commercial (NC), Downtown Commercial (DC), General Commercial (GC), Downtown Transitional (DT), McNary Center Mixed Use Commercial (MC)
Industrial	Light Industrial (M-1), Heavy Industrial (M-2)

From Table 10-2-1 of City of Umatilla's Zoning Ordinance

2.2 Service Area Policies and Agreements

The City's Comprehensive land use plan is the City's guide for future growth. The Comprehensive Plan Map designations are shown in Figure 2-2. System development charges and policies are documented in the City's Codified Ordinances.

The City has an intergovernmental agreement with the Port of Umatilla to supply water to the Port's McNary Industrial Park located in the northeast corner of the City adjacent to the Columbia River. There is a lease agreement with the Port, for the City to maintain and operate the Port's well. A copy of the agreement is located in Appendix B. Under the agreement, the City provides potable water to the Port's property and adjoining areas served by the Port. The Port, however, owns the well and accompanying water right. The lease agreement is set to expire in February of 2040.

The City's water system has no other inter-tie connections with other potable water systems.

The Port of Umatilla and City of Hermiston own the Regional Water System (RWS) which provides untreated non-potable water to a data center located along Lind Road. The RWS conveys Columbia River water permitted to the Port of Umatilla. The water system was built in the early 1990's and provides water to two large natural gas power plants located south of Hermiston. The RWS runs from the Columbia River, across federal lands (Army Corps of Engineers), then along Lind Road, a city-owned roadway within city limits. Beyond Lind Road the 42-inch RWS pipeline extends outside of the UGB and then to the City of Hermiston.

In 2017, the RWS contracted with a private company to provide water to a large data center campus located along Lind Road within city limits. The RWS is a source of water for the City of Hermiston in the future and is not reliable as a backup source for the City of Umatilla. The City provides water to another data center campus located within city limit along Beach Access Road.

2.3 Current Population and Number of Service Connections

The historical population of the City of Umatilla is presented in Table 2-2. Population increased rapidly from 1970 to 1980. Since the 1990's, the City has been experiencing positive growth.

Table 2-2 Historical Population

Year	Population	Percent Increase
1920	390	97.0%
1930	345	-11.5%
1940	370	7.2%
1950	883	138.6%
1960	617	-30.1%
1970	679	10.0%
1980	3,199	371.1%
1990	3,046	-4.8%
2000*	5,786	90.0%
2010*	7,623	31.7%
2020†	8,195	7.5%

* Historical data from PSU Population Research Center for Umatilla County 2019 through 2069.

† Projected data from PSU Population Research Center for Umatilla County 2019 through 2069.

Table 2-3 shows the number of connections in each customer class for the City from 2017 through 2020. By far most of the connections are residential (about 91%). The Two Rivers Correctional Institution (TRCI) facility was completed in year 2000. Operation of the housing units at TRCI were fully occupied in 2001 for a total inmate capacity of 1,632. There are currently (February 2021) 1,685 inmates at the facility.

Table 2-3 Active Service Connections by Customer Class

Customer Class	2017[1]	2018[1]	2019[1]	2020[1]
Single-Family	1,341	1,383	1,441	1,513
Multi-Family	63	62	62	62
Commercial	84	87	85	85
Industrial	14	10	12	17
TRCI	2	2	2	2
Data Centers	1	1	1	1
Municipal/Government	29	29	29	29
Parks	13	13	15	16
Total	**1,547**	**1,587**	**1,647**	**1,725**

1. Count based on City of Umatilla's December user water meter data.

2.4 Current Water Use, Data Reporting, and ERUs

The City is 100% metered, which has allowed accurate measurement of the amount of water consumed and produced. Table 2-4 summarizes the well water production for the City and Table 2-5 summarizes the metered consumption by customer class.

Table 2-4 Water Production in MG

Source	2017[1,2]	2018[1]	2019[1]	2020[1]
McFarland Well	44.6	41.8	38.8	37.6
Intertie Well	124.0	81.4	109.9	119.6
Golf Course Well	173.4	164.7	137.1	150.3
Port Well	142.7	200.2	178.2	202.2
Total Annual Production	**484.7**	**488.1**	**464.1**	**509.7**

1. Production based on City of Umatilla's daily source production logs.
2. McFarland Well data does not include January 2017.

Table 2-5 Water Consumption in MG

Customer Class	2017[2]	2018[2]	2019[2]	2020[2]
Single-Family	215.2	219.1	237.9	261.7
Multi-Family	33.0	36.1	34.0	32.6
Commercial	31.1	30.5	27.3	31.9
Industrial	28.8	8.0	23.1	22.2
TRCI	73.6	95.1	86.0	82.2
Data Centers	60.6	53.9	43.2	52.7
Municipal/Government	28.8	29.4	25.0	26.2
Parks	19.7	17.4	20.0	23.3
Total	**491**	**490**	**497**	**533**
ERU Factor (gpd/ERU)[1]	440	434	452	474

1. SFR metered consumption divided by number of SFR connections as shown in Table 2-3.
2. Usage based on City of Umatilla's user water meter data from January 2017 through December 2020.

An Equivalent Residential Unit (ERU) is the amount of water consumed by a typical full-time single-family residence (SFR). An ERU factor was calculated for each year of historical data since 2017 by dividing the total annual metered use from SFR meters by the total number of SFR connections. The ERU factor calculated for each year is listed in Table 2-5. The ERU factor can then be divided by the water consumption in all other customer classifications to quantify their use in terms of ERUs. Table 2-6 lists the number of ERUs for 2017 through 2020 by each customer class.

Table 2-6 Equivalent Residential Units

Customer Class	2017	2018	2019	2020
Single-Family	1,341	1,383	1,441	1,513
Multi-Family	205	228	206	188
Commercial	194	193	165	184
Industrial	179	51	140	128
TRCI	458	600	521	475
Data Centers	377	340	262	305
Municipal/Government	179	186	151	151
Parks	122	110	121	135
Total	**3,057**	**3,090**	**3,007**	**3,079**

Industrial connections and demands for the past four years are shown in Table 2-7. The average industrial connection for the past four years is 1.5 MG/year/connection. The average data center demand for the past four years is 52.6 MG/year/connection.

Table 2-7 Historical Industrial User Demand

Year	Number of Industrial Connections	Water Demand	
		(MG/yr)	(MG/yr/ Connection)
2017	14	29	2.1
2018	10	8	0.8
2019	12	23	1.9
2020	17	22	1.3

Historical population at the TRCI was not readily available for this report. Assuming that the average number of inmates is 1,685, then the average water usage at the TRCI is 137 gal/inmate/day. Removing the Industrial, TRCI, and data center demand from the other potable water demands, a demand per capita can be determined and used for future demand projections. The average demand for non-industrial users for the past four years is 148 gpcd, this is summarized in Table 2-8.

Table 2-8 Historical Non-Industrial User Demand

Parameter	2017	2018	2019	2020
Non-Industrial Demand (MG/yr)	328	333	344	376
Population[1]	6,310	6,364	6,419	6,510
Gallons/Capita/Day (gpcd)	142	143	147	158

1. Population does not include TCRI.

2.4.1 Demand Peaking Factors

Demand peaking factors were used to describe the ratio of peak daily demand (PDD) relative to the average daily demand (ADD), and the ratio of peak hourly demand (PHD) relative to the peak daily demand. Peaking factors for Industrial and Non-Industrial demands were determined from existing daily and hourly information available.

The peak daily demand for industrial and non-industrial users was determined by finding the peak day of water production and dividing it by the average water demand. The peak day in year 2020 was July 21, 2020. Pumping and reservoir level changes for that day indicate a total water usage of 3,553,000 gallons. The average water demand for the system was 1,507,115 gallons. Using the average demand for 2020, the peaking factor for the industrial and non-industrial users was found to be 2.36 (3,553,000/1,507,115). This is similar to the peaking factor identified in the 2020 Water Management and Conservation Plan Update which found a peaking factor of 2.35 based on observed peak day demands in 2018, see Appendix M.

Daily flow meter readings were not available for the TRCI. It was assumed that the PDD/ADD for TRCI is the same for the non-industrial users (2.36). There is an existing data center which currently uses the City's potable water system to provide both their industrial and domestic water demands. After 2023, the industrial demands will be provided by an independent non-potable system. Because the existing meter data provided includes the combined potable and non-potable usage of the existing data center, the potable demands of the data center were estimated at 5,000 gpd for ADD. For the existing potable/non-potable demands, the existing data center peaking factor for PDD/ADD was found to be 10.27. For the 20-year and 40-year planning periods, the data center facilities will use the PDD/ADD peaking factor of 2.36 since the future non-potable water is planned to supply their industrial demands.

The City had no hourly production data available, so it was not possible to calculate a peaking factor for PHD using meter data. The City's 2008 Water Master Plan used a PHD/PDD factor of 2.5, but it is unclear how that was determined. The WSDM has an equation to estimate PHD for each user type based on the number of peak day demand ERUs. This equation was used to determine the PHD for the City's water system.

WSDM Equation 3-1 PHD Based on ERUs

$$\mathrm{PHD} = \left(\frac{\mathrm{ERU_{PDD}}}{1440}\right)[(\mathrm{C})(\mathrm{N}) + \mathrm{F}] + 18\ (\mathrm{gpm})$$

Where: PHD = Peak Hourly Demand (gallons per minute)

ERU_{PDD} = Peak Day Demand per ERU (gallons per day)

C = Coefficient Associated with Ranges of ERUs

F = Factor Associated with Ranges of ERUs; and

N = Number of ERUs based on PDD

Calculating Equation 3-1 for non-industrial users resulted in a PHD of 2,702 gpm, so the calculated peaking factor (PHD/PDD) for non-industrial users is 1.72. Using this same equation for the industrial users and the TRCI gives a PHD/PDD ratio of 3.02 and 1.72 respectively. The existing PHD/PDD peaking factor for the data center facilities was calculated to be 3.02. The future (domestic potable demands) PHD/PDD peaking factor for the data center facilities was determined to be 1.73.

Applying all of these peaking factors at the same time would lead to a higher than expected peak demand since the peak flow of industrial, TRCI, and non-industrial are expected to occur at different hours during the day. Generally, residential peaks occur at 6 am, and industrial peaks occur at 1 pm. The PHD/PDD ratios were adjusted, based on typical diurnal curves, so that when applied in the water model they give a more realistic total peak hourly demand for the water system as a whole. It is recommended that the City upgrade their telemetry to store hourly well production and reservoir levels since this will give a more accurate depiction of the actual peak hourly demand.

The peaking factors used in this water master plan are summarized in Table 2-9.

Table 2-9 Peaking Factors

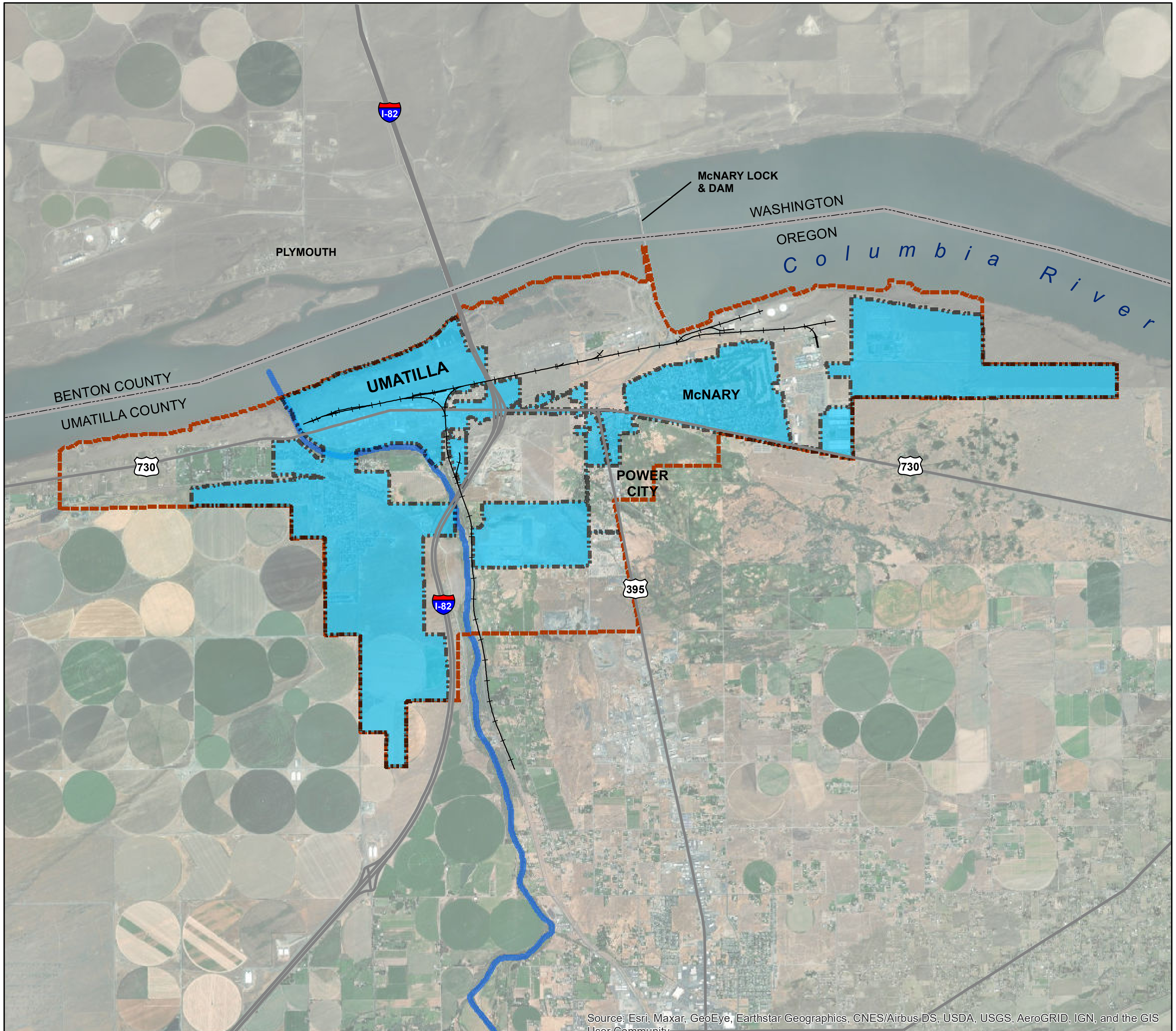
User Classification	PDD/ADD	Calculated PHD/PDD	Adjusted PHD/PDD
Industrial Users	2.36	3.02	1.13
TRCI	2.36	1.72	1.58
Non-Industrial Users[1]	2.36	1.72	1.72
Data Centers[2]	2.36	1.73	1.73
Data Centers[3]	10.3	3.02	3.02

1. Includes Residential, Commercial, Public connections.
2. For future potable demands only.
3. For existing combined potable and industrial demands.

2.5 Current and Future Land Use

Current zoning and planned land use for the City of Umatilla are shown in Figure 2-2. Approximately 91% of the current water connections are residential and 9% non-residential. It is anticipated that this ratio will not remain the same through the 20-year planning period as population increases. Because of the large difference in water demand between industrial and non-industrial connections, a separate growth projection is used for each.

Irrigation has a significant impact on the amount of water consumed. Only a small percentage of the acreage within the City's water service area lies within a service area for an irrigation district (West Extension Irrigation District). If opportunities arise to use non-potable water for irrigation, this would benefit the City by lowering consumption of treated potable water for irrigation use.



City of Umatilla

Water Master Plan

Figure 2-1

Service Area

Legend

- City Limit / Service Area
- Urban Growth Boundary
- Railroad
- Highway/Interstate
- Umatilla River

0 2,000 4,000 Feet

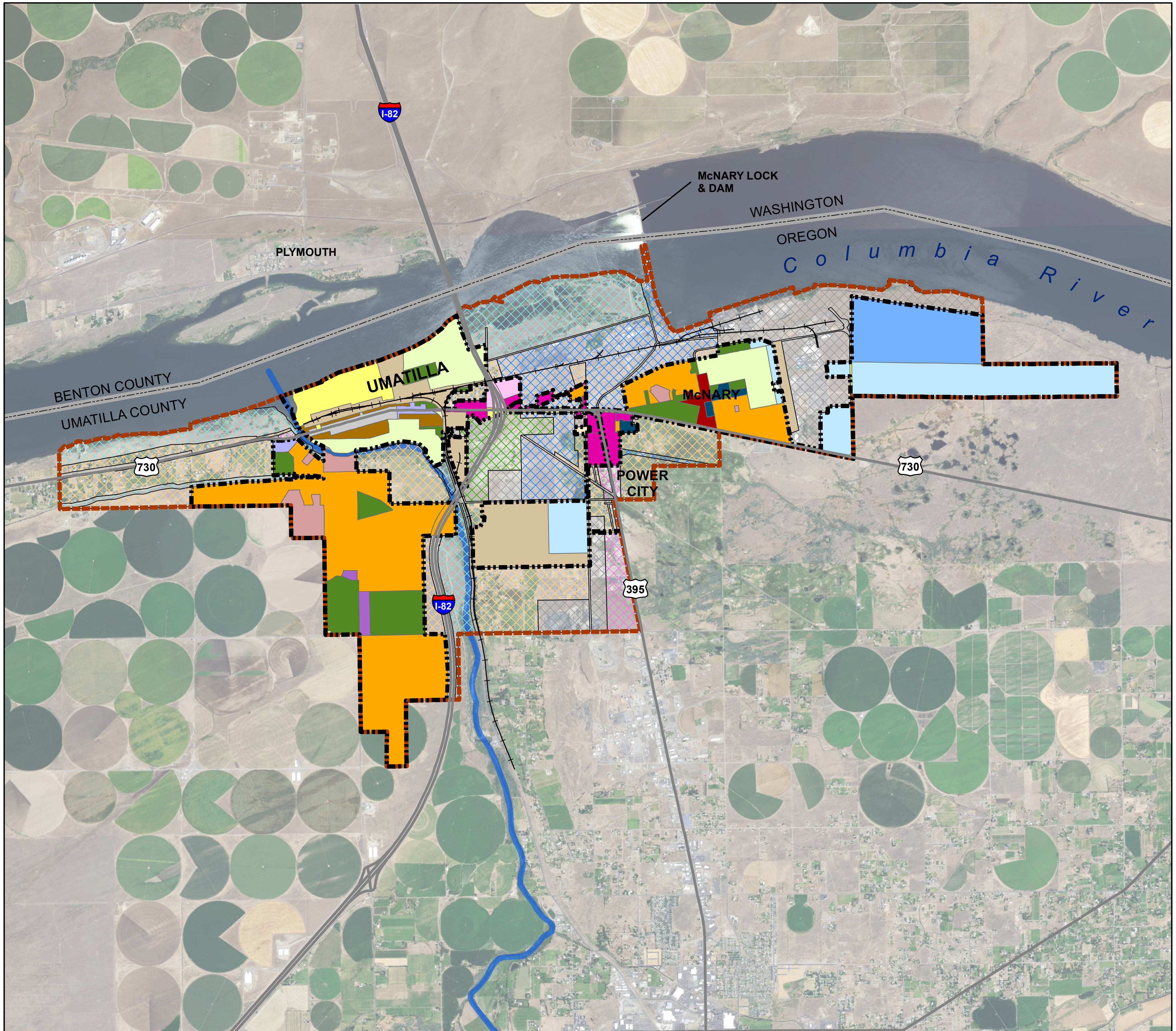
1 inch = 4,000 feet

Date: Jun 1, 2021

J-U-B ENGINEERS, INC.

City of Umatilla
Water Master Plan

Figure 2-2
Current Zoning / Planned Land Use



Legend

- Railroad
- Highway/Interstate
- Umatilla River
- Urban Growth Boundary
- City Limit / Service Area

Code

- CS, Community Service
- DR, Downtown Residential
- DT, Downtown Transitional
- DC, Downtown Commercial
- NC, Neighborhood Commercial
- MC, McNary Center Mixed Use
- GC, General Commercial
- GC/CS, General Commercial/Community Service
- R-1, Single-Family Residential
- R-1/CS, Single-Family/Community Service
- R-2, Medium Density Residential
- R-2/CS, Medium Density/Community Service
- R-3, Multi-Family
- M-1, Light Industrial
- M-1/CS, Light Industrial/Community Service
- M-2, Heavy Industrial
- M-2/CS, Heavy Industrial/Community Service
- R, Residential Plan
- C, Commercial Plan
- M, Industrial Plan
- NR, Natural Resource Plan
- PF, Public Facility Plan
- R-O/S, Recreation-Open/Space Plan

0 2,000 4,000 Feet

1 inch = 4,000 feet

Date: May 21, 2021

J-U-B ENGINEERS, INC.

2.6 Future Population and Industrial Connection Projections

Historical records indicate that the population growth in the City of Umatilla is a fairly inconsistent growth rate (see Table 2-2). The population forecast used in this report was taken from the 2019 PSU Coordinated Population Forecast. This projects a 1.1% growth rate from years 2019 to 2044, and a 0.9% growth rate from year 2044 to 2069, this is shown graphically in Figure 2-3. These population projections include the existing TRCI inmate population, however, the projection does not accurately account for anticipated growth of the TRCI inmate population. The TRCI is expected to grow at 1.75% which would double its capacity in the 40-year planning period (2061).

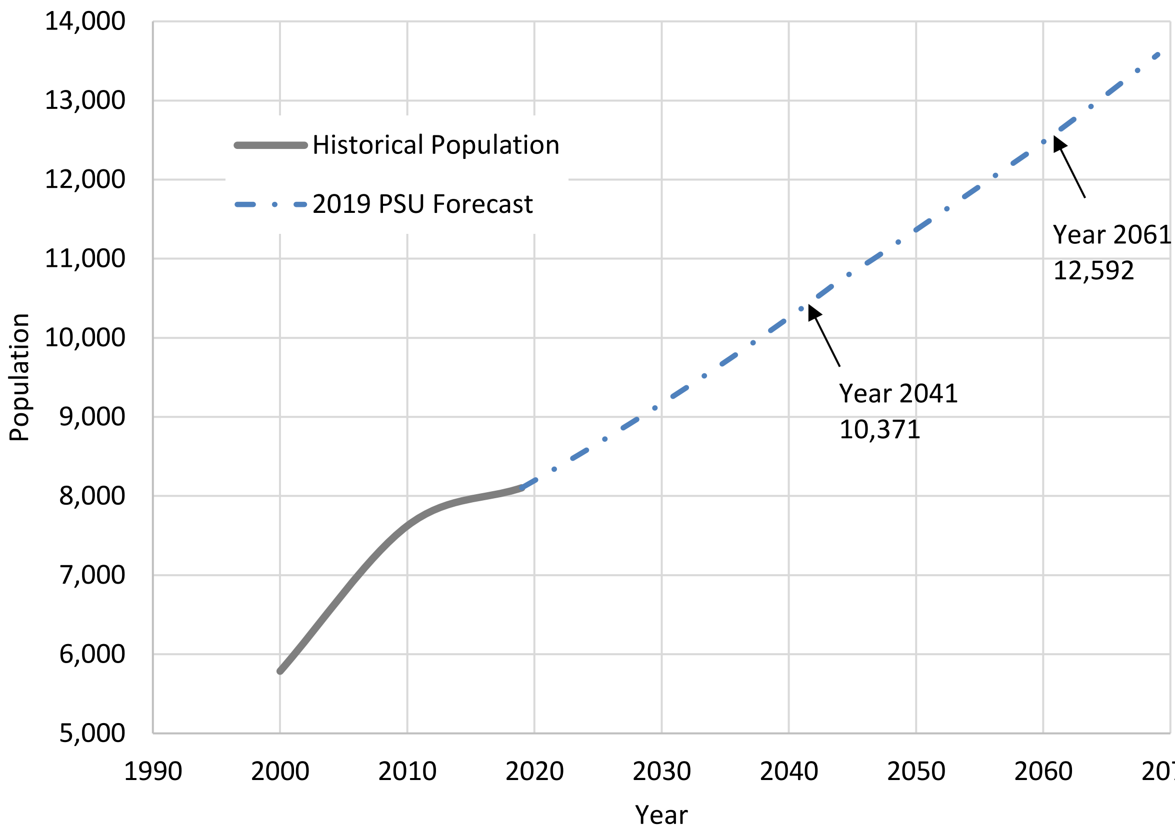


Figure 2-3 Population Projections

Industrial Users are expected to grow at 1.9% through 2044, and 3.9% through the end of the 40-year planning period. These values match the total combined customer growth rate projected in the Utility Rate and System Development Charge Study done by the FCS Group in 2020, this growth is shown graphically in Figure 2-4. The FCS Group study is included in Appendix N.

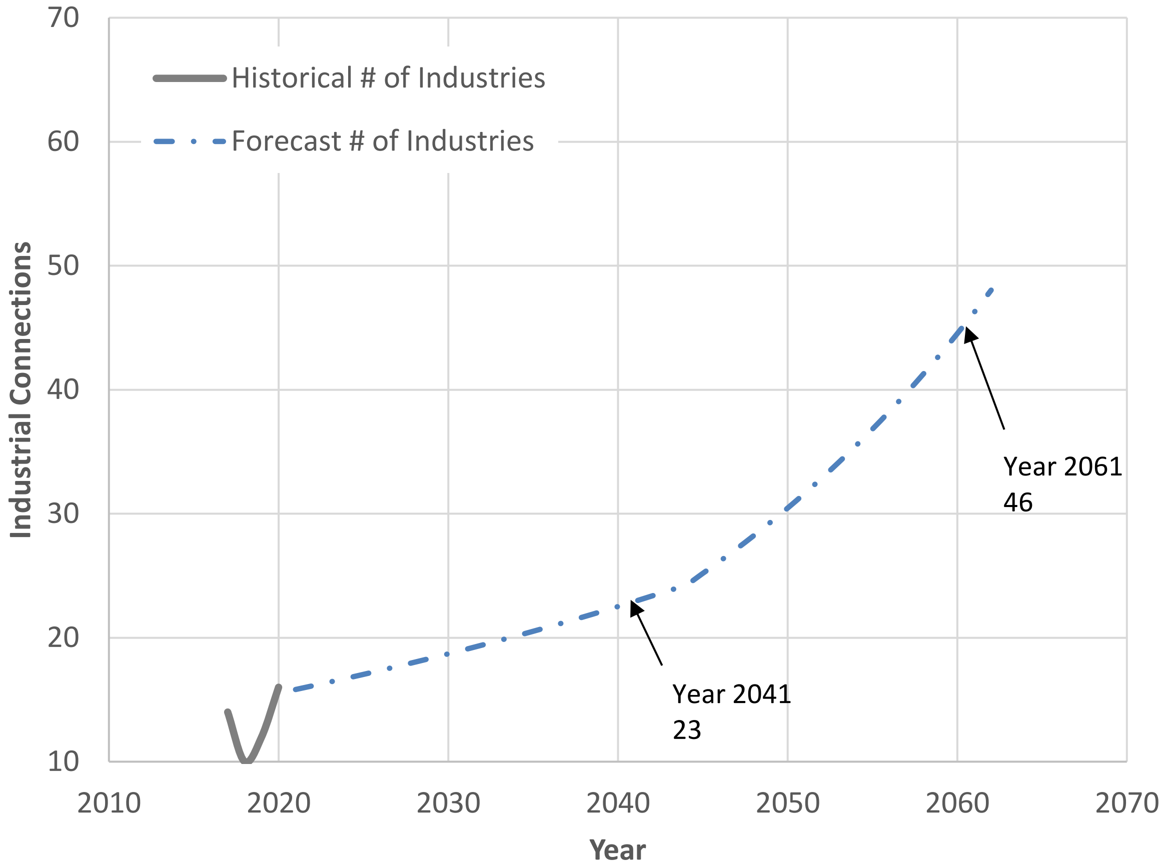


Figure 2-4 Industrial User Projections

2.7 Future Water Use

Growth projections for Industrial Users, TRCI, Non-Industrial users, and data centers, along with historical water usage were used to derive the future connections, demands, and ERU's shown in Table 2-10, Table 2-11, and Table 2-12.

Future Industrial demands were based on 1.5 MG/yr/Connection. Future Non-Industrial Demands were based on 148 gpcd. Future TRCI demands were based on 137 gpcd. As mentioned in Section 2.4.1, the City anticipates large water using industrial data centers to continue constructing facilities within the City's water service area. These large industrial users will develop independent water sources to meet their industrial non-potable demands and the only demand from the City's system will be their domestic potable demands. Currently there are two existing data centers within the City's service area. One of the data centers is connected to the City's potable system, the other existing data center has been utilizing an independent water source since it was constructed. The City plans for domestic potable service to this second site as infrastructure is likely to be installed adjacent to the facility within the 40-year planning period. The domestic potable demands for these data centers have been reported to have an ADD of 5,000 gpd, this is equal to 1.83 MG/yr per site, these demands will be applied in the 20-year and 40-year planning period. The existing combined potable and industrial demands for data centers were based on 52.6 MG/year/connection, these demands are only used for the existing system demands.

Future ERUs were based on 450 gpd, which is the average single-family residential demand for the past four years.

Table 2-10 Future Number of Connections

Year	City Population†	TRCI Population	Industrial Connections	Non-Industrial Connections	TRCI Connections	Data Center Connections
2021	8,288	1,685	16	1,724	2	1
2041	10,371	2,383	23	2,158	2	4
2061	12,592	3,370	46	2,620	2	6

† As reported in PSU Projections (assuming a constant TRCI population of 1,685 inmates).

Table 2-11 Future Water Demand

Year	Industrial (MGD)	Non-Industrial (MGD)	TRCI (MGD)	Data Centers (MGD)	ADD (gpm)	PDD (gpm)[1]	PHD (gpm)[2]
2021	0.07	0.97	0.23	0.14	983	3,109	6,566
2041	0.10	1.28	0.33	0.02	1,197	2,823	4,685
2061	0.19	1.61	0.46	0.03	1,593	3,757	6,166

1. PDD determined by PDD/ADD peaking factor of 2.36 for Industrial, Non-Industrial, TRCI users; 10.3 for data centers in 2021; and 2.36 for data centers in 2041 and 2061.
2. PHD determined by PHD/PDD peaking factor of 1.13 for Industrial, 1.72 for Non-Industrial, 1.58 for TRCI users; 3.02 for data centers in 2021; and 1.73 for data centers in 2041 and 2061.

Table 2-12 Future Equivalent Residential Units

Year	Industrial ERUs	Non-Industrial ERUs	TRCI ERUs	Data Center ERUs	Total ERUs
2021	147	2,166	513	320	3,145
2041	212	2,849	725	44	3,831
2061	428	3,578	1,026	67	5,099

1. ERU is equivalent to 450 gpd (average single-family residential usage for the past four years).

2.8 Adjacent Water Systems

There are several small water systems located within the City limits and Urban Growth Boundary. These small water systems will be individually considered for connection to the City's system as time and needs allow. For the purpose of this WMP, these small water systems were assumed to remain off the City's system unless noted otherwise.

2.8.1 Sand Bur Water Association

The Sand Bur Water Association (PWS ID #4105842) is a small private water system, which serves a approximately 10 residential connections year round. The Sand Bur Water Association service area is located north of the Umatilla Port of Entry generally serving residences north of Locust Street, west of Brownell Boulevard, and south of the railroad. This system was first registered with the state in 1993 and is served by a domestic well (UMAT 3365) that was completed in 1949. Connection to the City's water system for the Sand Bur Water Association was not included in the 20-year or 40-year planning period.

2.8.2 Power City Water Co-Op

The Power City Water Co-Op (PWS ID #4100375) is a community private water system, which serves a approximately 35 residential and commercial properties year round. The Power City Water Co-Op service area is located in the Power City community east of Umatilla, the service area lies partially within City limits and within the Urban Growth Boundary. The Power City Water Co-Op service area is generally bound by U.S. Route 395 to the east, Union Street to the south, Margaret Avenue to the north, and Lind Road to the west. The system consists of an 8-inch diameter 580-feet deep well (UMAT 53429), a 200,000-gallon ground level storage tank and booster pump station. The Power City Water Co-Op has been in discussions with the City about connection to the City's system and its connection is included as part of the 20-year planning period.

2.8.3 Wildwood Water

Wildwood Water (PWS ID #4106201) is a small private water system, which serves approximately 6 residential connections year round. The Wildwood Water service area is located near Wildwood RV park east of Umatilla, the service area is generally bound by U.S. 395 to the west, U.S. 730 to the north and Pollock Lane to the east. The system is served by a private well and a small pressure tank. Connection to the City's water system for Wildwood Water was not included in the 20-year or 40-year planning period.

2.8.4 Umatilla Marina

The Umatilla Marina system (PWS ID #4190873) is a small public water system owned by the City, which serves approximately 5 connections from April 1 to November 15 annually. The Umatilla Marina system service area is located at the Umatilla Marina Park and mainly serves restrooms and several outdoor hydrants for site water on the marina. The system is served by two wells, one is currently inactive and under emergency use only. The City has interest in abandoning the wells and connecting the system to the main distribution system. The connection of the Umatilla Marina system to the City's main distribution system is included as part of the 20-year planning period.

2.8.5 Shady Rest Mobile Court

The Shady Rest Mobile Court system (PWS ID #4101214) is a community private water system, which serves approximately 57 residential mobile home connections year round. The Shady Rest Mobile Court system is located west of Umatilla along U.S. 730 and is limited to the Shady Rest Mobile Home & RV site. The system is served by a 225-foot deep well (UMAT 5441) completed in 1990. Connection of the Shady Rest Mobile Court system to the City's water system is included as part of the 40-year planning period.

Chapter 3 - Existing Water System

3.1 System Description

The purpose of this Chapter is to describe the existing system facilities. A map depicting the locations of the various water facilities is provided as Figure 3-25.

3.1.1 Sources

Sources used for the City of Umatilla drinking water come from four wells and four booster stations, each facility is described below. The McFarland, Intertie, Port and Golf Course Wells pump from the Columbia River Basalt Group's Grande Ronde aquifer. The McFarland, Intertie, and Port wells currently have chlorine gas injection systems for disinfection as well as the Golf Course Booster Station. All of the City pumps are connected via a telemetry system that operates the pumps based on reservoir levels. Well logs for each of the wells are provided in Appendix C. Table 3-1 summarizes the current pumping capacities of the wells, Table 3-2 summarizes the capacities of the booster stations.

Table 3-1 Current Well Pumping Capacities

Well	OWRD Log No.	Pumping Capacity (gpm)[1]
McFarland Well	UMAT50632	505
Intertie Well[2]	UMAT3361	602
Golf Course Well[2]	UMAT3347	1,762
Port Well[2]	UMAT3343	1,769
Total		**4,638**

1. Pumping capacities as of April 2020.
2. Well pump has been lowered as far as possible, located just above basalt.

Table 3-2 Current Booster Pump Capacities

Booster Station	No. Pumps	Pumping Capacity (gpm)[1]	Notes
McFarland Booster	2	2,000	(2) 100 HP pumps
Coyote Booster	4	2,750	10 HP, (2) 30 HP, 100 HP pump
McNary Booster	1	700	60 HP pump
Golf Course Booster	4	7,000	(2) 60 HP, 100 HP, (1) diesel fire pump
Total		**12,450**	

1. Capacity does not include fire pumps.

McFarland Well

The McFarland Well is located in the southwest portion of the city near the intersection of Van Buren Drive and Grant Street. The Oregon Water Resource Department (OWRD) number is UMAT50632. The well was drilled in 1947 to a depth of 785 feet. The well is only partially cased with various diameters and spacings between the casings. The casing configuration includes 165 feet of 16-inch diameter casing from 0 feet to 165 feet below ground surface (BGS); 49 feet of 9-1/2-inch diameter casing from 303 feet to 352 feet BGS; and 181 feet of 8-inch casing from 352 feet to 533 feet BGS. The well initially yielded 700 gpm during construction, however due to decreasing aquifer levels the current pumping capacity of the well has decreased to 505 gpm. A copy of the McFarland Well log is included in Appendix C.

In 1997 a 50 HP 500-gpm American Turbine Model 10-L-20 submersible pump, designed for 284 feet of total dynamic head (TDH) was installed. The McFarland Well discharges directly into the two McFarland reservoirs and is controlled by telemetry based on water levels in the steel reservoir. The McFarland Well primarily serves the Coyote High Level System and the Powerline High Level System. Improvements in 2001 to the nearby McFarland Booster Station allow for the McFarland Well to be powered by an emergency generator and automatic transfer switch in the event of a power outage.

The static water level has varied from 200 feet to 208 feet BGS from 2015 to 2020, groundwater levels for the McFarland Well can be seen in Appendix D. The dynamic water level has varied from 220 feet to 237 feet BGS.

Figure 3-1 McFarland Well Pump House

McFarland Well Characteristics

Ground Elevation	492 feet
Well Yield Capacity	700 gpm
Installed Pumping Capacity	500 gpm
Current Pumping Capacity	505 gpm
Casing Size	0-165 ft BGS 16-inch Steel
	165-232 ft BGS 15-inch Open Hole
	232-303 ft BGS 12-inch Open Hole
	303-352 ft BGS 9-1/2-inch Steel
	352-533 ft BGS 8-inch Steel
	533-785 ft BGS 8-inch Open Hole
Perforations	N/A
Well Depth	785 feet
Static Water Level	208 ft BGS (2020)
Dynamic Water Level	220-237 ft BGS (2008)
Motor	50 HP
Pump	American Turbine 10-L-20
Stages	Unknown
Pump Setting	275 ft BGS (top of bowls)
Impeller Diameter	Unknown
Column Diameter	Unknown

Figure 3-2 McFarland Well

Intertie Well

The Intertie Well is located in the Power City area adjacent to Lind Road. The Intertie Well and Reservoir are located approximately 760 feet south of the intersection of U.S. Highway 730 and Lind Road. The Oregon Water Resource Department (OWRD) number is UMAT3361. The well was drilled in 1979 to a depth of 1,134 feet. The well has a 20-inch diameter casing from 0 feet to 500 feet BGS, the well is a 12-inch diameter open hole rock hole from 500 feet to 1,134 feet BGS. The well initially yielded 1,245 gpm during construction, however, due to decreasing aquifer levels the current pumping capacity of the well has decreased to 602 gpm in recent years. A copy of the Inertie Well log is included in Appendix C. In 1995 a 200 HP 850-gpm Fairbanks-Morse 11-M-7000 vertical line shaft turbine pump, designed for 680 feet of total dynamic head (TDH) was installed. The pump was initially installed on 602 feet of 8-inch column pipe and a pump intake of 617 feet BGS, due to the declining aquifer levels the pump was lowered to 650 feet BGS (top of bowls) in 1998, and again to 710 feet BGS (top of bowls) in 2018. The Intertie Well discharges directly into the Intertie Reservoir and is controlled by telemetry based on water levels in the reservoir as well as water levels in the aquifer. The Intertie Well is the primary source for the Low-Level System and can also provide water to the McNary High Level System via the McNary Booster Station. The Intertie Well does not currently have auxiliary power.

The static water level has stabilized at approximately 160 feet BGS over the last 5 years, groundwater levels for the Intertie Well can be seen in Appendix D. Over the last three years, the dynamic water level has averaged a depth of 579 feet BGS during normal operations over the summer months of June to August.

Figure 3-3 Intertie Well Pump House

Figure 3-4 Intertie Well

Intertie Well Characteristics

Ground Elevation	455 feet
Well Yield Capacity	1,245 gpm
Installed Pumping Capacity	850 gpm
Current Pumping Capacity	602 gpm
Casing Size	0-500 ft BGS 20-inch Steel
	500-1,134 ft BGS 12-inch Open Hole
Perforations	N/A
Well Depth	1,134 feet
Static Water Level	160 ft BGS (2020)
Dynamic Water Level	579 ft BGS (2017-2020)
Motor	200 HP
Pump	Fairbanks-Morse 11-M-7000
Stages	13
Pump Setting	710 ft BGS (top of bowls)
Impeller Diameter	Unknown
Column Diameter	8-inch

Golf Course Well

The Golf Course Well is located in the Port of Umatilla Industrial Park adjacent to Bud Draper Road. The Golf Course Well, Golf Course Booster Station and Golf Course Reservoir are located approximately 1,600 feet south of the intersection of Roxbury Road and Bud Draper Road. The Oregon Water Resource Department (OWRD) number is UMAT3347. The well was drilled in 1978 to a depth of 989 feet. The well has a 20-inch diameter casing from 0 feet to 500 feet BGS, the well is a 23-inch diameter open hole rock hole from 500 feet to 989 feet BGS. The well initially yielded 2,000 gpm during construction, however due to decreasing aquifer levels the current pumping capacity of the well has decreased to 1,762 gpm in recent years. A copy of the Golf Course Well log is included in Appendix C. In 1995 a 300 HP 2,000-gpm American Turbine 15-M-200 water lubed vertical turbine pump, designed for 440 feet of total dynamic head (TDH) was installed. The pump was initially installed at depth of 447 feet BGS but was recently lowered to 489 feet BGS (top of bowls). In 2020, a new 300 HP US Motor was installed on the existing well pump and a new soft starter was installed. The Golf Course Well discharges into the Golf Course Reservoir and can also feed the Golf Course Booster Station if a pressure relieve valve is exercised. Along with the Port Well, the Golf Course Well is one of two sources for the McNary High Level System. The Golf Course Well alternates with the Port Well as the lead and lag pump based on the water level in the Golf Course Reservoir. A diesel-driven generator serves as the auxiliary power source for both the Golf Course Well and Booster Station. The diesel-driven generator is outdated and difficult to maintain due to the challenge to find repair parts.

The static water level has varied from 187 feet to 190 feet BGS over the last 5 years, groundwater levels for the Golf Course Well can be seen in Appendix D. Over the last three years, the dynamic water level has averaged a depth of 420 feet BGS during normal operations over the summer months of June to August.

Figure 3-5 Golf Course Well Pump House

<u>Golf Course Well Characteristics</u>

Ground Elevation	490 feet
Well Yield Capacity	2,000 gpm
Installed Pumping Capacity	2,000 gpm
Current Pumping Capacity	1,762 gpm
Casing Size	0-500 ft BGS 20-inch Steel
	500-989 ft BGS 23-inch Open Hole
Perforations	N/A
Well Depth	989 feet
Static Water Level	187-190 ft BGS (2020)
Dynamic Water Level	420 ft BGS (2017-2020)
Motor	300 HP
Pump	American Turbine 15-M-200
Stages	5
Pump Setting	489 ft BGS (top of bowls)
	497.5 ft BGS (pump intake)
Impeller Diameter	Unknown
Column Diameter	12-inch

Figure 3-6 Golf Course Well Diesel Generator

Port Well

The Port Well is located in the Port of Umatilla Industrial Park near the United Grain elevator. The Port Well is located approximately 600 feet east of the intersection of Launch Lane and Bud Draper Road. The Oregon Water Resource Department (OWRD) number is UMAT3343. The well was drilled in 1967 to a depth of 850 feet. The well has a 24-inch diameter steel casing from 0 feet to 109 feet BGS, a 20-inch diameter steel casing from 99 feet to 345 feet BGS, and is a 12-inch diameter open hole rock hole from 345 feet to 850 feet BGS. The well initially yielded 2,000 gpm during construction, however due to decreasing aquifer levels the current pumping capacity of the well has decreased to 1,769 gpm in recent years. A copy of the Port Well log is included in Appendix C. In 2002, a 250 HP 2,000-gpm Robbco 14JME submersible turbine pump, designed for 365 feet of total dynamic head (TDH) was installed. In 2020, a new soft starter was installed for the well. The pump was initially installed at depth of 220 feet BGS but was recently lowered to 337 feet BGS (top of bowls). The Port Well discharges directly into the Golf Course Reservoir. Along with the Golf Course Well, the Port Well is one of two sources for the McNary High Level System. The Port Well alternates with the Golf Course Well as the lead and lag pump based on the water level in the Golf Course Reservoir. The Port Well does not currently have auxiliary power.

In 2001, the City entered a 40-year lease with the Port of Umatilla for the rights to the property and the municipal use of the water from the Port Well. The lease is set to expire in February of 2040, a copy of the lease can be seen in Appendix B.

The static water level has varied from 91 feet to 94 feet BGS over the last 5 years, groundwater levels for the Golf Course Well can be seen in Appendix D. Over the last three years, the dynamic water level has averaged a depth of 243 feet BGS during normal operations over the summer months of June to August.

Figure 3-7 Port Well Pump House

Port Well Characteristics	
Ground Elevation	385 feet
Well Yield Capacity	2,000 gpm
Installed Pumping Capacity	2,000 gpm
Current Pumping Capacity	1,769 gpm
Casing Size	0-109 ft BGS 24-inch Steel
	99-345 ft BGS 20-inch Steel
	345-850 ft BGS 12-inch Open Hole
Perforations	N/A
Well Depth	850 feet
Static Water Level	91-94 ft BGS (2020)
Dynamic Water Level	243 ft BGS (2017-2020)
Motor	250 HP
Pump	Robbco 14JME
Stages	5
Pump Setting	337 ft BGS (top of bowls)
Impeller Diameter	Unknown
Column Diameter	10-inch

Figure 3-8 Port Well

McFarland Booster Station

The McFarland Booster Station is located in the southwest portion of the city near the intersection of Van Buren Drive and Grant Street. The booster station is located adjacent to the McFarland Well. In 2001, two 1,000 gpm 100 HP centrifugal end suction pumps were installed. Pump No. 1 operates on a soft start and Pump No. 2 operates on a variable frequency drive (VFD). Pump No. 1 is the lead pump, Pump No. 2 is the lag pump and typically operates in level mode, varying speeds based on the water levels at the Coyote Reservoir. The 2001 project upgrades included the installation of a diesel-driven emergency generator and an automatic transfer switch. The emergency generator will power the McFarland Booster Station as well as the McFarland Well in case of a power outage. The McFarland Booster Station draws from the McFarland Reservoirs and pumps to the Coyote Reservoir to serve the Powerline High Level System. The booster station also serves the Coyote High Level System.

Figure 3-9 McFarland Booster Station

McFarland Booster Station Characteristics

Pump No.	No. 1	No. 2
Pump Type	End Suction	End Suction
Pump	Paco 4095-9	Paco 4095-9
Pump Capacity	1,000 gpm	1,000 gpm
Pump Head	268 ft	268 ft
Motor	100 HP	100 HP
Impeller Diameter	8.563 in	8.563 in
Pump Start	Coyote Reservoir Level < 52 ft	Coyote Reservoir Level < 51 ft
Pump Stop	Coyote Reservoir Level > 61 ft	Coyote Reservoir Level > 60 ft
Operator	Soft Start	VFD
Lead/Lag	Lead	Lag

Figure 3-10 McFarland Booster Pumps

Coyote Booster Station

The Coyote Booster Station is located in the southwest portion of the city near in the South Hill area. The booster station is adjacent to the Coyote Reservoir, the site is approximately 1,300 feet west of the intersection of Radar Road and Powerline Road. Built in 2000, the Coyote Booster Station draws from the Coyote Reservoir and serves the Powerline High Level System pressure zone. The station includes four end suction booster pumps, three of which operate on VFDs to maintain a discharge pressure of 60 psi. The fourth pump is operated by a soft start and is a fire pump.

Pump No. 1 is a 10 HP that can pump up to 150 gpm and serves as the lead pump in the system. Pump No. 1 had a new motor installed and underwent a pump rebuild in 2020. Pump No. 2 and No. 3 are 30 HP and can each pump 600 gpm, these pumps serve as the lag pumps in the system. Pump No. 4 is the 100 HP fire pump and can pump up to 2,000 gpm.

The Coyote Booster Station controls are designed to monitor and maintain a set pressure as demand varies. At this time the discharge pressure is set to 60 psi. The booster station includes an emergency generator and an automatic transfer switch to continue to power the site in the event of a power outage.

Figure 3-11 Coyote Booster Station

Coyote Booster Station Characteristics

Pump No.	No. 1	No. 2	No. 3	No. 4
Pump Type	End Suction	End Suction	End Suction	End Suction
Pump	Cornell 1.5W-10-2	Cornell 3RB-30-4	Cornell 3RB-30-4	Cornell 6H-100-4
Pump Capacity	150 gpm	600 gpm	600 gpm	2,000 gpm
Pump Head	165 ft	152 ft	152 ft	140 ft
Motor	10 HP	30 HP	30 HP	100 HP
Impeller Diameter	7.00 in	12.88 in	12.88 in	13.56 in
Pump Start	Pressure < 60 psi	Pressure < 60 psi	Pressure < 60 psi	Fire Pump
Pump Stop	Pressure > 60 psi	Pressure > 60 psi	Pressure > 60 psi	Fire Pump
Operator	VFD	VFD	VFD	Soft Start
Lead/Lag	Lead	Lag	Lag	Lag

Figure 3-12 Coyote Booster Pumps

McNary Booster Station

The McNary Booster Station is located along U.S. Highway 730 between the McNary area and the downtown area. The booster station is located near the intersection of Scaplehorn Road and U.S. Highway 730. The McNary Booster Station provides the ability to pump water from the Low-Level System to the McNary High Level system in case of a water shortage, this booster station is only used in emergency situations. The station includes a single end suction booster pump, which operates on a soft start. The booster pump is a 60 HP pump and is capable of pumping 700 gpm to 1,000 gpm, depending on the level of the Port Reservoir. The pump is able to pump 700 gpm with the Port Reservoir level at 14.40 feet. Unlike the other booster stations, the McNary Booster sits in a buried steel vault that extends a few feet above ground level. The booster station is manually started and does not have an auxiliary power source.

Figure 3-13 McNary Booster Station

Figure 3-14 McNary Booster Pump

Golf Course Booster Station

The Golf Course Booster Station is located in the Port of Umatilla Industrial Park adjacent to Bud Draper Road. The booster station is adjacent to both the Golf Course Well and the Golf Reservoir, these facilities are located approximately 1,600 feet south of the intersection of Roxbury Road and Bud Draper Road. Built in 1995, the Golf Course Booster Station draws from the Golf Course Reservoir, serves the McNary High Level System and also fills the elevated Port Reservoir. The station includes four end suction booster pumps, three of which operate on electric motors, the fourth pump is diesel-driven fire pump.

Pump No. 1 is a 60 HP electric pump that can pump up to 1,000 gpm and serves as the lead pump in the system during the non-peak winter season. Pump No. 2 is also a 60 HP electric pump that can pump up to 1,000 gpm and serves as the lag pump in the system year-round. Pump No. 3 is a 100 HP electric pump that can pump 2,000 gpm and serves as the lead pump in the system during the peak summer season. Pump No. 4 is the diesel-driven fire pump and can pump up to 3,000 gpm.

The Golf Course Booster Station controls are designed to monitor and maintain water levels in the Port Reservoir. If the Port Reservoir is out of service, the controls are set to maintain a constant system pressure with varying demands. The Golf Course Well includes an emergency diesel-driven generator and an automatic transfer switch to continue to power the well in the event of a power outage, this generator also provides auxiliary power to the Golf Course Booster Station.

Figure 3-15 Golf Course Booster Station

Golf Course Booster Station Characteristics

Pump No.	No. 1	No. 2	No. 3	No. 4
Pump Type	End Suction	End Suction	End Suction	End Suction
Pump	Cornell 4HH-60-4	Cornell 4HH-60-4	Cornell 6H-CC	Cornell 8H-EM18-1
Pump Capacity	1,000 gpm	1,000 gpm	2,000 gpm	3,000 gpm
Pump Head	165 ft	165 ft	150 ft	170 ft
Motor	60 HP	60 HP	100 HP	Diesel
Impeller Diameter	13.44 in	13.44 in	13.81 in	14.00 in
Pump Start	Port Reservoir Level < 13 ft	Port Reservoir Level < 13 ft	Port Reservoir Level < 13 ft	Port Reservoir Level < 9 ft
Pump Stop	Port Reservoir Level > 26.10 ft	Port Reservoir Level > 26.10 ft	Port Reservoir Level > 26.10 ft	Port Reservoir Level > 26.10 ft
Operator	Soft Start	Soft Start	VFD	Soft Start
Lead/Lag	Lead (winter)	Lag	Lead (summer)	Lag

Figure 3-16 Golf Course Booster Pumps

3.1.2 Treatment

The City currently disinfects water pumped from all wells by chlorination. The McFarland, Intertie and Port Wells all currently have chlorine gas equipment injecting the water as it is pumped from the wells. At these three sites, the chlorine gas equipment is located at the well house. The water pumped from the Golf Course Well is injected by chlorine gas equipment located at the nearby Golf Course Booster Station before it discharges to the Golf Course Reservoir or into the Golf Course Booster Station.

3.1.3 Storage

The City currently has six storage reservoirs which sum to a total capacity of 4.8 MG. Each of these storage reservoirs are described herein. Figure 3-25 shows the location of each of these reservoirs. Appendix E includes copies of the latest inspection reports for each of the reservoirs.

McFarland Reservoirs

The McFarland Reservoirs serve the McFarland Booster Station and are located adjacent to the McFarland Well and McFarland Booster Station. The older reservoir, built in 1935, is a ground-level concrete reservoir and the newer reservoir, built in 1954, is a ground-level welded steel reservoir. No records on the construction of either reservoir were found. The dimensions referenced for the McFarland Reservoirs were referenced from the most recent inspection reports completed in 2019. A copy of these reports is included in Appendix E.

The overflow of the two reservoirs are believed to be the same elevation of 491 feet. The steel reservoir is 67 feet in diameter and has an operational height of 20 feet with a storage capacity of 530,000 gallons. The floor elevation of the steel reservoir is thought to be approximately 471 feet. The concrete reservoir is 51 feet in diameter and has and operational height of 10 feet with a storage capacity of 152,000 gallons. The floor elevation of the concrete reservoir is thought to be approximately 481 feet.

Both the McFarland Steel and Concrete Reservoirs are typically filled by the McFarland Well, the water level in the steel reservoir controls the well pump. Currently the McFarland Well is set to maintain the McFarland Steel Reservoir water level between 19 and 20 feet. The two reservoirs can alternatively be filled by the Intertie Reservoir through an intertie pipeline and an altitude valve. Since the Intertie Reservoir is higher in elevation, the altitude valve is set to open when the McFarland Reservoir water levels are at 16 feet and close at a water level of 19 feet. The altitude valve keeps the McFarland Reservoirs from overflowing.

The 2019 inspection report for the McFarland Steel Reservoir indicated that the reservoir was in satisfactory condition. The report did recommend recoating the interior of the reservoir within 5-10 years, as the interior coating was in such disrepair that patching would not be cost effective. The report also recommended an inspection and repair cycle every 2-3 years.

The 2019 inspection report for the McFarland Concrete Reservoir indicated that the reservoir was in satisfactory condition. The report recommended an inspection and repair cycle every 2-3 years.

McFarland Steel Reservoir Characteristics

Storage Volume	527,438 gallons
Material	Steel
Diameter	67 ft
Operational Height	20 ft
Floor Elevation	471 ft
Overflow Elevation	491 ft

Figure 3-17 McFarland Steel Reservoir

<u>McFarland Concrete Reservoir Characteristics</u>

Storage Volume	152,803 gallons
Material	Concrete
Diameter	51 ft
Operational Height	10 ft
Floor Elevation	481 ft
Overflow Elevation	491 ft

Figure 3-18 McFarland Concrete Reservoir

Coyote Reservoir

The Coyote Reservoir is located adjacent to the Coyote Booster Station. Built in 1978, the Coyote Reservoir is a ground-level welded steel reservoir that serves the Coyote High Level System via gravity flow and also serves as the source for the Coyote Booster Station that serves the Powerline High Level System.

The floor elevation for the Coyote Reservoir is approximately 622.6 feet and the overflow elevation is approximately 684.6 feet. The reservoir is 44 feet in diameter and is 62 feet high with a storage capacity of 705,161 gallons.

The Coyote Reservoir is filled by the McFarland Booster Station. Currently the McFarland Booster Station pumps are set to maintain the Coyote Reservoir water level between 52 and 61 feet.

Coyote Reservoir Characteristics

Storage Volume	705,161 gallons
Material	Steel
Diameter	44 ft
Operational Height	62 ft
Floor Elevation	422.6 ft
Overflow Elevation	484.6 ft

Figure 3-19 Coyote Reservoir

Intertie Reservoir

The Intertie Reservoir is located adjacent to the Intertie Well. Built in 1978, the Intertie Reservoir is a ground-level welded steel reservoir that serves the Low-Level System via gravity flow. Located in the Power City area on the east side Interstate I-82, the Intertie Reservoir serves the Low-Level System through a 16-inch diameter transmission pipe.

No records on the construction of the reservoir were found. The dimensions used for the Intertie Reservoir were referenced from the most recent inspection report completed in 2019, a copy of this report is included in Appendix E. The floor elevation for the Intertie Reservoir is approximately 455 feet and the overflow elevation is approximately 521 feet. The reservoir is 62 feet in diameter and is 66 feet high with a storage capacity of 1,490,455 gallons.

The Intertie Reservoir is typically filled by the Intertie Well. Currently the Intertie Well is set to maintain the Intertie Reservoir water level between 57.05 feet and 62 feet. The Intertie Well is also designed to start/stop based on the dynamic water level in the aquifer. Alternatively, the Intertie Reservoir can also be filled by the McNary High Level System. The two systems are hydraulically connected by a 12-inch diameter transmission pipe that runs parallel to U.S. Highway 730. Flow from the McNary High Level System to the Low-Level System is controlled by an automatic valve located near the McNary Booster Station. This automatic valve is a combination pressure reducing, backpressure sustaining and solenoid control valve. The automatic valve is set to open and close based on water levels at the Intertie Reservoir at a rate which does not allow the McNary High Level System to drain or lose pressure. During the summer, the valve is set to open when the water level is 57 feet and close at 62 feet. During the winter, the valve is set to open when the water level is 56 feet and close at 62 feet. The automatic valve sits in a vault with a flowmeter that records the flow being transferred from the McNary High Level System to the Low-Level System.

The 2019 inspection report for the Intertie Reservoir indicated that the reservoir was in satisfactory condition. The report also recommended an inspection and repair cycle every 2-3 years.

Intertie Reservoir Characteristics	
Storage Volume	1,490,455 gallons
Material	Steel
Diameter	62 ft
Operational Height	66 ft
Floor Elevation	455 ft
Overflow Elevation	521 ft

Figure 3-20 Intertie Reservoir

Golf Course Reservoir

The Golf Course Reservoir is located adjacent to the Golf Course Well and Golf Course Booster Station. Built in 1995, the Golf Course Reservoir is a ground-level welded steel reservoir that feeds the Golf Course

Booster Station. The Golf Course Reservoir also has the ability to serve the Low-Level System through an automatic bypass valve located near the McNary Booster Station.

The floor elevation for the Golf Course Reservoir is approximately 492 feet and the overflow elevation is approximately 523.5 feet. The reservoir is 98 feet in diameter and is 32 feet high with a storage capacity of 1.8 MG.

The Golf Course Reservoir is directly filled by the Golf Course Well and the Port Well. During the summer, both the Golf Course Well and the Port Well operate simultaneously to maintain the Golf Course Reservoir water level between 24.25 feet and 29.95 feet. During the winter, the two wells alternate being the lead and lag pumps. The winter water level controls are 20.25 feet to 30.25 feet for the lead pump and 19.25 feet and 29.25 feet for the lag pump.

The 2019 inspection report for the Golf Course Reservoir, which is included in Appendix E, indicated that the reservoir was in satisfactory condition. The cathodic protection anodes appeared to be in fair condition and had 75% life remaining. The report recommends recoating the interior of the reservoir within 5-10 years, as the interior coating was in such disrepair that patching would not be cost effective. The report also recommended an inspection and repair cycle every 2-3 years.

Golf Course Reservoir Characteristics

Storage Volume	1,777,273 gallons
Material	Steel
Diameter	98 ft
Height	32 ft
Floor Elevation	492 ft
Overflow Elevation	523.5 ft

Figure 3-21 Golf Course Reservoir

Port Reservoir

The Port Reservoir is located near the intersection of Roxbury Road and Bud Draper Road. The Intertie Reservoir is an elevated steel reservoir that serves the McNary High Level System via gravity flow.

No records on the construction of the reservoir were found, it is believed to have been constructed in 1968. The dimensions used for the Port Reservoir were referenced from the most recent inspection report completed in 2019. A copy of this report is included in Appendix E. The ground elevation is approximately 488 with the reservoir floor elevation approximately being 628 feet and the overflow elevation is approximately 655 feet. The reservoir is 28 feet in diameter and is 27 feet high with a storage capacity of approximately 124,357 gallons.

The Port Reservoir is filled by the Golf Course Booster Station. Currently, the Golf Course Booster pump are set to maintain the water level in the Port Reservoir between 13 feet and 26.10 feet.

The 2019 inspection report for the Port Reservoir indicated that the reservoir was in satisfactory condition. The report recommends replacing the sacrificial anodes in 2-3 years, the anodes had less than 10% life remaining. The report also recommended recoating the interior of the reservoir within 5-10 years, as the interior coating was in such disrepair that patching would not be cost effective, and recommended an inspection and repair cycle every 2-3 years.

Port Reservoir Characteristics

Storage Volume	124,357 gallons
Material	Steel
Diameter	28 ft
Height	27 ft
Ground Elevation	488 ft
Floor Elevation	628 ft
Overflow Elevation	655 ft

Figure 3-22 Port Reservoir

3.1.4 Distribution System

The distribution system consists of distribution and transmission pipelines, valves, hydrants, and special purpose valves. The following is a description of each of these components.

3.1.4.1 Pipe

The distribution system is made up predominantly of 6-inch, 8-inch, and 12-inch pipelines. The majority of the system was originally constructed of cast iron pipe, however, recent development and pipeline replacement projects have installed ductile iron (DI) pipe or polyvinyl chlorine (PVC) pipe. There are small quantities of other materials such as steel, asbestos cement (AC), and galvanized iron. Table 3-3 shows the composition of the water distribution system pipe classified by pipe diameter, based on the information taken from the City's GIS database and record drawings. Figure 3-25 depicts the location of distribution pipelines.

Table 3-3 System Inventory by Pipe Diameter

Diameter (inches)	Length (ft)	Length (miles)
≤ 2	28,300	5.4
3	900	0.2
4	17,300	3.3
6	65,300	12.4
8	53,900	10.2
10	6,000	1.1
12	56,600	10.7
14	100	0.02
16	14,900	2.8
18	10,500	2.0
20	600	0.1
Total	**253,800**	**48.1**

Based on City's GIS database and record drawings.

3.1.4.2 Valves

In general, the valve spacing in a City distribution system is considered good when valves are located approximately every 1,000 feet along water mains. This means substantial areas need not be shut down when making repairs. There are approximately 732 valves in the City's system and approximately 253,800 feet of pipe in the system. This means that the average spacing between valves is 346 feet.

The City does not have a formal valve operation program in place for valves throughout the distribution system. There are several valves throughout the system that are believed to be broken and are inoperable, it is recommended that a replacement and valve exercising program be developed. In older sections of the distribution system, there is a concern that isolation events will cause failures in old pipelines due to water hammer events.

3.1.4.3 Pressure Reducing Valve Stations

The City has a number of Pressure Reducing Valve (PRV) stations throughout the water system. Because the PRVs are critical for supplying water from areas of high pressure to areas of lower pressure, a PRV maintenance program that involves annual inspection, service, and, if necessary, repair is recommended. The location of each of the PRV stations is shown on Figure 3-26.

Grant Street (North) PRV Station

The Grant Street (North) PRV Station is located near the McFarland Reservoirs, west of the intersection of Grant Street and McFarland Avenue. The PRV station has two PRVs that provide water from the Coyote High Level System to a small developing area north of the McFarland Reservoirs. This PRV station creates a smaller pressure zone called the Coyote High Level System Zone 2. The elevations served by this PRV range from 400 to 480 feet. The PRV station includes a 3-inch valve set to have an outlet pressure of 52 psi and an 8-inch valve set to have an outlet pressure of 38 psi.

Grant Street (East) PRV Station

The Grant Street (East) PRV Station is located near the McFarland Reservoirs west of the intersection of Grant Street and McFarland Avenue. The PRV station has one PRV that reduces the pressure from the McFarland Booster Station to the lower elevations of the Coyote High Level System. The elevations served by this PRV range from 400 to 550 feet. The PRV station includes a 6-inch valve, the station is set to have an outlet pressure of 44 psi.

Monroe Street PRV Station

The Monroe Street PRV Station is located near the intersection of Monroe Street and Orchard Street. The PRV station has two PRVs that provide water from the Coyote High Level System to the lower elevations in the Orchard Terrace subdivision. This PRV station reduces pressures from the Coyote High Level System to the Low Level System. The PRV station includes a 4-inch valve set to have an outlet pressure of 66 psi and an 8-inch valve set to have an outlet pressure of 62 psi. These valves are shown in Figure 3-23 below.

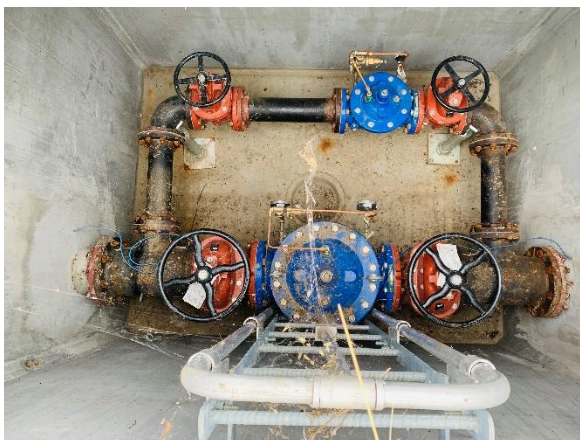


Figure 3-23 Monroe Street PRV Station

McNary Intertie Station

The McNary Intertie Station is a multipurpose valve vault located along U.S. Highway 730 between the McNary area and the downtown area. The McNary Intertie Station is located near the intersection of Scaplehorn Road and U.S. Highway 730. The McNary High Level System and the Low-Level System are hydraulically connected at this site by a 12-inch diameter transmission line. Water from the Low-Level System can be pumped to the McNary High Level System by the McNary Booster Station during peak demand. Similarly, water can gravity flow from the McNary High Level System to the Low-Level System, mainly to fill the Intertie Reservoir. This gravity flow is controlled by an automatic valve located in a buried vault near the McNary Booster Station. This automatic valve is a combination pressure reducing, backpressure sustaining and solenoid control valve. The automatic valve is set to open and close based on water levels at the Intertie Reservoir at a rate which does not allow the McNary High Level System to drain or lose significant pressure. During the summer, the valve is set to open when the water level at the Intertie Reservoir is 57.05 feet and close at a water level of 61.95 feet. During the winter, the valve is set to open when the water level is 56.0 feet and close at 61.95 feet. The automatic valve sits in a buried vault with a flowmeter that records the flow being transferred from the McNary High Level System to the Low-Level System. This vault is shown in Figure 3-24 below.

Figure 3-24 McNary Intertie Station

3.1.4.4 Hydrants

There are approximately 238 fire hydrants in the City. Dividing the total length of pipe in the system, 253,800 feet, by the total number of hydrants in the system, yields an average spacing of 1,066 feet. A geospatial analysis was conducted to confirm that a majority of buildings in the developed portion of the City are within 150 LF of a fire hydrant. Fire hydrants are planned to be spaced at 300 foot spacings. The coverage areas of the fire hydrants are shown in Figure 3-27. The City routinely inspects the systems fire hydrants, a copy of the inspection and maintenance form can be found in Appendix F. Despite having an inspection and maintenance form, the City does not have a formal maintenance program in place for its fire hydrants. Hydrants are flushed where possible, however, a lack of storm drain facilities throughout the City limit flushing activities. The City aims to test up to 25% of their hydrants each year. Fire hydrants in newer subdivisions are tested where storm drain facilities allow for flushing.

The 2008 Water System Plan indicated that an area of concern to the City Fire Chief was near the intersection of Brownell Boulevard and U.S. Highway 730. The area is populated with fueling stations, convenience stores, restaurants, and the ODOT weigh station. The City Fire Chief recommended adding additional fire hydrants in this area. Other areas of concern include the downtown area, specifically the north side of 6th Street from L Street to C Street.

3.1.4.5 Pressure Zones

There are currently five distinct pressure zones that are based upon service elevations. Typically, pressure system boundaries are laid out such that the pressures in the system range from 40 to 80 psi, this avoids low pressures (30 psi) and excessively high pressures. Figure 3-26 shows the extents of the pressure zone boundaries and location of Pressure Reducing Valves (PRV) within the existing service area. Figure 3-28 provides a schematic representation of the water system in the form of a hydraulic profile based upon hydraulic grade lines. The following is a brief description of each of the pressure zones.

McNary High Level System

The McNary High Level System primarily serves the area east of U.S. Highway 395 and north of U.S. Highway 730. The McNary High Level System includes the McNary residential area, the Big River Golf Course, the Port of Umatilla's McNary Industrial Park and the Two Rivers Correctional Institution (TRCI). The majority of the City's industrial users are located in this pressure zone. The sources for the McNary High Level System are the Golf Course Well, the Port Well, and in emergencies the McNary Booster Station can pump water from the Low-Level System. This pressure zone has direct storage provided by the McNary and Port Reservoirs. The existing elevation service range for the McNary High Level System is 400 to 520 feet. The static pressures range from 58 to 110 psi.

Low-Level System

The Low-Level System generally serves the downtown areas and the residential areas south and east of the City center. The Low-Level System is bound by Interstate I-82 to the east, the West Extension Irrigation District's (WEID) Main Canal to the south, and the Columbia River to the north. The Low-Level System users mainly include commercial properties with several school and community service facilities. The Low-Level System also includes residential demand. The sources for the Low-Level System are the Intertie Well and in emergencies the McNary High Level System. This pressure zone has direct storage provided by the Intertie Reservoir. The existing elevation service range for the Low-Level System is approximately 280 feet to 400 feet. The static pressures range from 52 to 104 psi.

Coyote High Level Systems

The Coyote High Level System serves the South Hill residential area of the City, bound to the north by the WEID's Main Canal at approximately elevation 400 and extends south to elevation 550. The majority of the demand in the Coyote High Level System comes from residential users. The source for the Coyote High Level System is the McFarland Booster Station and direct storage is provided by the Coyote Reservoir and the McNary Reservoirs. The McFarland Booster Station pumps water up to the Coyote Reservoir, where it then gravity feeds back down into the Coyote High Level System.

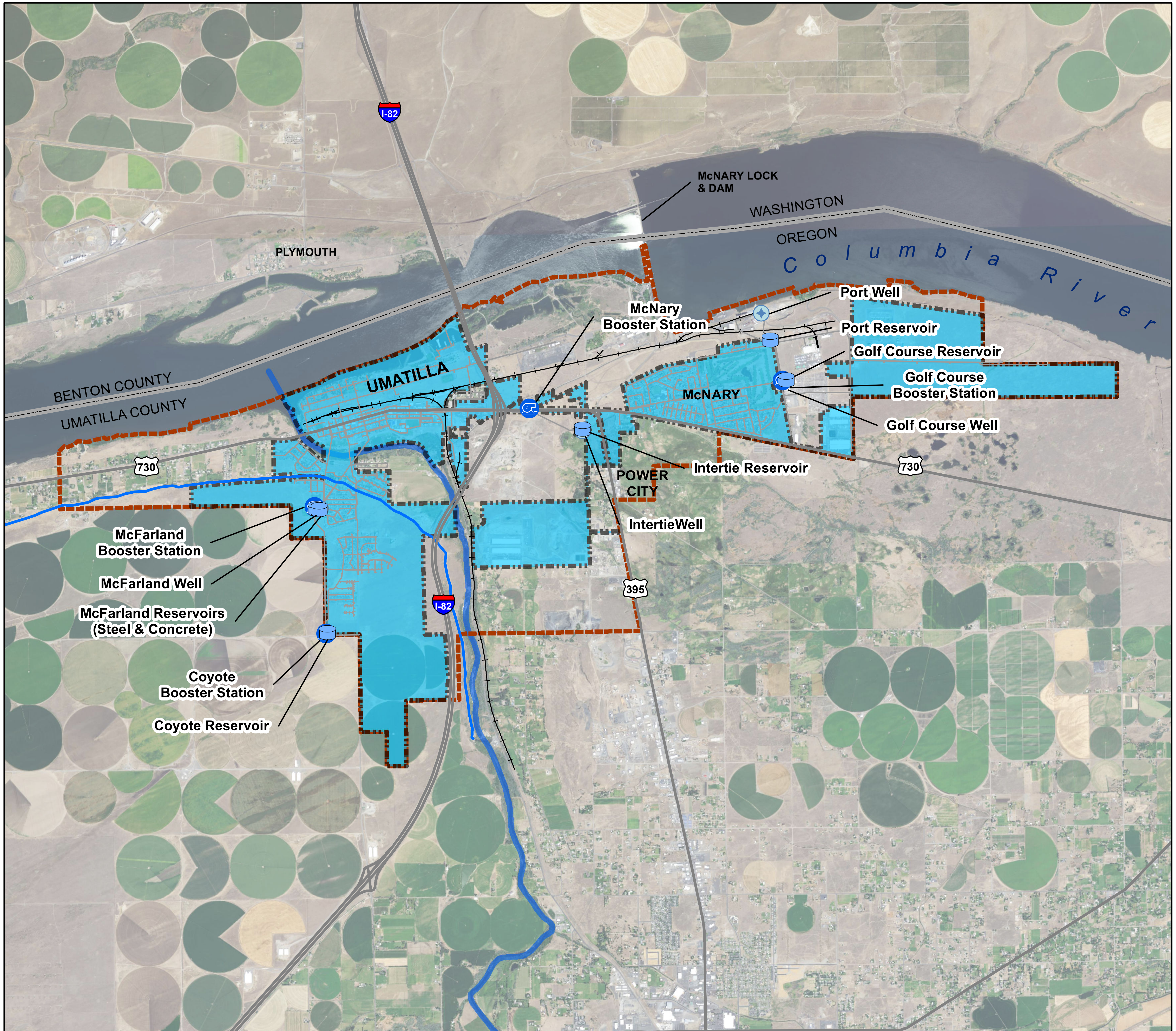
The high-pressure water discharged from the McFarland Booster Station to the Coyote Reservoir also serves the Coyote High Level System directly. Due to the high pressures in the lower elevations of the Coyote High Level System, the Grant Street PRV stations were installed. The Grant Street (North) PRV Station creates a small pressure zone, Coyote High Level System Zone 2, which is generally described as the residential area north of the McFarland Reservoirs and west of McFarland Avenue. The Coyote High Level System Zone 2 serves elevations from 400 to 480 feet. The static pressures range from 52 to 87 psi.

The Grant Street (East) PRV Station is intended to reduce pressure to the lower elevations in the Coyote High Level System, however the 12-inch diameter high-pressure pipeline feeding the Coyote Reservoir loops into the Coyote High Level System at the south end of the zone. This pressurized loop serves the majority of the Coyote High Level System ranging in elevation from 400 to 550 feet. The static pressures range from 58 to 123 psi based on the overflow elevation of the Coyote Reservoir. Due to the looping of the Coyote High Level System, the Grant Street (East) PRV Station will only operate if pressures downstream of the valve are lower than the 44 psi setpoint. Currently the Coyote Reservoir provides enough pressure to maintain the Grant Street (East) PRV inactive under normal conditions.

Through the installation of the Monroe Street PRV Station, pressures can be reduced from the Coyote High Level System to the Low-Level System. The static pressure upstream of the PRV is approximately 130 psi based on the overflow level at the Coyote Reservoir.

Powerline High Level System

The Powerline High Level System serves elevations ranging from 550 to 670 feet on the west and east sides of Powerline Road within the Urban Growth Boundary. Currently the majority of the demand of the Powerline High Level System is from the new developments adjacent to Powerline Road. The source for the Powerline High Level System is the Coyote Reservoir. The Coyote Booster Station currently pumps water to the Powerline High Level System. The static pressures range from 39 to 91 psi.



Umatilla
Est. 1862

City of Umatilla

Water Master Plan

Figure 3-25

Water System Facilities

Legend

- Reservoir
- Booster Station
- Well
- Water Pipes
- Railroad
- Highway/Interstate
- WEID Main Canal
- Umatilla River
- Urban Growth Boundary
- City Limit / Service Area

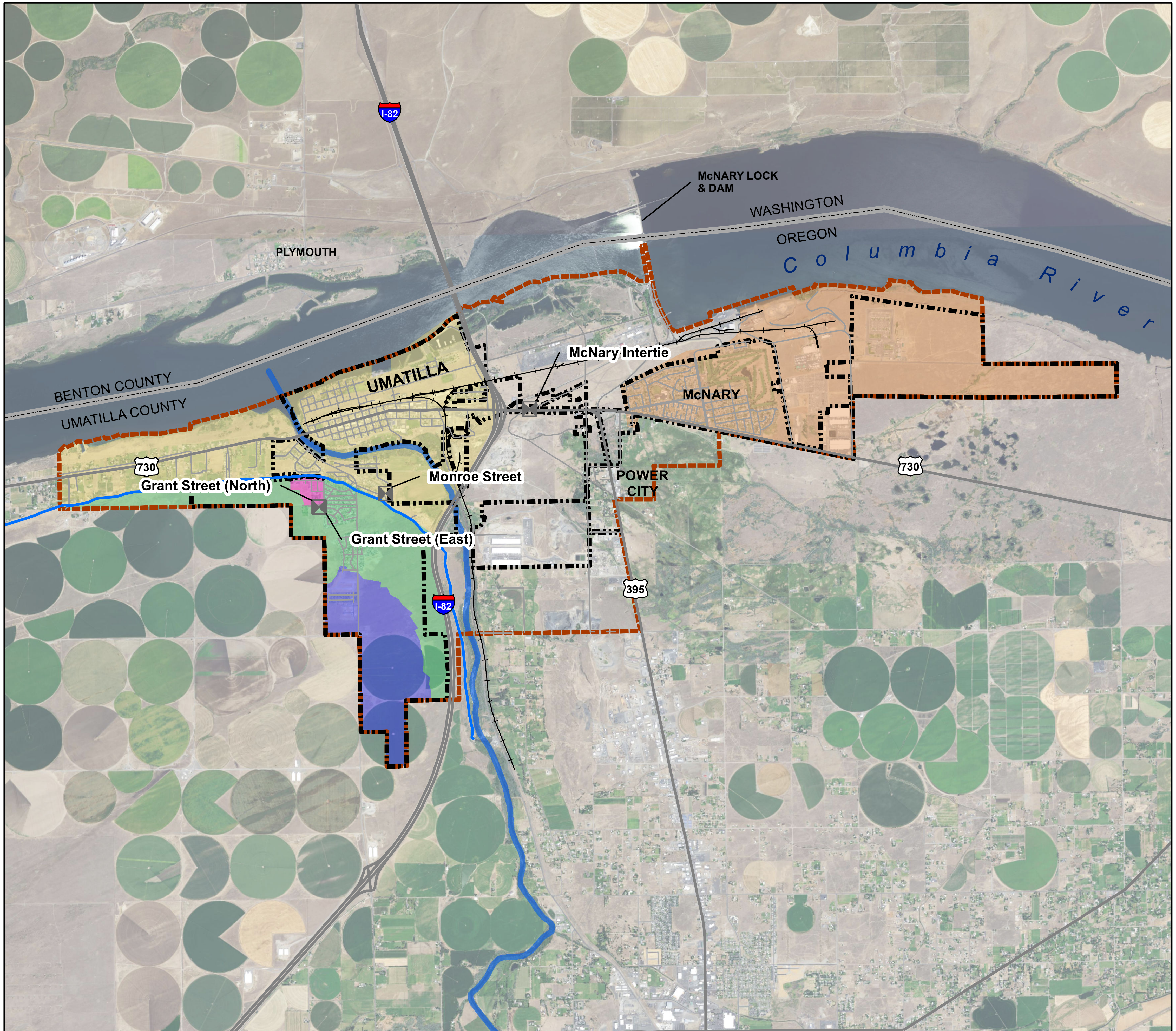
0 2,000 4,000
Feet

1 inch = 4,000 feet

N W E S

Date: Aug 11, 2021

J-U-B
J-U-B ENGINEERS, INC.



City of Umatilla

Water Master Plan

Figure 3-26

Existing Pressure Zones

Legend

- Control Valves
- Railroad
- Highway/Interstate
- Streets
- City Limit / Service Area
- Urban Growth Boundary

Pressure Zones

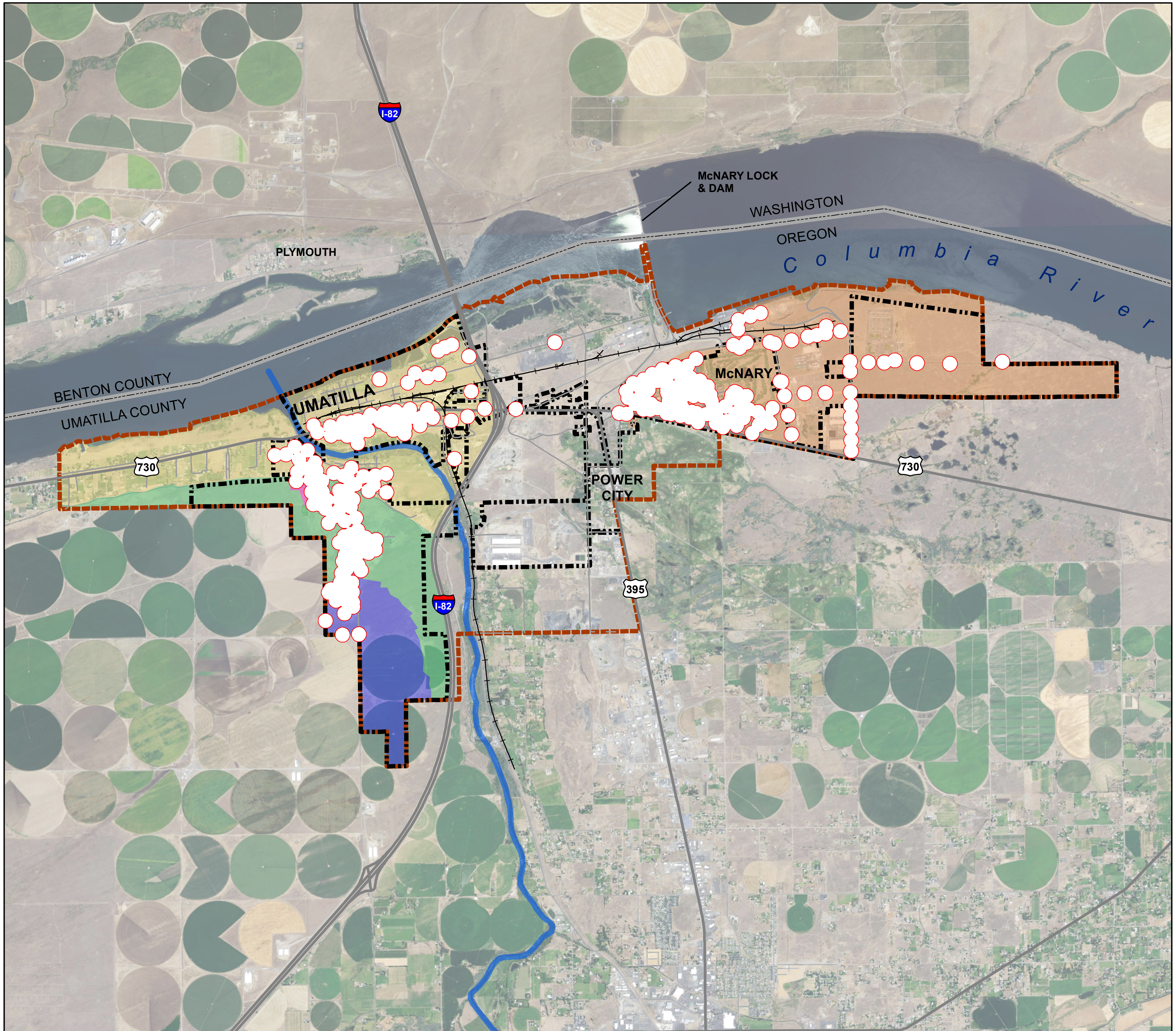
- McNary High Level System
- Low Level System
- Coyote High Level System
- Coyote High Level System Zone 2
- Powerline High Level System
- WEID Main Canal
- Umatilla River

0 2,000 4,000 Feet

1 inch = 4,000 feet

Date: May 21, 2021

J-U-B ENGINEERS, INC.



City of Umatilla

Water Master Plan

Figure 3-27

Fire Hydrant Coverage Areas

Legend

- Fire Hydrant Coverage Area (300' Radius)
- Railroad
- Highway/Interstate
- Streets
- City Limit / Service Area
- Urban Growth Boundary
- Umatilla River

Pressure Zones

- McNary High Level System
- Low Level System
- Coyote High Level System
- Coyote High Level System Zone 2
- Powerline High Level System

0 2,000 4,000 Feet

1 inch = 4,000 feet

Date: Aug 9, 2021

J-U-B ENGINEERS, INC.

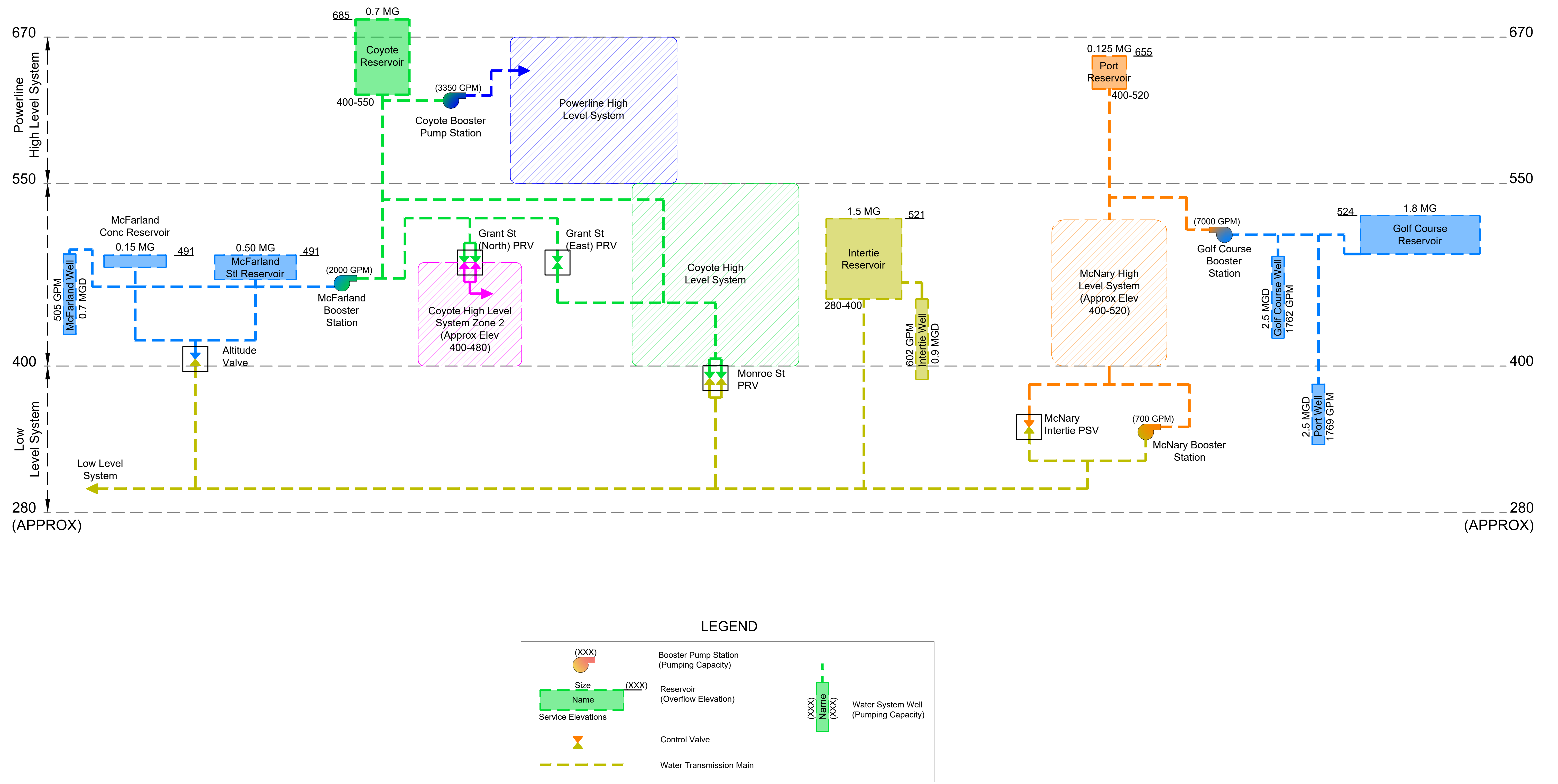


Figure 3-28

WATER MASTER PLAN
CITY OF UMATILLA

WATER SYSTEM EXISTING
HYDRAULIC PROFILE SCHEMATIC

J-U-B ENGINEERS, INC.

LAST UPDATED: 6/1/2021
PLOT DATE: 6/1/2021
FILE: HYDRAULIC PROFILE

3.2 System Operation and Control

A thorough description of the existing system including detailed description of all existing facilities is provided in Section 3.1. Figure 3-25 shows the major system components of the water system.

Booster pumps and wells are typically called to turn on/off by reservoir water levels. These set points are adjustable using the City's telemetry HMI (Human Machine Interface) at each site.

3.2.1 SCADA System

Operation and control of the pumping facilities is regulated with a SCADA system. The SCADA system allows for efficient operation of the water system by automatically controlling pumps and reservoir levels. At this time the City does not have the ability to collect and record instantaneous flow data. It is recommended that the City make improvements to allow for data collection and recording to help identify deficiencies in the system and historical trends.

In 2002 all of the City's water system telemetry systems were replaced. Programmable logic controllers (PLCs) were installed at each of the major sites including the Golf Course Booster Station, Intertie Well, McFarland Well and Booster Station, Coyote Reservoir and Booster Station, and the City shops. The Intertie Well serves as the telemetry system's main site and the City shop hosts the master monitoring panel. Communication between the various facilities and the master panel is accomplished via Federal Communications Commission (FCC) licensed radio signals. The City is currently working on upgrading their radios. The existing telemetry system provides information on all of the system pumps, flowmeters, and reservoirs.

3.3 Routine System Operation and Maintenance Plan

The City is currently developing an Operation and Maintenance Plan. Below are activities that have previously been included in system operation and maintenance and also new implementations that will be incorporated moving forward.

3.3.1 Daily Tasks

When a well is operating, the disinfection equipment should be inspected daily for proper operation, and chemical material consumption noted. Chlorine concentration should be monitored daily. On a daily basis, the following tasks should be performed at each well, reservoir, and the booster pump stations:

1. Record flow meter data, hour-meter, reservoir levels, fuel levels (if applicable), chlorine gas levels, and pressure readings.
2. Police the area-looking for vandalism or abnormalities in equipment operation.
3. Record static or drawdown level of well.
4. Provide daily water reports.
5. At each well and the booster pump station:
    a. Check and grease (if needed) the pump packings.
    b. Sweep out the pump houses.
    c. Check the floor drains and clean if necessary. Add water to the drain if needed.

d. Check all indicator lamps on the electrical controls for proper operation and replace if necessary.

e. Check the oil level in the pump bearing reservoirs and fill if necessary.

3.3.2 Monthly Tasks

During each month, the following tasks should be performed:

1. Read City water meters:
    a. All water meters are read every month.
    b. Deliver readings to the administrative staff for billing.
2. Take bacteriological samples for testing according to the schedule established by OHA.
3. Provide monthly water reports.
4. At each reservoir:
    a. Check cathodic protection for proper operation
5. At each well and the booster pump station:
    a. Check and grease (if needed) the pump packings, replace as required.
    b. Clean air intake screens on electric motors.
    c. Check drive belts on cooling fans. Adjust tension or replace as required.
    d. Check condition of overflow pipe flap valves or screens.
    e. Sweep out the pump houses.
    f. Check the floor drains and clean if necessary. Add water to the drain if needed.
    g. Check all indicator lamps on the electrical controls for proper operation and replace if necessary.
    h. Check the oil level in the pump bearing reservoirs and fill if necessary.
    i. Check perimeter fencing, repair as required.
    j. Check PLC backup batteries, replace as required.

3.3.3 Annual Tasks

The following tasks should be performed annually:

1. At each well and the booster pump station:
    a. Grease motor bearings per manufacturers specifications. (July)
    b. Operate all valves including control valves. (July)
2. At each reservoir:
    a. Inspect access hatches.
    b. Calibrate level transducers.

3. Exercise PRV valves.

3.3.4 Other Tasks

Several tasks should be performed as noted:

1. The reservoir exteriors should be inspected bi-annually. The condition of the paint coatings should be noted. Any damage of any kind should also be investigated and noted. All vent screens should be checked for proper attachment. (January, July)
2. Exercise all valves in the distribution system on a 3-year cycle.
3. Exercise all fire hydrants in the distribution system on a 4-year cycle.
4. Perform maintenance on well pumps on a yearly cycle.
5. Perform maintenance on generators bi-annually (February/March and September/October). Contracted with Wester Estates and Gordon Electric in 2019.
6. At each well and the booster pump station:
    a. Drain oil and refill per manufacturers specifications. (January, July)
    b. Clean inside of control panels. Inspect connections for excess heat. (January, July)

3.3.5 Equipment, Supplies, and Chemical Inventory

Following is an equipment and supplies inventory that should be maintained for the City of Umatilla water system at all times:

- Chlorine Gas Cylinders,
- Pump packing materials,
- Lubricants for pump motor bearings,
- Fuses for motor starters,
- Spare parts for telemetry equipment; and
- Pipe, valves, spare meters, and fittings for emergency repairs

3.4 Comprehensive Monitoring Plan

Monitoring the quality of water supply delivered to the City is the responsibility of the Public Works Department. The Environmental Protection Agency (EPA) and the Oregon Health Authority (OHA) Drinking Water Services (DWS) have minimum requirements via established rules and regulations for the operation of public water systems. These regulations identify maximum contaminant levels (MCL) for physical, chemical, and bacteriological properties of the supply, as well as adequate monitoring and operating procedures for a water system.

The City of Umatilla is the supplier for the water used within their service area and is therefore responsible for sampling of the water to state and federal standards. The standards of quality specified by DWS are intended to apply throughout the distribution system. Water quality monitoring for the utility is to conform with State requirements in OAR 333-061.

The Public Works Department is responsible for water quality testing for parameters that affect the City's reservoirs and distribution system, including coliform bacteria, chlorine residual monitoring, and disinfection by-products. The well sources must be monitored for inorganic chemicals (IOCs), secondary contaminants, coliform bacteria, radionuclides, synthetic organic chemicals (SOCs) and volatile organic chemicals (VOCs).

DWS addresses requirements for sampling, testing, and reporting maximum coliform bacteria, inorganic chemicals, secondary contaminants, synthetic organic chemicals, and synthetic organic chemicals. When water sample tests indicate that maximum contaminant levels for coliform bacteria or inorganic chemicals are exceeded, the rules and regulations require specific action as the public health may be endangered.

DWS may be contacted at telephone number (971) 673-0405 regarding specific concerns involved in water quality monitoring rules and regulations. A discussion of the Safe Water Drinking Act and water quality parameters that are tested for is presented in Section 4. The following is a description of the routing sampling procedures.

3.5 Routine Procedures

The City of Umatilla is responsible for water quality monitoring and testing of the water distribution system. The City's water quality monitoring and testing of the water distribution system follows Oregon Drinking Water Services standards. The following is a summary of the routine procedures involved in water quality monitoring:

1. Water quality sampling
2. Follow-up action when MCLs are exceeded
3. Follow-up Procedures
4. Record keeping
5. Reporting

3.5.1 Water Quality Sampling

The standard of water quality is determined by monitoring the following parameters:

- Inorganic Chemicals
- Synthetic Organic Chemicals (SOC)
- Pesticides
- Volatile Organic Chemicals (VOC)
- Disinfection Byproducts
- Bacteriological
- Chlorine Residual
- Radionuclides
- Lead and Copper

The City's Coliform Monitoring Plan is included in Appendix G.

3.5.2 Sampling Procedure

The following are generic procedures made to follow when collecting water samples:

1. Make certain the identification number is correct on all forms.
    a. City of Umatilla Identification No. OR41 00914.
    b. Classification: Community
2. Try to take your samples as early in the month as possible. This lets you get the results back early. If you have unsatisfactory results, it will give you time to correct the problem, collect additional samples, and possibly avoid having to notify the water users.
3. Try to get your sample to the lab as soon as possible after you take it. You have a maximum of 30 hours to get it there, otherwise your sample may be refused because it is too old.
4. The white powder or clear liquid in the sample bottle is supposed to be there. Do not rinse it out or try to rub it off or you may contaminate the bottle.
5. Take samples from designated sample sites.
6. Do not touch the edge of the bottle or its cap. Do not lay the cap down while sampling.
7. Note a daytime phone number on the sample collection slip so you can be reached if necessary.
8. The number of samples required for bacteriological testing is currently 9/month.
9. Take bacteriological samples to Umpqua Research Company (419 SW. 5th Street, Pendleton, OR 97801).
10. Other accredited Oregon State labs can be found at the following website: https://www.oregon.gov/oha/PH/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/DrinkingWaterTesting.aspx

3.5.3 Follow-Up Action When MCL's Are Exceeded

If water quality exceeds any maximum contaminant level (MCL) listed in OAR 333-061-0030, follow-up actions should be taken. Refer to EPA Public Notification Handbook for procedures and examples. This EPA document is provided in Appendix H.

3.5.4 Record Keeping

Records of all the chemical analysis and bacteriological sampling should be maintained in the City for a period of at least ten years per OAR 333-061-0040.

3.5.5 Reports

Monthly compliance reports on the bacteriological testing results and the free and total chlorine residuals are required and must be mailed to the Oregon Health Authority. The mailing address is as follows:

Oregon Health Authority
Drinking Water Services
PO Box 14350
Portland, OR 97293-0350

3.6 Emergency Response Program

The City of Umatilla recently completed a Risk Resilience Assessment for their water system, see Appendix L, and is currently working on an Emergency Response Program.

3.7 Water System Personnel Emergency Call-up List

Figure 3-29 lists the chain of command that should be used to determine who to contact or notify during emergency events. Contact should be made with the next in line on the chain of command.

On-Call Operators and Maintenance Staff

The first decision makes for most maintenance issues.

↓

On-Call Supervisor or Water Operations Supervisor – Leon Scheel (541-561-9038)

Notified when water system repairs are needed.

↓

Public Works Director – Scott Coleman (509-778-1978)

Engineer of Record – J-U-B ENGINEERS, Inc. (541-963-7100)

Notified when public health or safety is a threat, or major repairs are needed.

↓

City Manager – David Stockdale (541-922-3226)

Notified when public health or safety is at threat.

Figure 3-29 City Staff Notification Chain of Command

3.8 Public Notification

State and Federal laws require water systems to notify their customers any time drinking water poses a health risk. The chain of command shown in Figure 3-29 should be followed after assessing the health and safety risk of an emergency.

The timing for public notifications is also dictated by law. Notifying customers in a timely manner about actual or potential threats related to the drinking water allows them to make informed decisions affecting their health.

The following lists notification requirements by threat levels:

- Tier 1 - Critical/Urgent (must issue within 24 hours)
- Tier 2 - Important (must issue within 30 days)

- Tier 3 - No immediate concern (must issue within one year)

The following sections list the violations and situations that constitute each Tier per OAR 333-061-0042:

3.8.1 Tier 1 - Critical/Urgent (Within 24 Hours)

A Tier 1 notice is required for violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, including but not limited to the following:

- Exceeding the MCL for E. coli as specified in OAR 333-061-0030(4);
- Exceeding the MCL for nitrate, nitrite, or total nitrate and nitrite, or when the water system fails to take a confirmation sample within 24 hours of the system's receipt of the first sample showing an exceedance of the nitrate or nitrite MCL;
- Exceeding the MRDL for chlorine dioxide as prescribed in OAR 333-061-0031 when one or more samples taken in the distribution system the day following an exceedance of the MRDL at the entrance of the distribution system exceed the MRDL, or when the water system does not take the required samples in the distribution system;
- Violation of the interim operating plan for turbidity for a surface water system that does not meet the exception criteria for avoiding filtration under OAR 333-061-0032 nor has installed filtration treatment as defined by these rules when the Authority determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
- Violation of a surface water treatment requirement as prescribed in OAR 333-061-0032, resulting from a single exceedance of the maximum allowable turbidity limit, where the Authority determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
- Occurrence of a waterborne disease outbreak or other waterborne emergency, such as a failure or significant interruption in key water treatment processes, a natural disaster that disrupts the water supply or distribution system, or a chemical spill or unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination;
- Detection of E. coli in source water samples collected as specified in OAR 333-061-0036(6)(i) through (k); and
- Other violations or situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, as determined by the Authority.

Tier 1 notices shall be distributed as follows:

- Provide the notice as soon as practical, but no later than 24 hours after learning of the violation or situation;
- Initiate consultation with the Authority as soon as practical, but no later than 24 hours after learning of the violation or situation;
- Comply with any additional notification requirements established as a result of consultation with the Authority;

- The form and manner used by the public water system are to fit the specific situation, but must be designed to reach residential, transient, and non-transient users of the water system. In order to reach all persons served, one or more of the following forms of delivery must be used:
  - Appropriate broadcast media such as radio and television;
  - Posting of the notice in conspicuous locations throughout the area served by the water system;
  - Hand delivery of the notice to persons served by the water system; or
  - Another delivery method approved in writing by the Authority.
- The City must repeat Tier 1 notices at least once every three months or more frequently at the discretion of the Authority, as long as the violation or situation persists.

3.8.2 Tier 2 - Important (Within 30 Days)

A Tier 2 notice is required for all violations and situations with potential to have serious adverse effects on human health, including but not limited to:

- All violations of the MCL, MRDL, and treatment technique requirements, except where a Tier 1 notice is required or where the Authority determines that a Tier 1 notice is required.
- Violations of the monitoring and testing procedure requirements, where the Authority determines that a Tier 2 rather than a Tier 3 public notice is required, taking into account potential health impacts and persistence of the violation.
- Failure to comply with the terms and conditions of any variance or permit in place.
- Failure to respond to sanitary survey reports or CPE reports prepared by the Authority as required in OAR 333-061-0076 and 333-061-0077.
- Use of an emergency groundwater source that has been identified as potentially under the direct influence of surface water, but has not been fully evaluated.
- Failing to comply with groundwater treatment or corrective action requirements specified in OAR 333-061-0032.
- Failing to complete a coliform investigation or corrective action related to a coliform investigation as prescribed by OAR 333-061-0078.
- Failing to complete or follow an Authority approved start-up procedure prior to serving water to the public at a seasonal water system.

Tier 2 notices shall be distributed as follows:

- Provide the public notice as soon as practical, but no later than 30 days after learning of the violation or situation. The Authority may, in writing, extend additional time for the initial notice of up to three months in appropriate circumstances;
- If the public notice is posted, leave the notice in place as long as the violation or situation exists, but in no case for less than seven days, even if the violation or situation is resolved;
- Repeat the notice every three months as long as the violation or situation persists.

- For the turbidity violations specified in subparagraphs (3)(b)(D)(i) and (ii) of this rule, public water systems must consult with the Authority as soon as practical, but no later than 24 hours after learning of the violation to determine whether a Tier 1 public notice is required to protect public health. When consultation with the Authority does not take place within the 24 hour period, the water system must distribute a Tier 1 notice of the violation within the next 24 hours as prescribed in subsection (3)(a) of this rule:
  - Violation of the interim operating plan for turbidity for a surface water system that does not meet the exception criteria for avoiding filtration under OAR 333-061-0032 nor has installed treatment as defined by these rules; or
  - Violation of the SWTR, LT1ESWTR, or IESWTR treatment technique requirement as prescribed in OAR 333-061-0032, resulting from a single exceedance of the maximum allowable turbidity limit.
- The form and manner used by the public water system for initial and repeat notices must be calculated to reach persons served by the system in the required time period. The form and manner may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:
  - Unless directed otherwise by the Authority in writing, community water systems must provide notice by:
    - Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and
    - Any other method reasonably calculated to reach other persons regularly served by the water system who would not normally be reached by mail or direct delivery. Other methods may include: local newspapers, delivery of multiple copies for distribution, posting, e-mail and community organizations.
  - Unless directed otherwise by the Authority in writing, noncommunity water systems must provide notice by:
    - Posting the notice in conspicuous locations frequented by users throughout the distribution system, or by mail or direct delivery to each customer or connection; and
    - Any other method reasonably calculated to reach other persons not normally reached by posting, mail or direct delivery. Other methods may include: local newspaper, newsletter, e-mail and multiple copies in central locations.

3.8.3 Tier 3 – No Immediate Concern (Within One Year)

A Tier 3 notice is required for other violations or situations not included in Tier 1 and 2, including but not limited to:

- Failing to conduct monitoring or reporting as prescribed by these rules except where the Authority determines a Tier 1 or Tier 2 notice is required;
- Failure to comply with a testing procedure established in these rules except where a Tier 1 notice is required or where the Authority determines that a Tier 2 notice is required;
- Operation under a variance or permit granted by the Authority;

- Availability of unregulated contaminant monitoring results as required under section (6) of OAR 333-061-0042;
- Exceedance of the fluoride secondary MCL as required under section (7) of OAR 333-061-0042; and
- Disinfection profiling and benchmarking monitoring and testing violations.
- Failing to submit a completed investigation report or notify the Authority when corrective action is completed related to a coliform investigation as prescribed by OAR 333-061-0078.
- Failing to certify to the Authority upon completing an Authority approved start-up procedure at a seasonal water system.
- Failure to analyze for E. coli following a total coliform-positive routine sample collected according to OAR 333-061-0036(6)(b) through (g).
- Failure to notify the Authority following an E. coli-positive sample in a timely manner as required by OAR 333-061-0036(6)(a)(D).
- Failure to conduct recordkeeping as prescribed by OAR 333-061-0040(2)(o) or (p).

Tier 3 notices shall be distributed as follows:

- Provide the public notice not later than one year after learning of the violation or situation or begins operating under a variance or permit. Following the initial notice, the system must repeat the notice annually for as long as the violation, variance, permit or other situation persists. If the public notice is posted, the notice must remain in place for as long as the violation, variance, permit, or other situation persists, but in no case less than seven days even if the violation or situation is resolved.
- Instead of individual Tier 3 public notices, a community public water system may use its annual Consumer Confidence Report (CCR) for the initial and all repeat notices detailing all violations and situations that occurred during the previous twelve months. This method may be used as long as it is distributed within the one year requirement in paragraph (3)(c)(A) of this rule, follows the public notice content required under section (4) of this rule and is delivered to users as required under paragraph (3)(c)(C) of this rule.
- The form and manner used by the public water system for initial and repeat notices must be calculated to reach persons served by the system in the required time period. The form and manner may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:
    - Unless directed otherwise by the Authority in writing, community water systems must provide notice by:
        - Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and
        - Any other method reasonably calculated to reach other persons regularly served by the water system who would not normally be reached by mail or direct delivery. Other methods may include: local newspapers, delivery of multiple copies for distribution, posting, e-mail and community organizations.

- Unless directed otherwise by the Authority in writing, noncommunity water systems must provide notice by:
  - Posting the notice in conspicuous locations frequented by users throughout the distribution system, or by mail or direct delivery to each customer or connection; and
  - Any other method reasonably calculated to reach other persons not normally reached by posting, mail or direct delivery. Other methods may include: local newspaper, newsletter, e-mail and delivery of multiple copies in central locations.

3.8.4 Public Notification Elements

When a public water system has a violation or situation requiring a public notice, each public notice must include the following elements:

- A description of the violation or situation, including the contaminant(s) of concern, and the contaminant level;
- When the violation or situation occurred;
- Any potential adverse health effects including the standard language required under paragraphs (4)(d)(A) and (B) of OAR 333-061-0042;
- The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;
- Whether alternative water supplies should be used;
- What actions consumers should take, including when they should seek medical help, if known;
- What the City is doing to correct the violation or situation;
- When the City expects to return to compliance or resolve the situation;
- The name, business address, and phone number of the City's contact as a source of additional information concerning the notice; and
- A statement to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under paragraph (4)(d)(C) of OAR 333-061-0042.

The Oregon Health Authority must also be notified with any public notification that is a Tier 1, 2, or 3 response. The Public Works Director should be the primary communication contact with OHA. The OHA emergency contact is:

- For After-Hours call 1-503-704-1174
- For Business-Hours call 1-974-673-0405

The EPA Public Notification Handbook (located in Appendix H) has procedures and examples for notifications.

Chapter 4 - Performance and Design Criteria

4.1 System Design Standards

The City of Umatilla's water system has been designed based on state and local regulations. The design and operation of the system are based on the following documents:

- Oregon Health Authority Public Health Division (OAR 333-061)
- Water System Planning Guidebook (DOH 331-068)
- Water Management and Conservation Plans (OAR 690-86)
- Manual for the Preparation of a Coliform Monitoring Plan (DOH 331-036)
- Manuals for the Preparation of an Emergency Response Plan (DOH 331-211, EPA 816-B-19-003)
- American Water Works Association Standards
- Recommended Standards for Water Works, Policies for the Review and Approval of Plans and Specifications for Public Water Supplies (also known as 'Ten State Standards')

4.1.1 Average and Peak Daily Demand

Future water use was determined using four user classifications: Industrial users, the TRCI, Non-Industrial users, and future data center facilities. Usage for these classifications was based on water meter data from January 2017 through December 2020 for the Industrial, TRCI, and Non-Industrial users, the usage for the data center facilities was based on water meter data provided by an existing data center facility. The Average Daily Demands (ADD) are based on the following: Industrial demands were based on 1.5 MG/yr/Connection, Non-Industrial Demands were based on 148 gpcd, TRCI demands were based on 137 gpcd, and future data center demands were based on 1.9 MG/yr/Connection. Future ERUs were based on 450 gpd, which is the average single-family residential demand for the past four years. These demands are summarized in Table 4-1.

The PDD/ADD peaking factors were calculated for each of the user classifications based on existing peak day demands (see Section 2.4.1). The existing and future PDD demands for each user classification are summarized in Table 4-1.

Table 4-1 Future Demands Per Connection Type

User Classification	Average Daily Demand	Peak Daily Demand[1]	Peak Hourly Demand[2]	Unit
Industrial Users	4,170	9,830	11,133	gpd/connection
Non-Industrial Users	148	349	583	gpcd
TRCI	137	323	700	gpcd
Data Centers[3]	5,000	11,787	20,427	gpd/connection
Single-Family Residential	450	1,061	1,773	gpd/ERU

1. PDD determined by PDD/ADD peaking factor of 2.36 for Industrial, Non-Industrial, TRCI users; 10.3 for data centers in 2021; and 2.36 for data centers in 2041 and 2061.
2. PHD determined by PHD/PDD peaking factor of 1.13 for Industrial, 1.72 for Non-Industrial, 1.58 for TRCI users; 3.02 for data centers in 2021; and 1.73 for data centers in 2041 and 2061.
3. Demands for potable demands only for years 2041 and 2061.

4.1.2 Peak Hour Demand

The City did not have any hourly production data available, thus a peak hourly demand (PHD) peaking factor was not calculated using metering data. The Washington State Department of Health Water System Design Manual was used to determine the PHD peaking factors for these user classifications using Equation 2-1 and then adjusted using typical diurnal curves. The peaking factors and the PHD demands of the user classifications are summarized in Table 4-1.

4.1.3 Storage

The design criteria for storage requirements are developed based on WDOH regulations for effective storage for each separate pressure zone on an individual basis. Effective storage is determined as the sum of operational, equalizing, standby, and fire suppression storage. Effective storage does not include volumes in reservoirs that cannot be used (dead storage). Minimum elevations for storage are also required to be calculated in order to meet minimum dynamic system pressure requirements. Specific design criteria for storage are listed below:

Operational Storage (OS): The volume of the reservoir devoted to supplying the water system while, under normal operating conditions, the source(s) of supply are in “off” status. The OS volume is the largest of either of the following:

1. The sensitivity of the water level sensors controlling the source pumps.
2. The configuration of the reservoir and sensor settings to prevent excessive cycling of the pump motors. The volume used to prevent excessive cycling was 2.5 times the capacity of the largest pump used to fill the reservoir.

Equalizing Storage (ES): The volume of water needed to supply the water system when source pumping cannot meet the peak hourly demand (PHD). Systems must be able to provide PHD at no less than 30 psi at all existing and proposed service connections throughout the distribution system when equalization storage (ES) is depleted. As recommended by the WDOH, the duration of the typical peak demand period is estimated to be 150 minutes. The ES volume is based on the call-on-demand mode of operation following Equation 7-1 of the WSDM:

WSDM Equation 7-1 Call-on-Demand Storage

$$\mathrm{ES} = (\mathrm{PHD} - \mathrm{Q_S})(150\ \mathrm{minutes})$$

Where: ES = Equalizing Storage, in gallons

PHD = Peak Hourly Demand, in gpm

Q_S = Sum off all installed and active supply source capacities except emergency supply, in gpm

The WSDM allows the elimination of ES if the combined capacity of the supply sources meet or exceed the PHD for the water system while providing 30 psi at each existing and proposed service connection.

Standby Storage (SB): The volume of water that is needed to supply the water system during abnormal operating conditions, such as structural, electrical, mechanical, or treatment process failure, or source contamination. The SB volume is calculated by providing a volume equal to the PDD for a duration of one day or 200 gallons per ERU. For water systems with multiple sources WSDM guidelines allow for a reduction of SB volume based on:

1. Nesting of SB and FSS volumes, with the larger of the two volumes being the minimum available.
2. Two or more sources have permanent on-site auxiliary power that starts automatically when the primary power feed is disrupted. With the largest of these sources out of service, the remaining sources plus SB volume can maintain at least 20 psi throughout the distribution system under PHD conditions.
3. Two or more sources receive power from two electrical substations, so that failure of one substation will not interrupt the power supply to the source as documented in writing by the power utility. With the largest of these sources out of service, the remaining sources plus SB volume can maintain at least 20 psi throughout the distribution system under PHD conditions.
4. Sources are located in different watersheds, wellhead protection areas, or aquifers.
5. Converting dead storage (DS) to standby storage (SB) by providing mechanically redundant booster pumping capacity with permanent on-site auxiliary power that starts automatically when the primary power feed is disrupted.

Fire Suppression Storage (FSS): The volume of water required to provide the highest risk fire flow rate and duration in each particular pressure zone during PDD. The determination of fire flow requirements is made by the County Fire Marshal while maintaining a minimum 20 psi dynamic pressure throughout the distribution system. Fire flow requirements are included in Section 4.1.5.

Dead Storage (DS): The volume of stored water not available to all customers at the minimum design pressure. The system must be able to provide a minimum dynamic system pressure of 30 psi during PHD under the condition where all equalizing storage has been depleted. The system must also provide a minimum dynamic system pressure of 20 psi during PDD under fire flow conditions and under the condition where the designated volume of fire suppression and equalizing storage has been depleted. The hydraulic model of the distribution system is utilized to determine the quantity of dead storage.

4.1.4 Fire Flow Rate and Duration

Fire flow requirements for development should be per the International Fire Code (IFC) and as determined by the County Fire Marshal. For the purposes of this study, fire flow requirements applied were based upon land use as summarized in Table 4-2; however, the Fire Marshal should be consulted for specific fire flow requirements on a case by case basis.

Table 4-2 Fire Flow Rate and Duration

Land Use	Flow (gpm)	Duration (hours)
Commercial/Industrial	3,000	3
Residential	1,500	2
Data Centers	2,500	2

4.1.5 Minimum and Maximum System Pressures

The minimum system pressure shall be in accordance with OAR 333-061-0025(7), the system must be able to provide a minimum dynamic system pressure of 20 psi at all times.

For this analysis, the system was analyzed to provide a minimum dynamic system pressure of 30 psi during PHD under the condition where all equalizing storage has been depleted. The system was analyzed to also provide a minimum dynamic system pressure of 20 psi during PDD under fire flow conditions and under the condition where the designated volume of fire suppression and equalizing storage has been depleted.

For typical daily operating conditions (ADD), pressures between 40 and 80 psi are considered appropriate. The lower limit of 40 psi provides adequate pressure to operate household appliances such as dishwashers. Pressures higher than 80 psi can damage household plumbing and require pressure-reducing valves at each service per the International Building Code.

4.1.6 Minimum Pipe Sizes

The minimum pipe size for new pipes anywhere in the distribution system is eight inches in diameter. Looping shall be performed where possible.

Distribution piping shall be sized to meet criteria of OAR 333-061-0050 (8). Design criteria used to evaluate the necessity of piping improvements of pipe in this plan included a maximum velocity during PHD of seven feet per second (fps) and maximum head loss during PHD of 5 ft per 1,000 LF of pipe. These criteria may be exceeded in certain cases under transient high flow conditions. For new pipes, a maximum velocity of 10 feet per second during the PDD and fire flow scenario was used, as well as the maximum head loss criteria of 5 ft/1,000 ft

4.1.7 Valve and Hydrant Spacing

Sufficient valving should be in place to keep a minimum number of customers out of service when water is turned off for maintenance, repair, replacement, or additions. As a general rule, valves on distribution mains of 12-inch diameter or smaller should be located such that the water main length of not more than 1,000 feet can be isolated by closure.

Hydrant locations should be determined by the County Fire Marshal. As a general rule, fire hydrants should be spaced at a maximum of 400 feet apart on distribution mains of 12-inch diameter or smaller. The City of Umatilla requires fire hydrants at intersections and every 300 LF. The International Fire Code requires fire hydrants to be within 250 LF from a property. Additionally, the distance of pipe connecting a fire hydrant to the main distribution system pipe should not exceed 50 LF.

4.1.8 Distribution Facilities Design and Construction Standards

All extensions to the water system must conform to the design standards established by the City. New water system design must provide adequate domestic supply, fire flow and must also be capable of future expansion and be constructed of permanent materials. The City is currently updating their design standards and are expected to be completed by the fall of 20221.

4.2 Water Quality Analysis

The objective of this section is to briefly review current OAR 333-061 and federal drinking water regulations pursuant to the Safe Drinking Water Act (SDWA) and to assess compliance status for the City. The water quality compliance evaluation is based on information and data provided by the City.

Currently, all of the City's water is pumped from groundwater wells. Presently, there are four water sources (McFarland Well, Intertie Well, Port Well, and Golf Course Well) providing water to the water system, a detailed description of each of the well facilities is provided in Section 3.1. The City chlorinates the water pumped from all wells.

4.2.1 Regulatory Framework

Water quality monitoring and regulation compliance is the responsibility of the City. The Federal regulatory framework directing water quality is the Safe Drinking Water Act (SDWA), and its 1986 and

1996 amendments. Under the SDWA, the Environmental Protection Agency (EPA) sets standards for drinking water quality. EPA and OAR regulations identify maximum contaminant levels (MCLs) for physical, chemical, and biological water quality parameters as well as monitoring and operating procedures. Table 4-3 summarizes the list of effective water quality regulations.

Table 4-3 Effective Regulations

Rule	Parameters Regulated	Effective Milestone
Source Water Quality Regulations		
VOC Rule – Ph. I	VOCs	Jan 1989
SOC/IOC Rule – Ph. II & V	Inorganics, SOCs	Jan 1993
Radionuclide Rule	Radium-226, Radium-228, Gross alpha particle activity, beta particle/photon activity	Jan 1993
Arsenic Rule	Arsenic	Jan 2006
Surface Water Treatment Rule	Turbidity, Giardia, viruses, Legionella, HPC	Dec 1990
Interim Enhanced Surface Water Treatment Rule	Turbidity, Cryptosporidium	Jan 2002
Source Protection Rule	N/A	Apr 1993
Groundwater Rule	Bacteriological	Nov 2006
Long Term 2 Enhanced Surface Water Treatment	Cryptosporidium, pathogenic	Jan 2006
Distribution System Water Quality Regulations		
Revised Total Coliform Rule Assessments and Corrective Actions	Bacteriological	Apr 2016
Lead and Copper Rule	Lead, Copper, water quality parameters	Dec 1992
Stage 1 Disinfectant/Disinfection Byproduct Rule	TTHMs, HAA5, Bromate, Chlorite	Jan 2002
Stage 2 Disinfectant/Disinfection Byproduct Rule	TTHM, HAA5	Apr 2012
System-wide Regulations		
Consumer Confidence Reports and Public Notification Rules	Requires annual report addressing drinking water quality	Sep 1998
Operator Certification Rule	N/A	Dec 2002

As a Community Water Distribution 2 distribution system, the City of Umatilla is required to conform to sampling and reporting requirements for that classification. The primary Drinking Water Regulations administered and regulated by the OHA are contained in 333-061 of the OAR. The following sections provide information on system classification, source protection, reporting requirements, and water quality:

- OAR 333-061-0220: Classification of Water Treatment Plants and Water Distribution Systems
- OAR 333-061-0050: Construction Standards

- OAR 333-061-0030: Maximum Contaminant Levels and Action Levels
- OAR 333-061-0032: Treatment Requirements and Performance Standards
- OAR 333-061-0042: Public Notice

4.2.2 Source Water Quality

The effective source water quality regulations applicable to the City are listed in Table 4-3. A discussion of each rule follows:

Organic Chemicals: Monitoring requirements and MCLs for 21 volatile organic chemicals (VOCs) were established under the final VOC Phase I Rule and MCLs for 35 synthetic organic chemicals (SOCs) were established under the final SOC/IOC Phase II and Phase V Rules. Required testing of specific contaminants is determined by OHA. Typically, groundwater sources are sampled once every three years. The most current water quality monitoring schedule, which lists the testing requirements for each well is included in Appendix J.

A review of water quality monitoring data for VOCs and SOCs shows full compliance through 2017.

Inorganic Chemicals: Monitoring requirements and MCLs for 15 inorganic chemicals (IOCs) were established under the final SOC/IOC Phase II and Phase V Rules. Required testing of specific contaminants is determined by OHA. Typically, groundwater sources are sampled once every three years. The most current water quality monitoring schedule, which lists the testing requirements for each well is included in Appendix J.

A review of water quality monitoring data for IOCs shows full compliance through 2020.

Radionuclides: Revised radionuclide monitoring regulations became effective in 2003. There is no waiver option for radionuclides under the SDWA. Under OAR 331-061-0036, OHA requires monitoring every nine years with compliance based on either a composite of four consecutive quarterly samples or the average of the analysis of four samples obtained at quarterly intervals.

A review of water quality monitoring data for radionuclides shows full compliance from through 2020.

Arsenic: The EPA published the Final Arsenic Rule in the Federal Register in January 2001. The Arsenic Rule, which applies to all community and non-transient, non-community water systems, establishes a revised arsenic MCL of 0.010 mg/L. Arsenic must be monitored at each entry point to the distribution system as part of the IOC monitoring framework.

A review of water quality monitoring data for arsenic shows full compliance through 2020.

Source Water Protection: The SDWA established a Wellhead Protection Program (WHPP) to protect groundwaters that contribute to public water systems. OHA has expanded those Federal source protection regulations to include public water systems.

The City anticipates using the Columbia River as a drinking water source in the near future. The Columbia River watershed upstream of Umatilla is approximately 1,500 square miles of land area which covers parts of Idaho, Montana, and British Columbia. The Columbia River has many dams including the McNary Dam which is adjacent to Umatilla City and is controlled and operated by the Army Corp of Engineers.

Surface water from the Columbia River is expected to have seasonal fluctuations in water quality. Regional Utilities along the Columbia River often find manganese and iron levels that are close to the secondary MCL levels. During spring runoff, turbidity is also anticipated to be a water quality concern. It is recommended that water quality samples at the future intake structure(s) be tested seasonally when determining treatment options.

4.2.3 Distribution System Water Quality

The effective distribution system water quality regulations applicable to the City are listed in Table 4-3. A discussion of each rule follows:

Coliform: Coliform monitoring requirements detailed in OAR 333-061-0036 are based upon the Revised Total Coliform Rule (RTCR). The City is required to collect nine samples per month from representative points within the distribution system. The City's Coliform Monitoring Plan is located in Appendix G.

A review of water quality monitoring data for coliform shows full compliance through 2020.

Lead and Copper: The Lead and Copper Rule (LCR) addresses lead and copper levels in the source water or resulting from corrosion of distribution piping and household plumbing. The LCR requires that public water systems conduct lead and copper monitoring at customer taps to determine whether lead and copper action levels of 0.015 mg/L and 1.3 mg/L are exceeded, respectively. Ten percent (10%) of the homes tested are allowed to exceed the action levels. The City most recently tested for lead and copper in 2018, reporting no violations.

A review of water quality monitoring data for lead and copper shows full compliance through 2020.

Stage 1 Disinfectant/Disinfection By-Product (Stage 1 D/DBP Rule) Rule: The D/DBP Rule was developed in two Stages. Stage I became effective in January 2002 and Stage II became effective in January 2006. The Rule sets MCLs for four (4) DBPs (total trihalomethanes [TTHM] and the sum of five haloacetic acids [HAA5], chlorite, and bromate) and maximum residual disinfectant levels (MRDLs) for three (3) disinfectants (chlorine, chloramine, and chlorine dioxide). Because the City does not use ozonation, testing for Bromate is not required. Also, because the City does not use chlorine dioxide, testing for Chlorite is not required. Table 4-4 summarizes the Stage I D/DBP Rule monitoring requirements for the City, based on their groundwater sources.

Table 4-4 Stage 1 D/DBP Monitoring Requirements (GW, Population < 10k)

Chemicals	MCL or MRDL (mg/L)	# of Samples	Sample Locations
Chlorine	MRDL 4.0	Same as # of total coliforms	Same time and location as total coliform samples
TTHM	MCL 0.080	1 per year per source	1 at max. residence time in distribution system, during month with warmest water temp.
HAA5	MCL 0.060	Same as TTHM	Same as TTHM

The City's population is expected to exceed the 10,000 threshold by 2041 and will also include surface water testing; therefore, the TTHM/HAA5 sampling will change to four samples per quarter per source. Review of the City's D/DBP data since 2004 indicates that TTHM and HAA5 levels have been consistently and significantly lower than the MCL.

Stage 2 Disinfectant/Disinfection By-Product (Stage 2 D/DBP Rule) Rule: As previously mentioned, Stage II became effective in January 2006. The EPA will enforce Stage II until the OHA adopts them into their drinking water rules. The key provision in this rule is the change in calculating the MCL. Under Stage II D/DBPR, the MCL will be calculated using locational running annual averages (LRAAs) for each compliance sampling location. Under Stage 1 rules, compliance with the MCL was calculated using a running annual average (RAA) to average compliance samples across the distribution system sampling locations.

4.2.4 Water System Water Quality

Two system-wide regulations are described below:

Consumer Confidence Reports (CCR) and Public Notification Rule (PNR): Under the amended SDWA, community water systems are required to provide an annual Consumer Confidence Report (CCR) on the source of their drinking water and levels on any contaminants found. In January 2013 the Consumer Confidence Report rule changed to allow CCR to be published on the City's website instead of mailed to customers. The latest CCR is included in Appendix K. The annual report includes:

- Information on the source of the drinking water
- A brief definition of terms
- If regulated contaminants are found, the maximum contaminant level goal (MCLG), the MCL, and the level detected
    - If an MCL is violated, information on health effects
    - If EPA requires, information on levels on unregulated contaminants

While the CCR provides an annual report, the purpose of the Public Notification Rule (PNR) is to direct utilities in providing customers with notification of an acute violation when they occur. The PNR outlines public notification requirements for violations of MCLs, treatment techniques, testing procedures, monitoring requirements, and violations of a variance or exemption. If violations have the potential for "serious adverse effect", consumers and the State must be notified within 24 hours of the violation. The notice must explain the violation, potential health effects, what the system is doing to correct the problem, and whether consumers need to use an alternative water source. Notice must be made by the appropriate media or posted door-to-door. Less serious violations must be reported to the consumer in the first bill after the violation, in an annual report, or by mail or direct delivery within one year.

There are three tiers for public notification requirements as follows:

- Tier 1 – Acute health concerns: Requires public notification within 24 hours
- Tier 2 – Chronic health concerns: Must be reported within 30 days
- Tier 3 – Reporting and monitoring violations: Must be reported once per year

A copy of the City's 2019 CCR is provided in Appendix K. The CCR template meets CCR requirements, includes information on public meeting, a basic description of drinking water contaminants, source description, and annual water quality analysis summary. As a guideline for public notification requirements and procedures, the EPA Public Notification Handbook is provided in Appendix H.

Operator Certification: The SDWA amendments require that states develop and implement an operator certification program. The regulation sets out minimum guidelines for such a certification program including operator classification and qualifications. Some highlights include:

- Each treatment facility and/or distribution system be placed under the direct supervision of a certified operator who is designated as the operator in Direct Responsible Charge (DRC),
  - The DRC certification must be equal to or greater than the system classification being operated;
  - The DRC supervises the system and is ultimately responsible for how it's operated; and
  - The DRC is available during periods of time when treatment processes and operational decisions that affect public health are made.

In addition to the DRC, a system may use other operators as needed, as long as a written protocol addresses the following elements:

- Describes operational decisions the operator is allowed to make;
- Describes the conditions under which the operator must consult with the DRC, and when and how contact is made;
- Takes into account the certification level of the operator, their knowledge, skills, and abilities;
- Takes into account the range of expected operating conditions of the water system;
- Is signed and dated by the DRC and the other operator(s) and is available for inspection by the Oregon Department of Human Services (DHS) and OHA's Drinking Water Program (DWP).

As a Community Water Distribution 2 distribution water system, the City currently meets minimum staff certification requirements. To ensure compliance in the future, all certified staff are provided necessary expenses and leave time to attend classes and seminars in order to meet requirements for certification renewal.

4.2.5 Anticipated Regulations

4.2.5.1 Lead and Copper Rule

The EPA has proposed revisions to the Lead and Copper Rule (LCR). The proposed rule will identify the most at-risk communities and ensure systems have plans in place to rapidly respond with actions to reduce elevated levels of lead in drinking water. The long-term revision goals are to improve the effectiveness of corrosion control treatment in reducing exposure to lead and copper, and to trigger additional actions that reduce the publics exposure when corrosion control treatment alone is not effective.

4.2.5.2 Manganese

In 2019, Canada published new regulations regarding manganese concentration levels in drinking water. Future similar regulations in the USA are anticipated. The guidelines show a maximum allowable concentration of 0.12 mg/L (analogous to primary contaminant MCL), as well as aesthetic guideline of 0.02 mg/L which is below the current EPA secondary MCL of 0.05 mg/L.

4.2.5.3 Disinfectant By-Products (DBPs)

In 2016, the EPA published the fourth Unregulated Contaminant Monitoring Rule (UCMR 4). The UCMR 4 requires participating utilities to test for three Brominated Haloacetic Acid (HAA) groups: HAA5, HAA6Br, and HAA9. HAA5 is currently regulated under the Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules. Future regulations are anticipated for HAA DBPs.

4.2.5.4 Cyanotoxin

Oregon Health Authority (OHA) in 2018 established rules for monitoring and testing Cyanotoxin for water systems that serve surface water and have had algae issues in the past. Concerns about harmful algal blooms (HABs) and algal toxins were spotlighted in 2015 with the algal bloom in Lake Erie. In the summer of 2018 low levels of algal toxins triggered a do-not-drink notice in Salem, Oregon.

Chapter 5 - Water Source Evaluation and Alternatives Analysis

5.1 Source System Analysis

Currently, the City's sources include four groundwater wells. A description of each source is included in Chapter 3. The ability of the sources to meet the demands of the City is dependent on groundwater levels, groundwater quality, and water rights. The dependability of pumping the aquifer is a function of the hydrogeologic characteristics of each well and is found through pumping tests. All of the current wells pump from the Grande Ronde aquifer. The well yield tests indicate that this aquifer has adequate capacity to meet the current peak demands, however, due to declining aquifer levels the well pumps have had to be lowered to increase their pumping capacities. A summary of the current pumping capacities is summarized in Table 5-1.

Table 5-1 Current Source Capacities

Source	OWRD Log No.	Well Production Capacity (gpm)	Installed Pumping Capacity (gpm)	Current Pumping Capacity (gpm)[1]
McFarland Well	UMAT50632	700	500	505
Intertie Well[2]	UMAT3361	1,245	850	602
Golf Course Well[2]	UMAT3347	2,000	2,000	1,762
Port Well[2]	UMAT3343	2,000	2,000	1,769
Total		**5,945**	**5,350**	**4,638**

1. Pumping capacities as of April 2020.
2. Well pump has been lowered as far as possible, located just above basalt zone.

Section 5.2 contains tables outlining the City of Umatilla's existing water right capacity, along with current and projected water use, the data is summarized in Table 5-5. These current and projected values were used to determine if/when more water rights would need to be pursued. Projected water use was based on the projected growth of the City as explained in Chapter 2. The City has adequate water rights for the 20-year and 40-year planning periods, however, due to the expiration of the Port Well lease in 2040, the City will need to make improvements to utilize their surface water right to meet peak demands prior to the expiration of the lease.

The source capacities of the water system can provide the annual volume needed to meet the forecasted annual demands of the City. Peak hourly demands cannot be met by source capacities alone; however, storage water can be provided to the water system during these times of peak demand. As the demand decreases, such as during the night, the storage tanks are replenished. The adequacy of storage capacity is discussed in Chapter 6.

5.2 Water Rights Assessment

The City of Umatilla currently relies on four groundwater wells as its primary source of water. The City also has a surface water right from the Columbia River, however, there is no infrastructure in place for the City to utilize this water right. This section addresses the City's water rights and their adequacy to meet the projected demands. These current and projected values are used to determine if/when more water rights and/or other measures would need to be pursued to meet demands.

5.2.1 Existing Water Rights

The City of Umatilla is currently authorized for three groundwater rights and one surface water right to the Columbia River. The Port of Umatilla owns the groundwater right for the Port Well. Via a 40-year lease agreement, the City operates the Port Well and utilizes the water right. The water rights are under jurisdiction by the Oregon Water Resources Department (OWRD) for municipal use. The groundwater rights are at various stages of being perfected, the surface water permit has a pending extension request and is not currently being used.

The McFarland Well has a certificate of water right (Certificate No. 76316) for 1.25 cfs (560 gpm). The well is located in the Buttercreek Critical Groundwater Area, which limits the City to an annual withdrawal of 250 acre-feet.

The Intertie and Golf Course Wells are both permitted under the same permit (G-8042) and are authorized for 8.9 cfs (3,994 gpm) each. In 2003, a Claim of Beneficial Use and Site Report (CBU) was submitted to OWRD to perfect the water right for 4.45 cfs (2,000 gpm) for the Golf Course Well and 1.69 cfs (760 gpm) for the Intertie Well. The full water right was not perfected due to the limiting capacity of the existing pumps. The issuance of a certificate on the perfected water right may take some time. In order to maintain the priority date on the remaining unperfected portion of the water right, an application for the extension of beneficial use will need to be submitted to OWRD. For the purpose of this water rights analysis the full water right was evaluated.

The Port of Umatilla owns the groundwater right (Permit G-3112) for 4.46 cfs (2,002 gpm) for the Port Well. The City is under lease to utilize this water right and maintain and operate the Port Well until February 2040. In 2002, a transfer for the place of use of Permit G-3112 was authorized to include the City of Umatilla's service area. In 2003, a CBU was submitted to perfect the full 4.46 cfs water right, the issuance of this certificate may take several years to perfect.

The City's surface water right permit (S-41444) for 23.0 cfs (10,322 gpm) is to draw water from the Columbia River. The City does not currently have any infrastructure constructed that can utilize this water right. OWRD granted the City an extension to complete construction and to fully apply the water to beneficial use by 2055.

The City recently purchased the Big River Golf Course and acquired an irrigation surface water right (S-38484) for 1.8 cfs (808 gpm) to draw water from the Columbia River. This water right includes an existing river pump station. For the purposes of this section, this water right will not be considered as part of the municipal system water rights analysis.

Table 5-2 summarizes the City's current water rights. It should be noted that all of the sources share a common place of use. This grouping of water rights provides flexibility in the operation and maintenance of the water system.

Table 5-2 Existing Water Rights

Source[1]	Certificate/ Permit No.	Priority Date	Permit Instantaneous Flow, Qi (cfs)	Permit Instantaneous Flow, Qi (gpm)	Type of Use
McFarland Well[2]	76316	12/24/1963	1.25	561	Municipal
Intertie Well	G-8042	12/28/1977	8.9	3,994	Municipal
Golf Course Well	G-8042	12/28/1977	8.9	3,994	Municipal
Port Well[3]	G-3112	8/10/1966	4.46	2,002	Municipal
Columbia River[4]	S-41444	10/5/1976	23.0	10,322	Municipal
Columbia River[5]	S-38484	4/26/1967	1.50	673	Irrigation
Columbia River[5]	S-38484	8/3/1967	0.30	135	Irrigation
Total			**46.51**	**20,874**	

1. Intertie Well = UMAT3361. Golf Course Well = UMAT3347. McFarland Well = UMAT50632. Port Well = UMAT3343.
2. Certificate No. 76316 is limited to 250 acre-feet/year.
3. The City's lease agreement with the Port of Umatilla is set to expire in 2040.
4. The City does not currently have any infrastructure in place to utilize the surface water right under permit S-41444.
5. The volume for S-38484 was not considered as part of this analysis.

5.2.2 Source of Supply Analysis

Projected water use was based on population growth in the City as explained in Chapter 2. Water rights contain a maximum instantaneous flow rate (Qi) and a permitted volume (Qa). The projected instantaneous flow rate (Qi) is limited by either the pumping capacity or well production capacity of each source. The available water rights and projected consumption are summarized in Table 5-3, Table 5-4, and Table 5-5. The well capacities shown in Table 5-4 decrease over time, this is discussed in Section 5.3.1.

Table 5-3 Water Rights by Year

Source	Current Authorized Instantaneous Flow, Qi (gpm)	Flow in Beneficial Use, Qi (gpm)		
		2021	2041	2061
McFarland Well	561	561	561	561
Intertie Well	3,994	3,994	3,994	3,994
Golf Course Well	3,994	3,994	3,994	3,994
Port Well[1]	2,002	2,002	-	-
Columbia River[2]	10,322	-	-	-
Total	**20,873**	**10,551**	**8,550**	**8,550**

1. The City has a lease agreement with the Port of Umatilla for use of the Port Well, this is set to expire in 2040.
2. The City does not currently have any infrastructure in place to utilize the surface water right under permit S-41444.

Table 5-4 Projected Source Capacity

Source	2021	2041	2061
McFarland Well[1]	505	283	0
Intertie Well[1]	602	527	467
Golf Course Well[1]	1,762	1,603	1,390
Port Well[1,2]	1,769	-	-
Columbia River[3]	-	-	-
Total	**4,638**	**2,413**	**1,857**

1. Projected declining aquifer levels impact the static head and the well pump capacity over time.
2. The City has a lease agreement with the Port of Umatilla for use of the Port Well, this is set to expire in 2040.
3. The City does not currently have any infrastructure in place to utilize the surface water right under permit S-41444.

Table 5-5 Water Source Capacity Summary

Year	ERUs[1]	ADD[2] (gpm)	PDD[2] (gpm)	PHD[2] (gpm)	Source Capacity (MGD)	Source Capacity (gpm)[3]	Water Rights, Qi (gpm)[4]
2021	3,145	983	3,109	6,566	5.57	4,638	10,551
2041	3,831	1,197	2,823	4,685	2.90	2,413	8,550
2061	5,099	1,593	3,757	6,166	2.29	1,857	8,550

1. System ERU demands, from Table 2-12.
2. System water demands, from Table 2-11.
3. Sum of source pumping capacities, from Table 5-4.
4. Sum of usable water rights, from Table 5-3.

Figure 5-1 shows the projected peak daily demands (PDD) compared to the source capacity and available water rights for the 20-year and 40-year planning periods.

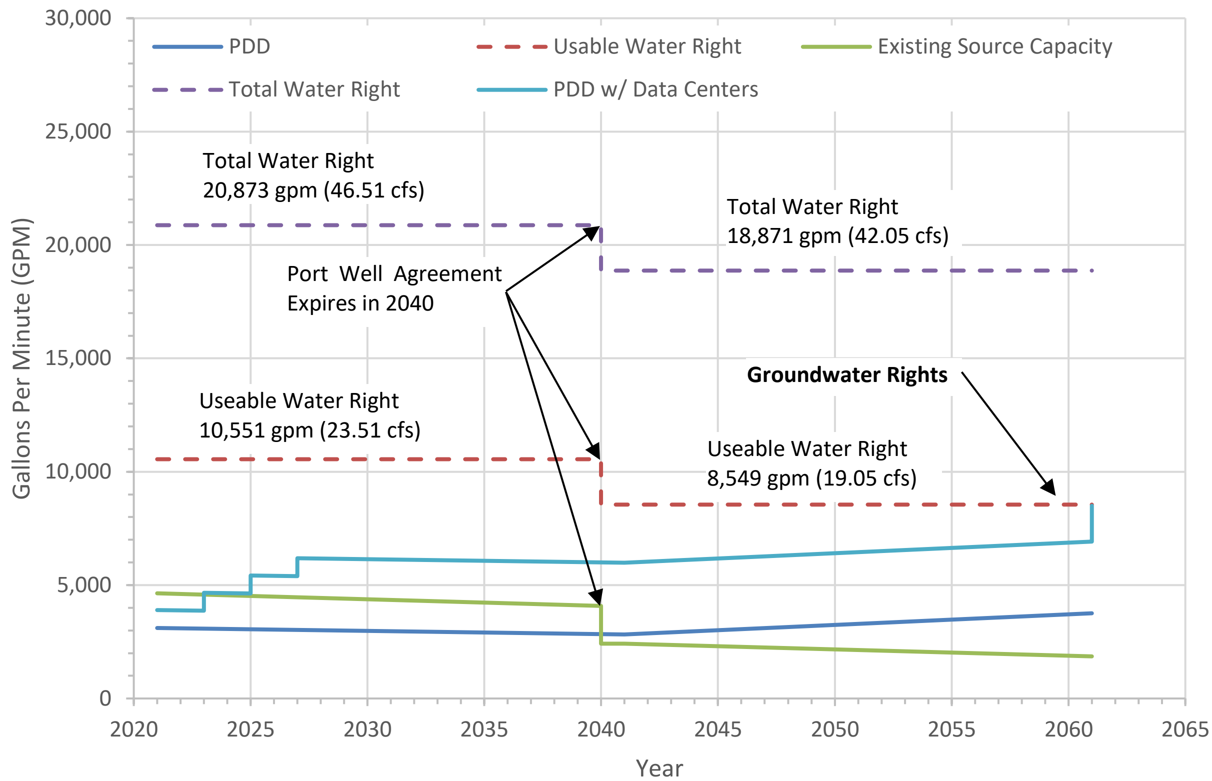


Figure 5-1 Existing Source Capacity and Projected Peak Demands

Figure 5-1 graphically shows the capacity available by all existing sources compared to the usable and total water rights available to the City. Figure 5-1 also shows how the source capacity compares to the projected demands. With the expiring agreement with the Port of Umatilla in 2040, the City will need to make system improvements to meet the peak daily demands of the system. The City will need to plan for additional groundwater sources to utilize their full groundwater rights and increase source capacity, make improvements to the existing wells to meet peak daily demands, or build infrastructure to utilize their surface water right. With the historic decline of the aquifer it is likely the City will need to consider other alternatives to meet their future water demands. The City may need to consider improvements that use a portion of its surface water right within the 20-year planning period. Regardless of the source type, the City will need to plan for improvements within the 20-year planning period to increase source capacity. Figure 5-1 shows that adding the future non-potable demands from future data centers under the City's water rights is not a concern, however it is clear that by 2023 the source capacity is not sufficient and additional capacity is required.

Once the peak hourly demand becomes greater than the instantaneous source capacity, the levels in the storage reservoirs will begin to drop. The reservoirs are filled once again during non-peak times. A storage analysis for each pressure zone is discussed in Chapter 6. Increasing source capacity can decrease the size of storage needed.

5.3 Water Supply Reliability Analysis

The reliability of the water system includes sources providing clean water, the adequacy of sufficient water rights, and the reliability of the water system facilities.

5.3.1 Source Reliability

The City of Umatilla's current sources are four groundwater wells. As previously mentioned, the City's lease agreement for the water rights and use of the Port Well will expire in 2040. The City will need to make improvements to the existing sources or plan for future sources to meet peak demands within the 20-year planning period. When the Port Well comes offline in 2040, the remaining sources will not be able to meet peak demands.

The Oregon Water Resources Department has been monitoring groundwater levels since the late 1970's. The Grande Ronde aquifer that the four groundwater wells pump from has seen a decline over the last 20 years. As the aquifer levels continue to decline, the pumping capacity of the existing well pumps will decline as well. Figure 5-2 shows the existing and projected groundwater levels for the City's existing groundwater sources, Figure 5-3 shows the current well pump settings and groundwater levels. Projected groundwater decline rates are based on historic trends. The City has already lowered the well pumps in recent years to increase pumping capacity, however, the well pumps at the Intertie, Golf Course, and Port Wells have been lowered to the maximum extent possible. Using the average water level decline over the last 10 years, the aquifer levels were projected for the 20-year and 40-year planning periods to determine the estimated future pumping capacities of the well pumps. These are projected estimates of the groundwater levels, actual future groundwater levels are not known. The projected source capacities are summarized in Table 5-4. The McFarland Well appears to be the well that is most impacted by the declining water levels, by the year 2061 the water levels will be so low that the pump will not have the required static head to pump. Unlike the other well pumps, the McFarland Well can be lowered to increase its pumping capacity in the future.

As seen in Figure 5-1, if the City relies only on the existing groundwater sources, the peak daily demands will not be met by the existing source capacity. The City will need to plan for source improvements to increase the source capacity within the 20-year planning period.

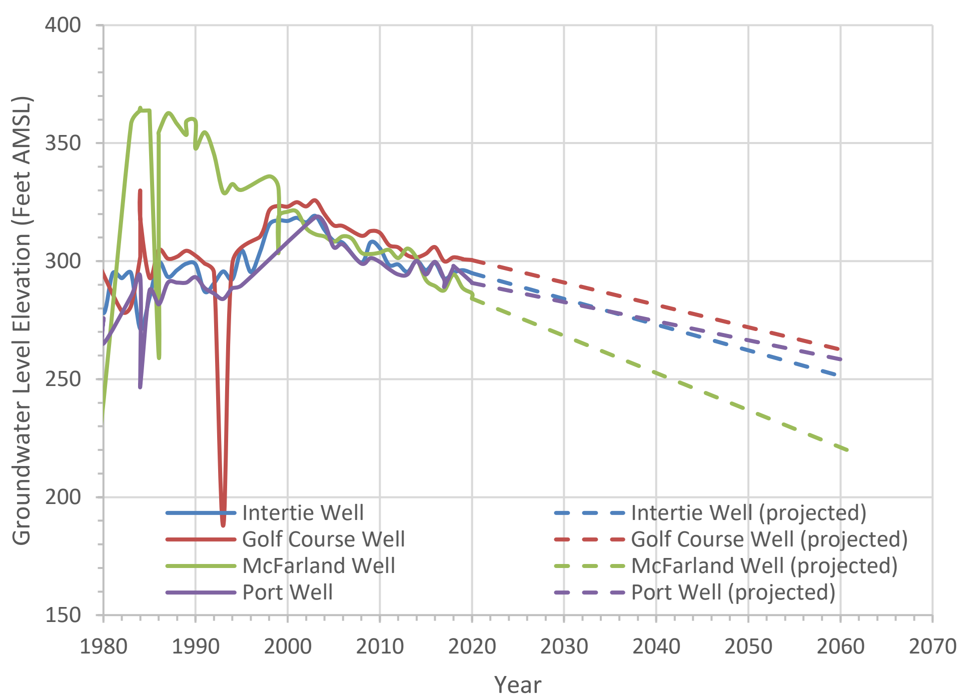


Figure 5-2 Groundwater Levels

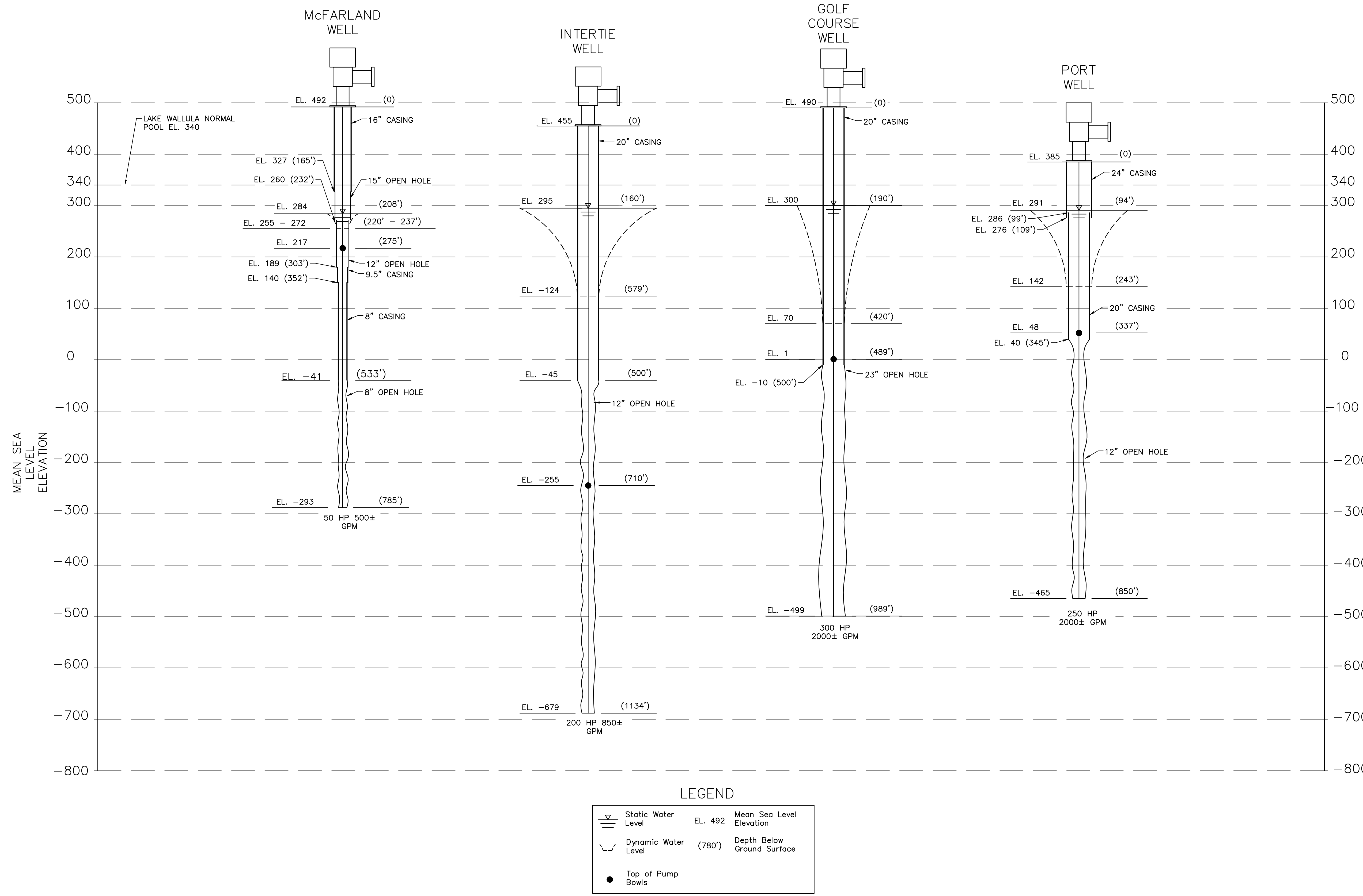


Figure 5-3

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LAST UPDATED: 5/7/2021
PLOT DATE: 5/17/2021
FILE: WELL SCHEMATIC PROFILE

WATER MASTER PLAN
CITY OF UMATILLA

WELL PUMP SETTINGS AND CURRENT WATER LEVELS

Currently the City only has auxiliary power at the McFarland and Golf Course Wells. The McFarland Well has the ability to be powered by the emergency generator located at the McFarland Booster Station. The Golf Course Well has a diesel-driven generator that also serves the Golf Course Booster Station. This diesel-driven generator is outdated and difficult to maintain. The City would add reliability to their system by replacing the Golf Course Well generator and installing auxiliary power at the Intertie and Port Wells.

5.3.2 Water Curtailment Planning

The City's 2020 Water Management and Conservation Plan Update outlines the program and procedures for emergency water conservation as determined by the Public Works Director. The program outlines the City's plan during mild stages, moderate stages, and emergency stages. If a serious problem was identified, the City would be prepared to enact a stringent water use restriction policy and institute an extensive public education program to increase customer awareness of the problem and reduce overall water use. A copy of the 2020 Water Management and Conservation Plan is included in Appendix M.

5.3.3 Treatment

The City currently disinfects water pumped from all wells by gas chlorination. The McFarland, Intertie and Port Wells all currently have chlorine gas equipment injecting the water as it is pumped from the wells. At these three sites, the chlorine gas equipment is located at the well house. The water pumped from the Golf Course Well is injected by chlorine gas equipment located at the nearby Golf Course Booster Station before it discharges to the Golf Course Reservoir or into the Golf Course Booster Station. The City is satisfied with their existing treatment system and has no plans to make any improvements.

5.4 Water Source Alternatives

As seen in Figure 5-1, the City will need to make improvements within the 20-year planning period to meet peak demands. The City will need to consider whether to continue using groundwater sources, either existing or new, or plan improvements to utilize their surface water right. The following sections evaluate alternatives for both groundwater and surface water sources.

5.4.1 Groundwater

5.4.1.1 Increase Groundwater Source Capacity

While the City has adequate groundwater rights to meet the peak demands of the 20-year and 40-year planning periods, the pumping capacity of the wells will continue to decline due to the dropping aquifer levels. In order to match the source yield capacities, the City would need to deepen the wells to increase pumping capacity and increase the efficiency of the well pumps. The City has deepened the wells to the basalt in the Intertie, Golf Course, and Port Wells, therefore the only well that can be deepened is the McFarland Well. The only other option the City would have to increase the capacity of these wells is to replace the pumps with higher flow pumps. The ability to pump higher volumes would allow the City to perfect their water rights and allow them to meet the peak demands for the planning periods, however, due to the steady decline of the aquifer this would only be a temporary solution to the City's water supply concerns. As the aquifer continues to decline, improvements on the wells would be something the City would need to plan for on a regular basis. Under this option all four wells would require pump improvements.

Another option the City could pursue would be the construction of additional wells. Since the existing water rights are sufficient for the peak demands, the City could pursue construction of additional wells to help meet the peak demands and would also help perfect their water rights. Under this alternative the City may need to acquire land. Additional wells would also likely contribute to the decline of the aquifer if drawing from the Grande Ronde aquifer and would be a temporary fix, similar to upsizing the pumps.

Some permitting and environmental concerns with this alternative are the State of Oregon has committed substantial resources to limit water withdrawals from the dwindling groundwater supply in the Umatilla Basin. Further development of the groundwater would face a number of high regulatory hurdles. The Umatilla Basin is home to four of Oregon's six Critical Groundwater Areas. Increased use, especially deeper well drilling, could threaten the already declining deep basalt aquifer.

The installation of new groundwater sources or improvements to the existing wells would increase the source capacity of the City's system, however, with the history of the declining aquifer this alternative is not recommended for further action. If this alternative is pursued, additional analysis of the aquifer is needed.

5.4.2 Surface Water

Based on the water rights analysis in this Chapter, the City has sufficient groundwater rights to meet the peak demands of the planning periods, however, the current and future source capacities of those groundwater sources are not sufficient to meet peak demands within the 20-year planning period. As seen in Figure 5-1, the source capacity is decreasing over time due to the continuous decline of the aquifer feeding the wells. The termination of the Port Well lease agreement in 2040 will severely impact the City's ability to meet the peak demands of the system. As evaluated in Section 5.4.1, groundwater sources are not a viable long-term option in this area. With the steady decline of the aquifer it would be very beneficial for the City to make improvements to begin utilizing their 23 cfs surface water right. Figure 5-1 shows that by utilizing the full surface water right, the City would have sufficient water rights beyond the 40-year planning period. Alternatives to develop the City's surface water right are discussed in this section. Figure 5-4 shows the locations of the proposed surface water alternatives.

5.4.2.1 Hydraulically Connected Wells (Columbia River)

While Ranney Wells are specifically noted in the City's surface water right, vertical high production shallow wells were assumed to be more cost effective. The Ranney system involves drilling a large diameter (30-foot) shaft to a depth of approximately 100-feet below ground level. Horizontal wells would then be drilled out from the large diameter shaft to produce high volumes of water. This alternative involves drilling vertical wells adjacent to the Columbia River to access water that is directly hydraulically connected to the Columbia River. Ideally, the wells would be located on property adjacent to the river that would be City owned and not controlled by federal agencies that would not approve use of the water right. There are currently several locations along the Columbia river where these hydraulically connected wells already exist. An advantage of this alternative is the elimination of any improvements within the river. Existing wells in the area produce between 1,000 gpm to 2,000 gpm, therefore, the City would need to drill 6 to 11 of these wells to put the full 23 cfs water right to beneficial use.

Use of water hydraulically connected to the Columbia River would be considered a surface water source from the perspective of treatment requirements. A new water treatment plant would be required if surface water is to be used to meet potable water demand. These hydraulically connected wells would be considered Groundwater Under the Direct Influence of Surface Water (GWUDI) by OHA. As a result, the water would need to be treated similarly to a surface water in order to be used as a drinking water source.

While wells hydraulically connected to the Columbia River may result in instream flow losses in the river, they do not require a United States Army Corps of Engineers (USACE) permit if located off USACE property. Eliminating the need for a USACE permit may also eliminate the need to consult with National Marine Fisheries Service (NMFS) and impact of their no net loss policy, providing only the City funds are used. This would eliminate the most significant hurdle to withdrawing water from the river, but the option may still require significant coordination with other agencies. If Federal or State financing is utilized, a National Environmental Policy Act (NEPA) level environmental review will be required, which necessitates consultation with the National Oceanic and Atmospheric Administration (NOAA) and the United States Fish and Wildlife Service (USFWS).

The City of Umatilla has discussed preliminary work to establish locations where water from the river may be available in the basalts. Initial analysis suggests there are potential well locations adjacent to the McNary Pool that have a high probability of hydraulic connectivity. Additional analysis and site investigation, including drilling test wells, is required to confirm capacity and hydraulic connectivity. Potential sites for well locations are shown in Figure 5-4. The locations the City has looked at would require land acquisition or land lease agreements with the property owners, which could become challenging. At this time, the City has determined to take no further action on this alternative.

5.4.2.2 Regional Water Supply Intake Pump Station Expansion

The Regional Water Supply system is owned and operated by the Port of Umatilla, City of Hermiston, and various private industries. Infrastructure includes a pump station that draws surface water from the Columbia River on the left bank approximately 1,700 feet upstream from McNary Dam at river mile 293. The water system provides surface water to domestic, industrial, and agricultural users downstream via a 42-inch diameter pipeline from the river pump station south. The Regional Water Supply intake location is shown on Figure 5-4.

This alternative would involve expanding the existing river pump station, that withdraws from the Columbia River, to utilize the City's surface water right. Information provided on the existing pump deck suggests the existing pumps are at capacity and there are no spare pump holes in the deck where new pumps could be added. Without available pump holes, use of the deck would require modifications to allow for the installation of additional pumps and a separate discharge penstock. Work of this magnitude would require the acquisition USACE's Section 10/404 permit. As a part of the USACE's permitting process, the City would initiate a consultation with NMFS to generate requirements for the permit necessary to protect Endangered Species Act (ESA) listed anadromous fish in the Columbia River. Since the mid 1990's, NMFS has had a no net loss policy for water withdrawals from the Columbia River and has made obtaining a USACE permit challenging for work in the Columbia River that include new or increased withdrawals.

This alternative will likely have permitting and regulatory obstacles from NOAA, NMFS, U.S. Fish and USFWS, Federal Emergency Management Administration (FEMA), USACE, and EPA as all agencies have no net loss policies that will affect work in the Columbia River. Regarding USACE permitting, a Section 10 permit, which is part of the 1899 Rivers and Harbors Act, would be likely for the City to obtain, as the project would not obstruct navigable waters. A Section 404 permit from USACE, a part of the Clean Water Act, would be difficult to obtain because the structure would be treated as fill materials being placed in the river. Construction of a new pump station in the river, or installation of an intake pipe into the river for a shore-based pump station, would require in-water excavation/dredging at a minimum along the shoreline. Piles and other materials placed into the river to build the pump station or intake pipe are also treated as fill materials being placed in the river. USACE's no net loss policy would make implementing this action very difficult.

USACE, EPA, and USFWS regulate and enforce a no net loss policy that is empowered through the Clean Water Act Section 4(b)(1) and relates to natural function, quality, and quantity of aquatic resources (wetlands, streams, rivers, etc.) that would be impacted by development in or near the river. NMFS' no net loss policy relates to the natural function of fisheries and is empowered through the ESA. The Columbia River is home to many ESA species and official Critical Habitat. FEMA's no net loss policy is in relation to floodplain development. Much of the City is unmapped by FEMA and development near the river would likely require survey and additional analysis of the floodplain. The various agency policies would require the City to develop mitigation for any additional withdrawal of water, and/or aquatic resources, and/or impact to wetlands, and/or ESA-protected fish species.

In addition to the permitting and environmental challenges, the City would need to enter an agreement with the Port of Umatilla, City of Hermiston, and the other owners to make improvements and use the Regional Water Supply intake. The City is interested in pursuing alternatives that minimize the dependency on other entities to procure their water supplies. At this time the City is not planning to pursue this alternative.

5.4.2.3 New Columbia River Intake Pump Station

This alternative analyzes the construction of a new river pump station according to the authorized Point of Diversion location on the City's surface water right certificate. The point of diversion would be located near the existing Port Well in accordance with the existing surface water right, the location is shown on Figure 5-4. The construction of a new intake structure and pump station would require a permit from the USACE and various other agencies to work in the Columbia River. During the permitting process, the USACE would consult with other federal agencies and gather input from other state and local agencies, interested groups, and the general public. The USACE has issued numerous permits to work in the Columbia River to reconstruct and maintain existing water withdrawal facilities in recent years. The City's surface water right has not been put to beneficial use and would be considered a new withdrawal resulting in a net loss to the river's instream flows. Like the Regional Water System intake improvements, the construction of a new river intake would have the same permitting and environmental hurdles.

Implementation of this alternative would require some form of mitigation in order to secure permits. That mitigation could include purchasing water rights from upstream water users who have put their water rights to beneficial use and are now looking to sell them. If this alternative is pursued, the City may want to begin exploring options for purchasing water rights that have been put to beneficial use or other mitigation means. At this time the City has not eliminated this alternative but considering the water rights and permitting obstacles, it is one of the more challenging alternatives to pursue.

5.4.2.4 Big River Golf Club River Intake Pump Station

The City of Umatilla recently purchased the Big River Golf Course which includes a 1.8 cfs irrigation surface water right (Certificate No. 38484) from the Columbia River. The water right contains an existing river intake pump station originally owned by the McNary Golf Club, the river platform is shown on Figure 5-4. The river intake pump station is located near the Regional Water System intake pump station and houses a 50 HP, 3-stage pump originally installed in 1971. From the pump station, an eight-inch steel distribution pipeline travels approximately 3,300 feet south to the golf course. The pump station is estimated to have a capacity of 1.63 cfs.

Under this alternative, the City would make improvements to the existing river pump station to upsize the pumping capacity of the station as well as constructing new piping connecting to the City's distribution system. The City would also need to add the Big River Golf Club river intake as an authorized point of diversion for its surface water right via a transfer with OWRD. As with the Regional Water System, the modifications to the existing Big River Golf Clubs intake would require USACE Section 10/404 permits, meeting NMFS requirements, as well as other environmental and permitting challenges included in Section 5.4.2.2. The benefit from this alternative over the Regional Water System improvements is that the City already owns this facility and would only need to address the concerns of the regulating agencies. The City has started looking into this alternative and has determined that the existing intake pump station would require a complete rebuild. The City is considering either a partial or complete surface water right withdrawal from this facility. As previously mentioned, since the mid 1990's NMFS has had a no net loss policy for water withdrawals from the Columbia River and made obtaining USACE permits for work in the Columbia River that include new or increased withdrawals a challenge. Albeit the permitting challenges associated with this alternative, the City is interested in pursuing this option.

5.4.2.5 Confederated Tribes of the Umatilla Indian Reservation (CTUIR) River Intake Pump Station

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have an existing river intake pump station just east of the City's service area, the existing intake is shown on Figure 5-4. The existing pump station is authorized as the point of diversion for Certificate Nos. 90765 and 90790. Certificate No. 90765 authorizes 8.21 cfs (1,644.3 af/yr) for wildlife and wetlands maintenance. Certificate No. 90790 authorizes 7.80 cfs; 7.78 cfs (1,960.0 af/yr) for wildlife and wetlands maintenance and 0.02 cfs for stockwater. In tandem with a private industrial user, the City has been in communications with CTUIR about entering into an agreement to use the existing intake pump station to access a portion of their 23 cfs surface water right. Current discussions are being led by the private user under the premise that the City would enter into a 99-year lease agreement, with the option to renew, with the CTUIR for the use of the river intake pump station.

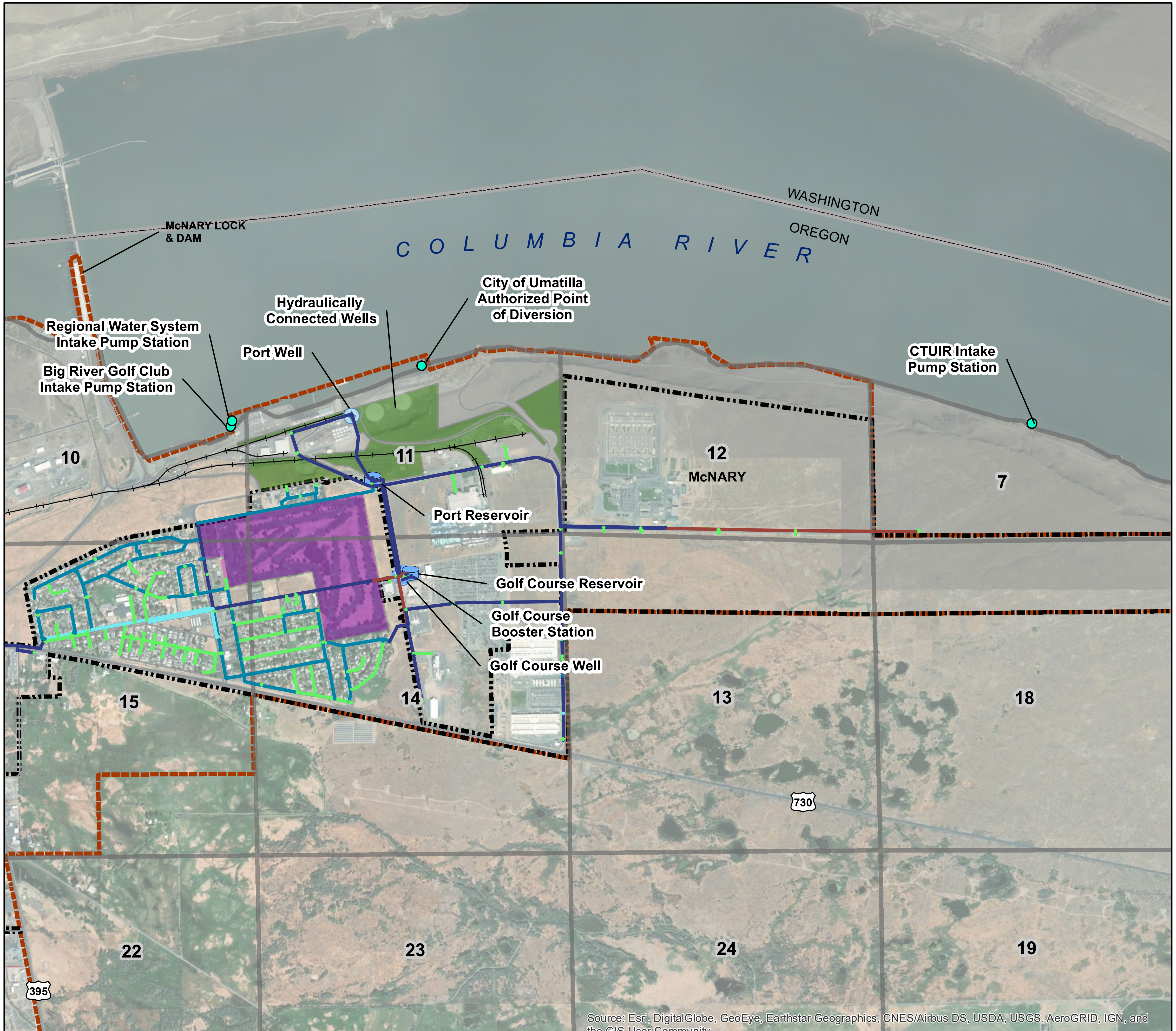
Under this alternative, the existing intake river pump station would be improved to meet the demands of the City of Umatilla, the private industrial user, and the CTUIR. The improvements would include an expansion of the existing river intake pump station and a new potable water treatment plant (WTP) to serve as the City's primary potable water source with the existing groundwater wells being the secondary source for the City's system. In addition to the City facilities, a non-potable water treatment plant would be constructed primarily for the use of the private industrial user but would serve as primary treatment for the flows from the CTUIR pump station. This non-potable water treatment plant would not treat the raw water to potable standards, thus the need for a new potable WTP to meet the City's potable demands. Both of these water treatment plants would be operated by the City. Infrastructure would also be planned for CTUIR to continue using raw untreated water for the wildlife and wetlands maintenance, and stockwater needs in the area. Currently, the private industrial user plans to construct the facilities and then turn the infrastructure over to the City for ownership, operation and maintenance. Again, since this alternative includes in-water modifications to the existing CTUIR intake pump station as well as increasing the current withdrawal rate of the site, permitting and environmental concerns are at the forefront of this alternative. Despite the challenges, the City is considering either a partial or complete surface water right withdrawal from this facility.

City of Umatilla

Water Master Plan

Figure 5-4

Water Source Alternatives



Legend

- Water Source Alternatives
- Reservoir
- Booster Station
- Well
- Streets
- Railroad
- City Limit / Service Area
- Urban Growth Boundary
- Big River Golf Course
- Port of Umatilla Owned
- Section Lines

Existing Pipe Size

- 4"
- 6"
- 8"
- 10"
- 12"
- 14"
- 15"
- 16"
- 18"

0 850 1,700 Feet

1 inch = 1,700 feet

Date: Aug 4, 2021

J-U-B ENGINEERS, INC.

5.4.3 Water Right Adequacy

The current water rights were compared to projected demands in Section 5.2. As seen in Figure 5-1, the City currently has enough groundwater rights to meet the projected peak daily demands through the 20-year and 40-year planning periods. As the City considers the future of their existing groundwater sources, one thing to note is that only one of the two water rights they own are perfected. Permit No. G-8042 which authorizes the Intertie and Golf Course wells submitted a Claim of Beneficial Use (CBU) and Site Report into OWRD in 2003 to perfect a portion of the water right. The full water right was not able to be perfected due to the limitations of the existing pumps at each site, therefore, the same concern will remain moving forward. If additional points of diversion are not added to Permit No. G-8042, the City will need to continue working on the water right perfection moving forward, and due to the declining aquifer levels this may become challenging if the same wells and pumps remain in place.

In addition to the groundwater rights, the City also has their 23 cfs surface water right that is not being used due to a lack of infrastructure. OWRD currently has a deadline of 2055 to put that water right to beneficial use. Based on the water right needs, the City may need to submit an extension on this requirement.

5.5 Summary of Source Deficiencies

The City currently relies on four groundwater wells as the main source of supply for its water demands. The four wells are authorized by three groundwater rights. The City also has an unperfected surface water right to pump water from the Columbia River, however, the City does not currently have infrastructure in place to put this water to beneficial use. As seen in Figure 5-1, the City is limited by the capacity of its sources rather than by water rights over the next 40-years. With the expiring lease agreement with the Port of Umatilla in 2040, the City will need to plan for improvements within the 20-year planning period to meet system peak demands.

The City can make improvements to the existing well facilities to increase the source capacities or drill additional wells. The City has adequate groundwater rights to meet their future demands, however, due to declining aquifer levels additional groundwater sources will not be as reliable as surface water sources. It’s recommended that the City plan for projects that allow them to utilize their surface water right beginning with the 20-year planning period. As mentioned in Section 5.3, the City will need to work on perfecting their full water right under Permit Nos. G-8042 and S-41444 during the 40-year planning period.

Currently all four of the City wells (McFarland, Intertie, Golf Course, Port) use gas chlorination to disinfect their water, the City is content with their systems and don’t plan to make any improvements to their treatment systems. One deficiency that can be improved is the modification of the City’s SCADA system to record daily source productions and have programming in place to calculate the daily usage for the system. It is recommended that this improvement be coordinated system wide with all of the City’s telemetry.

In summary, these are the City’s system source needs (SN):

- SN1) Additional groundwater source(s) or improvements to increase pumping capacity of existing groundwater sources within the next 20 years to meet peak demands and perfect water right Permit No. G-8042;
- SN2) New surface water source(s) to begin using the City’s surface water right Permit No. S-41444 within the next 20 years;

SN3) Surface water source improvements to implement full beneficial use of Permit No. S-41444 (23 cfs) by 2055 or apply for an extension from OWRD;

SN4) Improvements to install new or replace auxiliary power for each source within system.

SN5) Telemetry improvements to allow for continuous data collection and recording at the system sources.

5.6 Recommended Source Alternative

The recommended source alternative for the City to meet peak demands within the 20-year and 40-year planning periods is the expansion of the CTUIR River Intake Pump Station and a transfer of 23 cfs of the City's surface water right authorized by Permit No. S-41444. The City's surface water right will provide a more reliable source by reducing dependency on the declining aquifer. Another advantage with this alternative is that despite the environmental and permitting concerns, the City will have the CTUIR and the private industrial user's coordination in the development of the project.

In combination with the new surface water source, the Intertie, Golf Course, and McFarland Wells would be used as secondary sources for the system, as would the Port Well until the lease agreement ends in 2040. With regards to status of Permit No. G-8042, it's recommended that the City make improvements to the Intertie and Golf Course Wells to perfect the water right once a response on the existing CBU is determined by OWRD. Due to the decline of the aquifer it is also recommended that an evaluation be done to determine the feasibility of lowering the City's wells, making improvements to the existing well pumps, and/or drilling new groundwater wells. Between 2041 and 2061 the projected decline of the aquifer will leave the existing well configuration without enough static head to use the well without lowering it. The City has decided to monitor the aquifer response once the switch is made to surface water sources to determine if the recommended well improvements are necessary.

The projected source capacities and water rights for the recommended alternatives are summarized in Table 5-6, Table 5-7, and Table 5-8.

Table 5-6 Projected Water Rights by Year

Source	Current Authorized Permit Instantaneous Flow, Qi (gpm)	Flow in Beneficial Use, Qi (gpm)		
		2021	2041	2061
McFarland Well	561	561	561	561
Intertie Well	3,994	3,994	3,994	3,994
Golf Course Well	3,994	3,994	3,994	3,994
Port Well[1]	2,002	2,002	-	-
Columbia River[2]	10,322	-	10,322	10,322
Total	**20,873**	**10,551**	**18,872**	**18,872**

1. The City has a lease agreement with the Port of Umatilla for use of the Port Well, this is set to expire in 2040.
2. Proposed improvements utilize all of the City's 23 cfs water right under Permit S-41444.

Table 5-7 Projected Source Capacity with Improvements

Source	2021	2041	2061[4]
McFarland Well[1]	505	283	0
Intertie Well[1]	602	527	467
Golf Course Well[1]	1,762	1,603	1,390
Port Well[1,2]	1,769	-	-
Columbia River[3]	-	10,322	10,322
Total	**4,638**	**12,735**	**12,179**

1. Projected declining aquifer levels impact the static head and the well pump capacity over time.
2. The City has a lease agreement with the Port of Umatilla for use of the Port Well, this is set to expire in 2040.
3. Proposed improvements utilize all of the City's 23 cfs water right under Permit S-41444.
4. Does not reflect increased capacities to wells.

Table 5-8 Projected Water Source Capacity Summary

Year	ERUs[1]	ADD[1] (gpm)	PDD[1] (gpm)	PHD[1] (gpm)	Source Capacity (MGD)	Source Capacity (gpm)[2]	Water Rights, Qi (gpm)[3]
2021	3,145	983	3,109	6,566	5.57	4,638	10,551
2041	3,831	1,197	2,823	4,685	15.3	12,735	18,872
2061	5,099	1,593	3,757	6,166	14.6	12,179	18,872

1. System demands, from Table 2-11 and Table 2-12.
2. Sum of source pumping capacities, from Table 5-7.
3. Sum of usable water rights, From Table 5-6.

Figure 5-5 shows the projected source capacity based on the recommended source alternatives.

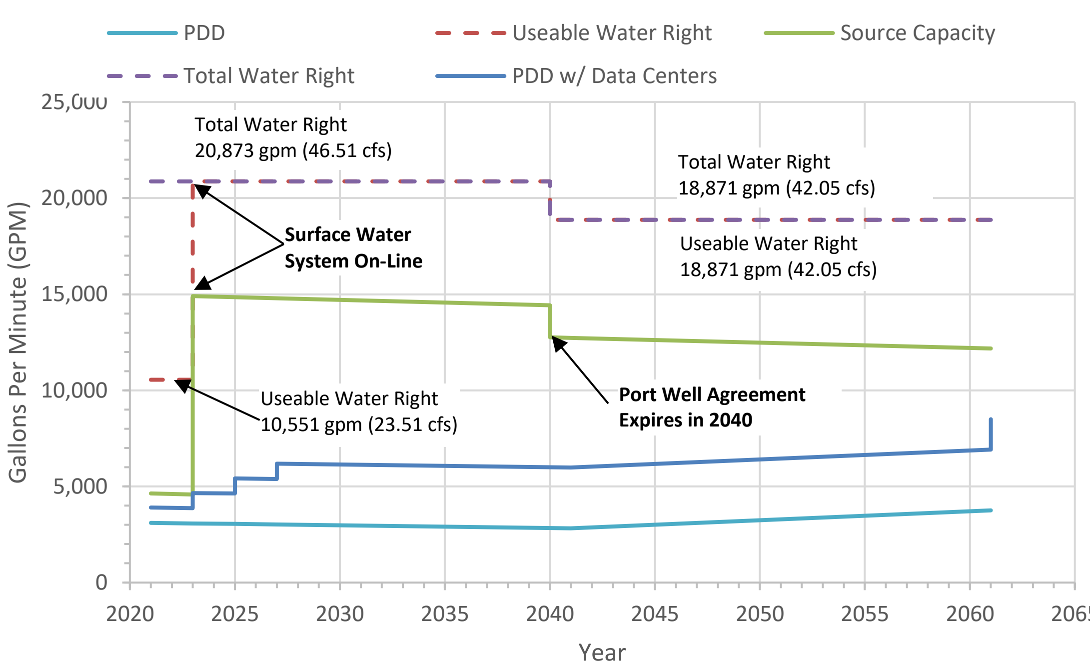


Figure 5-5 Projected Source Capacity and Projected Peak Demands

As seen from Figure 5-5, the City will have adequate water rights from the groundwater and surface water sources for the 20-year and 40-year planning periods. The construction of the river intake pump station will allow the City to meet demands by transferring 23 cfs of the water right to the CTUIR river intake. The City may transfer a portion of their water right in the future for use and potential modifications to the Big River Golf Club pump station. If the CTUIR river intake transmission system improvements are completed prior to 2040, improvements to the wells are less critical for meeting peak demands. The improvements for the McFarland, Intertie, and Golf Course Wells become secondary concerns as they will be primarily used for emergencies and secondary sources. As mentioned, the City plans to monitor the aquifer's response to a switch to surface water and will evaluate if any improvements to the wells is necessary. Figure 5-5 shows the impact the non-potable water usage from the future data centers will have on the City's system. This demand is well within the City's water right, however, the improvements for additional source capacity are required much sooner than on potable demand alone.

5.7 Source Improvement Projects

The water system source needs identified in Section 5.5 and the recommendations made in Section 5.6 can be met through the following improvement projects listed in Table 5-9.

Table 5-9 Recommended Source Improvements

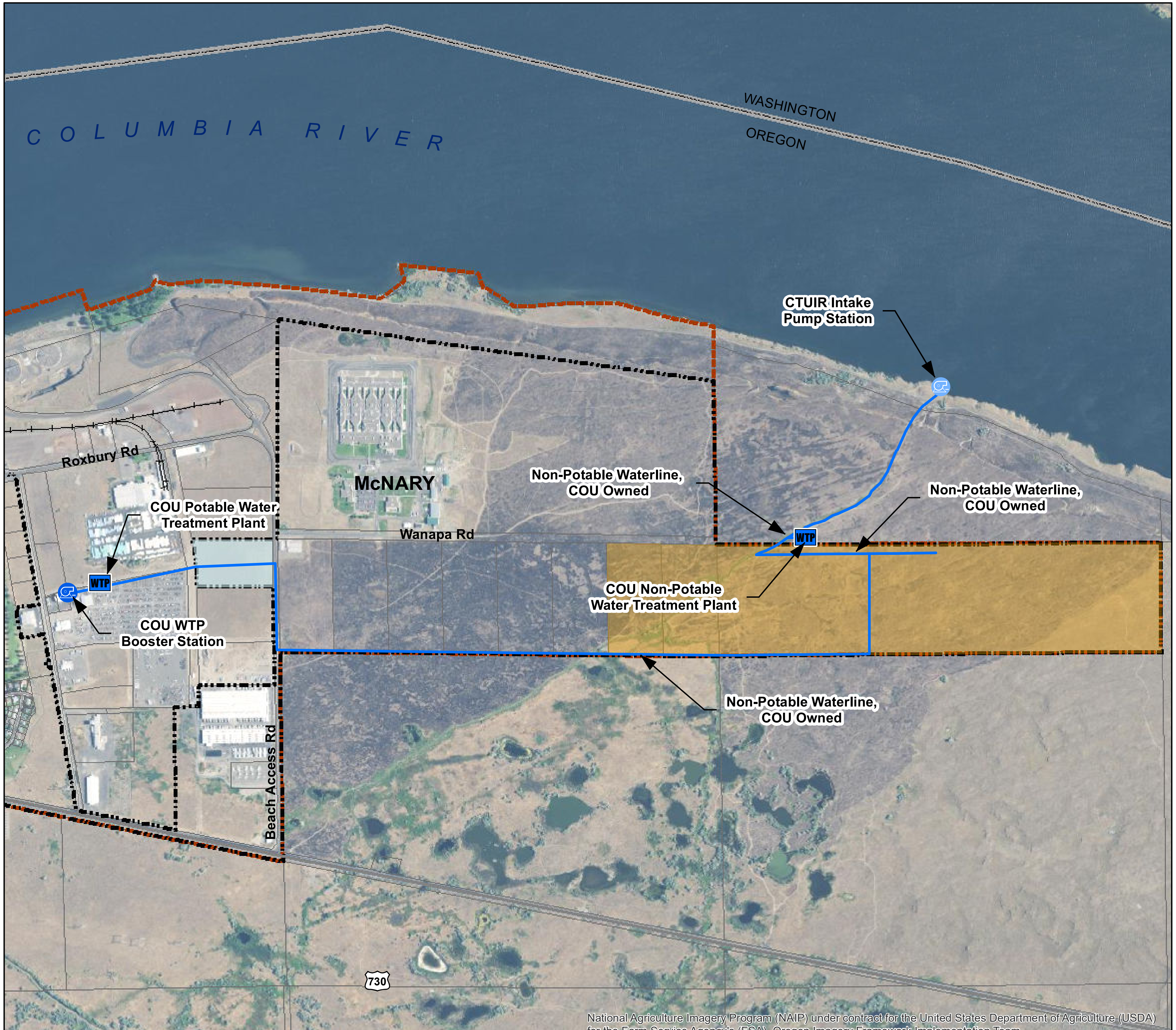
Improvement Number	System Need	Zone	Description
SR-1	SN2	All	CTUIR River Intake Pump Station Expansion
SR-2	SN2	All	New Non-Potable Water Treatment Plant
SR-3	SN2	All	New Potable Water Treatment Plant
SR-4	SN2	All	New Regional Booster Pump Station
SR-5	SN5	All	SCADA Telemetry Improvements
SR-6	SN1	McNary High Level System	Golf Course Well Pump Improve Capacity
SR-7	SN4	McNary High Level System	Golf Course Well/Golf Course Booster Pump Station Auxiliary Power Replacement
SR-8	SN1	Low Level System	Intertie Well Improve Capacity
SR-9	SN4	Low Level System	Intertie Well Auxiliary Power
SR-10	SN1	Coyote High Level System/ Powerline High Level System	McFarland Well Improve Capacity

5.7.1 CTUIR River Intake Pump Station Expansion

As described in Section 5.4.2.5, the CTUIR River Intake Pump Station is being evaluated by a private industrial user to utilize the CTUIR's pump station to meet their demands. The private user would be utilizing the City's 23 cfs surface water right to meet their non-potable service demands. The private industrial user recently retained HDR Engineering, Inc. (HDR) to conduct an evaluation of the existing pump station. The existing pump station generally consists of two in-water screens each capable of a 3,500 gpm withdrawal rate, the screens each have 12-inch suction lines to the pumps. The pump station has two existing horizontal split case pumps that were tested individually with one pump discharging 2,385 gpm and the second pump was observed to produce 2,735 gpm. Out of the pump station a 24-inch forcemain carries flows approximately 1,200 feet southwest of the pump station to an irrigation canal for the CTUIR's use.

HDR recommended replacing the existing pump structure with a larger fully enclosed building similar to the Regional Water System Pump Station, the size of the building was not included in their evaluation. In addition to the building improvements, HDR recommended replacing the river intake screens and piping, replacing the existing pumps with self-priming pumps each capable of pumping 7,200 gpm, as well as improvements to the discharge pipelines and telemetry/electrical upgrades.

With the involvement of the City in the CTUIR pump station expansion, the recommendation would be to size the new pump station to accommodate both the full CTUIR water right of 7,200 gpm and the 23 cfs (10,322 gpm) transferred water right of the City. As recommended in the HDR study, the pump station improvements would include replacing the building, installing new river intake screens and suction piping, replacing the existing pumps with pumps capable of handling the combined flows of all users (17,522 gpm / 39 cfs) and telemetry/controls to adjust the pump speeds to meet the varying demands of the various users. Discharging out of the pump station, the existing 24-inch CTUIR pipeline could be reused to convey water southwest towards the private user's facilities if the pipe is adequately sized or a new pipeline installed in the similar alignment. A portion of the CTUIR's irrigation canal would need to be piped to extend the forcemain to Wanapa Road. At this location the forcemain would split to divert water to a new non-potable water treatment plant that would treat water for industrial purposes only. The non-potable water would then continue to the City's system, needing to be treated to potable standards, and provide industrial water to the private user. A separate raw water pipeline would need to be installed to the south to connect to the CTUIR irrigation canal, the planning of this raw water line is not included in this water master plan. From Wanapa Road, the partially treated water forcemain would continue south and west to the City's new potable water treatment plant along Beach Access Road, where the water would be treated again and then boosted to the City's distribution system with a new booster station. The recommended improvements are shown in Figure 5-6.



Umatilla Est. 1862

City of Umatilla

Water Master Plan

Figure 5-6

CTUIR River Intake Pump Station Expansion

Legend

- Proposed Booster Station
- Proposed Water Treatment Plant
- Existing Booster Station
- Future Data Center
- COU Owned Property
- Railroad
- Highway/Interstate
- Streets
- City Limit / Service Area
- Urban Growth Boundary

0 600 1,200 Feet

1 inch = 1,200 feet

N S E W

Date: Aug 30, 2021

J-U-B ENGINEERS, INC.

Chapter 6 - Water Storage and Distribution Evaluation and Alternatives Analysis

This chapter summarizes the storage and distribution improvements recommended in this water master plan. Chapter 5 analyzed the water system's ability to meet source of supply criteria, and established improvements based on projected growth of the City and advancing the overall efficiency of the system. Similarly, the system's ability to meet storage and distribution needs are analyzed and described in this Chapter.

The necessary improvements will be prioritized as specific projects for the Capital Improvement Program (CIP) in Chapter 7, and will be planned as conceptual projects in this Chapter to be completed within the 20-year (2041) and 40-year (2061) planning periods. It will be necessary to annually review the City's growth patterns to make sure that the projects recommended in this plan support the existing and future development. The City should also review the rate of growth to determine if development occurs at the rates estimated in this plan. The scheduled CIP improvements should keep pace with actual development rates. If growth rates do not match those in this plan, the CIP projects should be delayed or accelerated to keep in stride with the actual development.

6.1 Storage Requirements

Water system storage requirements consists of five components: operational; equalizing; standby; fire suppression; and dead storage. The components were based on the WDOH regulations for effective storage of each pressure zone, the effective storage is determined as the sum of operational, equalizing, standby, and fire suppression storage. Dead storage is not included in the effective storage calculation. A brief description of each component is given below, specific design criteria used for each component for the water master plan is found in Section 4.1.4.

Operational Storage (OS) is the volume of the reservoir devoted to supplying the water system while, under normal operating conditions, the source(s) of supply are in "off" status and are not delivering water. All of the sources are called to turn on or off by elevation level readings of the reservoirs.

Equalizing Storage (ES) is the volume of water needed to supply the water system when source pumping cannot meet the peak hourly demand (PHD). Systems must be able to provide PHD at no less than 30 psi at all existing and proposed service connections throughout the distribution system when equalization storage (ES) is depleted.

Standby Storage (SB) is the volume of water needed to supply the water system when source pumping cannot meet the peak hourly demand (PHD). Systems must be able to provide PHD at no less than 30 psi at all existing and proposed service connections throughout the distribution system when equalization storage (ES) is depleted. It is recommended that SB volume equal the PDD for a duration of one day.

Fire Suppression Storage (FSS) is the volume of water required to provide the highest risk fire flow rate and duration in each particular pressure zone during PDD. The determination of fire flow requirements is made by the County Fire Marshal while maintaining a minimum 20 psi dynamic pressure throughout the distribution system. Fire flow requirements are included in Section 4.1.5. WDOH guidelines allow for consolidation of the SB and FSS volumes.

Dead Storage (DS) is the volume of stored water not available to all customers at the minimum design pressure. The system must be able to provide a minimum dynamic system pressure of 30 psi during PHD under the condition where all equalizing storage has been depleted. The system must also provide a minimum dynamic system pressure of 20 psi during PDD under fire flow conditions and under the condition where the designated volume of fire suppression and equalizing storage has been depleted. Since several of the City's reservoirs have booster pumps the DS on those reservoirs would be the volume below the booster pump suction line.

The storage requirements (OS, ES, FSS, SB, and DS) for the system was determined by calculating the needs of the system as a whole. The Coyote Reservoir provides storage for the Coyote High Level System, it also provides storage for the Coyote High Level System Zone 2 through the Grant Street (North) pressure reducing valve (PRV). The Powerline High Level System is provided water through the Coyote Booster Station, but it's storage is considered part of the Coyote Reservoir. The Intertie Reservoir provides storage for the Low Level System. The Port Reservoir and Golf Course Reservoir provide storage for the McNary High Level System.

In addition to performing storage calculations for the system as a whole, storage calculations were performed on a zone by zone basis. In order to analyze each pressure zone, some of the system's PRV's and altitude valves were considered sources. The PRV capacity is variable and depends on its setting, size, and pressure differential. Typical PRV flowrates expected during PHD scenarios were used as the capacity.

6.1.1 Existing Storage Analysis

The existing storage analysis of the system indicates that the system requires significant storage improvements for the 20-year and 40-year planning periods. The individual zone analysis showed where that additional storage was necessary. The existing system storage analysis showed that only the McNary High Level System was currently deficient, needing approximately 1.45 MG of storage to meet existing requirements, see Table 6-2. Despite the significate storage deficit, it is anticipated that a data center that is currently a user of the system will begin using non-potable water and will no longer create storage demand on the City's potable system. It is recommended that storage improvements for the McNary High Level System be made based on the 20-year storage analysis.

The 20-year storage analysis (2041) shows the McNary High Level System is deficient by 0.32 MG without any improvements and would be 0.69 MG deficient without any improvements by the 40-year planning period (2061). Due to the increase in storage requirements within the 20-year planning period in the McNary High Level System, it is recommended to provide storage improvements to the McNary High Level System to meet the 40-year planning period requirements within the 20-year planning period. The recommended improvements include a 0.76 MG reservoir, the Golf Course Reservoir #2, to be located adjacent to the existing Golf Course Reservoir. The addition of this reservoir is reflected in the storage evaluation for the McNary High Level System for 2041 and 2061 in Table 6-2 and Figure 6-1.

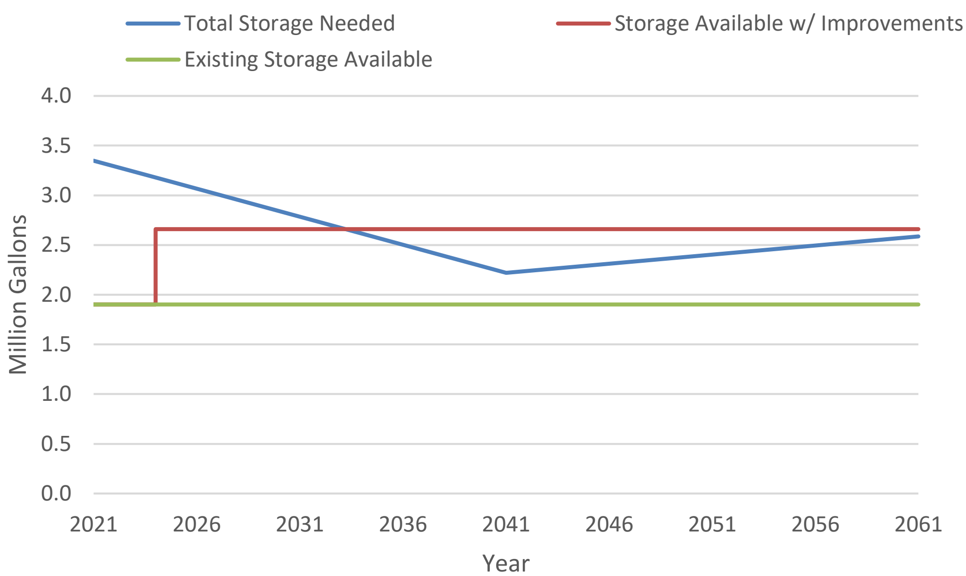


Figure 6-1 McNary High Level System Storage Evaluation

The 20-year storage analysis also shows the Coyote High Level System is deficient by 1.18 MG without improvements and the removal of the McFarland Reservoirs (see Section 6.3.2) and would be 1.96 MG deficient without any improvements by the 40-year planning period. The Coyote High Level System currently draws storage from the Coyote Reservoir and the McFarland Reservoirs. These reservoirs also provide storage for the Coyote Low Level System Zone 1, Coyote Low Level System Zone 2, and Powerline High Level System pressure zones. The analysis was performed on each zone individually, however, the storage requirements were analyzed collectively to determine the Coyote Reservoir System requirements. Due to the large discrepancy in storage requirements between planning periods it is recommended to provide storage improvements in both the 20-year and 40-year planning periods to meet storage demands as needed. The recommended improvement would be to add storage within the 20-year planning period with a 1.34 MG reservoir (Coyote Reservoir #2) and the remaining storage would be recommended within the 40-year planning period, a 0.84 MG reservoir (Coyote Reservoir #3) is recommended within the 40-year planning period. The addition of these reservoirs is reflected in the storage evaluation for the Coyote High Level System for 2041 and 2061 in Table 6-4 and Figure 6-2.

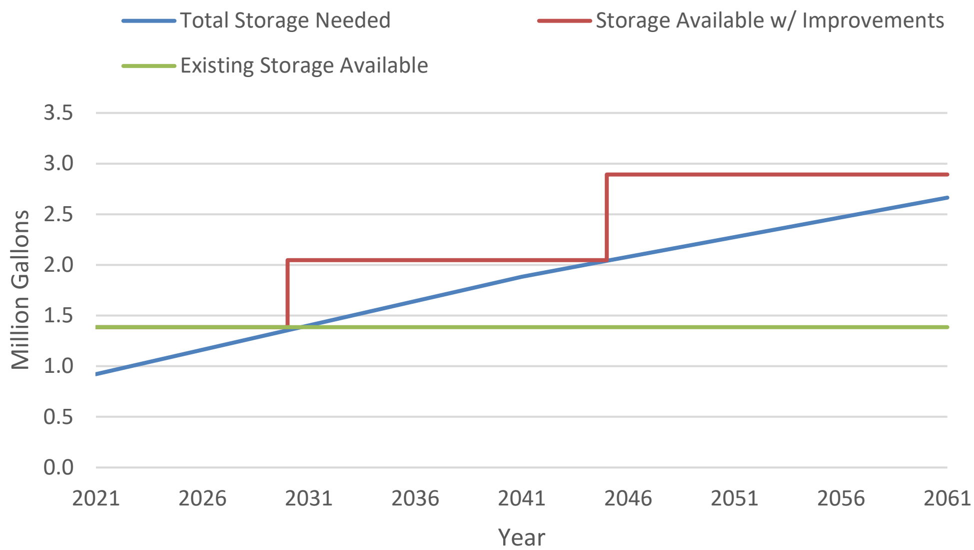


Figure 6-2 Coyote Reservoir System Storage Evaluation

With the removal of the McFarland Reservoirs (see Section 6.3.2), 20-year storage analysis showed the Low-Level System being deficient 0.15 MG and 0.29 MG deficient by the end of the 40-year planning period. Due to the increase in dead storage in the Intertie Reservoir it is recommended that a 0.36 MG reservoir be added to the Low-Level System storage, the McFarland Reservoir #3, is recommended to replace the McFarland Steel and Concrete Reservoirs and be hydraulically connected to the Intertie Reservoir.

The storage analysis also showed that with the new 395 Corridor System pressure zone being served, new storage would be needed for that area. A 0.62 MG reservoir (new 395 Corridor Reservoir) is recommended for the pressure zone within the 20-year planning period.

Figure 6-3 shows the required storage versus the existing available storage and available storage with the proposed improvements of the City's system.

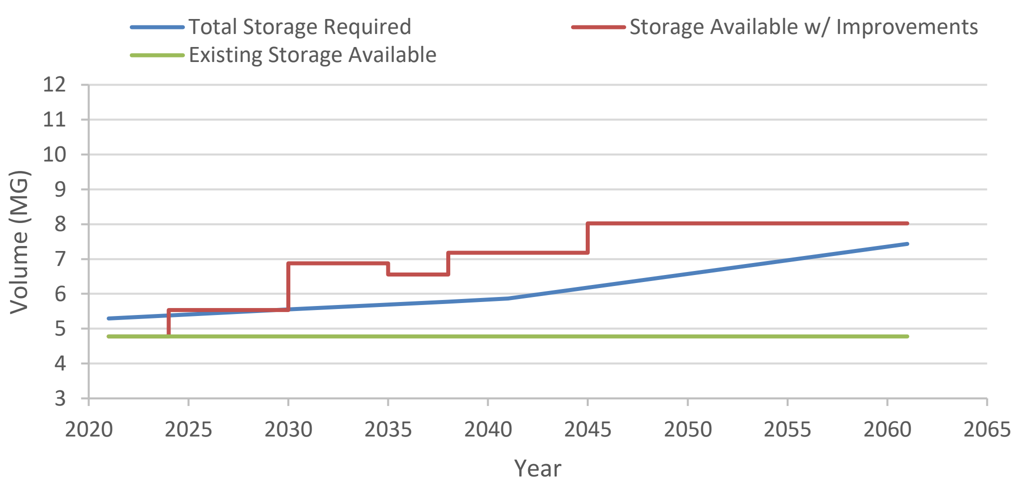


Figure 6-3 City of Umatilla Water System Storage Evaluation

6.1.2 Storage Evaluation

Recommended storage capacity was first evaluated for the existing system, and then analyzed for the 20-year (2041) and 40-year (2061) planning conditions. Future demands were allocated to each pressure zone by spatially distributing demands and expected buildout based upon information provided by the City. Table 6-1 summarizes the existing and future storage calculations for the system as a whole while Table 6-2 through Table 6-8 summarize the calculations for each pressure zone, respectively. Future years shown in these tables include planned storage improvements.

Table 6-1 City of Umatilla Water System Storage Evaluation

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	3,948	3,811	5,093
Projected Demand (gpm)			
Average Day Demand (gpm)	924	1,195	1,591
(MGD)	1.33	1.71	2.29
Peak Day Demand (gpm)	2,908	2,808	3,752
(MGD)	4.19	4.04	5.40
Peak Hour Demand (gpm)	6,166	4,660	6,159
(MGD)	8.88	6.71	8.87
Available Source (MGD)			
In (+), Out (-)			
McFarland Well	0.73	0.41	0.00
Intertie Well	0.87	0.76	0.67
Golf Course Well	2.54	2.31	2.00
Port Well	2.55	0.00	0.00
CTUIR Booster	0.00	14.86	14.86
COU WTP Booster	0.00	14.86	14.86
Golf Course Booster	5.76	5.76	5.76
McNary Booster	0.00	0.00	0.00
McFarland Booster	2.88	2.88	2.88
Coyote Booster	1.94	1.94	1.94
395 Corridor Booster	0.00	0.36	0.36
Total (In - Out)	17.26	44.15	43.35
Required Storage			
Operational Storage (MG)[4]	0.05	0.09	0.10
Equalizing Storage (MG)[5]	0.63	0.61	0.81
Standby Storage (MG)[6]	4.19	4.04	5.40
Fire Suppression Storage (MG)[7]	0.54	0.54	0.54
Dead Storage (MG)	0.43	1.10	1.10
Total (MG)[8]	5.29	5.84	7.41
Total Available Storage (MG)			
	4.78	7.18	8.02
Storage Surplus (+) / (-) Deficiency (MG)			
	-0.52	1.34	0.61

1. 2021 demands based on average service meter data for the years 2017-2020 provided by the City.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.

Table 6-2 Storage Evaluation for McNary High Level System

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	2,678	1,703	2,004
Projected Demand (gpm)			
Average Day Demand (gpm)	527	532	626
(MGD)	0.76	0.77	0.90
Peak Day Demand (gpm)	1,973	1,255	1,476
(MGD)	2.84	1.81	2.13
Peak Hour Demand (gpm)	4,562	2,066	2,417
(MGD)	6.57	2.98	3.48
Available Source (MGD)			
In (+), Out (-)			
Golf Course Well	0.00	0.00	0.00
Port Well	0.00	0.00	0.00
CTUIR Booster	0.00	0.00	0.00
COU WTP Booster	0.00	0.00	0.00
Golf Course Booster	5.76	5.76	5.76
McNary Booster	0.00	0.00	0.00
McNary Intertie PSV	0.00	0.00	0.00
Intertie Reservoir Altitude Valve	0.00	-3.55	-3.56
Total (In - Out)	5.76	2.21	2.20
Required Storage			
Operational Storage (MG)[4]	0.02	0.06	0.06
Equalizing Storage (MG)[5]	0.43	0.27	0.32
Standby Storage (MG)[6]	2.84	1.81	2.13
Fire Suppression Storage (MG)[7]	0.54	0.54	0.54
Dead Storage (MG)	0.06	0.08	0.08
Total (MG)[8]	3.35	2.22	2.59
Total Available Storage (MG)			
	1.90	2.66	2.66
Storage Surplus (+) / (-) Deficiency (MG)			
	-1.45	0.44	0.07

1. 2021 demands based on average service meter data for the years 2017-2020 provided by the City.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.

Table 6-3 Storage Evaluation for Low-Level System

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	691	750	868
Projected Demand (gpm)			
Average Day Demand (gpm)	216	234	271
(MGD)	0.31	0.34	0.39
Peak Day Demand (gpm)	509	552	640
(MGD)	0.73	0.80	0.92
Peak Hour Demand (gpm)	873	947	1,097
(MGD)	1.26	1.36	1.58
Available Source (MGD)			
In (+), Out (-)			
Intertie Well	0.87	0.00	0.00
McNary Booster	0.00	0.00	0.00
McFarland Booster	0.00	-2.88	-2.88
395 Corridor Booster	0.00	-0.59	-0.59
McNary Intertie PSV	0.00	0.00	0.00
Monroe Street PRV	1.15	0.00	0.00
Intertie Reservoir Altitude Valve	0.00	3.55	3.56
McFarland Reservoir Altitude Valve	-1.76	0.00	0.00
Total (In - Out)	0.26	0.08	0.09
Required Storage			
Operational Storage (MG)[4]	0.01	0.01	0.01
Equalizing Storage (MG)[5]	0.11	0.12	0.14
Standby Storage (MG)[6]	0.73	0.80	0.92
Fire Suppression Storage (MG)[7]	0.54	0.54	0.54
Dead Storage (MG)	0.32	0.72	0.72
Total (MG)[8]	1.17	1.64	1.79
Total Available Storage (MG)			
	1.49	1.85	1.85
Storage Surplus (+) / (-) Deficiency (MG)			
	0.32	0.21	0.07

1. 2021 demands based on average service meter data for the years 2017-2020 provided by the City.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.

Table 6-4 Storage Evaluation for Coyote High Level System

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	370	314	466
Projected Demand (gpm)			
Average Day Demand (gpm)	116	98	146
(MGD)	0.17	0.14	0.21
Peak Day Demand (gpm)	272	232	343
(MGD)	0.39	0.33	0.49
Peak Hour Demand (gpm)	468	397	589
(MGD)	0.67	0.57	0.85
Available Source (MGD)			
In (+), Out (-)			
McFarland Well	0.00	0.00	0.00
McFarland Booster	2.88	2.88	2.88
Coyote Booster	-1.94	-1.94	-1.94
Grant Street (North) PRV	-0.05	-0.27	-0.50
Grant Street (East) PRV	0.00	-0.25	-0.28
Monroe Street PRV	-1.15	0.00	0.00
Powerline Rd PRV	0.00	-0.33	-0.52
McFarland Reservoir Altitude Valve	1.76	0.00	0.00
Eagle Ave PRV	0.00	0.00	0.00
Powerline Rd PRV #2	0.00	0.00	0.00
Total (in-out)	1.49	0.08	-0.36
Required Storage			
Operational Storage (MG)[4]	0.02	0.02	0.03
Equalizing Storage (MG)[5]	0.06	0.05	0.07
Standby Storage (MG)[6]	0.39	0.33	0.49
Fire Suppression Storage (MG)[7]	0.54	0.54	0.54
Dead Storage (MG)	0.03	0.30	0.30
Total (MG)[8]	0.64	0.92	0.95
Total Available Storage (MG)			
	1.39	2.05	2.89
Storage Surplus (+) / (-) Deficiency (MG)			
	0.74	1.13	1.94

1. 2021 demands based on average service meter data for the years 2017-2020 provided by the City.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.

Table 6-5 Storage Evaluation for Coyote Low Level System Zone 1

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	0	224	253
Projected Demand (gpm)			
Average Day Demand (gpm)	0	70	79
(MGD)	0.00	0.10	0.11
Peak Day Demand (gpm)	0	165	187
(MGD)	0.00	0.24	0.27
Peak Hour Demand (gpm)	0	283	320
(MGD)	0.00	0.41	0.46
Available Source (MGD)			
In (+), Out (-)			
Grant Street (East) PRV	0.00	0.25	0.28
Powerline Rd PRV	0.00	0.33	0.52
Total (In - Out)	0.00	0.58	0.79
Required Storage			
Operational Storage (MG)[4]	0.00	0.00	0.00
Equalizing Storage (MG)[5]	0.00	0.04	0.04
Standby Storage (MG)[6]	0.00	0.24	0.27
Fire Suppression Storage (MG)[7]	0.00	0.00	0.00
Dead Storage (MG)	0.00	0.00	0.00
Total (MG)[8]	0.00	0.27	0.31
Total Available Storage (MG)[9]			
	0.00	0.00	0.00
Storage Surplus (+) / (-) Deficiency (MG)			
	0.00	-0.27	-0.31

1. Pressure Zone established as part of recommended improvements for the existing system.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.
9. Storage provided through the Coyote High Level System.

Table 6-6 Storage Evaluation for Coyote Low Level System Zone 2

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	28	149	275
Projected Demand (gpm)			
Average Day Demand (gpm)	9	47	86
(MGD)	0.01	0.07	0.12
Peak Day Demand (gpm)	20	110	203
(MGD)	0.03	0.16	0.29
Peak Hour Demand (gpm)	35	189	348
(MGD)	0.05	0.27	0.50
Available Source (MGD)			
In (+), Out (-)			
Grant Street (North) PRV	0.05	0.27	0.50
Total (in-out)	0.05	0.27	0.50
Required Storage			
Operational Storage (MG)[4]	0.00	0.00	0.00
Equalizing Storage (MG)[5]	0.00	0.02	0.04
Standby Storage (MG)[6]	0.03	0.16	0.29
Fire Suppression Storage (MG)[7]	0.00	0.00	0.00
Dead Storage (MG)	0.03	0.00	0.00
Total (MG)[8]	0.06	0.18	0.34
Total Available Storage (MG)[9]			
	0.00	0.00	0.00
Storage Surplus (+) / (-) Deficiency (MG)			
	-0.06	-0.18	-0.34

1. 2021 demands based on average service meter data for the years 2017-2020 provided by the City.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.
9. Storage provided through the Coyote High Level System.

Table 6-7 Storage Evaluation for Powerline High Level System Storage

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	181	418	878
Projected Demand (gpm)			
Average Day Demand (gpm)	9	131	274
(MGD)	0.01	0.19	0.39
Peak Day Demand (gpm)	133	308	647
(MGD)	0.19	0.44	0.93
Peak Hour Demand (gpm)	229	529	1,017
(MGD)	0.33	0.76	1.46
Available Source (MGD)			
In (+), Out (-)			
Coyote Booster	1.94	1.94	1.94
Total (In - Out)	1.94	1.94	1.94
Required Storage			
Operational Storage (MG)[4]	0.00	0.00	0.00
Equalizing Storage (MG)[5]	0.03	0.07	0.14
Standby Storage (MG)[6]	0.19	0.44	0.93
Fire Suppression Storage (MG)[7]	0.00	0.00	0.00
Dead Storage (MG)	0.00	0.00	0.00
Total (MG)[8]	0.22	0.51	1.07
Total Available Storage (MG)[9]			
	0.00	0.00	0.00
Storage Surplus (+) / (-) Deficiency (MG)			
	-0.22	-0.51	-1.07

1. 2021 demands based on average service meter data for the years 2017-2020 provided by the City.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.
9. Storage provided through the Coyote High Level System.

Table 6-8 Storage Evaluation for 395 Corridor System Storage

Projected ERU's and Demand	2021[1]	2041[2]	2061[3]
Equivalent Residential Units (ERU_{PDD})	0	253	350
Projected Demand (gpm)			
Average Day Demand (gpm)	0	79	109
(MGD)	0.00	0.11	0.16
Peak Day Demand (gpm)	0	186	258
(MGD)	0.00	0.27	0.37
Peak Hour Demand (gpm)	0	248	371
(MGD)	0.00	0.36	0.53
Available Source (MGD)			
In (+), Out (-)			
395 Corridor Booster	0.00	0.59	0.59
Total (in-out)	0.00	0.59	0.59
Required Storage			
Operational Storage (MG)[4]	0.00	0.01	0.01
Equalizing Storage (MG)[5]	0.00	0.04	0.06
Standby Storage (MG)[6]	0.00	0.27	0.37
Fire Suppression Storage (MG)[7]	0.00	0.54	0.54
Dead Storage (MG)	0.00	0.00	0.00
Total (MG)[8]	0.00	0.59	0.60
Total Available Storage (MG)			
	0.00	0.62	0.62
Storage Surplus (+) / (-) Deficiency (MG)			
	0.00	0.03	0.02

1. Area currently unserved, will begin being served within 20-year planning period.
2. 2041 demands based on 2021 demands with anticipated development and projected growth per Section 2.7.
3. 2041 demands based on 2041 demands with anticipated development and projected growth per Section 2.7.
4. Volume from pump on to pump off in reservoirs.
5. Higher of Equation 7-1 from WDOH Water System Design Manual, or 15% of PDD.
6. PDD of system for one day per Equation 7-2 from WDOH Water System Design Manual.
7. See Table 4-2 for the highest risk fire criteria.
8. Total required storage includes larger of Standby Storage and Fire Suppression Storage.

6.2 Distribution System

Hydraulic modeling of the distribution system was conducted to evaluate the adequacy of existing facilities for conveying current and future flows and to generally size future improvements. The following sections describe the methodology used, assumptions, calibration, analysis scenarios, and summary of identified deficiencies. Maps depicting the node and pipe network as well as tabular results from the hydraulic model are presented in Appendix P.

6.2.1 Methodology and Assumptions

The City of Umatilla's water system was modeled using Bentley's WaterCAD Version V10.03 software. The hydraulic model was prepared from the City's GIS information and system records. All modeling scenarios involved steady-state conditions.

6.2.1.1 Demands

Existing demands were determined from the 2017-2020 water meter readings and spatially assigned to the water model. Future demands were determined by the demand projections shown in Section 2.7. The locations and projected timing (20-year and 40-year planning periods) for future growth were identified by the City. The areas of projected growth by 2061 are shown in Figure 6-6. The demands assigned to the future growth areas took into account zoning and availability of separate irrigation systems.

Peaking factors were used to calculate peak daily demand (PDD) and peak hourly demand (PHD) for inputs to model nodes in various scenarios using the peaking factors shown in Table 6-9. The adjusted PHD peaking factor was used for the PHD scenarios based on the diurnal curve adjustments mentioned in Section 2.4.1.

Table 6-9 Water Model Peaking Factors

User Classification	PDD/ADD	Calculated PHD/PDD	Adjusted PHD/PDD
Industrial Users	2.36	3.02	1.13
TRCI	2.36	1.72	1.58
Non-Industrial Users[1]	2.36	1.72	1.72
Data Centers[2]	2.36	1.73	1.73
Data Centers[3]	10.3	3.02	3.02

1. Includes Residential, Commercial, Public connections.
2. For future potable demands only.
3. For existing combined potable and industrial demands.

6.2.1.2 Physical System

The hydraulic model prepared involved extensive effort in verifying that the physical system was represented accurately. In general, most of the City's piping was incorporated into the model. Pipeline information was verified using City record drawings, GIS drawings and data, and utility drawings. Topographic elevation information was provided using lidar data of the area where available and GIS contour data. Pump curve data and groundwater elevations were verified using manufacturers' pump curves, actual pump test data, and measured dynamic water elevations, when available. Pressure reducing valve settings were also input using actual data from the City.

6.2.2 Calibration

The City provided fire hydrant test data obtained by completing flow/pressure tests at five locations throughout the system. At each location, the pressure was measured at a non-flowing "test" hydrant. Then, flow was discharged simultaneously from a nearby hydrant, and pressure was again measured at the non-flowing "test" hydrant. Pressure was read from a gauge connected to a 2-1/2" outlet "Hydrohitch" diffuser. The flow rate was derived from a calibrated "Hydrohitch" chart relating pressure to flow rate. The City also provided system information such as reservoir levels and pump discharge flows during the test period.

To compare the field test data with the model, a calibration scenario was developed to simulate each flow test. The reservoir levels and pump conditions were set in the model to match the actual system conditions during the flow testing using information provided by the City. Nodes and piping were added as needed for each hydrant location. Both flowing and non-flowing scenarios were run at each test location, and the corresponding pressures at the node representing the test hydrant were noted. Table 6-10 lists the calibration results.

Table 6-10 Model Calibration Results

Test No.	Test FH - Address	Zone	Total Test Flow (gpm)	Pre-Test Pressure (psi)		Pressure During Test (psi)	
				Field Data	Model Data	Field Data	Model Data
1	HYD448 Wanapa Rd	McNary High Level	1,060	60	61	59	58
2	HYD350 Bud Draper Rd	McNary High Level	1,275	74	70	70	66
3	HYD310 Walla Wall St/Cowlitz Ave	McNary High Level	1,190	72	67	69	64
4[1]	HYD46 Blue Jay St/Dark Canyon Ave	Powerline High Level	880	82	71	30	53
5[1]	Riley St	Powerline High Level	750	80	66	22	51

1. Fire flow tests 4 and 5 were not used in calibration due to the duration of the test. Field notes indicated Coyote Booster #2 came on during shutdown of the test, meaning the test was not run long enough to determine accurate measurements.

The inaccuracies that exist when modeling demands and measuring pressures and flows during the field tests prevent exact correlation between the model data and the field data. Reading the pressure gauge has uncertainty of ±2 psi, ground elevations are within about 5 feet, and the uncertainty of flow readings is within 6%. The total combined effect of all the variables in the model have a combined uncertainty of approximately 10.8 ft of head (4.7 psi). More information on the calibration, the uncertainty calculations, and a map showing calibration points locations are included in Appendix O. There are no established standards for hydraulic calibration. Typical values for a calibrated water model are hydraulic grade lines (HGL) to be within 5 ft to 10 ft of recorded values. Typically, the larger value (10 ft) is applied to models used for long term range planning and the smaller value (5 ft) would be applied to design and operations evaluations. The results in Table 6-10 above show that the current model is calibrated for long range planning. Calibration is an ongoing process, and the model should be periodically calibrated as it is used and modified.

6.2.3 Analysis Scenarios

Once the calibration efforts confirmed that the hydraulic model of the existing system was an accurate representation of the existing system, several analysis scenarios were created to evaluate the ability of the distribution system to function per the design criteria. The following model scenarios were used for analysis:

6.2.3.1 2021 Average Daily Demand (ADD)

To analyze the existing system, this scenario was included to provide output data relating to the typical day-to-day operating conditions, making sure typical operation pressures were between 40 and 80 psi.

This scenario used 2017-2020 average ADD for node demands. The physical system included the existing (2021) system with all reservoirs full and all current sources operating. Model results are provided in Figure P-2 in Appendix P.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- West edge of zone sees static pressures between 80-100 psi due to lower elevations in relation to the Port Reservoir.
- North edge of zone near Launch Lane sees static pressures over 100 psi due to lower elevations in relation to Port Reservoir.

Low Level System

- Majority of flow coming through Monroe Street PRV, this is causing unnecessary excess pumping by the McFarland Booster Station since the zone can be fed by gravity through the Intertie Reservoir.
- South half of zone (south of railroad) sees static pressures between 80-100 psi due to lower elevations in relation to the Intertie Reservoir.
- North half of zone (north of railroad) sees static pressures over 100 psi due to lower elevations in relation to the Intertie Reservoir.

Coyote High Level System

- Majority of zone north of Sparrow Avenue sees static pressures between 80-100 psi due to the large elevation range of the zone (400’-550’) and relation to the Coyote Reservoir.
- North end of zone near the West Extension Canal sees static pressures over 100 psi due to the large elevation range of the zone (400’-550’) and lower elevations in relation to the Coyote Reservoir.
- Grant Street (East) PRV is not being actuated due to high downstream pressures.

6.2.3.2 2021 Peak Daily Demand (PDD) + Fire Flow

The fire flow analysis function of the WaterCAD hydraulic model was used to evaluate available fire flows throughout the system. The model determined maximum available fire flows while maintaining minimum operating pressures of 20 psi throughout the system. Available fire flows were determined by incrementally adding demands to the PDD until either the system pressure dropped to 20 psi, or the demand on the node reached the required fire flow rate for the node classification, see table Table 4-2.

The physical system included the existing system (2021) with reservoirs depleted of their FSS and ES volumes. Available fire flows determined from the model are provided in Appendix P (Figure P-4).

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- A few locations fail to meet fire flow goals due to the 20 psi limit being reached at those locations, failure appears to be due to undersized piping at those locations.

- Pipes along Bud Draper Road have high headloss.

Low-Level System

- Majority of the zone does not meet fire flow goals due to the 20 psi limit being reached in the system, failure appears to be due to small diameter piping in a majority of the zone.
- There are no hydrants in the northwest part of the zone.

Coyote High Level System

- A few junctions don't meet the required fire flow goals due to the 20 psi limit being reached at those locations.
- The failures in the north end of the zone are due to undersized piping.
- The failures in the northeast portion of the zone are due to high head losses through the zone piping, this is due to high flows through the zone required by the Monroe Street PRV to serve the Low-Level System.

Powerline High Level System

- Junctions on the east half of the zone don't meet the required fire flow goals due to the 20 psi limit being reached at the south end of Blue Jay Way, it's anticipated that with buildout of the development and further looping of the system the fire flow goals will be met.

6.2.3.3 2021 Peak Hourly Demand (PHD)

This scenario used 2017-2020 water meter data with PHD peaking factors for node demands. The physical system included the existing system (2021) with reservoirs depleted of their ES volume and all sources operating. The model was used to verify that PHD can be delivered to the system while maintaining minimum operating pressures of 30 psi throughout the system. Model results are provided in Figure P-6 in Appendix P.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- North edge of zone near Launch Lane sees static pressures over 100 psi due to lower elevations in relation to Port Reservoir.
- High headloss, greater than 0.005 ft/ft on transmission pipes to and from the Golf Course Booster Station along Bud Draper Drive.

Low-Level System

- Majority of flow coming through Monroe Street PRV, this is causing unnecessary excess pumping by the McFarland Booster Station since the zone can be fed by gravity through the Intertie Reservoir.
- South half of zone (south of railroad) sees static pressures between 80-100 psi due to lower elevations in relation to the Intertie Reservoir.
- North half of zone (north of railroad) sees static pressures over 100 psi due to lower elevations in relation to the Intertie Reservoir.

Coyote High Level System

- Majority of zone north of Tyler Avenue sees static pressures between 80-100 psi due to the large elevation range of the zone (400'-550') and relation to the Coyote Reservoir.
- North end of zone sees static pressures over 100 psi due to the large elevation range of the zone (400'-550') and lower elevations in relation to the Coyote Reservoir.
- Grant Street (East) PRV is not being actuated due to high downstream pressures.
- Pipes in north end of zone see high headloss, greater than 0.005 ft/ft, this is due to high flows through the area required by the Monroe Street PRV to serve the Low-Level System.
- The intake and discharge piping of the McFarland Booster Station see high headlosses.

6.2.3.4 2021 PDD + Fire Flow with Improvements

This scenario is the same as the "2021 Fire Flow" scenario but improvements were added so that the 30 psi minimum system pressures during PHD and the 20 psi during fire flow were met. The physical system included the improvements recommended from the 2021 analysis including a new pressure zone configuration in the Coyote High Level System and adjustments to the Monroe Street PRV, as well as construction of the 18-inch Umatilla River water main replacement, and pipe upsizing in the Low-Level System. Model results are provided in Figure P-5 in Appendix P.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- A few locations fail to meet fire flow goals due to the 20 psi limit being reached at those locations, failure appears to be due to undersized piping and dead end lines at those locations, it's recommended to loop or upsize pipe when additional development occurs.
- Pipes along Bud Draper Road have high head losses.

Low-Level System

- A few junctions don't meet the required fire flow goals due to the 20 psi limit being reached at those locations. The failures appear to be the result of undersized existing piping to those locations as well as dead end lines, it's recommended to loop or upsize pipe when additional development occurs.
- One of the areas that fails is a long dead end along 3rd Street to an electrical substation, this area will require substantial offsite piping improvements, no improvements are recommended at this location.
- Another long dead end along Umatilla River Road requires large pipe upsizing to pass, no improvements are recommended at this location.
- There are no hydrants in the northwest part of the zone.

Coyote Low Level System Zone 1

- A few junctions don't meet the required fire flow goals due to the 20 psi limit being reached at those locations. The failures appear to be the result of undersized existing piping to those locations.

- The intake and discharge piping of the McFarland Booster Station see high headlosses.

Powerline High Level System

- Junctions on the east half of the zone don't meet the required fire flow goals due to the 20 psi limit being reached at the south end of Blue Jay Way. It's anticipated that with buildout of the development and further looping of the system the fire flow goals will be met.

6.2.3.5 2021 PHD with Improvements

This scenario is the same as the "2021 Fire Flow" scenario but improvements were added so that the 30 psi minimum system pressures during PHD and the 20 psi during fire flow were met. The physical system included the improvements recommended from the 2021 analysis including a new pressure zone configuration in the Coyote High Level System and adjustments to the Monroe Street PRV, as well as construction of the 18-inch Umatilla River water main replacement, and pipe upsizing in the Low-Level System. Model results are provided in Figure P-7 in Appendix P.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- North edge of zone near Launch Lane sees static pressures over 100 psi due to lower elevations in relation to Port Reservoir.
- High headloss, greater than 0.005 ft/ft on transmission pipes to and from the Golf Course Booster Station along Bud Draper Drive.

Low Level System

- South half of zone (south of railroad) sees static pressures between 80-100 psi due to lower elevations in relation to the Intertie Reservoir.
- North half of zone (north of railroad) sees static pressures over 100 psi due to lower elevations in relation to the Intertie Reservoir.

Coyote Low Level System Zone 1

- North end of zone sees static pressures over between 80-100 psi due to lower elevations in relation to the Grant Street (East) and Powerline Road PRVs.

6.2.3.6 2041 PDD + Fire Flow

The fire flow analysis function of the WaterCAD hydraulic model was used to evaluate available fire flows throughout the system. The model determined maximum available fire flows while maintaining minimum operating pressures of 20 psi throughout the system. Available fire flows were determined by incrementally adding demands to the PDD until either the system pressure dropped to 20 psi, or the demand on the node reached the required fire flow rate for the node classification, see table Table 4-2.

The physical system included the improvements recommended from the 2021 analysis. The sources in this scenario are still considered to come from groundwater sources, i.e. Golf Course Well, Intertie Well, and McFarland Well. With the Port Well lease agreement expiring in 2040, all scenarios after 2040 were modeled with the Port Well offline. Reservoirs were depleted of their FSS and ES volumes. Available fire flows determined from the model are provided in Appendix P, Figure P-10.

The system also included 8-inch minimum piping to areas of expected development, see Figure 6-6. The areas of expected development by 2041 include:

- 2 Data Centers (Wanapa Road) – potable demands only
- Data Center (South Hill) – potable demands only
- Power City Residential Area
- Rural Residential Area South of Lind Road Data Center
- Brownell Residential Area
- Medium Density Residential Area at end of Dean Avenue – Townhomes (partial development)
- Single-Family Residential Area at end of Roosevelt St (partial development)
- Elementary School at end of Grant Street
- Medium Density Residential Area – Powerline Road and Canal Road (partial development)
- Vandalay Meadows (partial development)
- Cheryl’s Place Subdivision (partial development)
- Single Family Residential Subdivision – “Ballard Property” (partial development)
- Medium Density Residential Area – East of Cheryl’s Place (partial development)
- New Baseball Fields (Hash Park)
- Big River Golf Course Fairway Homes

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- A few locations fail to meet fire flow goals due to the 20 psi limit being reached at those locations, failure appears to be due to undersized piping and dead end lines at those locations, it’s recommended to loop or upsize pipe when additional development occurs.
- Pipes along Bud Draper Road have high head losses.

Low-Level System

- A few junctions don’t meet the required fire flow goals due to the 20 psi limit being reached at those locations. The failures appear to be the result of undersized existing piping to those locations as well as dead end lines, it’s recommended to loop or upsize pipe when additional development occurs.
- One of the areas that fails is a long dead end along 3rd Street to an electrical substation, this area will require substantial offsite piping improvements, no improvements are recommended at this location.
- Another long dead end along Umatilla River Road requires large pipe upsizing to pass, no improvements are recommended at this location.
- There are no hydrants in the northwest part of the zone.

Coyote Low Level System Zone 1

- A few junctions don't meet the required fire flow goals due to the 20 psi limit being reached at those locations. The failures appear to be the result of undersized existing piping to those locations.

Coyote Low Level System Zone 2

- The west half of the pressure zone does not meet the required fire flow goals due to the 20 psi limit being reached at the west end of the new subdivision.

395 Corridor System

- The zone does not meet the required fire flow goals with the minimum 8-inch pipe size due to the 20 psi limit being reached.

Powerline High Level System

- One location at the southeast end of the zone does not meet fire flow goals due to the 20 psi limit being reached at that location, the minimum 8-inch pipe size appears to be undersized.

6.2.3.7 2041 PHD

This scenario used 2041 PHD for node demands. The physical system included the improvements recommended from the 2021 analysis and 8-inch minimum piping to areas of expected development. The reservoirs were depleted of their ES volume and all sources were operating, less the Port Well. The model was used to verify that PHD can be delivered to the system while maintaining minimum operating pressures of 30 psi throughout the system. Model results are provided in Appendix P, Figure P-12.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- North edge of zone near Launch Lane sees static pressures over 100 psi due to lower elevations in relation to Port Reservoir.

Low Level System

- South half of zone (south of railroad) sees static pressures between 80-100 psi due to lower elevations in relation to the Intertie Reservoir.
- North half of zone (north of railroad) sees static pressures over 100 psi due to lower elevations in relation to the Intertie Reservoir.

Coyote High Level System

- The northeast of the zone, where new development is planned to occur, sees static pressures between 80-100 psi due to the relation in elevation to the Coyote Reservoir.
- The intake piping of the McFarland Booster Station sees high headloss.

Coyote Low Level System Zone 1

- North end of zone sees static pressures over between 80-100 psi due to lower elevations in relation to the Grant Street (East) and Powerline Road PRVs.

6.2.3.8 2041 PDD + Fire Flow with Improvements

This scenario is the same as the "2041 Fire Flow" scenario but improvements were added so that the 30 psi minimum system pressures during PHD and the 20 psi during fire flow were met. By adding the CTUIR River Intake Pump and making this the City's primary source of water, the wells were modeled as secondary sources and were turned off in all of the ensuing scenarios. The results of this model are shown in Appendix P, Figure P-11.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- A few locations fail to meet fire flow goals due to the 20 psi limit being reached at those locations, failure appears to be due to undersized piping at those locations.
- Several pipes in the system have high head loss.

Low-Level System

- One of the areas that fails is a long dead end along 3rd Street to an electrical substation, this area will require substantial offsite piping improvements, no improvements are recommended at this location.
- Another long dead end along Umatilla River Road requires large pipe upsizing to pass, no improvements are recommended at this location.
- There are no hydrants in the northwest part of the zone.

Coyote Low Level System Zone 1

- A few junctions don't meet the required fire flow goals due to the 20 psi limit being reached at those locations. The failures appear to be the result of undersized existing piping to those locations.

6.2.3.9 2041 PHD with Pipe Improvements

This scenario is the same as the "2041 PHD" scenario but improvements were added so that the 30 psi minimum pressures and the 20 psi during Fire Flow were met. This model verified that the minimum 30 psi pressure requirement was met with planned improvements. The results of this model are shown in Appendix P, Figure P-13.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- North edge of zone near Launch Lane sees static pressures over 100 psi due to lower elevations in relation to Port Reservoir.
- Several pipes in the system have high head loss.

Low Level System

- South half of zone (south of railroad) sees static pressures between 80-100 psi due to lower elevations in relation to the Intertie Reservoir.

- North half of zone (north of railroad) sees static pressures over 100 psi due to lower elevations in relation to the Intertie Reservoir.

Coyote Low Level System Zone 1

- North end of zone sees static pressures over between 80-100 psi due to lower elevations in relation to the Grant Street (East) and Powerline Road PRVs.

6.2.3.10 2061 PDD + Fire Flow

The physical system included the improvements identified for the 2041 improvements as well as any piping necessary to reach new developments. In this scenario the expected development by 2061 includes:

- Power City Residential Area subdivision to 3x existing demands
- Data Center (Lind Road) – potable demands only
- Medium Density Residential Area at end of Dean Avenue – Townhomes (full development)
- Single-Family Residential Area at end of Roosevelt St (full development)
- Medium Density Residential Area – Powerline Road and Canal Road (full development)
- Vandalay Meadows (full development)
- Cheryl’s Place Subdivision (full development)
- Single Family Residential Subdivision – “Ballard Property” (full development)
- Medium Density Residential Area – East of Cheryl’s Place (full development)
- Annexed Industrial Area – South of data center to I-182
- Annexed Residential Plan Area – Powerline Road and U.S. 730 (west to Shady Rest Mobile Home & RV Park)

In this scenario reservoirs were depleted of their FSS and ES volumes. Available fire flows determined from the model are provided in Appendix P, Figure P-16.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- A few locations fail to meet fire flow goals due to the 20 psi limit being reached at those locations, failure appears to be due to undersized piping at those locations.
- Several pipes in the system have high head loss.

Low-Level System

- One of the areas that fails is a long dead end along 3rd Street to an electrical substation, this area will require substantial offsite piping improvements, no improvements are recommended at this location.
- Another long dead end along Umatilla River Road requires large pipe upsizing to pass, no improvements are recommended at this location.

- There are no hydrants in the northwest part of the zone.

Coyote Low Level System Zone 1

- A few junctions don't meet the required fire flow goals due to the 20 psi limit being reached at those locations. The failures appear to be the result of undersized existing piping to those locations.

Powerline High Level System

- Two locations at the southeast end of the zone do not meet fire flow goals due to the 20 psi limit being reached at those locations, the minimum 8-inch pipe size appears to be undersized.

6.2.3.11 2061 PHD

This scenario used 2061 PHD for node demands. The physical system included the improvements identified for the 2041 improvements as well as any piping necessary to reach planned developments. The reservoirs were depleted of their ES volume and all sources were operating. The model was used to verify that PHD can be delivered to the system while maintaining minimum operating pressures of 30 psi throughout the system. The results of this model are shown in Appendix P, Figure P-18.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- North edge of zone near Launch Lane sees static pressures over 100 psi due to lower elevations in relation to Port Reservoir.
- Various pipelines with excessive head loss gradients.

Low Level System

- South half of zone (south of railroad) sees static pressures between 80-100 psi due to lower elevations in relation to the Intertie Reservoir.
- North half of zone (north of railroad) sees static pressures over 100 psi due to lower elevations in relation to the Intertie Reservoir.

Coyote Low Level System Zone 1

- North end of zone sees static pressures over between 80-100 psi due to lower elevations in relation to the Grant Street (East) and Powerline Road PRVs.

6.2.3.12 2061 PDD + Fire Flow with Improvements

This scenario is the same as the "2061 Fire Flow" scenario but improvements were added so that the 30 psi minimum pressures and the 20 psi during Fire Flow were met. This model verified that the fire flow goals while maintaining a minimum 20 psi were met. The results of this model are illustrated in Appendix P, Figure P-17.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- A few locations fail to meet fire flow goals due to the 20 psi limit being reached at those locations, failure appears to be due to undersized piping at those locations.

- Several pipes in the system have high head loss.

Low Level System

- One of the areas that fails is a long dead end along 3rd Street to an electrical substation, this area will require substantial offsite piping improvements, no improvements are recommended at this location.
- Another long dead end along Umatilla River Road requires large pipe upsizing to pass, no improvements are recommended at this location.
- There are no hydrants in the northwest part of the zone.

Coyote Low Level System Zone 1

- A few junctions don't meet the required fire flow goals due to the 20 psi limit being reached at those locations. The failures appear to be the result of undersized existing piping to those locations.

6.2.3.13 2061 PHD with Pipe Improvements

This scenario is the same as the "2061 PHD" scenario but piping improvements were added so that the 30 psi minimum pressures and the 20 psi during fire flow were met. This model verified that the minimum 30 psi pressure requirement was met with planned improvements. The results of this model are presented in Appendix P, Figure P-19.

Based on the design criteria set forth in Section 4.1 the following concerns were noted as part of this scenario:

McNary High Level System

- North edge of zone near Launch Lane sees static pressures over 100 psi due to lower elevations in relation to Port Reservoir.
- Several pipes in the system have high head loss.

Low Level System

- South half of zone (south of railroad) sees static pressures between 80-100 psi due to lower elevations in relation to the Intertie Reservoir.
- North half of zone (north of railroad) sees static pressures over 100 psi due to lower elevations in relation to the Intertie Reservoir.

Coyote Low Level System Zone 1

- North end of zone sees static pressures over between 80-100 psi due to lower elevations in relation to the Grant Street (East) and Powerline Road PRVs.

6.3 Summary of Storage and Distribution Evaluation

Analysis for the City's storage facilities and distribution network were discussed in Sections 6.1 and 6.2. A summary of the system evaluation is presented here.

6.3.1 2021 Analysis

The main concern was the Low-Level System's inability to meet fire flow goals in a majority of the zone due to small diameter piping. The recommendation is to upsize pipes to a minimum of 8-inch diameter pipe where needed to meet fire flow goals.

The McNary High Level System and Low-Level System consistently showed high pressures due to the wide range of elevations within their pressure zones. The Coyote High Level System also saw high pressures to the north of its service area during the ADD scenario. As noted in Section 4.1.6, appropriate operating ranges for pressure zones is 40 to 80 psi, this 40 psi range equals approximately 90 feet of elevation. Using the 400' elevation as the base elevation for the City's water system the elevation bands are recommended to be adjusted to 400'-490', 490'-580', and 580'-670'. Since most of the growth and development is anticipated in the Coyote High Level System it is recommended to make no changes to the elevation ranges of the McNary High Level System and Low-Level System, but to adjust the Coyote High Level System ranges to match the appropriate pressure ranges as closely as possible.

Based on the existing system analysis it is recommended to reconfigure the elevation range of the Coyote High Level System from an elevation range of 400'-550' to 490'-580'. This change would also reconfigure the elevation range of the Powerline High Level System from 550'-670' to 580'-670' and will create a new pressure zone for the elevation range of 400'-490' being fed through the Coyote High Level System, this zone is proposed as the Coyote Low Level System Zone 1. This zone would be fed through the existing Grant Street (East) PRV as well as a new PRV installed on Powerline Road at the 490' contour, the Grant Street (East) PRV should be adjust to a downstream pressure of 42 psi. The current area fed off the Grant Street (North) PRV would see no changes only renamed from Coyote High Level Zone 2 to Coyote Low Level Zone 2. These improvements will adjust the pressure issues currently seen in the north end of the Coyote High Level System. The newly configured Coyote High Level System (490'-580') will still see high static pressures at the lower elevations due to the elevation of the Coyote Reservoir elevations, typically north of Sparrow Avenue, it is recommended that a new PRV near the intersection of Pheasant Ridge Street and Eagle Avenue be installed as well as a future PRV at the 580' contour along Powerline Road once development occurs. The Eagle Avenue PRV should be set to a downstream pressure of 50 psi.

Another recommendation is to adjust the Monroe Street PRV settings to ensure the Low-Level System is being fed primarily from the Intertie Reservoir rather than through the PRV. This will reduce the strain on the Coyote High Level System and Coyote Low Level System Zone 1 piping as well as the McFarland Booster Station. The recommendation is to reduce the PRV settings to only open during fire flow scenarios when downstream pressures are very low. The 8-inch valve is proposed to be set to 30 psi and the 4-inch valve at 34 psi.

The 18" transmission line crossing the Umatilla River north of Powerline Road is also recommended as an improvement to improve flow to the McFarland Reservoirs.

The storage analysis of the existing system showed that the McNary High Level System was deficient approximately 1.45 MG. However, with the existing data center industrial demands expected to be removed from the potable system within the next few years it is recommended to size the new reservoir based on the 2041 and 2061 potable demands.

Results for these improvements are seen in Appendix P, Figures P-3, P-5, and P-7.

6.3.2 2041 Analysis

As recommended in Chapter 5, the City is planning to construct facilities to utilize surface water sources within the 20-year planning period. The improvements recommended to prepare the City's system for this distribution system shift include modification to the CTUIR River Intake Pump Station, installation of large transmission piping from the river intake station to the new City Water Treatment Plant where the water will be boosted again by the WTP Booster Station to the McNary High Level System. The recommended pipe from the CTUIR River Intake Pump Station is a 36-inch transmission main, this pipeline would meet the demands of the 20-year and 40-year planning periods, as well as the full buildout demands of the City's full 23 cfs surface water right. It is understood that the City is in the process of working on agreements in regards to the CTUIR River Intake Pump Station improvements, this involves installation of a 24-inch transmission main from the river intake station to Beach Access Road, as a result, parallel transmission pipelines will be required to meet the demands of the City in future years. To meet the 20-year planning period demands, this second parallel transmission line from the river intake to Wanapa Road will need to be an 18-inch pipeline based on the 2041 demands.

Since the primary conveyance of water will be from the east side of town to the west side of town, a new connection is proposed to connect the 12-inch transmission main from the McNary High Level System running parallel to U.S. 730, to the Intertie Reservoir. The Intertie Reservoir would become the primary source of water for the pressure zones to the west. In order to reduce headloss along the existing 12-inch transmission main, a new transmission main is proposed to run parallel along U.S. 730 from Lind Road to Willamette Avenue.

With the vast amount of development planned to occur within the 20-year planning period, new distribution piping will be installed as part of the developments, with a few areas requiring upsizing to meet PHD pressure and fire flow goals. The "Ballard Property" subdivision spans two different pressure zones, the Coyote High Level System to the southwest and the Coyote Low Level System Zone 1 to the north east. It is recommended that the distribution system through the subdivision be physically separated to keep the two pressure zones separate. In order to do this; offsite piping will be necessary to supply the portion of the subdivision in the Coyote Low Level System Zone 1. This offsite piping will require connection to the 12-inch line in Powerline Road downstream of the new Powerline Road PRV. In order to meet the 30 psi pressure requirement and 20 psi fire flow requirement this offsite pipe is recommended to be upsized from the minimum 8-inch size. The new single-family residential development at the end of Roosevelt Street requires a secondary 12-inch supply pipe from the east to meet the 20 psi fire flow requirements. As development occurs along Powerline Road, the Powerline Road PRV #2 is recommended to be installed at the 580' contour as a second source for the Coyote High Level System, The recommendation would be to reduce this PRV's settings to only open during fire flow scenarios when downstream pressures are very low, it's recommended to set the downstream pressure of the Powerline Road PRV #2 to 30 psi.

There are a few areas planned to be added to the City's system that currently don't have service. The Brownell residential area located near I-82 and U.S. 730 will be added within the Low-Level System, new distribution piping will be required to meet their demands. The Power City area located along Lind Road will also be served within the 20-year planning area, currently there is no infrastructure to this part of the City. In addition to the Power City residential area, a data center on Lind Road and additional residential areas south of the data center are planned to be connected as part of the service extension. The addition of the Power City area and the data center on Lind Road, will require the addition of a new pressure zone to the City's system. The analysis of the buildout of this area was previously performed in the City's 2018 Beneficial Reuse Feasibility Analysis, see Appendix Q. The new pressure zone will range in elevations from

400 to 490 feet. This zone will be established as the 395 Corridor System and requires a new booster station, drawing suction from the Intertie Reservoir and pumping up to a new reservoir at the south end of the zone. Within this area there is another future pressure zone, the Umatilla Butte Low System, however, this pressure zone will not be effective until further development occurs to the south of the existing UGB.

As the conveyance of water to the South Hill area changes to primarily being supplied from the Low-Level System, the McFarland Reservoirs' altitude valve becomes a concern. This bottleneck in the system is required to meet the PDD of the South Hill area, which includes the Coyote High Level Systems and the Powerline High Level System. Upon modeling the 2041 PDD coming through the McFarland altitude valve, it is recommended that major improvements are made in this part of the system to ensure the McFarland Booster Station has adequate suction pressure to boost water up to the Coyote High Level Systems and the Powerline High Level System. In order to provide adequate suction to the McFarland Booster Station, the water level at the McFarland Reservoirs needs to be kept at a minimum of 483 feet. Since the water levels in the McFarland Reservoirs can be affected by the level in Intertie Reservoir, the useable storage in the Intertie Reservoir will be limited to that volume above the 483 foot elevation. By limiting the useable storage in the Intertie Reservoir, 0.36 MG of additional storage will be required to meet the storage requirements for the Low-Level System. Due to the system's complications with the operation of the McFarland altitude valve, it is recommended to remove the altitude valve and construct the additional storage for the Low-Level System near the McFarland Booster Station. This new reservoir would match the overflow elevation of the Intertie Reservoir and would provide sufficient positive suction for the McFarland Booster Station. The new McFarland Reservoir #3 would replace the existing McFarland Reservoirs resulting in additional storage needed in the Coyote High Level System.

With the construction of the McFarland Reservoir #3, the suction piping of the McFarland Booster Station is recommended to be upsized to also reduce headloss.

In addition to the McFarland Reservoir #3, storage analysis for the 2041 demands required one new 0.76 MG reservoir in the McNary High Level System, Golf Course Reservoir #2, and one new 1.34 MG reservoir in the Coyote High Level System, Coyote Reservoir #2. The new Coyote Reservoir #2 will be located south of the existing Coyote Reservoir in a higher elevation area to minimize the amount of dead storage in the Coyote High Level System. Since the two reservoirs are not in the same location, there is anticipated difference in water levels with the current pipe configuration to the existing Coyote Reservoir. Due to the difference in head loss in the pipes between the two reservoirs the Coyote Reservoir would fill up faster than the Coyote Reservoir #2, to solve this differential it is recommend to increase the head loss on the Coyote Reservoir piping by downsizing the reservoir inlet pipe.

Results for these improvements are seen in Appendix P, Figures P-9, P-11, and P-13.

6.3.3 2061 Analysis

With the majority of the anticipated development beginning within the 20-year planning period, most infrastructure requirements are expected to occur within the next 20-years, and by the end of the 40-year planning period the developments are expected to be fully built out. As mentioned in the 2041 analysis, the large transmission pipeline from the river intake pump station to Beach Access Road will need additional capacity to meet the City's peak demands as the City continues to grow. For the 40-year planning period, the secondary parallel pipeline from the river intake to Wanapa Road will need to be a 24-inch pipeline to meet the 2061 demands and PHD goals. In the 2041 analysis this parallel pipeline only needed to be an 18-inch line to meet the 2041 demands, however, it is recommended to install the 24-

inch pipeline to meet the 2061 demands. This 24-inch pipeline will also be adequate to meet the City's 23 cfs surface water right capacity up to Wanapa Road. When full buildout occurs, this parallel transmission pipeline will need to be continued to the potable Water Treatment Plant, preliminary thoughts are to install this secondary line along the Wanapa Road alignment.

The addition of the new industrial users at the south end of Powerline Road require new pipeline to extend service. With fully built out developments, the storage analysis indicated that, and additional 0.84 MG of storage was needed for this area (Coyote Reservoir #3). As seen with the addition of Coyote Reservoir #2, the same water level differential due to pipe head loss is expected for the Coyote Reservoir #3. It is recommended that the inlet pipe for Coyote Reservoir #1 be downsized in the 20-year planning period in order to minimize differential reservoir fill rates.

6.3.4 Summary of Storage and Distribution Deficiencies

In summary, these are the City's storage and distribution system needs (SN):

SN6) Pumping and/or piping improvements to meet the fire flow goals and pressures at PHD;

SN7) Modify pressure zone elevation ranges to provide appropriate operating pressures during ADD and PHD scenarios for future areas of growth;

SN8) Installation of additional fire hydrants to ensure buildings in system are within 300 LF of a fire hydrant;

SN9) Piping improvements to reach water customers within the service area;

SN10) A new McFarland Reservoir;

SN11) A new 395 Corridor Reservoir;

SN12) New Coyote Reservoirs;

SN13) A new Golf Course Reservoir; and

SN14) Routine reservoir inspection and repair.

6.3.5 Water System Storage and Distribution Facility Reliability

The City's source analysis was included in Chapter 5 and the storage and distribution system analysis is included in this Chapter. The facility reliability is related to the capacity of source, storage, and distribution system hydraulics to provide safe potable water to the system's users.

As the City moves towards surface water sources in the 20-year planning period it will be important to implement projects that will have capacity to convey water from the east end of the City to the west end to meet the needs of the South Hill area. The bottleneck created by the McFarland Reservoirs will need to be corrected in order to meet peak demands to the South Hill area, as recommended this would be solved by installing a new McFarland Reservoir that is at the same elevation as the Intertie Reservoir.

With the reconfiguration of the Coyote High Level System pressure zone, storage improvements are recommended to meet the demands of the heavily developing areas. The Coyote Low Level System Zone 1 and Zone 2 are served via PRVs and don't have any zone storage, similarly the Powerline High Level System will continue to develop over the next 40-years with residential and industrial potable demands. These zones are all currently served by the Coyote Reservoir and as seen in this Chapter, additional storage is recommended to meet the future demands of the South Hill area.

The existing system has key facilities that have served the City's needs, however with the continued anticipated growth it is important to plan ahead and construct adequate facilities for a safe and reliable system. For those areas that are already being served, undersized pipes have a significant impact on the system meeting fire flow goals and high head losses in multiple zones. Pipe replacement projects are recommended to lower the head loss through the undersized pipes to meet system pressure requirements as well as reducing the strain on the system pumps. The Capital Improvement Plan included in Chapter 7 will identify the timing of these projects to help the City plan the improvements to the water system over the next 40-years.

6.4 Storage Improvement Projects

The water system storage needs identified in Section 6.3.5 can be me through the recommended storage improvements listed in Table 6-11, Table 6-12, and Table 6-13.

Table 6-11 Immediate Storage Improvements (Years 2021-2031)

Improvement Number	System Need	Zone	Description
ST-1	SN14	McNary High Level System	Replace sacrificial anodes in Port Reservoir
ST-2	SN14	McNary High Level System	Recoat interior of Golf Course Reservoir
ST-3	SN14	McNary High Level System	Recoat interior of Port Reservoir
ST-4	SN14	Coyote High Level System	Recoat interior of McFarland Steel Reservoir
ST-5	SN13	McNary High Level System	New Golf Course Reservoir #2, 0.76 MG
ST-9	SN12	Coyote High Level System	New Coyote Reservoir #2, 0.84 MG
ST-10	SN7	Coyote High Level System	8-inch water main – downsize Coyote Reservoir inlet piping

Table 6-12 Storage Improvements (Years 2032-2041)

Improvement Number	System Need	Zone	Description
ST-6	SN6/SN10	Low-Level System	New McFarland Reservoir #3, 0.36 MG
ST-7	SN6/SN10	Low-Level System	Abandon McFarland Steel/Concrete Reservoirs
ST-8	SN11	395 Corridor System	New 395 Corridor Reservoir, 0.62 MG

Table 6-13 Storage Improvements (Years 2042-2061)

Improvement Number	System Need	Zone	Description
ST-11	SN12	Coyote High Level System	New Coyote Reservoir #3, 0.84 MG

6.5 Distribution System Improvements

The water distribution system needs identified in Section 6.3 can be me through the recommended storage improvements listed in Table 6-14, Table 6-15, and Table 6-16.

Table 6-14 Immediate Distribution System Improvements (Years 2021-2031)

Improvement Number	System Need	Zone	Length (LF)	Description
DS-1	SN6	Low Level System	N/A	Adjust Monroe Street PRV Pressures
DS-2	SN6	Low Level System	200	18-inch Umatilla River water main replacement
DS-3	SN6	Low Level System	400	8-inch water main Umatilla Port of Entry
DS-4	SN6	Low Level System	650	8-inch water main in Locust Street
DS-5	SN6	Low Level System	1,300	8-inch water main in Division Street (Locust St. - 3rd St.)
DS-6	SN6	Low Level System	250	8-inch water main in L Street (7th St. - 6th St.)
DS-7	SN6	Low Level System	1,900	8-inch water main in 7th Street (L St. - Randall St.)
DS-8	SN6	Low Level System	350	8-inch water main in Yerxa Avenue (6th St. - 7th St.)
DS-9	SN6	Low Level System	500	8-inch water main in 6th Street (Yerxa Ave. - Sloan Ave.)
DS-10	SN6	Low Level System	800	8-inch water main in Switzler Avenue (3rd St. - 6th St.)
DS-11	SN6	Low Level System	3,600	8-inch water main in 3rd Street (WWTP - Cline Ave.)
DS-12	SN6	Low Level System	350	8-inch water main in Cline Avenue (3rd St. - 2nd St.)
DS-13	SN6	Low Level System	650	10-inch water main at WWTP (3rd St. - Hydrant)
DS-14	SN6	Low Level System	350	8-inch water main in Oliver Avenue (2nd St. - 3rd St.)
DS-15	SN6	Low Level System	350	8-inch water main in Patterson Street (2nd St. - 3rd St.)
DS-16	SN6	Low Level System	700	8-inch water main in Quincy Avenue (1st St. - 3rd St.)
DS-17	SN6	Low Level System	1,000	8-inch water main in 2nd Street (Oliver Ave. - Quincy Ave.)
DS-18	SN6	Low Level System	1,300	8-inch water main in 1st Street (Umatilla Marina Park)
DS-19	SN6	Low Level System	1,500	8-inch water main in Stephens Avenue

Improvement Number	System Need	Zone	Length (LF)	Description
DS-20	SN6	Low Level System	1,700	8-inch water main in Tucker Avenue
DS-21	SN6	Low Level System	200	8-inch water main in J Street (Stephens Ave. - Tucker Ave.)
DS-22	SN7	Coyote High Level System	N/A	Install Eagle Avenue PRV
DS-23	SN9	Coyote Low Level System Zone 1	N/A	Install Powerline Road PRV
DS-24	SN2	All	12,400	24-inch transmission main (CTUIR River Intake Pump Station – Beach Access Rd)
DS-26	SN9	McNary High Level System	800	24-inch water main for Data Centers (Wanapa Rd.)
DS-33	SN9	Low Level System	1,500	8-inch water main in Cherry Street
DS-34	SN9	Low Level System	400	8-inch water main in Brownell Boulevard and Robinnet Street
DS-37	SN6	395 Corridor System	N/A	New 395 Corridor Booster Station
DS-39	SN9	395 Corridor System	7,000	16-inch water main in Lind Road
DS-40	SN9	395 Corridor System	1,017	8-inch water main in Union Street
DS-41	SN9	395 Corridor System	1,500	8-inch water main near Union Street and U.S. 395
DS-42	SN9	395 Corridor System	1,100	12-inch water main Lind Road to U.S. 395
DS-43	SN9	395 Corridor System	1,400	12-inch water main along U.S. 395
DS-44	SN9	395 Corridor System	200	8-inch water main along U.S. 395
DS-45	SN9	395 Corridor System	1,300	8-inch water main in Power City Road
DS-46	SN9	395 Corridor System	750	8-inch water main in Marian Avenue
DS-47	SN9	395 Corridor System	900	12-inch water main in Margaret Avenue
DS-49	SN12	Coyote High Level System	2,100	12-inch water main connecting new Coyote Reservoir #2

Table 6-15 Distribution System Improvements (Years 2032-2041)

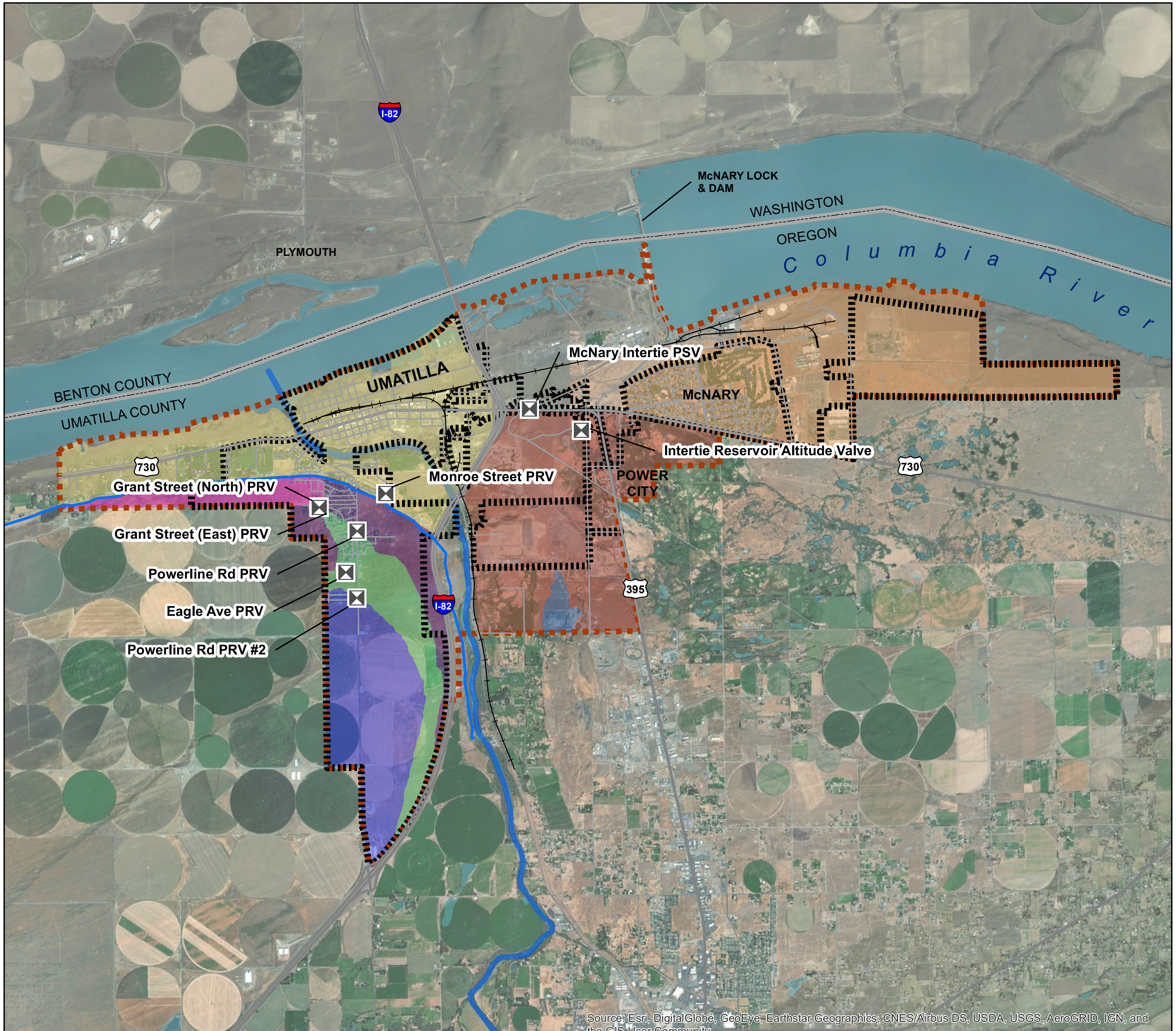
Improvement Number	System Need	Zone	Length (LF)	Description
DS-24	SN2	All	3,600	24-inch transmission main (Wanapa Rd – WTP)
DS-25	SN2	All	200	24-inch transmission main (WTP Booster Station - Golf Course Reservoirs)
DS-27	SN6	McNary High Level System	1,900	12-inch transmission main in U.S. 730 (Willamette St. - 2nd Ave.)
DS-28	SN6	McNary High Level System	150	8-inch water main in 2nd Avenue (Lewis St. - U.S. 730)
DS-29	SN6	McNary High Level System	150	8-inch water main near Willamette Street (Lewist St. - U.S. 730)
DS-30	SN6	McNary High Level System	3,100	16-inch transmission main in U.S. 730 (Lind Rd. - Columbia Blvd.)
DS-31	SN6	McNary High Level System/Low Level System	1,000	16-inch transmission main in Lind Road (U.S. 730 - Intertie Reservoir)
DS-32	SN6	McNary High Level System/Low Level System	N/A	Install Intertie Reservoir Altitude Valve
DS-35	SN6	Low Level System	N/A	Remove McFarland Reservoirs Altitude Valve
DS-36	SN6/SN9	Low Level System	1,900	8-inch water main loop near Dean Avenue (Townhomes)
DS-38	SN11	395 Corridor System	5,800	16-inch water main connecting new 395 Corridor Reservoir
DS-48	SN9	Coyote High Level System	1,000	12-inch water main in Powerline Road (Eagle Ave. - Dark Canyon Ave.)
DS-50	SN6	Coyote High Level System	200	16-inch McFarland Booster Station suction piping replacement
DS-51	SN7	Coyote High Level System	N/A	Install Powerline Road PRV #2
DS-52	SN9	Coyote High Level System	750	12-inch water main for SFR Ballard Property Development
DS-53	SN9	Coyote High Level System	13,000	8-inch water main for SFR Ballard Property Development
DS-54	SN9	Coyote High Level System	6,100	8-inch water main for Medium Density Residential Area east of Cheryl's Place
DS-55	SN9	Coyote High Level System	1,400	8-inch water main for Vandalay Meadows Development

Improvement Number	System Need	Zone	Length (LF)	Description
DS-56	SN9	Coyote Low Level System Zone 1	2,000	8-inch water main for Medium Density Residential Area at Powerline Road/Canal Road
DS-57	SN9	Coyote Low Level System Zone 1	8,200	8-inch water main for SFR Ballard Property Development
DS-58	SN6	Coyote Low Level System Zone 1	900	12-inch water main for SFR Ballard Property Development in Pine Tree Ave
DS-59	SN6	Coyote Low Level System Zone 1	2,200	12-inch water main for SFR Ballard Property Development from Powerline Road PRV
DS-60	SN6	Coyote Low Level System Zone 2	1,700	12-inch water main to SFR development in Grant Street
DS-61	SN9	Coyote Low Level System Zone 2	900	8-inch water main near Roosevelt Street (Elementary School)
DS-62	SN9	Coyote Low Level System Zone 2	12,500	8-inch water main for SFR development near Roosevelt Street
DS-63	SN6	Powerline High Level System	1,500	8-inch water main in Powerline Road (Dark Canyon Ave. - Radar Rd.)
DS-64	SN6	Powerline High Level System	2,650	16-inch water main in Powerline Road (South of Radar Rd.)
DS-65	SN9	Powerline High Level System	900	8-inch water main for Vandalay Meadows Development
DS-66	SN9	Powerline High Level System	850	8-inch water main for Cheryl's Place in Riley Avenue
DS-67	SN9	Powerline High Level System	650	8-inch water main for Cheryl's Place in Renee Avenue
DS-68	SN9	Powerline High Level System	500	8-inch water main for Cheryl's Place in Blue Jay Street
DS-69	SN9	Powerline High Level System	400	8-inch water main for Cheryl's Place in High Desert Loop
DS-70	SN9	Powerline High Level System	2,200	8-inch water main for Cheryl's Place
DS-71	SN9	Powerline High Level System	2,900	8-inch water main for Medium Density Residential Area east of Cheryl's Place
DS-76	SN6	Powerline High Level System	250	12-inch water main in Powerline Road (North of Radar Rd.)
DS-77	SN6	All	3,900	24-inch transmission main (CTUIR River Intake Pump Station - Wanapa Rd)

Table 6-16 Distribution System Improvements (Years 2042-2061)

Improvement Number	System Need	Zone	Length (LF)	Description
DS-72	SN9	Low Level System	1,850	8-inch water main in Powerline Road (U.S. 730 - Dean Ave.)
DS-73	SN9	Low Level System	1,900	8-inch water main in U.S. 730 (Shady Rest Mobile Home Park - Powerline Rd.)
DS-74	SN6/SN9	Low Level System	2,700	8-inch water main loop (Shady Rest Mobile Home Park)
DS-75	SN6	Powerline High Level System	2,700	16-inch water main in Powerline Road (South of Radar Rd.)

The WaterCAD hydraulic computer model was used to evaluate the performance of the City of Umatilla's existing water system and recommend needed improvements. As described in the previous section, the distribution system was evaluated based upon current PHD and fire flow criteria in accordance with the WDOH Water System Design Manual. Recommendations were developed to address the growth of the City and the reliability of the system to provide fire flows. The updated hydraulic profile, along with planned facility improvements are shown in Figure 6-5, future pressure zones are shown in Figure 6-4. The Capital Improvement Plan (CIP) schedule is discussed in Chapter 7.



City of Umatilla

Water Master Plan

Figure 6-4

Future Pressure Zones

Legend

- Control Valves
- Railroad
- Streets
- Highway/Interstate
- 40 year City Limit
- 40 year UGB

Future Pressure Zones

- McNary High Level System
- Low Level System
- Coyote High Level System
- Coyote Low Level System Zone 1
- Coyote Low Level System Zone 2
- Powerline High Level System
- 395 Corridor System
- Umatilla Butte Low System

0 2,000 4,000 Feet

1 inch = 4,000 feet

Date: Aug 9, 2021

J-U-B ENGINEERS, INC.

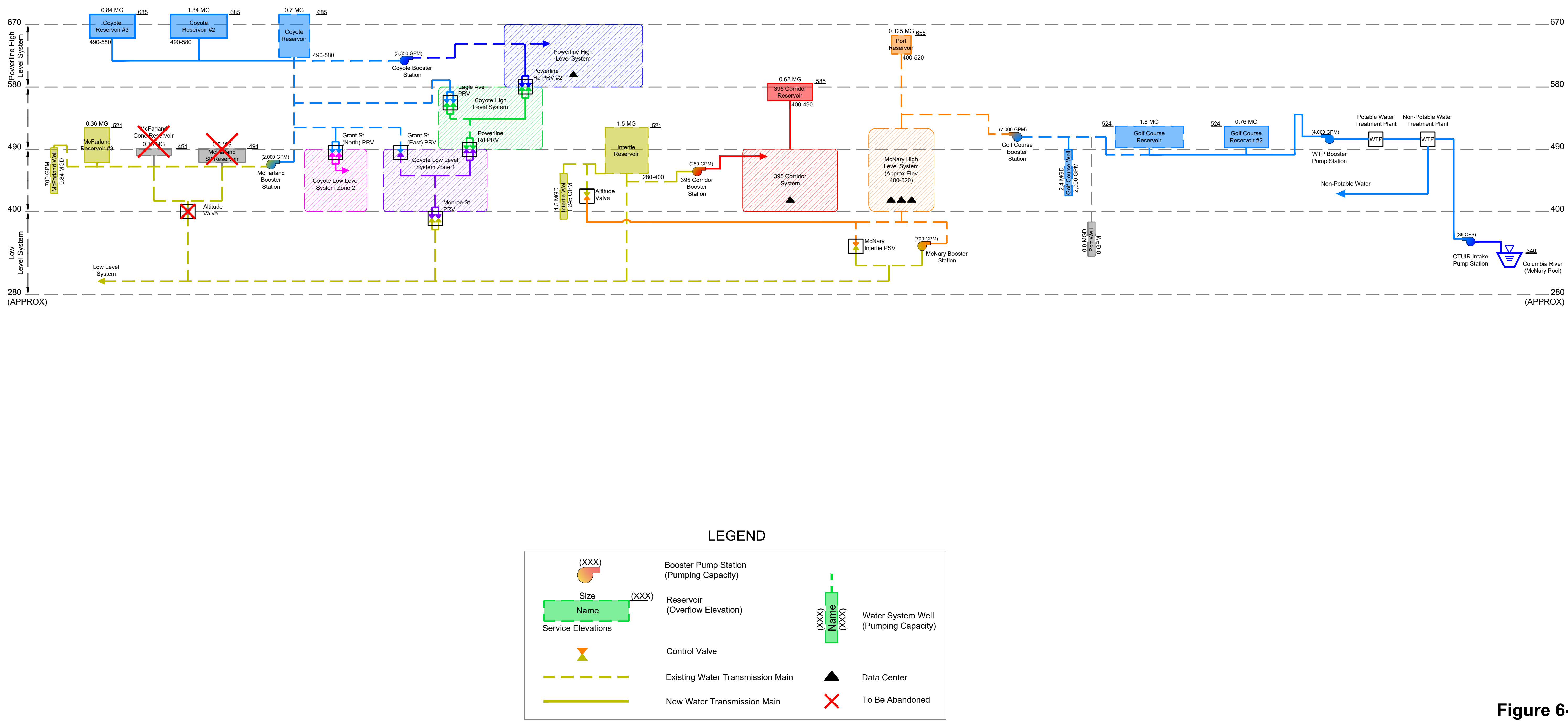


Figure 6-5

WATER MASTER PLAN
CITY OF UMATILLA

WATER SYSTEM FUTURE
HYDRAULIC PROFILE SCHEMATIC

J-U-B ENGINEERS, INC.

LAST UPDATED: 8/30/2021
PLOT DATE: 8/30/2021
FILE: FUTURE HYDRAULIC PROFILE

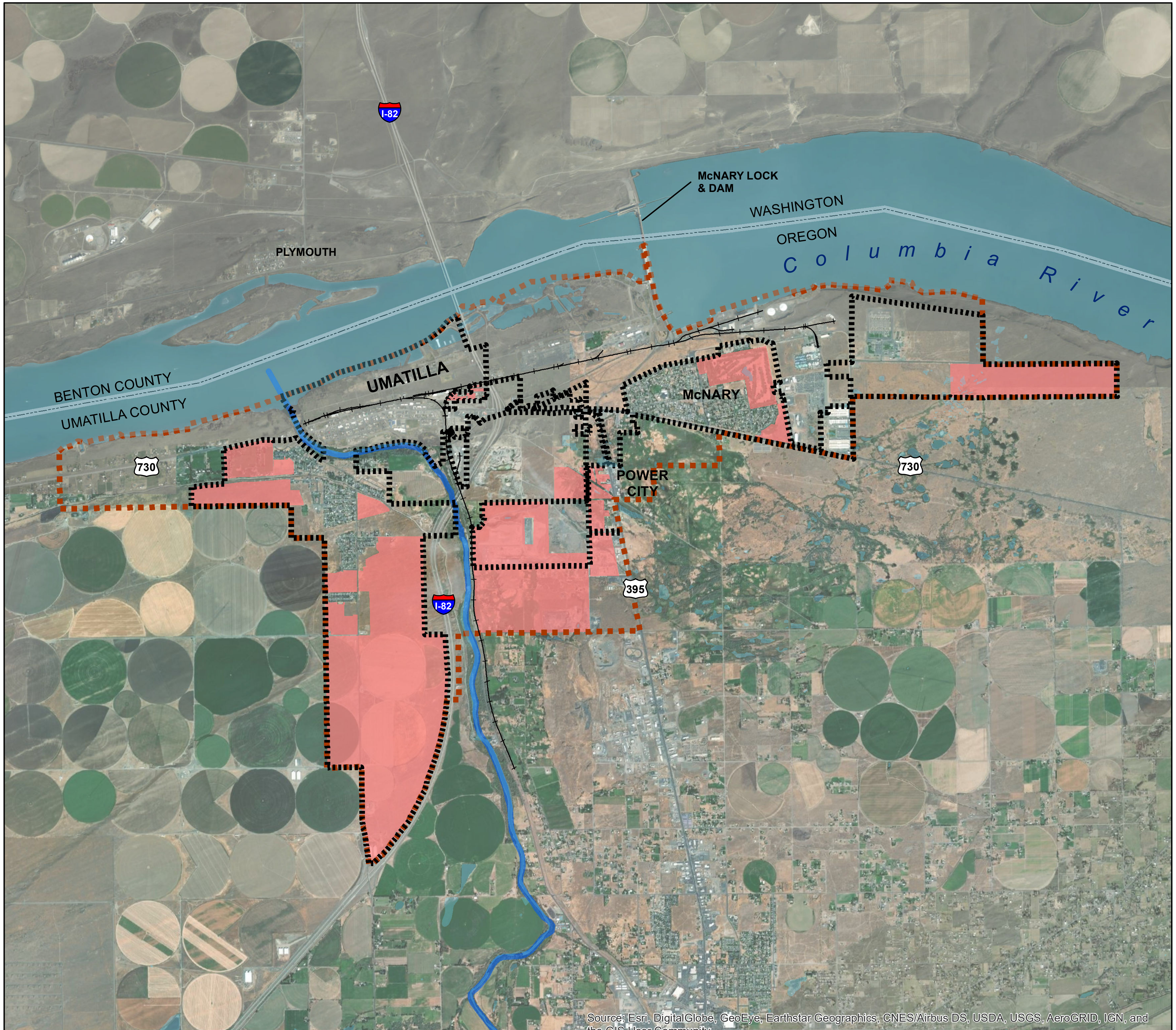
Plot Date:8/30/2021 9:58 AM Plotted By: Alex Romero
Date Created:8/5/2021 \\JUB.COM\CENTRAL\CLIENTS\OR\UMATILLACITY\PROJECTS\33-20-013_WATERMASTERPLAN\DESIGN\CAD\SHEET\FUTURE HYDRAULIC PROFILE.DWG

City of Umatilla

Water Master Plan

Figure 6-6

40-Year Planning Period Development



Legend

- Railroad
- Highway/Interstate
- Umatilla River
- 40 year City Limit
- 40 year UGB
- Developing Areas

0 2,000 4,000 Feet

1 inch = 4,000 feet

Date: Aug 4, 2021

J·U·B ENGINEERS, INC.

Chapter 7 - Capital Improvement and Implementation Plan

This chapter summarizes the improvements recommend in this Water Master Plan. Chapters 5 and 6 analyzed the water system's ability to meet source of supply, storage, and distribution design criteria. Improvements were also established on projected growth of the City and advancing the overall efficiency of the system.

The necessary improvements are prioritized as specific projects for either the 20-year (2021-2041) or 40-year (2042-2061) planning periods. It will be necessary to annually review the City's growth patterns to make sure that the projects recommended in this plan support the existing and future development. The City should also review the rate of growth to determine if development occurs at the rate estimated in the Chapter 2. The scheduled CIP improvements should keep pace with actual development rates. If growth rates do not match those in this plan, the CIP projects should be delayed or accelerated to keep in stride with the actual development.

7.1 Capital Improvement Schedule

The recommended CIP projects are categorized into source (SR), storage (ST), and distribution system (DS). Table 7-1 and Table 7-2 list the improvement schedules. Each improvement has an associated number as well as the anticipated implementation cost and year. Some of the items on the list, however, are dependent on development growth. With this in mind, growth may be faster or slower than what is currently anticipated in this plan. Projects may be constructed before or after the target implementation year established in this plan. Each of the improvement projects is also referenced by its number on Figure 7-1.

The costs shown in Table 7-1 and Table 7-2 are not based on detailed engineering evaluations. The construction costs are based on past experience with similar types of projects and do not include variations due to specific site or alignment constraints. Associated project costs should also be included when establishing budget costs for CIP projects. The projects include engineering, easement acquisition, administrative and legal costs that the City will incur when implementing a project. Pipeline costs were generally estimated based on the following:

- $219/LF of 8-inch diameter pipe
- $280/LF of 10-inch diameter pipe
- $384/LF of 12-inch diameter pipe
- $580/LF of 16-inch diameter pipe
- $1,000/LF of 24-inch diameter pipe

These costs include trenching, backfill, traffic control, valves and fittings, and overhead. The storage costs were estimated based on $1 per gallon of storage capacity for the new Coyote Reservoir #2, Coyote Reservoir #3, McFarland Reservoir #3, and the Golf Course Reservoir #2; $3 per gallon of storage capacity for the new 395 Corridor Reservoir. The referenced project costs can be quickly located and adjusted to assist the City in making management decisions or to answer developer inquiries.

The funding sources for each project may come from multiple sources. The City's 2020 Utility Rate and System Development Charge Study looked at the City's rate forecasts and financial plans for a twenty-year planning period, a copy of the study is included in Appendix N. With the recommended improvements listed in this chapter the study will need to be amended to reflect the financial impacts of the Capital Improvement Plan for the 20-year and 40-year planning periods.

Table 7-1 20-Year CIP Schedule (2021-2041)

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
Source Improvements					
SR-1	CTUIR River Intake Pump Station Expansion	$8,000,000	$8,324,000	TBD	2023
SR-2	New Non-Potable Water Treatment Plant	$37,200,000	$38,703,000	DF	2023
SR-3	New Potable Water Treatment Plant	$23,000,000	$31,575,000	TBD	2037
SR-4	New Regional Booster Pump Station	$1,260,000	$1,730,000	TBD	2037
SR-5	SCADA Telemetry Improvements	$60,000	$65,000	TBD	2025
Storage Improvements					
ST-1	Replace sacrificial anodes in Port Reservoir (2-3 years)	$21,000	$22,000	TBD	2022
ST-2	Recoat interior of Golf Course Reservoir (5-10 years)	$900,000	$937,000	TBD	2023
ST-3	Recoat interior of Port Reservoir (5-10 years)	$60,000	$67,000	TBD	2026
ST-4	Recoat interior of McFarland Steel Reservoir (5-10 years)	$250,000	$293,000	TBD	2029
ST-5	New Golf Course Reservoir #2	$1,300,000	$1,380,000	TBD	2024
ST-6	New McFarland Reservoir #3	$700,000	$924,000	TBD	2035
ST-7	Abandon McFarland Steel/Concrete Reservoirs	$60,000	$80,000	TBD	2035
ST-8	New 395 Corridor Reservoir	$4,000,000	$5,601,000	TBD	2038
ST-9	New Coyote Reservoir #2	$2,300,000	$2,749,000	TBD	2030
ST-10	8-inch water main - downsize Coyote Reservoir inlet piping	$69,000	$83,000	TBD	2030
Distribution System Improvements					
DS-1	Adjust Monroe Street PRV Pressures	-	-	N/A	2022
DS-2	18-inch Umatilla River water main replacement	$6,500,000	$6,630,000	TBD	2022
DS-3	8-inch water main Umatilla Port of Entry	$88,000	$92,000	TBD	2023

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-4	8-inch water main in Locust Street	$116,000	$121,000	TBD	2023
DS-5	8-inch water main in Division Street (Locust St. - 3rd St.)	$558,000	$581,000	TBD	2023
DS-6	8-inch water main in L Street (7th St. - 6th St.)	$56,000	$61,000	TBD	2025
DS-7	8-inch water main in 7th Street (L St. - Randall St.)	$417,000	$452,000	TBD	2025
DS-8	8-inch water main in Yerxa Avenue (6th St. - 7th St.)	$77,000	$84,000	TBD	2025
DS-9	8-inch water main in 6th Street (Yerxa Ave. - Sloan Ave.)	$110,000	$120,000	TBD	2025
DS-10	8-inch water main in Switzler Avenue (3rd St. - 6th St.)	$436,000	$492,000	TBD	2027
DS-11	8-inch water main in 3rd Street (WWTP - Cline Ave.)	$791,000	$891,000	TBD	2027
DS-12	8-inch water main in Cline Avenue (3rd St. - 2nd St.)	$77,000	$87,000	TBD	2027
DS-13	10-inch water main at WWTP (3rd St. - Hydrant)	$182,000	$205,000	TBD	2027
DS-14	8-inch water main in Oliver Avenue (2nd St. - 3rd St.)	$77,000	$91,000	TBD	2029
DS-15	8-inch water main in Patterson Street (2nd St. - 3rd St.)	$77,000	$91,000	TBD	2029
DS-16	8-inch water main in Quincy Avenue (1st St. - 3rd St.)	$154,000	$181,000	TBD	2029
DS-17	8-inch water main in 2nd Street (Oliver Ave. - Quincy Ave.)	$220,000	$258,000	TBD	2029
DS-18	8-inch water main in 1st Street (Umatilla Marina Park)	$286,000	$336,000	TBD	2029
DS-19	8-inch water main in Stephens Avenue	$312,000	$381,000	TBD	2031
DS-20	8-inch water main in Tucker Avenue	$306,000	$374,000	TBD	2031
DS-21	8-inch water main in J Street (Stephens Ave. - Tucker Ave.)	$44,000	$54,000	TBD	2031
DS-22	Install Eagle Avenue PRV	$113,000	$116,000	TBD	2022
DS-23	Install Powerline Road PRV	$113,000	$116,000	TBD	2022

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-24	24-inch transmission main (CTUIR River Intake Pump Station - WTP)	$12,900,000	$13,422,000	TBD	2023
DS-24	24-inch transmission main (CTUIR River Intake Pump Station - WTP)	$3,300,000	$4,531,000	TBD	2037
DS-25	24-inch transmission main (WTP Booster Station - Golf Course Reservoirs)	$180,000	$248,000	TBD	2037
DS-26	24-inch water main for Data Centers (Wanapa Rd.)	$900,000	$937,000	DF	2023
DS-27	12-inch transmission main in U.S. 730 (Willamette St. - 2nd Ave.)	$760,000	$1,003,000	TBD	2035
DS-28	8-inch water main in 2nd Avenue (Lewis St. - U.S. 730)	$28,000	$37,000	TBD	2035
DS-29	8-inch water main near Willamette Street (Lewist St. - U.S. 730)	$34,000	$45,000	TBD	2035
DS-30	16-inch transmission main in U.S. 730 (Lind Rd. - Columbia Blvd.)	$954,000	$1,259,000	TBD	2035
DS-31	16-inch transmission main in Lind Road (U.S. 730 - Intertie Reservoir)	$1,485,000	$1,960,000	TBD	2035
DS-32	Install Intertie Reservoir Altitude Valve	$130,000	$172,000	TBD	2035
DS-33	8-inch water main in Cherry Street	$330,000	$344,000	TBD	2023
DS-34	8-inch water main in Brownell Boulevard and Robinnet Street	$89,000	$93,000	TBD	2023
DS-35	Remove McFarland Reservoirs Altitude Valve	$10,800	$15,000	TBD	2035
DS-36	8-inch water main loop near Dean Avenue (Townhomes)	$381,000	$381,000*	DF	MD
DS-37	New 395 Corridor Booster Station	$1,370,000	$1,426,000	TBD	2023
DS-38	16-inch water main connecting new 395 Corridor Reservoir	$2,985,000	$4,180,000	TBD	2038
DS-39	16-inch water main in Lind Road	$3,413,000	$3,551,000	TBD	2023

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-40	8-inch water main in Union Street	$224,000	$234,000	TBD	2023
DS-41	8-inch water main near Union Street and U.S. 395	$255,000	$266,000	TBD	2023
DS-42	12-inch water main Lind Road to U.S. 395	$372,000	$388,000	TBD	2023
DS-43	12-inch water main along U.S. 395	$440,000	$458,000	TBD	2023
DS-44	8-inch water main along U.S. 395	$45,000	$47,000	TBD	2023
DS-45	8-inch water main in Power City Road	$286,000	$298,000	TBD	2023
DS-46	8-inch water main in Marian Avenue	$143,000	$149,000	TBD	2023
DS-47	12-inch water main in Margaret Avenue	$329,000	$343,000	TBD	2023
DS-48	12-inch water main in Powerline Road (Eagle Ave. - Dark Canyon Ave.)	$401,000	$401,000*	DF	MD
DS-49	12-inch water main connecting new Coyote Reservoir #2	$748,000	$894,000	TBD	2030
DS-50	16-inch McFarland Booster Station suction piping replacement	$115,000	$152,000	TBD	2035
DS-51	Install Powerline Road PRV #2	$113,000	$113,000*	TBD	MD
DS-52	12-inch water main for SFR Ballard Property Development	$799,000	$799,000*	DF	MD
DS-53	8-inch water main for SFR Ballard Property Development	$2,421,000	$2,421,000*	DF	MD
DS-54	8-inch water main for Medium Density Residential Area east of Cheryl's Place	$1,137,000	$1,137,000*	DF	MD
DS-55	8-inch water main for Vandalay Meadows Development	$281,000	$281,000*	DF	MD
DS-56	8-inch water main for Medium Density Residential Area at Powerline Road/Canal Road	$401,000	$401,000*	DF	MD

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-57	8-inch water main for SFR Ballard Property Development	$1,528,000	$1,528,000*	DF	MD
DS-58	12-inch water main for SFR Ballard Property Development in Pine Tree Ave	$361,000	$361,000*	DF	MD
DS-59	12-inch water main for SFR Ballard Property Development from Powerline Road PRV	$882,000	$882,000*	DF	MD
DS-60	12-inch water main to SFR development in Grant Street	$647,000	$647,000*	TBD	MD
DS-61	8-inch water main near Roosevelt Street (Elementary School)	$181,000	$181,000*	DF	MD
DS-62	8-inch water main for SFR development near Roosevelt Street	$2,200,000	$2,200,000*	DF	MD
DS-63	8-inch water main in Powerline Road (Dark Canyon Ave. - Radar Rd.)	$330,000	$330,000*	TBD	MD
DS-64	16-inch water main in Powerline Road (South of Radar Rd.)	$1,384,000	$1,384,000*	TBD	MD
DS-65	8-inch water main for Vandalay Meadows Development	$181,000	$181,000*	DF	MD
DS-66	8-inch water main for Cheryl's Place in Riley Avenue	$171,000	$171,000*	DF	MD
DS-67	8-inch water main for Cheryl's Place in Renee Avenue	$131,000	$131,000*	DF	MD
DS-68	8-inch water main for Cheryl's Place in Blue Jay Street	$101,000	$101,000*	DF	MD
DS-69	8-inch water main for Cheryl's Place in High Desert Loop	$81,000	$81,000*	DF	MD
DS-70	8-inch water main for Cheryl's Place	$441,000	$441,000*	DF	MD
DS-71	8-inch water main for Medium Density Residential Area east of Cheryl's Place	$581,000	$581,000*	DF	MD

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
DS-76	12-inch water main in Powerline Road (North of Radar Rd.)	$117,000	$117,000*	TBD	MD
DS-77	24-inch transmission main (CTUIR River Intake Pump Station - Wanapa Rd)	$4,100,000	$5,628,500	TBD	2037

1. Escalated costs were projected to the year of implementation at a 2.0% inflation rate per year.
2. DF = Developer Funded, MD = Market Dependent, TBD = To Be Determined.
* Costs were not escalated.

Table 7-2 40-Year CIP Schedule (2042-2061)

No.	Description	Total Cost (2021$)	Escalated Cost[1]	Financial Source[2]	Year Constructed[2]
Source Improvements					
SR-6	Golf Course Well Pump Improve Capacity	$390,000	$692,600	TBD	2050
SR-7	Golf Course Well/Golf Course Booster Pump Station Auxiliary Power Replacement	$170,000	$273,500	TBD	2045
SR-8	Intertie Well Improve Capacity	$570,000	$1,012,300	TBD	2050
SR-9	Intertie Well Auxiliary Power	$170,000	$273,500	TBD	2045
SR-10	McFarland Well Improve Capacity	$60,000	$106,600	TBD	2050
Storage Improvements					
ST-11	New Coyote Reservoir #3	$1,500,000	$2,412,700	TBD	2045
Distribution System Improvements					
DS-72	8-inch water main in Powerline Road (U.S. 730 - Dean Ave.)	$407,000	$722,800	TBD	2050
DS-73	8-inch water main in U.S. 730 (Shady Rest Mobile Home Park - Powerline Rd.)	$417,000	$740,600	TBD	2050
DS-74	8-inch water main loop (Shady Rest Mobile Home Park)	$487,000	$864,900	TBD	2050
DS-75	16-inch water main in Powerline Road (South of Radar Rd.)	$1,410,000	$1,410,000*	TBD	MD

1. Escalated costs were projected to the year of implementation at a 2.0% inflation rate per year.
2. DF = Developer Funded, MD = Market Dependent, TBD = To Be Determined.
* Costs were not escalated.

CITY OF UMATILLA
Water Master Plan
Capital Improvement Plan
Figure 7-1
Legend
Pipe Improvements
20-Year Schedule
40-Year Schedule
Developer Funded
40 year City Limit
40 year UGB
Existing Booster Station
Proposed Booster Station
Existing Well
Existing Reservoir
Proposed Reservoir
Existing Control Valve
Proposed Control Valve
Proposed Water Treatment Plant
0 1,400 Feet
1 inch = 1,400 feet
Date: Aug 30, 2021
COLUMBIA RIVER
WASHINGTON
OREGON
LOW LEVEL SYSTEM
COYOTE LOW LEVEL SYSTEM ZONE 2
COYOTE LOW LEVEL SYSTEM ZONE 1
COYOTE HIGH LEVEL SYSTEM
POWERLINE HIGH LEVEL SYSTEM
395 CORRIDOR SYSTEM
UMATILLA BUTTE LOW SYSTEM
McNARY HIGH LEVEL SYSTEM
WTP Booster Station
Golf Course Reservoirs
Golf Course Booster Station
Potable Water Treatment Plant
Golf Course Well
Port Well
Port Reservoir
CTUIR River Intake Pump Station
Non-Potable Water Treatment Plant
McNary Booster Station
McNary Intertie PSV
Monroe Street PRV
Powerline Road PRV
Eagle Road PRV
Powerline Road PRV #2
Coyote Reservoir #2 and #3
395 Corridor Reservoir
395 Corridor Booster Station
Intertie Reservoir
Intertie Reservoir Altitude Valve
Intertie Well
McFarland Reservoir Altitude Valve
Grant Street (North) PRV
Grant Street (East) PRV
McFarland Booster Station
McFarland Reservoir (Steel)
McFarland Well
McFarland Reservoir (Concrete)
McFarland Reservoir #3
Coyote Booster Station
Coyote Reservoir
730
395
I-82
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community