West Bountiful City

Water System
Capital Facilities Plan

August 2008

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1.0 EXECUTIVE SUMMARY

The Water System Capital Facilities Plan (WCFP) documents the evaluation of the existing West Bountiful City water source, storage, and distribution system infrastructure, performed by Caldwell Richards Sorensen. Existing deficiencies in the City's water system and future improvements necessary to meet projected demands are identified in the WCFP project list found in the Appendix of this report. The improvement projects in the WCFP are necessary in order to maintain the current Level of Service (LOS) provided to the residents of West Bountiful City.

The existing water system supplies, stores, and distributes culinary water to nearly all residents and businesses within the City limits. Current water sources include the City's Well (350 gpm) and a Weber Basin connection (1000 gpm), which provide sufficient water to satisfy the minimum demand required by the State of Utah. The water system presently operates with two storage reservoirs having a combined 2.5 Million Gallons (MG), which is sufficient for current water demands and complies with State regulations. The transmission lines conveying water throughout the City have the capacity to meet peak demands. Some of the lines are aging to the point that they are becoming unreliable.

The City is expected to approach built-out conditions by 2028. The future water source demand is projected to be 2118 gpm, which exceeds the current source capacity by 768 gpm. Additional water source capacity will become necessary within 5 years and additional municipal water rights will also need to be acquired if the City wishes to use their own well water. The current storage capacity will be exceeded within 15 years and by 2028 another 0.5 MG of storage will be necessary. Existing transmission lines will need to be replaced and new lines will need to be installed to serve areas expected to be developed. Several major replacement projects have been identified for immediate attention.

It is recommended that impact fees be assessed to help fund the improvements related to growth. It may also be necessary to increase water rates in order to fund improvement projects that are necessary to maintain the current level of service to existing businesses and residents.

Table 1-1 contains summary of the estimated costs and priority level of the recommended improvement projects.

Table 1-1: Summary of Project Costs

Priority	Number of Projects	Existing Deficiency	System Improvement	Project Improvement	Total
High	8	$1,518,017	$2,327,967	$ 0	$3,845.984
Medium	10	$2,973,170	$5,714,513	$ 0	$8,687,683
Low	8	$1,557,721	$2,326,703	$1,799,504	$5,683,928
Total	26	$6,048,907	$10,369,183	$1,799,504	$18,217,594

2.0 DEFINITION OF TERMS AND ABBREVIATIONS

CFP	–	Capital Facilities Plan
CFS	–	Cubic Feet per Second
CIP	–	Capital Improvement Program
CRS	–	Caldwell Richards Sorensen
DSB	–	Deuell-Stone-Barton Canal
ERC	–	Equivalent Residential Connection
gpd	–	Gallons Per Day
gpm	–	Gallons Per Minute
LYRB	–	Lewis Young Robertson and Burningham
MG	–	Million Gallons
MGD	–	Million Gallons per Day
UDOT	–	Utah Department of Transportation
WCFP	–	Water System Capital Facilities Plan

3.0 INTRODUCTION

~~3.2~~3.1 Background

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This study was performed to update the previous Water System Capital Facilities Plan (WCFP), which was prepared by the City in 2002. A WCFP provides an evaluation of the water system and how it is maintained and funded, looking at existing as well as future built-out conditions. Improvements necessary to maintain an adequate and consistent level of service are identified and prioritized. Changes in growth patterns, system degradation, and escalating construction costs make it necessary to periodically reevaluate the water system needs and update the WCFP in order to maintain an adequate level of service and to verify that funding sources are adequate to support the future needs of the water system.

~~3.3~~3.2 Scope of Investigation

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Caldwell Richards Sorensen (CRS) was retained by West Bountiful City to evaluate the City's water system and prepare a WCFP. This evaluation included collecting information about the system (repair history, age, performance, size and type of pipes and storage facilities, etc.) and identifying existing deficiencies. Using published population projections and land use maps provided by the City, the future demands were calculated and future improvements were identified. A list of all improvement projects including cost estimates and proposed construction dates was prepared.

The WCFP provides documentation for the water system analysis performed by CRS and presents the recommended system improvement projects to be included in the City's Capital Improvement Program (CIP).

4.0 EXISTING CONDITIONS

4.1 Water Source

4.1.1 State Requirements

The State of Utah Drinking Water Rules (R309-510-7) require sources for public water systems to meet usage demands under two separate conditions. First, the source must be adequate to meet the anticipated peak-day demand; second, the source must be able to provide for the average yearly demand. Table 4-1, provided by the Utah Division of Drinking Water, provides the basis to determine the indoor and outdoor peak day and average yearly demand. Criteria presented in Table 4-1 include residential and non-residential demands, and are defined in terms of Equivalent Residential Connections (ERC).

Table 4-1: Source Demand for Indoor and Outdoor Water Use

Source Demand for Indoor and Outdoor Use		
Type of Water Use	Peak Day Demand	Average Yearly Demand
Indoor Water Use	800 gpd/ERC	146,000 gal/ERC
Outdoor Water Use[1,2]	1140 gpd/ERC	121,860 gal/ERC

[1] Outdoor demand is based on an average lot size of ½ acre and assumes that 40% of the lot is irrigated.
[2] Outdoor use only applies to approx. 25% of residents because the other have secondary water service.

The ERC per non-residential connection is based on the size of the connection. The ERC per connection value for various connection sizes is specified by AWWA and this information is also included in Table 4-2.

Table 4-2: Non residential ERC values

Connection Size	ERCs
3/4”	1.0
1”	1.4
1-1/2”	1.8
2”	2.9
3”	11.0
4”	14.0
6”	21.0

Using information from the City's utility database and applying Table 4-2, culinary water is currently provided to 1769 ERCs. Based on the requirements presented in Table 4-1, the City must be able to meet the minimum source requirements as presented in Table 4-3 below.

Table 4-3: Current Minimum Water Source Requirements

Current Minimum Water Source Requirements		
Type of Water Use	Peak Day Demand	Average Yearly Demand
Indoor Water Use	1.41 MGD (983 gpm)	258.27 MG (793 Ac-ft)
Outdoor Water Use[1,2]	0.45 MGD (313 gpm)	48.13 MG (148 Ac-ft)
Total Water Use	1.86 MGD (1296 gpm)	306.41 MG (940 Ac-ft)

[1] Outdoor demand is based on an average lot size of ½ acre and assumes that 40% of the lot is irrigated.
[2] Outdoor use only applies to approx. 25% of residents because the other have secondary water service.

4.1.2 Weber Basin

West Bountiful City is under contract with Weber Basin Water Conservancy District to purchase 244.37 MG (750 acre-feet) of culinary water every year. This is the City's primary water source and is adequate to meet the City's normal demands except during the peak summer months. Weber Basin Water Conservancy District supplies this water through a meter station and a pressure reducing station located at 300 East 500 South in Bountiful City. The approximate capacity of this connection is 1.44 MGD (1000 gpm). Under normal operating conditions, only 1.15 MGD (800 gpm) is necessary to meet the City's needs.

4.1.3 Stone Creek Well

The City owns a 16 inch, 420 foot deep well located at 550 West 1000 North. The City has the water rights to pump 1.29 MGD (898 gpm, 2.0 cfs) for a total of 215.05 MG (660 acre-feet) per year from this well. However, the well and appurtenant pumping and treatment facilities are only capable of producing culinary water at a maximum rate of 0.50 MGD (350 gpm), which would yield 184.0 MG (565 ac-ft) per year if the well were pumped continuously. The City presently uses this well to supplement the water purchased from Weber Basin.

4.2 Water Storage

4.2.1 State Requirements

In the State of Utah Drinking Water Rules (R309-510-8), there are specific requirements for water storage. Storage facilities must provide equalization storage to satisfy average day demands for indoor and outdoor use, fire suppression storage, and emergency storage to meet the demands in the event of an unexpected emergency. Equalization storage requirements for

indoor and outdoor water use are determined by multiplying the number of ERCs by the appropriate volume per ERC value as presented in Table 4-4.

Table 4-4: Equalization Storage Volume for Indoor and Outdoor Water Use

Equalization Storage for Indoor and Outdoor Water Use		
Type of Water Use	Volume per ERC	Equalization Storage
Indoor Water Use	400 gal/ERC	0.71 MG
Outdoor Water Use[1,2]	570 gal/ERC	0.22 MG
Combined Indoor/Outdoor Use	970 gal/ERC	0.93 MG

[1] Outdoor demand is based on an average lot size of ½ acre and assumes that 40% of the lot is irrigated.
[2] Outdoor use only applies to approx. 25% of residents because the other have secondary water service.

Fire storage volume is determined by the South Davis Metro Fire Marshall and is based on the structure type requiring fire protection. West Bountiful City is mostly a residential/agricultural community however there are also several large commercial structures which require larger fire suppression capacity. The Fire Marshall requires a fire storage volume equal to 3000 gpm for 4 hours be maintained. Subsequently, the required fire storage volume is calculated to be 0.72 MG.

No specific emergency storage amount is required by the State of Utah Drinking Water Rules, but in West Bountiful City a minimum of half of an average day's demand should be reserved for emergencies, this is approximately half of the equalization storage or 0.5 MG.

Table 4-5 summarizes the minimum requirements for water storage and the actual storage volume with which the City currently operates.

Table 4-5: Current Storage Requirements

Current Storage Requirements	
Type of Storage	Storage Volume
Equalization Storage	0.93 MG
Fire Suppression Storage	0.72 MG
Recommended Emergency Storage	0.5 MG
Total Required Storage	**2.15 MG**
Actual Storage	**2.50 MG**

4.2.2 Current Storage

The West Bountiful City water system currently operates with two storage reservoirs. A 1.0 MG reinforced concrete reservoir constructed in 1979, is located at approximately 300 East and 500 South in Bountiful City. The second reservoir is 1.5 MG in size and was built in 1995, and is located at approximately 600 East and 400 North in Bountiful City.

4.3 Water Distribution

The water distribution system owned and operated by West Bountiful City was constructed in the late 1950s. The top of the City's reservoirs are at approximately 4464 ft, the highest elevation within the service area is 4330 ft, and the lowest elevation is 4218. These elevations dictate the normal operating pressures within the service area, which range from 58 to 106 pounds per square inch (psi).

The major transmission lines conveying water from the reservoirs to and throughout the City range in size from 8 to 14 inches. These transmission lines are generally found within the main streets throughout the City, which loops the system and creates a strong grid that provides adequate fire protection and redundancy to most areas. The water system grid is shown in Figure 4.1.

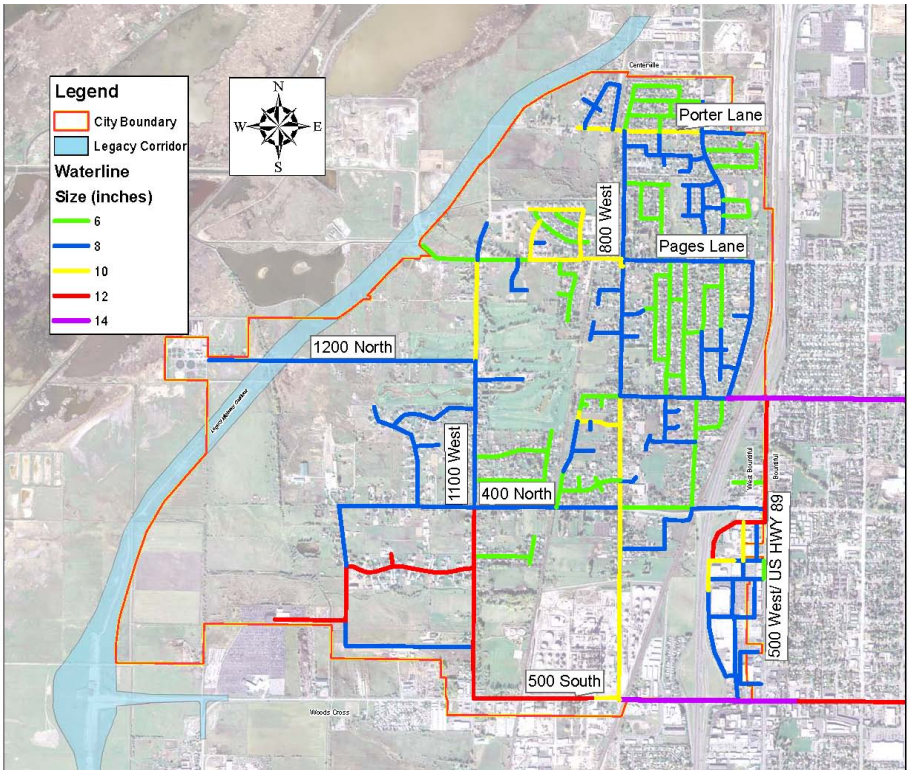

Figure 4.1. Water System Grid

The distribution system has been in service for approximately 60 years and now requires frequent maintenance and repair work to keep the system operating properly. Due to age and the growing demand being placed on the water system, it is necessary to consider replacing, upsizing, and installing new system segments.

4.4 Funding for Existing System

The water system is funded by the water fund, which is an enterprise fund supported by water rates collected from residents and businesses within the city.

Current water rates are sufficient to maintain the existing system but are insufficient to pay for additional capital improvements such as replacing old and installing new waterlines. Impact fees and new connection fees help cover costs for repairs but are insufficient to cover large capital improvement costs.

5.0 FUTURE CONDITIONS

5.1 Growth and Demand Projections

Future conditions are based on a built-out scenario, which is expected to be realized by 2028. Built-out conditions are estimated using the Future Land Use Plan outlined in the City's General Plan. The Future Land Use Plan defines the maximum number of units that can be developed per acre within each zone. Within the current City boundary and areas planned for annexation, there are 934 acres of developable land. These undeveloped lands are identified in Figure 5.1.

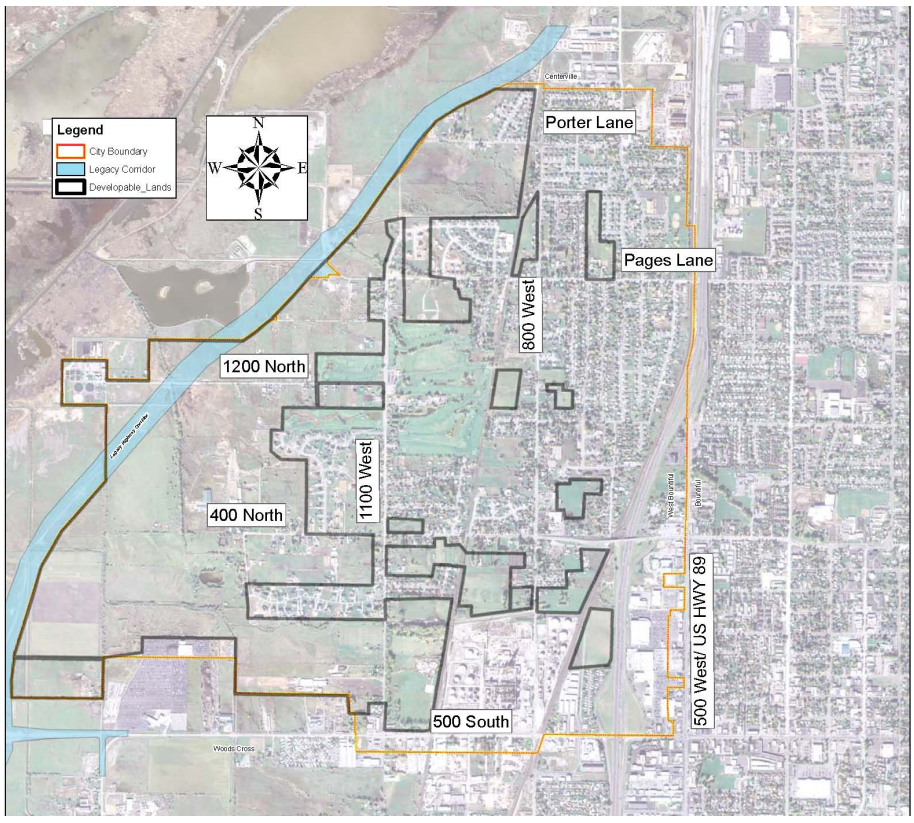

Figure 5.1: Developable Land

Figure 5.2 is taken from the General Plan and shows the Future Land Use Plan. The majority of the developable land is zoned for rural density development and is located west of 1100 West.

There is also a significant amount of developable land within the low and medium density residential and light industrial zones. The low and medium density residential areas are generally between 1100 West and 500 West and will consist largely of infill type development. Light Industrial development will be allowed along 500 South and near the Legacy Interchange at 500 South.

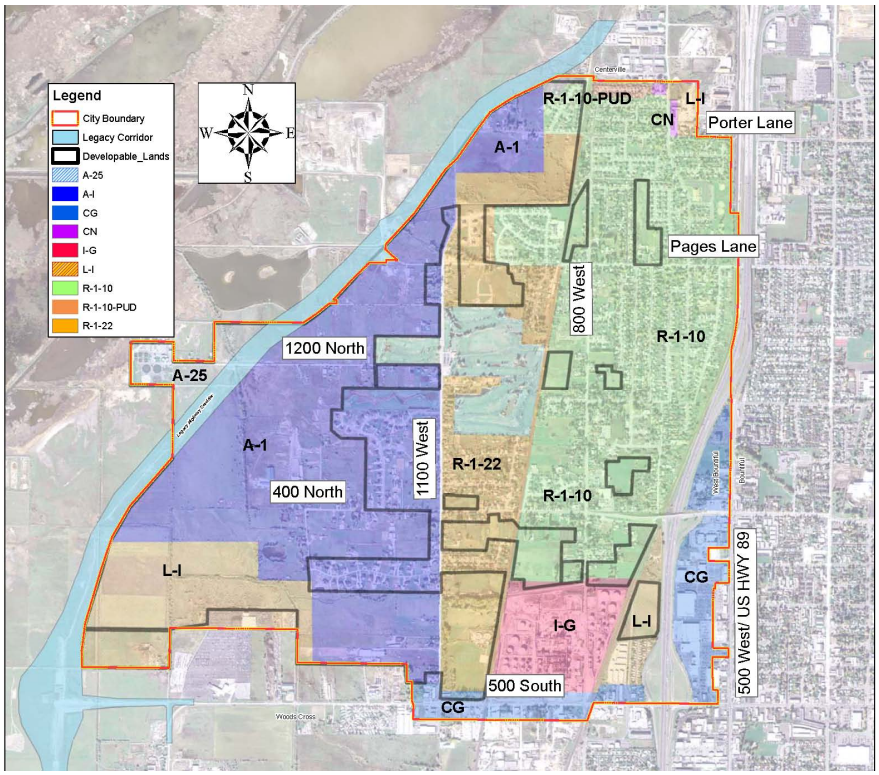

Figure 5.2. Future Land Use Plan

Table 5-1 provides a breakdown of the developable acreage within each zone showing the maximum number of connections and the peak day demand within each land use zone based on the zoning restrictions. The peak day demand is calculated using 800 gpd per connection as required in the *State of Utah Drinking Water Rules.* The City currently requires all new developments use secondary water for outside use; therefore projected demands are based on indoor use only. It was assumed there will be two ERCs per acre in the light industrial zone. This assumption is based on an analysis of the currently developed commercial and light industrial areas within the City.

Table 5-1: Demand from New Development

Demand from New Development				
Land Use Zone	Allowed Density (lots/acre)	Developable Acreage	Number of ERCs	Peak Day Demand (MGD)
Rural Density (A-1)	1	540	540	0.43 (299 gpm)
Low Density (R-1-22)	2	145	290	0.23 (160 gpm)
Medium Density (R-1-10)	4	77	308	0.25 (173 gpm)
Light Industrial (L-I)[1]	2[1]	172	344	0.28 (194 gpm)
Total		**934**	**1482**	**1.19 (826 gpm)**

[1] Assumed two ERCs per acre for Light Industrial Zone.

5.2 Water Source

The water source demand under built-out conditions was determined by adding the existing demand and the projected demand from new development. Table 5-2 provides a summary of the total future water demand.

Table 5-2: Future Water Demand Summary

Summary of Water Source Requirements			
Type of Water Use	Number of ERCs	Peak Day Demand	Average Yearly Demand
Existing	1769	1.86 MGD (1292 gpm)	306.411 MG (940 Ac-ft)
Additional	1482	1.19 MGD (826 gpm)	216.37 MG (664 Ac-ft)
Total Future	3251	3.05 MGD (2118 gpm)	522.78 MG (1,604 Ac-ft)

As described in Chapter 4, the City currently has two water sources, Weber Basin Water Conservancy District and Stone Creek Well. At built-out conditions an additional 1.11 MGD (768 gpm) of source water will be needed to meet the peak day demand as well as an additional 100.4 MG (289 ac-ft) to meet the average yearly demand. The City will also need to review their water rights to verify that sufficient groundwater can be acquired to meet these demands. Table 5-3 provides a comparison of the current source capacity and the future demand.

Table 5-3: Comparison of Current Water Source Capacity vs. Future Demand

Current Source Capacity vs. Future Demand		
Water Source	Peak Day Capacity/Demand	Average Yearly Capacity/Demand
Stone Creek Well	0.50 MGD (350 gpm)	184.00 MG (565 Ac-ft)
Weber Basin WCD	1.44 MGD (1000 gpm)	244.37 MG (750 Ac-ft)
Total Current Capacity	1.94 MGD (1350 gpm)	428.38 MG (1,315 Ac-ft)
Total Future Demand (from Table 5-2)	3.05 MGD (2118 gpm)	522.78 MG (1,604 Ac-ft)
Additional Capacity Needed to Meet Future Demand	1.11 MGD (768 gpm)	100.40 MG (289 Ac-ft)

5.3 Water Storage

The future water storage requirement is calculated by multiplying the projected number of new ERCs as presented in Table 5-1, by 400 gallons per ERC, which is the minimum storage volume required by the *State of Utah Drinking Water Rules*. The projected storage requirements at built-out conditions are presented in Table 5-4. The future storage requirement is greater than the current storage volume; therefore additional storage will be necessary in order to maintain the existing level of service. The City expects to construct the additional storage reservoir at the same site as the 1.5 MG reservoir.

Table 5-4: Future Storage Requirements

Future Storage Requirements	
Type of Storage	Storage Volume
Equalization Storage	1.53 MG
Fire Suppression Storage	0.72 MG
Emergency Storage	0.76 MG
Total Required Storage	**3.01 MG**
Current Storage	**2.50 MG**

5.4 Water Distribution

The scope of this water distribution analysis did not include the creation of a system wide distribution model. Specific flow and pipe analyses were performed using hydraulic equations that are acceptable by industry standards and commonly used in water system design and analysis. Sample calculations can be found in the Appendix of this report. The system wide analysis was based on sound engineering judgment and actual knowledge of the operating system.

In order to provide adequate water service to the developing areas without affecting the level of service to existing businesses and residents it will be necessary to increase the flow capacity of several of the major transmission lines in the City's water distribution system. Flow capacity is increased by replacing existing transmission lines with larger diameter pipe. The replacement pipe sizes were designed to handle the worst case scenario (fire flow).

5.5 Conclusion

In order to maintain the current level of service under the projected built-out conditions, several improvements to the City's water system will be necessary. These improvements include increasing the water source capacity, increasing the storage capacity, replacing and upsizing existing water transmission lines, and installing new water transmission lines. Descriptions of the specific locations and sizes of the improvements will be discussed in the following chapter.

6.0 RECOMMENDATIONS

~~6.2~~6.1 Water Capital Improvement Plan

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It is recommended that the water system improvement projects identified in this chapter be added to the West Bountiful Capital Improvement Program. Each of the projects is briefly described in this chapter and a summary of the projects is presented in Table 6-1. Each project is categorized by the type of project (source, storage, distribution or combination) and by the priority level of the project (high, medium, low). Figure 6.1 shows the location of each of the projects, where possible.

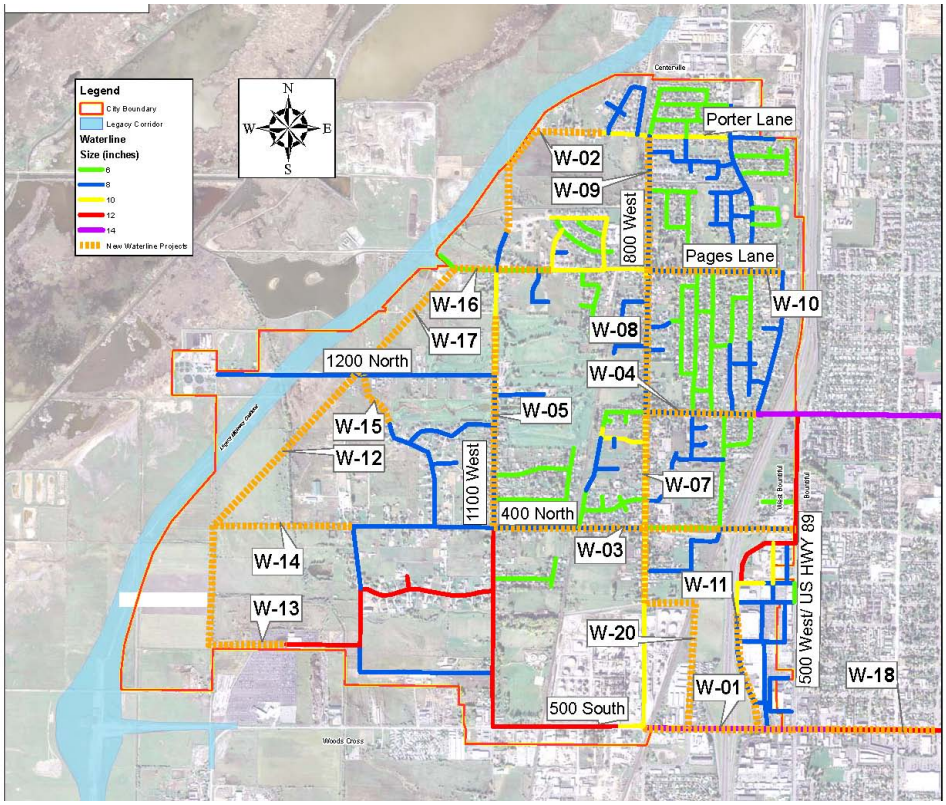

Figure 6.1: Map Showing Water Projects

Table 6-1: Summary Matrix of Projects

Number of Projects by Type					
Priority	Source	Storage	Distribution	Combination	Total
High	1	0	4	3	8
Medium	2	0	7	1	10
Low	0	1	7	0	8
Total	3	1	18	4	26

Project W-01 **High Priority, Distribution**

- *Location*: 500 South from 800 West to 500 West
- *Description*: Replace 10 inch cast iron pipe with 12 inch PVC pipe
- *Need*: The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands.
- *Planned Construction Year*: 2009
- *Special Considerations*: This project is deemed high priority because the Utah Department of Transportation (UDOT) is currently designing roadway improvements for 500 South which are to be completed during the summer of 2009. This waterline project needs to be completed prior to the roadway improvements. This project will include a Union Pacific Railroad crossing, I-15 crossing, and will require a major traffic control effort.

Project W-02 **High Priority, Distribution**

- *Location*: West end of Porter Lane continuing southward along 1100 West
- *Description*: Install new 12 inch PVC waterline
- *Need*: To supply culinary water to this portion of the city that has been recently annexed. Current residents have relied on wells which have begun to dry up within the past several years.
- *Planned Construction Year*: 2009
- *Special Considerations*: There are several high pressure gas lines that will be crossed by this new waterline.

Project W-03 **High Priority, Distribution**

- *Location*: 400 North from 1100 West to 500 West
- *Description*: Replace 8 inch cast iron pipe with 12 inch PVC pipe

- *Need*: The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands.
- *Planned Construction Year*: 2010
- *Special Considerations:* This project will include a Union Pacific Railroad crossing, I-15 crossing, and Utah Transit Authority (UTA) crossing.

Project W-04 High Priority, Distribution

- *Location*: 100 North from 800 West to 550 West
- *Description*: Replace 8 inch cast iron pipe with 12 inch PVC pipe
- *Need:* The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands. This pipe has required several repairs in recent years.
- *Planned Construction Year*: 2011
- *Special Considerations*: This project should be coordinated and completed prior to the replacement of 1000 North.

Project W-05 Medium Priority, Distribution

- *Location*:1100 West from 400 North to 1070 North
- *Description*: Replace 8 inch cast iron pipe with 12 inch PVC pipe
- *Need:* The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands.
- *Planned Construction Year*: 2012
- *Special Considerations*: Several active and abandoned gas lines are crossed with this project which will require coordination with the owners of these lines.

Project W-06A Medium Priority, Source

- *Location*: Not determined yet
- *Description*: Conduct study and drill new production well (Phase I)
- *Need*: The current water supply which includes water supplied by Weber Basin Water Conservancy District and the existing well is not sufficient for projected growth demands. A new well is required to meet these demands.
- *Planned Construction Year*:2013
- *Special Considerations:* City will need to acquire sufficient water rights to operate this well

Project W-06A Medium Priority, Source

- *Location*: Not yet determined

- *Description*: Construct well house, obtain operating permit and place well into use (Phase II)
- *Need*: The current water supply which includes water supplied by Weber Basin Water Conservancy District and the existing well is not sufficient for projected growth demands. A new well is required to meet these demands.
- *Planned Construction Year*: 2015
- *Special Considerations*: This is the second phase of the well project.

Project W-07 Medium Priority, Distribution

- *Location*: 800 West from 400 North to 1000 North
- *Description:* Replace 10 inch cast iron pipe with new 12 inch PVC pipe
- *Need*: The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands.
- *Planned Construction Year*:2014
- *Special Considerations*: This project is located in the West Bountiful Historic District and should be coordinated with road improvement projects that are planned for this area.

Project W-08 Medium Priority, Distribution

- *Location*: 800 West from 1000 North to Pages Lane
- *Description*: Replace 8 inch cast iron pipe with 12 inch PVC pipe
- *Need*: The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands.
- *Planned Construction Year*: 2016
- *Special Considerations*: None

Project W-09 Medium Priority, Distribution

- *Location*: 800 West from Pages Lane to Porter Lane
- *Description*: Replace 8 inch cast iron pipe with 10 inch PVC pipe
- *Need*: The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands.
- *Planned Construction Year*: 2018
- *Special Considerations*: This project will cross the Deuell-Stone-Barton (DSB) canal.

Project W-10 Medium Priority, Distribution

- *Location*: Pages Lane from 800 West to 550 West

- *Description*: Replace 8 inch cast iron pipe with 10 inch PVC pipe
- *Need:* The current pipe is approximately 60 years old and does not have the capacity to meet growth related demands.
- *Planned Construction Year*: 2019
- *Special Considerations*: None

Project W-11 Medium Priority, Distribution

- *Location*: East of I-15 behind Shopko from 500 South to Costco at 50 North
- *Description*: Replace 8 inch PVC pipe with 12 inch PVC pipe
- *Need*: Strengthen fire suppression capacity due to redevelopment of the area
- *Planned Construction Year*: 2020
- *Special Considerations*: None

Project W-12 Low Priority, Distribution

- *Location:* Future Legacy frontage road from 300 South to 1200 North
- *Description*: Install new 12 inch PVC pipe
- *Need*: To create a loop in the water system in the southwest portion of the city
- *Planned Construction Year*: 2021
- *Special Considerations*: This project does not need to be completed until development extends to this portion of the City.

Project W-13 Low Priority, Distribution

- *Location*: New commercial district at Legacy Parkway and 500 South
- *Description*: Install new 12 inch PVC pipe and fire hydrants
- *Need*: Supply drinking water and fire suppression to the new development
- *Planned Construction Year*: 2023
- *Special Considerations*: None

Project W-14 Low Priority, Distribution

- *Location*: Future 400 North from 1450 West to Legacy Parkway
- *Description*: Install new 12 inch PVC pipe, fire hydrants, and connections
- *Need*: Supply drinking water and fire suppression to the new development
- *Planned Construction Year*: 2024
- *Special Considerations*: None

Project W-15 Low Priority, Distribution

- *Location*: Approximately 1450 West and 1070 North extending to 1200 North
- *Description*: Install new 8 inch PVC pipe, fire hydrants, and connections
- *Need*-Loop existing system and provide water to new development
- *Planned Construction Year*: 2025
- *Special Considerations*: None

Project W-16 Low Priority, Distribution

- *Location*: Pages Lane from 1000 West to future Legacy frontage road
- *Description*: Replace 6 inch PVC pipe with new 12 inch PVC pipe
- *Need*: The current pipe does not have the capacity to meet growth related demands
- *Planned Construction Year*: 2026
- *Special Considerations*: None

Project W-17 Low Priority, Distribution

- *Location:* Future Legacy frontage road from 1200 North to Pages Lane
- *Description*: Install new 12 inch PVC pipe, fire hydrants, and service connections
- *Need*: Loop existing system and provide water to new development
- *Planned Construction Year*: 2027
- *Special Considerations*: None

Project W-18 Medium Priority, Distribution

- *Location:* 500 South from 500 West to 300 East
- *Description*: Replace 12 inch transite pipe with new 16 inch PVC pipe
- *Need*: The transite pipe contains asbestos fibers that could pose a potential health risk and the current pipe does not have the capacity to meet growth related demands
- *Planned Construction Year*: 2017
- *Special Considerations*: Removal and disposal of existing pipe includes contact with asbestos lined pipe.

Project W-19 Low Priority, Storage

- *Location*: Not determined yet
- *Description*: Construct new 1.0 MG storage reservoir and connect to water system
- *Need*: Required to satisfy the State of Utah Drinking Water Rules for water storage based on development projections.

- *Planned Construction Year*: 2022
- *Special Considerations*: Property acquisition should be considered well in advance of the expected completion date for this project

Project W-20 Low Priority, Distribution

- *Location*: 800 West from 500 South to 400 North
- *Description*: Replace 12 inch cast iron pipe with new 12 inch PVC pipe
- *Need*: The current pipe is approximately 60 years old and the existing 800 West alignment of the waterline is being considered for abandonment
- *Planned Construction Year*: 2028
- *Special Considerations*: None

Project W-21 High Priority, Combination

- *Location*: Not Applicable
- *Description:* Prepare Capital Facilities Plan
- *Need:* To determine new Impact Fee rates and identify needed projects
- *Planned Construction Year*: 2008
- *Special Considerations*: None

Project W-22 High Priority, Combination

- *Location*: Not Applicable
- *Description*: Analyze and update water impact fees
- *Need:* Future development will place more demand on the water system
- *Planned Construction Year*: 2008
- *Special Considerations*: None

Project W-23 Medium Priority, Combination

- *Location*: Not Applicable
- *Description*: Update Capital Facilities Plan in 5 years
- *Need*: Record improvement projects that have been completed and identify new projects to maintain an acceptable level of service.
- *Planned Construction Year*: 2013
- *Special Considerations*: Create a system-wide computer model to analyze the water system

Project W-24 High Priority, Source

- *Location:* Not Applicable
- *Description*: Water right study
- *Need:* Update water right proof of beneficial use and verify if existing water rights are sufficient for growth projections for the City
- *Planned Construction Year*: 2008
- *Special Considerations*: The City's main water right has a proof due in the near future

Project W-25 High Priority, Combination

- *Location*: Not Applicable
- *Description*: Water rate study
- *Need*: To determine if current rates will produce the funds needed to maintain and operate the water system as expands due to growth of the City
- *Planned Construction Year:* 2008
- *Special Considerations*: None

~~6.3~~6.2 Cost Estimate

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A comprehensive list of water system improvement projects, the estimated costs for the design and construction of the projects, and the approximate year that each project will be constructed has been prepared and can be found in the Appendix of this report. The total construction costs are divided into three components: *Existing Deficiencies, System Improvements, Project Improvements*.

Existing Deficiency Costs are the portion of the costs necessary to repair existing problems or replace components of the current system.

System Improvement Costs are the portion of the costs necessary to upgrade system components to meet future growth related demands, without improving the level of service. System improvement costs include the cost to upsize the infrastructure in order to meet system needs beyond the immediate project area. For example, in a new residential development, the developer would be required to pay for the installation of an 8 inch waterline to service the homes in the development. But, if there is a potential additional future growth to take place downstream of the new development, then the developer could be required to install a new 12 inch waterline instead of an 8 inch waterline. The project improvement costs would include the cost to install the standard 8 inch waterline. This portion of the cost will only benefit the new development. The system improvement costs will cover the additional expense to upgrade the waterline from 8 to 12 inches, which will benefit areas downstream of the immediate project area.

Project Improvement Costs are costs which represent the developer's responsibility to install system components that comply with the City's standards and will only benefit the newly developed area. If the cost of a project is to be broken into existing deficiency and system improvement costs then, the total costs are divided into the two parts based on existing and

future flow capacity. For example, a project that involves the replacement and upsizing of a waterline will have an existing deficiency component and a system improvement component. If the new pipe has a diameter of 12 inches and a flow capacity of 1,567 gpm, and the existing pipe has a diameter of 8 inches and a flow capacity of 600 gpm, then the system improvement percentage is calculated by dividing the additional flow capacity by the new pipe total flow capacity, shown as follows:

$$\text{System Improvement \%} = \frac{1567 - 600}{1567} = 62\%$$

If the cost of a project is to be broken down into project improvement and system improvement components then the project improvement costs are determined by calculating the cost of the improvements which will only benefit the specific development.

Table 6-2 presents a summary of the improvement costs broken down into the three components: existing deficiency, system, project improvements.

Table 6-2: Summary of Project Costs

Priority	Number of Projects	Existing Deficiency	System Improvement	Project Improvement	Total
High	8	$1,518,017	$2,327,967	$ 0	$3,845.984
Medium	10	$2,973,170	$5,714,513	$ 0	$8,687,683
Low	8	$1,557,721	$2,326,703	$1,799,504	$5,683,928
Total	26	$6,048,907	$10,369,183	$1,799,504	$18,217,594

~~6.4~~6.3 Impact Fees

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It has been demonstrated in this report that a significant amount of development related growth is expected within West Bountiful City over the next few decades. In order to serve the future businesses and residents while maintaining the level of service to current residents it will be necessary to require developers pay a water impact fee. The impact fees will be determined by analyzing the total system improvement costs throughout the City. This analysis will be performed by Lewis Young Robertson and Burningham (LYRB), the City's financial analysis consultant.

7.0 REFERENCES

1. Cooper Roberts Simonsen Associates. *West Bountiful General Plan – 2007 Update*. May 2007.
2. Lewis Young Robertson & Burningham, Inc. *West Bountiful City, Utah City-Wide Impact Fee Analysis*. December 2002.
3. State of Utah, Department of Natural Resources, Division of Drinking Water. *State of Utah Drinking Water Rules, R308-510, Minimum Sizing Requirements*.

8.0 APPENDIX

Sample Calculations

Project List and Estimated Costs

APPENDIX: SAMPLE CALCULATIONS

APPENDIX: PROJECT LIST AND ESTIMATED COSTS