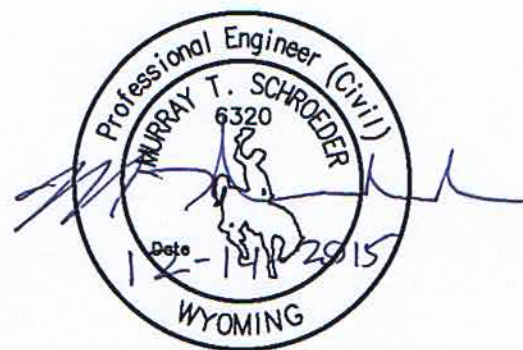
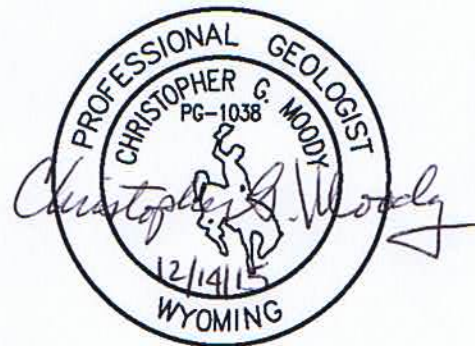


**2015 Laramie Water  
Master Plan, Level I  
Executive Summary  
December 14, 2015**



Prepared for:

Wyoming Water Development Commission  
6920 Yellowtail Road  
Cheyenne, WY 82002



Prepared by:

WWC Engineering  
Wyoming Groundwater/Hinckley Consulting  
Camp Creek Engineering  
HDR

# EXECUTIVE SUMMARY

## ES.1 Introduction

The City of Laramie has completed the 2015 Laramie Water Master Plan, Level I funded by the Wyoming Water Development Commission. The project objective was to prepare a plan that addresses the comprehensive water system needs; including water supply development to meet increased demands, to correct distribution system deficiencies, and to improve operational performance.

This Executive Summary provides selected information from each of the Master Plan chapters and restates the recommendations.

## ES.2 Service Area and Population

Figure ES -1 identifies the water distribution service area. The City provides treated water for City residents, the residents of three water districts, and a few county residents that do not reside in the City limits. The current service area population is about 32,920. The service area population is projected to grow to 41,603 (26% increase) by the year 2050.

## ES.3 Water Use

Table ES-1 presents average daily water demands by season from 1971 through 2010. There has been a dramatic 28% decline in per capita water use in recent years. Possible reasons for this decrease include the cumulative impact of the following factors:

- Increased water rates.
- Increased use of xeriscaping.
- Replacement of leaking distribution mains.
- Increased use of low-flow fixtures in houses and businesses.
- The University of Wyoming's (UW) increased use of non-potable groundwater resources for irrigation.

Although not apparent in the water demand decline from 2000 to 2010, there are present day factors that will likely promote a further reduction in municipal water demand/production, including:

- City park irrigation system conversion from manual operation to automated and “intelligent” operation. Since the 2011 conversion, City irrigation water use has decreased about 8%.
- UW’s conversion to “intelligent irrigation” of the Jacoby Golf Course. This project was initiated in the summer of 2015 and will likely reduce water use.
- UW’s pursuit of a non-potable irrigation source for Jacoby Golf Course and other green spaces.

Table ES-2 presents planning horizon water demands by pressure zone within the City.

This study included the preparation of an “unaccounted for” water use estimate, a statistic commonly compiled for municipal systems. Unaccounted for water is about 23% of the produced amount. Municipal systems are typically satisfied if unaccounted for water is less than 10% of the produced amount.

#### **ES.4 Existing Water Supplies and Infrastructure**

The character of the City’s water supplies is excellent. Both the groundwater and surface water resources are of excellent quality and quantity, and the City has excellent water rights standing amongst other users. Additionally, the treatment that water receives is fully compliant with existing regulations, but with a few noted compliance challenges that may develop in time.

The Master Plan presents an inventory and condition assessment of the water production, treatment, storage, and distribution facilities. The overall condition of these existing facilities is good or excellent, with a few exceptions.

### **ES.5 Alternative Supplies and Infrastructure**

The Master Plan evaluated options for supply development, distribution system improvement and operational changes for improving water system reliability and performance. Planning horizon water demands are less than available supplies, so new water supply development is not recommended. Distribution system water storage is lacking in Zone 3 and a storage facility is recommended. The preferred projects identified in this study are expressed in the Capital Improvement Plan (CIP) and in the final recommendations.

### **ES.6 Capital Improvement Plan**

Table ES-3 summarizes the recommended 10 Year Water System Capital Improvement Plan. The proposed plan includes a number of specific projects, several of which are of immediate need, as presented in the recommendations.

### **ES.7 Recommendations**

1. Initiate the final design work for a Zone 3 water storage tank north of the City after obtaining authorization from the Wyoming Water Development Office which funded the final design work in a previous year. Final design work should include rights of way acquisition, preliminary and final design, geotechnical exploration, and permitting. A goal is to have the project sufficiently developed so that the City can apply for WWDC Level III construction funding in August 2016.
2. Consider adoption of the 10 Year Water System Capital Improvement Plan (CIP) that was prepared by this study. The CIP reflects project prioritization by the City and recommendations from the consulting Team.
3. Further evaluate the strategies presented in this study that promote more water use during the winter months. One or more of the ideas should be implemented on a pilot scale basis to estimate effectiveness and to identify operational issues that need to be addressed if the idea is used at full scale.

4. Request that the Laramie Alliance market the fact that the City of Laramie has the potential water supply capacity to support businesses that need large amounts of water. There is water supply available and more winter time use would likely benefit the distribution system water quality.
5. Continue to irrigate large green spaces with treated potable water. The City should suspend the implementation of the LaPrele and Washington Park irrigation projects using groundwater.
6. If financially beneficial, the City might consider delaying the current effort of modifying the Surface Water Treatment Plant to provide treatment and delivery of the entire surface water right. Increased use of Casper Aquifer supplies may be a good short-term strategy for a slight rebalancing of the CIP away from supply infrastructure expansion and towards distribution infrastructure replacement, at least for a few years.
7. According to City financial information, the operating expenses of the water utility are comfortably less than the annual operations budget. The Evaluation of Operations suggests that the City should increase staffing to assist with the ongoing maintenance of the distribution system within areas of poor condition.
8. Groundwater expansion opportunities are available on a short-term peaking basis and on a long-term sustainable production basis through more aggressive operation, particularly of the Turner and Spur wellfields. An additional 2.3 mgd beyond current average annual groundwater production is available for extraction without adverse impacts to long-term aquifer water levels.
9. Meet with the State Engineer's Office (SEO) to define information that the SEO will need to consider for modification of the Spur Wellfield Use Agreement in 2020. It is assumed that the response of the Casper Aquifer to Spur Wellfield production will be a primary factor in the modification of the agreement such that we recommend:

- In 2016 and over successive summers, the Spur Wellfield should be pumped at maximum allowable production rates for extended time periods to empirically test the aquifer's response to sustained pumping. A Spur Wellfield testing plan should be developed prior to testing.
  - In 2020, present data collected at the Spur Wellfield over the previous 20 years, including production records, the monitoring well hydrographs, and the results of testing per the previous recommendation, to the SEO for consideration to modify the agreement.
  - Revision of either the baseline water levels used to define "drawdown" or development of trigger-points that distinguish natural from wellfield production-induced impacts on monitor well water levels.
  - Revision of production peak rates to reflect the points at which short-term drawdown impacts have a significant impact on domestic wells.
10. Conduct pump tests at the Turner Wellfield that empirically define pumping rates at the Turner No. 1 and Turner No. 2 wells that control surface discharge at City Springs and that allow extended periods of simultaneous pumping of the wells. A Turner Wellfield testing plan should be developed prior to testing.
  11. Conduct an engineering study to evaluate alternatives designed to improve the operation and infrastructure of the Turner Wellfield to achieve water quality objectives within the limits of desired water production.
  12. Conduct a study to evaluate the condition and performance of the existing buried groundwater collection system in the City Springs enclosure. If determined to be in poor condition or inefficient, alternatives (including replacement) should be considered.

13. Improve or replace the security fence at the City Springs enclosure to prevent unauthorized access by wildlife and humans.
14. Conduct bi-annual sampling and analysis of water from the Turner and Soldier wellfields for Microscopic Particulate Analysis and fecal coliform.
15. When additional groundwater is needed beyond what can be developed through modified management/construction at the existing wellfields, the next groundwater development prospect to evaluate for drinking water supply replacement/expansion is the Laramie Fault where it occurs within the corporate limits of the City. The fault trends north-south, roughly parallel to 18<sup>th</sup> Street.
16. Update the Casper Aquifer Protection Plan in 2016 with new information on the aquifer and program implementation improvements.
17. Work with Albany County towards the development of a consistent delineation of the western boundary of the protection area and the implementation of City and County Casper Aquifer Protection programs.
18. Expand the Casper Aquifer Monitoring Program to include the installation of monitor wells in areas contributory to the Soldier-Pope Wellfield and in areas that provide baseline water quality data.
19. Prepare a Casper Aquifer Monitoring Program document that defines program objective(s), the location of existing and proposed monitor wells, water level measurement and water sampling procedures, water quality analytes, sampling frequency/schedule, and the creation of water level and water quality databases that facilitate data presentation and interpretation.

20. Develop cooperative data-based Casper Aquifer research efforts with the University of Wyoming and WyCEHG.
21. Prior to September of 2016, and as an extension of this Level I Study, apply for a Level II study to address some of the subjects not addressed in adequate depth in this Level I Study. The scope of this project might include some of the activities presented in the recommendations presented above. Additionally, the scope could explore solutions to pressure issues in the Corthell Hill neighborhood, re-evaluate infrastructure improvements under modified fire flow criteria, and evaluate an upward modification to the Zone 1 hydraulic grade line.

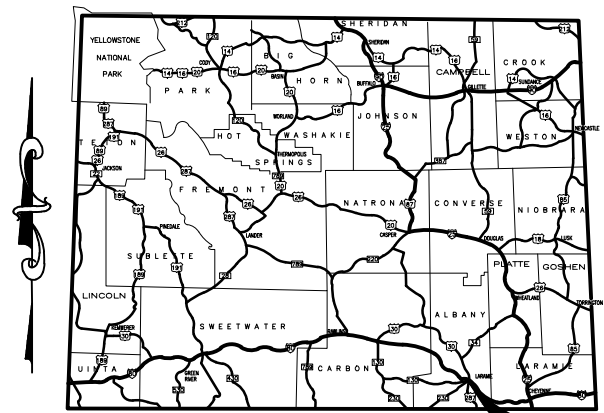


12. Conduct a study to evaluate the condition and performance of the existing buried groundwater collection system in the City Springs enclosure. If determined to be in poor condition or inefficient, alternatives (including replacement) should be considered.
13. Improve or replace the security fence at the City Springs enclosure to prevent unauthorized access by wildlife and humans.
14. Conduct bi-annual sampling and analysis of water from the Turner and Soldier wellfields for Microscopic Particulate Analysis and fecal coliform.
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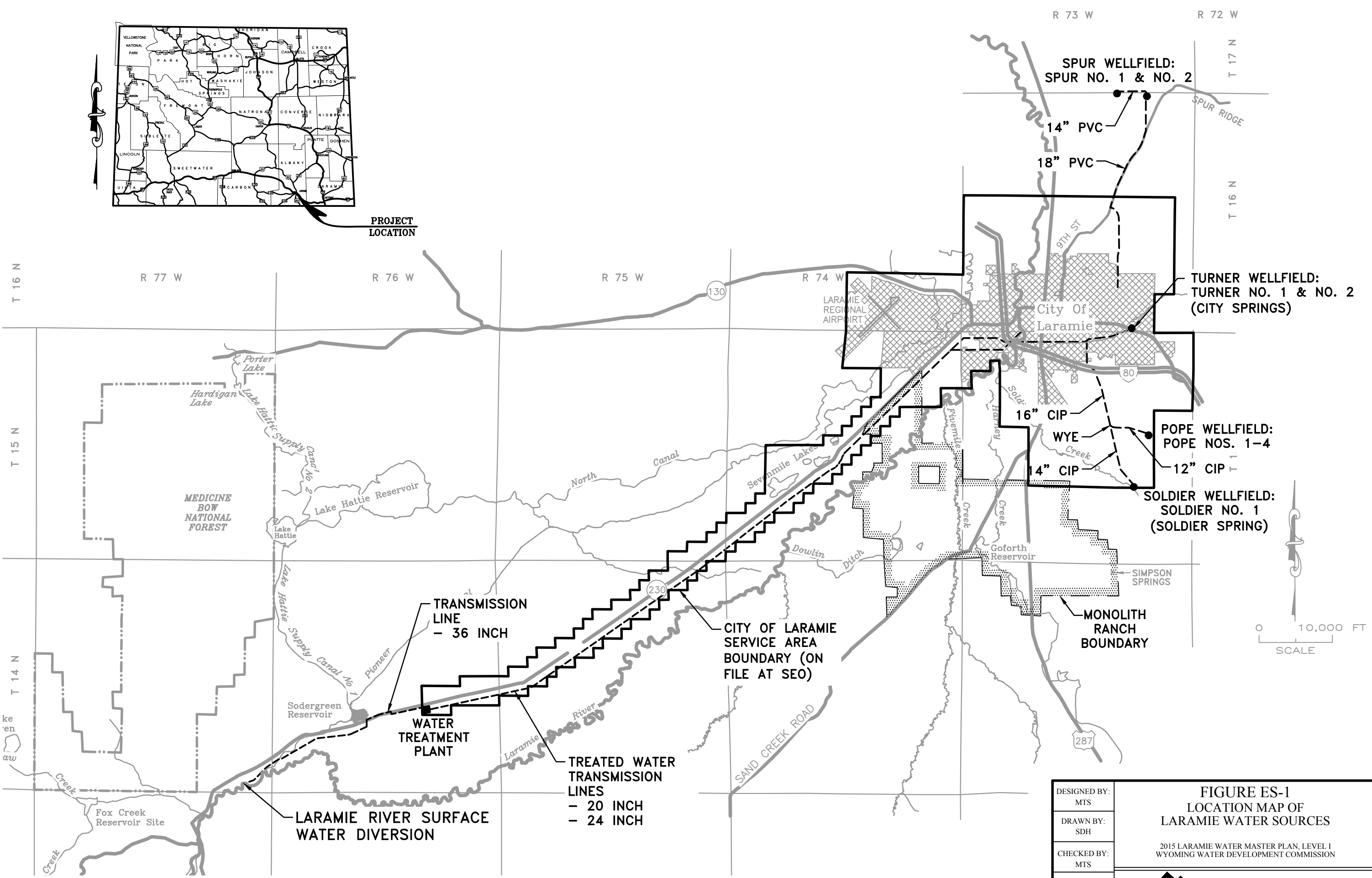
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**PROJECT LOCATION**



DESIGNED BY:	MTS
DRAWN BY:	SDH
CHECKED BY:	MTS
DATE:	06/15

**FIGURE ES-1**  
**LOCATION MAP OF**  
**LARAMIE WATER SOURCES**  
 2015 LARAMIE WATER MASTER PLAN, LEVEL I  
 WYOMING WATER DEVELOPMENT COMMISSION



Table ES-1 Water Demand by Season

	<b>Average Day</b>				
	1971-1980 <sup>1</sup>	1981-1990 <sup>2</sup>	1991 <sup>3</sup>	2000 <sup>3</sup>	2010 <sup>3</sup>
	<b>gallons per capita per day (gpcd)</b>				
Winter (N, D, J, F, M)	150	180	164	152	107
Summer (J, J, A)	390	410	328	378	264
Oct/Apr	175	195	201	183	134
Sept/May	248	320	227	244	197
Annual Average Day	230	264	222	229	166

Notes:

1. Source: Water Supply Master Plan, Banner 1983, Table 2.12 Recommended for planning.
2. Source: Level 1 Water Supply Master Plan, WWC 1995.
3. Source: from 1991, 2000, 2010 water production records and service area population estimates from Ch 2

Table ES-2 - City of Laramie Future Water Demand

Pressure Zone	Future Total <sup>7</sup>	Average Day Increase <sup>8</sup>	Max Day Increase <sup>9</sup>	Park Demand Increase <sup>10</sup>	Total Increase <sup>11</sup>	Max Day Future <sup>12</sup>	Total Future Water Demand
	GPM	GPD				MGD	
1	200	288,000	650,880	72,000	722,880	5,227,542	5.23
2	560	806,400	1,822,464	134,400	1,956,864	9,400,088	9.41
3	284	408,960	924,250	38,400	962,650	2,243,046	2.25
4	10	14,400	32,544	0	32,544	796,101	0.80
6	159	228,960	517,450	0	517,450	1,888,583	1.89
7	35	50,400	113,904	0	113,904	116,674	0.12
<b>Total</b>	<b>1,248</b>	<b>1,797,120</b>	<b>4,061,491</b>	<b>244,800</b>	<b>4,306,291</b>	<b>19,672,033</b>	<b>19.70</b>

Future Demand:

<sup>7</sup> Future Total = Sum of all future nodes in Pressure Zones

<sup>8</sup> Average Day Increase = Future Node Total X 1440 min/day

<sup>9</sup> Max Day Increase = Average Day Increase X Peaking Factor (2.26)

<sup>10</sup> Park Demand Increase = Future Park Node Total X 8 hour watering period.

<sup>11</sup> Total Increase = Max Daily Increase + Park Demand

<sup>12</sup> Max Day Future = Max Day Demand Increase + Max Day Demand (Existing)

Table ES-3 Existing 2014-2015 CIP and 2015 Master Plan CIP

Project Description	2014-2015 City Water System CIP						
	Fiscal Years						
	14-15	Expenditures to Date	FY 2014-15 TTD Rebudget	15-16 Adopted	15-16 Supplementals	Recommended Supplemental Budget	FY 2015-16 Adjusted Budget
	\$						
Fixed Base Meter Reading System	-	-	-	-	-	-	-
<b>Meters Total</b>	-	-	-	-	-	-	-
Simpson Springs Wellhead Development	525,590	-371,552	154,038	-	-	154,038	154,038
Capp Well Drilling	200,000	-5,193	194,807	-	-	194,807	194,807
PRV Stations	600,000	-	600,000	636,000	-	600,000	1,236,000
Roof Replacement	-	-	-	-	-	-	-
<b>Pumps &amp; Wells Total</b>	<b>1,325,590</b>	<b>-376,745</b>	<b>948,845</b>	<b>636,000</b>	<b>-</b>	<b>948,845</b>	<b>1,584,845</b>
South Laramie Water Delivery - Level III	4,231,375	-2,406,458	-	-	-	-	-
Indian Hills Pump Station	207,000	-78,894	-	-	-	-	-
Grand Avenue 14" & 16" Pipe Replacement	2,111,353	-1,346,071	-	-	-	-	-
36" Transmission Pipe Replacement	5,432,468	-3,207,567	2,224,901	-	-	2,224,901	2,224,901
Priority 1 Water Line Replacement - Cleveland St	214,000	-214,000	-	-	-	-	-
Priority 1 Water Line Repl - Canby Harney Alley	409,847	-387,123	-	-	-	-	-
Priority 1 Water Line Repl - Mill Street	468,523	-	468,523	-	-	468,523	468,523
Priority 1 Water Line Repl - 11th Street	350,000	-155,815	194,185	-	-	194,185	194,185
West Laramie 12" Pipe Replacement	-	-	-	-	-	-	-
Water Line Replacement - Mitchell Street	250,000	-	250,000	-	-	250,000	250,000
Water Master Plan	250,000	-	250,000	-	-250,000	-	-
20" Transmission Main Rehab	3,100,000	-	3,100,000	3,000,000	-5,600,000	-2,500,000	500,000
W Laramie Waterline Improvements	-	-	-	-	500,000	500,000	500,000
East Side Tank	1,399,539	-7,500	1,392,039	1,317,827	-	1,392,039	2,709,866
Harney Street Overpass	50,000	-	50,000	250,000	-	50,000	300,000
North Side Tank	1,200,000	-	1,200,000	6,000,000	-6,000,000	-4,800,000	1,200,000
Water Line Replacement - Iverson St.	100,000	-	100,000	500,000	-	100,000	600,000
Water Line Replacement - Grand Ave.	-	-	-	200,000	-	-	200,000
Water Dispensing Systems	-	-	-	-	-	-	-
Ongoing Water Main Replacement	-	-	-	-	-	-	-
<b>Transmission Total</b>	<b>19,774,105</b>	<b>-7,803,428</b>	<b>9,229,648</b>	<b>11,267,827</b>	<b>-11,350,000</b>	<b>-2,120,352</b>	<b>9,147,475</b>
Electric Valve - Soldier Springs	286,000	-205,271	80,729	-	-	80,729	80,729
Clearwell Storage & Clarifier Effluent Piping Upgr	450,000	-105,147	344,853	3,150,000	-	344,853	3,494,853
Water Treatment Plant Evaluation	150,000	-	150,000	-	-	150,000	150,000
<b>Treatment Plant Total</b>	<b>886,000</b>	<b>-310,418</b>	<b>575,582</b>	<b>3,150,000</b>	<b>-</b>	<b>575,582</b>	<b>3,725,582</b>
Wellhead Buildings	-	-	-	-	-	-	-
<b>Water Rights Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Water Fund Total</b>	<b>21,985,695</b>	<b>-8,490,591</b>	<b>10,754,075</b>	<b>15,053,827</b>	<b>-11,350,000</b>	<b>-595,925</b>	<b>14,457,902</b>

2015 Master Plan CIP					
Laramie Water Master Plan Recommended Project Description	Master Plan Estimated Total Cost	16-18	18-20	20-24	Total Project Funding
		\$			
		1,750,000	-	-	1,750,000
		1,750,000	-	-	<b>1,750,000</b>
Plan Recommends Removal		-525,590	-	-	0
		-	-	-	200,000
Install 6 PCS	3,060,000	1,000,000	1,000,000	1,000,000	4,236,000
		-	40,000	100,000	140,000
Turner Wellfield Optimization	300,000			300,000	300,000
Vault Replacement					0
		474,410	1,040,000	1,400,000	<b>4,876,000</b>
		-	-	-	4,231,375
		-	-	-	207,000
Grand Ave UP Line (Zone 1) COMPLETED	920,000	-	-	-	2,111,353
		-	-	-	5,432,468
		-	-	-	214,000
		-	-	-	409,847
		-	-	-	468,523
		-	-	-	350,000
West Laramie Transmission	1,430,000		715,000	715,000	1,430,000
		-	-	-	250,000
		-	-	-	-
Re-Lining 20" Main from WTP	12,570,000	5,000,000	-	-	5,500,000
		-	-	-	500,000
Plan Recommends Removal		-2,717,366	-	-	-
		-	-	-	300,000
Zone 3 North Tank and Transmission Line	6,140,000	1,600,000	1,740,000	1,600,000	6,140,000
		-	-	-	600,000
Grand Ave Transmission Line (Zone 2)	4,910,000				200,000
4th to 13th		1,300,000			1,300,000
13th to 15th			570,000		570,000
South on 4th Street				1,130,000	1,130,000
21st to Wister Pump Station			955,000	955,000	1,910,000
Plan Recommends Reduction		100,000	100,000	100,000	300,000
Distribution Line Replacement	30,000,000	10,000,000	10,000,000	10,000,000	30,000,000
10" Pipeline from University PS to airport	1,530,000	-	780,000	750,000	1,530,000
Pope-Soldier Pipeline	3,100,000	-	-	-	0
Ongoing Water Main Expansion (Growth Areas)	2,550,000	850,000	850,000	850,000	2,550,000
		16,132,634	15,710,000	16,100,000	<b>67,634,566</b>
		-	-	-	286,000
		-	-	-	3,600,000
		-	-	-	150,000
Water treatment plan/WTP Clearwell	22,000,000	-	-	-	-
		-	-	-	<b>4,036,000</b>
Well House Replacement x 6		400,000	200,000	-	600,000
		400,000	200,000	0	<b>600,000</b>
		18,757,044	16,950,000	17,500,000	<b>78,896,566</b>

Indicates 2015 Master Plan recommends different value than current City of Laramie CIP.