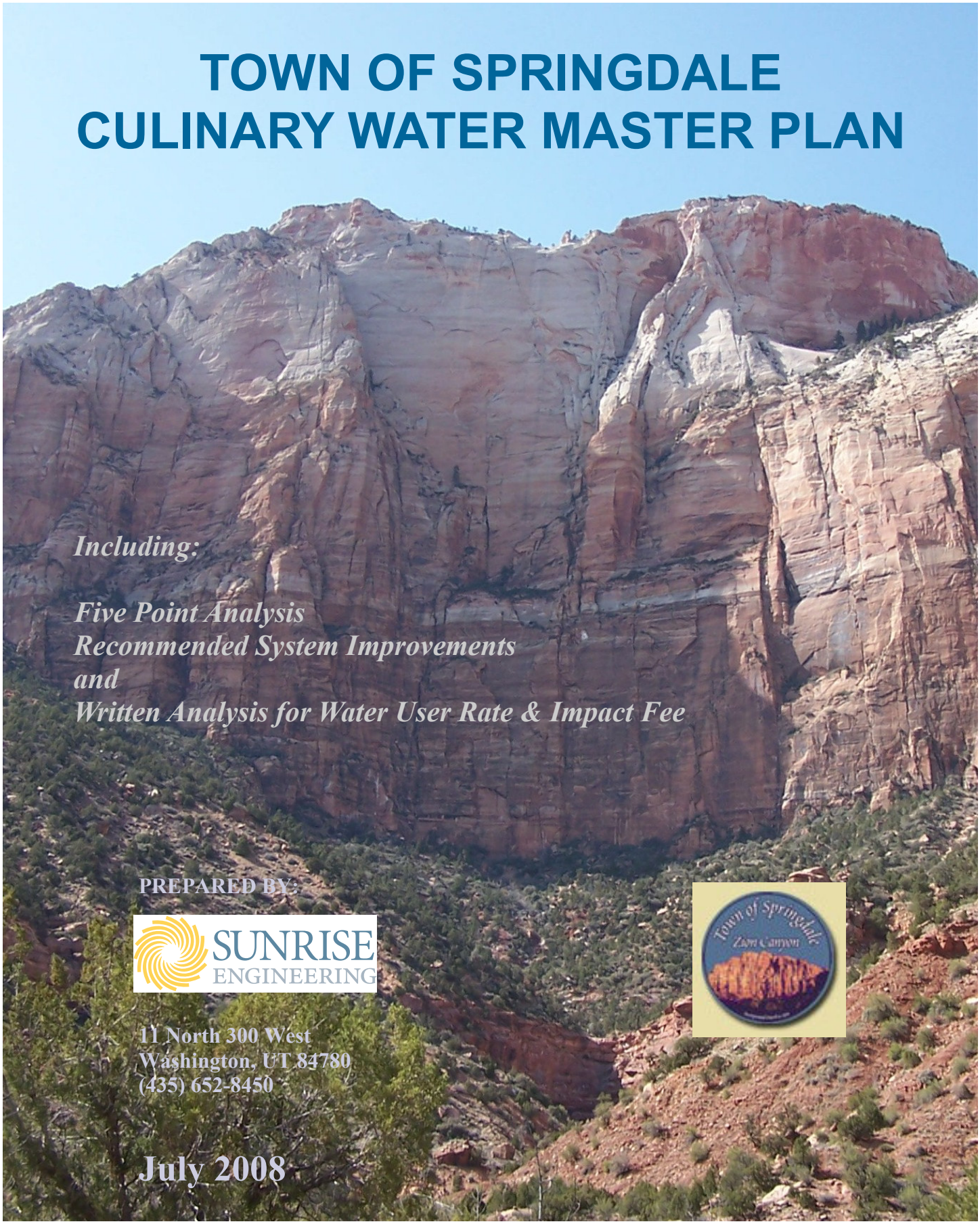
TOWN OF SPRINGDALE
CULINARY WATER MASTER PLAN



Including:

Five Point Analysis
Recommended System Improvements
and
Written Analysis for Water User Rate & Impact Fee

PREPARED BY:

SUNRISE ENGINEERING

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July 2008

SPRINGDALE, UTAH
CULINARY WATER MASTER PLAN

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INCLUDES:

FIVE POINT ANALYSIS
RECOMMENDED SYSTEM IMPROVEMENTS
AND
WRITTEN ANALYSIS FOR WATER USER RATE AND IMPACT FEE

MAYOR---------- Pat Cluff
COUNCIL MEMBER---------- Louise Excell
COUNCIL MEMBER----------Kathy LaFave
COUNCIL MEMBER----------Stan Smith
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TOWN MANAGER---------- Rick Wixom
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SECTION I
INTRODUCTION

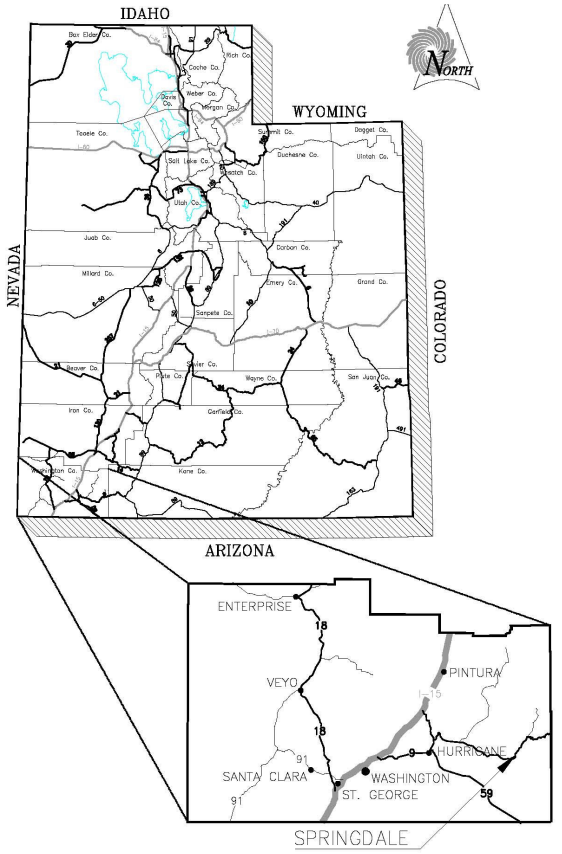
A. PREFACE

On April 9, 2008 the Town of Springdale contracted with Sunrise Engineering, Inc. to provide a Culinary Water Master Plan that would address needs of the culinary water system for 20 year planning period and also for anticipated Town buildout. Needed water rights and storage for anticipated buildout are of particular interest to the Town at this time, so that any improvements made today will have the ability to service the Town to the anticipated buildout.

A glance at the Springdale Culinary Water System shows a number of different sources and associated water rights. Historically these different sources have had times of use and times of no use depending on need and feasibilty of use. Currently the Town uses water diverted from the Virgin River to meet both culinary and secondary needs. Additional water can be obtained from other sources during periods of high use. Culinary water is treated by a filtration treatment plant before being introduced into the culinary system.

The existing storage and distribution system layout has been in place for some time and is in need of some changes that could be made to bring the service up to current capacity state standards. Many needed improvements have been recognized by the Town and verified by this report. Those recognized improvements include a new tank located at a higher elevation, preferably at the elevation of the existing Anasazi tank, a new line from the proposed tank to the existing system, and replacement of transite and undersized lines.

Figure I.A.1 Area Map



B. INTRODUCTION

This Culinary Water Master Plan has been prepared for the Town of Springdale, located in Washington County Utah, East of St. George, Utah along Highway 9 and adjacent to Zion National Park. The Town of Springdale has experienced moderate to high growth rates for a small town over the past 20 years. As in other communities, the culinary water system must be improved and enlarged to support growth and development within the Town, and to comply with current State of Utah Drinking water Standards. Unlike many small towns of similar size, Springdale has experienced much of its recent growth in commercial use such as hotels and restaurants. This growth along with the associated residential growth experienced presents a challenge for the planning of infrastructure to accommodate existing and future growth.

The culinary water system has been analyzed under The State of Utah Department of Drinking Water Regulations to determine existing system conditions and needs, and to

determine projected system needs as the community grows during the next 20 years and to an anticipated buildout. The culinary water system improvements have been recommended, and a proposed financing plan has been developed.

Springdale average water rates and impact fees have also been analyzed in support of the proposed financing plan and the recommended system improvements. The recommended culinary water rates and impact fees are fair, and they will allow the Town to continue to maintain the level of service that is required of public water systems for the present and over the duration of the 20 year planning period and beyond.

SECTION II
SYSTEM USERS ANALYSIS

A. PROJECTED GROWTH RATE

An essential element in the development of a Culinary Water Master Plan is the projection of the Town's growth rate to an anticipated buildout if possible. The population growth rate gives the planner a glimpse of the future demands that may need to be accommodated by the Town's culinary water system.

Projecting the number of future culinary water connections with any degree of accuracy can be a very subjective process, especially with the variety of connections serviced by the Town of Springdale. Springdale currently services connections ranging from seasonal residential to large 120+ room hotels with high usage during tourist season. With this variation in mind this plan uses population and zoning data in line with the Town's General Plan to estimate growth in the 20 year planning period. Table II.A.1 shows the historic growth rate and provides an idea of how the community has grown based on Census counts from 1970 through 2000, and Census estimates from 2006.

Table II.A.1 Sprindale Historic Population

Year	US Census Population	Annual Growth Rate	
1970	182	-	-
1980	258	1970-1980	3.6%
1990	275	1980-1990	0.6%
2000	457	1990-2000	5.2%
2006 (Est.)	550	2000-2006	3.1%

While population growth is essential to anticipating water needs over a specific time period, eventually development in the Town will reach the boundaries currently defined by Zion National Park on the North, East and West. The estimated buildout of the Town reflects the condition when development has reached these extents defined by Zion National Park. Town staff has prepared anticipated buildout numbers which will be used as part of this Master Plan. Table II.A.2 shows the anticipated ERUs buildout based upon zoning, current ERU data and known developments in the Town. While the exact number of ERUs seen by the Town may not exactly match those shown in Table II.A.2 the numbers do allow the Town to examine the anticipated maximum improvements that would be needed to service the Town to the extent that no further growth is anticipated.

Table II.A.2 Estimated Buildout

Residential ERUs	1,022	ERUs
Commercial ERUs	998	ERUs
Other ERUs	100	ERUs
Total	2,120	ERUs

It is important to understand that projected population figures tied to the growth rate shown are not the corner stone of this master plan. The Town of Springdale is expected to experience commercial growth that could vary greatly from the growth anticipated with a simple growth rate. Commercial growth is also expected to have a greater overall impact on the demands of the water system over the planning period. Recommended improvements are based upon buildout ERUs which may be achieved sooner or later than anticipated. If the number of ERUs projected changes on a small scale, then future improvements to support growth may also be affected on a small scale and could be addressed in updates to this master plan. Large scale changes such as annexation of large parcels outside the existing Town boundaries are not expected, but could be addressed in a future updated master plan. Impact Fees should not be significantly affected if buildout conditions are reached sooner or later than anticipated.

B. LENGTH OF PLANNING PERIOD

This culinary water master plan uses two planning periods for analysis and recommended

improvements. A 20-year planning period, beginning in fiscal year 2008, July 1 of 2007, and running through fiscal year 2028 is used to show growth similar to that experienced in the past by the Town. A buildout planning period is also included to show anticipated connections and improvements needed to meet water system demands up to the time when Springdale has been developed to the current Town boundaries. While the period of time to the buildout condition is not currently known, it is expected to be beyond the initial 20 year planning period. Revenue sources should be carefully evaluated each year as the Town Council sets budgets and anticipates system requirements.

C. CULINARY WATER CONNECTIONS

1. Existing Culinary Water Connections

The State of Utah Administrative Rules for Public Drinking Water Systems requires public water systems to meet requirements based upon usage. State rules provide a standard usage based upon the types of connections serviced in a system. Usage can also be based upon historical data if there is enough data to provide a confidence level of 90% or higher that the usage shown is representative of actual average use.

The Town of Springdale has provided historic usage which will meet the confidence requirements outlined previously. The analysis of this historic usage will be outlined in this section.

According to the Town of Springdale Rate Table Summary data, the average number of existing culinary connections in FY 2007 was 322. The 322 connections include 222 residential connections, 95 commercial connections and 5 other connections.

To calculate how much water is used at an average residential connection, the total amount of water used by all Springdale residential customers over the course of a year was determined. Table II.C.1 below provides historic data from Springdale records from 2005 to 2008. The average daily use per residential connection was **156 gal/day**.

In comparison to other communities of similar nature, the daily average use for Springdale appears to be significantly lower. This is likely due to the many seasonal homes, use of xeriscape landscaping, and restrictions placed on outdoor use of the culinary water system. Also, the Springdale Consolidated Irrigation Company and the Town both serve irrigation connections for secondary use throughout the Town. With this uniquely low outdoor usage in mind it is recommended that any future

TABLE II.C.1 Average Usage Per Connection

	2005	2006	2007	2008 *	Average
Residential					**05 - 07**
Usage (sum of metered use) (gallons)	13,186,000	11,552,000	12,209,000	2,131,000	12,315,667
Connections (ERUs)	210	217	222	225	216
Usage Per Connection (gal/year)	62,790	53,235	54,995	9,471	57,007
Daily Usage Per Connection (gal/day)	172	146	151	158	**156**
This master plan will use a historical daily ERU usage of					250 gpd/conn.

* Year 2008 is a partial year usage and was not used in the analysis

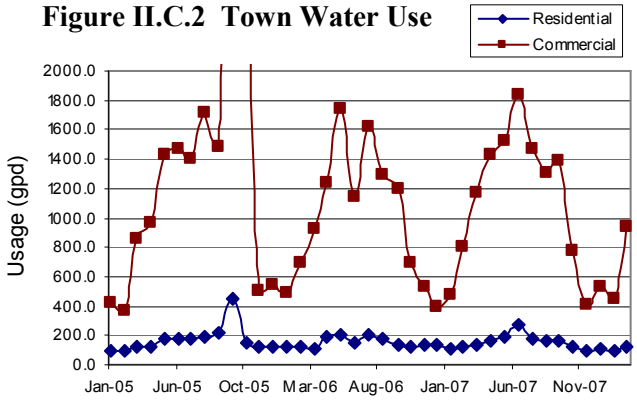
improvements be sized for a conservative 250 gal/day per ERU. The remainder of this report will refer to this usage as historical usage and each section will include analysis showing requirements based upon this historic usage.

Commercial connections generally require more water than that required by a residential customer. An Equivalent Residential Unit (ERU) represents the additional volume of water required for commercial users above and beyond the amount used by an average residential connection. The ERU value is determined by comparing the average daily use per commercial connection to the average daily use per residential connection. To calculate the average daily use for commercial connections, the total amount of water used by all commercial users was determined for the usage data period. In the years 2005-2007 the average commercial water usage was approximately 40,727,000 gallons, distributed to an *average* of 94 commercial users. The average usage per commercial connection between 2005 and 2007 was 1,187 gal/day. Below is the calculation showing average commercial usage.

Using the adjusted historic usage of 250 gpd/ connection for residential use, the average commercial connection uses approximately 4.74 times the amount used by the average residential connection. Thus, for the purpose of this master plan an ERU value for each historic usage commercial connection will be 4.74 times that of a residential connection.

Similar analysis of the connections designated as "other" reveals average "other" usage of only 190,333 gallons from 2005-2007 with an average of 4 connections. Other connections have an average daily use of 130 gpd during this period. Because "other" per connection usage is less than that of a residential connection this master plan will round each

Figure II.C.2 Town Water Use



"other" connection to 1 ERU in historic usage.

Shown below is the number of current (March. 2008) residential connections, commercial and other ERUs. This represents the method in which the total number of ERUs were calculated.

ERUs 2008 (Historic Usage 250 gpd)	
Residential	= 229
Commercial ERUs (98 X 4.74)	= 464
Other ERUs (6 X 1.0)	= 6
Total ERUs	= 699

2. Projected Culinary Water Connections and ERUs

The number of future culinary connections for each year can be calculated using the compound interest formula and inserting the projected growth rate, the existing number of culinary water ERUs, and the 20-year planning period for culinary water improvements.

$$F = P(1 + i)^N$$

F = Future Population
P = Present Population
i = Historic Growth Rate
N = Years

$$2005 - 2007\ Average\ Commercial\ Use = \frac{40{,}727{,}000\ Gallons}{1\ Year} \times \frac{1\ Year}{365\ Days} \times \frac{1}{94\ Conn.} = 1{,}187\ Gal / Day / Conn.$$

The 20-Year projection of ERUs can be found in Table II.C.3. As shown, the total number of culinary water ERUs projected for the end of the 20-year planning period in 2028 is 1,289 according to historic usage. Note that for this analysis the commercial growth rate is equivalent to the residential growth rate. It is recommended that the Town of Springdale size all future culinary water related infrastructure improvements for at least 1,289 ERUs.

Table II.C.3 Residential Water Use (At End of Each Year Shown)

Year	Est. Residential Growth Rate	Total Estimated Connections	Total Estimated ERUs (Historical Usage)	Estimated Population **
2005	-	307	654	532
2006 *	-	316	671	550
2007	-	322	677	563
2008	3.1%	332	699	580
2009	3.1%	343	720	598
2010	3.1%	353	742	616
2011	3.1%	364	766	636
2012	3.1%	376	790	656
2013	3.1%	388	814	677
2014	3.1%	399	839	697
2015	3.1%	412	866	720
2016	3.1%	425	893	743
2017	3.1%	438	920	765
2018	3.1%	452	949	788
2019	3.1%	466	978	814
2020	3.1%	480	1,009	839
2021	3.1%	495	1,040	864
2022	3.1%	511	1,073	892
2023	3.1%	527	1,106	920
2024	3.1%	543	1,140	948
2025	3.1%	560	1,176	978
2026	3.1%	578	1,212	1,009
2027	3.1%	595	1,249	1,039
2028	3.1%	614	1,289	1,072

Estimated ERUs for 2005-2007 are based upon actual connection data, 2008-2028 ERUs are based upon the growth rate shown for each year and are an end of year ERU estimate

* 2006 Population data is based on an estimate provided by the US Census.

** Estimated Population is determined by multiplying the Estimated Residential ERUs by a calculated average household size of 2.53. The value 2.53 was obtained by taking the population estimate of 2006 and dividing it by the estimated residential ERUs.

550 people / 217 residential ERUs = 2.53 people per residential ERU.

SECTION III
WATER RIGHTS ANALYSIS

A. EXISTING WATER RIGHT

The existing Town of Springdale water rights used for culinary water are identified in Table III.A.1 below. The water rights are listed according to number, source, and flow.

B. EXISTING REQUIRED WATER RIGHT

The State of Utah Public Drinking Water Regulations, Section 5, states that a community should have adequate water right to supply each culinary connection with 400 gallons per day for indoor water use, plus an amount for outdoor use as dictated by irrigated acreage and a consumptive use value obtained from the State Guidelines. The community may substitute historical use data for indoor and outdoor requirements. For planning purposes the Town of Springdale historic average daily use is assumed to be 250 gallons per ERU per day as outlined in Section II. In the Town of Springdale where secondary irrigation is available and encouraged these amounts are assumed to include all indoor and outdoor usage from the culinary system.

From Table III.A.1, the total amount of water right available in Springdale is 1,182.6 acre-feet. Based on the historic average daily use of 250 gallons per day per ERU and a total of 699 existing ERUs, the existing required water right is calculated as follows:

Existing required water right (FY 2008):
Historic Usage

$$699 \text{ ERUs} \times \frac{250 \text{ gpd}}{\text{ERU}} \times \frac{1 \text{day}}{1{,}440 \text{ min.}} = 121 \text{ gpm}$$

$$121 \text{ gpm} \times \frac{1.61 \text{ ac} - \text{ft}}{\text{gpm}} = 196 \text{ ac} - \text{ft}$$

The existing water right surplus or deficit under these conditions is determined by subtracting the existing required water right of 196 ac-ft from the total available water right of 1,182.6 ac-ft, which yields a surplus of 987 ac-ft.

C. PROJECTED REQUIRED WATER RIGHT

The projected required water right at the end of the 20 year planning period is calculated by using the same factors as above, but the projected number of culinary water ERUs are

Table III.A.1 Town of Springdale Culinary Water Rights

		Flow		
W.R. #	**Source**	**gpm**	**cfs**	**AcFt.**
81-105	Spring above ZNP Campground	7.2	0.016	11.58
81-220	Birch Springs East - West of ZNP Museum	18.8	0.042	30.41
81-274	Birch Springs West - West of ZNP Museum	31.4	0.070	50.68
81-585	Hummingbird Well	148.1	0.330	238.91
81-1326	Cemetery Well	65.1	0.145	104.98
81-2413	Big Springs	235.6	0.525	380.08
81-3392	Springdale Town for Municipal Use - Irrigation	596.9	1.330	365.95
Total Water Rights =		**1,103.2**	**2.458**	**1,182.6**

substituted in the calculations. Two different scenarios will be considered in the projection analysis; the 20-year historic usage and buildout historic usage. The historic average daily use of gallons per day per ERU will remain the same at 250. The projected 20 year estimates of ERUs are 1,289 ERUs based on historic and 2,120 ERUs based on the Town's calculated buildout scenario. The calculations for the projected water right requirements are as follows:

Projected required water right (FY 2028):
Historic Usage

$$1{,}289\ \text{ERUs} \times \frac{250\ \text{gpd}}{\text{ERU}} \times \frac{1\text{day}}{1{,}440\ \text{min.}} = 224\ \text{gpm}$$

$$224\ \text{gpm} \times \frac{1.61\ \text{ac} - \text{ft}}{\text{gpm}} = 361\ \text{ac} - \text{ft}$$

The projected water right surplus or deficit is determined by subtracting the projected required water right of 361 ac-ft from the grand total available water right of 1,182.6 ac-ft, which yields a surplus of 822 ac-ft.

Projected required water right (Buildout):
Historic Usage

$$2{,}120\ \text{ERUs} \times \frac{250\ \text{gpd}}{\text{ERU}} \times \frac{1\text{day}}{1{,}440\ \text{min.}} = 368\ \text{gpm}$$

$$368\ \text{gpm} \times \frac{1.61\ \text{ac} - \text{ft}}{\text{gpm}} = 594\ \text{ac} - \text{ft}$$

The projected water right results in a surplus of 589 ac-ft.

A summarization of all scenarios previously calculated is found at the end of this section.

D. RECOMMENDED WATER RIGHT IMPROVEMENTS

The projections in this analysis show that the Town of Springdale has enough water rights to serve the Town including planned development through a 20 year planning period and buildout. However, it is assumed in all previous calculations that at Town buildout all culinary connections will also have an irrigation connection and that the irrigation water rights are sufficient to supply the Towns irrigation needs. It is recommended that an additional study be conducted to insure the Towns Water Rights are sufficient for both culinary use and for irrigation.

Please note that this Water Rights inventory includes those water rights that are currently being delivered by Zion National Park to the Town, and water rights associated with sources that may or may not be able to deliver the quantity shown on the right to the culinary system.

Figure III.C.1 on the following page shows the existing water rights compared to the projected requirements for year 2028 under historic use. Buildout projections would require 368 gpm and 594 ac-ft at a date projected beyond the year 2028. Should water rights in the irrigation or culinary systems become an issue in the future, consideration to transfer right from points of less production to more could be considered. Care should also be taken that current water rights are protected so they will be available in the future when needed.

Finally, it is recommended that the Town require all new development to provide water rights sufficient for their needs.

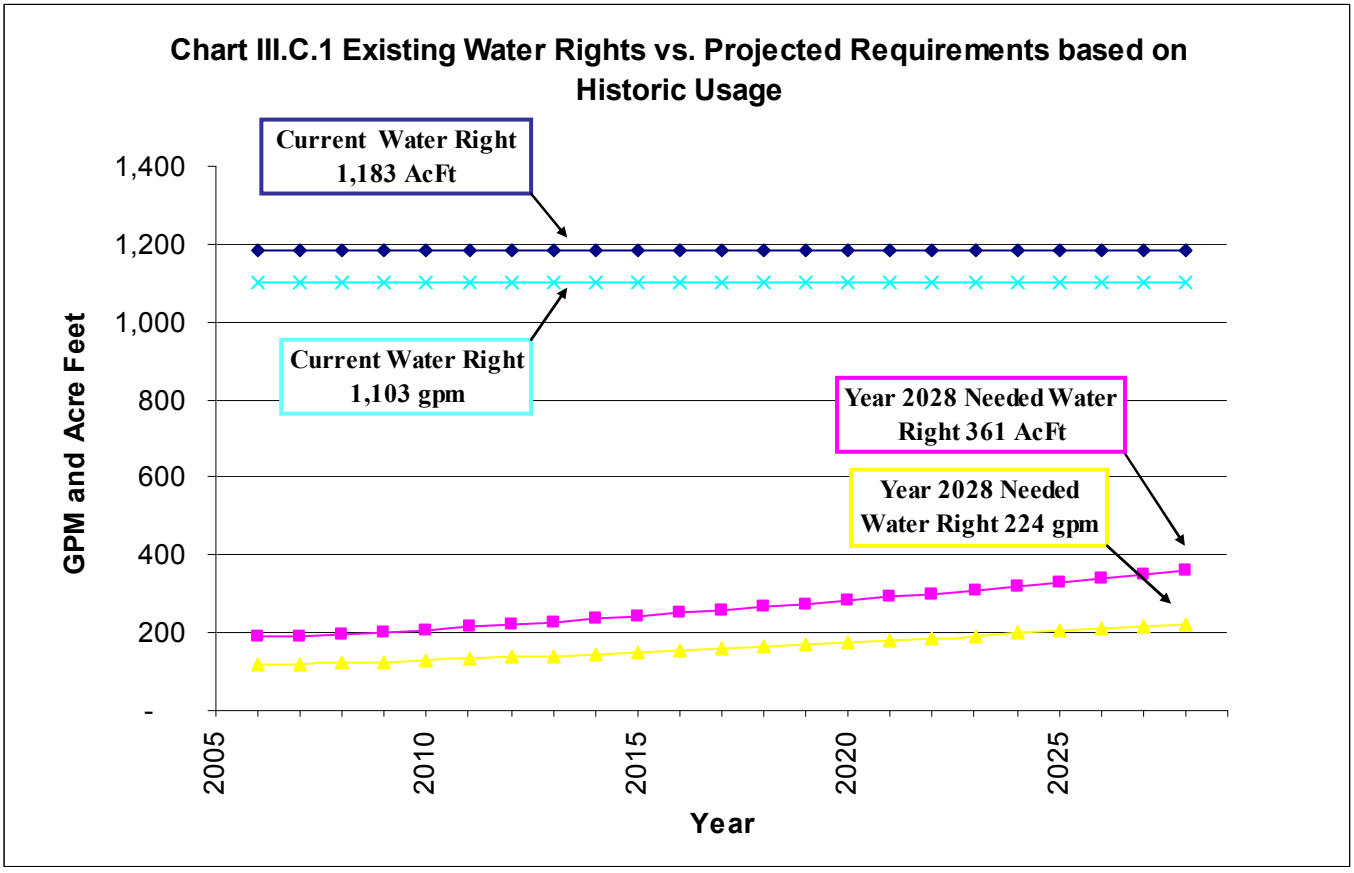


Chart III.C.1 Existing Water Rights vs. Projected Requirements based on Historic Usage
Current Water Right 1,183 AcFt
Current Water Right 1,103 gpm
Year 2028 Needed Water Right 361 AcFt
Year 2028 Needed Water Right 224 gpm
GPM and Acre Feet
1,400
1,200
1,000
800
600
400
200
-
2005
2010
2015
2020
2025
Year

WATER RIGHTS SUMMARY

Existing Surplus (2008)	**=**	**987 ac-ft**
Project Surplus FY 2028 (Indoor)	**=**	**822 ac-ft**
Buildout Surplus (Indoor)	**=**	**589 ac-ft**

Recommendations

1. **Continue to encourage water conservation through water rates, education and expansion of the secondary water system.**
2. **Further investigate secondary water system to determine long term water right needs and insure protection of water rights held by the Town.**
3. **Review water rights at least every 5 years.**
4. **All new developments bring water rights to the Town.**

SECTION IV
WATER SOURCE CAPACITY ANALYSIS

A. EXISTING WATER SOURCE CAPACITY

To analyze source capacity, all available culinary water sources are first identified and listed in the Table IV.A.1 below.

Table IV.A.1 Town of Springdale Water Sources

Town of Springdale Sources (Total flow shown reflects water used in the culinary system)	Total Flow gpm
Spring above ZNP Campground	0
Birch Springs East - West of ZNP Museum	0
Birch Springs West - West of ZNP Museum	0
Hummingbird Well	0
Cemetery Well	0
Big Springs	0
North Fork of the Virgin River (Treatment Plant)	400
Source Total =	**400**

Three source springs listed first in Table IV.A.1 are located in Zion National Park. Water from each of these springs is collected and treated by Zion National Park. In order for the Town to access this water the Town must pay a fee to Zion National Park for any use. For said reasons this water has been considered as an emergency source and would only be used under emergency conditions and not to support future growth, thus source capacity of these springs are shown as 0 gpm.

Springdale's source situation is unique in that of the seven listed sources, three, the Virgin River, Hummingbird Well, and Big Springs are connected directly to the Town's irrigation system which is shared with the Springdale Consolidated Irrigation Company. Water from these three sources can be pumped to an irrigation pond from which the Town's treatment plant can draw water to be treated and then introduced to the culinary water system. Of the three sources listed which can easily be introduced into the culinary system, the Virgin River is considered the primary source and hence the 400 gpm capacity of the treatment plant is shown as source from the Virgin River.

The Cemetery Well is currently not connected to the culinary or irrigation systems. If extensive work were done and treatment designed, the Cemetery Well could be connected to either system. For these reasons source capacity of the Cemetery Well is shown to be 0 gpm.

From a water rights and physical point of diversion stand point, the Town of Springdale does have multiple sources to supply the Town's culinary system with water. Due to system logistics, locality of some of those rights and the interconnected irrigation system, true source capacity must be reported as the amount of water that can physically be introduced to the culinary water system. The bottleneck in the existing Springdale culinary water system is the treatment plant with a limited capacity of 400 gpm. While the Town can obtain water from multiple other sources, and those capacities can be reasonably assumed from the water rights associated with those points of diversion or measured flow at each source, 400 gpm remains the limit of current source capacity and the number which will be used to determine current and future needs of the system.

B. EXISTING REQUIRED WATER SOURCE CAPACITY

State of Utah Public Drinking Water Regulations, Section 5, states that a community

should have an adequate water source capacity to physically meet the anticipated peak day demand. The regulations also require the source to be capable of meeting peak irrigation

demands, where no secondary source of irrigation water is available. The Town of Springdale has made irrigation water available as a secondary source to residents and commercial users in the Town and thus this plan will address the source capacity required for indoor use only.

State regulations outline that peak day demand for source capacity requirement per connection should be double the average amount of water required per connection per day. This master plan assumes that the peak day demand in Springdale for source capacity is double the average requirement per ERU based on historic use. This required source capacity per ERU in the Town of Springdale is assumed to be 500 gallons per day for historical use. The required existing source capacity is calculated below:

Existing Required Source Capacity (FY 2008):
Historic Usage

$$699 \text{ ERUs} \times \frac{500 \text{ gpd}}{\text{ERU}} \times \frac{1\text{day}}{1{,}440 \text{ min.}} = 243 \text{ gpm}$$

The existing source capacity surplus or deficit is determined by subtracting the existing required source capacity of 243 gpm from the total available source capacity of 400 gpm, which yields an existing surplus of 157 gpm.

C. PROJECTED REQUIRED WATER SOURCE CAPACITY

Projected required water source capacity at the end of the planning period is determined from the same information and calculations explained in Part B, except the projected number of culinary water ERUs are substituted in the calculations for the projected number of ERUs. In this situation we consider the 20 year projection under historic usage, as well as the buildout under historic usage. The number of ERUs for the 20 year projection under historic usage is 1,289, while 2,120 is the calculated ERUs for buildout under historic usage. The peak flows remain the same for historic usage at

500 gpd/ERU. The following are calculations for water source capacity requirements for both scenarios.

Projected Required Source Capacity (FY 2028):
Historic Usage

$$1{,}289 \text{ ERUs} \times \frac{500 \text{ gpd}}{\text{ERU}} \times \frac{1\text{day}}{1{,}440 \text{ min.}} = 448 \text{ gpm}$$

The projected source capacity surplus or deficit is determined by subtracting the projected required source capacity of 448 gpm from the

total available source capacity of 400 gpm, which yields a projected shortage of 48 gpm at the end of the 20 year planning period using historic use.

PROJECTED SHORTAGE = (48) gpm

Projected Required Source Capacity (Buildout):
Historic Usage

$$2{,}120 \text{ ERUs} \times \frac{500 \text{ gpd}}{\text{ERU}} \times \frac{1 \text{day}}{1{,}440 \text{ min.}} = 736 \text{ gpm}$$

The projected source capacity requirement for historic use results in a projected shortage of 336 gpm for buildout conditions.

PROJECTED SHORTAGE = (336) gpm

D. RECOMMENDED WATER SOURCE IMPROVEMENTS

The existing source capacity of 400 gpm is projected to not provide sufficient source capacity through the 20 year planning period and hence not through the projected buildout period either. Using growth projections outlined in section II and historic average use and increase in source capacity is anticipated to be needed by the year 2024.

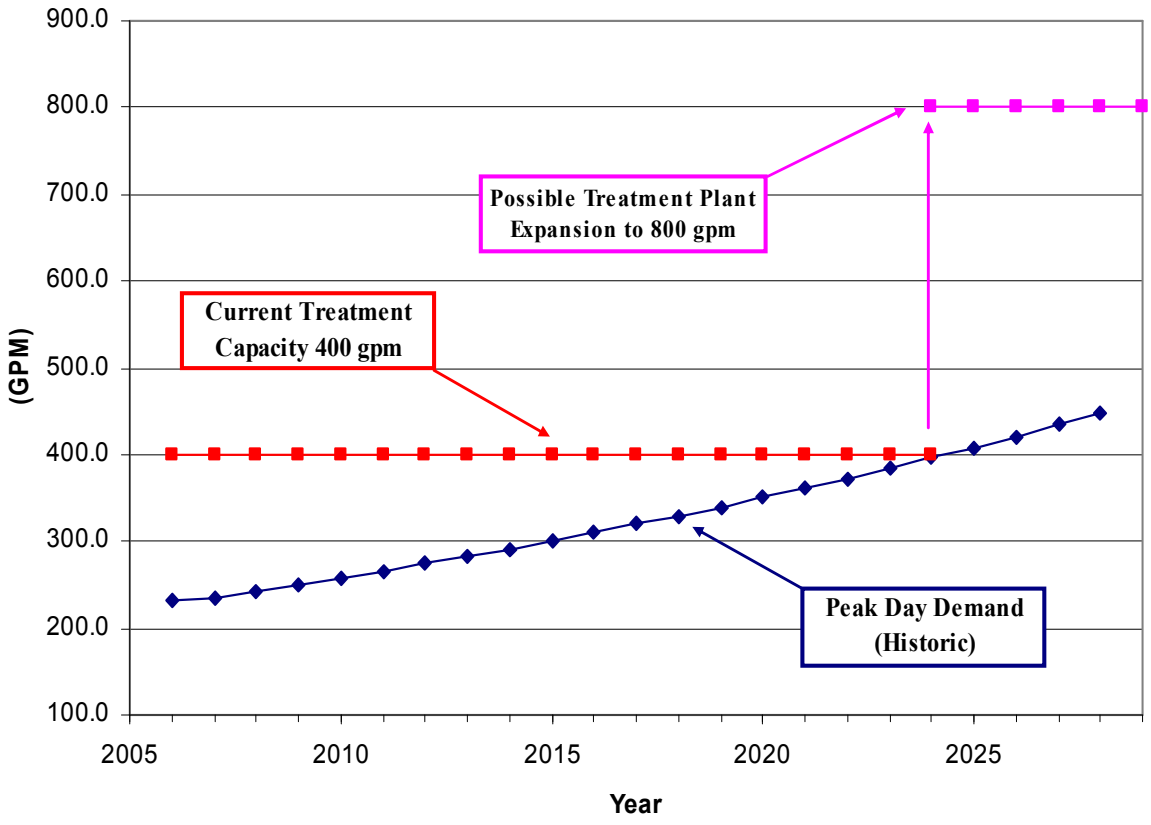
While the Town could address the needed increase in capacity in several different ways, likely the most cost effective option will be to increase the capacity of the treatment plant.

It is anticipated that doubling the size of the existing treatment plant will address the projected source capacity shortages shown to affect the Town in approximately 16 years. Doubling the capacity of the treatment plant could also incorporate a second redundant train for water through the treatment plant should one track ever become contaminated or need to shut down for any reason.

The recommended improvement to double the size of the existing treatment plant will not be included in the project proposed in conjunction with this master plan until further decisions are made in regards to the existing irrigation system, current wells, connection to Zion National Park, and water rights, each of which could affect the proposed treatment plant upgrade.

Figure IV.D.1 graphically represents a comparison between the current water source capacity and the projected required peak day demand flows over the planning period. A depiction of a possible treatment capacity upgrade of 400 gpm is also shown in the graph. The proposed 400 gpm upgrade of the existing treatment plant to 800 gpm capacity is anticipated to meet the buildout source capacity required using historic usage.

Figure IV.D.1 Town of Springdale Comparison of Water Source and Required Source



WATER SOURCE SUMMARY

Existing Source	=	**400 gpm**
Existing Surplus (2008)	=	**157 gpm**
Project Shortage FY 2028 (Indoor)	=	**(-48) gpm**
Buildout Shortage (Indoor)	=	**(-336) gpm**

Recommendations

1. **The Town currently has enough water source capacity for their needs.**
2. **The Town will not have enough water source capacity under 20-year period or under buildout scenarios.**
3. **It is suggested that options to increase source capacity be evaluated over the next 5 years.**
4. **It is suggested that sources such as wells be used at least periodically and flows monitored to monitor and ensure their continual effectiveness.**
5. **Continue to encourage water conservation through water rates and education.**
6. **Review water source requirements at least every 5 years.**

SECTION V
WATER STORAGE CAPACITY ANALYSIS

A. EXISTING WATER STORAGE CAPACITY

The Town of Springdale's existing culinary water storage capacity is identified below.

Table V.A.1 Springdale Water Storage

Water Storage Unit:	Capacity (gal.)
North Concrete Tank	500,000
East Concrete Tank *	250,000
Anasazi Steel Tank	200,000
Total Existing Storage Capacity =	**950,000**

* This Master Plan will show that the East Concrete Tank will be rendered unusable due to the need to construct a new tank at the same elevation as the Anasazi Tank in order to meet pressure/elevation requirements. This will reduce total storage by 250,000 gallons in future projections.

B. EXISTING REQUIRED WATER STORAGE CAPACITY

Water storage capacity requirements are found in the State of Utah Public Drinking Water Regulations. These regulations require storage for a community's culinary water system to meet one full days use requirement for all connections in the community plus the required fire flows specific to the Town under study plus emergency storage deemed necessary to meet demands in an emergency situation such as a line break or treatment plant failure.

As shown in previous sections, historic average use per ERU in the Town of Springdale is assumed to be 250 gallons per day. Storage requirements for fire protection vary from community to community. In general, fire flow requirements are set by the local Fire Chief or are based on building size and type of construction. The Town of Springdale has multiple commercial buildings of varying size which require varying fire flows. New improvements in some portions of the Town have been required to install fire suppression systems while other portions of the Town are protected with traditional fire hydrants and no

other special requirements are mandated. The largest stuctures in the traditional fire protection area have been rated to require at least 3,500 gpm for a period of at least 3 hours. The following storage design calculations will base required fire flow protection on this amount.

Also included in required storage is emergency storage. The Town of Springdale has indicated that for planning purposes the required emergency storage should be on the order of 25% of the total required storage from equalization and fire protection storage. This amount is based on the degree of the water system's reliability and the Town's need for supply redundancy for any and all possible water treatment facility interruptions. Based on the above data and the two separate usage scenarios, the Town of Springdale's storage capacity is calculated below.

Existing Required Storage (FY 2008):
Historic Usage
Storage for Average Usage per ERU:

$$699 \text{ ERUs} \times \frac{250 \text{ gpd}}{\text{ERU}} = 174,815 \text{ gallons}$$

Storage for Fire Protection:

$$3{,}500 \text{ gpm} \times \frac{60 \text{ min}}{\text{hour}} \times 3 \text{ hours} = 630{,}000 \text{ gallons}$$

Storage for Emergency Supply:

$$0.25 \times (804{,}815 \text{ gallons}) = 201{,}204 \text{ gallons}$$

TOTAL EXISTING REQUIRED STORAGE (Historic usage) = 1,006,019 gallons

The existing water storage capacity surplus or deficit is determined by subtracting the existing required water storage capacity of 1,006,019 gallons from the total available water storage capacity of 700,000 gallons, which yields an existing shortage of (-306,019) gallons.

EXISTING STORAGE CAPACITY <u>Shortage</u> = (-306,019) gallons

C. PROJECTED REQUIRED WATER STORAGE CAPACITY

Projected required culinary water storage capacity at the end of the 20 year planning period is determined from the same factors explained in part B above, but the projected number of culinary water ERUs is inserted into the calculations.

When projecting required water storage capacity the Town of Springdale requested a couple different factors to be taken into consideration in the projection analysis. First, since the need for a new treatment facility is roughly 16 years in the future, new storage suggested in this Master Plan will also be used to increase system dependability in time of water treatment facility failures or scheduled maintenances (emergency storage). Second, the Town desires not to build additional storage in the future, therefore the buildout scenario will be heavily weighed in sizing the new storage tank.

As with water rights and source capacity, storage capacity will be analyzed for the 20 year growth and buildout projections under historic usage. As before, fire suppression storage will be based on 3,500 gpm for three hours. The following are calculations for water storage requirements for both scenarios.

Projected Required Storage Capacity (FY 2028):

<u>Historic Usage</u>

Storage for Average Usage per ERU:

$$1{,}289 \text{ ERUs} \times \frac{250 \text{ gpd}}{\text{ERU}} = 322{,}246 \text{ gallons}$$

Storage for Fire Protection:

$$3{,}500 \text{ gpm} \times \frac{60 \text{ min}}{\text{hour}} \times 3 \text{ hours} = 630{,}000 \text{ gallons}$$

Storage for Emergency Supply:

$$0.25 \times (952{,}246 \text{ gallons}) = 238{,}062 \text{ gallons}$$

TOTAL PROJECTED REQUIRED STORAGE = 1,190,308 gallons

The projected water storage capacity surplus or deficit is determined by subtracting the projected required water storage capacity of 1,190,308 gallons from the total available water storage capacity of 700,000 gallons, which yields a projected shortage of 490,308 gallons at the end of the 20 year planning period.

PROJECTED 2028 WATER STORAGE CAPACITY <u>SHORTAGE</u> (Historic usage) = (490,308) gallons

Projected Required Storage Capacity (Buildout):

<u>Historic Usage</u>

Storage for Average Usage per ERU:

$$2{,}120 \text{ ERUs} \times \frac{250 \text{ gpd}}{\text{ERU}} = 530{,}000 \text{ gallons}$$

Storage for Fire Protection:

$$3{,}500 \text{ gpm} \times \frac{60 \text{ min}}{\text{hour}} \times 3 \text{ hours} = 630{,}000 \text{ gallons}$$

Storage for Emergency Supply:

$$0.25 \times (1{,}160{,}000 \text{ gallons}) = 290{,}000 \text{ gallons}$$

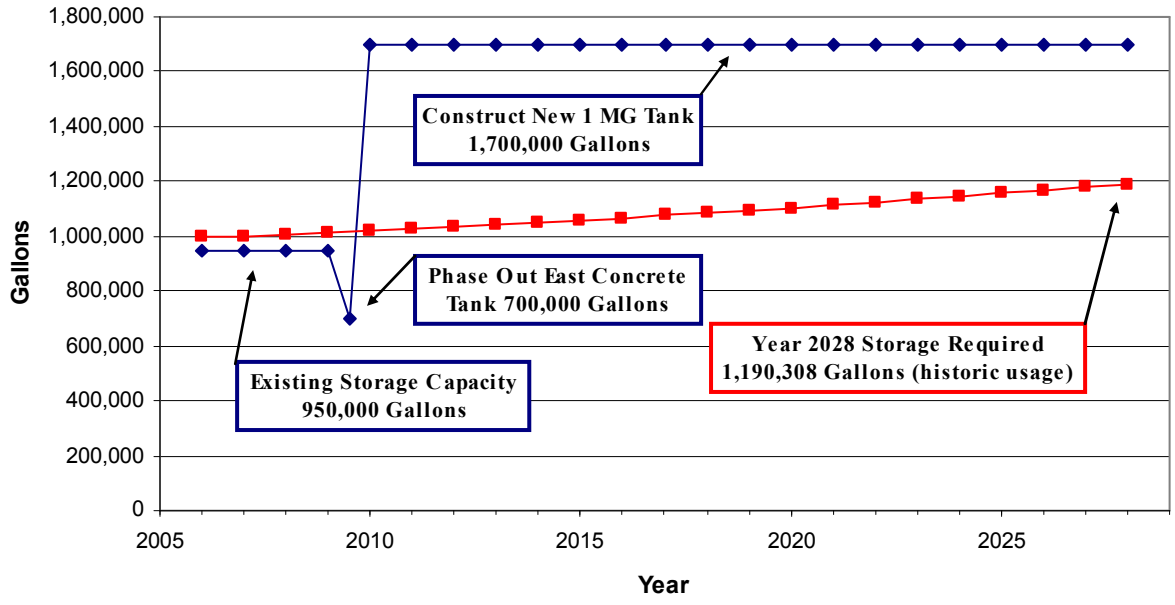
TOTAL PROJECTED REQUIRED STORAGE = 1,450,000 gallons

The projected water storage capacity, calculated as before, yields a projected shortage of 750,000 gallons at the end of the buildout period.

PROJECTED (Buildout) WATER STORAGE CAPACITY <u>SHORTAGE</u> (Historic usage) = **(750,000) gallons**

Figure V.C.1 shows the timeline of projected storage required versus current storage capacity using historic usage.

Figure V.C.1 Town of Springdale Water Storage (3500 gpm Fire Flow x 3 hours)



D. RECOMMENDED WATER STORAGE CAPACITY IMPROVEMENTS

The existing required storage capacity calculations yield a shortage of storage capacity by 306,019 gallons with historic usage when the lower elevation East Concrete tank (250,000 gallons) is not included in the total avaliable storage. Since the Town of Springdale desires not to build additional tanks in the future, and this appears to be logistically and financially possible, it is recommended that the buildout scenario be used instead of the 20 year planning period to determine projected required storage capacity. The buildout required storage capacity calculations result in a shortage of 750,000 gallons with historic usage.

In addition to running an analysis using historic usage, the Town of Springdale requested that analysis for storage capacity be run using the State Standard usage as well. These calculations are similar to the calculations previously found in this Section except State Standard usage is 400 gpd instead of the 250 gpd for historic usage. The calculations for the storage capacity using State Standard usage can be found in Appendix B. These calculations show that by State Standard usage the Town's future storage capacity deficit at buildout is 1,147,500 gallons. Therefore, based on the buildout scenario using State Standard and historic usage, the recommended size of the storage tank to be constructed is 1 million gallons, a value which lies between the historic and State Standard usage scenarios. Using State Standard usage along with historic provides a more conservative estimate ensuring more confidence that the Town will not need to build any additional storage tanks in the future.

This tank will also meet the goals of the Town by providing enough required storage to handle all the demands up to and including anticipated buildout, thus negating the requirement of constructing another storage tank in the future. In addition, the new storage tank will provide enough emergency storage to accommodate facility maintenance or possible treatment interruptions until a new or upgraded treatment facility would be required to meet source requirements.

WATER STORAGE SUMMARY

Existing Shortage	=	**(306,019)**	**Gallons**
Project Shortage (FY 2028)	=	**(490,308)**	**Gallons**
Project Shortage (Buildout)	=	**(750,000)**	**Gallons**

Recommendations

1. **Recognize the immediate need for new storage facilities to accommodate current needs of the Town.**
2. **Construct a tank large enough to supply storage at buildout conditions.**
3. **Continue to encourage irrigation system use decreasing culinary water use.**
4. **Continue to encourage water conservation through water rates and education.**
5. **Review water storage requirements at least every 5 years.**
6. **Consider use of the East Concrete Tank for secondary irrigation purposes.**

SECTION VI
WATER TREATMENT REQUIREMENTS

A. GENERAL REQUIREMENTS

The State of Utah Public Drinking Water Regulations, in accordance with the National Safe Drinking Water Act, have adopted "primary" regulations for the protection of public health, and "secondary" regulations related to taste and aesthetics. The regulations recommend that all culinary water sources have provisions for continuous disinfection.

B. EXISTING TREATMENT FACILITIES

The Town of Springdale has a treatment facility to treat all the water sources used by the Town. Water from the Virgin River and all other sources are pumped to a 2 million gallon holding pond where the water goes through initial settling. The water for treatment is then sent into the primary treating facility compound. First, alum sulfate is injected into the water to act as a coagulant. The water is then monitored for turbidity and sent into the 74,500 gallon floculation basin also known as the Contraflow. Once the water passes through the Contraflow it is sent into four separate sand and activated carbon filters. Each filter has a flow capacity of 100 gpm. This process is the limiting process of the treatment plant, thus limiting the maximum treatment flow to 400 gpm. The water is then sent to a clear well for collection and residual disinfection takes place by method of chlorine gas. From the clear well the water is pumped to the 500,000 gallon tank for distribution. Currently this treatment system has one train or path which water can follow for treatment. The State would like to see multiple trains in the Town's water treatment system in case of contamination or other unforeseen shutdowns. Currently all redundancy lies in the extra storage capacity, thus providing the needed water in case of emergency shutdown of the treatment system. It is recommended that any future upgrades or additional treatment facilities built should be designed to add multiple trains to accomodate the suggested redundancy.

C. RECOMMENDED WATER TREATMENT FACILITY IMPROVEMENTS

The current treatment facility is capable of producing the amount of treated water required by the Town's needs. As suggested in Section IV, the needs of the Town will exceed the current capacity of the treatment facility likely around the year 2024 based on historical use data. Once this takes place the Town will need to provide additional capacity to the treatment facility by either expansion of the current facility or by building a second treatment facility. It is suggested that water demands be revised every 5 years or less to ensure that current needs are provided for by the capacity of the treatment facility.

SECTION VII
WATER DISTRIBUTION SYSTEM ANALYSIS

A. EXISTING DISTRIBUTION SYSTEM ANALYSIS

The State of Utah Administrative Rules for Public Drinking Water Systems, R309-105-9, requires that no connection experience less than 20 psi at any time during operation of the system. The regulations also require that the distribution system be sized to maintain 20 psi during peak day conditions with fire flow demands, 30 psi during conditions of peak instantaneous demand, and 40 psi during peak day demand.

As previously discussed in Section V, the Town of Springdale has identified 3,500 gpm as a goal for fire flow demands, but for the distribution system analysis the 3,500 gpm flow is not required for everywhere in the system. Currently, the Town has two structures which were built before the requirement that all rooms in large structures be equipped with sprinklers. These structures are the only locations in the system where the fire flows are required to be 3,500 gpm for traditional fire hydrant fire protection. Elsewhere in the system, fire flows are checked for compliance with R309-105-9.

As stated in the source capacity analysis, peak day flows are equal to twice the average day flow, while the equation to calculate the peak instantaneous demand is found in the State of Utah Administrative Rules for Public Drinking Water Systems rule R309-105-9. This equation can also be found below.

Existing Peak Day Demand (FY 2008):
Indoor Use (Historic)

250 gpd/ERU X 699 ERU / 1,440 min/day = **121** gpm
$Q_{Peak\ Day}$ = 121 X 2 = **242** gpm

Existing Total Peak Day Demand:

$Q_{Total\ Peak\ Day} = Q_{Peak\ Day} + Q_{Fire\ Flow}$ = **3,742 gpm**

Existing Peak Instantaneous Demand:

$Q_{Peak\ Instantaneous\ (Indoor)} = 10.8 \times N^{0.64}$
(N = Number of ERUs)

$= 10.8 \times (699)^{0.64} =$ **714 gpm**

The resulting peaking factor is determined by dividing the existing peak instantaneous demand by the average day demand.

Peaking Factor (Historical) = 5.9

The Town's culinary water distribution system has been modeled, using the computer program H20Net® by MWHSoft. For the existing network under peak instantaneous demands there are several areas with pressures in the low 30s psi which does supply the required 30 psi, but is near insufficent. Overall the system seems to be providing good service to all other connections. Analysis of required fireflows under peak day demand, shows that there are areas that the existing system cannot produce the minimum required 1,000 gpm flows and some areas even produce flows less than 100 gpm. Mainly these areas contain undersized main lines (none of these locations have existing fire hydrants). The system also has areas that drop below the required 20 psi and in some instances pressures drop to negative.

Even though 1,000 gpm cannot be supplied everywhere in the system, the two structures

requiring 3,500 gpm are supplied with their required flows. 3,500 gpm flows are only obtained for these structures in select fire hydrants along Zion Park Boulevard, and these flows cannot be achieved off Zion Park Boulevard from the hydrants behind the large structures. A map of the existing system is provided in Appendix C.

B. PROJECTED DISTRIBUTION SYSTEM ANALYSIS

The projected distribution system analysis is performed using the same assumptions as used in the existing system analysis, except that the projected number of connections for year 2028 or under buildout conditions are inserted into the calculations. Two different scenarios will be explored by this analysis which include the following; a 20 year projection using historic usage, as well as buildout conditions, again using historic usage.

Projected Peak Day Demand (FY 2028):
Indoor Use (Historic)

250 gpd/ERU X 1,289 ERU / 1,440 min/day = **224** gpm
$Q_{Peak\ Day}$ = 224 X 2 = **448** gpm

Projected Total Peak Demand:
$Q_{Total\ Peak\ Day} = Q_{Peak\ Day} + Q_{Fire\ Flow}$ = **3,948 gpm**
Projected Peak Instantaneous Demand:

$Q_{Peak\ Instantaneous\ (Indoor)} = 10.8 \times N^{0.64}$
(N = Number of ERUs)

$= 10.8 \times (1,289)^{0.64}$ = **1,056 gpm**

Projected Peak Day Demand (Buildout):
Indoor Use (Historic)

250 gpd/ERU X 2,120 ERU / 1,440 min/day = **368** gpm
$Q_{Peak\ Day}$ = 368 X 2 = **736** gpm

Projected Total Peak Demand:
$Q_{Total\ Peak\ Day} = Q_{Peak\ Day} + Q_{Fire\ Flow}$ = **4,236 gpm**

Projected Peak Instantaneous Demand:

$Q_{Peak\ Instantaneous\ (Indoor)} = 10.8 \times N^{0.64}$
(N = Number of ERUs)

$= 10.8 \times (2,120)^{0.64}$ = **1,453 gpm**

Using each of the above listed flows the water system model was used to analyze the existing culinary water system. Results from the model can be found in the appendices. From deficiencies observed in the analysis specific improvements are recommended which will remedy problems in deficient areas.

C. RECOMMENDED DISTRIBUTION SYSTEM IMPROVEMENTS

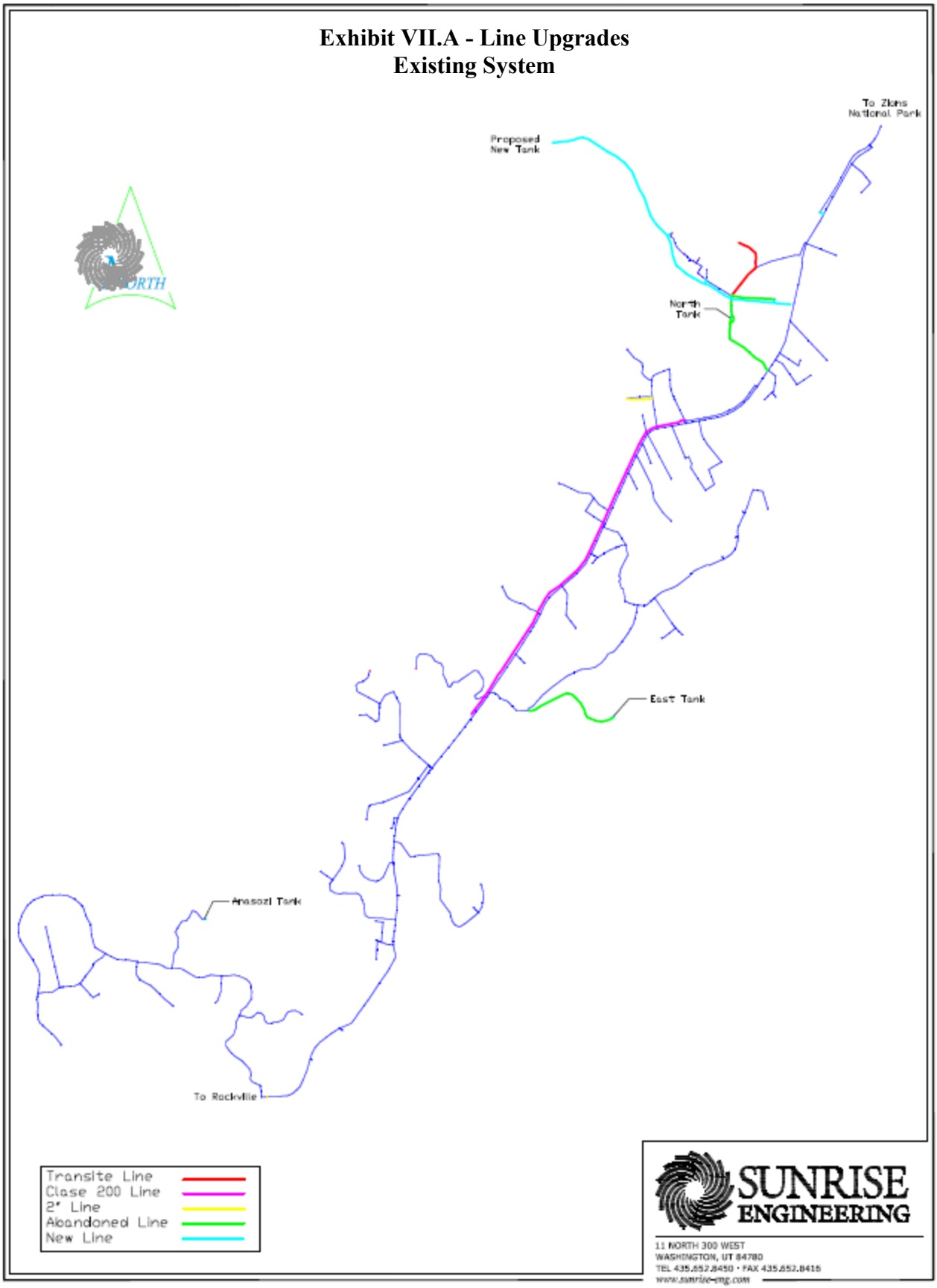
To meet the requirements set forth by the State of Utah Administrative Rules for Public Drinking Water Systems, R309-105-9, as previously mentioned, the Town of Springdale is in need of pipeline replacements and upsizing. Not only are these improvements suggested for existing system needs but also for future system needs.

Following the analysis done in H2ONet® by MWHSoft, the following distribution system improvements are being reccommended.

- An 8 inch line will replace the 2 inch line located along Foothill Lane running from Winderland Lane West to the end of Foothill Lane.
- A 10 inch PVC line will need to replace the current line along Zion Park Boulevard from approximately Paradise Road to Quail Ridge Road.
- A 12 inch line will need to be installed from the location of the new tank, located approximately near the top of Lion Boulevard, down Lion Boulevard and connecting into the line along Zion Park Boulevard.
- A 10 inch PVC line will also need to be installed tying into the new 12 inch line where Stone Mountain Road and Lion Boulevard intersect, across the field to where Paradise Road and Winderland Lane intersect, and down Paradise Road to Zion Park Boulevard. It should also be noted that this section of line is part of a development and not part of the recommended improvements.
- Additionally, due to government regulations on Transite lines used in culinary systems, an 8 inch PVC line will need to replace an old Transite line running North East from Lion Boulevard along Stone Mountain Road and up Stone Mountain Road as it heads North West.

Running the water model analysis with the proposed improvements shows the Town would be in compliance with State rules previously mentioned. Exhibit VII.A shows the location of the current lines that are to be replaced by the recommended improvements. It is also recommended that the Town keep record of dated and leaky lines that need to be replaced and create a renewal and replacement fund to pay for replacement of trouble lines as deemed necessary. Every 5 years or less the distribution system should be reanalyzed to insure it is compliant with up to date rules and regulations, this can be accomplished through an updated water master plan or similar analysis.

Exhibit VII.A - Line Upgrades
Existing System



SECTION VIII
SUMMARY OF RECOMMENDED CULINARY WATER SYSTEM IMPROVEMENTS

A. RECOMMENDED IMPROVEMENTS

Based on the findings from Sections III - VII, showing requirements for growth projected over the next 20 years and buildout, it is recommended that the Town proceed to implement the following recommended improvements in anticipation of increased system demands due to new growth. After modeling the system for projected flows over the next 20 years and under buildout conditions, the following summarizes the improvements recommended for the various aspects of the culinary water system.

Water Rights

1. The Town currently has enough water rights to service the Town, as well as through a 20 year planning period and buildout period.
2. Ensure current trends of outdoor water usage of irrigational water stay intact. Review with regard to secondary irrigation system and associated water rights.
3. Require developers to provide water rights.

Water Storage Capacity

1. Construct an additional 1 Million Gallon Concrete Storage Tank to accommodate expected buildout of the Town as well as provide emergency storage as a back up to treatment facility shutdowns.
2. Ensure additional water storage tank is located at high enough elevation to accommodate any foreseen developments.

Water Treatment

1. As the Town grows, an additional treatment facility upgrade will be required.
2. Ensure future design of treatment plant incorporates multiple trains for redundancy.

Water Source Capacity

1. The Town currently has enough water source capacity for their needs, but not enough through the 20 year planning and buildout periods. It is suggested that an evaluation be made at a later date since the shortage of capacity is expected sometime near the year 2024.
2. Consider expansion of treatment capacity to provide redundancy of source and to meet future demands.
3. It is also suggested that sources such as wells be monitored to ensure their continual effectiveness and to demonstrate beneficial use as it relates to water right requirements.

Distribution System

1. Replace 8” transit line with 8” PVC C900 pipe.
2. Replace existing 2” line in Foothill Lane with new 8” PVC C900 pipe.
3. Construct 10” line on Paradise Road and Zion Park Boulevard.
4. Construct 12” line from the new tank location to the highway.
5. Monitor lines that need to be replaced and put funds aside in a renewal and replacement fund to pay for outdated lines as seen fit.

B. ENGINEER'S OPINION OF PROBABLE COST

Engineer's opinions of probable costs for the recommended culinary water improvements are provided in Table VIII.B.1.

Included in the Opinions of Probable Cost for the proposed projects are anticipated construction costs, a contingency budget, and a budget for other normal project costs such as survey, administration, engineering, legal services, fiscal costs, rights-of-way and etc. **Please note that the date of the Opinion of Probable Cost is May 2008.**

This master plan is a 20-year plan, designed to consider the projected growth and required demands for the Town's culinary water system over the next 20 years. In addition to the 20-year plan, the Town of Springdale has asked that the demands under buildout be considered. The proposed improvements have taken into consideration both the 20-year plan, the buildout scenario and other desires of the Town. A review of the locations of the proposed improvements can be found on Exhibit VII.A, which can be found in Section VII. This exhibit shows the locations of the current water lines for replacement as well as the preliminary proposed placement of the 1 million gallon water tank.

C. PROPOSED FINANCING PLAN

Table VIII.C.1 outlines a sample financing plan for the recommended improvements. The total proposed cost for the financing plan is $2,968,600. This cost is split 69% / 31% into a DWB Loan and a DWB Grant. The financing plan assumes that the loan has an interest rate of 1% and payback term of 30 years. The financing plan also considers the expected first year expenses including salaries, utilities, legal and professional fees, as well as the existing debt service.

For the Town to pay for these expenses they would need to address impact fees and the monthly water user fee. The proposed amount for these fees can be found in Table VII.C.1. Section X will go into greater detail on how the impact fees were determined. The average monthly water user fee was calculated using the sample financing plan by taking all the expected expenditures and existing debt service and subtracting off the total impact fees and other expected revenues obtained that year. The amount was then divided by the number of expected ERUs in the system that year to come up with the average monthly water user fee per ERU. Then Section IX lays out possible water rate structures set to cover the average monthly water user fees.

The last portion of the financing plan accounts for the user's additional water fees from irrigation, which should be considered when totaling the user's water fees. Finally, the cash flow spreadsheet can be found in Appendix E, which implements the proposed financing plan over the next 20 year planning period. Included in the cash flow spreadsheet are anticipated projects, such as the water treatment facility which needs to be implemented into the current system within the next 16 years according to current growth trends.

TABLE VIII.B.1
Town of Springdale
Engineer's Opinion of Probable Cost 12-May-08
Install New 1.0 Million Gallon Tank, In Town Replacements ALA

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 96,000.00	$ 96,000.00
2	Earthwork 1.0 Million Gallon Tank	1	LS	$ 85,000.00	$ 85,000.00
3	Construct 1.0 Million Gallon Tank	1	LS	$ 800,000.00	$ 800,000.00
4	Tank Appurtenances	1	LS	$ 75,000.00	$ 75,000.00
5	Chainlink Fence & Gate	800	LN.FT.	$ 22.00	$ 17,600.00
6	Metering Station	1	LS	$ 25,000.00	$ 25,000.00
7	8" PVC Line & Fittings, Replace transite pipe, Foot Hill Lane	1,750	LN.FT.	$ 21.00	$ 36,750.00
8	8" Gate Valve Assembly	18	Each	$ 1,200.00	$ 21,600.00
9	Fire Hydrant Reconnection	16	Each	$ 2,000.00	$ 32,000.00
10	Fire Hydrant Assembly	4	EA.	$ 3,500.00	$ 14,000.00
11	10" PVC Line & Fittings, Paradise and Zion Park Boulevard	7,750	LN.FT.	$ 27.00	$ 209,250.00
12	10" Gate Valve Assembly	19	Each	$ 1,800.00	$ 34,200.00
13	12" PVC Line & Fittings, New Tank to Highway	5,250	LN.FT.	$ 33.00	$ 173,250.00
14	12" Gate Valve Assembly	5	EA.	$ 2,200.00	$ 11,000.00
15	Untreated Base Course (6" Depth in Trench)	91,163	SQ. FT.	$ 0.85	$ 77,488.55
16	Bituminous Surface Course	91,163	SQ. FT.	$ 2.15	$ 196,000.45
17	Reconnection of Meters (saddle, meter setter & service lateral pipe)	37	Each	$ 900.00	$ 33,300.00
18	Retrofitting the existing booster pumps to pump to the new tank	1	LS	$ 93,000.00	$ 93,000.00
19					
20	**Sub-Total**				$ 2,030,400
21	**Contingency**	14%			$ 284,300
22	**Total Construction**				**$ 2,314,700**
23	**INCIDENTALS**				
24	Funding & Administrative Services	1%	L.S.		$ 23,100
25	Legal and Fiscal		Est.		$ 69,800
26	Engineering Design	5.3%	L.S.		$ 156,000
27	Engineering Construction Services	5.5%	Hourly		$ 185,200
28	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ -
29	Environmental/Archeology		Est.		$ 20,000
30	Geotechnical Engineering		Est.		$ 30,000
31	Electrical Engineering		Est.		$ 15,000
32	Land & R/W Acquisition/Negotiation		Est.		$ 20,000
33	Water Rights Research and POD Applications		Est.		$ 10,000
34	Survey & GIS Mapping		Est.		$ 20,000
35	Radio Read Meters/Equipment/Software - Materials, no Install		Est.		$ 40,000
36	SCADA Improvements		Est.		$ 45,000
37	Miscellaneous Engineering Services		Est.		$ 20,000
38					
39	**TOTAL PROJECT COST**				**$ 2,968,800**

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.

TABLE VIII.C.1			
TOWN OF SPRINGDALE			
FY 2009 PROPOSED FINANCING PLAN			
TOTAL PROJECT COST			**$ 2,968,600**
FY 2009 EXPENSES			
Proposed Funding:	**Rate**	**Term in Yrs.**	**Principal**
Self Participation			200,000
DWB Grant			768,600
DWB Loan	1.00%	30	2,000,000
TOTAL PROJECT FUNDING:			**$2,968,600**
EXPENSES: (First Year of New Debt Serv. Pmt.)			
Salaries, wages and benefits			$121,911
Office expenses and travel			$6,584
Repairs and maintenance			$39,526
Utilities			$14,370
Legal and professional fees			$12,761
Garbage collection			$0
Contract services			$2,442
Insurance			$10,739
Miscellaneous			$15,235
Depreciation			$0
Subtotal Expenses:			**$223,568**
EXISTING DEBT SERVICE			
No Interest State Loan	0%		$17,080
Loan Reserve (Payment /10)			$1,708
Water Revenue Bond 1995A	0%	20	$48,000
Bond Reserve (Payment/6)			$8,000
Water Revenue Bond 2004 Tank Project	1%	20	$21,260
Bond Reserve (Payment/6)			$10,000
Subtotal Existing Annual Debt Service:			**$106,048**
NEW DEBT SERVICE			
New Loan(s)	100.0%	0	$77,496
Loan Reserve (Payment/10)			$7,700
Subtotal New Annual Debt Service:			**$85,196**
Renewal and Replacement Fund			$66,000
GRAND TOTAL EXPENSES:			**$480,812**
ANNUAL INCOME			
Transient Room Tax Revenues			$60,000
Projected Yearly Impact Fees Received			$70,201
Total Number Of ERUs			721
Average Monthly Water User Rate/ERU			**$40.52**
TOTAL ANNUAL INCOME:			**$480,812**
Average Monthly Irrigation Water User Rate/ERU			**$4.88**
Total Average Monthly Water Cost/ERU			**$45.40**

SECTION IX
WATER RATE ANALYSIS

A. GENERAL

Generally water rates are a combination of base rates and overage rates. Typically, a base amount of water is provided for the base rate charge. The base rate is charged to all connections in the system whether or not water is used. Overage rates are normally set to encourage water conservation. The Town has adopted the rate structure shown in Table IX.A.1. A separate structure has been established for either residential water use or commercial and other water use.

TABLE IX.A.1

Town of Springdale

Existing Residential Water Rate Structure

Total Base Rate	$13.46	per ERU/Month
Includes	0	Gallons

Overage Steps		
Cost Per 1,000 Gal.	Low Gallons	High Gallons
$2.92	0	5,000
$3.25	5,001	10,000
$3.59	10,001	25,000
$3.93	25,001	& UP

Existing Commercial and Other Water Rate Structure

Total Base Rate	$26.93	per Connection/ Month
Includes	0	Gallons

Overage Steps		
Cost Per 1,000 Gal.	Low Gallons	High Gallons
$4.49	0	10,000
$5.05	10,001	20,000
$5.61	20,001	50,000
$6.17	50,001	& UP

The overage step structure was established to promote conservation and reward low water users. The current average water rate has been established to be $27.18 for residential and $209.57 for commercial. These figures were determined by applying the average monthly usage of 4,568 gallons for residential and 35,550 gallons for commercial, to the rate structure currently use by the Town.

B. AVERAGE RATE DETERMINATION FOR FY 2009

Tables IX.B.1 shows a method used to determine the average water rate per ERU, which should be divided between all system customers. The purpose for considering FY 2009 is to determine the effect of the first full year of the new loans from suggested improvement projects, which is being funded by the Utah Division of Drinking Water Board.

As described in Section II an ERU is defined as a residential connection or a commercial connection using 250 gallons per day by historic usage for indoor use only. If a commercial connection uses 1,000 gallons per day it would then consist of 4 ERUs by historic use.

Annual revenues must be sufficient to cover the expenses incurred by the construction, maintenance, and administration of the water system. These expenses include debt service, utilities, personnel salaries and benefits, system maintenance, legal and professional fees, and other miscellaneous items. It is strongly recommended that the water department maintain a funded depreciation account or a replacement fund to provide the money necessary for replacement and repair of water department facilities and pipelines. The loan for the proposed project may require a fund where at least 5% of the expenses, including debt service, be set aside for this purpose.

In the most recent audit completed to date for the Town, total revenues from user fees for the Springdale Town water account in 2006 were $299,378. When $299,378 is divided by the

TABLE IX.B.1

TOWN OF SPRINGDALE

FIXED RATE ANALYSIS

FY 2009 Expenses	Fixed	Variable	Total
Salaries, wages and benefits	$ 85,338	$ 36,573	$ 121,911
Office expenses and travel	$ 4,609	$ 1,975	$ 6,584
Repairs and maintenance	$ 27,668	$ 11,858	$ 39,526
Utilities	$ 5,748	$ 8,622	$ 14,370
Legal and professional fees	$ -	$ 12,761	$ 12,761
Garbage collection	$ -	$ -	$ 0
Contract services	$ -	$ 2,442	$ 2,442
Insurance	$ 10,739	$ -	$ 10,739
Miscellaneous	$ 6,094	$ 9,141	$ 15,235
Depreciation	$ -	$ -	$ 0
EXISTING DEBT SERVICE (PARTIALLY IMPACT FEE ELIGIBLE)			
No Interest State Loan	$ 17,080	$ -	$ 17,080
Loan Reserve (Payment /10)	$ 1,708	$ -	$ 1,708
Water Revenue Bond 1995A	$ 48,000	$ -	$ 48,000
Bond Reserve (Payment/6)	$ 8,000	$ -	$ 8,000
Water Revenue Bond 2004 Tank Project	$ 21,260	$ -	$ 21,260
Bond Reserve (Payment/6)	$ 10,000	$ -	$ 10,000
NEW DEBT SERVICE (NOT IMPACT FEE ELIGIBLE)			
New Loan(s)	$ 11,449	$ -	$ 11,449
Loan Reserve (Payment/10)	$ 1,138	$ -	$ 1,138
Renewal and Replacement Fund	$ 9,751	$ -	$ 9,751
NEW DEBT SERVICE (IMPACT FEE ELIGIBLE)			
New Loan	$ 66,047	$ -	$ 66,047
Loan Reserve (Payment/10)	$ 6,562	$ -	$ 6,562
Renewal and Replacement	$ 56,249	$ -	$ 56,249
Total Expenses:	$ 397,439	$ 83,373	**$ 480,812**
Transient Room Tax Revenues	$ 60,000		
Impact Fee Income	$ 58,028	$ 12,173	$ 70,201
Total Expenses - Impact Fees	$ 279,411	$ 71,200	$ 350,611
Total Projected System ERUs in FY 2009	721	721	721
Monthly Cost/ERU in FY 2009	$32.29	$8.23	**$40.52**

estimated total number of ERUs in the system for 2006, which was 677 ERUs, and again by 12 months, the result is $36.85 per ERU per month. This amount is the average total cost per month that each ERU connected to the system paid (not including any impact fee revenue) in 2006. This value represents how much the total cost per ERU connected to the system would need to pay in order for the water budget to pay for itself with the yearly revenues it would take in. The previous year resulted in a slightly larger average total cost per month at $37.38.

The Town has set aside $60,000 a year from the Transient Room Tax to help pay for water fund expenses. By doing so it subsidizes the costs to the Town's customers. Therefore, this $60,000 was used in the analysis when estimating the new average cost per month per ERU. Based on the calculations shown in Table IX.B.1, the average water rate per residential connection (1ERU) for any newly adopted rate structure for the year 2009 would need to be approximately $40.52 when taking on new debt. This assumes that the system has 721 ERUs in 2009 when payments on a loan would begin. Note that the proposed funding shows that the average expenses per connection remain near current average rates and that the Town is able to make the financing payments for the proposed improvements

C. BASE AND OVERAGE RATE DETERMINATION

This study includes separating the average user rate into base and overage rates, and investigates possible rate structures that would promote conservation and work hand-in-hand with drought management policies. In order to determine a base and overage schedule, the projected expenses of the water system for FY 2009 have been separated into fixed and variable expenses (Table IX.B.1). It is recommended that the base rate and any portion paid by tax revenue should cover the fixed expenses of a system. However, Springdale Town may decide to lower the base rate, and increase the variable costs in order to promote conservation. Table IX.B.1 suggests a possible scenario for determining base and overage rates for Springdale Town. Included in the base rate is $32.29 for fixed costs and $8.23 for variable costs. This rate scenario simply identifies base and overage rates that should satisfy the revenue requirements based on estimated operation and maintenance (O&M) expenses and projected water usage. Springdale Town is able to set the rate structure to any amount it deems to be fair. However, the rates should be such that the system remains financially viable.

The Town of Springdale will need to determine a rate schedule / tax revenue package that will result in revenues that will average $40.52/ ERU/month in order to provide the necessary culinary water system improvements as recommended in this plan and maintain the current level of O&M. The base and overage rates should be examined each year to ensure that enough revenue is being generated to cover the expenses.

D. POSSIBLE RATE STRUCTURE

Tables IX.D.1 and IX.D.2 illustrate possible rate structures based partially on the base and overage rates suggested in Section C. The overage rate structure is stepped to promote conservation by charging a higher amount for excessive water usage similar to the existing rate structure used by the Town of Springdale. The tables also include some examples of water bills based on the proposed rate structure and show bills based on existing rates for comparison. Transient Room Tax revenue used to pay water fund expenses is included in this analysis. An amount is shown for the average monthly use of approximately 4,700 gallons for residential usage and 35,500 gallons for commercial usage. These figures are based on actual historical usages of 156 gpd for residential and 1,185 gpd for commercial. The

only way to confirm that the average rate produced will cover annual expenses is to implement the structure and evaluate the results after a few years of use.

TABLE IX.D.1

TOWN OF SPRINGDALE

Other Possible Water Rate Structures for Residential Water Usage

Total Base Rate $14.74 ERU/Month Includes 0 Gallons				Total Base Rate $17.52 ERU/Month Includes 0 Gallons			
Overage Steps				Overage Steps			
Cost Per 1,000 Gal.	Low Gallons	High Gallons		Cost Per 1,000 Gal.	Low Gallons	High Gallons	
$3.05	0	5,000		$2.46	0	5,000	
$3.40	5,001	10,000		$2.76	5,001	10,000	
$3.75	10,001	25,000		$3.06	10,001	25,000	
$4.10	25,001	& UP		$3.36	25,001	& UP	
Usage (Gallons)	In Town Rates			Usage (Gallons)	In Town Rates		
	New Rate	Old Rate			New Rate	Old Rate	
0	$ 14.74	$ 13.46		0	$ 17.52	$ 13.46	
3,000	$ 23.89	$ 22.22		3,000	$ 24.90	$ 22.22	
4,700	$ 29.08	$ 27.18		4,700	$ 29.08	$ 27.18	
10,000	$ 46.99	$ 44.31		10,000	$ 43.62	$ 44.31	
35,500	$ 146.29	$ 139.43		35,500	$ 124.80	$ 139.43	

TABLE IX.D.2

TOWN OF SPRINGDALE

Other Possible Water Rate Structures for Commercial Water Usage

Total Base Rate $31.45 ERU/Month Includes 0 Gallons				Total Base Rate $35.00 ERU/Month Includes 0 Gallons			
Overage Steps				Overage Steps			
Cost Per 1,000 Gal.	Low Gallons	High Gallons		Cost Per 1,000 Gal.	Low Gallons	High Gallons	
$4.78	0	10,000		$4.68	0	10,000	
$5.38	10,001	20,000		$5.28	10,001	20,000	
$5.98	20,001	50,000		$5.88	20,001	50,000	
$6.58	50,001	& UP		$6.48	50,001	& UP	
Usage (Gallons)	In Town Rates			Usage (Gallons)	In Town Rates		
	New Rate	Old Rate			New Rate	Old Rate	
0	$ 31.45	$ 26.93		0	$ 35.00	$ 26.93	
3,000	$ 45.79	$ 40.40		3,000	$ 49.04	$ 40.40	
4,700	$ 53.92	$ 48.03		4,700	$ 57.00	$ 48.03	
10,000	$ 79.25	$ 71.83		10,000	$ 81.80	$ 71.83	
35,500	$ 225.74	$ 209.29		35,500	$ 225.74	$ 209.29	

WATER RATE ANALYSIS SUMMARY

2006 Average Rate = $36.85/ERU/Month

Est. Required FY 2008 Avg. Rate = $40.52/ERU/Month
(including tax revenue)

Recommendations

1. **Continue to review annually the ERU value for commercial connections.**
2. **Water rates and fees should be reviewed by the Town Council periodically to ensure that they remain abreast of actual inflation rates and costs.**

SECTION X
IMPACT FEES

A. IMPACT FEE

It is recommended that an impact fee should be charged to all new connections to the culinary water system. An impact fee that is charged by a community may be used to pay for the debt service associated with surplus capacity built into the system. The surplus capacity in the water system has been designed for growth, and for this reason, impact fees should pay for that portion of the debt service associated with the system surplus capacity. The impact fee should also be used to pay for the cost of improvements to the system that are required to support new growth as new connections are added to the system. The existing impact fees can be found in Table X.A.1 below.

Table X.A.1 Existing Impact Fee

Connection	Impact Fee
3/4"	$3,725
1"	$6,625
1 1/2"	$14,910
2"	$23,505
3"	$59,635
4"	$106,020
6"	$238,550

B. CALCULATION

The total cost that is eligible for impact fee calculation is equal to the existing debt service from previous water improvements projects that can be attributed to new growth plus the portion of the proposed water improvements project that will be constructed to accommodate new growth. The combined total cost that is due to new growth is divided by the number of new ERUs that will be added to the system during the 20-year planning period.

The impact fee calculation found in Table X.B.1 shows that the maximum impact fee that the Town of Springdale may assess each new ERU is $6,060 which includes existing debt service previously included in the former impact fee calculations. The Town is free to charge less than the maximum if it decides to do so, but should ensure that collected impact fees be sufficient to cover future culinary water system needs and payments made for debt incurred for this project. Please note that this impact fee calculation assumes that the system improvements constructed, the expenses for those improvements and funding package match those in this report. Should any of these conditions change, the impact fee should be adjusted accordingly.

The percentage eligible for impact fees for the new debt service was determined by whether the improvements were needed to allow the system to meet State requirements now or in the future. The percent of impact fee eligible costs for the recommended project in this plan average 85%.

When the Town allows connections larger than the assumed ¾" residential connection, larger impact fees should be charged for these larger connections as has been done in the past. Table X.B.1 includes at the bottom the proposed impact fees associated with the size of the connection required and assumes that a ¾" water service connection is equivalent to 1 ERU. Each ERU with a ¾" connection would then pay an impact fee of $6,060 or the amount the Town of Springdale decides to charge. For larger meters the base impact fee of $6,060 is increased according to the percent increase in flow capacity of each size of meter.

TABLE X.B.1

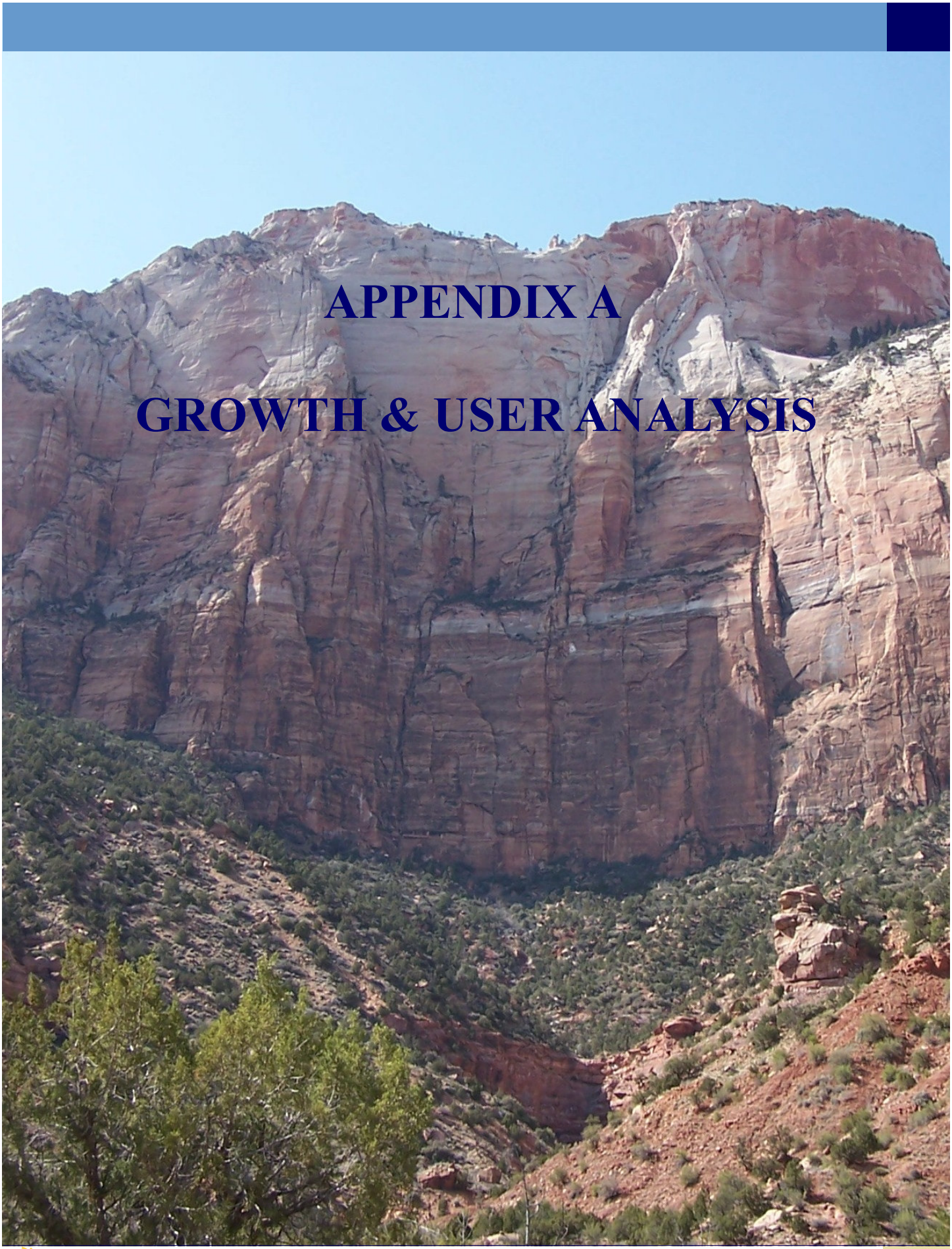
TOWN OF SPRINGDALE
IMPACT FEE ANALYSIS FY 2007
CULINARY WATER MASTER PLAN

EXISTING DEBT SERVICE	% Eligible		Eligible
No Interest State Loan	100%	$	102,480
Water Revenue Bond 1995A	100%	$	306,000
Water Revenue Bond 2004 Tank Project	100%	$	1,014,890
Existing Impact Fee Eligible Cost:		$	1,423,370

PROPOSED IMPROVEMENT PROJECTS			
Total Estimated 2008 Project Cost		$	2,968,800
Total Estimated 2008 Project Cost Paid in Grant Funds		$	(768,800)
% Of New Project Cost Due to New Growth	85.2%	$	1,874,980
Interest From New Debt Service	$324,887	$	276,889
Impact Fee Eligible Cost		$	2,151,869
No. of ERUs (2007)			699
Future ERUs (2028 Historic)			1,289
No. of New ERUs Due to Growth			590
Impact Fee Eligible Cost for Improvement Projects		$	3,575,239

Impact Fee Amount for Improvement Projects = Total Eligible Cost / New ERUs	$	6,060	/Conn.
Additional Amount per connection for Future Water Rights	$	-	/Conn.
Proposed Impact Fee for Town of Springdale Water Users (FY2007) =	**$**	**6,060**	/Conn.

Meter Size	Cross-Sectional Area (in^2)	% Area In-crease	Impact Fee	
3/4"	0.44	0%	$	6,060
1"	0.79	80%	$	10,880
1 1/2"	1.77	302%	$	23,377
2"	3.14	614%	$	43,244
3"	7.07	1507%	$	97,369
4"	12.57	2757%	$	173,115
6"	28.27	6325%	$	389,338



APPENDIX A

GROWTH & USER ANALYSIS

Water Usage Data

Month & Year	Water Usage Data				Connection Data		
	Residential	Commercial	Other	Total	Residential	Commercial	Other
Jan-05	598	1,146	4	1,748	206	91	4
Feb-05	590	1,015	4	1,609	208	91	4
Mar-05	774	2,343	6	3,122	208	91	4
Apr-05	766	2,623	31	3,420	207	91	4
May-05	1,099	3,892	13	5,004	213	91	4
Jun-05	1,109	4,065	30	5,204	211	92	4
Jul-05	1,117	3,886	12	5,015	211	92	4
Aug-05	1,232	4,868	14	6,114	215	95	4
Sep-05	1,365	4,193	6	5,564	211	94	3
Oct-05	2,822	13,492	13	16,328	211	94	3
Nov-05	974	7,746	9	8,729	211	94	4
Dec-05	742	1,425	3	2,170	212	94	4
Jan-06	748	1,553	5	2,306	214	96	4
Feb-06	758	1,391	6	2,155	216	94	4
Mar-06	831	1,973	6	2,809	217	95	4
Apr-06	703	2,634	9	3,345	215	95	4
May-06	1,223	3,505	13	4,741	214	94	4
Jun-06	1,354	4,901	10	6,264	218	94	4
Jul-06	951	3,234	11	4,196	215	94	4
Aug-06	1,289	4,557	16	5,862	217	94	4
Sep-06	1,141	3,704	13	4,857	217	96	4
Oct-06	886	3,429	20	4,335	221	95	4
Nov-06	784	2,017	26	2,828	218	97	4
Dec-06	884	1,527	35	2,446	219	95	5
Jan-07	865	1,142	26	2,033	219	95	5
Feb-07	700	1,360	29	2,088	221	96	6
Mar-07	791	2,308	38	3,137	221	96	5
Apr-07	879	3,344	39	4,262	221	95	5
May-07	1,108	4,073	35	5,215	221	95	5
Jun-07	1,214	4,353	14	5,580	220	95	5
Jul-07	1,792	5,250	12	7,054	222	95	5
Aug-07	1,189	4,203	9	5,401	224	95	5
Sep-07	1,090	3,715	8	4,812	222	95	6
Oct-07	1,089	3,950	23	5,062	223	95	6
Nov-07	820	2,200	22	3,042	224	95	6
Dec-07	673	1,167	3	1,842	222	96	6
Jan-08	713	1,534	4	2,251	223	96	6
Feb-08	609	1,311	8	1,928	228	96	6
Mar-08	809	2,692	7	3,508	223	95	6
Total	**27,608**	**127,718**	**590**	**167,386**			

Year	Yearly Usage in 1,000 Gallons				Average Yearly Connections		
2005	13,186	50,695	145	64,026	210	93	4
2006	11,552	34,423	169	46,144	217	95	4
2007	12,209	37,063	257	49,530	222	95	5
2008	2,131	5,537	19	7,687	225	96	6

Year	Monthly Averages by Year				Weighted Usage (Winter)		
2005 Ave	1,098,833	4,224,583	12,083	5,335,500	62	255	20
2006 Ave	962,667	2,868,583	14,083	3,845,333	114	504	40
2007 Ave	1,017,417	3,088,583	21,417	4,127,500	121	465	196
2008 Ave	1,065,500	2,768,500	9,500	3,843,500	107	616	26

Year	Average Usage Per Connection			
	Residential		Commercial	
	Monthly	Daily	Monthly	Daily
2005	5,233	172	45,426	1,493
2006	4,436	146	30,196	993
2007	4,583	151	32,511	1,069
2008	4,736	156	28,839	948

Table II. C-1

Year	Residential Connections	Commercial ERUs	Other ERUs	**Total ERU's**
2005	210	93	4	307
2006	217	95	4	316
2007	222	95	5	322
*2008	225	96	6	327
*2009	232	99	0	331

** Future connections projected using assumed growth rate*

	Res. Conn.	Rate
2005	210	
2006	217	3.33%
2007	222	2.30%
2008	225	1.35%
2009	232	3.10%

ASSUMED GROWTH RATE **3.10%**

Average Usage Per Connection

	2005	2006	2007	2008	Average
Residential					**05 - 07**
Usage (gallons)	13,186,000	11,552,000	12,209,000	2,131,000	12,315,667
Connections (ERUs)	210	217	222	225	216
Usage Per Connection (gal/year)	62,790	53,235	54,995	9,471	57,007
Daily Usage Per Connection (gal/day)	172	146	151	158	**156**
This master plan will use a historical daily ERU usage of				250	gpd/conn.
This master plan will also use the state standard daily ERU usage of				400	gpd/conn.
Commercial					
Usage (gallons)	50,695,000	34,423,000	37,063,000	5,537,000	40,727,000
Connections	93	95	95	96	94
Usage Per Connection (gal/year)	545,108	362,347	390,137	57,677	432,531
Daily Usage Per Connection (gal/day)	1,493	993	1,069	961	1,185
Equivalent Residential Unit - Historical	5.97	3.97	4.28	3.85	4.74
Equivalent Residential Unit - State	3.73	2.48	2.67	2.40	2.96
Commercial ERUs - Historical	556	377	406	369	406
Commercial ERUs - State	347	236	254	231	254
Other					
Usage (gallons)	145,000	169,000	257,000	19,000	190,333
Connections	4	4	5	6	4
Usage Per Connection (gal/year)	36,250	42,250	51,400	3,167	43,300
Daily Usage Per Connection (gal/day)	99	116	141	9	119
Equivalent Residential Unit	0.58	0.79	0.93	0.33	1
Other ERUs	4	4	5	6	5
Total ERUs	770	598	633	600	**667**

*2008 numbers are shown but only for the first 3 months of the year. 2008 data is not used in the average calculations shown.

gallons per connection per day will be used in this master plan for current usage.

Average Usage (Winter Versus Summer)		Residential	Commercial	Other	
Yearly Average Usage		156	1,185		gpd/conn
Indoor Usage (December,January,February Ave Month Usage)		101	460		gpd/conn
Outdoor Usage (Total-Indoor)		55	725		gpd/conn

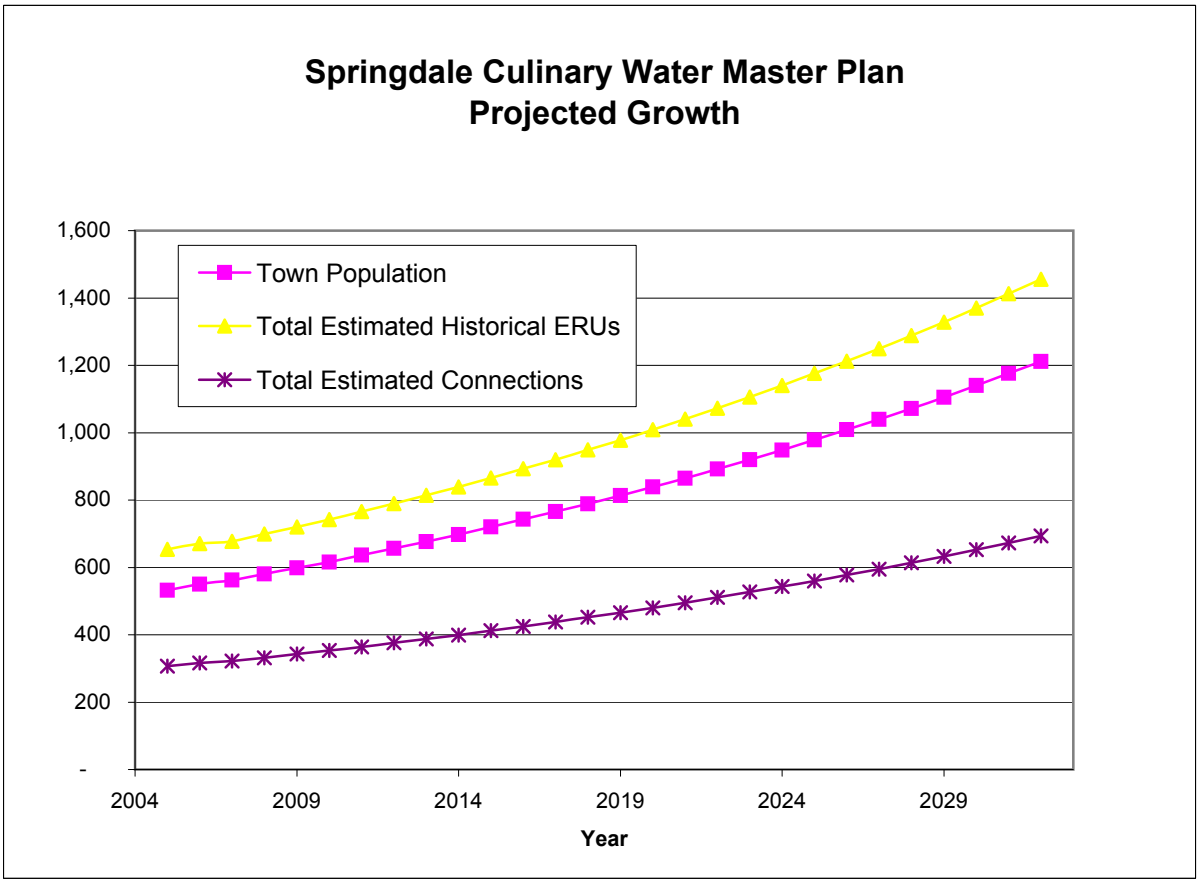
*For Residential Connections the average winter use can be considered indoor use in the summer with the remainder being outdoor use the rest of the year. For commercial connections this increase is likely due to tourist season being during the summer months and not outdoor use.

Population Data

	Population	% Growth
1970 Census Population	182	
1980 Census Population	258	3.6%
1990 Census Population	275	0.6%
2000 Census Population	457	5.2%
2006 Estimated Population	550	3.1%

3.6% Growth rate experienced between 1970 & 1980
0.6% Growth rate experienced between 1980 & 1990
2.1% Growth rate experienced between 1970 & 1990
5.2% Growth rate experienced between 1990 & 2000
3.1% Growth rate experienced between 1970 & 2000
3.1% Growth rate experienced between 2000 & 2006
3.1% Growth rate experienced between 1970 & 2006

Growth Rate for 20 Year Residential Projections	3.1%
Growth Rate for 20 Year Commercial Projections	3.1%
Projected 20 Year Population (2027)	1,039
Projected 20 Year ERU's (2027)	1,249



Year	Est. Residential Growth Rate	Total Estimated Connections	Total Estimated Historical ERUs	Total Estimated State ERUs	Estimated Population
2005	-	307	654	489	532
2006	-	316	671	502	550
2007	-	322	677	508	563
2008	3.1%	332	699	525	580
2009	3.1%	343	720	541	598
2010	3.1%	353	742	558	616
2011	3.1%	364	766	575	636
2012	3.1%	376	790	593	656
2013	3.1%	388	814	612	677
2014	3.1%	399	839	630	697
2015	3.1%	412	866	650	720
2016	3.1%	425	893	671	743
2017	3.1%	438	920	691	765
2018	3.1%	452	949	713	788
2019	3.1%	466	978	735	814
2020	3.1%	480	1,009	758	839
2021	3.1%	495	1,040	781	864
2022	3.1%	511	1,073	806	892
2023	3.1%	527	1,106	831	920
2024	3.1%	543	1,140	856	948
2025	3.1%	560	1,176	883	978
2026	3.1%	578	1,212	911	1,009
2027	3.1%	595	1,249	939	1,039
2028	3.1%	614	1,288	968	1,072
2029	3.1%	633	1,328	998	1,105
2030	3.1%	653	1,370	1,029	1,141
2031	3.1%	673	1,413	1,061	1,176
2032	3.1%	694	1,456	1,094	1,212

* 2006 Data is based on an estimate provided by the US Census.

** Estimated Population is determined by multiplying the Estimated Residential ERU's by 2.46.

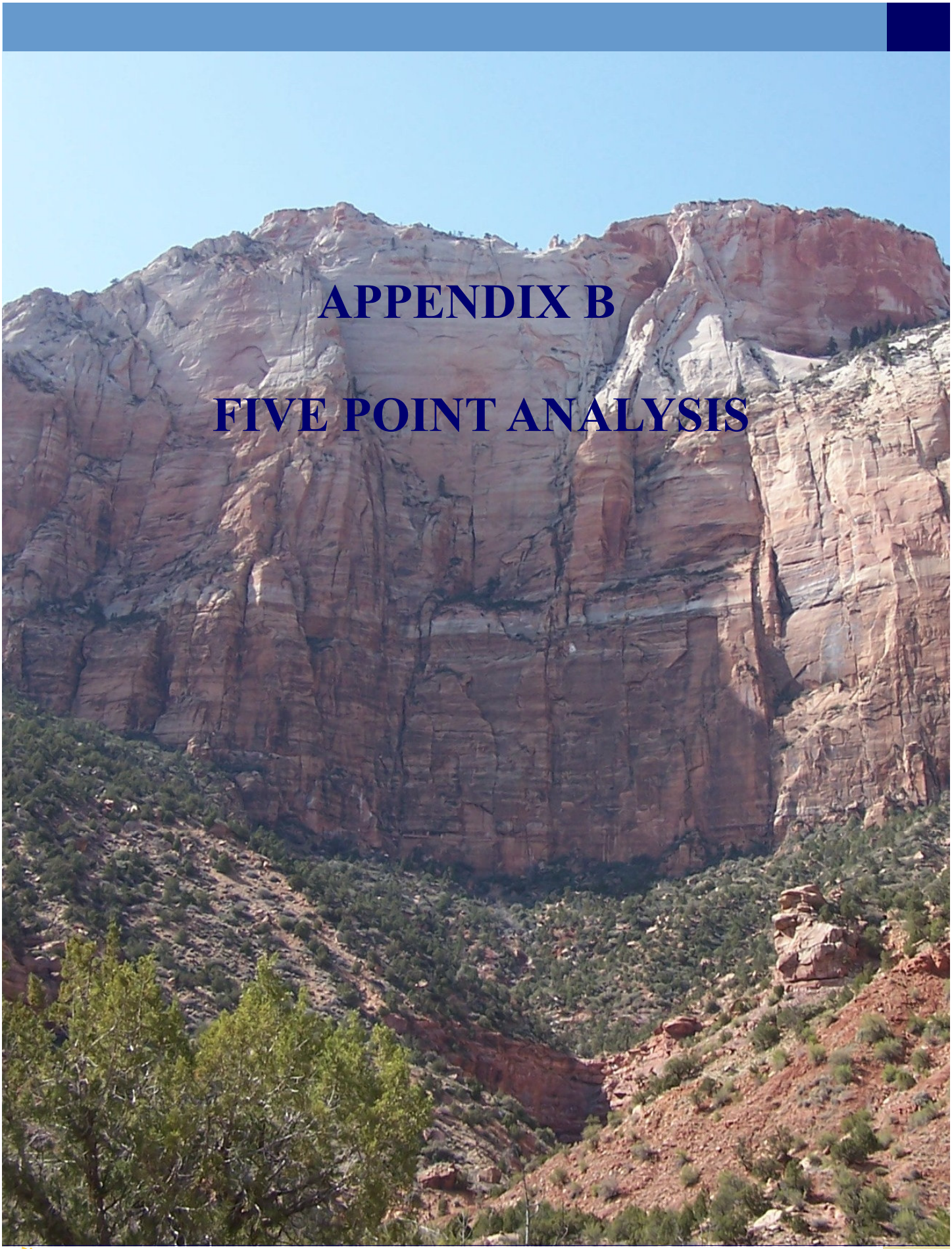
Buildout Calcualtions

From Town of Springdale

Town of Springdale Buildout Estimates				Current	Estimated
	Current	Estimated	ERC	ERUs	ERUs
Residential Connections	222	1022	1	222	1022
Hotel Rooms	666	1666	0.5	333	833
Restaurants	12	30	5.5	66	165
Other connections ERU	24	50	2	48	100
Build Out	924	2768		669	2120

From Springdale General Plan Dec. 2005 - Simple Acreage Division

Zones	Acres	Acres Vacant	Density	Existing	Potential	Total Buildout
Residential	1201	721		206		616
Foothill Residential	1053	661	2		330	
Valley Residential	148	60	0.75		80	
Commercial	269	114		91		381
Central Commercial	76	32	0.25		128	
Village Commercial	193	81	0.5		162	
Public Use	244	31	5	6	6	12
Agriculture	19	0	5	1	0	1
						1010



APPENDIX B

FIVE POINT ANALYSIS

Culinary Water Right Data

A.

Culinary Water Rights		Flow		
W.R. #	**Source**	**gpm**	**cfs**	**AcFt.**
81-105	Spring above ZNP Campground	7.2	0.016	11.58
81-220	Birch Springs East - West of ZNP Museum	18.8	0.042	30.41
81-274	Birch Springs West - West of ZNP Museum	31.4	0.070	50.68
81-585	Hummingbird Well	148.1	0.330	238.91
81-1326	Cemetary Well	65.1	0.145	104.98
81-2413	Big Springs	235.6	0.525	380.08
81-3392	Springdale Town for Municipal Use - Irrigation	596.9	1.330	365.95
	Total Water Rights	**1,103.2**	**2.458**	**1,182.6**

Other Water Rights of Interest (Slated for Irrigation)		Flow		
W.R. #	**Source/Owner**	**gpm**	**cfs**	**AcFt.**
81-1142	North Fork Virgin River Springdale Consolidated Irrigation Company	659.7	1.47	1,064.2
	Total Other Water Rights	660	1.47	1,064.2

B. Current & Projected Required Water Right (2008-2028+):

	Average Water Right Required (Historic Usage)	2008	2028	Buildout	
Historic Usage	Residential ERUs	229	423	1,022	ERUs
	Commercial ERUs (Historic)	464	855	998	ERUs
	Other ERUs	6	11	100	ERUs
	Total ERUs	699	1,289	2,120	ERU's
	Average Residential Water Use (Indoor + Outdoor) (gpd)	250	250	250	gpd
	Average Commercial Water Use (Indoor + Outdoor) (gpd)	250	250	250	gpd/ERU
	Average Other Water Use (Indoor + Outdoor) (gpd)	250	250	250	gpd/ERU
	Required Water Right for Residential Use (Indoor + Outdoor) (gpm)	40	73	177	gpm
	Required Water Right for Residential Use (Indoor + Outdoor) (AcFt)	64	118	286	Ac-Ft
	Required Water Right for Commercial Use (gpm)	81	148	173	gpm
	Required Water Right for Commercial Use (AcFt)	130	239	279	Ac-Ft
	Required Water Right for Other Use (gpm)	1	2	17	gpm
	Required Water Right for Other Use (AcFt)	2	3	28	Ac-Ft
	Culinary System Water Right Surplus/(Deficit) (gpm)	982	879	735	gpm
	Culinary System Water Right Surplus/(Deficit) (AcFt)	987	822	589	Ac-Ft
State Usage 400 gpd/ERU	**Average Water Right Required (State Usage)**	**2008**	**2028**	**Buildout**	
	Residential ERUs	229	423	1,022	ERUs
	Commercial ERUs (State)	290	534	998	ERUs
	Other ERUs	6	11	100	ERUs
	Total ERUs	525	968	2,120	ERU's
	Average Residential Water Use (Indoor + Outdoor) (gpd)	400	400	400	gpd
	Average Commercial Water Use (Indoor + Outdoor) (gpd)	400	400	400	gpd/ERU
	Average Other Water Use (Indoor + Outdoor) (gpd)	400	400	400	gpd/ERU
	Required Water Right for Residential Use (Indoor + Outdoor) (gpm)	64	118	284	gpm
	Required Water Right for Residential Use (Indoor + Outdoor) (AcFt)	103	190	458	Ac-Ft
	Required Water Right for Commercial Use (gpm)	81	148	277	gpm
	Required Water Right for Commercial Use (AcFt)	130	239	447	Ac-Ft
	Required Water Right for Other Use (gpm)	2	3	28	gpm
	Required Water Right for Other Use (AcFt)	3	5	45	Ac-Ft
	Culinary System Water Right Surplus/(Deficit) (gpm)	957	834	514	gpm
	Culinary System Water Right Surplus/(Deficit) (AcFt)	947	749	233	Ac-Ft

B. **Current Required Water Right**

Using Town of Springdale Historic Average Consumption 250 gpd/conn.

Table 3.B-1

Average Demand (Total Use)									
Residential Use									
229	ERUs X	250 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			40	gpm
229	ERUs X	250 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	64	acft		
Commercial Use									
464	ERUs X	250 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			81	gpm
464	ERUs X	250 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	130	acft		
Other Use									
6	ERUs X	250 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			1	gpm
6	ERUs X	250 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	2	acft		
	Total Required Water Right					**196**	**Acft**	**121**	**gpm**
	Existing Culinary System Water Right Surplus					**987**	**Acft**	**982**	**gpm**

Projected 20 Year Required Water Right

Using Town of Springdale Historic Average Consumption 250 gpd/conn.

C. Table 3.C-1

Average Demand (Total Use)									
Residential Use									
423	ERU's X	250 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			73	gpm
423	ERU's X	250 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	118	acft		
Commercial Use									
855	ERU's X	250 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			148	gpm
855	ERU's X	250 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	239	acft		
Other Use									
11	ERU's X	250 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			2	gpm
11	ERU's X	250 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	3	acft		
	Total Required Water Right					**361**	**Acft**	**224**	**gpm**
	Projected Culinary System Water Right Surplus					**822**	**Acft**	**879**	**gpm**

Projected Buildout Required Water Right

Using Town of Springdale Historic Average Consumption 250 gpd/conn.

D. Table 3.D-1

Average Demand (Total Use)										
Residential Use										
1,022	ERU's X	250 gpd	X	1 day	X	1 hr	=			177 gpm
		ERU		24 hr		60 min.				
1,022	ERU's X	250 gpd	X	365 day	X	1 Acft.	=	286	acft	
		ERU		1 yr		325,829 gal				
Commercial Use										
998	ERU's X	250 gpd	X	1 day	X	1 hr	=			173 gpm
		ERU		24 hr		60 min.				
998	ERU's X	250 gpd	X	365 day	X	1 Acft.	=	279	acft	
		ERU		1 yr		325,829 gal				
Other Use										
100	ERU's X	250 gpd	X	1 day	X	1 hr	=			17 gpm
		ERU		24 hr		60 min.				
100	ERU's X	250 gpd	X	365 day	X	1 Acft.	=	28	acft	
		ERU		1 yr		325,829 gal				
Total Required Water Right								**594**	**Acft**	**368 gpm**
Projected Culinary System Water Right Surplus								**589**	**Acft**	**735 gpm**

E. **Current Required Water Right**

Using Town of Springdale State Standard Average Consumption 400 gpd/conn.

Table 3.E-1

Average Demand (Total Use)										
Residential Use										
229	ERUs X	400 gpd	X	1 day	X	1 hr	=			64 gpm
		ERU		24 hr		60 min.				
229	ERUs X	400 gpd	X	365 day	X	1 Acft.	=	103	acft	
		ERU		1 yr		325,829 gal				
Commercial Use										
290	ERUs X	400 gpd	X	1 day	X	1 hr	=			81 gpm
		ERU		24 hr		60 min.				
290	ERUs X	400 gpd	X	365 day	X	1 Acft.	=	130	acft	
		ERU		1 yr		325,829 gal				
Other Use										
6	ERUs X	400 gpd	X	1 day	X	1 hr	=			2 gpm
		ERU		24 hr		60 min.				
6	ERUs X	400 gpd	X	365 day	X	1 Acft.	=	3	acft	
		ERU		1 yr		325,829 gal				
Total Required Water Right								**235**	**Acft**	**146 gpm**
Existing Culinary System Water Right Surplus								**947**	**Acft**	**957 gpm**

Projected 20 Year Required Water Right

Using Town of Springdale State Standard Average Consumption 400 gpd/conn.

F. Table 3.F-1

Average Demand (Total Use)										
Residential Use										
423	ERU's X	400 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			118	gpm
423	ERU's X	400 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	190	acft		
Commercial Use										
534	ERU's X	400 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			148	gpm
534	ERU's X	400 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	239	acft		
Other Use										
11	ERU's X	400 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			3	gpm
11	ERU's X	400 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	5	acft		
	Total Required Water Right					**434**	**Acft**	**269**	**gpm**
	Projected Culinary System Water Right Surplus					**749**	**Acft**	**834**	**gpm**

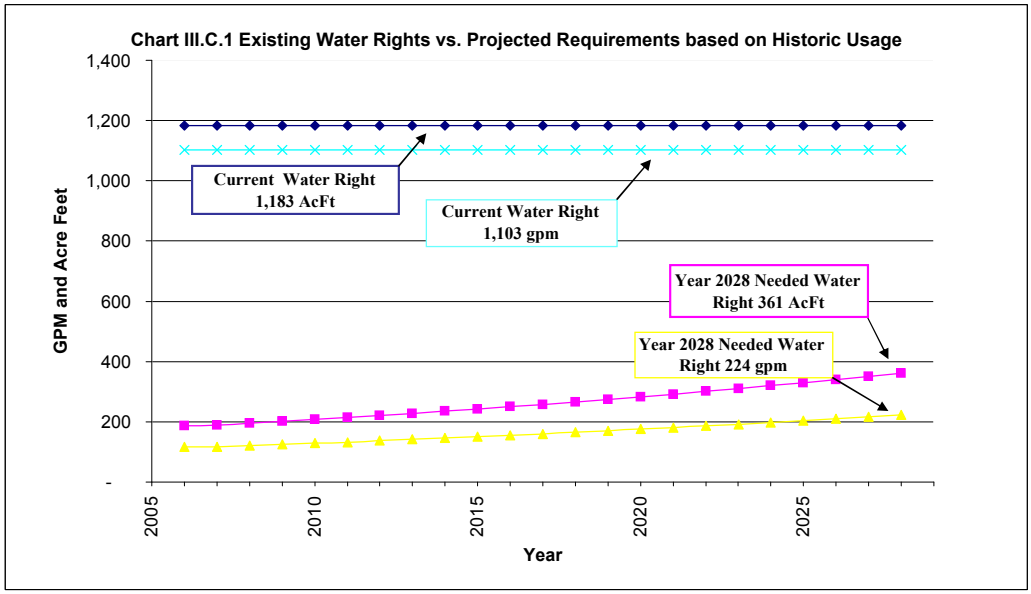
Projected Buildout Required Water Right

Using Town of Springdale State Standard Average Consumption 400 gpd/conn.

G. Table 3.G-1

Average Demand (Total Use)										
Residential Use										
1,022	ERU's X	400 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			284	gpm
1,022	ERU's X	400 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	458	acft		
Commercial Use										
998	ERU's X	400 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			277	gpm
998	ERU's X	400 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	447	acft		
Other Use										
100	ERU's X	400 gpd / ERU	X 1 day / 24 hr	X 1 hr / 60 min.	=			28	gpm
100	ERU's X	400 gpd / ERU	X 365 day / 1 yr	X 1 Acft. / 325,829 gal	=	45	acft		
	Total Required Water Right					**950**	**Acft**	**589**	**gpm**
	Projected Culinary System Water Right Surplus					**233**	**Acft**	**514**	**gpm**

Water Rights Summary (Not Including Irrigation)				
	Historic		**State**	
Existing Water Rights	**1,182.6**	**Acft**	**1,182.6**	**Acft**
Existing Water Rights Surplus	**986.8**	**Acft**	**947.4**	**Acft**
Projected 2028 Water Rights Surplus	**821.6**	**Acft**	**748.9**	**Acft**
Projected Buildout Water Rights Surplus	**588.9**	**Acft**	**232.6**	**Acft**
Surplus ERUs Serviceable at Buildout	**2,102**		**519**	



Minimum Required Water Right

Year	Water Right Available AcFt.	Historical Use AcFt.	Comm and Other AcFt.	20 Year AcFt.	Water Right Available gpm.	20 Year gpm.
2005	1,183	59	125	184	1,103	114
2006	1,183	61	127	188	1,103	117
2007	1,183	62	128	190	1,103	118
2008	1,183	64	132	196	1,103	122
2009	1,183	66	136	202	1,103	125
2010	1,183	68	140	208	1,103	129
2011	1,183	70	144	214	1,103	133
2012	1,183	73	149	222	1,103	138
2013	1,183	75	153	228	1,103	141
2014	1,183	77	158	235	1,103	146
2015	1,183	80	163	243	1,103	151
2016	1,183	82	168	250	1,103	155
2017	1,183	85	173	258	1,103	160
2018	1,183	87	179	266	1,103	165
2019	1,183	90	184	274	1,103	170
2020	1,183	93	190	283	1,103	175
2021	1,183	95	196	291	1,103	180
2022	1,183	99	202	301	1,103	187
2023	1,183	102	208	310	1,103	192
2024	1,183	105	215	320	1,103	198
2025	1,183	108	221	329	1,103	204
2026	1,183	111	228	339	1,103	210
2027	1,183	115	235	350	1,103	217
2028	1,183	118	243	361	1,103	224
Water Rights Surplus/(Deficit)				**822** AcFt.		**879** gpm

Water Source Capacity

A.

Town of Springdale Sources	Total Flow CFS	Total Flow gpm
Spring above ZNP Campground	0.000	0
Birch Springs East - West of ZNP Museum	0.000	0
Birch Springs West - West of ZNP Museum	0.000	0
Hummingbird Well	0.000	0
Cemetary Well	0.000	0
Big Springs	0.000	0
North Fork of the Virgin River	0.891	400
Source Total =	**0.891**	**400**

B. **Current & Projected Required Water Source (2008-2028+):**

Historic Use

Average Source Required - Historic Use	Year 2008	2028	Buildout	
Residential ERUs	229	423	1,022	ERUs
Commercial ERUs	464	855	998	ERUs
Other ERUs	6	11	100	ERUs
Total ERUs	699	1,289	2,120	ERUs
Residential/Other Peak Day Average Water Use (2 X Ave. Day)	500	500	500	gpd/ERU
Commercial Peak Day Average Water Use (2 X Ave. Day)	500	500	500	gpd/ERU
Required Water Source for Residential Use	80	147	355	gpm
Required Water Source for Commercial Use	161	297	347	gpm
Required Water Source for Other Use	2	4	35	gpm
Total Required Water Source	243	448	736	gpm
Culinary System Water Source Surplus/(Deficit)	157	(48)	(336)	gpm

C. **Current & Projected Required Water Source (2008-2028):**

State Standard Use

Average Source Required - State Std. Use	Year 2008	2028	Buildout	
Residential ERUs	229	423	1,022	ERUs
Commercial ERUs	290	534	998	ERUs
Other ERUs	6	11	100	ERUs
Total ERUs	525	968	2,120	ERUs
Residential/Other Peak Day Average Water Use (2 X Ave. Day)	800	800	800	gpd/ERU
Commercial Peak Day Average Water Use (2 X Ave. Day)	800	800	800	gpd/ERU
Required Water Source for Residential Use	127	235	568	gpm
Required Water Source for Commercial Use	161	297	554	gpm
Required Water Source for Other Use	3	6	56	gpm
Total Required Water Source	292	538	1,178	gpm
Culinary System Water Source Surplus/(Deficit)	108	(138)	(778)	gpm

Historic Usage Source

Required Indoor/Outdoor Source - Historic Usage

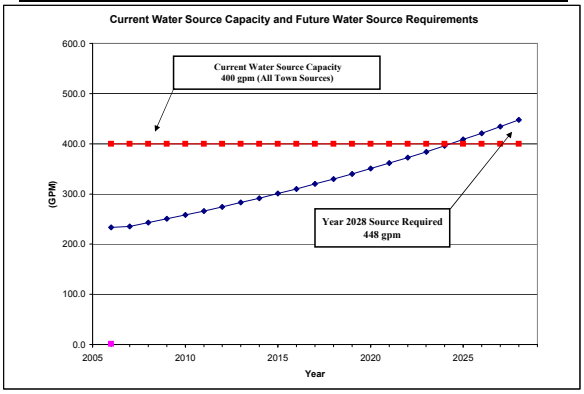
Residential ERUs							
229	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	80	gpm
Commercial ERUs							
464	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	161	gpm
Other ERUs							
6	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	2	gpm
Outdoor Use							
-	Irrigated Acres X	4.9 gpm / irrigated acre in zone 6			=	0	gpm
	Total Required Source Capacity					**243**	**gpm**
	Existing Culinary System Source Capacity Surplus					**157**	**gpm**

Required Indoor/Outdoor Source - Historic Usage

Residential ERUs							
423	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	147	gpm
Commercial ERUs							
855	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	297	gpm
Other ERUs							
11	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	4	gpm
Outdoor Use							
-	Irrigated Acres X	4.9 gpm / irrigated acre in zone 6			=	0	gpm
	Total Required Source Capacity					**448**	**gpm**
	Projected Culinary System Source Capacity Deficit					**-48**	**gpm**

Required Indoor/Outdoor Source - Historic Usage

Residential ERUs							
1,022	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	355	gpm
Commercial ERUs							
998	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	347	gpm
Other ERUs							
100	ERUs X	500 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	35	gpm
Outdoor Use							
-	Irrigated Acres X	4.9 gpm / irrigated acre in zone 6			=	0	gpm
	Total Required Source Capacity					**736**	**gpm**
	Projected Culinary System Source Capacity Deficit					**-336**	**gpm**



Water Source Capacity Summary - Historic Usage	
Existing Water Source	**400 GPM**
Existing Water Source Surplus	**157 GPM**
Projected 2028 Water Source Surplus	**-48 GPM**
Projected Buildout Water Source Deficit	**-336 GPM**
ERUs Serviceable at Buildout with Current Water Source	**(968)**

State Standard Source

Required Indoor/Outdoor Source - Historic Usage

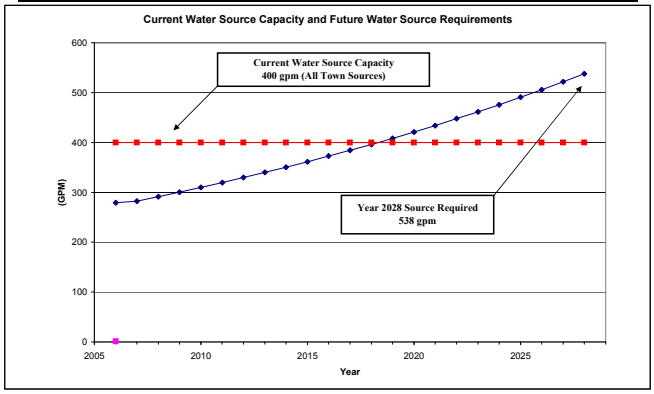
Residential ERUs							
229	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	127	gpm
Commercial ERUs							
290	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	161	gpm
Other ERUs							
6	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	3	gpm
Outdoor Use							
-	Irrigated Acres X	4.9 gpm / irrigated acre in zone 6			=	0	gpm
	Total Required Source Capacity					**292**	**gpm**
	Existing Culinary System Source Capacity Surplus					**108**	**gpm**

Required Indoor/Outdoor Source - Historic Usage

Residential ERUs							
423	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	235	gpm
Commercial ERUs							
534	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	297	gpm
Other ERUs							
11	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	6	gpm
Outdoor Use							
-	Irrigated Acres X	4.9 gpm / irrigated acre in zone 6			=	0	gpm
	Total Required Source Capacity					**538**	**gpm**
	Projected Culinary System Source Capacity Deficit					**-138**	**gpm**

Required Indoor/Outdoor Source - Historic Usage

Residential ERUs							
1,022	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	568	gpm
Commercial ERUs							
998	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	554	gpm
Other ERUs							
100	ERUs X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	56	gpm
Outdoor Use							
-	Irrigated Acres X	4.9 gpm / irrigated acre in zone 6			=	0	gpm
	Total Required Source Capacity					**1,178**	**gpm**
	Projected Culinary System Source Capacity Deficit					**-778**	**gpm**



Water Source Capacity Summary - State Standard Usage	
Existing Water Source	**400 GPM**
Existing Water Source Surplus	**108 GPM**
Projected 2028 Water Source Surplus	**-138 GPM**
Projected Buildout Water Source Deficit	**-778 GPM**
ERUs Serviceable at Buildout with Current Water Source	**(1,400)**

Water Storage Capacity

A.	Existing Storage Capacity:		
	North Concrete Tank	500,000	gal.
	East Concrete Tank	-	gal.
	Anasazi Steel Tank	200,000	gal.
	Total Existing Storage Capacity	**700,000**	**gal.**

Historic Usage

B. Existing Required Storage Capacity

Residential ERUs								
	250 gpd / ERU	X	229	ERUs	=	57,250	gpd
Commercial ERUs								
	250 gpd / ERU	X	464	ERUs	=	116,065	gpd
Other ERUs								
	250 gpd / ERU	X	6	ERUs	=	1,500	gpd
Fire Demand								
3,500 gpm	X	60 / 1 min/hr	X	3 hr	=	630,000	gal.
Emergency Supply								
25% of required storage						201,204	gal.
					Total Existing Required Storage	1,006,019	gal.
					Total Existing Storage Capacity	700,000	gal.
					Existing Storage Capacity Deficit	(306,019)	gal.

Projected Required Storage Capacity in 2028

Residential ERUs								
	250 gpd / ERU	X	423	ERUs	=	105,750	gpd
Commercial ERUs								
	250 gpd / ERU	X	855	ERUs	=	213,734	gpd
Other ERUs								
	250 gpd / ERU	X	11	ERUs	=	2,762	gpd
Fire Flow								
3,500 gpm	X	60 / 1 min/hr	X	3 hr	=	630,000	gal.
Emergency Supply								
25% of required storage						238,062	gal.
					Total Required Storage	1,190,308	gal.
					Total Existing Storage Capacity	700,000	gal.
					Future Storage Capacity Deficit	(490,308)	gal.

Projected Required Storage Capacity at Buildout									
Residential ERUs									
	250	gpd / ERU	X	1,022	ERUs	=		255,500	gpd
Commercial ERUs									
	250	gpd / ERU	X	998	ERUs	=		249,500	gpd
Other ERUs									
	250	gpd / ERU	X	100	ERUs	=		25,000	gpd
Fire Flow									
3,500 gpm	X	60 / 1	min / hr	X		3 hr	=	630,000	gal.
Emergency Supply									
25% of required storage								290,000	gal.
							Total Required Storage	1,450,000	gal.
							Total Existing Storage Capacity	700,000	gal.
							Future Storage Capacity Deficit	(750,000)	gal.

State Standard Usage

B. Existing Required Storage Capacity									
Residential ERUs									
	400	gpd / ERU	X	229	ERUs	=		91,600	gpd
Commercial ERUs									
	400	gpd / ERU	X	290	ERUs	=		115,967	gpd
Other ERUs									
	400	gpd / ERU	X	6	ERUs	=		2,400	gpd
Fire Demand									
3,500 gpm	X	60 / 1	min / hr	X		3 hr	=	630,000	gal.
Emergency Supply									
25% of required storage								209,992	gal.
							Total Existing Required Storage	1,049,959	gal.
							Total Existing Storage Capacity	700,000	gal.
							Existing Storage Capacity Deficit	(349,959)	gal.

Projected Required Storage Capacity in 2028									
Residential ERUs									
	400	gpd	X	423	ERUs	=		169,200	gpd
		ERU							
Commercial ERUs									
	400	gpd	X	534	ERUs	=		213,554	gpd
		ERU							
Other ERUs									
	400	gpd	X	11	ERUs	=		4,420	gpd
		ERU							
Fire Flow									
3,500 gpm	X	60	min	X		3	hr =	630,000	gal.
		1	hr						
Emergency Supply									
25%	of required storage							254,293	gal.
							Total Required Storage	1,271,467	gal.
							Total Existing Storage Capacity	700,000	gal.
							Future Storage Capacity Deficit	(571,467)	gal.

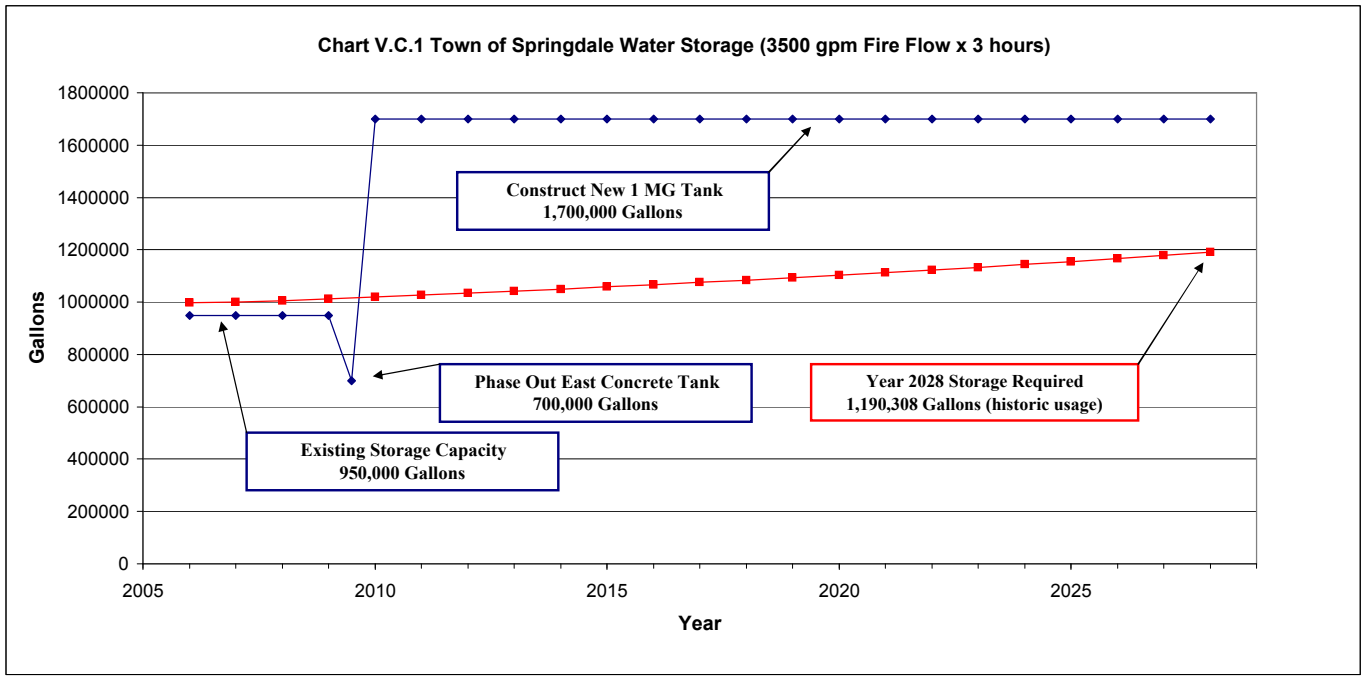
Projected Required Storage Capacity at Buildout									
Residential ERUs									
	400	gpd	X	1,022	ERUs	=		408,800	gpd
		ERU							
Commercial ERUs									
	400	gpd	X	998	ERUs	=		399,200	gpd
		ERU							
Other ERUs									
	400	gpd	X	100	ERUs	=		40,000	gpd
		ERU							
Fire Flow									
3,500 gpm	X	60	min	X		3	hr =	630,000	gal.
		1	hr						
Emergency Supply									
25%	of required storage							369,500	gal.
							Total Required Storage	1,847,500	gal.
							Total Existing Storage Capacity	700,000	gal.
							Future Storage Capacity Deficit	(1,147,500)	gal.

Water Storage Capacity Summary				
	Historic		**State Std.**	
Existing Water Storage Capacity	**700,000**	**gal.**	**700,000**	**gal.**
Existing Water Storage Surplus	**(306,019)**	**gal.**	**(349,959)**	**gal.**
Projected 2028 Water Storage Deficit*	**(490,308)**	**gal.**	**(571,467)**	**gal.**
Projected Buildout Water Storage Deficit*	**(750,000)**	**gal.**	**(1,147,500)**	**gal.**
ERUs Serviceable at buildout with current storage capacity*	**-3,000**		**-2,869**	

*Existing Storage may or may not service new connections through the planning period and beyond. Proposed new development should be added to the existing water model and checked for servicability with the existing tanks.

Water Storage Analysis

	Both				Historic Usage							State Standard Usage						
	Residential	Other	Existing	Fire Flow	Commercial	Residential	Commercial	Other	Emergency	20 Year	Surplus	Commercial	Residential	Commercial	Other	Emergency	20 Year	Surplus
Year	ERUs	ERUs	Storage	Stg rqd	ERUs	Stg rqd	Stg rqd	Stg rqd	Supply	Stg rqd	Storage	ERUs	Stg rqd	Stg rqd	Stg rqd	Supply	Stg rqd	Storage
			-															
2005	210	4	700,000	630,000	441	52,500	110,205	1,000	198,426	992,131	(292,131)	275	84,000	110,112	1,600	206,428	1,032,140	(332,140)
2006	217	4	700,000	630,000	450	54,250	112,575	1,000	199,456	997,281	(297,281)	281	86,800	112,480	1,600	207,720	1,038,600	(338,600)
2007	222	5	700,000	630,000	450	55,500	112,575	1,250	199,831	999,156	(299,156)	281	88,800	112,480	2,000	208,320	1,041,600	(341,600)
2008	229	6	700,000	630,000	464	57,250	116,065	1,500	201,204	1,006,019	(306,019)	290	91,600	115,967	2,400	209,992	1,049,959	(349,959)
2009	236	6	700,000	630,000	479	59,000	119,663	1,547	202,552	1,012,762	(312,762)	299	94,400	119,562	2,474	211,609	1,058,045	(358,045)
2010	243	6	700,000	630,000	493	60,750	123,372	1,594	203,929	1,019,646	(319,646)	308	97,200	123,268	2,551	213,255	1,066,274	(366,274)
2011	251	7	700,000	630,000	509	62,750	127,197	1,644	205,398	1,026,988	(326,988)	318	100,400	127,090	2,630	215,030	1,075,150	(375,150)
2012	259	7	700,000	630,000	525	64,750	131,140	1,695	206,896	1,034,481	(334,481)	328	103,600	131,029	2,712	216,835	1,084,176	(384,176)
2013	267	7	700,000	630,000	541	66,750	135,205	1,747	208,426	1,042,128	(342,128)	338	106,800	135,091	2,796	218,672	1,093,359	(393,359)
2014	275	7	700,000	630,000	558	68,750	139,397	1,802	209,987	1,049,935	(349,935)	348	110,000	139,279	2,882	220,540	1,102,702	(402,702)
2015	284	7	700,000	630,000	575	71,000	143,718	1,857	211,644	1,058,219	(358,219)	359	113,600	143,597	2,972	222,542	1,112,711	(412,711)
2016	293	8	700,000	630,000	593	73,250	148,173	1,915	213,335	1,066,673	(366,673)	370	117,200	148,048	3,064	224,578	1,122,890	(422,890)
2017	302	8	700,000	630,000	611	75,500	152,767	1,974	215,060	1,075,301	(375,301)	382	120,800	152,638	3,159	226,649	1,133,246	(433,246)
2018	311	8	700,000	630,000	630	77,750	157,502	2,036	216,822	1,084,110	(384,110)	393	124,400	157,370	3,257	228,757	1,143,783	(443,783)
2019	321	8	700,000	630,000	650	80,250	162,385	2,099	218,683	1,093,417	(393,417)	406	128,400	162,248	3,358	231,001	1,155,007	(455,007)
2020	331	9	700,000	630,000	670	82,750	167,419	2,164	220,583	1,102,916	(402,916)	418	132,400	167,278	3,462	233,285	1,166,424	(466,424)
2021	341	9	700,000	630,000	690	85,250	172,609	2,231	222,522	1,112,612	(412,612)	431	136,400	172,463	3,569	235,608	1,178,041	(478,041)
2022	352	9	700,000	630,000	712	88,000	177,960	2,300	224,565	1,122,825	(422,825)	445	140,800	177,810	3,680	238,072	1,190,362	(490,362)
2023	363	9	700,000	630,000	734	90,750	183,477	2,371	226,649	1,133,247	(433,247)	458	145,200	183,322	3,794	240,579	1,202,895	(502,895)
2024	374	10	700,000	630,000	757	93,500	189,164	2,445	228,777	1,143,886	(443,886)	473	149,600	189,005	3,912	243,129	1,215,645	(515,645)
2025	386	10	700,000	630,000	780	96,500	195,028	2,521	231,012	1,155,061	(455,061)	487	154,400	194,864	4,033	245,824	1,229,121	(529,121)
2026	398	10	700,000	630,000	804	99,500	201,074	2,599	233,293	1,166,466	(466,466)	502	159,200	200,905	4,158	248,566	1,242,828	(542,828)
2027	410	11	700,000	630,000	829	102,500	207,308	2,679	235,622	1,178,109	(478,109)	518	164,000	207,133	4,287	251,355	1,256,774	(556,774)
2028	423	11	700,000	630,000	855	105,750	213,734	2,762	238,062	1,190,308	(490,308)	534	169,200	213,554	4,420	254,293	1,271,467	(571,467)



Water Distribution

Historic Usage

Total Current ERUs = 699

A. Existing Distribution Requirement (Historical Usage):

Indoor Peak Instantaneous Demand:								
Q=	10.8 X N^.64			N= Number of ERU's				
Q=	10.8 X (699) ^.64					=	714	gpm
Outdoor Peak Instantaneous Demand:								
-	ERU. X	0.15 acre / ERU	X	9.8 gpm / irr. acre		=	-	gpm
	Current Peak Instantaneous Demand					=	**714**	**gpm**
Peak Day Demand & Fire Flow								
All ERUs								
699	ERU's X	500 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	243	gpm
Outdoor Usage								
-	ERU's X	110 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	0	gpm
	Fire Flow					=	3,500	gpm
	Current Peak Day Demand + Fire Flow					=	**3,743**	**gpm**

B. Total Projected ERUs 20 Years = 1,289

Distribution Requirement for projected 20 year growth (Historic Usage):

Indoor Peak Instantaneous Demand:								
Q=	10.8 X N^.64			N= Number of ERU's				
Q=	10.8 X 1,289 ^.64					=	1,057	gpm
Outdoor Peak Instantaneous Demand:								
-	ERU. X	0.15 acre / conn.	X	9.8 gpm / irr. acre		=	-	gpm
	Projected Peak Instantaneous Demand					=	**1,057**	**gpm**
Peak Day Demand & Fire Flow								
All ERUs								
1,289	ERU's X	500 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	448	gpm
Outdoor Usage								
-	ERU's X	110 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	-	gpm
	Fire Flow					=	3,500	gpm
	Projected Peak Day Demand + Fire Flow					=	**3,948**	**gpm**

C. Total Projected Buildout ERUs = 2,120

Distribution Requirement for projected buildout growth (Historic Usage):

Indoor Peak Instantaneous Demand:								
Q=	10.8 X N^.64			N= Number of ERU's				
Q=	10.8 X 2,120 ^.64					=	1,453	gpm
Outdoor Peak Instantaneous Demand:								
-	ERU. X	0.15 acre / conn.	X	9.8 gpm / irr. acre		=	-	gpm
	Projected Peak Instantaneous Demand					=	**1,453**	**gpm**
Peak Day Demand & Fire Flow								
All ERUs								
2,120	ERU's X	500 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	736	gpm
Outdoor Usage								
-	ERU's X	110 gpd / ERU	X	1 day / 24 hr	1 hr / 60 min.	=	-	gpm
	Fire Flow					=	3,500	gpm
	Projected Peak Day Demand + Fire Flow					=	**4,236**	**gpm**

State Standard Usage

Total Current ERUs = 525

A. Existing Distribution Requirement (State Standard Usage):

Indoor Peak Instantaneous Demand:							
Q=	10.8 X N^.64			N= Number of ERU's			
Q=	10.8 X (525) ^.64				=	595	gpm
Outdoor Peak Instantaneous Demand:							
-	ERU. X	0.15 acre / ERU	X	9.8 gpm / irr. acre	=	-	gpm
	Current Peak Instantaneous Demand				=	**595**	**gpm**
Peak Day Demand & Fire Flow							
All ERUs							
525	ERU's X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	292	gpm
Outdoor Usage							
-	ERU's X	110 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	0	gpm
	Fire Flow				=	3,500	gpm
	Current Peak Day Demand + Fire Flow				=	**3,792**	**gpm**

B. Total Projected ERUs 20 Years = 968

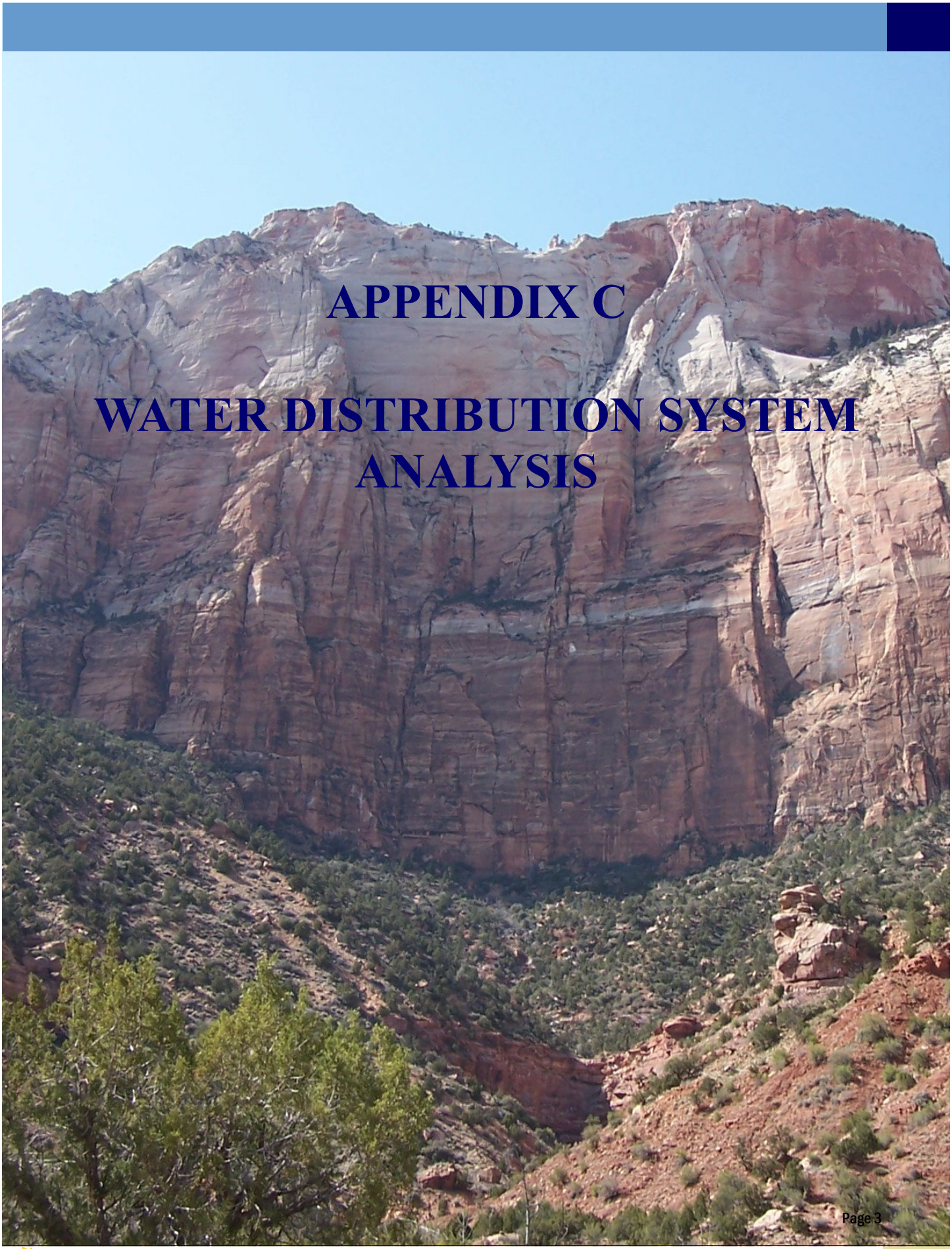
Distribution Requirement for projected 20 year growth (State Standard Usage):

Indoor Peak Instantaneous Demand:							
Q=	10.8 X N^.64			N= Number of ERU's			
Q=	10.8 X 968 ^.64				=	880	gpm
Outdoor Peak Instantaneous Demand:							
-	ERU. X	0.15 acre / conn.	X	9.8 gpm / irr. acre	=	-	gpm
	Projected Peak Instantaneous Demand				=	**880**	**gpm**
Peak Day Demand & Fire Flow							
All ERUs							
968	ERU's X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	538	gpm
Outdoor Usage							
-	ERU's X	110 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	-	gpm
	Fire Flow				=	3,500	gpm
	Projected Peak Day Demand + Fire Flow				=	**4,038**	**gpm**

C. Total Projected Buildout ERUs = 2,120

Distribution Requirement for projected buildout growth (State Standard Usage):

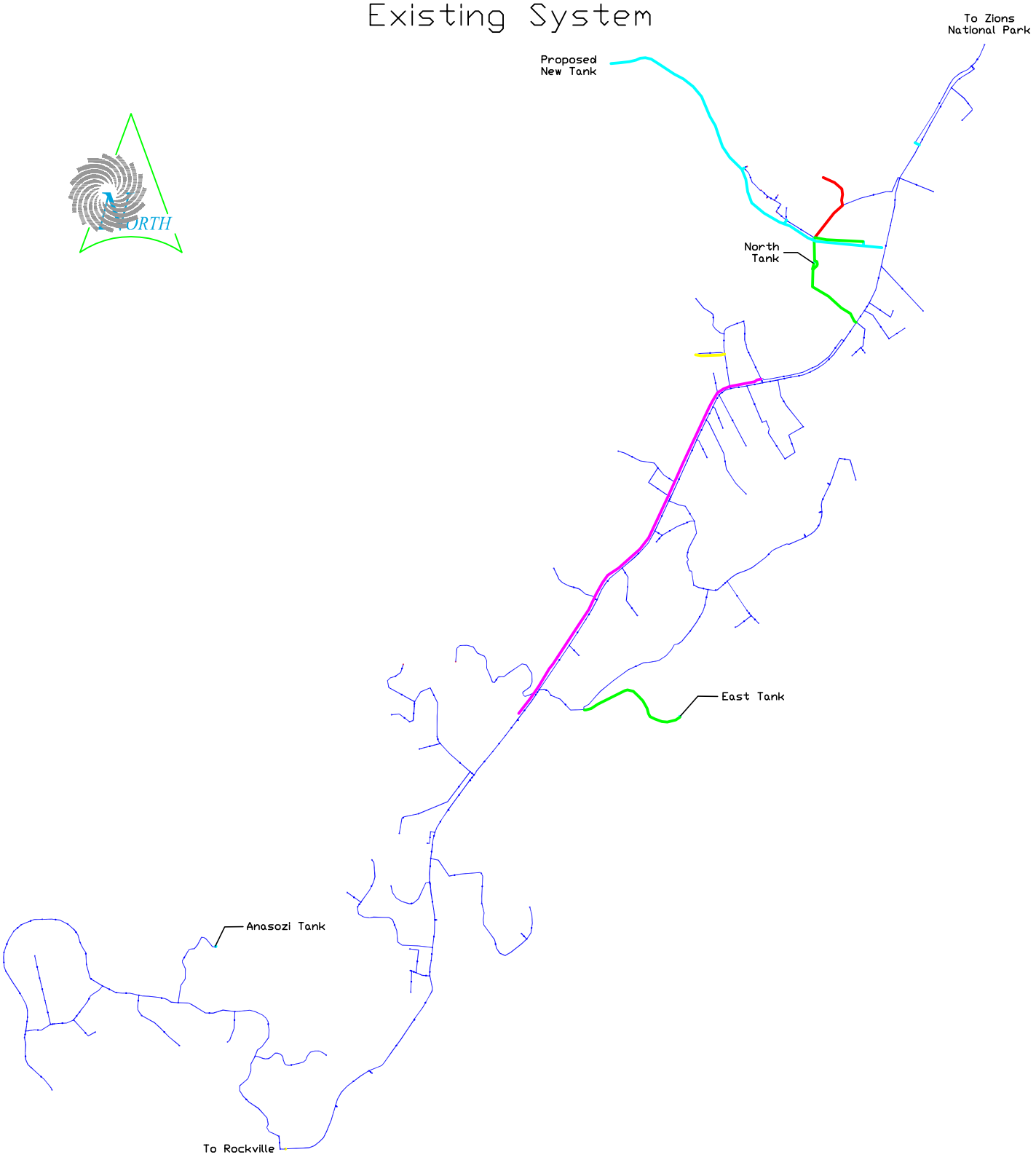
Indoor Peak Instantaneous Demand:							
Q=	10.8 X N^.64			N= Number of ERU's			
Q=	10.8 X 2,120 ^.64				=	1,453	gpm
Outdoor Peak Instantaneous Demand:							
-	ERU. X	0.15 acre / conn.	X	9.8 gpm / irr. acre	=	-	gpm
	Projected Peak Instantaneous Demand				=	**1,453**	**gpm**
Peak Day Demand & Fire Flow							
All ERUs							
2,120	ERU's X	800 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	1,178	gpm
Outdoor Usage							
-	ERU's X	110 gpd / ERU	1 day / 24 hr	1 hr / 60 min.	=	-	gpm
	Fire Flow				=	3,500	gpm
	Projected Peak Day Demand + Fire Flow				=	**4,678**	**gpm**



APPENDIX C

WATER DISTRIBUTION SYSTEM ANALYSIS

Springdale Culinary Water Master Plan
Line Upgrades
Existing System



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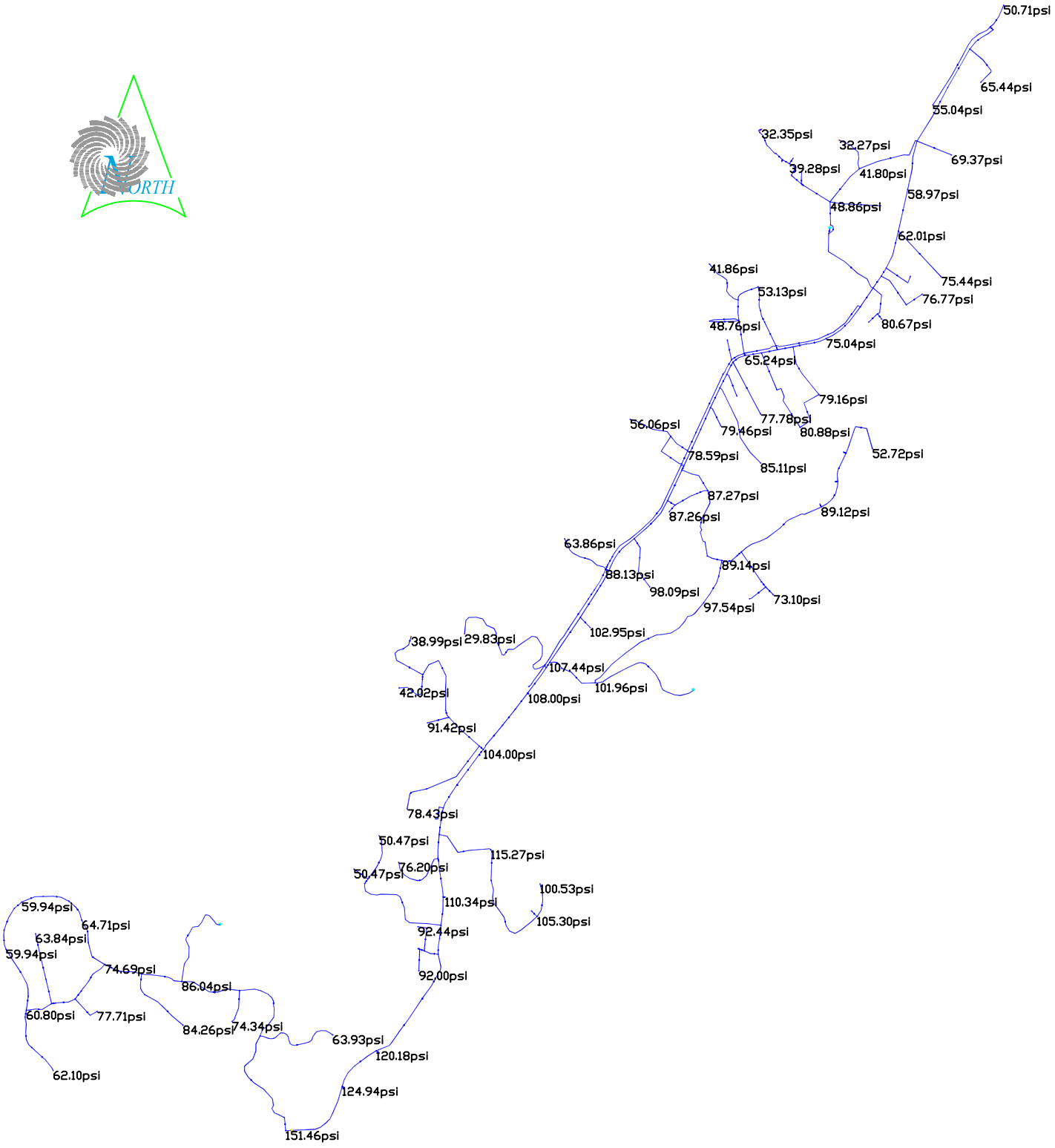
Springdale Culinary Water Master Plan
Existing Peak Instantaneous Demand
Existing System



HEADLOSS

0-5 ft	
5-10 ft	
10 + ft	

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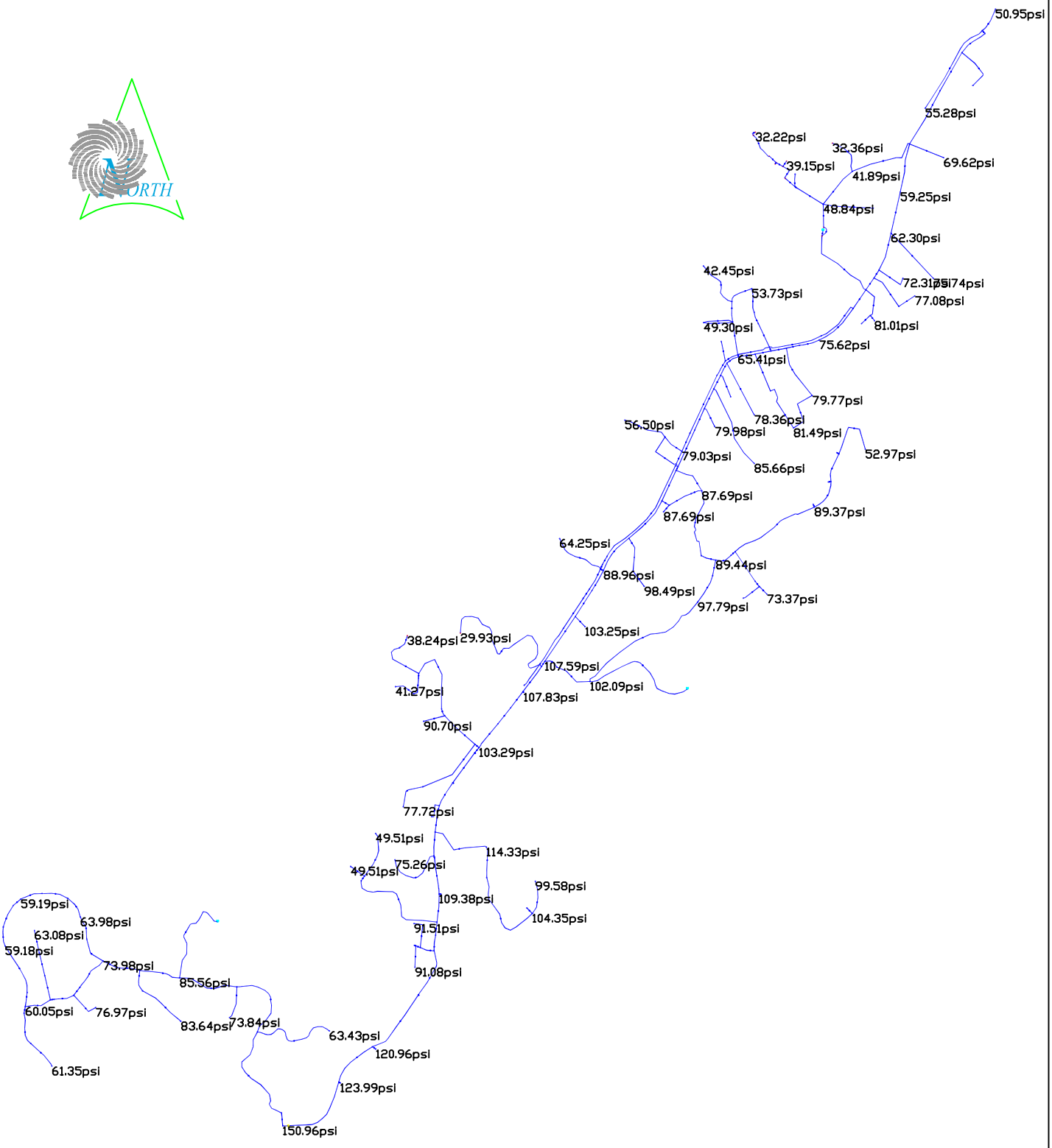
Springdale Culinary Water Master Plan
Future Peak Instantaneous Demand
Existing System



HEADLOSS

0-5 ft	
5-10 ft	
10 + ft	

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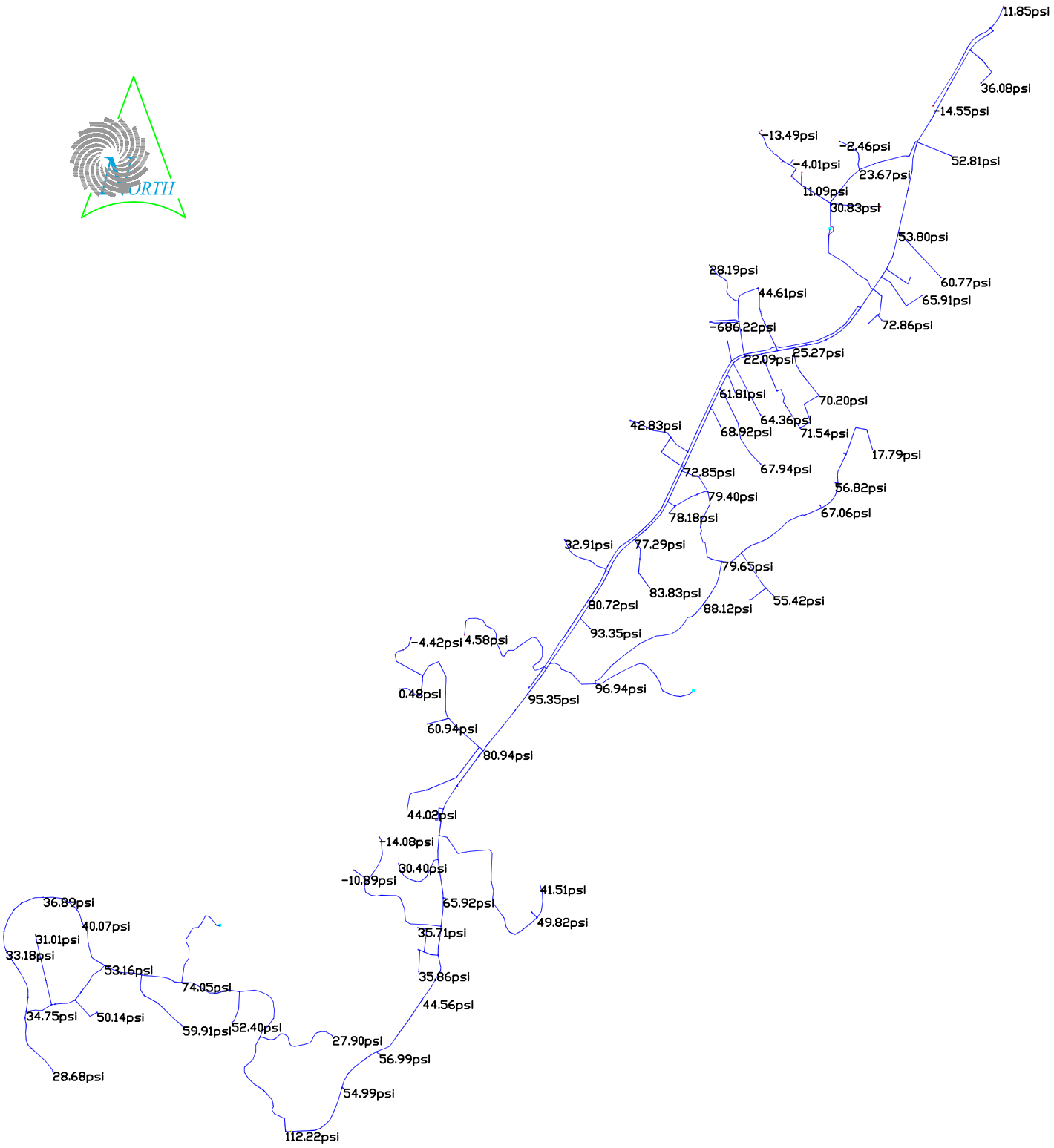
Springdale Culinary Water Master Plan
Existing Fire Flow Demand
Existing System



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Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
1	J10	65.68	1,000.00	36.31	3,996.79	1,298.90
2	J100	42.45	1,000.00	29.43	4,032.93	1,395.48
3	J102	58.91	1,000.00	51.50	4,045.85	2,856.79
4	J104	49.30	1,000.00	-689.65	2,357.37	174.90
5	J106	66.63	1,000.00	59.57	4,046.49	3,367.22
6	J108	75.72	1,000.00	66.14	4,040.65	2,942.54
7	J112	70.49	1,000.00	63.12	4,045.68	3,407.14
8	J114	85.66	1,000.00	69.19	4,024.68	2,246.45
9	J116	74.78	1,000.00	67.21	4,045.10	3,499.76
10	J118	79.98	1,000.00	70.18	4,039.96	3,024.48
11	J12	58.75	1,000.00	34.21	4,007.94	1,314.80
12	J120	66.25	1,000.00	58.45	4,044.90	3,070.49
13	J122	76.48	1,000.00	66.03	4,038.39	2,794.76
14	J124	79.03	1,000.00	71.01	4,043.89	3,556.77
15	J126	80.33	1,000.00	71.84	4,042.79	3,441.53
16	J128	80.77	1,000.00	73.81	4,046.35	4,108.95
17	J130	81.20	1,000.00	74.18	4,046.20	4,102.90
18	J132	72.97	1,000.00	64.93	4,043.86	3,336.41
19	J134	56.50	1,000.00	43.76	4,033.00	1,902.48
20	J136	76.48	1,000.00	68.93	4,045.09	3,591.86
21	J138	87.69	1,000.00	80.26	4,045.23	4,148.39
22	J14	55.71	1,000.00	27.87	4,000.32	1,163.89
23	J140	87.69	1,000.00	80.02	4,044.68	4,035.87
24	J142	87.69	1,000.00	80.05	4,044.75	4,055.48
25	J144	84.65	1,000.00	77.22	4,045.22	4,041.35
26	J146	87.69	1,000.00	79.14	4,042.65	3,683.71

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
27	J148	96.37	1,000.00	87.00	4,040.79	3,696.57
28	J150	89.44	1,000.00	79.85	4,040.29	3,439.42
29	J152	91.64	1,000.00	82.02	4,040.29	3,477.35
30	J154	97.79	1,000.00	88.28	4,040.75	3,654.05
31	J156	88.11	1,000.00	75.78	4,033.89	2,856.19
32	J158	102.09	1,000.00	97.14	4,052.18	6,431.38
33	J16	54.00	1,000.00	34.36	4,019.30	1,392.59
34	J160	107.59	1,000.00	100.38	4,045.67	5,123.22
35	J162	110.92	1,000.00	104.69	4,048.62	5,841.68
36	J164	77.27	1,000.00	61.04	4,024.87	2,140.29
37	J166	77.27	1,000.00	58.22	4,018.37	1,928.40
38	J168	75.11	1,000.00	58.15	4,023.21	2,034.22
39	J170	73.37	1,000.00	55.29	4,020.61	1,914.58
40	J172	89.37	1,000.00	66.60	4,009.71	1,938.26
41	J174	89.37	1,000.00	66.29	4,009.00	1,921.66
42	J176	82.87	1,000.00	56.25	4,000.81	1,663.76
43	J178	82.87	1,000.00	56.53	4,001.46	1,674.64
44	J18	59.22	1,000.00	46.51	4,035.33	1,983.22
45	J180	89.37	1,000.00	59.57	3,993.49	1,643.99
46	J182	89.37	1,000.00	59.85	3,994.11	1,653.22
47	J184	52.97	1,000.00	17.12	3,979.51	959.11
48	J186	86.82	1,000.00	75.14	4,035.40	2,929.81
49	J188	86.36	1,000.00	78.08	4,043.20	3,756.41
50	J190	86.36	1,000.00	78.01	4,043.03	3,739.48
51	J192	86.79	1,000.00	78.72	4,043.68	3,874.99
52	J194	92.86	1,000.00	82.38	4,038.11	3,293.66

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
53	J196	98.49	1,000.00	84.57	4,030.17	2,808.30
54	J198	88.96	1,000.00	81.21	4,044.41	4,093.03
55	J20	69.62	1,000.00	53.04	4,026.40	1,913.82
56	J200	88.52	1,000.00	80.63	4,044.08	4,014.07
57	J202	88.52	1,000.00	80.60	4,044.01	4,000.13
58	J204	64.25	1,000.00	33.46	3,991.22	1,238.24
59	J206	96.75	1,000.00	81.55	4,027.21	2,632.69
60	J208	94.16	1,000.00	86.15	4,043.82	4,145.97
61	J210	92.85	1,000.00	82.45	4,038.29	3,337.37
62	J212	99.35	1,000.00	91.31	4,043.73	4,300.04
63	J214	101.08	1,000.00	70.35	3,991.35	1,750.43
64	J216	103.25	1,000.00	93.73	4,040.31	3,839.51
65	J218	107.49	1,000.00	99.30	4,043.17	4,691.43
66	J22	41.89	1,000.00	22.95	4,020.97	1,097.22
67	J220	29.93	1,000.00	4.20	4,002.69	569.92
68	J222	107.57	1,000.00	47.34	3,923.24	1,240.26
69	J224	107.83	1,000.00	94.16	4,029.31	3,345.85
70	J226	107.83	1,000.00	94.27	4,029.56	3,368.98
71	J228	104.91	1,000.00	87.98	4,021.04	2,858.31
72	J230	103.30	1,000.00	82.97	4,012.49	2,511.57
73	J232	103.29	1,000.00	77.90	3,999.77	2,177.46
74	J234	101.99	1,000.00	75.96	3,998.32	2,117.89
75	J236	103.67	1,000.00	77.19	3,997.15	2,123.00
76	J238	103.67	1,000.00	77.27	3,997.34	2,128.12
77	J24	32.36	1,000.00	-3.29	3,982.42	546.86
78	J240	90.26	1,000.00	59.43	3,987.17	1,703.93

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
79	J242	90.70	1,000.00	57.57	3,981.87	1,625.41
80	J244	88.96	1,000.00	57.26	3,985.16	1,651.96
81	J246	41.27	1,000.00	-3.26	3,955.47	628.63
82	J248	58.61	1,000.00	16.26	3,960.54	950.10
83	J250	71.17	1,000.00	30.80	3,965.08	1,168.13
84	J252	72.04	1,000.00	32.14	3,966.17	1,189.39
85	J254	41.27	1,000.00	-3.56	3,954.78	626.10
86	J256	38.24	1,000.00	-8.19	3,951.10	554.86
87	J258	77.72	1,000.00	40.81	3,973.18	1,330.32
88	J26	48.84	1,000.00	29.66	4,020.44	1,282.02
89	J260	98.95	1,000.00	65.51	3,981.20	1,722.71
90	J262	105.13	1,000.00	73.21	3,983.97	1,896.49
91	J264	105.13	1,000.00	73.29	3,984.14	1,899.79
92	J266	105.32	1,000.00	67.81	3,970.50	1,708.59
93	J268	106.26	1,000.00	70.56	3,974.84	1,776.99
94	J270	102.35	1,000.00	9.69	3,843.36	939.97
95	J272	114.33	1,000.00	68.15	3,950.27	1,577.08
96	J274	105.15	1,000.00	62.13	3,957.40	1,559.18
97	J276	105.67	1,000.00	66.18	3,965.73	1,656.07
98	J278	105.15	1,000.00	62.48	3,958.20	1,567.47
99	J28	57.91	1,000.00	-4,473.10	-6,393.33	76.33
100	J280	105.22	1,000.00	55.70	3,942.56	1,413.91
101	J282	100.01	1,000.00	40.11	3,918.56	1,202.67
102	J284	99.58	1,000.00	36.92	3,912.21	1,165.28
103	J286	104.35	1,000.00	45.25	3,920.44	1,252.73
104	J288	75.26	1,000.00	26.19	3,943.44	1,086.04

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
105	J290	109.38	1,000.00	61.51	3,945.96	1,497.62
106	J292	109.38	1,000.00	61.71	3,946.42	1,501.94
107	J294	98.47	1,000.00	45.63	3,934.31	1,294.51
108	J296	102.38	1,000.00	51.14	3,938.01	1,361.55
109	J298	77.67	1,000.00	15.15	3,911.96	957.08
110	J300	78.10	1,000.00	14.99	3,910.59	955.98
111	J302	49.51	1,000.00	-15.39	3,906.49	607.66
112	J304	49.51	1,000.00	-18.60	3,899.07	591.23
113	J306	91.08	1,000.00	32.02	3,919.89	1,131.47
114	J308	91.51	1,000.00	34.53	3,924.69	1,162.53
115	J310	91.95	1,000.00	35.14	3,925.09	1,169.25
116	J312	92.38	1,000.00	36.08	3,926.27	1,180.61
117	J314	95.85	1,000.00	41.14	3,929.94	1,238.77
118	J316	91.51	1,000.00	31.87	3,918.56	1,128.69
119	J318	100.60	1,000.00	40.30	3,917.00	1,207.76
120	J32	74.51	1,000.00	71.35	4,057.68	6,569.61
121	J320	100.60	1,000.00	40.35	3,917.13	1,208.46
122	J322	119.22	1,000.00	51.22	3,899.20	1,270.49
123	J324	120.96	1,000.00	52.53	3,898.23	1,278.84
124	J326	123.99	1,000.00	50.46	3,886.45	1,243.89
125	J328	123.99	1,000.00	50.63	3,886.85	1,245.76
126	J330	150.96	1,000.00	109.16	4,030.92	1,920.83
127	J336	80.33	1,000.00	51.13	4,060.01	1,533.99
128	J338	63.43	1,000.00	24.93	4,038.53	1,079.05
129	J34	59.25	1,000.00	48.89	4,040.84	2,256.51
130	J340	76.01	1,000.00	55.29	4,079.60	1,811.94

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
131	J342	73.84	1,000.00	49.69	4,071.68	1,609.07
132	J344	85.56	1,000.00	71.61	4,095.27	2,560.22
133	J346	76.71	1,000.00	57.13	4,081.85	1,919.27
134	J348	83.64	1,000.00	56.60	4,064.62	1,666.44
135	J350	76.97	1,000.00	45.96	4,055.06	1,449.25
136	J352	70.90	1,000.00	43.04	4,062.34	1,451.35
137	J354	60.92	1,000.00	32.08	4,060.04	1,246.20
138	J356	63.08	1,000.00	26.67	4,042.54	1,113.17
139	J358	60.05	1,000.00	30.48	4,058.33	1,211.07
140	J36	62.30	1,000.00	54.38	4,046.50	2,803.86
141	J360	61.35	1,000.00	24.32	4,041.13	1,075.47
142	J362	73.98	1,000.00	49.27	4,069.71	1,618.82
143	J364	141.42	1,000.00	100.99	4,034.08	1,877.85
144	J366	75.41	1,000.00	53.52	4,076.52	1,759.10
145	J368	69.69	1,000.00	47.02	4,074.52	1,623.54
146	J370	76.54	1,000.00	49.20	4,063.54	1,562.89
147	J372	63.09	1,000.00	34.38	4,060.34	1,289.15
148	J374	66.55	1,000.00	35.03	4,053.86	1,273.84
149	J376	68.28	1,000.00	34.29	4,048.13	1,242.21
150	J378	63.95	1,000.00	34.12	4,057.75	1,273.93
151	J38	75.74	1,000.00	61.31	4,031.50	2,202.34
152	J380	59.18	1,000.00	28.92	4,056.75	1,178.01
153	J382	50.52	1,000.00	20.29	4,056.82	1,012.72
154	J384	53.99	1,000.00	23.94	4,057.25	1,085.39
155	J386	59.19	1,000.00	29.27	4,057.54	1,186.11
156	J388	62.23	1,000.00	32.70	4,058.48	1,250.86

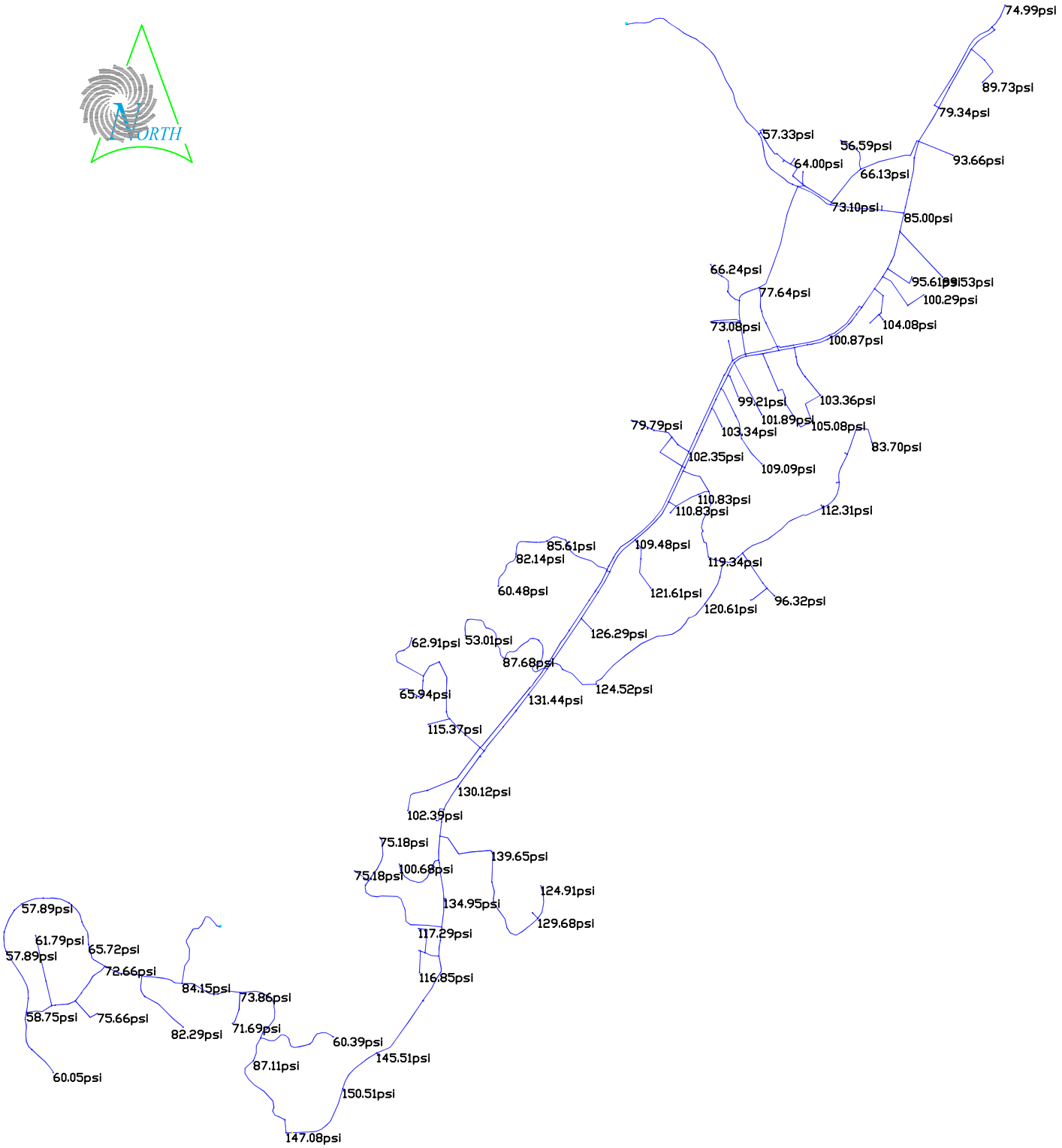
Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
157	J390	63.97	1,000.00	35.14	4,060.09	1,300.37
158	J392	63.98	1,000.00	35.98	4,062.05	1,324.50
159	J394	67.03	1,000.00	40.17	4,064.71	1,414.89
160	J396	57.88	1,000.00	27.56	4,056.60	1,152.93
161	J398	54.42	1,000.00	20.68	4,048.72	1,019.00
162	J40	66.24	1,000.00	61.04	4,052.88	3,963.51
163	J400	13.78	1,000.00	13.41	4,065.94	-7,216.56
164	J402	4.82	1,000.00	-12.74	4,024.61	-1,116.24
165	J404	43.09	1,000.00	8.93	3,985.60	798.63
166	J406	40.37	1,000.00	-1,109.23	1,411.05	112.77
167	J408	39.15	1,000.00	-6.63	3,958.71	602.84
168	J410	39.15	1,000.00	-4.91	3,962.67	615.57
169	J412	39.15	1,000.00	-3.88	3,965.05	623.92
170	J414	39.15	1,000.00	-4.73	3,963.07	616.92
171	J416	35.25	1,000.00	-9.65	3,960.74	530.78
172	J418	28.32	1,000.00	-19.52	3,953.95	353.15
173	J42	72.31	1,000.00	63.65	4,044.89	2,918.54
174	J420	32.22	1,000.00	-16.18	3,952.66	445.08
175	J424	41.79	1,000.00	6.53	3,983.07	757.18
176	J426	39.16	1,000.00	-1.91	3,969.58	641.14
177	J428	55.28	1,000.00	-14.80	3,902.84	685.55
178	J430	55.71	1,000.00	27.46	3,999.37	1,153.83
179	J432	50.95	1,000.00	11.80	3,974.22	879.95
180	J44	71.45	1,000.00	67.01	4,054.66	4,756.46
181	J46	77.52	1,000.00	68.98	4,045.19	3,100.25
182	J48	77.08	1,000.00	66.54	4,040.56	2,687.23

Print Report

	ID	Static Pressure (psi)	Fire Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
183	J52	81.01	1,000.00	73.83	4,048.38	3,569.82
184	J54	81.44	1,000.00	73.68	4,047.05	3,399.55
185	J56	79.71	1,000.00	73.22	4,049.98	3,787.37
186	J58	77.15	1,000.00	72.53	4,053.40	5,143.09
187	J60	75.62	1,000.00	69.59	4,049.60	4,035.44
188	J62	72.49	1,000.00	66.42	4,049.28	3,923.29
189	J64	69.83	3,500.00	28.38	3,967.51	3,907.98
190	J66	77.39	1,000.00	71.32	4,049.61	4,073.35
191	J68	66.77	1,000.00	60.97	4,049.71	3,895.99
192	J70	79.77	1,000.00	71.61	4,044.27	3,395.34
193	J72	81.49	1,000.00	72.94	4,043.33	3,335.90
194	J74	74.11	1,000.00	66.27	4,044.95	3,304.22
195	J76	66.74	1,000.00	60.66	4,049.00	3,735.19
196	J78	67.63	1,000.00	61.82	4,049.66	3,924.62
197	J80	65.84	1,000.00	59.90	4,049.23	3,793.28
198	J82	65.41	3,500.00	25.20	3,970.16	3,767.81
199	J84	64.96	1,000.00	58.06	4,047.00	3,321.31
200	J86	59.33	1,000.00	50.34	4,042.17	2,497.40
201	J88	78.36	1,000.00	65.65	4,033.51	2,476.91
202	J90	66.23	1,000.00	59.64	4,047.65	3,527.20
203	J92	61.98	1,000.00	54.81	4,046.49	3,064.85
204	J94	61.97	1,000.00	54.46	4,045.69	2,956.94
205	J96	53.73	1,000.00	45.89	4,044.91	2,512.38
206	J98	52.85	1,000.00	45.07	4,045.02	2,487.88

Springdale Culinary Water Master Plan
Future Peak Instantaneous Demands
With Recommended Improvements



SUNRISE ENGINEERING

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WASHINGTON, UT 84780
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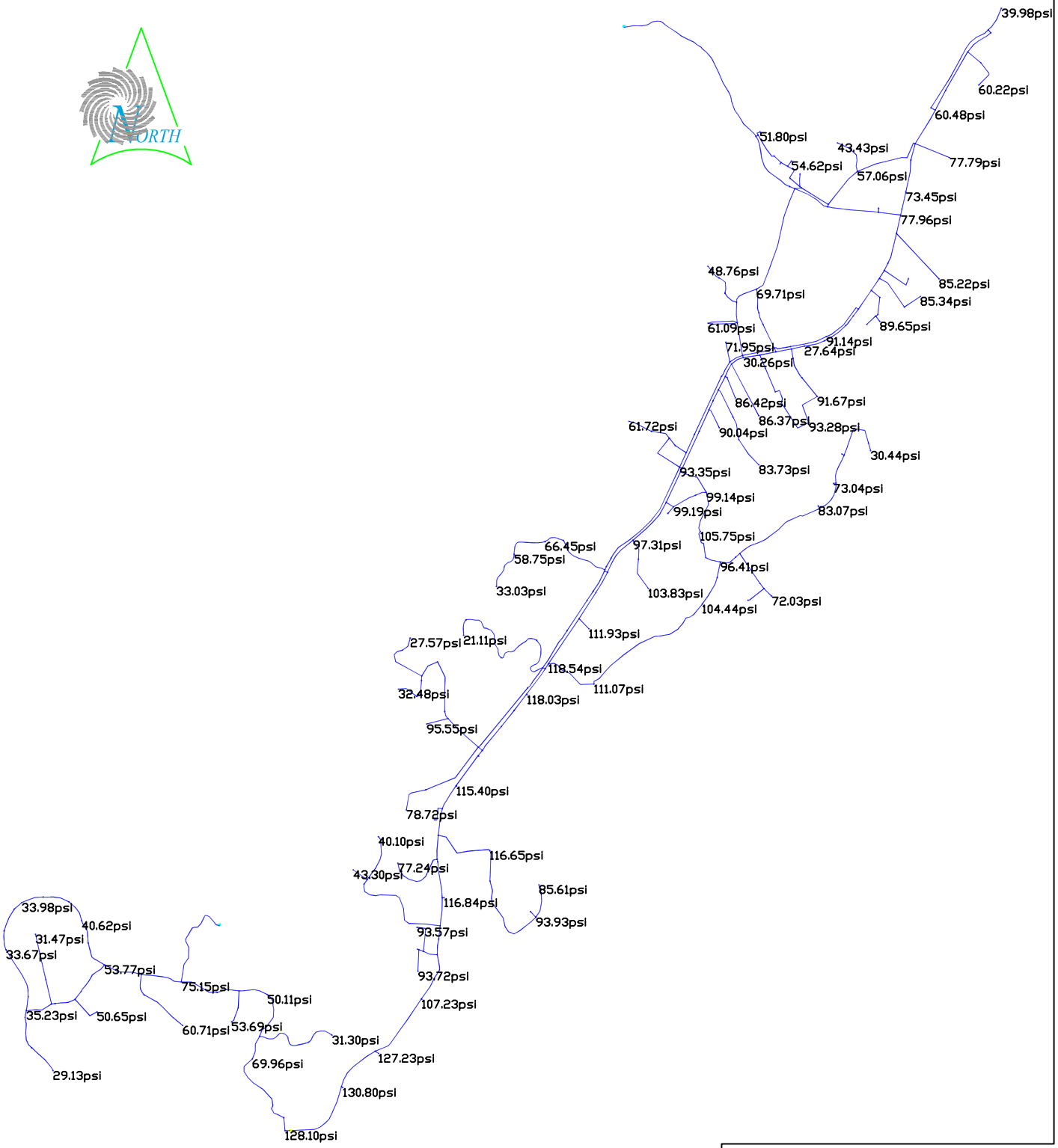
Springdale Culinary Water Master Plan
Future Fire Flow Demands
With Recommended Improvements



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Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
1	J10	90.97	1,000.00	60.22	4,051.97	1,639.63
2	J100	67.79	1,000.00	48.76	4,077.54	1,774.46
3	J102	84.20	1,000.00	73.57	4,096.78	3,389.28
4	J104	74.67	1,000.00	61.09	4,089.99	2,470.44
5	J106	91.79	1,000.00	80.06	4,093.77	3,392.77
6	J108	100.89	1,000.00	86.42	4,087.45	3,025.39
7	J112	95.64	1,000.00	83.40	4,092.47	3,380.75
8	J114	110.80	1,000.00	83.73	4,058.24	2,062.37
9	J116	99.88	1,000.00	87.06	4,090.92	3,372.89
10	J118	105.08	1,000.00	90.04	4,085.80	3,046.51
11	J12	84.04	1,000.00	59.85	4,067.13	1,797.81
12	J120	91.38	1,000.00	80.55	4,095.90	3,675.24
13	J122	101.59	1,000.00	89.83	4,093.31	3,752.90
14	J124	104.13	1,000.00	92.17	4,092.72	3,784.06
15	J126	105.41	1,000.00	93.35	4,092.45	3,802.50
16	J128	105.81	1,000.00	93.28	4,091.27	3,687.01
17	J130	106.22	1,000.00	93.53	4,090.85	3,658.73
18	J132	98.05	1,000.00	85.00	4,090.17	3,318.38
19	J134	81.59	1,000.00	61.72	4,074.44	2,038.21
20	J136	101.56	1,000.00	88.63	4,090.55	3,410.33
21	J138	112.68	1,000.00	99.14	4,088.80	3,617.64
22	J14	81.01	1,000.00	55.71	4,064.57	1,698.27
23	J140	112.68	1,000.00	99.00	4,088.48	3,578.17
24	J142	112.68	1,000.00	99.19	4,088.92	3,622.33
25	J144	109.65	1,000.00	96.41	4,089.50	3,611.71
26	J146	112.68	1,000.00	98.29	4,086.83	3,408.02

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
27	J148	121.23	1,000.00	103.66	4,079.23	3,096.07
28	J150	114.29	1,000.00	96.41	4,078.51	2,930.23
29	J152	116.45	1,000.00	98.45	4,078.20	2,949.37
30	J154	122.52	1,000.00	104.44	4,078.04	3,043.32
31	J156	112.97	1,000.00	92.44	4,072.33	2,615.99
32	J158	126.42	1,000.00	111.07	4,084.35	3,558.94
33	J16	79.28	1,000.00	57.41	4,072.49	1,833.23
34	J160	132.49	1,000.00	118.54	4,087.57	4,028.35
35	J162	135.52	1,000.00	120.77	4,085.72	3,879.33
36	J164	102.13	1,000.00	77.76	4,063.46	2,138.45
37	J166	102.13	1,000.00	74.96	4,056.99	1,980.59
38	J168	99.97	1,000.00	74.88	4,061.82	2,061.88
39	J170	98.23	1,000.00	72.03	4,059.23	1,973.04
40	J172	114.24	1,000.00	83.38	4,048.43	1,981.82
41	J174	114.24	1,000.00	83.07	4,047.72	1,968.41
42	J176	107.73	1,000.00	73.04	4,039.56	1,759.19
43	J178	107.73	1,000.00	73.32	4,040.20	1,768.55
44	J18	84.50	1,000.00	71.24	4,092.42	2,717.74
45	J180	114.23	1,000.00	76.35	4,032.20	1,733.77
46	J182	114.23	1,000.00	76.62	4,032.83	1,741.86
47	J184	77.83	1,000.00	30.44	4,010.26	1,130.99
48	J186	111.67	1,000.00	91.77	4,073.79	2,654.60
49	J188	111.34	1,000.00	97.31	4,087.58	3,470.60
50	J190	111.33	1,000.00	98.19	4,089.62	3,708.31
51	J192	111.76	1,000.00	98.60	4,089.57	3,722.29
52	J194	117.84	1,000.00	101.62	4,082.54	3,183.72

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
53	J196	123.47	1,000.00	103.83	4,074.63	2,823.02
54	J198	113.92	1,000.00	100.69	4,089.39	3,760.11
55	J20	94.90	1,000.00	77.79	4,083.53	2,460.78
56	J200	113.48	1,000.00	100.33	4,089.55	3,768.70
57	J202	113.49	1,000.00	100.33	4,089.55	3,768.13
58	J204	89.22	1,000.00	70.31	4,076.26	2,295.01
59	J206	121.70	1,000.00	108.05	4,088.37	3,836.29
60	J208	119.10	1,000.00	104.81	4,086.89	3,611.53
61	J210	117.81	1,000.00	104.27	4,088.65	3,775.57
62	J212	124.28	1,000.00	109.51	4,085.73	3,616.79
63	J214	126.02	1,000.00	112.13	4,087.78	3,879.27
64	J216	128.18	1,000.00	111.93	4,082.32	3,396.40
65	J218	132.49	1,000.00	118.59	4,087.70	4,049.30
66	J22	67.30	1,000.00	57.06	4,099.69	2,716.85
67	J220	54.92	1,000.00	21.11	4,041.72	1,024.53
68	J222	132.48	1,000.00	118.19	4,086.77	3,943.37
69	J224	133.34	1,000.00	118.03	4,084.39	3,712.19
70	J226	133.34	1,000.00	118.13	4,084.64	3,736.36
71	J228	130.74	1,000.00	115.28	4,084.04	3,631.19
72	J230	129.44	1,000.00	114.02	4,084.14	3,618.36
73	J232	129.87	1,000.00	115.11	4,085.66	3,788.23
74	J234	128.57	1,000.00	113.80	4,085.62	3,757.36
75	J236	130.30	1,000.00	115.16	4,084.78	3,707.66
76	J238	130.30	1,000.00	115.25	4,084.97	3,726.45
77	J24	57.76	1,000.00	43.43	4,090.24	1,835.59
78	J240	116.85	1,000.00	97.40	4,074.78	2,788.97

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
79	J242	117.29	1,000.00	95.55	4,069.51	2,564.64
80	J244	115.55	1,000.00	95.24	4,072.81	2,676.89
81	J246	67.87	1,000.00	32.48	4,037.95	1,207.08
82	J248	85.20	1,000.00	51.99	4,042.99	1,513.33
83	J250	97.77	1,000.00	66.51	4,047.50	1,748.92
84	J252	98.64	1,000.00	67.84	4,048.58	1,778.13
85	J254	67.87	1,000.00	32.19	4,037.28	1,201.00
86	J256	64.84	1,000.00	27.57	4,033.62	1,123.71
87	J258	104.30	1,000.00	78.72	4,060.67	2,083.07
88	J26	74.26	1,000.00	66.88	4,106.34	3,993.07
89	J260	125.53	1,000.00	103.41	4,068.65	2,641.37
90	J262	132.04	1,000.00	115.40	4,081.32	3,438.96
91	J264	132.04	1,000.00	115.47	4,081.49	3,452.28
92	J266	132.47	1,000.00	114.54	4,078.34	3,235.44
93	J268	133.34	1,000.00	115.82	4,079.29	3,314.62
94	J270	129.43	1,000.00	55.19	3,948.37	1,251.52
95	J272	141.57	1,000.00	116.65	4,062.21	2,641.94
96	J274	132.48	1,000.00	113.45	4,075.82	3,074.92
97	J276	132.91	1,000.00	114.54	4,077.35	3,179.59
98	J278	132.48	1,000.00	113.51	4,075.96	3,083.53
99	J28	83.66	1,000.00	63.20	4,075.85	1,971.49
100	J280	132.46	1,000.00	104.26	4,054.62	2,316.35
101	J282	127.26	1,000.00	88.79	4,030.90	1,838.80
102	J284	126.83	1,000.00	85.61	4,024.58	1,756.60
103	J286	131.59	1,000.00	93.93	4,032.78	1,907.13
104	J288	102.59	1,000.00	77.24	4,061.26	2,068.91

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
105	J290	136.84	1,000.00	116.84	4,073.65	3,016.01
106	J292	136.84	1,000.00	117.04	4,074.10	3,039.39
107	J294	126.06	1,000.00	105.56	4,072.62	2,785.37
108	J296	129.94	1,000.00	109.63	4,073.00	2,869.16
109	J298	105.23	1,000.00	73.82	4,047.38	1,826.40
110	J300	105.66	1,000.00	73.67	4,046.03	1,810.13
111	J302	77.07	1,000.00	43.30	4,041.94	1,376.58
112	J304	77.07	1,000.00	40.10	4,034.55	1,301.10
113	J306	118.71	1,000.00	93.72	4,062.28	2,311.66
114	J308	119.15	1,000.00	96.22	4,067.07	2,463.83
115	J310	119.58	1,000.00	96.83	4,067.46	2,483.54
116	J312	120.01	1,000.00	97.76	4,068.63	2,530.33
117	J314	123.48	1,000.00	102.79	4,072.22	2,720.86
118	J316	119.15	1,000.00	93.57	4,060.95	2,280.92
119	J318	128.37	1,000.00	107.23	4,071.47	2,734.89
120	J32	99.09	1,000.00	88.66	4,097.62	3,831.66
121	J320	128.37	1,000.00	107.28	4,071.60	2,739.98
122	J322	147.21	1,000.00	125.92	4,071.61	2,963.95
123	J324	148.94	1,000.00	127.23	4,070.64	2,945.61
124	J326	152.14	1,000.00	130.80	4,071.86	3,007.53
125	J328	152.14	1,000.00	130.97	4,072.26	3,025.07
126	J330	148.55	1,000.00	128.10	4,074.64	3,022.10
127	J336	78.50	1,000.00	60.68	4,082.03	2,073.80
128	J338	61.60	1,000.00	31.30	4,053.25	1,210.91
129	J34	84.50	1,000.00	73.45	4,097.51	3,122.02
130	J340	74.77	1,000.00	60.95	4,092.66	2,344.66

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
131	J342	72.61	1,000.00	53.69	4,080.90	1,852.03
132	J344	84.82	1,000.00	75.15	4,103.44	3,286.69
133	J346	76.07	1,000.00	61.20	4,091.25	2,272.73
134	J348	83.00	1,000.00	60.71	4,074.12	1,856.93
135	J350	76.41	1,000.00	50.65	4,065.89	1,605.93
136	J352	70.35	1,000.00	47.72	4,073.14	1,633.35
137	J354	60.38	1,000.00	36.81	4,070.96	1,396.23
138	J356	62.54	1,000.00	31.47	4,053.62	1,211.68
139	J358	59.51	1,000.00	35.23	4,069.31	1,352.42
140	J36	87.40	1,000.00	78.26	4,101.62	3,809.36
141	J360	60.81	1,000.00	29.13	4,052.23	1,168.56
142	J362	73.40	1,000.00	53.77	4,080.10	1,850.64
143	J364	139.07	1,000.00	118.78	4,075.13	2,903.81
144	J366	74.77	1,000.00	57.61	4,085.96	2,031.45
145	J368	69.09	1,000.00	51.36	4,084.52	1,877.09
146	J370	75.98	1,000.00	53.85	4,074.27	1,762.86
147	J372	62.54	1,000.00	39.10	4,071.25	1,445.30
148	J374	66.01	1,000.00	39.80	4,064.86	1,410.65
149	J376	67.74	1,000.00	39.07	4,059.18	1,363.08
150	J378	63.41	1,000.00	38.88	4,068.73	1,421.17
151	J38	100.83	1,000.00	85.22	4,086.68	2,732.04
152	J380	58.64	1,000.00	33.67	4,067.70	1,310.46
153	J382	49.98	1,000.00	25.03	4,067.76	1,124.58
154	J384	53.44	1,000.00	28.66	4,068.15	1,207.05
155	J386	58.64	1,000.00	33.98	4,068.43	1,320.69
156	J388	61.68	1,000.00	37.40	4,069.32	1,395.17

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
157	J390	63.42	1,000.00	39.80	4,070.86	1,454.50
158	J392	63.42	1,000.00	40.62	4,072.73	1,486.87
159	J394	66.46	1,000.00	44.76	4,075.29	1,597.38
160	J396	57.34	1,000.00	32.33	4,067.60	1,282.77
161	J398	53.87	1,000.00	25.47	4,059.78	1,117.72
162	J40	90.99	1,000.00	80.72	4,098.29	3,598.98
163	J404	68.68	1,000.00	61.74	4,107.49	3,862.29
164	J406	66.05	4.75	65.89	4,123.06	178.42
165	J408	65.02	1,000.00	54.62	4,100.05	2,510.24
166	J410	65.05	1,000.00	57.36	4,106.38	3,213.03
167	J412	65.02	1,000.00	57.36	4,106.37	3,225.62
168	J414	65.05	1,000.00	57.53	4,106.78	3,280.31
169	J416	61.18	1,000.00	53.92	4,107.44	3,194.95
170	J418	54.37	1,000.00	48.46	4,110.84	3,467.08
171	J42	97.05	1,000.00	83.34	4,090.34	2,956.69
172	J420	58.27	1,000.00	51.80	4,109.55	3,376.57
173	J424	67.41	1,000.00	60.15	4,106.82	3,589.85
174	J426	64.96	1,000.00	57.12	4,105.83	3,166.74
175	J428	80.58	1,000.00	60.03	4,075.54	1,933.26
176	J430	81.01	1,000.00	55.59	4,064.30	1,693.16
177	J432	76.24	1,000.00	39.98	4,039.26	1,297.23
178	J434	86.23	1,000.00	77.96	4,103.92	4,112.74
179	J438	67.38	1,000.00	60.64	4,107.95	3,952.66
180	J44	96.13	1,000.00	85.77	4,097.94	3,740.07
181	J440	90.97	1,000.00	65.02	4,063.07	1,824.62
182	J442	83.63	1,000.00	70.81	4,093.43	2,762.79

Print Report

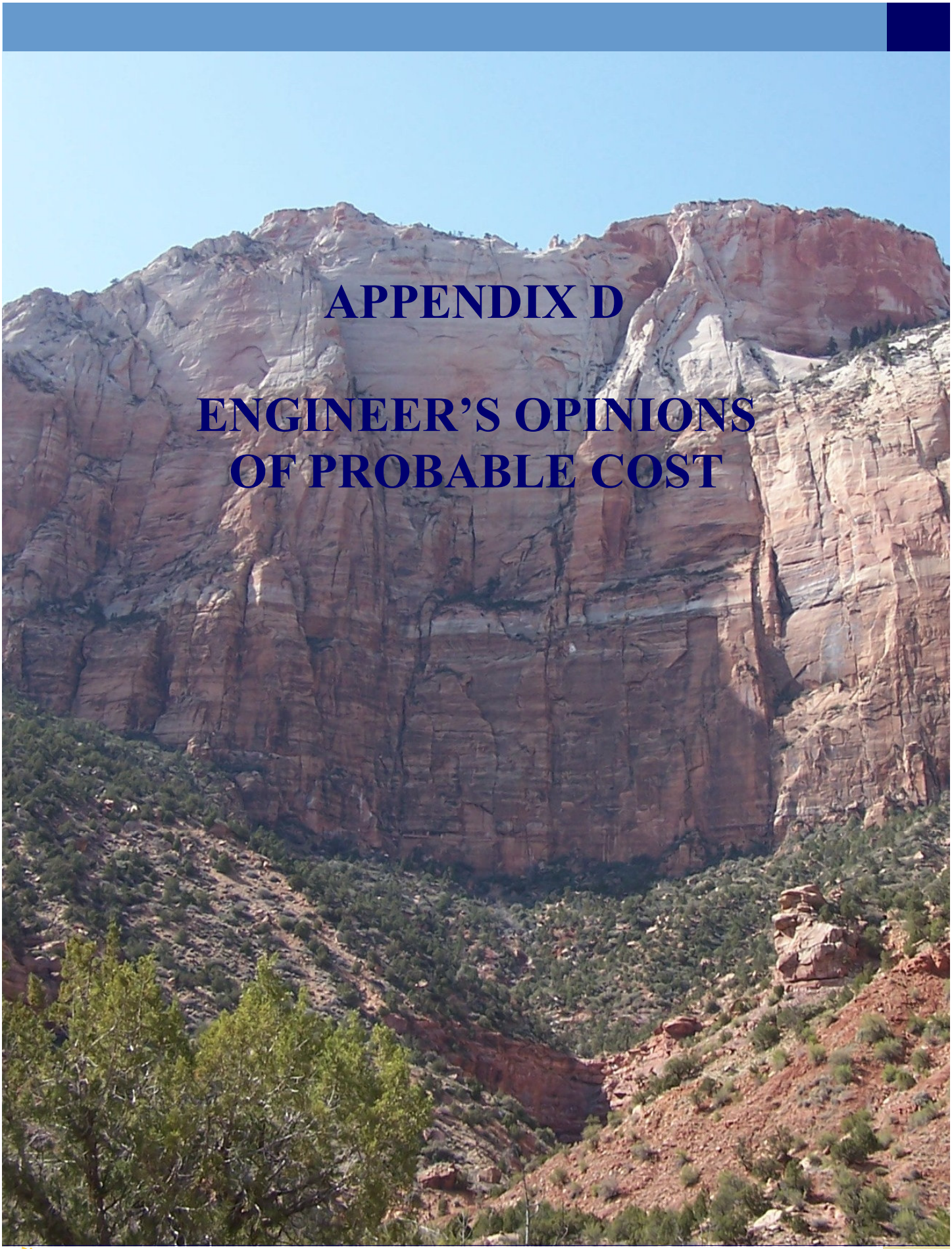
	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
183	J444	85.36	1,000.00	76.65	4,102.89	3,872.61
184	J446	66.55	1,000.00	59.88	4,108.18	3,934.67
185	J448	89.74	1,000.00	79.59	4,098.67	3,584.38
186	J450	101.69	1,000.00	90.07	4,094.87	3,545.11
187	J452	104.29	1,000.00	89.35	4,087.20	2,947.91
188	J454	104.19	1,000.00	93.56	4,096.92	3,963.83
189	J456	95.02	1,000.00	84.44	4,096.87	3,756.82
190	J458	95.87	1,000.00	84.84	4,095.79	3,646.24
191	J46	102.20	1,000.00	87.77	4,088.56	2,964.26
192	J460	100.63	1,000.00	88.62	4,093.51	3,495.47
193	J462	94.55	1,000.00	83.41	4,095.50	3,586.14
194	J464	72.13	1,000.00	60.04	4,093.57	2,642.69
195	J466	65.19	1,000.00	47.85	4,081.43	1,829.97
196	J468	93.09	1,000.00	81.14	4,093.26	3,369.97
197	J470	103.87	1,000.00	88.35	4,084.90	2,934.21
198	J472	107.34	1,000.00	89.33	4,079.15	2,678.60
199	J474	98.61	1,000.00	85.91	4,091.27	3,362.16
200	J476	101.09	1,000.00	88.17	4,090.48	3,430.42
201	J478	92.85	1,000.00	77.67	4,085.26	2,781.68
202	J48	101.76	1,000.00	85.34	4,083.95	2,681.92
203	J484	107.35	1,000.00	87.97	4,075.02	2,605.85
204	J486	89.58	1,000.00	65.54	4,064.25	1,940.24
205	J488	85.63	1,000.00	39.07	4,012.17	1,231.90
206	J490	122.56	1,000.00	105.75	4,081.05	3,223.71
207	J492	106.01	1,000.00	77.62	4,054.13	1,979.76
208	J494	88.36	1,000.00	69.96	4,080.46	2,227.83

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
209	J496	53.36	1,000.00	26.20	4,060.46	1,135.67
210	J498	75.09	1,000.00	57.60	4,082.94	2,025.41
211	J500	65.09	1,000.00	50.11	4,089.65	1,984.21
212	J502	71.31	1,000.00	54.03	4,084.69	1,937.39
213	J504	76.64	1,000.00	63.81	4,095.26	2,510.05
214	J506	74.26	1,000.00	67.02	4,106.67	4,081.70
215	J508	80.58	1,000.00	60.48	4,076.57	1,961.95
216	J518	53.95	1,000.00	48.33	4,111.55	3,587.73
217	J52	105.59	1,000.00	89.65	4,084.89	2,832.37
218	J520	132.49	1,000.00	118.60	4,087.72	4,052.10
219	J522	114.23	1,000.00	70.21	4,018.03	1,576.60
220	J524	103.31	1,000.00	92.36	4,096.14	3,840.05
221	J526	87.48	1,000.00	66.45	4,071.37	2,088.38
222	J528	84.02	1,000.00	58.75	4,061.58	1,778.48
223	J530	62.35	1,000.00	33.03	4,052.22	1,257.57
224	J532	83.66	1,000.00	75.50	4,104.23	4,060.67
225	J534	62.28	1,000.00	30.17	4,045.63	1,187.67
226	J54	106.02	1,000.00	89.50	4,083.57	2,767.15
227	J56	104.29	1,000.00	89.04	4,086.48	2,902.25
228	J58	102.04	1,000.00	91.70	4,097.64	4,000.65
229	J60	100.67	1,000.00	89.40	4,095.33	3,700.08
230	J62	97.62	3,500.00	27.64	3,959.78	3,732.89
231	J64	95.01	1,000.00	84.55	4,097.14	3,817.67
232	J66	102.43	1,000.00	91.14	4,095.33	3,721.59
233	J68	91.98	1,000.00	82.16	4,098.62	3,988.99
234	J70	104.96	1,000.00	91.67	4,090.56	3,304.79

Print Report

	ID	Static Pressure (psi)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Residual Head (ft)	Available Flow @Hydrant (gpm)
235	J72	106.69	1,000.00	93.28	4,090.28	3,321.55
236	J74	99.31	1,000.00	86.67	4,092.02	3,312.03
237	J76	91.95	1,000.00	81.69	4,097.53	3,814.31
238	J78	92.84	1,000.00	82.88	4,098.28	3,958.12
239	J80	91.04	3,500.00	30.26	3,980.83	3,864.95
240	J82	90.61	1,000.00	80.58	4,097.96	3,881.86
241	J84	90.13	1,000.00	79.67	4,096.86	3,738.10
242	J86	84.50	1,000.00	71.95	4,092.06	2,970.95
243	J88	103.55	1,000.00	86.37	4,081.33	2,685.12
244	J90	91.42	1,000.00	80.34	4,095.41	3,557.26
245	J92	87.28	1,000.00	77.51	4,098.87	3,802.79
246	J94	87.32	1,000.00	77.60	4,099.10	3,818.63
247	J96	79.15	1,000.00	69.71	4,099.88	3,615.25
248	J98	78.19	1,000.00	67.72	4,097.28	3,224.94



APPENDIX D

ENGINEER'S OPINIONS OF PROBABLE COST

Engineer's Opinion of Probable Cost

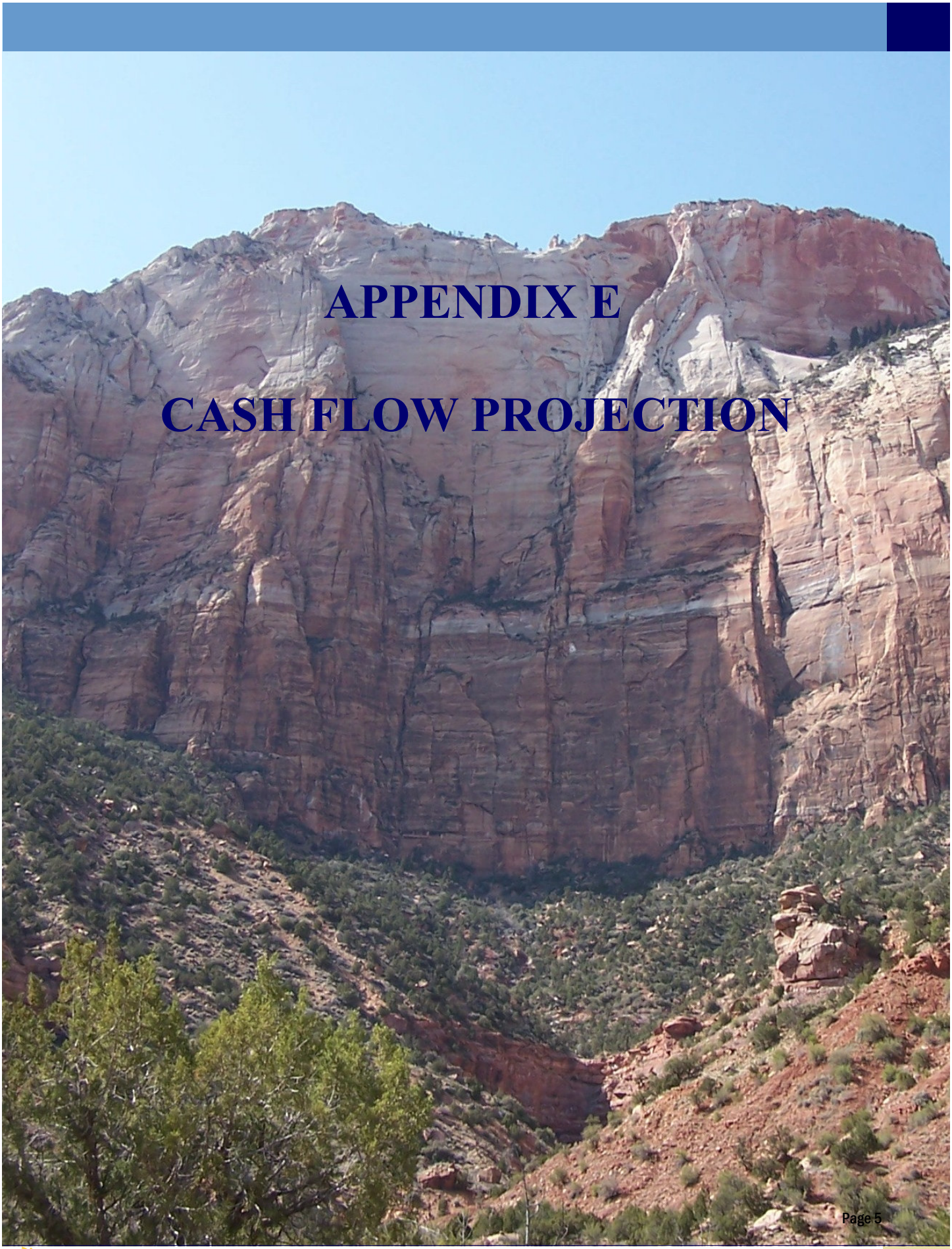
SUNRISE ENGINEERING, INC.
11 North 300 West, Washington, Utah 84780
Tel: (435) 652-8450 Fax: (435) 652-8416
Engineer's Opinion of Probable Cost

Install New 1.0 Million Gallon Tank, In Town Replacements 12-May-08
Town of Springdale

ALA

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 96,000.00	$ 96,000.00
2	Earthwork 1.0 Million Gallon Tank	1	LS	$ 85,000.00	$ 85,000.00
3	Construct 1.0 Million Gallon Tank	1	LS	$ 800,000.00	$ 800,000.00
4	Tank Appurtenances	1	LS	$ 75,000.00	$ 75,000.00
5	Chainlink Fence & Gate	800	LN.FT.	$ 22.00	$ 17,600.00
6	Metering Station	1	LS	$ 25,000.00	$ 25,000.00
7	8" PVC Line & Fittings, Replace transite pipe, Foot Hill Lane	1,750	Ln. Ft.	$ 21.00	$ 36,750.00
8	8" Gate Valve Assembly	18	Each	$ 1,200.00	$ 21,600.00
9	Fire Hydrant Reconnection	16	Each	$ 2,000.00	$ 32,000.00
10	Fire Hydrant Assembly	4	EA.	$ 3,500.00	$ 14,000.00
11	10" PVC Line & Fittings, Paradise and Zion Park Boulevard	7,750	Ln. Ft.	$ 27.00	$ 209,250.00
12	10" Gate Valve Assembly	19	Each	$ 1,800.00	$ 34,200.00
13	12" PVC Line & Fittings, New Tank to Highway	5,250	LN.FT.	$ 33.00	$ 173,250.00
14	12" Gate Valve Assembly	5	EA.	$ 2,200.00	$ 11,000.00
15	Untreated Base Course (6" Depth in Trench)	91,163	SQ. FT.	$ 0.85	$ 77,488.55
16	Bituminous Surface Course	91,163	SQ. FT.	$ 2.15	$ 196,000.45
17	Reconnection of Meters (saddle, meter setter & service lateral pipe)	37	Each	$ 900.00	$ 33,300.00
18	Retrofitting the existing booster pumps to pump to the new tank	1	LS	$ 93,000.00	$ 93,000.00
19					
20	**Sub-Total**				$ 2,030,400
21	**Contingency**	14%			$ 284,300
22	**Total Construction**				**$ 2,314,700**
23					
24	**INCIDENTALS**				
25	Funding & Administrative Services	1%	L.S.		$ 23,100
26	Legal and Fiscal		Est.		$ 69,800
27	Engineering Design	5.3%	L.S.		$ 156,000
28	Engineering Construction Services	6.2%	Hourly		$ 185,200
29	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ -
30	Environmental/Archeology		Est.		$ 20,000
31	Geotechnical Engineering		Est.		$ 30,000
32	Electrical Engineering		Est.		$ 15,000
33	Land & R/W Acquisition/Negotiation		Est.		$ 20,000
34	Water Rights Research and POD Applications		Est.		$ 10,000
35	Survey & GIS Mapping		Est.		$ 20,000
36	Radio Read Meters/Equipment/Software - Materials, no Install		Est.		$ 40,000
37	SCADA Improvements		Est.		$ 45,000
38	Miscellaneous Engineering Services		Est.		$ 20,000
39					
40					
41	**TOTAL PROJECT COST**				**$ 2,968,800**

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.



APPENDIX E

CASH FLOW PROJECTION

Cash Flow Analysis

	Fiscal Year Beginning July 1	2003	2004	2005	2006	2007	2008	2009	2010
	Ending June 30	2004	2005	2006	2007	2008	2009	2010	2011
1	Average Rate ERU	$35.15	$40.25	$37.36	$36.83	$39.34	$40.52	$41.84	$43.20
2	Connection Fee	$500	$500	$500	$500	$540	$540	$540	$540
3	Impact fee	$2,000	$2,000	$2,000	$ 3,725	$ 3,725	$ 5,842	$ 5,842	$ 5,842
4	**System Users:**								
5	Total Existing ERU's	630	651	671	677	699	721	743	766
6	New ERU's:		21	20	6	22	22	22	23
7									
8	**REVENUES:**								
9	User Fees (Water Sales)	265,723	314,361	300,944	299,378	330,000	355,961	378,575	403,061
10	Impact and Connection Fees	17,085	48,775	29,810	14,900	37,250	70,201	70,201	73,392
11	Late Fees & Penalties	0	0	0	0	0	0	0	0
12	Miscellaneous	616	7,773	2,880	6,860	7,000	7,245	7,499	7,761
13	Garbage collection revenue								
14	Interest Income/Bond Discount	5,925	21,648	12,440	13,690	5,000	5,175	5,356	5,544
15	***TOTAL REVENUE:***	**$289,349**	**$392,557**	**$346,074**	**$334,828**	**$379,250**	**$438,581**	**$461,631**	**$489,758**
16									
17	**EXPENSES:** (Inc. O&M & Debt Serv.)	**5.05% = Annual Inflation Rate+1/2 Annual Growth Rate**							
18	Salaries, wages and benefits	83,524	67,555	90,228	110,472	116,051	121,911	128,068	134,535
19	Office expenses and travel	3,733	4,946	7,543	5,966	6,267	6,584	6,916	7,266
20	Repairs and maintenance	18,794	24,502	21,268	35,817	37,626	39,526	41,522	43,619
21	Utilities	13,180	15,029	9,162	13,022	13,680	14,370	15,096	15,858
	Legal and professional fees	1,100	2,773	6,206	11,564	12,148	12,761	13,406	14,083
	Garbage collection								
	Contract services	16,011	7,445	5,776	2,213	2,325	2,442	2,565	2,695
	Insurance	8,507	8,937	9,305	9,731	10,222	10,739	11,281	11,851
22	Miscellaneous	2,804	3,030	3,955	13,805	14,502	15,235	16,004	16,812
23	Depreciation	68,645	80,382	70,296	74,610	78,378	0	0	0
24	***Sub-Total Operation & Maintainance***	**$216,298**	**$214,599**	**$223,739**	**$277,200**	**$291,199**	**$223,568**	**$234,858**	**$246,719**
25									
26	**EXISTING DEBT SERVICE (810-820)**								
27	No Interest State Loan	17,080	17,080	17,080	17,080	17,080	17,080	17,080	17,080
28	No Interest State Loan (Payment/10)	0	0	0	0	0	1,708	1,708	1,708
29	Water Revenue Bond 1995A	18,000	18,000	18,000	18,000	18,000	48,000	48,000	48,000
30	Water Revenue Bond 1995 Reserve (Payment/6)					0	8,000	8,000	8,000
	1995A DSRF	3,996	3,996	3,996	3,996				
	1995A DSRF Reserve (Payment/10)								
	Water Revenue Bond 2004 (tank project)		4,300	9,500	19,490	20,380	21,260	22,130	22,990
	Water Revenue Bond 2004 Reserve (Payment/6)				0	0	10,000	10,000	10,000
31	Owing to the General Fund			23,460	23,460	23,460	23,460	23,460	23,460
32	***Sub-Total Existing Debt Service***	**$39,076**	**$43,376**	**$72,036**	**$82,026**	**$78,920**	**$129,508**	**$130,378**	**$131,238**
33									
34	**NEW DEBT SERVICE (810-820)**								
35	2008 Loan	0	0	0	0	0	77,496	77,496	77,496
36	Loan Reserve (Payment/10)	0	0	0	0	0	7,700	7,700	7,700
37									
38	2016 Loan	0	0	0	0	0	0	0	0
39	Loan Reserve (Payment/10)	0	0	0	0	0	0	0	0
40									
41	***Sub-Total New Debt Service***	**$0**	**$0**	**$0**	**$0**	**$0**	**$85,196**	**$85,196**	**$85,196**
42	***Total Debt Service***	**$39,076**	**$43,376**	**$72,036**	**$82,026**	**$78,920**	**$214,704**	**$215,574**	**$216,434**
43									
44	Renewal and Replacement Fund (590)	0	0	0	0	0	66,000	69,333	71,126
45	***TOTAL EXPENSES:***	**$255,374**	**$257,975**	**$295,775**	**$359,226**	**$370,119**	**$504,272**	**$519,765**	**$534,279**
46									
47	***Net Cashflow***	**$33,975**	**$134,582**	**$50,299**	**($24,398)**	**$9,131**	**($65,691)**	**($58,135)**	**($44,521)**
48									
49	**CASH ON HAND**								
50	*Fund Balance	0	134,582	184,881	(4,517)	4,614	(61,076)	(119,211)	(163,732)
51	Renewal and Replacement Account Balance:	0	0	0	0	0	66,000	135,333	208,167
52	New Bond Reserves	0	0	0	0	7,700	15,400	23,100	30,800
53	***Total***	**$0**	**$134,582**	**$184,881**	**($4,517)**	**$12,314**	**$20,324**	**$39,222**	**$75,235**
54	**Fund Balance is obtained by adding the previous year's*								
55	*balance to the net cash flow, minus any self funded portion*								
56	*of future projects.*								
57	**Total Project Amount**	**0**	**0**	**0**	**0**	**2,200,000**	**0**	**0**	**0**
58	**FINANCING PLAN FOR PROJECT PHASES:**								

Cash Flow Analysis

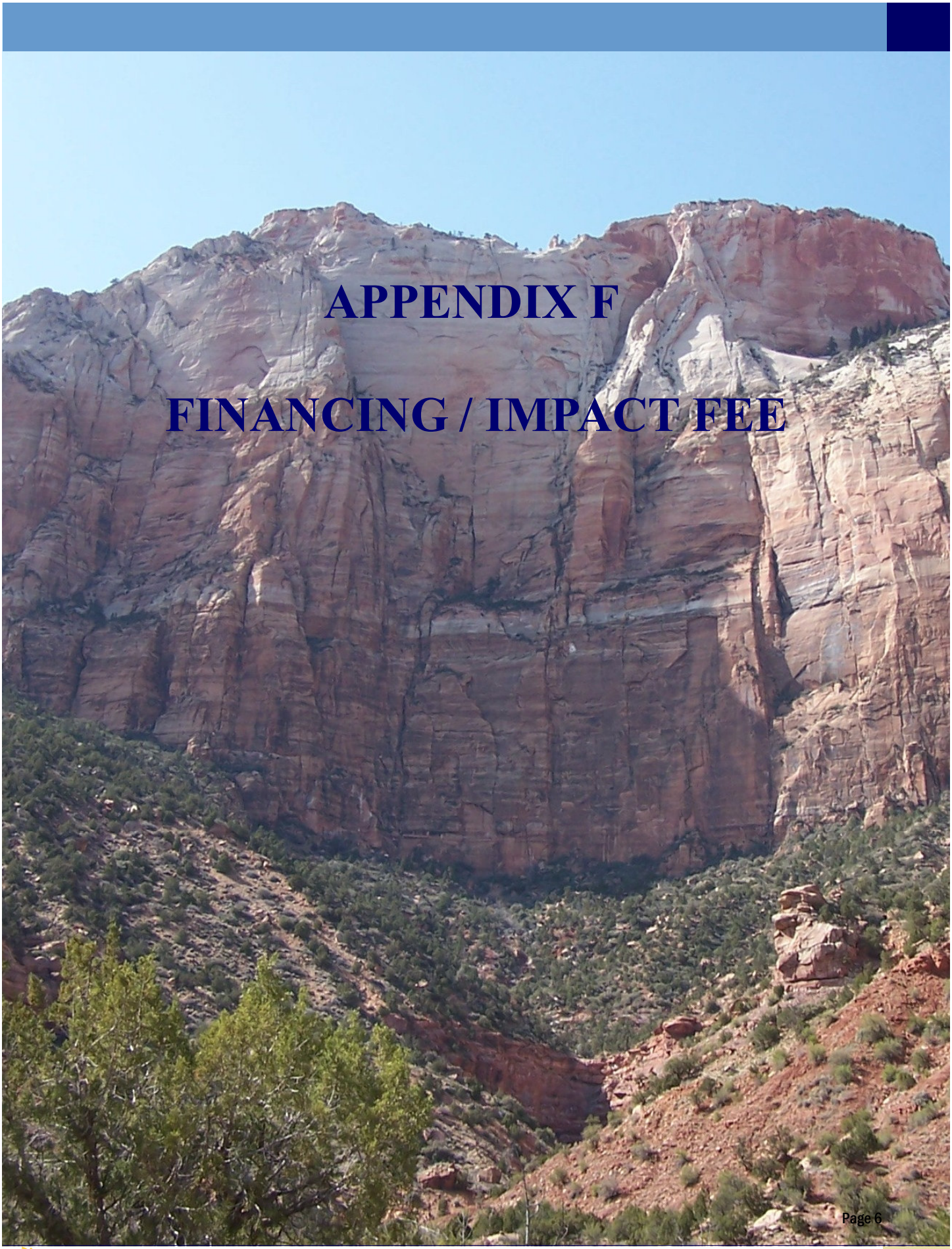
	Fiscal Year Beginning July 1	2011	2012	2013	2014	2015	2016	2017	2018
	Ending June 30	2012	2013	2014	2015	2016	2017	2018	2019
1	Average Rate ERU	$44.60	$46.05	$47.55	$49.10	$50.69	$52.34	$54.04	$55.80
2	Connection Fee	$540	$540	$540	$540	$540	$540	$540	$540
3	Impact fee	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842
4	**System Users:**								
5	Total Existing ERU's	790	814	840	866	893	920	949	978
6	New ERU's:	24	24	26	26	27	27	29	29
7									
8	**REVENUES:**								
9	User Fees (Water Sales)	429,275	456,490	486,732	517,869	551,428	586,308	624,817	664,541
10	Impact and Connection Fees	76,583	76,583	82,965	82,965	86,156	86,156	92,537	92,537
11	Late Fees & Penalties	0	0	0	0	0	0	0	0
12	Miscellaneous	8,033	8,314	8,605	8,906	9,218	9,540	9,874	10,220
13	Garbage collection revenue								
14	Interest Income/Bond Discount	5,738	5,938	6,146	6,361	6,584	6,814	7,053	7,300
15	***TOTAL REVENUE:***	**$519,628**	**$547,325**	**$584,448**	**$616,101**	**$653,386**	**$688,818**	**$734,282**	**$774,598**
16									
17	**EXPENSES:** (Inc. O&M & Debt Serv.)								
18	Salaries, wages and benefits	141,329	148,467	155,964	163,840	172,114	180,806	189,937	199,528
19	Office expenses and travel	7,632	8,018	8,423	8,848	9,295	9,764	10,257	10,775
20	Repairs and maintenance	45,822	48,136	50,566	53,120	55,803	58,621	61,581	64,691
21	Utilities	16,659	17,501	18,384	19,313	20,288	21,313	22,389	23,520
	Legal and professional fees	14,794	15,541	16,326	17,150	18,017	18,926	19,882	20,886
	Garbage collection								
	Contract services	2,831	2,974	3,124	3,282	3,448	3,622	3,805	3,997
	Insurance	12,449	13,078	13,738	14,432	15,161	15,926	16,731	17,576
22	Miscellaneous	17,661	18,553	19,490	20,474	21,508	22,594	23,735	24,934
23	Depreciation	0	0	0	0	0	0	0	0
24	***Sub-Total Operation & Maintainance***	**$259,178**	**$272,267**	**$286,016**	**$300,460**	**$315,633**	**$331,573**	**$348,317**	**$365,907**
25									
26	**EXISTING DEBT SERVICE (810-820)**								
27	No Interest State Loan	17,080	17,080	0	0	0	0	0	0
28	No Interest State Loan (Payment/10)	1,708	1,708	0	0	0	0	0	0
29	Water Revenue Bond 1995A	48,000	48,000	48,000	0	0	0	0	0
30	Water Revenue Bond 1995 Reserve (Payment/6)	8,000	8,000	8,000	0	0	0	0	0
	1995A DSRF								
	1995A DSRF Reserve (Payment/10)								
	Water Revenue Bond 2004 (tank project)	24,840	25,670	26,490	27,300	75,100	87,420	89,610	92,770
	Water Revenue Bond 2004 Reserve (Payment/6)	10,000	10,000	10,000	10,000	10,000			
31	Owing to the General Fund	23,460	23,460	23,460	23,460	23,460	23,460	23,460	23,460
32	***Sub-Total Existing Debt Service***	**$133,088**	**$133,918**	**$115,950**	**$60,760**	**$108,560**	**$110,880**	**$113,070**	**$116,230**
33									
34	**NEW DEBT SERVICE (810-820)**								
35	2008 Loan	77,496	77,496	77,496	77,496	77,496	77,496	77,496	77,496
36	Loan Reserve (Payment/10)	7,700	7,700	7,700	7,700	7,700	7,700	7,700	0
37									
38	2016 Loan	0	0	0	0	0	0	0	0
39	Loan Reserve (Payment/10)	0	0	0	0	0	0	0	0
40									
41	***Sub-Total New Debt Service***	**$85,196**	**$85,196**	**$85,196**	**$85,196**	**$85,196**	**$85,196**	**$85,196**	**$77,496**
42	***Total Debt Service***	**$218,284**	**$219,114**	**$201,146**	**$145,956**	**$193,756**	**$196,076**	**$198,266**	**$193,726**
43									
44	Renewal and Replacement Fund (590)	73,010	74,989	78,776	82,754	86,933	91,324	95,935	100,780
45	***TOTAL EXPENSES:***	**$550,472**	**$566,370**	**$565,938**	**$529,170**	**$596,323**	**$618,972**	**$642,518**	**$660,413**
46									
47	***Net Cashflow***	**($30,845)**	**($19,045)**	**$18,510**	**$86,931**	**$57,063**	**$69,846**	**$91,764**	**$114,185**
48									
49	**CASH ON HAND**								
50	*Fund Balance	(194,577)	(213,622)	(195,112)	(108,181)	(51,118)	18,727	110,491	224,676
51	Renewal and Replacement Account Balance:	282,886	359,583	438,359	521,113	608,047	699,370	795,306	896,086
52	New Bond Reserves	38,500	46,200	53,900	61,600	69,300	77,000	77,000	77,000
53	***Total***	**$126,809**	**$192,161**	**$297,147**	**$474,532**	**$626,228**	**$795,098**	**$982,797**	**$1,197,762**
54	**Fund Balance is obtained by adding the previous year's*								
55	*balance to the net cash flow, minus any self funded portion*								
56	*of future projects.*								
57	**Total Project Amount**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
58	**FINANCING PLAN FOR PROJECT PHASES:**								

Cash Flow Analysis

	Fiscal Year Beginning July 1	2019	2020	2021	2022	2023	2024	2025	2026
	Ending June 30	2020	2021	2022	2023	2024	2025	2026	2027
1	Average Rate ERU	$57.61	$59.48	$61.42	$63.41	$65.47	$67.60	$69.80	$72.07
2	Connection Fee	$540	$540	$540	$540	$540	$540	$540	$540
3	Impact fee	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842	$ 5,842
4	**System Users:**								
5	Total Existing ERU's	1,008	1,040	1,072	1,105	1,139	1,175	1,211	1,249
6	New ERU's:	30	32	32	33	34	36	36	38
7									
8	**REVENUES:**								
9	User Fees (Water Sales)	707,224	753,764	801,845	853,397	908,238	967,770	1,029,375	1,096,557
10	Impact and Connection Fees	95,728	102,110	102,110	105,301	108,492	114,874	114,874	121,256
11	Late Fees & Penalties	0	0	0	0	0	0	0	0
12	Miscellaneous	10,577	10,948	11,331	11,727	12,138	12,563	13,002	13,458
13	Garbage collection revenue								
14	Interest Income/Bond Discount	7,555	7,820	8,093	8,377	8,670	8,973	9,287	9,613
15	***TOTAL REVENUE:***	**$821,085**	**$874,642**	**$923,380**	**$978,802**	**$1,037,538**	**$1,104,180**	**$1,166,539**	**$1,240,883**
16									
17	**EXPENSES:** (Inc. O&M & Debt Serv.)								
18	Salaries, wages and benefits	209,605	220,190	231,309	242,990	255,261	268,152	281,694	295,919
19	Office expenses and travel	11,320	11,891	12,492	13,123	13,785	14,481	15,213	15,981
20	Repairs and maintenance	67,958	71,389	74,995	78,782	82,760	86,940	91,330	95,942
21	Utilities	24,707	25,955	27,266	28,643	30,089	31,609	33,205	34,882
	Legal and professional fees	21,941	23,049	24,213	25,436	26,720	28,070	29,487	30,976
	Garbage collection								
	Contract services	4,199	4,411	4,634	4,868	5,113	5,372	5,643	5,928
	Insurance	18,463	19,396	20,375	21,404	22,485	23,620	24,813	26,066
22	Miscellaneous	26,193	27,516	28,905	30,365	31,898	33,509	35,202	36,979
23	Depreciation	0	0	0	0	0	0	0	0
24	***Sub-Total Operation & Maintainance***	**$384,385**	**$403,797**	**$424,188**	**$445,610**	**$468,113**	**$491,753**	**$516,587**	**$542,674**
25									
26	**EXISTING DEBT SERVICE (810-820)**								
27	No Interest State Loan	0	0	0	0	0	0	0	0
28	No Interest State Loan (Payment/10)	0	0	0	0	0	0	0	0
29	Water Revenue Bond 1995A	0	0	0	0	0	0	0	0
30	Water Revenue Bond 1995 Reserve (Payment/6)	0	0	0	0	0	0	0	0
	1995A DSRF								
	1995A DSRF Reserve (Payment/10)								
	Water Revenue Bond 2004 (tank project)	94,890	97,980	102,030	104,030				
	Water Revenue Bond 2004 Reserve (Payment/6)								
31	Owing to the General Fund	23,460	23,460						
32	***Sub-Total Existing Debt Service***	**$118,350**	**$121,440**	**$102,030**	**$104,030**	**$0**	**$0**	**$0**	**$0**
33									
34	**NEW DEBT SERVICE (810-820)**								
35	2008 Loan	77,496	77,496	77,496	77,496	77,496	77,496	77,496	77,496
36	Loan Reserve (Payment/10)	0	0	0	0	0	0	0	0
37									
38	2016 Loan	0	0	0	0	70,361	70,361	70,361	70,361
39	Loan Reserve (Payment/10)	0	0	0	0	7,000	7,000	7,000	7,000
40									
41	***Sub-Total New Debt Service***	**$77,496**	**$77,496**	**$77,496**	**$77,496**	**$154,857**	**$154,857**	**$154,857**	**$154,857**
42	***Total Debt Service***	**$195,846**	**$198,936**	**$179,526**	**$181,526**	**$154,857**	**$154,857**	**$154,857**	**$154,857**
43									
44	Renewal and Replacement Fund (590)	105,870	111,216	116,832	122,732	128,930	135,441	142,281	149,466
45	***TOTAL EXPENSES:***	**$686,101**	**$713,949**	**$720,547**	**$749,868**	**$751,901**	**$782,051**	**$813,725**	**$846,998**
46									
47	***Net Cashflow***	**$134,985**	**$160,693**	**$202,833**	**$228,934**	**$285,637**	**$322,129**	**$352,814**	**$393,885**
48									
49	**CASH ON HAND**								
50	*Fund Balance	359,661	520,354	723,187	452,120	737,757	1,059,886	1,412,700	1,806,586
51	Renewal and Replacement Account Balance:	1,001,955	1,113,171	1,230,004	1,352,736	1,481,667	1,617,108	1,759,389	1,908,856
52	New Bond Reserves	77,000	77,000	77,000	77,000	84,000	91,000	98,000	105,000
53	***Total***	**$1,438,616**	**$1,710,525**	**$2,030,191**	**$1,881,857**	**$2,303,424**	**$2,767,994**	**$3,270,090**	**$3,820,441**
54	**Fund Balance is obtained by adding the previous year's*								
55	*balance to the net cash flow, minus any self funded portion*								
56	*of future projects.*								
57	**Total Project Amount**	**0**	**0**	**0**	**1,500,000**	**0**	**0**	**0**	**0**
58	**FINANCING PLAN FOR PROJECT PHASES:**								

Cash Flow Analysis

	Fiscal Year Beginning July 1	2027	2028
	Ending June 30	2028	2029
1	Average Rate ERU	$74.41	$76.83
2	Connection Fee	$540	$540
3	Impact fee	$ 5,842	$ 5,842
4	**System Users:**		
5	Total Existing ERU's	1,287	1,316
6	New ERU's:	38	29
7			
8	**REVENUES:**		
9	User Fees (Water Sales)	1,166,125	1,226,611
10	Impact and Connection Fees	121,256	92,537
11	Late Fees & Penalties	0	0
12	Miscellaneous	13,929	14,416
13	Garbage collection revenue		
14	Interest Income/Bond Discount	9,949	10,297
15	***TOTAL REVENUE:***	**$1,311,258**	**$1,343,862**
16			
17	**EXPENSES:** (Inc. O&M & Debt Serv.)		
18	Salaries, wages and benefits	310,863	326,562
19	Office expenses and travel	16,788	17,636
20	Repairs and maintenance	100,787	105,877
21	Utilities	36,643	38,494
	Legal and professional fees	32,541	34,184
	Garbage collection		
	Contract services	6,227	6,542
	Insurance	27,383	28,765
22	Miscellaneous	38,847	40,808
23	Depreciation	0	0
24	***Sub-Total Operation & Maintainance***	**$570,079**	**$598,868**
25			
26	**EXISTING DEBT SERVICE (810-820)**		
27	No Interest State Loan	0	0
28	No Interest State Loan (Payment/10)	0	0
29	Water Revenue Bond 1995A	0	0
30	Water Revenue Bond 1995 Reserve (Payment/6)	0	0
	1995A DSRF		
	1995A DSRF Reserve (Payment/10)		
	Water Revenue Bond 2004 (tank project)		
	Water Revenue Bond 2004 Reserve (Payment/6)		
31	Owing to the General Fund		
32	***Sub-Total Existing Debt Service***	**$0**	**$0**
33			
34	**NEW DEBT SERVICE (810-820)**		
35	2008 Loan	77,496	77,496
36	Loan Reserve (Payment/10)	0	0
37			
38	2016 Loan	70,361	70,361
39	Loan Reserve (Payment/10)	0	1
40			
41	***Sub-Total New Debt Service***	**$147,857**	**$147,858**
42	***Total Debt Service***	**$147,857**	**$147,858**
43			
44	Renewal and Replacement Fund (590)	157,014	164,944
45	***TOTAL EXPENSES:***	**$874,951**	**$911,670**
46			
47	***Net Cashflow***	**$436,308**	**$432,192**
48			
49	**CASH ON HAND**		
50	*Fund Balance	2,242,893	2,675,085
51	Renewal and Replacement Account Balance:	2,065,870	2,230,814
52	New Bond Reserves	105,000	105,000
53	***Total***	**$4,413,764**	**$5,010,899**
54	**Fund Balance is obtained by adding the previous year's*		
55	*balance to the net cash flow, minus any self funded portion*		
56	*of future projects.*		
57	**Total Project Amount**	**0**	**0**
58	**FINANCING PLAN FOR PROJECT PHASES:**		



APPENDIX F

FINANCING / IMPACT FEE

Proposed Financing Plan

TOWN OF SPRINGDALE			
FY 2009 PROPOSED FINANCING PLAN			
TOTAL PROJECT COST			**$ 2,968,600**
FY 2009 EXPENSES			
Proposed Funding:	**Rate**	**Term in Yrs.**	**Principal**
Self Participation			200,000
DWB Grant			768,600
DWB Loan	1.00%	30	2,000,000
TOTAL PROJECT FUNDING:			**$2,968,600**
EXPENSES: (First Year of New Debt Serv. Pmt.)			
Salaries, wages and benefits			$121,911
Office expenses and travel			$6,584
Repairs and maintenance			$39,526
Utilities			$14,370
Legal and professional fees			$12,761
Garbage collection			$0
Contract services			$2,442
Insurance			$10,739
Miscellaneous			$15,235
Depreciation			$0
Subtotal Expenses:			**$223,568**
EXISTING DEBT SERVICE			
No Interest State Loan	0%		$17,080
Loan Reserve (Payment /10)			$1,708
Water Revenue Bond 1995A	0%	20	$48,000
Bond Reserve (Payment/6)			$8,000
Water Revenue Bond 2004 Tank Project	1%	20	$21,260
Bond Reserve (Payment/6)			$10,000
Subtotal Existing Annual Debt Service:			**$106,048**
NEW DEBT SERVICE			
New Loan(s)	100.0%	0	$77,496
Loan Reserve (Payment/10)			$7,700
Subtotal New Annual Debt Service:			**$85,196**
Renewal and Replacement Fund			$66,000
GRAND TOTAL EXPENSES:			**$480,812**
ANNUAL INCOME			
Transient Room Tax Revenues			$60,000
Projected Yearly Impact Fees Received			$70,201
Total Number Of ERU's			721
Average Monthly Water User Rate/ERU			**$40.52**
TOTAL ANNUAL INCOME:			**$480,812**
Average Monthly Irrigation Water User Rate/ERU			**$4.88**
Total Average Monthly Water Cost/ERU			**$45.40**

Impact Fee Analysis

IMPACT FEE ANALYSIS FY2008
CULINARY WATER MASTER PLAN

Feb-08

EXISTING DEBT SERVICE	**% Eligible**		**Eligible**
No Interest State Loan	100%	$	102,480
Water Revenue Bond 1995A	100%	$	306,000
Water Revenue Bond 2004 Tank Project	100%	$	1,014,890
Existing Impact Fee Eligible Cost:		$	1,423,370
PROPOSED IMPROVEMENT PROJECTS			
Total Estimated 2008 Project Cost		$	2,968,800
Total Estimated 2008 Project Cost Paid in Grant Funds		$	(768,800)
% Of New Project Cost Due to New Growth	85.2%	$	1,874,980
Interest From New Debt Service	$324,887	$	276,889
Impact Fee Eligible Cost		$	2,151,869
No. of ERUs (2008 Historic)			699
Future ERU's (2028 Historic)			1,289
No. of New ERU's Due to Growth			590
Impact Fee Eligible Cost for Improvement Projects		$	3,575,239
Impact Fee Amount for Improvement Projects = Total Eligible Cost / New ERU's		$	6,060 /Conn.
Additional Amount per connection for Future Water Rights		$	- /Conn.
Proposed Impact Fee for Town of Springdale Water Users (FY2008) =		**$**	**6,060** /Conn.

Size	Sectional	Increase	Impact Fee
3/4"	0.44	0%	$ 6,060
1"	0.79	80%	$ 10,880
1 1/2"	1.77	302%	$ 24,377
2"	3.14	614%	$ 43,244
3"	7.07	1507%	$ 97,369
4"	12.57	2757%	$ 173,115
6"	28.27	6325%	$ 389,338