

6.3.2 Projects Years 1 to 10

1 – Water Treatment Plant **Controls completed in 2018**

Complete miscellaneous improvements at the water treatment plant including the upgrade of controls to a PLC based system and installing a manual transfer switch at the WTP to allow operation by portable emergency generator in the event of an extended power outage.

2 – Telemetry / SCADA Improvements **Project Completed in 2018**

Replacement and upgrade of telemetry and SCADA systems for the water system. It is assumed the existing telemetry system would be replaced with a cellular-based system. New SCADA panels will be provided for the WTP, Hegewald Well, Base Reservoir / Pump Station 3, Catholic Church Reservoir, and High Zone Reservoir.

3 – Hegewald Well **Initial study completed in 2022, additional testing continues.**

Install chemical addition to adjust the pH of raw water to satisfy the requirements of the Lead and Cooper Rule. Adjustment of the pH will reduce customer complaints when the City uses the well.⁴
– *New Groundwater Source Study*

Investigate a replacement well in either the City-owned LaBong Creek watershed, near the Hegewald Well, or close to the Columbia River. Work will include an initial hydrogeologic investigation, preliminary engineering report, and test well. Assuming completion of a successful test well, development of new groundwater source(s) would include electrical / controls, chemical building, transmission main to distribution system, and water rights.

5 – Base Reservoir Roof **Project completed in 2018**

The existing roof is made of Portland Cement Concrete (PCC) with integral beams and has an overlay of gravel and emulsified asphalt. The asphalt is worn off in several places, leaving the PCC exposed and subject to degradation. The proposed project consists of removing the existing gravel / asphalt overlay and replacing it with a new membrane overlay. The roof and sidewall interface will be constructed to be watertight during replacement of the existing reservoir roof. Deficiencies where the new siding meets the existing roof will be filled with mortar to seal the structure.

6 – Base Reservoir Condition Assessment **Project completed in 2018**

The Base Reservoir is the largest reservoir in the Stevenson Water System and is a vital link in the system. The project will be a high-level assessment of the seismic resilience of the structure. This assessment will be based on materials of construction, age and as-built drawings of the wall thickness, reinforcing, and foundation. Needed future investigations and structural evaluation of the reservoir will be identified.

7 – Zone 1 Distribution Improvements

Three improvement projects are proposed for the PZ 1 distribution system to address existing system deficiencies. Each project is described below.

The first project involves the replacement of the six-inch reservoir transmission main routed along School Street and Russell Avenue. This line is undersized to provide existing and future fire flow goals to the commercial district. Replacing the six-inch main with, at a minimum, an eight-inch main will improve fire flow capabilities to the downtown commercial area. Total length is approximately 1,450 feet.

The second project is the replacement of undersized AC waterlines along SW Atwell Road between Rock Creek Drive. Replacement of this four-inch main with an eight-inch main will increase available fire flow to this area thereby meeting the 2,000 gpm fire flow goal. Total length is approximately 1,000 feet.

The third project is the replacement of undersized AC waterlines along Rock Creek Drive between Ryan Allen Road and Monda Road and along Rock Creek Drive from Monda Road to the intersection with the water main from the Angel Heights PRV. Replacement of these six-inch mains with eight-inch mains will increase available fire flow to this area thereby meeting the 2,000 gpm fire flow goal for future commercial development. Total length is approximately 1,430 feet.

8 – Zone 2-1 Distribution Improvements

Three improvement projects are proposed for the PZ 2-1 distribution system to address existing system deficiencies. Each project is described below.

The first project is the construction of a new PRV station intertie with PZ 3. The PRV would replace a closed valve on Frank Johns Road near Gale Street. Addition of an intertie in this location increases available fire flow to the Frank Johns and Loop Road areas.

The second project is the replacement of undersized AC water mains in Frank Johns Road from Gale Street to Loop Road. Replacing the six-inch water main with an eight-inch main increases available fire flow to the Frank Johns and Loop Road areas. Total length is approximately 900 feet.

The third project is the replacement of undersized AC water mains in Frank Johns Road from Loop Road to just north of Highway 14. Replacing the six-inch water main with an eight-inch main satisfies available fire flow to the lower reaches of Frank Johns Road. Total length is approximately 1,000 feet.

In addition to the projects described above, it is recommended that the remaining AC water mains in the zone be upsized to eight-inch when they are replaced as part of the City's AC pipe replacement program. Opportunities to transfer lower elevation portions of this area to PZ 1 should be explored as new development is proposed east of the downtown area.

9 – Zone 3-1 Distribution Improvements

One improvement project is proposed for the PZ 3-1 distribution system to address existing system deficiencies. The project is described below.

Replacement of an undersized AC water main in Hillcrest Avenue and NE Major Street. Replacing the four-inch water main with an eight-inch main satisfies available fire flow to the lower reaches of NE Major Street. Total length is approximately 500 feet.

6.3.3 Projects Years 11 to 20

10 – Water System Plan Update

This project includes funds to complete two updates to this Water System Plan over the 20-year horizon.

11 –Zone 1 Distribution Improvements

Two improvement projects are proposed for the Zone 1 distribution system to accommodate future growth. Each project is described below.

The first project includes an extension of 12-inch main along SR-14 to the easternmost limits of the Urban Growth Area. This extension will satisfy the 2,000 gpm fire flow goal for potential development at the eastern end of PZ 1. Total length of pipe is approximately 3,280 feet.

A second project includes the extension of a 12-inch main west on Rock Creek Drive and SR-14 to the westernmost limits of the Urban Growth Area. This project will also satisfy the 2,000 gpm fire flow goal for potential developments at the west end of PZ 1. Total length is approximately 3,200 feet.

12–Zone 2 Distribution Improvements

Two improvement projects are proposed for the PZ 2 distribution system to accommodate future growth. Each project is described below.

The first is the relocation of the existing pressure reducing station near the Interpretive Center to restructure the service zone for this area. Relocating this pressure reducing station from Rock Creek Drive to just north of the intersection of Ryan Allen Road and Foster Creek Road will benefit this area by transferring existing waterlines on both roads from PZ 2 to PZ 1.

A second improvement for PZ 2 is to provide looping at the west end of the system by extending the 12-inch water mains adjacent to Skamania Lodge to the proposed PZ 1 waterline extension at the west end of the system. This improvement will require the installation of a pressure reducing valve to connect the two zones. Total length is approximately 2,500 feet.

13 – Zone 3 Distribution Improvements

Two improvement projects are proposed for the Zone 3 distribution system to accommodate future growth. Each project is described below.

The first project includes an extension of an eight-inch main north on Maple Way Road from the intersection with Gropper, and an extension of eight-inch main along West Loop Road. Total length of pipe is approximately 5,700 feet.

The second project is a eight-inch main on Maple Way Road between West Loop and Kanaka Creek Road that will provide the backbone for future development. Total length of pipe is approximately 1,700 feet.

14 – Pressure Zone 4 Improvements

A single project is identified for Zone 4 and will be dependent upon development extending into this higher elevation area. This project includes construction of a 500,000-gallon reservoir, booster pump station, PRV intertie, and extension of a 12-inch water main north along Kanaka Creek Road to the future PZ 4 reservoir site. Total length of pipe is assumed to be approximately 4,600 feet for cost estimating purposes. Because this is outside of the Retail Service Area, a water system plan amendment will be needed to expand the boundary.

There are two alternatives for upgrading the distribution system to supply water to the proposed Zone 4 reservoir. These alternatives are described below and represented graphically in **Figure 6-1**.

Alternative A - Install a booster pump station to supply the proposed PZ 4 reservoir from the PZ 3 distribution system. PZ 4 reservoir construction will include the construction of a new lift station and PRV intertie within PZ 3. The construction of a future PZ 4 reservoir and pressure reducing intertie will supplement PZ 3 fire storage deficiencies.

Alternative B - Upgrade the Zone 3 booster pump station with higher head pumps and transfer the Gropper Road / Kanaka Creek Road transmission main to directly serve the proposed Zone 4 reservoir. This alternative would require that the High Zone reservoir be fed directly from the proposed PZ 4 reservoir and isolating PZ 3 distribution system connections to the Gropper Road / Kanaka Creek Road transmission main, or installing pressure reducing connections between the high-pressure transmission main and PZ 3 distribution system.

For developing this plan, the Alternative A improvements will provide the basis of future capital improvements. However, the potential to implement both alternatives will be evaluated during the review of development proposals and design of critical infrastructure components.

The City completed a preliminary siting study for the proposed PZ 4 reservoir which was summarized in the August 2003 Water System Plan Amendment. This study included a geotechnical investigation by Squier & Associates which resulted in the identification of four

potential reservoir sites with relatively favorable conditions in respect to landslide hazards. The following is a summary of the potential sites as presented in the Squier report (see **Appendix J**).

Site A - This site is located east of Loop Road in a debris flow zone with a designated "moderate" hazard characterization. While deep seated landslide hazards do not appear to present a significant threat, upslope failures could result in rapidly moving debris flows, though the potential for upslope landslide debris reaching the site is considered low.

Site B - This site is located on a high bluff upslope of Baker Road with a designated "low" hazard characterization. Steep escarpments bound this area with older landslide deposits below. Siting a reservoir in this area will require careful evaluation of slope stability for the site, including evaluation of the stability of the escarpments. Siting a reservoir in this area will also require the City to verify available properties as the general location is currently being developed.

Site C - This site is located near the existing Zone 3 Reservoir at the upper extent of Bone Road with a designated "low" hazard characterization. This site is located on a ridge line that parallels an apparently dormant landslide area where the existing reservoir is located.

Site D - This site is located on the nose of a long northwest trending ridge upslope of the Williams gas pipeline at the eastern limits of the growth boundary with a designated "low" hazard characterization. Roadway access to this area does not presently exist.

In comparing the reservoir site alternatives, consideration was given to transmission main routing, vacant properties, areas of current and future development, and total infrastructure and land costs. Based on these considerations, it was concluded that Site B and C are the preferred sites. These sites are centrally located within the service area, reside within "low" landslide hazard ratings, and provide the lowest cost for installing transmission main to the site from the existing PZ 3 distribution system. If unanticipated future development occurs primarily in the eastern or western fringes of PZ 4, Site A or Site D may warrant further investigation. Once the preferred site has been selected, a site-specific preliminary engineering report, including reservoir foundation investigation, should be conducted at the site. For developing capital improvement projects and costs, the proposed PZ 4 reservoir is shown near Site B.

6.4 Ongoing Pipe Replacement

The City does not currently maintain an annual budget for the replacement of smaller diameter and poor condition pipe. However, they recognize the need to replace older water mains, especially those constructed of asbestos cement pipe because this material has been the primary source of leaks and water main breaks in the system. On average, the City replaces approximately 400 feet of water main each year. Most of this replacement work has been self-performed by City crews which allows for more pipe to be installed, per dollar invested, when compared to using a contractor.

With most of the water system being installed since the 1960's, the City has a head-start on maintaining a 100+/- year cycle on its pipe. The City is working to develop an annual pipe

replacement budget while recognizing that the budget will likely need to be leveraged for other system projects such as fire flow improvements and coordination with street or other infrastructure system improvements.

Zone restructuring to reduce the extent of high pressure areas and reliance of individual pressure reducing valves has been examined during previous water plan updates. However, given the challenging topography as previously discussed and length of time many areas have been adequately served by existing facilities, it is difficult to justify the construction of upgrades during a period when the resources of the City are limited. Opportunities to transfer existing waterlines or service areas to an “ideal” pressure zone will be examined in additional detail when future waterline projects make such a project feasible.

6.4.1 Leak Reduction Program

The City’s Water Loss Control Action Plan (WLCAP) outlines actions the City will take to reduce its leakage rate to below 10%. These efforts include leak detection surveys, calibration of large service meters, replacement of outdated water mains, and having pressure reducing valves serviced regularly. The WLCAP in **Appendix C** discusses how these activities will be paid for.

Current pipe replacement priorities include 1) replacing approximately 2,000 feet of six-inch AC mains with eight-inch ductile iron on Ryan Allen Road between Foster Creek Road and SW Rock Creek Drive and 2) replacing approximately 1,300 feet of six-inch AC mains with eight-inch ductile iron on Upper School Street between Hot Springs Alameda Road and Kanaka Creek Road.

6.5 Summary

Recommended projects are divided across two-time periods, those recommended within 10 years and those in years 11 through 20. Projects are intended to address system deficiencies projected during these time periods but should be evaluated annually through City reviews of demand growth, available budget and system development pressure. Within each time period, the projects are not placed in any particular order. **Table 6-1** summarizes the recommended system improvements for years 1 through 10. **Table 6-2** summarizes the recommended system improvements for years 11 through 20. The proposed improvements are shown on **Figure 6-2** and **Figure 6-3**.

Table 6-1
10-Year Capital Improvement Projects

| Project ID | Project Name | Project Components | Description | Source (S) | Deficiency Addressed ¹ | | | Cost ² |
|----------------------------|-------------------------------------|--------------------|---|------------|-----------------------------------|-----------------------------|-----------------|--------------------|
| | | | | | Pressure (P) | Fire Flow (FF) | Other | |
| 1 | Water Treatment Plant | WTP | Complete miscellaneous improvements <ul style="list-style-type: none"> Upgrade controls to a PLC based system Install manual transfer switch for portable generator³ | S2 | | Completed controls for \$6k | Treatment | \$100,000 |
| 2 | Telemetry / SCADA Improvements | All | Upgrade of telemetry and SCADA systems <ul style="list-style-type: none"> Replace audio tone system with radio based system WTP, Hegewald Well, Base Reservoir/BPS 3, High Reservoir, Catholic Church Reservoir | | | Completed for \$30k | Telemetry | \$300,000 |
| 3 | Hegewald Well | Well | Install chemical addition for pH adjustment | S2 | | | | \$50,000 |
| 4 | New Groundwater Source Study | Well | Investigate a new well to replace the WTP <ul style="list-style-type: none"> Hydrogeologic investigation Test well Preliminary engineering report | S2 | | | | \$250,000 |
| 5 | Base Reservoir Roof | Tank | Replace existing gravel / asphalt covering with membrane overlay | S2 | | Completed for \$50k | | \$50,000 |
| 6 | Base Reservoir Condition Assessment | Reservoir | High-level assessment of structure seismic resiliency <ul style="list-style-type: none"> Based on materials of construction, age, as-built drawings Assumes involvement of Civil, Structural, and Geotechnical engineers | | | Completed for \$2,500 | Resiliency | \$20,000 |
| 7.1 | Church Reservoir Transmission | Pipe | Downtown area fire flow through upsized piping <ul style="list-style-type: none"> Install 1,450 feet of new 12" pipe | | | FF1 | Undersized pipe | \$425,000 |
| 7.2 | SW Atwell Road | Pipe | PZ 1 fire flow through upsized piping <ul style="list-style-type: none"> Install 1,000 feet of new 8" pipe | | | FF1 | Undersized pipe | \$263,000 |
| 7.3 | Rock Creek Drive | Pipe | PZ 1 fire flow through upsized piping <ul style="list-style-type: none"> Install 1,430 feet of new 8" pipe | | | FF1 | Undersized pipe | \$375,000 |
| 8.1 | Frank Johns PRV | PRV / Pipe | Intertie PZ 3 with PZ 2 with new 6" PRV station <ul style="list-style-type: none"> Open existing closed valve Install 8" pipe to connect the PRV station to the existing water main | | | FF2 | Undersized pipe | \$157,000 |
| 8.2 | Frank Johns North | Pipe | PZ 2 fire flow through upsized piping <ul style="list-style-type: none"> Install 900 feet of new 8" pipe | | | FF2 | Undersized pipe | \$237,000 |
| 8.3 | Frank Johns South | Pipe | PZ 2 fire flow through upsized piping <ul style="list-style-type: none"> Install 1,000 feet of new 8" pipe | | | FF2 | Undersized pipe | \$283,000 |
| 9 | NE Major Street | Pipe | PZ 3-1 fire flow through upsized piping <ul style="list-style-type: none"> Install 500 feet of new 8" pipe | | | FF3 | Undersized pipe | \$132,000 |
| Years 1 to 10 Total | | | | | | | | \$2,642,000 |

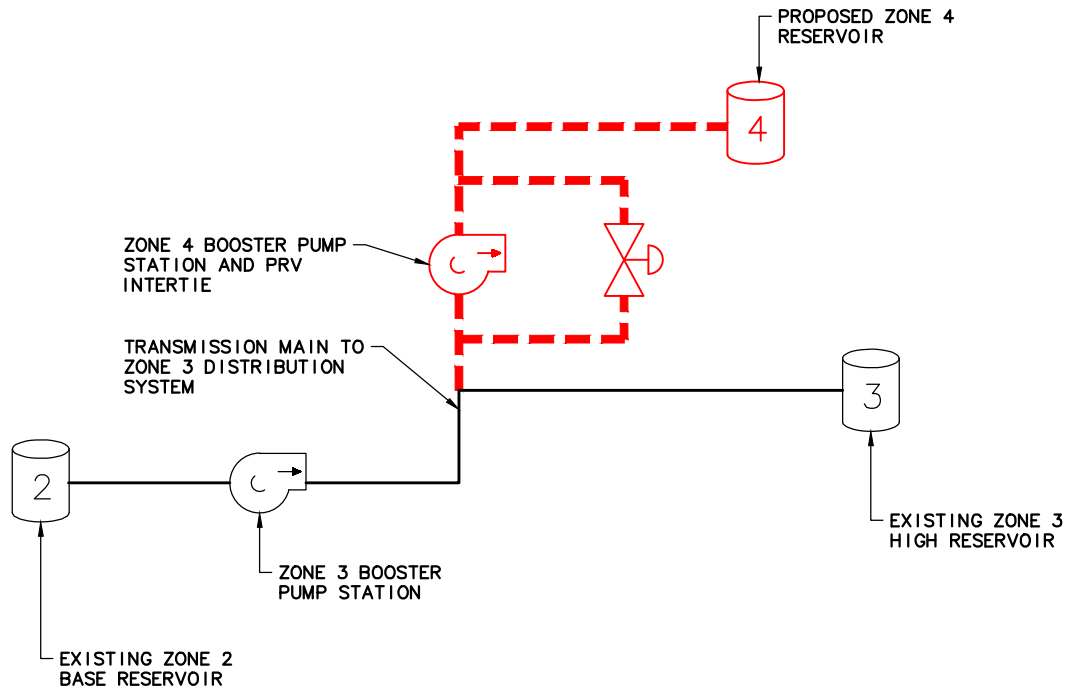
- Notes:
- Capital projects are identified by what type of deficiency is addressed and in which pressure zone.
 - All costs are in 2016 dollars.
 - Portable generator to be purchased separately.

Table 6-2
20-Year Capital Improvement Projects

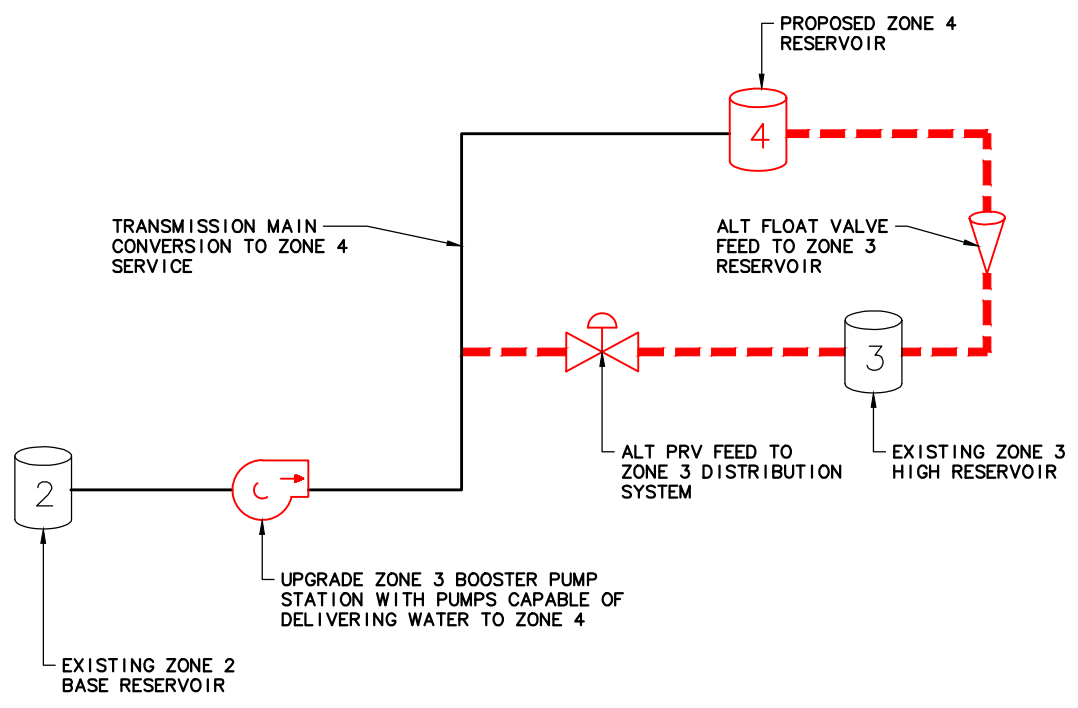
| Project ID | Project Name | Project Components | Description | Deficiency Addressed ¹ | | | | Cost ² |
|------------|---------------------------|-----------------------------|---|-----------------------------------|---------------------|----------------------|-----------------------------|--------------------|
| | | | | Facility Deficiency | Pressure Deficiency | Fire Flow Deficiency | Other | |
| 10 | Water System Plan Update | Facility Plan | Update the WSP every 10 years <ul style="list-style-type: none"> ▪ Once 10 years from year of approval ▪ Once 20 years from year of approval | | | | Planning | \$150,000 |
| 11.1 | SR-14 East | Pipe | PZ 1 improvements to accommodate future growth <ul style="list-style-type: none"> ▪ Install 3,280 feet of new 12" pipe | | | | Growth | \$960,000 |
| 11.2 | SR-14 West | Pipe | PZ 1 improvements to accommodate future growth <ul style="list-style-type: none"> ▪ Install 3,200 feet of new 12" pipe | | | | Growth | \$937,000 |
| 12.1 | Rock Creek PRV Relocation | PRV / Pipe | Relocate pressure zone break from Rock Creek Drive to Ryan Allen and Foster Creek Road <ul style="list-style-type: none"> ▪ Install new 6-inch PRV station ▪ Abandon existing PRV station ▪ Miscellaneous water lines as required | | P2 | | | \$100,000 |
| 12.2 | West-End Looping | Pipe | PZ 2 improvements to accommodate future growth <ul style="list-style-type: none"> ▪ Install 2,500 feet of new 12" pipe | | | | Growth | \$657,000 |
| 13.1 | Maple Way East | Pipe | PZ 3 improvements to accommodate future growth <ul style="list-style-type: none"> ▪ Install 5,700 feet of new 8" pipe | | | | Growth | \$1,323,000 |
| 13.2 | Maple Way West | Pipe | PZ 3 improvements to accommodate future growth <ul style="list-style-type: none"> ▪ Install 1,700 feet of new 8" pipe | | | | Growth | \$412,000 |
| 14.1 | Zone 4 Predesign | Tank / Booster / PRV / Pipe | Preliminary design investigation for Zone 4 Improvements <ul style="list-style-type: none"> ▪ Identify tank location and configuration ▪ Identify pump station location and configuration ▪ Identify transmission main routing | | | | Planning | \$75,000 |
| 14.2 | Zone 4 Improvements | Tank / Booster / PRV / Pipe | Develop new pressure zone 4 <ul style="list-style-type: none"> ▪ Build new 500,000-gallon tank ▪ Build new booster pump from PZ 3 to PZ 4 ▪ Electrical and telemetry improvements to connect the new facilities to existing SCADA ▪ Install approximately 4,600 feet of 12" pipe ▪ <i>Land acquisition costs are not included</i> | | | | Growth | \$4,038,000 |
| | | | | | | | Years 11 to 20 Total | \$8,652,000 |

- Notes:
1. Capital projects are identified by what type of deficiency is addressed and in which pressure zone.
 2. All costs are in 2016 dollars.

c:\PDX_Projects\16\1828 - Stevenson Water System Plan Update\05.CAD\Figures\16-1828-WA-FIGURE 6-1.dwg FIGURE 6-1 11/6/2017 2:23 PM DKH 2.1.0s (LMS Tech)



ALTERNATIVE A



ALTERNATIVE B

FIGURE 6-1

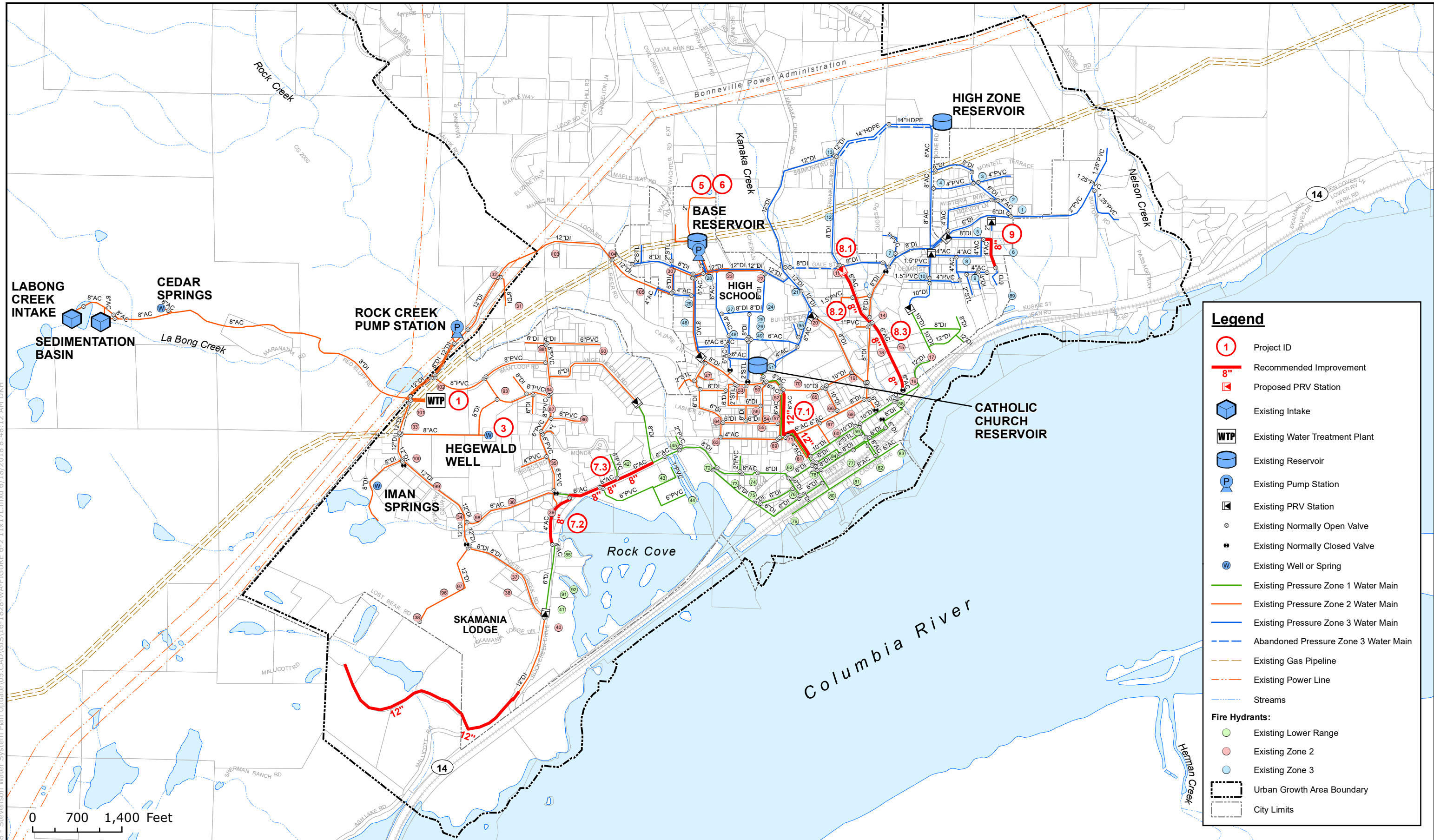


STEVENSON WATER SYSTEM PLAN UPDATE
ZONE 4 RESERVOIR SUPPLY
ALTERNATIVES

November 2017



G:\PDX_P\Projects\161828 - Stevenson Water System Plan Update\05_CAD\GIS\16-1828-WA-FIGURE 6-2 11x17L.mxd 6/18/2018 8:48:12 AM DKH



Legend

- 1 Project ID
- Recommended Improvement
- Proposed PRV Station
- Existing Intake
- WTP Existing Water Treatment Plant
- R Existing Reservoir
- P Existing Pump Station
- Existing PRV Station
- o Existing Normally Open Valve
- Existing Normally Closed Valve
- W Existing Well or Spring
- Existing Pressure Zone 1 Water Main
- Existing Pressure Zone 2 Water Main
- Existing Pressure Zone 3 Water Main
- Abandoned Pressure Zone 3 Water Main
- Existing Gas Pipeline
- Existing Power Line
- Streams

Fire Hydrants:

- o Existing Lower Range
- o Existing Zone 2
- o Existing Zone 3

- Urban Growth Area Boundary
- City Limits

0 700 1,400 Feet

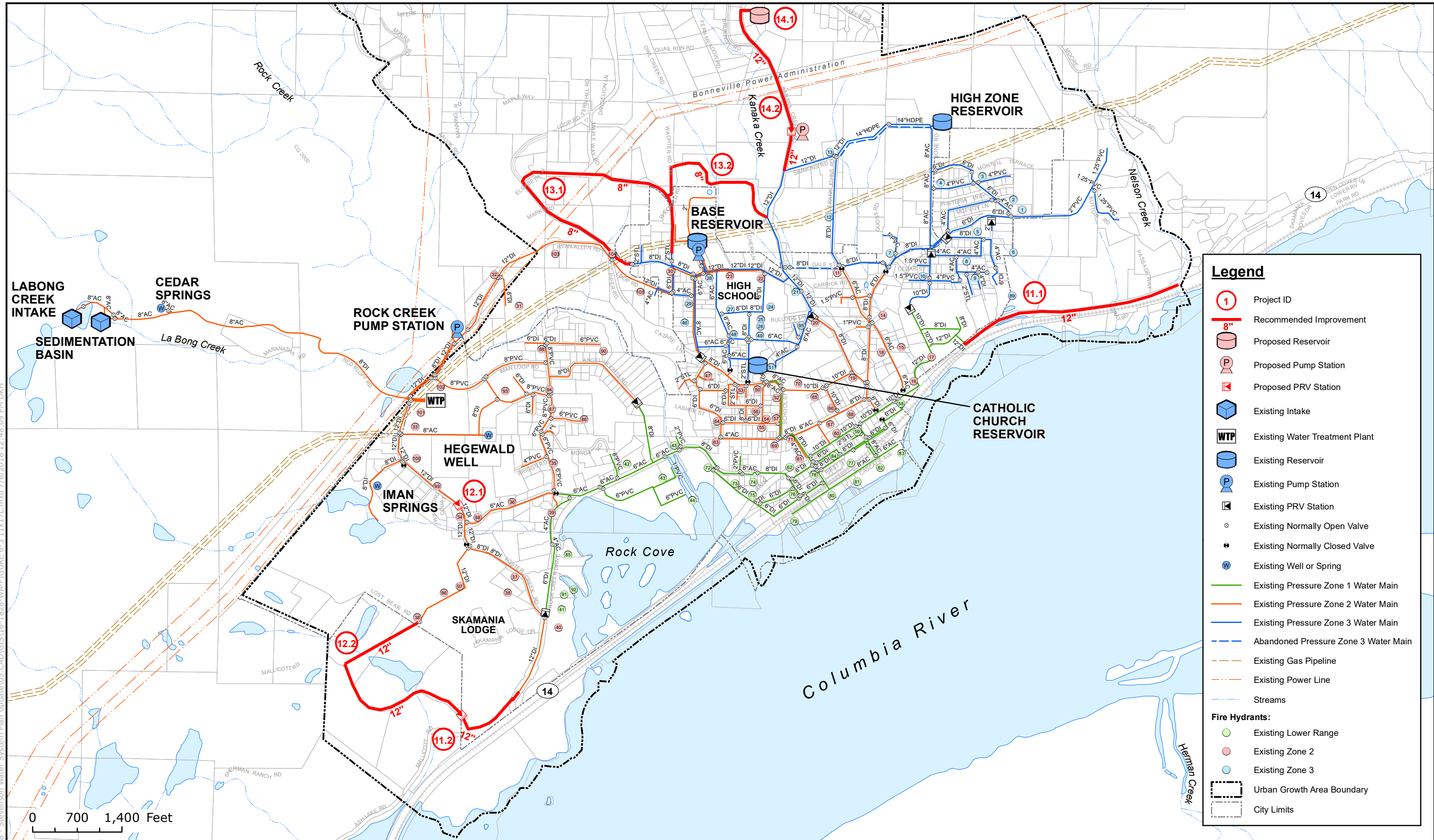


Stevenson Water System Plan Update



Figure 6-2
Recommended Improvement
Projects: Years 1-10

G:\PDX_P\Projects\161828 - Stevenson Water System Plan Update\05_CAD\GIS\16-1828-WA-FIGURE 6-3 11x17L.mxd 7/16/2018 12:48:09 PM DKH



Legend

- 1 Project ID
- Recommended Improvement
- 8" Proposed Reservoir
- P Proposed Pump Station
- PRV Proposed PRV Station
- I Existing Intake
- WTP Existing Water Treatment Plant
- R Existing Reservoir
- P Existing Pump Station
- PRV Existing PRV Station
- NOV Existing Normally Open Valve
- NCV Existing Normally Closed Valve
- W Existing Well or Spring
- Existing Pressure Zone 1 Water Main
- Existing Pressure Zone 2 Water Main
- Existing Pressure Zone 3 Water Main
- Abandoned Pressure Zone 3 Water Main
- Existing Gas Pipeline
- Existing Power Line
- Streams

Fire Hydrants:

- Existing Lower Range
- Existing Zone 2
- Existing Zone 3

- Urban Growth Area Boundary
- City Limits



Stevenson Water System Plan Update



**Figure 6-3
Recommended Improvement
Projects: Years 11-20**