NIBLEY CITY
CULINARY WATER MASTER PLAN

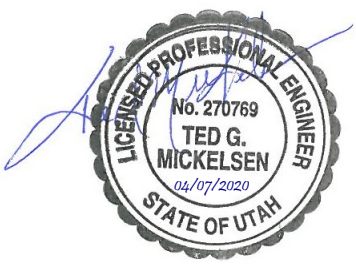
APRIL 2020

PREPARED FOR:

NIBLEY
SETTLED 1855

PREPARED BY:

Jones & DeMille Engineering



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1. EXECUTIVE SUMMARY

This Master Plan will provide an outline of the existing system components, such as storage, system piping, water rights, and sources. The plan also provides recommendations for the City to supply water for the projected growth through 2040. The recommendations in this plan are given to meet the minimum level of service required by the State while providing the best value to Nibley City.

Based on the growth projection of 3.87%, Nibley City is expected to grow from 7,800 people to approximately 18,000 by 2040. This population is comparable to 4,890 equivalent residential connections, see Sections 4.1 and 5.1.

Nibley City currently has three storage tanks with a combined capacity of 3.35 million gallons. The current storage meets the existing requirements of the system as determined by the new State of Utah Division of Drinking water rules. The storage capacity will become deficient sometime during 2023 and additional storage will be needed to maintain optimal operation of the system. By the year 2040, the City will need a total of 6.35 million gallons of storage. It is recommended that an additional 2-million-gallons of storage be available by 2023 to meet short term needs, with the remaining 1-million-gallons of storage available before 2040, see Sections 7.1 and 7.1.1.

Nibley City has three active sources; namely the 4000 South Well, Nelson Well, and the 640 West Well. The current combined well test capacity is 9,980 gpm. The Division of Drinking Water considers 2/3 of the pumping rate from the aquifer drawdown test (6,653 gpm) as the safe yield of the well. The safe yield is used for planning purposes and determines the number of ERCs a well source can support. Based on the pumps installed at each well, the current combined pumping rate of all wells is 5,060 gpm. Comparing the well safe yield capacity and the pumping capacity, there is approximately 1,600 gpm of water than can be further extracted from the wells through increasing the pumping rate. By 2025 the City will need approximately 1,000 gpm of additional water production. This increase can be achieved by changing the pump settings on the 640 West Well and other existing wells to increase the pumping rate to the safe yield. By 2030 the City will need additional source water and by 2040 will need an additional 3,000 gpm. This could be achieved by re-drilling and equipping a new well near the 4000 South well to replace it. If the new 4000 South well can produce a safe yield of 3,000 gpm then it satisfies the need through 2040. If the rate is less than 3,000 gpm and new source making up the balance to 3,000 gpm will be necessary by 2040. This additional need can be met by developing new wells and sizing them appropriately (Sections 7.2 and 7.2.1).

A hydraulic model was created using the Bentley WaterGEMS modeling software from existing data provided by JUB Engineers. The model was calibrated to the existing system for accuracy. The model then projected water demands based on the State's guidelines for minimum pressures during different flow scenarios for 2025, 2030, and 2040 (see Section 6). The model results show that the system can adequately provide fire flow and minimum pressures during the various demand patterns.

As part of the Master Plan, there are existing pipelines that have been identified for a pipeline replacement program due to their age/condition or capacity needs. See Tables 1 and 2 below.

By 2030, the model shows that an additional transmission line is required to maintain flows and pressures. It is proposed that the transmission line start from the existing tank location and connect to the existing transmission line at 4400 S and 300 W. The transmission line would then be extended further west, as growth occurred, and connect to the 12-inch line on 1500 W and 3300 South.

Nibley City's water rights currently are classified under the "Interim Cache Valley Ground-Water Management Plan" of Area 25 (Bear River/Cache Valley) created by the Utah Division of Water Rights (DWR). This policy dictated the requirement for future water right applications, which Nibley City will need to do in the near future. Currently, Nibley City has water rights for 3,304 ERCs, which is sufficient for the current system, see Section 7.5. Future water right acquisition will be needed and can be obtained through the formal application process, purchase of existing water rights/shares, acquiring them through new development, or through filing change applications on Nibley City's existing water rights and diligence claims. A key aspect of the new policy in Area 25 is that compensation water is required for any new water right and some change applications. Because of this policy and its various interpretations that will change in time, the best practice will be to meet with DWRi's Regional Engineer of the Northern Regional Office at the time when future water rights are required. The approximate future needs are shown below in this document. The highest priority change application corresponds to Yeates Spring (WR25-2167). It is recommended that this water right be moved to within the culinary water service boundary to be utilized by the City for municipal water needs.

A summary of the recommended capital improvements and construction schedule are shown in Table 1. The recommended pipeline replacement projects are shown in Table 2 - Pipeline Replacement Projects.

Table 1 - Capital Improvements List

5 YEAR CAPITAL IMPROVEMENTS				
Map ID	**Improvement Name**	**Description**	**Year**	**Years from 2020**
	Source and Capacity Improvements			
C-1	2 MG Storage Tank	Increase Storage Capacity	2023	3
	20 YEAR CAPITAL IMPROVEMENTS			
	Source and Capacity Improvements			
C-2	4000 S Replacement Well	Increase Source Capacity (3,000 gpm required by 2040)	1,500 gpm by 2030	10
C-3	Transmission Line Phase 1	Install 18" Transmission Line Phase 1	2035	15
C-4	1 MG Storage Tank	Increase Storage Capacity	2035	15
C-5	Transmission Line Phase 2	Install 18" Transmission Line Phase 2	2038	18
	Develop New Source	New gpm Source (Well) (balance not developed in 2030)	2040	20

Table 2 - Pipeline Replacement Projects

Pipeline Replacement Program (See Section 7.4)			
Map ID	**Improvement Name**	**Description**	**Purpose for Replacement**
P-1	Meadowview Ln	Upsize to 8" pipe	Capacity
P-2	Cottonwoods-3850 S PRV	Add PRV to Developer Installed Pipeline	Capacity
P-3	4300 S. Hollow Rd	Upsize to 8" pipe	Capacity
P-4	South End of Hollow Rd	Upsize to 8" & 10" pipe	Capacity
P-5	3750 S Sheridan Ridge Ln	Upsize to 8" pipe	Capacity
P-6	2900 South	Upsize to 8" pipe	Capacity
P-7	4000 S	Replace 12" pipe	Age/Condition of Pipe
P-8	280 W - 250 W	Replace 10" & 12" pipes	Age/Condition of Pipe
P-9	South End of Hollow Rd Pipeline Replacement	Upsize to 10" pipe	Capacity

2. INTRODUCTION

Nibley City is one of the fastest growing communities in Cache County, Utah. The reason for the growth Nibley is experiencing is due to new residential developments, which make up the majority of land use. To support and sustain this development, Nibley has updated its Culinary Water Master Plan. This Master Plan will identify system limitations and associated strategic improvements that will allow the city to supply sufficient water supply to sustain and reliable system and support future growth.

3. DEFINITIONS

ADD	Average Day Demand	LCC	Life Cycle Cost
MG	Million Gallons	PDD	Peak Day Demand
ac-ft	Acre-feet	PID	Peak Instantaneous Demand
DDW	Division of Drinking Water	PRV	Pressure Reducing Valve
DWR	Division of Water Rights	psi	pounds per square inch
ERC	Equivalent Residential Connections	SRF	State Revolving Fund
gpm	gallons per minute	WR	Water Right
IFC	International Fire Code	LOS	Level of Service

4. DEMOGRAPICS

4.1. POPULATION PROJECTIONS

Growth projections were developed using historic Census data (1990-2010) and data reported by Nibley to the Division of Water Rights (2011-2018). To calculate the projected population, the future value formula was used, see Equation 1.

$$FP = CP \times (1 + r)^t \quad (1)$$

Where:
FP = Future Population
CP = Current Population
r = Annual Growth Rate (%)
t = Number of Years Between Current and Future Population

Nibley City has experienced significant growth in recent years. From 2000 to 2010 the population grew at the rapid pace of 10% annually, from 2010 to 2018 the growth slowed to 3.87% annually. Since the more recent growth rate of 3.87% is more typical for the state and this area, it was used to determine the future growth projections. In 2025, Nibley's population is projected to be approximately 10,000, and approximately 18,000 in 2040 (see Figure 1).

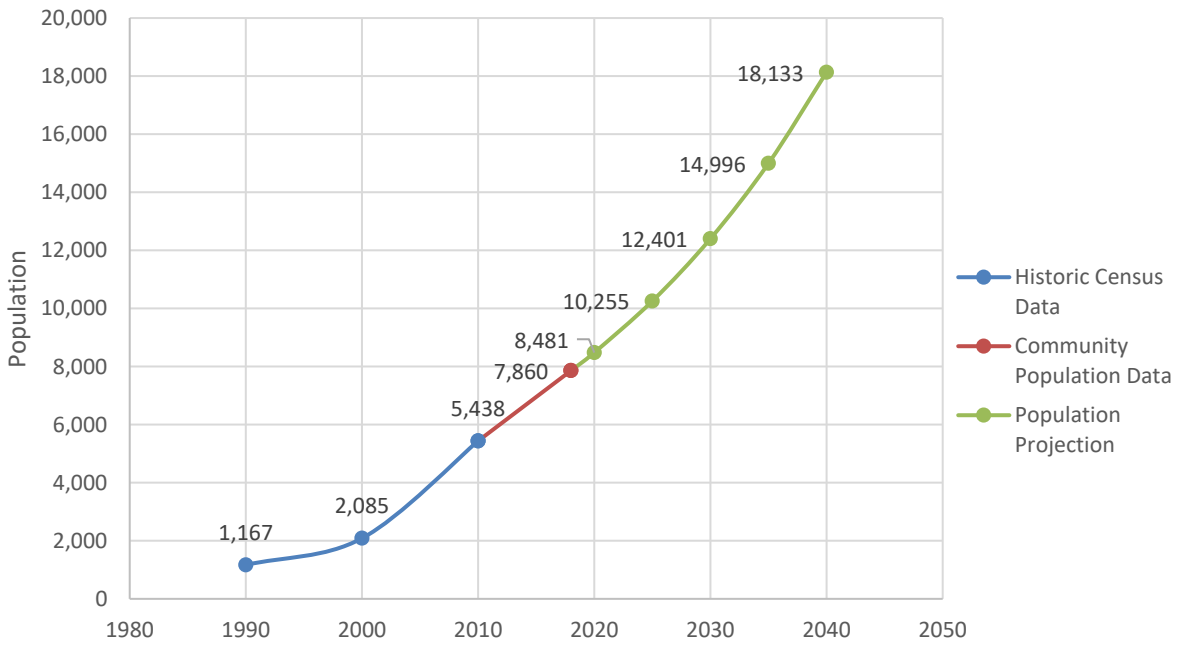


Figure 1 - Population Projections

5. CONNECTIONS

Nibley is mainly a residential community with some commercial and industrial connections. Water usage for these connections was based on the data reported to the Division of Water Rights by Nibley City for 2018. Because the water usage data doesn't differentiate the water between indoor and outdoor use and most of the residential culinary water use is for irrigating lawns, the calculation for converting connections to ERCs is straightforward and combines indoor and outdoor use. Typically, for planning purposes, ERCs are used to define the capacities of system components. Equations 2 and 3 show the conversion for connections to ERCs. A breakdown of connections and their ERC is shown in Table 3.

$$\text{Water Usage per ERC} = \frac{\text{Total Water Used by Residential Connections}}{\text{Number of Residential Connections}} \quad (2)$$

$$\text{Number of ERCs} = \frac{\text{Water Usage by Type of Connection}}{\text{Water Usage per ERC}} \quad (3)$$

Table 3 - 2018 Culinary Water Connections

2018	Connections	ERC
Residential	1,847	1,847
Commercial	19	65
Industrial	10	61
Institutional	48	146
Total Connections	1,924	2,119

5.1. ERC PROJECTIONS

To project future water demands, it was assumed that the system ERCs would grow at the same rate as the population (3.87%). This assumes that the residential, institutional, and commercial connections grow proportionally. Figure 2 shows existing and projected number of ERCs through 2040.

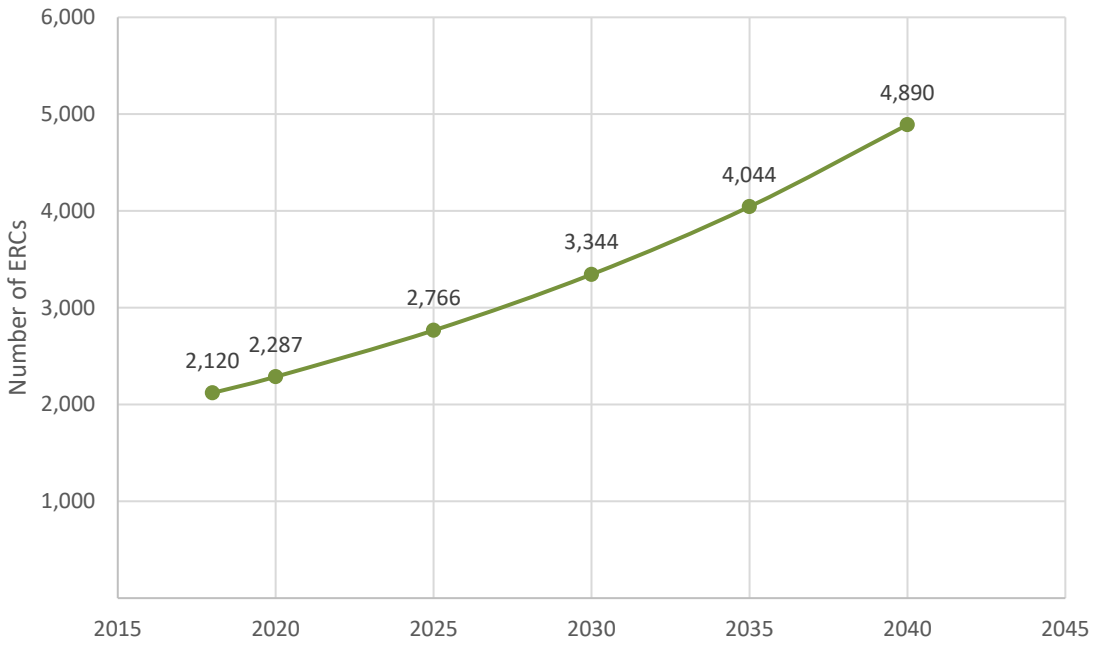


Figure 2 - Projected ERC Growth

6. LEVEL OF SERVICE

The State of Utah Division of Drinking Water Rules and the IFC outline the minimum Level of Service (LOS) that water systems are required to provide. Recently, the DDW has updated the requirements or calculations to determine the LOS for water systems serving more the 500 people (see Appendix A for a summary of the new rules and calculations). The LOS for the storage and source components incorporates a 16% System-Specific Variation Factor. The LOS for Water Rights is determined by the peak flow (based on peak day demand) and the annual diversion limit (based on the average day demand over a year). The LOS for Nibley's water system is as follows:

Storage

- Equalization storage of 1,076.5 gallons per ERC for indoor and outdoor use
- Fire storage 3,500 gpm for 3 hours (630,000 gallons)
    - Controlled by larger requirements of Nibley City Elementary
- Emergency storage based upon an assessment of risk and the desired degree of system dependability

Source

- Peak Day Demand of 1.86 gpm per ERC for indoor and outdoor use

Distribution Minimum Water Pressure Requirements

- Peak Day Demand is defined as 1.86 gpm/ERC with 40 psi residual system pressure during peak day demands.
- Peak Instantaneous Demand is defined as 2.72 gpm/ERC with 30 psi during peak instantaneous demands.
    - Peak Instantaneous Demand was calculated for every pipe according to DDW guidelines:
        - Indoor use (gal/year) is defined as 10.8 x (Number of ERCs)$^{0.64}$
        - Outdoor use (gal/year), Nibley is located in Irrigation Zone 4, which states that each irrigated acre equates to 7.92 gallons per minute (4,192,752 gallons per year per irrigated acre) for peak instantaneous demand. A sample of 10 homes was taken to find the average irrigated acres per ERC (0.283 acres). This number was then multiplied by the total number of ERCs and the peak instantaneous demand for irrigated use.
        - The sum of the indoor and outdoor peak instantaneous demand was converted to gpm (5761.38) and then divided by the total number of ERCs.
- Peak Day Demand with Fire Flow Demand is defined as 1.86 gpm/ERC with 20 psi during peak day demands with fire.
    - 1,500 gpm for residential homes >3,600 square feet
    - 3,500 gpm for Nibley City Elementary

Water Rights

- Diversion Limit (peak flow or PDD) = 0.001667 cfs/ERC (1.86 gpm/ERC)
- Annual Diversion Volume (ADD projected for one year) = 1.21 ac-ft/ERC (0.748 gpm/ERC)

7. SYSTEM CAPACITY ANALYSIS

A map of the current system layout can be found in Appendix B.

7.1. STORAGE CAPACITY ANALYSIS

Currently, there are three water storage tanks that serve Nibley City and provide the total storage capacity for the water system of 3.35 million gallons. The existing ERC capacity was evaluated by first estimating the required fire storage based on the International Fire Code 2015, Appendix B. For Nibley City, the largest fire flow demand is Nibley City Elementary, which requires 3,500 gpm and 3 hours of storage, totaling 630,000 gallons of fire storage.

After the fire storage is accounted for, the tanks need additional storage for emergencies. Currently, the DDW does not specify the amount of storage volume required for emergencies but states,

> "Emergency storage shall be considered during the design process. The amount of emergency storage shall be based upon an assessment of risk and the desired degree of system

dependability. The Director may require emergency storage when it is warranted to protect public health and welfare."[1]

Since the existing storage tanks have not been planned or constructed with emergency storage, the current emergency storage LOS is 0%. As future storage tanks are planned it is recommended that Nibley consider 10% of the storage reserved for emergencies.

Using the ERC's calculated in Section 5 and the equalization storage requirements outlined in Section 6 , the required equalization storage was determined for the City. A breakdown of the existing storage translated into ERCs is shown in Table 4. The current existing storage can sustain 2,527 ERCs, which is sufficient for the current storage needs.

Table 4 – Existing Storage Tank Capacity

Name	Total Volume (gal)
Tank 1	350,000
Tank 2	1,000,000
Tank 3	2,000,000
Total Existing Storage	**3,350,000**
Fire Storage (gal)	630,000
Emergency Storage	0
Equalization Storage	2,720,000
ERCs (Equalization Storage/ Equalization Storage per ERC)	**2,527**

7.1.1. STORAGE CAPACITY IMPROVEMENTS

To accommodate the projected growth, additional storage will be required. Using the LOS criteria, the total storage needed by 2024 is approximately 1 MG. However, due to space constrictions and the cost-benefit advantage of constructing larger tanks, it is recommended to plan for a larger tank, approximately 2 MG. To support the near future need, the tank should be built by 2023. For the full 20-year buildout, an additional 1 MG of storage is required between 2035 and 2040 to meet the needs of the city, see Table 5.

[1] Utah Admin Code 309-510-8.4 https://rules.utah.gov/publicat/code/r309/r309-510.htm#T8

Table 5 - Storage Improvements

Planning Period	Year	Population	ERC	Additional Storage (MG)	Additional Equalization (ERC)	Cumulative Storage (MG)	Available Storage Capacity (ERC)
Short Term Planning Period	2018	7,860	2,120			3.35	2,527
	2019	8,164	2,202			3.35	2,527
	2020	8,481	2,287			3.35	2,527
	2021	8,809	2,376			3.35	2,527
	2022	9,150	2,468			3.35	2,527
	2023	9,505	2,563	2	1,858	5.35	4,385
	2024	9,873	2,663			5.35	4,385
	2025	10,255	2,766			5.35	4,385
Long Term Planning Period	2030	12,401	3,344			5.35	4,385
	2035	14,996	4,044	1	929	6.35	5,314
	2040	18,133	4,890			6.35	5,314

As the city continues to grow, consideration for 10 to 15 percent emergency storage should be included in the tank storage volume. This will increase the storage capacity more than what is required. Section 7.5 outlines the costs for the additional storage.

The new storage tanks should be located at a similar elevation as the existing tanks. Potential locations for the new tank could be near the existing tanks, next to Highway 165 and Ridgecrest Dr. (near LeGrand Johnson's truck shop in Hyrum) or south of the existing tanks, see Appendix F.

7.2. SOURCE CAPACITY ANALYSIS

Currently, the system is served by three wells, the Nelson Well, 4000 South Well, and the 640 West Well. The current system's source capacity is based upon the physical pumping capacity along with the well safe yield capacity. The current combined rate at which the City is pumping these wells is approximately 5,060 gpm, where combined well safe yield capacity is approximately 6,653 gpm. Given that each ERC requires 1.86 gpm, the number of ERCs that can be supported at the current pumping rate is 2,720 ERCs. The number of ERC's that can be supported at the wells' safe yield capacity is 3,577 ERCs, as shown in Table 6. Since the pump duration and pump speed of the wells is not fully utilized and the well safe yield capacity is greater than the current pumping rate, increasing the pumping rate (motor speed) of the wells will increase the number of ERC's that can be served by approximately 857.

Table 6 - System Source Capacities

Current Source Pump Production			Well Test Capacity		Well Safe Yield*	
Nelson Well	1,960	gpm	3,300	gpm	2,200	gpm
640 West Well	1,900	gpm	4,000	gpm	2,667	gpm
4000 South Well	1,200	gpm	2,680	gpm	1,787	gpm
Total	**5,060**	**gpm**	**9,980**	**gpm**	**6,653**	**gpm**
Capacity	**2,720**	**ERC**		**Capacity**	**3,577**	**ERC**

*Safe yield capacity calculated as 2/3 the well test capacity (Rule R309-515-6(10)(c)).

7.2.1. SOURCE CAPACITY IMPROVEMENTS

The safe yield of the wells is sufficient to handle the needs for the immediate future. Increasing the pumping rates and pump duration at the wells can supply the needed amount of water until 2030. To accommodate the growth to 2030, it is recommended to increase the pumping rate from the existing wells to the safe yield of each well.

Since the 4000 South well is aging, when the existing wells have reached their safe yield pumping capacity, it is recommended to replace the 4000 South Well to increase the well capacity. The redevelopment would include drilling a new well next to the current well, equipping the well with a larger pump, and constructing a building around the well. The new well could then produce an increased capacity that could meet the water supply needs up to 2035-2040.

The significant increase in the population from 2025 to 2040 has a large impact on the amount of water the system needs to pull from its sources. An additional 3,000 gpm of water produced from new sources will need to be achieved. This means that the production rate of the new wells will need to total 4,500 gpm. For planning purposes, the wells have been broken down to two new sources. By 2030, an additional 1,500 gpm safe yield of source water (2,250 gpm total capacity) will need to be added to the system as well as an additional 1,500 gpm of source water (2,250 gpm capacity) by 2040, see Table 7. If a safe yield of 3,000 gpm can be achieved through a single source in 2030, then no additional source water is needed through 2040. To optimize the location of the wells, it is recommended that they pump water into the system upstream of the existing PRV vaults, which will allow the wells to pump water to the tanks as well as the distribution system.

Table 7 - Source Capacity Improvements

Planning Period	Year	Population	ERC	Additional Source Needed (gpm)	Additional ERC	Cumulative Source Capacity (gpm)	Capacity (ERC)
Short Term Planning Period	2018	7,860	2,120			5,060	2,720
	2019	8,127	2,192			5,060	2,720
	2020	8,404	2,266			5,060	2,720
	2021	8,689	2,343			5,060	2,720
	2022	8,985	2,423			5,060	2,720
	2023	9,290	2,506			5,060	2,720
	2024	9,606	2,591			5,060	2,720
	2025	9,933	2,679	Increase pumping rate to safe yield	857	6,653	3,577
Long Term Planning Period	2030	12,401	3,344	1,500	806	7,459	4,383
	2035	14,996	4,044	1,500	806	9,560	5,140
	2040	18,133	4,890			9,560	5,140

7.3. DISTRIBUTION SYSTEM CAPACITY ANALYSIS

7.3.1. HYDRAULIC MODELING

The hydraulic model was set up using information from previous models and shapefiles and was verified with current operating conditions. Additional service connections were added to the data by viewing aerial imagery and with additional information from the City. The water system was then modeled using the Bentley WaterGEMS program and calibrated with existing flow data. Junctions were used to represent the nearby ERC values of homes and businesses. The representative junctions were used to minimize the overall size of the model and simplify the model for review. The junctions were strategically placed at beginning, middle and end of pipes, along major roads and intersections and at other locations as necessary to achieve system representation. The WaterGEMS demand calculator tool was used to assign ERC data to the placed junctions, based on the nearest connection locations, and associated ERC values. The hydraulic model was used to check multiple scenarios for system health in accordance with Utah drinking water laws and rules. The scenarios evaluated include: Average Day Demand (ADD), Peak Day Demand (PDD), Peak Instantaneous Demand (PID) and Peak Day Demand + Fire Flow (PDD+Fire), see Table 8. The scenarios include minimum system pressures that must be checked for function of the system.

Table 8 - Model Flows

ADD Flow per ERC	PDD Flow per ERC	PID Flow per ERC
0.748 gpm	1.856 gpm	2.718 gpm

The hydraulic model was created to check existing conditions and evaluate future buildout. The Nibley water system is large enough, and there are enough scenarios to evaluate that setup was vital to ensure smooth model transitions into the future buildouts. Nibley's reported water data from 2017 and 2018 were used in conjunction with the Utah Division of Administrative Rules (DAR) to determine the flow rate values per ERC. These calculations were used as a global demand factor and adjusted for the required scenario. The residential and commercial fire values for the model were used from the International Fire Code (IFC).

Upon completing the base model, dependent scenarios were created for the 2025 and 2040 buildouts. By creating dependent scenarios, any changes to the base or parent model were carried through the rest of the project. The system was continually updated as adjustments were made during the design process.

Buildout calculations were used to estimate future ERC values and were based on current growth data. The additional ERC's were divided into several junctions and placed along areas on the outer boundaries of the city and conservatively add flows to the existing system. The additional demand locations were placed by using aerial imagery and the Nibley City zoning map.

7.3.2. EXISTING DISTRIBUTION SYSTEM CAPACITY

The existing system was evaluated for ADD, PDD, PID, and PDD + Fire. The system provides adequate flow and pressure for all scenarios for all portions of the system. The IBC requires fire hydrants have a minimum specified flow with no less than 20 psi through the system during PDD. The minimum flow varies based on building size, type, and use. In general, 1,500 gpm is required for resident protection fire hydrants at 20 psi through the system. Schools and other large commercial buildings may require greater flows but the same minimum 20 psi pressure must be maintained. Facilities constructed prior to this rule requirement may not meet these conditions; however, when improvements are made to older facilities or newer facilities are constructed, they should provide the necessary system improvements to meet their required fire flow conditions.

7.3.3. DISTRIBUTION SYSTEM CAPACITY IMPROVEMENTS

The distribution lines throughout the system meet the DDW requirements for peak water demands on the system. The 2025 model was evaluated with ADD, PDD, PID, and PDD+Fire.

The year 2040 design model was evaluated with ADD, PDD, PID, and PDD+Fire. By the year 2040, the projected population growth is more than double the current population. Assuming water usage will continue at the same rate per ERC, the system has potential for large deficiencies by this time. The

deficiencies are great enough that an additional series of scenarios were completed at a 10-year interval to get in front of the major changes between 2025 and 2040.

The 2040 demands were divided up and placed around the city using several junctions. The junctions were also placed by estimation using aerial photography and the Nibley City zoning map. As the city grows, modeling adjustments are recommended to stay ahead and correct zones that may have issues, see Appendix E.

Several methods were modeled to determine the required improvements for the 20-year buildout, of which, two options were viable to meet the water demand. One option is to add an 18-inch transmission pipeline from the tanks that parallels the existing 18-inch transmission pipeline. The other option is to add a well, tank, and booster pump station to the lower portion of the system at 3200 South and 1200 west. To meet the water demand, the pump station would need a capacity of approximately 2,300 gpm during peak day demand and approximately 4,800 gpm during peak instantaneous demand. Both the pump station and the transmission pipeline could be phased, where the first phase is needed around 2030 and the second phase by 2040.

Both options provided the water needed to the system, so a life cycle cost (LCC) analysis was performed to determine the total cost of each option. The transmission pipeline has the initial capital project cost of $2.78 million and $25,000 to replace valves every 10 years. The pump station initial project cost is $1.13 million with $50,000 for pump maintenance/replacement at 10 years and $100,000 for pump maintenance and replacement at 20 years. The pump station LCC cost also accounts for power usage and annual operation and maintenance (O&M). From the LCC analysis, the transmission pipeline is the cost-effective solution for Nibley, see Table 9 for the comparison and Appendix G for the calculation sheets.

Table 9 - Life Cycle Cost Comparison

Improvement Alternative	Initial Project Cost	Annual O&M	Total Cost after 20 Years
Transmission Pipeline	$2,775,000	$24,420	$3,393,000
Pump Station	$1,125,000	$29,700	$3,828,000

Nibley's water system is primarily driven by gravity, where the wells feed the tanks during the night and the tanks feed the system during the day. Because of the low cost associated with running a gravity fed system, the recommended distribution system improvement is to install the transmission pipeline in phases. Appendix F shows the location for the recommended transmission pipeline as well as the calculation sheets for the LCC analysis.

The entire length of the transmission pipeline can be broken into phases to support growth as it occurs. Phase 1 includes installing the transmission pipeline from the tanks to Highway 165 and parallels the existing pipeline to 4400 South and would connect to the existing 18-inch transmission pipe. Phase 1 would need to be completed by 2030 to meet the demands of the system.

Phase 2 begins where Phase 1 left off and would run west along 4400 South to 640 West. Then the pipe runs North to 4000 South and runs West to 1500 West and connects into the system, see Appendix F for locations of Phase 1 and 2 . The pipe location was chosen based on the low impacts to residents and lower costs for street repair. Costs for each phase may be seen in Section 7.5. The cost of the transmission pipeline does not include a PRV. To maximize the pressures in this pipeline for future expansion, we recommend that newly installed subdivisions include PRV's at the connection to this pipeline as needed.

Table 10 - 20-Yr Distribution System Improvements

20 YEAR CAPITAL IMPROVEMENTS		
Transmission Line Phase 1	Install 18" Transmission Line Phase 1	2030
Transmission Line Phase 2	Install 18" Transmission Line Phase 2	2038

7.3.3.1. PIPELINE REPLACEMENT PROGRAM

These improvements may happen when funding becomes available or the pipe needs to be replaced due to failure. To account for these and other potential pipe replacements, it is recommended that Nibley City start a Pipeline Replacement Program. This program is an annual budget amount set aside by the city to help cover the costs of pipe replacements when they need to occur. Table 11 has a list of recommendations for existing pipes that could be replaced and budgeted for with a pipeline replacement fund. Costs and dates for these Pipeline Replacement Projects can be found in Table 17.

Table 11 – Pipeline Replacement Projects

PIPELINE REPLACEMENT PROJECTS		
Improvement Name	**Description**	**Cost**
Pipeline Replacement Projects		
Meadowview Ln	Upsize to 8" pipe	$ 91,000
Cottonwoods-3850 S PRV	Add PRV to Developer Installed Pipeline	$ 96,000
4300 S. Hollow Rd	Upsize to 8" pipe	$ 254,000
South End of Hollow Rd	Upsize to 8" & 10" pipe	$ 355,000
3750 S Sheridan Ridge Ln	Upsize to 8" pipe	$ 89,000
2900 South	Upsize to 8" pipe	$ 37,000
4000 S	Replace 12" pipe	$ 253,000
280 W - 250 W	Replace 10" & 12" pipes	$ 917,000
South End of Hollow Rd Pipeline Replacement	Upsize to 10" pipe	$ 194,000

7.4. WATER RIGHTS ANALYSIS

Currently, Nibley City has approximately 3,986.14 ac-ft per year of water rights (see Table 12). Given that each ERC is based on the Average Day Demand, each ERC requires 1.21 ac-ft/year (0.748 gpm). The number of ERCs that Nibley has sufficient water rights for is 3,304 ERCs.

Table 12 - Current Water Rights

WR No.	Owner	Flow (cfs)	Volume (AF)	Source	Use	Status	Application Status
25-2167	Nibley Town Incorporated	0.75	542.98	Yeates Spring	Municipal	Not in Use	Certificated
25-6680	Nibley Town Corporation	0.724	524.16	400 South Well	Municipal	In Use	Water User's Claim
25-9078	Nibley Town Corporation	7	1,700	Nelson & 4000 S Wells	Municipal	In Use	Approved
25-11236	Cache County Corporation & Nibley City	1.65	1,201	Wells (4) 4000 S, Nelson, 12th West, 640 West	Municipal	In Use	Approved
25-11105 a37687	Nibley City, a Utah Municipal Corporation		18	Wells (2)	Irrigation		Approved
Total Water Rights		**10.124**	**3,986.14**				

The large population growth has a considerable impact on the amount of water rights the system needs. By 2025, Nibley will need to acquire an additional 100 ac-ft/year of water rights. By 2030 an additional 800 ac-ft/year of water rights, as well as 1,100 ac-ft/yr by 2040, see Table 13.

Table 13 – Required Water Rights

	Year	Population	ERC	Additional Water Right Required (ac-ft/yr)	Additional ERC	Cumulative Water Rights (Ac-ft/yr)	Capacity (ERC)
Short Term Planning Period	2018	7,860	2,120			3,986	3,304
	2019	8,164	2,202			3,986	3,304
	2020	8,481	2,287			3,986	3,304
	2021	8,809	2,376			3,986	3,304
	2022	9,150	2,468			3,986	3,304
	2023	9,505	2,563			3,986	3,304
	2024	9,873	2,663			3,986	3,304
	2025	10,255	2,766	100	1022	4,086	3,387
Long Term Planning Period	2030	12,401	3,344	800	430	4,886	4,050
	2035	14,996	4,044	1,100	591	5,986	4,961
	2040	18,133	4,890			5,986	4,961

The water rights or water shares can be obtained over a period of time by various methods. The most likely method is to require all residential, commercial, or industrial developers or businesses to furnish the appropriate amount of water rights or water shares from local irrigation companies to the city for their respective developments as agricultural lands are retired for the respective developments. The water rights/shares should continue to be part of the application process requiring the developer/business to provide the water rights/shares before receiving a building permit or development plan approval. The water rights are typically measured by the amount of ERC's the development or business will add to the system. As shown in Table 14, the amount of water rights that may be collected from development should satisfy the water needs for the City.

Table 14 - Water Right Balance

	Year	Water Rights Required (Ac-ft)	Expected Water Rights Collected from Development (Ac-ft)	Cumulative Water Rights Collected from Development (Ac-ft)	Cumulative Water Rights City Owns (Ac-ft)
Short Term Planning Period	2020	2,767.27	102.85	102.85	4,089
	2021	2,874.96	107.69	210.54	4,197
	2022	2,986.28	111.32	321.86	4,308
	2023	3,101.23	114.95	436.81	4,423
	2024	3,222.23	121.00	557.81	4,544
	2025	3,346.86	124.63	682.44	4,668
Long Term Planning Period	2030	4,046.24	699.38	1,381.82	5,368
	2035	4,893.24	847.00	2,228.82	6,215
	2040	5,916.90	1,023.66	3,252.48	7,238

**Note: Water Rights collected from development may not actually be collected on an annual basis but as development occurs.*

7.4.1. YEATES SPRING

Yeates Spring is a water source that was previously used by Nibley City. Due to a contamination event, there is concern that the spring may not meet water quality standards. Additionally, the source protection zone for the spring is large, covering several miles of Nibley and Hyrum and creates difficulty in managing these zones. This source also requires pumping to the tanks. Currently, this spring is being turned out to a nearby irrigation canal and not being used by the City. Several alternatives were discussed for the best course of action for future use of this spring. Ultimately, due to the risk using the

spring as is, controlling the source protection area, or the costs associated with piping the spring at a planning level cost of $500,000 per mile, using the spring water for a different purpose does not appear to be viable.

It is recommended that the Yeates Spring water right (25-2167) be moved to other existing sources, such as the 4000 South well for future increased capacity, and other wells with the remaining balance of the water rights, by a change application so that the water right can be put to beneficial use.

Possible options for the physical spring and water were reviewed by an attorney (Memorandum dated August 18, 2019 from Smith Hartvigsen, PLLC)) related to the liabilities and legal option. Option #1 recommended in the letter is to transfer the water right as suggested above and quit claim the spring and the underlying land to the canal company. Other options discussed in review included using the spring for non-potable uses or re-developing the spring both of which are more costly options for infrastructure and/or re-development costs.

7.4.2. MITIGATION WATER

This section is prepared not as an attempt to document all previous water rights and mitigation water actions but more as a status report of current conditions and future actions to comply with previous decisions.

In 1991, the Cache Valley Groundwater Management Plan was established to manage water development of the ground and surface waters, such that water being developed would not impair prior rights or compensation water must be provided to replace the new source water.

Subsequent to this plan being adopted, Nibley City filed for WR 25-9078. As part of the filing, a Justification Report (mitigation plan) was provided outlining a plan for mitigating depleted waters beyond the year 2000. On May 11, 2005 the water right was approved with six conditions. Conditions 5 and 6 required additional actions that continue from 2002 forward. Condition 5 is to map Nibley City and its annexation area defining irrigated and non-irrigated agricultural lands. Condition 6 requires that sufficient water rights or shares be obtained from various irrigation companies for compensation or mitigation water.

In 2014, Nibley City filed “A Request to Segregate a Water Right” WR25-11236. As part of this filing, a water mitigation map was provided along with an updated table (Cache-Landmark Water Right 25-11236 Protest Response Letter dated December 10, 2014) showing the equivalent amount of depletion or mitigation water acquired by the City that satisfied its obligation into the future, based on population projections at the time.

Since 2014, the City has been actively collecting water shares in various irrigation companies. Below is a table with the current water shares owned by the City that are not being diverted and are available as mitigation water. Depletion calculations per share were provided in the Justification Report filed with WR25-9078.

Table 15 - Irrigation Shares

Irrigation Company	Total Shares	Depletion/Share (ac-ft)	Total Depletion (ac-ft)
Clear Creek Irrigation Company	86.5	1.61	139.27
Nibley Blacksmith Fork Canal Company	411.16	2.32	953.89
Providence Blacksmith Fork Irrigation Company	5.5	2	11
Millville Irrigation Company	2.25	2	4.50
College Irrigation Company	311.59	2	623.18
Spring Creek-Cache Irrigation Company	26.5	2	53.0
TOTAL SHARES	843.5		1,784.84

The State Engineers decision also required the City to have one foot of depletion for every 2.67 acre-feet of diversion. Using these depletion calculations and the population projections and water source determinations in this report, the table below shows that the City has sufficient water shares to be used as mitigation water until between the years 2030-2035.

Table 16 - Mitigation Water Requirements

Year	Population	ERC's	Diversion Limit (ac-ft)	Depletion Requirement (ac-ft)	Depletion Shares (ac-ft)	Depletion Balance (ac-ft)
2019	8164	2,202	2,664	998	1,784.84	787
2020	8,841	2,287	2,767	1,037	1,784.84	748
2025	10,255	2,766	3,347	1,253	1,784.84	531
2030	12,401	3,344	4,047	1,516	1,784.84	269
2035	14,996	4,044	4,894	1,833	1,784.84	-48
2040	18,133	4,890	5,917	2,216	1,784.84	-431

It is recommended that the City continue to acquire water shares from lands that are being converted from agricultural use to development. The waters attached to the water shares can be left to continue downstream and mitigate waters being diverted from municipal wells to support growth. Additionally, the irrigated and non-irrigated lands should be mapped and updated every 5 years to account for agricultural lands no longer in production, as outlined in the State Engineers water right decision.

7.5. IMPROVEMENT COSTS

A summary of costs for each improvement are given in Table 17 - Capital Improvements Cost Summary and Table 18 - Pipeline Replacement Program Costs. The costs are shown in 2019 dollars.

Table 17 - Capital Improvements Cost Summary

5 YEAR CAPITAL IMPROVEMENTS					
Improvement Name	**Description**	**Cost**	**Financial Planning Period**	**Construction Planning Year**	**Year Needed**
Source and Capacity Improvements					
2 MG Storage Tank	Increase Storage Capacity	$ 3,500,000	2019	2022	2023
TOTAL 5 YEAR SOURCE AND CAPACITY IMPROVEMENTS		**$ 3,500,000**			
20 YEAR CAPITAL IMPROVEMENTS					
4000 S Replacement Well	Increase Source Capacity	$ 1,100,000	2025-2027	2029	2030
Transmission Line Phase 1	Install 18" Transmission Line Phase 1	$ 711,000	2027-2030	2034	2035
1 MG Storage Tank	Increase Storage Capacity	$1,700,000	2027-2030	2034	2035
Transmission Line Phase 2	Install 18" Transmission Line Phase 2	$ 2,331,000	2030-2036	2037	2038
Develop New Source	New 1,500 gpm Source (Well)	$ 1,370,000	2036-2039	2039	2040
TOTAL 20 YEAR IMPROVEMENTS		**$ 5,512,000**			

Table 18 - Pipeline Replacement Program Costs

Pipeline Replacement Program				
Map ID	**Improvement Name**	**Description**	**Purpose for Replacement**	**Cost**
P-1	Meadowview Ln	Upsize to 8" pipe	Capacity	$ 91,000
P-2	Cottonwoods-3850 S PRV	Add PRV to Developer Installed Pipeline	Capacity	$ 96,000
P-3	4300 S. Hollow Rd	Upsize to 8" pipe	Capacity	$ 254,000
P-4	South End of Hollow Rd	Upsize to 8" & 10" pipe	Capacity	$ 355,000
P-5	3750 S Sheridan Ridge Ln	Upsize to 8" pipe	Capacity	$ 89,000
P-6	2900 South	Upsize to 8" pipe	Capacity	$ 37,000
P-7	4000 S	Replace 12" pipe	Age/Condition of Pipe	$ 253,000
P-8	280 W - 250 W	Replace 10" & 12" pipes	Age/Condition of Pipe	$ 917,000
P-9	South End of Hollow Rd Pipeline Replacement	Upsize to 10" pipe	Capacity	$ 194,000
TOTAL WATERLINE REPLACEMENT IMPROVEMENTS				**$ 2,286,000**

8. WATER RATE STUDY AND FUNDING

Included in Appendix H

8.1. FUNDING SOURCES

8.1.1. UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF DRINKING WATER

The Utah Division of Drinking Water offers low interest loans from the Federal State Revolving Funds (Federal SRF) and the State Revolving Funds (SRF). These funds are available to all political entities of the state. The typical interest rate ranges between 1.5-4% with a 20-year term.

- The Federal SRF is provided to the states from the Environmental Protection Agency (EPA). These funds are federal dollars and require compliance with the Davis Bacon Wage Act, the American Iron and Steel Act (Buy America), and the other federal programs.
- The SRF is administered by the state and offers low interest loans (2-4%) and grants. Typically, only about 5% of the SRF funds are awarded as grants.

8.1.2. PERMANENT COMMUNITY IMPACT FUND BOARD (CIB)

The CIB is an entity of the state that provides loans and grants to cities. The typical conditions of a loan are a 20-30-year term at the going interest rate (currently 2.5%).

8.1.3. UTAH BOARD OF WATER RESOURCES

The Utah Board of Water Resources offers low interest loans for projects that conserve, protect, or more efficiently use present water supplies, develop new water, or provide flood control. This option is likely less favorable funding option for culinary water infrastructure improvements. Typical loan terms are 20-30 years at 2-4%.

8.1.4. USDA EMERGENCY COMMUNITY WATER ASSISTANCE GRANT (ECWAG)

The ECWAG grant can be applied for to aid communities that have experienced a significant decline in water quantity or quality from their sources due to a natural disaster or other emergency event, such as: drought, flood, fire, earthquake, disease outbreak, chemical or leakage spill. 70% or more of funding is to be used for work at the source, 30% can be used in piping.

8.1.5. AGENCY FUNDING (SELF-FUND)

This option is for agencies to self-fund individual projects. Although self-funding is the least expensive money over the life of the project, this option is likely not financially possible for all agencies.

The most likely source to leverage the most favorable and obtainable funding terms for Nibley City culinary water infrastructure improvements is the Utah Division of Drinking Water.

For more information on available funding programs, please visit our funding website at: https://funding.jonesanddemille.com/

9. SYSTEM OPTIMIZATION

9.1. WELLS

With the current system layout and operation, the wells turn on during the night to fill the tanks. This is the most cost-effective way to operate the wells because city can avoid higher daytime electricity rates. Peak electricity charges occur during the day when most users are consuming electricity, especially during the warmer seasons when air conditioners are in use. Our recommendation is to continue to operate the wells during the night to keep the system cost efficient.

The wells are currently located upstream of system PRVs. This allows the wells to pump into the system and fill the water storage tanks. Our recommendation is to locate future wells in the upper pressure zone. This will minimize costs associated with wells pumping only into the system and not to a water storage tank.

9.2. TANKS

The current location of the water storage tanks is sufficient to provide the State DDW minimum pressure requirements. To ensure proper system operation in the most cost-effective way, future water storage tanks should be constructed with similar floor and ceiling elevations as the existing tanks.

9.3. PRVS

The existing PRVs reduce the pressure 20 psi on average. This ensures that the lower elevation areas of the system do not experience too high of pressures. With the current PRV operation, the highest pressure in the system is approximately 115 psi during Average Day Demand. Without the PRVs, the pressure climbs to 135 psi during Average Day Demand. 135 psi is a high enough pressure to potentially cause problems in homes without residential PRVs, especially to the hot water lines and appliances.

10. CONCLUSIONS AND RECOMMENDATIONS

The current system meets the needs of the population. As the City grows, additional water storage, water sources, and water pipelines will need to be developed to meet the demand. This report has estimated areas where growth is likely to occur. As growth occurs, it is important for Nibley City to update its current hydraulic model. Additional water storage and existing and new water sources will need to be developed to meet the growing water demand. In addition, several distribution lines will need to be improved and a new transmission line installed to maintain pressures and flows throughout the system.

10.1. NEXT STEPS

Since a water storage tank is the next major water infrastructure improvement need, the City should consider the following as next steps in planning process:

- Conduct a tank siting and funding options study in 2020.
- Begin property and or easement acquisitions through 2021
- Planning, engineering, and construction of the tank through 2022

As development continues in the City it is also important to continue collecting irrigation water shares from development for mitigation water.

10.2. SECONDARY WATER SYSTEM CONSIDERATION

As the city continues to expand, the culinary water system will continue to be the source of water for most of the outdoor watering needs. Since outdoor watering accounts for up to, and possibly more than 50% of the system use, and is generally more expensive than untreated raw water, many communities are turning to secondary water systems. A separate secondary water system reduces the burden on the culinary water system and provides less expensive water for outdoor uses. However, the

large initial capital investment for a new system in an existing an established community may not reduce the cost to the end user. Some of the advantages and disadvantages of a secondary system include:

Benefits of a secondary water system:

- Decreases the timing and need to expand/improve culinary water system
- Additional revenue source for city
- May lower homeowner cost of water for outdoor uses.

However, it is worthwhile to consider the disadvantages to secondary water, such as:

- Additional utility for city to operate and maintain requiring additional resources.
- High capital investment to install a system in an existing community
- May require filtering source water
- Decreased revenue from culinary water system.

If the City desires to further investigate how a secondary water system could benefit them and the water users, it is recommended that a feasibility study be conducted and that the following be addressed:

1. Capital cost investment to install secondary water system.
    a. Analyze annual costs related to system operation, maintenance, and replacement.
2. Analysis for water rights required
    a. Not recommended to move water amounts from culinary water to provide secondary water.
3. Response plan for droughts
4. Analysis of rate structure and resulting revenue
5. Analysis of cash flows and position over the life of the system or payback time of any loan
6. Benefit/cost analysis
    a. Installing secondary water system vs culinary system improvements
        i. Costs to operate and maintain secondary water system vs culinary water system
    b. Income from secondary water vs income lost from culinary water use

In some cases, the City can use new development to help with the initial system capital investment by requirement new developments to install secondary water infrastructure. However, the means of providing the water to these areas will be an investment by the City. Given the moderate growth of Nibley, as initial, less expensive study that could evaluate the potential return on investment and system user costs for a secondary system as the next best step. If a secondary system is a priority for the City, a higher-level study could be completed for an estimated $25,000 to $50,000

APPENDIX A. NEW DDW CALCULATIONS FOR SOURCE & STORAGE REQUIREMENTS

Summary of New Water Use Data Reporting and Water System Minimum Sizing Requirements
(2018 Legislative Revisions to Utah Code 19-4-104 and 114)

I. Annual Water Use Data Reporting by All Community Water Systems Serving 500 People or More

Water Use Data to Be Collected:	Reporting Frequency:	Report Data to:	Reporting Due:
1. Peak Day Source Demand 2. Average Annual Demand 3. Number of Retail Equivalent Residential Connections *[Number of Total ERCs]* 4. Quantity of Non-revenue Water	Annual	Division of Water Rights (**DWRi**)	**March 1, 2019** for 2018 data; as specified by DWRi for future years

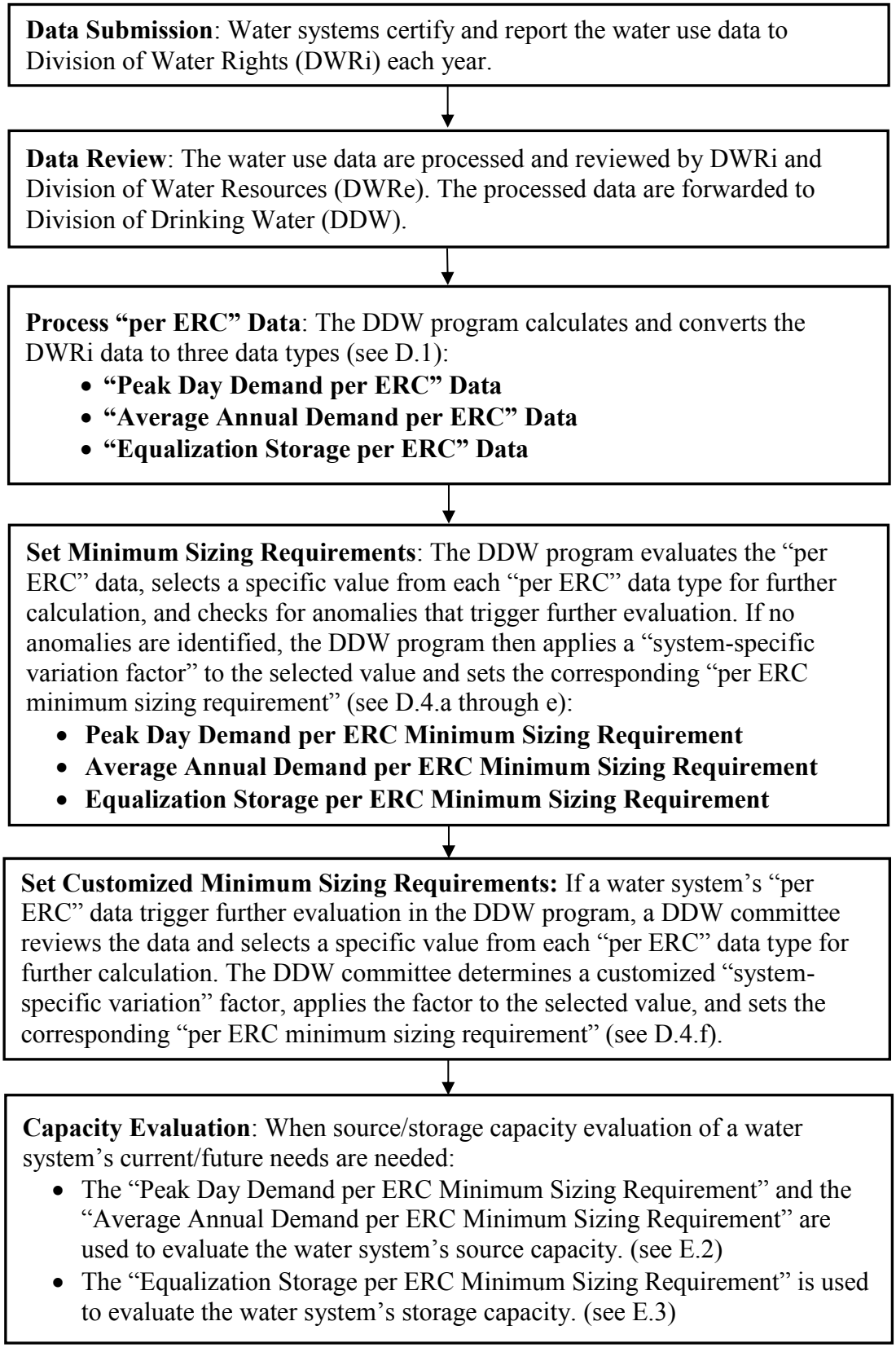
II. Schedule of Water Use Data Reporting and Minimum Sizing Requirements for Community Water Systems (CWS)

Water System Type	3 Years of Data Due	Report Data to	DDW Sets System-Specific Sizing Requirements by
Community Water Systems serving over 3,300 people	March 1, 2019	• DWRi – Annual Water Use Data described in 19-4-104(6)(a) • DDW – Engineering Study	After Division of Drinking Water (**DDW**) receives acceptable data
Community Water Systems serving between 500 and 3,300 people	March 1, 2023	• DWRi – Annual Water Use Data described in 19-4-104(6)(a) • DDW – Engineering Study	October 1, 2023
Community Water Systems serving fewer than 500 people	TBD	DWRi – Water Use Data (as previously required by DWRi)	TBD
Wholesale Water Suppliers that serve a total population of more than 10,000 people and the wholesale population is 75% or more of the total population served	March 1, 2019 (assume to be same as CWS serving over 3,300 people)	DWRi – Annual Water Use Data	Not Applicable

III. Non-Community Water Systems

DDW Director to establish minimum source and storage sizing standards - no water use reporting or deadlines given for water systems

Process of Analyzing Water Use Data and Establishing Minimum Sizing Requirements



To Calculate the Data:

Quantity of Non-Revenue Water (in gallons) =
[Average Annual Demand] − [Water Volume Metered/Billed] − [Wholesale Delivery Outflow]

"Peak Day Demand per ERC" Data = $\frac{\text{[Peak Day Source Demand]}}{\text{[Total Number of ERCs]}}$
(in gallons/day)

"Average Annual Demand per ERC" Data = $\frac{\text{[Average Annual Demand]}}{\text{[Total Number of ERCs]}}$
(in gallons/year)

"Equalization Storage per ERC" Data = $\frac{\text{[Average Annual Demand per ERC]}}{\text{[Operational Days in a Year]}}$
(in gallons)

To Calculate the "per ERC Minimum Sizing Requirements":

System-Specific Variation Factor = $\frac{\text{[Highest Data Value]} - \text{[Lowest Data Value]}}{\text{[Lowest Data Value]}}$

Peak Day Demand per ERC Minimum Sizing Requirement (in gallons/day) =
["Peak Day Demand per ERC" selected value] × [1 + System-Specific Variability Factor]

Average Annual Demand per ERC Minimum Sizing Requirement (in gallons/year) =
["Average Annual Demand per ERC" selected value] × [1 + System-Specific Variability Factor]

Equalization Storage per ERC Minimum Sizing Requirement (in gallons) =
["Equalization Storage per ERC" selected value] × [1 + System-Specific Variability Factor]

To Calculate Source Capacity:

Source Capacity Needed to Meet the Peak Day Source Demand (in gallons/day) =
[Peak Day Demand per ERC Minimum Sizing Requirement] × [Total Number of ERCs]

Source Capacity Needed to Meet the Average Annual Demand (in gallons/year) =
[Average Annual Demand per ERC Minimum Sizing Requirement] × [Total Number of ERCs]

To Calculate Storage Capacity:

Total Storage Capacity Required (in gallons) =
[Equalization Storage] + [Fire Suppression Storage] + [Emergency Storage (optional)]

Equalization Storage Required in Utah (in gallons) =
[Equalization Storage per ERC Minimum Sizing Requirement] × [Total Number of ERCs]

Fire Suppression Storage Required by Local Fire Code Authority (in gallons) =
[Required Fire Flow (in gallons per minute)] × [Required Duration (in minutes)]

APPENDIX B. EXISTING SYSTEM LAYOUT

Existing Fire Hydrants
Existing Wells
Existing PRV Valves
Existing Tanks
Existing Pipe Diameters
2"
4"
6"
8"
10"
12"
18"

252
91
165
101

Logan
Providence
Millville
Nibley
Hyrum
Hyrum Reservoir

Nelson Well
640 W Well
4000 S Well
1 MG Tank
2 MG Tank
0.35 MG Tank

N
0 1,000 2,000 Feet

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Nibley City

Water Master Plan
Existing System

Map Name: H:\JD\Proj\1902-004\Design\GIS\Projects\Design\1902-004_Design\1902-004_Design.aprx - EXH01_Existing_System

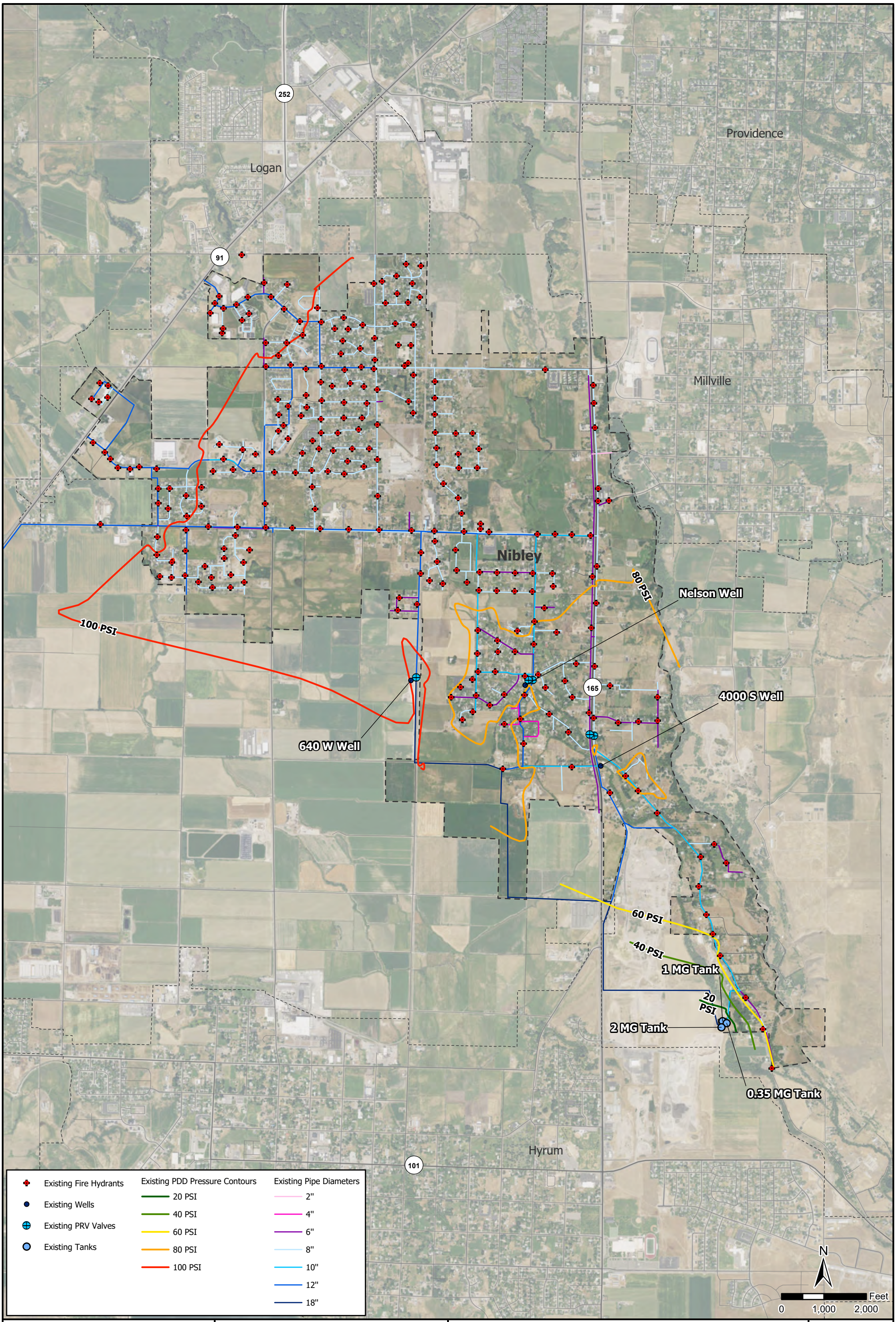
Project Number: 1902-004 | Drawn by: JWW 06-19 | Last Edit: 06/07/2019

Cache County

Scale: 1" = 2,000'

1

APPENDIX C. EXISTING SYSTEM HYDRAULIC MODEL RESULTS PEAK DAY DEMAND



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Nibley City

Cache County

Water Master Plan
Existing System Modeling Results - Peak Daily Demand

Scale: 1" = 2,000'

Map Name: H:\JD\Proj\1902-004\Design\GIS\Projects\Design\1902-004_Design\1902-004_Design.aprx - EXH02_Existing_System_Modeling_Results_PDD

Project Number: 1902-004 | Drawn by: JWW 06-19 | Last Edit: 06/07/2019

2

APPENDIX D. EXISTING SYSTEM HYDRAULIC MODEL RESULTS AVAILABLE FIRE FLOW

Logan
Providence
Millville
Nibley
Hyrum
Hyrum Reservoir
252
91
165
101
640 W Well
Nelson Well
4000 S Well
1 MG Tank
2 MG Tank
0.35 MG Tank

- Existing Fire Hydrants
- Existing Wells
- Existing PRV Valves
- Existing Tanks

Existing Pipe Diameters
- 2"
- 4"
- 6"
- 8"
- 10"
- 12"
- 18"

Existing Available Fire Flow
- ≤1300 GPM
- ≤1800 GPM
- ≤2300 GPM
- ≤2800 GPM
- ≤3300 GPM
- ≤3950 GPM

N

0 1,000 2,000 Feet

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Nibley City

Cache County

Water Master Plan
Existing System Modeling Results - Available Fire Flow

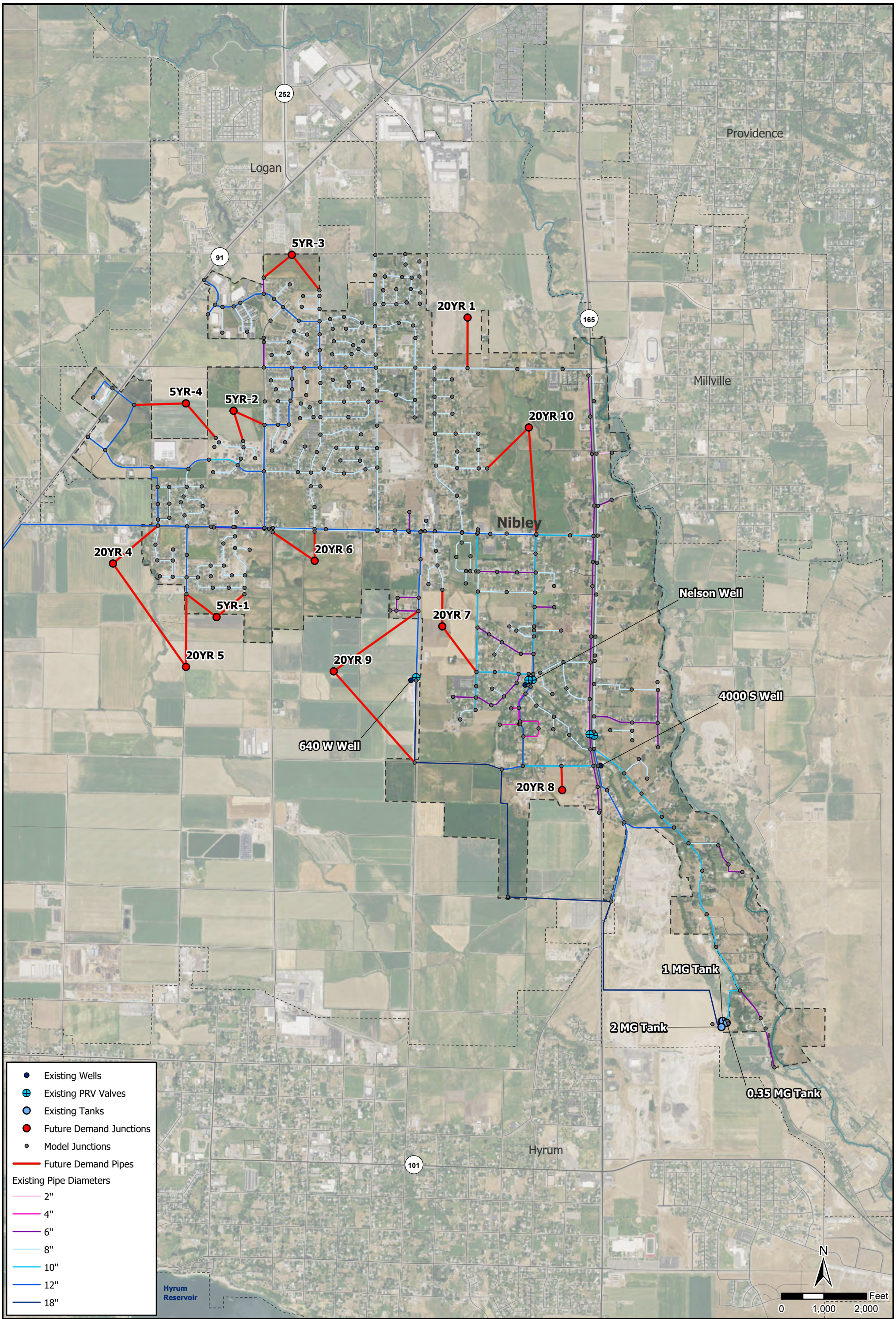
Scale: 1" = 2,000'

Map Name: H:\JD\Proj\1902-004\Design\GIS\Projects\Design\1902-004_Design\1902-004_Design.aprx - EXH03_Existing_System_Modeling_Results_Fire_Flow

Project Number: 1902-004 | Drawn by: JWW 06-19 | Last Edit: 06/07/2019

3

APPENDIX E. HYDRAULIC MODEL JUNCTIONS MAP



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Nibley City

Water Master Plan
Model Junction Map

Map Name: H:\JD\Proj\1902-004\Design\GIS\Projects\Design\1902-004_Design\1902-004_Design.aprx - EXH04_Model_Junction_Map

Project Number: 1902-004 | Drawn by: JWW 06-19 | Last Edit: 06/07/2019

Cache County

Scale: 1" = 2,000'

4

		Existing Condition			5- Yr Buildout Before Improvements		5- Yr Buildout After Improvements		20- Yr Buildout Before Improvements		20- Yr Buildout After Improvements	
ID	Label	PDD Pressure (psi)	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	PDD Pressure (psi)	Fire Flow (Available) (gpm)	PDD Pressure (psi)	Fire Flow (Available) (gpm)	PDD Pressure (psi)	Fire Flow (Available) (gpm)	PDD Pressure (psi)	Fire Flow (Available) (gpm)9
1460	5YR-1	(N/A)	1,500	(N/A)	84	2,175	84	2,198	19	(N/A)	90	(N/A)
1463	5YR-2	(N/A)	1,500	(N/A)	87	2,403	87	2,429	23	(N/A)	91	(N/A)
1466	5YR-3	(N/A)	1,500	(N/A)	90	2,050	90	2,069	27	(N/A)	94	(N/A)
1469	5YR-4	(N/A)	1,500	(N/A)	90	2,190	90	2,211	25	(N/A)	94	(N/A)
1405	20YR 1	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	26	0	88	2,731
1426	20YR 10	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	32	0	84	3,739
1413	20YR 4	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	21	0	92	5,000
1415	20YR 5	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	17	0	91	5,000
1417	20YR 6	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	18	0	84	5,000
1419	20YR 7	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	30	0	78	4,486
1422	20YR 8	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	30	0	63	2,236
1424	20YR 9	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	41	0	98	5,000
31	J-1	106	1,500	3,044	94	2,494	94	2,519	29	0	99	4,240
34	J-3	87	1,500	4,244	79	2,997	79	3,043	22	0	81	5,000
52	J-15	94	1,500	3,056	82	2,328	82	2,355	17	0	88	4,774
77	J-31	80	1,500	4,513	69	3,642	69	3,709	23	0	65	4,603
79	J-32	85	1,500	4,027	80	3,187	80	3,232	28	0	80	4,473
82	J-34	83	1,500	4,081	79	3,170	79	3,238	26	0	77	4,375
85	J-36	76	1,500	3,789	74	3,094	74	3,253	31	0	73	3,968
86	J-37	76	1,500	3,588	74	2,941	74	3,051	31	0	73	3,658
91	J-40	106	1,500	5,000	98	4,969	98	5,000	58	0	94	5,000
96	J-43	99	1,500	2,496	87	2,278	87	2,302	23	0	92	3,782
97	J-44	99	1,500	2,407	87	2,250	87	2,273	23	0	91	3,690
99	J-45	72	1,500	2,321	71	2,007	71	2,316	41	0	72	2,498
103	J-48	84	1,500	4,454	80	3,471	80	3,525	27	0	79	5,000
105	J-49	94	1,500	3,102	91	2,666	91	2,684	45	0	94	3,237
106	J-50	94	1,500	2,500	92	2,189	92	2,201	46	0	95	2,528
108	J-51	97	1,500	3,106	85	2,497	85	2,527	21	0	89	4,784
109	J-52	97	1,500	2,928	85	2,470	85	2,498	21	0	89	4,502
111	J-53	94	1,500	2,849	82	2,257	82	2,282	17	0	88	4,460
113	J-54	99	1,500	2,384	87	2,151	87	2,173	22	0	91	3,394
115	J-55	91	1,500	3,330	80	2,380	80	2,410	17	0	83	4,098
116	J-56	91	1,500	3,042	80	2,221	80	2,247	17	0	84	3,540
118	J-57	97	1,500	3,709	85	2,637	85	2,675	21	0	90	5,000
119	J-58	97	1,500	3,781	85	2,637	85	2,675	21	0	90	5,000
121	J-59	104	1,500	3,148	92	2,413	92	2,438	29	0	96	3,731
122	J-60	104	1,500	3,121	92	2,396	92	2,421	29	0	95	3,679
124	J-61	82	1,500	(N/A)	72	(N/A)	72	(N/A)	29	(N/A)	68	(N/A)
125	J-62	82	1,500	(N/A)	73	(N/A)	73	(N/A)	29	(N/A)	69	(N/A)
129	J-64	98	1,500	2,174	87	1,706	87	1,720	24	0	90	2,245
130	J-65	98	1,500	2,078	86	1,641	86	1,654	24	0	90	2,131
132	J-66	73	1,500	2,194	72	1,905	72	2,168	42	0	73	2,311
134	J-67	88	1,500	2,540	80	1,998	80	2,019	30	0	83	3,755
135	J-68	88	1,500	2,369	80	1,879	80	1,897	31	0	83	3,683
137	J-69	72	1,500	4,458	71	3,454	71	3,519	22	0	66	4,790
138	J-70	71	1,500	2,871	70	2,354	70	2,385	21	0	66	2,724
140	J-71	91	1,500	3,431	81	2,470	81	2,501	18	0	84	4,388
141	J-72	90	1,500	3,004	80	2,220	80	2,245	17	0	83	3,530
143	J-73	98	1,500	2,184	87	1,716	87	1,730	24	0	90	2,257
145	J-74	98	1,500	3,357	86	2,450	86	2,478	23	0	89	4,011
146	J-75	97	1,500	2,957	85	2,211	85	2,233	22	0	89	3,316
148	J-76	86	1,500	4,777	81	3,547	81	3,608	28	0	81	5,000
149	J-77	86	1,500	4,477	81	3,500	81	3,552	29	0	81	5,000
151	J-78	85	1,500	4,809	80	3,530	80	3,589	27	0	80	5,000
152	J-79	86	1,500	3,744	81	2,980	81	3,015	29	0	81	4,180
154	J-80	99	1,500	2,013	87	1,599	87	1,612	24	0	90	2,054
155	J-81	99	1,500	1,914	87	1,530	87	1,542	24	0	90	1,940
158	J-83	99	1,500	2,859	88	2,164	88	2,184	22	0	93	3,640
160	J-84	94	1,500	3,666	82	2,575	82	2,612	19	0	86	4,902
161	J-85	95	1,500	3,663	83	2,571	83	2,607	20	0	87	4,873
163	J-86	98	1,500	3,249	86	2,390	86	2,416	21	0	92	4,680
164	J-87	97	1,500	2,875	86	2,160	86	2,182	21	0	91	3,709
166	J-88	95	1,500	3,699	83	2,593	83	2,630	20	0	87	5,000
167	J-89	95	1,500	3,681	83	2,591	83	2,627	20	0	87	5,000
169	J-90	63	1,500	(N/A)	62	(N/A)	62	(N/A)	57	0	62	2,305
170	J-91	62	1,500	1,106	61	1,074	61	1,883	56	0	61	2,115
172	J-92	101	1,500	3,681	89	2,607	89	2,640	24	0	95	5,000
173	J-93	101	1,500	3,745	90	2,610	90	2,643	25	0	95	5,000
175	J-94	73	1,500	4,802	72	3,678	72	3,748	25	0	68	5,000
177	J-95	94	1,500	3,670	82	2,582	82	2,619	19	0	86	4,961
179	J-96	97	1,500	3,530	86	2,517	86	2,548	21	0	91	5,000
180	J-97	97	1,500	3,276	85	2,403	85	2,430	20	0	90	4,718
183	J-98	96	1,500	3,490	84	2,534	84	2,564	21	0	88	4,471
186	J-100	78	1,500	3,252	69	2,717	69	2,744	25	0	65	3,099
187	J-101	77	1,500	2,678	67	2,263	67	2,287	23	0	64	2,498
190	J-103	84	1,500	3,328	79	2,698	79	2,731	27	0	79	3,445
192	J-104	99	1,500	3,343	87	2,453	87	2,480	22	0	93	4,983
193	J-105	99	1,500	2,881	87	2,170	87	2,191	22	0	93	3,725
195	J-106	96	1,500	3,742	84	2,602	84	2,639	21	0	88	5,000
197	J-107	90	1,500	5,000	88	4,098	88	4,156	42	0	91	5,000
198	J-108	88	1,500	5,000	85	3,986	85	4,044	38	0	88	5,000
200	J-109	101	1,500	3,461	89	2,535	89	2,564	26	0	93	4,218

201	J-110	99	1,500	2,916	87	2,204	87	2,226	24	0	91	3,256
203	J-111	98	1,500	3,623	86	2,509	86	2,540	21	0	92	5,000
205	J-112	72	1,500	2,417	70	2,013	70	2,036	20	0	65	2,249
206	J-113	73	1,500	2,154	71	1,825	71	1,844	21	0	67	1,984
208	J-114	74	1,500	2,486	73	2,069	73	2,093	22	0	69	2,334
209	J-115	73	1,500	2,184	72	1,842	72	1,862	21	0	68	2,025
213	J-117	96	1,500	2,766	85	2,088	85	2,108	20	0	90	3,458
215	J-118	84	1,500	3,172	80	2,544	80	2,582	26	0	79	3,188
216	J-119	86	1,500	1,942	81	1,624	81	1,640	28	0	80	1,848
218	J-120	96	1,500	2,250	85	1,746	85	1,762	22	0	88	2,340
219	J-121	97	1,500	2,066	85	1,627	85	1,640	22	0	89	2,118
221	J-122	98	1,500	1,926	87	1,538	87	1,550	24	0	90	1,954
223	J-123	100	1,500	3,642	89	2,607	89	2,641	24	0	94	5,000
224	J-124	99	1,500	2,993	88	2,255	88	2,278	23	0	93	3,811
227	J-126	67	1,500	5,000	62	4,614	62	4,609	33	0	60	5,000
229	J-127	97	1,500	3,751	86	2,623	86	2,657	22	0	91	5,000
230	J-128	98	1,500	3,069	86	2,288	86	2,311	22	0	91	3,925
232	J-129	94	1,500	3,274	82	2,380	82	2,408	19	0	86	4,057
233	J-130	94	1,500	3,245	83	2,371	83	2,399	19	0	87	3,989
235	J-131	79	1,500	4,985	70	3,915	70	3,975	28	0	66	5,000
236	J-132	78	1,500	5,000	70	4,024	70	4,079	29	0	66	5,000
238	J-133	99	1,500	3,216	87	2,386	87	2,411	22	0	93	4,492
239	J-134	100	1,500	3,229	88	2,394	88	2,419	23	0	94	4,546
241	J-135	93	1,500	2,871	82	2,116	82	2,139	19	0	85	3,230
242	J-136	92	1,500	2,371	80	1,803	80	1,820	17	0	84	2,507
244	J-137	72	1,500	1,050	67	971	67	1,846	42	0	65	1,869
245	J-138	72	1,500	(N/A)	67	(N/A)	67	(N/A)	41	0	65	1,607
247	J-139	95	1,500	2,538	83	2,044	83	2,064	19	0	88	3,158
249	J-140	104	1,500	3,299	92	2,526	92	2,553	29	0	96	4,050
250	J-141	102	1,500	2,021	90	2,075	90	2,094	27	0	94	2,936
252	J-142	89	1,500	2,667	81	2,094	81	2,116	30	0	83	3,589
253	J-143	89	1,500	2,338	82	1,866	82	1,884	31	0	84	2,820
256	J-144	99	1,500	3,492	87	2,557	87	2,588	24	0	91	4,298
257	J-145	100	1,500	2,865	89	2,187	89	2,208	25	0	92	3,181
259	J-146	96	1,500	3,176	85	2,331	85	2,358	22	0	88	3,700
260	J-147	95	1,500	2,598	84	1,974	84	1,994	21	0	87	2,794
262	J-148	97	1,500	2,159	86	1,685	86	1,700	23	0	89	2,229
263	J-149	96	1,500	1,915	85	1,519	85	1,531	22	0	88	1,942
265	J-150	93	1,500	3,321	84	2,515	84	2,545	24	0	85	3,816
266	J-151	93	1,500	(N/A)	84	(N/A)	84	(N/A)	24	0	85	2,889
268	J-152	93	1,500	2,754	81	2,052	81	2,073	18	0	85	3,044
269	J-153	93	1,500	2,246	81	1,728	81	1,744	18	0	84	2,346
271	J-154	91	1,500	3,054	80	2,214	80	2,240	17	0	83	3,514
272	J-155	89	1,500	2,536	78	1,900	78	1,920	16	0	81	2,715
276	J-157	92	1,500	3,115	83	2,388	83	2,415	26	0	85	3,622
277	J-158	92	1,500	(N/A)	83	(N/A)	83	(N/A)	25	0	84	2,787
279	J-159	68	1,500	1,880	67	1,628	67	3,050	43	0	70	3,361
280	J-160	67	1,500	1,686	66	1,480	66	3,122	42	0	70	3,441
282	J-161	100	1,500	2,866	89	2,241	89	2,263	25	0	92	3,340
283	J-162	99	1,500	3,078	87	2,361	87	2,387	24	0	91	3,706
285	J-163	91	1,500	3,001	83	2,316	83	2,343	27	0	84	3,593
286	J-164	90	1,500	(N/A)	82	(N/A)	82	(N/A)	27	0	83	2,761
289	J-165	74	1,500	3,330	72	2,699	72	2,738	19	0	66	3,296
290	J-166	76	1,500	2,545	74	2,130	74	2,154	21	0	69	2,402
292	J-167	102	1,500	3,476	90	2,554	90	2,588	27	0	94	4,275
293	J-168	102	1,500	2,819	91	2,175	91	2,195	27	0	94	3,117
295	J-169	79	1,500	4,672	77	3,692	77	3,757	28	0	74	5,000
296	J-170	81	1,500	4,095	79	3,317	79	3,368	30	0	76	4,237
298	J-171	85	1,500	3,544	78	2,715	78	2,750	24	0	80	4,333
299	J-172	86	1,500	1,820	79	1,514	79	1,526	25	0	81	1,827
301	J-173	84	1,500	4,671	80	3,637	80	3,696	28	0	79	5,000
302	J-174	84	1,500	2,856	79	2,369	79	2,395	27	0	78	2,830
305	J-176	80	1,500	1,884	78	1,619	78	1,634	27	0	75	1,758
307	J-177	101	1,500	3,504	89	2,582	89	2,611	24	0	94	5,000
309	J-178	94	1,500	3,552	83	2,506	83	2,539	19	0	86	4,546
311	J-179	95	1,500	2,522	83	1,924	83	1,942	20	0	86	2,695
312	J-180	95	1,500	2,193	84	1,712	84	1,727	21	0	87	2,273
314	J-181	90	1,500	2,956	82	2,297	82	2,323	29	0	84	3,793
317	J-183	88	1,500	1,964	82	1,648	82	1,664	27	0	81	1,874
318	J-184	88	1,500	(N/A)	82	(N/A)	82	(N/A)	28	0	81	2,378
320	J-185	84	1,500	4,701	80	3,640	80	3,699	27	0	79	5,000
321	J-186	84	1,500	4,648	81	3,638	81	3,705	29	0	78	5,000
323	J-187	100	1,500	3,591	88	2,595	88	2,628	24	0	94	5,000
324	J-188	99	1,500	3,272	88	2,426	88	2,452	23	0	93	4,519
326	J-189	79	1,500	4,984	69	3,898	69	3,957	27	0	66	5,000
327	J-190	82	1,500	678	72	619	72	2,631	30	0	69	2,912
329	J-191	99	1,500	2,882	88	2,283	88	2,306	24	0	91	3,492
331	J-192	82	1,500	2,342	76	1,889	76	1,907	28	0	79	3,939
332	J-193	83	1,500	1,993	77	1,638	77	1,653	28	0	79	2,660
334	J-194	101	1,500	3,573	89	2,599	89	2,632	24	0	94	5,000
336	J-195	103	1,500	3,381	92	2,546	92	2,573	29	0	95	4,138
337	J-196	102	1,500	2,681	90	2,088	90	2,107	27	0	94	2,935
339	J-197	84	1,500	5,000	76	5,000	76	5,000	40	0	73	5,000
340	J-198	79	1,500	5,000	71	4,712	71	4,755	33	0	68	5,000
342	J-199	95	1,500	3,639	84	2,562	84	2,596	21	0	87	4,797
344	J-200	103	1,500	3,410	92	2,633	92	2,667	27	0	97	5,000
345	J-201	104	1,500	3,286	92	2,563	92	2,590	27	0	97	4,657

347	J-202	100	1,500	3,438	88	2,501	88	2,530	25	0	92	4,213
348	J-203	97	1,500	2,658	85	2,025	85	2,044	22	0	89	2,889
350	J-204	68	1,500	1,785	67	1,552	67	3,080	43	0	71	3,391
351	J-205	69	1,500	1,615	68	1,436	68	2,342	44	0	72	2,460
353	J-206	99	1,500	3,753	87	2,645	87	2,680	23	0	92	5,000
355	J-207	82	1,500	4,578	79	3,565	79	3,626	27	0	77	5,000
356	J-208	81	1,500	2,691	77	2,233	77	2,258	25	0	75	2,618
358	J-209	74	1,500	3,616	72	2,906	72	2,951	20	0	67	3,666
359	J-210	77	1,500	1,653	75	1,445	75	2,252	22	0	70	2,528
361	J-211	97	1,500	3,328	85	2,437	85	2,465	20	0	91	4,920
362	J-212	95	1,500	3,232	83	2,393	83	2,420	18	0	89	4,915
364	J-213	82	1,500	5,000	76	4,401	76	4,401	42	0	72	5,000
365	J-214	82	1,500	2,316	75	2,099	75	2,099	40	0	70	2,153
368	J-215	92	1,500	3,381	80	2,418	80	2,448	18	0	84	4,179
369	J-216	92	1,500	3,171	80	2,300	80	2,327	18	0	84	3,760
372	J-217	95	1,500	3,276	83	2,389	83	2,416	20	0	86	3,885
373	J-218	95	1,500	3,084	84	2,291	84	2,317	21	0	87	3,521
375	J-219	69	1,500	1,847	68	1,602	68	2,084	41	0	70	2,194
376	J-220	67	1,500	(N/A)	66	(N/A)	66	(N/A)	40	(N/A)	69	(N/A)
378	J-221	94	1,500	3,307	82	2,397	82	2,426	19	0	85	3,963
380	J-222	76	1,500	4,227	75	3,368	75	3,430	28	0	71	4,382
381	J-223	72	1,500	2,662	71	2,243	71	2,271	24	0	68	2,505
385	J-225	80	1,500	4,624	77	3,658	77	3,722	28	0	74	5,000
386	J-226	81	1,500	3,483	79	2,874	79	2,913	30	0	76	3,465
388	J-227	99	1,500	3,627	87	2,553	87	2,587	24	0	90	4,579
389	J-228	97	1,500	3,232	85	2,384	85	2,410	22	0	89	3,778
392	J-229	102	1,500	3,149	90	2,383	90	2,407	27	0	94	3,620
395	J-230	91	1,500	3,393	80	2,420	80	2,450	17	0	83	4,210
396	J-231	90	1,500	3,048	79	2,210	79	2,236	16	0	82	3,559
398	J-232	98	1,500	2,730	86	2,078	86	2,098	22	0	91	3,144
400	J-233	105	1,500	3,065	93	2,361	93	2,385	30	0	96	3,579
401	J-234	103	1,500	2,455	91	1,943	91	1,960	28	0	95	2,631
403	J-235	73	1,500	2,589	72	2,236	72	2,546	42	0	73	2,785
406	J-236	93	1,500	3,473	82	2,488	82	2,519	19	0	86	4,493
407	J-237	92	1,500	2,548	81	1,930	81	1,949	18	0	85	2,808
409	J-238	87	1,500	3,180	77	2,293	77	2,322	15	0	80	3,806
410	J-239	89	1,500	2,354	79	1,799	79	1,817	17	0	82	2,504
412	J-240	95	1,500	3,834	83	2,628	83	2,666	19	0	87	5,000
414	J-241	79	1,500	4,611	77	3,648	77	3,712	28	0	74	4,999
415	J-242	79	1,500	2,806	77	2,341	77	2,368	28	0	74	2,700
417	J-243	105	1,500	3,139	93	2,561	93	2,587	28	0	98	4,578
420	J-244	95	1,500	3,609	83	2,546	83	2,579	20	0	87	4,712
421	J-245	93	1,500	2,558	81	1,929	81	1,948	18	0	85	2,770
424	J-246	97	1,500	3,106	85	2,319	85	2,344	20	0	91	4,421
426	J-247	98	1,500	3,462	86	2,471	86	2,501	21	0	92	5,000
430	J-248	98	1,500	3,609	87	2,563	87	2,596	24	0	90	4,576
431	J-249	102	1,500	2,685	91	2,087	91	2,105	27	0	94	2,908
433	J-250	100	1,500	2,732	88	2,225	88	2,247	24	0	91	3,345
435	J-251	79	1,500	2,800	69	2,369	69	3,810	27	0	66	4,952
438	J-253	101	1,500	3,778	89	2,630	89	2,664	24	0	94	5,000
442	J-255	92	3,500	3,539	81	2,493	81	2,527	19	0	84	4,000
444	J-256	90	1,500	3,140	79	2,245	79	2,273	16	0	82	3,771
446	J-257	96	1,500	2,367	84	1,820	84	1,837	21	0	87	2,488
448	J-258	91	1,500	3,489	80	2,471	80	2,505	17	0	83	4,407
450	J-259	94	1,500	2,454	82	1,872	82	1,889	19	0	85	2,604
451	J-260	94	1,500	2,156	83	1,682	83	1,697	20	0	86	2,228
453	J-261	93	1,500	3,623	82	2,544	82	2,577	19	0	85	4,733
455	J-262	100	1,500	3,730	89	2,599	89	2,632	24	0	94	5,000
458	J-263	66	1,500	5,000	65	5,000	65	3,819	60	0	65	3,874
460	J-264	105	1,500	2,940	94	2,296	94	2,318	30	0	97	3,346
461	J-265	106	1,500	3,029	94	2,359	94	2,382	31	0	97	3,493
463	J-266	100	1,500	3,723	88	2,594	88	2,627	23	0	94	5,000
467	J-268	73	1,500	3,538	72	2,989	72	3,398	41	0	72	3,949
472	J-271	86	1,500	4,838	81	3,589	81	3,651	28	0	80	5,000
474	J-272	96	1,500	2,549	84	1,941	84	1,960	21	0	88	2,729
476	J-273	91	1,500	3,478	80	2,478	80	2,510	18	0	83	4,344
479	J-275	60	1,500	769	59	750	59	1,266	54	0	59	1,707
481	J-276	97	1,500	3,751	86	2,624	86	2,658	21	0	91	5,000
483	J-277	88	1,500	2,113	77	1,618	77	1,633	14	0	81	2,206
486	J-278	76	1,500	5,000	71	4,457	71	4,447	45	0	69	5,000
488	J-279	78	1,500	3,827	77	3,158	77	3,216	31	0	73	3,830
489	J-280	74	1,500	3,115	73	2,614	73	2,652	27	0	69	2,990
494	J-282	92	1,500	3,675	81	2,545	81	2,581	18	0	84	4,941
497	J-284	101	1,500	3,621	89	2,554	89	2,588	26	0	92	4,517
501	J-286	99	1,500	(N/A)	88	(N/A)	88	(N/A)	24	0	92	1,337
503	J-287	86	1,500	3,343	76	2,382	76	2,413	14	0	79	4,000
504	J-288	90	1,500	3,456	79	2,473	79	2,504	17	0	83	4,369
510	J-290	74	1,500	4,173	73	3,293	73	3,350	20	0	67	4,525
512	J-291	82	1,500	4,689	79	3,679	79	3,742	27	0	76	5,000
515	J-293	83	1,500	4,203	79	3,250	79	3,318	26	0	78	4,565
517	J-294	76	1,500	3,456	75	2,880	75	2,930	29	0	72	3,392
518	J-295	74	1,500	4,859	73	3,718	73	3,789	26	0	69	5,000
520	J-296	102	3,000	3,756	90	2,620	90	2,653	25	0	95	4,000
521	J-297	100	1,500	3,727	88	2,596	88	2,629	23	0	94	5,000
523	J-298	84	1,500	3,552	78	2,720	78	2,757	27	0	80	4,000
524	J-299	82	1,500	1,973	76	1,620	76	1,634	30	0	79	4,307
526	J-300	79	1,500	4,853	77	3,713	77	3,787	30	0	74	5,000

527	J-301	76	1,500	4,237	74	3,338	74	3,395	21	0	69	4,488
531	J-303	63	1,500	5,000	58	5,000	58	5,000	35	0	57	5,000
533	J-304	84	1,500	3,510	78	2,698	78	2,733	25	0	79	4,361
535	J-305	98	1,500	3,496	86	2,491	86	2,521	21	0	92	5,000
536	J-306	99	1,500	3,713	87	2,584	87	2,617	23	0	93	5,000
538	J-307	87	1,500	3,301	76	2,344	76	2,374	14	0	80	4,071
540	J-308	88	1,500	2,950	81	2,291	81	2,317	30	0	83	3,873
544	J-310	73	1,500	5,000	67	4,198	67	4,214	32	0	64	5,000
546	J-311	102	1,500	5,000	94	5,000	94	5,000	56	0	89	5,000
551	J-313	76	1,500	3,098	68	2,650	68	2,669	26	0	64	2,926
553	J-314	91	1,500	3,941	81	2,722	81	2,761	19	0	84	5,000
556	J-315	77	1,500	5,000	71	4,776	71	4,776	43	0	69	5,000
562	J-318	99	1,500	1,929	87	1,546	87	1,558	25	0	91	1,957
563	J-319	92	1,500	3,585	81	2,539	81	2,573	18	0	84	4,577
565	J-320	70	1,500	(N/A)	63	(N/A)	63	(N/A)	28	(N/A)	60	(N/A)
567	J-321	106	1,500	3,065	94	2,361	94	2,385	31	0	97	3,579
570	J-322	85	1,500	2,166	80	1,806	80	1,826	27	0	79	2,083
571	J-323	91	1,500	2,821	85	2,277	85	2,303	28	0	84	2,770
574	J-325	87	1,500	4,189	79	3,000	79	3,046	22	0	81	5,000
579	J-327	102	1,500	2,482	90	1,941	90	1,958	25	0	96	2,887
587	J-330	82	1,500	5,000	76	4,272	76	4,290	41	0	73	5,000
589	J-331	107	1,500	2,831	95	2,329	95	2,350	30	0	100	3,672
592	J-332	97	1,500	2,205	86	1,725	86	1,740	23	0	89	2,284
595	J-333	97	1,500	2,259	85	1,758	85	1,773	23	0	89	2,350
598	J-334	96	1,500	2,202	85	1,716	85	1,731	22	0	88	2,281
601	J-335	97	1,500	2,029	86	1,598	86	1,611	23	0	89	2,074
604	J-336	98	1,500	2,115	86	1,668	86	1,682	23	0	89	2,175
607	J-337	96	1,500	3,376	84	2,462	84	2,490	21	0	88	4,161
608	J-338	97	1,500	3,373	85	2,470	85	2,498	22	0	89	4,141
609	J-339	100	1,500	2,838	89	2,234	89	2,256	25	0	92	3,323
610	J-340	93	1,500	2,868	81	2,130	81	2,153	19	0	85	3,239
611	J-341	93	1,500	2,845	82	2,122	82	2,144	19	0	85	3,199
613	J-342	93	1,500	3,100	91	2,659	91	2,676	44	0	93	3,234
614	J-343	95	1,500	3,114	84	2,308	84	2,334	21	0	86	3,559
615	J-344	103	1,500	2,825	91	2,193	91	2,214	28	0	94	3,181
618	J-345	91	1,500	2,611	83	2,075	83	2,096	32	0	86	3,370
633	J-347	97	1,500	2,819	86	2,142	86	2,163	22	0	90	3,211
638	J-348	89	1,500	3,111	78	2,266	78	2,293	16	0	82	3,671
644	J-350	91	1,500	3,259	80	2,354	80	2,383	17	0	83	3,975
650	J-352	88	1,500	2,779	77	2,059	77	2,082	15	0	81	3,115
653	J-353	88	1,500	3,097	78	2,251	78	2,278	15	0	81	3,654
656	J-354	91	1,500	3,439	81	2,492	81	2,523	18	0	84	4,425
668	J-358	101	1,500	3,738	89	2,604	89	2,638	24	0	95	5,000
674	J-360	100	1,500	3,344	88	2,477	88	2,504	23	0	94	4,817
677	J-361	99	1,500	3,660	87	2,538	87	2,570	22	0	93	5,000
680	J-362	97	1,500	3,292	86	2,420	86	2,447	21	0	91	4,697
683	J-363	94	1,500	2,782	86	2,223	86	2,246	26	0	85	2,705
692	J-366	80	1,500	2,160	77	1,853	77	1,886	29	0	75	2,057
695	J-367	79	1,500	3,312	76	2,718	76	2,799	29	0	75	3,337
698	J-368	83	1,500	3,998	80	3,205	80	3,251	28	0	77	4,194
710	J-371	86	1,500	4,925	82	3,689	82	3,746	31	0	83	5,000
713	J-372	85	1,500	3,842	81	3,074	81	3,115	28	0	80	4,150
716	J-373	84	1,500	4,350	80	3,387	80	3,452	27	0	79	4,823
719	J-374	81	1,500	2,362	77	2,004	77	2,038	27	0	76	2,272
722	J-375	81	1,500	3,466	77	2,797	77	2,865	27	0	76	3,528
728	J-377	76	1,500	3,072	67	2,606	67	2,627	25	0	64	2,901
731	J-378	80	1,500	3,807	70	3,109	70	3,149	26	0	67	3,761
734	J-379	78	1,500	(N/A)	69	(N/A)	69	(N/A)	28	(N/A)	66	(N/A)
740	J-381	73	1,500	4,196	72	3,309	72	3,367	21	0	67	4,462
750	J-385	80	1,500	4,993	74	4,340	74	4,340	42	0	71	5,000
753	J-386	77	1,500	5,000	71	4,574	71	4,574	41	0	69	5,000
756	J-387	75	1,500	1,372	70	1,261	70	2,287	44	0	68	2,349
759	J-388	74	1,500	4,917	70	4,423	70	4,411	48	0	68	4,799
762	J-389	71	1,500	4,743	68	4,345	68	4,335	52	0	67	4,581
765	J-390	70	1,500	4,955	68	4,596	68	4,589	56	0	67	4,775
768	J-391	68	1,500	(N/A)	62	(N/A)	62	(N/A)	26	0	58	1,359
771	J-392	67	1,500	5,000	61	4,147	61	4,152	29	0	58	5,000
774	J-393	73	1,500	2,532	71	2,104	71	2,129	19	0	66	2,372
784	J-397	76	1,500	2,871	74	2,390	74	2,419	25	0	70	2,748
787	J-398	75	1,500	2,780	73	2,298	73	2,326	22	0	69	2,649
790	J-399	81	1,500	4,584	78	3,613	78	3,675	28	0	75	5,000
794	J-400	83	1,500	2,837	79	2,347	79	2,373	27	0	77	2,804
797	J-401	86	1,500	4,848	81	3,609	81	3,672	28	0	80	5,000
812	J-406	98	1,500	3,635	86	2,552	86	2,586	23	0	90	4,627
815	J-407	95	1,500	3,613	83	2,549	83	2,583	20	0	87	4,617
818	J-408	94	1,500	2,454	82	1,872	82	1,890	19	0	86	2,605
824	J-410	92	1,500	3,163	81	2,307	81	2,334	18	0	84	3,695
827	J-411	93	1,500	3,369	81	2,422	81	2,451	18	0	85	4,133
830	J-412	93	1,500	2,916	82	2,151	82	2,174	19	0	85	3,316
833	J-413	93	1,500	2,758	86	2,228	86	2,252	28	0	86	2,693
836	J-414	83	1,500	4,636	79	3,612	79	3,674	26	0	78	5,000
839	J-415	84	1,500	3,031	78	2,719	78	2,719	42	0	73	2,869
842	J-416	70	1,500	4,256	69	3,545	69	3,942	44	0	70	4,603
852	J-419	75	1,500	3,557	73	2,962	73	3,182	35	0	73	3,749
855	J-420	94	1,500	3,047	86	2,376	86	2,402	23	0	85	2,983
861	J-422	93	1,500	3,508	83	2,608	83	2,641	22	0	84	4,045
865	J-423	95	1,500	3,072	84	2,286	84	2,312	21	0	87	3,495

868	J-424	90	1,500	2,709	83	2,137	83	2,159	30	0	85	3,416
871	J-425	90	1,500	2,554	82	2,023	82	2,043	31	0	84	3,424
874	J-426	88	1,500	3,190	77	2,278	77	2,307	14	0	80	3,846
922	J-429	74	1,500	5,000	67	4,054	67	4,072	31	0	63	5,000
935	J-431	86	1,500	4,582	80	3,336	80	3,389	26	0	81	5,000
940	J-433	85	1,500	4,217	80	3,310	80	3,358	27	0	79	4,742
942	J-435	80	1,500	4,557	69	3,675	69	3,744	23	0	65	4,657
944	J-436	85	1,500	3,773	80	3,015	80	3,055	27	0	80	4,083
949	J-438	88	1,500	2,825	83	2,289	83	2,322	28	0	82	2,789
955	J-441	94	1,500	2,651	83	1,998	83	2,018	20	0	86	2,877
960	J-442	90	1,500	3,974	80	2,764	80	2,804	19	0	83	4,000
962	J-443	75	1,500	3,825	73	3,053	73	3,103	20	0	67	3,965
966	J-444	96	1,500	3,196	84	2,362	84	2,388	19	0	90	4,629
969	J-445	101	1,500	3,454	89	2,554	89	2,582	24	0	94	5,000
970	J-446	100	1,500	3,492	88	2,571	88	2,599	23	0	94	5,000
975	J-448	86	1,500	3,986	81	3,175	81	3,218	29	0	81	4,371
979	J-449	96	1,500	3,036	84	2,285	84	2,310	19	0	90	4,380
983	J-450	81	1,500	4,744	71	3,787	71	3,852	26	0	67	4,894
993	J-451	89	1,500	3,166	78	2,295	78	2,323	16	0	82	3,772
1002	J-452	77	1,500	3,242	76	2,729	76	2,770	30	0	72	3,140
1008	J-453	76	1,500	5,000	69	4,232	69	4,253	32	0	65	4,989
1012	J-454	87	1,500	3,254	81	2,527	81	2,558	29	0	82	3,820
1014	J-455	89	1,500	1,992	84	1,668	84	1,684	28	0	83	1,903
1024	J-456	96	1,500	3,891	84	2,673	84	2,711	21	0	89	5,000
1025	J-457	96	1,500	3,872	85	2,680	85	2,720	21	0	89	5,000
1032	J-459	86	1,500	4,719	81	3,502	81	3,561	28	0	81	5,000
1082	J-462	92	1,500	2,864	81	2,123	81	2,146	18	0	84	3,235
1132	J-463	86	1,500	4,405	80	3,172	80	3,222	24	0	81	5,000
1136	J-464	85	1,500	4,046	80	3,206	80	3,251	28	0	80	4,470
1142	J-465	71	1,500	3,678	70	3,062	70	3,751	44	0	71	4,361
1175	J-466	86	1,500	4,890	81	3,666	81	3,733	28	0	80	5,000
1220	J-467	90	1,500	2,732	84	2,213	84	2,238	28	0	83	2,675
1280	J-471	83	1,500	2,689	77	2,136	77	2,160	27	0	79	4,066
1383	J-482	86	1,500	(N/A)	81	(N/A)	81	(N/A)	28	0	81	5,000
1446	J-498	95	1,500	(N/A)	84	(N/A)	84	(N/A)	21	(N/A)	88	(N/A)
1448	J-499	95	1,500	(N/A)	84	(N/A)	84	(N/A)	21	(N/A)	88	(N/A)
1450	J-500	91	1,500	(N/A)	81	(N/A)	81	(N/A)	19	(N/A)	84	(N/A)
1452	J-501	86	1,500	(N/A)	81	(N/A)	81	(N/A)	28	(N/A)	80	(N/A)
1455	J-502	95	1,500	(N/A)	85	(N/A)	85	(N/A)	22	(N/A)	89	(N/A)
1475	J-507	98	1,500	3,805	87	2,722	87	2,755	22	(N/A)	92	(N/A)
1502	J-508	72	1,500	(N/A)	66	(N/A)	66	(N/A)	37	0	66	5,000
1505	J-509	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	66	5,000
1509	J-510	(N/A)	1,500	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	8	(N/A)
74	Tank Junction A	13	1,500	(N/A)	13	(N/A)	13	(N/A)	37	(N/A)	73	(N/A)
62	Tank Junction B	12	1,500	(N/A)	12	(N/A)	12	(N/A)	12	0	13	0
1432	J-511	75	1,500	(N/A)	74	(N/A)	74	(N/A)	12	(N/A)	12	(N/A)

APPENDIX F. PROPOSED IMPROVEMENTS

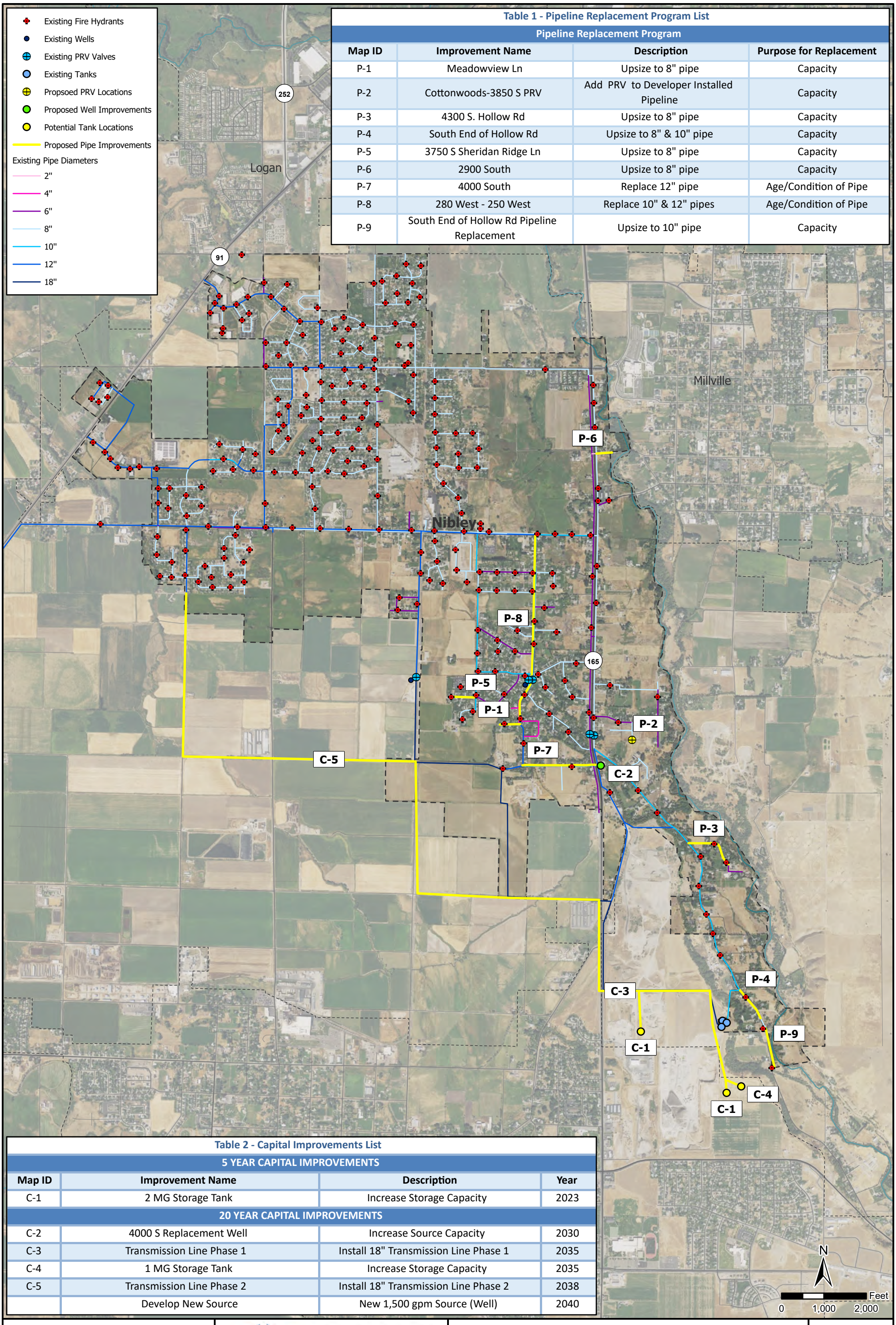

Table 1 - Pipeline Replacement Program List

Pipeline Replacement Program			
Map ID	**Improvement Name**	**Description**	**Purpose for Replacement**
P-1	Meadowview Ln	Upsize to 8" pipe	Capacity
P-2	Cottonwoods-3850 S PRV	Add PRV to Developer Installed Pipeline	Capacity
P-3	4300 S. Hollow Rd	Upsize to 8" pipe	Capacity
P-4	South End of Hollow Rd	Upsize to 8" & 10" pipe	Capacity
P-5	3750 S Sheridan Ridge Ln	Upsize to 8" pipe	Capacity
P-6	2900 South	Upsize to 8" pipe	Capacity
P-7	4000 South	Replace 12" pipe	Age/Condition of Pipe
P-8	280 West - 250 West	Replace 10" & 12" pipes	Age/Condition of Pipe
P-9	South End of Hollow Rd Pipeline Replacement	Upsize to 10" pipe	Capacity

Table 2 - Capital Improvements List

5 YEAR CAPITAL IMPROVEMENTS			
Map ID	**Improvement Name**	**Description**	**Year**
C-1	2 MG Storage Tank	Increase Storage Capacity	2023
20 YEAR CAPITAL IMPROVEMENTS			
C-2	4000 S Replacement Well	Increase Source Capacity	2030
C-3	Transmission Line Phase 1	Install 18" Transmission Line Phase 1	2035
C-4	1 MG Storage Tank	Increase Storage Capacity	2035
C-5	Transmission Line Phase 2	Install 18" Transmission Line Phase 2	2038
	Develop New Source	New 1,500 gpm Source (Well)	2040

Jones & DeMille Engineering
- Shaping the Quality of Life -
800.748.5275 www.jonesanddemille.com

Nibley City

Water Master Plan
Proposed Improvements

Cache County

Scale: 1" = 2,000'

5

Map Name: H:\JD\Proj\1902-004\Design\GIS\Projects\Design\1902-004_Design\1902-004_Design.aprx - EXH05_Proposed_Improvements

Project Number: 1902-004 | Drawn by: JWW 09-19 | Last Edit: 09/11/2019

APPENDIX G. LIFE CYCLE COSTS ANALYSIS FOR TRANSMISSION LINE VS PUMP STATION

Power ($/KWHr) =	0.11	Year - 2019		
Discount Rate =	3.0%			
Escalation Rate =	2.0%			
Power Escalation =	0.5%			
Average Day Q =	100.0%			
Pipe to E Res =	0.0 ft			
C =	130			
Pump Effeciency =	82%			

Initial Capital Cost (2019):		O&M Rate (% per year)
Pump Station	$ 990,000	3%
PRVs' and Valves	$ -	1%
Special Crossings	$ -	1%
Power Transmission	$ -	1%
Misc. Costs	$ -	1%
Total:	$ 990,000	
Annual O&M:	$ 29,700	

Lifecycle Cost Analysis for Pump Station

		Power Usage						Capital Cost			O & M Cost			Power Cost			
Year	Flow Rate	Average Flow Rate (MGD)	Flow Rate (GPM)	Pumping Hf + Static Hf	Equivalent Power Usage (HP)	Equivalent Power Usage (KW)	Equivalent Power Usage (KW)	Capital Cost	Escalated Capital Cost	Present Worth Capital Cost	Escalated Annual O&M $/Year	Present Worth Annual O&M $/Year	Cumulative Present Worth Annual O&M	Power Cost $ ($/KWHr)	Annual Power Usage $/Year	Annual Present Worth Power Usage $/Year	Cumulative Present Worth Power Usage
				-													
1	8	5.2	3,591	150.0 ft	166	124	124	$ 1,125,000	$ 1,125,000	$ 1,125,000	$ 29,700	$ 29,700	$ 29,700	$ 0.1100	$ 119,712	$ 119,712.05	$ 119,712
2	8	5.2	3,591	151.0 ft	168	125	125		$ -	$ -	$ 30,900	$ 29,999.88	$ 59,700	$ 0.1106	$ 121,113	$ 117,585.13	$ 237,297
3	8	5.2	3,591	152.0 ft	169	126	126		$ -	$ -	$ 31,518	$ 29,708.62	$ 89,409	$ 0.1111	$ 122,524	$ 115,490.93	$ 352,788
4	8	5.2	3,591	153.0 ft	170	127	127		$ -	$ -	$ 32,148	$ 29,420.19	$ 118,829	$ 0.1117	$ 123,947	$ 113,429.12	$ 466,217
5	8	5.2	3,591	154.0 ft	171	128	128		$ -	$ -	$ 32,791	$ 29,134.56	$ 147,963	$ 0.1122	$ 125,381	$ 111,399.36	$ 577,617
6	8	5.2	3,591	155.0 ft	172	128	128		$ -	$ -	$ 33,447	$ 28,851.70	$ 176,815	$ 0.1128	$ 126,826	$ 109,401.30	$ 687,018
7	8	5.2	3,591	156.0 ft	173	129	129		$ -	$ -	$ 34,116	$ 28,571.58	$ 205,387	$ 0.1133	$ 128,283	$ 107,434.62	$ 794,453
8	8	5.2	3,591	157.0 ft	174	130	130		$ -	$ -	$ 34,798	$ 28,294.19	$ 233,681	$ 0.1139	$ 129,750	$ 105,498.95	$ 899,951
9	8	5.2	3,591	158.0 ft	175	131	131		$ -	$ -	$ 35,494	$ 28,019.49	$ 261,700	$ 0.1145	$ 131,230	$ 103,593.95	$ 1,003,545
10	8	5.2	3,591	159.0 ft	176	132	132	50,000	$ 59,755	$ 45,797	$ 36,204	$ 27,747.45	$ 289,448	$ 0.1151	$ 132,721	$ 101,719.28	$ 1,105,265
11	8	5.2	3,591	160.0 ft	178	133	133		$ -	$ -	$ 36,928	$ 27,478.06	$ 316,926	$ 0.1156	$ 134,223	$ 99,874.58	$ 1,205,139
12	8	5.2	3,591	161.0 ft	179	133	133		$ -	$ -	$ 37,667	$ 27,211.28	$ 344,137	$ 0.1162	$ 135,737	$ 98,059.51	$ 1,303,199
13	8	5.2	3,591	162.0 ft	180	134	134		$ -	$ -	$ 38,420	$ 26,947.10	$ 371,084	$ 0.1168	$ 137,263	$ 96,273.70	$ 1,399,472
14	8	5.2	3,591	163.0 ft	181	135	135		$ -	$ -	$ 39,189	$ 26,685.47	$ 397,770	$ 0.1174	$ 138,801	$ 94,516.82	$ 1,493,989
15	8	5.2	3,591	164.0 ft	182	136	136		$ -	$ -	$ 39,972	$ 26,426.39	$ 424,196	$ 0.1180	$ 140,351	$ 92,788.51	$ 1,586,778
16	8	5.2	3,591	165.0 ft	183	137	137		$ -	$ -	$ 40,772	$ 26,169.83	$ 450,366	$ 0.1185	$ 141,913	$ 91,088.41	$ 1,677,866
17	8	5.2	3,591	166.0 ft	184	137	137		$ -	$ -	$ 41,587	$ 25,915.75	$ 476,282	$ 0.1191	$ 143,487	$ 89,416.18	$ 1,767,282
18	8	5.2	3,591	167.0 ft	185	138	138		$ -	$ -	$ 42,419	$ 25,664.14	$ 501,946	$ 0.1197	$ 145,073	$ 87,771.46	$ 1,855,054
19	8	5.2	3,591	168.0 ft	186	139	139		$ -	$ -	$ 43,267	$ 25,414.97	$ 527,361	$ 0.1203	$ 146,671	$ 86,153.90	$ 1,941,208
20	8	5.2	3,591	169.0 ft	188	140	140		$ -	$ -	$ 44,133	$ 25,168.23	$ 552,529	$ 0.1209	$ 148,282	$ 84,563.16	$ 2,025,771
21	8	5.2	3,591	170.0 ft	189	141	141		$ -	$ -	$ 45,015	$ 24,923.87	$ 577,453	$ 0.1215	$ 149,905	$ 82,998.89	$ 2,108,770
22	8	5.2	3,591	171.0 ft	190	142	142		$ -	$ -	$ 45,916	$ 24,681.90	$ 602,135	$ 0.1221	$ 151,541	$ 81,460.73	$ 2,190,231
23	8	5.2	3,591	172.0 ft	191	142	142		$ -	$ -	$ 46,834	$ 24,442.27	$ 626,577	$ 0.1228	$ 153,189	$ 79,948.34	$ 2,270,179
24	8	5.2	3,591	173.0 ft	192	143	143		$ -	$ -	$ 47,771	$ 24,204.96	$ 650,782	$ 0.1234	$ 154,850	$ 78,461.39	$ 2,348,640
25	8	5.2	3,591	174.0 ft	193	144	144	100,000	$ 160,844	$ 79,124	$ 48,726	$ 23,969.96	$ 674,752	$ 0.1240	$ 156,524	$ 76,999.51	$ 2,425,640
26	8	5.2	3,591	175.0 ft	194	145	145		$ -	$ -	$ 49,701	$ 23,737.24	$ 698,489	$ 0.1246	$ 158,211	$ 75,562.37	$ 2,501,202
27	8	5.2	3,591	176.0 ft	195	146	146		$ -	$ -	$ 50,695	$ 23,506.79	$ 721,996	$ 0.1252	$ 159,910	$ 74,149.64	$ 2,575,352
28	8	5.2	3,591	177.0 ft	196	147	147		$ -	$ -	$ 51,708	$ 23,278.56	$ 745,274	$ 0.1259	$ 161,623	$ 72,760.97	$ 2,648,113
29	8	5.2	3,591	178.0 ft	198	147	147		$ -	$ -	$ 52,743	$ 23,052.56	$ 768,327	$ 0.1265	$ 163,349	$ 71,396.03	$ 2,719,509
30	8	5.2	3,591	179.0 ft	199	148	148		$ -	$ -	$ 53,797	$ 22,828.75	$ 791,156	$ 0.1271	$ 165,088	$ 70,054.48	$ 2,789,563
31	8	5.2	3,591	180.0 ft	200	149	149		$ -	$ -	$ 54,873	$ 22,607.11	$ 813,763	$ 0.1278	$ 166,840	$ 68,736.00	$ 2,858,299
32	8	5.2	3,591	181.0 ft	201	150	150		$ -	$ -	$ 55,971	$ 22,387.62	$ 836,150	$ 0.1284	$ 168,606	$ 67,440.24	$ 2,925,740
33	8	5.2	3,591	182.0 ft	202	151	151		$ -	$ -	$ 57,090	$ 22,170.27	$ 858,321	$ 0.1290	$ 170,385	$ 66,166.90	$ 2,991,906
34	8	5.2	3,591	183.0 ft	203	152	152		$ -	$ -	$ 58,232	$ 21,955.02	$ 880,276	$ 0.1297	$ 172,178	$ 64,915.64	$ 3,056,822
35	8	5.2	3,591	184.0 ft	204	152	152		$ -	$ -	$ 59,397	$ 21,741.87	$ 902,018	$ 0.1303	$ 173,984	$ 63,686.14	$ 3,120,508
36	8	5.2	3,591	185.0 ft	205	153	153		$ -	$ -	$ 60,585	$ 21,530.78	$ 923,548	$ 0.1310	$ 175,805	$ 62,478.08	$ 3,182,986
37	8	5.2	3,591	186.0 ft	206	154	154		$ -	$ -	$ 61,796	$ 21,321.74	$ 944,870	$ 0.1316	$ 177,639	$ 61,291.14	$ 3,244,277
38	8	5.2	3,591	187.0 ft	208	155	155		$ -	$ -	$ 63,032	$ 21,114.74	$ 965,985	$ 0.1323	$ 179,487	$ 60,125.01	$ 3,304,402
39	8	5.2	3,591	188.0 ft	209	156	156		$ -	$ -	$ 64,293	$ 20,909.74	$ 986,895	$ 0.1330	$ 181,349	$ 58,979.39	$ 3,363,382
40	8	5.2	3,591	189.0 ft	210	157	157		$ -	$ -	$ 65,579	$ 20,706.73	$ 1,007,601	$ 0.1336	$ 183,225	$ 57,853.96	$ 3,421,236
41	8	5.2	3,591	190.0 ft	211	157	157		$ -	$ -	$ 66,890	$ 20,505.70	$ 1,028,107	$ 0.1343	$ 185,115	$ 56,748.41	$ 3,477,984
42	8	5.2	3,591	191.0 ft	212	158	158		$ -	$ -	$ 68,228	$ 20,306.61	$ 1,048,414	$ 0.1350	$ 187,020	$ 55,662.45	$ 3,533,647
43	8	5.2	3,591	192.0 ft	213	159	159		$ -	$ -	$ 69,593	$ 20,109.46	$ 1,068,523	$ 0.1356	$ 188,939	$ 54,595.77	$ 3,588,242
44	8	5.2	3,591	193.0 ft	214	160	160		$ -	$ -	$ 70,985	$ 19,914.22	$ 1,088,437	$ 0.1363	$ 190,873	$ 53,548.08	$ 3,641,790
45	8	5.2	3,591	194.0 ft	215	161	161		$ -	$ -	$ 72,404	$ 19,720.88	$ 1,108,158	$ 0.1370	$ 192,821	$ 52,519.09	$ 3,694,310
46	8	5.2	3,591	195.0 ft	216	162	162		$ -	$ -	$ 73,852	$ 19,529.42	$ 1,127,688	$ 0.1377	$ 194,784	$ 51,508.50	$ 3,745,818
47	8	5.2	3,591	196.0 ft	218	162	162		$ -	$ -	$ 75,329	$ 19,339.81	$ 1,147,027	$ 0.1384	$ 196,762	$ 50,516.03	$ 3,796,334
48	8	5.2	3,591	197.0 ft	219	163	163		$ -	$ -	$ 76,836	$ 19,152.04	$ 1,166,180	$ 0.1391	$ 198,755	$ 49,541.39	$ 3,845,875
49	8	5.2	3,591	198.0 ft	220	164	164		$ -	$ -	$ 78,373	$ 18,966.10	$ 1,185,146	$ 0.1398	$ 200,763	$ 48,584.30	$ 3,894,460
50					-	-	-		$ -	$ -	$ 79,940	$ 18,781.96	$ 1,203,928	$ 0.1405	$ -	$ -	$ 3,894,460

20 Year Present Worth of Facility/O&M/Power Costs:	$ 3,828,221

Assumptions:

2.) Pump Eff = 86% Motor Eff = 95% Overall Eff= 82%

3.) The annual escalation, power cost and the year the power cost was quoted are listed above.

4.) Average Daily Flow is 100% of Max Daily Flow.

5.) Project Capital Cost are based on Total Estimated Cost including Contingency.

Life of Facility:	25 Years	50 Years
Pipelines:		XX
Pump Station(s) - Mech/Elec	XX	XX
Pump Station(s) - Pipe/Struct		XX
Special Crossings		XX
Power Transmission		XX
Misc. Costs		XX

	Base Cost	Contingency 10%	Admin, Eng 15%	Total
Pump Station	$ 900,000	$ 90,000	$ 135,000	$ 1,125,000
PRVs' and Valves		$ -	$ -	$ -
Special Crossings	$ -	$ -	$ -	$ -
Power Transmission	$ -	$ -	$ -	$ -
Misc. Costs	$ -	$ -	$ -	$ -
	$ 900,000	$ 90,000	$ 135,000	
			Total:	$ 1,125,000

Power ($/KWHr) =	0	Year - 2013
Discount Rate =	3.0%	
Escalation Rate =	2.0%	
Power Escalation =	1.0%	
Average Day Q =	100.0%	
Pipe to E Res =	0.0 ft	
C =	130	
Pump Effeciency =	83%	

Initial Capital Cost (2013):

Pipeline	$	2,090,000
PRVs' and Valves	$	-
Special Crossings	$	-
Power Transmission	$	-
Misc. Costs	$	-
Total:	$	2,090,000
Annual O&M:	$	20,900

O&M Rate (% per year)

Pipeline	1%
PRVs' and Valves	0%
Special Crossings	0%
Power Transmission	0%
Misc. Costs	0%

Lifecycle Cost for Pipeline

		Power Usage						Capital Cost			O & M Cost			Power Cost			
Year	Flow Rate	Average Flow Rate (MGD)	Flow Rate (GPM)	Pumping Hf + Static Hf	Equivalent Power Usage (HP)	Equivalent Power Usage (KW)	Equivalent Power Usage (KW)	Capital Cost	Escalated Capital Cost	Present Worth Capital Cost	Escalated Annual O&M $/Year	Present Worth Annual O&M $/Year	Cumulative Present Worth Annual O&M	Power Cost $ ($/KWHr)	Annual Power Usage $/Year	Annual Present Worth Power Usage $/Year	Cumulative Present Worth Power Usage
				-													
1	8	5.2	3,591	150.0 ft	164	122	122	$ 2,375,000	$ 2,375,000	$ 2,375,000	$ 20,900	$ 20,900	$ 20,900	$ -	$ -	$ -	$ -
2	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 21,744	$ 21,111.03	$ 42,011	$ -	$ -	$ -	$ -
3	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 22,179	$ 20,906.07	$ 62,917	$ -	$ -	$ -	$ -
4	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 22,623	$ 20,703.10	$ 83,620	$ -	$ -	$ -	$ -
5	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 23,075	$ 20,502.10	$ 104,122	$ -	$ -	$ -	$ -
6	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 23,537	$ 20,303.05	$ 124,425	$ -	$ -	$ -	$ -
7	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 24,008	$ 20,105.93	$ 144,531	$ -	$ -	$ -	$ -
8	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 24,488	$ 19,910.73	$ 164,442	$ -	$ -	$ -	$ -
9	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 24,977	$ 19,717.42	$ 184,159	$ -	$ -	$ -	$ -
10	6.2	4.0	2,783	1.0 ft	1	1	1	25,000	$ 29,877	$ 22,898	$ 25,477	$ 19,525.99	$ 203,685	$ -	$ -	$ -	$ -
11	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 25,987	$ 19,336.41	$ 223,022	$ -	$ -	$ -	$ -
12	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 26,506	$ 19,148.68	$ 242,170	$ -	$ -	$ -	$ -
13	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 27,036	$ 18,962.77	$ 261,133	$ -	$ -	$ -	$ -
14	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 27,577	$ 18,778.67	$ 279,912	$ -	$ -	$ -	$ -
15	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 28,129	$ 18,596.35	$ 298,508	$ -	$ -	$ -	$ -
16	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 28,691	$ 18,415.80	$ 316,924	$ -	$ -	$ -	$ -
17	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 29,265	$ 18,237.01	$ 335,161	$ -	$ -	$ -	$ -
18	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 29,850	$ 18,059.95	$ 353,221	$ -	$ -	$ -	$ -
19	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 30,447	$ 17,884.61	$ 371,106	$ -	$ -	$ -	$ -
20	6.2	4.0	2,783	1.0 ft	1	1	1	25,000	$ 36,420	$ 20,770	$ 31,056	$ 17,710.97	$ 388,817	$ -	$ -	$ -	$ -
21	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 31,677	$ 17,539.02	$ 406,356	$ -	$ -	$ -	$ -
22	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 32,311	$ 17,368.74	$ 423,724	$ -	$ -	$ -	$ -
23	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 32,957	$ 17,200.11	$ 440,925	$ -	$ -	$ -	$ -
24	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 33,616	$ 17,033.12	$ 457,958	$ -	$ -	$ -	$ -
25	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 34,289	$ 16,867.75	$ 474,825	$ -	$ -	$ -	$ -
26	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 34,974	$ 16,703.99	$ 491,529	$ -	$ -	$ -	$ -
27	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 35,674	$ 16,541.81	$ 508,071	$ -	$ -	$ -	$ -
28	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 36,387	$ 16,381.21	$ 524,452	$ -	$ -	$ -	$ -
29	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 37,115	$ 16,222.17	$ 540,675	$ -	$ -	$ -	$ -
30	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 37,857	$ 16,064.67	$ 556,739	$ -	$ -	$ -	$ -
31	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 38,615	$ 15,908.71	$ 572,648	$ -	$ -	$ -	$ -
32	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 39,387	$ 15,754.25	$ 588,402	$ -	$ -	$ -	$ -
33	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 40,175	$ 15,601.30	$ 604,003	$ -	$ -	$ -	$ -
34	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 40,978	$ 15,449.83	$ 619,453	$ -	$ -	$ -	$ -
35	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 41,798	$ 15,299.83	$ 634,753	$ -	$ -	$ -	$ -
36	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 42,634	$ 15,151.29	$ 649,904	$ -	$ -	$ -	$ -
37	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 43,486	$ 15,004.19	$ 664,909	$ -	$ -	$ -	$ -
38	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 44,356	$ 14,858.52	$ 679,767	$ -	$ -	$ -	$ -
39	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 45,243	$ 14,714.26	$ 694,481	$ -	$ -	$ -	$ -
40	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 46,148	$ 14,571.40	$ 709,053	$ -	$ -	$ -	$ -
41	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 47,071	$ 14,429.93	$ 723,483	$ -	$ -	$ -	$ -
42	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 48,012	$ 14,289.84	$ 737,773	$ -	$ -	$ -	$ -
43	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 48,973	$ 14,151.10	$ 751,924	$ -	$ -	$ -	$ -
44	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 49,952	$ 14,013.71	$ 765,937	$ -	$ -	$ -	$ -
45	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 50,951	$ 13,877.66	$ 779,815	$ -	$ -	$ -	$ -
46	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 51,970	$ 13,742.92	$ 793,558	$ -	$ -	$ -	$ -
47	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 53,010	$ 13,609.50	$ 807,167	$ -	$ -	$ -	$ -
48	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 54,070	$ 13,477.36	$ 820,645	$ -	$ -	$ -	$ -
49	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 55,151	$ 13,346.52	$ 833,991	$ -	$ -	$ -	$ -
50	6.2	4.0	2,783	1.0 ft	1	1	1		$ -	$ -	$ 56,254	$ 13,216.94	$ 847,208	$ -	$ -	$ -	$ -

30 Year Present Worth of Facility/O&M/Power Costs: **$ 2,910,198**

Assumptions:

2.) Pump Eff = 86% Motor Eff = 95% Overall Eff= 82%

3.) The annual escalation, power cost and the year the power cost was quoted are listed above.

4.) Average Daily Flow is 100% of Max Daily Flow.

5.) Project Capital Cost are based on Total Estimated Cost including Contingency.

Life of Facility:

	25 Years	50 Years
Pipelines:		XX
Pump Station(s) - Mech/Elec	XX	XX
Pump Station(s) - Pipe/Struct		XX
Special Crossings		XX
Power Transmission		XX
Misc. Costs		XX

	Base Cost	Contingency 10%	Admin, Eng 15%	Total
Pipeline	$ 1,900,000	$ 190,000	$ 285,000	$ 2,375,000
PRVs' and Valves		$ -	$ -	$ -
Special Crossings	$ -	$ -	$ -	$ -
Power Transmission	$ -	$ -	$ -	$ -
Misc. Costs	$ -	$ -	$ -	$ -
	$ 1,900,000	$ 190,000	$ 285,000	
			Total:	**$ 2,375,000**

APPENDIX H. WATER RATE STUDY

Water Rate Analysis

Nibley City

September 10, 2019

ZIONS PUBLIC FINANCE, INC.

Contents

Water Rates

Background and Approach

Nibley City is experiencing strong growth, putting pressure on the City's water system to serve more customers. Further, inflationary costs are resulting in increased operating expenses. Rates must be designed to keep up with these changes and must be structured to fairly and equitably serve customer needs. As such, Nibley City has two components to its water rates: 1) a base rate charged to all customers monthly; and 2) a usage rate that is tied to the actual amount of water used each month.

The approach used in this analysis is commonly referred to as a "revenue sufficiency model." All expenses (operating and capital) are first calculated, and then rates are structured to cover annual expenses, maintain sufficient debt service ratios, and to keep at least 180 days on hand in the water utility fund.

Growth Projections

Growth in water equivalent residential connections (ERCs) is based on historical growth in the City and has been projected at a rate of three percent per year, which equates to approximately 56 ERCs in 2019, increasing to roughly 75 ERCs per year over the next 10 years. Nibley is experiencing steady growth and this is expected to continue in the future.

TABLE 1: PROJECTED WATER ERC GROWTH

Water Growth	ERCs
2019	1,932
2029	2,597

Of the existing customers, most are categorized as meter size 1 as shown in the table below.

TABLE 2: ERCS BY METER SIZE

Meter Size	Current ERCs	Current Base Rate per Month
Meter Size 1 (1 inch base and under)	1,891	$10.50
Meter Size 2 (2 inch base)	36	$31.50
Meter Size 3 (3 inch base)	1	$58.50
Meter Size 4 (4 inch base)	4	$85.80
Meter Size 6 (6 inch base)	0	$92.50
Meter Size 8 (8 inch base)	0	$102.50

Water usage, for which water users are charged in addition to the base monthly fees, is anticipated to grow in proportion to the increased ERCs. Current usage reaches nearly 630 million gallons per year and is expected to reach nearly 872 million gallons by 2029.

TABLE 3: WATER USAGE, 2018 AND 2029

Tier	Gallons Usage per Month per Tier	Total Annual Usage - Current	Projected Annual Usage – 2029
Tier 1	0-5,000	92,523,912	128,074,733

Tier	Gallons Usage per Month per Tier	Total Annual Usage - Current	Projected Annual Usage – 2029
Tier 2	5,001-40,000	264,022,024	365,468,228
Tier 3	40,001-65,000	75,049,293	103,885,773
Tier 4	65,001-99,999	42,595,936	58,962,737
Tier 5	100,000+	155,642,504	215,445,625
TOTAL		629,833,668	871,837,097

Operating Expenses

Growth in operating expenses is projected at an average annual rate of five percent per year. This includes the new costs attributable to new development, as well as inflationary expenses. These expense projections are shown in detail in Appendix A.

Outstanding Debt

Outstanding debt that must be covered by the Water Fund include payments on a well loan. These payments extend through 2022 and average slightly less than $100,000 per year.

Capital Projects

The only capital project planned within the next 10 years is the 2 MG storage tank. An inflation rate of three percent per year has been added to these projects to cover the increased costs of construction over time.[1]

TABLE 4: WATER CAPITAL PROJECTS

Project #	Description	Estimated Cost	Year Budget
Meadowview Ln Pipeline Replacement	Upsize to 8" pipe	$91,000	Within 20 Years
4300 S. Hollow Rd Pipeline Replacement	Upsize to 8" pipe	$254,000	Within 20 Years
South End of Hollow Rd Pipeline Replacement	Upsize to 8" & 10" pipe	$550,000	Within 20 Years
2 MG Storage Tank	New 2 MG Water Tank	$3,500,000	2023
3850 S. Main Pipeline Replacement	Loop Line and Add PRV	$138,000	Within 20 Years
3750 S Sheridan Ridge Ln	Upsize to 8" pipe	$89,000	Within 20 Years
2900 South Pipeline Replacement	Upsize to 8" pipe	$37,000	Within 20 Years
Reconstruct and Equip 4000 S Well House	Increase Source Capacity	$1,100,000	Within 20 Years
Transmission Line Phase 1		$711,000	Within 20 Years
Transmission Line Phase 2		$2,331,000	Within 20 Years
Develop New 2,000 gpm Source		$1,644,000	Within 20 Years
Develop New 1,500 gpm Source		$1,370,000	Within 20 Years

Repair and Replacement

Based on conversations with the City, an amount of $100,000 annually has been budgeted for repair and replacement of water facilities.

[1] Projects shown in the table are in $2019. The spreadsheet analysis adds in the inflationary costs, depending on construction year.

Cash Balances

The beginning cash balance in the Water Utility Fund is $300,000.[2] This represents 176 days cash on hand, which is near the City's goal of at least 180 days cash on hand. An absolute minimum level of cash on hand, in order not to negatively impact bond ratings, is 150 days; and 180 days is preferable.

Rate Structuring

Current rates are structured as follows:

TABLE 5: CURRENT RATES

Meters and Tiers	Current Rate per Month or per 1,000 Gallons
Meter Size	
Meter Size 1	$10.50
Meter Size 2	$31.50
Meter Size 3	$58.50
Meter Size 4	$85.50
Meter Size 6	$92.50
Meter Size 8	$102.50
Tiers	
All Tiers	$0.95

Proposed Rates

The proposed water rates strive to accomplish two things: 1) place more of the revenue generation on the monthly base charges, rather than on usage charges; and 2) comply with State of Utah requirements that encourage water conservation by placing higher rates on the largest water users. Therefore, the proposed rate structure is for a one-time increase as follows:

TABLE 6: PROPOSED RATE STRUCTURE

	Tiers	Current Monthly Rates	Proposed Rates
Meter Size 1		$10.50	$15.50
Meter Size 2		$31.50	$35.00
Meter Size 3		$58.50	$65.00
Meter Size 4		$85.50	$90.00
Meter Size 6		$92.50	$95.00
Meter Size 8		$102.50	$105.00
		Per 1,000 Gallons	**Per 1,000 Gallons**
Tier 1	0-5,000	$0.95	$0.00
Tier 2	5,001-40,000	$0.95	$0.95
Tier 3	40,001-65,000	$0.95	$1.00
Tier 4	65,001-99,999	$0.95	$1.20
Tier 5	100,000+	$0.95	$1.50

With the proposed rate structure, the City would still need to issue a $1.75 million bond by 2023 in order to fund the one-time large expense of the new 2-million gallon storage tank. While impact fees will provide some revenues for the tank, there will be insufficient funds collected by 2023 to enable a pay-as-you-go approach. With the issuance of the bond, cash on hand would always stay above 180 days. Cash on hand is shown, year-by-year, in Appendix A.

Impacts on Existing Water Users

This rate structuring was chosen, after extensive discussions with City staff and its consultants, because it has minimal impacts on existing water users. The table below provides a sample of impacts to customers at varying levels of usage.

For example, if a customer uses less than 5,000 gallons per month, the customer will see the base fee go up from $10.50 to $15.50 – an increase of $5.00; however, this will be offset by the fact that the first 5,000 gallons are free. There will be a reduction in the usage fee of $3.80; therefore, the overall increase is $1.20 per month.

TABLE 7: IMPACTS TO CUSTOMERS FROM PROPOSED RATE CHANGE

Customer Tier	Example Customer Usage	Current Monthly Charge	Monthly Charge with Rate Change in 2020	Total Change in Monthly Bill 2020	Percent Change
1	4,000	$14.30	$15.50	$1.20	8%
2	7,000	$17.15	$17.40	$0.25	1%
2	17,000	$26.65	$26.90	$0.25	1%
2	30,000	$39.00	$39.25	$0.25	1%
3	45,000	$53.25	$53.75	$0.50	1%
3	60,000	$67.50	$68.75	$1.25	2%
4	75,000	$81.75	$85.75	$4.00	5%
4	95,000	$100.75	$109.75	$9.00	9%
5	125,000	$129.25	$153.25	$24.00	19%
5	175,000	$176.75	$228.25	$51.50	29%

Benefits from Change in Water Rate Structure

One benefit from the change in the water rate structure is that the City will now meet State requirements to charge a higher rate for higher levels of water usage, thereby encouraging conservation.

Another benefit is that more of the utility's revenues will come from the base rate, rather than from usage. Usage revenues can vary greatly, depending on wet and dry years. This change will add more stability and predictability to water rate revenues. Further, the City currently receives only 28 percent of its revenues from the basic monthly charge, with the remaining 72 percent coming from water usage. With the proposed changes, the City should receive 37 percent of its revenues from base rates. Over time, the City may want to consider increasing this ratio even further.

Debt Coverage Ratios

Debt coverage ratios, with the issuance of the $1.75 million bond, are shown on Appendix A and never get lower than 4.96. Minimum debt coverage ratios are generally assumed to be 1.25.

Days Cash on Hand

Days cash on hand never gets lower than 186 days which is within the guidelines set forth in this report.

Appendix A – Water Rate Analysis

APPENDIX A		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
	Customers and Tiers												
	Meter Size 1 (1 inch and under)	1,835	1,891	1,949	2,009	2,070	2,134	2,199	2,266	2,335	2,407	2,480	2,556
	2 Inch Base Rate	36	36	36	36	36	36	36	36	36	36	36	36
	3 Inch Base Rate	1	1	1	1	1	1	1	1	1	1	1	1
	4 Inch Base Rate	4	4	4	4	4	4	4	4	4	4	4	4
	6 Inch Base Rate												
	8 Inch Base Rate												
	Tiers - Usage												
	Tier 1	92,523,912	95,299,630	98,158,619	101,103,377	104,136,478	107,260,573	110,478,390	113,792,742	117,206,524	120,722,720	124,344,401	128,074,733
	Tier 2	264,022,024	271,942,685	280,100,965	288,503,994	297,159,114	306,073,888	315,256,104	324,713,787	334,455,201	344,488,857	354,823,523	365,468,228
	Tier 3	75,049,293	77,300,771	79,619,794	82,008,388	84,468,640	87,002,699	89,612,780	92,301,164	95,070,198	97,922,304	100,859,974	103,885,773
	Tier 4	42,595,936	43,873,814	45,190,028	46,545,729	47,942,101	49,380,364	50,861,775	52,387,628	53,959,257	55,578,035	57,245,376	58,962,737
	Tier 5	155,642,504	160,311,779	165,121,132	170,074,766	175,177,009	180,432,319	185,845,289	191,420,647	197,163,267	203,078,165	209,170,510	215,445,625
	TOTAL	629,833,668	648,728,678	668,190,539	688,236,255	708,883,343	730,149,843	752,054,338	774,615,968	797,854,447	821,790,081	846,443,783	871,837,097
Revenues													
Operational Revenues													
	Base Water Charges												
	Meter Size 1 (1 inch and under)	$231,210	$238,301	$362,560	$373,666	$385,105	$396,886	$409,022	$421,521	$434,396	$447,656	$461,315	$475,383
	2 Inch Base Rate	$13,608	$13,608	$15,120	$15,120	$15,120	$15,120	$15,120	$15,120	$15,120	$15,120	$15,120	$15,120
	3 Inch Base Rate	$702	$702	$780	$780	$780	$780	$780	$780	$780	$780	$780	$780
	4 Inch Base Rate	$4,104	$4,104	$4,320	$4,320	$4,320	$4,320	$4,320	$4,320	$4,320	$4,320	$4,320	$4,320
	6 Inch Base Rate	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	8 Inch Base Rate	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Tiers												
	Tier 1	$87,898	$90,535	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Tier 2	$250,821	$258,346	$266,096	$274,079	$282,301	$290,770	$299,493	$308,478	$317,732	$327,264	$337,082	$347,195
	Tier 3	$71,297	$73,436	$79,620	$82,008	$84,469	$87,003	$89,613	$92,301	$95,070	$97,922	$100,860	$103,886
	Tier 4	$40,466	$41,680	$54,228	$55,855	$57,531	$59,256	$61,034	$62,865	$64,751	$66,694	$68,694	$70,755
	Tier 5	$147,860	$152,296	$247,682	$255,112	$262,766	$270,648	$278,768	$287,131	$295,745	$304,617	$313,756	$323,168
Total Operational Revenues		**$847,966**	**$873,008**	**$1,030,406**	**$1,060,940**	**$1,092,390**	**$1,124,784**	**$1,158,150**	**$1,192,517**	**$1,227,914**	**$1,264,374**	**$1,301,927**	**$1,340,607**
Base as % of Total Revenues			29%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%
Operational Expenses													
	Salaries & Wages	($84,000)	($88,200)	($92,610)	($97,241)	($102,103)	($107,208)	($112,568)	($118,196)	($124,106)	($130,312)	($136,827)	($143,669)
	Employee Benefits	($44,000)	($46,200)	($48,510)	($50,936)	($53,482)	($56,156)	($58,964)	($61,912)	($65,008)	($68,258)	($71,671)	($75,255)
	Education, Training, & Travel	($6,000)	($6,300)	($6,615)	($6,946)	($7,293)	($7,658)	($8,041)	($8,443)	($8,865)	($9,308)	($9,773)	($10,262)
	Water Meters	($10,000)	($10,500)	($11,025)	($11,576)	($12,155)	($12,763)	($13,401)	($14,071)	($14,775)	($15,513)	($16,289)	($17,103)
	Maintenance - General	($65,000)	($68,250)	($71,663)	($75,246)	($79,008)	($82,958)	($87,106)	($91,462)	($96,035)	($100,836)	($105,878)	($111,172)
	Utilities	($100,000)	($105,000)	($110,250)	($115,763)	($121,551)	($127,628)	($134,010)	($140,710)	($147,746)	($155,133)	($162,889)	($171,034)
	Memberships & Dues	($3,000)	($3,150)	($3,308)	($3,473)	($3,647)	($3,829)	($4,020)	($4,221)	($4,432)	($4,654)	($4,887)	($5,131)
	Professional Services	($10,000)	($10,500)	($11,025)	($11,576)	($12,155)	($12,763)	($13,401)	($14,071)	($14,775)	($15,513)	($16,289)	($17,103)
	Legal Expense	($5,000)	($5,250)	($5,513)	($5,788)	($6,078)	($6,381)	($6,700)	($7,036)	($7,387)	($7,757)	($8,144)	($8,552)
	Water Share Assessments	($10,000)	($10,500)	($11,025)	($11,576)	($12,155)	($12,763)	($13,401)	($14,071)	($14,775)	($15,513)	($16,289)	($17,103)
	Department Expenditures	($3,000)	($3,150)	($3,308)	($3,473)	($3,647)	($3,829)	($4,020)	($4,221)	($4,432)	($4,654)	($4,887)	($5,131)
	Water Testing	($6,500)	($6,825)	($7,166)	($7,525)	($7,901)	($8,296)	($8,711)	($9,146)	($9,603)	($10,084)	($10,588)	($11,117)
	Engineering Expense	($5,000)	($5,250)	($5,513)	($5,788)	($6,078)	($6,381)	($6,700)	($7,036)	($7,387)	($7,757)	($8,144)	($8,552)
	Emergency Expense	($10,000)	($10,500)	($11,025)	($11,576)	($12,155)	($12,763)	($13,401)	($14,071)	($14,775)	($15,513)	($16,289)	($17,103)
39%	Adminstrative Charge	($231,000)	($242,550)	($254,678)	($267,411)	($280,782)	($294,821)	($309,562)	($325,040)	($341,292)	($358,357)	($376,275)	($395,088)
Total Operational Expenses		**($592,500)**	**($622,125)**	**($653,231)**	**($685,893)**	**($720,187)**	**($756,197)**	**($794,007)**	**($833,707)**	**($875,392)**	**($919,162)**	**($965,120)**	**($1,013,376)**

APPENDIX A		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Non-Operational Revenues and Expenses													
Non-Operational Revenues													
	Impact Fees	$0	$109,746	$113,038	$116,430	$119,922	$123,520	$127,226	$131,042	$134,974	$139,023	$143,194	$147,489
	Water Fund Interest Earned	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500
	Penalties	$30,000	$30,600	$31,212	$31,836	$32,473	$33,122	$33,785	$34,461	$35,150	$35,853	$36,570	$37,301
	Connection Fees	$0	$39,396	$40,578	$41,795	$43,049	$44,341	$45,671	$47,041	$48,452	$49,906	$51,403	$52,945
	Utility Interest Earned	$5,000	$5,100	$5,202	$5,306	$5,412	$5,520	$5,631	$5,743	$5,858	$5,975	$6,095	$6,217
	Sale of Fixed Assets	$65,000	$66,300	$67,626	$68,979	$70,358	$71,765	$73,201	$74,665	$76,158	$77,681	$79,235	$80,819
	Water Share Rent	$100	$102	$104	$106	$108	$110	$113	$115	$117	$120	$122	$124
Non-Operational Expenses													
	Water Master Plan	($30,000)											
Total Non-Operational Revenues and Expenses		**$71,600**	**$252,744**	**$259,260**	**$265,952**	**$272,823**	**$279,879**	**$287,125**	**$294,567**	**$302,209**	**$310,057**	**$318,118**	**$326,396**
	Net Revenues Available for Debt Service	**$327,066**	**$503,627**	**$636,435**	**$640,999**	**$645,026**	**$648,467**	**$651,269**	**$653,376**	**$654,731**	**$655,269**	**$654,925**	**$653,627**
Outstanding Debt													
	Well Loan	($86,000)	($88,000)	($93,000)	($95,000)	($96,000)							
	Well Loan Interest	($4,008)	($3,255)	($2,485)	($1,671)	($840)							
Future Debt													
Bond 1		$0	$0	$0	$0	$0	$0	($131,343)	($131,343)	($131,343)	($131,343)	($131,343)	($131,343)
Bond 2		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bond 3		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Total Outstanding and Future Debt	**($90,008)**	**($91,255)**	**($95,485)**	**($96,671)**	**($96,840)**	**$0**	**($131,343)**	**($131,343)**	**($131,343)**	**($131,343)**	**($131,343)**	**($131,343)**
Coverage Ratio with Impact Fees (Min = 1.25; Target = 1.5)		**3.63**	**5.52**	**6.67**	**6.63**	**6.66**	**-**	**4.96**	**4.97**	**4.98**	**4.99**	**4.99**	**4.98**
Coverage Ratio without Impact Fees (Min = 1.0)		**3.63**	**4.32**	**5.48**	**5.43**	**5.42**	**-**	**3.99**	**3.98**	**3.96**	**3.93**	**3.90**	**3.85**
Bond Proceeds													
Bond 1		$0	$0	$0	$0	$0	$1,750,000	$0	$0	$0	$0	$0	$0
Bond 2		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bond 3		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bond Proceeds		**$0**	**$0**	**$0**	**$0**	**$0**	**$1,750,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Net Revenues After Debt Service		**$237,058**	**$412,372**	**$540,950**	**$544,328**	**$548,186**	**$2,398,467**	**$519,925**	**$522,033**	**$523,388**	**$523,926**	**$523,582**	**$522,284**
Capital Project Year		**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Capital Needs													
Meadowview Ln Pipeline Replacement		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4300 S. Hollow Rd Pipeline Replacement		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
South End of Hollow Rd Pipeline Replacement		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2 MG Storage Tank		$0	$0	$0	$0	$0	($3,939,281)	$0	$0	$0	$0	$0	$0
3850 S. Main Pipline Replacement		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3750 S Sheridan Ridge Ln		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2900 South Pipeline Replacement		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Reconstruct and Equip 4000 S Well House		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

APPENDIX A	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Transmission Line Phase 1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transmission Line Phase 2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Develop New 2,000 gpm Source	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Develop New 1,500 gpm Source	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Project 5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Project 6	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Project 7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Project 8	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Project 9	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Project 10	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Project 11	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL Capital	**$0**	**$0**	**$0**	**$0**	**$0**	**($3,939,281)**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Repair and Replacement			**($100,000)**	**($100,000)**	**($100,000)**	**($100,000)**	**($100,000)**	**($100,000)**	**($100,000)**	**($100,000)**	**($100,000)**	**($100,000)**
Beginnning Cash Balance Water Fund		$300,000	$712,372	$1,153,321	$1,597,649	$2,045,835	$405,021	$824,946	$1,246,979	$1,670,366	$2,094,292	$2,517,874
Ending Cash Balance Water Fund	$300,000	$712,372	$1,153,321	$1,597,649	$2,045,835	$405,021	$824,946	$1,246,979	$1,670,366	$2,094,292	$2,517,874	$2,940,158
Days Cash on Hand		**176**	**398**	**614**	**810**	**987**	**186**	**361**	**520**	**663**	**792**	**907**
RATE SCHEDULE												
Rate Increase				***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***
Meter Size 1	$10.50	$10.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50	$15.50
2 Inch Base Rate	$31.50	$31.50	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00	$35.00
3 Inch Base Rate	$58.50	$58.50	$65.00	$65.00	$65.00	$65.00	$65.00	$65.00	$65.00	$65.00	$65.00	$65.00
4 Inch Base Rate	$85.50	$85.50	$90.00	$90.00	$90.00	$90.00	$90.00	$90.00	$90.00	$90.00	$90.00	$90.00
6 Inch Base Rate	$92.50	$92.50	$95.00	$95.00	$95.00	$95.00	$95.00	$95.00	$95.00	$95.00	$95.00	$95.00
8 Inch Base Rate	$102.50	$102.50	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00
Tiers				***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***
Tier 1	$0.95	$0.95	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95
Tier 3	$0.95	$0.95	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00
Tier 4	$0.95	$0.95	$1.20	$1.20	$1.20	$1.20	$1.20	$1.20	$1.20	$1.20	$1.20	$1.20
Tier 5	$0.95	$0.95	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50

APPENDIX I. WATER RIGHT INVENTORY

WATER INVENTORY

November 2017

Nibley City

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INTRODUCTION

This report analyzes Nibley City's current water rights to help the city understand what water is available to them and how it can be used. The purpose is to establish the current status of Nibley's water and determine what questions should be asked that can be addressed in an updated water master plan.

WATER RIGHTS

Nibley City has 11 active, approved water rights. These rights are listed under various names all referring to Nibley City: Nibley City, a Utah Municipal Corporation; Nibley City Corporation; Nibley Town Incorporated; Nibley City; and Nibley Town Corporation. In addition to these active rights, Nibley has one right, 25-11236, that is currently unapproved due to a request for reconsideration filed by protestants. Table 1 summarizes Nibley City's current water rights. Flow is specified in cubic feet per second (cfs) and volume in acre-feet (AF).

Utilization of Water Rights

Water Rights 25-6680 and 25-9078 for the 4000 South and Nelson Wells are currently the only two water rights being utilized for municipal use. Yeates Spring, WR 25-2167, was contaminated and has not been used since. Nibley's application for two additional wells, the 640 West and 12th West Wells, as represented by WR 25-11236, has not been approved. Water Right 25-11105 is currently being used to water Nibley City parks. Nibley's remaining rights are currently designated for irrigation and stock water purposes, but are not being used. A detailed table summarizing all water rights held by Nibley is shown in Appendix A. Appendix B details the history of each water right as documented by the Utah Division of Water Rights (UDWRi). Figures 1 and 2 on the following pages indicate the points of diversion for the water rights listed above.

Mitigation Water Rights

In 1999, the Cache Valley Groundwater Management Plan was established to ensure that future water development of groundwater would not interfere with prior surface and underground water rights. As new water is developed, the process set forth in this plan governs whether or not the developed water will be approved. For any water being developed for more than an individual family, the applicant must prove that prior rights will not be impaired or provide compensation water to replace the water drawn from the new source. Nibley City had originally filed WR 25-9078 in 1990, but protests arose, and the groundwater management plan was developed to address these concerns and the overall water management throughout the valley. Following the implementation of the plan, Nibley refiled their application for WR 25-9078 in 2000 with a plan to provide compensation water to replace the water requested in the application. After some revisions and public hearings, the application was approved and the standard was set: newly developed water requires compensation water if it is expected to impair prior water rights. In this sense, compensation water is synonymous with replacement water or mitigation water. All are intended to describe water that is used to mitigate the negative impacts caused by newly developed water. Hereafter it will be referred to as mitigation water, but if old documents are referenced, they may label it as compensation water.

Table 1. Nibley City Water Rights.

Water Right No.	Owner	Flow (cfs)	Volume (AF)	Source	Use
Municipal Use (Not Currently in Use)					
25-2167	Nibley Town Incorporated	0.75	542.98	Yeates Spring	Municipal
Municipal Use (Currently in Use)					
25-6680	Nibley Town Corporation	0.724	524.16	4000 South Well	Municipal
25-9078	Nibley City Corporation	7	1,700	Nelson & 4000 S Wells	Municipal
Municipal Use (Unapproved)					
25-11236	Cache County Corporation & Nibley City	1.65	1,201	Wells (4) 4000 S Nelson 12th West 640 West	Municipal
Secondary Park Watering Use					
25-11105 (a37687)	Nibley City, a Utah Municipal Corporation		18	Wells (2)	Irrigation
Other Rights Held by Nibley (Not Currently in Use)					
25-553	Nibley City Corporation	0.08		Water Drain	Stock Water
25-2193	Nibley City	0.064		Well	Irrigation
25-3503	Nibley City Corporation	0.15	20.68	Spring	Irrigation Stock Water
25-4192	Nibley City	0.015		Well	Irrigation Stock Water
25-5429	Nibley City Corporation	0.1		Drain	Irrigation
25-7674	Nibley City Corporation	0.015		Well	Stock Water Domestic
25-8369	Nibley City Corporation	0.0318	2	Well	Stock Water Dairy

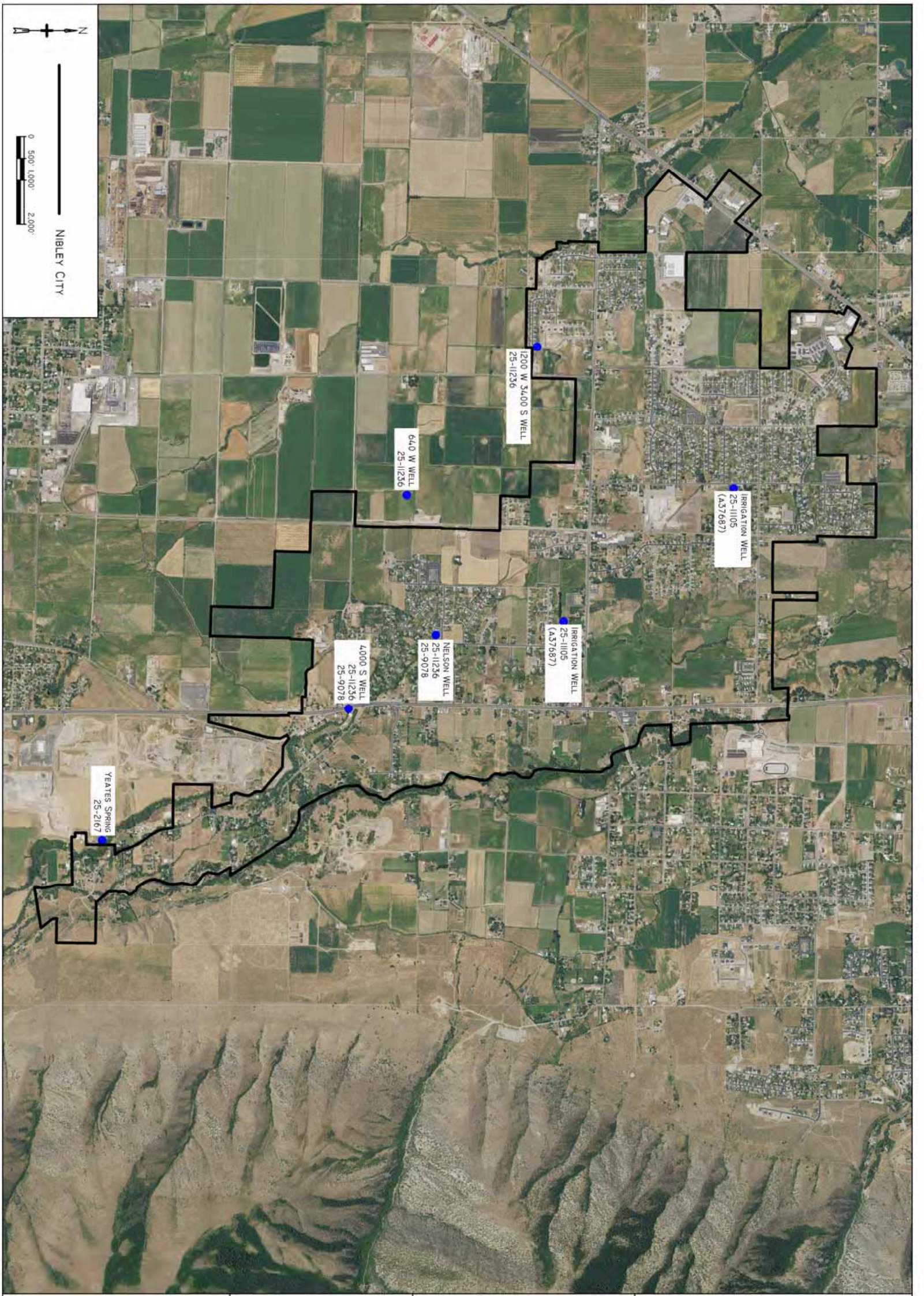

FIGURE 1 NIBLEY WATER RIGHTS	DATE: NOVEMBER 15, 2017 SCALE: Water Right Map.dwg P:\UT\Northern\Nibley City Water Resource Inventory\Drawings LAYOUT: Nibley WR	NIBLEY CITY NIBLEY CITY WATER RESOURCE INVENTORY	FRANSON CIVIL ENGINEERS

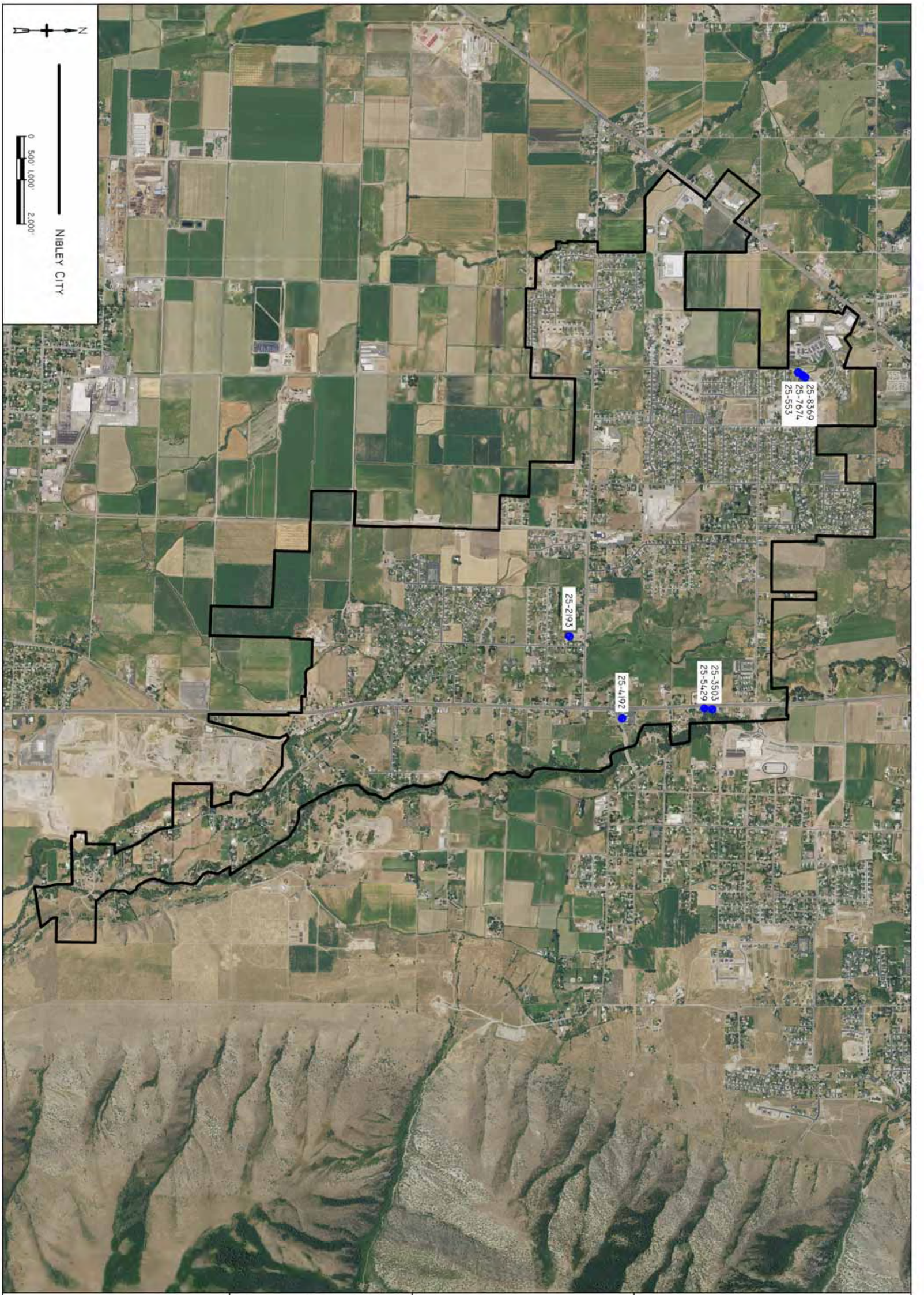

FIGURE 2

OTHER WATER RIGHTS

DATE: NOVEMBER 15, 2017

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Water Right Map.dwg

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LAYOUT: Non-Nibley WR

NIBLEY CITY

NIBLEY CITY WATER

RESOURCE INVENTORY

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Mitigation water may come from water rights owned by Nibley City or water shares held by Nibley City. In the case of WR 25-9078, the mitigation water is a combination of water rights and water shares as indicated in the justification report prepared by Cache Landmark (see Appendix C). As referenced in multiple locations, a mitigation plan was developed that outlined the process Nibley would follow to ensure mitigation water was provided; this is incorporated into the justification report in Appendix C. As far as the available documentation indicates, Nibley has adequate mitigation water, but there is confusion on the exact amount needed and its source (see Appendix D for details).

Mitigation water for the unapproved application for WR 25-11236 comes solely from College Irrigation Company water shares as shown in Appendix E. Specific certificates have been dedicated to this purpose and a letter of acknowledgement has been signed by the irrigation company. Although this application has not been approved, a mitigation plan has been developed as a collaborative effort between Nibley City and the protestants, PacifiCorp and the Bear River Water Users Association (see Appendix F).

The most current water master plan for Nibley City, prepared in 2012, indicates that Water Rights 25-553, 25-2193, 25-3503, 25-4192, 25-5429, 25-7674, and 25-8369 are mitigation rights. As shown in Appendices C and D, Water Rights 25-3503 and 25-5429 are being used for WR 25-9078 mitigation water; however, the other water rights have not been linked to any other application as mitigation water and there is no other record that these rights are being used at all, for mitigation or otherwise. It is assumed that they are not currently mitigation water.

If these water rights will be used as mitigation water for future water rights, the following steps should be taken:

1. Develop a mitigation agreement that states what rights will be used for mitigation and what their associated mitigation value is.
2. Submit a request to the UDWRi to note on each indicated water right that it is being used for mitigation for the appropriate water right.
3. Continue to hold the mitigation rights without using them. No change application is necessary.

Yeates Spring

Yeates Spring was previously one of Nibley City's main potable water sources. However, after a diesel spill contaminated the spring, it was eliminated as a potable water source. Nibley City has discussed with the Division of Drinking Water (DDW) what remediation would be necessary to allow the spring to continue to be used for potable water supply and has determined it is not a viable option. FCE recommends that Nibley City either move the water from Yeates Spring to a new source to use as municipal supply or use it as mitigation water for new water developed from a new or existing source. It is likely that a change application would need to be filed if the water is moved to a new source.

Nibley City is interested in diverting the spring water through the city in a wide, open ditch and then discharging it into the Blacksmith Fork River. The intent is to provide aesthetics to the community and possible recreational use of the water. Whether or not the right is used for mitigation or moved to a new well, the mitigation agreement or change application could include

provisions for this desired non-consumptive use. This would need to be discussed further with UDWRi.

Action Items

FCE recommends that Nibley take the following actions to ensure all records are up-to-date and to maintain compliance:

- **WR 25-11236: Push application forward immediately**
  All the steps have been taken to apply for this water right, provide mitigation water, and negotiate with the protestants. However, since the State Engineer did not incorporate specific details into the official Order, the protestants are unhappy. This resulted in a granted request for reconsideration that requires action by Nibley City to ensure something gets done on this application.
- **Change Application a28705: Withdraw application immediately**
  This application (described in Appendix B) is no longer necessary due to the approval of WR 25-9078 and should be withdrawn to eliminate any confusion.
- **WR 25-2167: Determine how to use this water**
  Since Nibley City has already determined that using Yeates Spring for their potable water system is not a feasible option, the water use needs to be determined. The recommended options include moving the water to a usable source or using the water as mitigation water for other developed uses.
- **WR 25-9078: File proof by May 31, 2019**
  The due date for this water right proof is drawing near. Nibley needs to determine what water is set aside as mitigation water for this right and file the proof to maintain the active status. Franson Civil Engineers (FCE) recommends this be addressed sooner rather than later, if possible, in case any issues arise. However, if growth in Nibley has not warranted the full use of this right yet, Nibley may need to file an extension so that the proof reflects evidence that Nibley is utilizing the full water right.
- **WR 25-11105: File proof by November 30, 2021**
  Although the proof for this water right is not due in the near future, FCE recommends verifying that the current use matches the water right. If they do not match, these issues need to be resolved prior to the proof being filed.

WATER SHARES

Water shares are a subset of water rights that indicate the shareholder owns a portion of an overall water right. Often, an irrigation or canal company owns multiple water rights in which the shareholders purchase water shares which allows them to use water distributed by the irrigation company as allocated by the company water rights. Each share represents a unique water yield based on the irrigation company that manages the water rights.

Nibley City currently holds shares in six irrigation companies: Clear Creek Irrigation Company, College Irrigation Company, Millville Irrigation Company, Nibley Blacksmith Fork (BSF) Irrigation Company, Providence BSF Irrigation Company, and Spring Creek Cache Irrigation Company. Based on the City's boundaries and irrigation company service areas, it is likely that

Nibley may gain shares in Hyrum BSF Irrigation Company in the future since it serves a portion of Nibley City (see Figure 3). Table 2 summarizes Nibley City's shares in the irrigation companies.

As shown in the table below, many of the irrigation companies have multiple sources of water that are used in different areas or to supplement areas when the main source is not sufficient. It is likely that the water Nibley City uses per their shares is mainly from the Blacksmith Fork River with occasional supplemental flows from underground sources.

Table 2. Nibley City Water Shares.

Irrigation Company (IC)	Nibley City Water Shares	Source of Water	Period of Use
Clear Creek IC	86.5	Clear Creek Spring	4/1 – 10/31
College IC	311.59	Blacksmith Fork River McKinney Spring Stream Underground Wells & Drains Berger Spring	4/1 – 10/31
Millville IC	2.25	Blacksmith Fork River	4/1 – 10/31
Nibley BSF IC	374.41	Blacksmith Fork River Underground Water Drains John Schiess Springs Hyrum Slough Stream Anderson Slough Stream	4/1 – 10/31
Providence BSF IC	5.5	Blacksmith Fork River	4/1 – 10/31
Spring Creek Cache IC	26.5	Blacksmith Fork River Underground Water Drains Wellsville Slough	4/1 – 10/31

Utilization of Water Shares

A large portion of Nibley City's water shares have already been dedicated as mitigation water for WR 25-9078 and WR 25-11236 while the remaining shares are currently unused. The challenge arises when trying to determine which specific shares are being used as mitigation water. This information is not clear and varies from document to document (see Appendices D and E). FCE recommends that Nibley City evaluate the available documentation, determine which shares are set aside as mitigation water to fulfill the mitigation plan requirements, and document this determination. Documentation should include the source, diversion volume, depletion volume, and water share certificate number.

Once the official number of shares held by Nibley City and used for mitigation have been determined, Nibley City will be able to determine what shares are available for use. To prevent the development of a profitable water market, Utah Code states that municipalities are not legally allowed to sell water shares once they are in possession of them. Due to this law, once Nibley City

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NIBLEY CITY WATER
RESOURCE INVENTORY

DATE: NOVEMBER 1, 2017
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Water Right Map.dwg
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LAYOUT: Service Areas

FIGURE 3
SERVICE AREAS

N

0 750' 1,500' 3,000'

- NIBLEY CITY
- CLEAR CREEK IRRIGATION SERVICE AREA
- COLLEGE IRRIGATION SERVICE AREA
- HYRUM BLACKSMITH FORK IRRIGATION SERVICE AREA
- MILLVILLE IRRIGATION SERVICE AREA
- NIBLEY BSF IRRIGATION SERVICE AREA
- PROVIDENCE BSF SERVICE AREA
- SPRING CREEK IRRIGATION SERVICE AREA

receives water shares, they can trade them or use them, but they cannot ever sell them. As Nibley City evaluates what shares are available, further research should be conducted to determine how best to use these shares.

Alternatives for Unused Water Shares

The least complicated alternative is to use all water shares for mitigation purposes. If Nibley City attempts to gain additional water sources or increase the quantity of existing water sources to meet demands, it is likely that mitigation efforts will be required in compliance with the Cache Valley Groundwater Management Plan. Available water shares could then be dedicated as mitigation water and left in the source to recharge the groundwater with an equivalent amount to that depleted by the newly-requested water. It is recommended that mitigation calculations to determine depletion amounts follow the process used when filing WR 25-9078 or WR 25-11236. These methods have been approved by the State Engineer and are detailed in Appendix G.

Rather than using the water shares to supplement the potable water system as mitigation water, Nibley City could create a secondary water system. This could service the entire city or begin smaller and serve Nibley City property. This would decrease outdoor potable water use, provide irrigation water at a lower cost, and require minimal changes to the existing water shares since they are already designated for irrigation purposes. While this is a significant project, it would benefit the city for years to come as it decreases the anticipated potable water demand and utilizes the already-held water shares.

Irrigation Company Information

Nibley City requested information be gathered about all the irrigation companies with shares held by Nibley City. FCE was able to make contact with some irrigation companies, but not with others. The information gathered is listed in Appendix H, as well as a note of the information that was not able to be obtained. It is recommended that Nibley City directly contact these companies for the information as they all seemed happy to work together.

WATER NEEDS

Although evaluating Nibley City's future water needs was not requested in the scope of work, FCE did a preliminary review of the existing water master plan prepared by Cache Landmark Engineering in March 2012 to see a rough status of Nibley's situation. This review was not extensive and provided no additional evaluation or calculations performed by FCE. It is anticipated that Nibley City will update their water mater plan in the near future to answer the questions that arose during this inventory, resolve any confusion with the current water rights/shares situation, provide a more extensive and updated analysis of Nibley City's water needs, and organize a plan to address the stated needs and action items.

As stated above, the following information is a summary of the 2012 Nibley City Water Master Plan conclusions. As stated in the plan, Nibley is not able to meet the future culinary water needs as required by DDW. DDW requires that source capacity be able to handle the peak day flows and the average yearly volume. Due to the contamination of Yeates Spring in 2015 and Nibley's decision to eliminate it as a potable water source, Nibley currently has two culinary water sources:

4000 South Well and Nelson Well. In addition to the water rights for these two sources, Nibley has also applied for an additional water right that would utilize these two wells and add two new wells to Nibley's sources. However, this application has been protested and is currently unapproved until further action has been taken. Table 3 indicates the available source supply and the required source supply under two conditions based on the water master plan: 1) sources consist only of the 4000 South Well and Nelson Well, and 2) sources consist of the two existing wells and the additional unapproved water right that adds two more wells.

Table 3. Nibley City Water Needs.

Scenario	Available Volume	Average Yearly Demand		Available Flow	Peak Day Demand	
		Year 2030	Year 2050		Year 2030	Year 2050
1	2,224 AF	2,720 AF	4,912 AF	7.724 cfs	12.41 cfs	22.41 cfs
2	3,424 AF			9.374 cfs		

*The demand numbers have not been verified by FCE. Their validity should be determined in an updated master plan. The available volume is based on the water right limitations and is considered valid.

As indicated in the table above, Nibley City does not have enough source supply to meet the average yearly demand or peak day demand as indicated in the water master plan with its current municipal water rights. If Nibley City is able to get WR 25-11236 approved, they would have enough source supply to meet the average yearly demand for 2030, but would still be unable to meet 2050 average yearly demand and all future peak day demands.

Alternatives to Provide for the Future

In order to accommodate future growth in Nibley City, action needs to be taken to provide adequate potable water supply. FCE recommends utilizing a water master plan to research and evaluate possible alternatives to address future needs. Among the potential alternatives, Nibley should consider developing new potable water supplies using unused water shares or rights for mitigation or converting unused water rights to municipal use. These options have not been thoroughly explored by FCE and may not be feasible, but may provide benefit to Nibley City.

RECOMMENDATIONS & CONCLUSION

In summary, this water inventory analyzed Nibley City's existing water rights and water shares, provided information on the irrigation companies Nibley is a part of, briefly evaluated Nibley's water needs, and provided options for Nibley to fully utilize their water. Based on the analysis completed, it is recommended that Nibley City take the action suggested regarding their existing water rights, determine what is being used for mitigation water and how, and create an updated water master plan to answer all unresolved questions, clarify Nibley's situation, and plan for the future.

APPENDIX A

WATER RIGHTS SUMMARY

The following is a summary of Nibley City's existing water rights based on the UDWRi database and associated scanned documents.

Table A1. Detailed List of Nibley City Water Rights.

Water Right Number	Description	Flow (cfs)	Volume (AF)	Priority	Type of Right	Status of Right	Designated Use	Notes
25-2167	Yeates Spring	0.75	542.98	12/7/1914	Application to Appropriate	Certificate	Municipal	Contaminated in May 2015, not currently used
25-6680	4000 S Well	0.724	524.16	10/9/1975	Application to Appropriate	Water User's Claim	Municipal	
25-9078	4000 S Well Nelson Well	7	1,700	6/25/1990	Application to Appropriate	Approved	Municipal	Proof due 5/31/2019 Nelson Well limited to 4.45 cfs
25-11236	4000 S Well Nelson Well 640 W Well 12th W Well	1.65	1,201	9/8/2014	Application to Appropriate	Unapproved	Municipal	Protestants are not satisfied
25-11105 a37687	Shallow Wells (2)		18	5/1/1861	Decree		Irrigation	Proof due 11/30/2021
25-553	Drain	0.08		1930	Diligence Claim		Stock Water	
25-2193	Well	0.064		6/2/1958	Application to Appropriate	Water User's Claim	Irrigation	
25-3503	Spring	0.15	20.68	1901	Diligence Claim	Water User's Claim	Irrigation Stock Water	*Possible mitigation water for 25-9078
25-4192	Well	0.015		4/7/1964	Application to Appropriate	Water User's Claim	Irrigation Stock Water	
25-5429	Drain	0.1		3/31/1972	Application to Appropriate	Water User's Claim	Irrigation	*Possible mitigation water for 25-9078
25-7674	Well	0.015		7/6/1978	Application to Appropriate	Water User's Claim	Stock Water Domestic	
25-8369	Well	0.0318	2	9/13/1991	Application to Appropriate	Certificate	Stock Water Dairy	

APPENDIX B

WATER RIGHTS HISTORY

WATER RIGHT HISTORY

Water Right (WR) 25-2167 was originally filed for Yeates Spring in December 1914 by Millville Water Works Company and approved in June 1915. A proof was filed in December 1917 leading to its certification in June 1918. This water right was deeded to Nibley Town in January 1936. A permanent change application (a28705) was filed in March 2004 to add the Nelson Well as a point of diversion, but was not approved. A temporary change application was filed and approved in 2005, but expired in 2006. UDWRi requested Nibley to reply to a questionnaire about the change application in November 2011, but received no response so the change application was never completed and remains unapproved. Due to WR 25-9078, this change application is no longer needed, and the original water right continues to operate as originally filed with no problems. It should be noted that this spring was contaminated by diesel fuel in May 2015 and is no longer used in Nibley City's drinking water system.

Water Right 25-6680 was originally filed for the 4000 South Well in October 1975 by Nibley Town. Shortly thereafter, Nibley requested to drill the well prior to the approval of the application. This request was denied. The application was approved in January 1976 and a water user's claim was filed in July 1978. While the original request and approval was for 5 cfs, a court decision in January 1979 states the allotted flow as 0.724 cfs with no record of the decrease in quantity. Nibley later filed a change application (a28705) to add the Nelson Well as a point of diversion in March 2004, which was not approved. UDWRi requested that Nibley fill out a questionnaire related to the change application in November 2011, but received no response so the change application was never completed and remains unapproved. However, the original water right continues to operate as indicated in the court decision with no problems.

Water Right 25-9078 was originally filed for the new Nelson Well and existing 4000 South Well in June 1990 by Nibley City with the limitation that only 4.45 cfs could be pulled from Nelson Well. Protests were filed by PacifiCorp and the United States Bureau of Reclamation (USBR) and the application was put on hold until the Cache Valley Groundwater Management Plan was developed and a US geologic study was conducted. Nibley then filed a revised application for the well in November 2000. Protests were filed by PacifiCorp, USBR, Bear River Water Users, US Fish & Wildlife, and multiple local residents. Nibley provided a justification report prepared by Cache Landmark Engineering in 2001 and then revised and filed the application again in 2002. The protestants restated their original protests and a public hearing was held in July 2003. In the meantime, Nibley requested, and was granted, permission to construct the well, but not use it for production. Following the public hearing in July 2003, two more public hearings were held, one in January 2004 and the second in March 2004. The application was then approved via Order of the State Engineer in May 2005 with the proof due May 31, 2010. It should be noted that the application for appropriation lists the period of use as January 1 to December 1, but the UDWRi website lists the period of use as January 1 to December 31. Although there is no documentation for the change, it is assumed that the original application had a typo since the expected period would be year-round. Nibley requested an extension of the proof deadline, which was granted and extends the deadline to May 31, 2019.

Water Right 25-11236 was filed to be segregated from the unapproved WR 25-10883 in August 2014. Water Right 25-10883 was originally filed by Cache County to hold water within Cache

Valley until individual cities needed more water, at which time the county would then transfer a portion of the right to the city in need. This water right was never approved and no city had requested water prior to Nibley's request. A statement of segregation was issued in September 2014 indicating that WR 25-11236 was segregated from WR 25-10883 and included 1.65 cfs up to 1,201 AF. Just after the segregation was complete, Nibley City, with Cache County listed as a co-owner, filed an application to appropriate the segregated water to four wells: Nelson Well (existing), 4000 South Well (existing), 640 West Well (new), and 12th West Well (new). Included in this application was a mitigation plan that indicated that Nibley City would use their shares in College Irrigation Company as mitigation water to recharge the groundwater and meet the requirements set forth in the Cache Valley Groundwater Management Plan.

Protests were filed by PacifiCorp, Bear River Water Users, and Duane Morley Cox. Following the protests, College Irrigation Company issued a statement that they would not divert Nibley City's share of their water so that it could be used as mitigation water. A hearing was held in February 2015 and the record was kept open for legal issues until June 30, 2016. Nibley City and Cache County negotiated with the protestants, mainly PacifiCorp and Bear River Water Users as Duane Morley Cox was only concerned with the priority date, and came to a settlement on March 22, 2016. This settlement included an agreement that indicated that Nibley would adhere to specific conditions to ensure the mitigation water was used properly and no negative impacts would affect the protestants. The protestants stated that if the conditions of the agreement and mitigation plan were included in the Order of the State Engineer, they would remove their protests. An Order of the State Engineer was then issued that approved the application on September 27, 2016 and listed the proof deadline as September 30, 2021.

Although the application was approved, the protestants were not satisfied with the wording in the Order of the State Engineer and filed a request for reconsideration with UDWRi requesting that the Order be clarified such that it require Nibley to comply with all aspects of the settled-upon agreement. UDWRi responded to the protestants stating that it is not under the authority of the UDWRi to ensure that Nibley upholds the agreement and is not proper to include such wording in the Order. In addition, the State Engineer did not include any specific mention of the requirement for College Irrigation Company to measure the water that is not diverted so that it can be used for mitigation efforts as it is not reasonable for anyone to measure flow that is not diverted. In addition to the UDWRi response, Cache County also responded to the protestants. The protestants then replied to the letters from UDWRi and Cache County stating that they are not satisfied and if their requests are not considered, they will reinstate their protests such that the application approval is void. UDWRi granted the request for reconsideration on November 7, 2016, and changed the status of the application to unapproved. At this time, action should be taken to ensure this application moves forward.

Water Right 25-11105 was originally part of WR 25-6422, but was segregated in September 2011 by Duane Morley Cox. Cox then filed a change application (a37687) to change the quantity, point of diversion, place of use, and nature of use. This moved the water from a surface source in Hyde Park, Utah, to two underground water wells in Nibley, Utah. The quantity was decreased from the originally-segregated 24 AF to 18 AF and the designated irrigation use was sustained with a minor change in acreage. This change application was protested by Bear River Water Users and PacifiCorp, but after discussions regarding depletion, the application was approved in November

2011. Nibley City was deeded this water right immediately following the approval of the change application in November 2011. Currently, the source for this water comes from shallow wells constructed as concrete manholes with pumps to water local parks. A proof still needs to be submitted on this water right by November 30, 2021.

Water Right 25-553 has very little documentation available on its history, but it was listed as either certificated or proved via a water user's claim in December 1952. Ernest Speth, the owner of the water right at the time, signed a court decision that confirmed the details of the right. Nibley City was deeded this water right in March 2005. This water comes from a drain and is purposed for stock water.

Water Right 25-2193 was originally filed in May 1958 by Douglas Olson and approved in August 1959. A water user's claim was filed in May 1962. While the original request and approval allotted 0.25 cfs to irrigate 1.5 acres, a court decision in December 1962 states the flow as 0.064 cfs to irrigate 0.3 acres with no record of the decrease in quantity. Nibley City was deeded the water right in October 2008.

Water Right 25-3503 was originally filed in 1964 by Arthur L. Maurer. This water right was deeded to Nibley City in 2002 (conveyed with WR 25-5429). It should be noted that all associated scanned documents reflect an allotted flow of 0.15 cfs, but the UDWRi website lists the flow as 0.5 cfs. Based on all documentation, the flow should be 0.15 cfs. The right is for an unnamed spring that was rediverted from Blacksmith Fork River for personal use.

Water Right 25-4192 was originally filed in March 1964 by Charles Ames and approved in August 1964. A water user's claim was filed in July 1967. While the original request and approval allotted 0.1 cfs, a court decision in October 1967 states the flow as 0.015 cfs with no record of the decrease in quantity. Nibley City was deeded the water right in February 2008. Sometime between 2006 and 2009, a Maverik gas station was built on top of the associated farmland.

Water Right 25-5429 was originally filed in March 1972 by Arthur Maurer and approved in June 1972. A water user's claim was filed in June 1974. While the original request and approval allotted 0.25 cfs, a court decision in December 1975 states the flow as 0.1 cfs with no record of the decrease in quantity. Nibley City was deeded the water right in August 2002.

Water Right 25-7674 was originally filed in July 1978 by Ernest Speth and approved in November 1978. A water user's claim was filed in July 1981. A court decision was filed in April 1982 confirming the quantity and other details on the original application. Nibley City was deeded the water right in March 2005 and a new water user's claim was prepared in March 2017. In a memorandum discussing the new water user's claim, UDWRi indicates that the water is not being used as indicated on the original filing and a change application will be required prior to Nibley City using the water.

Water Right 25-8369 was originally filed in April 1982 by Brent Speth and was approved in July 1982. The application lapsed multiple times due to no proof being filed and multiple requests for the proof deadline to be extended were filed. A proof was finally submitted by Clair Webb in December 2001 with some of the details different than the original application based on measured

quantity and actual purpose of use. The water right was certificated in December 2001. Nibley City was deeded the water right in March 2005.

Water Right 25-4947 was filed on November 25, 1969, to appropriate 0.1 cfs from an underground water well for irrigation of 3 acres. The application was approved March 4, 1970, with the proof due July 31, 1972. No proof was ever filed, and the application lapsed.

Water Right 25-8288 was filed in May 1981, to appropriate an additional 2.83 cfs of municipal water from the existing 4000 South Well. The application was approved October 2, 1981, with the proof due July 31, 1984. No proof was ever filed, and the application lapsed.

Water Right 25-9044 was filed on April 11, 1990, to appropriate an additional 2.83 cfs of municipal water from the existing 4000 South Well. Protests were filed, but a hearing was not held. Nibley City then filed the application for WR 25-9078 which was approved and intended to cover all reasonable future growth. The State Engineer deemed this application (WR 25-9044) as unnecessary due to the approval of WR 25-9078 and rejected the application.

APPENDIX C

JUSTIFICATION REPORT FOR WR 25-9078 APPROVAL

NIBLEY CITY JUSTIFICATION REPORT FOR THE APPROVAL OF WATER RIGHT #25-9078

FEBRUARY 2004

CACHE • LANDMARK ENGINEERING, INC.

Nibley City Justification Report for the approval of Water Right # 25-9078

February 2004

Prepared for:

Nibley City
A. Lynn Welker, Mayor
Larry Anhder, City Manager

Prepared by:

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EXECUTIVE SUMMARY

1. On July 22, 2003, the Division of Water Rights held a public hearing on Nibley City's Application to Appropriate Water, No. 25-9078 (A64770) (the "Application"). The hearing was continued pending further negotiations among the parties concerning revisions to Nibley City's Mitigation Plan. The parties agreed, and the hearing officer ordered, that Nibley City would revise and clarify its prior mitigation report, which would be submitted to the Division of Water Rights and made available for protestants to review. This report has updated the diversion and depletions numbers for the Application (A64770) and information concerning local interference of the new well. It replaces and supersedes all prior mitigation or justification reports filed by Nibley City in the Application.

2. Based on Nibley City's projected growth rate of 6.0 %, Nibley City plans to grow in the next 20 years from 620 equivalent residential connections (ERCs) in the year 2000 up to 1,946 ERCs in the year 2020. (Sections 2.0 & 3.0). Nibley City projects that in the year 2020 it will need the source capacity and water rights to divert up to 7.2 cfs (3,240 gpm) (Section 5) and that it will divert a maximum of 2,683 acre-feet/per year (a-f/yr) (Section 5.0). Nibley City currently has two water rights, which allow for the diversion of up to 1.424 cfs (639 gpm) from a spring and existing well (Table 7). Hence, under this Application, Nibley City seeks the right to divert at a peak flow rate of 7.0 cfs (Section 5.0). The calculated diversion amount in the year 2000 was 721.2 a-f/yr. Hence, under this application, Nibley is seeking the right to divert up to 1961.8 a-f/year (2,683 a-f – 721.2 a-f).

3. Nibley City is committed to mitigate for all of its depletion pursuant to this application beyond the depletion occurring in the year 2000. In the year 2020, 1,946 ERCs will deplete 873.7 a-f (Table 9). The depletion under this application will be 604.4 a-f/yr (Section 5.0).

4. Nibley City has prepared a mitigation plan setting forth its plan for mitigating additional depletion of water beyond the 2000 usage (Section 6.0). Under the mitigation plan, Nibley City will use water rights and water shares (acquired by development of previously irrigated agricultural land) to replace the additional depletion resulting from this application. Downstream users will be compensated with replacement water during the peak demand period of the irrigation season.

5. Nibley City has completed a 16" well under a non-production well permit. The well was completed to a depth of 506 feet below the surface. Well perforations start at 215' below the surface. The well was test pumped at a maximum flow rate of 3,500 gpm (7.8 cfs). The drawdown at this flow rate was 21 feet (Table 11). The transmissivity was calculated to be 45,000 ft^2/day. With the calculated transmissivity the drawdown of the surrounding area (up to a three mile radius) was estimated using the Theis equation (see Section 7.0). In addition, the zone of contribution of the well is included in Appendix E.

6. Cache-Landmark Engineering, Inc., on behalf of Nibley City, asked Classic Geological Studies Corporation to: (1) determine the geologic setting of the Nibley City - College Ward area; (2) evaluate the existing hydrogeologic evidence therein; (3) illustrate the existing piezometric surface for the lower main confined aquifer and the changes it should undergo during sustained pumping of the new municipal well in Nibley City; (4) make a mass-balance calculation for the water available to recharge both the Nibley City municipal well and the College Ward area to determine if it is likely adequate for the needs of both; and (5) evaluate the possible causes of lowered water levels in wells in College Ward during recent Summer seasons. This report is included in Appendix F.

7. Conclusions from the report state the problem of low water levels in wells in College Ward during the Summers likely results from: (1) severe drought; (2) cumulative addition of wells in the College Ward area through time; and (3) proximity of deeper wells with larger diameters to older, shallower wells with smaller diameters that do not permit emplacement of submersible pumps. College Ward may want to consider drilling a deep, large-diameter municipal well to service the entire community, as Nibley has done. There appears to be significant risk of ongoing problems if proliferation of wells for individual homes continues in College Ward in Section 19.

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APPENDICES

1.0 INTRODUCTION

1.1. This mitigation plan is prepared in conformance with the requirements and guidelines of the "Interim Cache Valley Ground-Water Management Plan" (the "Policy") issued by the Division of Water Rights to support Nibley City's application to appropriate additional water rights for the City, Water Right No. 25-9078 (A64770) (the "Application").

1.2. Nibley City, located 4 miles South of Logan, in Cache County, is presently experiencing very rapid growth. Like all other communities, as growth and development takes place, additional culinary water sources must be developed and additional water rights secured to support the growth.

1.3. With recent growth, Nibley City's culinary water needs exceed the existing water rights. Additional water for Nibley City is needed now and the deficit will become critical in the summer of 2004. This mitigation plan addresses the current status of Nibley City's water sources and water rights to justify the need for additional water rights, and sets forth the City's plan for mitigating additional depletions resulting from the Application.

2.0 GROWTH PROJECTIONS (2000 –2020)

2.1. To determine future water needs (water rights and source) a reasonable growth prediction must be determined. The Nibley City population in the year 2000 was 2,045 according to the 2000 Census. In the ten-year period from 1990 to 2000 the City experienced an increase of 75.2 % in population (5.77% a year) (Nibley City, 2003).

2.2. Table 1 shows the population history and projections. The State of Utah Governor's Demographic and Economic Analysis (2000) projects an annual growth rate of 6.04% from 2000 to 2010 for Nibley City. Based on the past growth rate and the projected growth rate used by the State this report will use an annual growth rate of 6.0%.

Table 1: Growth Projections

Year	Population
1970	367
1980	1,036
1990	1,167
1994	1,579
1997	1,803
2000	2,045
2010	3,662[1]
2020	6,559[1]

1 – $F=P(1+I)^N$ where F= future population, P = present population, I = growth rate (6.0%), N = Years

2.3. In the year 2000 Nibley City had 574 residential connections and 19 large water users (commercial, industrial, and institutional). Table 2 and 3 show the projected number of connections using the historic growth rate of 6.0%.

Table 2: Residential Connection Projections (2020)

Year	Residential Connections
2000	574
2005	743
2010	995
2020	1,844

Table 3: Large water users (2020)

Year	Connections
2000	19
2005	23
2010	28
2020	42

3.0 CURRENT WATER USE (1999-2002)

3.1. Nibley City currently diverts 818.5 acre-feet (a-f) a year. Table 4 illustrates the amount of water diverted (a-f) from each source over the last four years. Table 5 shows the yearly average flows from the City's current water sources.

Table 4: Water Diversion 1999-2002

Year	4000 South Well (a-f)	Yeates Spring (a-f)	Total Diversion (a-f)
1999	116.9	479.4	589.3
2000	288.8	530.5	819.3
2001	308.7	497.7	806.4
2002	317.5	501.0	818.5

Table 5: Average Yearly Flows 1999-2002

Year	4000 South Well (gpm)	Yeates Spring (gpm)	Total Avg. Flow (gpm)
1999	71.2	292.9	364.1
2000	177.5	328.9	506.4
2001	189.4	308.6	498.0
2002	194.9	310.6	505.5

3.2. Table 6 identifies the large water users in Nibley City by type and shows the equivalent residential connection (ERC) for each type. With the average residential yearly usage of 1.45 a-f (0.45 a-f (indoor) + 1.0 a-f (outdoor)) for residential use (1/2-acre lot), the ERC can be determined by dividing the average yearly water usage (66.9 a-f) by 1.45 a-f.

Table 6: Large Water Users (2000)

Type of Connection	Number of Connections	Average Yearly Water Usage (a-f)	Equivalent Residential Connection (ERC)
Commercial	2	1.3	0.9
Industrial	2	10.3	7.1
Institutional	11	44.1	30.4
Stock watering	4	11.2	7.7
Total	**19**	**66.9**	**46.1**

3.3. Assuming in the year 2020 the large water users are the same as the large water users in 2000, Nibley City will have 1,946 ERCs (1,844 (Table 2) + 102 (2020 projection)).

4.0 EXISTING WATER RIGHTS

4.1. Nibley City's water rights currently authorize diversions from one well (4000 South Well) and from Yeates Spring. Table 7 lists the City's current water rights. Specific information relative to each individual water right is found in Appendix B.

Table 7: Water Rights

W.R. Number	Status	Priority	Source	Flow (cfs)	a-f (Limitation)
25-2167	Cert	1914	Yeates Spring	0.75	543.1
25-6680	Cert	1975	4000 South Well	0.724	524.3
			TOTAL	**1.424**	**1,067.4**

4.2. Two water rights previously owned by Nibley City have lapsed, and the City holds two other unapproved water rights, including the water right for the Application. These rights are identified in Table 8.

Table 8: Other Water Rights

W.R. Number	Status	Priority	Source	Flow (cfs)
25-9078	Unapproved	1990	Nelson Well	7.0
25-9044	Unapproved	1991	4000 South Well	2.83
25-8288	Lapsed	1991	4000 South Well	2.83
25-4947	Lapsed	1990	4000 South Well	0.1

4.3. With respect to its unapproved rights, Nibley City is requesting approval under the Application (25-9078) to divert water at a rate of 7.0 cfs with an annual limitation of 1,961.8 a-f (Section 5.0). Upon approval of the Application, Nibley City hereby withdraws the unapproved application under water right 25-9044.

5.0 PROJECTED WATER DIVERSION/DEPLETION (2020)

5.1 Table 9 shows the future water diversion and depletion that will be required to satisfy its demand in the year 2020.

Table 9: Projected Water Diversion/ Depletion (2020)

Type of Connection	Number of Connections (ERC)	Annual Water Diversion (a-f/yr)	Annual Water Depletion (a-f/yr)
Residential Indoor	1,844	829.8[1]	266.4[2]
Residential Outdoor (1/2 ac lots, 1/3 ac irrigated)	396[3]	396.0[4]	161.0[5]
Residential Outdoor (1/3 ac lots, ¼ ac irrigated)	1,279[6]	959.3[7]	390.1[8]
Large Water Users (LWU)	102[9]	147.9[10]	56.2[11]
Total		**2333.0**	**873.7**

1—Residential Indoor Diversion = 1,844 x 0.45 a-f/connection/yr = 829.8 a-f/yr

2—Residential Indoor Depletion = 1,844 x 0.45 a-f/conn./yr x 32.1% = 266.4 a-f/yr The indoor depletion (32.1%) is calculated as 13% indoor plus 22% of the remaining 87% is depleted at the Logan WWTP (Hughes, 1996).

3—Number of existing connections using Nibley's Water System for outdoor use (Hughes, 1996). The remaining lots use secondary water systems (30%).

4—Residential Outdoor Diversion = (396 lots)(1/3 acre/irrigated acre)(3.0 a-f /irr. ac./yr) = 396.0 a-f/yr

5—Residential Outdoor Depletion for ½ acre lots = (396 lots)(1/3 ac/irr. ac)(1.22 a-f /irr. ac./yr) =161.0 a-f/yr. The depletion of 1.22 a-f/acre/yr is the net irrigation requirement for turf at Logan (see page 249 of Research Report 145, Consumptive Use of Irrigated Crops in Utah, Utah Agricultural Experiment Station, Utah State University, Logan, Utah).

6—Assumed all future residential connections will use culinary water for outdoor irrigation and the lots will be smaller in size.

7—Residential Outdoor Diversion = (1,279 lots)(1/4 ac/irr. ac)(3.0 a-f /irr. ac./yr) =959.3 a-f/yr

8—Residential Outdoor Depletion for 1/3 acre lots = (1,279 lots)(1/4 ac/irr. ac)(1.22 a-f /irr. ac./yr) = 390.1a-f/yr

9—see Section 3.0 for calculations.

10—Large Water Users Diversion = 102 x 1.20 a-f/yr (0.45 a-f + ¼-irr. acre x 3.0 a-f/irr. acre) =147.9 a-f/yr

11—Large Water Users Depletion = 102 x 0.37 a-f/yr ((0.45 a-f/conn/yr)(32.1% depletion) + (1/3 acre)(1.22 a-f /irrigated acre)) = 56.2 a-f/yr.

5.2 Nibley City's water use in the year 2000, calculated according to the methodology in Table 9, should be 721.2 a-f/yr, as follows: [(0.45 x 574 (Residential Indoor) + 396 (Residential Outdoor) + 66.9 (LWU))]. It should be noted, however, that Nibley City's actual water use in the year 2000 was 819.3 a-f. (See Section 3.0) The actual use was thus 12% greater than the calculated water use of 721.2 a-f.

5.3 The calculated annual diversion for 2020 is 2,333.0 a-f/yr as set forth in Table 9. Inasmuch as the actual use ~~has~~ historically exceeds the calculated use, the diversion amount requested in the Application is 15% greater than the calculated annual diversion. This will serve as a protective cap to cover such contingencies as population increase above projections, drought, and other unforeseen conditions. Thus, the projected maximum water diversion in 2020 is 2,683 a-f/yr. (2,333.0 + 15% = 2,683 a-f/yr.) Subtracting Nibley City's calculated water use in the year 2000 of 721.2 a-f from the projected maximum diversion for 2020 of 2,683 a-f results in an increase in total annual diversion of 1,961.8 a-f/yr in year 2020. Accordingly, under the Application, Nibley City is seeking authority to divert 1,961.8 a-f/yr and a peak flow rate of 7.0 cfs under the Application.

5.4 Using the depletion fractions set forth in Table 9, the depletion for the year 2000 is calculated to be 269.3 a-f as follows:

- Indoor residential (574 connections)*(0.45 a-f/conn.)*(32.1%) = 82.9 a-f/yr
- Outdoor residential (396 lots)*(1/3 ac/lot)*(1.22 a-f/ac) = 161.0 a-f/yr
- Large Users (46 ERC)*((0.45 a-f/conn.)*(32.1%)+(1/3 ac)*(1.22 a-f)) = 25.4 a-f/yr
- Total Depletion = 269.3 a-f/yr

5.5 The projected depletion in the year 2020 is 873.7 a-f (see Table 9). Therefore, the additional depletion resulting from the Application for which mitigation will be required is 604.4 a-f/yr in the year 2020.

6.0 REPLACEMENT/COMPENSATION PLAN

6.1. Nibley City has acquired or will acquire water rights and water shares through the development of agricultural land within the City, or otherwise (the "Mitigation Rights"). The City's plan to mitigate additional depletions resulting from the Application is to divert and/or take delivery of water to which it is entitled under the Mitigation Rights and return this water to the hydrologic system during the irrigation season. The Mitigation Rights Nibley City currently owns are listed in Table 10 (also see Appendix C for specific water right numbers).

6.2. The quantity of water to be diverted from the well under this Application will increase over time according to demand, but only if the City's Mitigation Rights are available to mitigate the commensurate depletion. The amount of depletion, which can be mitigated with water under the Mitigation Rights, is likewise shown on Table 10.

6.3. The need for mitigation will increase between years 2000 and 2020. As a condition to increased diversions, Nibley City will be required to own the Mitigation Rights and have in place such agreements as shall be necessary to authorize use of water there under for mitigation purposes as set forth herein. The Mitigation Rights

identified in Table 10 may not be sufficient to fully satisfy the mitigation requirement in the year 2020. Accordingly, Nibley City is obligated to acquire additional Mitigation Rights as development occurs in quantities sufficient to satisfy the projected mitigation demands resulting from increased depletion under the Application.

Table 10: Depletion Credit Conversion Table

Irrigation Company	Sole Supply Acres (acres)	Total Shares in Irrigation Company (a-f/yr)	Decreed or Estimated Depletion Per acre (a-f/yr)[1]	Calculated Historic Depletion per share/right (a-f/share)[2]	Number of Shares Owned by Nibley	Total Depletion Credit (a-f/yr)
Clear Creek	155	200	2.08	1.61	65	104.7
Nibley	2,648	2,377.75	2.08	2.32	94	218.1
Blacksmith College Irrigation	1,036.7	778	2.08	2.77	22	60.97
Water Rights (Individual)	45		2.08	2.08		93.6
Total						**477.3**

1—Proposed Determination for the Blacksmith Fork Adjudication (the "Proposed Determination"). (All replacement/compensation shares/rights are in the Blacksmith Adjudication)
2—Number of acres divided by the number of shares multiplied by the historic depletion per acre multiplied by the dependability factor
3—Historic depletion per share multiplied by the number of shares owned by Nibley to determine total depletion credit

6.4. Water will be diverted from the City's new well to be authorized under the Application only after the Application (or companion applications if the Application is segregated) has been approved by the State Engineer, and the City agrees that any approval of the Applications(s) shall have as a condition the requirement that depletions under the Application(s) will at all times be limited to the quantity of water available under the Mitigation Rights then owned by the City and approved for use by the State Engineer for mitigation purposes under this mitigation plan.

6.5. As set forth in Table 9, the resulting depletion represents 37.45% of the total diversion (873.7 a-f/2333 a-f). Therefore, for every acre-foot of water approved by the State Engineer for use as mitigation water under the Mitigation Rights, Nibley will be authorized to divert 2.67 a-f from its new well. For example, if Nibley were to receive approval to convert all of its 65 shares of stock in the Clear Creek Irrigation Company to be used for mitigation, then it could divert in each and every year thereafter 279.5 a-f ((104.7 a-f)*(2.67 a-f)) under the Application. As successive Mitigation Rights are approved, the City's authority to divert water from its new well will be commensurately increased.

6.6. Nibley City intends to use the water under the Mitigation Rights for mitigation in the following order:

- Clear Creek Irrigation Company shares
  - The water represented by the City's shares will flow, unused, through Clear Creek's conveyance system to the Blacksmith Fork for the benefit of downstream users.
- Individual water rights acquired by Nibley City originating in the Morgan Drain.
  - The water represented by these rights will be unused, and allowed to flow downstream to the Blacksmith Fork.
- Nibley Blacksmith Irrigation Company shares.
  - The water represented by the City's shares will flow, unused, through Nibley-Blacksmith's conveyance system to the Spring Creek area.
- College Irrigation Company shares.
  - The water represented by the City's shares will flow, unused, through Nibley-Blacksmith's conveyance system to the Spring Creek area.
- Other.

Nibley City may change the order of use of water under the Mitigation Rights.

6.7. Appendix D provides a sample agreement between Nibley City and the respective irrigation companies, which it proposes to use in obtaining approval for use of the company's water for mitigation water under the Application.

6.8. Notwithstanding the foregoing, Nibley City may require, or developers may request, secondary water systems for new developments. It is acknowledged that the use of secondary water systems will conserve the amount of water diverted from the new well, and commensurately decrease the mitigation requirement for the calculated number of equivalent residential connections (1,946 ERC). Currently, 30% of Nibley's residents use secondary water for their outside irrigation. This mitigation plan, as presently written (see Table 9) contemplates that all future connections will use culinary water for outside irrigation. However, for example, if 30% of the future connections were to receive irrigation water through developed secondary water systems rather than from the City's culinary water supply, the water diverted and depleted by this Application would support more ERCs. In such event, an addendum to this mitigation plan will be submitted for approval by the State Engineer.

7.0 IMPACT TO PRIOR EXISTING WATER RIGHTS

7.1. This section addresses the impact the new well will have on prior existing water rights.

7.2. Nibley City completed the 16-inch well under a non-production well permit. The well was completed to a depth of 506 feet below the surface. Well perforations start at 215' below the surface. The well was test pumped at a maximum flow rate of 3,500 gpm (7.8 cfs). The drawdown at this flow rate was 21 feet (Table 11). The transmissivity was calculated to be 45,000 ft^2/day.

Table 11: Pump Test

Flow Rate (gpm)	Drawdown (ft)
1,300	2.0
2,000	9.5
3,330	21.0

7.3. With the calculated transmissivity the drawdown of the surrounding area (up to a three mile radius) was estimated using the Theis equation (Driscoll, 1986). Table 12 shows the drawdown in feet associated with the distance away from the wellhead. The wellhead is located at 3703 South 250 West in Nibley City. The drawdown is based on the additional water (a-f/yr) diverted above Nibley City's existing water rights (1,067 a-f) not the total amount of water diverted by Nibley.

Table12: Well Drawdown

Year (withdrawal)	0.5 mile (ft)	1.0 mile (ft)	1.5 miles (ft)	2.0 miles (ft)	3.0 miles (ft)
2020 (1,962 a-f)	4.51	3.94	3.60	3.36	3.03

7.4. Appendix F is a map with the radius (in miles) from the wellhead. The drawdown from the well will impact the wells in the principal confined aquifer as described in Mike Robinson's thesis (Robinson, 1999). Nibley City did not perforate the well above 215 feet. Above the perforations was two blue clay layers (42'~96' & 157'~173') described as an aquitard in Robinson's report. The effect of drawdown will only be on the wells in deep confined aquifer. The new well will have minimal impact to the shallow confined aquifer. In addition, the zone of contribution of the well is included in Appendix F. The water pumped from the well is outlined by zone of contribution.

7.5. Cache-Landmark Engineering, Inc., on behalf of Nibley City, asked Classic Geological Studies Corporation to: (1) determine the geologic setting of the Nibley City - College Ward area; (2) evaluate the existing hydrogeologic evidence therein; (3) illustrate the existing piezometric surface for the lower main confined aquifer and the changes it should undergo during sustained pumping of the new municipal well in Nibley City; (4) make a mass-balance calculation for the water available to recharge both the Nibley City municipal well and the College Ward area to determine if it is likely adequate for the needs of both; and (5) evaluate the possible causes of lowered water levels in wells in College Ward during recent Summer seasons. This report is included in Appendix F.

7.6. Conclusions from the report state the problem of low water levels in wells in College Ward during the Summers likely results from: (1) severe drought; (2) cumulative addition of wells in the College Ward area through time; and (3) proximity of deeper wells with larger diameters to older, shallower wells with smaller diameters that do not permit emplacement of submersible pumps. College Ward may want to consider drilling a deep, large-diameter municipal well to service the entire community, as Nibley has done. There appears to be significant risk of ongoing problems if proliferation of wells for individual homes continues in College Ward in Section 19.

8.0 CONCLUSIONS

8.1. Nibley City has a need for additional water rights based on its current situation and future demands. This mitigation plan verifies the need for additional water rights and provides a plan to mitigate for additional depletions resulting from the diversion and use of water under this Application.

8.2. The projected water diversion in 2020 is 2,683 a-f/yr. Nibley City will need an additional 1,961.8 a-f/yr of water to meet future demands. Only a portion of the water diverted will be depleted and the remainder will be returned to the hydrologic system. Nibley will deplete an additional 604.1 a-f/yr.

8.3. Nibley proposes this mitigation plan to mitigate for the depletion from the new water right under this Application to be phased in over the next twenty years to replace the additional depletions of water resulting from this Application. Under this mitigation plan, depletions will be mitigated using water under Mitigation Rights in irrigation companies and other water rights owned or to be acquired by Nibley City.

8.4. Nibley City will not impair prior existing water rights with this application.

APPENDIX A

REFERENCES

REFERENCES

Division of Water Resources, 2002, Identifying Residential Water Use, 26 p. (http://www.water.utah.gov/M&I/Residential%20Final1.pdf)

Division of Water Resources, 2002, Utah State Water Plan, 33 p. (http://www.water.utah.gov/waterplan/default.htm)

Division of Water Rights, 2003, Policies & Terms (http://nrwrt1.nr.state.ut.us/wrinfo/glossary.htm) (http://nrwrt1.nr.state.ut.us/wrinfo/policy/topic.htm)

Driscoll, Flecther G., 1996, Groundwater and Wells, Second Edition, Johnson Screens, St. Paul, Minnesota

Hughes, Trevor C., 1996, Consumptive Use of Municipal Water Supply, Utah Water Research Laboratory, Utah State University, Logan, Utah

Hill, Robert W., 1994, Consumptive Use of Irrigated Crops in Utah, Utah Water Research Laboratory, Utah State University, Logan, Utah, Research Report 145

Kariya, Kim, Roark, Michael, Hanson, Karen, 1994, Hydrology of Cache Valley, Cache County, Utah, and adjacent part of Idaho, with emphasis on simulation of ground-water flow: Department of Natural Resources Technical Publication No.108

Nibley City, Larry Anhder, City Recorder, Personal Interview 2003

Robinson, J. Mike., 1999, Chemical and Hydrostaratigraphic Characterization of Ground Water and Surface Water Interaction in Cache Valley, Utah, Master of Science-Geology, Utah State University, Logan, Utah

State of Utah Division of Drinking Water, 1998, Administrative Rules for Public Drinking Water Systems.

USDA-SCS (Soil Conservation Service), 1976, Irrigation Conveyance System-Working Paper for Bear River Basin Type IV Study, (Available from USDA Logan Field Office, Out of Print).

Wold, S.R., Heilweil, V.M., and Baskin, R.I., 1994, Hydrogeology of recharge areas and water quality of the principal aquifers along the Wasatch Front and adjacent areas, Utah: U.S. Geological Survey Water-Resources Investigations Report 93-4221

APPENDIX B

NIBLEY CITY WATER RIGHTS

STATE OF UTAH -- DIVISION OF WATER RIGHTS -- DATA PRINT OUT for 25-2167(A5992)

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 01/04/2004

WRNUM: 25-2167 APPLICATION/CLAIM NO.: A5992 CERT. NO.: 727

OWNERSHIP**********

NAME: Nibley Town Incorporated (c/o Merlend Hansen)
ADDR: OWNER MISC:
CITY: Nibley STATE: UT ZIP:

LAND OWNED BY APPLICANT?

DATES, ETC.**********

FILED:	PRIORITY: 12/07/1914	PUB BEGAN:	PUB ENDED:	NEWSPAPER:	
ProtestEnd:	PROTESTED: [No]	HEARNG HLD:	SE ACTION: [ ]	ActionDate:	PROOF DUE:
EXTENSION:	ELEC/PROOF: [ ]	ELEC/PROOF:	CERT/WUC:	LAP, ETC:	PROV LETTER:
RENOVATE:	RECON REQ:	TYPE: [ ]			

PD Book No. 10 Map: 69x

Type of Right: Application to Appropriate Source of Info: Proposed Determination Status: Certificate

LOCATION OF WATER RIGHT**********

FLOW: 0.75 cfs SOURCE: Yeates Spring

COUNTY: Cache COMMON DESCRIPTION:

POINT OF DIVERSION - SURFACE:
(1) N 1035 ft W 2375 ft from SE cor, Sec 34, T 11N, R 1E, SLBM
Diverting Works: Source:

USES OF WATER RIGHT**********

CLAIMS USED FOR PURPOSE DESCRIBED: 2167
Referenced To: Claims Groups: I Type of Reference -- Claims: Purpose: Remarks:
###MUNICIPAL: Nibley Town, Incorporation
PERIOD OF USE: 01/01 TO 12/31

**********E N D O F D A T A**********

STATE OF UTAH -- DIVISION OF WATER RIGHTS -- DATA PRINT OUT for 25-6680(A45398)

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 01/04/2004 Page 1

WRNUM: 25-6680 APPLICATION/CLAIM NO.: A45398 CERT. NO.:

OWNERSHIP**********

NAME: Nibley Town Corporation
ADDR: Nibley Town Hall OWNER MISC:
CITY: Nibley STATE: UT ZIP: 84321 INTEREST: 100%
LAND OWNED BY APPLICANT?

DATES, ETC.**********

FILED: 10/09/1975	PRIORITY: 10/09/1975	PUB BEGAN:	PUB ENDED:	NEWSPAPER:			
ProtestEnd:	PROTESTED: [No]	HEARNG HLD:	SE ACTION: [ ]	ActionDate:01/02/1976	PROOF DUE: 07/31/1978		
EXTENSION:	ELEC/PROOF: [Election]	ELEC/PROOF:07/27/1978	CERT/WUC: 01/04/1979	LAP, ETC:	PROV LETTER:		
RENOVATE:	RECON REQ:	TYPE: [ ]					

PD Book No. Map: 68d

Type of Right: Application to Appropriate Source of Info: Application to Appropriate Status: WUC Signed

LOCATION OF WATER RIGHT**********

FLOW: 0.724 cfs SOURCE: Underground Water Well
COUNTY: Cache COMMON DESCRIPTION:

POINT OF DIVERSION -- UNDERGROUND:
(1) N 1320 ft W 75 ft from SE cor, Sec 28, T 11N, R 1E, SLBM DIAM: 16 ins. DEPTH: 441 to ft. YEAR DRILLED: WELL LOG?
Comment:

USES OF WATER RIGHT**********

CLAIMS USED FOR PURPOSE DESCRIBED: 6680
Referenced To: Claims Groups: 1

###MUNICIPAL: Nibley, Utah	Type of Reference -- Claims:	Purpose:	Remarks:

PERIOD OF USE: 01/01 TO 12/31

**********E N D O F D A T A**********

STATE OF UTAH -- DIVISION OF WATER RIGHTS -- DATA PRINT OUT for 25-9078(A64770)

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 01/04/2004

WRNUM: 25-9078 APPLICATION/CLAIM NO.: A64770 CERT. NO.:

OWNERSHIP**********

NAME: Nibley City Corporation OWNER MISC:
ADDR: 625 West 3200 South
CITY: Nibley STATE: UT ZIP: 84321

LAND OWNED BY APPLICANT? No

DATES, ETC.**********

FILED: 06/25/1990 | PRIORITY: 06/25/1990 | PUB BEGAN: 05/09/2002 | PUB ENDED: 05/16/2002 | NEWSPAPER: Herald Journal
ProtestEnd:06/05/2002 | PROTESTED: [HearHeld] | HEARNG HLD:01/15/2004 | SE ACTION: [ ] | ActionDate: | PROOF DUE:
EXTENSION: | ELEC/PROOF: [ ] | ELEC/PROOF: | CERT/WUC: | LAP, ETC: | PROV LETTER:
RENOVATE: | RECON REQ: | TYPE: [ ]

PD Book No. Map:

Type of Right: Application to Appropriate Source of Info: Application to Appropriate Status: Unapproved

LOCATION OF WATER RIGHT**********

FLOW: 7.0 cfs SOURCE: Underground Water Wells (1 new & 1 existing)

COUNTY: Cache COMMON DESCRIPTION: South Nibley

POINTS OF DIVERSION -- UNDERGROUND:
(1) S 1998 ft W 1780 ft from NE cor, Sec 28, T 11N, R 1E, SLBM DIAM: 16 ins. DEPTH: 400 to 600 ft. YEAR DRILLED: WELL LOG?
Comment:
(2) N 1320 ft W 75 ft from SE cor, Sec 28, T 11N, R 1E, SLBM DIAM: 16 ins. DEPTH: 441 to ft. YEAR DRILLED: WELL LOG?
Comment: existing well

USES OF WATER RIGHT**********

CLAIMS USED FOR PURPOSE DESCRIBED: 9078
Referenced To: Claims Groups: 1 Type of Reference -- Claims: Purpose: Remarks:

###MUNICIPAL: Nibley City Corporation PERIOD OF USE: 01/01 TO 12/31

OTHER COMMENTS**********

See attached report 25-6680.

PROTESTANTS**********

NAME: Albiston, Steven and Karma
C/O :
ADDR: 830 West 2200 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Anderson, Kim
C/O :
ADDR: 2778 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Barker, Roger
C/O :
ADDR: PO Box 38
CITY: Newton STATE: UT ZIPCODE: 84327 0038

NAME: Barrett, Tracy
C/O :
ADDR: 1028 South 3200 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Bear Lake Watch Inc.
C/O : c/o Jim Kimbal (atty)
ADDR: P. O. Box 205
CITY: Fish Haven STATE: ID ZIPCODE: 83287

NAME: Bear River Water Users' Association
C/O : c/o D. Brent Rose
ADDR: One Utah Center, Suite 1300
CITY: Salt Lake City STATE: UT ZIPCODE: 84111-2216

NAME: Berry, Bryce
C/O :
ADDR: 1170 West 1000 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Bleazard, Dave
C/O :
ADDR: 870 South 2400 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Christensen, Lisa and Dan
C/O :
ADDR: 2766 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Christensen, Scott
C/O :
ADDR: 2790 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: College Irrigation Co
C/O : Edwin Nelson, Pres.
ADDR: 2352 S Hwy 89-91
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Cox, Duane
C/O :
ADDR: 2200 South 210 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Daugs, Ammon
C/O :
ADDR: 2496 West 1800 South
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Daugs, Darald
C/O :
ADDR: 1847 South 2400 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Dobson, Beverly
C/O :
ADDR: 2685 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Edward Rich
C/O :
ADDR: 2400 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Ferguson, Gary
C/O :
ADDR: 1635 South 3200 West
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Fredrickson, Bart
C/O :
ADDR: 2880 West 2200 South
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Gordon Zilles
C/O :
ADDR: 1835 W 3200 S
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Hall, Lee Reed
C/O :
ADDR: 2233 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Hansen, Glen L
C/O :
ADDR: 2610 S Hwy
CITY: College Ward STATE: UT ZIPCODE: 84321

NAME: Hansen, Quentin W
C/O :
ADDR: 2645 S State Hwy 91
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Hansen, Terry
C/O :
ADDR: 2483 S 1600 W
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Harris, Jean and Lynn
C/O :
ADDR: 826 South 3600 West
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Hat, Kim
C/O :
ADDR: 1327 South 1000 West
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Holt Springs and Clear Creek Springs
C/O : Kent & Cindy Selley, et al
ADDR: 2881 South Main
CITY: Nibley STATE: UT ZIPCODE: 84321

NAME: Hubbell, James D.
C/O :
ADDR: 3136 S 2000 W
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Israelsen, Clark E.
C/O :
ADDR: 2624 West 1800 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Israelson, Floyd
C/O :
ADDR: 2615 West 1800 South
CITY: Young Warad STATE: UT ZIPCODE: 84321

NAME: Israelson, N.
C/O :
ADDR: 1795 South 2400 West
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Jensen, Edwin
C/O :
ADDR: 1645 West 2200 South
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Jensen, Gail
C/O :
ADDR: 3509 West 2200 South
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Jensen, Joseph and Jackie
C/O :
ADDR: 3707 West 2200 South
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Jensen, Louise A.
C/O :
ADDR: 3509 West 2200 South
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Jensen, Van
C/O :
ADDR: 3567 West 2200 South
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Jenson, Douglas
C/O :
ADDR: 2200 South 1631 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Jenson, Eldon
C/O :
ADDR: 1695 West 2200 South
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Johnson, A. Kim
C/O :
ADDR: 800 South 2400 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Johnson, Brian
C/O :
ADDR: 830 South 2400 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Johnson, Terry
C/O :
ADDR: PO Box 223
CITY: Newton STATE: UT ZIPCODE: 84327-0223

NAME: Larsen, Bryan
C/O :
ADDR: 3410 West 2200 South
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Leishman, Dallas
C/O :
ADDR: 784 South 2000 West
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Leishman, Hazel
C/O :
ADDR: 2455 S Hwy 89-91
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Leishman, Homer
C/O :
ADDR: 2455 S Hwy 89-91
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Lloyd, Norman
C/O :
ADDR: 3260 West 2200 South
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: McBride, Ron
C/O :
ADDR: 2155 South 1200 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Merrill, Jed
C/O :
ADDR: 1105 West 2200 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Morrill, Scott
C/O : interested party
ADDR: 1576 South 3200 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Morrison, Allen
C/O :
ADDR: 2778 West 600 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Nelson, Grant L
C/O :
ADDR: 2543 S 2000 W
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Nielsen, Lynn
C/O :
ADDR: 1262 W 2200 N
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Nyman, Donald
C/O :
ADDR: 1790 West 2200 South
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Olsen, Evan L.
C/O : interested party
ADDR: 2009 South 3200 West
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Olsen, Hal
C/O :
ADDR: 1966 South 2000 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Olsen, Jill and J.
C/O :
ADDR: 2542 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Olsen, Mark
C/O :
ADDR: 2306 South Pelican
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Olsen, Rhea K.
C/O :
ADDR: 1744 West 2200 South
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Olsen, Robert
C/O :
ADDR: 2250 South Pelican Pond Road
CITY: Young Ward STATE: UT ZIPCODE: 84339

NAME: Olson, Dean
C/O :
ADDR: 2357 West 1800 South
CITY: College Ward STATE: UT ZIPCODE: 84321

NAME: Olson, Gregory R.
C/O :
ADDR: 1221 South 3200 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: PacifiCorp
C/O : c/o Jody L. Williams
ADDR: 299 South Main St., Ste. 1800
CITY: Salt Lake City STATE: UT ZIPCODE: 84111

NAME: PacifiCorp/Claudia Conder
C/O :
ADDR: 1407 West North Temple #320
CITY: Salt Lake City STATE: UT ZIPCODE: 84116

NAME: Pate, Robert
C/O : interested party
ADDR: 2222 West 600 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Peterson, Rory
C/O :
ADDR: 2325 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Resident 1
C/O :
ADDR: 2297 West 600 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Resident 2
C/O :
ADDR: 2520 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Resident-3
C/O :
ADDR: 2537 South 3800 West
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Resident-4
C/O :
ADDR: 3509 West 2200 South
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Resident-5
C/O :
ADDR: 3605 West 1400 South
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Resident-6
C/O :
ADDR: 3819 West 600 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Rich, Edward
C/O :
ADDR: 2400 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Rivera, John
C/O :
ADDR: 3820 West 600 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Ropelato, Roy
C/O : interested party
ADDR: Box 272
CITY: Millville STATE: UT ZIPCODE: 84326

NAME: Sagers, Kay
C/O :
ADDR: 3394 West 1800 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Sleight, Weldon and Pauline
C/O :
ADDR: 727 South 2400 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Sogen, Lynn
C/O :
ADDR: 3394 West 1800 South
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Sorensen, Kendall
C/O :
ADDR: 3266 West 1800 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Stewart, Harold and Vera
C/O :
ADDR: 3325 South 1500 West
CITY: College Ward STATE: UT ZIPCODE: 84321

NAME: Thatcher, S.
C/O :
ADDR: 2727 West 1800 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Timmins, Garth
C/O :
ADDR: 635 South 3200 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: US Fish and Wildlife Service
C/O : c/o Cheryl C. Williss
ADDR: P. O. Box 25486 Denver Federal Center
CITY: Denver STATE: CO ZIPCODE: 80225 0486

NAME: USA Bureau of Reclamation
C/O : ATTN: Jonathan Jones
ADDR: 302 East 1860 South
CITY: Provo STATE: UT ZIPCODE: 84606-7317

NAME: Wangsgard, Mike
C/O :
ADDR: 351 South 3200 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Wangsgard, Neva
C/O :
ADDR: 2975 West 600 South
CITY: Young Ward STATE: UT ZIPCODE: 84321

NAME: Wangsgard, Ross H.
C/O :
ADDR: 2915 West 600 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Wangsgard, Scott
C/O :
ADDR: 2975 West 600 South
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Wesley Nelson Farms Inc.
C/O : Edwin Nelson, Pres.
ADDR: 2352 S Hwy 89-91
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Zilles, L.
C/O :
ADDR: 3190 South 2000 West
CITY: Logan STATE: UT ZIPCODE: 84321

NAME: Zilles, Laurie and Kelly
C/O :
ADDR: 2520 South 2400 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Zilles, Vera and Deloy
C/O :
ADDR: 3021 South 2000 West
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Zollinger, Cindy
C/O :
ADDR: 2082 West 3000 South
CITY: College Ward STATE: UT ZIPCODE: 84339

NAME: Zollinger, Melvin J.
C/O :
ADDR: 1680 W 3200 S
CITY: College Ward STATE: UT ZIPCODE: 84321

NAME: Zollinger, Terry
C/O :
ADDR: 1966 West 3200 South
CITY: College Ward STATE: UT ZIPCODE: 84321

NAME:
C/O :
ADDR:
CITY: STATE: ZIPCODE:

**********E N D O F D A T A**********

APPENDIX C

REPLACEMENT/COMPENSATION
WATER RIGHTS

WATER RIGHTS FOR THE REPLACEMENT/COMPENSATION PLAN

CLEAR CREEK IRRIGATION COMPANY
25-4852

POTENTIAL INDIVIDUAL WATER RIGHTS
25-314, 25-315, 25-316, 25-317, 25-528, 25-529, 25-708, 25-1981, 25-3503, 25-5429

NIBLEY BLACKSMITH IRRIGATION COMPANY
25-725, 25-726, 25-727, 25-728, 25-729, 25-730, 25-731, 25-732, 25-733, 25-1292, 25-1293, 25-1948, 25-2008, 25-4526, 25-4527, 25-3492, 25-3493, 25-6994, 25-7320, 25-7873, 25-7874

COLLEGE IRRIGATION COMPANY
25-1848, 25-1849, 25-1850, 25-1851, 25-1852, 25-1853, 25-1854, 25-2226, 25-2302, 25-2303, 25-4180, 25-4259, 25-4260

APPENDIX C

REPLACEMENT/COMPENSATION
WATER RIGHTS

WATER RIGHTS FOR THE REPLACEMENT/COMPENSATION PLAN

CLEAR CREEK IRRIGATION COMPANY
25-4852

POTENTIAL INDIVIDUAL WATER RIGHTS
25-314, 25-315, 25-316, 25-317, 25-528, 25-529, 25-708, 25-1981, 25-3503, 25-5429

NIBLEY BLACKSMITH IRRIGATION COMPANY
25-725, 25-726, 25-727, 25-728, 25-729, 25-730, 25-731, 25-732, 25-733, 25-1292, 25-1293, 25-1948, 25-2008, 25-4526, 25-4527, 25-3492, 25-3493, 25-6994, 25-7320, 25-7873, 25-7874

COLLEGE IRRIGATION COMPANY
25-1848, 25-1849, 25-1850, 25-1851, 25-1852, 25-1853, 25-1854, 25-2226, 25-2302, 25-2303, 25-4180, 25-4259, 25-4260

APPENDIX D

REPLACEMENT/COMPENSATION
SAMPLE AGREEMENT

WATER USE AGREEMENT

THIS Agreement (the "Agreement") is made and entered into by and between Nibley City (the "City") and the < _____ > Irrigation Company, a Utah nonprofit mutual water company (the "Company").

RECITALS

The Company is the owner of certain water rights, both surface and underground, which rights are used to provide water to its stockholders. The Company desires to maintain the full beneficial use of all of its water rights.

The majority of the Company's water rights have historically been, diverted from the < _____ >for delivery to its stockholders, under the prescribed method of distribution approved by the Company's board of directors.

The City has acquired and is presently the record owner of shares of stock in the Company, which have previously been used to irrigate certain lands within the Company's service area.

The City has filed an application to appropriate seven cfs of groundwater, Water Right No. 25-9078 (the "Application") with the Utah State Engineer for municipal purposes from existing and/or new wells.

Pursuant to the State Engineers interim Cache Valley Groundwater Management Plan, the City will be required to provide replacement/mitigation water to protect other water users as a condition for the approval of the Application (the "Replacement/Mitigation Water").

The City desires to use the shares it owns or may hereafter acquire in the Company, in whole or in part, to provide all or part of the Replacement/Mitigation Water as may be required by the Utah State Engineer as a condition for the approval of the Application.

The Company desires to insure that the City's use of its Company stock, as set forth in this Agreement, will not result in any additional expenses to the Company or impair the rights of the Company or its other stockholders.

Both parties desire to maintain and preserve the full beneficial use of the water represented by the shares now or hereafter owned by the City.

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, the parties agree as follows:

Use of City Shares for Replacement/Mitigation. The Company agrees to allow the water represented by the shares now or hereafter owned by the City to be used by the City as Replacement/Mitigation Water as part of its "Replacement/Mitigation Plan" for the Application to the extent and under such conditions as may be required by the Utah State Engineer, subject to the following conditions:

The water represented by the City's shares, from any, all or a combination of the Company's water sources shall be diverted into and be allowed to flow, unused, through the company's distribution system for the benefit of downstream users, at such times and in such quantities as may be required by the Utah State Engineer.

The City water will be made available according to the method of distribution applicable to all stockholders as determined by the Company's board of directors.

The Company will use its best efforts to see that the water represented by the City's shares is allowed to flow unused through to the end of the Company's distribution system.

The City will bear any additional seepage or evaporation losses caused by the delivery of water as set forth in this Agreement.

The parties acknowledge that the period of use for the Company's water rights is generally from April 1 to November 30 of each year, and unless otherwise authorized by the Utah State Engineer, the Company cannot guarantee delivery of the City's Replacement/ Mitigation Water except during said approved periods of use.

The City shall, within sixty (60) days of the execution of this Agreement, or within sixty (60) days of the acquisition by the City of any new stock, inform the Company in writing of the acreage previously irrigated by the City's stock, which is to be taken out of irrigation.

Use of City Stock When Not Required for Replacement/Mitigation. During such times when the State Engineer does not require the City's stock for Replacement/Mitigation Water for the City's Application, the City agrees to maintain full beneficial use of its shares by leasing or allowing other stockholders to use the water, provided that all such use shall be within the Company's service area.

Necessary Changes or Exchanges. In the event the Utah State Engineer requires that a change or exchange application be filed in connection with the use of Replacement/Mitigation Water by the City as set forth in this Agreement, the City shall immediately notify the Company in writing. The City shall have the primary obligation for the filing of any such application, including all fees, costs, preparation, attorney fees, or expert witness fees necessary during the administrative process or any judicial appeal of the State Engineer's decision. Nothing herein shall be deemed to be a waiver by the Company of the process or requirements set forth in Utah Code Ann. § 73-3-3.5.

Costs and Expenses. The City shall have the sole responsibility for any costs, fees or expenditures necessary under this Agreement. The City also agrees to pay the Company any and all additional reasonable expenses incurred by the Company in delivering, distributing, measuring or monitoring the Replacement/Mitigation Water provided for in this Agreement.

Continued Water Use. Although the City agrees to maintain beneficial use of the water represented by its shares, should the State Engineer or any court determine that any part of the Company's water rights represented by the City's shares has been forfeited for nonuse due to the City's Replacement/Mitigation Plan and uses set forth in this Agreement, the City agrees that, not withstanding anything to the contrary in Section 73-1-4.5 Utah Code Ann., the City's shares causing such finding of forfeiture shall be cancelled.

Assessments. The City agrees to pay any and all Company assessments on all shares the City owns or may acquire in the future.

Water Shortages. In the event the Company experiences a shortage of water caused by drought, inaccuracy of distribution, not resulting from negligence, hostile diversion by others, failure of well equipment, prior or superior claims or other causes not within the reasonable control of the Company, no liability shall accrue against the Company or any of its officers, agents or employees, or any of them, for any damage, direct or indirect, arising there from. If a shortage of water occurs, deliveries of water to stockholders in general and deliveries for Replacement/Mitigation Water specifically, shall be reduced equally among the stockholders in proportion to the number of shares held by each stockholder. The determination of any such shortage will be made by the Company's board of directors and its determination shall be final and conclusive.

Agreement Contingent on State Engineer Approval. This Agreement is contingent on the Utah State Engineer's approval of the City's Replacement/Mitigation Plan and the approval of the City's Application.

Force Majeure. The obligation of the Company to deliver Replacement/Mitigation Water as provided under this Agreement shall be suspended to the extent and for the period that performance of such obligation is prevented by any unforeseen cause beyond the Company's control, including riots, civil strife, war or terrorist acts; proclamations, regulations, controls or requests from any government or governmental agency; judgment or orders of any court; fire or other casualty; earthquakes, floods or other acts of God. The Company shall restore delivery of water, as herein provided, as soon as reasonably possible after such delivery is interrupted due to a state of Force Majeure.

Indemnification. The City agrees that it will indemnify and hold the Company harmless against all liability and against all loss or damage to persons or property resulting from or in any manner connected with the Company's delivery of Replacement/Mitigation Water as provided in this Agreement except for negligence or willful misconduct by the Company.

Notices. Any notice provided for or concerning this Agreement shall be in writing and shall be deemed sufficiently given when sent by United States mail to the following:

If sent to Nibley City:
Attn: Larry Anhler
625 West 3200 South
Nibley City, UT 84321

If sent to < _____ >Irrigation Company:
Irrigation President or Secretary's Address

Effective Date and Term of Agreement. This Agreement shall be effective when executed by the parties and, except as provided in paragraph 8 hereof, shall continue so long as the City is required to provide Replacement/Mitigation Water under the City's Application.

Governing Law. This Agreement shall be governed by, construed and enforced in accordance with the laws of the State of Utah.

Entire Agreement. This Agreement shall constitute the entire agreement between the parties and supercedes any prior understanding, representation or agreement of the parties regarding the subject matter hereof.

Modification of Agreement. Any modification of this Agreement, or additional obligation assumed by either party in connection with this Agreement, shall be binding only if evidenced in writing, signed by each party or an authorized representative of each party.

No Waiver. No delay or failure by either party to exercise any right under this Agreement and no partial or single exercise of that right, shall constitute waiver of that or any other right, unless expressly provided herein. Either party may, by notice delivered in the manner provided in this Agreement, but shall not be under obligation to, waive any of its rights or any conditions to its obligations hereunder or any covenant or duty of any other party. No waiver shall affect or alter the remainder of this Agreement, and each and every covenant, duty, and condition hereof shall continue in full force and effect with respect to any other then existing or subsequently occurring breach.

Rights and Remedies. The parties shall have all rights and remedies provided under Utah law for a breach or threatened breach of this Agreement, these rights and remedies shall not be mutually exclusive and the exercise of one or more of these rights and remedies shall not preclude the exercise of any other rights and remedies.

Necessary Acts and Cooperation. The parties hereby agree to do any act or thing and to execute any and all instruments required by this Agreement which are necessary and proper to make effective the provisions of this Agreement.

Authorization. Each individual executing this Agreement does hereby represent and warrant to each other so signing that he or she has been duly authorized to sign this Agreement in the capacity and for the entities set forth where he or she signs.

Execution of Agreement. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement.

IN WITNESS WHEREOF, each party to this Agreement has caused it to be executed on the date indicated below.

< _____ > IRRIGATION COMPANY

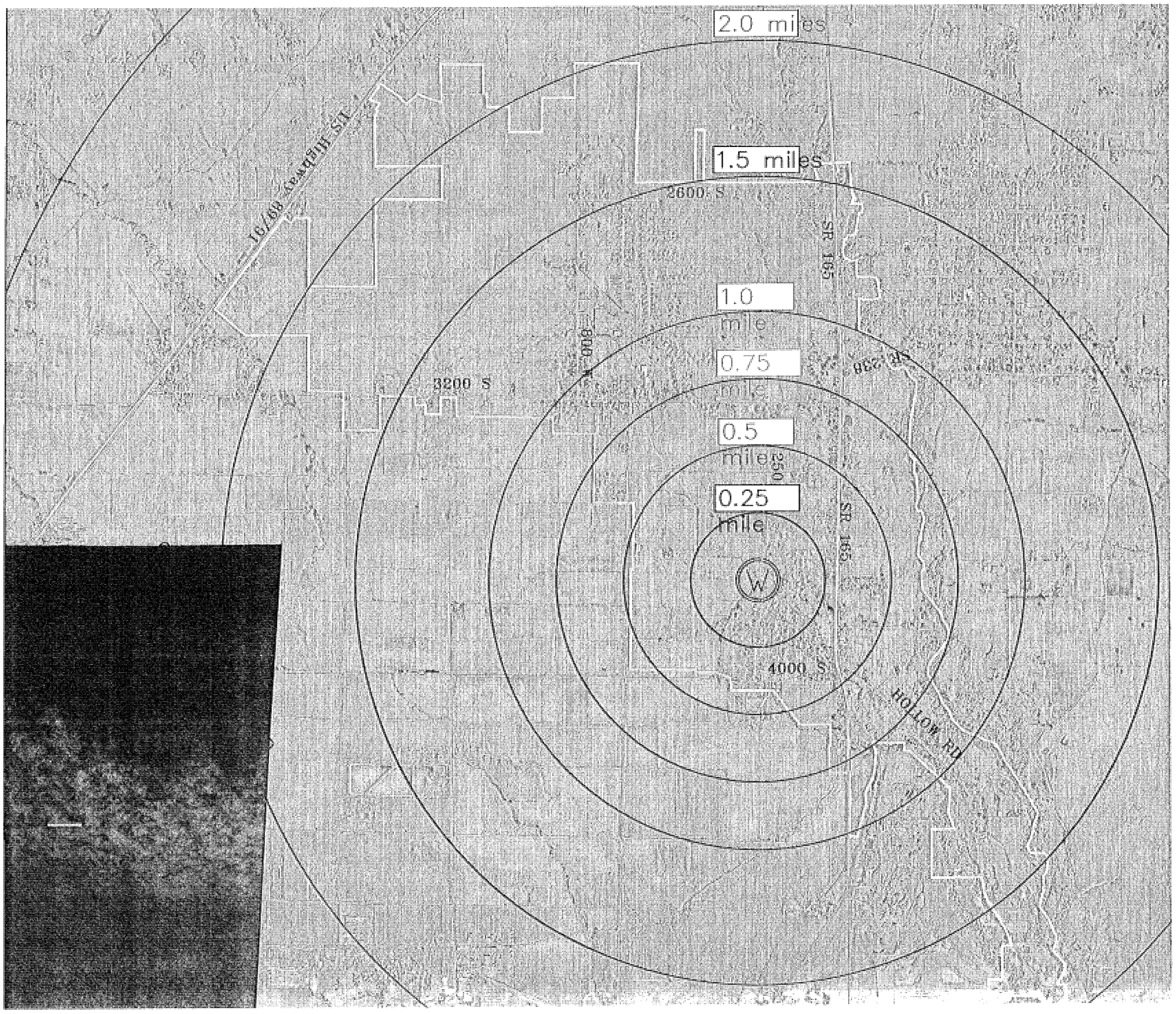
By: _____
Its: _____
Date: _____

NIBLEY CITY

By: _____
Its: _____
Date: _____

APPENDIX E

MAPS



NIBLEY CITY

NELSON WELL
ZONES OF INFLUENCE

SCALE: NTS

CACHE–LANDMARK ENGINEERING

PAUL HANSEN
ASSOCIATES, L.L.C.
Consultants / Engineers

NIBLEY - NELSON WELL
PRELIMINARY EVALUATION REPORT
DRINKING WATER SOURCE PROTECTION ZONES

FIGURE
2

APPENDIX F

GEOLOGIC EVALUATION OF DRILLERS' LOGS OF WATER WELLS AND ASSOCIATED HYDROGEOLOGIC EVIDENCE IN THE NIBLEY CITY - COLLEGE WARD AREA, CACHE VALLEY, NORTH - CENTRAL UTAH

Dr. Bob Oaks

GEOLOGIC EVALUATION OF DRILLERS' LOGS OF WATER WELLS AND ASSOCIATED HYDROGEOLOGIC EVIDENCE IN THE NIBLEY CITY - COLLEGE WARD AREA, CACHE VALLEY, NORTH - CENTRAL UTAH

for

CACHE - LANDMARK ENGINEERING, INC.

by

DR. ROBERT Q. OAKS, JR.

Utah Licensed Professional Geologist 5212865-2750

CLASSIC GEOLOGICAL STUDIES CORPORATION

13 February 2004

EXECUTIVE SUMMARY

Mr. Lance Anderson
Cache-Landmark Engineering, Inc.
666 North Main, Suite 203
Logan UT 84321 U.S.A.

Dear Mr. Anderson:

Cache-Landmark Engineering, Inc., on behalf of Nibley City, asked Classic Geological Studies Corporation to: (1) determine the geologic setting of the Nibley City - College Ward area; (2) evaluate the existing hydrogeologic evidence therein; (3) illustrate the existing piezometric surface for the lower main confined aquifer and the changes it should undergo during sustained pumping of the new municipal well in Nibley City; (4) make a mass-balance calculation for the water available to recharge both the Nibley City municipal well and the College Ward area to determine if it is likely adequate for the needs of both; and (5) evaluate the possible causes of lowered water levels in wells in College Ward during recent Summer seasons.

My report is attached. A WNW-ESE geologic section based on drillers' logs of water wells was drawn from the Nibley City well through the center of College Ward. The year each well was drilled is shown at the bottom of the upper geologic section, which has a vertical exaggeration of 10 in order to show the sediment types, etc. The upper geologic section confirms the presence (Robinson, 1999) of a thin and local unconfined surface aquifer of gravel and sand up to 25 feet thick, an upper confining layer dominantly of clay up to 70 feet thick, an upper confined aquifer of gravel and sand up to 60 feet thick, a lower confining layer dominantly of clay up to 40 feet thick, and a lower main aquifer of gravel and sand more than 330 feet thick in the Nibley City municipal well (well 28H).

The lower geologic section shows a flat to slight eastward slope of perhaps 10 feet in the piezometric surface ESE of the middle of Sec 20, T11N, R1E (SLBM). This condition existed prior to drilling of the Nibley City municipal well. There is a slight westward slope, and nearsurface position, of the piezometric surface westward from the middle of Sec 20 through College Ward, including a depth to water of only 1.5 feet in a well completed in 2003, after the Nibley City well. The calculated amount of drop of the piezometric surface due to sustained pumping of the Nibley City well from 2020 to 2040 is about 14 feet at well 28H, and declines to less than 5 feet at College Ward, based on calculations supplied by Cache-Landmark Engineering. A drop of at least 200 feet, and more likely about 400 feet, is required at well 28H to lower the piezometric surface in College Ward below the deepest existing wells there. The mass-balance calculations suggest that a drop of that magnitude (i.e., 200 to 400 feet) is not likely. Instead, the mass-balance calculations are more consistent with the minor declines in the piezometric surface calculated by Cache-Landmark Engineering. A WNW-trending high-permeability corridor ("fairway") in the lower main confined aquifer in this area was identified by Robinson (1999) based on a sulfate plume and westward advance of atmospheric, bomb-generated tritium. The northern limit of this corridor is here established between wells 21A and 21B in Sec 21, north of the geologic section.

Analysis of the cumulative number of wells in College Ward in Sec 19 shows an increased rate of new wells drilled since 1984. Also, newer, deeper wells of larger diameter are adjacent to older, shallower wells of smaller diameter. The combination of more demand, proximity of deeper wells to shallower wells, and severe drought appears a more likely cause of the recent problems in College Ward than pumping at the Nibley City municipal well, where mass-balance calculations suggest more than sufficient recharge for demands through the entire area involved.

Yours sincerely,

Robert Q. Oaks Jr.

Dr. Robert Q. Oaks, Jr.
Utah Licensed Professional Geologist 5212865-2250
Classic Geological Studies Corporation
1695 East 3100 North
North Logan UT 84341-1609
tel./answ./fax (435) 752-0867

GEOLOGIC SECTIONS

Well data in Table 1 are derived from the UDWRights web site. These wells were plotted on topographic maps at the indicated coordinates. The final sites of these wells may differ somewhat when surveyed. Figure 1 shows the map location of the geologic section and the wells used therein. Figure 2 shows the same geologic section twice: the upper section has a vertical exaggeration of 10, whereas the lower section has no vertical exaggeration. The static water level (piezometric surface) in each well is shown as a bar with ball where measured, or by an upward arrow if artesian flow occurred. Table 1 shows that static water levels in wells drilled 1936 through 2003 in the College Ward area (Section 19, T11N, R1W) was within 11 feet of the surface. Of the first 11 wells drilled, 3 were artesian, whereas the others measured had an average depth to water of 2 feet. Of the next 11 drilled, 5 were artesian, and the others measured had an average depth to water of 5 feet. Of the next 11 drilled, 4 were artesian, and the others measured had an average depth to water of 5 feet. Of the most recent 11 wells drilled, 3 were artesian, and the others measured had an average depth to water of 5 feet.

Locally, a thin upper unconfined aquifer is present, underlain by two confining layers, up to 70' and 40' thick, respectively, and with an upper confined aquifer between, up to 60 feet thick. That aquifer consists primarily of gravel and sand, locally muddy, and locally with cobbles. The upper confining layer is typically clay, oxidized brown in the upper part, and unoxidized gray below. The lower confining layer is typically tan to brown to red in the west; blue, gray, and green slightly W and SW of well 28H; and brown and red again to the east. Well 21B, projected 0.8 mile from the NE, lacks the typical excellent aquifer characteristics found in the Nibley City municipal well 28H, and thus probably lies NE of a corridor, or "fairway," of gravels and sands with high permeability and porosity. However, well 21A exhibits good aquifer characteristics. Thus, the NE margin of the "fairway" likely passes between those 2 wells.

Observations:

(1) Well 28B is completed in the upper unconfined aquifer; wells 19GG, 20A, 20B, 20D, 28A, and 29A are completed in the upper confined aquifer, and the other wells are completed in the lower main confined aquifer (Figure 2).

(2) The piezometric surface, based on wells drilled into the lower main confined aquifer between the 1960s and early 2000s, is nearly flat or may slope slightly down to the east about 10 feet from the middle of Section 20 to the east end of the geologic section. This condition preceded drilling of well 28H in 2003. From the middle of Section 20 westward, the piezometric surface is near or slightly above ground surface and slopes slightly down to the west parallel to the topography. This near-surface position of the piezometric surface has persisted from 1936 through 2003 (Table 1). Apparent differences in static water levels in adjacent wells in the section may be more apparent than real, because of projections of the wells into the section. For example, well 29B is 4,000 to 5,000 feet horizontally from wells 20B, 20C, and 20D. Also, surface altitudes of wells were interpolated with potential errors of about 5 feet, but possibly more if the final well site differs from the one shown on file.

Nevertheless, climatic factors may be reflected in adjacent wells completed in different years. Prior to well 28H, the maximum apparent differences in static water levels between nearby wells was about 30 feet vertically between well 28F (1977; lower) and well 28C (1991; higher), about 250 feet apart; about 28 feet vertically between well 29C (1972; higher) and well 29D (1998; lower), about 450 feet apart; and about 12 feet vertically between well 20B (1970; lower) and well 20C (1973; higher), about 450 feet apart. The state meteorologist can provide information on past years of drought and of abundance of precipitation needed to determine if some of the vertical changes in the static water levels are due to climatic fluctuations. Climate possibly affects static water levels in this area by as much as 10 to 30 feet.

(3) An essentially flat piezometric surface between well 28H and the College Ward area, nearly parallel to the present piezometric surface, would require a drop of 200 feet to cause the piezometric surface at the College Ward wells to drop below the completed intervals in all of those wells (Figure 2). A more reasonable hypothetical cone of depression, with the piezometric surface sloping down toward well 28H, would require a drop of perhaps 400 feet in well 28 H. Such a drop is not likely, for two reasons:

First: Calculations based on tests at Well 28H, supplied at my request by Lance Anderson, show a maximum drawdown of 14 feet at Well 28H after 20 years of projected pumping at the maximum capacity of the pump at that well. Calculated drawdowns in the surrounding cone of depression are about 4.5 feet in the area of College Ward.

Second: If drawdown is already affecting wells in College Ward area, the wells closer to well 28H should be impacted even more. No evidence has been submitted that the water levels in wells in the intermediate area has been lowered ***more*** than those in the College Ward area since well 28H has come on line. Unless those interceding wells show a greater marked decline, it is unlikely that pumping of well 28H has impacted the wells in Section 19 in College Ward.

MASS-BALANCE CALCULATIONS

A mass-balance calculation of groundwater flow must determine the cross-sectional area through which water moves and the rate of advance, to compare with proposed withdrawals. Study by Robinson (1999) showed a "fairway" of permeable aquifers of high transmissivity through the area studied here. Figure 19 of Robinson (1999) shows an area of high concentration of sulfate between Little Bear River and Blacksmith Fork, with flow lines of groundwater toward the NW. Width of this "fairway" is about 13,300' between the 45.00 mg/L contours at their narrowest, and about 17,500' between the 30.00 mg/L contours at their narrowest. Robinson (1999, Fig. 20) also determined values of tritium (H_3) at selected wells. Tritium was released into the atmosphere during above-ground nuclear tests, with a peak in 1962 - 1965. Radioactive decay has reduced tritium in water older than 1952 to background levels (0.76 Tu). Groundwater with concentrations >30 Tu is derived from precipitation between 1952 and 1969, whereas concentrations of 0.6 Tu to 30 Tu either were precipitated after 1969 or are a mix of pre-1952 and post-1952 waters (Robinson, 1999, pg. 54). Samples from Robinson's well #4 and from the spring at the head of Spring Creek (site #7) had concentrations between 12 and 13 Tu, whereas the sample from Robinson's well #8 had 0.03 Tu. Thus, there probably is a higher flux past well #4 than well #8. A high flux probably also exists for the spring at the head of Spring Creek. However, unlike wells #4 and #8, the spring could be

supplied from the upper confined aquifer or perhaps from the unconfined surface aquifer. If the spring at Spring Creek is supplied from the lower main confined aquifer, then the "fairway" of high permeability, through College Ward, is at least 17,500 feet wide to well #4. The SW boundary probably is between well #4 and well #8, which adds perhaps as much as 5,000 feet more in width. However, the NE margin of the "fairway" lies north of wells 21 A and 21 C and south of well 21 B, so the NE margin of the "fairway" may lie 2,000 feet to 3,000 feet SW of Spring Creek. A width of 17,500 feet is close to the width and essentially coincident with the areal extent of the "fairway" site based on the 30.00 mg/L contour for sulfate. Thus, a width of 17,000 feet width was selected for the mass-balance calculations.

There is a minimum cumulative thickness of 300 feet of water-bearing gravels and sands penetrated in the lower main confined aquifer in well 28H; 413 feet of aquifer sands and gravels below the second major confining layer in the deep well south of the Hunter Safety Facility on Valley View Highway (Utah State Highway 69); and at least 358 feet in the same setting in the deep well in Logan (Robinson, 1999, profiles F - F′ and G - G′). A minimum thickness of 300 feet for sands and gravels in this "fairway" was selected for the mass-balance calculations.

Migration rates of recharge in the "fairway" were calculated for well #4 and the Spring Creek site #7 by Robinson (1999, p. 58) from the minimum distances that tritium has migrated from flanking recharge zones into and through the lower main confined aquifer. He determined the rate to be at least 0.96 foot/day. Proximity of wells #4 and #8, with no elevation of tritium at the latter, led Robinson (1999, Fig. 21) to propose NNW recharge past well #4. A value of 1.0 feet/day is used here.
Fair sorting is assumed for the sands and gravels. Probably these are stream, delta, and beach deposits, and may have better sorting. Therefore, the inference of about 32% porosity is likely conservative (see Loucks, Dodge, and Galloway, 1972, Fig. 10; and Selley, 1988, Figs. 3.20 and 3.21).

Mass Balance Calculation, narrowest part of "fairway" =

17,000 feet x 300 feet = 5,250,000 square feet (SF) cross section
x 0.32 water-filled porosity = 1,680,000 SF water
x 1 feet/day flow rate = 1,680,000 cu feet/day
= 19.44 cu. feet/sec x 1.984
= 38.6 A-F/day = 14,060 A-F/year

Maximum withdrawal by Nibley well 28H = 1,961 A-F/year (13.9% of total available)
Residual, not diverted by Nibley well 28H = 12,099 A-F/year

For comparison, a very conservative mass-balance calculation was made. A "fairway" width of only 10,000 feet (60.00 mg/L sulfate-concentration width of Robinson, 1999, Fig. 19), a thickness of 300 feet, a flow rate of 1.00 foot/day, and porosity of only 25%, yields an estimated recharge mass balance calculation =

10,000 x 300 x 0.25 x 1 = 750,000 cu feet/day = 6,276 A-F/year
Maximum withdrawal by Nibley well 28H = 1,961 A-F/year (31.2% of total available)
Residual not diverted = 4,315 A-F/year

A calculation of the minimum present diversion for College Ward is shown at the top of Figure 3. The actual diversions will be greater if more than one home is supplied by some wells, if there are older wells not documented in the UDWRights web page, and if some wells are used for irrigation, stock watering, etc. The values used for the calculations are from Anderson and Bares (2003). The present diversion for College Ward probably is at least 50 to 90 A-F/year. Possibly it is as high as 200 A-F/year.

Thus, the mass-balance calculations suggest ample recharge WNW past Nibley well 28H to supply the current diversion in College Ward. Also, these calculations are consistent with the Cache-Landmark calculations that indicate a maximum 20-year drawdown of 14 feet at Nibley City municipal well 28H and about 4.5 feet at College Ward. The results also are consistent with the observation that the piezometric surface for the lower main confined aquifer has been at or very close to the present land surface from the middle of section 20 WNW through College Ward as recently as 2001 and for many years before that.

The flat or slight slope down of the piezometric surface ESE toward the Nibley well 28H suggests that the highest flow in the recharge "fairway" may lie between Nibley and College Ward. If correct, that condition could further buffer the College Ward area from some or all of the 4.5 feet of drawdown calculated to occur during 20 years of pumping of Nibley well 28H at full capacity. The inference of Robinson (1999, Fig 21) of a NNW direction of recharge near his well #4 is consistent with a slightly more southerly source of recharge for College Ward rather than directly from the area of well 28H. In any case, the high recharge rate of 6,000 to 14,000 A-F/year, derived from mass-balance calculations, suggests that there is adequate water available for both Nibley and College Ward.

ANALYSIS OF CUMULATIVE ADDITION AND AREAL DISTRIBUTION OF WELLS IN COLLEGE WARD, SEC. 19, T11N, R1E, SBLM

If Nibley City municipal well 28H is not the likely cause of the low water levels in some wells in College Ward in Summer, then what other factors might contribute? One possibility is the effect of the severe drought of the past 4 years. Another is the cumulative addition of wells in College Ward. A third is the proximity of deeper wells and shallower wells.

A plot was made from Table 1 of the cumulative number of wells by year (Figure 3). An early episode of rapid increase in new wells (1936-1946) was followed by an episode of gradual, steady increase (1947-1983) and then the present episode of rapid increase (1984-2003). Figure 3 suggests that the cumulative addition of wells could contribute to the low water levels during Summers in College Ward.

Wells with a diameter less than 4 inches cannot accept available submersible pumps, and so are the most susceptible to a fall in water level. The last 2-inch-diameter well in College Ward in Section 19 was completed in 1951. Deterioration of the pipe plus infrastructure in these wells in the past 52 to 67 years also may contribute to the problem. Two of the 12 wells recorded with 2-inch diameters (19 A, 19 O) were replaced by 4-inch-diameter wells (19 Q, 19 T) in 1959 and 1970, respectively.

Thus, only ten 2-inch-diameter wells in the UDWRights web-site database remain. The third and last 3-inch-diameter well was completed in 1976. The other 27 recorded operative wells can accept a submersible pump. The average depth of the 10 recorded operative 2-inch-diameter wells is 130.5 feet; of the 3 recorded operative 3-inch-diameter wells is 133.7 feet; of the 13 recorded operative 4-inch-diameter wells is 138.2 feet; of the 13 recorded operative 6-inch-diameter wells is 138.9 feet; and of the 1 recorded operative 8-inch diameter well is 151 feet. Although similar in average depth, the shallower average for 2-inch-diameter wells could be a factor.

Only the deepest wells were included in Figure 2. Two 6-inch-diameter wells, drilled in 2000 and 2001, had static depths with water of 10 feet and 1.25 feet, respectively, but the yield was insufficient for the requirements, and the wells were plugged. Yields from pumping tests have varied from 7 gpm (19J) to 230 gpm (19JJ), but measured maximum yields once submersible pumps were installed varied from 16 gpm (19W, 19KK) to 25 gpm (19RR). The maximum recorded drops in water level during testing were 18 feet in 6 hours (19V), 14 feet with no recorded time interval (19Q), 12 feet in 3 hours (19Z), 10 feet in 24 hours (19U), and 10 feet in 48 hours (19T). Well 19S showed no drop in 42 hours when tested at 10 GPM. A total of 17 wells have no record of the vertical drop in water level nor length of time of testing. However, 12 of those 17 had artesian flow. No record of time interval was made for 11 additional wells. All wells with drops of 10 feet or more were in wells with 4-inch diameters, after the last 2-inch-diameter well was drilled.

Areally, 4 of 5 clustered wells in the west part of Section 19 had artesian flow; 3 clustered wells along Hyrum Slough had artesian flow; NNE and E the 4 wells closest to the Hyrum Slough cluster also had artesian flow; and 2 wells in the tight cluster of wells SE of the College Ward Church had artesian flow. Two wells (19A, 19O) that had artesian flow were replaced in 1959 (19Q) and 1970 (19T) by deeper wells without artesian flow. Seven wells that had artesian flow, including well 19O, are smaller than 4-inch diameter and therefore very susceptible to changes in water level because a submersible pump cannot be implanted.

From the summary above, it is clear that two wells that initially had artesian flow were replaced by deeper wells with no artesian flow, in 1959 and 1970, years before the 2003 well 28H was completed. Well 19LL has the same described location as well 19II, but is 35 feet deeper. Also, substantial drops in the water level of 10 feet to 18 feet occurred during pumping tests as early as 1959. No substantial drops were recorded since 1978, but no recorded tests since then have exceeded 4 hours' duration.

The areal distribution of 2-inch-diameter wells and wells deeper than 140 feet is instructive. Well 19KK (172 feet; 6-inch diameter) is shown less than 200 feet upflow (SE) from well 19J (149 feet; 2-inch diameter). Well 19EE (151 feet; 8-inch diameter) is shown about 400 feet upflow from well 19X (138 feet; 3-inch diameter). Well 19U (170 feet; 4-inch diameter) is shown about 300 feet from well 19B (122 feet; 2-inch diameter) and from well 19C (106 feet 2-inch diameter). Well 19OO (140 feet; 6-inch diameter) is shown about 200 to 300 feet upflow from well 19 K (137 feet: 3-inch diameter), well 19L (140 feet; 2-inch diameter), and well 19S (124 feet; 4-inch diameter). The cluster of small-diameter wells near College Ward Church, 19D (126 feet; 3-inch diameter), 19E (133 feet; 2-inch diameter), 19G (133 feet; 2-inch diameter), 19H (126 feet; 2-inch diameter), 19N (133 feet; 2-inch diameter), and 19P (136 feet; 2-inch diameter) are all shallower and smaller in diameter than the two deep wells mixed in with them (19Y; 210 feet; 6-inch diameter) (19AA; 170 feet; 4-inch

diameter), the one nearby well (19Q; 147 feet; 4-inch diameter), and the three wells upflow to the south (19LL; 155 feet; 6-inch diameter) and to the southeast (19T; 200 feet; 4-inch diameter) (19Z; 200 feet; 4-inch diameter). The correlation of deeper wells of larger diameter near shallower wells less than 4 inches in diameter described here is remarkable.

CONCLUSION

The evidence suggest that the problem of low water levels in wells in College Ward during the Summers likely results from: (1) severe drought; (2) cumulative addition of wells through time; and (3) proximity of deeper wells with larger diameters to older, shallower wells with smaller diameters that do not permit emplacement of submersible pumps. College Ward may want to consider drilling a deep, large-diameter municipal well to service the entire community, as Nibley has done. There appears to be significant risk of ongoing problems if proliferation of wells for individual homes continues in College Ward in Section 19.

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Table 1. Data from Drillers' Logs of Water Wells in Sec 19, T11N, R1E

Well	Water Right	Identifier	Date	Depth feet	Pump feet	Perf's feet	Temp in °F	Pump gpm	Test gpm	Test hrs	Drop feet	Static W L in feet	Casing inches
19RR	0325600P01	Provisional	6\13\03	145	105	138	ND	25	200	1	ND	1.5	6
19QQ	25-639 abnd		1\25\01	130	20	128	ND		40	1	1.5	1.25	6
19PP	25-71 abnd	A 21726	11\17\00	140		135	ND		33	1	0	10	6
19OO	25 \ 10076	F 72253	11\1\99	140		140	ND		50	1.5	0	ND	6
10NN	25 \ 9926	A 71328	5\18\99	120	85	120	ND	16	30	1	5	5	6
19MM	25 \ 9111	A 65179	7\2\97	138		138	ND		300	ND	ND	Artesian +2	6
19LL	25 \ 9586	A 68918	10\31\96	155	25	155	"cold"	20	50	1	4	9	6
19KK	25 \ 9691	A 69609	8\24\96	172		162	ND	16	30	1	0	ND	6
19JJ	25 \ 9162	A 65621	5\24\96	140	25	138	ND	20	230	ND	ND	Artesian +1	6
19 I I	25 \ 9586	A 68918(?)	10\26\95	120	110	102	52	18	50	2	ND	4	6
19HH	25 \ 9457	A 67758	9\14\94	117		115	ND		250	ND	ND	Artesian	6
19GG	25 \ 1052	U 15976	9\18\91	109		100	44		29	1	0	11	6
19FF	25 \ 8982	A 63868	9\8\89	116		115	ND		80	2	1.5	0.5	6
19EE	25 \ 555	U 13263	8\26\88	151		104	ND		ND	ND	ND	4	8
19DD	25 \ 8757		9\23\86	112		107	ND		125	ND	ND	Artesian	4
19CC	25 \ 8671	A 60838	6\3\86	105		105	ND		187	ND	ND	Artesian	4
19BB	25 \ 8662	A 60628	3\13\85	124		122	ND		200	2	3	2	6
19AA	25 \ 1447	A 16206	2\9\84	170	none	ND			30	4	3	3	4
19Z	25 \ 7646	51521	9\20\78	199	none	51			30	3	12	ND	4
19Y	25 \ 7425	49955	10\27\77	210	none	53			100	6	ND	11	6
19X	25 \ 6738	45902	4\1\76	138	none	53			20	ND	ND	Artesian+21	3
19W	25 \ 5218(?)	40843	10\17\71	100	none	53		16	225	ND	ND	Artesian+23	4
19V	25 \ 5299	40844	10\1\71	140	none	52			100	6	18	Artesian +1	4
19U	25 \ 4960	A 39816	7\2\70	170	none	52			60	24	10	Artesian +1	4
19T	25 \ 1050	A 23241	6\8\70	200	none	ND			40	48	10	5	4
19S		33767	11\6\61	124	none	ND			10	42	0	9	4
19R		C 2762	8\29\61	124	124(?)	50			15	1	6(?)	10	4
19Q		A 21434	7\31\59	147		52			25	ND	14	4	4
19P		23365	11\14\51	136		50			30	ND	ND	Artesian +3	2
19O		A 23241	9\20\51	66		52			40	ND	ND	Artesian +6	2
19N		21726	6\20\50	133		50			15	ND	2	1	2
19M		20495	5\19\50	130		50			10	ND	0.5	1.2	4
19L		17638	6\29\46	140		50			15	ND	ND	Artesian +3	2
19K		17514	5\21\46	137		50			20	ND	1.5	0.5	3
19J		17309	10\22\45	149		53			7	ND	ND	Artesian +1	2
19 I		C 19754	6\12\45	76		49			20	ND	2	3	4
19H		16206	5\9\45	126		49			20	ND	2	3	2
19G		15470	10\5\43	133		49			15	ND	4	0	2
19F		14493	10\15\41	127		49			8	ND	0	7	2
19E		13057	9\26\39	133		49			20	ND	2	3	2
19D		A 13247	8\15\39	126		50			8	ND	2	3	3
19C		C 17891	5\25\36	106		49			80	ND	ND	Artesian	2
19B		13087	5\15\36	122		49			10	ND	ND	Artesian	2
19A			5\9\36	119		57			30	ND	ND	4	2

LICENSED PROFESSIONAL GEOLOGIST
DR. ROBERT Q. OAKS, JR.
#212865-2250
2-13-2004
STATE OF UTAH

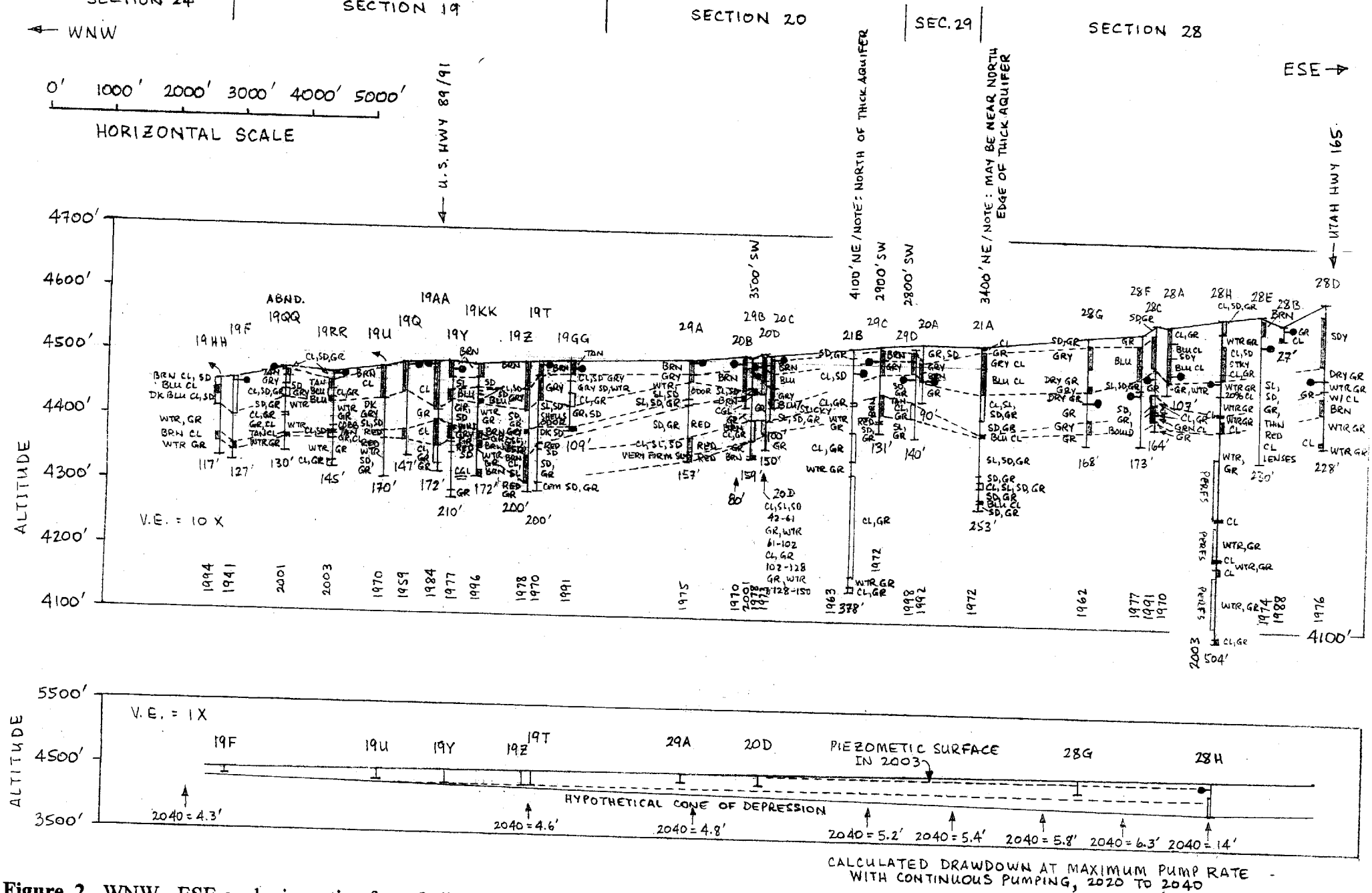

Figure 2. WNW - ESE geologic section from College Ward to Nibley, Utah, T11N, R1E, SLBM. The vertically exaggerated upper section shows sediment types, colors, water, etc., noted in drillers' logs of water wells. Bar and ball shows static water level when the well was completed, or an arrow for artesian flow. The year each well was drilled is shown along the bottom. The lowers section has no vertical exaggeration, and shows the piezometric surface in 2003, the calculated drawdown in 2040 after 20 years at the maximum pump capacity of the Nibley City well (28H), and the approximate cone of depression, about 400 feet lower, that would be required to drop the piezometric surface below the wells in College Ward.

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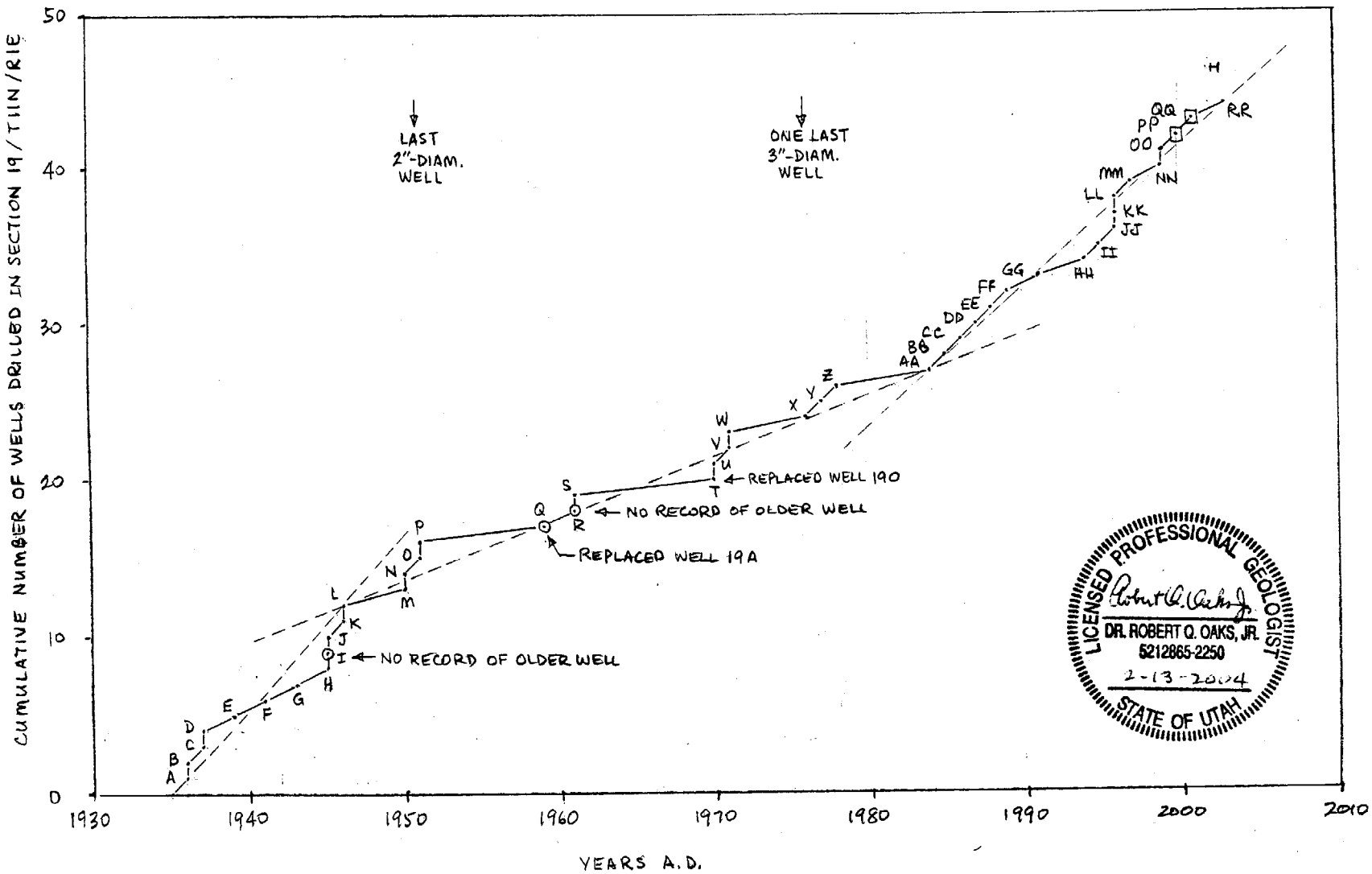
SECTION 19 T11N R1E SLBM / COLLEGE WARD

· NEW WELL
⊙ REPLACED OLD WELL
⊡ NEW WELL, ABANDONED
N NIBLEY WELL DRILLED

ASSUME 0.5 ACRE / LOT
ASSUME 1 HOME, 4 OCCUPANTS PER WELL
IGNORE REPLACED AND ABANDONED WELLS = 44 - 4 = 40
USE TABLE 3 OF CACHE - LANDMARK REPORT
½ ACRE TOTAL RESIDENTIAL WATER DIVERSION PER WELL = 1.23 A-F/YEAR X 40 WELLS = 49.2 A-F/YEAR
ASSUME 1.0 ACRE/LOT: TOTAL RESIDENTIAL WATER DIVERSION = 2.15 A-F/YR X 40 = 86.0 A-F/YEAR

Figure 3. **Graph showing cumulative number of wells drilled, 1936 - 2003, in College Ward, Sec 19, T11N, R1E, SLBM.**



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2-13-2004
STATE OF UTAH

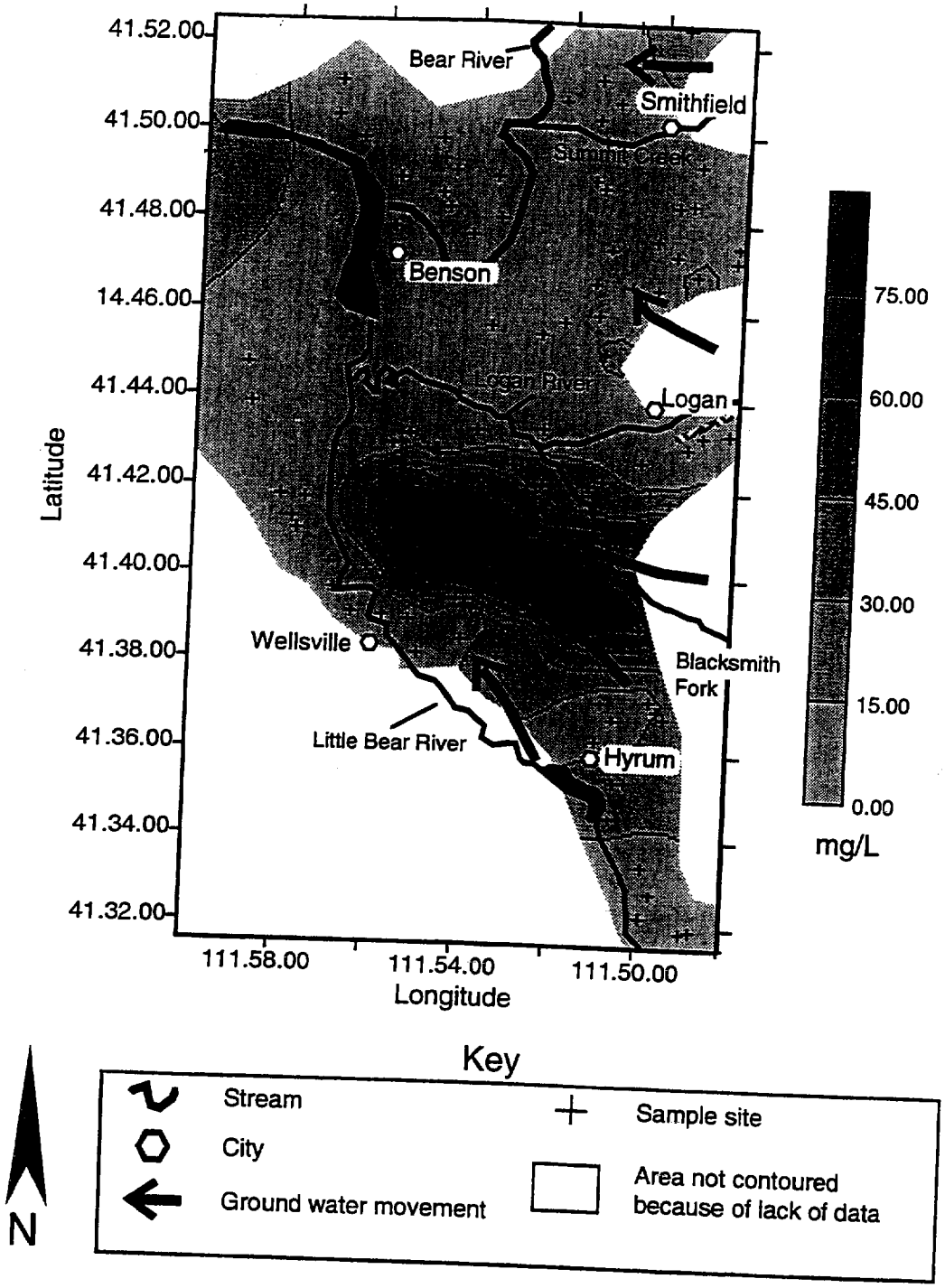


Figure 19. Areal distribution of sulfate (SO_4^{2-}) in Cache Valley. All chemical data are displayed in Appendix B. Contour lines were generated with Surfer32 by the kriging method. Sample sites are not discriminated on the basis of well depth.

MIKE ROBINSON 1999

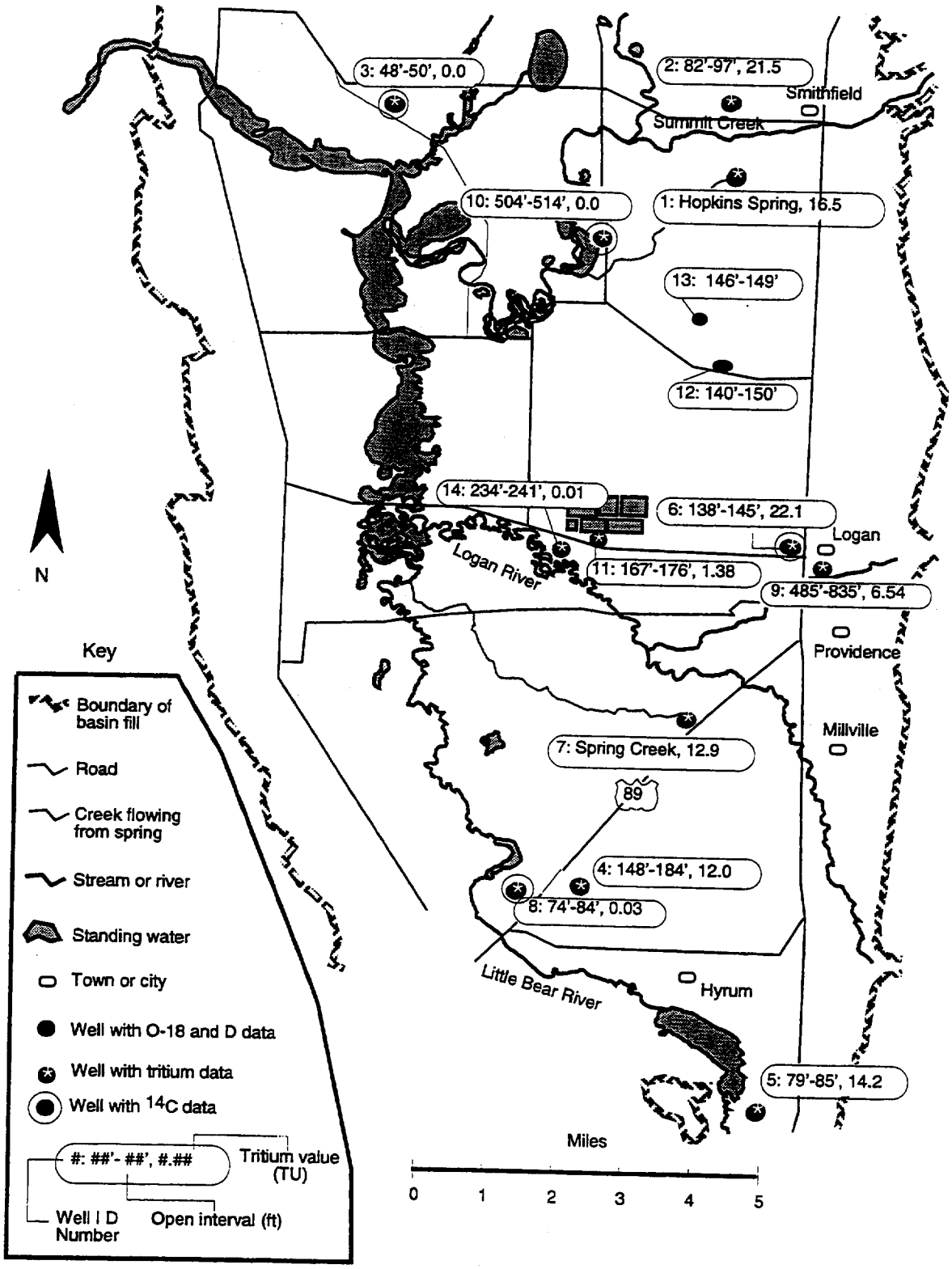


Figure 20. Locations of wells sampled for tritium, oxygen-18 and deuterium, and carbon-13 and carbon.

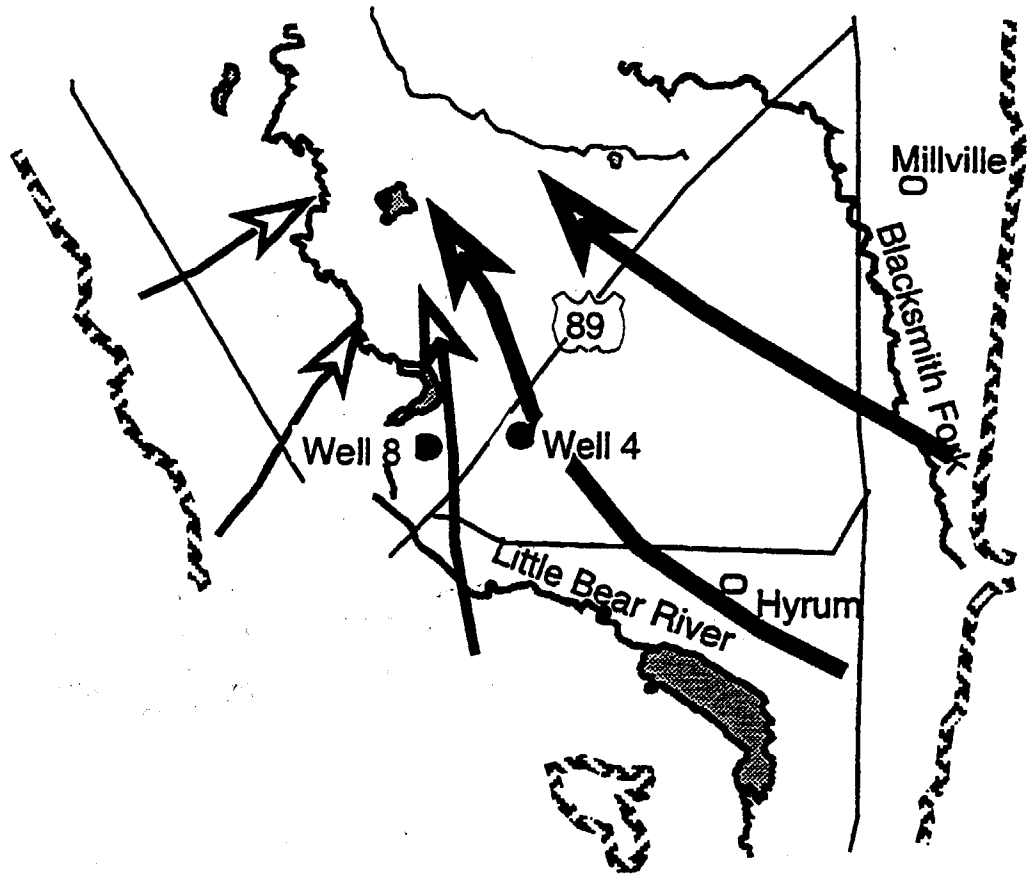


Figure 21. Illustration of hypothesis explaining the discrepancy in tritium values between wells 8 and 4. Arrows denote the general flow direction of ground water as indicated by the potentiometric surface contoured by Kariya et al. (1994). The relative widths of the arrows portray the relative fluxes.

MIKE ROBINSON 1999

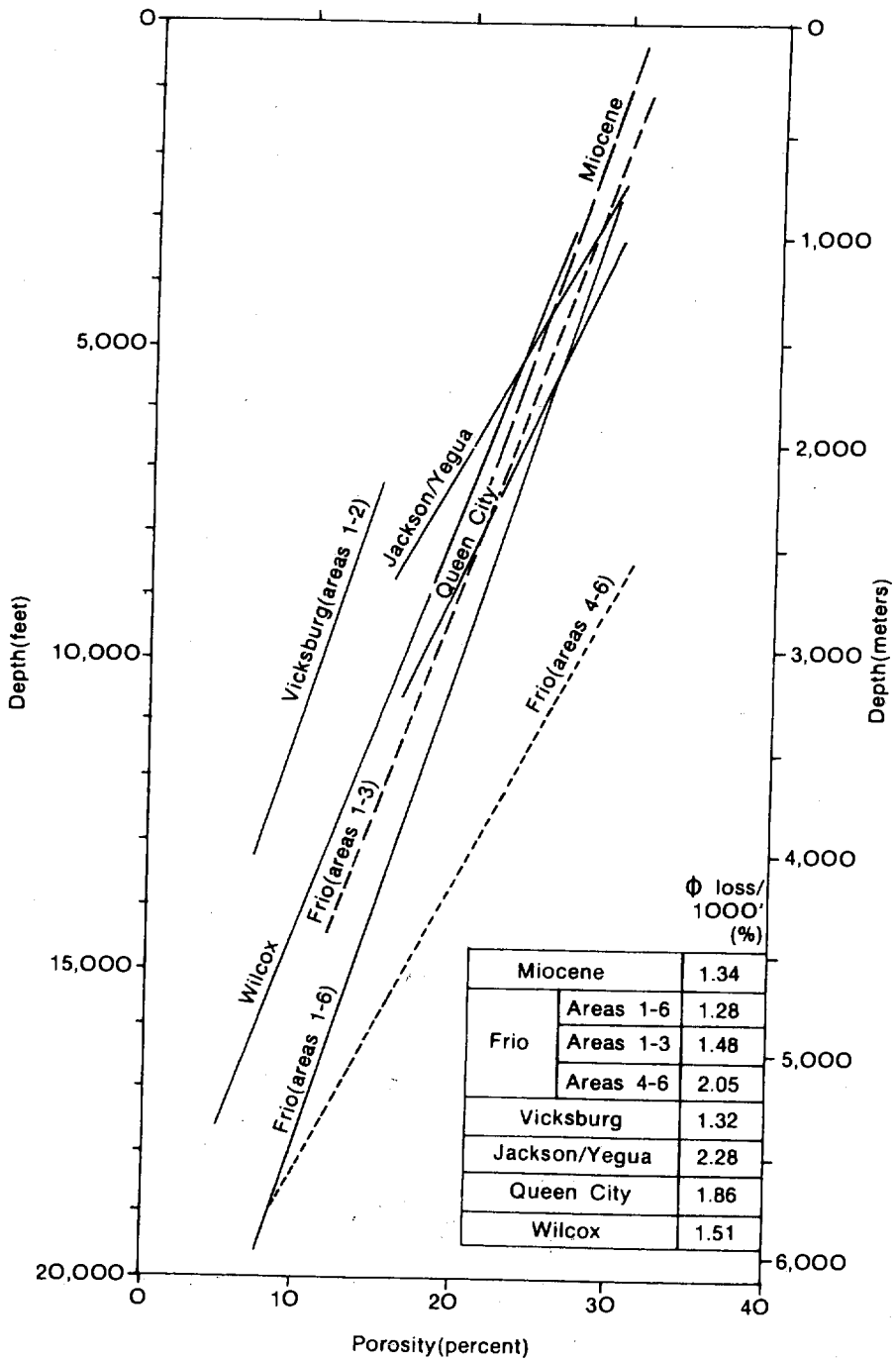


Figure 10—Mean sandstone porosity versus depth by unit for Lower Tertiary strata along the Texas Gulf Coast. Table in lower right hand corner shows porosity loss per 1000 ft for each formation.

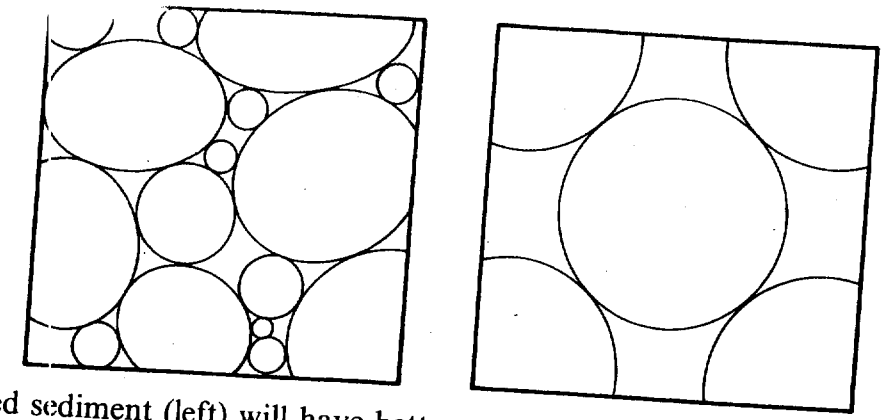
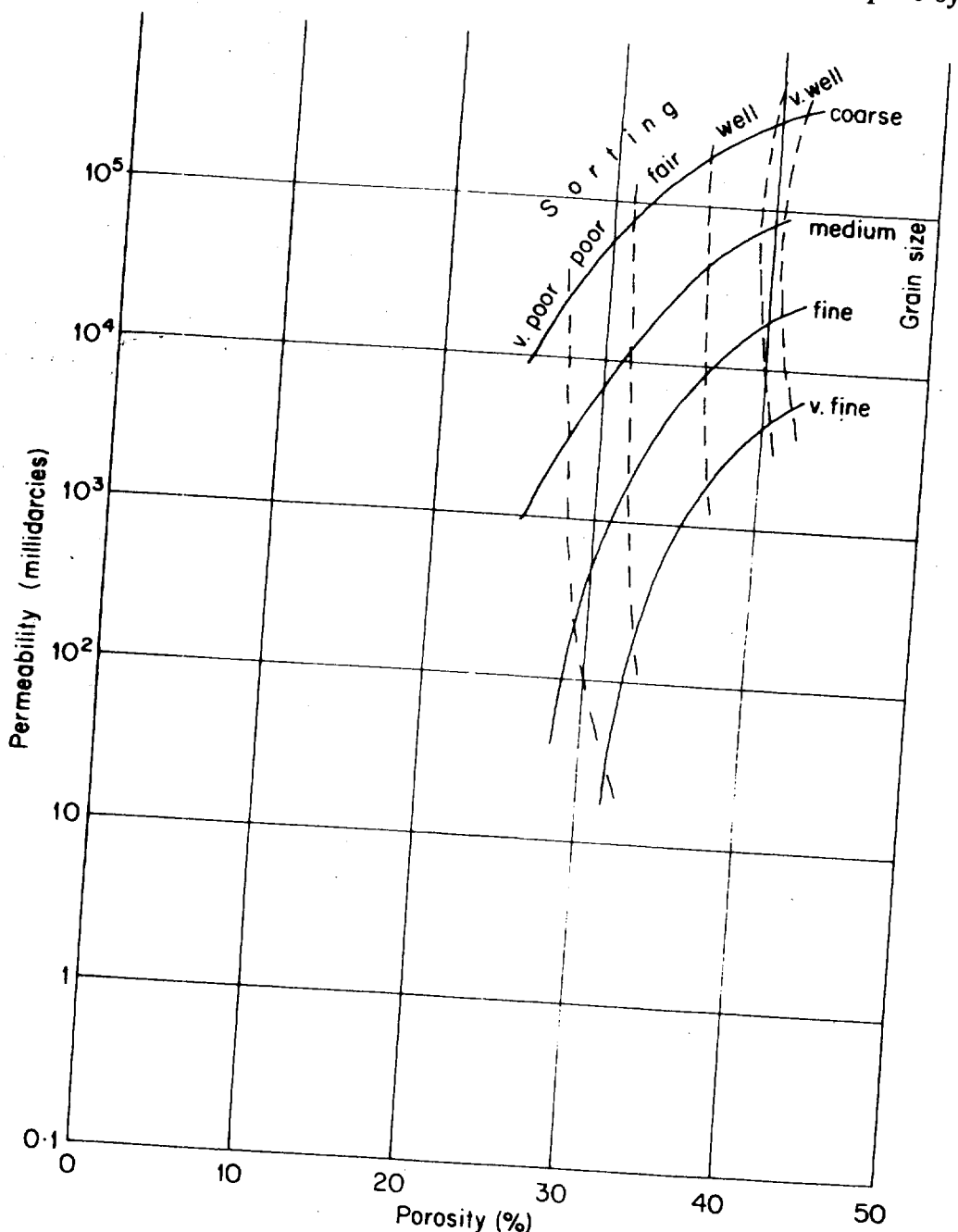


Fig. 3.20. A well-sorted sediment (left) will have better porosity and permeability than a poorly sorted one (right). In the latter the space between the framework grains is infilled, thus diminishing porosity. The heterogeneous fabric diminishes permeability by increasing the tortuosity of the pore system.



. 3.21. Graph to show the relationship between petrophysics and sediment texture in unconsolidated clay-e sand. For explanation see text (from Beard and Weyl, 1973; Nagtegaal, 1978).

R. C. Selley 1988
Applied Sedimentology

SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GN MN 0°37' 11 MILS 15° 267 MILS

UTM GRID AND 1986 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LICENSED PROFESSIONAL GEOLOGIST
Robert Q. Oaks
DR. ROBERT Q. OAKS, JR.
5212865-2250
2-13-2004
STATE OF UTAH

Well	Total Depth	Well	Total Depth
19A	119'	19W	100'
19B	122'	19X	138'
19C	106'	19Y	240'
19D	126'	19Z	200'
19E	133'	19AA	170'
19F	129'	19BB	124'
19G	133'	19CC	105'
19H	126'	19DD	112'
19I	76'	19EE	151'
19J	149'	19FF	116'
19K	137	19GG	109'
19L	140'	19HH	117'
19M	130'	19II	120' SEE 19LL
19N	133'	19JJ	140'
19O	66'	19KK	172'
19P	136'	19LL	155' SEE 19 II
19Q	147'	19MM	138'
19R	124'	19NN	120'
19S	124'	19OO	140'
19T	200'	19PP	140' ABND
19U	130'	19QQ	130' ABND
19V	140'	19RR	145'

SEE 19Q

SEE 19T

EXPLANATION

- ⊙ well diameter ≤ 3 inches
- ● well ≥ 140 feet deep
- ◎ initial artesian flow
- ◎ spring/well tested for tritium

Figure 1. Topographic map showing locations of wells and of geologic section, Nibley and College Ward area, Cache Valley, Utah. Base from U.S. Geological Survey Wellsville and Logan 7.5-minute quadrangles. Contour interval is 40 feet, with dashed supplemental contours 10 feet apart vertically. Numbered sections are about 1 mile (5,280 feet) across.

APPENDIX D

MITIGATION WATER FOR WR 25-9078

According to the justification report filed by Cache Landmark dated February 2004, the mitigation water for WR 25-9078 came from water shares in Clear Creek Irrigation Company, Nibley Blacksmith Fork Irrigation Company, College Irrigation Company, and individual water rights. The following table is from that report and shows how the depletion credit was calculated.

Table D1. WR 25-9078 Mitigation Water per 2004 Justification Report.

Source	Sole Supply Acres (acres)	Total Shares in Irrigation Company (AF/yr)	Decreed or Estimated Depletion per Acre (AF/yr)	Calculated Historic Depletion per Share/Right (AF/share)	Number of Shares Owned by Nibley	Total Depletion Credit (AF/yr)
Clear Creek	155	200	2.08	1.61	65	104.7
Nibley Blacksmith Fork	2,648	2,377.75	2.08	2.32	94	218.1
College	1,036.7	778	2.08	2.77	22	60.97
Individual Water Rights*	45		2.08	2.08		93.6
Total						477.3

*The individual water rights are listed as potential water rights and include 25-314, 25-315, 25-316, 25-317, 25-528, 25-529, 25-708, 25-1981, 25-3503, 25-5429.

The total depletion necessary to mitigate was determined as 604.4 AF/year in the justification report and verified in the Memorandum Decision of the State Engineer dated May 11, 2005. The justification report stated that additional water shares and rights would be acquired in the future to completely fulfill the mitigation requirement prior to utilizing the full volume of the approved water right. The specific method of the calculations shown in Table D1 are detailed in Appendix G.

In a letter addressing protestants of WR 25-11236 dated December 10, 2014, Cache Landmark presented an updated list of the mitigation water for WR 25-9078 as shown below (letter is included in this appendix). It was assumed that this list took into account the updated amount of water shares Nibley held at that point in time.

Table D2. WR 25-9078 Mitigation Water per 2014 Cache Landmark Letter.

Source	Shares held by Nibley	Depletion per Share (AF/yr)	Depletion Credit (AF/yr)
Clear Creek	86.5	1.61	139.3
Nibley Blacksmith Fork	246.92	2.32	572.9
Spring Creek-Cache	23.5	2	47
Logan-Providence	18	2	36
Individual Water Rights	45	2	90
Total			885.1

As shown, during the 10 years between the justification report and the letter with updated share information, Nibley City acquired additional shares in Clear Creek Irrigation Company and Nibley Blacksmith Fork Irrigation Company. The other shares incorporated into the 2014 letter may have also been acquired during that time or utilized to obtain the necessary depletion amount. As shown, College Irrigation shares were removed which is likely due to them being used for mitigation water for WR 25-11236 rather than WR 25-9078. The problem is that Nibley does not currently own any Logan-Providence Irrigation Company shares and only owns two of the water rights originally listed in the 2004 report that were reiterated in the 2014 letter. It was assumed that the Logan-Providence shares were traded to Logan City as indicated in Appendix C of the 2012 Water Master Plan. However, Nibley still meets the necessary depletion amount without the use of the Logan-Providence share and the other water rights. In reality, even the two water rights listed that are held by Nibley are not needed for the mitigation.

As the proof date draws near, FCE recommends that Nibley City determine exactly what shares will be used for mitigation water for WR 25-9078 and if the listed Water Rights 25-3503 and 25-5429 will be included in the mitigation water. The proof can then document exactly what water is used so that Nibley does not use that water elsewhere.

CACHE • LANDMARK
ENGINEERS • SURVEYORS • PLANNERS

December 10, 2014

HEARING SUBMITTAL TO DIVISION OF WATER RIGHTS
Right No.: 25-11236
Date: 2/12/2015
Submittee: Fatherington Law
1/2 hrs

Bear River Water Users Association/ Pacificorp

RE: Water Right 25-11236 Protest Response

NIBLEY CITY EXISTING WATER RIGHT 25-9078
This letter summarizes the conditions the City has met with the existing Water Right 25-9078. The table below shows the diversion amounts of the Nelson Well. The well was installed with a measuring device (meter) as per requirement of the memorandum of decision by the State Engineer.

Year	Diversion (acre-feet)	Depletion Requirement (acre-feet)
2006	575.6	215.6
2007	782.9	293.2
2008	376.7	141.1
2009	339.5	127.1
2010	804.6	301.3
2011	631.2	236.4
2012	1008.3	377.6
2013	610.6	228.7

As per the Engineers decision the City is required to have one acre-foot of depletion for every 2.67 acre-feet of diversion. The table above shows the depletion requirement for the diversion amounts per year.

The City has acquired sufficient water rights and water shares to meet the diversion and depletion requirements. The water rights/shares were acquired as development occurred within City Limits for the last twelve years. The land developed was taken out of production. The table below shows the equivalent amount of depletion for the shares acquired by the City. The depletion calculations were provided in the report "Justification for the Approval of Additional Water Rights for Nibley City (March 25, 2002)" for Water Right 25-9078.

1011 W. 400 N., SUITE 130 • LOGAN UT 84321
435.713.0099 OFFICE 435.713.0055 FAX • OFFICE@CACHELANDMARK.COM

	Shares	Depletion per Share (acre-feet)	Depletion (acre-feet)
Clear Creek	86.5	1.61	139.3
Nibley Blacksmith	246.92	2.32	572.9
Spring Creek- Cache	23.5	2	47.0
Logan-Providence	18	2	36.0
Water Rights	45	2	90.0
Total			**885.1**

The table above shows sufficient water shares and rights for the amount of diversion by Nibley City. In addition, Nibley City had acquired College Irrigation shares for depletion, which will be used for this new application.

Sincerely,

Lance Anderson, P.E.
Principal Engineer

APPENDIX E

MITIGATION WATER FOR WR 25-11236

The mitigation water set aside for the approval of WR 25-11236 differs across various sources. Nibley wrote a letter to UDWRi dated June 2, 2014, which indicated how the depletion was calculated for the selected mitigation water shares and how it was used to determine the diversion amount from the new wells. This letter indicated that 259.92 shares from College Irrigation Company would be used as mitigation water, resulting in an equivalent groundwater diversion of 1,201 AF/year. It also indicated the specific certificates that would be dedicated as mitigation water and provided a map that indicated 260 acres that would be removed from production.

The specific College Irrigation share certificates dedicated as mitigation water include: 335, 345, 348, 350, 353, 356, 357, 369, 373, 374, 379, 423, 429, 445, 449, and 455.

However, in the Order of the State Engineer dated September 27, 2016, the mitigation water was stated as coming from 265 shares of College Irrigation Company and equated to the removal of 270 acres from production. It is not clear where the discrepancy between this Order and the previous letter came from. Nibley City should verify what mitigation water is necessary to better understand what water shares are still available for use. Detailed calculations for how this mitigation depletion value was calculated is shown in Appendix G.

NIBLEY
SETTLED 1865

2 June 2014

Utah Division of Water Rights
Attn: Will Atkin, Regional Engineer
1780 North Research Parkway, Suite 104
North Logan, UT 84341

Dear Mr. Atkin:

Nibley City acquired College Irrigation Company shares through the development of irrigated agricultural land within the city service area, as shown on the attached map. The lands previously associated with the shares were removed from agricultural production and the land has been developed with residential homes being serviced by our culinary water system. At the time of development, the developers were required by ordinance to transfer all irrigation shares associated with the land to the city.

Sincerely,

David Zook
City Manager

Nibley City
455 W. 3200 S., Nibley, UT 84321
Phone: (435) 752-0431 Fax: (435) 753-1510
www.nibleycity.com

POINT OF DIVERSION FOR WATER STATE OF UTAH

C·L
Cache • Landmark
Engineers
Surveyors
Planners
1011 WEST 400 NORTH
Suite 130
Logan, UT 84321
435.713.0099

PROFESSIONAL ENGINEER
LANCE ANDERSON
323733-2202
STATE OF UTAH

POINT OF DIVERSION
STATE OF UTAH

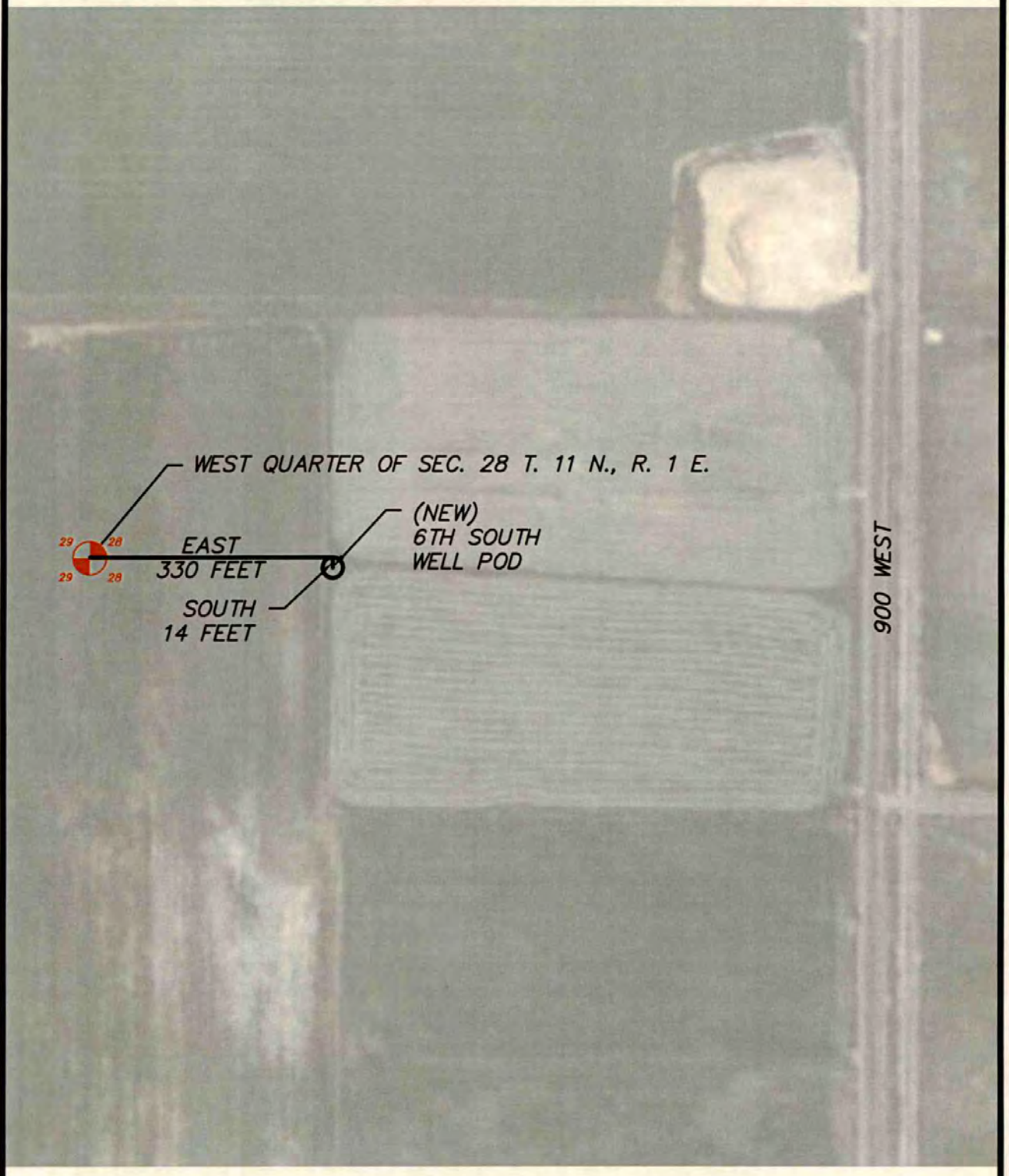
NORTH EAST CORNER OF SECTION 28
NIBLEY, CACHE COUNTY, UT

WATER RIGHT NO: _____
APPLICATION NO: _____
OWNER:
CIVIL ENGINEER: LANCE ANDERSON
LICENSE NO: 323733-2202

DATE: 06 Aug. 2014
SCALE: 1"=300'
APPROVED BY: L. ANDERSON
PROJECT NUMBER: 610-1204
SHEET: C-1

Logan 09-10-2014 12:32 003

POINT OF DIVERSION FOR WATER STATE OF UTAH



NORTH

0 100' 200' 400'

Logan 09-10-2014 12:32 004

C·L
Cache • Landmark
Engineers
Surveyors
Planners
1011 WEST 400 NORTH
Suite 130
Logan, UT 84321
435.713.0099

PROFESSIONAL ENGINEER
LANCE ANDERSON
323733-2202
STATE OF UTAH

POINT OF DIVERSION
STATE OF UTAH

WEST QUARTER OF SECTION 28
NIBLEY, CACHE COUNTY, UT

WATER RIGHT NO: _____
APPLICATION NO: _____
OWNER:
CIVIL ENGINEER: LANCE ANDERSON
LICENSE NO: 323733-2202

DATE: 06 Aug. 2014
SCALE: 1"=200'
APPROVED BY: L. ANDERSON
PROJECT NUMBER: 610-1204
SHEET: C-1

POINT OF DIVERSION FOR WATER STATE OF UTAH

Cache • Landmark
Engineers
Surveyors
Planners
1011 WEST 400 NORTH
Suite 130
Logan, UT 84321
435.713.0099

PROFESSIONAL ENGINEER
LANCE ANDERSON
323733-2202
STATE OF UTAH

POINT OF DIVERSION STATE OF UTAH

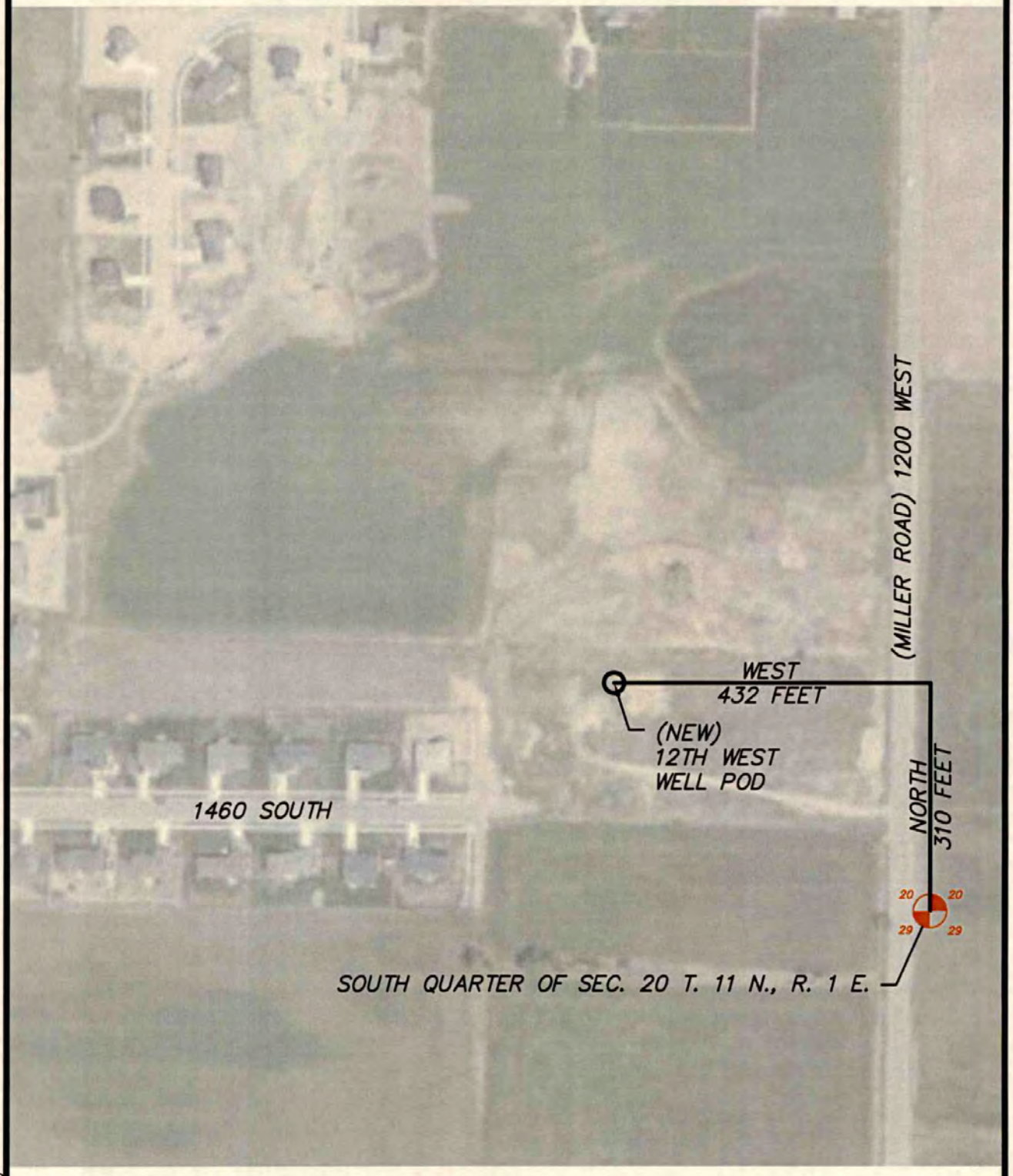
SOUTH EAST CORNER OF SECTION 28
NIBLEY, CACHE COUNTY, UT

WATER RIGHT NO: _____
APPLICATION NO: _____
OWNER:
CIVIL ENGINEER: LANCE ANDERSON
LICENSE NO: 323733-2202

DATE: 06 Aug. 2014
SCALE: 1"=200'
APPROVED BY: L. ANDERSON
PROJECT NUMBER: 610-1204
SHEET: C-1

Logan 09-10-2014 12:32 005

POINT OF DIVERSION FOR WATER STATE OF UTAH



NORTH

0 100' 200' 400'

Logan 09-10-2014 12:32 006

Cache • Landmark
Engineers
Surveyors
Planners
1011 WEST 400 NORTH
Suite 130
Logan, UT 84321
435.713.0099

PROFESSIONAL ENGINEER
LANCE ANDERSON
323733-2202
STATE OF UTAH

POINT OF DIVERSION
STATE OF UTAH

SOUTH QUARTER OF SECTION 20
NIBLEY, CACHE COUNTY, UT

WATER RIGHT NO: _____
APPLICATION NO: _____
OWNER:
CIVIL ENGINEER: LANCE ANDERSON
LICENSE NO: 323733-2202

DATE: 06 Aug. 2014
SCALE: 1"=200'
APPROVED BY: L. ANDERSON
PROJECT NUMBER: 610-1204
SHEET: C-1

EXHIBIT B

Mitigation Water for Application

Within Nibley City the demand for municipal water supplies is increasing to meet new growth. The new growth is occurring on undeveloped lands within the City and also as a result of new annexation petitions for lands within the unincorporated areas. Existing water supply of the City is not sufficient to meet the projected new growth.

The Utah Division of Water Rights has adopted the Interim Cache Valley Ground-Water Management Plan. New applications to appropriate groundwater, even for municipal purposes, are not generally allowed without a showing of how impacts to downstream users will be compensated or that adequate replacement water is provided. However, under the policy of the Utah Division of Water Rights, applications to appropriate groundwater in the Cache Valley are permitted if the application includes a mitigation plan that shows the new application will not result in a new depletion of water within the drainage. In effect then, the new application will not impact downstream prior rights. This application falls within that policy.

The report of Trevor Hughes, 1996, to the U.S.G.S, which is sited in the Management Plan states:

> "There are substantial return flows from municipal uses, and as demands approach and exceed some traditional supply sources, there is increasing interest in claiming diversions minus return flows as the measure of water use. Quantification of return flows are also needed for river basin water balance studies. A very large fraction of indoor use is returned to sewers and a large fraction of sewer flows is returned to the hydrologic system (approaching 100% in the case of mechanical treatment). Outdoor uses amount to about half of total residential uses and while a large fraction of this component is evaporated, substantial return flows exist in the form of runoff to surface streams and deep percolation which may recharge groundwater sources."

The applicant currently owns 259.92 shares in College Irrigation Company and are represented by Certificate Numbers shown in Exhibit C. These shares will be used for Mitigation Water for the application. The land previously irrigated by the shares have been removed from agricultural production and by City Ordinance or Development Agreement cannot be watered except by City Water (See Attached Letter from Nibley City).

The calculated interference to prior water rights (downstream users having the highest priority on the determined in the Cache Valley Ground Water Management Plan is a calculated interference; hence this application is a calculated replacement (mitigation) for the interference to prior existing water rights, which include downstream users (regionally—e.g. Box Elder) and will provide replacement for the extra depletion occurred in Cache Valley. Using this water shares as mitigation replaces any interference to downstream users. This is not measured water, however it is measured irrigated acres withdrawn from production. The City's current depletion is not measured but estimated by current uses. As explained below, this mitigation water will ensure that there is no new depletion of water as result of the diversion of water for municipal purposes under this application.

Depletion.

The typical depletion factor set by Division Water Rights is 2.0 a-f/yr for this region The previously irrigated 259.92 acres depleted **519.84 acre-feet per year** (2.0 a-f/yr x 259.92 ac.).

The depletion factor for Nibley City is determined by the type of wastewater treatment facility and whether the city uses a separate secondary system to supply irrigation water. Currently, the City has 1/4 of the residents on secondary systems. Nibley City uses Logan City's treatment facility for indoor water use and Logan City lagoons depletes 22% of the inflow. (Hughes, 1996). Cities that have no secondary irrigation system have on an average 45% depletion. (Hughes, 1996). All depletion calculations are based on Dr. Hughes and Dr. Hill's reports (Hughes, 1996 and Hill, 1994). The proposed depletion factor for Nibley City is 0.45

EXHIBIT B

College Irrigation Company has a total of 997 outstanding shares in the company. The total number of acres under the proposed determination is 1036.7 acres. The shares per acre is 0.96 (997 shares/1036.7 acres)

Diversion.
The maximum quantity approved for diversion under this application is based on the depletion of the existing shares. The proposed diversion is 1,201 acre-feet/year (519.84/0.45)/0.96).

The local interference from the withdrawal 1,201 a-f/yr the draw down in the vicinity of the existing wells is shown below. The calculations shown in Table 2 are for the yearly withdrawal of 1,201 a-f/yr over twenty years. Table 3 shows the peak daily diversion drawdown of the well based on the withdrawal of 6.9 a-f/day over 180 days. However, the full impact to surrounding wells will be less than the draw down shown in Table 2 over twenty years because the proposed mitigation water are shares from the College Irrigation Company, which has two underground water wells used for water supply during insufficient flows of the Blacksmith River water rights.

Table 2--Yearly Diversion (1,201 a-f/yr)

Distance from Well (miles)	0.25 miles	0.75 miles	1.5 miles
Drawdown (ft)	3.22	2.76	2.46

1—The pump test data from the existing Nelson well was used to calculate the drawdown in Table 2. (T= 45,000(sf/day). Theis Equation over 20 years.

Table 3--Peak Daily Diversion (6.9 a-f/day)

Distance from Well (miles)	0.25 miles	0.75 miles	1.5 miles
Drawdown (ft)	6.13	4.66	4.23

1—The pump test data from the existing Nelson well was used to calculate the drawdown in Table 2. (T= 45,000(sf/day). Theis Equation over 180 days.

Cache Valley Ground Water Management Plan states there can be an additional 25,000 A-F/ year withdrawn without impacting the groundwater resource. However, there is an impact to the downstream users on the Bear River. This mitigation water uses water shares to mitigate the withdrawal and depletion by the proposed diversion.

References Cited

Hughes, Trevor C., Consumptive Use of Municipal Water Supply, Utah Water Research Laboratory, August 1996

Hill, Robert W., 1994, Consumptive Use of Irrigated Crops in Utah, Utah Water Research Laboratory, Utah State University, Logan, Utah, Research Report 145

College Irrigation	Certificate #	Shares	Certificate Obtained
1	353	17.75	5/27/2005
2	348	2	6/10/2000
3	429	4	9/20/2008
4	350	36	2/15/2005
5	357	6.5	6/9/2005
6	373	27	1/20/2007
7	335	6	5/21/2001
8	369	6.5	3/14/2006
9	374	48.75	2/2/2007
10	356	9	5/27/2005
11	445	11.07	3/20/2012
12	345	10	4/6/2004
13	379	14	10/9/2007
14	423	43.35	6/3/2008
15	449	4	4/25/2013
16	455	14	11/19/2013
	Total	**259.92**	

Stock Split

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No. 423

Shares ~~43~~ 43.35 A/L

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of ~~43~~ 43.35 – Shares of A/L each of the Capital Stock of College Irrigation Company transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 3 day of June A.D. 2008

Cindy Zulle
Secretary

President

SHARES $10.00 EACH

Neighborhood Non-Profit - Maple View 2

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 455

Shares -14-

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of -Forteen- Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney, upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 19 day of NOV A.D. 2013

Cindy Zulle
Secretary

President

SHARES $10.00 EACH

Pud - Nelson
MV - Meadow View

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 335

Shares 6

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City Inc. is the owner of Six Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 21 day of MAY A.D. 2001

Linda [illegible]
Secretary

Edwin W. Nelson
President

SHARES $10.00 EACH

©GOES 50.

Tonie Jack Nelson

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 345

Shares 10

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of Ten Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 6th day of Sept A.D. 2004

Secretary

President

SHARES $10.00 EACH

Clear Creek Sub

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No. 348

Shares — 2 —

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of

Two Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Wherrof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 10th day of June A.D. 19

Secretary

President

SHARES $10.00 EACH

© GOES 50.

J Nelson/ T. Gibbons
Country Cove

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 350

Shares 36

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of

Thirty Six Shares of each of the Capital Stock of

College Irrig

transferable only on the [illegible] by the holder

hereof in person or by Atte[illegible] of this Certificate

properly endorsed.

These Shares are from Tim J Nelson Gibbons Country Cove

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 15 day of February A.D. 2005

Gordon [illegible]
Secretary

Glen L Hansen
President

SHARES $10.00 EACH

© GOES 50.

Bushnell Park (Alan Spendlove)

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 353

Shares 17¾

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of 17¾ Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 27th day of MAY A.D. 1905

Secretary

President

SHARES $10.00 EACH

Sunset Park (Neal Anderson)

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No. 356

Shares 9

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of nine Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 27th day of MAY A.D. 1905

Secretary

President

SHARES $10.00 EACH

James P Maloney - Heritage Bus Park

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 357

Shares 6½

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of Six and one half — Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 9th day of June A.D. 2005

Gordon Hansen
Secretary

Glen L Hansen
President

SHARES $10.00 EACH

© GOES 50.

1 Share purchased by Roy
5½ Shadow Crest

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No. 369

Shares 6½

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of Six and one half Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 14th day of March A.D. 19 06

Secretary

President

SHARES $10.00 EACH

Other side

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 373

Shares 27-

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of Twenty Seven - Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, *the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 20 day of January A.D. 2007*

[signature] Secretary

[signature] President

SHARES $10.00 EACH

©GOES 50.

Herschi
Sunrise meadows

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 374

Shares 4874

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of Forty Eight and 3/4 — Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 2 day of February A.D. 1867

Secretary

President

SHARES $10.00 EACH

Siera Park

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 379

Shares -14-

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of

Fourteen Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 9th day of Oct A.D. 1904

Gordon L. Secretary

Glen L Hansen President

SHARES $10.00 EACH

Floyd
Carrie Cook-
Hideaway Est

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No. 429

Shares - 4 -

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of

— Four — Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney, upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 20th day of September A.D. 2008

Cindy Zulla
Secretary

President

SHARES $10.00 EACH

Neil Anderson
Sunset parks

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No. 445

Shares 11.07

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of

Eleven and 7/100 (11.07) Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this -20- day of MARCH A.D. 2012

Cindy Zollinger
Secretary

President

SHARES $10.00 EACH

INCORPORATED UNDER THE LAWS OF

THE STATE OF UTAH

No 449

Shares -4-

COLLEGE IRRIGATION COMPANY

CAPITAL STOCK $8,000.00

THIS CERTIFIES THAT Nibley City is the owner of

Four Shares of each of the Capital Stock of

College Irrigation Company

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

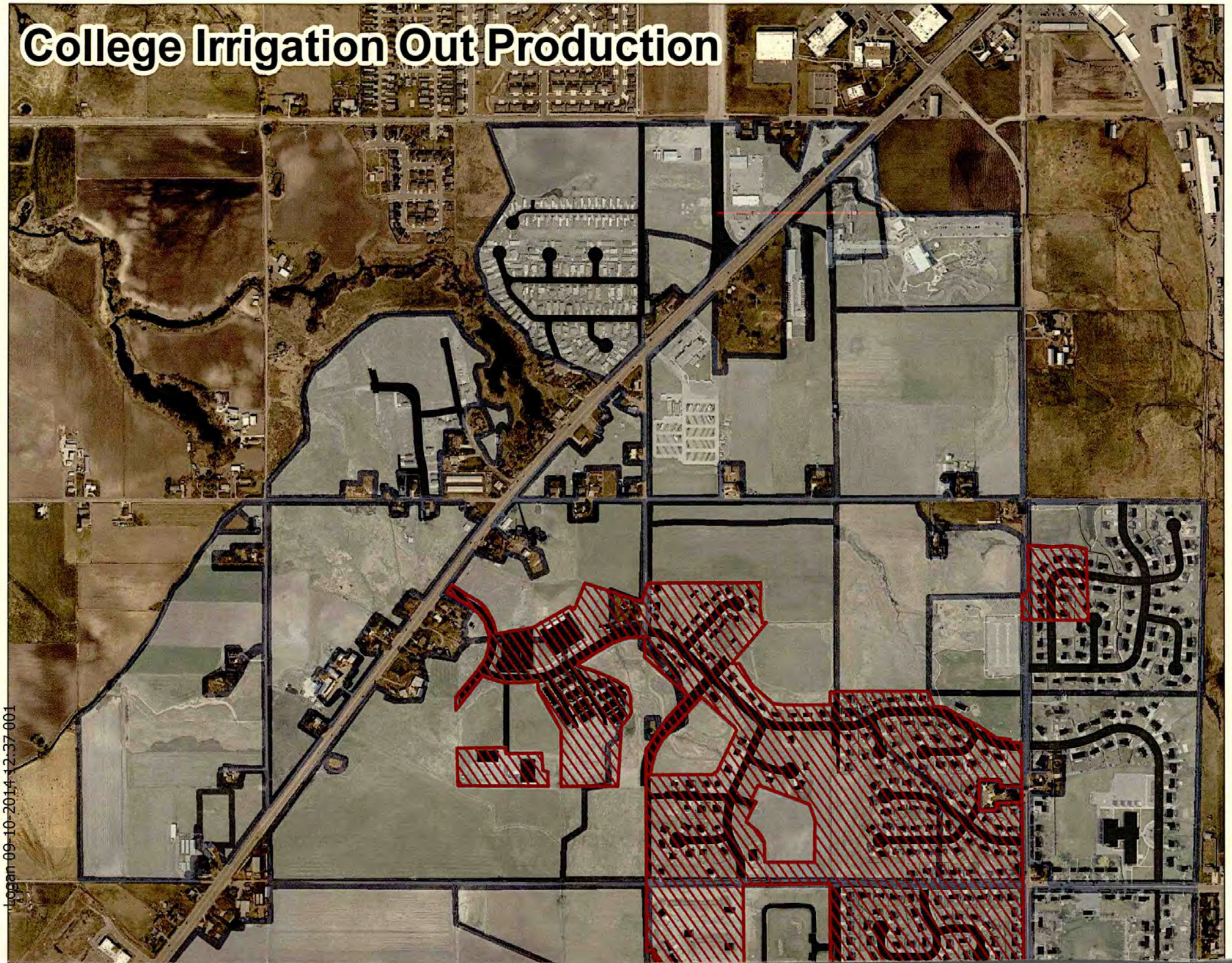
In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation this 25th day of April A.D. 2013

Cindy Zollinger
Secretary

President

SHARES $10.00 EACH

College Irrigation Out Production



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certificate number	entity	shares	date obtained
348	CLEAR CREEK	2	6/10/2000
335	MEADOW VIEW	6	5/21/2001
345	TOM AND JACK NELSON	10	4/6/2004
350	COUNTRY COVE	36	2/15/2005
353	ALAN SPENDLOVE BUSINESS PARK	17.75	5/27/2005
356	SUNSET PARKS	9	5/27/2005
357	HERITAGE BUSINESS PARK	6.5	6/9/2005
369	SHADOW CREST	6.5	3/14/2006
373	MCMANUS/ANDERSON/GNEHM/G&S HOLDINGS	27	1/20/2007
374	SUNRISE MEADOWS	48.75	2/2/2007
379	SIERRA PARK	14	10/9/2007
423	STOCK SPLIT	43.35	6/3/2008
429	COOK-HIDEAWAY ESTATES	4	9/20/2008
445	SUNSET PARKS	11.07	3/20/2012
449	<Null>	4	4/25/2013
455	NEIGHBORHOOD NON-PROFIT	14	11/19/2013

Acres Out = 260

Legend

- OUT
- College Irrigation - Water Rights
- Roads and Sidewalks
- Structures

N

S. Kurpius 1/22/2014

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GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

MICHAEL R. STYLER
Executive Director

KENT L. JONES
State Engineer/Division Director

SEP 27 2016

ORDER OF THE STATE ENGINEER
For Application to Appropriate Water Number 25-11236 (A78054a)

Application to Appropriate Water Number 25-11236 (A78054a), a segregated portion of unapproved Application 25-10883 (A78054), in the names of Cache County Corporation (County), and Nibley City, was filed on June 18, 2008, to appropriate 1.65 cubic feet per second (cfs) or 1201.00 acre-feet (af) of water from points located: (1) Well - North 310 feet and West 432 feet from the S¼ Corner of Section 20, (20-inch well, 150-800 feet deep); (2) Well - South 1998 feet and West 1780 feet from the NE Corner of Section 28 (20-inch well, 150-800 feet deep); (3) Well - North 1320 feet and West 75 feet from the SE Corner of Section 28 (20-inch well, 150-800 feet deep); and (4) Well - South 14 feet and East 330 feet from the W¼ Corner of Section 28 (20-inch well, 150-800 feet deep), all in T11N, R1E, SLB&M. The water is to be used for municipal uses within the service area of Nibley.

Notice of Application 25-10883 (A78054) was published in The Herald Journal on July 17 and July 24, 2008, and protests were received from Duane Morley Cox, United States Department of the Interior Fish and Wildlife Service, United States Department of the Interior Bureau of Reclamation, Utah Rivers Council, Bear River Water Users Association, PacifiCorp Energy and Bear Lake Watch, Inc. (late protest). A hearing was held on December 18, 2008. The application has been held pending submission of additional information. This segregated application, 25-11236 (A78054a), was modified and then re-advertised in The Herald Journal on September 25 and October 2, 2014, and protests were received from PacifiCorp Energy and Bear River Water Users Association. A hearing was held on February 12, 2015.

The original Application to Appropriate (25-10883) filed by Cache County was for 18.0 cfs or 13,031.4 acre-feet from 19 well locations for municipal uses in all of Cache County. It was filed with an untitled document that describes how the County planned to manage water under the application "to maintain the balance of use in the Bear River Drainage as established by the Groundwater Management Plan." The document states that the application was filed under Management Guideline Number 2 and gives a discussion aimed at providing "reason to believe that prior water rights above and below Cache Valley, Utah, will not be impaired as a result of approving this application." Management Guideline Number 2 states, in part:

> "2) Applications to appropriate ground water, larger than the limitations set forth in paragraph 1, above, will be considered for approval, if the applicant can show that, (a) There is reason to believe that prior water rights will not be impaired, or (b) That impacts to prior water rights will be compensated or adequate replacement water provided. It is the responsibility of the applicant to make an evidentiary showing to the State Engineer at the time the application is filed, pursuant to (a) or (b) above. The evidentiary showing should address local, regional, and downstream effects on springs, streams, and the ground-water system."

The application document describes a "brokering process" such that water is not lost to forfeiture and the County "anticipates using this appropriated water as "seed water" to begin the brokering process." The focus of some of the protests centered on the concept of the "brokering process" described. The submittal of the original filing documents and subsequent protests are contained in the record and included by reference and summarized below.

United States Department of the Interior Bureau of Reclamation and Fish and Wildlife Service protested the application over the potential impacts of increased groundwater withdrawals on Hyrum Reservoir, Newton Reservoir, and the Bear River Migratory Bird Refuge. They disagree with some of the concepts proposed in the application and feel a more thorough analysis is needed and requested a hearing to better understand the application.

Utah Rivers Council protested the application as a "person interested....because of the threat it poses to the aquatic life, terrestrial wildlife, wetlands, water quality, and recreational opportunities in the Bear River basin including the Great Salt Lake....and the threat it poses to public welfare." It argues that further ground water depletion will alter surface water flows and that loss in flow will negatively affect water quality and wetland resources.

Duane Morley Cox protested the application, arguing that the application is "seriously flawed" and "would unfairly and inappropriately tie up 13,031.4 acre-feet of water that others would otherwise have access to for appropriation purposes." He further argues that the County should have structured their application under Management Guideline Number 6 and the plan proposed is unrealistic and monopolizes water under the Groundwater Management Plan. He also protests "that the application as filed does not provide any assurances that the local withdrawals from the 19 proposed well sites will not impair existing near vicinity water rights." Under the filing, the entire amount could be taken from one location.

Bear River Water Users Association, PacifiCorp Energy, and Bear Lake Watch, Inc. protested the application out of concern for impacts to surface water which is tributary to their rights in Bear River that are supplemented by releases from Bear Lake. Their written protests take issue with the concept of appropriating water that is subject to nonuse and argue that "the water sought to be appropriated by the County is not unappropriated water." Representatives for the protestants stated in the hearing that the application was too abstract and requested more time to understand the application and supplement the record. They also argued that the application does not quantify specific impacts to individual users caused by groundwater withdrawals. Finally, the applicant has not complied with the requirements of the Groundwater Management Plan by making an evidentiary showing that prior rights will not be impaired or a mitigation plan as required at the time of the filing.

Segregated Application 25-11236 (A78054a) was modified to include only 4 wells, 2 of which are existing, to appropriate 1.65 cfs or 1201 acre-feet for Nibley City. It included Exhibit B, a mitigation plan that shows that the new appropriation "will not result in a new depletion of water within the drainage." The city owns shares in College Irrigation Company that represent acres of agricultural land that have been removed from production and by city ordinance cannot be irrigated except by city water. The mitigation plan also demonstrates that mitigation makes the appropriation depletion-neutral. A calculation of drawdown is presented to show that maximum diversion does not result in unreasonable interference. The applicant drilled and tested a well near point of diversion #4 from the first paragraph and provided a report that substantiates their anticipated impacts to the groundwater aquifer.

Bear River Water Users Association and PacifiCorp Energy protested Segregated Application 25-11236 (A78054a), incorporating by reference all documents and supplemental material from its initial protest of parent Application 25-10883 (A78054). They further argued that the proposed replacement water should be used as the basis of a change application. They contended that the mitigation plan does not fully satisfy the evidentiary requirement of the Groundwater Management Plan and note deficiencies in the mitigation plan.

In a letter dated March 2, 2016, protestant Duane Morley Cox argues that this segregated application should have a priority date consistent with the date of filing of the segregation and accompanying mitigation plan.

In a letter dated March 22, 2016, the applicants, Cache County and Nibley City and protestants, Bear River Water Users Association and PacifiCorp Energy jointly submitted a signed Mitigation Agreement and conditional withdrawal of protests. The protestants and the applicants jointly request that "Applicants' compliance with the Agreement be incorporated as an express condition to any approval of the application. Also, it is requested that the State Engineer include the conditions provided in paragraph 1(g) of the Agreement regarding measurement and reporting." The protests of these protestants are withdrawn if the State Engineer includes these conditions in an order of approval. Quoting, in part, from the Mitigation Agreement:

> Under the mitigation plan filed in support of the Application attached thereto as Exhibit B (the "Mitigation Plan"), the County and the City have proposed that the water to which the City is entitled under the City Stock will not be diverted and/or otherwise delivered by the Company to any shareholder or other person for any use or purpose. Such water will not be beneficially used by the Company or any shareholder, but will be left to freely run downstream or remain in the aquifer as compensation to the Downstream Right Holders ("Mitigation Use"). This compensation water shall replace the groundwater depletions arising out of the City's diversion and use of water under the Application.

Under the Mitigation Plan, the County and the City have identified and mapped lands historically irrigated under the City's water shares. The maps identifying said land are a part of the application referenced above and are incorporated herein by reference. It is acknowledged by the parties that in a normal water year, the quantity of water allocated to the City under its 265 shares is sufficient for the irrigation of the 270 acres referenced in the application. For purposes of providing and accounting for water for mitigation use as required under the application, the parties desire to establish that the lands historically irrigated under the City's water shares, shall no longer be irrigated by water from College Irrigation Company (Company) water, and the total number of Company irrigated acres in any given year must be permanently reduced by 270 acres.

[1](g)The applicants shall comply with all applicable requirements and conditions imposed by the State Engineer's Order approving the application as the same may apply to the use of Company water under the City's water shares for mitigation use in connection with the application, which may include the following:

1) The applicants, in cooperation with the Company, shall install, operate, maintain, and regularly monitor measurement devices as required by the State Engineer, so as to provide an ongoing accurate record of the quantity of water diverted by the Company into its irrigation system. The measurement data generated shall be used in verifying that the water required for mitigation use is not diverted or otherwise delivered by the Company for irrigation of the historically irrigated lands or any other lands, and/or for any use or purpose other than mitigation use pursuant to the terms and conditions of this agreement.

2) The applicants shall provide a report of the water measurements as required by the State Engineer, which report shall be available for review by the downstream right holders, on an annual basis.

Upon review of Application to Appropriate 25-11236 (A78054a) and the mitigation agreement submitted, the State Engineer believes this segregated application meets the requirements for approval under Utah Code Annotated 73-3-8 and guideline 2(b) of the Interim Cache Valley Ground Water Management Plan. The dedicated shares, that have historically irrigated lands that have been identified and mapped that will no longer be irrigated by College Irrigation Company, are deemed as being sufficient to provide mitigation and replacement water for the depletion associated with the appropriation. Not diverting the amount of water historically diverted to irrigate these lands, but leaving it to "freely run downstream or remain in the aquifer as compensation" addresses the concerns of the protestants and makes the applicant's use depletion-neutral such that it will not impair existing downstream rights. For the purposes of this application, mitigation is considered to be a beneficial use.

Inasmuch as Application to Appropriate 25-11236 (A78054a) and its mitigation plan are considerably changed from the original Application (25-10883, A78054) and the document and plan submitted with the filing, it is appropriate that this Segregated Application 25-11236 (A78054a) be approved with a priority of the date of the filing of the segregation and mitigation plan.

It is, therefore, **ORDERED** and Application to Appropriate Water Number 25-11263 (A80215) is hereby **APPROVED** subject to prior rights and the following requirements.

1. The groundwater withdrawal under this application will be included in the withdrawal limitation set forth in the ground water management plan for Cache Valley effective September 1, 1999.

2. The State Engineer will not certificate the water right unless the conditions of approval have been acceptably complied with and noted in the information provided by the proof engineer and applicant.

3. The applicant is required to meter the water diverted. Total diversion under this right cannot exceed 1201.0 acre-feet. Section 73-5-4 of the Utah Code provides that "...a person using water in this state, except as provided by Subsection (4), shall construct or install and maintain controlling works and a measuring device at: (a) each location where water is diverted from a source; and (b) any other location required by the State Engineer." The applicant must install a permanent measuring meter on each well. These meters are to be maintained and remain functional as long as the wells remain in service. The amount of water from each well is to be reported under the Utah Water Use Program as administered by the Division of Water Rights.

4. The priority of Application to Appropriate 25-11236 (A78054a) shall be September 8, 2014.

The applicant is strongly cautioned that other permits may be required before any development of this application can begin and it is the responsibility of the applicant to determine the applicability of and acquisition of such permits. Once all other permits have been acquired, this is your authority to develop the water under the above referenced application which under Sections 73-3-10 and 73-3-12, Utah Code Annotated, 1953, as amended, must be diligently prosecuted to completion. The water must be put to beneficial use and proof must be filed on or before **September 30, 2021**, or a request for extension of time must be acceptably filed; otherwise the application will be lapsed. This approval is limited to the rights to divert and beneficially use water and does not grant any rights of access to, or use of land or facilities not owned by the applicant.

The applicants shall be liable to mitigate or provide compensation for any impairment of or interference with prior rights as such may be stipulated among the parties or decreed by a court of competent jurisdiction.

Proof of beneficial use is evidence to the State Engineer that the water has been placed to its full-intended beneficial use. By law, it must be prepared by a registered engineer or land surveyor, who will certify to the location and uses of the extent of your water right.

Upon the submission of proof as required by Section 73-3-16, Utah Code, for this application, the applicants must identify every source of water used under this application and the amount of water used from that source. The proof must also show the capacity of the sources of supply and demonstrate that each source can provide the water claimed to be diverted under this right as well as all other water rights, which may be approved to be diverted from those sources.

Failure on your part to comply with the requirements of the applicable statutes may result in the lapsing of this application.

It is the applicants' responsibility to maintain a current address with this office and to update ownership of their water right. Please notify this office immediately of any change of address or for assistance in updating ownership. Additionally, if ownership of this water right or the property with which it is associated changes, the records of the Division of Water Rights should be updated. For assistance in updating title to the water right please contact the Division at the phone number below.

Your contact with this office, should you need it, is with the Northern Regional Office. The telephone number is 435-752-8755.

This Order is subject to the provisions of Administrative Rule R655-6-17 of the Division of Water Rights and to Sections 63G-4-302, 63G-4-402, and 73-3-14 of the Utah Code which provide for filing either a Request for Reconsideration with the State Engineer or an appeal with the appropriate District Court. A Request for Reconsideration must be filed with the State Engineer within 20 days of the date of this Order. However, a Request for Reconsideration is not a prerequisite to filing a court appeal. A court appeal must be filed within 30 days after the date of this Order, or if a Request for Reconsideration has been filed, within 30 days after the date the Request for Reconsideration is denied. A Request for Reconsideration is considered denied when no action is taken 20 days after the Request is filed.

Dated this 27th day of September 2016.

Kent L. Jones, P.E., State Engineer

Mailed a copy of the foregoing Order this 22nd day of September, 2016 to:

Cache County Corporation
c/o Bob Fotheringham
199 North Main Street
Logan, UT 84321

Nibley City
455 West 3200 South
Nibley, UT 84321

PacificiCorp
c/o John H. Mabey, Jr.
175 South Main, Suite 1330
Salt Lake City, UT 84111

Bear River Water Users Association
c/o D. Brent Rose, Attorney
201 South Main Street
Salt Lake City, UT 84111

Bear River Watch, Inc.
c/o Claudia and David Cottle
3539 Brighton Point Drive
Salt Lake City, UT 84121

Bear River Water Users Association
c/o D. Brent Rose - Attorney
201 South Main Street, Suite 1300
Salt Lake City, UT 84111-2216

Duane Morley Cox
1199 Cliffside Drive
Logan, UT 84321

PacifiCorp Energy
c/o Claudia Conder
1407 West North Temple, #120
Salt Lake City, UT 84116

United States Bureau of Reclamation
c/o Jonathan B. Jones
302 East 1860 South
Provo, UT 84606-7317

United States Dept. of the Interior
c/o Megan Estep
PO Box 25486, Denver Federal Center
Denver, CO 80225-0486

Utah Rivers Council
c/o Ted Wilson
1055 East 2100 South, Suite 207
Salt Lake City, UT 84106

BY: _____
Sonia R. Nava, Appropriation Secretary

APPENDIX F

MITIGATION PLAN FOR WR 25-11236

MITIGATION AGREEMENT

Pertaining to Application to Appropriate No. 25-111236 (A78054a) Filed by Nibley City and Cache County

THIS MITIGATION AGREEMENT ("Agreement"), is made and executed effective as of this 29th day of February, 2016 (the "Effective Date"), by and among NIBLEY CITY, a Utah municipal corporation (the City"), CACHE COUNTY CORPORATION, a county of the State of Utah (the "County"), and COLLEGE IRRIGATION COMPANY, a Utah nonprofit corporation (the "Company"). The City, the County and the Company are sometimes referred to herein individually as a "Party" and collectively as the "Parties."

RECITALS

A. The City and the County are co-applicants ("Applicants") in the filing of that certain Application to Appropriate Water, Water Right No. 25-11236, A78054a (the "Application"), which proposes to divert 1201.0 ac-ft of water from four groundwater wells for municipal use within the City and other public uses as described in the Application. The Application represents a segregated portion of unapproved Application to Appropriate No. A78054 filed in 2008 by the County, which seeks to appropriate a total of 13,031.4 ac-ft of water.

B. The Parties hereby acknowledge that under the Interim Cache Valley Groundwater Management Plan published by the Utah Division of Water Rights ("Groundwater Management Plan"), the State Engineer has determined that there is a one-to-one ratio in terms of impact to the Bear River and its tributaries from surface waters for every acre-foot of groundwater diverted in Cache Valley.

C. The Parties further acknowledge that the filing of the Application and the diversion and use of water thereunder is governed by the Groundwater Management Plan, which, among other things, requires, as a condition to the approval of any new application to appropriate water in Cache Valley, that water replacement and/or other adequate compensation be made to mitigate against any impairment to the prior rights of all prior appropriators including those which are downstream water right holders ("Downstream Right Holders"), that will occur as a result of depletions resulting from the City's diversion and use of water as proposed under the Application. For purposes of this Agreement, "Downstream Right Holders" shall be defined to mean the Bear River Water Users Association, and PacifiCorp.

D. The City owns 265.0 shares of stock in the Company. Copies of the certificates representing the City shares of Company stock are part of the application referenced above and incorporated by reference herein (the "City Stock").

E. Under the mitigation plan filed in support of the Application attached thereto as Exhibit B (the "Mitigation Plan"), the County and the City have proposed that the water to which the City is entitled under the City Stock will not be diverted and/or otherwise delivered by the Company to any shareholder or other person for any use or purpose. Such water will not be beneficially used by the Company or any shareholder, but will be left to freely run downstream or remain in the aquifer as compensation to the Downstream Right Holders ("Mitigation Use"). This compensation water shall replace the groundwater

depletions arising out of the City's diversion and use of water under the Application.

F. Under the Mitigation Plan, the County and the City have identified and mapped lands historically irrigated under the City Stock. The maps identifying said land are a part of the application referenced above and are incorporated herein by reference. It is acknowledged by the Parties that in a normal water year, the quantity of water allocated to the City under its 265 City Shares is sufficient for the irrigation of the 270 acres referenced in the Application. For purposes of providing and accounting for water for Mitigation Use as required under the Application, the Parties desire to establish that the lands historically irrigated under the City Stock, shall no longer be irrigated by Company irrigation water, and the total number of Company irrigated acres in any given year must be permanently reduced by 270 acres.

G. The purpose and intent of this Agreement is to set forth the terms and conditions pursuant to which the Company's water supply shall be administered, released and monitored for Mitigation Use so as to effectively achieve the water replacement and compensation required herein.

NOW, THEREFORE, in consideration of the terms and conditions set forth herein, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

AGREEMENT

1. **USE OF COMPANY WATER FOR MITIGATION PURPOSES.** The Company hereby agrees that water under the City Stock may be utilized for Mitigation Use in connection with the diversion and use of water by the City under the Application, subject to the following:

(a) The Company hereby expressly represents, acknowledges and agrees that the use of water under the water rights of the Company has been duly authorized by the Company's board of directors for Mitigation Use.

(b) The Company represents that the City Stock is in good standing with the Company, and title to the City Stock is held by the City according to the Company's books and records.

(c) The Company hereby represents that the City's right to the use of water under its shares has not been lost due to abandonment or forfeiture for non-use.

(d) The City hereby expressly acknowledges, represents, covenants and agrees that the water to which it is entitled under the City Stock shall be perpetually and irrevocably dedicated to providing a water supply for Mitigation Use in conformance with the terms and provisions of this Agreement so long as water is diverted and used by the City under authority of the Application and/or any change application filed on the Application, as well as under any water users claim, certificate of beneficial use, proposed determination, decree or other document or order authorizing and/or perfecting the City's use of water applied for under the Application.

(e) The Company shall promulgate and/or otherwise amend its bylaws, rules, regulations and/or policies (providing a bylaw provision substantially similar to the provision set forth in EXHIBIT "A", and effectively enforce the same, so as to put into place measures to ensure that:

(1) The water to which the City is entitled under its City Stock is dedicated solely to Mitigation Use as described herein;

(2) The water supply under the City Stock to be dedicated by the Company for Mitigation Use will not be authorized to be diverted by and/or delivered to any other shareholder in the Company or other person for any other use or purpose other than Mitigation Use to support the Mitigation Plan submitted in conjunction with the Application.

(3) The 270 acres historically irrigated by water under the City Stock will be identified, legally described and mapped in the Company's records, and be taken and remain out of irrigation.

(f) The Company agrees that neither the historically irrigated land nor any other land shall be authorized to be irrigated with the water to which the City is entitled under the City Stock.

(g) The Applicants shall comply with all applicable requirements and conditions imposed by the State Engineer's Order approving the Application as the same may apply to the use of Company water under the City Stock for Mitigation Use in connection with the Application, which may include the following:

(1) The Applicants, in cooperation with the Company, shall install, operate, maintain, and regularly monitor measurement devices as required by the State Engineer, so as to provide an ongoing accurate record of the quantity of water diverted by the Company into its irrigation system. The measurement data generated shall be used in verifying that the water required for Mitigation Use is not diverted or otherwise delivered by the Company for irrigation of the historically irrigated lands or any other lands, and/or for any use or purpose other than Mitigation Use pursuant to the terms and conditions of this Agreement.

(2) The Applicants shall provide a report of the water measurements as required by the State Engineer, which report shall be available for review by the Downstream Right Holders, on an annual basis.

2. **COMPANY AUTHORITY**. The Company hereby represents that it has the full right, power and authority to enter into this Agreement and to perform all acts and obligations required of it hereunder.

3. **CONDITION TO APPROVAL OF THE APPLICATION**. The Parties hereby acknowledge and agree that compliance with the terms and provisions of this Agreement may be imposed by the State Engineer as a condition to approval of any order or memorandum decision of the State Engineer issued in connection with Application.

4. **DEFAULT**. In the event of a failure by the City, the County or the Company to observe and perform any of the terms and provisions of this Agreement, a Downstream Right Holder may provide written notice of such failure to the City, County and Company. If said failure is not cured within fifteen (15) days after such written notice, the failure shall be deemed to constitute a default and breach of this Agreement; however, in event the default is such that it cannot be cured within said fifteen day period, there shall be no event of default if the defaulting Party shall commence to cure the default within the fifteen day period and proceeds thereafter to cure the default with all possible diligence, and the default is

cured within a reasonable period. In the event the default is not cured as provided herein, the Downstream Right Holders shall have any and all remedies available to them at law or in equity.

5. **NOTICES**. Any and all notices, demands, or other communications required or desired to be given hereunder by any Party shall be in writing and shall be validly given or made to another Party if served either personally or if deposited in the United States mail, certified or registered, postage prepaid, return receipt requested. If such notice, demand or other communication be served personally, service shall be conclusively deemed at the time of such personal service. If such notice, demand or other communication be served by mail, such notice shall be conclusively deemed given two business days after the deposit thereof in the United States mail addressed to the Party to whom such notice, demand or other communication is to be given as hereinafter set forth:

To the City:

Nibley City Corporation
455 West 3200 South
Nibley, UT 84321
Attn: City Manager

To the County:

Cache County
199 North Main Street
Logan, UT 84321
Attn: County Executive

To the Company:

College Irrigation Company
2352 South Hwy 89-91
Logan, UT 84321
Attn: President

Any Party hereto may change its address for the purpose of receiving notices, demands and other communications as herein provided by a written notice given in the manner aforesaid to the other Parties.

6. **MISCELLANEOUS PROVISIONS**.

(a) Further Assurances. Each of the Parties hereto shall execute and deliver any and all additional papers, documents, and other assurances, and shall do any and all acts and things reasonably necessary in connection with the performance of their obligations hereunder and to carry out the intent of the Parties hereto.

(b) Modification and Amendment. This Agreement, and all rights, covenants and restrictions set forth herein, may not be terminated, extended, modified or amended without the consent of all of the Parties, and any such termination, extension, modification or amendment shall be effective only upon a

written document effecting the same, duly executed and acknowledged by all of the Parties.

(c) Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of the Parties hereto, and to their respective successors-in-interest and assigns.

(d) Third-Party Beneficiaries. It is hereby acknowledged and agreed that this Agreement has been entered into by the Parties directly and primarily for the benefit of the Downstream Right Holders, and that the purpose and intent of the Mitigation Plan provided for herein is for the protection of the rights of Downstream Right Holders from impairment arising out of the diversion and use of water by the City and County under the Application. As such, the Parties hereby acknowledge and agree that all Downstream Right Holders are third-party beneficiaries under this Agreement.

(e) Integration. This Agreement constitutes the entire understanding and agreement of the Parties and any and all prior agreements, understandings or representations relating to the matters addressed herein are hereby terminated and canceled in their entirety and are of no force and effect.

(f) Waiver. The waiver by any Party of a breach of any provision of this Agreement shall not be deemed a continuing waiver of any subsequent breach whether of the same or another provision hereof.

(g) Construction. This Agreement is the result of negotiations between the Parties, none of whom has acted under any duress or compulsion, whether legal, economic or otherwise. Accordingly, the terms and provisions hereof shall be construed in accordance with their usual and customary meanings. Each Party hereby waives the application of any rule of law which otherwise would be applicable in connection with the construction of this Agreement that ambiguous or conflicting terms or provisions should be construed against the Party who (or whose attorney) prepared the executed Agreement or any earlier draft of the same. As used herein, all words in any gender shall be deemed to include the masculine, feminine, or neuter gender, all singular words shall include the plural, and all plural words shall include the singular, as the context may require.

(h) Applicable Law and Severability. This Agreement shall, in all respects, be governed by the laws of the State of Utah. Nothing contained herein shall be construed so as to require the commission of any act contrary to law, and wherever there is any conflict between any provision contained herein and any present or future statute, law, ordinance or regulation, the latter shall prevail and the provision of this document which is affected shall be curtailed and limited to the extent necessary to bring it within the requirements of the law.

(i) Incorporation of Recitals. The Recitals hereto are incorporated into and made a part of this Agreement.

(j) Warranty of Authority. The individuals executing this Agreement on behalf of the Parties hereby warrant that they have the requisite authority to execute this Agreement on behalf of the respective Parties and that the respective Parties have agreed to be and are bound hereby.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the day and year first above written.

NIBLEY CITY

By: _____
Its: MAYOR

NIBLEY CITY CORPORATE SEAL
Attest: _____ Recorder
CACHE COUNTY

CACHE COUNTY

By: Craig W Buttars
Its: COUNTY EXECUTIVE

COLLEGE IRRIGATION COMPANY

By: _____
Its: PRESIDENT

EXHIBIT "A"

BYLAW PROVISION AUTHORIZING MITIGATION USE

The Company bylaw provision authorizing mitigation use shall be substantially similar to the following:

> A shareholder of the Company is authorized, subject to and in conformance with the provisions of this Section, to dedicate Company shares ("Mitigation Shares"), for the purpose of implementing a plan approved by the State Engineer to mitigate impairment of an existing right ("Mitigation Plan"), as provided for in Section 73-3-8(6)(b)(iii), Utah Code Ann. 2015, in connection with a new application to appropriate water or a permanent or temporary change application ("Application"), filed with the State Engineer by such the shareholder ("Mitigation-Use Shareholder"). As a condition to said dedication:
>
> (1) The Company and the Mitigation-Use Shareholder shall be required to enter into a written mitigation agreement ("Mitigation Agreement"), setting forth the terms and conditions of such use and the procedure by which such use shall be implemented and maintained by the Company and the Mitigation-Use Shareholder. The Mitigation Agreement shall be incorporated into the Mitigation Plan to be submitted by the Mitigation-Use Shareholder to the State Engineer in connection with the Application, and shall provide, among other things: (i) that the water which would otherwise be delivered by the Company under the Mitigation Shares shall be dedicated solely to mitigation use and will not be beneficially used by the Company or any other shareholder, but will be left to freely run downstream or remain in the aquifer to mitigate downstream impairment, and (ii) that the acreage historically irrigated by the water under said shares be identified, legally described, mapped in the Company records and be taken and remain out of irrigation so long as the Mitigation Shares remain dedicated for mitigation purposes.
>
> (2) The Mitigation-Use Shareholder shall be authorized and obligated to construct and install such measuring devices within the Company system as shall be required by the State Engineer in connection with an order approving the Application to which the Mitigation Plan applies. All such measuring devices shall be constructed and installed pursuant to Company plans and specifications and under the Company's direct supervision. It shall be the sole responsibility of the Mitigation-Use Shareholder to thereafter operate, maintain, repair and monitor any such measuring devices and provide such reports as shall be required by the State Engineer. All costs and expenses incurred in the construction, installation, operation, maintenance, repair, and monitoring of any such measuring devices and for any reports related to the same, shall be borne solely by the Mitigation-Use Shareholder.

(3) Any and all other costs and expenses incurred by the Company in connection with the Mitigation Agreement and Mitigation Plan of the Mitigation-Use Shareholder, and any activity, requirement of other obligation of the Company arising in connection therewith, shall be reimbursed by the Mitigation-Use Shareholder to the Company as billed by the Company. In the event the Mitigation-Use Shareholder shall fail to pay the same as and when due, the Company shall be authorized to rescind the Mitigation Agreement and so notify the State Engineer.

APPENDIX G

MITIGATION CALCULATIONS

Shown below are the methods of calculating mitigation water depletion credit and diversion amounts for WR 25-9078 and WR 25-11236. As shown, both have been approved by the State Engineer and should be used as reference for future mitigation water calculations.

WR 25-9078 Mitigation Water Calculations

Shown below is the same table as shown in Appendix D and taken from the 2004 justification report.

Table G1. WR 25-9078 Mitigation Water per 2004 Justification Report.

Column	1	2	3	4	5	6
Source	Sole Supply Acres (acres)	Total Shares in Irrigation Company (AF/yr)	Decreed or Estimated Depletion per Acre (AF/yr)	Calculated Historic Depletion per Share/Right (AF/share)	Number of Shares Owned by Nibley	Total Depletion Credit (AF/yr)
Clear Creek	155	200	2.08	1.61	65	104.7
Nibley Blacksmith Fork	2,648	2,377.75	2.08	2.32	94	218.1
College	1,036.7	778	2.08	2.77	22	60.97
Individual Water Rights*	45		2.08	2.08		93.6
Total						477.3

The mitigation depletion calculations for WR 25-9078 are as follows:

1. The values shown in column 3 are based on the proposed determination of the Blacksmith Fork Adjudication, of which, all mitigation shares are part of.
2. Column 4 values were calculated by taking column 1 divided by column 2, then multiplied by column 3. This assumed that the dependable supply factor is 1.
3. The depletion credit was then calculated by multiplying column 4 by column 5.

This process was used again in the Cache Landmark letter dated December 10, 2014, with the minor adjustment of using a historic depletion of 2 AF/share rather than 2.08 AF/share for the individual water rights and the newly-incorporated water rights. It is not clear why this change was made.

WR 25-11236 Mitigation Water Calculations

The method used for the approval of this water right is detailed in the June 2, 2014, letter from Nibley City to UDWRi (see Appendix E). Nibley's depletion factor was based on the Hughes 1996 report referenced in the Cache Valley Groundwater Management Plan.

College Irrigation shares used for mitigation	259.92	shares
Typical depletion factor set by UDWRi	2	AF/yr/acre
Depletion = 259.92*2 =	519.84	AF/yr*shares/acre

Nibley depletion factor	0.45	
Total College Irrigation shares	997	shares
Total College Irrigation acres served	1,036.7	acres
College Irrigation Ratio	0.96	shares/acre
Diversion available = 519.84/0.45/0.96 =	1,201	AF/yr

APPENDIX H

IRRIGATION COMPANY INFORMATION

IRRIGATION COMPANY INFORMATION

This section summarizes the governance process, shareholder meeting schedule, assessments, and leadership for each irrigation company Nibley City has shares in as far as information was able to be gathered. In talking with each company, some were more willing to provide information to FCE than others so not all the desired information was gathered. However, Nibley, as a shareholder, has the right to all the information included, they just need to contact the irrigation company directly.

Listed on the following pages is the information that was gathered for each company as well as a summary of what information is still needed.

Clear Creek Irrigation Company

Clear Creek Irrigation Company is a small company with a few small ditches that carry flow less than five cubic feet per second. While there are eight shareholders, only a couple of them occasionally use the flow provided through this system. This system is mostly fed by spring water that appears during favorable weather, making it an unreliable sole source of water. Due to the lack of water flowing in the ditch, the location of the ditches, and the condition of the system, these shareholders rarely utilize their allotment. However, all regularly pay their assessments in order to maintain their shares in the company. The president is currently working with the State of Utah to mark and record the locations of their existing ditches, but other than that, the company is not very active.

Water Right

25-4852 *Please note that this water right is pending an adjudication claim and may not be valid.

Governance Process

Bruce Jenson currently holds all the historic company records. The bylaws were last updated in 1997, but are only available in hard copy format at this time. If Nibley City would like a copy, they should contact Bruce directly.

Shareholder Meeting Schedule

Because this is not a very active company and most of the shareholders do not use water from these ditches, the company has not held regular shareholder meetings since the early 1980s.

Assessments

Assessments are currently $3/share.

Current Leadership

The current president of the irrigation company, Bruce Jenson, took over the position when the previous president passed away in 2013. Since then, not much has happened with the company and since minimal water is being used, there is no active board of directors. The company does have a secretary in order to obtain the required two signatures for any major decisions or financial transactions.

Title	Name	Phone Number
President & Water Master	Bruce Jenson	(435) 770-5874
Secretary	Kim Ropoleto	

Other Company Information

Total Number of Shares =	168 shares
Total Number of Shareholders =	8 shareholders
Total Number of Acres Served =	155 acres (approx.)
Shares held by Nibley =	86.5 shares

Percent Shareholder =	51.5%
Yield per Share =	Unknown

Information Still Needed

- Bylaws (Bruce Jenson has a hard copy)

College Irrigation Company

Discussions with College Irrigation Company made it clear that Nibley City is intimately involved with this company due to all the ongoing development resulting in alignment changes and water share transfers. It was apparent that Gordon Zillis has had many discussions with David Zook and if any information is needed on the company, Nibley City should give Gordon a call.

Water Rights

25-10996, 25-1848, 25-1849, 25-1850, 25-1851, 25-1852, 25-1853, 25-1854, 25-2226, 25-11175, 25-2302, 25-2303, 25-4180, 25-4260, 25-4259

Governance Process

Based on a discussion with the company secretary, Cindy Zillis, the board of directors consists of the president, vice president, secretary, and three additional board members with two-year terms.

Shareholder Meeting Schedule

The annual shareholder meeting is held in the spring with notices sent to each shareholder in advance. The board of directors meets each fall to determine annual assessments.

Assessments

Assessments range from $8/share to $12/share depending on if pumps were needed throughout the season to pump the irrigation water.

Current Leadership

Title	Name	Phone Number
President	Gordon Zillis	(435) 752-7573 (home)
Vice President	Terry Hansen	
Director	[Unknown]	
Director	[Unknown]	
Director	[Unknown]	
Secretary	Cindy Zillis	(435) 752-7573 (home)

Other Company Information

Total Number of Shares =	778-997 shares (approx., varies by source)
Total Number of Shareholders =	45 shareholders
Total Number of Acres Served =	1,037 (approx.)
Shares held by Nibley =	311.59 shares
Percent Shareholder =	40% (approx.)
Yield per Share =	1 hour every 14 days

Information Still Needed

- Bylaws

Millville Irrigation Company

Water Rights

25-4524, 25-4525, 25-4429

Information Still Needed

- Bylaws
- Total number of acres served by the company
- Total number of shares in the company
- Yield/Value per share (cfs, gpm, acre-feet, etc.)
- Total number of shareholders in the company
- Current leadership and contact information
- When annual meetings are held
- Current assessment amount

FCE was unable to make contact with Millville Irrigation Company and does not have verified contact information. The UDWRi website lists two possible contacts:

Legrand Matthews	(435) 752-6357
William Moore	(435) 753-0482

Nibley Blacksmith Fork Irrigation Company

Water Rights

25-10276, 25-1948, 25-2008, 25-3492, 25-3493, 25-725, 25-726, 25-727, 25-728, 25-729, 25-730, 25-731, 25-732, 25-733, 25-7873, 25-7874, 25-10498, 25-10497, 25-11445, 25-1292, 25-1293, 25-4526, 25-4527, 25-6994, 25-7320

Governance Process

Nibley Blacksmith Fork (BSF) Irrigation Company operates with a five-member board of directors in charge of overseeing the proper operation of the company, water distribution, and major decision-making. The company holds annual shareholder meetings and regular board meetings which are always open to shareholders. Board members are elected at the annual shareholder meeting to serve for a term of three years. A president, vice president, and secretary are then elected by the board at the first board meeting following the annual shareholder meeting. While the secretary does not have to be an elected board member, the president and vice president must be elected board members. These positions are held for a term of one year. The board members, secretary, and water master may be compensated as directed by the majority shareholder vote.

In order to be elected as a board member, the shareholder must be 18 years of age, own at least 5 shares, and be current on all assessment payments. If the shareholder is a corporation or other business entity, under written authorization, a representative for that entity is eligible to serve on the board of directors.

Shareholder Meeting Schedule

The annual shareholder meeting is held each January at the beginning of the fiscal year. Notice will be sent out to each shareholder between 10 and 60 days prior to the meeting detailing the exact date and time of the meeting.

Other Company Information

Total Number of Shares =	2,378 shares (approx.)
Total Number of Acres Served =	2,648 acres (approx.)
Shares held by Nibley =	374.41 shares
Percent Shareholder =	15.7%
Yield per Share =	Unknown

Information Still Needed

- Yield/Value per share (cfs, gpm, acre-feet, etc.)
- Total number of shareholders in the company
- Current leadership and contact information
- Current assessment amount

FCE was not able to make contact with Nibley BSF Irrigation Company, but the following contact is on file from Nibley City:

Paul Leishman (435) 757-1183

Providence Blacksmith Fork Irrigation Company

Water Rights

25-10739

Governance Process

The board of directors for the Providence Blacksmith Fork Irrigation Company consists of five elected directors that are at least 18 years old and have no outstanding company dues. At least three of the five directors must own at least five shares in the company. As stated in the bylaws, a designated representative of a corporation or other entity with five or more shares is eligible to serve on the board of directors.

Shareholder Meeting Schedule

Annual shareholder meetings are typically held the first Monday of December at 7:00 p.m. at the Providence City Office.

Assessments

Assessments are approximately $18/share with the exact assessment each year requested via mail to each shareholder.

Current Leadership

Title	Name	Phone Number
President	Jason Fuhriman	(435) 512-3710
Director	Brian Olsen	(435) 770-8615 (cell)
Director	Jon Byington	(435) 232-8381
Director	John Hubbard	(435) 753-3972
Director & Treasurer	Clay Wilker	(435) 279-3409
Secretary	Wendy Wilker	
Water Master	Wes McNeil	(435) 213-5760 (cell)

Contact Information

Providence Blacksmith Fork Irrigation Company
P.O. Box 373
Providence, Utah 84332
blacksmithforkirrigation.com

Other Company Information

Market Value of Shares =	$750/share
Total Number of Shares =	1,400 shares
Total Number of Shareholders =	330 shareholders

Shares held by Nibley =	5.5 shares
Percent Shareholder =	0.4%
Yield per Share =	1:05 hours/share/week

Spring Creek Cache Irrigation Company

The Spring Creek Cache service area is located northwest of Nibley City with most of their service area lying in Cache County and a small portion lying within Logan City boundaries. The company's bylaws state that their shares cannot be sold to any person not holding property within their service area. The shares can be converted to groundwater, but would still need to be used within the service area. Since the service area does not enter Nibley City boundaries at any point, the best use of these shares would be to use for mitigation.

Water Rights

25-10437, 25-4529, 25-4536, 25-4537, 25-4541, 25-4539

Shareholder Meeting Schedule

Annual shareholder meetings are typically held sometime in March.

Assessments

The 2017 assessment was $12/share, but in years past, it has been as high as $15/share.

Current Leadership

Title	Name	Phone Number
President	Stephen Thatcher	(435) 757-1835
Director	Darrel Jensen	
Director	Brad Tolman	
Director	Randy Olson	
Secretary	John Olson	(435) 753-1177 (cell) (435) 232-4080 (home)

Other Company Information

Market Value of Shares =	$2,000/share
Total Number of Shares =	1,500 shares
Total Number of Shareholders =	200 - 300 shareholders
Shares held by Nibley =	26.5 shares
Percent Shareholder =	1.8%
Yield per Share =	1 share = 1 irrigable acre

Information Still Needed

- Bylaws

Stephen Thatcher provided the information listed above, but he said John Olson would have the bylaws. FCE was unable to make contact with John, but the bylaws should be easily accessible if Nibley City can make contact with him.

APPENDIX J. WATER CONSERVATION STUDY

NIBLEY CITY WATER MANAGEMENT AND CONSERVATION PLAN

MARCH 2020

PREPARED FOR:

NIBLEY
SETTLED 1855

PREPARED BY:

Jones & DeMille Engineering

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FIGURES

TABLES

1. INTRODUCTION

The purpose of this Water Conservation Plan is to provide Nibley City a current view of water consumption, projected water demand, give recommendations for the next five years to help guide water conservation for the city and satisfy the requirements of the Utah Water Conservation Plan Act (73-10-32, UCA).

1.1. BACKGROUND INFORMATION

Nibley City is located in Cache County, Utah and has a population of approximately 7,800 according to the data reported by Nibley to the Division of Water rights. Nibley City's culinary water system serves all of Nibley City's residents. Nibley also has an average of 4.04 people per household.[1]

Currently Nibley City's Water Master Plan is being updated by Jones and DeMille Engineering and will be done by December 2019. The City will use the Master Plan as a guide for expanding and upgrading the culinary water system as the population increases.

1.2. DESCRIPTION OF NIBLEY CITY WATER SYSTEM

The City's culinary water system has three sources of water, 4000 South Well, Nelson Well, and the 640 West Well. These wells treat the water with chlorine as the water leaves the building and enters the system.

The City currently has three concrete storage tanks: 350,000-gallon tank, 1,000,000-gallon tank, and a 2,000,000-gallon tank for a combined storage capacity of 3,350,000 gallons.

The distribution system comprises of different size and material pipes, ranging from 6" to 18" and from PVC to steel pipe.

1.3. INVENTORY OF WATER RESOURCES

Nibley City's water rights currently are classified under the "Interim Cache Valley Ground-Water Management Plan" of Area 25 (Bear River/Cache Valley) created by the Utah Division of Water Rights (DWRi). This policy dictated the requirement for future water right applications, which Nibley City will need to do in the near future. Currently, Nibley City has sufficient water rights for its water system at the current population. Future water right acquisition will be necessary and can be obtained through several methods, including requiring developers to acquire water shares/rights to be transferred to Nibley, the formal application process, purchase of existing water rights/shares, or through filing change applications on Nibley City's existing water rights and diligence claims. A key aspect of the new policy in Area 25 is that compensation water is required for any new water right and some change applications. Because of this policy and its various interpretations that will change in time, the best practice will be to

[1] https://www.census.gov/quickfacts/fact/table/nibleycityutah/RHI825217

meet with DWRi's Regional Engineer of the Northern Regional Office at the time when future water rights are required. See Nibley Water Master Plan, September 2019 for further explanation. The approximate future needs are shown below in this document. One of the first change applications that needs to be filed is for WR 25-2167, which its source is Yeates Spring. This water right could be moved to a new or existing well to be utilized by the City for municipal water needs.

Table 1 - Inventory of Water Rights

WR No.	Owner	Flow (cfs)	Volume (AF)	Source	Use	Status	Application Status
25-2167	Nibley Town Incorporated	0.75	542.98	Yeates Spring	Municipal	Not in Use	
25-6680	Nibley Town Corporation	0.724	524.16	400 South Well	Municipal	In Use	
25-9078	Nibley Town Corporation	7	1,700	Nelson & 4000 S Wells	Municipal	In Use	
25-11236	Cache County Corporation & Nibley City	1.65	1,201	Wells (4) 4000 S, Nelson, 12th West, 640 West	Municipal	In Use	Approved
25-11105 a37687	Nibley City, a Utah Municipal Corporation		18	Wells (2)	Irrigation		Application
Total Water Rights		**10.124**	**3,986.14**				

In addition to available water rights, the amount of reliable water Nibley has access to is based on the reliable yield of the wells or "safe yield". The safe yield of the well is defined y Utah Admin Code R309-515-6 as "2/3 of the pumping rate used in the constant-rate test" of the well. The total reliable water Nibley has available is summarized in Table 2.

Table 2 - Inventory of Water Sources

Source	Reliable Yield* (gpm)	Reliable Yield (ac-ft/yr)
4000 South Well	2,200	3,548.62
Nelson Well	2,667	4,301.90
640 West Well	1,787	2,882.45
Total	**6,653**	**10,731.36**

1.4. WATER RATE SCHEDULE

Nibley City's water rate schedule is as follows:

Base Rate $10.50 per month

Usage Charge $.95 per 1,000 gallons

2. PRESENT AND FUTURE WATER USE

Water usage data for this report is based on the water usage data from the Division of Water Rights website as reported by Nibley City.

2.1. POPULATION PROJECTIONS

Growth projections were developed using historic Census data (1990-2010) and data reported by Nibley to the Division of Water Rights (2011-2018). To calculate the projected population, the future value formula was used, see Equation 1.

$$FP = CP \times (1 + r)^t \quad (1)$$

Where:
FP = Future Population
CP = Current Population
r = Annual Growth Rate (%)
t = Number of Years Between Current and Future Population

Nibley City has experienced significant growth in recent years. From 2000 to 2010 the population grew at an annual rate of 10% and then 3.87% annually from 2010 to 2018. Based on the more recent historical growth rate of 3.87%, future projections were made. In 2025 Nibley's population is projected to be approximately 10,000, and approximately 18,000 in 2040 (see Figure 1).

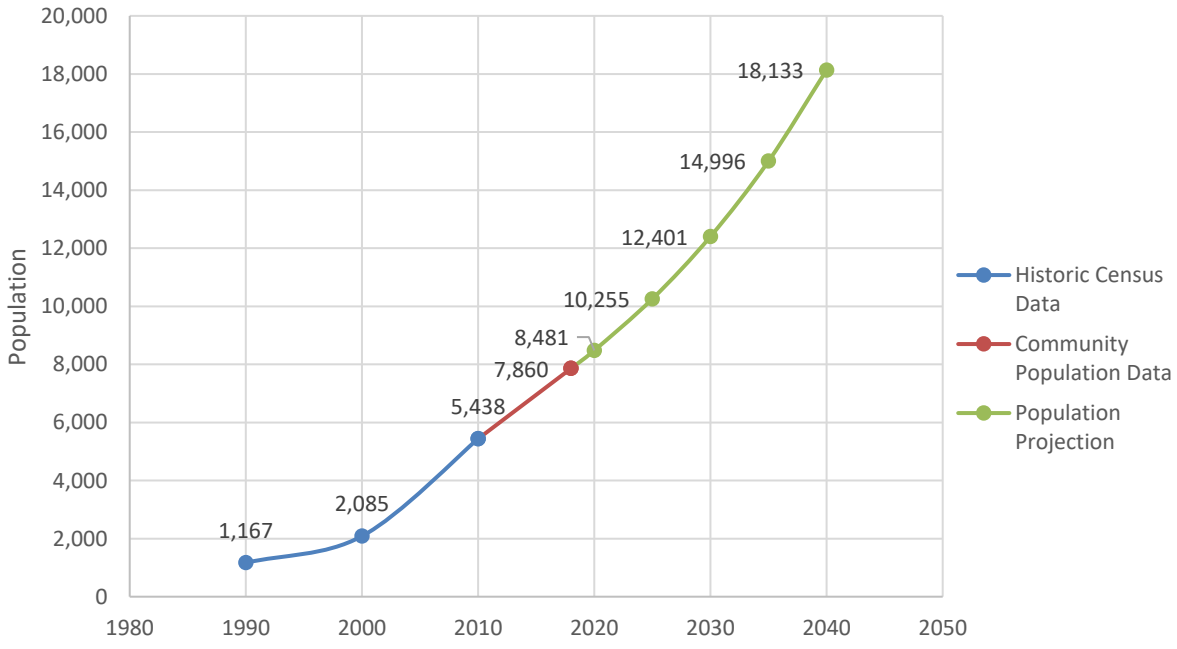


Figure 1 - Population Projections

3. CONNECTIONS

Nibley is mainly a residential community with some commercial and industrial connections. Water usage for these connections was based on the data reported to the Division of Water Rights by Nibley City for 2018. Because the water usage data doesn't differentiate the water between indoor and outdoor use and the majority of residents use culinary water for irrigating lawns, the calculation for converting connections to ERCs is straightforward and combines indoor and outdoor use. Typically, for planning purposes, ERCs are used to define the capacities of system components. Equations 2 and 3 show the conversion for connections to ERCs. A breakdown of connections and their ERC is shown in Table 3.

$$\text{Water Usage per ERC} = \frac{\text{Total Water Used by Residential Connections}}{\text{Number of Residential Connections}} \quad (2)$$

$$\text{Number of ERCs} = \frac{\text{Water Usage by Type of Connection}}{\text{Water Usage per ERC}} \quad (3)$$

Table 3 - 2018 Culinary Water Connections

2018	Connections	ERC
Residential	1,847	1,847
Commercial	19	65
Industrial	10	61
Institutional	48	146
Total Connections	**1,924**	**2,119**

3.1. ERC PROJECTIONS

To project future water demands, it was assumed that the system ERCs would grow at the same rate as the population (3.87%). This assumes that the residential, institutional, and commercial connections would grow proportionally. Figure 2 shows existing and projected number of ERCs through 2040.

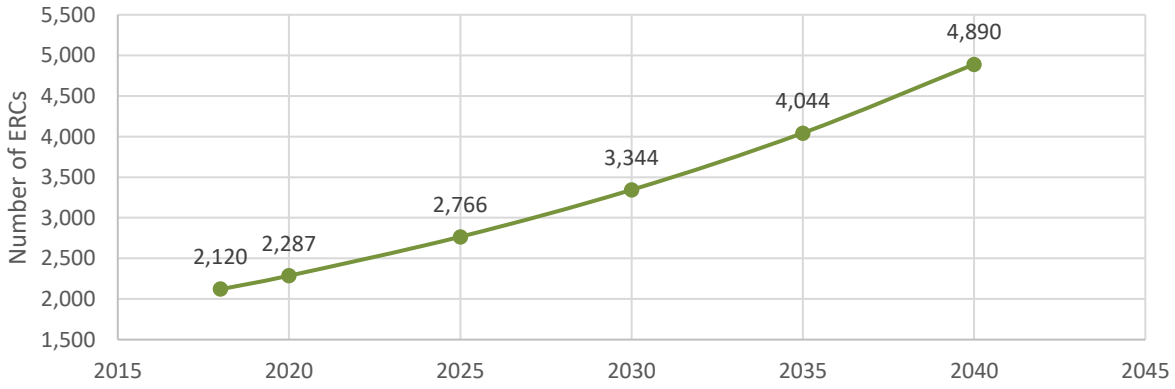


Figure 2 - Projected ERC Growth

3.2. PER CAPITA WATER USE

The per person (per capita) water use is calculated by divided the total water use by the population served. Figure 2.1 shows the per capita water use from 2000 to 2018. During this period, Nibley City's population has grown significantly.

Table 4 - Total Reported Water Use

Year	Population	Residential Use (ac-ft/yr)	Commercial Use (ac-ft/yr)	Industrial Use (ac-ft/yr)	Institutional Use (ac-ft/yr)	Total Use (ac-ft/yr)
2018	7,860	1,399.20	49.42	46.49	110.74	1,605.85
2017	7,450	1,350.49	30.87	41.43	96.33	1,519.12
2016	7,390	1,235.88	47.39	35.12	75.98	1,394.37
2015	7,060	1,242.42	36.84	45.29	75.77	1,400.32
2014	6,500	1,055.17	40.92	13.96	59.11	1,169.16
2013	6,500	1,150.29	18.22	29.25	101.42	1,299.18
2012	5,970	410.23	49.50	54.57	57.20	571.50
2011	6,000	968.36	15.88	4.98	83.96	1,073.18
2010	5,600	653.05	26.68	1.28	93.01	774.02
2005	3,500	597.48	0.22	5.01	45.78	648.49
2000	2,100	545.25	1.00	14.29	36.27	596.81

Per capita water use is calculated by converting the total annual water use to gallons per day and dividing by the population, see Figure 3.

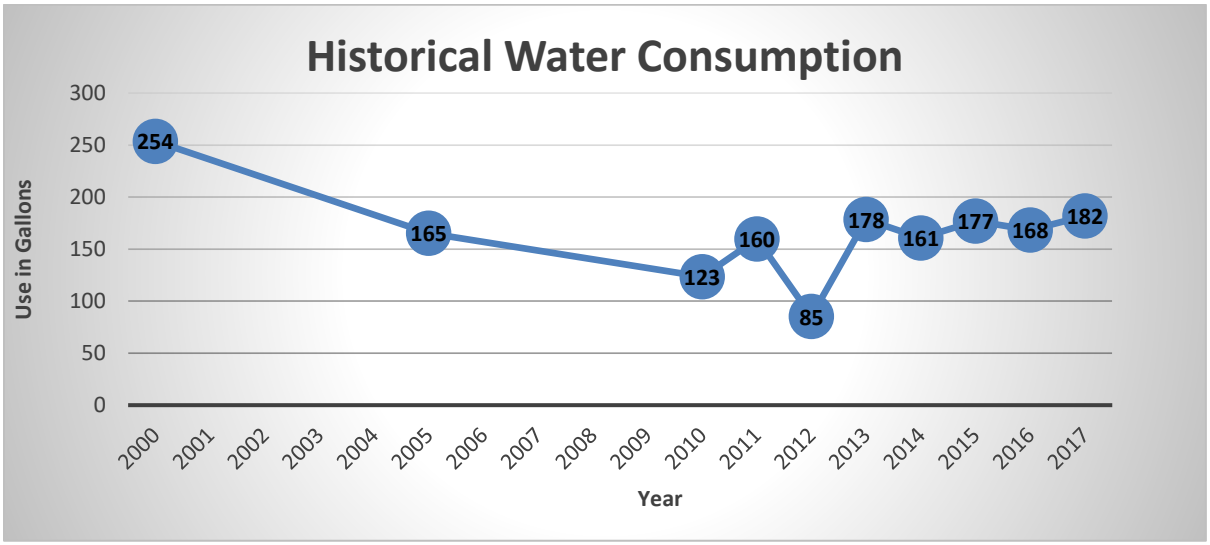


Figure 3 - Water Use per Capita per Day 2000-2018

Since 2000, the population has more than tripled while the average water use has declined by about 30%. In the last 10 years, the water use per person per day[2] has mainly stayed consistently around 160 gallons. Compared to the 2010 State average of 185 gpcd, Nibley residents consume 9 percent less water.

3.3. UNACCOUNTED WATER

To further understand the water use in the system, a simple water loss analysis was performed. The total use water was subtracted from the total water produced from the sources for each year. Table 5 shows the historical water loss for the system.

Table 5 - Unaccounted Water

Year	4000 S Well (ac-ft)	640 W Well (ac-ft)	Nelson Well (ac-ft)	Total Water Produced (ac-ft)	Unaccounted Water (ac-ft)	% UW
2018	515.9	1,014.7	724.4	2,255.0	649.15	28.8%
2017	558.7		1393.1	1,951.8	432.68	22.2%
2016	549.7		1323.8	1,873.5	479.13	25.6%
2015	406.8		1197.3	1,604.1	203.78	12.7%
2014	446.8		876.9	1,323.7	154.54	11.7%
2013	0			0.0	-1,299.18	
2012	0			0.0	-571.50	
2011	0			0.0	-1,073.18	
2010	0			0.0	-774.02	
2005	510		868.5	1,378.5	730.01	53.0%
2000	288.8			288.8	-308.01	-106.7%

There are some years where the unaccounted water data is most likely incorrect because the amount of source water produced is either missing or inaccurately reported. However, in recent years, the data appears to be more accurate and consistent. It should also be noted the amount of unaccounted water has risen, either from more accurate water reporting or aging infrastructure.

3.4. PROJECTED WATER DEMAND

To project the future water demand, the current usage rate, 160 gpcd was multiplied by the projected population. For comparison, a 15 percent conservation effort was also graphed for the same future projection period. A 15 percent conservation approximate to 136 gpcd, see Section 6 Water Conservation Recommendations and Goals for more explanation on conservation measures. Table 6 and *Note, Water Usage Rates are based on data reported to the Utah Division of Water Rights on the annual Water Use Form produced by the city.

[2] Based on data reported to the Utah Division of Water Rights on the Annual Water Use form submitted by the city.

contain information on projected water demand and supply with and without conservation efforts.

Table 6 - Projected Water Demand/Water Conservation

Year	Nibley City Pop.	No Conservation Efforts		10% Conservation by 2025 Usage Rates		Daily Amount Conserved (gal)	Annual Amount Conserved (gal)	Annual Amount Conserved (ac-ft)
		Usage Rates* (gal)	Daily Demand (gal)	Usage Rates (gpcd)	Daily Water Demand (gal)			
2018	7,860	160	1,257,600	160	1,257,600	0	0	0
2020	8,481	160	1,356,960	160	1,356,960	0	0	0
2025	10,255	160	1,640,800	144	1,476,720	164,080	59,889,200	184
2030	12,401	160	1,984,160	144	1,785,744	198,416	72,421,840	222
2035	14,996	160	2,399,360	144	2,159,424	239,936	87,576,640	269
2040	18,113	160	2,898,080	144	2,608,272	289,808	105,779,920	325

*Note, Water Usage Rates are based on data reported to the Utah Division of Water Rights on the annual Water Use Form produced by the city.

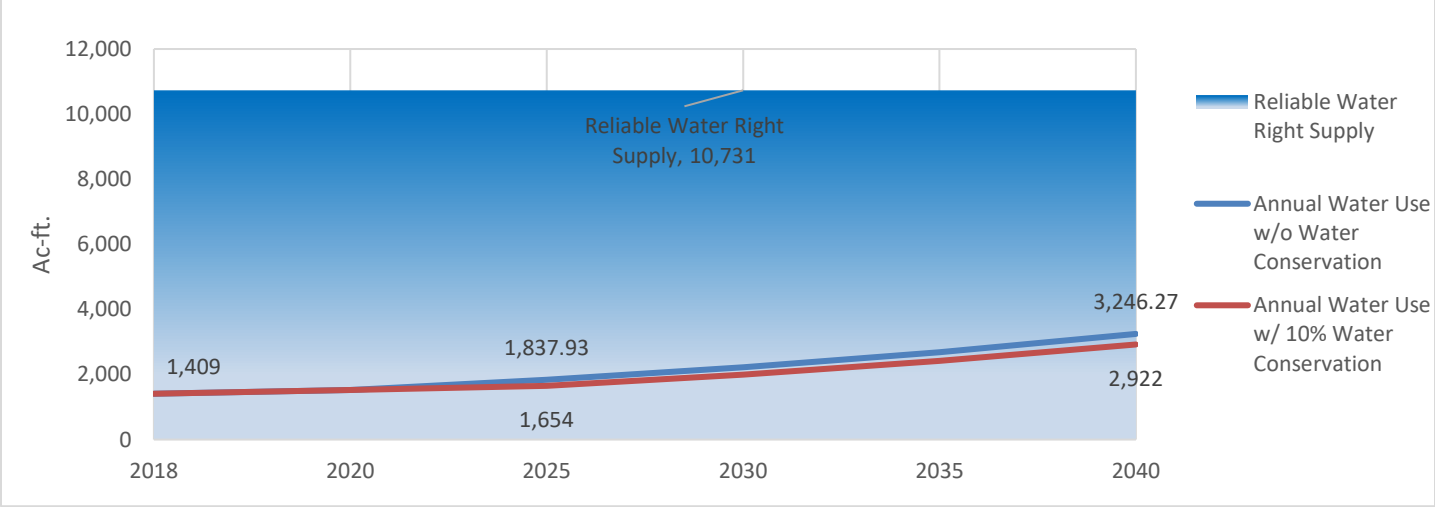


Figure 4 - Projected Water Use & Supply

With current water resources, Nibley City has enough reliable water sources to supply water until 2040.

4. CURRENT WATER CONSERVATION ACTIVITIES

The Utah Division of Water Resources has published a list of Best Management Practices (BMPs) for water providers to help promote Water Conservation, which are listed in Table 7. These BMPS help water providers in conservation practices.

Table 7 Utah DWRe BMPS

BMP 1	Comprehensive Water Conservation Plans
BMP 2	Universal Metering
BMP 3	Incentive Water Conservation Pricing
BMP 4	Water Conservation Ordinances
BMP 5	Water Conservation Coordinator
BMP 6	Public Information Program
BMP 7	System Water Audits, Leak Detection and Repair
BMP 8	Large Landscape Conservation Programs and Incentives
BMP 9	Water Survey Programs for Residential Customers
BMP 10	Plumbing Standards
BMP 11	School Education Programs
BMP 12	Conservation Programs for Commercial, Industrial and Institutional
BMP 13	Reclaimed Water Use
BMP 14	"Smart Controller" Technology

Nibley City has always taken an active role providing high quality drinking water to their residents. The following sections describe the current efforts Nibley is taking to achieve water conservation.

BMP 1 - Comprehensive Water Conservation Plans. Nibley is implementing this practice by submitting this water conservation plan.

BMP 2 - Universal Metering. Nibley has been metering all of its water users for the past 15+ years and currently uses smart meters to do so. Readings are taken monthly and information on water use, customer type, meter size and other relevant data are recorded. The meter system is also set up to detect abnormal water use, such as excessive or spikes in water use due to leaks, which allows the city to alert the water user of a potential leak. Nibley also has a maintenance and replacement program to replace meters as they age or break to maintain the integrity of the system and accuracy of water usage.

BMP 3 - Incentive Water Conservation Pricing. The city has set up a utility fee schedule for water and sewer services that are based on the meter size, and water usage. The base rate for water usage is based on the meter size with a water usage rate of $.95 for every 1,000 gallons of water used. The sewer base rate is $50 with tiered additional charges based on water usage.

BMP 4 - Water Conservation Ordinances. Currently Nibley has a "Waste of Water" Ordinance (15.02.170) to help promote water conservation and is outlined as follows,

"Prohibited Acts: It shall be unlawful for any water user to:

1. Waste water.

2. Allow it to be wasted by stops, taps, valves, leaky joints or pipes, or to allow tanks or watering troughs to leak or overflow.
3. Wastefully run water from hydrants, faucets or stops, or through basins, water closets, urinals, sinks or other apparatus.
4. Use the water for purposes other than for those which he has applied, or to use water in violation of the rules and regulations for controlling the water supply.

BMP 5 - Water Conservation Coordinator. The current Public Works Director, Justin Maughan leads these water conservation efforts. He can be reached at:

Nibley City Offices
455 West 3200 South
Nibley, Utah 84321
435 752-0431

BMP 10 - Plumbing Standards. Nibley has adopted the Utah plumbing code which is based on the 2015 International Plumbing Code. All new constructions are required to adhere to this code as well as constructions that require a building permit.

5. WATER CONSERVATION CHALLENGES

As with all water systems, the revenue generated by water deliveries goes to support water operators' salaries, system repairs and operations, and other budget items. The size of the water system determines the number of employees and materials needed to maintain and operate the system. Therefore, water conservation efforts can be put in place, but the amount of conservation should not place any financial burden on the system

6. WATER CONSERVATION RECOMMENDATIONS AND GOALS

The amount of water use per person per day is fairly conservative. Nibley City also has 20-25 percent unaccounted water, which is above AWWA's 15 percent standard. Based on the amount of unaccounted water, it would be beneficial for Nibley to consider some water conservation practices.

6.1. POTENTIAL WATER CONSERVATION PROGRAMS

The recommended water conservation of 10 percent is based on the amount of unaccounted water lost somewhere in the system. 10 percent conservation is an attainable goal for Nibley to achieve by 2025. Because this water conservation is based on reducing the water lost in the system, the revenue for the system should not be impacted because actual residential water use remains the same. With decreasing water lost in the system, costs to operate the system should decrease. In addition to current conservation goals, see Section 4, a few new programs are listed below that Nibley City plans to adopt and implement that will further reduce the amount of water lost.

6.1.1. BMP 3 – INCENTIVE WATER CONSERVATION PRICING

To reduce water consumption for the system, Nibley City may consider implementing a restructured water rate schedule. The base rate is applied for all water users but as water consumption increases, the cost increases. A restructuring of the water rate schedule may incentivize water users to reduce water consumption. An example water rate is provided, see Appendix B. As part of the current Master Plan being updated, a water rate study is being conducted and a graduated or tiered rate schedule is being recommended for adoption.

6.1.2. BMP 6 – PUBLIC INFORMATION PROGRAM

Nibley City may also increase water conservation education by reaching out to the public through classroom visits, information booths at the city office, or additional mailers. A very simple education program that is easily implemented is to educate water users to water their lawns during non-peak temperature times, typically 12 PM to 6 PM, and to turn off their systems during rainstorms. The information could be sent out in mailers with the monthly bill or by email.

Appendix A contains water conservation education provided by the state for water systems to send out. These items may also be downloaded at https://conservewater.utah.gov/materials.html.

6.1.3. BMP 7 – SYSTEM WATER AUDITS, LEAK DETECTION AND REPAIR

Water Loss Study. Nibley has a higher percentage of unaccounted for water in relation to AWWA 15 percent standard. It is recommended that Nibley. The first proposed water conservation program is to conduct a field water loss study to determine where the unaccounted water is being lost. This field study could be conducted by the city operators and include the following:

- include spot checking meter connections for water leaks
- checking pressure reducing valves, isolation valves, and other system connections for leaks

Conducting a water loss study is a cost-effective program to quickly determine leaks and potentially reduce unaccounted water.

Pipeline Replacement Program.

From the water loss study, a pipeline replacement program may be appropriate to reduce water loss. The percent and condition of pipe that need to be updated from the study may be estimate for the whole system. Steel pipes tend to be the most susceptible to corrosion or abrasion wear based on soil conditions and the bedding around the pipe. Gravels larger than ¾-inch to 1-inch tend to rub against steel pipes during water hammer events. Water hammer occurs in distributions systems when hydrants are opened or closed or when pipes are shut down for repairs or for new connections. For PVC pipes a common source of leaks come from pipes that are not properly connected, i.e. the rubber gaskets rolled or not in contact with the adjacent pipe.

If leaks are detected, then an ongoing program may be implemented to replace water pipes based on their condition or age.

7. IMPLEMENTING AND UPDATING THE WATER CONSERVATION PLAN

This Water Conservation Plan will be adopted by the Nibley City Council, who will have the responsibility to coordinate and carry out the water conservation program measures. A copy of the ordinance for the water conservation plan is attached as Appendix C.

The water conservation plan will be revised and updated as required to meet changing conditions and needs. This plan will also be updated and resubmitted to the Utah Division of Water Resources in January of 2020, as required by legislative House Bill 153.

APPENDIX A. EXAMPLE WATER CONSERVATION EDUCATION MAILERS

Facts about Residential Water Use

- Indoor residential water use is now 60 gallons per capita per day (gpcd), 15% lower than in 2001
- Residents in homes built after 1992 use 5 gpcd less indoors than pre 1992 homes
- Residents in homes that have greater than 3,000 square feet of floor space used 13.6 gpcd more indoors than homes with less than 1,000 square feet
- Income does not affect indoor water use
- Evaporative coolers use about 28 gpd during summer months (6 gpcd on an annually basis)
- Residents using automatic sprinklers for their landscapes over water by about 30%
- Residents using a hose and sprinklers attachment under water by approximately 17%

For More Information Visit:
www.water.utah.gov

A detailed report on residential water use has been prepared by the DWRe and is on the web at: www.water.utah.gov

Utah Division of Water Resources

Mission: To Plan, Develop, Conserve and Protect Utah's Water Resources

UTAH DNR WATER RESOURCES

For more information on water conservation visit us on the web at www.conservewater.utah.gov or www.slowtheflow.org

Utah Division of Water Resources

Water Issues Education Series

2009 Residential Water Use

SURVEY RESULTS AND ANALYSIS OF RESIDENTIAL WATER USE FOR SEVENTEEN COMMUNITIES IN UTAH

SLOW THE FLOW SAVE H2O

CONSERVE EDUCATE

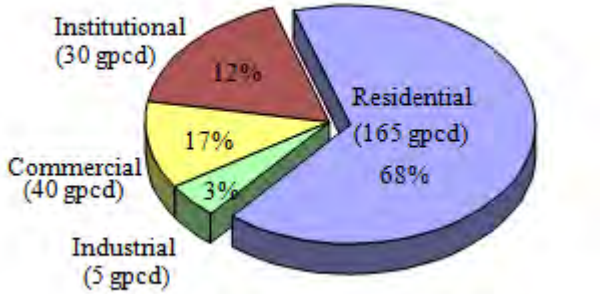
www.conservewater.utah.gov

Residential Water Use

Water Use in Utah

Water is used for several different purposes in Utah The majority (71%) of Utah's municipal and industrial (M&I) water is used by residential consumers. Water use data is reported in gallons per capita per day (gpcd).

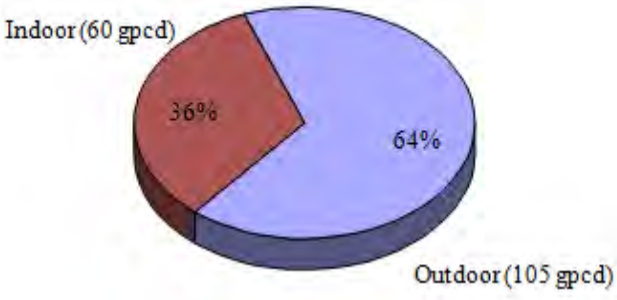
Public Community System Water Use



Indoor Water Use vs. Outdoor Water Use

Even though Utahns are constantly using water indoors every day throughout the year, the majority of residential water use occurs outdoors (about 68%). This is due to the nature of water use and its relation to the climate of Utah. A typical landscape in Utah requires almost 24 inches of supplemental water above the normal summertime precipitation.

Residential Water Use

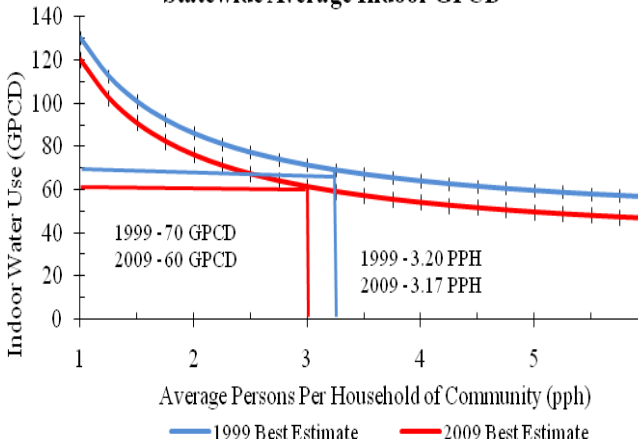


Residential Water Use Studies

Identifying residential water use and how it can be reduced has been a topic of national interest for several decades. In 1993 the U.S. Geological Survey (USGS) performed a national study to understand how much water is being used inside an average residential dwelling. Six years later the American Water Works Association (AWWA) performed a more encompassing study quantifying average use both indoor and outdoor. The Utah Division of Water Resources (DWRe) performed a similar study within Utah two years later in 2001. This same analysis was recently redone by the DWRe. The following table shows the indoor water use results in each of the studies.

Studies	Indoor GPCD
USGS 1993 (National)	81
AWWA 1999 (National)	69
DWRe 2001 (Utah)	68
DWRe 2010 (Utah)	62

Statewide Average Indoor GPCD



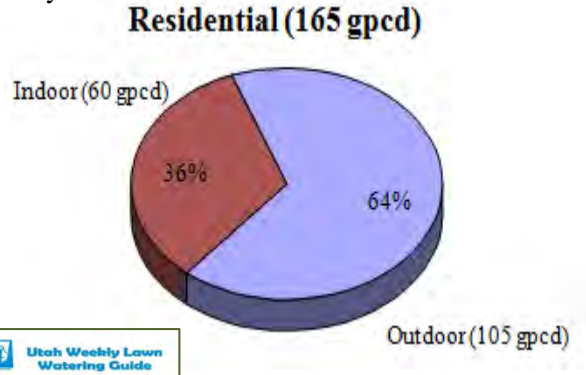
Indoor Water Use

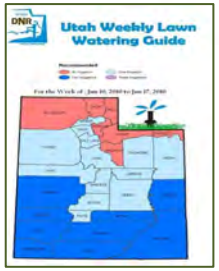
The two DWRe Utah based studies were used to calculate a statewide indoor per capita water use. In 2001, the statewide indoor residential water use was 70 gpcd. In 2009, the statewide indoor residential water use decreased approximately by 15% to 60gpcd. The above figure shows that as pph increase gpcd decreases. Both studies found a similar relationship. This can be attributed to the phenomenon of a household with more people becoming more efficient by doing full loads of dishes in their dishwashers and full loads of clothing in their washing machines. Naturally, total indoor water use will be higher for large households. However, indoor per capita use is lower.

General Water Information

Outdoor Watering

The DWRe has focused water conservation efforts primarily on residential water use with an emphasis on outdoor landscapes because this category has the greatest potential for water conservation. With 64% of the residential water being used outdoors, Utahns can conserve millions of gallons water annually if they water more efficiently. One of these ways is to use a smart controller that allows homeowners a more efficient way to water using only what the plants actually need.





Based on 2010 per capita data

Check the Lawn Watering Guide

The DWRe already provides a statewide network of weather stations for Utahns to use. The weather stations track ET and tell Utahns in a given region how many times they should water during the week. If you don't yet have a smart controller installed, visit the Lawn Watering Guide online at: ***www.conservewater.utah.gov*** to see how many times you should water each week.

General Lawn Watering Tips:

- Stop thinking of "watering your lawn" and start thinking of "refilling the soil moisture reservoir" under your lawn.
- Remember, water less often, but water more deeply! This will provide healthy roots and save water.
- Water in cycles so water will have time to penetrate the soil and reach the root zone.
- Make sure your sprinklers are only watering landscaped areas, not sidewalks, driveways, porches or streets.
- Make sure you apply the right amount of water each time you water, then check the weekly lawn watering guide online at ***www.conservewater.utah.gov*** to find out how many times to water each week.

Utah Division of Water Resources

Mission: To Plan, Develop, Conserve and Protect Utah's Water Resources

UTAH DNR WATER RESOURCES

For more information on water conservation visit us on the web at www.conservewater.utah.gov or www.slowtheflow.org

CONSERVE EDUCATE

UTAH DNR WATER RESOURCES

Save Water Automatically!

Install a Smart Controller on Your Sprinkler System

SLOW THE FLOW SAVE H2O

www.slowtheflow.org
www.conservewater.utah.gov

How Does a Smart Controller Work?

Smart Controllers Water to Evapotranspiration (ET)

ET is defined as the amount of water a plant and its environment loses from evaporation and transpiration. Simply put, transpiration is water the plant uses to grow and survive, and evaporation is water lost from the surrounding soil. The factors that affect ET, are temperature, wind, precipitation, humidity and solar radiation. ET is usually expressed in inches of water over a certain time period; commonly, a day, week, month or year. The Division of Water Resources' (DWRe) main emphasis in water conservation education is for residents to water to the ET requirements of their landscapes as efficiently as possible. Smart controllers can assist residents in accomplishing this. Smart controllers can reduce outdoor water consumption by an average of 15% to 30%!

Smart Controllers Automatically Adjust Sprinkler Schedule

Once a smart controller is properly installed, the controller will automatically regulate your sprinkler system. This means that you will no longer have to adjust your sprinkler times and duration for seasonal changes and will still have a healthy beautiful lawn! Watering plants with the correct amount of water that is required by the plant, is the healthiest way to grow plants.

Smart Controllers Use Weather Stations or Soil Moisture Sensors

Some smart controllers use weather data and local sensors to manage the property's sprinklers. These types of controllers receive data from either sensors and/or weather stations and then turn the sprinklers on or off based on these weather conditions. These controllers can also turn the sprinklers off in the event of rain, high winds or low temperatures.

Other smart controllers use soil moisture probes that measure how much water is in the soil. As you water your landscape, imagine that there is a reservoir of water under the ground and you are filling it up. The soil moisture probe will measure how full that reservoir is. Once the reservoir level drops below a certain level the probe will turn the sprinklers on and re-fill the soil storage reservoir. These types of smart controllers can also turn off sprinklers during rain events.

Smart Controllers Help Save and Maintain Healthy Landscapes

Plants only require a certain amount of water to maintain health. Too much water, can actually damage your grass. Overwatering promotes fungal growth and insect activity. A smart controller can eliminate over watering.

Smart Controllers Cost

Smart controllers can cost anywhere from $100 to several thousand dollars, seeming to be an expensive investment. However, when you consider what you are saving in both monthly water charges and water, a smart controller can have a fairly fast payback time frame.

Companies that Make Smart Controllers

- Acclima
- Accurate Weather Set
- Accuwater
- Alex-tronics
- Aqua Conserve
- Baseline
- Calsense
- Dynamax
- ET Water Systems
- Hunter
- Hydropoint-Weather Trak
- HydroEarth
- Irrisoft-Weather Reach
- Irritrol
- Irrometer
- Rain Bird
- Rain Master Irrigation System
- Signature Controls
- Toro
- WCS Hydrosaver
- Water 2 Save
- Weather Set
- Weathermatic

DWRe does not endorse any product.

Remember if we each save a little we'll all save a lot!

See www.slowtheflow.org for more water wise landscaping tips.

WE **teach** THEM THE VALUE OF
HONESTY, HARD WORK AND PRIDE.
WE NEED TO ADD **water conservation**
TO THAT LIST.

SLOW THE FLOW
SAVE H_2O

Governor's Water Conservation Team

Outdoor Water Conservation Tips

The DWRe has focused their water conservation efforts primarily on residential water use with an emphasis on outdoor landscapes because this category has the greatest potential for water conservation. The amount of water that should be applied to plants and a lawn is determined by the evapotranspiration (Et) for a given region and plant types. Et is defined as the amount of water a plant and its environment loses from evaporation and transpiration. The factors that affect Et are temperature, wind, humidity, solar radiation, and precipitation. The DWRe has found that Utahns are applying about 30% more water on our landscapes than the Et requirement. **The most important factor in watering more efficiently is utilizing water wise landscape principles. This does not mean you have to have a desert landscape! Water wise landscape principles incorporate thoughtful landscape concepts with appropriate plant selection, maintenance and irrigation.**

SIMPLE STEPS FOR A HEALTHIER LAWN AND TO SAVE WATER:

- Raise the height of your lawn mower to 3".
- Add more days between irrigations.
- Don't water during the hottest part of the day.
- Check and repair any sprinkler heads that are leaking or are tilting to the side.
- When watering, break up the zone times by "cycling" your sprinkler system.
- Add a pressure reducer to your sprinkler system.
- Add a "Smart Controller Timer" to your sprinkler system

One thought:
If you are only "using" your lawn areas of your landscape when you walk over it with the mower, you could probably put other plantings there that use less water.
For example,

1) Grass Park Strips use a lot of water but get little use. Consider replacing it with water wise plants.
2) Consider adding more enjoyable patio space to reduce grass areas.

TIPS FOR A WATER-WISE LANDSCAPE

- **Analyze Your Soil**. Using a soil probe or shovel, analyze the type of soil you have in your landscape. Determining your soil type will help you make informed decisions as to appropriate plants for your yard.
- **Plan It Before You Plant It**. Be sure you are familiar with your landscape's many attributes. For instance, note which areas get more or less shade, which areas have reflected heat from the patio or house, and any other features you may encounter.
- **Use Grass Wisely**. Take into consideration the different activities that will go on in your yard. A good rule of thumb is *"If the only time you walk on it is to mow it, you probably don't need it"*.
- **Water Wisely**. Group plants according to their water needs. This will help you avoid over-watering some plants and under-watering others. Putting shrubs and perennials on separate sprinkler zones from your lawn will help avoid severe damage to your plants due to excess water. Use drip systems to water bushes, perennial flower and garden areas, where appropriate.

- **Just Mulch It**. Using mulches to reduce evaporation from the soil also helps prevent weeds from growing in areas where water is needed for ornamental plants.
- **Keep It Up**. While using these principles helps reduce maintenance time, it does not completely eliminate it. Use of good preventive maintenance will reduce the need for costly and time-consuming maintenance later on.
- **Use Appropriate Plants**. Different plants have different requirements for optimum health. To use water more efficiently, choose plants that do not require much water, and are adapted to our arid climate.

Did you know that every time you eliminate one irrigation of a 1/4 acre lot - you can save about 3,000 gallons of water! In some areas that's a savings of about $5.00 every time you water!

VISIT A LOCAL WATER-WISE DEMONSTRATION GARDEN:

There are many water-wise demonstration gardens located throughout the state. In addition to seeing how beautiful and maintenance free these types of landscapes can be, most of the sponsoring agencies offer free classes on how to conserve water indoors and outdoors. Also, Utah State University Extension offers classes at ***www.extension.usu.edu.***

- **Central Utah Gardens**
  355 West University Parkway
  Orem, UT 84057
- **The Garden**
  1851 Dixie Drive at Tonaquint Park
  St. George, UT 84771
- **The Greater Avenues Water Conservation Demonstration Garden**
  11th Avenue Terrace Hills Drive
  Salt Lake City, UT 84115
- **Jordan Valley Water Conservation Garden Park**
  8215 South 1300 West
  West Jordan, Utah 84088
- **Sego Lily Gardens**
  1472 East Sego Lily Drive (10200 South)
  Sandy, UT 84070
- **Utah Botanical Center Home**
  725 Sego Lily Drive
  Kaysville, UT 84037
- **Weber Basin's Water Conservation Learning Garden**
  2837 East Highway 193
  Layton, UT 84040

LAUNDRY:

Washing your clothes is a necessity. However, keep in mind that laundry uses 22% of all water used in your home. In order to maximize the efficiency of your laundry, only do full loads!

LAUNDRY CONSERVATION TIPS:

- Ask yourself, "Does this really need washing?"
- Update old washing machines with a newer Energy Star ® water-efficient machine, they use approximately 20 gallons less per load than a typical older models and save energy as well. Don't forget to check with Questar® Gas about rebates.

LEAKS:

You may not see them, but leaks can be a significant portion of your indoor water use within your home. On average, leaks make up about 14% of all indoor water use. If you have leaks, fixing them is a great way to save water, indoors!

How Much Water Does It Take?	
Activity	Gallons
Brush Teeth	1.0 – 2.5
Flush Toilet	1.28 – 7.0
Automatic Dishwasher	15 – 60
Wash Car	100
Bath	15 – 70
Washing Machine	30
Shower (per minute)	2.5 – 6.0
Leaking Faucet (per day)	10
1 day use (indoor per person)	60
Watering Lawn (1/4 acre lot)	3,000

LEAK DETECTION TIPS:

- Test to see if you have any leaks in your house by performing these tasks:
  1. Turn off all water-using devices.
  2. Find your water meter (ask your water provider), remove the lid to see the dial.
  3. If the dial is moving then you either have a leak or a water-using device is still active.
  4. If it is a leak, fix the leak.
  5. If you can't find the leak contact a professional to perform a more detailed investigation.
- Check for leaks in the most common places, toilets (flappers get old and wear out), faucets (cartridges need periodic replacement) and under sinks (water supply lines sometimes leak).

Indoor Water Conservation Tips

KITCHEN:

The average household uses about 11% of its total indoor water in the kitchen. Water is used in the kitchen in a variety of ways: washing dishes (in a dishwasher and by hand), and for general cooking and cleaning purposes. By carefully planning your activities, you can reduce water used in the kitchen significantly!

Children can learn about using water wisely at ***www.watereducation.utah.gov***

KITCHEN CONSERVATION TIPS:

- Make sure when you wash dishes you are doing full loads, this saves energy and water.
- Keep a gallon of water in the refrigerator for drinking water.
- Identify activities you could perform without the water running, for instance, filling the sink with a little bit of water to wash vegetables is much more efficient than letting the faucet run.
- Consider buying a new Energy Star ® dishwasher that uses less water and energy than older models.

BATHROOM:

You use more water in the bathroom than in all of the other rooms combined! This is where you shower, shave, wash hands, brush teeth and flush the toilet. There are many things you can do to save water in the bathroom.

BATHROOM CONSERVATION TIPS:

- Turn the water off while you brush your teeth.
- Fill the basin to rinse your razor when you shave.
- Take shorter showers, this saves water and energy.
- Install faucet aerators, they can reduce output from 2.5 gallons per minute (gpm) to 1.5 gpm.
- Install Low-Flow showerheads, they can reduce output from 5 gpm to 2.5 gpm and also saves energy.
- Upgrade your existing toilet to an Ultra-Low Flush Watersense® toilet, reducing water use down to 1.28 gallons per flush (gpf), older models use 3.5 gpf.
- Check with your local water provider about rebates.

FREE WATER CHECKS:

FREE WATER CHECK

A Water Check analyzes the performance of your automated sprinkler system. It is offered for free June through August. A trained representative will come to your house and will test the soil type, grass root depth, sprinkler distribution uniformity and water pressure. They will provide a customized watering schedule and tips on how to improve your sprinkler system. The free Water Check takes about an hour and will save you a lot of water over the watering season. The Water Check program is sponsored by the Jordan Valley Water Conservancy District, Central Utah Water Conservancy District, Washington County Water Conservancy District, Sandy City, Murray City, Salt Lake City, Metropolitan Water District of Salt Lake and Sandy, Central Iron County Water Conservancy District, USU Extension and the DWRe.

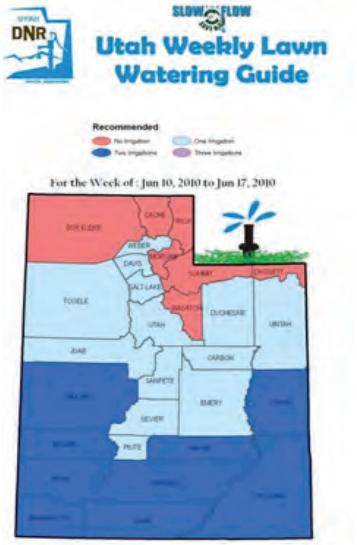
You can set an appointment for your free water check by signing up online at **www.slowtheflow.org/watercheck** or by calling **1-877-728-3420**

SLOW THE FLOW SAVE H2O

UtahState UNIVERSITY extension

LAWN WATERING GUIDE:

The DWRe has created a water conservation webpage that helps citizens save water It also serves as valuable resources for water agencies. One of the newest DWRe website features is a weekly lawn watering guide that assists residents in determining how many times they need to water their landscapes. The guide is updated every Thursday during the growing season and is based on a statewide network of weather stations that monitor ET. The DWRe presents the information in a user friendly lawn watering guide that is separated by counties. Using the color code water users can see if they need to water their lawn once, twice, three times or not at all during the week. This weekly guide is available on ***www.conservewater.utah.gov*** as well as on DWRe.s Facebook® page and Twitter® feeds.



The Lawn Watering Guide featured on the web page informs residents throughout the state how many times they should water in a given week.

WATER-WISE PLANT TAGS:

The DWRe, in cooperation with USU Extension, Bureau of Reclamation, and various water providers, have developed a water-wise plant tagging program to promote the use of native and other well-adapted plants in Utah landscapes. Look for the tagged plants the next time you shop for plants. These water-wise plants will help you save water. Remember to group plants together with similar water needs and adjust sprinklers to provide only the required amount of water for those plants. You can check out these plants before you buy them at ***www. waterwiseplants.utah.gov.***

Look for the Yellow Tags!

They indicate Water Wise Plants!

www.waterwiseplants.utah.gov

Water-Wise Plant Tag identifies a plant that is either native to Utah or well adapted to Utah's climate.


Showy Goldeneye

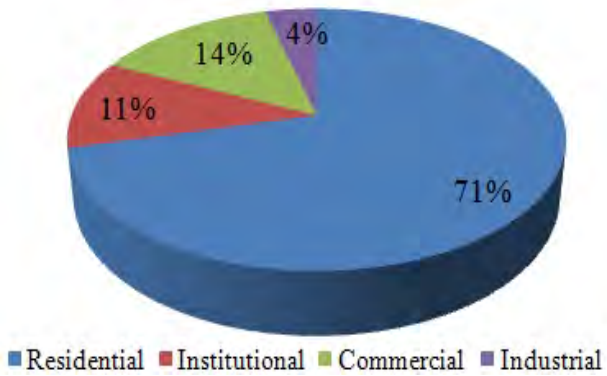

Russian Sage


Firecracker Penstemon

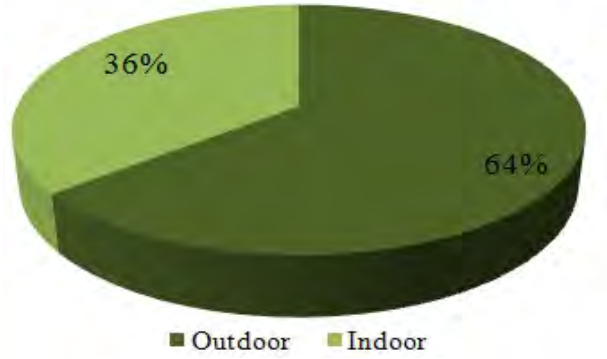
How do We Use Water in Utah?

Utahn's are becoming more aware of the need to conserve water. Even with this awareness, Utah continues to be one of the top water users in the nation. In the first chart, water use is shown by category. As the chart shows, we use most of our water in and around our homes (about 185 gpcd). The next chart shows the residential water use divided between indoors and outdoors. Most of our water use, nearly (2/3), is used to irrigate our landscapes. This is mainly due to climactic conditions and Utahns' water use habits. Therefore, the most potential Utah has to reduce overall water use is in efficient outdoor water use habits. Of course, if the 25% reduction goal is to be reached, indoor water use will also have to be reduced. The last chart shows a breakdown of our indoor water use. Utah's indoor water use (about 60 gpcd) is approximately the same as the rest of the nation. As can be seen, the majority of our indoor water use occurs in the bathroom.

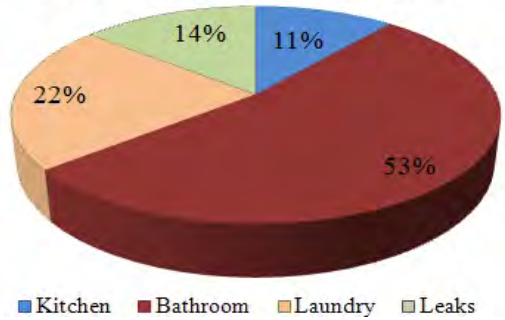
Utah's Total Public Water Use (260 gpcd)



Utah's Residential Water Use (185 gpcd)



Utah's Residential Indoor Water Use (60 gpcd)

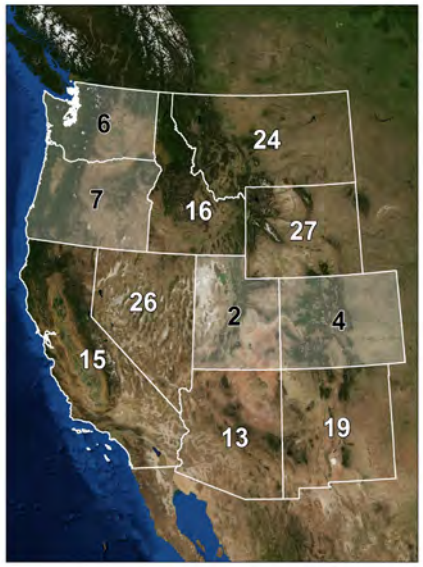


Highest Water Users in the Nation	
State	**gpcd (2005)**
Nevada	280
Utah	**260**
Hawaii	205
Arizonia	197
California	193

Source: USGS 2005 Estimated Use of Water in the United States of public water systems.

Why We Need to Conserve Water?

Utah is one of the three fastest growing states in the nation. From 2000 to 2010, Utah's population increased by more than 500,000 people to about 2.8 million. At this rate, Utah is adding another city about the size of Salt Lake City every three years. According to the Governor's Office of Planning and Budget, Utah's rapid growth will continue, with the population more than doubling to 6.8 million by 2060. Because of this rapid growth there will be an increase in demand of all natural resources, especially water. The Utah Division of Water Resources (DWRe) plans to meet future water demands by using several strategies. The most cost effective of these strategies is water conservation. The state has a goal to reduce per capita water use by at least 25% by the year 2025. This would reduce our per person water use (gpcd) to a more sustainable 220 gpcd. It would save over 500,000 acre-feet (ac-ft) every year. That is almost enough water to fill Jordanelle and Deer Creek reservoirs!



Note: Population growth ranking are estimated from 2000-2010.

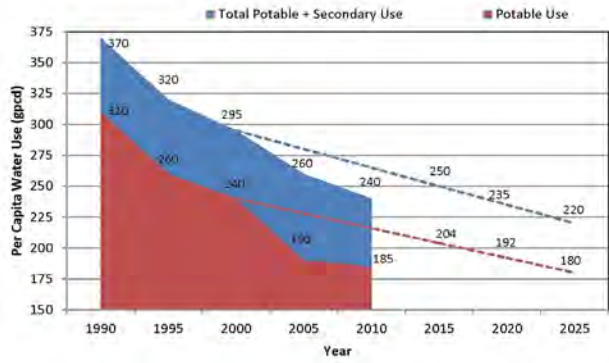
Utah's Water Conservation Goal: 25% reduction in Municipal & Industrial water usage by 2025 to a more sustainable 220 gpcd

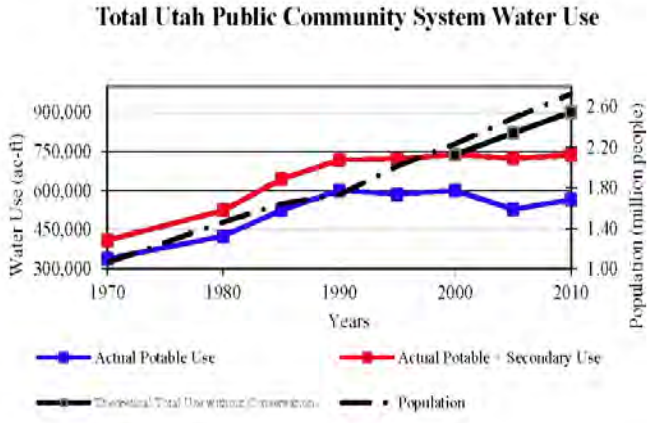
Reasons to Conserve Water

- **Limited water supply in Utah.**
- **Help meet future water demands.**
- **Postpone large water projects from having to be constructed.**
- **Delay expensive capital investments to upgrade or expand existing water facilities.**
- **Improve water levels in reservoirs.**
- **Conserve energy as less water needs to be treated, pumped and distributed to the consumer.**
- **Reduce sewage flows, delaying the need for more wastewater treatment facilities.**
- **Lessen the leaching of chemicals and sediments into streams and aquifers.**
- **A more sustainable way of life, balancing human needs with that of the natural environment.**

Utah's Water Conservation Progress Thus Far

Utahns are on their way to reducing their water use by at least 25 percent. The DWRe conducts a statewide water use study every 5 years. The latest 2010 study, indicates that water use statewide is at 240 gpcd. This is about a 18 percent reduction from the year 2000 (295 gpcd) water use. The data shows that the state is ahead of the projected reduction trend line. However, a lot of work still need to be done in order to reach our statewide goal! Prior to 1990, water use steadily increased with the state's population. However, efforts by the DWRe, the state's major public water suppliers, the creation of the "Slow the Flow: Save H2O" campaign and the push for Utah residents to conserve water, total M&I water use no longer increases as the population grows. If Utah's residents still consumed the same amount of water as they did in 2000, public water system deliveries would be about 162,000 ac-ft/yr more than the actual current amount of about 738,000 ac-ft/yr. This amount of water is greater than the capacity of Pineview Reservoir, (110,000 ac-ft) near Ogden. Utahns have responded well to the water conservation efforts. However, more needs to be done to reach the State's 25% reduction goal!





Please try and do your part: "Slow the Flow: Save H_2O."

Remember "If we each save a little we all save a lot!"

For more information on water conservation visit these water conservation websites:

www.water.utah.gov
www.conservewater.utah.gov
www.slowtheflow.org
www.waterwiseplants.utah.gov
www.watereducation.utah.gov

Utah Division of Water Resources
1594 West North Temple
Salt Lake City, Utah 84116
Phone: 801-538-7230
Fax: 801-538-7279

SLOW THE FLOW SAVE H2O

UTAH DNR NATURAL RESOURCES

UTAH DNR WATER RESOURCES

Your Guide to Water Conservation in Utah

SLOW THE FLOW SAVE H2O

CONSERVE EDUCATE
conservewater.utah.gov
watereducation.utah.gov

UTAH DNR WATER RESOURCES

www.SlowTheFlow.org
www.ConserveWater.utah.gov

Remember, if we each save a little, we'll all save a lot.

More Information

To locate some water-wise landscape examples near you, and to find out more ways you can help Slow The Flow, visit **www.conservewater.utah.gov.**

SLOW THE FLOW SAVE H2O

Sponsored by the Governor's Water Conservation Team

WATER MAY NOT SEEM LIKE
a big deal. UNTIL YOU
TRY **living without** IT.

To look around Utah, most would never guess that it is actually the second-driest state in the nation – averaging only 13 inches of water each year. Working together and practicing easy conservation techniques, such as water-wise landscaping, is a huge step toward ensuring we have enough water for now and into the future.

WATER-WISE LANDSCAPING

Water-wise landscaping dramatically decreases water usage while allowing you to maintain a beautiful, lush landscape. It employs a host of ideas that conserve water, reduce maintenance and save money.

Water-wise landscaping doesn't mean drab, colorless, lifeless yards, but it does mean the application of these important principles:

Planning & Designs that are environmentally sound, financially feasible and aesthetically pleasing. Because lawns consume a lot of water, choose a landscape that limits the lawn size and beautifies the yard.

Soil Amendments that improve the soil and provide beneficial nutrients.

Appropriate Plant Selection using low-water use plants as much as possible. Group plants together that have similar water demands.

Efficient Irrigation that lessens water use and saves money. Apply water in the proper amount and only when necessary. Cycle your irrigation into two or three installments to avoid run-off. Group plants by water need.

Use Of Mulch reduces weeding, evaporation and slows erosion. Mulch with 2 to 3 inches of materials such as compost, ground bark, gravel or stone.

Appropriate Maintenance to repair hoses and irrigation leaks, and adjust your timers according to the season. Maintenance needs of a carefully planned water-wise landscape should decrease over time as plantings mature.

HERE IN UTAH water IS A precious commodity.

Monthly Lawn Watering Guide

SLOW THE FLOW SAVE H2O

ADDITIONAL WATER-SAVING TIPS

Cycle Your Irrigation

Cycle your watering schedule by breaking your total watering time into two or three installments, allowing an hour between waterings to let the water soak in. The more clay in your soil means more frequent and shorter cycles for your lawn.

Water By Zone

If your lawn and plants are watered by different sprinkler zones, you will be able to save water by watering them appropriately. Shrubs, flowers and other decorative plants require 25 to 50 percent less water than lawn. If possible, water these zones a few minutes longer than the lawn but half as frequently.

More Information

To locate some water-wise landscape examples near you, and to find out more ways you can help Slow The Flow, visit **www.conservewater.utah.gov**.

Remember, if we each save a little, we'll all save a lot.

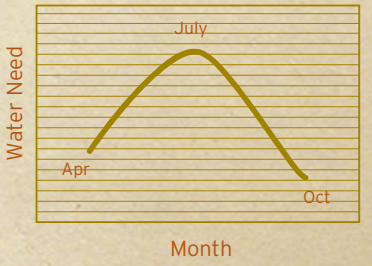
SLOW THE FLOW SAVE H2O

Sponsored by the Governor's Water Conservation Team

WE need TO MAKE every drop COUNT.

A typical Utah lawn has a water demand curve that begins in mid-April, rises to a peak in July, and then falls rapidly until mid-October. Adjusting your timer monthly to better follow this demand curve will save you water and money. An easy way to do this is keep the minutes constant and increase or decrease the number of days between watering.

Typical Lawn Water Demand Curve



MONTHLY WATERING GUIDE

These watering schedules are based on average conditions. If you already water less and are satisfied with how your lawn looks, don't increase your watering time. Instead, try decreasing your time. Turn down the minutes until you begin to see stress on your lawn, then turn it back up a bit and leave it. As you fine-tune your schedule you will save even more water and money.

If the recommended watering schedule does not seem to be enough water for your lawn, please check your system for inefficiencies and maintenance issues before increasing your run times. Watering a whole lawn to green-up just a few brown spots is an inefficient use of water.

Month	Northern Utah*	Southern Utah**
Mar.	No irrigation recommended	27 min. every 7 days
Apr.	No irrigation recommended	27 min. every 5 days
May	21 min. every 4 days	27 min. every 4 days
June	21 min. every 3 days	27 min. every 3 days
July	21 min. every 3 days	27 min. every 3 days
Aug.	21 min. every 3 days	27 min. every 3 days
Sep.	21 min. every 6 days	27 min. every 5 days
Oct.	21 min. every 10 days	27 min. every 7 days
Nov.	No irrigation recommended	27 min. every 10 days
Dec.	No irrigation recommended	No irrigation recommended

Please remember that these schedules are only recommendations. Each landscape has its own characteristics that affect its watering requirements.

The times have been calculated based on average application rates for spray heads. Times should be doubled for rotary heads.

* It is recommended to apply 1/2 inch per irrigation.
** It is recommended to apply 5/8 inch per irrigation.

Salt Lake City Ordinance regulates what can be planted in park strips in order to protect public safety, provide access for utilities, and maintain an aesthetic standard for our community. The rules are pretty simple, and for more information, visit our web site at www.slcsaveh20.com. By following the guidelines, you can make our streets beautiful and help ensure the safety of kids and pedestrians.

- 33 percent of the space must contain plants. Of course, you can plant more!
- Groundcovers and continuous planting should be no more than 18 inches tall.
- Individual plants used as accents or specimens may be 36 inches tall, as long as they don't block site lines from the roadway or driveway.
- The use of concrete or mortar is prohibited in park strips that are wider than 24 inches or have existing trees.
- Plants with thorns or barbs are prohibited.

Additional Plants

Arabis caucasia Rockcress Sun 4-9" high x 12" wide Spring bloom	*Helianthemum nummularium* Rockrose Sun to part shade 6" high x 18" wide Late spring bloom
Aubrieta deltoides False Rockcress Sun 4-9" high x 12" wide Spring bloom	*Lavandula x intermedia* Hyb. Lavender Sun 30" high x 24" wide Summer bloom
Juniperus ssp. Juniper Sun 8-24" high x 3-8" wide Evergreen	*Rhus aromatica* 'Gro-low' Gro-low Sumac Sun to shade 2' high x 5' wide Fall color
Dianthus ssp. Cottage Pinks Sun 6-12" high x 8-24" wide Early summer bloom	*Santolina ssp.* Lavender Cotton Sun 18" high x 36" wide Summer
Veronica liwanensis Turkish Speedwell Sun to part shade 2" high x 18" wide Early summer	*Zauschneria arizonica* Hummingbird Trumpet Sun 3' high x 2' wide Late summer

Salt Lake City
Department of Public Utilities

1530 SOUTH WEST TEMPLE
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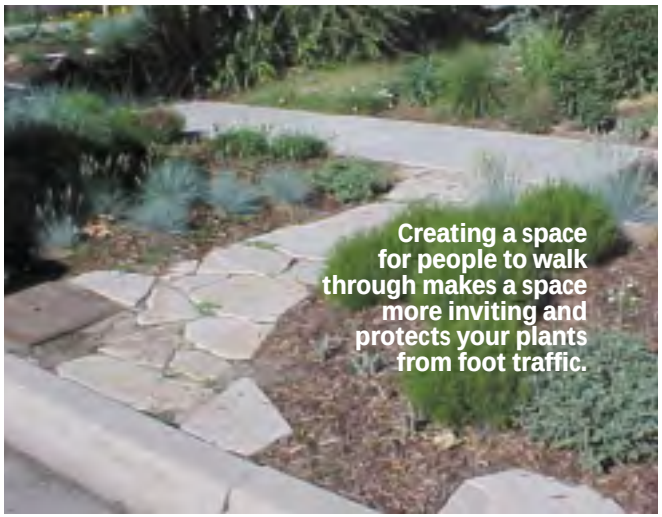
Salt Lake City
Department of Public Utilities

FROM Zero TO Xeriscape

A GUIDE TO
PLANTING PARK STRIPS

Create a beautiful, water-wise park strip.

It's the garden space we love to hate—the park strip—that little strip of soil between the sidewalk and the street. Too hot, too full of tree roots, too narrow, and worst of all, too hard to water efficiently.



Creating a space for people to walk through makes a space more inviting and protects your plants from foot traffic.

But with just a little planting know-how and following some common-sense guidelines, this space can be transformed into a water-wise oasis of color and texture.

Perennials for the Park Strip

Cerastium tomentosum
Snow-in-Summer
Sun
4" high x 20" wide
Spring bloom

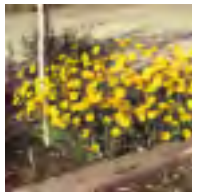
Thymus ssp.
Thyme
Sun
3" high x 24" wide
Early summer bloom

Antennaria rosea
Pink Pussytoes
Sun to part shade
2" high x 15" wide
Early summer

Bergenia cordifolia
Heartleaf Pig-squeak
Part to full shade
12" high x 18" wide
Early spring bloom

Phlox subulata
Moss Phlox
Sun
4" high x 24" wide
Spring bloom

Lavandula angustifolia
English Lavender
Sun
15-24" high x 15-24" wide
Summer bloom



Coreopsis grandiflora
Perennial Tickseed
Sun to part shade
12-24" high x 18-24" wide
Spring bloom

Festuca ovina glauca
Dwarf Blue Fescue
Sun to part shade
8-24" high x 20" wide
Evergreen

Anacyclus dupressus
Mt. Atlas Daisy
Sun
4" high x 12" wide
Early summer bloom

Corydalis lutea
Golden Corydalis
Part to full shade
12" high x 12" wide
Spring bloom

Sedum spectibilis
'Autumn Joy'
Autumn Joy Sedum
Sun
18" high x 24" wide
Fall

Geranium ssp.
Cranesbill
Sun to part shade
18-24" high x 24" wide
Spring bloom

PHOTOS: STEPHANIE DUER

1. Measure the site.

The square footage is determined by multiplying the strip depth by its length.

2. Determine site needs.

Is the park strip in sun or shade; for how long; and for what time of day? Knowing this will help in selecting the right plants for the space.

3. Make a plan.

City ordinance requires that 33 percent of a park strip contains plants, but the calculation is based on expected size after a three-year establishment period.

4. Select the plants.

Pick plants that are appropriate for your site: ones that won't be too tall, too wide, get the right sun, and not need a lot of water.

5. Prepare the soil.

Many plants need soil rich in organic material, and you can provide it by digging in compost before you plant. However, native plants want soil low in fertility and quick draining.

6. Plant!

After removing plants from their containers, rough up the root ball so the roots aren't in a tight ball. Place plants so that the top of the root ball is above the existing grade by one inch (this ensures good drainage).

7. Water.

Even water-wise plants need time to establish. Use a screwdriver inserted into the soil near the root ball to determine if the plants need water. If the screwdriver goes in easily, the roots have enough water.

8. Mulch.

To keep the soil moist and cool and to reduce weeds, place 3 to 4 inches of compost, bark, or fine gravel over the strip, taking care to not bury the plants or the water meter.

APPENDIX B. SAMPLE WATER RATE ORDINANCE

Water Rates Ordinance

_____ City
A Municipal Corporation

ORDINANCE NO._____

AN ORDINANCE AMENDING PROVISION OF THE _____ CITY MUNICIPAL CODE PERTAINING TO THE SERVICE RATES FOR THE CULINARY WATER SYSTEM.

Section 1. Preamble

A. WHEREAS, [the City] operates a culinary water system; and

B. WHEREAS, the city council understands that current water rates are not sufficient for present and future increases in costs of providing water to residents; and

C. WHEREAS, the city council desires to amend the provision of the _____ city municipal code pertaining the fee for culinary water service; and

D. WHEREAS, the city council understands the pressing need to use water in a more efficient manner to allow for future sustained growth of the community;

Section 2. Ordaining Clause

NOW, THEREFORE, IT IS ORDAINED BY THE CITY COUNCIL OF _____ CITY, UTAH:

Section ___ Subsection ____ of the _____ City Municipal Code is hereby repealed and reenacted to read as follows:

Section 3. Culinary Water Rates

The City Manager or his / her designee shall read meters monthly. Each account will be assessed a monthly fee using a daily rate as set forth below. Water service charges shall be collected monthly for each water connection. Service charges will be composed of the following parts:

A. A basic daily service charge, based upon the size of the meter connection calculated to cover major fixed costs associated with paying debt service, salaries, and other costs of operating and maintaining the water system, which do not vary with the amount of water delivered, is set according to the following schedule:

Meter Size	Daily Service Charge ($)	Monthly Service Charge ($)
.75	.33	9.90
1.0	.83	24.90
1.5	1.16	34.80
2.0	1.66	49.80
3.0	4.98	149.40
4.0	10.62	318.60

(Numbers used in this table are hypothetical and are used only to illustrate one methodology)

B. A charge for all water delivered through the meter, calculated to cover the variable costs of operating and maintaining the water system, which do vary according to the amount of water delivered, is set according to the following schedule:

OPTION 1: INCREASING BLOCK RATE STRUCTURE

(Numbers used in this table are hypothetical and are used only to illustrate one methodology)

Gallons Used	Monthly Service Charge ($)	Metered Water Rate ($ / Kgal)
0 – 4,200	9.90	1.00
4,201 – 19,200	9.90	1.50
19,201 – 28,200	9.90	2.00
28,201 – 33,000	9.90	2.50
33,001 – 39,000	9.90	3.00
39,001 – 49,000	9.90	3.50
Over 49,000	9.90	4.00

OPTION 2: SEASONAL BLOCK RATE STRUCTURE

(Numbers used in this table are hypothetical and are used only to illustrate one methodology)

Monthly Service Charge ($)	Metered Water Rate ($ / Kgal)	
	Oct - May	Jun - Sep
9.90	1.00	1.50

OPTION 3: ASCENDING BLOCK RATE STRUCTURE

(Numbers used in this table are hypothetical and are used only to illustrate one methodology)

Tier Name	Usage (% of Target)	Metered Water Rate ($ / Kgal)
Low-Volume	0 – 50%	.75
Conservation	51 – 100%	1.00
Inefficient	101 – 150%	2.00
Excessive	151 – 200%	4.00
Wasteful	Over 200%	8.00

Each customer has a water budget or target, which is based on:

- Lot size
- Number of occupants
- Daily evapotranspiration, totaled for the billing period, as measured at the nearest weather station

APPENDIX C. RESOLUTION BY NIBLEY CITY ADOPTING THE 2020 WATER CONSERVATION PLAN

The Water Conservation Plan was incorporated into the latest Water Master Plan (2019), which was adopted by Nibley City on March 12, 2020, thereby also adopting the Water Conservation Plan by association.

RESOLUTION 20-03

A RESOLUTION ADOPTING A NEW NIBLEY CITY WATER MASTER PLAN

WHEREAS, Utah law allows municipalities to create and plan for local infrstruture and utiltiy needs; and

WHEREAS, Nibley City has established a culinary water system for its residents; and

WHEREAS, large areas of land around Nibley City are unincorporated and will likely develop in the future; and

WHEREAS, Nibley City anticipates population growth and greater demand placed on Nibley City's water system; and

WHEREAS, Nibley City wishes to update the Water Master Plan to plan for future growth within Nibley City.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF NIBLEY CITY, STATE OF UTAH, AS FOLLOWS:

1. That the attached Water Master Plan is adopted by the Nibley City Council.

Dated this 12 day of March, 2020

Tom Bernhardt, Mayor Pro Tem

ATTEST

David Zook, City Recorder