ASHLAND WATER ADVISORY COMMITTEE
May 28, 2019
AGENDA

I. **CALL TO ORDER:** 4:00 PM, Siskiyou Room, 51 Winburn Way Ashland, OR

II. **ANNOUNCEMENTS**

III. **APPROVAL OF MINUTES:** April 23, 2019

IV. **PUBLIC FORUM**

V. **OLD BUSINESS**

A. None

VI. **NEW BUSINESS**

A. RH2 Master Plan Presentation/Discussion
- Water System Analysis
- Capital Improvement Program

VII. **ADJOURNMENT:** 6:00 PM

CITY OF ASHLAND

ASHLAND Water Advisory Committee
MINUTES
April 23, 2019

These minutes are pending approval by this Committee

CALL TO ORDER
Williams called the meeting to order at 4:09 PM

Committee Members Present: Pat Acklin, Joe Graf, Rich Miller, Don Morris, Donna Rhee, Alex Amarotico, Darrell Boldt, John Williams

Committee Members Absent: Lesley Adams, Kate Jackson

Staff present: Paula Brown, Scott Fleury, Steve Walker, Michael Morrison, Kevin Caldwell, Taina Glick

ANNOUNCEMENTS
None

APPROVAL OF MINUTES
March 27, 2018 approved as presented. March 26, 2019 approved as amended.

PUBLIC FORUM
None

Old Business

A. **Water Treatment Plant Update –** Fleury stated that HDR is set to have 30% design completed by end of May and Mortenson will have an updated cost of construction estimate at that time. Mortenson, HDR, and City staff will meet to discuss/make adjustment to the plan after which HDR will finalize the basis of design report. Initial bid package should be released in spring 2020. Construction will take approximately 2-3 years. Basis of design package should be available to committee members at the June meeting. Solar is being considered to offset some of electric consumption of the plant. Electric service redundancy is also being evaluated.

   Committee members and staff discussed the need or appropriateness of a public forum at this stage. It was suggested to provide information about the project in the City Source and a press release and encourage citizens to come to the AWAC meeting before the plan goes to City Council. Project information is available on the CIP Storybook section of the City of Ashland website.

B. **Pump Station Update –** Fleury informed committee members that both stations are substantially complete. Caldwell added that both should be operational mid-May. When the canal comes on, testing can begin at the Terrace Street location. Brown thanked Caldwell for the management of this project and keeping the costs within budget and time. Fleury thanked Glick for maintaining compliance with loan requirements.

C. **Canal Project Update –** Brown informed committee members of the City Council's request for an additional listening session (June 17), another study session (July 1), then potentially a decision on July 16. Brown indicated a survey may be sent out by Administration to gain citizen input. Acklin suggested seeking support from the climate and energy action group. Williams asked if DEQ is requiring this project. Brown indicated they are not.

These minutes are pending approval by this Committee

New Business

A. **RH2 Master Plan Schedule Update/Progress Report**
   - **Master plan development to date review**
   - **O&M Manual development to date review**
   - **Current Status**
   - **Shared vision planning – removal:** This task was to determine if additional climate modeling is warranted. Committee members and staff discussed why it was originally included and if this part of the plan is still necessary. Acklin moved to omit task 15 and the shared vision model and summarize the City's supply strategy in the systems analysis. Graf seconded. Motion passed by concession of the committee members.

Rachel Lannigan from RH2 presented the Water Master Plan. The presentation is attached.

Williams asked for clarification on the rate structure agenda topic. Brown informed group that rates will be discussed at the May meeting but provided basic information about the topic. Williams reminded the group not to discuss rates with members of the press. Brown requested that rate inquiries be forwarded to her.

FUTURE AGENDA TOPICS

May – Capital Improvement Program/Rate Structure
June – Document review and recommendations for adoption

Next Committee meeting May 28, 2019 4:00 pm

ADJOURNMENT: at 5:24 pm

Respectfully submitted,
Taina Glick
Public Works Administrative Assistant

April 23, 2019

RH2 ENGINEERING
40 YEARS SINCE 1978

CITY OF ASHLAND
WATER MASTER PLAN STATUS UPDATE

AGENDA

- Water Master Plan Status Update
  - Task 15 Discussion
- O&M Plan Status Update
- Schedule

WATER MASTER PLAN SCOPE OUTLINE

- ✓ Task 1: Project Management
- ✓ Tasks 2–7, 10–14: Water Master Plan
- ✓ Task 8: Water Availability Evaluation
- ✓ Task 9: Evaluate "One Water" Approach
- Task 15: Shared Vision Planning with Climate Change
- ✓ Task 16: Conservation Program

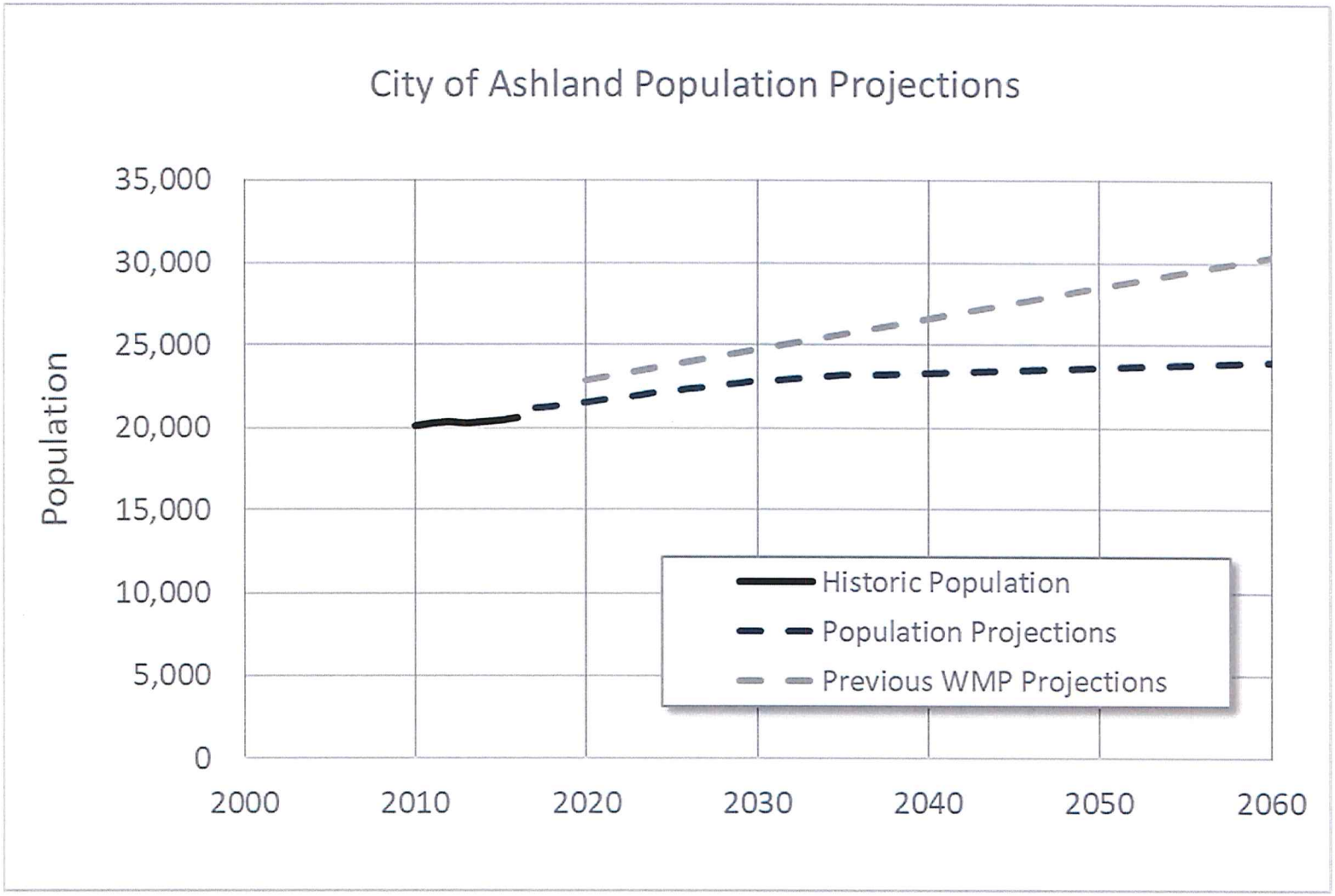
WATER MASTER PLAN CHAPTERS

- Chapter 1 – Introduction
- Chapter 2 – Existing System
- Chapter 3 – Land Use & Population
- Chapter 4 – Demand Projections
- Chapter 5 – System Analysis
- Chapter 6 – Capital Improvement Plan
- Chapter 7 – Financial Analysis

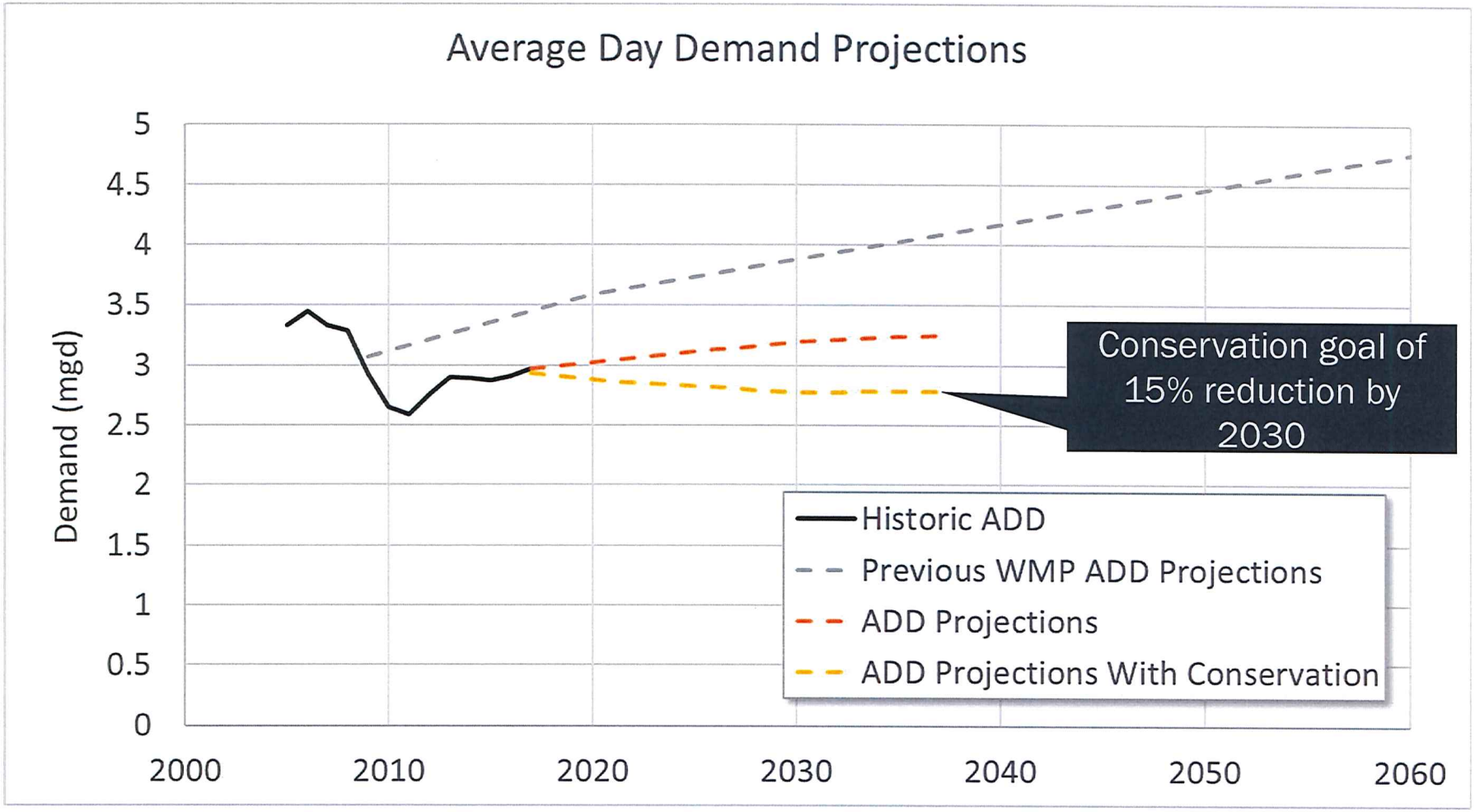
WATER MASTER PLAN CHAPTERS

- Chapter 1 – Introduction
- Chapter 2 – Existing System
- Chapter 3 – Land Use & Population
- Chapter 4 – Demand Projections
- Chapter 5 – System Analysis
- Chapter 6 – Capital Improvement Plan
- Chapter 7 – Financial Analysis

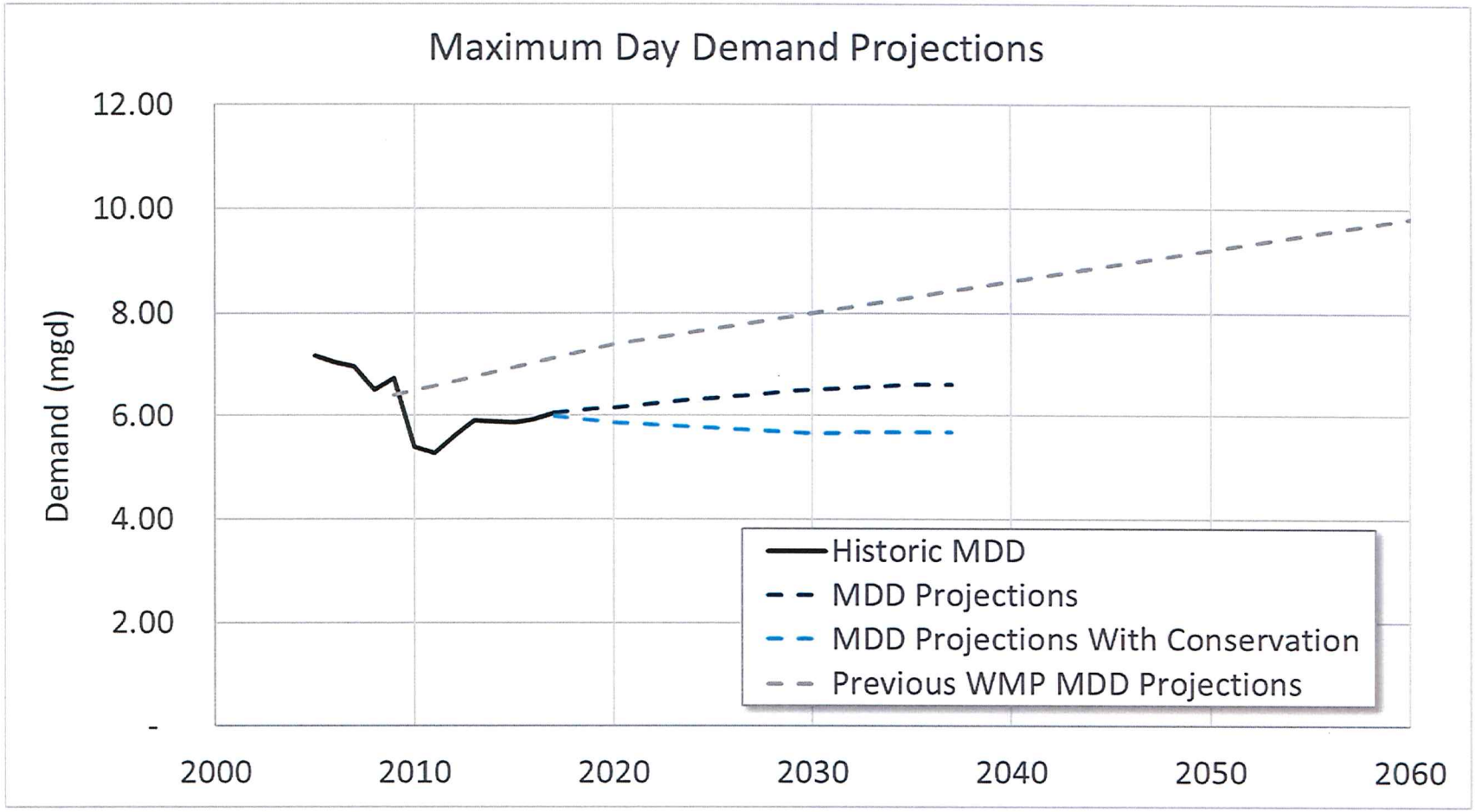
POPULATION PROJECTIONS



AVERAGE DAY DEMAND PROJECTIONS



MAXIMUM DAY DEMAND PROJECTIONS



TASK 15: SHARED VISION PLANNING WITH CLIMATE CHANGE

Purpose:

1. Determine if additional climate modeling is warranted
2. Identify and recommend strategy for supply reliability in times of drought
   - To be done with Maddaus

TASK 15: SHARED VISION PLANNING WITH CLIMATE CHANGE

Tasks:

1. Review *Drought Report* prepared by City
2. Recommend additional climate modeling if warranted
3. Review *Water Supply Model*
4. Build *Shared Vision Model*

5, 6, 7, 8: Use *Shared Vision Model* to identify supply reliability strategy

9. Develop Report

PREVIOUS CLIMATE CHANGE REPORTS AGREE ON STREAMFLOW IMPACTS

- ***Preparing for Climate Change in the Rogue River Basin of Southwest Oregon*** *(2008)*

- ***Effects of Climate Change in Ashland Creek, Oregon*** (Climate Research Center UW, 2010)
  - Ashland Creek: Higher spring flows, lower summer flows

- ***Climate Trends and Projections,*** Oregon Climate Change Research Institute, *2016*
  - Less snowpack, higher winter flows, lower summer flows

ADDITIONAL SUPPLY NEEDED DUE TO CLIMATE CHANGE IS BEING MET

Water Conservation and Reuse Study (Carollo, 2011)

- With climate change, need an additional 3.4 mgd of supply (during 60 day summer period)

Table 7 **Summary of Supply Model Analysis**
City of Ashland – WCRS & CWMP

Additional Conservation Goal	Additional Supply Capacity Needed, MG (AF)[1]					
	1928-1931 No Climate Change		1924 With Climate Change		1987 No Climate Change	
	MG	AF	MG	AF	MG	AF
5 percent	78	238	202	619	277	849
10 percent	11	34	135	414	210	645
15 percent	0	0	68	210	152	467

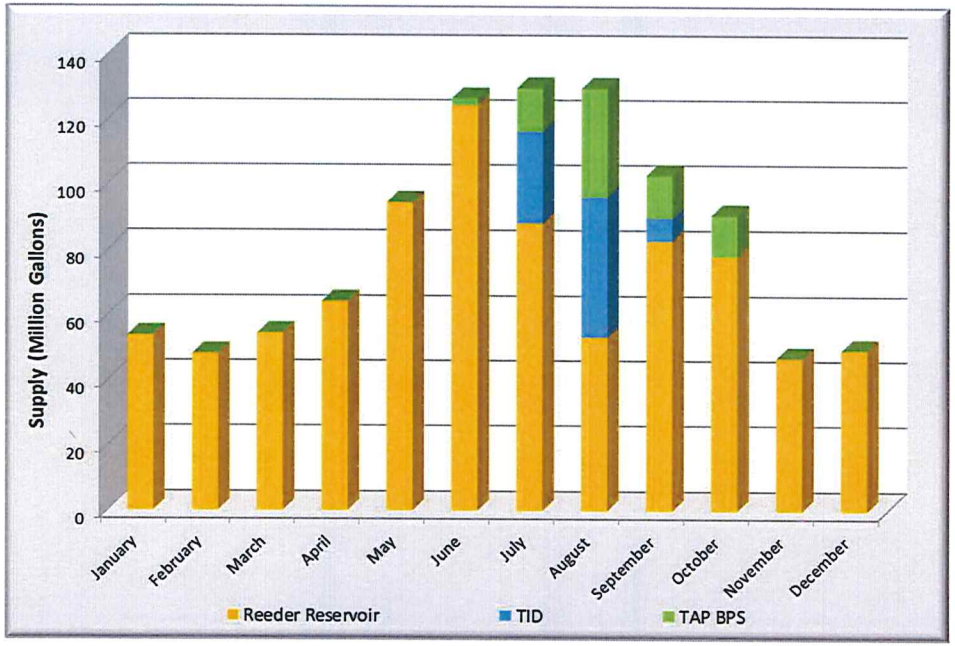
Notes:
(1) MG – millions of gallons; AF – acre feet.

WOULD MORE DATA INFLUENCE THE EXISTING SUPPLY PROTOCOL?

1. Reeder Reservoir/Ashland Creek Supply
2. TID Supply
3. TAP Supply
4. Curtailment

Chart 4-13

2015 Monthly Water Supply by Source



SUPPLY RELIABILITY IS ACTIVELY BEING BUILT IN

Demand Side

- Aggressive Conservation Program
- Water Loss Reduction

Supply Side

- New Reliable WTP = 7.5 mgd (expandable to 10 mgd)
- TAP Supply = 3.0 mgd
  - 3.0 mgd is only during peak periods
  - Need to consider reliability of MWC supply
- TID Canal lining

OMITTING/REDUCING TASK 15

- Omit Shared Vision Model
- Summarize City's supply strategy in System Analysis (Chapter 5)

OPERATIONS & MAINTENANCE PLAN

- Task 2 – O&M Plan
  - ✓ Review Maintenance and Replacement Programs
  - ✓ Review Water Quality Monitoring Plans
  - ✓ Develop Standard Operating Procedures (SOPs)
- Task 3 – Unidirectional Flushing Program
- ✓ Task 4 – Cross Connection Control Plan

WMP COMPLETION SCHEDULE

Task	2019						
	Apr	May	Jun	Jul	Aug	Sep	Oct
Water System Analysis							
Capital Improvement Program							
Financial Analysis							
Finalize and Submit Draft WMPU							

5 | WATER SYSTEM ANALYSIS

INTRODUCTION

This chapter presents the capacity analysis of the City of Ashland (City) water system. Individual water system components were analyzed to determine the ability to meet policies and design criteria under existing and future water demand conditions (presented in **Chapter 4**). The policies and criteria are summarized below for each analysis.

CHANGES SINCE LAST WATER MASTER PLAN

Since completion of the City's last Water Master Plan, several improvements have been decided upon and implemented that influence the system analysis. These include the following:

- **Construction of the Talent-Ashland-Phoenix (TAP) Supply System**. This new emergency supply provides Medford Water Commission (MWC) water to the City and makes use of the City's Lost Creek Reservoir water rights purchased for this purpose.
- **Construction of the New Park Estates Pump Station.** This pump station upgrade provides a much higher level of reliability and fire protection for customers at the highest elevations in the City.
- **Construction of the New Terrace Street Pump Station**. This pump station upgrade improves the City's ability to boost Talent Irrigation District (TID) supply to the WTP and new WTP.
- **New Water Treatment Plant Decision on Capacity and Location**. The new Water Treatment Plant (WTP) is planned to be a 7.5-million gallons per day (mgd) capacity plant (expandable to 10 mgd). The location of the plant is at the granite quarry southwest of the Granite Reservoir.
- **Pipe Improvement Projects**. Several pipe improvements have also been made related to new development and improving distribution system capacity.

GENERAL SYSTEM CHALLENGES

Challenge 1: Moving from a Gravity System to a Partial Gravity System

Goal: Reduce pumping to Crowson Zones

- Allow Granite Zones to expand
- Reduce/Eliminate PRVs supplying from Crowson to Granite

Challenge 2: Granite Tank Is Aging and Is In A Poor Location

Goal: Abandon tank without compromising system hydraulics

- Confirm ability of TAP system to function without tank
- Can WTP Clearwells replace Granite tank functionality completely?

Challenge 3: Oversized Alsing Reservoir

Goal: Expand service area to achieve reservoir turnover

Challenge 4: Fire Flow Deficiencies at Highest Customers (Park Estates and South Mountain)

Goal: Now that PS is rebuilt, increase pipe sizes, expand service area to Crowson Zone 4

- Reconnect piping for high Crowson Zone 1 customers

Challenge 5: TAP Emergency Supply Cannot Reach Crowson Zone

Goal: Identify ideal location for permanent pump station

- Could be a delayed project - City has a temporary pump station location for this if needed.

Challenge 6: Pressure Extremes in Many Locations

Goal: Rezone where feasible.

Challenge 7: Inability to Meet Higher Fire Flow Standards

Goal: Build in distribution capacity over time.

Challenge 8: Storage Deficiency (or Not)

Goal: Revise criteria to account for redundant, reliable supply sources

Challenge 9: Many Aging, Undersized Pipes

Goal: Replace as budget allows

SUPPLY EVALUATION

This section evaluates the City's water supplies for meeting existing and future demands of the water service area.

SUPPLY CRITERIA

Table 5-1 Supply Level of Service Goals

Goal Element	Goal
Water System Capacity	*Have sufficient supply to meet projected demands that have reduced based on 5 percent additional conservation* base year 2009. *However, City will have a goal of achieving 15 percent conservation.*
Water System Reliability	*Community will accept curtailments of 45 percent during a severe drought.* The City will prioritize source water available during drought conditions.
Water System Redundancy	*Implement redundant supply project to restore fire protection and supply for indoor water use shortly after a treatment plant outage.* Supply ADD with redundant supply.
Regulatory Requirements	*Meet or exceed all current and anticipated regulatory requirements* including cross connection program improvements.

SUPPLY ANALYSIS

- **Water System Capacity**: New WTP has adequate capacity to supply 2040 Maximum Day Demands (MDD) and beyond (see **Figure 5.1**).
    - The new WTP is located lower in elevation than the City's upper pressure zones served by the Crowson Reservoir (see **Figure 5.2**). (The existing WTP serves the Crowson Zone by gravity). To minimize pumping to Crowson Reservoir, the City should consider system changes to reduce supply from the Crowson zones to zones that can be supplied by gravity from the new WTP.
- **Water System Reliability**: During water supply disruption or drought conditions the City's supply strategy is as follows in order of priority:
    1. Supply East/West Fork Ashland Creek water as available to the New WTP (stored in Reeder Reservoir and soon to be able to bypass Reeder Reservoir).
    2. Supplement Ashland Creek water with Talent Irrigation District (TID) water to the New WTP.
    3. Use the TAP Supply System to supply water from MWC.
    4. Curtail supply according to the City's Water Curtailment Plan.

- **Water System Redundancy**: Neither the firm nor total TAP Supply System capacity is able to meet Average Day Demands (ADD) without conservation in the case of a WTP outage (see **Figure 5.3**).
    - *The City plans to provide 3.0 mgd of supply capacity through the TAP system.*
- **Regulatory Requirements**: The City is meeting all regulatory requirements with the exception of actively implementing cross-connection control.

Figure 5-1 - New WTP Capacity vs. Maximum Day Demand Projections

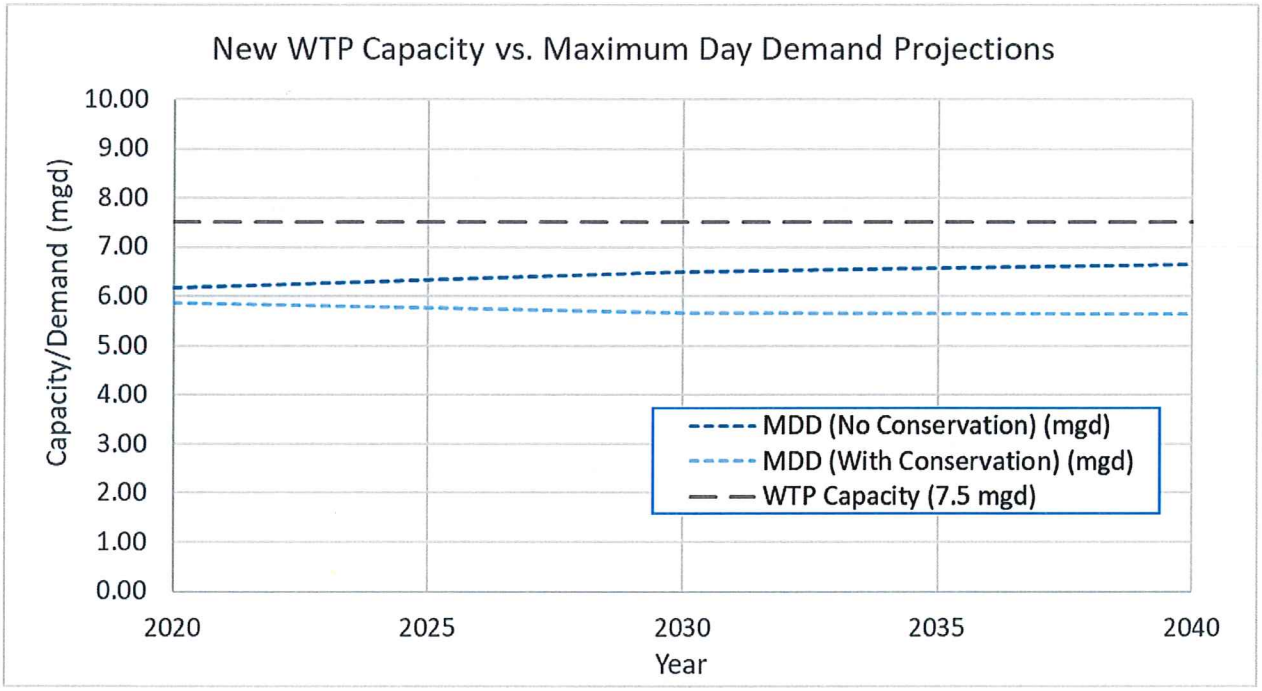
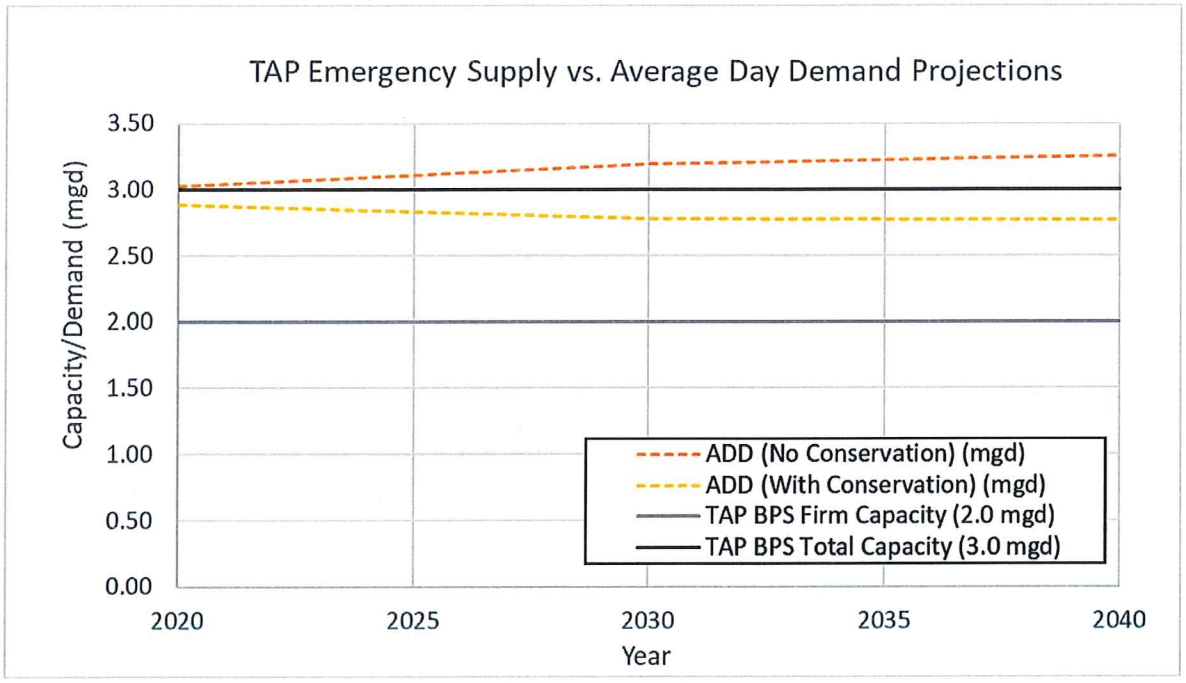


Figure 5-2 Hydraulic Profile with New WTP

(Included at end of chapter)

Figure 5-3 TAP Supply Capacity vs. Average Day Demand Projections



SUPPLY RECOMMENDATIONS

- Construct new WTP and associated projects:
  - 7.5-mgd WTP (expandable to 10.0 mgd).
  - Two (2) 0.85-MG Clearwells for storage.
  - Pump Station to boost water from the new WTP to the Crowson Reservoir (see pump station analysis below).
  - Piping and Valving to supply Granite Zones.
  - Emergency Ashland Creek Intake.
  - SCADA System Upgrades.
- TAP Supply Expand to 3.0 mgd
  - Additional pump at Ashland TAP BPS
  - Expansion of the Talent TAP BPS
  - Potential expansion of the Regional TAP BPS
  - TAP System Transmission Capacity Improvements
- Transmission piping improvements and rezoning to minimize pumping to Crowson Reservoir and associated pressure zones (see pipe projects below).

STORAGE FACILITIES

This section evaluates the capacity of the City's existing water storage tanks to meet the existing and future storage requirements of the system.

STORAGE CRITERIA

Water storage is typically made up of the following components: operational storage; emergency storage; and fire flow storage. Each storage component serves a different purpose and will vary from system to system. A definition of each storage component and the criteria used to evaluate the capacity of the City's storage tanks is provided below.

Operational Storage – Volume of the reservoir used to supply the water system under peak demand conditions when the system demand exceeds the total rate of supply of the sources. In the past, the City has calculated operational storage as 25 percent of MDD for the zone it serves. Another criterion is to calculate the volume needed to meet peak hour demands that supplies to the zone are unable to meet. Also called "Equalization Storage."

Emergency Storage – Volume of the reservoir used to supply the water system under emergency conditions when supply facilities are out of service due to equipment failures, power outages, loss of supply, transmission main breaks, and any other situation that disrupts the supply source. Common emergency criteria in the state of Oregon is to assume emergency storage as two times ADD (approximately equivalent to one times MDD). The City's previous criteria assumed 25 percent of MDD for emergency storage. This lower criteria correlates to the City constructing a new reliable WTP.

Fire Flow Storage – Volume of the reservoir used to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest fire flow requirement in the zone. The magnitude of the fire flow storage is the product of the fire flow rate and duration of the operating area's highest fire flow needs. These fire flow planning goals were presented in Chapter 4.

Nesting of Storage – Some water systems allow for "nesting" of fire flow and emergency storage, meaning that it is assumed that a fire and a supply disruption would not happen at the same time and therefore only the greater of the two storage volumes is used in the storage analysis.

Table 5-2 Storage Criteria

Parameter	Criterion
Operational Storage	*0.25 x Maximum Day Demand of the area served by each reservoir* *Or* OS = (PHD – Qs)(150 minutes), but in no case less than zero Where: ES=Equalization Storage in Gallons PHD = Peak Hour Demand, in gpm Qs = Sum of all installed and active sources, except emergency supply, in gpm
Fire Storage	*Provide volume for single most severe required fire flow and duration for each reservoir service area.* *System-wide, provide volume for two largest fires.*
Emergency Storage	*0.5 x Maximum Day Demand of the area served by each reservoir* *Or* *ES = (MDD – Firm Supply Capacity)(1 day), or 200 gpd per ERU*

STORAGE ANALYSIS

The total combined storage capacity of the City's reservoirs is 6.7 million gallons. The City's original criteria for storage requirements for operational, emergency, and fire flow are compared to the existing storage to determine storage adequacy for the planning periods, as summarized in **Table 5-3** The table includes the storage surplus/deficiency. As seen at the end of the table, under the City's original criteria, the City would have an existing storage deficit of 0.37 MG and a 2040 deficit of 1.34 MG.

Table 5-3
Existing Storage Evaluation

CROWSON	2020	2030	2040
Maximum Day Demand (no cons) (mgd)	2.29	2.59	2.81
Required Storage (MG)			
Operational	0.57	0.65	0.70
Fire Flow	0.96	0.96	0.96
Emergency	1.15	1.30	1.40
Total Required Storage	**2.68**	**2.90**	**3.06**
Total Existing Storage (MG)	2.10	2.10	2.10
Storage Excess/(Deficit) (MG)	**(0.58)**	**(0.80)**	**(0.96)**
GRANITE	**2020**	**2030**	**2040**
Maximum Day Demand (no cons) (mgd)	2.89	3.32	3.63
Required Storage (MG)			
Operational	0.72	0.83	0.91
Fire Flow	0.96	0.96	0.96
Emergency	1.45	1.66	1.81
Total Required Storage	**3.13**	**3.45**	**3.68**
Total Existing Storage (MG)	2.00	2.00	2.00
Storage Excess/(Deficit) (MG)	**(1.13)**	**(1.45)**	**(1.68)**
ALSING	**2020**	**2030**	**2040**
Maximum Day Demand (no cons) (mgd)	0.12	0.14	0.15
Required Storage (MG)			
Operational	0.03	0.03	0.04
Fire Flow	0.96	0.96	0.96
Emergency	0.06	0.07	0.07
Total Required Storage	**1.05**	**1.06**	**1.07**
Total Existing Storage (MG)	2.10	2.10	2.10
Storage Excess/(Deficit) (MG)	**1.05**	**1.04**	**1.03**

FALLON	2020	2030	2040
Maximum Day Demand (no cons) (mgd)	0.04	0.05	0.06
Required Storage (MG)			
Operational	0.01	0.01	0.01
Fire Flow	0.18	0.18	0.18
Emergency	0.02	0.03	0.03
Total Required Storage	**0.21**	**0.22**	**0.22**
Total Existing Storage (MG)	0.50	0.50	0.50
Storage Excess/(Deficit) (MG)	**0.29**	**0.28**	**0.28**
TOTAL SYSTEM	**Storage Excess/(Deficit) (MG)**		
Storage Operating Area	**2020**	**2030**	**2040**
CROWSON	(0.58)	(0.80)	(0.96)
GRANITE	(1.13)	(1.45)	(1.68)
ALSING	1.05	1.04	1.03
FALLON	0.29	0.28	0.28
TOTAL SYSTEM	(0.37)	(0.93)	(1.34)

It is recommended that the City revise its storage criteria to account for the planned and implemented system changes in the last few years. With a new emergency TAP Supply connection and an upcoming robust WTP, it is recommended that the City's criteria be adjusted to reduce emergency storage.

Additionally, several studies have identified options to expand the Alsing Reservoir service area and thereby shift the storage burden from the Crowson Reservoir to the Alsing Reservoir which has excess capacity and needs additional demands to improve water quality. This system change was reviewed again as part of this master plan as described below.

Lastly, the City is actively promoting water conservation and the estimated reduction in overall demands should be considered.

Table 5-4 presents the revised storage analysis using the adjusted criteria, the expanded Alsing Reservoir service area, and reduced demand due to conservation.

Table 5-4
Storage Evaluation – Revision 1

	Storage Excess/(Deficit) (MG)		
	2020	2030	2040
CROWSON	0.37	0.42	0.38
GRANITE	0.54	0.67	0.57
ALSING	0.43	0.51	0.48
FALLON	0.29	0.29	0.29
Total System	1.63	1.89	1.72

Granite Reservoir is in major need of replacement or removal. A recent estimate for improvements was $560,000. To replace the Granite Reservoir, the design for the new WTP is planning on including two (2) 0.85-MG clearwells that will serve as system storage. The first clearwell will be built with the WTP. The second is planned for when Granite is abandoned. **Table 5-5** presents the final storage evaluation considering the removal of the Granite Reservoir and addition of the two 0.85-MG clearwells at the new WTP.

Table 5-5
Storage Evaluation – Removal of Granite Reservoir

	Storage Excess/(Deficit) (MG)		
	2020	2030	2040
CROWSON	0.37	0.42	0.38
GRANITE	0.14	0.27	0.17
ALSING	0.43	0.51	0.48
FALLON	0.29	0.29	0.29
Total System	1.23	1.49	1.32

ALSING ZONE EXPANSION

Figure 5-4 shows the recommended Alsing Zone Expansion and other potential rezoning Specific locations of valve reconnections should be confirmed with City staff.

Figure 5-4 Alsing Zone Expansion and Rezoning Concepts

(Included at end of chapter)

STORAGE RECOMMENDATIONS

- Revise storage criteria to account for redundant system supplies.

- Expand the Alsing Reservoir Service Area
  - New PRV on Tolman Creek Road and Siskiyou Blvd.
- Construct two (2) 0.85-MG clearwells at the New WTP to serve the Granite and Crowson Zones.
  - As long as PRVs from Crowson to Granite are set to provide fire protection pressures, fire volume for Granite can be stored in the Crowson Reservoir.
- Abandon Granite Reservoir.
- Continue water conservation efforts.

PUMP STATION CAPACITY ANALYSIS

PUMP STATION ANALYSIS CRITERIA

Table 5-6 Pump Station Evaluation Criteria

Parameter	Criterion
Capacity for service levels with storage facilities	Supply Maximum Day Demand to service zone assuming the single largest capacity pump is offline (i.e., firm capacity)
Capacity for service levels with no storage facilities	Supply Peak Hour Demand and fire flow assuming the single largest capacity pump is offline (i.e., firm capacity).
Power Supply	New pump stations require a main power source and an emergency source. Secondary power source for new pumps stations to be sized to meet full pump station demands. City will plan and design facilities to optimize energy efficiency.

PUMP STATION ANALYSIS

Tables 5-7 and **5-8** present the required pumping capacity and pump station capacity analysis results respectively.

- The New WTP to Crowson Reservoir Pump Station should be sized to provide approximately 1,800 to 2,100 gpm to supply the Crowson and Alsing Zones.
- The Hillview Pump Station meets the City's criteria through 2040 but may be deficient in meeting MDD if the Alsing Reservoir service area expands.
  - With the planned expansion the pump station capacity should be XXX gpm.

- The Hillview Pump Station is aging (almost 40 years old) and warrants replacement in the next 10 years.

- The Park Estates and Strawberry Pump Stations meet the City's criteria through 2040.
- The South Mountain Pump Station does not currently meet the City's criteria.

Table 5-7 Pump Station Capacity Requirements

Pump Station	Zones Served	MDD (gpm)		PHD (gpm)		Largest Fire Flow (gpm)	Total 2020 Required Supply (gpm)	Total 2040 Required Supply (gpm)
		2020	2040	2020	2040			
Pumping Zones With Storage (Criteria = MDD)								
New WTP to Crowson PS	Crowson Zones 1-8, Alsing Zones	1,772	2,087	NA	NA	NA	1,772	2,087
	Crowson Zones 1-8, Alsing Zones, Reduction in Crowson 2 & 6	1,464	1,779	NA	NA	NA	1,464	1,779
Hillview	Alsing Zone 1	89	102	NA	NA	NA	89	102
	Alsing Zone 1, Crowson Zones 2 & 6	551	677	NA	NA	NA	551	677
Strawberry	Fallon Zones 1 & 2	32	38	NA	NA	NA	32	38
Pumping Zones Without Storage (Criteria = PHD + FF)								
South Mountain	Crowson Zone 4	8	9	20	23	1500	1,520	1,523
Park Estates	Crowson Zones 7 & 8	16	18	37	43	1500	1,537	1,543
	Crowson Zones 4, 7, & 8	16	18	37	43	1500	1,537	1,543

Table 5-8 Pump Station Capacity Evaluation

Pump Station	Zones Served	Total 2020 Required Supply (gpm)	Total 2040 Required Supply (gpm)	Firm Capacity		
				Pump Capacity (gpm)	2020 Excess Capacity (Deficiency) (gpm)	2040 Excess Capacity (Deficiency) (gpm)
Pumping Zones With Storage (Criteria = MDD)						
Hillview	Alsing Zone 1	89	102	350	261	248
	Alsing Zone 1, Crowson Zones 2 & 6	551	677	350	(201)	(327)
Strawberry	Fallon Zones 1 & 2	32	38	200	168	162
Pumping Zones Without Storage (Criteria = PHD + FF)						
South Mountain	Crowson Zone 4	1,520	1,523	145	(1,375)	(1,378)
Park Estates	Crowson Zones 7 & 8	1,537	1,543	2350	813	807
	Crowson Zones 4, 7, & 8	1,537	1,543	2350	813	807

PUMP STATION RECOMMENDATIONS

- The New WTP to Crowson Reservoir Pump Station should have firm capacity of approximately 2,100 gpm to supply the Crowson and Alsing Zones.

  - The required capacity may be as low as 1,800 gpm if the City is able to rezone low elevation customers in Crowson Zones 2 and 6 to be supplied by Granite Zone 1.
- Hillview Pump Station Replacement. Replace the Hillview Pump Station to bring this pump station to current design standards and avoid high maintenance costs.
  - Recommended capacity: XXX gpm

PRESSURE ZONES

PRESSURE ZONE CRITERIA

The ideal static pressure of water supplied to customers is between 40 and 80 pounds per square inch (psi). Pressures within a water distribution system are commonly as high as 120 psi, requiring pressure regulators on individual service lines to reduce the pressure to 80 psi or less. It is difficult for the City's water system (and most others) to maintain distribution pressures between 40 and 80 psi, primarily due to the topography of the water service area.

The City has adopted the following service pressure criteria:

- Minimum Pressure (during Peak Hour Demand): 30 psi
- Minimum Pressure (during Fire Flow): 20 psi
- Maximum Pressure: 120 psi

PRESSURE ZONE ANALYSIS

Table 5-9 lists each of the City's pressure zones, the highest and lowest elevation served in each zone, and the minimum and maximum distribution system pressures within each zone based on maximum static water conditions (full reservoirs with no demand). While this table presents the results of the pressure evaluations based on the adequacy of the pressure zones under static conditions, the hydraulic analysis section later in this chapter presents the results of the pressure evaluations based on the adequacy of the water mains under dynamic conditions.

As seen in the table, many pressure zones exceed the maximum pressure to customers. This is due to the complex topography and pipe networking within the City.

Table 5-9 Minimum and Maximum Distribution System Static Pressures

	Highest Elevation Served		Lowest Elevation Served	
Pressure Zone	Elevation (ft)	Static Pressure (psi)	Elevation (ft)	Static Pressure (psi)
Granite Zone 1 (2170)	2024	63	1788	165
Granite Zone 2 (2060)	1846	58	1724	110
Granite Zone 3 (1980)	1852	90	1757	131
Crowson Zone 1 (2420)	2359	145	1884	35
Crowson Zone 2 (2200)	2138	35	1884	145
Crowson Zone 3 (2270)	2153	51	1955	136

Crowson Zone 4 (2640)	2476	71	2341	130
Crowson Zone 5 (2270)	2058	92	2043	98
Crowson Zone 6 (2290)	2100	82	1911	164
Crowson Zone 7 (2570)	2371	86	2370	86
Crowson Zone 8 (2570)	2578	14	2382	98
Fallon Zone 1 (2586)	2431	67	2248	146
Fallon Zone 2 (2470)	2396	32	2224	107
Alsing Zone 1 (2552)	2336	94	2165	168

PRESSURE ZONE RECOMMENDATIONS

Granite Zone 1

- Perform a rezoning study to lower pressures to low elevation customers.
    - Rezone customers north of Siskiyou Blvd from Normal Ave to Crowson Road to be Crowson Zone 6. (This is assumed as part of the Alsing Storage Area expansion).
    - Possibly rezone customers south of Siskiyou Blvd from Normal Ave to Crowson Road to reduce high pressure customers.
- Rezone customers in Normal Avenue, Ray Lane, and Lit Lane between Ashland Street and Siskiyou Blvd to be served by the Crowson 6 Zone.

Granite Zone 3

- Reduce PRV settings to lower overall zone pressure.

Crowson Zone 1

- Perform a rezoning study to lower pressures to low elevation customers.
- For high elevation customers on Emma Street, reconnect piping to supply customers from Crowson Zone 4.

Crowson Zone 2

- Extend Granite Zone 1 to supply lower elevation customers in this zone. This recommendation also reduces the required pumping from the WTP to the Crowson Reservoir.
    - **New Transmission Pipe in East Main Street.** Install a new 12-inch transmission supply pipe from Walker Road across Interstate 5 (I-5) to connect to Crowson Zone 2.
        - This project could be implemented as part of development of undeveloped lands in the north east areas of the City.
        - This project will also serve lower elevation customers in Crowson Zone 6.
    - **Rezone Crowson Zone 2**: Identify the correct valve locations to isolate the lower elevation customers in Crowson Zone 2 and supply them from Granite Zone 1.
        - Allow Alsing Reservoir to supply emergency supply to the zone by installing/setting PRVs to meet reduced pressures for fire flow only.

Crowson Zone 3

- Reduce PRV settings to lower overall zone pressure.

Crowson Zone 4

- Extend supply from Crowson Zone 7 (supplied by the new Park Estates Pump Station and reduced in pressure by PRV 12) to supply customers in Crowson Zone 4.
  - Install piping from Morton Street to Ivy Lane.
  - Abandon South Mountain Pump Station.
  - Expand to supply high elevation customers from Crowson Zone 1.

Crowson Zone 5

- While this zone has no identified pressure issues, the zone could be connected to Crowson Zone 6.

Crowson Zone 6

- Extend Granite Zone 1 to supply lower elevation customers in these zones. This recommendation also reduces the required pumping from the WTP to the Crowson Reservoir.
  - **New Transmission Pipe in East Main Street.** Install a new 12-inch transmission supply pipe from Walker Road across Interstate 5 (I-5) to Crocker Street.
  - **Rezone Crowson Zone 6**: Isolate the lower elevation customers in Crowson Zone 6 north of Ashland Street and supply from Granite Zone 1.
    - Allow Alsing Reservoir to supply operational supply to the zone by installing/setting PRVs to meet normal pressures.

Crowson Zone 7

- Extend to Crowson Zone 4 (see Crowson Zone 4 above).

Crowson Zone 8

- None

DISTRIBUTION AND TRANSMISSION SYSTEM

This section evaluates the City's existing distribution and transmission system (i.e., water mains) to determine if they are adequately sized and looped to provide the necessary flow rates and pressures to meet the existing and future requirements of the system.

DISTRIBUTION SYSTEM ANALYSIS CRITERIA

Distribution and transmission mains must be capable of adequately and reliably conveying water throughout the system at acceptable flow rates and pressures. Hydraulic analyses of the existing system were performed under PHD conditions to evaluate its pressure capabilities and identify system deficiencies. The existing system was also analyzed under MDD conditions with fire flow demands to evaluate the fire flow capabilities. Additional hydraulic analyses were then performed with the same hydraulic model under future PHD and MDD conditions and with the proposed

improvements to demonstrate that the identified improvements will eliminate the deficiencies and meet the requirements far into the future. The following is a description of the hydraulic model, the operational conditions, and facility settings used in the analyses.

As discussed in the *Pressure Zones* section of this chapter, ideal water pressures delivered to customers are in the range of 40 to 80 psi and the City's criteria is to deliver pressures between 30 and 120 psi.

HYDRAULIC MODEL

Description

A computer-based hydraulic model of the existing water system was updated to version 8i of the WaterGEMS® program (developed by Bentley Systems, Inc.) with the City's most recent GIS shapefile, to reflect the best-known information on distribution system geometry and pipe characteristics, including diameter, material, and installation year. This was further refined to include the latest construction projects and changes to the system.

Hydraulic model pipe roughness coefficients were initialized with computed estimates based on the water main material and age information from the City's water main GIS shapefile. Based on the premise that the internal surface of water mains become rougher as they get older, older water mains were assigned higher roughness coefficients than newer water mains.

Demand Data

The hydraulic model of the existing system contains demands based on 2014 individual customer meter water demand data provided by the City. Demand data for each parcel was distributed to the closest representative junction node of the model based on the recorded usage. These demands were increased to represent 2020 demands. The peaking factors shown in **Chapter 4** were used to analyze the system under PHD and MDD conditions.

Facilities

The hydraulic model of the existing system contains all active existing system facilities. The facility settings for the pressure analyses corresponded to a PHD event in the water system. All sources of supply were set to operate at constant rates (i.e. MDD). Reservoir levels were modeled to reflect full utilization of operational storage.

The hydraulic model for the fire flow analyses contained settings that correspond to MDD events. All sources of supply were set to operate at constant MDD rates, and the reservoir levels were modeled to reflect full utilization of operational, emergency, and fire flow storage based on the maximum planning-level fire flow requirement.

Calibration

The model was calibrated as part of this Plan. Calibration is achieved by adjusting the roughness coefficients of the water mains in the model so the resulting pressures and flows from the hydraulic analyses closely match the pressures and flows from actual field tests under similar demand and operating conditions. Initial Darcy-Weisbach roughness coefficients were entered in the model based

on computed estimates of the coefficients from available pipe age and material data. For example, older water mains were assigned higher roughness coefficients than new water mains; thereby assuming that the internal surface of water pipe becomes rougher as it gets older.

The model was calibrated using twenty-five hydrant flow tests performed in the system in the spring of 2016. The model is considered calibrated when model results are within 10 percent of the field results. After identifying a few closed/partially closed valves in the system, and adjusting roughness coefficients, the modeled results closely match (within 10 percent) the field results for all 25 tests, thus the model is considered adequately calibrated for use in the following system analyses.

HYDRAULIC ANALYSIS

Pressure and fire flow analyses of the existing system were performed using the model for 2020, 2030, and 2040.

Pressure Analysis

Figure 5-5 presents a map of system pressures color coded by pressure range during Peak Hour Demands.

- Low pressures at high elevation customers within a zone.
- Many locations of high pressures exceeding 120 psi at low elevation customers within a zone.
- Crowson Zones are supplying Granite Zones over 2 mgd through PRV stations.

Fire Flow Analysis

Fire flow demands were assigned to the water system based on land use and the City's fire criteria presented in Chapter 4 and are shown in **Figure 5-6**. Maps of fire flow results are shown in **Figure 5-7**. The maps are color coded to show if each junction in the system satisfies, does not satisfy, or is within 10 percent of delivering assigned fire flows (10 percent is within the error of the model).

- Deficiencies where fire is unavailable while trying to maintain 20 psi at highest elevation customers.
- Deficiencies where neighborhood pipes were built before more stringent fire codes were adopted. Fire districts commonly classify these buildings as "existing non-conforming" and since they met previous fire code requirements when they were constructed, improvements to these areas are considered a low priority.
    - Several locations of fire flow below 750 gpm.
- Several more deficiencies than the previous master plan because fire flows were assigned at every hydrant in the current system.

DISTRIBUTION SYSTEM RECOMMENDATIONS

- Rezone as described above in Pressure Zone Recommendations.
- Increase transmission capacity across Granite Zone 1.

  - Reconnect Granite Zone 1 and Crowson Zone 1 pipelines in Granite Street to make the larger pipe available to Granite Zone 1.
  - Replace upper section of Granite Zone 1 transmission main (from new WTP to connection to 24-inch pipe).
  - Other transmission improvements.
- Set PRVs from Crowson and Alsing Zones to Granite Zones to only supply fire flow.
  - Abandon PRV 9.
- Extend transmission capacity of Granite Zone 1 in East Main Street to serve low elevation customers and new growth to the east of the system.
- Local pipe upsizing from 4- and 6-inch pipes to 8-inch pipes and larger.

Recommended pipe improvements are presented in **Chapter 6 – Capital Improvement Plan** to address pressure and fire deficiencies (see **Table 6-3**).

Maintenance Recommendations

- Annual Pipe Replacement
  - Many aging and undersized pipes throughout system.
- Hydrant Replacement
  - Many hydrants do not meet current standards for hydrants.

TELEMETRY AND SUPERVISORY CONTROL SYSTEM

This section evaluates the City's existing telemetry and supervisory control system to identify deficiencies related to its condition and current operational capability.

EVALUATION AND RECOMMENDATIONS

The City's SCADA System is headquartered at the Water Treatment Plant. System facilities including source, storage, and pumping, can be controlled with the telemetry system. At the WTP and on remote computers, City staff can monitor and control supplies, reservoir levels, and pump station flows. The system communicates to all facilities using radio towers. SCADA System hardware and software require regular maintenance and occasional replacement.

There are no signficant deficiencies with the existing telemetry/SCADA system; however, some minor changes would improve operations and management. As part of the new WTP updates, the City is reviewing alternatives to the current SCADA software system, which requires several third-party applications to achieve the functionality desired by staff. As a result, the City may be required to replace the radio towers throughout the system. Further details are discussed in **Chapter 6 – Capital Improvement Plan**.

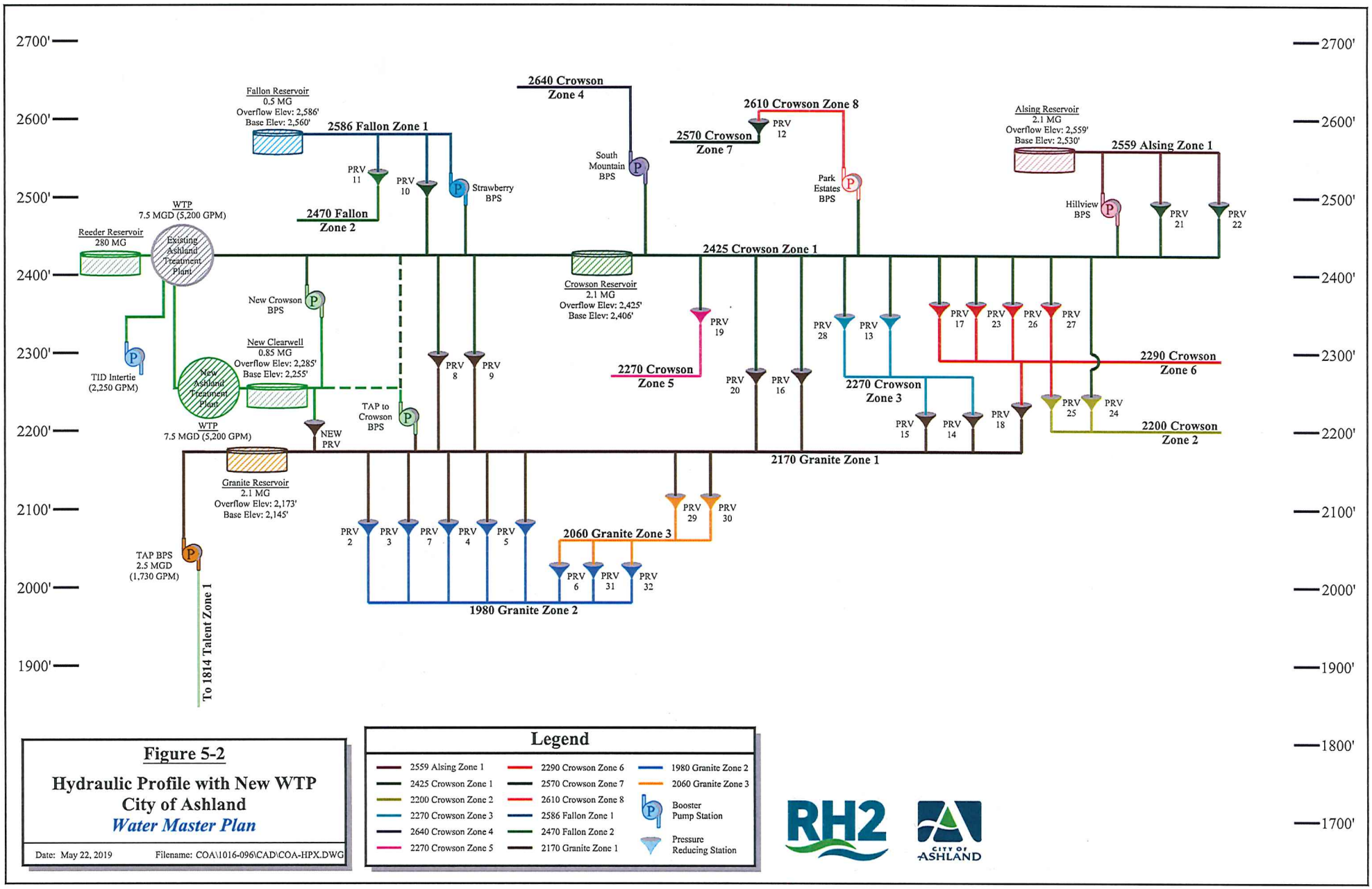


Figure 5-2

Hydraulic Profile with New WTP
City of Ashland
Water Master Plan

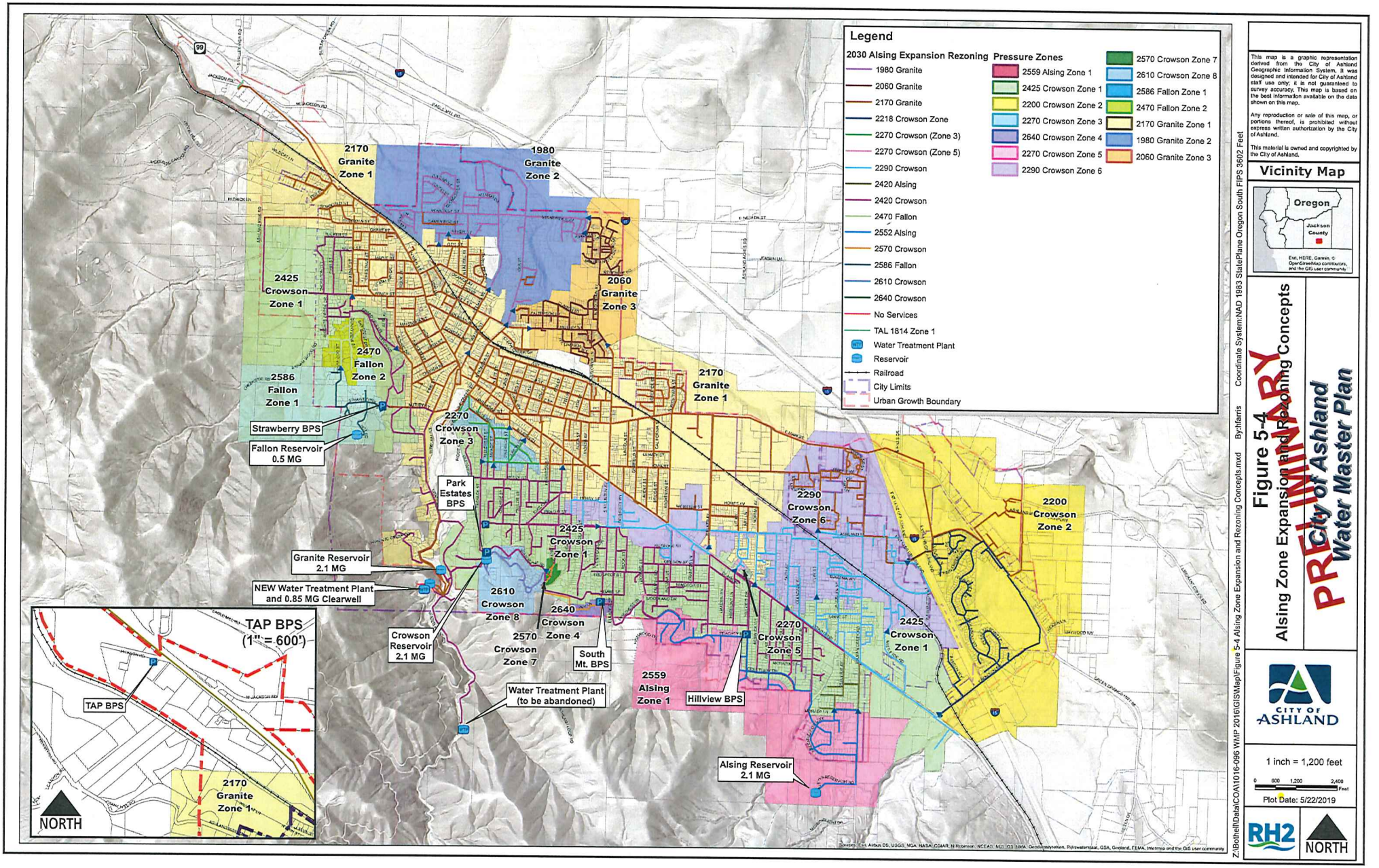
Date: May 22, 2019 Filename: COA\1016-096\CAD\COA-HPX.DWG

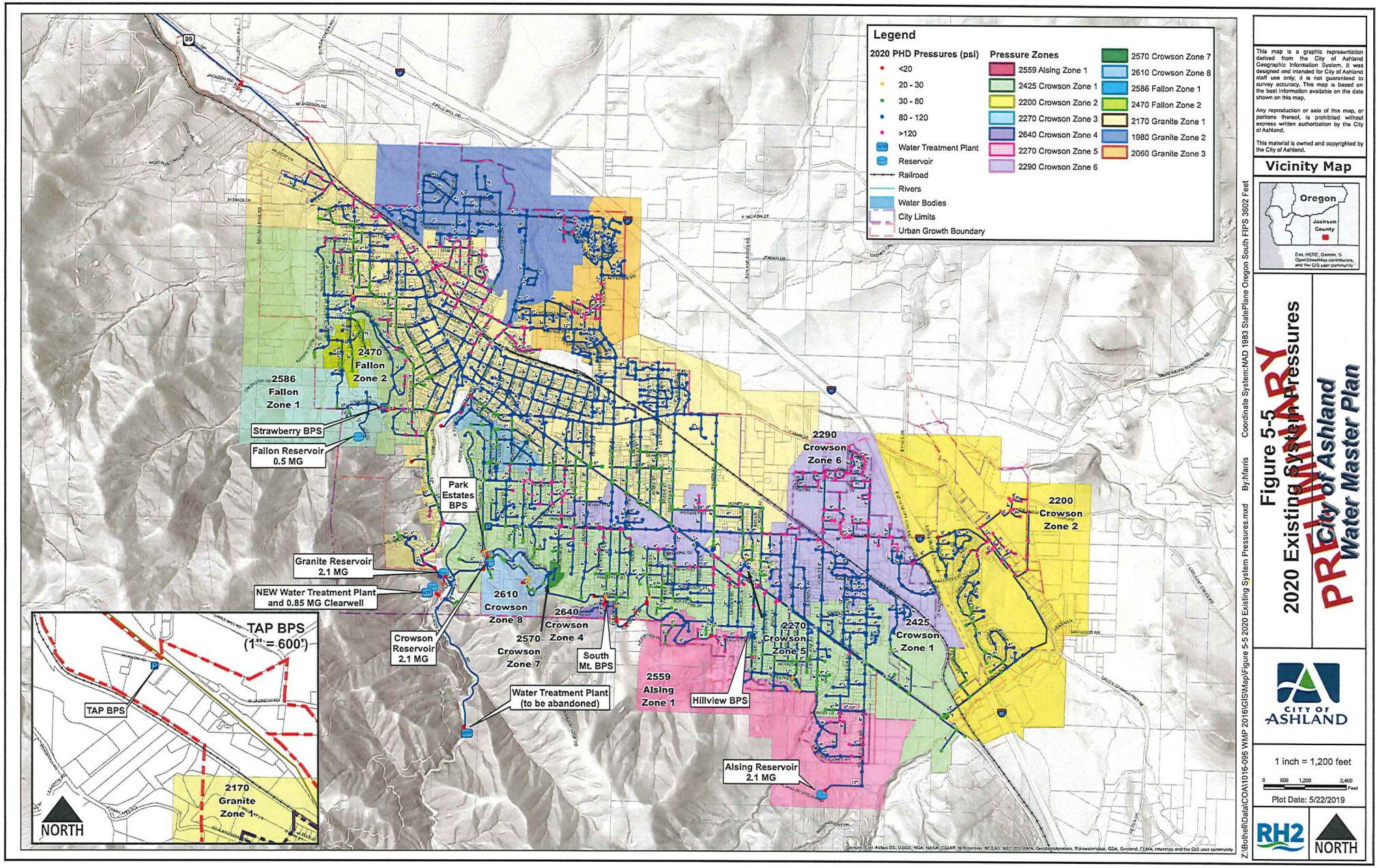
Legend

- 2559 Alsing Zone 1
- 2425 Crowson Zone 1
- 2200 Crowson Zone 2
- 2270 Crowson Zone 3
- 2640 Crowson Zone 4
- 2270 Crowson Zone 5
- 2290 Crowson Zone 6
- 2570 Crowson Zone 7
- 2610 Crowson Zone 8
- 2586 Fallon Zone 1
- 2470 Fallon Zone 2
- 2170 Granite Zone 1
- 1980 Granite Zone 2
- 2060 Granite Zone 3
- Booster Pump Station
- Pressure Reducing Station

RH2

CITY OF ASHLAND


Legend
2030 Alsing Expansion Rezoning
1980 Granite
2060 Granite
2170 Granite
2218 Crowson Zone
2270 Crowson (Zone 3)
2270 Crowson (Zone 5)
2290 Crowson
2420 Alsing
2420 Crowson
2470 Fallon
2552 Alsing
2570 Crowson
2586 Fallon
2610 Crowson
2640 Crowson
No Services
TAL 1814 Zone 1
Water Treatment Plant
Reservoir
Railroad
City Limits
Urban Growth Boundary
Pressure Zones
2559 Alsing Zone 1
2425 Crowson Zone 1
2200 Crowson Zone 2
2270 Crowson Zone 3
2640 Crowson Zone 4
2270 Crowson Zone 5
2290 Crowson Zone 6
2570 Crowson Zone 7
2610 Crowson Zone 8
2586 Fallon Zone 1
2470 Fallon Zone 2
2170 Granite Zone 1
1980 Granite Zone 2
2060 Granite Zone 3
2170 Granite Zone 1
1980 Granite Zone 2
2060 Granite Zone 3
2425 Crowson Zone 1
2470 Fallon Zone 2
2586 Fallon Zone 1
2270 Crowson Zone 3
Strawberry BPS
Fallon Reservoir 0.5 MG
Park Estates BPS
Granite Reservoir 2.1 MG
NEW Water Treatment Plant and 0.85 MG Clearwell
Crowson Reservoir 2.1 MG
2610 Crowson Zone 8
2640 Crowson Zone 4
2570 Crowson Zone 7
South Mt. BPS
Water Treatment Plant (to be abandoned)
2559 Alsing Zone 1
Hillview BPS
2290 Crowson Zone 6
2200 Crowson Zone 2
2425 Crowson Zone 1
2270 Crowson Zone 5
Alsing Reservoir 2.1 MG
TAP BPS (1" = 600')
TAP BPS
2170 Granite Zone 1
NORTH
Vicinity Map
Oregon
Jackson County
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.
Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Ashland.
This material is owned and copyrighted by the City of Ashland.
Figure 5-4
Alsing Zone Expansion and Rezoning Concepts
City of Ashland
Water Master Plan
PRELIMINARY
CITY OF ASHLAND
1 inch = 1,200 feet
0 600 1,200 2,400 Feet
Plot Date: 5/22/2019
RH2
NORTH
Z:\Bothell\Data\COA\1016-096 WMP 2016\GIS\Map\Figure 5-4 Alsing Zone Expansion and Rezoning Concepts.mxd By:hfarris Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet



This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Ashland.

Vicinity Map

Figure 5-5
2020 Existing System Pressures

PRELIMINARY

City of Ashland
Water Master Plan

CITY OF ASHLAND

1 inch = 1,200 feet

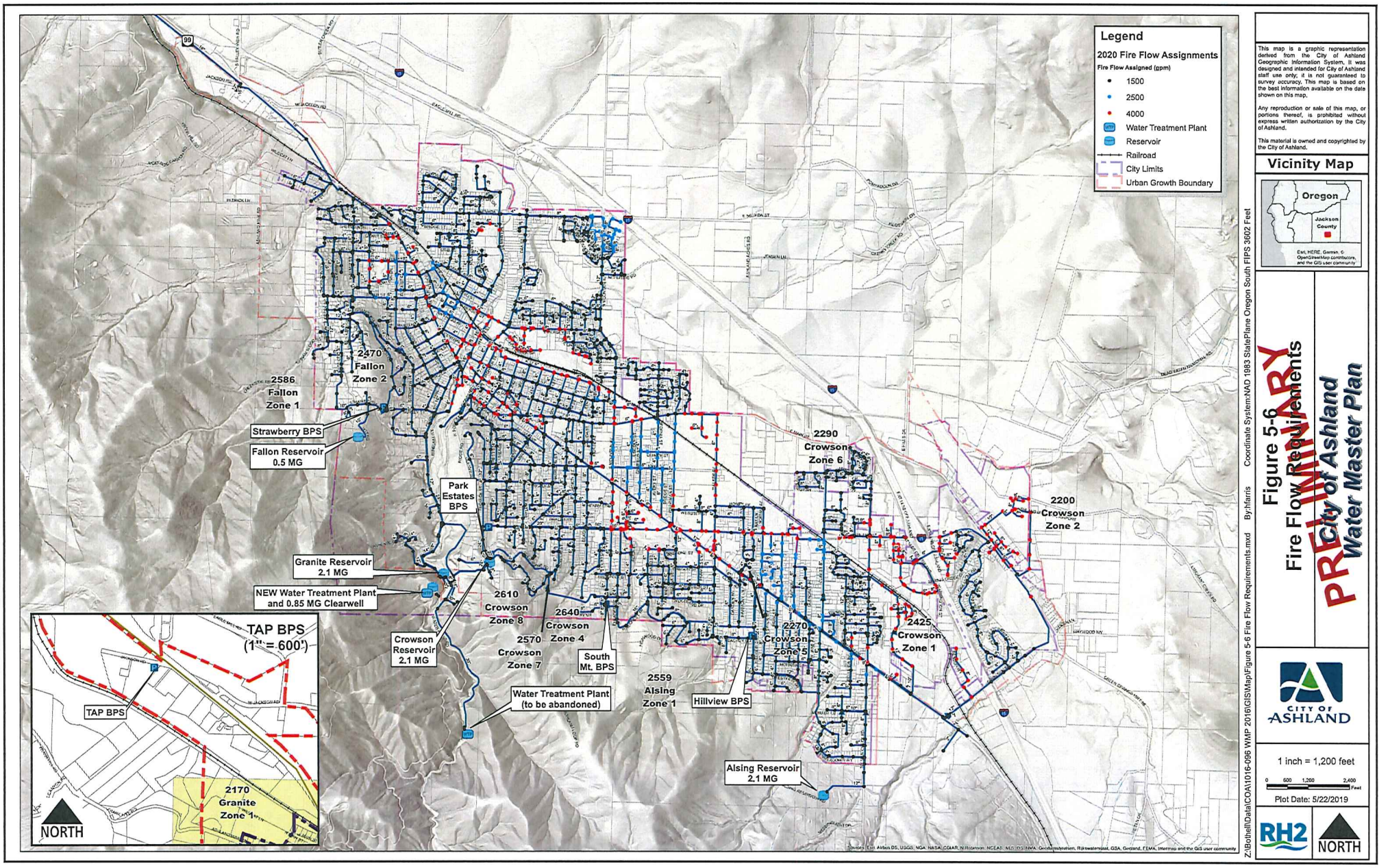
0 600 1,200 2,400 Feet

Plot Date: 5/22/2019

RH2

NORTH

Z:\Bothell\Data\COA\1016-096 WMP 2016\GIS\Map\Figure 5-5 2020 Existing System Pressures.mxd By:hfaris Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet



Z:\Bothell\Data\COA\10\16-096 WMP 2016\GIS\Map\Figure 5-6 Fire Flow Requirements.mxd By:hfarris Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet

This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Vicinity Map

Figure 5-6
Fire Flow Requirements

PRELIMINARY

City of Ashland
Water Master Plan

CITY OF ASHLAND

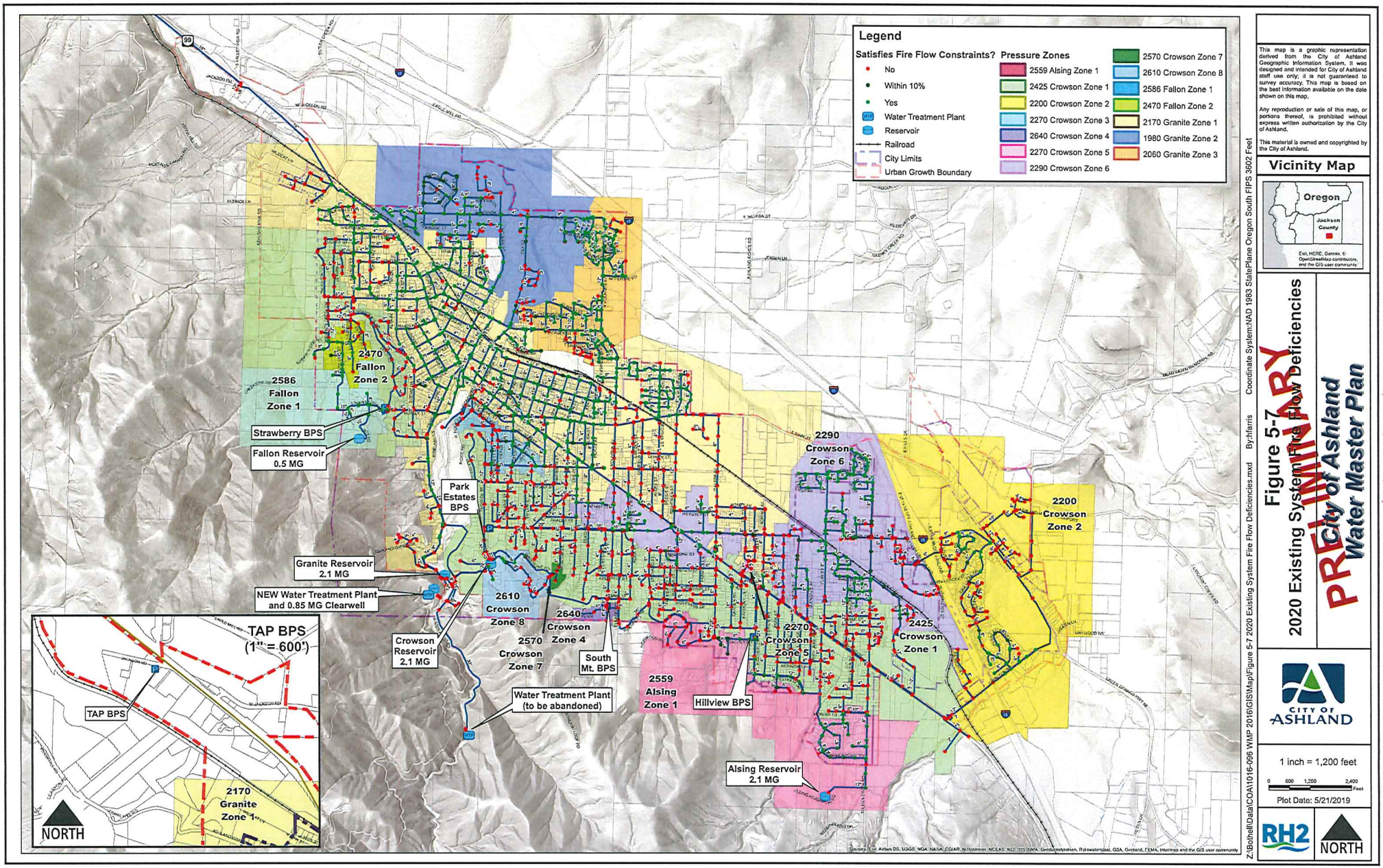
1 inch = 1,200 feet

0 600 1,200 2,400 Feet

Plot Date: 5/22/2019

RH2

NORTH



This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Ashland.

Vicinity Map

Figure 5-7
2020 Existing System Fire Flow Deficiencies

PRELIMINARY

City of Ashland
Water Master Plan

CITY OF ASHLAND

1 inch = 1,200 feet

0 600 1,200 2,400 Feet

Plot Date: 5/21/2019

RH2

NORTH

Z:\Bothell\Data\COA\11016-096 WMP 2016\GIS\Map\Figure 5-7 2020 Existing System Fire Flow Deficiencies.mxd By:hfarris Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet

6 | CAPITAL IMPROVEMENT PLAN

INTRODUCTION

This chapter presents the recommended Capital Improvement Plan (CIP) for meeting the City's level of service goals of continuing to provide safe, reliable water to current and future customers. The improvements described below were developed from the system analysis described in Chapter 5, as well as interviews with City staff, to address current and future water demand conditions and to sustain system reliability. The capital improvement projects are categorized as follows:

- Supply Improvements
- Storage Improvements
- Pump Station Improvements
- Pipe Improvements
- Operational Improvements
- Recommended Studies
- Additional Recommendations

A summary of the recommended pipe projects is presented at the end of this chapter in **Table 6-2** and the full recommended City CIP is developed and presented in **Table 6-3**. This summary provides total probable costs, a brief description, and prioritizes each capital improvement based on recommended year of implementation. Project priorities should be considered flexible in order to accommodate concurrent construction during other street opening projects, budgetary constraints, specific development projects, and other factors that may affect project implementation.

The following sections include the basis for the cost estimates, a brief description of each improvement, and the recommended prioritization and schedule for implementation.

COST ESTIMATES

Planning level cost estimates were prepared for the recommended projects following the American Association of Cost Estimators (AACE) Class 5 estimates, which assume 0 to 2 percent of project definition as appropriate for master planning. This level of opinions of cost are assumed to be within the range of plus 50 percent to minus 30 percent of the average of contractors' bids. The estimated costs of the facilities should be expected to change along with the accuracy of the estimate as a project proceeds into preliminary and final design. These opinions of probable cost are based on year 2019 dollars and no allowance has been made for inflation in future years.

Since construction costs change periodically, an indexing method to adjust present estimates in the future is useful. The Engineering News Record (ENR) Construction Cost Index (CCI) is a commonly used index for this purpose. The CCI used for this study is 11230, the May 2019 20-Cities Average. For comparison the last Water Master Plan CCI for September 2011 was 9030. Thus

costs are assumed to be approximately 25% higher than estimated in the previous Water Master Plan.

Estimated total project costs for each project are comprised of multiple components: directly estimated construction costs, an allowance for contingencies, and an allowance for engineering, legal, and administrative costs. These components are described below.

CONSTRUCTION COSTS

Planning-level construction costs were estimated assuming a traditional public works procurement process of design, bidding, award, and construction by a licensed contractor using commonly accepted means and methods. Property easements or land acquisition and maintenance costs are not included.

Table 6-1 presents the unit construction cost assumptions for pipe improvements used in the CIP. These are based on recent, local projects and include mobilization, materials, labor, contractor overhead and profit, and all elements expected to be included in a contractor's bid. Pump station costs were estimated using previous projects and comparing building square footage, total motor power, ultimate capacity, and startup capacity.

Table 6-1
Pipe Installation Unit Costs

Diameter (inches)	Unit Construction Cost (2017 $ / Linear Foot)
6	$180
8	$225
10	$235
12	$240
16	$250
18	$260
20	$280
24	$300

CONTINGENCIES

A contingency of 30 percent was added to estimated construction costs for all projects except small pipe improvement projects that require minimal traffic disruption. The allowance for contingencies covers items such as variations in the project configuration, which are developed during preliminary design and final design, unforeseen site conditions encountered during construction, and reasonable project changes during construction. The contingency allowance does not include major project scope additions or additional costs resulting from permit mitigation requirements (such as wetlands enhancement).

ENGINEERING, LEGAL, ADMINISTRATION

Total construction costs were increased by 25 percent to achieve the total project cost. This markup accounts for engineering design, construction management, legal, and administrative project costs. Costs shown in the CIP are estimated total project costs.

SDC ALLOCATION & DEVELOPMENT CONTRIBUTIONS

Projects that are required for meeting increased demands are eligible to be funded from System Development Charges (SDC) and will be used to estimate an updated SDC value for the City's water system in Chapter 7. Some projects are recommended for capacity upgrades and maintenance or other non-growth-related reasons. The portion eligible for SDC funding was calculated as the additional cost for increasing capacity only. *Still being developed.*

Other projects are identified below to serve future development areas and will be required by developers to implement when they occur. These projects are noted in **Table 6-2**, CIP Summary.

PROJECT PRIORITIZATION

As described in Chapter 5, the City's water system has several challenges to overcome.

1. Projects that resolve significant fire flow deficiencies.
    a. Projects that correct low pressure conditions causing fire flow deficiencies.
2. Projects that reduce supply from the Crowson to Granite zones (thereby reduce pumping to Crowson).
3. Projects that correct high pressure conditions.

DESCRIPTION OF IMPROVEMENTS

This section provides a general description of the recommended improvements and an overview of the deficiencies they will resolve. Most of the improvements are necessary to resolve existing system deficiencies. Improvements have also been identified for serving future growth. Recommended infrastructure improvements are show in **Figure 6-1**. *Still being developed.*

Table 6-2
Proposed Water System Capital Improvement Plan

5/22/2019

CATEGORY	PROJECT NO.	DESCRIPTION	TOTAL PROJECT COST	SCHEDULE FOR WATER SYSTEM IMPROVEMENTS PLANNING PERIOD (YEARS) SHORT-TERM FY 2019/2020	FY 2020/2021	FY 2021/2022	FY 2022/2023	FY 2023/2024	FY 2024/2025	FY 2025/2026	FY 2026/2027	FY 2027/2028	FY 2028/2029	MID-TERM FY 2030-2041	NOTES
Supply	S-1	Dam Safety Improvements	$ 4,800,000	$ 300,000	$ 500,000	$ 2,000,000	$ 2,000,000								
	S-2	Ashland Canal Piping Project	$ 3,500,000	$ 500,000	$ 1,500,000	$ 1,500,000									
	S-3	East and West Forks Transmission Line Rehabilitation	$ 2,123,000	$ 360,000	$ 1,763,000										
	S-4	Reeder Reservoir Intake Repairs	$ 131,500	$ 24,490	$ 107,010										
	S-5	Reeder Reservoir Sediment Removal	$ 1,120,000	$ 140,000			$ 140,000			$ 140,000			$ 140,000	$ 560,000	
	S-6	7.5 MGD Water Treatment Plant	$ 30,700,000	$ 3,900,000	$ 13,150,000	$ 13,650,000									
	S-7	WTP Backwash Recovery System	$ 2,800,000									$ 2,800,000			
	S-8	TAP System Improvements	NA												No cost known at this time.
	S-9	Deferred WTP Improvement Projects	NA												No cost known at this time.
		Total Supply Projects	$ 45,174,500	$ 5,224,490	$ 17,020,010	$ 17,150,000	$ 2,140,000	$ -	$ -	$ 140,000	$ -	$ 2,800,000	$ 140,000	$ 560,000	
Storage	ST-1	0.85-MG Second Clearwell	$ 600,000								$ 600,000				Timing within 10 years so Granite Reservoir can be taken offline
		Total Storage Projects	$ 600,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 600,000	$ -	$ -	$ -	
Pump Stations	PS-1	TAP BPS Backup Power	$ 410,000				$ 60,000	$ 350,000							
	PS-2	Hillview Pump Station Replacement	$ 1,500,000							$ 375,000	$ 1,125,000				
	PS-3	TAP to Crowson Pump Station	$ 1,500,000											$ 1,500,000	City has ability to use an emergency pump to boost between zones.
		Total Pumping Projects	$ 3,410,000	$ -	$ -	$ -	$ 60,000	$ 350,000	$ -	$ 375,000	$ 1,125,000	$ -	$ -	$ 1,500,000	
Pipes		**Total Pipe Projects**	$ 36,586,000	$ 1,781,000	$ 2,161,000	$ 1,874,000	$ 1,908,000	$ 1,401,000	$ 2,537,000	$ 1,184,000	$ 2,735,000	$ 520,000	$ 1,181,000	$ 19,307,000	
Operations and Maintenance	OM-1	Tolman/Siskiyou PRV Station	$ 75,000	$ 75,000											
	OM-2	Granite Street Pipes: Switch Crowson and Granite Zones	$ 40,000	$ 40,000											Modify pipe connections so that the existing 12-inch pipe supplies Crowson Zone 1 and the 24-inch pipe supplies Granite Zone 1.
	OM-3	Hydrant Replacement Program (20 per year)	$ 3,200,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 1,600,000	Assumes 20 hydrants per year
	OM-4	AMI/AMR Evaluation	$ 60,000						$ 60,000						
	OM-5	Pipe Connection/PRV Adjustments from Rezone Studies	$ 200,000				$ 200,000								
	OM-6	Telemetry Upgrades	$ 80,000					$ 80,000							
	OM-7	Pressure Relief Valves	TBD				TBD								Identify appropriate locations and install pressure relief valves to alleviate high pressure neighborhoods.
		Total O&M Projects	$ 3,655,000	$ 275,000	$ 160,000	$ 160,000	$ 360,000	$ 240,000	$ 220,000	$ 160,000	$ 160,000	$ 160,000	$ 160,000	$ 1,600,000	
Recommended Studies	RS-1	TAP Master Plan & Future Updates	$ 100,000	$ 50,000										$ 50,000	
	RS-2	Risk and Resilience Assessment and Emergency Response	$ 150,000		$ 150,000										
	RS-3	Rezoning Study	$ 50,000			$ 50,000									
	RS-4	Water Master Plan Updates	$ 500,000							$ 250,000				$ 250,000	
		Total Recommended Studies	$ 800,000	$ 50,000	$ 150,000	$ 50,000	$ -	$ -	$ -	$ 250,000	$ -	$ -	$ -	$ 300,000	
		CIP Total[1]	$ 90,225,500	$ 7,330,490	$ 19,491,010	$ 19,234,000	$ 4,468,000	$ 1,991,000	$ 2,757,000	$ 2,109,000	$ 4,620,000	$ 3,480,000	$ 1,481,000	$ 23,267,000	

1. Future costs are in 2018 dollars, no adjustment made for inflation.

Table 6-3
Proposed Water System Pipe Projects

5/22/2019

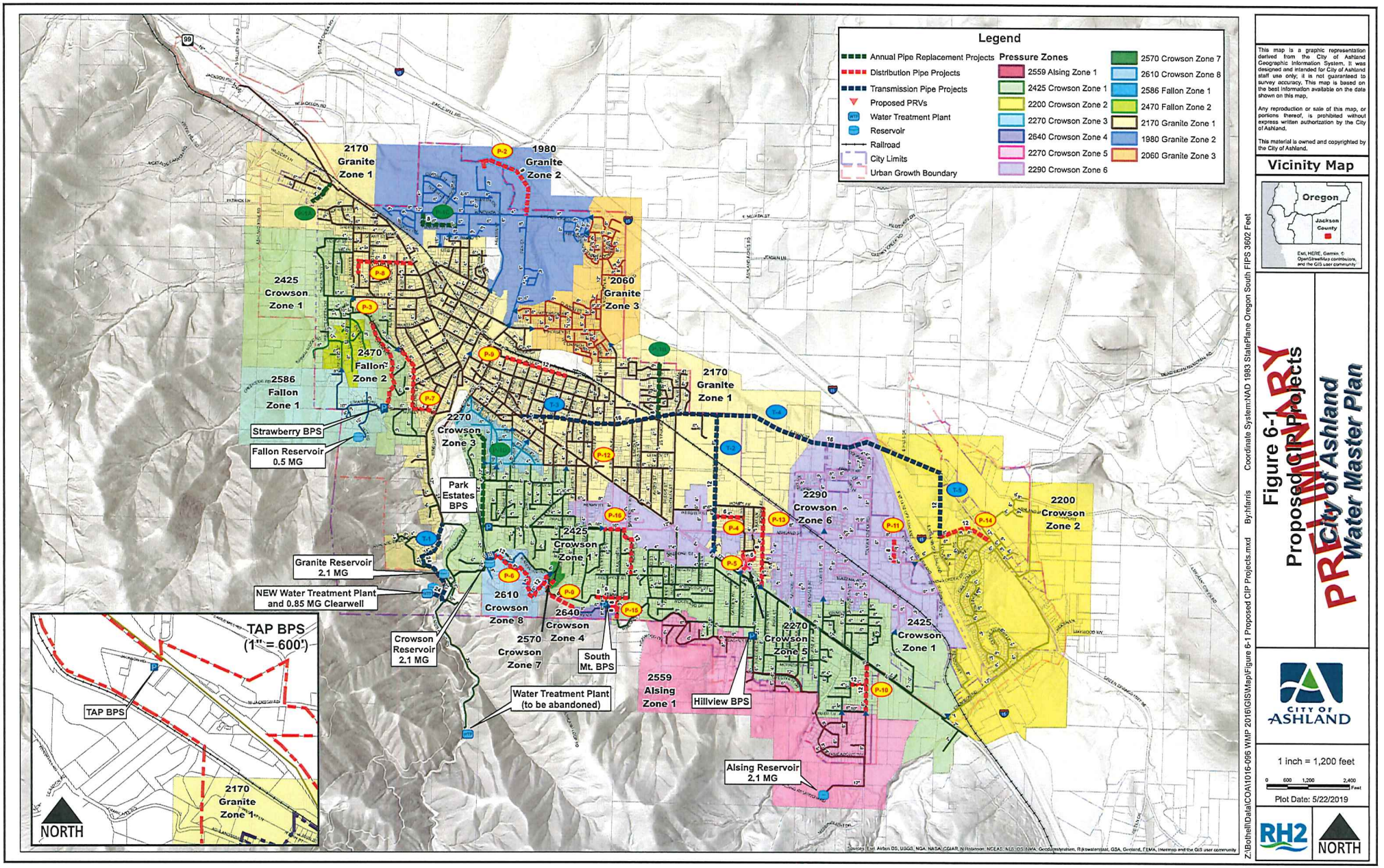
Fire Flow 1 = Available Fire Flows are <750 gpm

PROJECT NO.	DESCRIPTION	Length (feet)	Diameter (inches)	Unit Cost ($/ft)	Construction Cost (without Contingency)	Construction Cost (with Contingency)	Engineering/ Legal/ Admin	TOTAL PROJECT COST	SCHEDULE FOR WATER SYSTEM IMPROVEMENTS												NOTES
									PLANNING PERIOD (YEARS)												
									SHORT-TERM											MID-TERM	
									FY 2019/2020	FY 2020/2021	FY 2021/2022	FY 2022/2023	FY 2023/2024	FY 2024/2025	FY 2025/2026	FY 2026/2027	FY 2027/2028	FY 2028/2029	FY 2030-2041	
P-0	Morton to Ivy Street New Pipe Connection	1700	8	$225	$383,000	$498,000	$125,000	$ 623,000	$ 623,000												Fire Flow 1. Allows ability to disconnect South Mountain PS
P-1	Annual Pipe Replacement							$ 6,000,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 3,000,000		
P-1A	Fox St Pipe Replacement (Ashland Mine Rd to dead end)	472	8	$225	$106,200	$106,200	$26,550														Corrects fire deficiency
P-1B	Fordyce Pipe Replacement (E Main to dead end)	1576	8	$225	$354,600	$354,600	$88,650														Required to avoid continued maintenance costs
P-1C	Cambridge Pipe Replacement (Willow to W Nevada)	1316	8	$225	$296,100	$296,100	$74,025														Aging pipe.
P-1D	Terrace Pipe Replacement (527 Terrace north to end)	2809	12	$240	$674,160	$876,408	$219,102														Very old steel pipe requires replacement
P-2	Oak St Waterline (WWTP to E Nevada St)	2628	8	$225	$591,300	$591,300	$0	$ 591,000	$ 591,000												Recommended for looping.
P-3	Ditch Road Waterline (Strawberry Ln to Grandview Dr)	2810	12	$240	$674,400	$876,720	$219,180	$ 1,096,000	$ 219,000	$ 877,000											Replaces very old pipe.
P-4	Parker St Pipe Replacement (Walker Ave to Lit Way)	860	8	$225	$193,500	$193,500	$48,375	$ 242,000	$ 48,000	$ 194,000											
P-5	Harmony Lane, Lit Way, Ray Lane Line Upsizing	1735	8	$225	$390,375	$390,375	$97,594	$ 488,000		$ 488,000											Fire Flow 1
T-1	Granite Street (New WTP to Connection to 24-inch Pipe)	3100	24	$300	$930,000	$1,209,000	$302,250	$ 1,511,000		$ 302,000	$ 1,209,000										Recommended to reduce Crowson supply to Granite Zone. Also improves ability to boost TAP supply to Crowson Zone.
P-6	Ashland Loop Rd (Park Estates PS to Morton St) and Morton St (Ashland Loop Rd to Waterline Rd)	2982	12	$240	$715,680	$930,384	$232,596	$ 1,163,000			$ 233,000	$ 930,000									Fire Flow 1
P-7	Nutley and Scenic Dr (Granite St to Grandview St)	2351	8	$225	$528,975	$528,975	$132,244	$ 661,000			$ 132,000	$ 529,000									Recommended tp reduce Crowson supply to Granite Zone. Also replaces an aging pipe and reduces need for PRV 9 so City can abandon steep pipe behind houses.
P-8	Maple St and Maple Way (N Main to end of Maple Way)	2031	8	$225	$456,975	$594,068	$148,517	$ 743,000				$ 149,000	$ 594,000								Fire Flow 1
P-9	A St Pipe Replacement (1st St to 6th St)	1854	12	$240	$444,960	$578,448	$144,612	$ 723,000					$ 145,000	$ 578,000							Fire Flow 1
P-10	Tolman Creek Rd (Morada to Siskiyou Blvd)	1400	12	$240	$336,000	$436,800	$109,200	$ 546,000					$ 109,000	$ 437,000							Recommended for Expanding Alsing Service Area
T-2	Walker Ave Pipe Replacement (Siskiyou Blvd to Ashland Middle School)	3246	12	$240	$779,040	$1,012,752	$253,188	$ 1,266,000					$ 253,000	$ 1,013,000							Recommended for improving fire flow to Walker and Ashland Middle Schools
P-11	Washington St Pipe Replacement (Ashland St to Jefferson St)	940	8	$225	$211,500	$274,950	$68,738	$ 344,000						$ 69,000	$ 275,000						
P-12	AHS Property Pipe Replacement (Fire hydrant in school property)	480	6	$180	$86,400	$112,320	$28,080	$ 140,000						$ 140,000							
T-3	East Main Street (Siskiyou Blvd to Walker)	5768	16	$250	$1,442,000	$1,874,600	$468,650	$ 2,343,000							$ 469,000	$ 1,875,000					Recommended for rezoning Granite Zone 1 and for tranmission capacity to supply growth to east.
P-13	Normal Ave Pipe Replacement (400 north of Siskiyou Blvd to Homes Ave)	1913	8	$225	$430,425	$559,553	$139,888	$ 699,000							$ 140,000	$ 560,000					Fire Flow 1
P-14	Ashland St Pipe Replacement (Clover Ln to Oak Knoll Dr)	1500	12	$240	$360,000	$468,000	$117,000	$ 585,000									$ 117,000	$ 468,000			Fire Flow 1
P-15	Elkader St Pipe Replacement (Ivy Ln to Pinecrest Ter)	359	8	$225	$80,775	$105,008	$26,252	$ 131,000									$ 26,000	$ 105,000			
	Ivy Ln Pipe Replacement (S Mountain Ave to Elkader St)	310	8	$225	$69,750	$90,675	$22,669	$ 113,000									$ 23,000	$ 91,000			Fire Flow 1
	S Mountain Ave New Pipe (connection in Emma St)	30	6	$180	$5,400	$7,020	$1,755	$ 9,000									$ 2,000	$ 7,000			
	S Mountain Ave New Pipe (to fire hydrant north of Emma St)	90	6	$180	$16,200	$21,060	$5,265	$ 26,000									$ 5,000	$ 21,000			
	Emma St (Elkader St to west end)	645	8	$225	$145,125	$188,663	$47,166	$ 236,000									$ 47,000	$ 189,000			Fire Flow 1
P-16	Ashland St (Glenwood to Roca) and Roca St (Ashland St to Prospect St)	2041	12	$240	$489,840	$489,840	$122,460	$ 612,000											$ 612,000		Fire Flow 1
P-17	Prospect St (Palmer Road to west end)	1625	12	$240	$390,000	$507,000	$126,750	$ 634,000											$ 634,000		Fire Flow 1; Creek Crossing
P-18	Leonard St (Madrone St to Pinecrest Terrace)	1500	8	$225	$337,500	$337,500	$84,375	$ 422,000											$ 422,000		Fire Flow 1
	Madrone St (Indiana St to Leonard St	793	8	$225	$178,425	$178,425	$44,606	$ 223,000											$ 223,000		Fire Flow 1
	Oregon St (Leonard St to Walker Ave)	1941	8	$225	$436,725	$436,725	$109,181	$ 546,000											$ 546,000		Fire Flow 1
P-19	Beach Street (Ashland Street to south end)	2038	8	$225	$458,550	$458,550	$114,638	$ 573,000											$ 573,000		Fire Flow 1
	Glenwood Drive (Ashland Street to Beach Street)	1629	8	$225	$366,525	$366,525	$91,631	$ 458,000											$ 458,000		Fire Flow 1
P-20	Morton St (Ashland St to Forest St) and Forest St (Liberty St to end)	991	8	$225	$222,975	$222,975	$55,744	$ 279,000											$ 279,000		Fire Flow 1
	Taylor St (Ashland St to south end)	477	8	$225	$107,325	$107,325	$26,831	$ 134,000											$ 134,000		Fire Flow 1
P-21	Long Way (Ashland St to south end)	611	8	$225	$137,475	$137,475	$34,369	$ 172,000											$ 172,000		Fire Flow 1
P-22	High St (Wimer Rd to Manzanita St) and Manzanita St (High St to Almond St)	1233	8	$225	$277,425	$277,425	$69,356	$ 347,000											$ 347,000		Fire Flow 1
P-23	Pinecrest Ter Pipe Replacement (Walker Ave to Starlight Pl)	1833	10	$235	$430,755	$559,982	$139,995	$ 700,000											$ 700,000		Fire Flow 1
	Ponderosa Dr (Pinecrest Ter to west end)	645	8	$225	$145,125	$188,663	$47,166	$ 236,000											$ 236,000		Fire Flow 1
	Timberline Ter (Ponderosa Dr to south end)	596	8	$225	$134,100	$174,330	$43,583	$ 218,000											$ 218,000		Fire Flow 1
	Hiawatha Pl Pipe Replacement (Walker Ave to end of	300	8	$225	$67,500	$87,750	$21,938	$ 110,000											$ 110,000		Fire Flow 1
P-24	Pinecrest Ter New Pipe (Penny Dr to Woodland Dr)	880	8	$225	$198,000	$257,400	$64,350	$ 322,000											$ 322,000		
P-25	Beach St Pipe Replacement (Larkin Ln to Iowa St)	488	6	$180	$87,840	$87,840	$21,960	$ 110,000											$ 110,000		

Table 6-3
Proposed Water System Pipe Projects

5/22/2019

P-26	Vista St Pipe Replacement (Fork St to Hillcrest St)	740	8	$225	$166,500	$166,500	$41,625	$ 208,000												$ 208,000	
P-27	Vista St Pipe Replacement (Intersection of Vista St, Hillcrest St, and Glenview Dr)	22	8	$225	$4,950	$4,950	$1,238	$ 6,000												$ 6,000	
P-28	Meade St Pipe Replacement (Vista St/Hillcrest St to Iowa St)	1172	8	$225	$263,700	$263,700	$65,925	$ 330,000												$ 330,000	
P-29	Penny Dr Pipe Replacement (Woodland Dr to Weissenback	413	8	$225	$92,925	$92,925	$23,231	$ 116,000												$ 116,000	
P-30	Woodland Dr Pipe Replacement (Leonard St to Pinecrest	250	8	$225	$56,250	$56,250	$14,063	$ 70,000												$ 70,000	
P-31	Morton St Pipe Replacement (fire hydrant to PRV-12)	644	8	$225	$144,900	$144,900	$36,225	$ 181,000												$ 181,000	
P-32	Ashland Mine Rd Pipe Replacement (Cedar Way to Fox St)	611	6	$180	$109,980	$109,980	$27,495	$ 137,000												$ 137,000	
P-33	Almeda Dr New Pipe (west end of street to dog park)	180	6	$180	$32,400	$32,400	$8,100	$ 41,000												$ 41,000	
P-34	Skycrest Dr Pipe Replacement (Orchard St to south end	748	10	$235	$175,780	$175,780	$43,945	$ 220,000												$ 220,000	
P-35	Crispin St Pipe Replacement (Oak St to Patterson St)	650	8	$225	$146,250	$146,250	$36,563	$ 183,000												$ 183,000	
P-36	Oak Lawn Ave Pipe Replacement (Oak St to Sylvia St)	150	6	$180	$27,000	$27,000	$6,750	$ 34,000												$ 34,000	
P-37	Sylvia St Pipe Replacement (Oak Lawn Ave to hydrant)	330	6	$180	$59,400	$59,400	$14,850	$ 74,000												$ 74,000	
P-38	Black Oak Way Pipe Replacement (Tolman Creek Rd to Bellview Ave)	456	6	$180	$82,080	$82,080	$20,520	$ 103,000												$ 103,000	
P-39	Oak Knoll Dr (Ashland St to Twin Pines Creek Drive and Loop)	4018	8	$225	$904,050	$1,175,265	$293,816	$ 1,469,000												$ 1,469,000	Fire Flow 1; and replaces AC pipe from the 1960s
P-40	Ashland St Pipe Replacement (Tolman Creek Rd to Washington St)	2000	10	$235	$470,000	$611,000	$152,750	$ 764,000												$ 764,000	
P-41	Interstate 5 Crossing (Ashland St)	720	10	$235	$169,200	$219,960	$54,990	$ 275,000												$ 275,000	
P-42	Clover Ln Pipe Replacement (Ashland St to hydrant)	500	12	$240	$120,000	$156,000	$39,000	$ 195,000												$ 195,000	
P-43	Oak Knoll Dr Pipe Replacement (Ashland St to E Main St)	100	12	$240	$24,000	$31,200	$7,800	$ 39,000												$ 39,000	
P-44	Highway 66 Pipe Replacement (Oak Knoll Dr to Dead Indian Memorial Rd)	2472	12	$240	$593,280	$771,264	$192,816	$ 964,000												$ 964,000	Fire Flow 1; Two parallel pipes to serve two separate zones
P-45	Dead Indian Mem Rd (Hwy 66 to Airport)	2540	12	$240	$609,600	$792,480	$198,120	$ 991,000												$ 991,000	Fire Flow 1
T-4	East Main Street (Walker Road to East of I-5)	6500	16	$250	$1,625,000	$2,112,500	$528,125	$ 2,641,000												$ 2,641,000	Recommended for transmission capacity to supply growth to the east. Also recommended for rezoning lower customers in Crowson Zones 2 & 6.
T-5	New Pipe East Main St to Ashland St	3000	12	$240	$720,000	$936,000	$234,000	$ 1,170,000												$ 1,170,000	
	Total Pipe Projects							$ 36,586,000	$ 1,781,000	$ 2,161,000	$ 1,874,000	$ 1,908,000	$ 1,401,000	$ 2,537,000	$ 1,184,000	$ 2,735,000	$ 520,000	$ 1,181,000	$ 19,307,000		



This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Ashland.

Vicinity Map

Figure 6-1
Proposed CIP Projects

PRELIMINARY

City of Ashland
Water Master Plan

CITY OF ASHLAND

1 inch = 1,200 feet

0 600 1,200 2,400 Feet

Plot Date: 5/22/2019

RH2

NORTH

Z:\Bothell\Data\COA\1016-096 WMP 2016\GIS\Map\Figure 6-1 Proposed CIP Projects.mxd By:hfarris Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet