EXECUTIVE SUMMARY

ES.1 OVERVIEW

This Water Master Plan Update for the City of Santa Rosa (City) provides the City with the tools and the insight required to address important water system planning and associated funding issues. These issues include the following:

1. The need for additional transmission mains, distribution pipelines, pumping capacity, wells and storage facilities to meet the needs of existing customers and future development; and
2. The need to implement a comprehensive Capital Improvement Program (CIP) to meet the needs of both the existing water system and to accommodate planned future growth.

A comprehensive Water Master Plan (WMP) provides the City with the appropriate vehicle to formally develop, plan and implement water system and supply strategies to serve existing customers and future planned growth, and to provide the City with a useful tool to identify and evaluate City-wide capital improvements in an efficient and cost-effective manner. However, it should be noted that improvements are identified at a master plan level and does not constitute design of such improvements. Subsequent detailed design will be required to determine the exact sizes and locations of these proposed improvements.

ES.1.1 Project Objectives

To meet the City’s objective of updating the WMP to guide its future water system expansion and operation, the following project objectives were identified and met:

1. Determine the City’s projected water demand at year 2020, year 2025 and at buildout to provide an accurate allocation of existing and projected future water demands for use in developing an updated hydraulic water system model of the City’s water system;
2. Summarize the City’s updated water system performance criteria and service standards, and employ these criteria and standards in this study’s evaluation of the City’s water system;
3. Develop an updated hydraulic water system model which establishes a one-to-one correspondence between pipes in the City’s Geographical Information System (GIS) with pipes in the hydraulic model, to the degree feasible without compromising functionality of the hydraulic model;
4. Develop and document protocols for managing and updating the City’s hydraulic model;
5. Evaluate the ability of the City’s existing water system to meet minimum performance criteria, and hydraulically analyze alternative transmission/distribution system, storage and pump station improvements using the City’s updated hydraulic model;
Executive Summary

6. Identify the need for future water system facilities, including new transmission and distribution mains, storage facilities and pump stations, to meet future water demands at buildout; and,

7. Develop a comprehensive CIP identifying the size and location of required transmission and distribution pipelines, pump stations and storage reservoirs to meet existing water system deficiencies and future buildout water demands.

ES.1.2 System Overview

The City is located in Northern California approximately 50 miles north of San Francisco and 30 miles east of the Pacific Ocean, and is the county seat for Sonoma County. The City’s water service area is roughly coterminous with the City limits, but does extend slightly beyond the City limits in some areas, as shown on Figure ES-1. Land use within the City is primarily residential, but also includes some agricultural, industrial, commercial, and recreational land uses.

ES.1.2.1 Sonoma County Water Agency

Approximately 95 percent of the City’s potable water supply comes from the Sonoma County Water Agency (SCWA or Agency) Aqueduct System, which delivers water from the Russian River to the City through a series of pressure reducing valves and check valves. The SCWA also supplements this supply with groundwater extracted from three Agency wells located in the Western Santa Rosa Plain area.

The City currently receives water from SCWA under the Restructured Agreement for Water Supply (Restructured Agreement). Under this Agreement, the City is entitled to receive an average-day peak month supply of 56.6 million gallons per day (mgd) with an annual volume limitation of 29,100 acre-feet (af). While the City’s current and historical annual purchases from SCWA are well below this level, the projected buildout water demands are greater than 33,000 acre-feet per year (af/yr). The City’s plans for providing additional supply beyond their SCWA allotment are discussed in the 2010 Urban Water Management Plan.

ES.1.2.2 Groundwater

The City currently has four active wells which are permitted by the California State Water Resources Control Board (CSWRCB)¹ to provide potable supply (a fifth emergency well is currently out of service). Two wells can be used only during emergencies. The other two wells can be used as needed to supplement non-emergency supply, up to 2,300 af/yr.

¹ The Drinking Water Program, which permits existing municipal supply wells, was formerly part of the Department of Public Health, and became a Division within the State Water Resources Control Board on July 1, 2014.
ES.1.2.3 Recycled Water

The City owns and operates the Subregional Water Reuse System, from which the City has historically used approximately 153 acre-feet or 50 million gallons (MG) per year of recycled water for urban landscape irrigation. The City also has plans to implement the Santa Rosa Urban Reuse Project, which was approved in 2007, to serve up to 3,000 a/f/yr of recycled water to offset existing potable water use. Discussions with City staff indicate that the timing for the remaining projects in the Phase 1 West plan has not yet been determined and that additional projects would most likely be completed with grant funding. Because the timing of the remaining projects in the Phase 1 West plan is not currently known, the potable water offset from the proposed additional recycled water use was not included to provide a more conservative estimate of required potable water supply to meet projected water demands.

ES.2 EXISTING AND PROJECTED DEMANDS (CHAPTER 2)

ES.2.1 Water Purchased and Produced

Since the re-introduction of potable groundwater supply in 2007 to supplement water purchased from SCWA, the City has received on average approximately 95 percent of its water supply from SCWA. Table ES-1 summarizes the City’s historical annual water purchases from SCWA and groundwater production from 2006 to 2013.

<table>
<thead>
<tr>
<th>Year</th>
<th>Purchased from SCWA</th>
<th>Groundwater</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>7,756 (23,803)</td>
<td>0 (0)</td>
<td>7,756 (23,803)</td>
</tr>
<tr>
<td>2007</td>
<td>7,397 (22,700)</td>
<td>271 (832)</td>
<td>7,668 (23,532)</td>
</tr>
<tr>
<td>2008</td>
<td>7,137 (21,903)</td>
<td>489 (1,501)</td>
<td>7,626 (23,405)</td>
</tr>
<tr>
<td>2009</td>
<td>6,157 (18,895)</td>
<td>440 (1,350)</td>
<td>6,597 (20,245)</td>
</tr>
<tr>
<td>2010</td>
<td>6,033 (18,514)</td>
<td>298 (914)</td>
<td>6,331 (19,428)</td>
</tr>
<tr>
<td>2011</td>
<td>5,598 (17,180)</td>
<td>410 (1,259)</td>
<td>6,008 (18,439)</td>
</tr>
<tr>
<td>2012</td>
<td>6,306 (19,354)</td>
<td>258 (791)</td>
<td>6,564 (20,145)</td>
</tr>
<tr>
<td>2013</td>
<td>6,743 (20,692)</td>
<td>369 (1,131)</td>
<td>7,111 (21,823)</td>
</tr>
</tbody>
</table>

(a) Source: CSR_Use and Production Statistics_90-08.
(b) Source: CSR_ProdandUse_2009-2012.xlsx, received from City staff on 8/29/13.
(c) Source: 2013 Production and Use Statistics.pdf, received from City staff on 5/20/14.

Water use in the City significantly decreased in 2009 through 2011 and then increased in 2012 and 2013, with 2013 water use back above the 2009 level. It should be noted that the lower water use in 2009-2012 is not representative of normal water use characteristics for the City as it has been significantly affected by drought, water shortage and economic conditions.
ES.2.2 Water Consumption

The City tracks its water consumption through customer meter records. Table ES-2 summarizes the City’s historical annual water consumption by customer type. The predominant water use in the City is by residential customers, which accounts on average for approximately 73 percent of the total annual water consumption.

<table>
<thead>
<tr>
<th>Customer Type</th>
<th>2006(a,b)</th>
<th>2007(a)</th>
<th>2008(a)</th>
<th>2009(c)</th>
<th>2010(c)</th>
<th>2011(c)</th>
<th>2012(c)</th>
<th>2013(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Family</td>
<td>1,085</td>
<td>1,076</td>
<td>1,106</td>
<td>1,053</td>
<td>1,045</td>
<td>1,040</td>
<td>1,078</td>
<td>1,105</td>
</tr>
<tr>
<td>Subtotal Residential</td>
<td>5,192</td>
<td>5,072</td>
<td>5,126</td>
<td>4,477</td>
<td>4,260</td>
<td>4,242</td>
<td>4,536</td>
<td>4,670</td>
</tr>
<tr>
<td>Non-Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>1,156</td>
<td>715</td>
<td>685</td>
<td>565</td>
<td>696</td>
<td>742</td>
<td>777</td>
<td>815</td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td>88</td>
<td>86</td>
<td>72</td>
<td>73</td>
<td>73</td>
<td>76</td>
<td>93</td>
</tr>
<tr>
<td>Institutional</td>
<td></td>
<td>311</td>
<td>297</td>
<td>278</td>
<td>116</td>
<td>111</td>
<td>128</td>
<td>133</td>
</tr>
<tr>
<td>Irrigation</td>
<td>830</td>
<td>839</td>
<td>834</td>
<td>615</td>
<td>525</td>
<td>530</td>
<td>658</td>
<td>686</td>
</tr>
<tr>
<td>Other(e)</td>
<td></td>
<td>50</td>
<td>34</td>
<td>168</td>
<td>45</td>
<td>25</td>
<td>25</td>
<td>19</td>
</tr>
<tr>
<td>Subtotal Non-Residential</td>
<td>1,986</td>
<td>2,003</td>
<td>1,936</td>
<td>1,704</td>
<td>1,454</td>
<td>1,481</td>
<td>1,664</td>
<td>1,746</td>
</tr>
<tr>
<td>Total</td>
<td>7,178</td>
<td>7,075</td>
<td>7,062</td>
<td>6,181</td>
<td>5,714</td>
<td>5,723</td>
<td>6,200</td>
<td>6,416</td>
</tr>
<tr>
<td>Percent Residential</td>
<td>72%</td>
<td>72%</td>
<td>73%</td>
<td>72%</td>
<td>75%</td>
<td>74%</td>
<td>73%</td>
<td>73%</td>
</tr>
<tr>
<td>Percent Non-Residential</td>
<td>28%</td>
<td>28%</td>
<td>27%</td>
<td>28%</td>
<td>25%</td>
<td>26%</td>
<td>27%</td>
<td>27%</td>
</tr>
</tbody>
</table>

(a) Source: CSR_Use and Production Statistics_90-08.
(b) Water consumption from Industrial, Institutional, and Other customer types included in Commercial customer type.
(c) Source: CSR_ProdandUse_2009-2012.xlsx, received from City staff on 8/29/13.
(d) Source: 2013_Production and Use Statistics.pdf, received from City staff on 5/20/14
(e) Includes revenue (i.e., construction meters) and non-revenue water consumption.

ES.2.3 Unaccounted for Water

In the last eight years, the UAFW has ranged from 4.7 percent to 9.8 percent, with an average of 7.3 percent. West Yost recommends the use of this average UAFW factor of 7.3 percent for planning purposes in this Water Master Plan Update because this average accounts for some of the variability between the historical annual UAFW. This recommended UAFW factor of 7.3 percent is slightly higher than the UAFW factor (7.0 percent) used in the City’s 2006 Water Master Plan Update as it incorporates the more recent data (2006 to 2013), which documents that the UAFW was as high as 9.8 percent. However, this recommended UAFW factor is slightly lower than the UAFW factor (7.9 percent) used in the City’s 2010 Urban Water Management Plan (UWMP) based on the data available during that period. Future specific City UAFW data would be of interest for the City’s Water Management Plan.
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should be used to re-calculate and update this UAFW value for the City’s water system to better reflect actual conditions.

ES.2.4 Water System Peaking Factors

Water system facilities are generally sized to meet peak demand periods. The peaking factors used for evaluations in this Water Master Plan Update are as follows:

- Average Day during Maximum Month: 1.5 times average day demand
- Maximum Day: 2.0 times average day demand
- Peak Hour: 3.5 times average day demand

ES.2.5 Water Conservation

The City has water conservation targets as required to comply with Senate Bill x7-7, (i.e., 20x2020 Legislation or SB 7), which requires urban water purveyors to reduce their per capita water use by 20 percent by 2020. As documented in the City’s 2010 UWMP, the City’s per-capita water use targets are 136 gallons per capita per day (gpcd) in 2015 and 127 gpcd in 2020.

SB 7 establishes four methodologies by which urban water suppliers can establish their interim (2015) and final (2020) per capita water use targets. Based on the 2010 UWMP, the City has adopted Method 3, which establishes a goal of 95 percent of the hydrologic region targets established for per capita water use based on the April 2009 Draft 20x2020 Water Conservation Plan. The City has incorporated the minimum reduction requirement with a calculated 2020 water use target of 127 gpcd.

ES.2.6 Water Demand Projections

ES.2.6.1 Land Use Based Unit Water Demand Factors

West Yost used unit water demand factors multiplied by various land use designation acreages to develop future water demand projections. These unit demand factors were developed using the City’s historical water meter data. The unit water demand factors were based on the 2002 to 2012 average water use.

Residential unit water demand factors were developed based on average dwelling unit density (unit/acre) as summarized in Table ES-3. Non-residential unit water demand factors were calculated by dividing water consumption by acreage for each land use classification.
## Table ES-3. Summary of Average Dwelling Unit Density

<table>
<thead>
<tr>
<th>Land Use Designation</th>
<th>Dwelling Unit Density(^{(a)}), units/ac</th>
<th>Average Dwelling Unit Density(^{(b)}), units/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low Density Residential</td>
<td>0.2 to 2.0</td>
<td>1</td>
</tr>
<tr>
<td>Low Density Residential</td>
<td>2 to 8</td>
<td>5</td>
</tr>
<tr>
<td>Medium Low Density Residential</td>
<td>8 to 13</td>
<td>10</td>
</tr>
<tr>
<td>Medium Density Residential</td>
<td>8 to 18</td>
<td>13</td>
</tr>
<tr>
<td>Medium High Density Residential</td>
<td>18 to 30</td>
<td>24</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Data obtained from General Plan Land Use Diagram from the City’s website.

\(^{(b)}\) Data obtained from Table 3-7 in the June 2006 Water Master Plan Update.

## ES.2.6.2 Projected Water Demands

Future water demands were projected based on four distinct development categories: pending developments, intensification of the North Santa Rosa and Downtown Station Specific Plan Areas, private water systems, and vacant parcels (Figure ES-2). The projected timing of future water demands was developed based on discussions with City staff.

Table ES-4 provides a summary of the calculations for the land use based water demand projections for the private water system and vacant parcels.

Table ES-5 presents the projected average day water demand by development category and assumed timing for each. The City’s buildout average day water demand is projected to be 29.6 mgd based on the land use based water demand projections. Figure ES-3 graphically presents the projected average day water demand for the City. As shown on Figure ES-3, significant development (5.1 mgd) is expected to occur by 2020 due to the development of vacant parcels and intensification of the Station Areas. Additional development of the remaining vacant parcels and service to private water systems (4.5 mgd) is expected to occur between 2020 and 2035.
Table ES-4. Summary of Water Demand Projections for Private Water System and Vacant Parcels

<table>
<thead>
<tr>
<th>Land Use Designation</th>
<th>Residential</th>
<th>Non-Residential</th>
<th>Total</th>
<th>Density, unit/ac</th>
<th>Recommended Unit Water Demand Factor</th>
<th>Projected Average Day Water Demand, mgd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private Water Systems</td>
<td>Vacant Inside City Limits</td>
<td>Vacant Outside City Limits</td>
<td>Total</td>
<td>Dwelling Units</td>
<td>Private Water Systems</td>
</tr>
<tr>
<td>Vacant Inside City Limits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacant Outside City Limits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Low Density</td>
<td>384</td>
<td>752</td>
<td>708</td>
<td>1,844</td>
<td>630</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Density</td>
<td>35</td>
<td>620</td>
<td>515</td>
<td>1,170</td>
<td>288</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Low Density</td>
<td>9</td>
<td>60</td>
<td>64</td>
<td>133</td>
<td>216</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Density</td>
<td>24</td>
<td>149</td>
<td>125</td>
<td>298</td>
<td>211</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium High Density</td>
<td>21</td>
<td>32</td>
<td>53</td>
<td>53</td>
<td>145</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low/Open Space</td>
<td>13</td>
<td>187</td>
<td>35</td>
<td>235</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Parks/Recreation</td>
<td>27</td>
<td>5</td>
<td>32</td>
<td>1.3</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Mobile Home Park</td>
<td>161</td>
<td>1</td>
<td>162</td>
<td>1.3</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Business Park</td>
<td>1</td>
<td>77</td>
<td>78</td>
<td>1.4</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>General Industry</td>
<td>39</td>
<td>111</td>
<td>150</td>
<td>2.3</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Light Industry</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>0.9</td>
<td>-</td>
<td>0.0</td>
</tr>
<tr>
<td>Retail and Business Service</td>
<td>19</td>
<td>81</td>
<td>106</td>
<td>206</td>
<td>1.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Retail/Med Residential</td>
<td>86</td>
<td>15</td>
<td>101</td>
<td>1.8</td>
<td>-</td>
<td>0.1</td>
</tr>
<tr>
<td>Office</td>
<td>1</td>
<td>40</td>
<td>41</td>
<td>1.4</td>
<td>0.0</td>
<td>-</td>
</tr>
<tr>
<td>Office/Med Residential</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2.0</td>
<td>-</td>
<td>0.0</td>
</tr>
<tr>
<td>Public/Institutional</td>
<td>11</td>
<td>97</td>
<td>108</td>
<td>0.8</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Transit Village Medium</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1.1</td>
<td>-</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>659</td>
<td>2,282</td>
<td>1,717</td>
<td>4,658</td>
<td>14,170</td>
<td>0.6</td>
</tr>
</tbody>
</table>

| Total with UAFW(c)   |             |                 |       |                 |                                        |                                         |
|                      | 0.7         | 2.9             | 2.4   | 5.5             |                                        |                                         |

(a) Source: [WaterSystems_fromState_mod.shp](#), received from City staff. File was modified to include General Plan land use and only parcels inside the UGB were included.

(b) Source: [ExistingLandUse_Vacant.shp](#), received from City staff. File was modified to remove parcels that are located in pending developments, intensification and private water system areas.

(c) Includes 7.3 percent UAFW.
### Table ES-5. Average Day Water Demand Projections, mgd$^{(a)}$

<table>
<thead>
<tr>
<th>Development Category</th>
<th>2015</th>
<th>2018</th>
<th>2020</th>
<th>2025</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pending Developments</td>
<td>0.2</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Intensification—Downtown Station Area$^{(b)}$</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Intensification—North Santa Rosa Station Area$^{(c)}$</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Private Water Systems</td>
<td>0.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacant Inside City Limits</td>
<td></td>
<td>1.5</td>
<td>2.9</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Vacant Outside City Limits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td>Subtotal</td>
<td>0.2</td>
<td>1.4</td>
<td>5.1</td>
<td>6.5</td>
<td>9.6</td>
</tr>
<tr>
<td>Baseline Water Demand$^{(d)}$</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>20.2</td>
<td>21.4</td>
<td>25.1</td>
<td>26.5</td>
<td>29.6</td>
</tr>
</tbody>
</table>

$^{(a)}$ Includes 7.3 percent UAFW.

$^{(b)}$ Source: Appendix G of Downtown Station Area Specific Plan Draft Environmental Impact Report, City of Santa Rosa and DCE, February 2007.

$^{(c)}$ Source: Appendix D2 of North Santa Rosa Station Area Specific Plan Draft Environmental Impact Report, PMC, April 2012.

$^{(d)}$ Based on historical average water purchased/produced from 2002-2012.
Executive Summary

ES.2.7 Recommended Future Water Demand Projection

It is recommended that the City adopt the land used based water demand projection for this Water Master Plan Update because it is consistent with the projected water demand from the City’s 2010 UWMP. In addition, with the land use based water demand projection, GIS parcel data can be used to spatially locate projected water demands for the hydraulic evaluation of the future water system. This would provide a more accurate future water system demand allocation into the City’s hydraulic model.

The projected future water demands are summarized in Table ES-6.

Table ES-6. Summary of Recommended Water Demand Projections at Buildout

<table>
<thead>
<tr>
<th>Demand Condition</th>
<th>Peaking Factor</th>
<th>Buildout (2035) Water Demand, mgd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Day</td>
<td>--</td>
<td>29.6</td>
</tr>
<tr>
<td>Average Day During Maximum Month</td>
<td>1.5</td>
<td>44.4</td>
</tr>
<tr>
<td>Maximum Day</td>
<td>2.0</td>
<td>59.2</td>
</tr>
<tr>
<td>Peak Hour</td>
<td>3.5</td>
<td>103.6</td>
</tr>
</tbody>
</table>

ES.3 WATER SYSTEM SERVICE AND PERFORMANCE STANDARDS (CHAPTER 3)

Chapter 3 defines the recommended water system service and performance standards for evaluating the capacity and performance of the City’s potable water distribution system. These standards are summarized in Table ES-7 and include recommendations for the required fire flow and flow duration, firm pumping capacity, storage capacity, minimum and maximum system pressures, and maximum pipeline velocity and head loss. Chapter 3 also includes a description of the City’s emergency groundwater supply plan to describe the potential outage scenarios, durations and approach to meet minimum health and safety water demands during an emergency outage condition.
A booster pump station is defined as critical if it provides service to pressure zone(s) without sufficient fire or emergency storage or meets the following criteria:

- Maximum allowable pressure of 120 psi was adopted in the City of Santa Rosa Water System Design Standards, September 10, 2002.
- A facility that provides the sole source of water to a single or multiple pressure zones and/or service areas; or
- A facility that provides water from a supply turnout.

### FACILITIES SIZING

#### Water Transmission and Distribution Pipelines

<table>
<thead>
<tr>
<th>Component</th>
<th>Criteria</th>
<th>Note(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Pipeline Diameter</td>
<td>8-inch, 12-inch for multi-family residential, commercial, and industrial developments with more than two units</td>
<td>Locate new distribution pipelines within designated utility corridors wherever possible.</td>
</tr>
<tr>
<td>Maximum Velocity in Transmission Pipelines 16-inch diameter and greater, Normal Operating Conditions</td>
<td>5 fps</td>
<td>Criteria based on requirements for new development.</td>
</tr>
<tr>
<td>Maximum Velocity in Distribution Pipelines under 16-inch diameter, Normal Operating Conditions</td>
<td>8 fps</td>
<td>Existing distribution mains will be evaluated on case-by-case basis. Evaluation will include age, material type, velocity, head loss, and pressure.</td>
</tr>
<tr>
<td>Maximum Velocity - Fire Flow Conditions</td>
<td>10 fps</td>
<td></td>
</tr>
<tr>
<td>Maximum Velocity - Service Laterals</td>
<td>15 fps</td>
<td>Water service laterals are not typically evaluated during a master planning effort.</td>
</tr>
<tr>
<td>Hazen Williams &quot;C&quot; Factor</td>
<td>130 to 140</td>
<td>For consistency in hydraulic modeling.</td>
</tr>
</tbody>
</table>

#### Pumping Facility Capacity

- Firm pumping capacity equal to maximum day demand in zones with storage and equal to maximum day demand plus fire flow or peak hour demand, whichever is larger, in zones without storage.
- Firm pumping capacity defined as the total capacity of all pumps serving a pressure zone minus the capacity of the largest pumping unit. However, for pressure zones served by stations equipped with spare pump(s), the firm capacity is equal to the total pumping capacity without accounting for the capacity from the spare pump(s). Pumps located in lower pressure zones must deliver the largest demand requirement of all pressure zones above them.

#### Distribution System Pressures

<table>
<thead>
<tr>
<th>Component</th>
<th>Criteria</th>
<th>Note(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Pressure - Normal Operating Conditions</td>
<td>Maximum Day Demand: 40 psi at customer service connection</td>
<td>New services with pressure less than 35 psi require an individual booster pump.</td>
</tr>
<tr>
<td>Maximum Pressure</td>
<td>120 psi</td>
<td>New services with pressure greater than 80 psi require an individual pressure regulating device.</td>
</tr>
<tr>
<td>Minimum Pressure - Fire Flow Conditions</td>
<td>20 psi</td>
<td></td>
</tr>
</tbody>
</table>

#### Water Storage Capacity

<table>
<thead>
<tr>
<th>Component</th>
<th>Criteria</th>
<th>Note(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Storage</td>
<td>25 percent of the maximum day demand</td>
<td></td>
</tr>
<tr>
<td>Fire Storage</td>
<td>Fire flow demand for the most severe fire recommended in the pressure zone multiplied by the recommended duration</td>
<td></td>
</tr>
<tr>
<td>Emergency Storage</td>
<td>Two times the average day demand</td>
<td>On-site generator for critical stations.</td>
</tr>
</tbody>
</table>

#### Water Transmission and Distribution Pipelines

- Polyvinyl Chloride or Ductile Iron | For consistency in hydraulic modeling. |
Executive Summary

Chapter 4 develops protocols for updating the City’s hydraulic model so that it can be performed efficiently and on a regular updating schedule. West Yost developed hydraulic model management and documentation protocols with input from City staff. The recommended process is presented on Figure ES-4.

ES.4.1 Summary of Recent Hydraulic Model Update Performed for the Water Master Plan Update

As a part of this Water Master Plan Update effort, the City’s hydraulic model was first updated to maintain a one-to-one relationship with the City’s water system AutoCAD/GIS pipeline data. Some of the additional tasks performed to update the City’s hydraulic model included:

- Reviewing pipeline network connectivity
- Assigning pipeline roughness C-factors
- Incorporating facilities and assigning facility controls
- Allocating elevations and water demands

ES.4.2 Recommended Hydraulic Model Management and Documentation Protocols

Effective and successful hydraulic model management requires (1) updates that are scheduled to be performed regularly, (2) clear communication between City staff from different departments/divisions and between City staff and the consultant updating the hydraulic model, and (3) efficient data management.

ES.4.3 Update Schedule

Based on discussions with City staff, it was agreed that routine hydraulic model updates would initially be performed on a quarterly basis (in March, June, September and December) and can be adjusted in the future to better meet the City’s needs. The first quarterly hydraulic model update is scheduled for September 2014.

ES.5 EVALUATION OF EXISTING WATER SYSTEM (CHAPTER 5)

ES.5.1 Overview

Chapter 5 presents the evaluation of the City’s existing water distribution system (see Figure ES-5), and its ability to meet recommended water system service and performance standards under various existing water demand conditions.

ES.5.2 Evaluation Criteria

The City’s existing water system was evaluated based on the criteria described in Chapter 3 Water System Service and Performance Standards (see Table ES-7).
ES.5.3 Summary of Findings and Recommended Improvements for the Existing Water System

Findings from the evaluation of the existing water system and the recommended near-term improvements needed to eliminate deficiencies are summarized below and illustrated on Figure ES-6. However, the specific locations for the recommended groundwater wells are not shown on Figure ES-6 as they have not been determined yet (only general locations have been identified).

ES.5.3.1 Pumping Capacity

- Replace booster pumps at Station S3 with a total pumping capacity of 3,000 gallons per minute (gpm) to mitigate fire flow deficiencies in R4 and R17 Pressure Zones.  
- Replace booster pumps at Station S13 with a total dynamic head of approximately 320 feet and a firm capacity of 1,500 gpm to mitigate fire flow deficiencies in R14 Pressure Zone (which is supported by R13 Pressure Zone).
- Replace booster pumps at Station S14 with a total dynamic head of approximately 235 feet and a firm capacity of 1,500 gpm to mitigate fire flow deficiencies in R14 Pressure Zone.

ES.5.3.2 Pipelines: Peak Hour Demand and Maximum Day Demand

All deficiencies identified by the evaluation of the existing system under peak hour and maximum day demand conditions are related to service locations above the maximum topographic elevation to which the City can provide service at either 35 psi or 40 psi, under a peak hour or maximum day demand, respectively. Therefore, replacing existing pipelines with larger-diameter pipelines would not mitigate any of the identified deficiencies. To mitigate these very localized and/or individual service connection pressure deficiencies, it is recommended that individual booster pumps be installed in these identified low pressure areas.

ES.5.3.3 Pipelines: Maximum Day Demand Plus Fire Flow

- Replace pipelines and/or install new pipelines to mitigate fire flow deficiencies as recommended in Table ES-8.

---

2 Station S3 feeds Reservoir R3, which is the supply for Station S18. Station S18 pumps into Pressure Zone R17. Zone R17 can feed Zone R16 through PRC 47, and Zone R16 can feed Zone R4 through PRC 46.
## Table ES-8. Near-Term Fire Flow Mitigation Recommendations

<table>
<thead>
<tr>
<th>CIP Group</th>
<th>Existing Diameter</th>
<th>New Diameter</th>
<th>Length</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF EX CIP021</td>
<td>NA</td>
<td>8</td>
<td>540</td>
<td>Foley Street dead end to the 12-inch pipeline on Frances Street</td>
<td>This new pipeline loops the existing dead end pipeline on Foley Street. Based on a subsequent analysis performed on May 16, 2014, the recommended Cleveland Avenue water main replacement project precludes the need for this new pipeline.</td>
</tr>
<tr>
<td>FF EX CIP022</td>
<td>6</td>
<td>8</td>
<td>276</td>
<td>Agnew Place between 9th Street and 4-inch mains near Hydrant 1965</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP022</td>
<td>6</td>
<td>8</td>
<td>273</td>
<td>Bear Place between 9th Street and 4-inch mains near Hydrant 1449</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP023</td>
<td>6</td>
<td>8</td>
<td>778</td>
<td>Eardley Avenue between College Avenue and Tomayo Way</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP024</td>
<td>NA</td>
<td>8</td>
<td>210</td>
<td>Dutton Avenue from Duncan Street south to end of pipeline on Dutton Avenue near Apple Creek Lane</td>
<td>This new pipeline creates a connection that improves fire flow on Apple Creek Lane (2,015 gpm), where the fire flow requirement is 2,500 gpm.</td>
</tr>
<tr>
<td>FF EX CIP025</td>
<td>6</td>
<td>8</td>
<td>264</td>
<td>Sovereign Lane between Donahue Avenue and Westgate Circle</td>
<td>Current fire flow on Tudor Court (2,332 gpm) and Monarch Court (2,151 gpm) in this mobile home park is sufficient for single family residential, but not for multi-family residential. While 2,500 gpm can be obtained by opening two hydrants, the model indicates that the residual pressure would drop to 13 psi.</td>
</tr>
<tr>
<td>Pressure Zone A3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP031</td>
<td>4</td>
<td>8</td>
<td>396</td>
<td>McMinn Avenue from Sunset to Hughes Avenue</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP031</td>
<td>6</td>
<td>8</td>
<td>366</td>
<td>Delport Avenue between West Avenue and Stroven Lane</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP032</td>
<td>6</td>
<td>8</td>
<td>114</td>
<td>Sebastopol Rd from Timothy Rd to Roberts Ave</td>
<td>This project resolves fire flow deficiencies on Roberts Ave and Hotbrook St.</td>
</tr>
<tr>
<td>FF EX CIP041</td>
<td>NA</td>
<td>8</td>
<td>18</td>
<td>Salem Avenue at Elliott Avenue, connecting the proposed CIP 8-inch pipeline on Salem Ave to the existing 14-inch pipeline on Elliott Ave.</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP041</td>
<td>4</td>
<td>8</td>
<td>88</td>
<td>Albany Drive between Oliver Lane and Richmond Dr</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP041</td>
<td>4</td>
<td>8</td>
<td>247</td>
<td>Albany Drive between Richmond Dr and Clement Ave</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP041</td>
<td>4</td>
<td>8</td>
<td>249</td>
<td>Albany Drive between Clement Ave and Victor Dr</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP041</td>
<td>6</td>
<td>8</td>
<td>250</td>
<td>Clement Avenue between Albany Drive and Malano Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP041</td>
<td>6</td>
<td>8</td>
<td>468</td>
<td>Salem Avenue between Elliott Avenue and Clement Avenue</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP041</td>
<td>4</td>
<td>8</td>
<td>364</td>
<td>Clement Avenue between Malano Court and Emeritus Circle, and east of Emeritus Circle</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP042</td>
<td>6</td>
<td>8</td>
<td>144</td>
<td>Hidden Valley Dr from Moss Rock Rd to Winding Ridge Rd</td>
<td>After rezoning, this pipeline will be in Zone R4R3.</td>
</tr>
<tr>
<td>FF EX CIP042</td>
<td>6</td>
<td>8</td>
<td>650</td>
<td>Hidden Valley Drive from Parsons Drive to Moss Rock Court</td>
<td>After rezoning, this pipeline will be in Zone R4R3.</td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>6</td>
<td>8</td>
<td>56</td>
<td>Haven Drive between Hawthorne Court and Iris Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>70</td>
<td>Geary Drive between James Avenue and Finline Street</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>125</td>
<td>Haven Drive between Eleanor Avenue and Hawthorne Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>213</td>
<td>Geary Drive between Bryden Lane and James Avenue</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>223</td>
<td>Eleanor Avenue between Haven Drive and Belmont Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>237</td>
<td>Augustan Avenue between Haven Drive and Belmont Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>6</td>
<td>8</td>
<td>247</td>
<td>Geary Drive between James Avenue and Finline Street</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>8</td>
<td>8</td>
<td>258</td>
<td>E Foot Hill Drive between E Haven Dr and Thomas Dr</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>292</td>
<td>Haven Drive between Augustan Avenue and Eleanor Avenue</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>6</td>
<td>8</td>
<td>307</td>
<td>Haven Drive between Eleanor Avenue and Hawthorne Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>6</td>
<td>8</td>
<td>395</td>
<td>Haven Drive between Iris Court and E Foot Hill Drive</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>6</td>
<td>8</td>
<td>538</td>
<td>Shadow Drive between Norte Way and E Foot Hill Dr</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>6</td>
<td>8</td>
<td>643</td>
<td>Diamond Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>731</td>
<td>Elizabeth Way between Town and Country Drive and Parsons Drive</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP043</td>
<td>4</td>
<td>8</td>
<td>824</td>
<td>Haven Drive between 4th Street and Augustan Avenue</td>
<td></td>
</tr>
</tbody>
</table>

City of Santa Rosa
Winter Master Plan Update
## Table ES-8. Near-Term Fire Flow Mitigation Recommendations

<table>
<thead>
<tr>
<th>CIP Group</th>
<th>Existing Diameter</th>
<th>New Diameter</th>
<th>Length</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF EX CIP051</td>
<td>4</td>
<td>8</td>
<td>414</td>
<td>Raegan Way between Tallot Avenue and Alderbrook Drive</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>677</td>
<td>Gilbert Drive between Montgomery Drive and Leonard Avenue</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>232</td>
<td>Sherwood Drive between Leonard Avenue and Little Jon Ln</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>290</td>
<td>Sherwood Drive between Little John Ln and Marian Ln</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>113</td>
<td>Sherwood Drive between Marian Ln and Sherwood Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>319</td>
<td>Sherwood Drive between Marian Ln and Sherwood Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>118</td>
<td>Leonard Avenue between Alderbrook Drive and Sherwood Drive</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP052</td>
<td>4</td>
<td>8</td>
<td>298</td>
<td>Doctors Park Dr, east side of loop north of Spring Creek Drive</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP052</td>
<td>6</td>
<td>8</td>
<td>951</td>
<td>Church Street between Sonoma Avenue and Spring Creek Drive</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP053</td>
<td>12</td>
<td>422</td>
<td>Farmers Lane between Hain Avenue and Vallejo Street</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP053</td>
<td>6</td>
<td>12</td>
<td>156</td>
<td>Vallejo Street between Farmers Lane and Mt Olive Drive</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP053</td>
<td>6</td>
<td>8</td>
<td>206</td>
<td>Vallejo Street between Mt Olive Drive and Melbrook Way (East)</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP053</td>
<td>6</td>
<td>8</td>
<td>804</td>
<td>Vallejo Street between Melbrook Way (East) and Melbrook Way (West)</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP053</td>
<td>6</td>
<td>12</td>
<td>696</td>
<td>Mt Olive Drive between Vallejo Street and Mt Olive Court</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP064</td>
<td>4</td>
<td>8</td>
<td>46</td>
<td>Gatr Court at Sonoma Avenue</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>625</td>
<td>Aston Ave from Hendley St to Miraa Ln</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP051</td>
<td>6</td>
<td>8</td>
<td>440</td>
<td>Valley Oaks Dr from Valley Lakes Dr to Valley Oaks Pl</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP052</td>
<td>6</td>
<td>8</td>
<td>204</td>
<td>Autumn Leaf Dr from Autumn Leaf Pl to Mockingbird Dr</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP052</td>
<td>6</td>
<td>8</td>
<td>550</td>
<td>Rockgreen Pl from Fairfield Dr to loop</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP052</td>
<td>6</td>
<td>8</td>
<td>719</td>
<td>Fairfield Dr from White Oak Dr to Rockgreen Pl</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP052</td>
<td>6</td>
<td>8</td>
<td>431</td>
<td>Surniture Dr, north from Oakmont Dr (west of Deerfield Circle)</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP922</td>
<td>6</td>
<td>12</td>
<td>59</td>
<td>Meadowridge Dr from Stony Bridge Rd to Aspen Meadows Cir</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP927</td>
<td>6</td>
<td>12</td>
<td>623</td>
<td>Woodgreen St from Oakmont Dr to Hydrant on Woodgreen St.</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP923</td>
<td>10</td>
<td>12</td>
<td>606</td>
<td>Fountain Grove Parkway, east of Fir Ridge Drive.</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP923</td>
<td>10</td>
<td>12</td>
<td>606</td>
<td>Pump Station S3</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>6</td>
<td>8</td>
<td>93</td>
<td>162 Cobblestone Dr</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>6</td>
<td>8</td>
<td>93</td>
<td>127 Cobblestone Dr</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>6</td>
<td>10</td>
<td>163 Cobblestone Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>6</td>
<td>10</td>
<td>191 Chanate Rd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>6</td>
<td>10</td>
<td>193 Chanate Rd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>10</td>
<td>16</td>
<td>270 Chanate Rd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>10</td>
<td>16</td>
<td>339 Chanate Rd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP950</td>
<td>10</td>
<td>16</td>
<td>372 Chanate Rd</td>
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<tr>
<td>FF EX CIP950</td>
<td>10</td>
<td>16</td>
<td>392 Chanate Rd</td>
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<tr>
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<td>10</td>
<td>16</td>
<td>762 Chanate Rd</td>
<td></td>
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<tr>
<td>CIP Group</td>
<td>Old Diameter</td>
<td>New Diameter</td>
<td>Length</td>
<td>Location</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------</td>
<td>--------------</td>
<td>--------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>Pressure Zone R4R1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>6 12</td>
<td>133</td>
<td>Deer Park Dr, southwest from Shallow Creek Dr toward Sleepy Hollow Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>156</td>
<td>Bonita Vista Ln, between Sleepy Hollow Dr and Bonnie Ln</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>160</td>
<td>Bonita Vista Ln, north from Bonnie Ln</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>205</td>
<td>Sleepy Hollow Dr from Bonita Vista Ln to Sleepy Hollow Ct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>6 12</td>
<td>216</td>
<td>Deer Park Dr, northeast from Sleepy Hollow Dr toward Shallow Creek Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>237</td>
<td>Sleepy Hollow Dr from Deer Park Dr to Aaron Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>431</td>
<td>Sleepy Hollow Dr from Deer Park Dr to Sleepy Hollow Ct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>478</td>
<td>Sleepy Hollow Dr from Parker Hill Rd to Aaron Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>618</td>
<td>Bonita Vista Ln, from Chanate Rd to Bonnie Ln</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP952</td>
<td>8 12</td>
<td>740</td>
<td>Bonita Vista Ln, south from Sleepy Hollow Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R4R2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP953</td>
<td>6 8</td>
<td>147</td>
<td>Stonecrest Ct from Encina Ct to hydrant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP953</td>
<td>6 8</td>
<td>235</td>
<td>Miramont Dr from Buena Vista Dr to Stonecrest Ct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP953</td>
<td>6 8</td>
<td>281</td>
<td>Miramont Dr from Stonecrest Ct to Encina Ct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP953</td>
<td>8 12</td>
<td>55</td>
<td>Terra Linda Dr southeast from PRC 43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP953</td>
<td>6 12</td>
<td>275</td>
<td>Terra Linda Dr from Terra Linda Ct to Buena Vista Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP953</td>
<td>6 12</td>
<td>1,039</td>
<td>Terra Linda Dr between PRC 43 and Terra Linda Ct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP953</td>
<td>6 12</td>
<td>1,353</td>
<td>Buena Vista Dr from Terra Linda Dr to Miramont Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP945</td>
<td>8 16</td>
<td>215</td>
<td>Woodview Dr from Westline Ct, northeast toward Reservoir R10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP945</td>
<td>10 16</td>
<td>296</td>
<td>Woodview Dr southeast from Reservoir R10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP945</td>
<td>10 16</td>
<td>323</td>
<td>Woodview Dr north from Reservoir R10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP945</td>
<td>12 16</td>
<td>410</td>
<td>Skycrest Way, south of Skycrest Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP945</td>
<td>8 16</td>
<td>774</td>
<td>Woodview Dr from Deer Hollow Ln to Westline Ct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP945</td>
<td>12 16</td>
<td>1,659</td>
<td>North of Reservoir R10 from Woodview Dr to Skycrest Way</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP101</td>
<td></td>
<td></td>
<td>Pump Station S10</td>
<td>Install On-Site Generator.</td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP925</td>
<td>6 8</td>
<td>453</td>
<td>Singing Woods Ln from Oak Mesa Dr to Coney Dr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP925</td>
<td>6 8</td>
<td>492</td>
<td>Oak Mesa Pl from Oak Mesa Dr to Singing Woods Ln</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP925</td>
<td>6 8</td>
<td>917</td>
<td>Coney Dr from Overlook Dr to Singing Woods Ln</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP132</td>
<td>6 8</td>
<td>866</td>
<td>Northwest of Pump Station S13</td>
<td>Mitigate fire flow deficiencies in R13 Pressure Zone.</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP199</td>
<td>6 8</td>
<td>757</td>
<td>Northwest of Pump Station S13</td>
<td>Beyond pipe replacement recommended in FF EX CIP132</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP133</td>
<td></td>
<td></td>
<td>Pump Station S13</td>
<td>Replace booster pumps with a total dynamic head of approximately 320 feet and a firm pumping capacity of 1,500 gpm to mitigate fire flow deficiencies in R14 Pressure Zone (which is supported by R13 Pressure Zone).</td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R13R1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP20</td>
<td>6 8</td>
<td>524</td>
<td>Coney Ct from Wild Oak Dr to end</td>
<td>An alternative is to raise setting of PRC 16, but the static pressure at the intersection of Coney Ct and Wild Oak Dr is 99 psi. Another alternative is to install an emergency connection or hydrant to the Aqueduct at SCWA Annadel Tank, which is about 85 feet from the end of Coney Ct.</td>
<td></td>
</tr>
<tr>
<td>FF EX CIP20</td>
<td>6 8</td>
<td>984</td>
<td>Wild Oak Dr from PRC 16 to Coney Ct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF EX CIP141</td>
<td></td>
<td></td>
<td>Pump Station S14</td>
<td>Replace booster pumps with a total dynamic head of approximately 235 feet to mitigate fire flow deficiencies in R14 Pressure Zone.</td>
<td></td>
</tr>
</tbody>
</table>
Executive Summary

ES.5.3.4 System Operations

- Rezone Hidden Valley Road from Parsons Drive to Hollow Tree Court from Zone A4 to Zone R4R3 to mitigate fire flow deficiencies in A4 Pressure Zone. To mitigate the resultant high pressures to some service connections located in the lower service elevations, individual pressure reducing valves can be installed at specific service connections, or a master pressure reducing valve can be installed at Hidden Valley Road, south of Winding Ridge Road.

- Increase the pressure setting on PRC 25 by 10 psi to mitigate low pressures in Pressure Zone R2R1 or install individual booster pumps on service lines along Moss Hollow Court.

- Install booster pumps on individual service lines for service elevations exceeding their Pressure Zone’s normal service range.

ES.5.3.5 Backup Power

- Install on-site backup power generators at Stations S3 and S10 to improve the reliability of these pumping facilities during a fire flow or emergency condition.

ES.5.3.6 Groundwater Wells

- Construct one emergency well in the Oakmont/S-12 Master Zone to help mitigate the pumping and storage capacity deficit in the R15 Pressure Zone. This improvement corresponds to project GW-A-007 from the City’s 2013 Groundwater Master Plan.

- Construct one emergency well in the S-6 Master Zone to help mitigate the storage capacity deficit in the R6 Pressure Zone. This improvement corresponds to project GW-B-002 from the City’s 2013 Groundwater Master Plan.

ES.6 EVALUATION OF FUTURE WATER SYSTEM AT BUILDOUT (CHAPTER 6)

ES.6.1 Overview

Chapter 6 presents the evaluation of the City’s future expanded water distribution system, and its ability to meet recommended water system service and performance standards under various projected water demand conditions. The evaluation of the City’s future water distribution system assumes the adoption and implementation of the recommendations made in Chapter 5 Evaluation of Existing Water System.

ES.6.2 Evaluation Criteria

The City’s future water system was evaluated based on the criteria described in Chapter 3 Water System Service and Performance Standards (see Table ES-7).
ES.6.3 Future Pipelines at Buildout

New distribution pipelines were added to the hydraulic model in areas where future potable water demands were indicated by the water use projections in Chapter 2. Figure ES-7 presents the recommended new distribution pipelines (in red) to serve projected demands.

ES.6.4 Future Potable Water Demands at Buildout

Table ES-9 summarizes the potable water demands used for the buildout water system evaluation by pressure zone. The future water demands were spatially allocated into the hydraulic model using water use projections described in Chapter 2. The City’s future average demands are expected to increase by approximately 48 percent from the existing water demand.

Most of the projected growth will occur in the southwest portion of the City’s Aqueduct Pressure Zone, in the northeast area of the City’s Hillside Pressure Zones, and in the southeast portion of the City’s Hillside Pressure Zones.
## Table ES-9. Future Potable Water Demands by Pressure Zone

<table>
<thead>
<tr>
<th>Pressure Zone(s)</th>
<th>Average Day Demand&lt;sup&gt;(a)&lt;/sup&gt;</th>
<th>Maximum Day Demand&lt;sup&gt;(b)&lt;/sup&gt;</th>
<th>Peak Hour Demand&lt;sup&gt;(c)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>gpm</td>
<td>mgd</td>
<td>gpm</td>
</tr>
<tr>
<td>Aqueduct Zone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>2,684</td>
<td>3.86</td>
<td>5,367</td>
</tr>
<tr>
<td>A2</td>
<td>3,060</td>
<td>4.41</td>
<td>6,120</td>
</tr>
<tr>
<td>A3</td>
<td>3,409</td>
<td>4.91</td>
<td>6,917</td>
</tr>
<tr>
<td>A4</td>
<td>1,161</td>
<td>1.67</td>
<td>2,322</td>
</tr>
<tr>
<td>A5</td>
<td>1,571</td>
<td>1.97</td>
<td>2,743</td>
</tr>
<tr>
<td>A6</td>
<td>1,699</td>
<td>2.45</td>
<td>3,398</td>
</tr>
<tr>
<td>A8</td>
<td>333</td>
<td>0.48</td>
<td>666</td>
</tr>
<tr>
<td>A9</td>
<td>10</td>
<td>0.01</td>
<td>21</td>
</tr>
<tr>
<td><strong>Aqueduct Zone Subtotal</strong></td>
<td>13,727</td>
<td>19.77</td>
<td>27,453</td>
</tr>
<tr>
<td>Hillside Zones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fountaingrove 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1, R1R1</td>
<td>216</td>
<td>0.31</td>
<td>432</td>
</tr>
<tr>
<td>Fountaingrove 2</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>R2, R2R1, R2R2, R2R3, R2R4</td>
<td>521</td>
<td>0.75</td>
<td>1,043</td>
</tr>
<tr>
<td>Fountaingrove 3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>124</td>
<td>0.18</td>
<td>249</td>
</tr>
<tr>
<td>Skyfarm</td>
<td>66</td>
<td>0.09</td>
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<tr>
<td><strong>Fountaingrove and Skyfarm Subtotal</strong></td>
<td>927</td>
<td>1.34</td>
<td>1,855</td>
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<tr>
<td>Montecito High Level</td>
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<td></td>
<td></td>
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<tr>
<td>R4, R4R1, R4R2, R4R3, R4R4</td>
<td>601</td>
<td>0.95</td>
<td>1,222</td>
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<tr>
<td>Fountaingrove Unit 2 Lower Level</td>
<td></td>
<td></td>
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<tr>
<td>R16</td>
<td>25</td>
<td>0.04</td>
<td>49</td>
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<tr>
<td>Fountaingrove Unit 2 High Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R17, R17R1</td>
<td>281</td>
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<td>552</td>
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<tr>
<td><strong>Montecito and Fountaingrove Unit 2 Subtotal</strong></td>
<td>947</td>
<td>1.36</td>
<td>1,893</td>
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<tr>
<td>Rincon Reduced</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>R8, R8R1</td>
<td>2,022</td>
<td>2.91</td>
<td>4,043</td>
</tr>
<tr>
<td>Rincon High Level</td>
<td></td>
<td></td>
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<tr>
<td>R7</td>
<td>621</td>
<td>0.89</td>
<td>1,242</td>
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<tr>
<td>Los Alamos</td>
<td>114</td>
<td>0.16</td>
<td>228</td>
</tr>
<tr>
<td><strong>Rincon and Los Alamos Subtotal</strong></td>
<td>2,757</td>
<td>3.97</td>
<td>5,513</td>
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<tr>
<td>Bennett High Level&lt;sup&gt;(d)&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(includes Valley View and Bennett View Areas)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R9, R9R1</td>
<td>1,416</td>
<td>2.04</td>
<td>2,831</td>
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<tr>
<td><strong>Bennett and Fairway Subtotal</strong></td>
<td>1,437</td>
<td>2.07</td>
<td>2,874</td>
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<tr>
<td>Fairway</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>R10</td>
<td>22</td>
<td>0.03</td>
<td>43</td>
</tr>
<tr>
<td><strong>Bennett and Fairway Subtotal</strong></td>
<td>1,437</td>
<td>2.07</td>
<td>2,874</td>
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<tr>
<td>Southeast Zone 2</td>
<td></td>
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<tr>
<td>R11</td>
<td>906</td>
<td>1.30</td>
<td>1,812</td>
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<tr>
<td><strong>Southeast Subtotal</strong></td>
<td>516</td>
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<tr>
<td>Oakmont High Level</td>
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<td></td>
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<tr>
<td>R12</td>
<td>353</td>
<td>0.51</td>
<td>706</td>
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<td>Wild Oak</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R13, R13R1</td>
<td>19</td>
<td>0.28</td>
<td>39</td>
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<tr>
<td>Wild Oak Upper Level</td>
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<td></td>
<td></td>
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<tr>
<td>R14, R14R1</td>
<td>20</td>
<td>0.30</td>
<td>40</td>
</tr>
<tr>
<td>Meadow Ridge/Oakmont</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R15</td>
<td>25</td>
<td>0.04</td>
<td>50</td>
</tr>
<tr>
<td><strong>Oakmont and Wild Oak Subtotal</strong></td>
<td>307</td>
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<td>612</td>
</tr>
<tr>
<td><strong>Hillside Zones Subtotal</strong></td>
<td>6,781</td>
<td>9.78</td>
<td>13,582</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20,517</td>
<td>29.6</td>
<td>41,035</td>
</tr>
</tbody>
</table>

<sup>(a)</sup> Existing demand is based on water meter records and adjusted to reflect average water purchased between 2002-2012. Additional 2035 water use from new development, intensification, and private water systems were based on data provided by the City, as described in Chapter 2 of this report, and on 2010 UWMP demand projections. Water meter records were spatially located and then aggregated by pressure zone. Source of water meter record data was from WaterMeters_geocode.shp file provided by the City.

<sup>(b)</sup> Maximum day demand calculated using a peaking factor of 2.0 times the average day demand.

<sup>(c)</sup> Peak hour demand calculated using a peaking factor of 3.5 times the average day demand.

<sup>(d)</sup> Valley View and Bennett View areas are served privately by others. The City has capacity to incorporate them into the City's water system at buildout. The estimated average demand for Valley View is 73 gpm, and the estimated average demand for Bennett View is 41 gpm.
ES.6.5 Water Distribution System Performance Evaluation

ES.6.5.1 Evaluation of Pumping Capacity at Buildout

The City’s pumping facilities are used to deliver water to pressure zones that cannot be supplied directly from the SCWA Aqueduct. Currently, the City operates twenty booster pump stations to deliver water to the City’s Hillside Pressure Zones. The evaluation of required pumping capacity at buildout indicates that no additional pumping capacity is recommended to meet the pumping capacity requirements at buildout. However, it should be noted that a new pump station, designated as S9B, was recommended in a previous study to provide operational flexibility and emergency supply reliability to R9 Pressure Zone and has been included in this buildout pumping capacity evaluation. Details regarding this recommendation are presented in Appendix D. While no significant pumping deficiencies are indicated, deficiencies in system storage capacity, as discussed below, may require the upsizing of a specific pump station in lieu of providing additional storage.

ES.6.5.2 Evaluation of Storage Capacity at Buildout

The City’s Aqueduct Pressure Zone has a projected storage capacity deficit of approximately 3.1 MG. This storage deficiency could be mitigated by re-engaging the use of the Proctor Heights Tanks. If these tanks are re-activated to serve the future storage deficiency, additional hydraulic study to optimize the operation of these tanks is recommended.

Pump station upgrades are recommended in R7 and R17 Pressure Zones to meet projected buildout demand conditions. However, the timing of these upgrades will depend on the pace of eventual buildout in these areas.

ES.6.5.3 Peak Hour Demand and Maximum Day Demand

All deficiencies identified are related to service locations above the maximum topographic elevation to which the City can provide service at either 35 psi or 40 psi, under a peak hour or maximum day demand, respectively. Therefore, replacing existing pipelines with larger-diameter pipelines would not mitigate any of the identified deficiencies. To mitigate these very localized and/or individual service connection pressure deficiencies, it is recommended that individual booster pumps be installed in these identified low pressure areas.

Some areas near Reservoir R6 for which new development is projected by buildout (Harville Road, Creekmont Court) are above the maximum elevation that can be served by the current facilities serving Pressure Zone R6. Individual booster pumps are recommended for any new development in this zone above an elevation of 332 feet.

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3 Station S4 includes three locations—S4, S4R and S4B.
ES.6.6 Summary of Findings and Recommended Improvements for the Buildout Water System

Findings from the evaluation of the buildout water distribution system and the recommended improvements needed to eliminate deficiencies are presented in Table ES-10 and summarized below.

ES.6.6.1 Pumping Capacity

- Replace booster pumps at Station S7 with a firm pumping capacity of 3,200 gpm and design head of 170 feet to mitigate projected storage deficiencies in R7 Pressure Zone. NOTE: Under current existing conditions, when running any pumps at Station S7, Station S6 must be running simultaneously in order to avoid severely low pressures in the Sullivan Way area in R6 Pressure Zone. While this recommendation involves increasing the pumping capacity at Station S7, it should be noted that doing so will not alleviate the need to run Station S6 simultaneously.

- Replace booster pumps at Station S17 with a firm pumping capacity of 1,300 gpm and design head of 200 feet to mitigate projected storage deficiencies in R17 Pressure Zone.

- Construct new Pump Station S9B for purposes of redundancy and reliability, as presented in Appendix D to provide operational flexibility and emergency supply reliability to R9 Pressure Zone.

ES.6.6.2 Pipelines

- Recommendations for pipeline additions to serve future growth and intermediate-term improvements to meet fire flow requirements are presented in Table ES-10 and Figure ES-7.

ES.6.6.3 Groundwater Wells

- Construct six emergency wells in the Central City Master Zone to provide emergency storage. This improvement corresponds to projects GW-A-005, GW-A-006, GW-B-001 and GW-C-001 from the City’s 2013 Groundwater Master Plan.

- Construct two emergency wells in the S-6 Master Zone to provide emergency storage. This improvement corresponds to project GW-C-002 from the City’s 2013 Groundwater Master Plan.

- Construct one emergency well in the S-9 Master Zone to provide emergency storage. This improvement corresponds to project GW-B-003 from the City’s 2013 Groundwater Master Plan.
Table ES-10. Recommendations for Future System CIP Projects(a)

<table>
<thead>
<tr>
<th>Pressure Zone A1</th>
<th>Existing Diameter</th>
<th>New Diameter</th>
<th>Length</th>
<th>Location Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO CIP913</td>
<td>8</td>
<td>1,219</td>
<td></td>
<td>Aisling Dennis Ln from Pascal St to Bluegrass Ln</td>
</tr>
<tr>
<td>BO CIP915</td>
<td>6</td>
<td>243</td>
<td></td>
<td>Apache St from W. Steele Ln to Huron Ct</td>
</tr>
<tr>
<td>BO CIP916</td>
<td>6</td>
<td>483</td>
<td></td>
<td>Apple Valley Ln from W. Steele Ln to Rockwood Ct</td>
</tr>
<tr>
<td>FF IM CIP918</td>
<td>8</td>
<td>902</td>
<td></td>
<td>Millridge Ln from W. Steele Ln toward Terry Ln</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Zone A3</th>
<th>Existing Diameter</th>
<th>New Diameter</th>
<th>Length</th>
<th>Location Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO CIP900</td>
<td>8</td>
<td>2,831</td>
<td></td>
<td>Price Ave from Meroed Ave to S Wright Rd</td>
</tr>
<tr>
<td>BO CIP902</td>
<td>12</td>
<td>983</td>
<td></td>
<td>S Wright Rd from Price Ave to Miles Ave</td>
</tr>
<tr>
<td>BO CIP903</td>
<td>12</td>
<td>2,806</td>
<td></td>
<td>Miles Ave from Meroed Ave to S Wright Rd</td>
</tr>
<tr>
<td>BO CIP904</td>
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<td>810</td>
<td></td>
<td>Meroed Ave from Price Ave to Miles Ave</td>
</tr>
<tr>
<td>BO CIP905</td>
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<td>610</td>
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<td>Meroed Ave from Chico Ave to Price Ave</td>
</tr>
<tr>
<td>BO CIP907</td>
<td>12</td>
<td>1,725</td>
<td></td>
<td>Finley Ave from Golden Gate Ave to Finley Ave; Finley Ave from Finley Ave to west</td>
</tr>
<tr>
<td>BO CIP908</td>
<td>12</td>
<td>884</td>
<td></td>
<td>Finley Industrial Park</td>
</tr>
<tr>
<td>BO CIP911</td>
<td>12</td>
<td>902</td>
<td></td>
<td>Finley Industrial Park</td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>651</td>
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<td>Finley Industrial Park</td>
</tr>
<tr>
<td>BO CIP914</td>
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<td>2,462</td>
<td></td>
<td>S Wright Rd from Miss Ave to Madiera Ave</td>
</tr>
<tr>
<td>BO CIP915</td>
<td>12</td>
<td>1,045</td>
<td></td>
<td>Belvécue Ave - Stony Point Rd</td>
</tr>
<tr>
<td>BO CIP916</td>
<td>12</td>
<td>706</td>
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<td>Stony Point Rd from Ludewig Ave toward Yuba Dr</td>
</tr>
<tr>
<td>BO CIP917</td>
<td>12</td>
<td>4,563</td>
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<td>Ludewig Ave from Stony Point Rd to Fresno Ave</td>
</tr>
<tr>
<td>BO CIP918</td>
<td>8</td>
<td>820</td>
<td></td>
<td>Yuba Dr from Stony Point Rd to Ash Dr</td>
</tr>
<tr>
<td>BO CIP919</td>
<td>8</td>
<td>692</td>
<td></td>
<td>Yuba Dr from Fresno Ave toward Ash Dr</td>
</tr>
<tr>
<td>BO CIP920</td>
<td>8</td>
<td>342</td>
<td></td>
<td>Yuba Dr from Ash Dr toward Finley Ave</td>
</tr>
<tr>
<td>BO CIP921</td>
<td>8</td>
<td>902</td>
<td></td>
<td>Finley Ave from Yeager Dr to Yuba Dr</td>
</tr>
<tr>
<td>BO CIP922</td>
<td>8</td>
<td>1,307</td>
<td></td>
<td>Fresno Ave from Yuba Dr to Ludwig Ave</td>
</tr>
<tr>
<td>BO CIP923</td>
<td>12</td>
<td>2,435</td>
<td></td>
<td>Burbank Ave, north from Hanri Ave</td>
</tr>
<tr>
<td>BO CIP924</td>
<td>12</td>
<td>5,716</td>
<td></td>
<td>S Wright Rd from Madiera Ave to Ludwig Ave, and Ludwig Ave from S Wright Rd to Finso Ave</td>
</tr>
<tr>
<td>BO CIP925</td>
<td>12</td>
<td>2,966</td>
<td></td>
<td>Madiera Ave from S Wright Rd to Yeager Dr</td>
</tr>
<tr>
<td>BO CIP909</td>
<td>12</td>
<td>2,631</td>
<td></td>
<td>Moonland Ave from W Robles Ave to Todd Rd</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Pressure Zone A4</th>
<th>Existing Diameter</th>
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<th>Length</th>
<th>Location Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF IM CIP917</td>
<td>6</td>
<td>338</td>
<td></td>
<td>Schuman Dr from Mendocino Ave to Rowe Dr</td>
</tr>
<tr>
<td>BO CIP917</td>
<td>6</td>
<td>429</td>
<td></td>
<td>Meyers Dr from Steele Ln to Young Dr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Zone A5</th>
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<th>Length</th>
<th>Location Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO CIP908</td>
<td>12</td>
<td>1,522</td>
<td></td>
<td>Miller Rd south of Wintershaven Ave</td>
</tr>
<tr>
<td>BO CIP909</td>
<td>12</td>
<td>1,327</td>
<td></td>
<td>Miller Dr, through to Elisa Dr</td>
</tr>
<tr>
<td>BO CIP910</td>
<td>12</td>
<td>1,151</td>
<td></td>
<td>Future Miller Rd from Miller/Elisa to Future E Belvécue Ave</td>
</tr>
<tr>
<td>BO CIP911</td>
<td>12</td>
<td>1,054</td>
<td></td>
<td>Future E Belvécue Ave, east from end to Future Miller Rd</td>
</tr>
<tr>
<td>BO CIP912</td>
<td>12</td>
<td>1,213</td>
<td></td>
<td>E Robles Ave from Santa Rosa Ave to Brooks Ave</td>
</tr>
<tr>
<td>BO CIP913</td>
<td>12</td>
<td>3,046</td>
<td></td>
<td>Magnolia Ave from Brooks Ave, east toward Petaluma Hill Rd</td>
</tr>
<tr>
<td>BO CIP914</td>
<td>12</td>
<td>1,735</td>
<td></td>
<td>E Todd Rd, east from end</td>
</tr>
<tr>
<td>BO CIP915</td>
<td>12</td>
<td>2,842</td>
<td></td>
<td>Future Rd from Magnolia Ave to E Todd Rd</td>
</tr>
<tr>
<td>BO CIP916</td>
<td>12</td>
<td>2,559</td>
<td></td>
<td>Future Rd from E Belvécue Ave to Magnolia Ave</td>
</tr>
<tr>
<td>BO CIP917</td>
<td>12</td>
<td>1,273</td>
<td></td>
<td>Future E Belvécue Ave from Miller Rd to Petaluma Hill Rd</td>
</tr>
<tr>
<td>BO CIP918</td>
<td>12</td>
<td>2,448</td>
<td></td>
<td>Brooks Ave from E Robles Ave to Bucks Rd</td>
</tr>
<tr>
<td>BO CIP919</td>
<td>12</td>
<td>1,182</td>
<td></td>
<td>Bucks Rd from Santa Rosa Ave to Brooks Ave</td>
</tr>
<tr>
<td>BO CIP920</td>
<td>12</td>
<td>1,799</td>
<td></td>
<td>Franz Kafka Ave from Kawana Ter, south, then west to Petaluma Hill Rd</td>
</tr>
<tr>
<td>BO CIP921</td>
<td>12</td>
<td>1,080</td>
<td></td>
<td>Petaluma Hill Rd from Kawana Springs Rd to Yolanda Avene</td>
</tr>
<tr>
<td>FF IM CIP915</td>
<td>6</td>
<td>479</td>
<td></td>
<td>Astin Ave from Petaluma Hill Rd to John Richards Way</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Zone A6</th>
<th>Existing Diameter</th>
<th>New Diameter</th>
<th>Length</th>
<th>Location Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO CIP906</td>
<td>8</td>
<td>487</td>
<td></td>
<td>Peppenwood Rd from Bader Rd, north toward Alpco Drive</td>
</tr>
<tr>
<td>BO CIP907</td>
<td>8</td>
<td>328</td>
<td></td>
<td>Peppenwood Rd from Bader Rd to Volstit Rd</td>
</tr>
<tr>
<td>BO CIP908</td>
<td>8</td>
<td>402</td>
<td></td>
<td>Volstit Rd from Peppenwood Rd to Bader Rd</td>
</tr>
<tr>
<td>BO CIP909</td>
<td>8</td>
<td>791</td>
<td></td>
<td>Bader Rd from Volstit Rd to Peppenwood Rd</td>
</tr>
</tbody>
</table>

*aProponents.
*bCosts for this project are not included in the City's CIP costs because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.

cCosts for this project are not included in the City's CIP costs because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.
### Table ES-10. Recommendations for Future System CIP Projects

<table>
<thead>
<tr>
<th>CIP Group(a)</th>
<th>Existing Diameter</th>
<th>New Diameter</th>
<th>Length</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Zone R7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>321</td>
<td></td>
<td>Happy Valley Ave from Happy Valley Ctl to Happy Valley Rd</td>
<td>Costs for this project are not included in the City’s CIP because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.</td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>412</td>
<td></td>
<td>Happy Valley Ave from Montecito Ave to Happy Valley Ctl</td>
<td></td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>187</td>
<td></td>
<td>Happy Valley Ctl</td>
<td></td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>851</td>
<td></td>
<td>Happy Valley Rd from Happy Valley Ave to Montecito Ave</td>
<td></td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>477</td>
<td></td>
<td>Montecito Ave from Happy Valley Ave to Happy Valley Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>494</td>
<td></td>
<td>Montecito Ave from Happy Valley Rd toward Zieber Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>846</td>
<td></td>
<td>Montecito Ave from Ridgeway Dr to Happy Valley Ave</td>
<td></td>
</tr>
<tr>
<td>BO CIP912</td>
<td>8</td>
<td>1,028</td>
<td></td>
<td>Ridgeway Dr from Montecito Ave toward Zieber Rd</td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R8</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BO CIP902</td>
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<td>2,746</td>
<td></td>
<td>Harville Rd from Calistoga Rd to Baird Rd; Baird Rd from Harville Rd to Rincon Ave</td>
<td>Costs for this project are not included in the City’s CIP because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.</td>
</tr>
<tr>
<td>BO CIP902</td>
<td>8</td>
<td>1,004</td>
<td></td>
<td>Anderson Dr from Badger Rd to Ranchette Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP902</td>
<td>8</td>
<td>279</td>
<td></td>
<td>Wallace Rd from Ranchette Rd toward Badger Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP902</td>
<td>8</td>
<td>130</td>
<td></td>
<td>Wallace Rd from Ranchette Rd to Deer Trail Rd</td>
<td></td>
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<tr>
<td>BO CIP902</td>
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<td>2,433</td>
<td></td>
<td>Deer Trail Rd</td>
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<td>BO CIP902</td>
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<td>257</td>
<td></td>
<td>Wallace Rd from Deer Trail Rd to Future Rd</td>
<td></td>
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<tr>
<td>BO CIP902</td>
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<td>2,291</td>
<td></td>
<td>Creation Dr</td>
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<tr>
<td>BO CIP902</td>
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<td>1,852</td>
<td></td>
<td>Wallace Rd from Future Rd to Creekmont Ctl</td>
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<tr>
<td>BO CIP902</td>
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<td>391</td>
<td></td>
<td>Future Rd from Wallace Rd to east</td>
<td></td>
</tr>
<tr>
<td>BO CIP902</td>
<td>8</td>
<td>208</td>
<td></td>
<td>Ranchette Rd from Anderson Dr to Wallace Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP902</td>
<td>8</td>
<td>914</td>
<td></td>
<td>Future Rd north of Anderson Rd from Ranchette Rd north to Future Rd</td>
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</tr>
<tr>
<td>BO CIP902</td>
<td>8</td>
<td>1,341</td>
<td></td>
<td>Future Rd north of Anderson Rd and Ranchette Rd, from Future Rd to Creekmont Ctl</td>
<td></td>
</tr>
<tr>
<td>BO CIP910</td>
<td>8</td>
<td>468</td>
<td></td>
<td>Maria Ln dead end to Santa Rosa Creek Dr; Santa Rosa Creek Dr from Maria Ln to S. Boas Dr</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP907</td>
<td>8</td>
<td>290</td>
<td></td>
<td>Randall Ln</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP938</td>
<td>6</td>
<td>575</td>
<td></td>
<td>Bridle Trl from Jackson Dr toward Montgomery Ln</td>
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<tr>
<td>FF IM CIP939</td>
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<td>469</td>
<td></td>
<td>Culebra Ave from Primavera Dr to Las Raposas Ctl</td>
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<tr>
<td>FF IM CIP939</td>
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<td>315</td>
<td></td>
<td>Culebra Ave from Mission Blvd to Primavera Dr</td>
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<tr>
<td>FF IM CIP951</td>
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<td>1,986</td>
<td></td>
<td>Piston Dr from Brush Creek Rd to Cty Dr</td>
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<tr>
<td>FF IM CIP951</td>
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<td>430</td>
<td></td>
<td>Bridgeway Dr from Greenhaven Dr to first hydrant toward Eastside Ctl</td>
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<tr>
<td>Pressure Zone R9</td>
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<td>Mayate Ave from Wanda Way to Attari Dr</td>
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<td>FF IM CIP933</td>
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<td>Matanzas Way from Hahman Dr to Rock Creek Dr</td>
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<tr>
<td>FF IM CIP934</td>
<td>6</td>
<td>815</td>
<td></td>
<td>Princeton Way from Mayate Ave north to first cul de sac</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP934</td>
<td>6</td>
<td>426</td>
<td></td>
<td>Mayate Ave from Princeton Way to Impala Ctl</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP934</td>
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<td>242</td>
<td></td>
<td>Mayate Ave from Impala Ctl to Koldak Ctl</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP934</td>
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<td>302</td>
<td></td>
<td>Mayate Ave from Koldak Ctl to Elkhorn Ctl</td>
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<td>223</td>
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<td>Mayate Ave from Elkhorn Ctl to Cerrito Ctl</td>
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<td>FF IM CIP934</td>
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<td>317</td>
<td></td>
<td>Mayate Ave from Cerrito Ctl to Evans Dr</td>
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<tr>
<td>FF IM CIP936</td>
<td>6</td>
<td>269</td>
<td></td>
<td>Mayate Ave from Evans Dr to Yutapa Ave</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP936</td>
<td>6</td>
<td>311</td>
<td></td>
<td>Yutapa Ave from Montgomery Dr to Midway Dr</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP936</td>
<td>6</td>
<td>290</td>
<td></td>
<td>Yutapa Ave from Midway Dr to Magowan Dr</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP936</td>
<td>6</td>
<td>291</td>
<td></td>
<td>Yutapa Ave from Magowan Dr to Sonoma Ave</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP936</td>
<td>4</td>
<td>637</td>
<td></td>
<td>Magowan Dr between Franquetti Ave and Yutapa Ave</td>
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</tr>
<tr>
<td>FF IM CIP936</td>
<td>6</td>
<td>283</td>
<td></td>
<td>Midway Dr, east from Yutapa Ave</td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R7</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BO CIP904</td>
<td>12</td>
<td>1,142</td>
<td></td>
<td>Malia Rd from Malia Ctl to Hwy 12</td>
<td>Costs for this project are not included in the City’s CIP because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.</td>
</tr>
<tr>
<td>BO CIP904</td>
<td>12</td>
<td>614</td>
<td></td>
<td>Malia Rd from Hwy 12 to Kensington Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP904</td>
<td>12</td>
<td>1,201</td>
<td></td>
<td>Winifield Way from Malia Rd and Kensington Rd to Austin Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP904</td>
<td>12</td>
<td>575</td>
<td></td>
<td>Austin Rd, southeast of La Sierra Dr</td>
<td></td>
</tr>
<tr>
<td>BO CIP904</td>
<td>12</td>
<td>907</td>
<td></td>
<td>La Sierra Dr from Austin Rd to Los Alamitos Rd; Los Alamitos Rd from La Sierra Dr to Scotland Dr</td>
<td></td>
</tr>
<tr>
<td>BO CIP911</td>
<td>8</td>
<td>405</td>
<td></td>
<td>Airway Dr from Fairway Ctl to dead end</td>
<td></td>
</tr>
<tr>
<td>BO CIP911</td>
<td>8</td>
<td>635</td>
<td></td>
<td>Fairway Dr from Hwy 12 to Fairway Ctl</td>
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</tr>
<tr>
<td>FF IM CIP940</td>
<td>8</td>
<td>663</td>
<td></td>
<td>Del Monte Ctl from St. Francis Rd to end</td>
<td>An alternative is to install a hydrant on Del Monte Ctl near St Francis Rd.</td>
</tr>
<tr>
<td>BO CIP970</td>
<td></td>
<td></td>
<td></td>
<td>Replace booster pumps at Station S7 with a firm pumping capacity of 3,200 gpm and design head of 170 feet to mitigate storage deficiencies in R7 Pressure Zone</td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BO CIP905</td>
<td>12</td>
<td>1,166</td>
<td></td>
<td>Wildwood Tt, north</td>
<td>Costs for this project are not included in the City’s CIP because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.</td>
</tr>
<tr>
<td>BO CIP905</td>
<td>8</td>
<td>258</td>
<td></td>
<td>Wildwood Tt, north</td>
<td></td>
</tr>
<tr>
<td>BO CIP905</td>
<td>8</td>
<td>548</td>
<td></td>
<td>Los Alamitos Rd from Scott Dr to Fawn Dr</td>
<td></td>
</tr>
<tr>
<td>BO CIP905</td>
<td>8</td>
<td>738</td>
<td></td>
<td>Los Alamitos Rd from Fawn Dr to Future Way</td>
<td></td>
</tr>
<tr>
<td>BO CIP905</td>
<td>12</td>
<td>404</td>
<td></td>
<td>Los Alamitos Rd from Future Way to Loggerhead Rd</td>
<td></td>
</tr>
<tr>
<td>BO CIP905</td>
<td>12</td>
<td>1,471</td>
<td></td>
<td>Future Way from Los Alamitos Rd to Fawn Dr</td>
<td></td>
</tr>
<tr>
<td>BO CIP905</td>
<td>8</td>
<td>819</td>
<td></td>
<td>Fawn Dr from Los Alamitos Dr to Future Way</td>
<td></td>
</tr>
<tr>
<td>BO CIP905</td>
<td>12</td>
<td>1,076</td>
<td></td>
<td>Loggerhead Rd from Los Alamitos Rd to Sunhawk Dr</td>
<td></td>
</tr>
</tbody>
</table>
### Table ES-10. Recommendations for Future System CIP Projects

<table>
<thead>
<tr>
<th>CIP Group(a)</th>
<th>Existing Diameter</th>
<th>New Diameter</th>
<th>Length Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Zone R9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BO IM CIP960</td>
<td>12</td>
<td>2,228</td>
<td>Farmers Lane Extension</td>
<td></td>
</tr>
<tr>
<td>BO IM CIP960</td>
<td>16</td>
<td>2,707</td>
<td>Farmers Lane Extension</td>
<td></td>
</tr>
<tr>
<td>BO IM CIP960</td>
<td>12</td>
<td>210</td>
<td>Farmers Lane Extension</td>
<td></td>
</tr>
<tr>
<td>BO IM CIP960</td>
<td>12</td>
<td>97</td>
<td>Future Emergency Pump Station S9B Discharge Pipelines</td>
<td>Costs for this project are not included in the City’s CIP costs because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.</td>
</tr>
<tr>
<td>BO IM CIP960</td>
<td>16</td>
<td>64</td>
<td>Future Emergency Pump Station S9B Discharge Pipelines</td>
<td></td>
</tr>
<tr>
<td>BO IM CIP960</td>
<td>12</td>
<td>88</td>
<td>Future Emergency Pump Station S9B suction Pipelines</td>
<td></td>
</tr>
<tr>
<td>BO IM CIP961</td>
<td></td>
<td></td>
<td></td>
<td>Construct new Emergency Pump Station S9B with a firm pumping capacity of 3,500 gpm to support demand in R9 Pressure Zone.</td>
</tr>
<tr>
<td>Pressure Zone R11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF IM CIP928</td>
<td>6</td>
<td>8</td>
<td>204 Tachevah Dr from Bethards Dr to Woodlake Dr</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP928</td>
<td>6</td>
<td>8</td>
<td>395 Woodlake Dr from Tachevah Dr entrance road to southeast</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP929</td>
<td>6</td>
<td>8</td>
<td>348 Knots Hills Cir from Knots Dr (northwest) to Hydrant lines</td>
<td>An alternative would be to install a hydrant on Knots Hills Cir at Knots Dr. and replace only 134 feet of pipeline on Knots Dr. at Tachevah Dr.</td>
</tr>
<tr>
<td>FF IM CIP929</td>
<td>6</td>
<td>8</td>
<td>337 Knots Dr from Tachevah Dr to Knots Hills Cir (northwest)</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP930</td>
<td>8</td>
<td>277</td>
<td>Ronnie Dr between Deer Run and Neotomas Ave, completing loop</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP930</td>
<td>6</td>
<td>8</td>
<td>119 Ronnie Dr between Deer Run and Neotomas Ave.</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP930</td>
<td>6</td>
<td>8</td>
<td>419 Townview Ave from Post Ranch Rd to Ronne Rd</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP930</td>
<td>6</td>
<td>8</td>
<td>481 Post Ranch Rd from Neotomas Ave to Townview Ave</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP931</td>
<td>6</td>
<td>8</td>
<td>540 Sidney lnq from Creekside Rd to end</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP935</td>
<td>4</td>
<td>8</td>
<td>569 Devonshire Pl from Stoneshade Dr to end</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP935</td>
<td>6</td>
<td>8</td>
<td>131 Stoneshade Dr from Glencannon St toward Westminster Pl</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP936</td>
<td>6</td>
<td>8</td>
<td>391 Hoen Ave from Elmgreene Ct to Burlington Pl</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP935</td>
<td>6</td>
<td>8</td>
<td>372 Hoen Ave from Burlington Pl to Rockmeadow Pl</td>
<td></td>
</tr>
<tr>
<td>FF IM CIP935</td>
<td>6</td>
<td>8</td>
<td>277 Hoen Ave from Rockmeadow Pl to Glancannon St</td>
<td></td>
</tr>
<tr>
<td>Pressure Zone R17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BO CIP907</td>
<td>8</td>
<td>1,061</td>
<td>Limerick Ave, east of Hibiscus Dr</td>
<td>Costs for this project are not included in the City’s CIP costs because the project is within a City-designated specific plan area or a future development area and is expected to be fully funded and installed by the project proponents.</td>
</tr>
<tr>
<td>BO CIP907</td>
<td>12</td>
<td>2,423</td>
<td>Future Rl near Kawana Tank between Franz Kafka Ave and Kawana Springs Rd (east)</td>
<td></td>
</tr>
<tr>
<td>BO CIP907</td>
<td>12</td>
<td>1,141</td>
<td>Franz Kafka Ave from Kawana Ter to south</td>
<td></td>
</tr>
<tr>
<td>BO CIP907</td>
<td>12</td>
<td>1,063</td>
<td>Future Rl near Kawana Tank between Franz Kafka Ave and Kawana Springs Rd (west)</td>
<td></td>
</tr>
<tr>
<td>BO CIP911</td>
<td></td>
<td></td>
<td></td>
<td>Replace booster pumps at Station S17 with a firm pumping capacity of 1,300 gpm and design head of 200 feet to mitigate storage deficiencies in R17 Pressure Zone.</td>
</tr>
</tbody>
</table>

---

(a) Recommended groundwater wells are not included in this table because their specific location (pressure zone) has not been determined yet.

(b) CIP group numbers including "FF" (e.g., FF BO CIP915) indicate projects recommended for fire flow requirements.

"IM" identifies projects recommended for an Intermediate Timeframe (2020-2025).

"BO" identifies projects recommended for Buildout Timeframe of 2035, depending on the pace of eventual development.
Executive Summary

**ES.7 RECOMMENDED CAPITAL IMPROVEMENT PROGRAM (CHAPTER 7)**

Based on our evaluation of the City’s existing and future water systems, West Yost identified the need for approximately $50.4M in capital improvement projects throughout the City’s existing and future water service area. Table ES-11 summarizes the CIPs by timeframe and project type. The cost allocation to existing customers is $22.2M ($19.9M + $2.3M from Intermediate), while the allocation to future customers is $28.2M ($5.0M from Intermediate + $23.2M).

As discussed with City staff, pipelines required to be installed within a City-designated specific plan area or as part of a development project, must be fully funded and installed by the project proponents. Therefore, these facilities and corresponding costs are not included in Table ES-11 (though they are included in the detailed CIP listing in Appendix F).

<table>
<thead>
<tr>
<th>Improvement Type</th>
<th>Existing</th>
<th>Intermediate (d)</th>
<th>Buildout</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipelines</td>
<td>$13,270,000</td>
<td>$4,393,000</td>
<td>$707,000</td>
<td>$18,370,000</td>
</tr>
<tr>
<td>Hydrants</td>
<td>$18,000</td>
<td>$0</td>
<td>$0</td>
<td>$18,000</td>
</tr>
<tr>
<td>Generators</td>
<td>$712,000</td>
<td>$0</td>
<td>$0</td>
<td>$712,000</td>
</tr>
<tr>
<td>Pump Upgrades</td>
<td>$1,031,000</td>
<td>$2,916,000</td>
<td>$665,000</td>
<td>$4,612,000</td>
</tr>
<tr>
<td>Groundwater Wells(e)</td>
<td>$4,860,000</td>
<td>$0</td>
<td>$21,870,000</td>
<td>$26,730,000</td>
</tr>
<tr>
<td><strong>Total Capital</strong></td>
<td><strong>$19,891,000</strong></td>
<td><strong>$7,309,000</strong></td>
<td><strong>$23,242,000</strong></td>
<td><strong>$50,442,000</strong></td>
</tr>
</tbody>
</table>

(a) Costs shown are based on historical values compiled from various pipeline projects and other cities' bid tabs, scaled to March 2014 dollars with an ENR CCI of 9702 (20 City Average).

(b) Total cost is rounded to nearest $1,000.

(c) Costs include mark-ups equal to 62 percent (Construction Contingency: 20 percent of construction cost; other contingencies 35 percent; and 7 percent from "other contingencies" x Construction Contingency (35 percent x 20 percent)).

(d) Costs for these intermediate improvements are proportionately allocated to existing and future customers based on the proportionate increase in pipeline capacity; see Table F-2 in Appendix F. (The $7.3M in recommended intermediate improvements includes $2.3M allocated to existing customers and $5.0M to future customers; see Table 7-2.)

(e) Costs based on Table 7-2 from 2013 Groundwater Master Plan; base construction cost estimated at $1.5M per well with the WMP Update mark-ups applied (see footnote (c)).
FIGURE ES-1
City of Santa Rosa
Water Master Plan Update
EXISTING WATER SERVICE AREA
NOTES
1. Projected demand increases in the Downtown and North Santa Rosa Station Areas are included in the Intensification category in Chapter 2.
Figure ES-3. Historical and Projected Average Day Water Demands

Historical Average Day Water Demand = 20.0 mgd

Baseline Water Demand

Baseline Water Demand = 20.0 mgd

Average Day Water Demand, mgd

Year

Figure ES-4. Recommended Hydraulic Model Management and Documentation Protocols

Task 1
Update AutoCAD/GIS pipeline data

Task Leader: To be determined by City Department: Public Works – Asset Management
Task: Provide as-built drawings of new and replacement pipelines to Utilities – Asset Management staff

Task 2
Update Hansen Asset Management and SCADA Systems

Task Leader: To be determined by City Department: Utilities – Operations & Maintenance
Task: Provide any pipeline discrepancies found during field work to Utilities – Asset Management staff

Task 3
Provide up-to-date water system data to West Yost

Task Leader: To be determined by City Department: Utilities – Asset Management
Task: Update pipeline changes in AutoCAD/GIS; track edits in separate MODEL field and utilize unique PIPE_ID

Task 4
Perform hydraulic model update

Task Leader: Irene Suroso
Department: N/A – West Yost
Task: Perform hydraulic model update while maintaining a one-to-one relationship with the City’s AutoCAD/GIS pipeline mapping

Task Leader: Irene Suroso
Department: N/A – West Yost
Task: Provide updated hydraulic model to the City (City staff member to be determined by City)
FIGURE ES-5
City of Santa Rosa
Water Master Plan Update

EXISTING WATER SYSTEM

LEGEND
- Urban Growth Boundary
- City Limits
- SCWA Connection (PRA Valve)
- SCWA Reservoir
- City Reservoir
- City Well
- Pump Station
- SCWA Aqueduct
- 12-inch diameter City Pipeline
- 10-inch diameter City Pipeline
- 8-inch diameter City Pipeline

PRESSURE ZONE (RESERVOIR)
- FOUNTAINGROVE 1 (R1A, R1B)
- FOUNTAINGROVE 2 (R2A, R2B)
- FOUNTAINGROVE 3 (R3)
- SKYFARM (R5)
- MONTECITO HIGH LEVEL (R4A, R4B)
- FOUNTAINGROVE UNIT 2 LOWER LEVEL (R15)
- FOUNTAINGROVE UNIT 2 HIGH LEVEL (R17)
- RINCON REDUCED (R6)
- RINCON HIGH LEVEL (R7)
- LOS ALAMOS (R8)
- BENNETT HIGH LEVEL (R9A, R9B, R9C)
- FAIRWAY (R10)
- SOUTHEAST ZONE 2 (R11)
- OAKMONT HIGH LEVEL (R12A, R12B)
- WILD OAK (R13)
- WILD OAK UPPER LEVEL (R14)
- MEADOW RIDGE / OAKMONT
- A1, A3, A5
- A2, A4, A6
- A8
- A9
FIGURE ES-6
City of Santa Rosa
Water Master Plan Update

RECOMMENDED NEAR-TERM IMPROVEMENTS

NOTES
1. Some locations with deficient fire flow do not have related CIP recommendations because their fire flow requirements can be met by supplementing flow from nearby hydrants.
2. Specific locations for new groundwater wells are not shown because they have not been determined yet (only general locations have been identified).

LEGEND
- SCWA Reservoir
- City Reservoir
- Recommended Near-Term Pump Station Improvement for Existing System
- Existing Pump Station (No Recommended Improvement)
- City Well
- SCWA Aqueduct System
- City Pipelines
- Recommended Near-Term CIP Projects
- Urban Growth Boundary
- Specific Plan Area

PRESSURE ZONE (RESERVOIR)
- FOUNTAINGROVE 1 (R1A, R1B)
- FOUNTAINGROVE 2 (R2A, R2B)
- FOUNTAINGROVE 3 (R3)
- SKYFARM (R4)
- MONTECITO HIGH LEVEL (R4A, R4B)
- FOUNTAINGROVE UNIT 2 LOWER LEVEL (R6)
- FOUNTAINGROVE UNIT 2 HIGH LEVEL (R7)
- RINCON REDUCED (R8)
- RINCON HIGH LEVEL (R9A, R9B, R9C)
- LOS ALAMOS (R10)
- BENNETT HIGH LEVEL (R11)
- FAIRWAY (R12A, R12B)
- SOUTHEAST ZONE 2 (R13A, R13B)
- OAKMONT HIGH LEVEL (R14A, R14B)
- WILD OAK (R15)
- WILD OAK UPPER LEVEL (R16)
- MEADOW RIDGE / OAKMONT
- A1, A3, A5
- A2, A4, A6
- A8
- A9
FIGURE ES-7
City of Santa Rosa
Water Master Plan Update

RECOMMENDED IMPROVEMENTS FOR INTERMEDIATE AND BUILDOUT TIMEFRAMES

NOTES
1. Some locations with deficient fire flow do not have related CIP recommendations because their fire flow requirements can be met by supplementing flow from nearby hydrants.
2. Project CIP51, a hydrant installation on Incline Dr at Hidden Valley Dr in Zone 4 (Intermediate Timeframe) is not shown on this figure.
3. CIP projects to meet buildout demands within designated Specific Plan Areas are assigned a CIP number and shown on this figure, but their costs for construction are not included in CIP tables.
4. Specific locations for new groundwater wells are not shown because they have not been determined yet (only general locations have been identified).