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Herriman
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Herriman City FEBRUARY 2009 (AMENDED APRIL 2010)
WATER MASTER PLAN

HERRIMAN CITY

Water Master Plan



HORROCKS
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John E. Schiess P.E.

April, 2010

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EXECUTIVE SUMMARY

Herriman City (City) is a rapidly growing community located in the southwest corner of Salt Lake County. Changing land use and rapid population growth have created a need for the City to update its water master plan, which inventories the existing water system, identifies current deficiencies and demands placed on the water system by new development and recommends a plan for installing scheduled improvements. The State of Utah Division of Drinking Water and the International Fire Code provide requirements defining a minimum level of service that the City must meet in providing water to its residents.

The City's current population is approximately 18,500 residents in 2008 and growing rapidly. The City's existing water system adequately meets current peak flow demands. However, there are deficiencies with the existing delivery system.

Population projections for the City indicate continued growth. Growth patterns indicate different growth rates exist in each pressure zone, requiring separate evaluation of each zone. In Zone 1, there are no current deficiencies but system expansion will need to accommodate new development. Zone 2 has sufficient source and storage capacity for current needs. Zone 3 source capacity does not meet current or future needs. Storage, delivery system and source facilities will need to be constructed to meet the zones current and future needs. Current requirements for Zone 4 are met with the existing facilities. However, storage, source and delivery facilities will require upgrades to meet the needs of future growth projections. Future zones will require evaluation and planning upon inception. Zones A through F in the newly annexed "East Herriman" have been master planned by the developers and those plans have been combined in this master plan, with some adjustment, to form one document. The Culinary water system master plan for "East Herriman" was developed by Synergy Consultants and the secondary master plan was developed by Nolte.

To assist the City in systematically constructing improvements that will meet the City's growing water needs as they arise, a capital facilities plan (CFP) will be created. The CFP is to identify water demands placed on existing facilities by new development and propose means by which the City will meet these demands.

1.0 INTRODUCTION

Herriman City (City), located in the southwest corner of Salt Lake County, is a growing community. Neighboring cities include South Jordan to the North and Riverton and Bluffdale to the East. The Oquirrh Mountains provide a natural boundary to the west, while Camp Williams State Military Reserve and the Salt Lake County border lie to the south. It has not yet reached build-out. As such, the City is projected to grow from its current population of approximately 18,500 residents in 2008, to 100,000 residents by the year 2040. This forecasted growth will place increased pressure on the City's infrastructure, including its water system.

The last update to the City's water master plan was completed in 2007. Changing land use and rapid population growth in the City along with a large annexation to the east have resulted in the need to update the master plan to reflect the City's growing needs and long range planning. This update, titled, Herriman City Water Master Plan, is the culmination of the master plan update process. It is intended to guide upgrades to the City's water system for the next several years.

The purpose of the Herriman City Water Master Plan is to inventory the existing water system, identify current and future deficiencies and recommend a plan for installing scheduled improvements. It is assembled such that only the most useful and important information is contained in the body of the document. All supporting analysis and detailed technical information has been placed in the appendices. The information which will be used most often has been summarized in figures, tables and maps within each chapter.

Definitions

<i>DDW</i>	<i>Division of Drinking Water</i>
<i>ERC</i>	<i>Equivalent Residential Connection</i>
<i>gpm</i>	<i>gallons per minute</i>
<i>gpd</i>	<i>gallons per day</i>
<i>IFC</i>	<i>International Fire Code</i>
<i>JVWCD</i>	<i>Jordan Valley Water Conservancy District</i>

Equivalent Residential Connections (ERC)

Since, in master planning, flows from many different sources are evaluated, it is beneficial to convert flows into a system of common units. For the purposes of this study, flows required by major water users, such as commercial businesses, schools, churches, and City facilities have been converted to equivalent residential connections (ERC). This simplifies projection of future water demands.

As an example, if the average residential connection in 2006 used 648 gpd (indoor) and the average commercial connection used 2,125 gpd then the commercial ERC would be $2125/648 = 3.28$.

For this master plan, the City's water meter records were used and ERC's were calculated for the major water users. Calculated ERC's were adjusted to account for state standards, extreme water users, and non-typical water use years.

For the purposes of planning for future water needs, the following ERC's standards are set. Recommendations on meter size compared to ERC values are given in Chapter 4

- 1 ERC = One average residential indoor water user (actual average 648 gpd usage and state standard 800 gpd usage). Master plan utilizes State minimum standards.
- 1 acre of irrigated land = 7.1 ERC (average 0.2 acres of irrigation per resident, actual average 1,129 gpd usage and state standard 1,140 gpd usage). Master plan utilizes State minimum standards.

- 3.28 ERC = One average commercial connection or as evaluated on a case by case basis
- Industrial ERC = evaluated on a case by case basis

Indoor and Outdoor Use

In order to analyze implementation of a secondary water system (i.e. pressure irrigation), it is necessary to categorize water needs into indoor and outdoor needs. The ERC's presented in the previous section are based on total indoor usage for an average residential connection.

Categorizing water usage into indoor and outdoor needs enables us to calculate indoor and outdoor ERC's. Indoor ERC's become the basis for a culinary system in this scenario while outdoor ERC's become the basis for conceptual layout of a supplementary secondary system.

In order to separate indoor and outdoor use, winter and summer usage was compared. Since there is very little outdoor water use in the winter, water meter records during the winter months provide accurate data to calculate indoor ERC's. The difference between winter and summer peak flows can roughly be considered outdoor use and can serve as the basis for outdoor ERC calculations. An analysis of water meter data indicates, the City's indoor water use is approximately 648 gpd while the outdoor use is approximately 1,129 gpd for the average single family residential home. State minimum standards of 800 gpd and 1,140 gpd are utilized in the master plan.

Minimum Level of Service

The minimum level of service is the minimum standards within the water system that the City is required to meet. The City is required to meet the minimum standards because of City standards, State of Utah Division of Drinking Water requirements, and the International Fire Code. Some of the relevant requirements are as follows.

- Maintain 40 psi in all areas of the water system during peak day usage
- Maintain 30 psi in all areas of the water system during peak hour usage
- Maintain 20 psi in all areas of the water system during peak day usage plus fire flows
- Maintain 1000 gpm fire flows for all homes under 3,600 square feet
- Maintain 1,750 gpm fire flows for all homes between 3,600 and 4,800 square feet
- Maintain a minimum of 2,250 gpm fire flows for newly annexed areas of "East Herriman"

- Maintain adequate fire flows for all other buildings and sizes according to IFC standards
- Maintain adequate storage for fire flows according to IFC standards
- Maintain 400 gallons of storage per indoor ERC serviced
- Maintain 2,848 gallons of storage per acre of irrigation
- Maintain 800 gpd of source capacity per indoor ERC serviced
- Maintain 3.96 gpm (1,140 gpd) of source capacity per acre of irrigation
- Maintain 0.45 Acre-feet of water right per indoor ERC and 1.87 acre-ft per irrigated acre (users take delivery of 1.87 acre-ft per acre based on point of use meters, City produces or purchases 2.61 acre-ft per acre)

These values are the minimum standards the City is required to meet in their water system. The actual water use is somewhat lower than the minimum but the City is required to design to the minimums and will thus have a safety factor built into their water system.

Planning Period

A planning period is the length of time studied in an analysis. It was determined through consultation with City staff that the planning period for this master plan should be when the City reaches buildout which is estimated to be approximately year 2040. The planning period for this master plan is 32 years.

2.0 EXISTING CONDITIONS

In order to determine what the City's future needs will be, we must first assess the current population, existing facilities and the condition of those facilities. The following section includes the best existing information assembled from City records, census information and field data collected specifically for this master plan.

Current Population – Total Population

The City's population is estimated at 18,500 in 2008 at the time of this study. The current population estimate was based on the 2000 census and supplemented by recently issued building permits and average household occupancy rates. More detailed information regarding census and building permit data has been included in the Appendix.

Average Residents per Household

For purposes of this master plan, average residents per household were calculated to be 3.46. This was established using current building permits and zoning information to determine the number of units of various types of residences that exist throughout Herriman (i.e. single family dwellings, apartments, duplexes, etc.). The number of units of each dwelling type was multiplied by the industry standard of residents per dwelling unit for its respective type. The results of this method compare favorably with the 2000 Census which shows 3.49 residents per household.

Current Growth Trends

As a part of analyzing the population, current growth trends were evaluated to establish a population growth curve. Although this growth curve was established using current growth patterns, this data is critical to projecting future needs and is, therefore, located in Chapter 3 – Future Conditions.

Current Land Use and Zoning

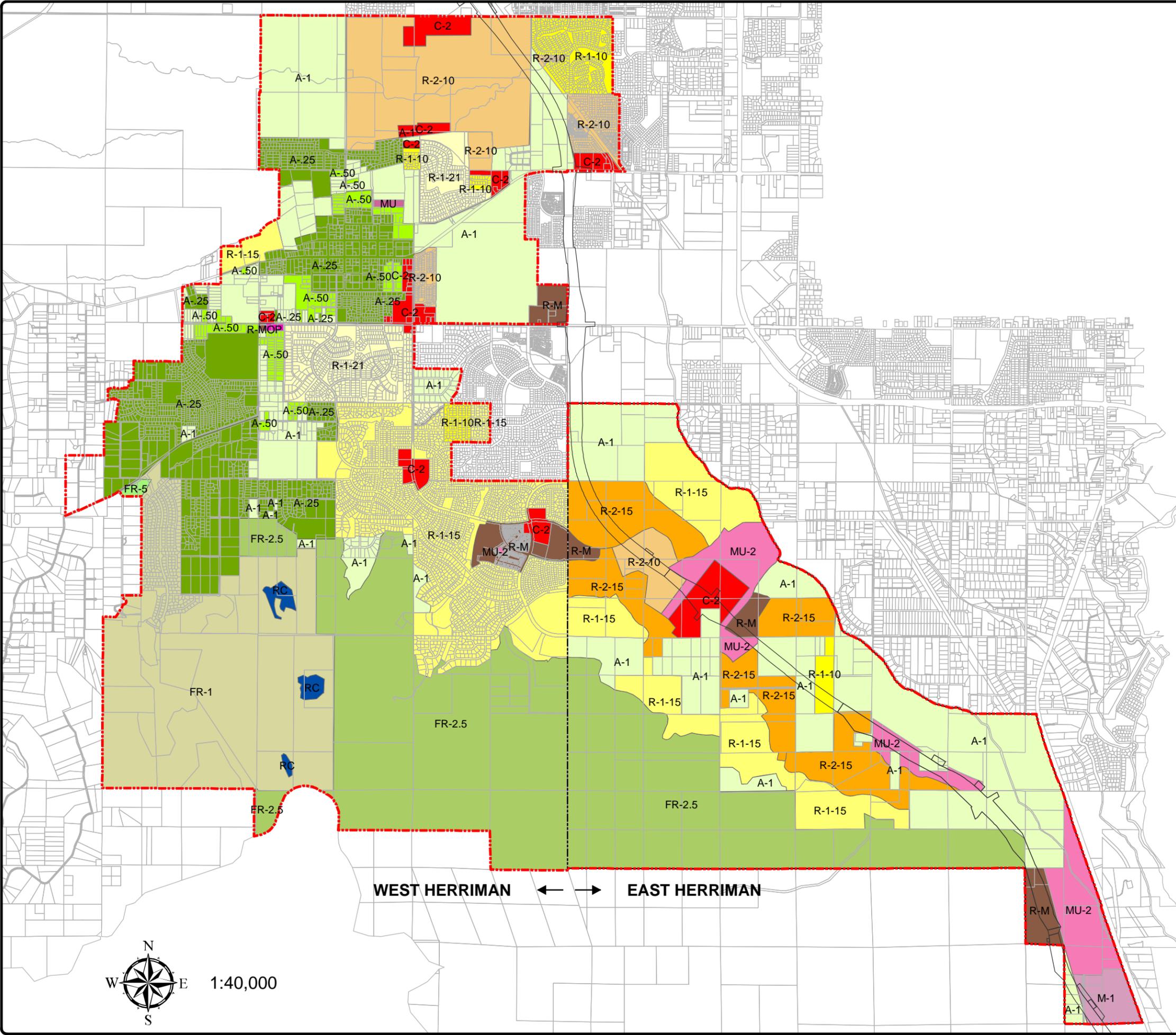
The City's current land use and zoning plan form the basis for evaluation of future facilities which will be built within City limits and, therefore, for future needs evaluations as well. Figure 2-1 illustrates the City's current land use and zoning plan as adopted and provided by the City.

Existing Facilities

Existing conditions at the time of this study were established using data collected from the City as well as field data generated specifically for the Herriman City Water Master Plan. Some of the data gathered and used includes an existing water model, the existing water master plan, existing City maps and field flow data. Figures 2-2 and 2-4 summarize the City's existing culinary and secondary water system and facilities respectively. Figure 2-3 summarizes the City's existing fireflow status. Figure 2-5 indicates required upgrades to bring the system up to meet current needs and standards. Existing conditions including water sources, storage, and water rights are described following the figures.

Existing connections to the culinary water system include approximately 5,506 residential connections, 4 schools (120 ERCs), six churches (85 ERCs), 16 commercial connections (19 ERCs), and 33 City owned facilities (470 ERCs) for a total of 6,200 indoor equivalent residential connections (ERCs).

FIGURE 2-1 Zone Map

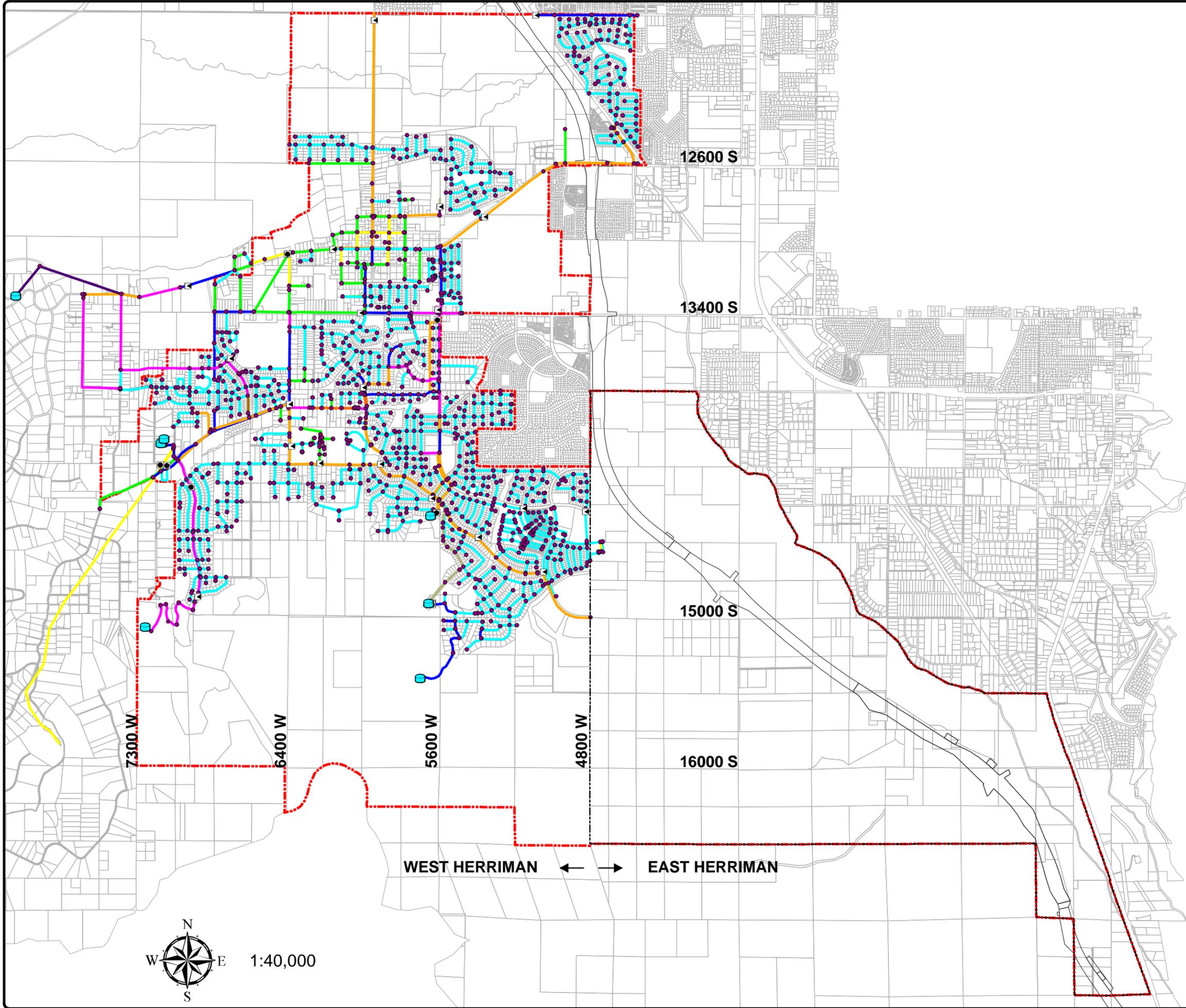


- City Limit
 - Annexation Line
 - Property Line
 - Mountain View Corridor
- ZONE**
- A-25 Agricultural - single family on 10,000 sq ft min
 - A-50 Agricultural - single family/limited animal uses on 1/2 acre min
 - A-1 Agricultural - single family/animals allowed on 1 acre min
 - C-2 Community Commercial
 - FR-1 Forestry Recreation - 1 acre min
 - FR-2.5 Forestry Recreation - 2.5 acre min
 - FR-5 Forestry Recreation - 5 acre min
 - M-1 Manufacturing Zone
 - MU Mixed Use
 - MU-2 Mixed Use 2 Zone
 - OP Office Professional
 - R-1-10 Residential - single family on 10,000 sq ft min
 - R-1-15 Residential - single family on 15,000 sq ft min
 - R-1-21 Residential - single family/limited animal uses on 0.5 acre min
 - R-2-10 Residential - single family or dwelling group on 10,000 sq ft min
 - R-2-15 Medium Density Residential
 - R-M Residential - multi-family
 - RC Resort Community Zone

WEST HERRIMAN ← → EAST HERRIMAN



FIGURE 2-2 Existing Culinary System



- Pressure Reducing Valve
- Tank
- Pump
- Pressure Junction

Culinary Pipes

Diameter

- 4-inch
- 6-inch
- 8-inch
- 10-inch
- 12-inch
- 14-inch
- 16-inch
- 18-inch
- 20-inch
- 24-inch

- City Limit
- Property Line
- Annexation Line
- Mountain View Corridor

WEST HERRIMAN ← → EAST HERRIMAN



FIGURE 2-3

Available Fire Flows



Fire Flow Nodes

Flow Available

- 0 - 1000 gpm
- 1000 - 1750 gpm
- 1750 - 2000 gpm
- 2000 - 2500 gpm
- 2500 - 3000 gpm
- 3000 - 4000 gpm

- Culinary Water Lines
- ⋯ Annexation Line
- ⋯ City Limit
- ▭ Property Line
- ▭ Mountain View Corridor

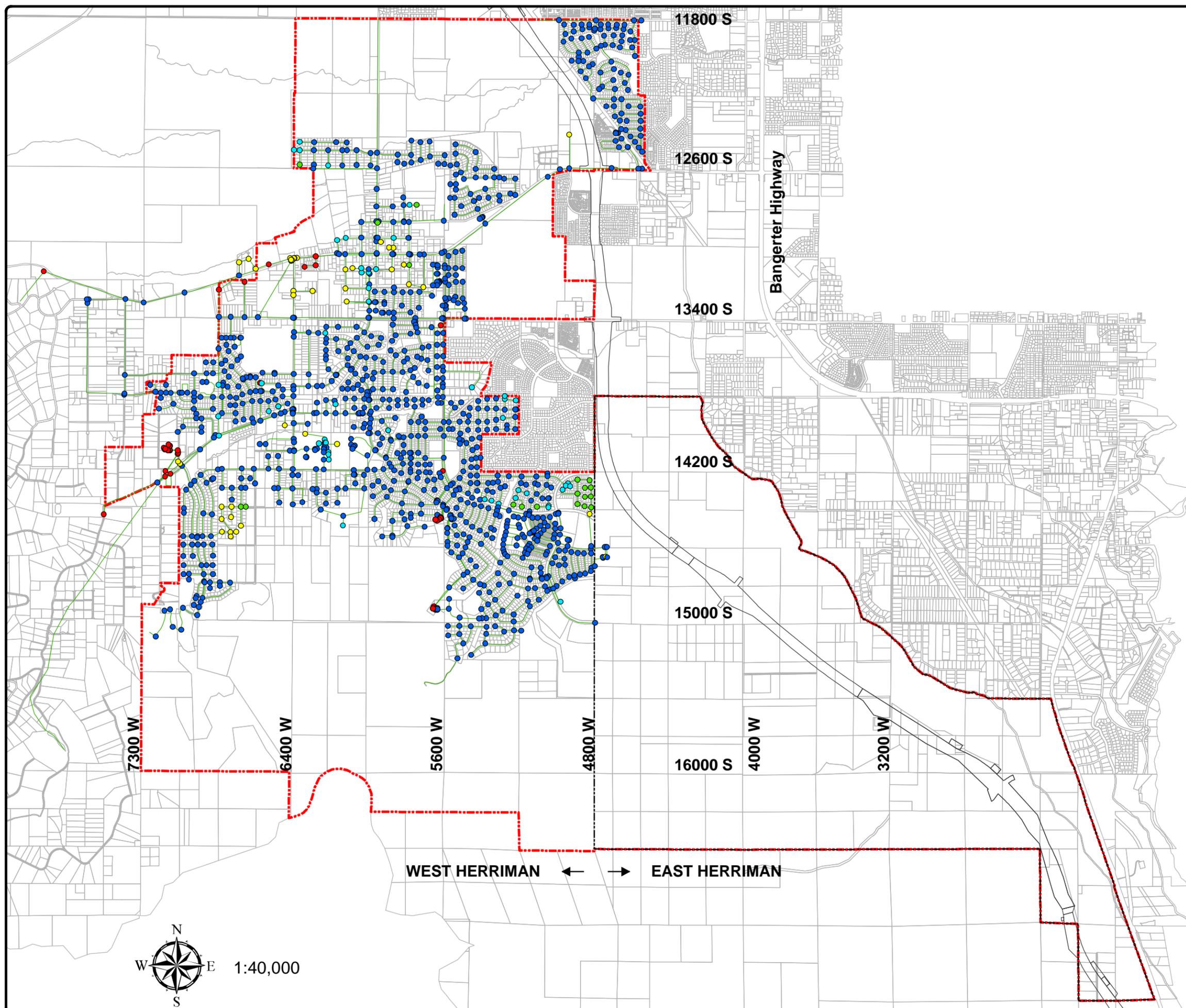
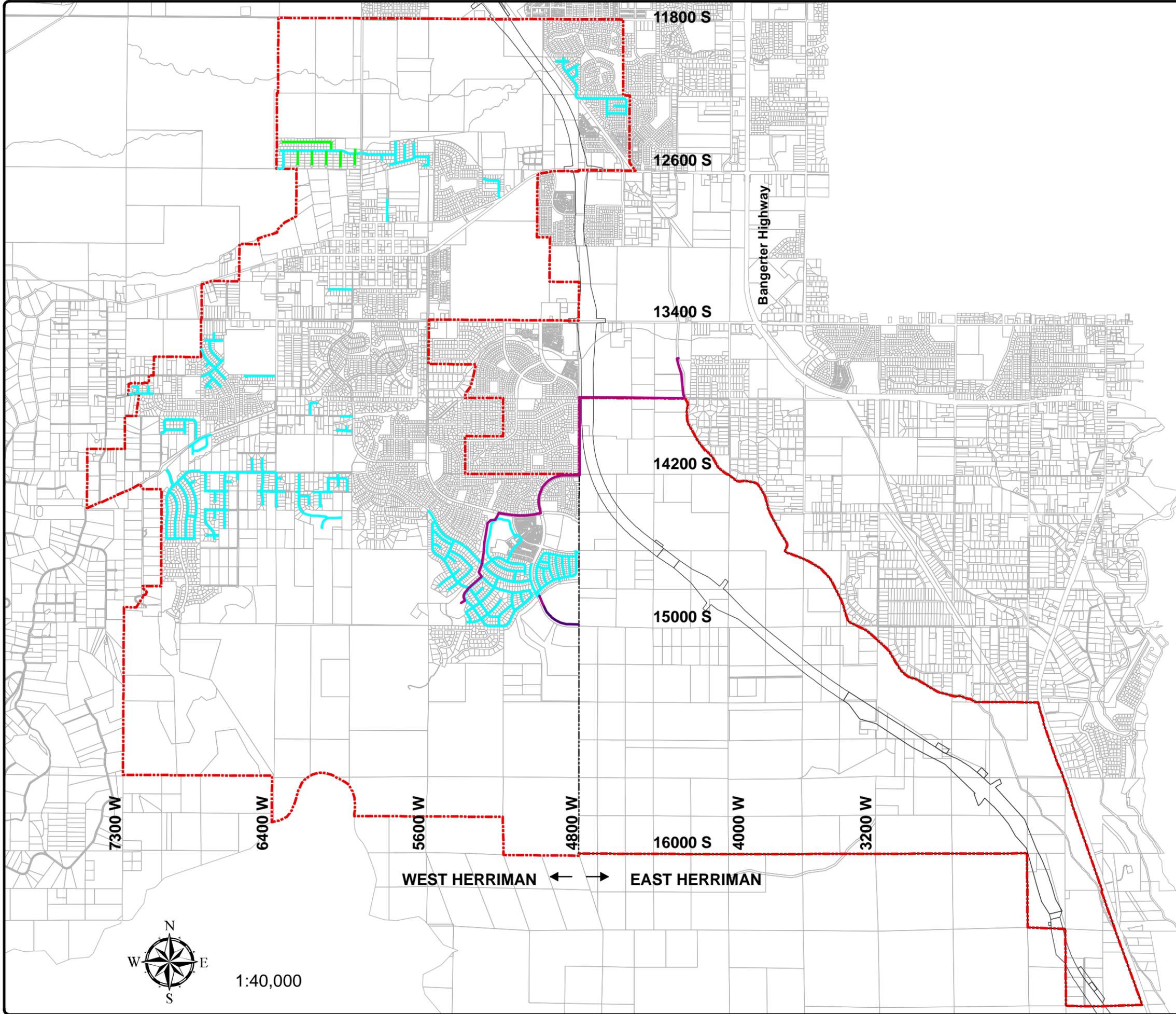


FIGURE 2-4

Existing Secondary Pipes



Installed Pipe

- Diameter
- 6-inch
 - 8-inch
 - 24-inch
 - 30-inch
 - City Limit
 - Annexation Line
 - Property Boundary
 - Mountain View Corridor



1:40,000

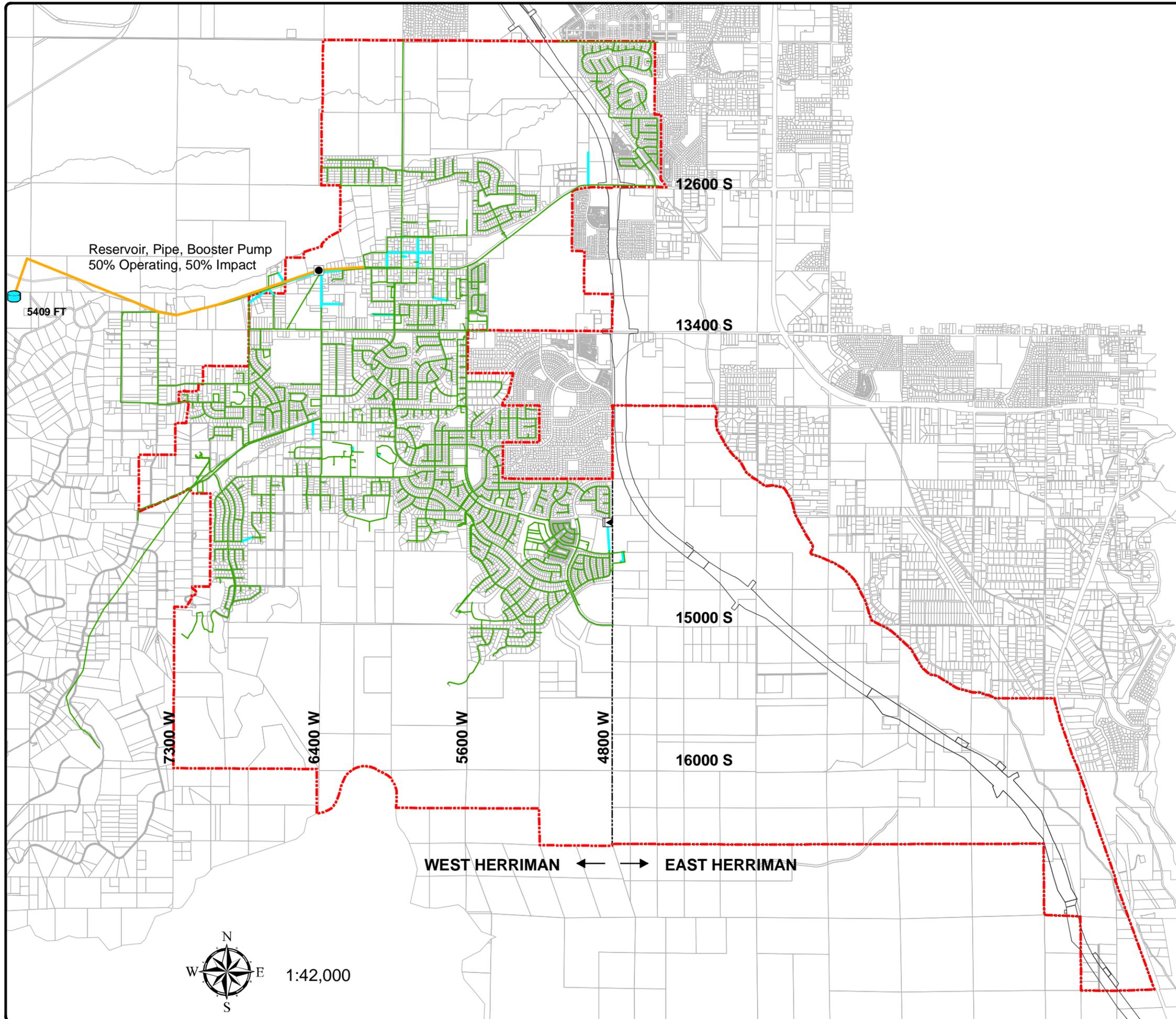
WEST HERRIMAN ← → EAST HERRIMAN



FIGURE 2-5 Improvements Needed to Cure Existing System Deficiencies



- Booster Pump
- Reservoir - Kenecott
- ▣ PRV
- Diameter**
- 16-inch (14,363 ft)
- 8-inch (16,016 ft)
- Existing
- ▭ City Limit
- ▭ Annexation Line
- ▭ Property Line
- ▭ Mountain View Corridor



The City's current water system supplies both indoor and outdoor water requirements for the City. Therefore the existing conditions discussion will focus on the existing culinary water system.

Existing Source

Tables 2-1 and 2-2 describe the City's existing water sources and requirements.

Table 2-1 Existing Water Sources

Sources		Capacity (gpm)	
JVWCD Delivery Points			Comments
1	134000 S 5600 W 12" and 6"	2,900	Max Capacity
2	129000 S 5600 W 6"	2,500	Max Capacity
3	118000 S 5000 W 8" and 4"	1,500	Max Capacity
4	118000 S 6000 W	5,000	Max Capacity
5	1MG Tank	3,000	Max Capacity
Sub Total		14,900	
City Wells			
1	H.P. Well #1 (6400 W. 131000 S)	172	
2	H.P. Well #3 (7100 W. 140000 S)	121	
3	H.P. Well #4 (7100 W. 142000 S)	121	
4	Hamilton Well (5600 W. 134000 S)	1750	
Sub Total		2164	
City Springs			
1	Arnold Hollow Springs (6400 W 13100 S)	80	
Total Capacity		17,144	

Table 2-2 Existing Water Source Requirements

Zone	Indoor (gpm)	Outdoor (gpm)
1	444.44	633.60
2	1916.66	2,732.40
3	583.33	831.60
3a	82.22	117.22
4	397.22	566.28
5 and above	20.00	28.51
Sub Total	3,444	4,910
Grand Total		8,353

* Detailed information on water requirements can be found in the Appendix (water zone analysis).

State of Utah Division of Drinking Water rules require the City to meet the following criteria with regards to water source.

- Provide 800 gallons per day per indoor ERC
- Provide 3.96 gpm (1,140 gpd) per irrigated acre

The City currently has excess source capacity of **8,791 gpm**.

Existing Storage

Tables 2-3 and 2-4 describe the City’s existing water storage facilities and requirements.

Table 2-3 Existing Water Storage Facilities

	Storage	Capacity (gallons)
1	1MG Zone 2 Tank	1,000,000
2	3MG Zone 4 Tank	3,000,000
3	H.P. Zone 3 Tanks	1,450,000
4	Arnold Hollow Springs Equivalent	9,600
5	JVWCD (Operated on Behalf of Herriman City)	1,500,000
6*	New 3 MG Kennecott Tank (under construction)	3,000,000
7	Lookout Ridge	425,000
8	Cove	1,000,000
9**	New Black Ridge Secondary Reservoir	10,510,000
Total Capacity		21,894,600

*Tank is under construction but the transmission line and booster station is not constructed yet.

**Black Ridge Reservoir is not connected to secondary users at this time.

Table 2-4 Existing Water Storage Requirements

Zone	Indoor (gallons)	Outdoor (gallons)	Fire Flow (gallons)
1	320,000	455,680	0
2	1,650,000	1,965,120	270,000
3	690,000	598,080	270,000
3a	59,200	84,301	0
4	556,000	407,264	270,000
5 and above	284,400	20,506	270,000
Sub Total	3,559,600	3,530,950	1,080,000
Grand Total			8,170,550

* Detailed information on water requirements can be found in the Appendix (water zone analysis).

State of Utah Division of Drinking Water rules require the City to meet the following criteria with regards to water storage.

- Provide 400 gallons of storage per indoor ERC
- Provide 2,848 gallons of storage per irrigated acreage
- Provide storage for fire flows according to International Fire Code Standards. The City has determined that a minimum of 270,000 gallons per zone is required (2,250 gpm for 120 Minutes). Those zones without storage obtain their fire flow upstream storage. Some area of the existing City have adequate fire flows for the type and size of construction without requiring 2,250 gpm fire flows.

The City currently has excess storage capacity of **13,724,050 gallons**. If the Black Ridge secondary irrigation reservoir and the Kenecott Tanks are not included, the City has excess storage capacity of **214,050 gallons**.

Existing Water Rights

Table 2-5 and 2-6 describes the City’s existing water rights and requirements.

Table 2-5 Existing Water Rights

	Sources	Capacity (ac-ft)
1	JVWCD contract	1,525.00
2	Perfected water rights	13.30
3	Water rights w/ approved change application	1,167.17
4	Water rights w/ unapproved change application	3,553.40
5	Welby Jacob canal shares	1,691.00
6	Utah & Salt Lake canal shares	275.94
7	Utah Lake Distributing canal shares	71.54
Total Capacity		8,297.35

Table 2-6 Existing Water Right Requirements

Zone	Indoor (ac-ft)	Outdoor (ac-ft)
1	360.00	299.20
2	1552.50	1290.30
3	472.50	392.70
3a	66.60	55.35
4	321.75	267.41
5 and above	16.20	13.46
Sub Total	2,789.55	2,318.43
Grand Total		5,108

* Detailed information on water requirements can be found in the Appendix.

State of Utah Division of Drinking Water rules require the City to meet the following criteria with regards to water rights.

- Provide 0.45 ac-ft of water right per indoor ERC
- Provide 1.87 ac-ft of water right per irrigated acreage (users take delivery of 1.87 acre-ft per acre based on point of use meters, City produces or purchases 2.61 acre-ft per acre)

The City currently has excess water right capacity of 3,189.35 **acre feet**. This excess water right is being conserved or held for the reasonable future water requirement of the public according to Terms of Utah Code Ann. 73-1-4.

Existing Distribution System

The City has a culinary water model developed with Hasted's WaterGems software which was utilized in this master plan. Horrocks Engineers obtained the model from the City, analyzed water usage, assigned demands throughout the model and calibrated the model to reflect actual conditions.

The calibration process involved taking fire flow tests at representative locations throughout the City and matching them to the model. Modifications to the model were made when testing demonstrated locations that did not perform as expected. We were able to identify several areas where pipe sizes were incorrect, not connected, or had other problems. After modifications, all fire flow tests conducted were within acceptable calibration ranges. Horrocks Engineers is confident that the model represents conditions in the field at the time of calibration and should remain so if the model is updated on a regular basis.

State of Utah Division of Drinking Water rules require the City to meet the following criteria with regards to its distribution system.

- Provide a minimum of 40 psi at all points in the distribution system during peak day demands
- Provide a minimum of 30 psi at all points in the distribution system during peak hour demands
- Provide a minimum of 20 psi at all points in the distribution system during peak day demand plus fire flows

The City' existing water system meets the first two criteria but has a few areas where fire flows are limited. Figure 2-3 shows the areas of the system that do not meet minimum pressures during fire flows. Figure 2-5 shows the improvements that are recommended to correct existing distribution system deficiencies. Improvements include replacing undersized and adding loops to increase fire flows. Cost estimates for such improvements are included in the Appendix.

3.0 FUTURE CONDITIONS

Forecasting the City's future needs relies heavily upon projecting future population trends, economic growth and projected water uses. In this section we will describe the methods used to evaluate future growth and water needs. We will also define the future conditions projected through our evaluation methods.

Future Population

The City's population is projected to reach build-out in 2040 at approximately 100,000 based on available data and growth trends.

Future Growth Trends

Since incorporating in 1999, the City has experienced extremely rapid growth rates. Due to factors such as continued economic growth in the region, the trend of rapid growth appears to be continuing in the foreseeable future. We have used population projections as provided by the City.

As shown in Figure 3-1, population growth, per year, has been projected by the City based upon available data and current regional and local growth patterns.

Population growth has slowed but is expected to return to normal patterns in the future. Growth rates are expected to decline as the City nears its projected buildout population. Tables 3-1, 3-2a and 3-2b give the projected growth patterns. Table 3-1 shows the overall growth patterns for the City with several different projections and data sources for comparison purposes. Tables 3-2a and 3-2b separate the projected growth into the different pressure zones. Table 3-2a includes the numerically numbered zones which are the zones representing the more westerly part of Herriman. Table 3-2b includes the alpha numbered zones which are the zones representing the more easterly part of Herriman. Each zone, with the exception of zone 3a, is projected to reach buildout population in 2040. Zone 3a covers the Butterfield Park area and the population in this zone has been set at a constant level.

Figure 3-1 Projected Population Growth in Herriman City

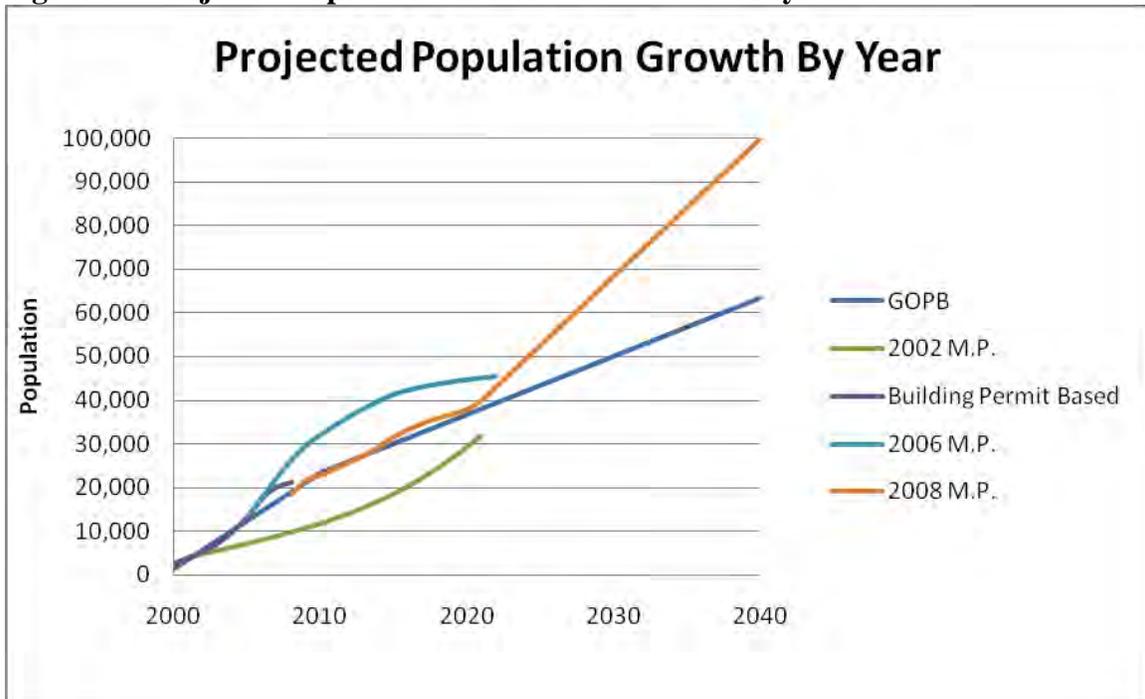


Table 3-1 Projected Population Growth

Year	GOBP Projected Population	GOBP Projected Growth Rate	2008 Master Plan Population Projections	2008 Master Plan Projected growth Rate	2002 Master Plan Projected Population	2002 Master Plan Projected Growth Rate	Population Based on Building Permits	Growth Rate Based on Building Permits	2006 Master Plan Projected Population	2006 Master Plan Projected Growth Rate
2000	1,523						2,572			
2001	3,717	144.05%			4,133		3,807	48.00%		
2002	5,911	59.02%			4,870	17.80%	5,223	37.20%		
2003	8,105	37.12%			5,642	15.90%	7,185	37.60%		
2004	10,299	27.07%			6,423	13.80%	9,856	37.20%		
2005	12,493	21.30%			7,183	11.80%	13,243	34.40%	13,243	
2006	14,686	17.56%			8,000	11.40%	17,500	32.15%	17,481	29.00%
2007	16,880	14.94%			8,872	10.90%	20,000	14.29%	22,201	25.00%
2008	19,074	13.00%	18,500		9,798	10.40%	21,020	5.10%	26,197	18.00%
2009	21,268	11.50%	21,666	17.11%	10,775	10.00%			29,602	15.00%
2010	23,462	10.32%	22,856	5.49%	11,798	9.50%			31,970	10.00%
2011	24,796	5.68%	24,318	6.40%	12,919	9.50%			34,208	8.00%
2012	26,129	5.38%	25,854	6.32%	14,147	9.50%			36,261	6.20%
2013	27,463	5.10%	27,454	6.19%	15,490	9.50%			38,074	5.00%
2014	28,797	4.86%	29,374	6.99%	16,962	9.50%			39,749	4.40%
2015	30,131	4.63%	31,614	7.63%	18,573	9.50%			41,260	3.80%
2016	31,464	4.43%	33,310	5.36%	20,338	9.50%			42,200	3.10%
2017	32,798	4.24%	34,750	4.32%	22,270	9.50%			43,000	2.40%
2018	34,132	4.07%	35,870	3.22%	24,386	9.50%			43,600	2.00%
2019	35,465	3.91%	36,830	2.68%	26,702	9.50%			44,150	1.80%
2020	36,799	3.76%	37,918	2.95%	29,239	9.50%			44,600	1.60%
2021	38,133	3.62%	40,022	5.55%	31,900	9.10%			45,000	1.50%
2022	39,466	3.50%	43,179	7.89%					45,348	1.00%
2023	40,800	3.38%	46,336	7.31%						
2024	42,134	3.27%	49,492	6.81%						
2025	43,468	3.17%	52,649	6.38%						
2026	44,801	3.07%	55,806	6.00%						
2027	46,135	2.98%	58,962	5.66%						
2028	47,469	2.89%	62,119	5.35%						
2029	48,802	2.81%	65,276	5.08%						
2030	50,136	2.73%	68,433	4.84%						
2031	51,470	2.66%	71,589	4.61%						
2032	52,803	2.59%	74,746	4.41%						
2033	54,137	2.53%	77,903	4.22%						
2034	55,471	2.46%	81,060	4.05%						
2035	56,804	2.40%	84,216	3.89%						
2036	58,138	2.35%	87,373	3.75%						
2037	59,472	2.29%	90,530	3.61%						
2038	60,806	2.24%	93,687	3.49%						
2039	62,139	2.19%	96,843	3.37%						
2040	63,473	2.15%	100,000	3.26%						

Table 3-2 Projected Population Growth by Zone (numeric numbered zones)

Year	Zone 1	Growth Rate	Zone 2	Growth Rate	Zone 3	Growth Rate	Zone 3a	Growth Rate	Zone 4	Growth Rate	Zone 5 and above	Growth Rate
2008	2,387		10,294		3,133		442		2,133		107	
2009	2,512	5.21%	10,673	3.68%	3,441	9.82%	442	0.00%	2,440	14.36%	365	239.93%
2010	2,636	4.96%	11,052	3.55%	3,748	8.94%	442	0.00%	2,746	12.55%	623	70.58%
2011	2,761	4.72%	11,430	3.43%	4,056	8.21%	442	0.00%	3,052	11.15%	881	41.38%
2012	2,885	4.51%	11,809	3.31%	4,364	7.59%	442	0.00%	3,359	10.04%	1,138	29.27%
2013	3,010	4.31%	12,187	3.21%	4,672	7.05%	442	0.00%	3,665	9.12%	1,396	22.64%
2014	3,134	4.14%	12,566	3.11%	4,979	6.59%	442	0.00%	3,971	8.36%	1,654	18.46%
2015	3,258	3.97%	12,944	3.01%	5,287	6.18%	442	0.00%	4,278	7.71%	1,912	15.58%
2016	3,383	3.82%	13,323	2.92%	5,595	5.82%	442	0.00%	4,584	7.16%	2,169	13.48%
2017	3,507	3.68%	13,702	2.84%	5,902	5.50%	442	0.00%	4,890	6.68%	2,427	11.88%
2018	3,632	3.55%	14,080	2.76%	6,210	5.21%	442	0.00%	5,197	6.26%	2,685	10.62%
2019	3,756	3.43%	14,459	2.69%	6,518	4.95%	442	0.00%	5,503	5.89%	2,942	9.60%
2020	3,881	3.31%	14,837	2.62%	6,826	4.72%	442	0.00%	5,809	5.57%	3,200	8.76%
2021	4,005	3.21%	15,216	2.55%	7,133	4.51%	442	0.00%	6,116	5.27%	3,458	8.05%
2022	4,130	3.11%	15,594	2.49%	7,441	4.31%	442	0.00%	6,422	5.01%	3,716	7.45%
2023	4,254	3.01%	15,973	2.43%	7,749	4.14%	442	0.00%	6,728	4.77%	3,973	6.94%
2024	4,379	2.93%	16,352	2.37%	8,056	3.97%	442	0.00%	7,034	4.55%	4,231	6.49%
2025	4,503	2.84%	16,730	2.32%	8,364	3.82%	442	0.00%	7,341	4.35%	4,489	6.09%
2026	4,628	2.76%	17,109	2.26%	8,672	3.68%	442	0.00%	7,647	4.17%	4,747	5.74%
2027	4,752	2.69%	17,487	2.21%	8,980	3.55%	442	0.00%	7,953	4.01%	5,004	5.43%
2028	4,877	2.62%	17,866	2.16%	9,287	3.43%	442	0.00%	8,260	3.85%	5,262	5.15%
2029	5,001	2.55%	18,245	2.12%	9,595	3.31%	442	0.00%	8,566	3.71%	5,520	4.90%
2030	5,126	2.49%	18,623	2.08%	9,903	3.21%	442	0.00%	8,872	3.58%	5,778	4.67%
2031	5,250	2.43%	19,002	2.03%	10,210	3.11%	442	0.00%	9,179	3.45%	6,035	4.46%
2032	5,375	2.37%	19,380	1.99%	10,518	3.01%	442	0.00%	9,485	3.34%	6,293	4.27%
2033	5,499	2.32%	19,759	1.95%	10,826	2.93%	442	0.00%	9,791	3.23%	6,551	4.10%
2034	5,624	2.26%	20,137	1.92%	11,134	2.84%	442	0.00%	10,098	3.13%	6,808	3.93%
2035	5,748	2.21%	20,516	1.88%	11,441	2.76%	442	0.00%	10,404	3.03%	7,066	3.79%
2036	5,873	2.17%	20,895	1.85%	11,749	2.69%	442	0.00%	10,710	2.94%	7,324	3.65%
2037	5,997	2.12%	21,273	1.81%	12,057	2.62%	442	0.00%	11,017	2.86%	7,582	3.52%
2038	6,122	2.08%	21,652	1.78%	12,364	2.55%	442	0.00%	11,323	2.78%	7,839	3.40%
2039	6,246	2.03%	22,030	1.75%	12,672	2.49%	442	0.00%	11,629	2.71%	8,097	3.29%
2040	6,371	1.99%	22,409	1.72%	12,980	2.43%	442	0.00%	11,935	2.63%	8,355	3.18%

Table 3-2 Continued - Projected Population Growth by Zone (alpha numbered zones)

Year	Zone A	Growth Rate	Zone B	Growth Rate	Zone C	Growth Rate	Zone D	Growth Rate	Zone E	Growth Rate	Zone F
2008	0		0		0		0		0		0
2009	590		201		272		56		31		22
2010	1,180	100.00%	402	100.00%	545	100.00%	111	100.00%	62	100.00%	44
2011	1,770	50.00%	603	50.00%	817	50.00%	167	50.00%	94	50.00%	67
2012	2,359	33.33%	803	33.33%	1,090	33.33%	222	33.33%	125	33.33%	89
2013	2,949	25.00%	1,004	25.00%	1,362	25.00%	278	25.00%	156	25.00%	111
2014	3,539	20.00%	1,205	20.00%	1,635	20.00%	333	20.00%	187	20.00%	133
2015	4,129	16.67%	1,406	16.67%	1,907	16.67%	389	16.67%	219	16.67%	155
2016	4,719	14.29%	1,607	14.29%	2,180	14.29%	445	14.29%	250	14.29%	178
2017	5,309	12.50%	1,808	12.50%	2,452	12.50%	500	12.50%	281	12.50%	200
2018	5,899	11.11%	2,009	11.11%	2,725	11.11%	556	11.11%	312	11.11%	222
2019	6,489	10.00%	2,209	10.00%	2,997	10.00%	611	10.00%	344	10.00%	244
2020	7,078	9.09%	2,410	9.09%	3,270	9.09%	667	9.09%	375	9.09%	266
2021	7,668	8.33%	2,611	8.33%	3,542	8.33%	722	8.33%	406	8.33%	289
2022	8,258	7.69%	2,812	7.69%	3,815	7.69%	778	7.69%	437	7.69%	311
2023	8,848	7.14%	3,013	7.14%	4,087	7.14%	834	7.14%	469	7.14%	333
2024	9,438	6.67%	3,214	6.67%	4,359	6.67%	889	6.67%	500	6.67%	355
2025	10,028	6.25%	3,414	6.25%	4,632	6.25%	945	6.25%	531	6.25%	377
2026	10,618	5.88%	3,615	5.88%	4,904	5.88%	1,000	5.88%	562	5.88%	399
2027	11,208	5.56%	3,816	5.56%	5,177	5.56%	1,056	5.56%	594	5.56%	422
2028	11,797	5.26%	4,017	5.26%	5,449	5.26%	1,111	5.26%	625	5.26%	444
2029	12,387	5.00%	4,218	5.00%	5,722	5.00%	1,167	5.00%	656	5.00%	466
2030	12,977	4.76%	4,419	4.76%	5,994	4.76%	1,223	4.76%	687	4.76%	488
2031	13,567	4.55%	4,620	4.55%	6,267	4.55%	1,278	4.55%	718	4.55%	510
2032	14,157	4.35%	4,820	4.35%	6,539	4.35%	1,334	4.35%	750	4.35%	533
2033	14,747	4.17%	5,021	4.17%	6,812	4.17%	1,389	4.17%	781	4.17%	555
2034	15,337	4.00%	5,222	4.00%	7,084	4.00%	1,445	4.00%	812	4.00%	577
2035	15,927	3.85%	5,423	3.85%	7,357	3.85%	1,501	3.85%	843	3.85%	599
2036	16,516	3.70%	5,624	3.70%	7,629	3.70%	1,556	3.70%	875	3.70%	621
2037	17,106	3.57%	5,825	3.57%	7,901	3.57%	1,612	3.57%	906	3.57%	644
2038	17,696	3.45%	6,026	3.45%	8,174	3.45%	1,667	3.45%	937	3.45%	666
2039	18,286	3.33%	6,226	3.33%	8,446	3.33%	1,723	3.33%	968	3.33%	688
2040	18,876	3.23%	6,427	3.23%	8,719	3.23%	1,778	3.23%	1,000	3.23%	710

Future Needs

As indicated above, rapid growth is projected to continue throughout the City over the next several years. As such, demands on the City's water system will increase rapidly as well, creating the need to prepare and implement a citywide capital facilities plan (CFP) based upon forecasted future needs. Therefore, we have projected citywide water system needs utilizing current usage patterns, State standards and the approved growth projections. Our analysis covers not only future volumes of water required for the growing population of the City, but also necessary water rights, sources, delivery system and storage to meet those requirements. To facilitate our analysis we have translated population projections into equivalent residential connections (ERC) projections for both indoor and outdoor water use. Table 3-3 summarizes total system requirements and illustrates the ERC projections and their associated source, storage and water rights requirements. The remainder of Chapter 3 includes a discussion of general future system requirements, followed by a discussion of future system needs broken down by zone.

Table 3-3 Projected Total System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	18,500	6,200	3,444	5,180,000	2,790	1,271	5,033	3,619,808	2,377
2009	21,666	7,261	4,034	5,604,415	3,267	1,489	5,895	4,239,284	2,784
2010	22,856	7,660	4,255	5,763,939	3,447	1,570	6,218	4,472,126	2,936
2011	24,318	8,150	4,528	5,959,926	3,667	1,671	6,616	4,758,189	3,124
2012	25,854	8,665	4,814	6,165,834	3,899	1,776	7,034	5,058,731	3,322
2013	27,454	9,201	5,112	6,380,320	4,140	1,886	7,469	5,371,795	3,527
2014	29,374	9,844	5,469	6,637,704	4,430	2,018	7,992	5,747,472	3,774
2015	31,614	10,595	5,886	6,937,985	4,768	2,172	8,601	6,185,763	4,062
2016	33,310	11,163	6,202	7,165,341	5,024	2,288	9,062	6,517,611	4,279
2017	34,750	11,646	6,470	7,358,378	5,241	2,387	9,454	6,799,369	4,464
2018	35,870	12,021	6,678	7,508,519	5,410	2,464	9,759	7,018,514	4,608
2019	36,830	12,343	6,857	7,637,211	5,554	2,530	10,020	7,206,353	4,732
2020	37,918	12,708	7,060	7,783,062	5,718	2,605	10,316	7,419,237	4,871
2021	40,022	13,413	7,452	8,065,125	6,036	2,750	10,889	7,830,936	5,142
2022	43,179	14,471	8,039	8,488,297	6,512	2,967	11,747	8,448,599	5,547
2023	46,336	15,529	8,627	8,911,470	6,988	3,183	12,606	9,066,262	5,953
2024	49,492	16,587	9,215	9,334,643	7,464	3,400	13,465	9,683,925	6,358
2025	52,649	17,645	9,803	9,757,815	7,940	3,617	14,324	10,301,587	6,764
2026	55,806	18,702	10,390	10,180,988	8,416	3,834	15,183	10,919,250	7,170
2027	58,962	19,760	10,978	10,604,161	8,892	4,051	16,041	11,536,913	7,575
2028	62,119	20,818	11,566	11,027,333	9,368	4,268	16,900	12,154,576	7,981
2029	65,276	21,876	12,153	11,450,506	9,844	4,485	17,759	12,772,239	8,386
2030	68,433	22,934	12,741	11,873,679	10,320	4,702	18,618	13,389,902	8,792
2031	71,589	23,992	13,329	12,296,851	10,796	4,918	19,477	14,007,564	9,197
2032	74,746	25,050	13,917	12,720,024	11,273	5,135	20,336	14,625,227	9,603
2033	77,903	26,108	14,504	13,143,197	11,749	5,352	21,194	15,242,890	10,008
2034	81,060	27,166	15,092	13,566,369	12,225	5,569	22,053	15,860,553	10,414
2035	84,216	28,224	15,680	13,989,542	12,701	5,786	22,912	16,478,216	10,820
2036	87,373	29,282	16,268	14,412,715	13,177	6,003	23,771	17,095,878	11,225
2037	90,530	30,340	16,855	14,835,887	13,653	6,220	24,630	17,713,541	11,631
2038	93,687	31,398	17,443	15,259,060	14,129	6,437	25,489	18,331,204	12,036
2039	96,843	32,456	18,031	15,682,233	14,605	6,653	26,347	18,948,867	12,442
2040	100,000	33,514	18,619	16,105,405	15,081	6,870	27,206	19,566,530	12,847

Water Sources

The City currently has approximately 17,144 gpm of source capacity in their culinary water system.

To help meet rapidly approaching needs, the City has drilled a new culinary well which is anticipated to be equipped in 2009 with a planned capacity of 200 gpm. In addition, a secondary water supply pipeline is under construction that will connect the Welby Jacobs Canal to the Black Ridge secondary reservoir with a supply capacity of approximately 12,000 gpm, half of which will be utilized by the City and the other half by Riverton City. These additional sources will bring the City's total culinary and secondary source capacity to approximately 23,344 gpm, which will cover project needs until almost 2020. This assumes a secondary system will be installed to utilize the secondary water supplies.

Analyzing a total buildout scenario, it is projected that the City will need approximately 45,706 gpm capacity. This includes 18,619 gpm for indoor and 27,087 gpm for outdoor use as indicated previously. Approximately 19.54 percent of the outdoor watering will be supplied through the culinary system with the balance supplied through the secondary system. The City will need to add approximately 4,767 gpm of culinary capacity if a secondary system is constructed. It is anticipated this will be built in East Herriman as connections to the JWCD. In order to meet a minimum level of service for future projected secondary buildout needs, the City must develop additional secondary source facilities as well. The City will need to develop an additional 14,294 gpm capacity in its secondary system. This is projected to be obtained through local irrigation company water, agricultural well conversion, Welby Jacob Canal, and wastewater reuse.

Table 3-4 shows the City's existing water sources and potential water sources that could be used to meet future needs while Table 3-5 shows the projected source requirements per zone at buildout. Table 3-6 gives the projected needs.

Table 3-4 Existing and Potential Water Source Facilities

Source	Capacity (gpm)	System
HP Well #1	172	Existing Culinary
HP Well #3	121	Existing Culinary
HP Well #4	121	Existing Culinary
Hamilton Well	1,750	Existing Culinary
Arnold Springs	80	Existing Culinary
JVWCD	14,900	Existing Culinary
Stokes Well	200	Potential Culinary
Converted Agricultural Wells	1,800	Potential Culinary
Welby Jacobs Pump Station	6,000	Potential Secondary
HP Well #2	150	Potential Secondary
Tuscany Well	450	Potential Secondary
Heritage Well	450	Potential Secondary
Bowdell Well	450	Potential Secondary
5200 W 13400 S Well	2000	Potential Secondary
Total Potential & Existing Culinary Capacity	19,144	
Total Potential Secondary Capacity	9,500	

Table 3-5 Projected Buildout Source Demands

Zone	Indoor (gpm)	Outdoor (gpm)
1	1,186	1,691
2	4,172	5,948
3	2,417	3,445
3a	82	117
4	2,222	3,168
5 and above	1,556	2,218
a	3,514	5,010
b	1,197	1,706
c	1,623	2,314
d	331	401
e	186	597
f	132	471
Sub Total	18,619	27,087
	Grand Total	45,706

*Detailed information on water requirements can be found in the Appendix (water zone analysis).

State of Utah Division of Drinking Water rules require the City to meet the following criteria with regards to water source.

- Provide 800 gallons per day per indoor ERC
- Provide 3.96 gpm per irrigated acre

Table 3-6 Projected Buildout Source Needs

System	Projected Need (gpm)	Potential Supply (gpm)	Difference
Culinary	23,911	19,144	4,767
Secondary	21,794	9,500	12,294

*Culinary includes all indoor plus outdoor water needs in selected zones.

Water Storage

Future storage requirements have been projected and illustrated in Table 3-2. As indicated, future indoor storage requirements at buildout are anticipated to be approximately 16.1 million gallons. Outdoor storage requirements are anticipated to be approximately 19.5 million gallons. Fire flow storage is anticipated to be 2.43 million gallons. Approximately 19.54 percent of the outdoor storage will be provided through the culinary system with the balance provided through the secondary system.

As shown in Tables 3-7, 3-8, and 3-9, the City has (existing and under construction) 20.41 million gallons of storage capacity (9,900,000 culinary and 10,510,000 secondary). Culinary storage needs will not be met with the existing volumes. Additional culinary storage facilities would be needed for operational purposes and for fire flows in new zones and isolated areas of existing zones. Projections indicate that significant new storage facilities will need to be constructed in the secondary system both for minimum levels of service and operational purposes.

Table 3-7 Existing and Potential Water Storage Facilities

Storage Facility	Capacity (gallons)	System
1 MG Zone 2 Tank	1,000,000	Culinary
3 MG Zone 4 Tank	3,000,000	Culinary
HP Zone 3 Tanks	1,450,000	Culinary
Arnold Hollow Springs Equivalent	9,600	Culinary
JVWCD (Operated on Behalf of Herriman City)	1,500,000	Culinary
New 3 MG Kennecott Tank (under construction)	3,000,000	Culinary (Under Construction)
Lookout Ridge	425,000	Culinary
Cove	1,000,000	Culinary
Black Ridge Reservoir	10,510,000	Secondary
Total Capacity	21,894,600	

Table 3-8 Projected Buildout Storage Requirements

Zone	Indoor (gallons)	Outdoor (gallons)	Fire Flow (gallons)
1	854,000	1,216,096	0
2	3,274,000	4,277,696	270,000
3	2,010,000	2,477,760	270,000
3a	59,200	84,301	0
4	1,870,000	2,278,400	270,000
5 and above	1,390,000	1,594,880	270,000
a	2,800,400	3,603,290	270,000
b	1,131,600	1,226,918	270,000
c	1,438,800	1,664,371	0
d	508,400	288,559	270,000
e	404,000	429,336	270,000
f	365,200	338,912	270,000
Sub Total	16,105,600	19,480,519	2,430,000
		Grand Total	38,016,119

* Detailed information on water requirements can be found in the Appendix (water zone analysis).

State of Utah Division of Drinking Water rules require the City to meet the following criteria with regards to water source.

- Provide 400 gallons of storage per indoor ERC
- Provide 2848 gallons of storage per irrigated acreage
- Provide storage for fire flows according to International Fire Code Standards. The City has determined that a minimum of 270,000 gallons per zone is required (2,250 gpm for 120 Minutes)

Table 3-9 Projected Buildout Storage Needs

System	Projected Need (gpm)	Planned Storage (gpm)	Difference
Culinary	21,801,924	11,384,600	10,417,324
Secondary	16,214,196	10,510,000	5,704,196

*Culinary includes all indoor plus outdoor water needs in selected zones.

Water Rights

Projected water rights required by future growth in the City were projected using the same methods of analysis as previously described in Chapter 2. The City's indoor use requires 0.45 ac-ft/ERC and outdoor use requires 1.87 ac-ft/ acre. Table 3-10 and 3-11 shows the future water rights and requirements.

Table 3-10 Existing Water Rights

	Sources	Capacity (ac-ft)
1	JVWCD contract	1,525.00
2	Perfected water rights	13.30
3	Water rights w/ approved change application	1,167.17
4	Water rights w/ unapproved change application	3,553.40
5	Welby Jacob canal shares	1,691.00
6	Utah & Salt Lake canal shares	275.94
7	Utah Lake Distributing canal shares	71.54
Total Capacity		8,297.35

Table 3-11 Projected Buildout Water Right Requirements

Zone	Indoor (ac-ft)	Outdoor (ac-ft)
1	960.75	798.49
2	3,379.50	2,808.74
3	1,957.50	1,626.90
3a	66.60	55.35
4	1,800.00	1,496.00
5 and above	1,260.00	1,047.20
a	2,846.70	2,365.92
b	969.30	805.60
c	1,314.90	1,092.83
d	268.20	189.47
e	150.75	281.90
f	107.10	222.53
Sub Total	15,081.30	12,790.93
Grand Total		27,872.23

* Detailed information on water requirements can be found in the Appendix (water zone analysis).

State of Utah Division of Drinking Water rules require the City to meet the following criteria with regards to water rights.

- Provide 0.45 ac-ft of water right per indoor ERC
- Provide 1.87 ac-ft of water right per irrigated acreage (users take delivery of 1.87 acre-ft per acre based on point of use meters, City produces or purchases 2.61 acre-ft per acre)

Table 3-12 Projected Buildout Water Rights Needs

System	Projected Need (ac-ft)	Existing Water Rights (ac-ft)	Difference
Culinary	17,580.54	6,258.87	11,321.67
Secondary	10,291.69	2,038.48	8,253.21

The following sections breakdown the individual zones and their respective needs through the buildout period. It should be noted that Zones 1 through 5 cover the westerly portion of City and zones A through F cover the eastern newly annexed “East Herriman”. Also of note is that zones 1 through 4, in the west, correspond roughly in elevation and pressure with zones A through D in the east portion of the City. Buildout population in all zones is expected to be reached in 2040. This projection is based on the currently approved growth patterns as well as analysis of current City boundaries and the newly annexed area known commonly as the East Herriman (4,273 acres).

Zone 1

Zone 1 is comprised of the land with the lowest elevation within City boundaries. Elevations in this zone range from 4,710 ft to 4,850 ft. Indoor needs are supplied through the culinary system and outdoor needs will be met through the secondary system.

There are no storage reservoirs in Zone 1, but the area is supplied by storage reservoirs in higher zones. These storage reservoirs meet requirements for current storage but fall short of capacity for buildout storage requirements. In order to meet future buildout storage requirements an additional 3.1 MG of storage is needed (1.3 MG Culinary and 1.8 MG Secondary). It is assumed this storage will be constructed in higher zones and fed to zone 1 through PRV’s.

Zone 1’s water source capacity is met through a connection to the JVWCD and pressure reducing connections to upper zones. There is adequate source capacity for current zone needs. Future needs will continue to be met by upstream sources and the JVWCD connection (maximum 1,500 gpm). Distribution system changes are anticipated to ensure adequate transmission of water to this zone from upstream sources. It is projected that 1,691 gpm of source capacity is needed for outdoor watering.

Table 3-13 shows the project requirements within Zone 1.

Table 3-13 Projected Zone 1 System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	2,387	800	444	320,000	360	160	634	455,680	299
2009	2,512	842	468	336,688	379	168	667	479,443	315
2010	2,636	883	491	353,375	398	177	700	503,206	330
2011	2,761	925	514	370,063	416	185	733	526,969	346
2012	2,885	967	537	386,750	435	193	766	550,732	362
2013	3,010	1,009	560	403,438	454	202	799	574,495	377
2014	3,134	1,050	584	420,125	473	210	832	598,258	393
2015	3,258	1,092	607	436,813	491	218	865	622,021	408
2016	3,383	1,134	630	453,500	510	227	898	645,784	424
2017	3,507	1,175	653	470,188	529	235	931	669,547	440
2018	3,632	1,217	676	486,875	548	243	964	693,310	455
2019	3,756	1,259	699	503,563	567	252	997	717,073	471
2020	3,881	1,301	723	520,250	585	260	1,030	740,836	486
2021	4,005	1,342	746	536,938	604	268	1,063	764,599	502
2022	4,130	1,384	769	553,625	623	277	1,096	788,362	518
2023	4,254	1,426	792	570,313	642	285	1,129	812,125	533
2024	4,379	1,468	815	587,000	660	294	1,162	835,888	549
2025	4,503	1,509	838	603,688	679	302	1,195	859,651	564
2026	4,628	1,551	862	620,375	698	310	1,228	883,414	580
2027	4,752	1,593	885	637,063	717	319	1,261	907,177	596
2028	4,877	1,634	908	653,750	735	327	1,294	930,940	611
2029	5,001	1,676	931	670,438	754	335	1,327	954,703	627
2030	5,126	1,718	954	687,125	773	344	1,361	978,466	642
2031	5,250	1,760	978	703,813	792	352	1,394	1,002,229	658
2032	5,375	1,801	1,001	720,500	811	360	1,427	1,025,992	674
2033	5,499	1,843	1,024	737,188	829	369	1,460	1,049,755	689
2034	5,624	1,885	1,047	753,875	848	377	1,493	1,073,518	705
2035	5,748	1,926	1,070	770,563	867	385	1,526	1,097,281	720
2036	5,873	1,968	1,093	787,250	886	394	1,559	1,121,044	736
2037	5,997	2,010	1,117	803,938	904	402	1,592	1,144,807	752
2038	6,122	2,052	1,140	820,625	923	410	1,625	1,168,570	767
2039	6,246	2,093	1,163	837,313	942	419	1,658	1,192,333	783
2040	6,371	2,135	1,186	854,000	961	427	1,691	1,216,096	798

Zone 2

Zone 2 is the largest zone in area within the City and serves the center of the City. It has the highest projected population in the City. Elevations in this zone range from 4,850 ft to 4,990 ft. Indoor needs are supplied through the culinary system and outdoor needs will be met through the secondary system.

Zone 2 storage needs are met through the City's 1 million gallon reservoir, 1.5 million gallons of storage operated for the City by JVWCD and pressure reducing connections to upper zones. These reservoirs meet the current storage needs of zone 1 and 2. In order to meet future storage needs, 3.8 MG will need to be constructed. The majority of this need is for secondary water.

Zone 2's water source capacity is met through one well, four connections to the JVWCD and pressure reducing connections to upper zones. The capacity of the well and JVWCD connections is a maximum of 14,650 gpm. There is adequate source capacity for current and future culinary zone needs, however, additional sources in this zone are recommended because of the high cost of JVWCD water and the need for secondary water supplies. City owned facilities have the potential of supplying water at a much lower cost. It is projected that 5,948 gpm of source capacity is needed for outdoor watering.

It is recommended that treated wastewater (reuse) supply be developed for the City. The buildout secondary water model includes a 8,500 gpm reuse supply entering the City from the Northeast. This supply would meet the secondary needs of zone 1 and 2.

Table 3-14 shows the project requirements within Zone 2.

Table 3-14 Projected Zone 2 System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	10,294	3,450	1,917	1,650,000	1,553	690	2,732	1,965,120	1,290
2009	10,673	3,577	1,987	1,700,750	1,610	715	2,833	2,037,388	1,338
2010	11,052	3,704	2,058	1,751,500	1,667	741	2,933	2,109,656	1,385
2011	11,430	3,831	2,128	1,802,250	1,724	766	3,034	2,181,924	1,433
2012	11,809	3,958	2,199	1,853,000	1,781	792	3,134	2,254,192	1,480
2013	12,187	4,084	2,269	1,903,750	1,838	817	3,235	2,326,460	1,528
2014	12,566	4,211	2,340	1,954,500	1,895	842	3,335	2,398,728	1,575
2015	12,944	4,338	2,410	2,005,250	1,952	868	3,436	2,470,996	1,622
2016	13,323	4,465	2,481	2,056,000	2,009	893	3,536	2,543,264	1,670
2017	13,702	4,592	2,551	2,106,750	2,066	918	3,637	2,615,532	1,717
2018	14,080	4,719	2,622	2,157,500	2,123	944	3,737	2,687,800	1,765
2019	14,459	4,846	2,692	2,208,250	2,181	969	3,838	2,760,068	1,812
2020	14,837	4,973	2,762	2,259,000	2,238	995	3,938	2,832,336	1,860
2021	15,216	5,099	2,833	2,309,750	2,295	1,020	4,039	2,904,604	1,907
2022	15,594	5,226	2,903	2,360,500	2,352	1,045	4,139	2,976,872	1,955
2023	15,973	5,353	2,974	2,411,250	2,409	1,071	4,240	3,049,140	2,002
2024	16,352	5,480	3,044	2,462,000	2,466	1,096	4,340	3,121,408	2,050
2025	16,730	5,607	3,115	2,512,750	2,523	1,121	4,441	3,193,676	2,097
2026	17,109	5,734	3,185	2,563,500	2,580	1,147	4,541	3,265,944	2,144
2027	17,487	5,861	3,256	2,614,250	2,637	1,172	4,642	3,338,212	2,192
2028	17,866	5,988	3,326	2,665,000	2,694	1,198	4,742	3,410,480	2,239
2029	18,245	6,114	3,397	2,715,750	2,751	1,223	4,843	3,482,748	2,287
2030	18,623	6,241	3,467	2,766,500	2,809	1,248	4,943	3,555,016	2,334
2031	19,002	6,368	3,538	2,817,250	2,866	1,274	5,044	3,627,284	2,382
2032	19,380	6,495	3,608	2,868,000	2,923	1,299	5,144	3,699,552	2,429
2033	19,759	6,622	3,679	2,918,750	2,980	1,324	5,245	3,771,820	2,477
2034	20,137	6,749	3,749	2,969,500	3,037	1,350	5,345	3,844,088	2,524
2035	20,516	6,876	3,820	3,020,250	3,094	1,375	5,445	3,916,356	2,571
2036	20,895	7,003	3,890	3,071,000	3,151	1,401	5,546	3,988,624	2,619
2037	21,273	7,129	3,961	3,121,750	3,208	1,426	5,646	4,060,892	2,666
2038	21,652	7,256	4,031	3,172,500	3,265	1,451	5,747	4,133,160	2,714
2039	22,030	7,383	4,102	3,223,250	3,322	1,477	5,847	4,205,428	2,761
2040	22,409	7,510	4,172	3,274,000	3,380	1,502	5,948	4,277,696	2,809

Zone 3

Zone 3 is the second largest zone in area within the City and has the third highest projected population in the City. Elevations in this zone range from approximately 4,990 ft to 5,120 ft. Indoor needs are supplied through the culinary system and outdoor needs will be met through the secondary system.

Zone 3 storage needs are met through 1.4 million gallons of storage in two reservoirs, 9,600 gallons from the Arnold Hollow Spring and pressure reducing connections to upper zones. These reservoirs meet the current and future culinary storage needs of this zone. Approximately 2.3 MG of storage will be required for the secondary water system.

Zone 3's water source capacity is met through three wells and a spring. The wells and spring supply approximately 494 gpm to this zone. There is inadequate source capacity for current and future zone needs. Additional sources will need to be constructed in this zone or above to supply the current and projected needs. Approximately 2,417 gpm will be required for the culinary system and 3,445 for the secondary system.

Table 3-15 shows the project requirements within Zone 3.

Table 3-15 Projected Zone 3 System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	3,133	1,050	583	690,000	473	210	832	598,080	393
2009	3,441	1,153	641	731,250	519	231	913	656,820	431
2010	3,748	1,256	698	772,500	565	251	995	715,560	470
2011	4,056	1,359	755	813,750	612	272	1,077	774,300	508
2012	4,364	1,463	812	855,000	658	293	1,158	833,040	547
2013	4,672	1,566	870	896,250	705	313	1,240	891,780	586
2014	4,979	1,669	927	937,500	751	334	1,322	950,520	624
2015	5,287	1,772	984	978,750	797	354	1,403	1,009,260	663
2016	5,595	1,875	1,042	1,020,000	844	375	1,485	1,068,000	701
2017	5,902	1,978	1,099	1,061,250	890	396	1,567	1,126,740	740
2018	6,210	2,081	1,156	1,102,500	937	416	1,648	1,185,480	778
2019	6,518	2,184	1,214	1,143,750	983	437	1,730	1,244,220	817
2020	6,826	2,288	1,271	1,185,000	1,029	458	1,812	1,302,960	856
2021	7,133	2,391	1,328	1,226,250	1,076	478	1,893	1,361,700	894
2022	7,441	2,494	1,385	1,267,500	1,122	499	1,975	1,420,440	933
2023	7,749	2,597	1,443	1,308,750	1,169	519	2,057	1,479,180	971
2024	8,056	2,700	1,500	1,350,000	1,215	540	2,138	1,537,920	1,010
2025	8,364	2,803	1,557	1,391,250	1,261	561	2,220	1,596,660	1,048
2026	8,672	2,906	1,615	1,432,500	1,308	581	2,302	1,655,400	1,087
2027	8,980	3,009	1,672	1,473,750	1,354	602	2,383	1,714,140	1,126
2028	9,287	3,113	1,729	1,515,000	1,401	623	2,465	1,772,880	1,164
2029	9,595	3,216	1,786	1,556,250	1,447	643	2,547	1,831,620	1,203
2030	9,903	3,319	1,844	1,597,500	1,493	664	2,628	1,890,360	1,241
2031	10,210	3,422	1,901	1,638,750	1,540	684	2,710	1,949,100	1,280
2032	10,518	3,525	1,958	1,680,000	1,586	705	2,792	2,007,840	1,318
2033	10,826	3,628	2,016	1,721,250	1,633	726	2,873	2,066,580	1,357
2034	11,134	3,731	2,073	1,762,500	1,679	746	2,955	2,125,320	1,395
2035	11,441	3,834	2,130	1,803,750	1,725	767	3,037	2,184,060	1,434
2036	11,749	3,938	2,187	1,845,000	1,772	788	3,119	2,242,800	1,473
2037	12,057	4,041	2,245	1,886,250	1,818	808	3,200	2,301,540	1,511
2038	12,364	4,144	2,302	1,927,500	1,865	829	3,282	2,360,280	1,550
2039	12,672	4,247	2,359	1,968,750	1,911	849	3,364	2,419,020	1,588
2040	12,980	4,350	2,417	2,010,000	1,958	870	3,445	2,477,760	1,627

Zone 3a

Zone 3a is the smallest in area of all the zones. Zone 3a encompasses the Butterfield Park area. This zone does not encompass residential development. Elevations in this zone range from approximately 5,040 ft to 5,085 ft. Indoor needs are supplied through the culinary system and outdoor needs will be met through the secondary system.

There are no storage reservoirs in Zone 3a, however, storage requirements are adequately met through storage reservoirs that lie in zones of higher elevation. Future storage demand is not projected to increase for this zone. Storage requirements will continue to be met by upstream storage facilities.

Zone 3a's water source capacity is currently provided through two PRV connections from Zone 4. These PRV connections are adequate to provide the source capacity required. Future source demand is not projected to increase for this zone.

Table 3-16 shows the project requirements within Zone 3a.

Table 3-16 Projected Zone 3a System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	442	148	82	59,200	67	30	117	84,301	55
2009	442	148	82	59,200	67	30	117	84,301	55
2010	442	148	82	59,200	67	30	117	84,301	55
2011	442	148	82	59,200	67	30	117	84,301	55
2012	442	148	82	59,200	67	30	117	84,301	55
2013	442	148	82	59,200	67	30	117	84,301	55
2014	442	148	82	59,200	67	30	117	84,301	55
2015	442	148	82	59,200	67	30	117	84,301	55
2016	442	148	82	59,200	67	30	117	84,301	55
2017	442	148	82	59,200	67	30	117	84,301	55
2018	442	148	82	59,200	67	30	117	84,301	55
2019	442	148	82	59,200	67	30	117	84,301	55
2020	442	148	82	59,200	67	30	117	84,301	55
2021	442	148	82	59,200	67	30	117	84,301	55
2022	442	148	82	59,200	67	30	117	84,301	55
2023	442	148	82	59,200	67	30	117	84,301	55
2024	442	148	82	59,200	67	30	117	84,301	55
2025	442	148	82	59,200	67	30	117	84,301	55
2026	442	148	82	59,200	67	30	117	84,301	55
2027	442	148	82	59,200	67	30	117	84,301	55
2028	442	148	82	59,200	67	30	117	84,301	55
2029	442	148	82	59,200	67	30	117	84,301	55
2030	442	148	82	59,200	67	30	117	84,301	55
2031	442	148	82	59,200	67	30	117	84,301	55
2032	442	148	82	59,200	67	30	117	84,301	55
2033	442	148	82	59,200	67	30	117	84,301	55
2034	442	148	82	59,200	67	30	117	84,301	55
2035	442	148	82	59,200	67	30	117	84,301	55
2036	442	148	82	59,200	67	30	117	84,301	55
2037	442	148	82	59,200	67	30	117	84,301	55
2038	442	148	82	59,200	67	30	117	84,301	55
2039	442	148	82	59,200	67	30	117	84,301	55
2040	442	148	82	59,200	67	30	117	84,301	55

Zone 4

Zone 4 is the third largest pressure zone in the City and has the fourth highest current and projected populations. Elevations in this zone range from approximately 5,120 ft to 5,275 ft. Indoor needs are supplied through the culinary system and outdoor needs will be met through the secondary system.

Zone 4 storage needs are met through two 3 MG reservoirs. These reservoirs meet the full culinary storage needs of this zone. There is a total of 8.38 million gallons of storage in the culinary system with a total current need of approximately 8.17 million gallons in the culinary system. There is 10.41 million gallons of storage currently under construction for the secondary system and outdoor irrigation will be moved from the culinary water system to the secondary to free up storage capacity within the culinary system.

Zone 4's water source capacity is provided through a booster pump from Zone 2. There is inadequate source capacity for current and future needs. This short fall is planned to be rectified through a new booster pump station as shown in figure 2-5. Approximately 2,222 gpm will be required for the culinary system and 3,168 for the secondary system.

Table 3-17 shows the project requirements within Zone 4.

Table 3-17 Projected Zone 4 System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	2,133	715	397	556,000	322	143	566	407,264	267
2009	2,440	818	454	597,063	368	164	648	465,737	306
2010	2,746	920	511	638,125	414	184	729	524,210	344
2011	3,052	1,023	568	679,188	460	205	810	582,683	383
2012	3,359	1,126	625	720,250	507	225	891	641,156	421
2013	3,665	1,228	682	761,313	553	246	973	699,629	459
2014	3,971	1,331	739	802,375	599	266	1,054	758,102	498
2015	4,278	1,434	796	843,438	645	287	1,135	816,575	536
2016	4,584	1,536	853	884,500	691	307	1,217	875,048	575
2017	4,890	1,639	911	925,563	738	328	1,298	933,521	613
2018	5,197	1,742	968	966,625	784	348	1,379	991,994	651
2019	5,503	1,844	1,025	1,007,688	830	369	1,461	1,050,467	690
2020	5,809	1,947	1,082	1,048,750	876	389	1,542	1,108,940	728
2021	6,116	2,050	1,139	1,089,813	922	410	1,623	1,167,413	767
2022	6,422	2,152	1,196	1,130,875	968	430	1,705	1,225,886	805
2023	6,728	2,255	1,253	1,171,938	1,015	451	1,786	1,284,359	843
2024	7,034	2,358	1,310	1,213,000	1,061	472	1,867	1,342,832	882
2025	7,341	2,460	1,367	1,254,063	1,107	492	1,948	1,401,305	920
2026	7,647	2,563	1,424	1,295,125	1,153	513	2,030	1,459,778	958
2027	7,953	2,665	1,481	1,336,188	1,199	533	2,111	1,518,251	997
2028	8,260	2,768	1,538	1,377,250	1,246	554	2,192	1,576,724	1,035
2029	8,566	2,871	1,595	1,418,313	1,292	574	2,274	1,635,197	1,074
2030	8,872	2,973	1,652	1,459,375	1,338	595	2,355	1,693,670	1,112
2031	9,179	3,076	1,709	1,500,438	1,384	615	2,436	1,752,143	1,150
2032	9,485	3,179	1,766	1,541,500	1,430	636	2,518	1,810,616	1,189
2033	9,791	3,281	1,823	1,582,563	1,477	656	2,599	1,869,089	1,227
2034	10,098	3,384	1,880	1,623,625	1,523	677	2,680	1,927,562	1,266
2035	10,404	3,487	1,937	1,664,688	1,569	697	2,761	1,986,035	1,304
2036	10,710	3,589	1,994	1,705,750	1,615	718	2,843	2,044,508	1,342
2037	11,017	3,692	2,051	1,746,813	1,661	738	2,924	2,102,981	1,381
2038	11,323	3,795	2,108	1,787,875	1,708	759	3,005	2,161,454	1,419
2039	11,629	3,897	2,165	1,828,938	1,754	779	3,087	2,219,927	1,458
2040	11,935	4,000	2,222	1,870,000	1,800	800	3,168	2,278,400	1,496

Zone 5 and above

“Zone 5 and above” consists of water model zones 5, 6 and future zones above. Elevations in zone five range from approximately 5,275 ft to 5,390 ft. Elevations in zone six and above are yet to be determined. Indoor and outdoor needs are supplied through the culinary system. All zones will be required to be self sustaining in that they need to provide their own storage facilities, transmission and distribution lines, booster pumps, etc to meet their individual needs. Lower zones will need to be upsized in order to provide water supplies to these zones.

Zone 5 is currently not contiguous. In the westerly part of the city, zone 5 feeds down from zone 6. In the easterly part of the city, zone 5 does not tie into a higher zone. Storage needs of the westerly zone 5 are provided through PRV connections from zone 6 where there is a 1 MG reservoir. Storage needs of the easterly zone 5 are provided directly in zone 5 with a 425,000 gallon tank. This 425,000 gallon tank in the easterly zone 5 meets the current needs of zone 5 but at buildout there may be a storage deficit. The 1 MG reservoir in zone 6 that feeds to the westerly zone 5 meets current storage requirements but at buildout there may be a deficit.

Zone 5 and above water source capacity is provided through booster pumps from Zones 3 and 4. There is adequate source capacity for current Zone 5 and above needs. There is inadequate source capacity for future needs.

Table 3-18 shows the project requirements within Zone 4.

Table 3-18 Projected Zone 5 and Above System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	107	36	20	284,400	16	7	29	20,506	13
2009	365	122	68	318,950	55	24	97	69,705	46
2010	623	209	116	353,500	94	42	165	118,904	78
2011	881	295	164	388,050	133	59	234	168,103	110
2012	1,138	382	212	422,600	172	76	302	217,302	143
2013	1,396	468	260	457,150	211	94	371	266,502	175
2014	1,654	554	308	491,700	249	111	439	315,701	207
2015	1,912	641	356	526,250	288	128	507	364,900	240
2016	2,169	727	404	560,800	327	145	576	414,099	272
2017	2,427	813	452	595,350	366	163	644	463,298	304
2018	2,685	900	500	629,900	405	180	713	512,498	337
2019	2,942	986	548	664,450	444	197	781	561,697	369
2020	3,200	1073	596	699,000	483	215	849	610,896	401
2021	3,458	1159	644	733,550	521	232	918	660,095	433
2022	3,716	1245	692	768,100	560	249	986	709,294	466
2023	3,973	1332	740	802,650	599	266	1,055	758,494	498
2024	4,231	1418	788	837,200	638	284	1,123	807,693	530
2025	4,489	1504	836	871,750	677	301	1,191	856,892	563
2026	4,747	1591	884	906,300	716	318	1,260	906,091	595
2027	5,004	1677	932	940,850	755	335	1,328	955,290	627
2028	5,262	1764	980	975,400	794	353	1,397	1,004,490	660
2029	5,520	1850	1,028	1,009,950	832	370	1,465	1,053,689	692
2030	5,778	1936	1,076	1,044,500	871	387	1,534	1,102,888	724
2031	6,035	2023	1,124	1,079,050	910	405	1,602	1,152,087	756
2032	6,293	2109	1,172	1,113,600	949	422	1,670	1,201,286	789
2033	6,551	2195	1,220	1,148,150	988	439	1,739	1,250,486	821
2034	6,808	2282	1,268	1,182,700	1,027	456	1,807	1,299,685	853
2035	7,066	2368	1,316	1,217,250	1,066	474	1,876	1,348,884	886
2036	7,324	2455	1,364	1,251,800	1,105	491	1,944	1,398,083	918
2037	7,582	2541	1,412	1,286,350	1,143	508	2,012	1,447,282	950
2038	7,839	2627	1,460	1,320,900	1,182	525	2,081	1,496,482	983
2039	8,097	2714	1,508	1,355,450	1,221	543	2,149	1,545,681	1,015
2040	8,355	2800	1,556	1,390,000	1,260	560	2,218	1,594,880	1,047

Zone A

Zone's A through F represent zones that have not yet been built. These zones have been created to model future growth in the newly annexed "East Herriman". Zone A will be the lowest pressure zone in elevation in the easterly portion of the City. Elevations in this zone range from approximately 4,710 ft to 4,850 ft. This elevation range of zone A is the same as Zone 1 in the westerly part of the city. Zone A has the second highest projected population of 18,876 and is the fourth largest pressure zone in the entire City. Only zone 2 in the west portion of the city has a higher projected population of 19,246. Currently zone A has a zero population. Indoor needs and approximately 20 percent of the outdoor needs will be supplied through the culinary system and 80 percent of the outdoor needs will be met through the secondary system.

There are no current Zone A storage needs, however, at buildout, zone A will have a storage capacity requirement of 6.4 million gallons. Of this need, 3.5 million will come from secondary and 2.9 million from culinary.

There are no current Zone A source capacity needs, however, at buildout, zone A will have a source capacity requirement of 8,500 gpm. Of this need, 4,500 gpm will come from secondary and 4,000 gpm from culinary.

Table 3-19 shows the project requirements within Zone A.

Table 3-19 Projected Zone A System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	0	0	0	270,000	0	0	0	0	0
2009	590	198	110	349,075	89	40	157	112,603	74
2010	1,180	395	220	428,150	178	79	313	225,206	148
2011	1,770	593	329	507,225	267	119	470	337,808	222
2012	2,359	791	439	586,300	356	158	626	450,411	296
2013	2,949	988	549	665,375	445	198	783	563,014	370
2014	3,539	1,186	659	744,450	534	237	939	675,617	444
2015	4,129	1,384	769	823,525	623	277	1,096	788,220	518
2016	4,719	1,582	879	902,600	712	316	1,253	900,822	591
2017	5,309	1,779	988	981,675	801	356	1,409	1,013,425	665
2018	5,899	1,977	1,098	1,060,750	890	395	1,566	1,126,028	739
2019	6,489	2,175	1,208	1,139,825	979	435	1,722	1,238,631	813
2020	7,078	2,372	1,318	1,218,900	1,068	474	1,879	1,351,234	887
2021	7,668	2,570	1,428	1,297,975	1,156	514	2,035	1,463,836	961
2022	8,258	2,768	1,538	1,377,050	1,245	554	2,192	1,576,439	1,035
2023	8,848	2,965	1,647	1,456,125	1,334	593	2,349	1,689,042	1,109
2024	9,438	3,163	1,757	1,535,200	1,423	633	2,505	1,801,645	1,183
2025	10,028	3,361	1,867	1,614,275	1,512	672	2,662	1,914,248	1,257
2026	10,618	3,558	1,977	1,693,350	1,601	712	2,818	2,026,850	1,331
2027	11,208	3,756	2,087	1,772,425	1,690	751	2,975	2,139,453	1,405
2028	11,797	3,954	2,197	1,851,500	1,779	791	3,131	2,252,056	1,479
2029	12,387	4,151	2,306	1,930,575	1,868	830	3,288	2,364,659	1,553
2030	12,977	4,349	2,416	2,009,650	1,957	870	3,445	2,477,262	1,627
2031	13,567	4,547	2,526	2,088,725	2,046	909	3,601	2,589,864	1,701
2032	14,157	4,745	2,636	2,167,800	2,135	949	3,758	2,702,467	1,774
2033	14,747	4,942	2,746	2,246,875	2,224	988	3,914	2,815,070	1,848
2034	15,337	5,140	2,855	2,325,950	2,313	1,028	4,071	2,927,673	1,922
2035	15,927	5,338	2,965	2,405,025	2,402	1,068	4,227	3,040,276	1,996
2036	16,516	5,535	3,075	2,484,100	2,491	1,107	4,384	3,152,878	2,070
2037	17,106	5,733	3,185	2,563,175	2,580	1,147	4,540	3,265,481	2,144
2038	17,696	5,931	3,295	2,642,250	2,669	1,186	4,697	3,378,084	2,218
2039	18,286	6,128	3,405	2,721,325	2,758	1,226	4,854	3,490,687	2,292
2040	18,876	6,326	3,514	2,800,400	2,847	1,265	5,010	3,603,290	2,366

Zone B

Zone B is the second lowest pressure zone in elevation in the easterly portion of the City. Elevations in this zone will approximately match those of zone 2. Population in this zone is projected to be third highest in the east portion of the City at 6,427. This projection is based on the currently approved growth pattern as well as analysis of current City boundaries and projected annexation boundaries. Currently zone B has a zero population. Indoor needs and 20 percent of the outdoor needs will be supplied through the culinary system and 80 percent of the outdoor needs will be met through the secondary system.

There are currently no zone B storage needs, however, at buildout, zone B will have a storage capacity requirement of 2.4 million gallons. Of this need, 1.0 million will come from secondary and 1.4 million from culinary.

There are currently no zone B source capacity needs, however, at buildout, zone B will have a source capacity requirement of 2,900 gpm. Of this need, 1,360 gpm will come from secondary and 1,540gpm from culinary.

Table 3-20 shows the project requirements within Zone B.

Table 3-20 Projected Zone B System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	0	0	0	270,000	0	0	0	0	0
2009	201	67	37	296,925	30	13	53	38,341	25
2010	402	135	75	323,850	61	27	107	76,682	50
2011	603	202	112	350,775	91	40	160	115,024	76
2012	803	269	150	377,700	121	54	213	153,365	101
2013	1,004	337	187	404,625	151	67	267	191,706	126
2014	1,205	404	224	431,550	182	81	320	230,047	151
2015	1,406	471	262	458,475	212	94	373	268,388	176
2016	1,607	539	299	485,400	242	108	426	306,730	201
2017	1,808	606	337	512,325	273	121	480	345,071	227
2018	2,009	673	374	539,250	303	135	533	383,412	252
2019	2,209	740	411	566,175	333	148	586	421,753	277
2020	2,410	808	449	593,100	363	162	640	460,094	302
2021	2,611	875	486	620,025	394	175	693	498,436	327
2022	2,812	942	524	646,950	424	188	746	536,777	352
2023	3,013	1,010	561	673,875	454	202	800	575,118	378
2024	3,214	1,077	598	700,800	485	215	853	613,459	403
2025	3,414	1,144	636	727,725	515	229	906	651,800	428
2026	3,615	1,212	673	754,650	545	242	960	690,142	453
2027	3,816	1,279	711	781,575	576	256	1,013	728,483	478
2028	4,017	1,346	748	808,500	606	269	1,066	766,824	503
2029	4,218	1,414	785	835,425	636	283	1,120	805,165	529
2030	4,419	1,481	823	862,350	666	296	1,173	843,506	554
2031	4,620	1,548	860	889,275	697	310	1,226	881,848	579
2032	4,820	1,616	897	916,200	727	323	1,279	920,189	604
2033	5,021	1,683	935	943,125	757	337	1,333	958,530	629
2034	5,222	1,750	972	970,050	788	350	1,386	996,871	655
2035	5,423	1,817	1,010	996,975	818	363	1,439	1,035,212	680
2036	5,624	1,885	1,047	1,023,900	848	377	1,493	1,073,554	705
2037	5,825	1,952	1,084	1,050,825	878	390	1,546	1,111,895	730
2038	6,026	2,019	1,122	1,077,750	909	404	1,599	1,150,236	755
2039	6,226	2,087	1,159	1,104,675	939	417	1,653	1,188,577	780
2040	6,427	2,154	1,197	1,131,600	969	431	1,706	1,226,918	806

Zone C

Zone C has the second highest population projection in the newly annexed “East Herriman”. This projection is based on the currently approved growth pattern as well as analysis of current City boundaries and projected annexation boundaries. Elevations in this zone will approximately match those of zone 3. Currently zone C has a zero population. Indoor needs and 20 percent of the outdoor needs will be supplied through the culinary system and 80 percent of the outdoor needs will be met through the secondary system.

There are currently no zone C storage needs, however, at buildout, zone C will have a storage capacity requirement of 3.0 million gallons. Of this need, 1.9 million will come from secondary and 1.1 million from culinary.

There are currently no zone C source capacity needs, however, at buildout, zone C will have a source capacity requirement of 3,950 gpm. Of this need, 1,850 gpm will come from secondary and 2,100 gpm from culinary.

Table 3-21 shows the project requirements within Zone C.

Table 3-21 Projected Zone C System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	0	0	0	270,000	0	0	0	0	0
2009	272	91	51	306,525	41	18	72	52,012	34
2010	545	183	101	343,050	82	37	145	104,023	68
2011	817	274	152	379,575	123	55	217	156,035	102
2012	1,090	365	203	416,100	164	73	289	208,046	137
2013	1,362	457	254	452,625	205	91	362	260,058	171
2014	1,635	548	304	489,150	247	110	434	312,070	205
2015	1,907	639	355	525,675	288	128	506	364,081	239
2016	2,180	731	406	562,200	329	146	579	416,093	273
2017	2,452	822	457	598,725	370	164	651	468,104	307
2018	2,725	913	507	635,250	411	183	723	520,116	342
2019	2,997	1,004	558	671,775	452	201	796	572,128	376
2020	3,270	1,096	609	708,300	493	219	868	624,139	410
2021	3,542	1,187	659	744,825	534	237	940	676,151	444
2022	3,815	1,278	710	781,350	575	256	1,012	728,162	478
2023	4,087	1,370	761	817,875	616	274	1,085	780,174	512
2024	4,359	1,461	812	854,400	657	292	1,157	832,186	546
2025	4,632	1,552	862	890,925	699	310	1,229	884,197	581
2026	4,904	1,644	913	927,450	740	329	1,302	936,209	615
2027	5,177	1,735	964	963,975	781	347	1,374	988,220	649
2028	5,449	1,826	1,015	1,000,500	822	365	1,446	1,040,232	683
2029	5,722	1,918	1,065	1,037,025	863	384	1,519	1,092,244	717
2030	5,994	2,009	1,116	1,073,550	904	402	1,591	1,144,255	751
2031	6,267	2,100	1,167	1,110,075	945	420	1,663	1,196,267	785
2032	6,539	2,192	1,217	1,146,600	986	438	1,736	1,248,278	820
2033	6,812	2,283	1,268	1,183,125	1,027	457	1,808	1,300,290	854
2034	7,084	2,374	1,319	1,219,650	1,068	475	1,880	1,352,302	888
2035	7,357	2,465	1,370	1,256,175	1,109	493	1,953	1,404,313	922
2036	7,629	2,557	1,420	1,292,700	1,151	511	2,025	1,456,325	956
2037	7,901	2,648	1,471	1,329,225	1,192	530	2,097	1,508,336	990
2038	8,174	2,739	1,522	1,365,750	1,233	548	2,170	1,560,348	1,025
2039	8,446	2,831	1,573	1,402,275	1,274	566	2,242	1,612,360	1,059
2040	8,719	2,922	1,623	1,438,800	1,315	584	2,314	1,664,371	1,093

Zone D

Relative to the other pressure zones in the system, zone D is small in area and has a small projected buildout population. This projection is based on the currently approved growth pattern as well as analysis of current City boundaries and projected annexation boundaries. Elevations in this zone will approximately match those of zone 4. Currently zone D has a zero population. Indoor needs and 50 percent of the outdoor needs will be supplied through the culinary system and 50 percent of the outdoor needs will be met through the secondary system.

There are currently no zone D storage needs, however, at buildout, zone D will have a storage capacity requirement of 0.8 million gallons. Of this need, 0.23 million will come from secondary and 0.57 million from culinary.

There are currently no zone D source capacity needs, however, at buildout, zone D will have a source capacity requirement of 731 gpm. Of this need, 320 gpm will come from secondary and 411 gpm from culinary.

Table 3-22 shows the project requirements within Zone D.

Table 3-22 Projected Zone D System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	0	0	0	270,000	0	0	0	0	0
2009	56	19	10	277,450	8	3	13	9,017	6
2010	111	37	21	284,900	17	6	25	18,035	12
2011	167	56	31	292,350	25	9	38	27,052	18
2012	222	75	41	299,800	34	13	50	36,070	24
2013	278	93	52	307,250	42	16	63	45,087	30
2014	333	112	62	314,700	50	19	75	54,105	36
2015	389	130	72	322,150	59	22	88	63,122	41
2016	445	149	83	329,600	67	25	100	72,140	47
2017	500	168	93	337,050	75	28	113	81,157	53
2018	556	186	103	344,500	84	32	125	90,175	59
2019	611	205	114	351,950	92	35	138	99,192	65
2020	667	224	124	359,400	101	38	150	108,210	71
2021	722	242	135	366,850	109	41	163	117,227	77
2022	778	261	145	374,300	117	44	176	126,245	83
2023	834	279	155	381,750	126	47	188	135,262	89
2024	889	298	166	389,200	134	51	201	144,280	95
2025	945	317	176	396,650	142	54	213	153,297	101
2026	1,000	335	186	404,100	151	57	226	162,315	107
2027	1,056	354	197	411,550	159	60	238	171,332	112
2028	1,111	373	207	419,000	168	63	251	180,350	118
2029	1,167	391	217	426,450	176	66	263	189,367	124
2030	1,223	410	228	433,900	184	70	276	198,385	130
2031	1,278	428	238	441,350	193	73	288	207,402	136
2032	1,334	447	248	448,800	201	76	301	216,420	142
2033	1,389	466	259	456,250	210	79	313	225,437	148
2034	1,445	484	269	463,700	218	82	326	234,454	154
2035	1,501	503	279	471,150	226	85	339	243,472	160
2036	1,556	522	290	478,600	235	89	351	252,489	166
2037	1,612	540	300	486,050	243	92	364	261,507	172
2038	1,667	559	310	493,500	251	95	376	270,524	178
2039	1,723	577	321	500,950	260	98	389	279,542	184
2040	1,778	596	331	508,400	268	101	401	288,559	189

Zone E

Zone E is second smallest in area among all pressure zones and its projected population ranks second smallest as well. Elevations in this zone will approximately match those of zone 5. Currently zone E has a zero population. Indoor and outdoor needs are supplied through the culinary system.

There are currently no zone E storage needs, however, at buildout, zone E will have a storage capacity requirement of 0.83 million gallons.

There are currently no zone E source capacity needs, however, at buildout, zone E will have a source capacity requirement of 783 gpm.

Table 3-23 shows the project requirements within Zone E.

Table 3-23 Projected Zone E System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	0	0	0	270,000	0	0	0	0	
2009	31	10	6	274,188	5	5	19	13,417	
2010	62	21	12	278,375	9	9	37	26,834	
2011	94	31	17	282,563	14	14	56	40,250	
2012	125	42	23	286,750	19	19	75	53,667	
2013	156	52	29	290,938	24	24	93	67,084	
2014	187	63	35	295,125	28	28	112	80,501	
2015	219	73	41	299,313	33	33	131	93,917	
2016	250	84	47	303,500	38	38	149	107,334	
2017	281	94	52	307,688	42	42	168	120,751	
2018	312	105	58	311,875	47	47	187	134,168	
2019	344	115	64	316,063	52	52	205	147,584	
2020	375	126	70	320,250	57	57	224	161,001	
2021	406	136	76	324,438	61	61	243	174,418	
2022	437	147	81	328,625	66	66	261	187,835	
2023	469	157	87	332,813	71	71	280	201,251	
2024	500	168	93	337,000	75	75	298	214,668	
2025	531	178	99	341,188	80	80	317	228,085	
2026	562	188	105	345,375	85	85	336	241,502	
2027	594	199	111	349,563	90	90	354	254,918	
2028	625	209	116	353,750	94	94	373	268,335	
2029	656	220	122	357,938	99	99	392	281,752	
2030	687	230	128	362,125	104	104	410	295,169	
2031	718	241	134	366,313	108	108	429	308,585	
2032	750	251	140	370,500	113	113	448	322,002	
2033	781	262	145	374,688	118	118	466	335,419	
2034	812	272	151	378,875	122	122	485	348,836	
2035	843	283	157	383,063	127	127	504	362,252	
2036	875	293	163	387,250	132	132	522	375,669	
2037	906	304	169	391,438	137	137	541	389,086	
2038	937	314	174	395,625	141	141	560	402,503	
2039	968	325	180	399,813	146	146	578	415,919	
2040	1,000	335	186	404,000	151	151	597	429,336	

Zone F

Zone F is the smallest, in area, of all pressure zones and its projected population at buildout is the smallest as well. Elevations in this zone will approximately match those of zone 6. Currently zone F has a zero population. Indoor and outdoor needs are supplied through the culinary system.

There are currently no zone F storage needs, however, at buildout, zone F will have a storage capacity requirement of 0.7 million gallons

There are currently no zone E source capacity needs, however, at buildout, zone E will have a source capacity requirement of 603 gpm.

Table 3-24 shows the project requirements within Zone F.

Table 3-24 Projected Zone F System Requirements

Fiscal Year	Projected Population	INDOOR REQUIREMENTS				OUTDOOR REQUIREMENTS			
		Indoor ERC	Source (gpm)	Storage (gal)	Water Rights (acre-ft)	Outdoor Acres	Source (gpm)	Storage (gal)	Water Rights (acre-ft)
2008	0	0	0	270,000	0	0	0	0	
2009	22	7	4	272,975	3	4	15	10,591	
2010	44	15	8	275,950	7	7	29	21,182	
2011	67	22	12	278,925	10	11	44	31,773	
2012	89	30	17	281,900	13	15	59	42,364	
2013	111	37	21	284,875	17	19	74	52,955	
2014	133	45	25	287,850	20	22	88	63,546	
2015	155	52	29	290,825	23	26	103	74,137	
2016	178	60	33	293,800	27	30	118	84,728	
2017	200	67	37	296,775	30	33	133	95,319	
2018	222	74	41	299,750	33	37	147	105,910	
2019	244	82	45	302,725	37	41	162	116,501	
2020	266	89	50	305,700	40	45	177	127,092	
2021	289	97	54	308,675	44	48	191	137,683	
2022	311	104	58	311,650	47	52	206	148,274	
2023	333	112	62	314,625	50	56	221	158,865	
2024	355	119	66	317,600	54	60	236	169,456	
2025	377	126	70	320,575	57	63	250	180,047	
2026	399	134	74	323,550	60	67	265	190,638	
2027	422	141	79	326,525	64	71	280	201,229	
2028	444	149	83	329,500	67	74	295	211,820	
2029	466	156	87	332,475	70	78	309	222,411	
2030	488	164	91	335,450	74	82	324	233,002	
2031	510	171	95	338,425	77	86	339	243,593	
2032	533	179	99	341,400	80	89	353	254,184	
2033	555	186	103	344,375	84	93	368	264,775	
2034	577	193	107	347,350	87	97	383	275,366	
2035	599	201	112	350,325	90	100	398	285,957	
2036	621	208	116	353,300	94	104	412	296,548	
2037	644	216	120	356,275	97	108	427	307,139	
2038	666	223	124	359,250	100	112	442	317,730	
2039	688	231	128	362,225	104	115	457	328,321	
2040	710	238	132	365,200	107	119	471	338,912	

4.0 RECOMMENDATIONS

Equivalent Residential Connections

This master plan is based on projecting the number of Equivalent Residential Connections (ERC's) and their associated water use. An indoor ERC is based on the water use for an average single family residential home. An outdoor ERC is based on acreage of irrigated land. Table 4-1 shows the recommended meter size and associated Indoor ERC. Also included are the Indoor ERC recommendations for multi-family units. Table 4-2 shows the projected irrigated acreage in each zone and associated information. Each new water connection should be charged an impact fee based on the culinary water meter size and irrigated acreage. Typical residential lots irrigate 60 percent of the lot area. Other irrigation uses could be determined on a case by case basis. One irrigated acre is equivalent to 7.1 Indoor ERCs. The culinary impact fee should be based on the Indoor ERC's plus the irrigated acreage supplied by the culinary system. ERC's are equated to meter size in Table 4-1. The Secondary impact fee should be based on the irrigated acreage supplied by the secondary system.

Table 4- 1 Indoor ERC Recommendations

Meter Size	AWWA Max Flow (gpm)	Indoor ERC
3/4"	30	1.00
1"	50	1.67
1.5"	100	3.33
2"	160	5.33
3"	320	10.67
4"	500	16.67
6"	1000	33.33
8"	1600	53.33
Multi Family # Bedrooms		Indoor ERC
1		0.48
2		0.97
3		1.39

Table 4- 2 Irrigated Acreage

Zone	Irrigated Acres per Indoor ERC	Total Irrigated Acres	Percentage Supplied By Culinary System*
1	0.2	639.00	0%
2	0.2	1,290.00	0%
3	0.2	870.00	0%
3a	0.2	29.60	0%
4	0.2	800.00	0%
5 and above	0.2	560.00	100%
A	0.2	1,265.20	20%
B	0.2	430.80	20%
C	0.2	584.40	20%
D	0.17	101.32	50%
E	0.5	150.75	100%
F	0.45	119.00	100%

*Projected at buildout when both culinary and secondary systems are operating

Service Areas

The City is divided into four distinct service areas (see Figure 4-2) in order to determine distinct impact fees. Service area I is all of pressure zones 1 through 4 while service area II is all numbered zones higher in elevation than zone 4. Service areas III and IV encompass the newly annexed areas of “East Herriman”. These areas are differentiated by whether or not there is a secondary irrigation system planned to provide the outdoor irrigation. The service area does not necessarily correspond to pressure zone boundaries.

Within service area I it is assumed that developers will install all improvements required for their projects and any upsize costs will be eligible for impact fee re-imbusement. The cost tables in the appendix identify which costs are eligible for impact fee re-imbusement. All 8-inch and smaller culinary water lines and 6-inch and smaller secondary lines are deemed to be project improvements and are to be installed at the developers expense.

In service area II the developers will install all necessary facilities to service their developments including pipes (minimum 8-inch culinary), tanks, and booster pumps. Both indoor and outdoor water requirements will be served through the culinary system. The culinary water system in

service area I will need to be up-sized to pass water from the City's sources of supply to service area II. Service area II will be charged an impact fee to cover the cost of doing so.

Service areas III and IV will all be constructed at the developer's expense. These areas are designed to be stand alone systems without connection to the existing water system.

System Sizing

Figure 4-1 shows the existing and planned system pressure zones.

Figure 4-3 and 4-4 shows the recommended secondary and culinary systems required to supply the City's projected water needs.

FIGURE 4-1

Pressure Zones



- Planning Boundary
- Annexation Line
- Mountain View Corridor
- Zone 1
- Zone 2
- Zone 3
- Zone 3a
- Zone 4
- Zone 5
- Zone 6
- Above Zone 6 - Future
- Zone A - Future
- Zone B - Future
- Zone C - Future
- Zone D - Future
- Zone E - Future
- Zone F - Future
- Above Zone F - Future
- Property Line

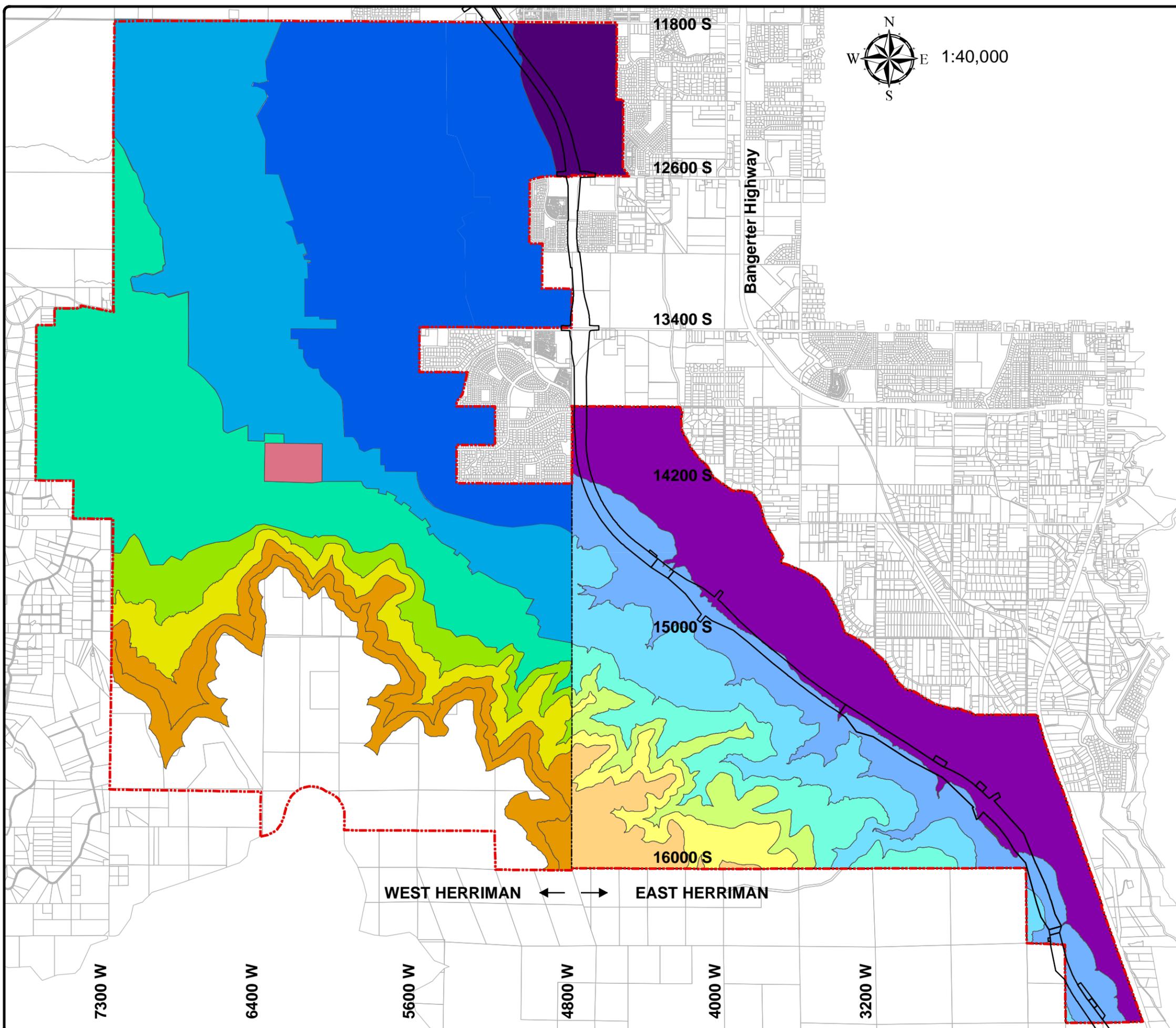
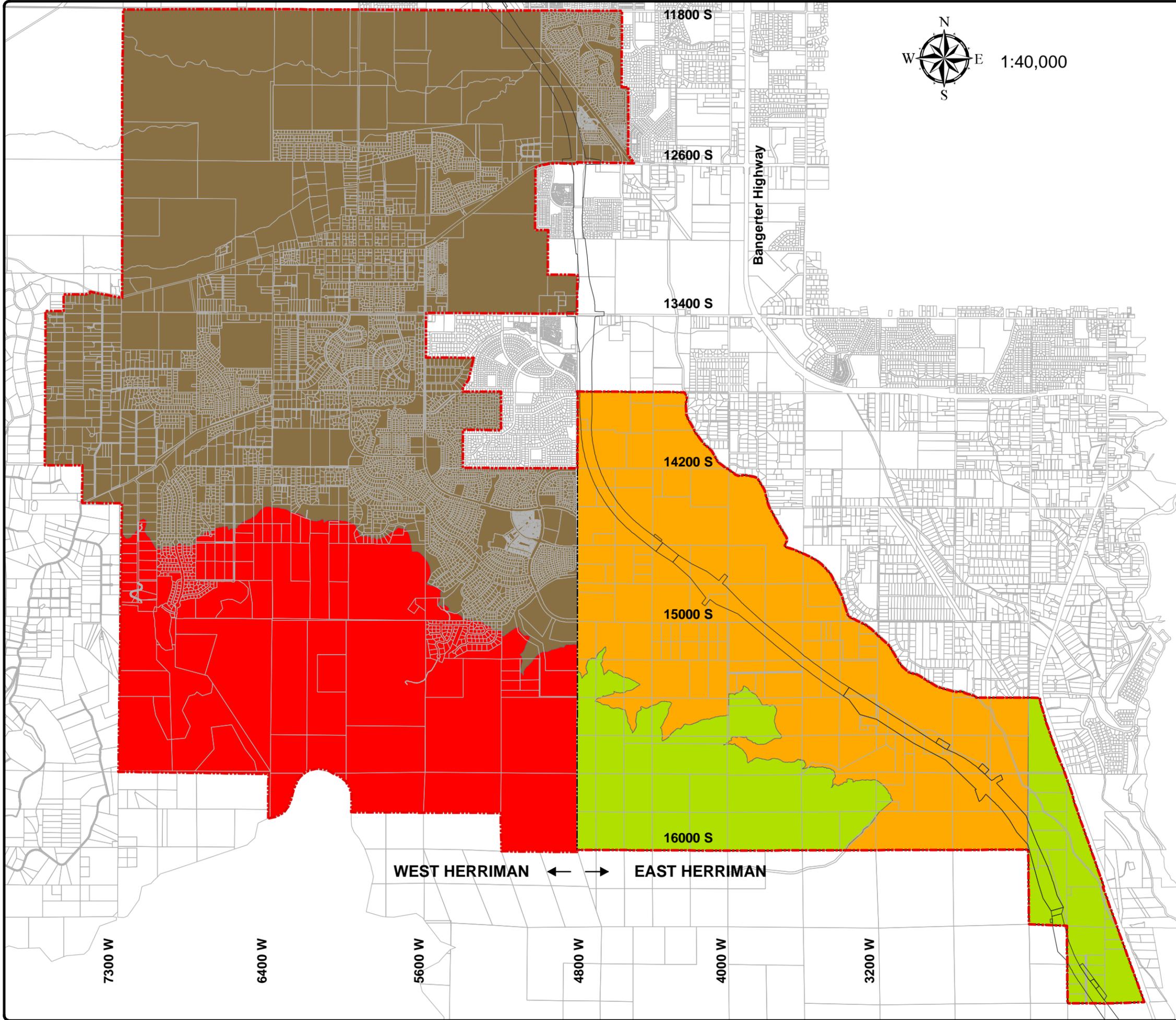


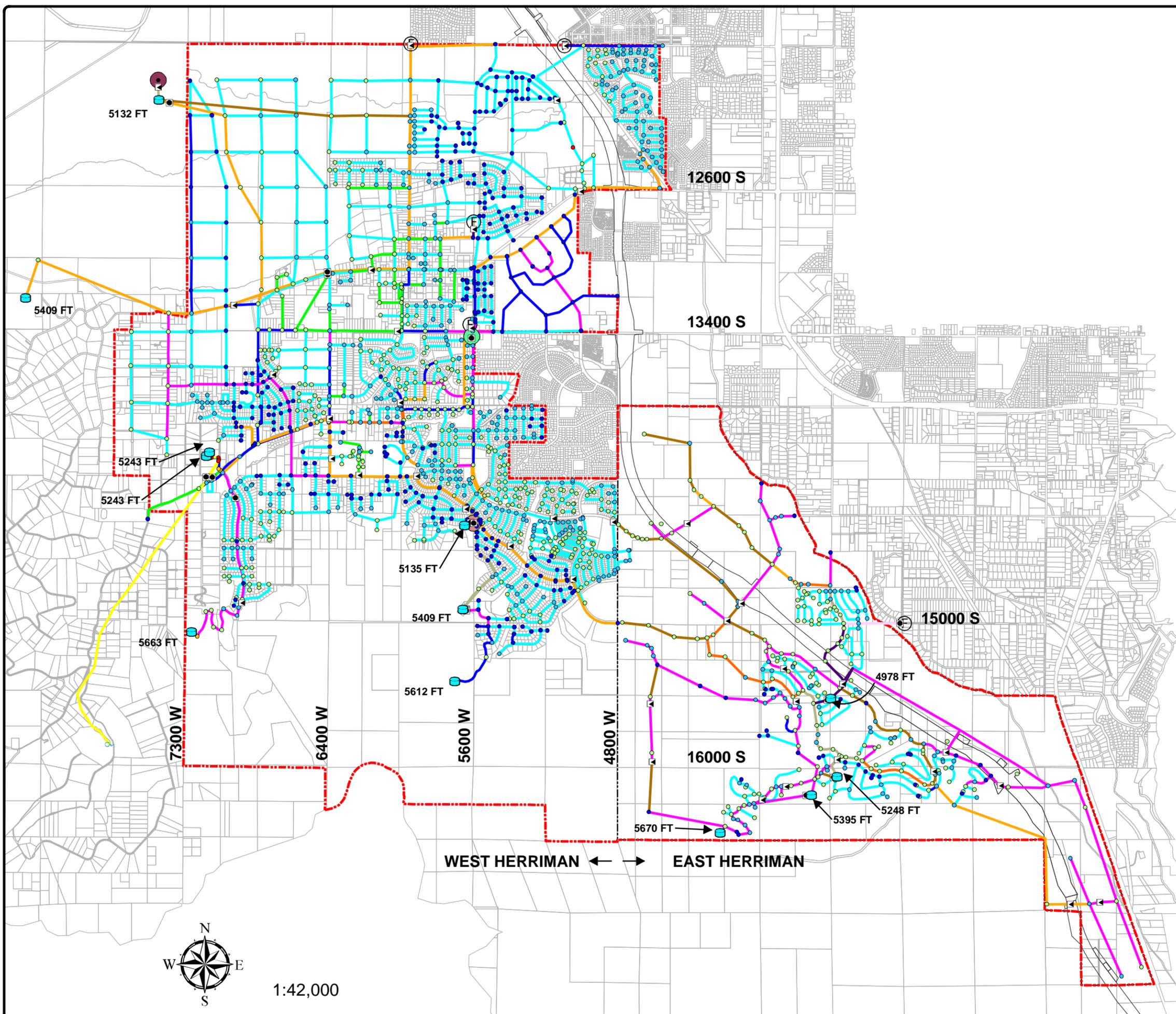
FIGURE 4-2 Service Areas



- Planning Boundary
 - Annexation Line
 - Property Boundary
 - Mountain View Corridor
- Service Areas**
- East Herriman
 - East Herriman - No Secondary
 - West Herriman Zone 1 Through 4
 - West Herriman Zone 5 and Above

FIGURE 4-3

Buildout Culinary System Zones 5 through 8 and Zones D through F



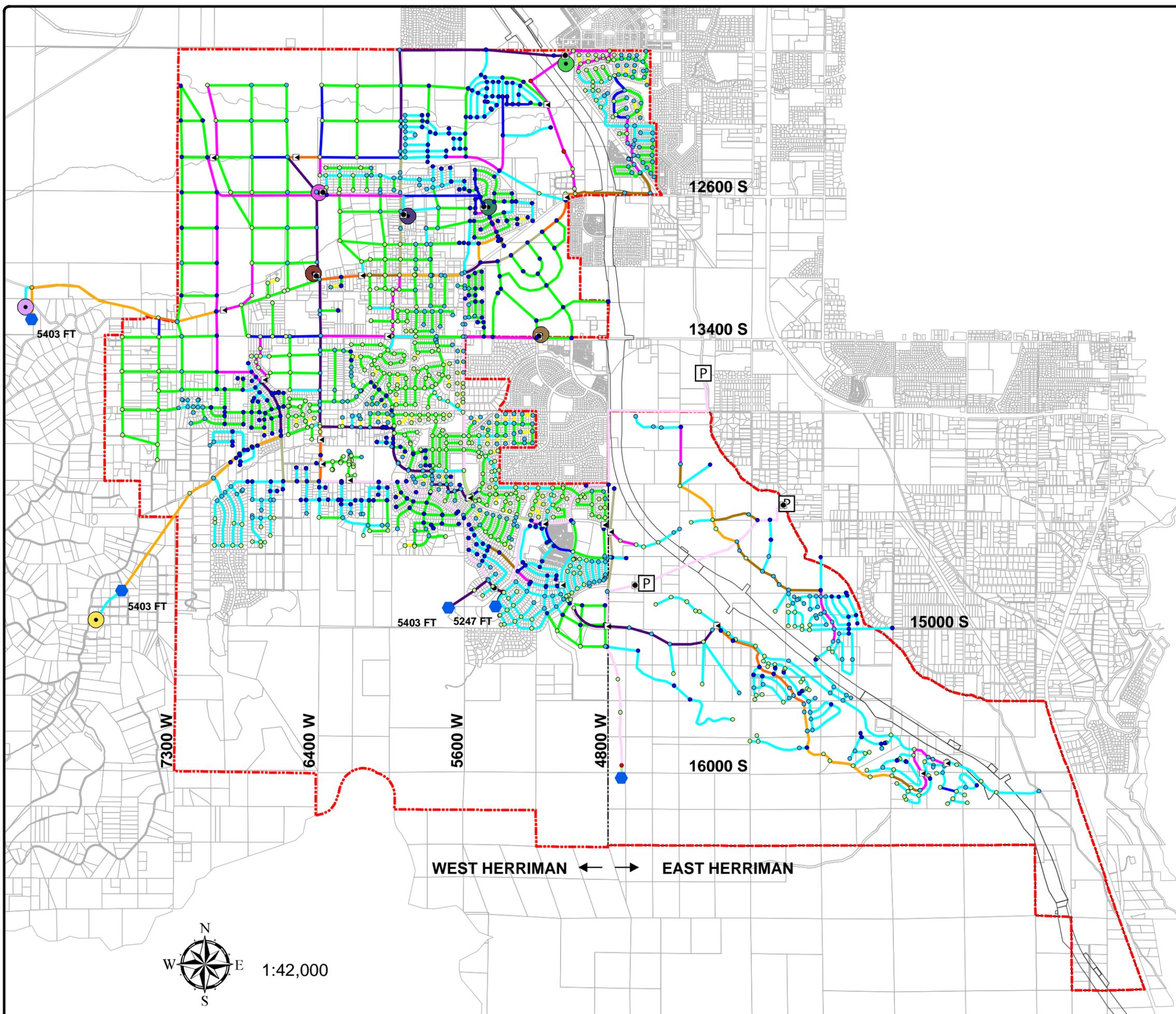
- PRV
- Pump
- Reservoir
- Pressure Junctions**
- Pressure (psi)
 - 3.000 - 20.00
 - 20.01 - 40.00
 - 40.01 - 80.00
 - 80.01 - 100.0
 - 100.1 - 200.0
- Source**
- Name
 - JVWCD
 - JVWCD
 - JVWCD
 - JVWCD
 - JVWCD
 - JVWCD
 - HP Well #1
 - HP Well #3
 - HP Well #4
 - Hamilton Well
 - JV 3 MG Tank
 - Southwest Groundwater
 - Springs
- Pipes**
- Diameter**
 - 2-inch
 - 4-inch
 - 6-inch
 - 8-inch
 - 10-inch
 - 12-inch
 - 14-inch
 - 16-inch
 - 18-inch
 - 20-inch
 - 24-inch
 - 30-inch
- Planning Boundary
- Annexation Line
- Property Line
- Mountain View Corridor



WEST HERRIMAN ← → EAST HERRIMAN

FIGURE 4-4

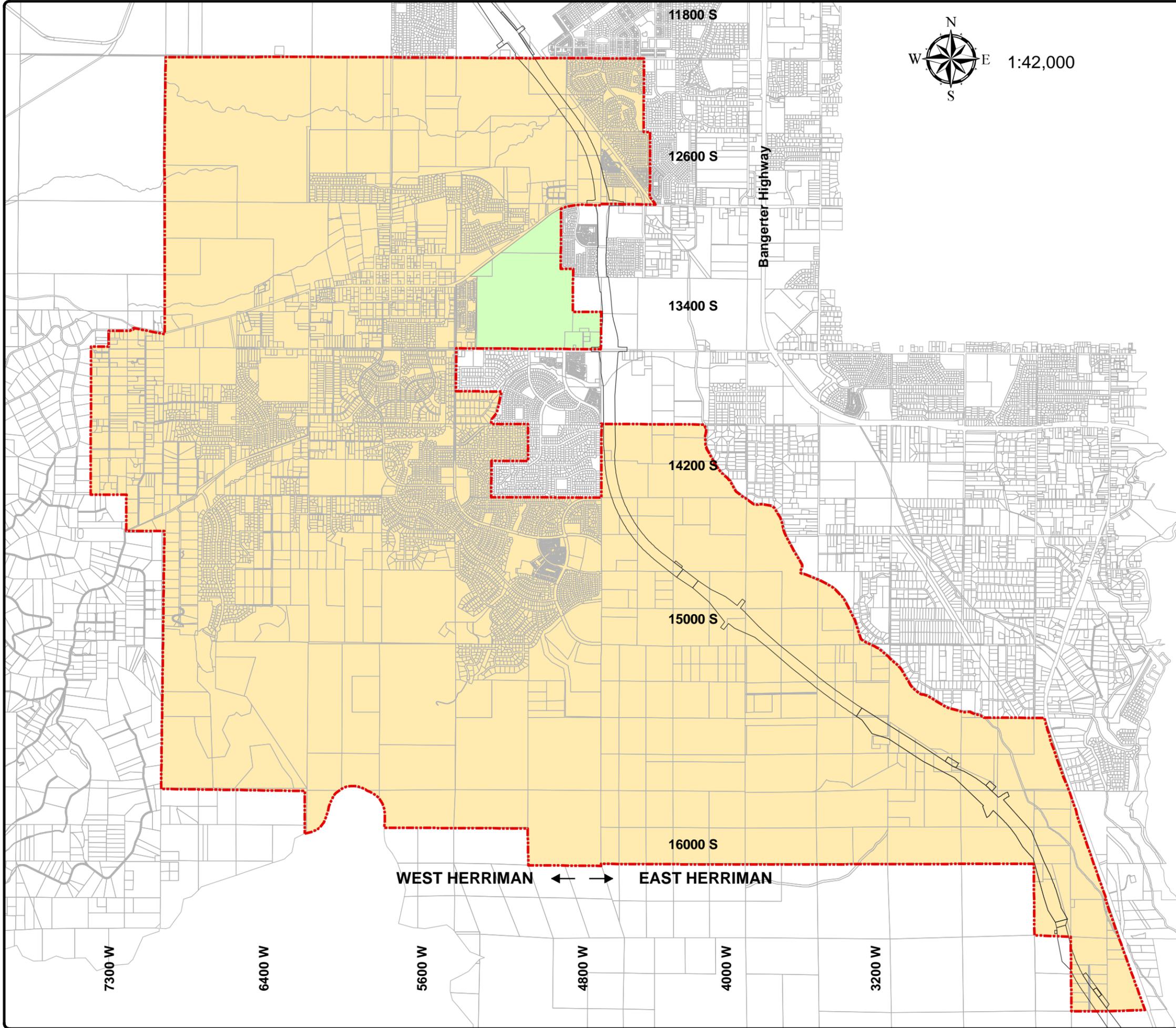
Buildout Secondary System Zones 1 through 4 and Zones A through C



- PRV
- Reservoir
- Pressure Junctions**
- Pressure (psi)**
- 4.3 - 20.00
- 20.01 - 40.00
- 40.01 - 80.00
- 80.01 - 100.00
- 100.01 - 200.00
- Pump
- SourceSecBldout3**
- Name**
- Welby Jacobs
- Welby Jacobs
- Welby Jacobs
- Treatment Reuse
- Tuscany Well
- Heritage Well
- HP Well #2
- Bowdell Well
- Butterfield Creek
- Rose Creek
- 5200 W 13400 S Well
- Pipes**
- Diameter**
- 4-inch
- 6-inch
- 8-inch
- 10-inch
- 12-inch
- 14-inch
- 16-inch
- 18-inch
- 20-inch
- 24-inch
- 30-inch
- 36-inch
- 42-inch
- Planning Boundary
- Annexation Line
- Mountain View Corridor
- Property Line



FIGURE 4-5 Water Right Service Areas



- Planning Boundary
- Mountain View Corridor
- Property Boundary
- City Center Water Right Service Area
- Regular Water Right Service Area



Water Sources

The City currently has several secondary grade wells that could supply around 1,500 gpm toward a secondary irrigation system. The current Welby Jacobs booster pump and pipeline will have a 12,000 gpm capacity of which one half could be utilized by the City with the other half used by Riverton City. This leaves an additional 14,294 gpm capacity the City will need to develop for the secondary system. These sources could include Rose Creek & Herriman Irrigation Company and Butterfield Canyon Irrigation Company water, additional Welby Jacobs canal water, and other secondary quality water wells. It is also recommended that treated wastewater (reuse) be developed as a secondary supply.

The City currently has identified approximately 20,144 gpm of source capacity for the culinary system. This includes the existing sources plus the future Stokes well, Southeast Ground water project, and converted agricultural wells. The City will need to identify and develop an additional 4,767 gpm in culinary sources. The newly annexed “East Herriman” will construct additional connections to JWCD to meet all of its culinary needs which would amount to approximately 8,868 gpm.

Additional booster pump stations will also need to be constructed to deliver water from the sources of supply to higher pressure zones.

Water Storage

The City will need to construct additional water storage facilities to meet future needs. In the existing system, it is projected the City will need to construct a 3 million gallon culinary tank in Zone 2 and individual culinary tanks in zones 5 and above as needed. In the newly annexed areas, approximately 9.7 million gallons of new culinary storage tanks will need to be built as noted in the plan to meet the specific needs of that area.

Approximately 2.4 million gallons of secondary irrigation storage will need to be built for Zone 4 of the existing system while approximately 5.6 million gallons of storage will be needed for the newly annexed “East Herriman”.

Water Rights

The City will need to continue to obtain water rights to supply its users. These rights should include a combination of groundwater rights and irrigation company shares. Water may also be obtained without purchasing new water rights through wastewater reuse, southwest groundwater treatment and JWCD supplied water. The City currently owns approximately 6,058 ac-ft and leases 1,525 ac-ft from JWCD. The City will need to obtain an additional 11,581 ac-ft of water rights for the culinary system and 8,707 ac-ft of secondary irrigation water rights.

REFERENCES

Horrocks Engineers, 2007. Herriman Water System Master Plan

Nolte, 2007. South Hills and RoseCrest Development Secondary Water Master plan.

Synergy Consultants, 2007. South Hills and RoseCrest Development Culinary Water Master plan.

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Table A-1 Improvement Schedule

Year	Recommended Capital Improvements	Cost	% Benefit	Expenditures Divided Between Impact and Operating Revenue		
				Impact	Operating	
2009	5 Year Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0	
	Construct new 8" Western Creek Subdivision Line (Loop)	\$69,506	80.00%	\$13,901	\$55,605	
	Construct new 8" Herriman Hwy (Lazy Creek Cv to 6780 W)	\$139,660	80.00%	\$27,932	\$111,728	
	Construct new 8" (Cocomo Ct to Lazy Creek Cv, Loop)	\$48,282	80.00%	\$9,656	\$38,625	
	3MG Kenecott Tank Waterline	\$2,500,000	0.00%	\$2,500,000	\$0	
	Booster Pump	\$450,000	0.00%	\$450,000	\$0	
	West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0	
	East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0	
	East Secondary Growth Related Improvements	\$376,688	0.00%	\$376,688	\$0	
	West Secondary Growth Related Improvements	\$331,438	0.00%	\$331,438	\$0	
	West Secondary Parallel to Culinary	\$1,424,688	54.32%	\$650,844	\$773,844	
	Subtotal	\$6,156,916		\$5,177,115	\$979,802	
2010	Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0	
	Replace 4" with 8" (Intersection of Herriman Hwy and Rose Canyon Rd)	\$16,364	80.00%	\$3,273	\$13,091	
	Replace 4" with 8" (Herriman Hwy from Rose Canyon Rd to the west)	\$207,708	80.00%	\$41,542	\$166,166	
	Replace 4" with 8" (Intersection of Herriman Hwy and Rose Canyon Rd HP Well #1 Pump)	\$3,240	80.00%	\$648	\$2,592	
	West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0	
	East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0	
	East Secondary Growth Related Improvements	\$376,688	0.00%	\$376,688	\$0	
	West Secondary Growth Related Improvements	\$331,438	0.00%	\$331,438	\$0	
	West Secondary Parallel to Culinary	\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,176,781		\$2,221,087	\$955,694
	2011	Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0
Replace 6" with 8" (Main St from Dillan Cir to Rose Canyon Rd)		\$126,375	80.00%	\$25,275	\$101,100	
Replace 4" with 8" (Rose Canyon Rd from Main St to 147 ft south of 13292 S)		\$211,596	80.00%	\$42,319	\$169,277	
West Culinary Growth Related Improvements		\$189,281	0.00%	\$189,281	\$0	
East Culinary Growth Related Improvements		\$623,875	0.00%	\$623,875	\$0	
East Secondary Growth Related Improvements		\$376,688	0.00%	\$376,688	\$0	
West Secondary Growth Related Improvements		\$331,438	0.00%	\$331,438	\$0	
West Secondary Parallel to Culinary		\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,287,440		\$2,243,219	\$1,044,221
2012		Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0
		Replace 6" with 8" (13293 S from Rose Canyon Rd to the east)	\$110,659	80.00%	\$22,132	\$88,527
	Replace 4" with 8" (13000 S from 6100 W to 5800 W)	\$268,951	80.00%	\$53,790	\$215,161	
	West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0	
	East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0	
	East Secondary Growth Related Improvements	\$376,688	0.00%	\$376,688	\$0	
	West Secondary Growth Related Improvements	\$331,438	0.00%	\$331,438	\$0	
	West Secondary Parallel to Culinary	\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,329,078		\$2,251,547	\$1,077,532
	2013	Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0
		Replace 4" with 8" (5900 W from 12900 S to 13100 S)	\$183,632	80.00%	\$36,726	\$146,906
Replace 4" with 8" (6100 W from 13000 S to Main st)		\$94,441	80.00%	\$18,888	\$75,553	
West Culinary Growth Related Improvements		\$189,281	0.00%	\$189,281	\$0	
East Culinary Growth Related Improvements		\$623,875	0.00%	\$623,875	\$0	
East Secondary Growth Related Improvements		\$376,688	0.00%	\$376,688	\$0	
West Secondary Growth Related Improvements		\$331,438	0.00%	\$331,438	\$0	
West Secondary Parallel to Culinary		\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,227,541		\$2,231,240	\$996,302
2014		5 Year Master Plan Review (Engineering)	\$35,000	0.00%	\$35,000	\$0
		Replace 4" with 8" (Intersection of Pioneer St and 12900 S)	\$9,235	80.00%	\$1,847	\$7,388
	Replace 4" with 8" (13011 S from Pioneer St going east)	\$26,247	80.00%	\$5,249	\$20,998	
	Replace 6" with 8" (4950 W from 12600 S to approximately 12200 S)	\$193,450	80.00%	\$38,690	\$154,760	
	West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0	
	East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0	
	East Secondary Growth Related Improvements	\$376,688	0.00%	\$376,688	\$0	
	West Secondary Growth Related Improvements	\$331,438	0.00%	\$331,438	\$0	
	West Secondary Parallel to Culinary	\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,209,901		\$2,252,911	\$956,990
	2015	Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0
Construct new 8" 13270 S (connect 5800 W with 5700 W)		\$85,060	80.00%	\$17,012	\$68,048	
Replace 6" with 8" and connect to 10" main instead (13360 S from Pioneer St to end of culdesac)		\$128,643	80.00%	\$25,729	\$102,914	
West Culinary Growth Related Improvements		\$189,281	0.00%	\$189,281	\$0	
East Culinary Growth Related Improvements		\$623,875	0.00%	\$623,875	\$0	
East Secondary Growth Related Improvements		\$376,688	0.00%	\$376,688	\$0	
West Secondary Growth Related Improvements		\$331,438	0.00%	\$331,438	\$0	
West Secondary Parallel to Culinary		\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,163,171		\$2,218,366	\$944,806
2016		Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0
		Construct new 8" (Long Ridge Dr to Ensenada Ct to loop)	\$68,210	80.00%	\$13,642	\$54,568
	Replace 6" with 8" (Tick Ln)	\$78,579	80.00%	\$15,716	\$62,863	
	West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0	
	East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0	
	East Secondary Growth Related Improvements	\$376,688	0.00%	\$376,688	\$0	
	West Secondary Growth Related Improvements	\$331,438	0.00%	\$331,438	\$0	
	West Secondary Parallel to Culinary	\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,096,258		\$2,204,983	\$891,275
	2017	Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0
		Replace 4" with 8" (Butterfield Park)	\$26,571	80.00%	\$5,314	\$21,257
Replace 4" with 8" (Jr High next to Butterfield Park)		\$13,772	80.00%	\$2,754	\$11,017	
Replace 4" with 8" (East of River Chase Rd)		\$70,478	80.00%	\$14,096	\$56,382	
West Culinary Growth Related Improvements		\$189,281	0.00%	\$189,281	\$0	
East Culinary Growth Related Improvements		\$623,875	0.00%	\$623,875	\$0	
East Secondary Growth Related Improvements		\$376,688	0.00%	\$376,688	\$0	
West Secondary Growth Related Improvements		\$331,438	0.00%	\$331,438	\$0	
West Secondary Parallel to Culinary		\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,060,290		\$2,197,789	\$862,500
2018		Annual Master Plan Review (Engineering)	\$35,000	0.00%	\$35,000	\$0
	Construct new 8" (River Chase Rd to Rose Crest Rd)	\$185,349	80.00%	\$37,070	\$148,279	
	West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0	
	East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0	
	East Secondary Growth Related Improvements	\$376,688	0.00%	\$376,688	\$0	
	West Secondary Growth Related Improvements	\$331,438	0.00%	\$331,438	\$0	
	West Secondary Parallel to Culinary	\$1,424,688	54.32%	\$650,844	\$773,844	
		Subtotal	\$3,166,318		\$2,244,195	\$922,123
	2019	5 Year Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0
		West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0
		East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0
East Secondary Growth Related Improvements		\$376,688	0.00%	\$376,688	\$0	
West Secondary Growth Related Improvements		\$331,438	0.00%	\$331,438	\$0	
West Secondary Parallel to Culinary		\$1,424,688	54.32%	\$650,844	\$773,844	
	Subtotal	\$2,949,469		\$2,175,625	\$773,844	
2020	Annual Master Plan Review (Engineering)	\$3,500	0.00%	\$3,500	\$0	
	West Culinary Growth Related Improvements	\$189,281	0.00%	\$189,281	\$0	
	East Culinary Growth Related Improvements	\$623,875	0.00%	\$623,875	\$0	
	East Secondary Growth Related Improvements	\$376,688	0.00%	\$376,688	\$0	
	West Secondary Growth Related Improvements	\$331,438	0.00%	\$331,438	\$0	
	West Secondary Parallel to Culinary	\$1,424,688	54.32%	\$650,844	\$773,844	
	Subtotal	\$2,949,469		\$2,175,625	\$773,844	
2021 to 2040	Annual Master Plan Reviews and 5 Year Reviews (Engineering)	\$196,000	0.00%	\$196,000	\$0	
	West Culinary Growth Related Improvements	\$3,785,625	0.00%	\$3,785,625	\$0	
	East Culinary Growth Related Improvements	\$12,477,500	0.00%	\$12,477,500	\$0	
	East Secondary Growth Related Improvements	\$7,533,750	0.00%	\$7,533,750	\$0	
	West Secondary Growth Related Improvements	\$6,628,750	0.00%	\$6,628,750	\$0	
	West Secondary Parallel to Culinary	\$28,493,750	54.32%	\$13,016,875	\$15,476,875	
	Subtotal	\$59,115,375		\$43,638,500	\$15,476,875	
	Total	\$99,888,007		\$73,232,201	\$26,655,806	

Table A- 2 Existing Culinary Distribution System Deficiencies

Item	Description	Quantity	Units	Unit Price	Total Cost
1	Mobilization (%5)	1	LS	\$ 67,000.00	\$ 67,000.00
2	Traffic Control	1	LS	\$ 14,814.80	\$ 14,814.80
3	Cut Asphalt Surfaces	32,032	LF	\$ 0.35	\$ 11,211.20
4	Valves and Fittings	1	LS	\$ 148,148.00	\$ 148,148.00
5	Utility Relocations	1	LS	\$ 14,814.80	\$ 14,814.80
6	Furnish & Install 8" Ductile Iron Pipe	16,016	LF	\$ 37.00	\$ 592,592.00
7	Fire Hydrants	36	EA	\$ 3,000.00	\$ 106,773.33
8	1" Single Service Connections	320	EA	\$ 950.00	\$ 304,304.00
9	Asphalt Street Restoration	48,048	SF	\$ 3.00	\$ 144,144.00
10	PRV Station	1.00	EA	\$ 50,000.00	\$ 50,000.00
11	Booster Pump Station	1.00	EA	\$ 400,000.00	\$ 400,000.00
Subtotal					\$ 1,853,802.13
~10% contingency					\$ 185,380.21
Total Construction Cost					\$ 2,039,182.35
Land Acquisition					\$ -
~15% Design & Construction Engineering					\$ 305,900.00
~1% Administration, Legal, Bond Counsel					\$ 20,400.00
Total Professional Services					\$ 326,300.00
Total Project Cost					\$ 2,366,000.00
Benefit to New Connections (20%)					\$ 473,200.00
Total Deficiencies					\$ 1,892,800.00

Table A- 3 Culinary West Herriman Impact Related - New over 8 inch

Item	Description	Quantity	Units	Unit Price	Total Cost
1	Mobilization (%5)	1	LS	\$ 320,000.00	\$ 320,000.00
2	Valves and Fittings	1	LS	\$ 339,214.95	\$ 339,214.95
3	Furnish & Install 10" Ductile Iron Pipe	24,644	LF	\$ 8.00	\$ 197,151.20
4	Furnish & Install 12" Ductile Iron Pipe	11,361	LF	\$ 13.00	\$ 147,691.70
5	Furnish & Install 14" Ductile Iron Pipe	9,316	LF	\$ 20.00	\$ 186,328.00
6	Furnish & Install 16" Ductile Iron Pipe	22,805	LF	\$ 33.00	\$ 752,565.00
7	Furnish & Install 18" Ductile Iron Pipe	182	LF	\$ 53.00	\$ 9,640.70
8	Furnish & Install 20" Ductile Iron Pipe	721	LF	\$ 88.00	\$ 63,483.20
9	Fire Hydrants	6	EA	\$ 3,000.00	\$ 17,173.33
10	1" Single Service Connections	52	EA	\$ 950.00	\$ 48,944.00
11	Asphalt Street Restoration	7,728	SF	\$ 3.00	\$ 23,184.00
12	Pressure Reducing Valves (PRV)	4	EA	\$ 50,000.00	\$ 200,000.00
13	Stokes WellHouse	1	EA	\$ 450,000.00	\$ 450,000.00
14	Well Development (Site To Be Deter.)	1	EA	\$ 1,000,000.00	\$ 1,000,000.00
15	Tank (3MG)	1	EA	\$ 2,500,000.00	\$ 2,500,000.00
16	Booster Pump Station	1	EA	\$ 450,000.00	\$ 450,000.00
Subtotal					\$ 6,705,376.08
~10% contingency					\$ 670,537.61
Upsize Cost Above 8 Inch					\$
Total Construction Cost					\$ 7,375,913.69
Land Acquisition					\$ 450,000.00
~15% Design & Construction					\$
Engineering					\$ 1,106,400.00
~1% Administration, Legal, Bond Counsel					\$ 73,800.00
Total Professional Services					\$ 1,180,200.00
Total Project Cost					\$ 9,007,000.00

Table A- 4 Culinary East Herriman Impact Related - Over 8 inch

Item	Description	Quantity	Units	Unit Price	Total Cost	
1	Mobilization (%5)	1	LS	\$ 272,000.00	\$ 272,000.00	
2	Valves and Fittings	1	LS	\$ 954,192.13	\$ 954,192.13	
3	Furnish & Install 10" Ductile Iron Pipe	1,096	LF	\$ 8.00	\$ 8,769.60	
4	Furnish & Install 12" Ductile Iron Pipe	73,721	LF	\$ 13.00	\$ 958,376.90	
5	Furnish & Install 14" Ductile Iron Pipe	27,233	LF	\$ 20.00	\$ 544,660.00	
6	Furnish & Install 16" Ductile Iron Pipe	10,571	LF	\$ 33.00	\$ 348,852.90	
7	Furnish & Install 18" Ductile Iron Pipe	10,183	LF	\$ 53.00	\$ 539,720.20	
8	Furnish & Install 20" Ductile Iron Pipe	6,577	LF	\$ 88.00	\$ 578,740.80	
9	Furnish & Install 24" Ductile Iron Pipe	4,672	LF	\$ 113.00	\$ 527,879.50	
10	Furnish & Install 30" Ductile Iron Pipe	2,245	LF	\$ 138.00	\$ 309,768.60	
11	Pressure Reducing Valves (PRV)	13	EA	\$ 50,000.00	\$ 650,000.00	
12	JVWCD Connection	1	EA	\$ 50,000.00	\$ 50,000.00	
13	Tank (1MG)	2	EA	\$ 1,000,000.00	\$ 2,000,000.00	
14	Tank (3MG)	1	EA	\$ 2,500,000.00	\$ 2,500,000.00	
15	Tank (4MG)	1	EA	\$ 3,250,000.00	\$ 3,250,000.00	
16	Booster Pump Stations	4	EA	\$ 450,000.00	\$ 1,800,000.00	
					\$	
					Subtotal	15,292,960.63
					\$	
					~10% contingency	1,529,296.06
					\$	
					Total Construction Cost	16,822,256.69
					\$	
					Land Acquisition	450,000.00
					~15% Design & Construction Engineering	\$ 2,523,300.00
					~1% Administration, Legal, Bond Counsel	\$ 168,300.00
					\$	
					Total Professional Services	2,691,600.00
					\$	
					Total Project Cost	19,964,000.00

Upsize Cost Above 8 Inch

Table A- 5 Secondary East Herriman Impact Related - Over 6 inch

Item	Description	Quantity	Units	Unit Price	Total Cost
1	Mobilization (%5)	1	LS	\$ 248,000.00	\$ 248,000.00
2	Furnish & Install 8" Ductile Iron Pipe	100,271	LF	\$ 6.00	\$ 601,628.40
3	Furnish & Install 10" Ductile Iron Pipe	637	LF	\$ 13.00	\$ 8,281.00
4	Furnish & Install 12" Ductile Iron Pipe	7,716	LF	\$ 20.00	\$ 154,312.00
5	Furnish & Install 14" Ductile Iron Pipe	7,745	LF	\$ 28.00	\$ 216,865.60
6	Furnish & Install 16" Ductile Iron Pipe	8,350	LF	\$ 41.00	\$ 342,358.20
7	Furnish & Install 18" Ductile Iron Pipe	4,716	LF	\$ 61.00	\$ 287,663.80
8	Furnish & Install 20" Ductile Iron Pipe	3,814	LF	\$ 81.00	\$ 308,966.40
9	Furnish & Install 24" Ductile Iron Pipe	4,435	LF	\$ 101.00	\$ 447,975.40
10	Furnish & Install 30" Ductile Iron Pipe	14,388	LF	\$ 156.00	\$ 2,244,590.40
11	Furnish & Install 36" Ductile Iron Pipe	458	LF	\$ 181.00	\$ 82,934.20
12	Pressure Reducing Valves (PRV)	5	EA	\$ 50,000.00	\$ 250,000.00
13	Reservoir	2	EA	\$ 1,500,000.00	\$ 3,000,000.00
14	Booster Pump Station	2	EA	\$ 450,000.00	\$ 900,000.00

Upsize Cost Above 6 Inch

	\$
Subtotal	9,093,575.40
	\$
~10% contingency	909,357.54
	\$
Total Construction Cost	10,002,932.94
	\$
Land Acquisition	450,000.00
~15% Design & Construction Engineering	\$
~1% Administration, Legal, Bond Counsel	1,500,400.00
	\$
Total Professional Services	1,600,500.00
	\$
Total Project Cost	12,054,000.00

Table A- 6 Secondary West Herriman Impact Related - New over 6 inch

Item	Description	Quantity	Units	Unit Price	Total Cost
1	Mobilization (%5)	1	LS	\$ 201,000.00	\$ 201,000.00
2	Furnish & Install 8" Ductile Iron Pipe	46,705	LF	\$ 6.00	\$ 280,230.00
3	Furnish & Install 10" Ductile Iron Pipe	12,452	LF	\$ 13.00	\$ 161,876.00
4	Furnish & Install 12" Ductile Iron Pipe	29,557	LF	\$ 20.00	\$ 591,132.00
5	Furnish & Install 16" Ductile Iron Pipe	2,654	LF	\$ 28.00	\$ 74,312.00
6	Furnish & Install 18" Ductile Iron Pipe	3,331	LF	\$ 41.00	\$ 136,571.00
7	Furnish & Install 20" Ductile Iron Pipe	3,650	LF	\$ 61.00	\$ 222,650.00
8	Furnish & Install 24" Ductile Iron Pipe	11,642	LF	\$ 81.00	\$ 943,002.00
9	Furnish & Install 30" Ductile Iron Pipe	12,784	LF	\$ 101.00	\$ 1,291,184.00
10	Furnish & Install 42" Ductile Iron Pipe	684	LF	\$ 156.00	\$ 106,766.40
11	Pressure Reducing Valves (PRV)	4	EA	\$ 50,000.00	\$ 200,000.00
12	5200 W 13400 S Well Improvements	1	EA	\$ 300,000.00	\$ 300,000.00
13	Well Development (Site To Be Deter.)	1	EA	\$ 1,000,000.00	\$ 1,000,000.00
14	Reservoirs	2	EA	\$ 1,000,000.00	\$ 2,000,000.00
15	Booster Pump Station	1	EA	\$ 450,000.00	\$ 450,000.00
					\$
				Subtotal	7,958,723.40
					\$
				~10% contingency	795,872.34
					\$
				Total Construction Cost	8,754,595.74
					\$
				Land Acquisition	450,000.00
				~15% Design & Construction Engineering	\$
				~1% Administration, Legal, Bond Counsel	1,313,200.00
					\$
					87,600.00
					\$
				Total Professional Services	1,400,800.00
					\$
				Total Project Cost	10,606,000.00

Upsize Cost Above 6 Inch

Table A- 7 Secondary West Herriman - All new pipes that are parallel to culinary lines

Item	Description	Quantity	Units	Unit Price	Total Cost	Impact Fee %	Impact Cost
1	Mobilization (%5)	1	LS	\$ 1,559,000.00	\$ 1,559,000.00	44%	\$ 685,960.00
2	Traffic Control	1	LS	\$ 342,438.06	\$ 342,438.06	52%	\$ 178,378.83
3	Cut Asphalt Surfaces	682,237	LF	\$ 0.35	\$ 238,782.88	52%	\$ 124,383.99
4	Valves and Fittings	1	LS	\$ 3,424,380.60	\$ 3,424,380.60	52%	\$ 1,783,788.32
5	Utility Relocations	1	LS	\$ 342,438.06	\$ 342,438.06	52%	\$ 178,378.83
6	Furnish & Install 4" PVC Pipe	25,695	LF	\$ 17.00	\$ 436,821.80	0%	\$ -
7	Furnish & Install 6" PVC Pipe	197,219	LF	\$ 19.00	\$ 3,747,162.90	0%	\$ -
8	Furnish & Install 8" PVC Pipe	13,674	LF	\$ 25.00	\$ 341,850.00	75%	\$ 256,387.50
9	Furnish & Install 10" PVC Pipe	10,454	LF	\$ 32.00	\$ 334,521.60	75%	\$ 250,891.20
10	Furnish & Install 12" PVC Pipe	20,216	LF	\$ 39.00	\$ 788,408.40	75%	\$ 591,306.30
11	Furnish & Install 14" Ductile Iron Pipe	6,997	LF	\$ 47.00	\$ 328,863.70	75%	\$ 246,647.78
12	Furnish & Install 16" Ductile Iron Pipe	17,439	LF	\$ 60.00	\$ 1,046,358.00	75%	\$ 784,768.50
13	Furnish & Install 18" Ductile Iron Pipe	4,364	LF	\$ 80.00	\$ 349,112.00	75%	\$ 261,834.00
14	Furnish & Install 20" Ductile Iron Pipe	5,696	LF	\$ 100.00	\$ 569,570.00	75%	\$ 427,177.50
15	Furnish & Install 24" Ductile Iron Pipe	22,388	LF	\$ 120.00	\$ 2,686,524.00	75%	\$ 2,014,893.00
16	Furnish & Install 30" Ductile Iron Pipe	13,081	LF	\$ 175.00	\$ 2,289,210.00	75%	\$ 1,716,907.50
17	Furnish & Install 36" Ductile Iron Pipe	3,896	LF	\$ 200.00	\$ 779,120.00	75%	\$ 584,340.00
18	Pressure Reducing Valves (PRV)	10	EA	\$ 50,000.00	\$ 500,000.00	50%	\$ 250,000.00
19	1" Single Service Connections	6,822	EA	\$ 950.00	\$ 6,481,249.60	0%	\$ -
20	Asphalt Street Restoration	2,046,710	SF	\$ 3.00	\$ 6,140,131.20	52%	\$ 3,198,445.38
21	Well Equipping	4	EA	\$ 300,000.00	\$ 1,200,000.00	100%	\$ 1,200,000.00
22	Reservoirs	1	EA	\$ 1,000,000.00	\$ 1,000,000.00	100%	\$ 1,000,000.00
23	Booster Pump Station	1	EA	\$ 450,000.00	\$ 450,000.00	100%	\$ 234,408.74
Subtotal					\$ 35,375,942.80		\$ 15,968,897.37
~10% contingency					\$ 3,537,594.28		\$ 1,596,889.74
Full Cost					Total Construction Cost		\$ 38,913,537.08
Land Acquisition					\$ 450,000.00		\$ 450,000.00
~15% Design & Construction Engineering					\$ 5,837,000.00		\$ 2,634,900.00
~1% Administration, Legal, Bond Counsel					\$ 389,200.00		\$ 175,700.00
Total Professional Services					\$ 6,226,200.00		\$ 2,810,600.00
Total Project Cost					\$ 45,590,000.00		\$ 20,827,000.00

Building Permit Summary

	Total Permits Per Month	?	Agricultural Bldg. & Sheds	Apartment/3 or 4 Family	Apartment/5 or more Family	Church	Commercial Addition	Condominium	Demolition	Duplex/Twin Home	Electrical	Furnace or A/C	Ind./Warehouse/Manufacturing	Office, Bank, Professional	OTHER	Other Shelters	Parking Structure	Public Bldgs & Projects	Public Utility	Residential Addition	Residential Garage/Carport	Residential Remodel	Retail, Mercantile, Restaurant	Sign	Single Family	Structures other than Bldgs
June-99	17	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	13	1
July-99	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0
August-99	16	0	0	0	0	0	0	0	0	0	5	1	0	0	1	0	0	0	0	0	0	0	0	0	9	0
September-99	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	13	0
October-99	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0
November-99	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0
December-99	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0
January-00	21	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	18	0
February-00	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0
March-00	33	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	30	0
April-00	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	35	0
May-00	22	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	18	0
June-00	44	2	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	38	0
July-00	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	33	0
August-00	39	0	0	0	0	0	0	0	0	0	2	1	0	0	0	2	0	0	1	0	0	0	0	0	33	0
September-00	35	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	28	0
October-00	39	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	34	0
November-00	29	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	24	0
December-00	32	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	26	0	
January-01	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3	0	0	21	0	
February-01	38	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	32	0	
March-01	33	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	1	0	0	0	28	0	
April-01	42	0	1	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	5	1	0	0	0	31	0	
May-01	52	2	1	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0	3	0	0	0	0	42	0	
June-01	55	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	2	1	1	0	0	47	0	
July-01	52	0	4	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	6	0	0	0	37	1	
August-01	46	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5	1	0	0	0	33	1	
September-01	49	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	4	1	1	0	0	41	0	
October-01	38	0	1	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	5	2	1	0	0	25	1	
November-01	29	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	4	0	0	0	0	21	0	
December-01	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	49	0	
January-02	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	18	0	
February-02	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	18	0	
March-02	49	0	1	0	0	0	0	0	0	0	1	2	0	0	1	0	0	0	2	0	0	0	3	39	0	
April-02	51	0	2	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	3	1	0	0	0	38	1	
May-02	64	0	1	0	0	1	0	0	0	0	2	0	0	0	1	0	0	2	0	3	1	3	0	48	0	
June-02	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	3	0	0	0	0	37	0	
July-02	44	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	40	0	
August-02	48	1	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	42	0	
September-02	46	1	2	0	0	0	0	0	0	0	2	0	0	0	1	0	1	0	1	2	0	0	0	35	1	
October-02	63	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	3	0	1	55	0	
November-02	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	0	58	0	
December-02	51	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0	0	1	0	1	0	0	0	45	0	
January-03	66	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	4	0	2	55	0	
February-03	54	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	2	0	0	49	0	
March-03	69	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	7	0	1	1	1	53	0	
April-03	80	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0	0	0	1	0	0	0	1	72	0	
May-03	82	0	0	0	0	0	0	0	0	0	5	3	0	0	1	0	0	0	6	0	0	1	0	68	0	
June-03	79	0	1	0	0	0	0	0	0	4	1	0	0	0	1	0	0	0	4	3	0	1	2	61	0	
July-03	85	0	0	0	0	0	2	0	0	2	1	0	0	0	2	0	0	0	3	1	0	0	0	72	2	
August-03	93	0	0	0	0	0	0	0	0	2	5	0	0	2	1	0	0	0	4	1	0	1	0	77	0	
September-03	71	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	11	1	0	1	5	47	0	
October-03	87	0	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	6	1	0	1	1	72	1	
November-03	52	0	0	0	0	0	4	0	0	0	1	0	0	0	1	0	0	0	1	2	0	2	5	36	0	
December-03	64	0	0	0	0	0	2	0	0	2	1	0	0	0	2	0	0	0	7	3	1	1	3	41	0	
January-04	68	0	0	0	0	0	3	9	0	2	1	0	0	0	2	0	0	0	3	1	2	0	3	41	1	
February-04	84	0	0	0	0	0	0	0	0	6	0	1	0	0	0	0	0	0	2	2	1	0	2	70	0	
March-04	89	0	0	0	0	0	2	1	0	4	1	0	0	0	1	0	0	0	8	0	1	0	0	70	1	
April-04	104	0	1	0	0	0	0	6	0	2	2	1	0	1	0	0	0	0	1	1	3	1	1	83	1	

May-04	95	0	1	0	0	0	1	0	0	4	1	0	0	0	0	0	0	1	1	1	3	0	2	80	0	
June-04	81	0	1	0	0	1	1	5	0	0	0	0	0	2	0	0	0	0	4	2	4	0	1	59	0	
July-04	59	0	0	0	0	0	0	9	0	6	2	0	0	0	0	0	0	0	0	0	5	0	1	35	1	
August-04	100	0	1	0	0	0	0	12	0	4	8	0	0	0	0	0	1	0	4	3	5	0	0	62	0	
September-04	87	0	0	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0	4	2	4	0	0	73	0	
October-04	96	1	1	1	6	0	0	12	0	0	5	0	0	0	0	0	2	0	2	1	10	0	0	54	1	
November-04	59	0	0	0	5	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	7	0	0	44	0	
December-04	87	0	1	0	0	0	0	0	0	5	3	2	0	0	2	0	0	0	1	2	12	0	0	59	0	
January-05	89	0	0	3	2	1	0	9	0	0	0	1	0	0	0	0	0	0	1	1	5	0	0	66	0	
February-05	93	0	0	5	3	0	0	3	0	0	3	1	0	0	0	0	0	0	1	0	14	0	0	63	0	
March-05	135	0	1	2	3	1	2	6	2	8	1	1	0	1	0	0	0	0	1	2	12	1	1	88	3	
April-05	111	0	0	2	2	0	2	9	1	4	1	0	0	1	0	0	0	0	2	2	7	0	1	77	1	
May-05	103	0	0	3	2	0	0	9	0	2	6	2	0	0	0	0	0	0	2	1	10	0	1	60	5	
June-05	94	0	0	0	0	0	2	9	0	0	2	0	0	0	2	0	0	0	5	1	13	2	1	59	0	
July-05	79	0	2	2	3	0	0	0	0	0	2	1	0	0	0	0	0	0	3	2	4	0	1	51	8	
August-05	138	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	7	1	9	0	3	99	10	
September-05	72	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	2	2	8	1	0	49	7
October-05	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	10	2	
	4396	11	36	18	27	7	24	108	3	64	113	23	1	5	40	2	1	13	7	185	56	174	16	46	3366	50

Table A- 10 Zone 1 Analysis

System User Analysis	
Existing ERC	800.0
Existing Irrigation ERC	0.20
Projected ERC	2,135.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	1,500
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE 1

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	800.0		0.45	gal/day/conn	360.00		
Existing Outdoor Need		160	1.87	ac-ft/irr ac	299.20		
Existing Total WR Need					659.20	0.00	(659.20)
Projected Indoor Need	2,135.0		0.45	gal/day/conn	960.75		
Projected Outdoor Need		427	1.87	ac-ft/season	798.49		
Projected Total WR Need					1759.24	0.00	(1759.24)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	800.0		800	gal/day/conn	444.00		
Existing Outdoor Need		160	3.96	gpm/irr-acre	634.00		
Existing Total WS Need					1078.00	1500.00	422.00
Projected Indoor Need	2,135.0		800	gal/day/conn	1186.00		
Projected Outdoor Need		427	3.96	gpm/irr-acre	1691.00		
Projected Total WS Need					2877.00	6030.00	3153.00

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	800.0		400	gal/conn	320,000		
Existing Outdoor Need		160	2848	gal/irr-acre	455,680		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					775,680	3,899,635	3,123,955
Projected Indoor Need	2,135.0		400	gal/conn	854,000		
Projected Outdoor Need		427	2848	gal/irr-acre	1,216,096		
Fire Protection			0	gpm*120min	-		
Projected Total Storage Need					2,070,096	-	(2,070,096)

Table A- 11 Zone 2 Analysis

System User Analysis	
Existing ERC	3,450.0
Existing Irrigation ERC	0.20
Projected ERC	7,510.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	14,650
Water Storage (gallons)	2,500,000

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE 2

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	3,450.0		0.45	gal/day/conn	1552.50		
Existing Outdoor Need		690	1.87	ac-ft/irr ac	1290.30		
Existing Total WR Need					2842.80	0.00	(2842.80)
Projected Indoor Need	7,510.0		0.45	gal/day/conn	3379.50		
Projected Outdoor Need		1502	1.87	ac-ft/season	2808.74		
Projected Total WR Need					6188.24	0.00	(6188.24)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	3,450.0		800	gal/day/conn	1917.00		
Existing Outdoor Need		690	3.96	gpm/irr-acre	2732.00		
Existing Total WS Need					4649.00	14650.00	10001.00
Projected Indoor Need	7,510.0		800	gal/day/conn	4172.00		
Projected Outdoor Need		1502	3.96	gpm/irr-acre	5948.00		
Projected Total WS Need					10120.00	14650.00	4530.00

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	3,450.0		400	gal/conn	1,380,000		
Existing Outdoor Need		690	2848	gal/irr-acre	1,965,120		
Fire Protection			2250	gpm*120min	270,000		
Existing Total Storage Need					3,615,120	7,514,755	3,899,635
Projected Indoor Need	7,510.0		400	gal/conn	3,004,000		
Projected Outdoor Need		1502	2848	gal/irr-acre	4,277,696		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					7,551,696	2,500,000	(5,051,696)

Table A- 12 Zone 3 Analysis

System User Analysis	
Existing ERC	1,050.0
Existing Irrigation ERC	0.20
Projected ERC	4,350.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	494
Water Storage (gallons)	1,409,600

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE 3

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	1,050.0		0.45	gal/day/conn	472.50		
Existing Outdoor Need		210	1.87	ac-ft/irr ac	392.70		
Existing Total WR Need					865.20	0.00	(865.20)
Projected Indoor Need	4,350.0		0.45	gal/day/conn	1957.50		
Projected Outdoor Need		870	1.87	ac-ft/season	1626.90		
Projected Total WR Need					3584.40	0.00	(3584.40)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	1,050.0		800	gal/day/conn	583.00		
Existing Outdoor Need		210	3.96	gpm/irr-acre	832.00		
Existing Total WS Need					1415.00	494.00	(921.00)
Projected Indoor Need	4,350.0		800	gal/day/conn	2417.00		
Projected Outdoor Need		870	3.96	gpm/irr-acre	3445.00		
Projected Total WS Need					5862.00	494.00	(5368.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	1,050.0		400	gal/conn	420,000		
Existing Outdoor Need		210	2848	gal/irr-acre	598,080		
Fire Protection			2250	gpm*120min	270,000		
Existing Total Storage Need					1,288,080	6,302,835	5,014,755
Projected Indoor Need	4,350.0		400	gal/conn	1,740,000		
Projected Outdoor Need		870	2848	gal/irr-acre	2,477,760		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					4,487,760	3,117,699	(1,370,061)

Table A- 13 Zone 3a Analysis

System User Analysis	
Existing ERC	148.0
Existing Irrigation ERC	0.20
Projected ERC	148.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	0
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE 3a

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	148.0		0.45	gal/day/conn	66.60		
Existing Outdoor Need		29.6	1.87	ac-ft/irr ac	55.35		
Existing Total WR Need					121.95	0.00	(121.95)
Projected Indoor Need	148.0		0.45	gal/day/conn	66.60		
Projected Outdoor Need		29.6	1.87	ac-ft/season	55.35		
Projected Total WR Need					121.95	0.00	(121.95)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	148.0		800	gal/day/conn	82.00		
Existing Outdoor Need		29.6	3.96	gpm/irr-acre	117.00		
Existing Total WS Need					199.00	0.00	(199.00)
Projected Indoor Need	148.0		800	gal/day/conn	82.00		
Projected Outdoor Need		29.6	3.96	gpm/irr-acre	117.00		
Projected Total WS Need					199.00	0.00	(199.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	148.0		400	gal/conn	59,200		
Existing Outdoor Need		29.6	2848	gal/irr-acre	84,301		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					143,501	5,036,736.00	4,893,235
Projected Indoor Need	148.0		400	gal/conn	59,200		
Projected Outdoor Need		29.6	2848	gal/irr-acre	84,301		
Fire Protection			0	gpm*120min	-		
Projected Total Storage Need					143,501	1,851,600.00	1,708,099

Table A- 14 Zone 4 Analysis

System User Analysis	
Existing ERC	715.0
Existing Irrigation ERC	0.20
Projected ERC	4,000.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	-490
Water Storage (gallons)	6,000,000

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE 4

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	715.0		0.45	gal/day/conn	321.75		
Existing Outdoor Need		143	1.87	ac-ft/irr ac	267.41		
Existing Total WR Need					589.16	0.00	(589.16)
Projected Indoor Need	4,000.0		0.45	gal/day/conn	1800.00		
Projected Outdoor Need		800	1.87	ac-ft/season	1496.00		
Projected Total WR Need					3296.00	0.00	(3296.00)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	715.0		800	gal/day/conn	397.00		
Existing Outdoor Need		143	3.96	gpm/irr-acre	566.00		
Existing Total WS Need					963.00	-490.00	(1453.00)
Projected Indoor Need	4,000.0		800	gal/day/conn	2222.00		
Projected Outdoor Need		800	3.96	gpm/irr-acre	3168.00		
Projected Total WS Need					5390.00	-490.00	(5880.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	715.0		400	gal/conn	286,000		
Existing Outdoor Need		143	2848	gal/irr-acre	407,264		
Fire Protection			2250	gpm*120min	270,000		
Existing Total Storage Need					963,264	6,000,000	5,036,736
Projected Indoor Need	4,000.0		400	gal/conn	1,600,000		
Projected Outdoor Need		800	2848	gal/irr-acre	2,278,400		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					4,148,400	6,000,000	1,851,600

Table A- 15 Zone 5 and Above Analysis

**HERRIMAN CITY
WATER SYSTEM ANALYSIS
ZONE 5 and Above**

System User Analysis	
Existing ERC	36.0
Existing Irrigation ERC	0.20
Projected ERC	2,800.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	390
Water Storage (gallons)	500,000

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	36.0		0.45	gal/day/conn	16.20		
Existing Outdoor Need		7.20	1.87	ac-ft/irr ac	13.46		
Existing Total WR Need					29.66	0.00	(29.66)
Projected Indoor Need	2,800.0		0.45	gal/day/conn	1260.00		
Projected Outdoor Need		560.00	1.87	ac-ft/season	1047.20		
Projected Total WR Need					2307.20	0.00	(2307.20)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	36.0		800	gal/day/conn	20.00		
Existing Outdoor Need		7.20	3.96	gpm/irr-acre	29.00		
Existing Total WS Need					49.00	390.00	341.00
Projected Indoor Need	2,800.0		800	gal/day/conn	1556.00		
Projected Outdoor Need		560.00	3.96	gpm/irr-acre	2218.00		
Projected Total WS Need					3774.00	390.00	(3384.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	36.0		400	gal/conn	14,400		
Existing Outdoor Need		7.20	2848	gal/irr-acre	20,506		
Fire Protection			2250	gpm*120min	270,000		
Existing Total Storage Need					304,906	500,000	195,094
Projected Indoor Need	2,800.0		400	gal/conn	1,120,000		
Projected Outdoor Need		560.00	2848	gal/irr-acre	1,594,880		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					2,984,880	500,000	(2,484,880)

Table A- 16 Zone A Analysis

System User Analysis	
Existing ERC	0.0
Existing Irrigation ERC	0.2
Projected ERC	6,326.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	0
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE A

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		0.45	gal/day/conn	0.00		
Existing Outdoor Need		0	1.87	ac-ft/irr ac	0.00		
Existing Total WR Need					0.00	0.00	0.00
Projected Indoor Need	6,326.0		0.45	gal/day/conn	2846.70		
Projected Outdoor Need		1265.2	1.87	ac-ft/season	2365.92		
Projected Total WR Need					5212.62	0.00	(5212.62)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		800	gal/day/conn	0.00		
Existing Outdoor Need		0	3.96	gpm/irr-acre	0.00		
Existing Total WS Need					0.00	0.00	0.00
Projected Indoor Need	6,326.0		800	gal/day/conn	3514.00		
Projected Outdoor Need		1265.2	3.96	gpm/irr-acre	5010.00		
Projected Total WS Need					8524.00	0.00	(8524.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		400	gal/conn	-		
Existing Outdoor Need		0	2848	gal/irr-acre	-		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					-	-	-
Projected Indoor Need	6,326.0		400	gal/conn	2,530,400		
Projected Outdoor Need		1265.2	2848	gal/irr-acre	3,603,290		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					6,403,690	-	(6,403,690)

Table A- 17 Zone B Analysis

System User Analysis	
Existing ERC	0.0
Existing Irrigation ERC	0.2
Projected ERC	2,154.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	0
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE B

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		0.45	gal/day/conn	0.00		
Existing Outdoor Need		0	1.87	ac-ft/irr ac	0.00		
Existing Total WR Need					0.00	0.00	0.00
Projected Indoor Need	2,154.0		0.45	gal/day/conn	969.30		
Projected Outdoor Need		430.8	1.87	ac-ft/season	805.60		
Projected Total WR Need					1774.90	0.00	(1774.90)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		800	gal/day/conn	0.00		
Existing Outdoor Need		0	3.96	gpm/irr-acre	0.00		
Existing Total WS Need					0.00	0.00	0.00
Projected Indoor Need	2,154.0		800	gal/day/conn	1197.00		
Projected Outdoor Need		430.8	3.96	gpm/irr-acre	1706.00		
Projected Total WS Need					2903.00	0.00	(2903.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		400	gal/conn	-		
Existing Outdoor Need		0	2848	gal/irr-acre	-		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					-	-	-
Projected Indoor Need	2,154.0		400	gal/conn	861,600		
Projected Outdoor Need		430.8	2848	gal/irr-acre	1,226,918		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					2,358,518	-	(2,358,518)

Table A- 18 Zone C Analysis

System User Analysis	
Existing ERC	0.0
Existing Irrigation ERC	0.2
Projected ERC	2,922.0
Projected Irrigation ERC	0.2
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	0
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE C

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		0.45	gal/day/conn	0.00		
Existing Outdoor Need		0	1.87	ac-ft/irr ac	0.00		
Existing Total WR Need					0.00	0.00	0.00
Projected Indoor Need	2,922.0		0.45	gal/day/conn	1314.90		
Projected Outdoor Need		584.4	1.87	ac-ft/season	1092.83		
Projected Total WR Need					2407.73	0.00	(2407.73)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		800	gal/day/conn	0.00		
Existing Outdoor Need		0	3.96	gpm/irr-acre	0.00		
Existing Total WS Need					0.00	0.00	0.00
Projected Indoor Need	2,922.0		800	gal/day/conn	1623.00		
Projected Outdoor Need		584.4	3.96	gpm/irr-acre	2314.00		
Projected Total WS Need					3937.00	0.00	(3937.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		400	gal/conn	-		
Existing Outdoor Need		0	2848	gal/irr-acre	-		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					-	-	-
Projected Indoor Need	2,922.0		400	gal/conn	1,168,800		
Projected Outdoor Need		584.4	2848	gal/irr-acre	1,664,371		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					3,103,171	-	(3,103,171)

Table A- 19 Zone D Analysis

System User Analysis	
Existing ERC	0.0
Existing Irrigation ERC	0.17
Projected ERC	596.0
Projected Irrigation ERC	0.17
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	0
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE D

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		0.45	gal/day/conn	0.00		
Existing Outdoor Need		0	1.87	ac-ft/irr ac	0.00		
Existing Total WR Need					0.00	0.00	0.00
Projected Indoor Need	596.0		0.45	gal/day/conn	268.20		
Projected Outdoor Need		101.32	1.87	ac-ft/season	189.47		
Projected Total WR Need					457.67	0.00	(457.67)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		800	gal/day/conn	0.00		
Existing Outdoor Need		0	3.96	gpm/irr-acre	0.00		
Existing Total WS Need					0.00	0.00	0.00
Projected Indoor Need	596.0		800	gal/day/conn	331.00		
Projected Outdoor Need		101.32	3.96	gpm/irr-acre	401.00		
Projected Total WS Need					732.00	0.00	(732.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		400	gal/conn	-		
Existing Outdoor Need		0	2848	gal/irr-acre	-		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					-	-	-
Projected Indoor Need	596.0		400	gal/conn	238,400		
Projected Outdoor Need		101.32	2848	gal/irr-acre	288,559		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					796,959	-	(796,959)

Table A- 20 Zone E Analysis

System User Analysis	
Existing ERC	0.0
Existing Irrigation ERC	0.45
Projected ERC	335.0
Projected Irrigation ERC	0.45
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	0
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE E

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		0.45	gal/day/conn	0.00		
Existing Outdoor Need		0	1.87	ac-ft/irr ac	0.00		
Existing Total WR Need					0.00	0.00	0.00
Projected Indoor Need	335.0		0.45	gal/day/conn	150.75		
Projected Outdoor Need		150.75	1.87	ac-ft/season	281.90		
Projected Total WR Need					432.65	0.00	(432.65)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		800	gal/day/conn	0.00		
Existing Outdoor Need		0	3.96	gpm/irr-acre	0.00		
Existing Total WS Need					0.00	0.00	0.00
Projected Indoor Need	335.0		800	gal/day/conn	186.00		
Projected Outdoor Need		150.75	3.96	gpm/irr-acre	597.00		
Projected Total WS Need					783.00	0.00	(783.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		400	gal/conn	-		
Existing Outdoor Need		0	2848	gal/irr-acre	-		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					-	-	-
Projected Indoor Need	335.0		400	gal/conn	134,000		
Projected Outdoor Need		150.75	2848	gal/irr-acre	429,336		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					833,336	-	(833,336)

Table A- 21 Zone F Analysis

System User Analysis	
Existing ERC	0.0
Existing Irrigation ERC	0.5
Projected ERC	238.0
Projected Irrigation ERC	0.5
Existing System Capacities	
Water Right (gpm)	0
Water Source (gpm)	0
Water Storage (gallons)	0

HERRIMAN CITY WATER SYSTEM ANALYSIS ZONE F

Water Right	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (ac-ft)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		0.45	gal/day/conn	0.00		
Existing Outdoor Need		0	1.87	ac-ft/irr ac	0.00		
Existing Total WR Need					0.00	0.00	0.00
Projected Indoor Need	238.0		0.45	gal/day/conn	107.10		
Projected Outdoor Need		119	1.87	ac-ft/season	222.53		
Projected Total WR Need					329.63	0.00	(329.63)

Water Source	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gpm)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		800	gal/day/conn	0.00		
Existing Outdoor Need		0	3.96	gpm/irr-acre	0.00		
Existing Total WS Need					0.00	0.00	0.00
Projected Indoor Need	238.0		800	gal/day/conn	132.00		
Projected Outdoor Need		119	3.96	gpm/irr-acre	471.00		
Projected Total WS Need					603.00	0.00	(603.00)

Water Storage	Number of Connections	Acres Irrigated	DDW Factor	Unit	Total Need (gal)	Existing Capacity	Surplus (need)
Existing Indoor Need	0.0		400	gal/conn	-		
Existing Outdoor Need		0	2848	gal/irr-acre	-		
Fire Protection			0	gpm*120min	-		
Existing Total Storage Need					-	-	-
Projected Indoor Need	238.0		400	gal/conn	95,200		
Projected Outdoor Need		119	2848	gal/irr-acre	338,912		
Fire Protection			2250	gpm*120min	270,000		
Projected Total Storage Need					704,112	-	(704,112)