BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

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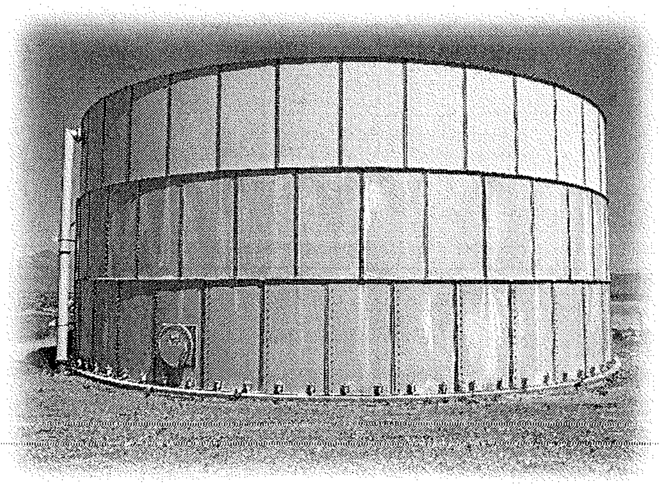
In the Matter of: Application of Great Basin Water Co., Pahrump, Spring Creek, Cold Springs, Pahrump, and Spanish Springs Divisions for Approval of its 2024 Integrated Resource Plan and to designate certain system improvement projects as eligible projects for which a system improvement rate may be established, and for relief properly related thereto.	Docket No. 24-______________

VOLUME 4 OF 18

Great Basin Water Co.
2024 Integrated Resource Plan
Volume IV: Cold Springs Division

March 1, 2024



Prepared for:

Great Basin Water Co.™

Prepared by:

Lumos & Associates, Inc.
950 Sandhill Road, Suite 100
Reno, Nevada 89521
775-827-6111

LUMOS & ASSOCIATES

PROFESSIONAL ENGINEER - STATE OF NEVADA
MICHAEL W. HARDY
Exp: 06-30-25
CIVIL
No. 21862

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List of Abbreviations

ADD	Average Day Demand
ADMM	Average Day Maximum Month
AF	Acre Feet
AFA	Acre Feet Annually
AFUDC	Allowance for Funds Used During Construction
AL	Active Level
AMP	Asset Management Plan
AMR	Automatic Meter Reading
amsl	above mean sea level
AWWA	American Water Works Association
bgl	Below Ground Level
CDP	Census Designated Place
CIP	Capital Improvement Projects
CPC	Certificate of Public Convenience and Necessity
CU	Color Units
DWR	Nevada Division of Water Resources
fps	Feet per Second
ft	Feet
GBWC	Great Basin Water Co.
GBWC-CSD	Great Basin Water Co. – Cold Springs Division
GBWC-PD	Great Basin Water Co. – Pahrump Division
GBWC-SCD	Great Basin Water Co. – Spring Creek Division
GBWC-SSD	Great Basin Water Co. – Spanish Springs Division
gpd	Gallons per day
gpdpc	Gallons per day per connection
gpm	Gallons per Minute
GIS	Geographical Information Systems
GPS	Global Positioning System
HAA5	Haloacetic acids
HGL	Hydraulic Grade Line
HP	Horse Power
IRP	Integrated Resource Plan
LF	Linear Feet
LOS	Level of Service
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MFL	Million Fibers per Liter
MG	Million Gallons

List of Abbreviations – cont.

MGA	Million Gallons Annually
MGD	Million Gallons per Day
mg/l	Milligrams per Liter
MG/Y	Million Gallons per Year
NAC	Nevada Administrative Code
ND	Non-Detect
NDEP	Nevada Division of Environmental Protection
NDMC	National Drought Mitigation Center
NRS	Nevada Revised Statues
NRW	Non-Revenue Water
O&M	Operation and Maintenance
pCi/L	Picocuries Per Liter
PF	Peaking Factor
pH	Potential of Hydrogen
PHD	Peak Hour Demand
ppm	Parts per Million
ppb	Parts per Billion
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
psig	Pounds per Square Inch Gauge
PUCN	Public Utilities Commission of Nevada
PVC	Poly Vinyl Chloride
RPN	Risk Priority Number
RTC	Regional Transportation Commission
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SIR	System Improvement Rate
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TMWA	Truckee Meadows Water Authority
TMWRF	Truckee Meadows Water Reclamation Facility
TTHM	Trihalomethane
μg/L	Micrograms per Liter
UI	Utilities, Inc.
UIN	Utilities, Inc. of Nevada
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

GBWC Cold Springs Division Overview

The water system in Cold Springs, Nevada is owned by Great Basin Water Company (GBWC), a wholly owned subsidiary of Corix Regulated Utilities (US) Inc., a private, investor-owned, national water and wastewater utilities owner and operator. The Great Basin Water Company - Cold Springs Division (GBWC-CSD) water system services the community of Cold Springs, Nevada, which is located approximately 10 miles north of Reno on U.S. Highway 395 at the California-Nevada Border as shown in Figure E-1. GBWC-CSD is the only utility that provides water service within the Cold Springs Valley. Cold Springs Valley covers an area on both sides of U.S. Highway 395. There are a few clusters of homes near the GBWC-CSD service area that are not serviced by GBWC-CSD and are on their own individual wells. These homes are adjacent to the GBWC-CSD service area and could in the future connect into the system with only minor capital improvements if a need arises for water service. A total of approximately 3,843 customers are currently being served.

The GBWC-CSD water system is made up of four (4) pressure zones served by two (2) booster pump stations, four (4) ground level water storage tanks, and five (5) groundwater wells located in two (2) hydrographic basins (Basins 100 and 100A). The primary use is residential, although the system serves several large water users, including two Washoe County School District Schools and two sizable parks owned by Washoe County.

The overall objective of this Integrated Resource Plan (IRP) is to provide guidance to GBWC-CSD as to how to provide safe and reliable water to their customers in the service area over the next 20 years by balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. The strategy is to identify current needs in the system and integrate an asset management approach into the document for future use. This strategy will allow the IRP to help address improvements needed to meet current and future demands. This IRP is intended to balance the needs of the water system, environment, and customers over the next 20 years. The Action Plan is a 3-year plan. The purpose of the Action Plan is to:

- Identify current major assets that may have exceeded their useful life;
- Identify needed improvements in the water system; and
- Promote water system innovations that will provide efficiencies in operations and maintenance.

By working through the Action Plan, GBWC will be able to develop a plan for the next three years balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. The planning horizon for the IRP is 20 years, from 2025 to 2044.

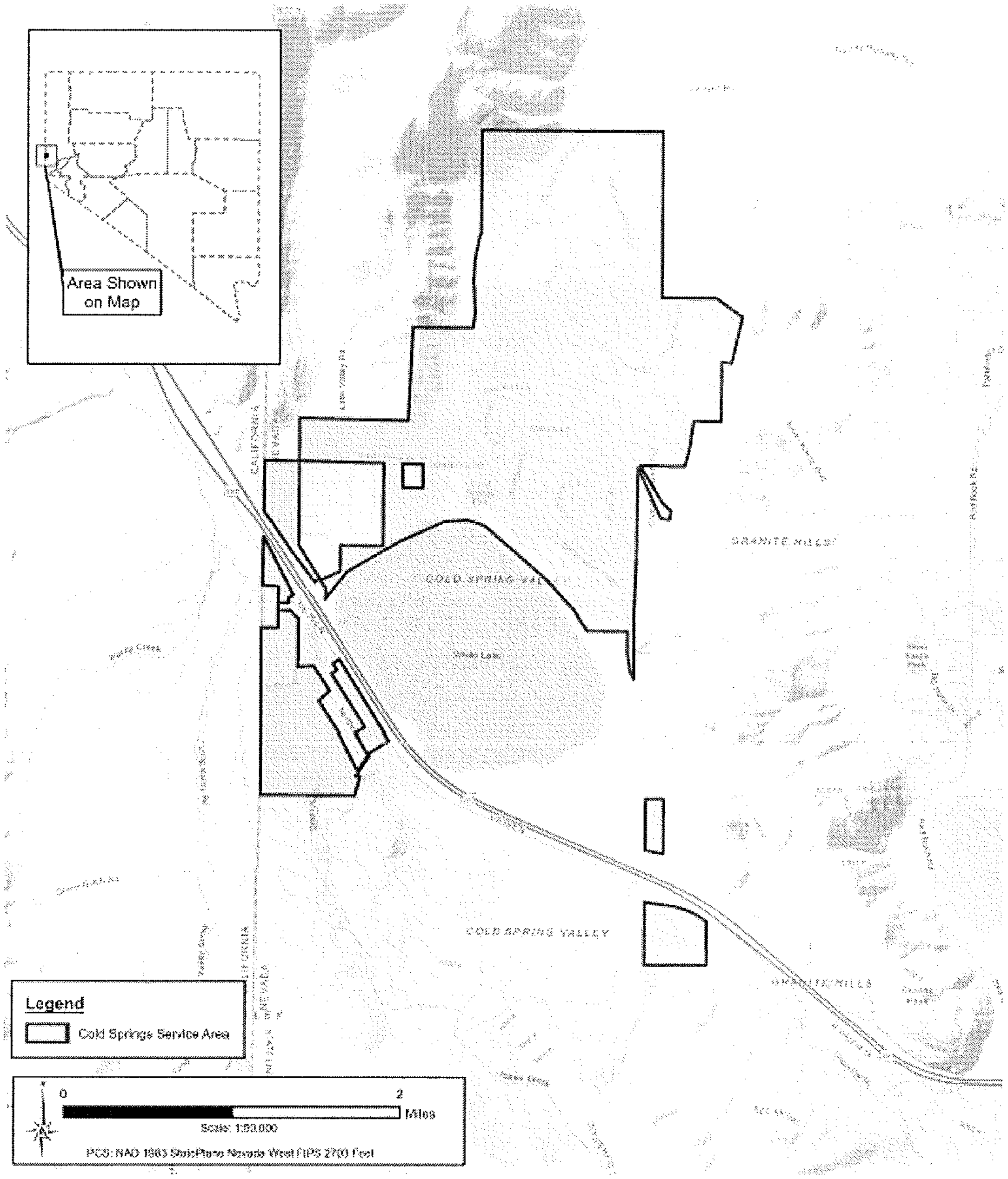


Figure E-1: Map of GBWC-CSD Service Territory

Current Level of Service

In February 2015, the GBWC management team developed the initial Asset Management Plan (AMP), which includes a section on the current "Level of Service" (LOS) assessment. This section listed the level of service elements for GBWC-CSD with regards to Regulatory and Contractual, Quality, Reliability, and Customer Service. The LOS section has helped GBWC-CSD identify areas where improvement will help to strengthen services and relations with their customers. The AMP has various components and is a continuous process on which GBWC-CSD has been working on. The LOS consists of various areas for improvement that GBWC-CSD has identified. These areas will or may always need constant monitoring or may be changed by implementing programs or projects. Included below are area which are being constantly monitored or programs have been developed:

- NAC Regulatory: GBWC-CSD staff continuously works with regulators to identify any deficiencies in the GBWC-CSD system via sanitary surveys;
- Monthly Reading of Meters: Occasional winter weather and buried/frozen meter pits makes readings difficult to acquire. GBWC-CSD is in the process of replacing non-AMR meter with AMR meters. Approximately 300 non-AMR meters remain.

Since identifying these service needs for improvement, the GBWC-CSD Staff are targeting solutions to improve these LOS aspects as well as recommended improvements in the resource plan.

Current Project Requirements

Growth Projections

Over the past decade, new developed lots in the GBWC-CSD Service Territory have fluctuated from a high of 137 to a low of 0 per year. This large fluctuation is believed to be due to the end of the housing boom in the mid 2000's, followed by the "Great Recession" in 2008, and then the steady increase in development since 2014. Currently, the GBWC-CSD Service Territory has several partially completed residential subdivisions. These subdivisions include the Petersen Village and Cold Springs Drive developments. The second phase of the Village Center is also in the design stages. Additionally, there are multiple developments that may potentially be annexed into the water system, including Silver Star, Train Crest, and Evans Ranch.

The *Nevada County Population Projections 2022 – 2041* dated October 1, 2022, prepared by the Nevada State Demographer's Office, was the most current data available at the time and used to develop the future population and connection projections in the GBWC-CSD Service Area. The U.S. Census Bureau American Factfinder was also evaluated to provide past and current population information for the Cold Springs Census Designated Place (CDP). The GBWC-CSD Service Area is contained within the Cold Springs CDP.

The 2022 to 2041 report shows a 2022 population for Washoe County of 469,124 people and an increase to 580,230 by the year 2041. The most recent Cold Springs CDP (2020) reported a population in the Cold Springs area of 10,153 and an occupancy density of 3.19 people per household. Census data was utilized for 2020 population and the State Demographer growth percentages were utilized to project the growth through 2041. The 2041 growth rate was then applied to the years 2042, 2043, and 2044 to provide projection estimates for these years. Table E-1 is a projection in population growth and service connections for the 20-year planning period. Projections have been calculated and are based on the Nevada Demographer's Information. Residential buildout is expected to be hit in 2031 based on the growth projections from the Nevada State Demographer.

Table E-1: Population and GBWC-CSD Service Connection Projections

Year	County Population % Change(1)	Cold Springs Population(2)	Total GBWC-CSD Service Connections(3)			
			Residential	Commercial	Public	All
2020	-	10,153	3,662	21	40	3,723
2021	1.90%	10,346	3,762	24	41	3,827
2022	2.30%	10,584	3,777	24	42	3,843
2023	2.00%	10,796	3,853	24	43	3,920
2024	1.70%	10,979	3,918	25	44	3,986
2029	0.90%	11,619	4,146	26	46	4,219
2034	0.60%	11,631	4,195	27	48	4,270
2040	0.40%	11,631	4,195	28	49	4,272
2044	0.40%	11,631	4,195	28	50	4,273

Water System Forecasting

With the exception of the Lakefront Project, which is the subject of a pending annexation application before the Commission (Docket No. 23-08027), the GBWC-CSD Service Territory is completely subdivided. Minor changes in the proposed total number of residential units may occur, but not to the extent that it will have a significant effect on projected customer counts. Therefore, unless additional developments are annexed into the service territory, all future development appears to be infilled, with the potential exception of the Village Center, Petersen Village, and Cold Springs Drive developments. The limiting factor for annexing future developments will be water right dedications in the Cold Springs and Long Valley Basins, and regulatory approvals from the City of Reno and Washoe County. Table E-2 shows the historical connection increase for GBWC-CSD for 2020-2022 as well as the projections from 2023 to 2044. Residential buildout is expected to be hit in 2031 based on the growth projections from the Nevada State Demographer.

Table E-2: Growth Projections

Year	All
2020	3,723
2021	3,827
2022	3,843
2023	3,920
2024	3,986
2025	4,042
2026	4,095
2027	4,144
2028	4,181
2029	4,219
2030	4,248
2031	4,268
2032	4,269
2033	4,269
2034	4,270
2035	4,270
2036	4,271
2037	4,271
2038	4,271
2039	4,272
2040	4,272
2041	4,272
2042	4,272
2043	4,273
2044	4,273

Water System Analysis

Water Rights

The GBWC-CSD owns water rights in two separate hydrographic groundwater basins (Long Valley - 100A, and Cold Springs Valley - 100) with a total combined duty of 2,414.86-acre feet annually (AFA). More specifically, GBWC-CSD's water rights in the Long Valley Basin have a total combined duty of 1906.90 AFA and 1707.96 AFA in the Cold Springs Valley Basin. Many of the water rights between the two basins are comingled. All the water rights are in good standing with the State Engineers Office.

Water System Capacity Analysis

The GBWC-CSD water system was evaluated based on available well capacity as compared to the current and projected future water demands. The criteria for evaluating adequate supply capacity is based on NAC 445A.6672, which requires a system that relies exclusively on wells to provide a total system capacity sufficient to meet the maximum data demand (MDD) when all wells are operational, or the average day demand (ADD) with the most productive well out of service. Table E-3 summarizes the existing and projected water demands with total available well capacities for each pressure zone. Each pressure zone has sufficient well capacity for MDD for the duration of the planning period. The following section supplies a full analysis of the water storage available in the GBWC-CSD system and whether or not it meets NAC compliance.

Table E-3: Pressure Zone 1 Capacity versus Demand

Pressure Zone	Zone 1	Zone 2	Zones 3 & 4
2022 ADD	199	244	509
2044 ADD	230	287	553
Adjusted Well Capacity (with largest well out of service)	330	Only available from inter-zone transfers	530
Adequate for ADD?	Yes	See Storage Analysis	See Storage Analysis
2022 MDD	465	570	1,112
2044 MDD	537	671	1,208
Total Well Capacity	700	1,000	1,360
Adequate for MDD?	Yes	Yes	Yes

Water Storage Analysis

Water storage was evaluated on the basis of operational, emergency, and fire flow storage needs using Nevada Administrative Code (NAC) 445A requirements. The GBWC-CSD system analysis was based on total system storage, which includes both available, above ground storage and alternative pumping capacity as defined by NAC. Available pumping capacity includes wells, which are equipped with an emergency backup power supply, and adds to the effective storage of the system.

The GBWC-CSD Water System has four above ground storage facilities: Tank 1, Tank 2 Tank 3 and Tank 4. Each tank nomenclature is associated with a corresponding Pressure Zone number.

So Tank 1 is in Pressure Zone 1, Tank 2 is in Pressure Zone 2, etc. Table E-4 shows the existing storage capacity for each pressure zone along with required capacity for existing and the 20-year projections.

Table E-4: Storage Capacity Requirements

Pressure Zone	Zone 1	Zone 2	Zone 3	Zone 4
NAC Scenario A				
2022 Required Storage (MG)	1.14	1.43	0.35	2.73
2044 Required Storage (MG)	1.28	1.63	0.35	2.93
Available Capacity (MG)	1.44	1.77	0.35	3.05
Meets NAC for Storage?	Yes	Yes	No	Yes
With Inter-Zone Analysis (If Applicable)	N/A	N/A	Yes (Zone 4)	N/A
NAC Scenario B				
2022 Required Storage (MG)	0.75	0.96	0.28	1.92
2044 Required Storage (MG)	0.84	1.08	0.28	2.05
Available Capacity (MG)	0.90	0.33	0.35	1.85
Meets NAC for Storage?	Yes	No	Yes	No
With Inter-Zone Analysis (If Applicable)	N/A	N/A	N/A	No

Distribution System Analysis

The piping systems were analyzed using Bentley's WaterCAD hydraulic modeling program. The hydraulic model was evaluated at peak demand conditions and fire flow demand conditions to determine the fire flow capabilities. The objective of the analysis was to identify weaknesses in the distribution network that would lead to unacceptable pressure conditions, reduced fire-flow capacity, and energy waste through high head losses. The GBWC-CSD hydraulic model was analyzed for Existing Conditions, 3-Year Action Plan, and Preferred Plan (2044). No significant deficiencies or unacceptable conditions were identified in any of the model runs.

Emergency Response Plan

Section 5 of Volume I (Introduction) provides a generalized explanation of the Emergency Action Plan for the four divisions. Appendix J contains the Emergency Action Plan for GBWC-CSD.

Water Conservation Plan

GBWC has chosen to develop a Water Conservation Plan pertinent to all of their divisions. Appendix K contains the Water Conservation Plan. Please refer to Section 6 of Volume I.

Preferred Plan

The 2024 Consolidated IRP Preferred Plan for GBWC-CSD is intended to provide a list of necessary projects over the next 20-year planning period in order for GBWC-CSD to continue to provide the current level of service to their customers. With the integration of an Asset Management Plan, the Preferred Plan also makes recommendations associated with monitoring, maintenance, and inspections for several of the more expensive critical assets of the water system. The purpose of these recommendations is to extend the useful life of the assets, prolonging the need for replacement or refurbishment. A condition assessment of several assets over the past year has identified some of the larger assets which have reached the end of their useful lives and will need to be replaced and/or refurbished. The capital projects provided in this Preferred Plan are at a planning level guideline based on current demand and growth projections and should be reviewed periodically and updated in future IRPs.

The Preferred Plan addresses the system, compliance, environmental, and conservation needs, at a capital spending and monitoring schedule, which GBWC-CSD staff believes are prudent. The asset maintenance, monitoring, and smaller capital recommendations are provided in the plan with the goal of extending the assets' useful lives beyond their nominal life expectancies. This will help to push out some of the larger capital projects for replacement or refurbishing of specific assets. With this strategy in mind, the objective of this Preferred Plan is to make the necessary investments to at least maintain the customer's existing level of service while ensuring NAC compliance of the GBWC-CSD water system.

The timing for the project improvements has been assessed extensively by GBWC-CSD staff and their engineer to ensure the most cost-effective results are captured for the ratepayers. The scheduling for the capital improvements is primarily based on the fixed asset registry and designed in a manner that brings about the least cost with the highest benefit to the company and ratepayers. The following CIP's have been developed based on the best information available and include the following:

Water Resources CIP

- On-Site Hypochlorite Generation Systems
- Long Valley Replacement Well

Water Distribution CIP

- Pipelines, Services, and Meter Pit Replacement
- AMI Conversion

Water Storage CIP

- Rehabilitation and Tank Replacement

The Preferred Plan also includes replacement or refurbishment of major assets based on age and nominal useful life expectancy. The goal with many of these assets, through appropriate monitoring and maintenance, is to extend their useful lives beyond the nominal useful life expectancy for replacement.

Action Plan

The GBWC-CSD (Volume IV) portion of the 2024 Consolidated IRP requests the approval of three (3) Action Plan Projects, which are needed for the improvement and compliance of the GBWC-CSD water system to serve current customers. The recommended Action Plan Projects for GBWC-CSD targets the water system in a way that helps maintain (and improve) the customers' current level of service, provide regulatory compliance to the system, and extends the useful life of existing major assets. In addition to the recommended capital projects, additional monitoring, testing, maintenance, and inspection recommendations are being proposed with the goal of even greater oversight of assets to further extend the nominal life expectancy for many of the larger assets.

The three-year Action Plan projects are focused on asset concerns that have been identified through the development of the asset management component, the new Lucity OMS Software System, NAC regulatory compliance, and GBWC-CSD staff recommendations. The Action Plan includes the following projects:

Water Resources CIP
- PR Installation to Assist with Fire Flows (PZ 3 to PZ 4)

Water Storage CIP
- Rehabilitation of Tank 1
- Rehabilitation or Replacement of Tank 2

All of these recommended Action Plan Projects are considered critical to ensure that the existing GBWC-CSD customer's level of service is maintained and ensure compliance with NAC 445A regulations.

Funding Plan

Volume I (Introduction) contains the funding plan analysis for the recommended Action Plan projects in Volume IV Section 8. Please refer to Section 9 of Volume I for information related to the Action Plan project funding plan. The project list in Volume IV Section 10.1 *et seq.* will be funded through traditional funding sources using GBWC's parent company's Corix Regulated Utilities (US) Inc. debt and equity investment.

System Improvement Rate Request

GBWC-CSD is requesting that the following projects described in the Action Plan be designated as eligible for a System Improvement Rate (SIR) under Nevada Revised Statutes (NRS) 704.663(3) and NAC 704.6339: Storage Tank 2 Replacement or Storage Tank 2 Factory Rehabilitation.

SECTION 1.0: INTRODUCTION

1.1 Report Organization

Summary	The Executive Summary provides an overview of the study and the recommended capital improvement plan.
Section 1.0	Introduction. This section provides background information on the Great Basin Water Company – Cold Springs Division (GBWC-CSD), a description of the Cold Springs Division and Hydrographic Basin 100 and 100A, and a discussion of the objectives of the Integrated Resource Plan (IRP).
Section 2.0	Existing Conditions. This section presents a complete description of the service area, existing facilities, condition of the major assets and remaining useful life, and their operation and control.
Section 3.0	Historical Data and Forecasting. This section presents an evaluation of the historical population and connections to the existing system. This data is used and presented as a basis for the population and demand forecasting for the utility.
Section 4.0	Water Supply Plan. This section presents the analysis of the existing water system with regards to how it will be impacted by the demand forecasting presented in Section 3.0.
Section 5.0	Emergency Response Plan. This section will be provided in the Introduction (Volume I) with a generalized explanation of the Plan for the GBWC-CSD. The actual Emergency Response Plan is provided in the Appendix J.
Section 6.0	Water Conservation Plans. This section provides a reference to GBWC's water conservation plan discussed in Volume I.
Section 7.0	Preferred Plan. This is a 20-year projected evaluation which includes a preferred plan for the necessary improvements over the 20-year planning period. This preferred plan is a planning level guideline based on current demands, growth projections, and remaining useful life of major assets.
Section 8.0	Action Plan. This section is a summary subset of the Preferred Plan detailing the improvements which are recommended for implementation in the 3 years following approval of the 2018 IRP.
Section 9.0	Funding Plan. This section details the financing impacts and strategies for meeting the needs addressed in the Action Plan.
Section 10.0	System Improvement Rate Request. This section outlines the information required by NAC 704.6339 to designate water and sewer projects in the Action Plan as eligible for a System Improvement Rate (SIR).
Technical Appendices	This section is part of the comprehensive technical appendix that will support all of the specific resource plan volumes which will contain the complete details of the methodologies used in developing the resource plan along with all of the basic data used in the study.

1.2 Background

1.2.1 Cold Springs Division Overview

The GBWC-CSD water system services the community of Cold Springs, Nevada, which is located approximately 10 miles north of Reno on U.S. Highway 395 at the California-Nevada Border as shown in Figure 1.01. The Cold Springs Division is the only utility that provides water service throughout the Cold Springs Valley. Cold Springs Valley covers an area on both sides of U.S. Highway 395. There are a few clusters of homes near the GBWC-CSD service area that are served by individual wells. These homes are adjacent to the GBWC-CSD service area and could be connected in the future with only minor capital improvements if a need arises for water service. Approximately 3,777 residential customers, 43 public customers and 23 commercial customers are currently being served.

The GBWC-CSD water system is made up of four pressure zones served by two booster pump stations, four ground level water storage tanks, and five groundwater wells located in two hydrographic basins (Basins 100 and 100A). The primary use is residential, although the system serves several large water users, including three Washoe County School District Schools and two sizable parks owned by Washoe County.

The purpose of this IRP is intended to balance the needs of the water system, environment, and customers over the next 20 years. The Action Plan is a 3-year plan. The purpose of the Action Plan is to:

- Identify current major assets that may have exceeded or are near the end of their useful life;
- Identify needed improvements in the water system; and
- Promote water system innovations that will provide efficiency in operations and maintenance.

By working through the Action Plan, GBWC-CSD will be able to develop a plan for the next three years balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. The planning horizon for the IRP is 20 years, from 2025 to 2044 (NAC 704.5654). Historical production data presented in this IRP covers the 10-year period preceding 2022 pursuant to NAC 704.5668.

1.2.2 Hydrographic Basins 100 (Cold Springs) and 100A (Long Valley) Overview

The GBWC-CSD service territory straddles two hydrographic basins in Nevada: the Cold Springs Basin (Basin 100) and the Long Valley Basin (Basin 100A). Basin 100A predominantly resides across the California border with only a small portion of the basin within Nevada. The majority of the water rights in Basin 100 consists of quasi-municipal followed by irrigation. In 1977 (Order 606), the State Engineer elevated Basin 100 to a "designated basin" status. A basin is usually elevated to a designated status when the water rights in the basin have reached or exceeded its perennial yield. A designated basin status allows the State Engineer additional authority in the administration of the water resources in the form of restricting specific uses and/or subdividing the basin for better management of the water resources. In January of 2023, the State Engineer issued an order increasing the perennial yield from 500 AFA to 1,500 AFA. Currently, there are approximately 2,064 acre feet annually (AFA) of water rights appropriated in Basin 100 with a perennial yield of 1,500 acre feet annual. Basin 100 is currently over appropriated.

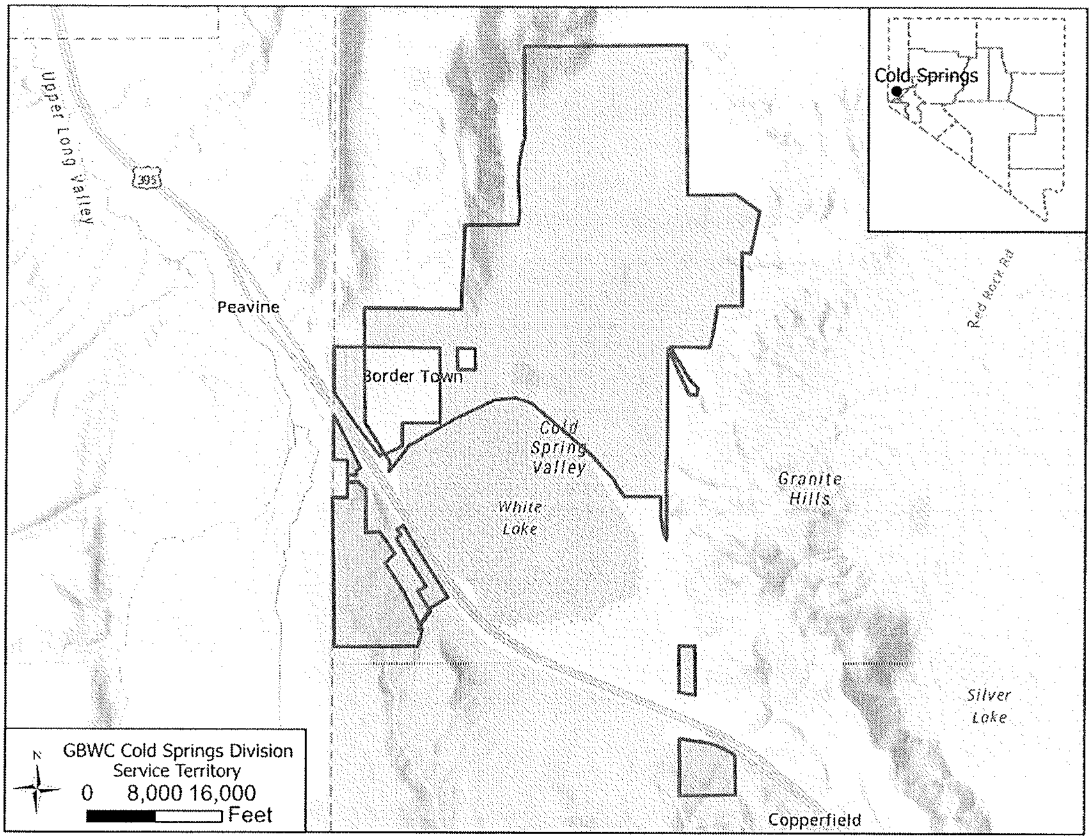


Figure 1.01: Map of GBWC – Cold Springs Service Territory

All of the water rights in Basin 100A consist of Quasi-Municipal. In 1983 (Orders 787 & 826), the State Engineer elevated Basin 100A to a "designated basin" Status. He also declared irrigation to be a non-preferred used of the limited ground water resource. Currently, there are approximately 1907 AFA of water rights appropriated in Basin 100A with a perennial yield of 500 – 900 acre feet annually. Basin 100A is currently over appropriated. Appendix B contains information associated with these two basins, including a summary of the appropriated rights, as well as all orders from the State Engineer.

1.3 Objective

The overall objective of this IRP is to provide guidance to GBWC as to how to provide adequate water service to their customers in the GBWC-CSD service area over the next 20 years by balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. This includes identifying needed improvements for the current system and needed improvements for projected growth over the next 20 years, identifying innovative tools and systems for improving operation and maintenance efficiencies, and determining the facilities needed to provide adequate service for growth. An asset management framework has been integrated into the IRP to identify and determine when existing critical assets will need to be replaced or rehabilitated in the future. A detailed Action Plan is provided, identifying the needed and recommended improvements over the next three (3) years, and the timing of those improvements. Additional sections address water conservation as a means to limit water demand and protect the groundwater resource, a funding plan for each of the proposed improvements, and estimated financial impacts of the proposed Action Plan on the customers.

1.3.1 Current Level of Service

In February 2015, the GBWC-CSD management team developed the initial Asset Management Plan (AMP), which includes a section on the current "Level of Service" (LOS) assessment. The section listed the level of service elements for the water system with regards to Regulatory and Contractual, Quality, Reliability, and Customer Service. The LOS sections have helped GBWC-CSD identify areas where improvement will help to strengthen services and relations with their customers. The AMP has various components and is a continuous process on which GBWC-CSD has been working. The LOS consists of various areas for improvement that GBWC-CSD has identified. These areas will or may always need constant monitoring or may be changed by implementing programs or projects. Included below are areas which are being constantly monitored or programs have been developed:

- NAC Regulatory: GBWC-CSD staff continuously works with regulators to identify any needed improvements in the GBWC-CSD system

Since identifying these service needs for improvement, the GBWC-CSD Staff are targeting solutions to improve these LOS aspects as well as recommended improvements in the resource plan.

Since the 2021 IRP, several improvements to the system have been made to address areas of LOS concern. In July of 2021, the replacement of non-AMR meters to AMR meters was completed. Since the completion of the AMR conversion, GBWC started its Meter Pit and Service Line Replacement project and completed two (2) phases as December 2023. Phase 1 (completed) included replacing 29 meter pits and service lines on Hummingbird Court, Meadowlark Court, and Dove Court. Phase 2 (completed) included replacing 38 meter pits and service lines on Cold Springs Drive, Flamingo Drive, Mockingbird Drive, Owl Court, and Peacock Place.

1.3.2 Asset Registry Condition Assessment

Prior to the 2018 Consolidated IRP, all GBWC Divisions performed an asset registry condition assessment independently. Since then, a more streamlined approach has been taken across all divisions. Please see Volume I for further details.

Appendix A, Vertical Asset Registry List, contains the current vertical assets for the GBWC-CSD water and wastewater systems.

1.3.3 Failure Mode and Effects Analysis

Historically, each GBWC Division identified vulnerabilities differently. It has since been streamlined and the same process is used across all divisions. Please reference Volume I for further details.

SECTION 2.0: EXISTING CONDITIONS

2.1 Cold Springs Division

2.1.1 Location

The GBWC-CSD service area is located approximately 10 miles northwest of Reno, Nevada, along U.S. Route 395. Specifically, the GBWC-CSD service area is located in Sections 7-10, 15-22, 27-34 of Township 21 North, Range 18 East of the Mount Diablo Meridian and within Washoe County, Nevada. The most recent service territory map for the water system can be found in Appendix D.

2.1.2 History

Reno Park Water Company (RPWC) was sold and its Certificate of Public Convenience and Necessity (CPCN) transferred to GBWC-CSD (formally known as Utilities, Inc. of Nevada) on June 23, 1998 in the Commission Order under Docket No. 98-2009. This Order completed the transaction that began on February 6, 1998, when RPWC and GBWC-CSD filed a joint application for Commission approval of the sale and transfer of Reno Park's CPCN and associated water utility plant to GBWC-CSD. On May 22, 1998, a stipulation and negotiated settlement was entered into regarding the sale and transfer of RPWC that included the following parties: RPWC, GBWC-CSD, Cold Springs 2000, and the Regulatory Operations Staff of the Public Utilities Commission of Nevada (PUCN). The Stipulation, among other things, reiterated certain agreements and responsibilities of RPWC and GBWC-CSD. Some of the responsibilities of GBWC-CSD included:

1) The construction of a new storage tank to replace the Long Valley Tank with a tank of equal or greater size,
2) Conduct a pressure/leak test on the 10" diameter Long Valley Transmission Main, and, if necessary, secure or relocate the transmission so the integrity of the pipeline is maintained,
3) Conduct main water quality testing for VOC, SOC, and nitrate on Well 8 (Sweger Well),
4) GBWC-CSD being bound by all stipulations approved by the Commission regarding RPWC,
5) GBWC-CSD assuming the rights and obligations of the existing contracts.

On July 1, 1998, GBWC-CSD issued Tariff No. 1A, sheets 1 through 91 (Tariff No. 2A was provided with the GBWC-CSD 2016 IRP filing). The PUCN accepted the tariff filing as effective on July 30, 1998. These tariffs were derived from Tariff No. 1A, originally issued March 1, 1997, and revised per the Commission's order under Docket No. 97-3017 on January 5, 1998. Subsequently, as part of the consolidation process, GBWC filed the consolidated Tariff No. 1-W for the four GBWC owned systems in Nevada. The PUCN accepted the Tariff No. 1-W filing as effective on January 12, 2017. The tariffs include, among other things, rules for the extension and/or alterations to the water system to provide for development within the service territory. Additionally, there is a rule that requires "...all applicants for new water service never theretofore supplied to the premises of theretofore deeded to or for use by the Utility on the premises for with water service is sought, shall provide all water rights required for the service applied for..." The previous utility, RPWC, sought tariffs in the mid-1990s to help mitigate the impacts that new annexations were causing to the utility, and to eliminate the need to make agreements with developers prior to the annexation that were a "condition precedent to the annexation". Prior to adoption of the new tariffs, these older agreements allowed the utility to acquire or fund improvements they deemed necessary to mitigate the impact of annexations. One of these agreements dated back to a case involving a group of five developers in the late 1980s, establishing what is known as the "Common Improvement Fee" for the water system in Cold Springs Valley. This pre-annexation fee has been used to develop several needed improvements for the utility such as, but not limited to, much of the radio telemetry and control system and altitude valve assembly on Tank No. 1, and construction of Tank No. 4. Prior to the sale of the RPWC to GBWC-CSD, an annexation was completed under PUCN Docket No. 95-11002. The majority of the property annexed since GBWC purchased the CSD system has been for the Woodland Village Subdivision. Detailed discussion on annexations, including the recent Petersen Village Development and Little Valley Development, can be found in Section 3.0.

2.1.3 Service Territory

The GBWC-CSD water service area covers approximately three square miles and consists of four (4) pressure zones. For the GBWC-CSD 2024 IRP Volume IV portion, there are approximately 3,843 connections consisting primarily of single-family residents with a small number of commercial clients, three schools (one middle and two K-6), four sizable parks, and two large industrial users (Reno Truss and Industrial Wood Products) and a future Industrial Park. Growth is expected to continue in the existing service territory which is approximately 90% built out.

Since the previous IRP, two developments (now referred to as Petersen Village and Little Valley) have been annexed into GBWC-CSD's service area (both under Docket No. 21-05008), and an application for approval of an annexation of a third development is pending before the Commission (under Docket No. 23-08027). A summary of the developments (with current and previous development names listed), year of annexation, and estimated water connections is summarized in Table 2.01, below. The location of each annexed development is called out in the service territory map in Figure 1.01.

Table 2.01: Developments Annexed Since the 2021 IRP

Name of Development	Previous Name(s) of Development	Year Annexed	Estimated Water Connections
Petersen Village	Mud Springs Condos Village Parkway	2021	105
Little Valley	Cold Springs Drive	2021	42
Lakefront Project	N/A	Pending	TBD

GBWC-CSD does not provide sewer services for their service area. GBWC-CSD's customers are either on private septic systems or are served by a Washoe County sewer system. Residents in Pressure Zones 1, 2, and 3 areas are primarily on private septic systems which are owned and maintained by the individual property owners. Pressure Zone 4 is primarily served by collection, treatment and disposal systems owned by Washoe County with the treatment facilities located in the northwest portion of Pressure Zone 4.

The legal description of the water service territory for GBWC-CSD is contained in GBWC's Tariffs Rule No. 17 which is maintained on file in the office of the PUCN and at GBWC offices in Reno and Pahrump, as well as the GBWC website at www.GreatBasinWaterCo.com. Refer to Appendix D for the legal descriptions of each service area.

2.1.4 Maps

Figure 1.01 shows the general overview of the GBWC-CSD water service territory. A more detailed map of the service territory is provided in Appendix D.

2.1.5 Geography and Climate

The service area terrain is generally level with slight slopes. The surrounding hills allow for placement of large water storage tanks sufficient for proper distribution pressures. One hundred feet of topographic relief exists in Pressure Zones 1 and 3, ranging from approximately 5,050 feet above mean sea level (amsl) to 5,150 amsl. Pressure Zone 2 is relatively level compared to the other pressure zones. One hundred fifty feet of topographic relief exists in Pressure Zone 4, ranging from approximately 5,050 amsl to 5,200 amsl.

Summers in Cold Springs are characterized by hot, dry afternoons with temperatures in the 90s to low 100s, cooling to lows in the 50s by morning. Average winter temperatures range from highs in the mid-40s and low 50s to lows in the mid-20s, frequently falling below freezing. Snowfall averages 14.2 inches per year and generally melts quickly. Annual precipitation averages around 10.9 inches per year through the region. Sunny or partly cloudy skies are predominant. Table 2.02 summarizes average monthly data for the region.

Table 2.02: Cold Springs Average Monthly Weather Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max. Temp. (ºF)	43.7	47.2	54.9	61.1	69.6	79.6	88.8	87.3	78.9	67.2	53.0	43.5	64.6
Min. Temp. (ºF)	21.5	24.5	29.4	33.8	40.8	48.3	55.2	53.1	45.1	35.9	26.7	21.0	36.3
Total Precip. (in.)	1.6	1.9	1.2	0.6	0.5	0.5	0.3	0.3	0.5	0.7	0.9	1.8	10.9
Total Snowfall (in.)	2.8	2.0	2.5	0.5	0.1	0.0	0.0	0.0	0.0	0.1	1.8	4.4	14.2

Station: Stead, Nevada (267820)
Period of Record: 1985 to 2016
Source: Western Regional Climate Center

2.1.6 Land Use

Land use within the service area is primarily residential with some light commercial and public facilities. Within the service area there are two elementary schools, a middle school, four sizable parks, two fire stations, and churches. Commercial and industrial uses include gas stations, a wood structure (truss company) manufacturer, a small grocery store, restaurants, an RV-park, a casino, and a pallet manufacturing company.

2.1.7 Population

The U.S. Census Bureau reported a population in the Cold Springs Census Designated Place (CDP) of 10,153 people in 2020, with an average household size of 3.11 persons per household. At the time of this report, the 2020 census was the most recent information.

2.1.8 Water Supply and Quality

The water supply for GBWC-CSD is groundwater from five (5) wells; two (2) wells supply water to Pressure Zone 1; one (1) well supplies water to Pressure Zone 2; and two (2) wells supply water to Pressure Zone 4.

Water quality data from the 2022 Consumer Confidence Report for GBWC-CSD is provided in Table 2.03. This report illustrates that no regulated contaminates exceed maximum contaminant levels (MCLs). The Consumer Confidence Reports can be found on www.GreatBasinWaterCo.com.

Table 2.03: Water Quality Data (2022) Cold Springs Consumer Confidence Report

Detected Substance	Units	Sample Year	Range	MCL	Violation
Microbiological					
No Detected Microbiological Contaminants Were Found in the Calendar Year of 2022					
Inorganic Contaminants					
Antimony	ppb	2022	<1	6	N
Arsenic	Ppb	2022	2 - 5	10	N
Barium	ppm	2022	0.048	2	N
Chromium	ppb	2022	<1	100	N
Fluoride	ppm	2022	<0.1 - 0.2	4	N
Nickel	ppm	2022	<0.001	0.1	N
Nitrate	ppm	2022	0.56 -2	10	N
Radionuclides					
Combined Radium 226 & 228	pCi/L	2017	0.510 - 2.626	5	N
Uranium	ug/L	2019	ND - 15	30	N
Gross Alpha, Incl. Radon & U.	pCi/L	2017	0.149 - 3.84	15	N
Gross Beta Particle Activity	pCi/L	2017	2.72 - 4.5	50	N
Radium 226	pCi/L	2017	0.266 - 0.535	5	N
Radium 228	pCi/L	2017	0.542 - 2.36	5	N
Disinfection By-Products					
Chlorine	ppm	2022	0.20 - 1.23	4	N
HAAs	ppb	2022	<1	60	N
TTHM	ppb	2022	<1	80	N
Lead and Copper					
Copper	ppm	2020	0.002 - 0.37	1.3 AL	N
Lead	ppb	2020	<2 - 5	15 AL	N
Secondary Contaminants					
Chloride	mg/L	2022	1.9 - 7.9	400	N
Color	CU	2022	<5	15	N
Magnesium	mg/L	2022	5.4 - 10	150	N
Manganese	mg/L	2022	<0.001 - <0.007	0.1	N
PH	pH	2022	7.95 - 8.12	8.5	N
Sodium	mg/L	2022	14 - 18	200	N

Detected Substance	Units	Sample Year	Range	MCL	Violation
Secondary Contaminants (Continued)					
Sulfate	mg/L	2022	5.4 - 15	500	N
TDS	mg/L	2022	150 - 230	1000	N
Zinc	mg/L	2022	<0.01 - 0.03	5	N
Nitrogen	mg/L	2014	2.7	10	N

Notes:
MFL = Million Fibers per Liter, HAA5 = Haloacetic Acid, TTHM = Trihalomethane, AL = Active Level, ppb = parts per billion, ppm = parts per million, pCi/L = picocuries per liter, mg/L = milligrams per liter, pH = Potential of Hydrogen, TDS = Total Dissolved Solids, CU = Color Units.

2.2 Existing System

2.2.1 Distribution Piping (Pressure Zones)

The GBWC-CSD distribution piping consists of 4-, 6-, 8-, 10-, 12-, and 14-inch piping. The hydraulic model indicates that pipe sizing and conditions are adequate for maximum daily demand (MDD) and fire flow. Linear footages for all the different pipe diameters are listed in Table 2.04.

Table 2.04: Pipe Sizes and Total Length for CSD

Pipe Size	Pipe Length (ft)
4-inch	693
6-inch	83,117
8-inch	122,442
10-inch	72,524
12-inch	9,334
14-inch	2,191
Total	**290,497**

2.2.1.1 Distribution Piping Existing Condition Assessment

The age of the distribution piping ranges over a 40-year period, with the initial piping being constructed during the 1970's. The original Reno Park Water Company's distribution piping network (constructed in the 1970's) consists primarily of 6-, 8-, and 10-inch schedule 40 PVC pipe. This portion of the distribution system is generally closest to White Lake and includes water mains north of White Lake Parkway, east of Village Parkway, west of Crystal Canyon Boulevard, and south of Black Lake Drive including Blackbird Drive and the water mains to the south. A 10-inch asbestos concrete (AC) transmission main crossing White Lake is also part of the original distribution system. The 10-inch AC transmission main was last pressure tested in 1998 and passed. All of the original distribution piping is currently 40+ years old, which is approximately the life expectancy of standard schedule 40 PVC pipe.

In June 2014, a main break occurred on part of the original piping on Gold Finch Drive. This is the first and only documented main break within the old distribution piping. Prior to the 2021 IRP, a meter pit replacement pilot test study was recommended and approved by the PUCN that documented leaking from several service laterals connected to the old Schedule 40 PVC distribution piping and meter pits. Since then, a three-phase Meter Pit and Service Line Replacement project was implemented, of which two (2) phases have been completed and the third phase is on hold. Phase 1 (completed) included replacing 29 meter pits and service lines on Hummingbird Court, Meadowlark Court, and Dove Court. Phase 2 (completed) included replacing 38 meter pits and service lines on Cold Springs Drive, Flamingo Drive, Mockingbird Drive, Owl Court, and Peacock Place.

The post-1970's distribution system is primarily constructed of 4-, 6-, 8-, and 10-inch PVC C-900 pipe throughout the system. There is a 14-inch PVC C-900 transmission main that feeds the majority of the Woodland Village Subdivision that runs from the Pressure Zone 4 storage tank. While staff has worked on numerous lateral leaks off the distribution system, documented transmission main leaks are very rare. GBWC-CSD currently maintains a GIS database system for their linear and vertical assets.

2.2.1.2 Pressure Zone Conditions Assessment

The GBWC-CSD water system has four distinct pressure zones known as Pressure Zones 1, 2, 3, and 4. Each pressure zone contains its own storage tank, which are also numerically associated with each pressure zone. Pressure Zone 1 is located on the west side of Highway 395 and northwest of White Lake and is fed by Wells 6 and 7. Pressure Zone 2 is located on the northeast side of White Lake, adjacent to Pressure Zone 1, and is fed by the Van Dyke Well and Well 2 (which is currently offline due to structural issues as discussed in Section 2.2.2.1). Pressure Zone 3 is on the far northeastern portion of the service territory and is the only zone without a supply well. Pressure Zone 3 receives water from booster stations located in Pressure Zones 2 and 4. Pressure Zone 4 is located on the northern most portion of the service territory and has historically been fed by Well 8 (Sweger Well). Due to the ongoing development in Zone 4, Well 1 was redirected to feed Pressure Zone 4 via a 10-inch distribution main within Sandpiper Drive. The MDD pressures in each zone are located in Table 2.05. Based on the available modeling results, the pressure zones all meet minimum and maximum allowable delivery pressures as per Nevada Administrative Code NAC 445A.6711 (see Table 4.12 for detailed parameters according to the NAC). A schematic diagram and map, included in Appendix C, show the locations of the pressure zones and other infrastructure.

Table 2.05: GBWC-CSD Pressure Zones

Pressure Zones	Supply	Hydraulic Grade Lines*	Hydraulic Model MDD Pressures (psi)
1	Wells 6 & 7 to Tank 1	5,323	50 to ~124 psi
2	Well 2 (offline) and Van Dyke Well to Tank 2	5,191	40 to ~111 psi
3	Tank 4 Booster Station and Pressure Zone 2 Touraco Booster Station to Tank 3	5,321	50 to ~96 psi
4	Wells 1 and 8 (Sweger Well) to Tank 4	5,284	43 to ~97 psi
Notes: *Based on high water level in tanks psi = pounds per square inch			

2.2.1.3 Pressure Reducing Valve Existing Conditions Assessment

The four pressure zones are controlled by four pressure reducing valves (PRVs), as summarized in Table 2.06. A fifth PRV vault exists adjacent to Well 1 that was originally designed to convey water from Pressure Zone 1 through the 10-inch main up Sandpiper Drive into Pressure Zone 4. Now that Well 1 feeds directly into Zone 4, this PRV is currently in operation.

Table 2.06: GBWC-CSD Pressure Reducing Valves

PRV	Location	High pressure zone	High pressure (psi)	Low pressure zone	Low pressure (psi)	Notes
1	Cold Springs Dr./ Diamond Peak Dr.	1	120	2	60	Operational
2	Puffin St.	4	90	2	45	Operational
3	Waxwing St.	3	102	2	42	Operational
4	Adjacent to Well 1	1	128	4	114	Operational
5	White Lake Pkwy./ Sandpiper Dr.	1	124	2	60	Not operational. Valve closed.

All the CLA-VAL valves in the PRV vaults were last serviced in 2023. The PRV's continue to operate as intended, with the only operational concern being that water infiltrates into the PRV vault adjacent to Well 1 due to the location of these vaults near White Lake. Appendix D contains the locations of the PRV's. Photos of the PRV systems have been provided in Appendix E. The fixed asset management registry, with the remaining useful life for the PRV's, is located in Appendix A.

2.2.2 Water Supply

The water that supplies GBWC-CSD system is produced from five wells (Wells 1, 6, 7, 8, and Van Dyke). Wells 6 and 7 supply water to Pressure Zone 1; Van Dyke Well supplies water to Pressure Zone 2; and Wells 1 and 8 supply water to Pressure Zone 4. The well capacities within the Cold Springs distribution system are summarized in Table 2.07. Appendix D contains a map showing the location of the wells.

Table 2.07: GBWC-CSD Wells and Capacities

Well	Year Drilled	Pressure Zone	Depth (ft)	Casing Diameter (in)	Liner(1) Diameter (in)	Capacity (gpm)	Backup Power
Well 1	2000	4	429	16		530	Yes
Well 2(2)	1971	2	242	10		N/A	No
Well 6	1979	1	605	14/16(3)		370	Yes
Well 7	1981	1	650	14		330	Yes
Well 8	1974	4	350	16		830	Yes
Van Dyke	2016	2	432	14		1,000	Yes
Total Production						**3,060**	

Notes:
(1) Liners are only installed in wells during the rehabilitation process
(2) Well 2 is currently offline and will likely not be put back into service
(3) Well 6 has a 16-inch diameter steel casing to a depth of 315 feet bgl and nominal 14-inch steel casing from a depth 315 feet to 605 feet bgl

2.2.2.1 Water Supply Well Existing Condition Assessment

Well 1

Well 1, originally drilled in 2000, was constructed with nominal 14-inch diameter steel casing to a depth of 429 feet below ground level (bgl). The screen intervals consist of wire wrap screen from 145-225 feet; 240-280 feet; 290-335 feet; 345-365 feet; and 380-390 feet bgl. The original static water level after completion was 7.8 feet bgl.

Currently the static water level in the well is 25 feet bgl. The well is equipped with a Goulds 7THC 4-stage submersible turbine pump with a 75 HP Hitachi submersible motor. The well site has been equipped with a 125 kW backup generator in case of power outage. A video log of the well was not available for review, but the standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. Well 1 is 24 years old as of 2024.

Well 2

Well 2, originally drilled in 1971, was constructed with nominal 10-inch diameter steel casing to a depth of 242 feet bgl. The screen intervals consist of mill slots from 30-242 feet bgl. The original static water level was 45 feet bgl. Historically, the well has been a low producer, but helped to supply water to a specific area in Pressure Zone 2.

The well has not been used for several years due to issues with the pumping water level reaching the pump intake after only 30 minutes of operation. Washoe County Health District prevented the well from being placed into service due to the high density of domestic septic systems near the well. Well 2 is 53 years old as of 2024. While it continues to be used as an observation well, this well has reached the end of its useful life and is not expected to be placed back in service.

Well 6

Well 6, originally drilled in 1979, was constructed with nominal 16-inch diameter steel casing to a depth of 315 feet bgl and nominal 14-inch steel casing from a depth 315 feet to 605 feet bgl. The well has multiple screen intervals of wire wrap screen located at 135-150 feet; 170-195 feet; 205-240 feet; 250-270 feet; 315-405 feet; 455-470 feet; 510-535 feet; 550-565 feet; and 585-600 feet bgl. The original static water level was 79 feet bgl.

Previously, complaints of air entrainment from customers were reported when this well was operating. In 2018, a well rehabilitation was initiated which revealed that the well casing was in very poor condition. The screen intervals were heavily plugged and the static water level in the well was 140 feet bgl, which had exposed the upper portion of screen, resulting in cascading water that was likely the cause of air entrainment issues. The rehabilitation involved a shock chlorination/swabbing pretreatment, installation of a 10-inch liner, acid main cleaning treatment, redevelopment, pump testing, and design of a new pumping system, Goulds 8RJLC 5 stage submersible pump and 60 Hp submersible motor. Complaints of air entrainment have subsided since the rehabilitation.

The well site has been equipped with a 100 kW backup generator in case of power outage. A sanitary survey conducted by Washoe County Health District (WCHD) in June 2020 identified significant deficiencies with the well house due to deterioration, meaning the well house is not providing adequate or sanitary protection of the wellhead. In 2022, surge protection and power conditioning were installed at the well house.

The nominal useful life of a well with good quality construction is roughly 40 (±5) years. Well 6 is 45 years old as of 2024.

Well 7

Well 7, originally drilled in 1981, was constructed with nominal 14-inch diameter steel casing to a depth of 650 feet bgl. The screen intervals consist of factory mill slot from 143-643 feet bgl. The original static water level was 88 feet bgl. Currently the static water level is 123 feet bgl. The well is equipped with a Goulds model 7CLC 5 stage pump and 75 HP Franklin submersible motor. The well site has been equipped with a 150 kW backup generator in case of power outage.

In 2018, the well underwent a rehabilitation, revealing several holes in the casing above the static water level (147.6 feet) and heavily plugged mill slot perforations, which had exposed the upper portion of screen, resulting in cascading water that was likely the cause of air entrainment issues. The rehabilitation involved a shock chlorination/swabbing pretreatment, installation of a high-quality stainless steel 10-inch liner, two separate acid main cleaning treatments, redevelopment, pump testing, design of a new pumping system, installation of a VFD, and numerous well site improvements and electrical upgrades.

A sanitary survey conducted by Washoe County Health District (WCHD) in June 2020 identified significant deficiencies with the well house due to deterioration, meaning the well house is not providing adequate or sanitary protection of the wellhead. In 2022, surge protection and power conditioning were installed at the well house.

The nominal useful life of a well with good quality construction is roughly 40 (±5) years. Well 7 is 43 years old as of 2024 and should have an extended nominal life due to the rehabilitations and installation of the liner.

Well 8

Well 8, originally drilled in 1974, was constructed with nominal 16-inch diameter steel casing to a depth of 350 feet bgl. The screen interval consists of mill slot perforations from 100-350 feet bgl. The original static water level was 54 feet bgl. Currently the static water level is 94 feet bgl.

In 2006, GBWC contracted a company to install a 12-inch liner in the well due to gaping holes in the screen interval. The well driller contractor failed to submit a Well Driller's Report for the modification made to Well 8 but based on a proposal estimate provided by the GBWC. The new well liner was installed consisting of 110 feet of 12-inch steel casing (0-110 feet bgl) welded to 240 feet of 12-inch stainless steel wire wrap screen (110-350 feet bgl). 8x16 well gravel was placed between the old casing and the new liner annulus. No documentation was provided regarding a transition coupling between the low carbon steel blank casing and the stainless steel screen liner.

In 2018, the well underwent a rehabilitation which involved a shock chlorination/swabbing pretreatment, installation of a 10-inch liner, acid main cleaning treatment, redevelopment, pump testing, and design of a new pumping system, 10DHHC, 10 Stage water lube submersible pump, on the existing 150 HP General Electric hollow shaft turbine motor. The well site has been equipped with a 200 kW backup generator in case of power outage. No recent video survey has been conducted since the new liner was installed.

The nominal useful life of a well with good quality construction is roughly 40 (±5) years. Well 8 is 50 years old as of 2024 and should be re-assessed to determine its revised remaining useful life based on structural integrity under a new condition assessment due to the installation of the new liner in 2018.

Van Dyke Well

The Van Dyke Well, originally drilled in 2016, was constructed with nominal 18-inch diameter stainless steel casing to a depth of 429 feet bgl. The screen intervals consist of stainless steel louvered screen from 155-215 feet; 235-305 feet; and 325-415 feet bgl. The static water level at the time of drilling was 25 feet bgl. Currently the static water level is 38 feet bgl. The well is equipped with a Flowserve 12EML, 6-stage vertical turbine pump with a 100 HP hollow shaft turbine electric motor and backup power.

The nominal useful life of a well with good quality construction is roughly 40 (±5) years. Van Dyke Well is eight (8) years old as of 2024. Recently, the Van Dyke Well House has been used as an interim storage shed due to vandalism and a mouse infestation at the Tank 4 storage shed.

2.2.3 Storage

There are four (4) water tanks used for water storage in the Cold Springs service area, as listed in Table 2.08. Each tank services the corresponding pressure zone (i.e., Tank 1 serves Pressure Zone 1).

Table 2.08: GBWC-CSD Water Storage Tanks

Tank	Nominal Volume (MG)	Base Elevation (ft asml)	Diameter (ft)	Height (ft)	Material
1	0.42	5,300	55	24	Bolted Steel
2	0.42	5,150	55	24	Bolted Steel
3	0.42	5,300	55	24	Welded Steel
4	1.20	5,250	80	32	Welded Steel
Total	**2.46**				

2.2.3.1 Storage Tank Existing Condition Assessment

Tank 1

Storage Tank 1 is a nominal 420,000 gallon bolted steel storage tank constructed in 1999. The tank was last inspected in 2023 and was given a condition assessment of good for all exterior and interior categories with the exception of minor isolated areas. It was noted that a few safety and design deficiencies are present and need to be corrected. This tank is equipped with cathodic protection. Appendix F contains a copy of the most recent Tank 1 inspection report, which includes a summary of the primary recommendations for upgrades and repairs that are required to maintain structural integrity, remain in service, or meet regulatory compliance. The remaining useful life is based on a storage tank's nominal life expectancy of 45 years. Tank 1 is 25 years old as of 2024, which leaves approximately 20 years of useful nominal life. Photos taken during the field inspection can be found in Appendix E.

Tank 2

Storage Tank 2 is a nominal 420,000 gallon bolted steel storage tank constructed in 1975 at its current location. Prior to this location, the tank was previously owned and moved to the current location. No identification plate is found on the tank. The actual age of the tank is unknown, but it has been at its current location for 49 years as of 2024.

Tank 2 was last inspected in 2023. The majority of the internal portion of the tank received a fair to poor assessment due to heavy amounts of corrosion on the interior walls and floor. The exterior condition assessment of the tank was found to be good. The tank is equipped with cathodic protection. It was recommended that the interior of Tank 2 be blasted and recoated as soon as budgets will allow. Appendix F contains a copy of the most recent Tank 2 inspection report. The last recorded repair on Tank 2 was in May of 2017, when a hole was patched at a leak site.

Just outside the security fencing below the tank is an area of soil erosion, which experiences a high rate of erosion due to off-road motorcycles using the dirt bank as a ramp. The erosion is so severe that concrete is exposed on one side of a fence post next to the eroded bank, which creates a space for people to squeeze under the fence. As a consequence, Tank 2 experiences constant vandalism in the form of graffiti. Operators drive by the site weekly to identify any changes in the fencing and soil conditions, as well as to monitor the appearance of any new vandalism. At its current location and based on a nominal life expectancy of 45 years, this tank is estimated to be at the end of its useful life. Photos taken during the field inspection can be found in Appendix E.

Tank 3

Storage Tank 3 is a nominal 420,000 gallon welded steel storage tank, constructed in 1993. The tank is equipped with a cathodic protection system. Tank 3 was last inspected in 2020 and was given a good to fair condition assessment for most interior and exterior categories. Notable comments include the external wall graded a fair to poor condition due to heavy de-lamination as well as the marker board graded as poor condition due to the parker, cable, and pulley hardware being absent. Recommendations in the report include replacing the float cable and exterior level indicator and to continue a consistent cleaning and inspection schedule of every 3 to 5 years. Appendix F contains a copy of the most recent Tank 3 inspection report.

Tank 3 was rehabilitated in early 2021, which included blasting and recoating the interior surfaces, welding spot repairs along the exterior, blasting and recoating the exterior surfaces, installing an air gap in the overflow pipe, installing new gaskets on the manways, installing new cables on the level indicator, and re-securing the steel grade band at the foundation. A full report of the rehabilitation can be found in Appendix F.

The nominal useful life is based on a storage tank's nominal life expectancy of 45 years. Tank 3 is 31 years old as of 2024 and estimated to have 14 years of nominal useful life. Photos taken during the field inspection can be found in Appendix E.

Tank 4

Storage Tank 4 is a nominal 1,200,000 gallon welded steel storage tank, constructed in 2001 and equipped with a cathodic protection system. The tank was last inspected in 2019. A visual external field inspection was conducted in August 2020. Although the tank was found to be in good to fair condition for most interior and exterior categories, the exterior water gauge was not operational. Appendix F contains a copy of the most recent Tank 4 inspection report.

Within a year, Tank 4 experienced two significant acts of vandalism. In May 2022, thieves cut the lock on the front gate and stole approximately $18,000 worth of new meter pit assemblies. They also siphoned diesel fuel out of the generator. GBWC eventually recovered the meter pits, but still had to replace them due to all the brass being stripped from the assemblies. In May 2023, the chain-link fence was cut and a fake camera on the booster pump housing was smashed, but nothing was stolen during this event. Since the two acts of vandalism, the storage shed at the Tank 4 site was emptied due to the security issues. Currently, the Van Dyke Well house is used as an interim storage shed.

The remaining useful life is based on a storage tank's nominal life expectancy of 45 years. Tank 4 is 23 years old as of 2024 and is estimated to have 22 years of nominal useful life remaining. Photos taken during the field inspection can be found in Appendix E.

2.2.4 Booster Pumps

Water is pumped through two booster pump stations into Pressure Zone 3 for water service. The booster pumping stations are located adjacent to Tank 4 (known as the Tank 4 Booster Station) in Pressure Zone 4 and in a vault on Touraco Street (known as the Touraco Booster Station) in Pressure Zone 2. Both the Tank 4 Booster Station and the Touraco Booster Station Vault contain two pumps. The Tank 4 Booster Station has been equipped with a 50 kW backup generator in case of power outage. The Touraco Booster Station is not equipped with backup power.

2.2.4.1 Pump and Motor Existing Conditions Assessment

Touraco Booster Station

The Touraco Booster Station has two Gould's model 3656 pumps with a 10 HP 3540 RPM electric motor. The pumps have a pumping capacity of 125 gallons per minute (175' TDH) and are assembled in a parallel configuration. One pump has recently been refurbished and is in good condition. When both pumps are operating simultaneously, the station has a 250 GPM capacity. According to the asset registry, these booster pumps should have approximately 4 years of nominal remaining life. This booster pumping station is considered to be a secondary pumping system to convey water to Pressure Zone 3. The booster station is located in a vault adjacent to a residential property with a large, grassed front lawn. The booster station vault is often flooded and requires dewatering. The pumps are located very close to the floor of the vault, resulting in frequent issues with water damage to the pumps and motors. The operators have installed a sump pump to help mitigate the flooding issue but the sump pump fails periodically. Operators visit the Touraco Booster Station once a week to ensure the vault is dry. If it isn't, they use a rope attached to the top of the vault to manually turn the sump pump on and off to drain the vault of water. All work within the vault still requires two operators to be present because of the confined space requirement.

Previously, the electrical control panels for the Touraco Booster Station were located within the vault. Since this vault has always experienced flooding issues, operators accessing the vault periodically to perform maintenance presented a significant safety hazard. Recently, GBWC-CSD has addressed this issue by moving the electrical panels above-ground, directly adjacent to the vault. Photos taken during the field inspection of the existing Touraco Booster Station and new above-ground electrical panels can be found in Appendix E.

Tank 4 Booster Station (Booster 4)
The Tank 4 Booster Station was placed in service in 2001 as part of a Tank 4 project with one Paterson vertical in-line pump with a 7.5 HP 1750 RPM Marathon Electric motor. In December of 2021, a redundant Patterson vertical in-line pump with a 7.5 HP 1450 RPM US motor was installed. Both pumps operate at a capacity of 350 gallons per minute at 51 feet TDH and each pump is alternated (lead/lag) as the active service pump.

Tank 4 Booster Station is the primary pumping system for conveying water into Tank 3. The booster pumping station appears to be in good condition. According to the asset registry, the booster pump is currently 23 years old as of 2024. The booster station is equipped with a 50 kW backup generator. During the Tank 4 vandalism event in May 2022 (discussed in Section 2.2.3.1), the backup generator was broken into and the diesel fuel was siphoned out of the tank. There was no damage done to the generator itself and no other vandalism events to the generator have happened since.

2.2.5 Backup Power Supply

Backup power supply is provided in the event that a power outage occurs and allows GBWC-CSD to continue to provide water services during emergency situations or shutdowns. Wells 1, 6, 7, 8, and Van Dyke, as well as the Tank 4 Booster Station, have backup generators and automatic transfer switches to ensure instantaneous power to the motors when a power outage occurs.

2.2.6 System Operation and Control

The wells and the booster pumping stations are controlled by a Supervisory Control and Data Acquisition (SCADA) by monitoring the water levels in the storage tanks. When a water level drops to a preset level, as seen in Table 2.09, the pumps turn on and begin filling the tanks. The SCADA system was upgraded in 2018 to a high-speed Ethernet radio system, consistent with a similar system installed in the GBWC-SSD system. All the existing monitoring equipment uses FM radio frequency to communicate with the receiving equipment located in Well House 8. GBWC does not maintain a licensed frequency for this communication.

Pressure Zone 1 (Tank 1 Operations)
The lower level in Storage Tank 1 triggers Well 6 and 7 to start when the water level is at 17 feet. Once Tank 1 is filled, both wells are told to shut off at 21.0 feet.

Pressure Zone 2 (Tank 2 Operations)
Storage Tank 2 triggers the Van Dyke Well to start when the water level reaches 16.0 feet. If the Van Dyke Well is unable to keep up with demand, the Cold Springs Drive PRV and the Puffin

Street PRV will open to convey water from Pressure Zones 1 and 4 to maintain pressure. When Tank 2 is filled (18 feet), the PRV's will close and the Van Dyke Well is told to shut off.

Pressure Zone 3 (Tank 3 Operations)
Storage Tank 3 triggers the Tank 4 Booster Station to start when the water level reaches 16feet. If the Tank 4 Booster Station is unable to keep up with demand, the second Tank 4 Booster Pump will then start at 15.5 feet. If both booster pumps are unable to keep up with demand, then the Touraco Booster Station will be manually started at 15 feet to keep up with demand. When Tank 3 is filled (19 feet), all the booster pumps will either be shut off automatically or manually.

Pressure Zone 4 (Tank 4 Operations)
Storage Tank 4 triggers both Well 1 and Well 8 to start when the water level reaches 25.5 feet. When Tank 4 is filled (28.5 feet), Well 1 and Well 8 are told to shut off.

A summary of the operational set points for how the tanks are filled is shown below in Table 2.09.

Table 2.09: Operational Set Points of GBWC-CSD Water Storage Tanks

Tank	Low Water Level (ft)	Main Filling Source at Low Water Level	Backup Supply Water Level (ft)	Backup Supply Source if Main Source Cannot Maintain Water Level	High Water Level - All Sources Off (ft)
Tank 1	17	Well 6	17	Well 7	21
Tank 2	16	Van Dyke Well	PRV Auto	Cold Springs PRV & Puffin PRV	18
Tank 3	16-15.5	Tank 4 BPS (2)	15	Touraco BPS*	19
Tank 4	25.5	Well 1 and 8	Auto	Well 1 and 8	28.5

Notes:
*Touraco BPS Pump 1 will be turned on manually after an alarm from SCADA. If Pump 1 cannot keep up with demand, Pump 2 will be automatically turned on from SCADA at the 15.5 feet level in Tank 4.

2.2.6.1 SCADA Existing Conditions Assessment

The original GBWC-CSD SCADA system was installed in 1999 with limited upgrades made in 2006 and 2013, and extensive upgrades made in 2018 to convert from a hybrid analog/digital system to a fully digital system. The current SCADA system monitors the following aspects:

- storage tank level with trends over time
- well pump start/stop status
- well pump run times
- static and pumping water levels
- booster pump start/stop status
- run times for booster pump motors

In addition, the SCADA system monitors "Out of Parameter" conditions and will trigger an alarm call-out to the on-call operator's cell phone. The "Out of Parameter" conditions include:

- high tank levels
- low tank levels
- well pump/motor failure
- electrical power failure

Most of the monitoring equipment uses FM analog radio frequency to communicate with the receiving equipment located at the Van Dyke Well Site. The entire SCADA system is supported by Sierra Controls and is accessible through the operator's laptops, cell phones, and tablets through an internet connection.

SECTION 3.0: HISTORICAL DATA AND FORECASTING

3.1 Planning Period

The planning period for the 2024 GBWC Consolidated IRP is from 2025 to 2044 with an emphasis on the most recent full three years of data compilation from 2020, 2021, and 2022. Demand projections and buildout estimates will extend to 2044. The existing GBWC-CSD service area currently contains 4,048 permitted residential lots. As of 2023, GBWC-CSD has installed meters on 3,777 of the residential lots, leaving 271 lots still available for development. This equates to the existing service area permitted residential lots at 93% of buildout currently.

3.2 Existing Service Area

The GBWC-CSD service area is largely residential with light commercial and public areas. The commercial area is primarily in located in the south area of the service area. The commercial base is a mix of stores, restaurants, industrial stores, and a casino. The service area is located approximately 10 miles north of Reno on U.S. Highway 395 at the California-Nevada Border. The GBWC-CSD service area boundaries are illustrated in Figure 1.01. Although the existing service area is approaching residential buildout, there is potential for adjacent residential developments to be annexed into the system as described in Section 3.3.1.

3.3 Population Projections

Over the past decade, new developed lots with meter installations in the GBWC-CSD service area have fluctuated between 0 to 137 per year. This large fluctuation is believed to be due to the end of the housing boom in the mid 2000's, followed by the Great Recession in 2008, and then the steady increase in development since 2014. Currently, the GBWC-CSD service area has several partially completed residential subdivisions. These subdivisions include Reno Park by H & N Properties, Woodland Village by Lifestyle Homes, LLC, and the two recently annexed multi-family developments called Petersen Village and Little Valley Townhomes.

Washoe County growth rates from the Nevada County Population Projections 2022-2041 (dated October 1, 2022, prepared by the Nevada State Demographer's Office) were used to develop the future population and connection projections in the GBWC-CSD service area. Past and current population information for Cold Springs Designated Place (CDP) was obtained from the U.S. Census Bureau American Factfinder. The entirety of the GBWC-CSD Service Area is contained within the Cold Springs CDP. All population and growth rate information used was the most current data available at the time this report was written. Table 3.01 summarizes the population and service connection growth over the 20-year planning period.

Table 3.01: Population and Service Connection Projections

Year	County Population % Change(1)	Cold Springs Population(2)	Total GBWC-CSD Service Connections(3)			
			Residential	Commercial	Public	All
2020	-	10,153	3,662	21	40	3,723
2021	1.90%	10,346	3,762	24	41	3,827
2022	2.30%	10,584	3,777	24	42	3,843
2023	2.00%	10,796	3,853	24	43	3,920
2024	1.70%	10,979	3,918	25	44	3,986
2025	1.40%	11,133	3,973	25	44	4,042
2026	1.30%	11,277	4,025	26	45	4,095
2027	1.20%	11,413	4,073	26	45	4,144
2028	0.90%	11,516	4,109	26	46	4,181
2029	0.90%	11,619	4,146	26	46	4,219
2030	0.70%	11,701	4,175	27	46	4,248
2031	0.70%	**11,620(4)**	**4,195(4)**	27	47	4,268
2032	0.60%	11,620	4,195	27	47	4,269
2033	0.60%	11,620	4,195	27	47	4,269
2034	0.60%	11,620	4,195	27	48	4,270
2035	0.50%	11,620	4,195	27	48	4,270
2036	0.50%	11,620	4,195	27	48	4,271
2037	0.50%	11,620	4,195	28	48	4,271
2038	0.40%	11,620	4,195	28	49	4,271
2039	0.40%	11,620	4,195	28	49	4,272
2040	0.40%	11,620	4,195	28	49	4,272
2041	0.40%	11,620	4,195	28	49	4,272
2042	0.40%	11,620	4,195	28	49	4,272
2043	0.40%	11,620	4,195	28	49	4,273
2044	0.40%	11,620	4,195	28	50	4,273

Notes:

(1) Washoe County population projections and % change based on Nevada County Population Projections 2022 to 2041 dated October 1, 2022, prepared by the Nevada State Demographer's Office. The percent change from 2041 was extended through 2042, 2043, and 2044 to estimate populations through the planning period.

(2) The 2020 Cold Springs population was taken from 2020 US Census data. Population projections from 2021 to 2044 were estimated using % change for Washoe County per Nevada State Demographer's Office.

(3) Total existing service connections for 2020-2022 is based on GBWC meter counts and includes commercial and public connections. Total service connections for 2023-2044 is based on the Nevada State Demographer's Office County percent change. The percent change from 2041 was extended through 2042, 2043, and 2044 to show population growth through the planning period.

(4) The CSD service area is anticipated to hit residential service connection buildout of 4,195 in 2031. Due to the census designated place being fully served by GBWC, the population is anticipated to stop growing in 2031. The buildout population was determined by using the household density of 2.77 from the 2020 population and residential connections.

3.3.1 Future Development

The GBWC-CSD service area is surrounded by several future developments, which are in various stages of preliminary and final approval for Plan Unit Developments. Since the 2021 IRP, several developments have been annexed into the GBWC-CSD service area, with the possibility of more developments being annexed in the future. The recently annexed developments (including Petersen Village and Little Valley), and other pending developments are described in detail in the following sections. The locations of the developments is shown in Figure 3.01.

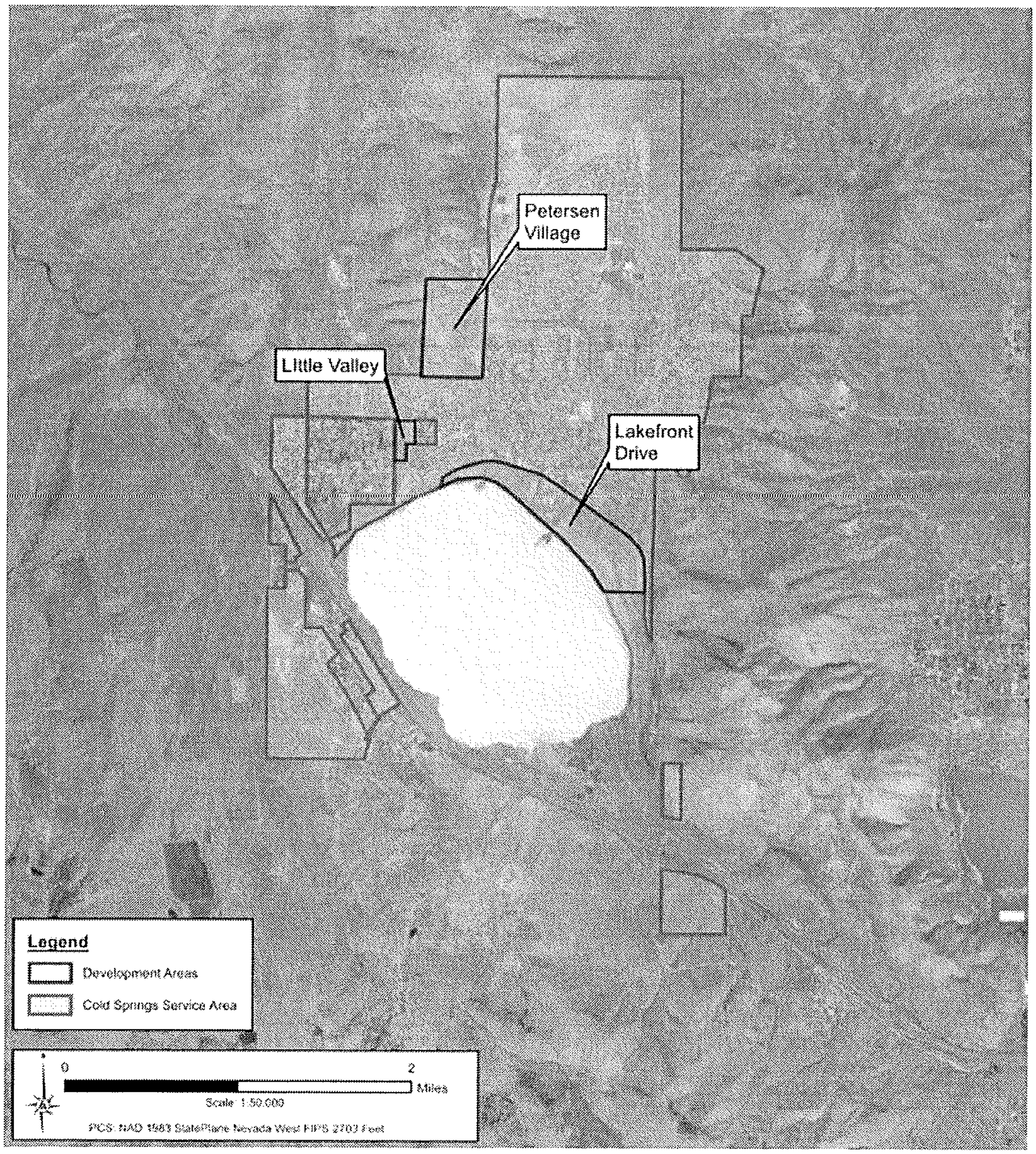


Figure 3.01: Cold Springs Recently Annexed Developments

While several developers would like to have water services provided by GBWC-CSD, the challenge is the availability of water rights in the Cold Springs and Long Valley Basins for dedication. What follows are brief descriptions of all the known developments that are located near the GBWC-CSD's Service Territory.

3.3.1.1 StoneGate

The StoneGate (formally Heinz Ranch) Project owned by Heinz Ranch Land Company, LLC consists of approximately 1,400 acres of undeveloped land that has been approved for a mixed-use Planned Unit Development with close to 5,000 single and multi-family units, a town center, schools, and parks located south of the existing GBWC-CSD Service Territory. The developer has negotiated with Truckee Meadows Water Authority (TMWA) to extend a water line approximately 6 miles east along Highway 395 to the development site and will be directly serviced by TMWA. An inter-tie with this new service territory and GBWC-CSD may be possible. The project is in the preliminary development stages.

3.3.1.2 Train Crest

The Train Crest Project is west and adjacent to the StoneGate Project. It is owned by Lifestyle Homes, LLC and consists of approximately 480 acres of undeveloped land that is being proposed for a residential Planned Unit Development with up to 1,400 residential units. The timing for this development will be dependent on the StoneGate Project schedule. No decision has been made on who will serve this future development.

3.3.1.3 Village Center

The Village Center Townhouses Project is in the center of the Woodland Village Development. It is owned by Lifestyle Homes, LLC and consists of residential multifamily units that will be built in two phases. Currently, Phase 1 has been constructed and Phase 2 is still in the design phase.

3.3.1.4 Petersen Village

The Petersen Village project (formerly the Village Parkway Townhouses Project and then the Mud Springs Condos Project) is west and southwest of Woodland Village. It is owned by Lifestyle Homes, LLC and consists of approximately 125 acres of undeveloped land that is being proposed for a residential multifamily development with up to 428 residential units. Preliminary design reports, plan review, hydraulic modeling, and hydrology reports are currently underway as well. In 2021, this area was annexed into the GBWC-CSD service area with an estimated connection count of 105 units. The timing for this development is assumed to occur in phases over several years, starting with the annexation.

3.3.1.5 Cold Springs Drive

The Cold Springs Drive Project is on the northwest side of White Lake. It is owned by Lifestyle Homes, LLC and consists of undeveloped land that is currently under construction for a residential development. This area was annexed into the GBWC-CSD water system service territory in 2021 with a total of 42 residential homes. The timing for this development is occurring in one phase and infrastructure is being built in 2023 and early 2024.

3.3.1.6 Lakefront

The property comprising the contemplated Lakefront Project, owned by Lifestyle Homes, is in its preliminary design phase and is the subject of an annexation application pending before the Commission (Docket No. 23-08027). The scenario under discussion would consist of an industrial building complex with some commercial storage units.

3.3.1.7 Evans Ranch

The Evans Ranch Project owned by Wallach and Lifestyle Homes, is an approved 7,200 residential Planned Unit Development located northeast of the GBWC-CSD service area. Construction of homes was estimated to begin in 2022 but has been delayed while it is determined who will provide water service to this area. Currently, the project is within the TMWA service territory. However, Lifestyle Homes would prefer GBWC-CSD provide water service. If this project is to be serviced by the GBWC-CSD water system, the developer will need to obtain water rights and dedicate them along with infrastructure. The developer of this project will be responsible for dedication of water rights.

3.3.1.8 Silver Star

The Silver Star Project, owned by Dan Douglass, is an approved 1,600 residential home Planned Unit Development located south and adjacent to the Evans Ranch Project. Similarly to the Evans Ranch Project, the construction of homes was estimated to start in 2022 but has been delayed while it is determined who will provide water service to this area. The developer of this project will be responsible for dedication of water rights if this area is to be serviced by GBWC-CSD.

3.3.1.9 Silver Hills

The Silver Hills Project, owned by Lifestyle Homes, is an approved 680 residential home Planned Unit Development located east of the GBWC-CSD Service Territory completely within Lemon Valley. Since the development is located on the east side of Granite Hills and closer to TMWA service area, it is likely that TMWA will be the water purveyor for the Silver Hills Project.

3.4 Water System Forecasting

3.4.1 Water System Connections Projections

Currently, the GBWC-CSD service area is completely subdivided. Minor changes in the proposed total number of residential units may occur, but will not have a significant effect on projected customer counts. Therefore, unless additional developments are annexed into the service area, all future development appears to be infill. Two recently annexed developments include the Petersen Village and Little Valley Townhomes, as discussed in detail in Section 3.3.1. The limiting factor for annexing future developments will be water right dedications in the Cold Springs and Long Valley Basins, and regulatory approvals from the City of Reno and Washoe County. Table

3.01 shows the historical connection increase for GBWC-CSD for 2020-2022, as well as connection projections from 2023 to 2044.

3.4.2 Water Usage

3.4.2.1 Recorded Water Production

Table 3.02 summarizes historical water production for the 5 wells from the years 2013 to 2022 based on monthly production reports provided in Appendix G. The well production data has been broken out into the pressure zones and associated wells supplying each zone. Since Pressure Zones 3 and 4 are heavily tied together through Wells 8 and 1's water production, they were tied together in the analysis. With the Van Dyke Well being brought online in 2017 and Well 1 directed into Pressure Zone 4 around the same time, Table 3.02 reflects these production wells pumping into their associated pressure zones prior to and after 2017. The table shows that prior to the Van Dyke Well being brought online, almost half of the yearly water production was provided by Well 8. Since then, yearly water production has been more evenly spread amongst the wells and their respective pressure zones, except for Well 2. After the Van Dyke Well was brought online 2017, Well 2 was permanently taken offline.

Total annual water production during the ten-year analysis period (2013-2022) ranged from a low of 404 MG/Y in 2015 to a high of 502 MG/Y in 2020. From 2020 to 2022, the yearly water decreased to 457 MG/Y, resulting in a 9% production decrease over a 2-year period.

As part of the water production analysis, the average daily demand (ADD), maximum daily demand (MDD), and peak hour demand (PHD) were calculated based on system-wide pumping data from 2020-2022, as shown in Table 3.03. The system was subsequently broken down and water demands were calculated for each pressure zone as well, as shown in Table 3.03a through Table 3.03c.

The ADD for each year was calculated by dividing the total yearly production volume by 365. In order to determine maximum daily demand (MDD), the average day of the maximum month (ADMM) was multiplied by a standard factor of 1.25 (a standard of the American Water Works Association [AWWA]). The ADMM was calculated by dividing the total monthly production for the highest month (typically July or August) by the number of days of that month. The ratio of ADD to MDD is typically referred to as the Peaking Factor (PF). According to the AWWA criteria, the peaking factor typically ranges from 1.2 to 3.0. The three-year average PF derived from the data (2020-2022) was calculated to be 2.25 for the entire system, which is within the typical range. The PHD was calculated by applying a standard factor (defined by AWWA) of 1.75 to the calculated MDD. The PHD is shown in Table 3.03 through Table 3.03c in both MGD and gpm.

Table 3.02: Historical Water Production for GBWC-CSD by Pressure Zones and Wells

Year	Pressure Zone 1				Pressure Zones 3 & 4			
	Well 6		Well 7		Well 8		Well 1	
	MG/Y	MG/D	MG/Y	MG/D	MG/Y	MG/D	MG/Y	MG/D
2013	71.48	0.20	20.86	0.06	205.82	0.56	-	-
2014	71.03	0.19	22.29	0.06	221.31	0.61	-	-
2015	61.68	0.17	25.51	0.07	193.5	0.53	-	-
2016	48.45	0.13	46.33	0.13	210.57	0.58	-	-
2017	52.85	0.14	39.65	0.11	200.12	0.55	22.66	0.06
2018	67.25	0.18	35.66	0.10	94.03	0.26	159.30	0.44
2019	63.41	0.17	33.21	0.09	108.81	0.30	135.73	0.37
2020	53.99	0.15	51.78	0.14	167.50	0.46	95.63	0.26
2021	54.99	0.15	48.40	0.13	161.92	0.44	90.69	0.25
2022	52.80	0.14	44.50	0.12	148.24	0.41	97.07	0.27
Year	Pressure Zone 2						Total	
	Well 1		Well 2		VanDyke Well		MG/Y	MG/D
	MG/Y	MG/D	MG/Y	MG/D	MG/Y	MG/D		
2013	126.68	0.35	6.40	0.02	-	-	431.24	1.18
2014	128.44	0.35	10.11	0.03	-	-	453.18	1.24
2015	121.81	0.33	1.02	0.00	-	-	403.51	1.11
2016	129.24	0.35	0.02	0.00	-	-	434.59	1.19
2017	-	-	0.00	0.00	112.61	0.31	427.89	1.17
2018	-	-	0.00	0.00	121.81	0.33	478.05	1.31
2019	-	-	0.00	0.00	116.35	0.32	457.51	1.25
2020	-	-	0.00	0.00	133.42	0.37	502.32	1.38
2021	-	-	0.00	0.00	131.16	0.36	487.16	1.33
2022	-	-	0.00	0.00	113.84	0.31	456.45	1.25

Table 3.03: GBWC-CSD Historical Daily Production, Peaking Factors and Maximum Day Demand/PHD

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	1.38	2.34	1.70	1.25	2.92	2.12	1.75	5.11	3,550
2021	1.33	2.49	1.87	1.25	3.12	2.34	1.75	5.45	3,787
2022	1.25	2.30	1.84	1.25	2.88	2.30	1.75	5.03	3,495
MDD/ADD Average for 2020, 2021, & 2022						**2.25**			

Table 3.03a: Pressure Zone-1 Historical Maximum Daily Production, Peaking Factors and Maximum Day Demand/PHD

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	0.29	0.52	1.78	1.25	0.65	2.23	1.75	1.13	784
2021	0.28	0.55	1.93	1.25	0.68	2.41	1.75	1.20	831
2022	0.27	0.51	1.90	1.25	0.63	2.38	1.75	1.11	771
MDD/ADD Average for 2020, 2021, & 2022						**2.34**			

Table 3.03b: Pressure Zone-2 Historical Maximum Daily Production, Peaking Factors and Maximum Day Demand/PHD

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	0.37	0.65	1.77	1.25	0.81	2.22	1.75	1.42	986
2021	0.36	0.68	1.90	1.25	0.85	2.37	1.75	1.49	1,035
2022	0.31	0.61	1.94	1.25	0.76	2.43	1.75	1.32	919
MDD/ADD Average for 2020, 2021, & 2022						**2.34**			

Table 3.03c: Pressure Zones 3 & 4 Historical Daily Production, Peaking Factors and Maximum Day Demand/PHD

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	0.72	1.19	1.65	1.25	1.48	2.06	1.75	2.60	1,804
2021	0.69	1.26	1.83	1.25	1.58	2.28	1.75	2.77	1,921
2022	0.67	1.19	1.77	1.25	1.48	2.21	1.75	2.60	1,804
MDD/ADD Average for 2020, 2021, & 2022						**2.18**			

As previously stated, peak production months historically occur in July or August. The maximum flows always occur in the summer months when temperatures are the highest and outdoor water demands are at their peak. Based on a review of production data, the peak season can be defined as May-October, with winter production including the months outside of this time frame. The seasonal peaking factor was used to determine how much more water is produced in the peak season than the winter months and is calculated by dividing the total peak season production divided by the winter production. Approximately 70% of water used during the year occurs during the peak season months as shown in Table 3.04. Table 3.05a through Table 3.06c are the historical seasonal well production averages for each of the pressure zones. Similar to previous analysis, Pressure Zones 3 and 4 production data were combined.

Table 3.04: Total Historical Seasonal Average Well Production

Year	**Annual Production (12 months total) (MG)**	**Peak Seasonal Production (May-Oct) (MG)**	**Winter Production (Nov-Apr) (MG)**	**Seasonal Peaking Factor** (Seasonal Peak/Winter Production)	**Peak Month Production (MG)**	**Peaking Factor** (Peak Month/Average Annual Month)
2013	431.24	290.38	140.86	2.06	69.55	1.94
2014	453.18	299.54	153.64	1.95	68.99	1.83
2015	403.51	260.15	143.36	1.81	60.02	1.78
2016	434.61	300.03	134.58	2.23	74.87	2.07
2017	427.89	296.12	131.78	2.25	69.86	1.96
2018	478.05	322.76	155.29	2.08	79.28	1.99
2019	457.51	308.84	148.66	2.08	79.12	2.08
2020	502.32	374.14	128.19	2.92	72.45	1.73
2021	487.16	357.59	129.57	2.76	77.29	1.90
2022	456.45	336.09	120.37	2.79	71.32	1.87

Table 3.05a: Pressure Zone 1 Historical Seasonal Average Well Production

Year	Annual Production (12 months total) (MG)	Peak Seasonal Production (May-Oct) (MG)	Winter Production (Nov-Apr) (MG)	Seasonal Peaking Factor (Seasonal Peak/Winter Production)	Peak Month Production (MG)	Peaking Factor (Peak Month/Average Annual Month)
2013	92.34	63.86	28.48	2.24	15.01	1.95
2014	93.32	64.63	28.69	2.25	14.66	1.89
2015	87.18	56.78	30.4	1.87	13.23	1.82
2016	94.78	67.01	27.77	2.41	16.84	2.13
2017	92.50	66.20	26.29	2.52	16.02	2.08
2018	102.91	70.06	32.85	2.13	17.15	2.00
2019	96.62	68.96	27.65	2.49	17.78	2.21
2020	105.77	81.68	24.09	3.39	16.01	1.82
2021	103.39	78.11	25.28	3.09	16.96	1.97
2022	97.30	74.43	22.88	3.25	15.73	1.94

Table 3.05b: Pressure Zone 2 Historical Seasonal Average Well Production

Year	Annual Production (12 months total) (MG)	Peak Seasonal Production (May-Oct) (MG)	Winter Production (Nov-Apr) (MG)	Seasonal Peaking Factor (Seasonal Peak/Winter Production)	Peak Month Production (MG)	Peaking Factor (Peak Month/Average Annual Month)
2013	133.08	86.51	46.57	1.86	21.33	1.92
2014	138.56	91.62	46.93	1.95	21.71	1.91
2015	122.83	79.99	42.84	1.87	19.81	1.94
2016	129.25	90.02	39.23	2.29	27.14	2.52
2017	112.62	78.94	41.32	1.91	20.03	2.13
2018	121.81	80.49	41.89	1.92	20.23	1.99
2019	116.35	74.46	41.89	1.78	16.42	1.69
2020	133.42	99.03	34.39	2.88	20.11	1.81
2021	131.16	96.37	34.79	2.77	21.13	1.93
2022	113.84	82.66	31.18	2.65	18.76	1.98

Table 3.05c: Pressure Zones 3 & 4 Historical Seasonal Average Well Production

Year	Annual Production (12 months total) (MG)	Peak Seasonal Production (May-Oct) (MG)	Winter Production (Nov-Apr) (MG)	Seasonal Peaking Factor (Seasonal Peak/Winter Production)	Peak Month Production (MG)	Peaking Factor (Peak Month/Average Annual Month)
2013	205.82	140.01	56.81	2.13	33.21	1.94
2014	221.31	143.29	78.02	1.84	32.62	1.77
2015	193.50	123.38	70.12	1.76	27.00	1.76
2016	210.57	143.00	67.57	2.12	30.89	1.86
2017	222.78	150.98	71.80	2.10	33.81	1.82
2018	253.33	172.21	81.12	2.12	41.89	1.98
2019	244.54	165.42	79.12	2.09	44.91	2.20
2020	263.13	193.43	69.70	2.78	36.82	1.68
2021	252.61	183.11	69.50	2.63	39.21	1.86
2022	245.31	179.00	66.31	2.7	36.82	1.80

3.4.2.2 Recorded Consumption

Table 3.06 summarizes the historical water meter use data for the years 2013 to 2022. The total annual water use supplied by GBWC-CSD during this period ranges from 382 million gallons in 2015 to a high of 472.5 million gallons in 2020. The largest increase the system experienced over a one-year period was from 2019 to 2020, when total yearly production increased by 14.3%. Similarly, the largest decrease the system experienced over a one-year period was from 2014 to 2015, when there was a 9.2% reduction of water produced by the wells.

The metered data can be broken down further to show the historical metered water use by class of service, which is categorized by residential, commercial, and public authority for this analysis. The public authority category includes users like HOA irrigation, Washoe County Parks, and Washoe County Schools. Table 3.07a through Table 3.07c present the metered data, by class of service with pressure zones for GBWC-CSD.

The three most recent years (2020-2022) of data are considered more representative of current demand and level of development within the system. For these years, Pressure Zone 1 has an average of 87.9% of metered water use as residential, 8.3% commercial, and 3.8% public. Pressure Zone 2 has an average of 95.9% metered water use as residential and 3.8% public, with very little commercial. Pressure Zones 3 and 4 have an average of 81.6% metered water use for residential, 15.7% for public, and 2.7% for commercial use. The public metered water use, which represents primarily irrigation water, could be replaced with treated effluent in the future.

Table 3.06: Summary of Historical Meter Water Use Data for 2013 – 2022

Year	Pressure Zone 1 (Gallons)	Pressure Zone 2 (Gallons)	Pressure Zones 3 & 4 (Gallons)	Total (Gallons)
2013	82,254,247	128,755,720	197,468,130	408,478,097
2014	89,484,309	126,314,460	205,660,807	421,459,576
2015	82,806,370	108,546,814	191,486,027	382,839,211
2016	88,993,012	118,126,641	206,885,516	414,005,169
2017	88,817,644	113,073,822	209,110,280	411,001,746
2018	94,598,978	115,588,590	229,243,456	439,431,024
2019	88,172,669	106,149,767	212,156,348	406,478,784
2020	101,374,440	118,827,216	244,359,808	464,561,464
2021	100,216,160	117,138,968	255,111,242	472,466,370
2022	92,378,090	105,997,872	236,414,040	434,790,002
Avg. AFA (2020-2022)	**300.72 AFA**	**349.82 AFA**	**752.78 AFA**	**1,403.32 AFA**

Table 3.07a: Pressure Zone 1 Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Public Authority	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	90,235,960	89.01%	7,906,640	7.80%	3,231,840	3.19%
2021	88,335,450	88.14%	8,076,860	8.06%	3,803,850	3.80%
2022	79,977,750	86.58%	8,238,010	8.92%	4,162,330	4.51%

Table 3.07b: Pressure Zone 2 Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Public Authority	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	117,515,986	98.90%	184,690	0.16%	1,126,540	0.95%
2021	114,997,498	98.17%	385,170	0.33%	1,756,300	1.50%
2022	103,512,472	97.66%	614,410	0.58%	1,870,990	1.77%

Table 3.07c: Pressure Zones 3 & 4 Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Public Authority	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	197,248,413	80.72%	7,873,847	3.22%	39,237,548	16.06%
2021	203,220,855	79.66%	8,127,658	3.19%	43,762,729	17.15%
2022	193,135,382	81.69%	3,620,408	1.53%	39,658,250	16.77%

3.4.2.3 Non-Revenue Water

The International Water Association (IWA) and the American Water Works Association (AWWA) define non-revenue water as equal to the total amount of water flowing into the potable water supply network from the source (Wells) minus the total amount of water that industrial and domestic consumers are authorized to use (metered/billed authorized consumption). There are two broad types of losses that occur in drinking water utilities, which include apparent losses and real losses. Apparent and Real Losses are defined as follows:

- Apparent Losses: the non-physical losses that occur in utility operations due to customer meter inaccuracies, systematic data handling errors in customer billing systems and unauthorized consumption. In other words, this water is consumed but is not properly measured, accounted or paid for.
- Real Losses: the physical losses of water from the distribution system, including leakage and storage overflows.

Table 3.08 presents the differences between historical water production and actual usage from 2013 to 2022. This compares the production data summarized in Table 3.04 to the metered uses from Table 3.06. Over the past ten years (2013-2022), the system non-revenue water (NRW) for GBWC-CSD averaged approximately 6.06%. Within the last 3 years (2020-2022), the average system NRW decreased to 5.09%, signifying that the system is receiving the repairs and general maintenance needed to improve leaks. It is important to note that two of the three phases of the Meter Pit and Service Line Replacement Projects have been completed, which is likely the leading contribution to the decrease in Real Losses throughout the system. Another factor for the reduced NRW could be attributed to all old non-AMR meters having been updated to AMR meters. Updated meters could provide more accurate usage data, leading to lower Apparent Losses throughout the system. A ruptured fire hydrant in Pressure Zone 4 during 2019, may account for the increase in NRW for that year.

AWWA has been working over the past two decades to change the perception of what is considered an acceptable industry water loss percentage standard for NRW. Publications on water loss that refer to the "AWWA" Standard have ranged from 5% to 20% NRW. These misrepresentations, often derived anecdotally, come from technology and service providers, regulatory agencies, environmental groups, and water utilities. Since 2003, AWWA has recommend that it is in the best interest of utilities to set system-specific loss targets and not use the prescribed "one size fits all" mentality. While in past IRP documents, NRW has always been presented as a percentage loss with a goal of targeting 10% or less, it would be best to refrain from this type of objective and instead transition to the AWWA "Key Performance Indicators" (KPI) as provided in the "Non-Revenue Water AWWA Loss Control Committee Report" (AWWA Report) dated November 2019. A copy of the AWWA Report can be found in Appendix M. In order to meet the NAC 704.5667 regulation, percentages for NRW are provided similar to previous IRP documents. However, for future analyses, it is recommended that GBWC work with the PUCN and other regulators to develop their own NRW targets by implementing the AWWA KPI as provided in the AWWA Report. The following measures can be conducted by GBWC-SCD as an ongoing effort to reduce real water losses from the water production process to the water delivery point and apparent losses in the utility operations as outlined in the AWWA Report:

- Annual water audits should be performed using the AWWA Free Water Audit Software.
- Well production meters should be regularly tested, monitored, and maintained.
- Storage tanks should be inspected at regular intervals to assure integrity against leakage.
- GBWC-CSD's continued diligence in repairing all pipeline leaks, lateral/meter pit leaks and breaks in a timely manner.
- Ensure that automatic meter reading/advanced metering infrastructure (AMR/AMI) are working properly.
- Install water meters at PRVs to monitor water flowing between pressure zones. The installation of flow meters at the existing and future PRVs will allow for better delineation of NRW between the pressure zones.

Table 3.08: GBWC-CSD Historical Non-Revenue Water Quantities

Year	Production (MG)	Metered Use (MG)	Unbilled Water (MG)	% Gross Non-Revenue Water
2013	431.24	408.48	22.76	5.3%
2014	453.18	421.46	31.72	7.0%
2015	403.51	382.84	20.67	5.1%
2016	434.59	414.01	20.58	4.7%
2017	427.89	411.00	16.89	4.0%
2018	478.05	439.43	38.62	8.1%
2019	457.51	406.48	51.03	11.2%
2020	502.32	464.56	37.76	7.5%
2021	487.16	472.47	14.69	3.0%
2022	456.45	434.79	21.66	4.8%
NRW Three Year Average (2020 – 2022)				**5.09%**

3.4.3 Water Usage Forecasting

Currently, the GBWC-CSD service area has been fully subdivided. However, since the Lakefront Project will be exclusively commercial/industrial, all residential parcels within the service area are already subdivided. Unless additional areas are annexed into the service area, all future development will be infill from the remaining permitted lots. In forecasting future connections, Lumos assumed that the Lakefront Project would no longer entail residential homes and instead would be all commercial development. Additionally, future connection projections accounted for the estimated water connections brought in by the recently annexed Petersen Village and Little Valley developments. The projections for future population and connections in the GBWC-CSD service area are detailed in Table 3.01 and Table 3.02. In addition, it is anticipated that all future infill connections will consist primarily of residential with a very small addition of commercial connections. Based on these assumptions, GBWC-CSD Service Territory will reach its residential build out of 4,195 residential connections by 2031, as summarized in Table 3.01.

Table 3.09 through Table 3.11 summarize average water demand data for 2013 to 2022 as provided by GBWC-CSD. To obtain more accurate residential water demand factors, only metered residential connections with 10 months of meter data or more were used to determine the average water demand per connection. The GBWC-CSD system has an average residential water usage of 300 gallons per day per connection (gpdpc), an average commercial usage of 1,820 gpdpc, and an average public usage of 3,065 gpdpc for the latest three years of data (2020-2022).

Table 3.12a through Table 3.12c: summarizes residential average water demand per connection by pressure zones as provided by GBWC-CSD. For the last three years of updated data (2020-2022) Pressure Zone 1 has an average residential water usage of 387 gpdpc, Pressure Zone 2 has an average water usage of 309 gpdpc and Pressure Zones 3 and 4 have an average water usage of 269 gpdpc. The significantly lower demand for Pressure Zones 3 and 4 is due to Woodland Village Subdivision's very low to zero landscape requirements in front yards and low-flow appliances required in the residential homes.

Table 3.13 provides both average day and maximum day projected future water demand for the GBWC-CSD service area. Actual demands were used for the years 2020-2022, and then the Nevada Demographer's population projections were integrated into the forecast. The Peaking Factors (MDD/ADD) previously calculated for each of the pressure zones were used in the projected future forecast. Refer to Table 3.03 and Table 3.04 for the historical maximum daily production and peaking factors used.

Table 3.09: Average Daily Water Demand – Residential

Year	Annual Metered Water Use (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2013	N/A(1)	N/A(1)	N/A(1)
2014	361,689,311	2,998	331
2015	325,846,415	3,063	291
2016	350,016,896	3,166	303
2017	344,072,014	3,294	286
2018	364,149,283	3,396	294
2019	343,108,727	3,441	273
2020	400,098,802	3,503	313
2021	401,838,602	3,577	308
2022	371,944,756	3,636	280
Average Use (Latest 3 years)			**300**

Notes:
(1) Data collected in 2013 was not separated by class of service
(2) Total number of connections with 10 months or more of observed metered water

Table 3.10: Average Daily Water Demand – Commercial

Year	Annual Metered Water Use (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2013	N/A(1)	N/A(1)	N/A(1)
2014	7,551,200	18	1,149
2015	7,249,953	19	1,045
2016	8,060,656	19	1,162
2017	8,081,816	22	1,006
2018	15,099,033	22	1,880
2019	21,921,241	23	2,611
2020	15,965,177	21	2,083
2021	16,589,688	24	1,894
2022	12,472,828	24	1,424
Average Use (Latest 3 years)			**1,800**

Notes:
(1) Data collected in 2013 was not separated by class of service.
(2) Total number of connections with 10 months or more of observed metered water.

Table 3.11: Average Daily Water Demand - Public

Year	Annual Metered Water Use (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2013	N/A(1)	N/A(1)	N/A(1)
2014	46,304,740	30	4,229
2015	44,502,753	32	3,810
2016	49,858,733	33	4,139
2017	49,320,267	36	3,753
2018	48,458,354	37	3,588
2019	47,914,586	39	3,366
2020	43,595,928	40	2,986
2021	49,322,879	41	3,296
2022	45,691,570	42	2,981
Average Use (Latest 3 years)			**3,087**

Notes:
(1) Data collected in 2013 was not separated by class of service.
(2) Total number of connections with 10 months or more of observed metered water.

Table 3.12a: Residential Average Daily Water Demand for Pressure Zone 1

Year	Annual Metered Water Use (Gallons)	Number of Active Connections (2)	Average GPD/Connection
2013	N/A(1)	N/A(1)	N/A(1)
2014	78,134,226	550	389
2015	71,718,835	550	357
2016	75,713,929	555	374
2017	77,015,999	595	355
2018	81,677,088	604	370
2019	76,384,313	597	351
2020	89,438,240	603	406
2021	87,733,020	607	396
2022	79,210,550	605	359
Average Use (Latest 3 years)			**387**

Notes:
(1) Data collected in 2013 was not separated by pressure zone and class of service.
(2) Total number of connections with 10 months or more of observed metered water.

Table 3.12b: Residential Average Daily Water Demand for Pressure Zone 2

Year	Annual Metered Water Use (Gallons)	Number of Active Connections (2)	Average GPD/Connection
2013	N/A(1)	N/A(1)	N/A(1)
2014	122,348,785	907	370
2015	103,705,074	936	304
2016	112,124,037	952	323
2017	107,754,112	965	306
2018	109,892,100	968	311
2019	101,646,287	969	287
2020	115,802,096	974	326
2021	113,661,262	981	317
2022	101,592,404	979	284
Average Use (Latest 3 years)			**309**

Notes:
(1) Data collected in 2013 was not separated by pressure zone and class of service.
(2) Total number of connections with 10 months or more of observed metered water.

Table 3.12c: Residential Average Daily Water Demand for Pressure Zones 3 & 4

Year	Annual Metered Water Use (Gallons)	Number of Active Connections (2)	Average GPD/Connection
2013	N/A(1)	N/A(1)	N/A(1)
2014	161,206,300	1,541	287
2015	150,422,506	1,577	261
2016	162,178,930	1,659	268
2017	159,301,903	1,737	251
2018	172,580,095	1,827	259
2019	165,078,127	1,876	241
2020	194,858,466	1,926	277
2021	200,444,320	1,989	276
2022	191,141,802	2,052	255
Average Use (Latest 3 years)			**269**

Notes:
(1) Data collected in 2013 was not separated by pressure zone and class of service.
(2) Total number of connections with 10 months or more of observed metered water.

Table 3.13: Projected Future Water Demand

Year	Total CSD Required Water Production (MGD)		Total CSD Water Demand (AFA)	Pressure Zone 1 (MGD)		Pressure Zone 2 (MGD)		Pressure Zone 3 & 4 (MGD)		County Population % Change[(1)]
	MDD/ADD = 2.25			MDD/ADD = 2.34		MDD/ADD = 2.34		MDD/ADD = 2.18		
	ADD	MDD		ADD	MDD	ADD	MDD	ADD	MDD	
2020	1.38	3.10	1,542	0.29	0.68	0.37	0.85	0.72	1.57	-
2021	1.33	3.01	1,495	0.28	0.66	0.36	0.84	0.69	1.51	-
2022	1.25	2.82	1,401	0.27	0.62	0.31	0.73	0.67	1.47	2.30%
2023	1.28	2.88	1,433	0.27	0.64	0.32	0.75	0.69	1.50	2.00%
2024	1.30	2.94	1,462	0.28	0.65	0.33	0.76	0.70	1.53	1.70%
2025	1.33	2.99	1,487	0.28	0.66	0.33	0.77	0.71	1.56	1.40%
2026	1.35	3.03	1,507	0.29	0.67	0.34	0.78	0.72	1.58	1.30%
2027	1.36	3.07	1,527	0.29	0.68	0.34	0.79	0.73	1.60	1.20%
2028	1.38	3.11	1,545	0.29	0.69	0.34	0.80	0.74	1.62	0.90%
2029	1.39	3.14	1,559	0.30	0.69	0.35	0.81	0.75	1.63	0.90%
2030	1.40	3.16	1,573	0.30	0.70	0.35	0.82	0.75	1.65	0.70%
2031[(2)]	1.41	3.19	1,584	0.30	0.71	0.35	0.82	0.76	1.66	0.70%
2032	1.42	3.21	1,595	0.30	0.71	0.36	0.83	0.77	1.67	0.60%
2033	1.43	3.23	1,605	0.31	0.71	0.36	0.84	0.77	1.68	0.60%
2034	1.44	3.25	1,615	0.31	0.72	0.36	0.84	0.77	1.69	0.60%
2035	1.45	3.27	1,624	0.31	0.72	0.36	0.85	0.78	1.70	0.50%
2036	1.46	3.28	1,632	0.31	0.73	0.36	0.85	0.78	1.71	0.50%
2037	1.46	3.30	1,640	0.31	0.73	0.37	0.85	0.79	1.72	0.50%
2038	1.47	3.32	1,649	0.31	0.73	0.37	0.86	0.79	1.73	0.40%
2039	1.48	3.33	1,655	0.32	0.74	0.37	0.86	0.79	1.73	0.40%
2040	1.48	3.34	1,662	0.32	0.74	0.37	0.87	0.80	1.74	0.40%
2041	1.49	3.36	1,669	0.32	0.74	0.37	0.87	0.80	1.75	0.40%
2042	1.50	3.37	1,675	0.32	0.75	0.37	0.87	0.80	1.76	0.40%
2043	1.50	3.38	1,682	0.32	0.75	0.37	0.88	0.81	1.76	0.40%
2044	1.51	3.40	1,689	0.32	0.75	0.38	0.88	0.81	1.77	0.40%

Notes:
(1) Population projections from 2021 to 2044 were estimated using % change for Washoe County per Nevada State Demographer's Office.
(2) Residential buildout was estimated to occur in 2031 with a population of 4,195 due to the amount of available water rights at the time of this report. The estimated population percent change based on Nevada State Demographer's Office was not used to determine future required water production after 2031 for future production requirements in the following tables. However, this table shows growth after 2031 to demonstrate what water demands *could* be if additional water rights are obtained.

Table 3.14 shows the existing well capacity available for each of the pressure zones based on current well production, and the redirection of Well 1 into Pressure Zone 4. When comparing Table 3.14 (current well production for each pressure zone) to Table 3.13 (existing and future projected demands for each pressure zone), the well production in all pressure zones currently meet the ADD and MDD and will meet the 20-year projected demand.

Table 3.14: Existing Well Capacity - Total and By Pressure Zone

Wells	Capacity (gpm)	Capacity (MGD)	Pressure Zone 1 (MGD)	Pressure Zone 2 (MGD)	Pressure Zone 3&4 (MGD)
Well 1	530	0.76	-	-	0.76
Well 6	370	0.53	0.53	-	-
Well 7	330	0.48	0.48	-	-
Well 8	830	1.20	-	-	1.20
Van Dyke	1,000	1.44	-	1.44	-
Totals	**3,060**	**4.41**	**1.01**	**1.44**	**1.96**

The projected future water demands do not account for system-wide losses, or continued savings associated with GBWC-CSD Water Conservation Plan. Future water system demands should be reduced even further as the system NRW is reduced. Since the NRW system losses averaged 5.06% for the entire system from 2020-2022, GBWC-CSD's water production must be able to accommodate for these apparent and real losses in order to ensure the system averages are met. In order to calculate the total amount of water that needs to be delivered, an adjustment to recognize NRW is needed. This "gross-up" adjustment is intended to provide the total amount of production water required to be delivered in order to compensate for both consumption and NRW. Therefore, the well production required was inflated by a factor of 5.06% for the entire system.

Both the existing and future water demand averages were provided/projected based on the calculated water demand factors for residential, public, and commercial service class for each pressure zone. Table 3.15 identified existing demands as provided by meter data and the grossed-up well production required to provide anticipated service and accommodation for NRW losses.

Table 3.16 includes future demands as of 2044 and the minimum well production required in order to accommodate for these unaccounted-for losses. Note that by using this same demand-average throughout the system and projected into the future, water demand in Table 3.16 for the pressure zones are higher than shown in the projected future water production shown in Table 3.13, in order to accommodate for system losses.

Table 3.15: Existing Demand and Well Production Required

GBWC-CSD – EXISTING DEMANDS					GBWC-CSD – EXISTING WELL PRODUCTION REQUIRED(1)		
Customer Class	# of Customers	ADD per capita(2) (gpdpc)	ADD(2) (gpd)	ADD(2) (gpm)	ADD Req.(3) (gpm)	MDD Req.(4) (gpm)	PHD Req.(5) (gpm)
Residential	3,777	300	1,134,309	788	828	1,865	3,263
Public	42	3,087	129,674	90	95	213	373
Commercial	24	1,800	43,204	30	32	71	124
TOTALS	**3,843**	**5,188**	**1,307,188**	**908**	**954**	**2,149**	**3,760**
PRESSURE ZONE 1 - EXISTING DEMANDS					**PRESSURE ZONE 1 – EXISTING WELL PRODUCTION REQUIRED(1)**		
Customer Class	**# of Customers**	**ADD per capita(2) (gpdpc)**	**ADD(2) (gpd)**	**ADD(2) (gpm)**	**ADD Req.(3) (gpm)**	**MDD Req.(4) (gpm)**	**PHD Req.(5) (gpm)**
Residential	618	387	239,177	166	175	408	715
Public	6	3,087	18,525	13	14	32	55
Commercial	8	1,800	14,401	10	11	25	43
TOTALS	**632**	**5,275**	**272,103**	**189**	**199**	**465**	**813**
PRESSURE ZONE 2 – EXISTING DEMANDS					**PRESSURE ZONE 2 – EXISTING WELL PRODUCTION REQUIRED(1)**		
Customer Class	**# of Customers**	**ADD per capita(2) (gpdpc)**	**ADD(2) (gpd)**	**ADD(2) (gpm)**	**ADD Req.(3) (gpm)**	**MDD Req.(4) (gpm)**	**PHD Req.(5) (gpm)**
Residential	1,013	309	313,177	217	229	534	935
Public	2	3,087	6,175	4	5	11	18
Commercial	8	1,800	14,401	10	11	25	43
TOTALS	**1,023**	**5,197**	**333,753**	**232**	**244**	**570**	**997**
PRESSURE ZONE 3 & 4 – EXISTING DEMANDS					**PRESSURE ZONE 3 & 4 – EXISTING WELL PRODUCTION REQUIRED(1)**		
Customer Class	**# of Customers**	**ADD per capita(2) (gpdpc)**	**ADD(2) (gpd)**	**ADD(2) (gpm)**	**ADD Req.(3) (gpm)**	**MDD Req.(4) (gpm)**	**PHD Req.(5) (gpm)**
Residential	2,146	269	578,338	402	422	922	1,614
Public	34	3,087	104,974	73	77	167	293
Commercial	8	1,800	14,401	10	11	23	40
TOTALS	**2,188**	**5,157**	**697,714**	**485**	**509**	**1,112**	**1,947**

Notes:
(1) To accommodate for demands and anticipated system-wide losses
(2) Average demands derived from consumption data for years 2020, 2021 and 2022 provided by GBWC-CSD
(3) Includes unaccounted-for losses (grossed up to accommodate for 5.1% system losses)
(4) System-wide MDD = ADD x 2.25
Pressure Zone 1 MDD = ADD x 2.34
Pressure Zone 2 MDD = ADD x 2.34
Pressure Zone 3 & 4 MDD = ADD x 2.18
(5) PHD = MDD x 1.75

Table 3.16: Future Demand and Well Production Required

GBWC-CSD – FUTURE DEMANDS (2044)					GBWC-CSD – FUTURE WELL PRODUCTION REQUIRED(1)		
Customer Class	# of Customers	ADD per capita(2) (gpdpc)	ADD(2) (gpd)	ADD(2) (gpm)	ADD Req.(3) (gpm)	MDD Req.(4) (gpm)	PHD Req.(5) (gpm)
Residential	4,195	300	1,259,843	875	919	2,071	3,624
Public	50	3,087	153,416	107	112	252	441
Commercial	28	1,800	51,114	35	37	84	147
TOTALS	**4,273**	**5,188**	**1,464,374**	**1,017**	**1,069**	**2,407**	**4,213**
PRESSURE ZONE 1 - FUTURE DEMANDS					**PRESSURE ZONE 1 – FUTURE WELL PRODUCTION REQUIRED(1)**		
Customer Class	# of Customers	ADD per capita(2) (gpdpc)	ADD(2) (gpd)	ADD(2) (gpm)	ADD Req.(3) (gpm)	MDD Req.(4) (gpm)	PHD Req.(5) (gpm)
Residential	707	387	273,621	190	200	467	818
Public	8	3,087	24,700	17	18	42	74
Commercial	9	1,800	16,202	11	12	28	48
TOTALS	**724**	**5,275**	**314,523**	**218**	**230**	**537**	**940**
PRESSURE ZONE 2 – FUTURE DEMANDS					**PRESSURE ZONE 2 – FUTURE WELL PRODUCTION REQUIRED(1)**		
Customer Class	# of Customers	ADD per capita(2) (gpdpc)	ADD(2) (gpd)	ADD(2) (gpm)	ADD Req.(3) (gpm)	MDD Req.(4) (gpm)	PHD Req.(5) (gpm)
Residential	1,194	309	369,134	256	269	630	1,102
Public	2	3,087	6,175	4	5	11	18
Commercial	10	1,800	18,002	13	13	31	54
TOTALS	**1,206**	**5,197**	**393,311**	**273**	**287**	**671**	**1,174**
PRESSURE ZONE 3 & 4 – FUTURE DEMANDS					**PRESSURE ZONE 3 & 4 – FUTURE WELL PRODUCTION REQUIRED(1)**		
Customer Class	# of Customers	ADD per capita(2) (gpdpc)	ADD(2) (gpd)	ADD(2) (gpm)	ADD Req.(3) (gpm)	MDD Req.(4) (gpm)	PHD Req.(5) (gpm)
Residential	2,294	269	618,224	429	451	986	1,725
Public	40	3,087	123,499	86	90	197	345
Commercial	9	1,800	16,202	11	12	26	45
TOTALS	**2,343**	**5,157**	**757,924**	**526**	**553**	**1,208**	**2,115**

Notes:

(1) To accommodate for demands and anticipated system-wide losses
(2) Average demands derived from consumption data for years 2020, 2021 and 2022 provided by GBWC-CSD
(3) Includes unaccounted-for losses (grossed up to accommodate for 5.1% system losses)
(4) System-wide MDD = ADD x 2.25
Pressure Zone 1 MDD = ADD x 2.34
Pressure Zone 2 MDD = ADD x 2.34
Pressure Zone 3 & 4 MDD = ADD x 2.18
(5) PHD = MDD x 1.75

SECTION 4.0: WATER SUPPLY NEEDS

4.1 Water Supply

The water supply was evaluated based on GBWC-CSD total system capacity, which includes wells and storage, and was then compared to projected water demands. Projected water demands are presented in Table 3.13 (without NRW) and Table 3.16 (with NRW) of Section 3.4.3. The water supply plan is based on the production and storage facilities defined previously in Section 2.0 of this report.

4.1.1 Water Rights

In the late 1980's, the State Engineer decided on a duty of 0.57 acre-feet annually (AFA) per lot for the 1/3-acre lots in the GBWC-CSD service area. This duty of 0.57 AFA has held true for all the residential lots except for Woodland Village Subdivision Phases 15, 16, 17, 18, and all future phases. GBWC-CSD Tariff No. 2A allows for dedications of less than 11,200 square foot lot sizes to use a specific calculation. For these phases and assuming similar future lots sizes for the remaining phases, the TMWA "Rule No. 7" provision was used. The TMWA "Rule No. 7" provision for a single-family residential lot is based on the footage of the lot with a minimum demand of 0.12 AFA per lot. The calculation is as follows:

$$\frac{1}{1.1 + (10{,}000/\text{Lot Size})}$$

GBWC-CSD has provided a water budget that breaks down the use of all water rights within the GBWC-CSD service area. A list of the water budget break down prior to changing the water right dedications to the TMWA "Rule 7" can be viewed in Appendix B. The budget defines the amount of water that each residential subdivision, commercial, public, and industrial facilities can use per year and is provided to the State Engineer in Will Serve Letters. The budget and associated Will Serve Letters help to ensure that GBWC-CSD's water rights are allocated properly throughout the entire water service area.

Based on the dedication criteria that GBWC-CSD has developed for the existing service area, there appears to be sufficient water rights to finish all the existing subdivisions as allocated in the dedication. If future annexed developments are to be serviced by the GBWC-CSD water system, the developer will need to obtain water rights and dedicate them along with infrastructure.

4.1.2 Water Supply Evaluation

The GBWC-CSD water system capacity was evaluated based on available well capacity compared to the current and projected future water demands. Although the pressure zones have the ability to move water between zones, the pressure zones were evaluated separately with Pressure Zones 3 and 4 tied together. The criteria for evaluating adequate supply capacity is based on NAC 445A.6672, which requires a system that relies exclusively on wells to provide for the most conservative of the two scenarios:

1. A total well capacity sufficient to meet the MDD when all the wells are operational, or;

2. The ADD with the most productive well out of service

Pressure Zone 1 Well Capacity

Pressure Zone 1 has two active wells with the total pumping capacity of 680 gpm, as shown in Table 4.01. With Well 6, the largest producer out of service, the available pumping capacity is 330 gpm. In order to accommodate for the 5.1% system losses in GBWC-CSD system, the water supply demand was grossed up by the 5.1%, which resulted in a total ADD of 192 gpm for existing conditions and an anticipated 222 gpm by 2044. Refer to Table 3.14 and Table 3.15 for the well production requirement figures. The peaking factor (MDD/ADD) for Pressure Zone 1 is 2.34, which brings the existing MDD (with NRW accounted for) to 449 gpm and the future MDD (with NRW accounted for) in 2044 to 513 gpm.

With all wells in service, Pressure Zone 1 well capacity is able to accommodate the MDD required for build out with existing system losses.

Table 4.01: Pressure Zone 1 Capacity versus Demand

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
Well #6	YES		370
Well #7	YES		330
		Total, All Wells in Service	**700**
		Total, Well #6 Out of Service	**330**
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	199	465	YES
2044	230	537	YES

Notes:
(1) Capacities are based on data provided by GBWC-CSD staff in 2023
(2) System demand (determined in previous sections) was grossed up to accommodate for 5.1% losses.
(3) Total well supply must be able to accommodate MDD.

Pressure Zone 2 Well Capacity

With the construction of the Van Dyke Well and bringing it online in February 2017, Pressure Zone 2 has one active well with the total pumping capacity of 1,080 gpm, as shown by Table 4.02. In order to accommodate for the system losses in Pressure Zone 2, the water supply demand was grossed up by 5.1%, which resulted in a total ADD of 230 gpm for existing conditions and an anticipated 269 gpm by 2044. Refer to Table 3.14 and Table 3.15 for the well production required figures. The peaking factor (MDD/ADD) for Pressure Zone 2 is 2.34, which brings the existing MDD (with NRW accounted for) to 538 gpm and the future MDD (with NRW accounted for) in 2044 to 635 gpm.

Since Pressure Zone 2 only has one active well, the only way it can receive water if Van Dyke Well is offline is to receive excess capacity from other pressure zones via PRV's. The excess capacity of Pressure Zones 3 and 4 would be able to supply the existing MDD of 538 gpm to Pressure Zone 2 in the event that Van Dyke Well is down. However, if Pressure Zones 3 and 4 are still required to supply the MDD in the event of a loss of supply at Van Dyke Well in 2044, GBWC-CSD would need to evaluate upsizing the future available well capacity.

With the one well in service, Pressure Zone 2 well capacity can meet both 2024 and 2044 ADD and MDD with existing system losses. Excess capacity from Pressure Zone(s) 1, 3, and 4 can be used to supply ADD to Pressure Zone 2 through PRVs if the Van Dyke Well is offline.

Table 4.02: Pressure Zone 2 Capacity versus Demand

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
Van Dyke Well	YES		1,000
		Total, All Wells in Service	**1,000**
		Total, Well #1 Out of Service	Only available from other zones excess capacity
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	244	570	YES
2044	287	671	YES

Notes:
(1) Capacities are based on provided by GBWC-CSD staff in 2023
(2) System demand (determined in previous sections) was grossed up to accommodate for 5.1% losses.
(3) Total well supply must be able to accommodate MDD.

Pressure Zone 3 and 4 Well Capacity

Pressure Zones 3 and 4 currently have two active wells with the total pumping capacity of 1,600 gpm, as shown by Table 4.03. After the Van Dyke Well was brought online in February 2017, Well 1 was redirected into Pressure Zone 4 to meet anticipated future demands. In order to accommodate for the system losses in Pressure Zones 3 and 4, the water supply demand was grossed up by 5.1%, which resulted in a total ADD of 489 gpm for existing conditions and an anticipated 561 gpm by 2044. Refer to Table 3.14 and Table 3.15 for the well production required figures. The peaking factor (MDD/ADD) for Pressure Zone 2 is 2.18, which brings the existing MDD (with NRW accounted for) to 1,067 gpm and the future MDD (with NRW accounted for) in 2044 to 1,168 gpm.

With the redirection of Well 1 into Pressure Zone 4, Pressure Zones 3 and 4 meet the existing and 2044 ADD and MDD conditions. Since the total capacity of the two wells within Pressure Zone

4 exceeds that of the demand conditions, the excess capacity from within this zone may be used to supplement deficiencies in Pressure Zone 2.

Table 4.03: Pressure Zones 3 &4 Capacity versus Demand

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
Well #1	530		530
Well #8	830		830
		Total, All Wells in Service	**1,360**
		Total, Well #8 Out of Service	**530**
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	509	1,112	YES
2044	553	1,208	YES

Notes:
(1) Capacities are based on provided by GBWC-CSD staff in 2023
(2) System demand (determined in previous sections) was grossed up to accommodate for 5.1% losses.
(3) Total well supply must be able to accommodate MDD.

4.1.3 System Capacity Analysis

Water storage and overall system capacity is regulated by the Nevada Administrative Code (NAC), Sections 445A.6672, 445A.6674, 445A.66745, 445A.6675 and 445A.66755. Key definitions that are used for the Water Storage Evaluation are listed, below:

- Total Storage Capacity – Includes operating storage, emergency storage, and fire flow storage.
- Operating Storage – Operating storage is provided as MDD. The MDD for each of the pressure zones in the GBWC-CSD Water System were calculated by applying a peaking factor to the ADD. The ADD was calculated from meter data provided for years 2020, 2021, and 2022.
- Emergency Storage – The NAC states that emergency storage can either be determined by the engineer or is 75% of the amount of operating storage. Lumos has provided emergency storage equivalent to ADD.
- Fire Flow Storage – Pressure Zones 1 and 3 require a maximum 1,500 gpm for two hours for the residential and/or small commercial buildings located within these zones. Pressure Zones 2 and 4 have public schools, which are significantly larger buildings and require more fire flow. Therefore, the elementary school building in Pressure Zone 2 requires 2,125 gpm for two (2) hours and the middle school in Pressure Zone 4 requires 2,750 gpm for two hours. Documentation of the TMFPD approved fire flows can be found in Appendix M.

As of the 2024 IRP, the System Capacity Analysis will include an additional scenario to check the total capacity of the GBWC-CSD water system, as defined by NAC 445A.6672. Since this system relies exclusively on groundwater wells as its source of water, it was determined that incorporating a more robust analysis would be the most conservative approach to ensure the system could successfully provide capacity for the following two scenarios:

- Scenario A: Total system capacity requirements for one day of MDD, emergency reserves, and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
- Scenario B: Total system capacity requirements for one day of ADD, emergency reserves, and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

It is important to note that the System Capacity Analysis performed in the previous versions of the GBWC IRP is still being performed in the 2024 IRP under Scenario A. The only modification to this analysis was the addition of Scenario B (per NAC 445A.6672) to provide insight into possible system vulnerabilities. Explanations of how ADD, MDD, and emergency reserves were calculated are listed in each storage capacity table in the following sub-sections. Each pressure zone's storage capacity was analyzed separately.

Additionally, it was determined by NDEP that "alternative pumping capacity", as stated in NAC 445A.66755, is defined as the well capacity from lower zones, only if the booster station meets or exceeds well capacity and is equipped with emergency power. As a result of this interpretation, pressure zones in the following analysis that were shown to be deficient underwent an additional analysis to determine if water available from an inter-zone transfer could satisfy NAC requirements. Documentation on the NDEP interpretation of NAC 445A can be found in Appendix M.

Pressure Zone 1 Storage

Pressure Zone 1 has one storage tank known as Tank 1. The storage capacity of Tank 1 is 429,510 gallons. Currently, Pressure Zone 1 has 618 connections consisting of residential, public, and commercial facilities. Table 4.04a and Table 4.04b summarize the existing (2022) Pressure Zone 1 storage capacity analysis and inter-zone transfer analysis, respectively. Table 4.05a and Table 4.05b summarize the future (2044) Pressure Zone 1 storage capacity analysis and inter-zone transfer analysis, respectively.

With the existing storage tank and the additional alternative pumping capacity from Well 6 and Well 7 being equipped with backup power, Pressure Zone 1 meets its existing and future build out storage requirements. It's important to note that a new booster pump station is being constructed that will convey water from Pressure Zone 2 to Pressure Zone 1 and will be fully operational in 2024. Even though Pressure Zone 1 meets NAC requirements for both the existing (2022) and future (2044) scenarios, Pressure Zone 2 is listed as a contributing zone in Table 4.05b.

Table 4.04a: GBWC-CSD Pressure Zone 1 Existing (2022) System Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	669,200	Operating Storage for ADD(3) (gal)	285,963
Emergency Reserve(4) (gal)	285,963	Emergency Reserve(4) (gal)	285,963
Fire Flow (gal) 1,500 gpm for 2 hours	180,000	Fire Flow (gal) 1,500 gpm for 2 hours	180,000
Required Storage (gal)	**1,135,163**	**Required Storage (gal)**	**751,925**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 1 (gal)	429,510	Existing Tank (gal)	429,510
Well 6 (gal)	532,800	Well 6 (gal)	532,800
Well 7 (gal)	475,200	Well 7 (gal)	475,200
Total Capacity (gal) All Wells in Service	**1,437,510**	**Total Capacity (gal) Largest Producer Out of Service**	**904,710**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	1,135,163	Required Storage (gal)	751,925
Total Capacity (gal)	1,437,510	Total Capacity (gal)	904,710
Difference (gal)	**302,347**	**Difference (gal)**	**152,785**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).

(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.

(5) Tank volumes represent actual volumes up to the overflow level of the tank

Table 4.04b: GBWC-CSD Pressure Zone 1 Existing (2022) Inter-Zone Analysis

Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**N/A**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**N/A**
Which Pressure Zones can contribute flow?	None	Which Pressure Zones can contribute flow?	None
Total excess capacity under this scenario available to this Pressure Zone from other Zones(3) (gal)	N/A	Total excess capacity under this scenario available to this Pressure Zone from other Zones(4) (gal)	N/A
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	N/A	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	N/A
Meets NAC Requirements with contributing Zones?	N/A	Meets NAC Requirements with contributing Zones?	N/A
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.

(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.

(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Table 4.05a: GBWC CSD Pressure Zone 1 Future (2044) Storage Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	773,526	Operating Storage for ADD(3) (gal)	330,543
Emergency Reserve(4) (gal)	330,543	Emergency Reserve(4) (gal)	330,543
Fire Flow (gal) 1,500 gpm for 2 hours	180,000	Fire Flow (gal) 1,500 gpm for 2 hours	180,000
Required Storage (gal)	**1,284,068**	**Required Storage (gal)**	**841,086**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 1 (gal)	429,510	Existing Tank (gal)	429,510
Well 6 (gal)	532,800	Well 6 (gal)	532,800
Well 7 (gal)	475,200	Well 7 (gal)	475,200
Total Capacity (gal) All Wells in Service	**1,437,510**	**Total Capacity (gal) Largest Producer Out of Service**	**904,710**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	1,284,068	Required Storage (gal)	841,086
Total Capacity (gal)	1,437,510	Total Capacity (gal)	904,710
Difference (gal)	**153,441**	**Difference (gal)**	**63,624**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).

(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.

(5) Tank volumes represent actual volumes up to the overflow level of the tank

Table 4.05b: GBWC-CSD Pressure Zone 1 Future (2044) Inter-Zone Analysis

Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**N/A**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**N/A**
Which Pressure Zones can contribute flow?	2	Which Pressure Zones can contribute flow?	2
Total excess capacity under this scenario available to this Pressure Zone from other Zones(3) (gal)	-	Total excess capacity under this scenario available to this Pressure Zone from other Zones(4) (gal)	-
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-
Meets NAC Requirements with contributing Zones?	N/A	Meets NAC Requirements with contributing Zones?	N/A
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.

(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.

(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Pressure Zone 2 Storage

Pressure Zone 2 has one storage tank known as Tank 2. The total storage capacity of Tank 2 is 328,811 gallons. Table 4.04a and Table 4.04b summarize the existing (2022) Pressure Zone 2 storage capacity analysis and inter-zone transfer analysis, respectively. Table 4.05a and Table 4.05b summarize the future (2044) Pressure Zone 2 storage capacity analysis and inter-zone transfer analysis, respectively.

Table 4.04a and Table 4.05a indicate that Pressure Zone 2 is deficient under Scenario B for existing (2022) and future (2044) conditions. However, Table 4.04b and Table 4.05b show that Pressure Zone 2 can be supplied excess water from Pressure Zones 1, 3, and 4 to make up for the deficiency, bringing Pressure Zone 2 into NAC compliance under both scenarios.

Currently, Pressure Zone 2 has 1,013 connections consisting of residential, public, and commercial facilities. As previously mentioned in Section 2.2.3.1, Tank 2 was erected in its current location in 1975 after being moved from an unknown location and the actual age of the tank is unknown. Tank 2 was last inspected in 2023. The majority of the internal portion of the tank received a fair to poor assessment due to heavy amounts of corrosion on the interior walls and floor. The exterior condition assessment of the tank was found to be good. The last recorded repair on Tank 2 was in May of 2017, when a hole was patched at a leak site.

In addition to typical daily operations to meet customer demands, GBWC-CSD also uses the capacity of the storage tanks within the water system to provide necessary fire flow to the community. As stated in a letter signed by the Deputy Fire Chief of TMFPD, the fire authority is not amenable to Tank 2 being removed from the GBWC-CSD water system (see Appendix M). TMFPD requires that each pressure zone contain its own fire storage capacity.

Table 4.06a: GBWC CSD Pressure Zone 2 Existing (2022) Storage Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	820,099	Operating Storage for ADD(3) (gal)	350,753
Emergency Reserve(4) (gal)	350,753	Emergency Reserve(4) (gal)	350,753
Fire Flow (gal) 2,125 gpm for 2 hours	255,000	Fire Flow (gal) 2,125 gpm for 2 hours	255,000
Required Storage (gal)	**1,425,852**	**Required Storage (gal)**	**956,505**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 2 (gal)	328,811	Tank 2 (gal)	328,811
Van Dyke Well (gal)	1,440,000	Van Dyke Well	1,440,000
Total Capacity (gal) All Wells in Service	**1,768,811**	**Total Capacity (gal) Largest Producer Out of Service**	**328,811**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	1,425,852	Required Storage (gal)	956,505
Total Capacity (gal)	1,768,811	Total Capacity (gal)	328,811
Difference (gal)	**342,959**	**Difference (gal)**	**-627,694**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**NO**

Notes:
(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.
(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).
(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.
(5) Tank volumes represent actual volumes up to the overflow level of the tank.

Table 4.06b: GBWC-CSD Pressure Zone 2 Existing (2022) Inter-Zone Analysis

Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**N/A**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**YES**
Which Pressure Zones can contribute flow?	1, 3, 4	Which Pressure Zones can contribute flow?	1, 3, 4
Total excess capacity under this scenario available to this Pressure Zone from other Zones(3) (gal)	-	Total excess capacity under this scenario available to this Pressure Zone from other Zones(4) (gal)	1,992,070
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	1,364,376
Meets NAC Requirements with contributing Zones?	N/A	Meets NAC Requirements with contributing Zones?	**YES**
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.

(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.

(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Table 4.07a: GBWC CSD Pressure Zone 2 Future (2044) Storage Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	966,445	Operating Storage for ADD(3) (gal)	413,344
Emergency Reserve(4) (gal)	413,344	Emergency Reserve(4) (gal)	413,344
Fire Flow (gal) 2,125 gpm for 2 hours	255,000	Fire Flow (gal) 2,125 gpm for 2 hours	255,000
Required Storage (gal)	**1,634,789**	**Required Storage (gal)**	**1,081,688**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 2 (gal)	328,811	Tank 2 (gal)	328,811
Van Dyke Well (gal)	1,440,000	Van Dyke Well	1,440,000
Total Capacity (gal) All Wells in Service	**1,768,811**	**Total Capacity (gal) Largest Producer Out of Service**	**328,811**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	1,634,789	Required Storage (gal)	1,081,688
Total Capacity (gal)	1,768,811	Total Capacity (gal)	328,811
Difference (gal)	**134,022**	**Difference (gal)**	**-752,877**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**NO**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).

(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.

(5) Tank volumes represent actual volumes up to the overflow level of the tank.

Table 4.07b: Pressure Zone 2 Future (2044) Inter-Zone Analysis

Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**N/A**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**YES**
Which Pressure Zones can contribute flow?	1, 3, 4	Which Pressure Zones can contribute flow?	1, 3, 4
Total excess capacity under this scenario available to this Pressure Zone from other Zones(3) (gal)	-	Total excess capacity under this scenario available to this Pressure Zone from other Zones(4) (gal)	1,656,355
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	903,478
Meets NAC Requirements with contributing Zones?	N/A	Meets NAC Requirements with contributing Zones?	**YES**
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.

(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.

(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Pressure Zone 3 Storage

Pressure Zone 3 has one storage tank known as Tank 3. The total storage capacity of Tank 3 is 346,585 gallons. Currently, Pressure Zone 3 is built out at 185 residential connections and will not experience any more growth between 2022 and 2044. Table 4.08a and Table 4.08b summarize the existing (2022) Pressure Zone 3 storage capacity analysis and inter-zone transfer analysis, respectively. Table 4.09a and Table 4.09b summarize the future (2044) Pressure Zone 3 storage capacity analysis and inter-zone transfer analysis, respectively.

Table 4.08a indicates that Pressure Zone 3 is slightly deficient under Scenario A for existing (2022) conditions. However, Table 4.08b shows that Pressure Zone 4 can provide excess water through a PRV to Pressure Zone 3 to make up for the deficiency, bringing Pressure Zone 3 into NAC compliance under both scenarios. The same situation was found to be true for future conditions, as summarized by Table 4.09a and Table 4.09b.

Table 4.08a: GBWC CSD Pressure Zone 3 Existing (2022) Storage Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	114,459	Operating Storage for ADD(3) (gal)	52,396
Emergency Reserve(4) (gal)	52,396	Emergency Reserve(4) (gal)	52,396
Fire Flow (gal) 1,500 gpm for 2 hours	180,000	Fire Flow (gal) 1,500 gpm for 2 hours	180,000
Required Storage (gal)	**346,855**	**Required Storage (gal)**	**284,792**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 3 (gal)	346,585	Tank 3 (gal)	346,585
Total Capacity (gal) **All Wells in Service**	**346,585**	**Total Capacity (gal)** **Largest Producer Out of Service**	**346,585**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	346,855	Required Storage (gal)	284,792
Total Capacity (gal)	346,585	Total Capacity (gal)	346,585
Difference (gal)	**-270**	**Difference (gal)**	**61,792**
Meets NAC Requirements?	**NO**	**Meets NAC Requirements?**	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).

(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.

(5) Tank volumes represent actual volumes up to the overflow level of the tank.

Table 4.08b: Pressure Zone 3 Existing (2022) Inter-Zone Analysis

Scenario A[1] = MDD + FF		Scenario B[2] = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**YES**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**N/A**
Which Pressure Zones can contribute flow?	4	Which Pressure Zones can contribute flow?	4
Total excess capacity under this scenario available to this Pressure Zone from other Zones[3] (gal)	318,231	Total excess capacity under this scenario available to this Pressure Zone from other Zones[4] (gal)	-
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	317,961	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-
Meets NAC Requirements with contributing Zones?	**YES**	Meets NAC Requirements with contributing Zones?	N/A
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	**YES**	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.

(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.

(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Table 4.09a: GBWC CSD Pressure Zone 3 Future (2044) Storage Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for ADD(3) (gal)	114,459	Operating Storage for ADD(3) (gal)	52,396
Emergency Reserve(4) (gal)	52,396	Emergency Reserve(4) (gal)	52,396
Fire Flow (gal) 1,500 gpm for 2 hours	180,000	Fire Flow (gal) 1,500 gpm for 2 hours	180,000
Required Storage (gal)	**346,855**	**Required Storage (gal)**	**284,792**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 3 (gal)	346,585	Tank 3 (gal)	346,585
Total Capacity (gal) All Wells in Service	**346,585**	**Total Capacity (gal) Largest Producer Out of Service**	**346,585**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	346,855	Required Storage (gal)	284,792
Total Capacity (gal)	346,585	Total Capacity (gal)	346,585
Difference (gal)	**-270**	**Difference (gal)**	**61,792**
Meets NAC Requirements?	**NO**	**Meets NAC Requirements?**	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).

(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.

(5) Tank volumes represent actual volumes up to the overflow level of the tank.

Table 4.09b: Pressure Zone 3 Future (2044) Inter-Zone Analysis

Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**YES**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**N/A**
Which Pressure Zones can contribute flow?	4	Which Pressure Zones can contribute flow?	4
Total excess capacity under this scenario available to this Pressure Zone from other Zones(3) (gal)	116,725	Total excess capacity under this scenario available to this Pressure Zone from other Zones(4) (gal)	-
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	116,455	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-
Meets NAC Requirements with contributing Zones?	**YES**	Meets NAC Requirements with contributing Zones?	N/A
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	**YES**	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A

Notes:
(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.
(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.
(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Pressure Zone 4 Storage

Pressure Zone 4 has one storage tank known as Tank 4. The total storage capacity of Tank 4 is 1,071,702 gallons. Currently, Pressure Zone 4, has 1,961 connections consisting of residential, public, and commercial. Table 4.10a and Table 4.10b summarize the existing (2022) Pressure Zone 4 storage capacity analysis and inter-zone transfer analysis, respectively. Table 4.11a and Table 4.11b summarize the future (2044) Pressure Zone 4 storage capacity analysis and inter-zone transfer analysis, respectively.

Table 4.10a and Table 4.11a indicate that Pressure Zone 4 is deficient under Scenario B for existing (2022) and future (2044) conditions. Table 4.10b and Table 4.11b show that Pressure Zone 4 cannot be supplied excess water from other pressure zones, since the only connection Pressure Zone 4 has to Pressure Zone 3 is through a manual valve. To solve this issue and bring Pressure Zone 4 into NAC compliance, GBWC-CSD has proposed an Action Plan project to construct a PRV from Pressure Zone 3 to Pressure Zone 4 (see Section 8.2.1).

Table 4.10a: GBWC CSD Pressure Zone 4 Existing (2022) Storage Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	1,487,318	Operating Storage for ADD(3) (gal)	680,856
Emergency Reserve(4) (gal)	680,856	Emergency Reserve(4) (gal)	680,856
Fire Flow (gal) 3,125 gpm for 3 hours	562,500	Fire Flow (gal) 3,125 gpm for 3 hours	562,500
Required Storage (gal)	**2,730,674**	**Required Storage (gal)**	**1,924,211**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 4 (gal)	1,071,702	Tank 4 (gal)	1,071,702
Well 1 (gal)	763,200	Well 1 (gal)	763,200
Well 8 (gal)	1,195,200	Well 8 (gal)	1,195,200
Total Capacity (gal) All Wells in Service	**3,030,102**	**Total Capacity (gal) Largest Producer Out of Service**	**1,834,902**
System Storage Requirements/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	2,730,674	Required Storage (gal)	1,924,211
Total Capacity (gal)	3,030,102	Total Capacity (gal)	1,834,902
Difference (gal)	**299,428**	**Difference (gal)**	**-89,309**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**NO**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).

(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.

(5) Tank volumes represent actual volumes up to the overflow level of the tank.

Table 4.10b: Pressure Zone 4 Existing (2022) Inter-Zone Analysis

Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**N/A**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**NO**
Which Pressure Zones can contribute flow?	None	Which Pressure Zones can contribute flow?	None
Total excess capacity under this scenario available to this Pressure Zone from other Zones(3) (gal)	-	Total excess capacity under this scenario available to this Pressure Zone from other Zones(4) (gal)	-
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-
Meets NAC Requirements with contributing Zones?	N/A	Meets NAC Requirements with contributing Zones?	**NO**
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	**N/A**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.

(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.

(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

Table 4.11a: GBWC CSD Pressure Zone 4 Future (2044) Storage Capacity Analysis

System Storage Requirements			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	1,625,546	Operating Storage for ADD(3) (gal)	744,133
Emergency Reserve(4) (gal)	744,133	Emergency Reserve(4) (gal)	744,133
Fire Flow (gal) 2,750 gpm for 2 hours	562,500	Fire Flow (gal) 1,500 gpm for 2 hours	562,500
Required Storage (gal)	**2,932,179**	**Required Storage (gal)**	**2,050,766**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Tank 4 (gal)	1,071,702	Tank 4 (gal)	1,071,702
Well 1 (gal)	763,200	Well 1 (gal)	763,200
Well 8 (gal)	1,195,200	Well 8 (gal)	1,195,200
Total Capacity (gal) **All Wells in Service**	**3,030,102**	**Total Capacity (gal)** **Largest Producer Out of Service**	**1,834,902**
System Storage Requirements/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
Required Storage (gal)	2,932,179	Required Storage (gal)	2,050,766
Total Capacity (gal)	3,030,102	Total Capacity (gal)	1,834,902
Difference (gal)	**97,923**	**Difference (gal)**	**-215,864**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**NO**

Notes:
(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.
(3) Operating storage is per scenario is defined as ADD for Scenario A and MDD for Scenario B, as allowed by NAC 445A.6672 and NAC 445A.66745. Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 5.1% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.34 (determined in previous sections).
(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.
(5) Tank volumes listed represent actual volumes up to the overflow level of the tank.

Table 4.11b: Pressure Zone 4 Future (2044) Inter-Zone Analysis

Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF - Well (Largest Producer)	
If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?	**N/A**	**If NAC Requirements within Pressure Zone are not met, can other Zones contribute flow into this Zone?**	**NO**
Which Pressure Zones can contribute flow?	None	Which Pressure Zones can contribute flow?	None
Total excess capacity under this scenario available to this Pressure Zone from other Zones(3) (gal)	-	Total excess capacity under this scenario available to this Pressure Zone from other Zones(4) (gal)	-
Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-	Total Storage Capacity of this Pressure Zone with excess capacity from other zones (gal)	-
Meets NAC Requirements with contributing Zones?	N/A	Meets NAC Requirements with contributing Zones?	**NO**
Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A	Does modeling confirm that connected zones can contribute excess capacity while maintaining pressures and velocities within NAC requirements?	N/A

Notes:
(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest-producing well.
(3) Excess capacity for Scenario A is defined as the difference between the Required Storage and Total Capacity under MDD conditions.
(4) Excess capacity for Scenario B is defined as the difference between the Required Storage and Total Capacity under ADD conditions. It is assumed that the largest producing well is only offline for the Pressure Zone being analyzed, and all contributing Zones have all facilities functioning.

4.2 Water Distribution System

The water distribution system was analyzed by hydraulically modeling the GBWC-CSD water system. The hydraulic model was analyzed on an existing demand basis for ADD, MDD, peak hour demand (PHD) and fire flow conditions. The pipeline network was evaluated based on flow velocities and head losses as they related to pressures throughout the distribution system.

The goal for developing any needed solution to problematic areas of the distribution network was to improve efficiency by making the minimum changes necessary to correct the deficiency. The overall objective was to produce a fully functional and compliant system at the lowest cost to ratepayers.

Design criteria are outlined in the Nevada Administrative Code (NAC) 445A.6672 and are summarized in Table 4.12.

Table 4.12: NAC 445A.6672 Design Criteria

Parameter	Criteria
Minimum Pressure at Peak Hour Demand(1)	30 psi
Minimum Pressure at Maximum Day Demand(1)	40 psi
Maximum Pressure(1)	100 psi
Maximum Flow Velocity in Pipe(1)	< 8 feet per second
Maximum Head Loss(2)	10 feet per 1,000 feet
Fire Flow	
Minimum Residual Pressure	20 psi
Minimum Residual Fire Flow	1,000 gpm
Minimum Commercial Fire Flow	1,500 gpm
Minimum Elementary School Fire Flow (PZ-2)	2,125 gpm
Minimum Middle School Fire Flow (PZ-4)	2,750 gpm

Notes:
(1) Provision of the Nevada Administrative Code
(2) American Water Works Association (AWWA)

Model Selection and Development

The GBWC-CSD hydraulic water model was analyzed using the Bentley® WaterCAD® v8i modeling software. The existing model was updated with all additional Woodland Village Subdivision phases that had occurred through the end of 2022. The model was updated to fit current conditions, including updating all system demands to reflect the most recent usage data and addition of new demands due to growth since the last model update.

Existing Demands Update

Based on available information, the following method was used to update the model demands, which included multiple steps:

- Lumos distributed new demands to account for growth since the model was last analyzed. This process included identification of new service connections between 2020 and 2022. Once identified, these demands were distributed to nodes adjacent to the new service connections, incorporating 2020-2022 water meter billing data.
- Updated average day system demands developed in the previous step and then globally adjusted to the 2022 system MDD for each of the pressure zones. This was done by applying the MDD/ADD peaking factor (2020-2022 three-year average) for each pressure zone. PHD was provided by multiplying 1.75 to MDD for each of the pressure zones.
- To adjust the model for the 3-Year Action Plan and 2044 Future Demands, the pressure zones were regionally adjusted based on the estimated ADD for both scenarios, as well as anticipated completion of housing developments. The ADD was then globally adjusted to the estimated MDD-scenario based on the peaking factor presented in Table 3.13.
- Table 4.13 presents the existing, and anticipated demands used in the hydraulic model.

Table 4.13: Hydraulic Model Loading

GBWC-SSD PRESSURE ZONES	ADD (gpm)	MDD (gpm)	PHD (gpm)
Existing Pressure Zone 1	189	442	774
Existing Pressure Zone 2	232	542	948
Existing Pressure Zone 3 & 4	485	1,058	1,852
Totals	**905**	**2,043**	**3,574**
Action Plan (2027) (Pressure Zone 1)	209	490	857
Action Plan (2027) (Pressure Zone 2)	263	616	1,077
Action Plan (2027) (Pressure Zone 3 & 4)	506	1,106	1,935
Totals	**979**	**2,211**	**3,870**
Preferred Plan 2044 (Pressure Zone 1)	218	511	894
Preferred Plan 2044 (Pressure Zone 2)	273	639	1,118
Preferred Plan 2044 (Pressure Zone 3 & 4)	526	1,150	2,012
Totals	**1,018**	**2,300**	**4,024**

The hydraulic modeling scenarios preformed include:

- Existing MDD
- Existing MDD with fire flow
- Existing PHD
- 3-Year Action Plan (2027) MDD
- 3-Year Action Plan (2027) MDD with fire flow
- 3-Year Action Plan (2027) PHD
- Preferred Plan (2044) MDD
- Preferred Plan (2044) MDD with fire flow
- Preferred Plan (2044) PHD

4.2.1 Distribution System Evaluation

The GBWC-CSD water system was evaluated using Bentley® WaterCAD® v8i software and carefully applied data, assumptions, and operating conditions. The objective of the analysis was to identify weaknesses in the distribution network that would lead to unacceptable pressure conditions, reduced fire-flow capacity, and energy waste through high head losses.

4.2.2 System Deficiencies and Alternatives for Improvements

The GBWC-CSD distribution model was analyzed for Existing Conditions, Three Year Action Plan (2027), and the Preferred Plan (2044). No significant deficiencies were identified in any of the model runs.

Existing Conditions

With the exception of some high pressures in junctions located in the low elevations of Pressure Zone 1, the hydraulic distribution model for the existing conditions meets all the design criteria. The MDD Run had a several junctions that exceed 100 psi, with a range of 42 to 114 psi. The PHD run had even less junctions that exceed 100 psi, with a range of 42 to 107 psi. No sections of pipe exceeded the recommended AWWA of 10 ft./1000 ft. head loss during PHD criteria.

Action Plan (2027)

Similar to existing conditions scenario in year 3 of the Action Plan, the hydraulic distribution model meets all the design criteria. The following minor issues were observed: MDD Run had several junctions in Pressure Zone 1 that exceeded 100 psi; PHD Run had a few junctions that exceeded 100 psi; one section of pipe (near the Bordertown Casino) marginally exceeded the AWWA recommended 10 ft./1000 ft. head loss criteria, but the headloss remained under eight (8) fps per the NAC.

Preferred Plan (2044)

Projecting assumptions for demand 20 years out, when future developments have not been approved for a Plan Unit Development, is difficult. With this in mind, the Preferred Plan (2044) hydraulic model appears to satisfy most of the criteria associated, with only very minor issues similar to the Action Plan hydraulic distribution model run. Please refer to Appendix H for all of the hydraulic modeling scenarios discussed.

4.3 Water Transfer Possibilities

There is one regional water purveyor, TMWA, which could be involved with a water transfer to or from GBWC-CSD. TMWA currently provides water services to almost all of the Reno/Sparks regional area. Currently, no inter-ties exist between GBWC-CSD and TMWA, with the closest potential connection on the east side of the Granite Hills approximately 6 miles away. However, since the StoneGate Development is planning to extend a water line approximately 6 miles east along Highway 395 to the development site, the possibility now exists to inter-tie with the TMWA system much closer to the GBWC-CSD system area.

4.4 Water Reliability

The GBWC-CSD water system relies entirely on groundwater. Several factors could affect the reliability of GBWC-CSD's groundwater such as droughts, which can affect water quality and water quantity, as well as any man-made catastrophic interruptions. Both of these factors are discussed in detail in the following sub-sections.

4.4.1 Historic Effects of Drought

One factor affecting reliability of the groundwater supply is the trend in pumping water levels. From 2001 through 2022, the Cold Springs area has had 15 years out of 22 years of "moderate to exceptional drought" conditions. The National Drought Mitigation Center (NDMC) monitors drought conditions throughout the United States and classifies drought conditions based on intensity and percent of an area affected by the drought. The NDMC has a website that records drought conditions several times per month every month of the year. The website is:

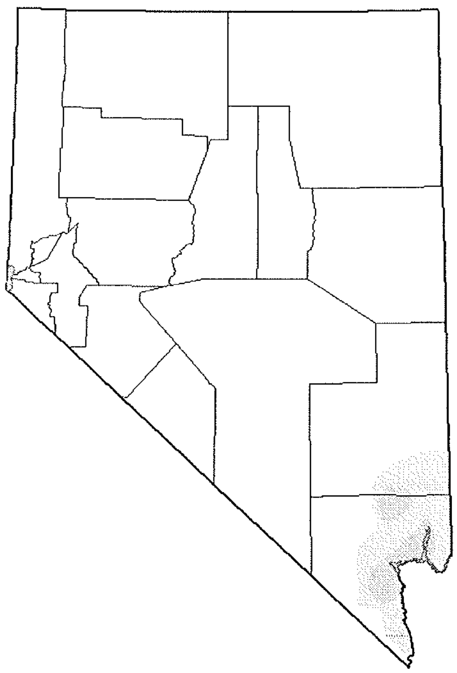
Reference: https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?fips_32031

Figure 4.01is an example of the data provided on the website. The extensive drought conditions has had an effect on the GBWC-CSD service area over the last 22 years continuing through the end of 2022. One example of the effect can be seen in Well 1 which is located in Pressure Zone 2. The well was originally drilled in 2001 with a static water level of 7 feet below ground level (bgl). In 2015, Well 1 was recorded to have a static water level of 23 feet bgl. The static water level in Well 1 averaged 1-foot per year decline over 15 years. However, with the wet winter of 2016/2017, the static water level in Well 1 has recovered to 14 feet bgl. The other wells in the water system have also seen similar effects over the years from the drought conditions.

Early 2023 brought large amounts of precipitation in the form of snow and rain, which is anticipated to have a positive effect on groundwater levels as the snowpack melts and recharges the aquifers. It is anticipated that updated groundwater levels due to the heavy precipitation in early 2023 will be available by the next IRP.

Section 6 Water Conservation Plan (as well as Appendix K) contains water conservation measure that are being implemented and will help with planning for possible future drought conditions.

U.S. Drought Monitor
Nevada



December 26, 2023
(Released Thursday, Dec. 28, 2023)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	94.41	5.59	1.60	0.00	0.00	0.00
Last Week 12-19-2023	94.40	5.60	1.60	0.00	0.00	0.00
3 Months Ago 09-26-2023	94.28	5.72	1.60	0.00	0.00	0.00
Start of Calendar Year 01-03-2023	0.00	100.00	100.00	78.45	24.45	0.00
Start of Water Year 09-26-2023	94.28	5.72	1.60	0.00	0.00	0.00
One Year Ago 12-27-2022	0.00	100.00	100.00	99.51	24.45	0.00

Intensity:

None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Rocky Bilotta
NCEI/NOAA

USDA NDMC NOAA

droughtmonitor.unl.edu

Figure 4.01: Nevada Drought Monitoring with Conditions and Intensity Classifications

4.4.2 Man-Made Disasters

Man-made disasters can come in many forms. Fortunately, GBWC-CSD has never experienced civil riots or acts of terrorism.

Recently, Tank 4 experienced two significant acts of vandalism. In May 2022, thieves cut the lock on the front gate and stole approximately $18,000 worth of new meter pit assemblies. They also siphoned diesel fuel out of the generator. GBWC eventually recovered the meter pits, but still had to replace them due to all the brass being stripped from the assemblies. In May 2023, the chain-link fence was cut and a fake camera on the booster pump housing was smashed but nothing was stolen during this event. Since the two acts of vandalism, the storage shed at the Tank 4 site was emptied due to the security issues. Currently, the Van Dyke Well house is used as an interim storage shed.

Aside from these two incidents, only minor acts of vandalism have occurred, such as graffiti and theft. Should a man-made disaster affect the infrastructure, the same procedures are followed with local law enforcement being notified.

The most likely sources of contamination of water supplies are because of backflow from loss of pressure in the system, through unprotected cross connections or after a break in a main.

Purposeful intrusion into the system is guarded through fences, lighting, inspections, and locks. Contamination of the water supply is protected by:

- Frequent monitoring and testing of water for bacterial contamination.
- Recording customer complaints regarding water quality.
- Working chlorinators at the well sites.
- Active backflow prevention requiring routine monitoring of all new customer service applications and backflow prevention assemblies for potential cross connections.
- Ability to isolate segments of the water distribution system through use of valves.

GBWC has created a Cross-Connection Control program and corresponding manual for all systems in the State of Nevada. Cross-connections between a potable water system and non-potable sources of contamination represent a threat to public health. This program is designed to maintain the safety and quality of the water in the supply and distribution system by preventing the introduction, by backflow, of any foreign liquids, gases, or other substances into the supply system. Cross connection control is addressed in GBWC's tariff and the GBWC Standards and Specifications for Water Distribution System Construction for new development.

GBWC Tariff Rule No. 15, Sections G (effective July 2019) and Section H (effective October 2019) provide for Cross-Connection Control and penalties for violation. Per Section G:

> *Where any water pipe on a Customer's premises is cross-connected to another source or water supply, the Utility may refuse or discontinue service until there shall be installed at the expense of the Customer a suitable protective device, approved by the Utility, to protect against back-flow into the Utility's system, as required by the governmental authorities having jurisdiction. Customer or Applicant will own and maintain said cross-connection protective device(s) and provide to Utility each year the annual inspection report by a licensed cross-connection inspector and follow the Utility's State approved Cross Connection Control Plan and this Section G can cause the imposition of penalties set forth in the following Section H.*

In accordance with Section H, penalties are assessed for violations of the Cross-Connection Plan, with the penalties increasing with each offense. The addition of violation fees and a structure for notifying customers in violation with the Cross-Connection Control Program are greatly assisting in protecting the potable water system.

SECTION 5.0: EMERGENCY RESPONSE PLAN

Volume I of this IRP provides a generalized explanation of the Emergency Response Plan for the four divisions, and the Emergency Response plan for GBWC-CSD is provided in Appendix J.

SECTION 6.0: WATER CONSERVATION PLAN

The Water Conservation Plan is discussed in Section 6 of Volume I of this IRP, and the full Water Conservation Plan in included as Appendix K. GBWC-CSD has no deviations from the Water Conservation Plan provided in Volume I.

SECTION 7.0: PREFERRED PLAN

The purpose of a utility's Preferred Plan is to set forth the "utility's selection of its preferred options for meeting the demand for water for the term of the resource plan." The preferred plan must "include an explanation of the criteria that the utility used to select its preferred options" in "sufficient detail to enable the Commission to determine whether the utility's selection is justified." NAC 704.5674.

The 2024 Consolidated IRP Preferred Plan for GBWC-CSD is intended to provide a list of necessary projects over the next 20-year planning period to continue providing the current level of service to their customers. With the integration of an asset management plan, the preferred plan also makes recommendations associated with monitoring, maintenance, and inspections for several critical assets of the water system. The purpose for these recommendations is to extend the useful life of the assets, prolonging the need for replacement or refurbishment. A condition assessment of several assets over the past year has identified some of the larger assets which have reach the end of their useful lives and will need to be replaced and/or refurbished. The capital projects provided in this Preferred Plan are at a planning level guideline based on current demand and growth projections and should be reviewed periodically and updated in future IRPs.

The preferred plan addresses the system, compliance, environmental, and conservation needs at a capital spending and monitoring schedule, which GBWC-CSD staff believes are prudent. The asset maintenance, monitoring, and smaller capital recommendations are provided in the plan with the goal of extending the assets' useful lives beyond their nominal life expectancies. This will help to push out some of the larger capital projects for replacement or refurbishing of specific assets.

With this strategy in mind, the objective of this preferred plan is to make the necessary investments to at least maintain the customer's existing level of service while ensuring NAC compliance of the GBWC-CSD water system.

7.1 CIP Organization and Description

The Capital Improvement Projects (CIP) sections describe capital improvements, maintenance, and monitoring recommendations to the system to maintain the customer's existing level of service while ensuring NAC 445A compliance. The timing for the project improvements has been assessed extensively by GBWC-CSD staff and their engineers to ensure the most cost-effective results are captured for the ratepayers, while sustaining their existing level of service. The scheduling for the capital improvements was designed in a manner that brings about the least cost with the highest benefit to the company and its ratepayers. The following CIPs have been developed based on the best information available.

It should be noted that the CIPs are conceptual plans and no topographic surveys, site inspections, or other field investigations have been conducted at this time. It should also be noted that no easements or sites have been obtained for facilities that are planned outside the public right of way. It is possible that when such investigations are conducted at the time of design, changes in pipe alignments, lengths, facility siting or other changes will be required. All estimated costs in the 2024 Consolidated IRP were developed from third party quotes and do not include items such as allowance for funds used during construction (AFUDC).

The following sections describe the capital improvement projects, monitoring, maintenance, and inspection recommendations necessary to maintain the customer's level of service for the GBWC-CSD water systems, while ensuring NAC 445A compliance. All of the recommendations are provided to:

1. Replace assets that are at the end of their useful lives
2. Extend the useful life of an asset
3. Improve the monitoring of major assets
4. Ensure that a reliable supply of water is conveyed to the customers

The 2024 IRP preferred plan includes projects that focus on the GBWC-CSD systems which are described below. A detailed breakdown of the construction and non-construction costs for each of the CIP can be found in Appendix I.

7.2 Water Resources CIP

7.2.1 On-Site Hypochlorite Generation Systems

GBWC-PD currently uses chemical delivery services to supply sodium hypochlorite drums for chlorination systems at each of the well sites. In order to potentially save on chemical delivery costs, GBWC-PD would like to invest in an on-site hypochlorite generation system. An on-site hypochlorite generation system is supplied with water, and brine (salt), and power to generate sodium hypochlorite in an electrolytic cell.

Based on preliminary planning effort, an on-site hypochlorite generation system would consist of the following:

- Hypochlorite Generators
  - One (1) Clortec 25-V or approved equal.
  - Capable of producing 25 lbs/day as required by flow data of well water.
  - Includes electrolytic cell, flow meters for water and brine, water and brine supply piping, sample port, and bellows pump.
- Double-Walled Plastic Storage Tanks
- Hypochlorite Dosage and Transfer Pump Stations
- Distribution piping (or trucking) to other treatment plants and well sites
- Chemical Room

The estimated cost to furnish and install all required components for an on-site hypochlorite generation system is $806,040. A breakdown of costs can be found in Appendix I. This project would start in 2028 and be completed by the end of 2030.

- <u>On-Site Hypochlorite Generation Systems</u>
  Estimated Cost: $806,040

Project Years: 2033

7.2.2 Well Replacement

GBWC-CSD recently drilled three test holes on three separate properties within the Cold Springs service area to determine a viable location for a replacement well. At the time this report was written, a report and recommendation for a location of a replacement well was still being developed based on the performance of the test holes. Based on the condition and age of Wells 6 and 7, GBWC-CSD estimates that at least one of these wells will need to be replaced in the next 5 to 7 years. As has been projected in the asset registry for fixed assets, we are recommending that a replacement well be drilled to either supplement lost production from Wells 6 and 7 or totally replace a well. The replacement well will be drilled to a depth of at least 700 feet to ensure that sufficient production will be available. The estimated cost and project schedule for this project is as follows:

- Long Valley Well Replacement
  Estimated Cost: $2,000,000
  CIP Year: 2028

7.3 Water Distribution CIP

7.3.1 Pipeline, Services, and Meter Pit Replacement

Some of the distribution piping in the water system consists of schedule 40 PVC pipe that is approximately 45 years old. Although pipeline breaks are rare, this old schedule 40 PVC pipe is reaching the end of its useful life and increasingly frequent leaks and breaks are expected in the future, which increases the NRW within the system.

Lumos is recommending that new distribution piping, laterals, and meter pits be installed within the older portions of Pressure Zone 2 using the methods determined in the pilot study. This will allow the customers to still have water service during construction and only be without water when the meter pits are transferred over. If specific streets with old schedule 40 PVC pipe do need to be replaced, then new pipelines will be installed in the streets with minimum disturbance of the old pipeline located in the roadside drainage. The old schedule 40 PVC distribution piping, which is reaching the end of its useful life, would then be abandoned in place after the new distribution piping was activated. The schedule 40 PVC will be replaced with C-900 PVC pipe in the appropriate pipe size to ensure proper hydraulic pressures and flows are achieved. Along with the pipe replacement, the associated distribution valves and fire hydrants will be included in the required projects.

Prioritizing and scheduling of replacement pipeline projects by GBWC-CSD will be in coordination with Washoe County to coincide with annual road repair projects to reduce construction impacts and for cost efficiency. Lumos recommending an annual pipeline replacement project budget of $250,000 for the Action Plan years of 2022-2024 (See Action Plan Section 8) and every year thereafter in the Preferred Plan.

- Pipeline, Service, and Meter Pit Replacement Project

Estimated Cost: $250,000 (per year)
CIP Year: 2028-2044

7.3.2 AMI Installation

GBWC is planning to upgrade their current Automatic Meter Reading (AMR) System to Advanced Metering Infrastructure (AMI) System. An AMR System is the communication technology water utilities use to automatically collect water consumption and status data from water meters. AMR systems can be either walk-by or drive-by. An endpoint is connected to the meter's encoder register. The endpoint captures water flow and alarm data which is collected by utility personnel by walking or driving by with a data receiver in proximity to the device. After collection, the meter data is transferred to a database where utilities can monitor and analyze usage, troubleshoot issues and bill customers based on actual consumption.

An AMI System is an integrated system of water meters, communication networks and data management systems that enables two-way communication between meter endpoints and utilities. Unlike AMR, AMI doesn't require utility personnel to collect the data. Instead, the system automatically transmits the data directly to the utility at predetermined intervals freeing up valuable time for operators to be proactive in conducting other critical activities. Meter data is sent to utilities via a fixed network. The utility can use the data to improve operational efficiencies and sustainability by effectively monitoring water usage and system efficiency, detecting malfunctions, and recognizing irregularities quicker. In today's world, the existing cellular networks designed to minimize downtime, can be used to make sure meter data is collected securely and without interruption.

GBWC is planning to conduct the upgrade using existing staff to cut down on costs. The upgrade will require the addition of a few strategically located towers and some software modifications. The preliminary plan is to conduct the transition over a 5-year period starting in January 2029 with the strategy to complete one fifth of the system at a time. Based on current meter replacement costs and projected number of metered connections, budgetary estimate has been provided:

- <u>AMI Installation</u>
  Estimated Cost: $1,380,700 over 5 years ($256,140 per year with $100,000 additional applied to the first year for equipment and software costs)
  Project Year: 2029-2033

7.4 Water Storage CIP

7.4.1 Rehabilitation and Tank Replacement

Tanks 1 and 2 have proposed rehabilitation or replacement alternatives in the Action Plan, described in the next Section. It is assumed that Tanks 3 and 4 will need to be rehabilitated during the Preferred Plan period based on estimated useful life. Tank 3 was recently rehabilitated in 2021 by Superior Tank, but will need another rehabilitation due to normal aging and deterioration within the next 25-30 years (within the Preferred Plan time frame). The nominal useful life is based on a storage tank's nominal life expectancy of 45 years.. Tank 4 is 23 years old as of 2024 and is estimated to have 22 years of nominal useful life. For this reason, an estimated cost of $500,000 dollars is applied to every three (3) years to budget ($2,500,000 total in the planning period) and save for anticipated tank rehabilitation and replacement costs.

- Rehabilitation and Tank Replacement
  Estimated Cost: $500,000 every 3 years
  Project Year: 2030-2042 (every three years)

7.4.2 Inspection and Maintenance Recommendations

Storage Tank Inspections and Cleanings
To help ensure that the storage tanks remain in good condition, ongoing third-party tank inspections should be scheduled every 5 years along with routine maintenance for all storage tanks. For the cathodic protection systems, this includes annual potential tests by a certified contractor to determine if the anodes are working properly and monthly rectifier readings. Regularly scheduled inspections and maintenance will help extend the useful lives of the tanks. The costs for the tank inspections and smaller-scale maintenance activities are not included in the CIP because it is budgeted for separately as ongoing inspection and maintenance.

7.5 Other Fixed Assets – Future Potential Replacement Needs

Table 7.01 is a list of additional assets that may need replacement or refurbishing based on their age and expected nominal useful lives. The goal for many of these assets, through proper monitoring and maintenance, is to extend their useful lives beyond the nominal useful life expectancy for replacement. Many of the recommended monitoring, maintenance, and inspection recommendations have been designed for this reason.

Table 7.01: Major Assets Expected Replacement/Refurbish Years

Asset	Year	Comments
Well 1	2040	Replacement
Touraco Booster Station	2035	Refurbishment

7.6 Preferred Plan Project Timeline

Table 7.02 provides an estimated project schedule timeline for the recommended implementation of the Preferred Plan. This project schedule timeline only recommends the implementation of projects out to 2033 with a recommended budgetary cost estimate for the yearly replacement of pipeline as well as meter pit and tank rehabilitation/replacement through 2044. Beyond 2033, the schedule timeline for replacement of assets should be determined based on the monitoring, maintenance, and inspection protocols recommended in this and future IRPs.

Table 7.02: Scheduled Timeline for Preferred Plan Water CIPs

YEAR	PROJECTS	TOTAL ANNUAL CIP COST – ALT. 1 (1)	TOTAL ANNUAL CIP COST – ALT. 2(2)
2025	See Action Plan Timeline	$602,800	$602,800
2026	See Action Plan Timeline	$513,277	$639,517
2027	See Action Plan Timeline	$345,238	$850,198
2028	Well Replacement Pipeline and Meter Pit Replacement	$2,250,000	$2,250,000
2029	Pipeline and Meter Pit Replacement AMI Installation	$606,140	$606,140
2030	Pipeline and Meter Pit Replacement AMI Installation Rehabilitation/Replacement of Tank	$1,006,140	$1,006,140
2031	Pipeline and Meter Pit Replacement AMI Installation	$506,140	$506,140
2032	Pipeline and Meter Pit Replacement AMI Installation	$506,140	$506,140
2033	Onsite Hypochlorite Systems Pipeline and Meter Pit Replacement AMI Installation Rehabilitation/Replacement of Tank	$1,812,180	$1,812,180
2034	Pipeline and Meter Pit Replacement	$250,000	$250,000
2035	Pipeline and Meter Pit Replacement	$250,000	$250,000
2036	Pipeline and Meter Pit Replacement Rehabilitation/Replacement of Tank	$750,000	750,00
2037	Pipeline and Meter Pit Replacement	$250,000	$250,000
2038	Pipeline and Meter Pit Replacement	$250,000	$250,000
2039	Pipeline and Meter Pit Replacement Rehabilitation/Replacement of Tank	$750,000	$750,000
2040	Pipeline and Meter Pit Replacement	$250,000	$250,000
2041	Pipeline and Meter Pit Replacement	$250,000	$250,000
2042	Pipeline and Meter Pit Replacement Rehabilitation/Replacement of Tank	$750,000	$750,000
2043	Pipeline and Meter Pit Replacement	$250,000	$250,000
2044	Pipeline and Meter Pit Replacement	$250,000	$250,000
20-Year Preferred/Action Plan Total		**$12,398,055**	**$13,029,255**

Notes:
(1) Two (2) alternatives are proposed for an Action Plan Project, so two (2) alternative total CIP costs are provided. See Section 8 for information regarding the alternative projects.

SECTION 8.0: ACTION PLAN

The recommended action plan projects for GBWC-CSD target the water system in a way that helps maintain (and improve) the customers' current level of service, provide redundancy to the system, increase staff time for monitoring and maintenance, and ensure compliance with NAC 445A "water works" regulations. Where this Action Plan provides only a single option for a project, this represents the sole viable option for the project. For every Action Plan item related to a forecasted demand deficiency, we have considered all relevant and required factors in reaching our determination. GBWC-CSD has scaled its Action Plan to reflect projects that it can reasonably complete within the 3-year Action Plan period.

It should be noted that the Action Plan projects are conceptual plans and no survey routes, site inspections or other field investigations have been conducted at this time. It should also be noted that no easements or sites have been obtained for facilities that are planned outside the public right of way. It is possible that when such investigations are conducted at the time of design, changes in pipe alignments, lengths, facility siting or other changes may be required. All estimated costs in this Volume (GBWC-CSD, Volume IV) of the 2024 IRP were developed from third party quotes and do not include items such as allowance for funds used during construction (AFUDC). The AFUDC is included in the Funding Plan (Appendix L).

A detailed breakdown on the construction and non-construction costs for each action plan project can be found in Appendix I.

8.1 Action Plan Projects

The three-year Action Plan projects are focused on asset concerns that have been identified through the development of the asset management component, NAC compliance, and GBWC-CSD staff recommendations. Three water system projects have been selected for the GBWC-CSD Action Plan:

- PRV Installation to Assist Fire Flows (PZ 3 to PZ 4);
- Storage Tank 1 Rehabilitation;
- Storage Tank 2 Replacement or Factory Rehabilitation.

Details of these three projects are described in the following sections.

8.2 Water Resources CIP

8.2.1 PRV Installation to Assist with Fire Flows (PZ 3 to PZ 4)

Pressure Zone 4 is currently deficient for storage as shown in the NAC System Capacity Analysis in Section 4.1.3, specifically when ADD demands and fire flow demands are present with the largest producer out of service. In order to address the storage deficiency, it is recommended a PRV station be installed to transfer flows from Pressure Zone 3 to Pressure Zone 4 during fire conditions. The average PRV has a life expectancy of 40 years.

The PRV will be located near the booster pump station between Tank 3 and Tank 4. The PRV will be branched off the 6-inch booster pump station line that fills Tank 3. For cost estimating purposes, a 6-inch PRV with a 3-inch bypass was assumed for the station and the recommended model is a Cla-Val 90-01 PRV. The downstream pressure setting for the PRV will be low, around 20 psi, because this water transfer will only be used to assist Pressure Zone 4 during fire conditions. The PRV will also need specific controls to shut off while the booster pump station is running to fill Tank 3. When open, the PRV would fill Tank 4 with the additional storage required to meet the demands. Additional modeling will be required to finalize the design of the PRV station. This project has been identified as a high priority project because it is critical to meeting fire flow storage requirements for Zone 4.

The estimated pricing and schedule for this project is as follows:

- PRV Installation to Assist with Fire Flows (PZ 3 to PZ 4)
  Estimated Cost: $454,221
  Project Year: 2025-2026
  Tier: High Priority

Table 8.01: Anticipated Timeline for PRV Installation to Assist with Fire Flows (PZ 3 to PZ 4)

Tasks	Est. Time
ITB Documents & Engineer Proposal Submittals	8 weeks
Capital Project Team Review & Engineer Award	2 weeks
Contract Negotiations	4 weeks
Survey	3 weeks
Geotechnical Inspection	4 weeks
Engineering Design	21 weeks
Project Bidding and Award	4 weeks
Construction	24 weeks
Closeout of Project	4 weeks
Total Estimated Project Time	**74 weeks**

8.3 Water Storage CIP

8.3.1 Rehabilitation of Tank 1

Storage Tank 1 is located in Pressure Zone 1 and was constructed in 1999. The average useful life of a storage tank is 45 years, meaning that Tank 1 has approximately 21 years of useful life left. Tank 1 was last inspected in 2023 where minor seepage was observed. Rehabilitation is necessary for aging storage tanks to keep them in good condition. This project has been established as a high priority project because allowing tanks to deteriorate into poor condition increases the risk of a failure which would compromise the entire water system.

The recommended rehabilitation project is an interior exterior coating project with exterior repairs to meet OSHA compliance. The interior coating will consist of sandblasting and an epoxy coating in the atmospheric zone and an elastomeric polyurethane coating in the immersion zone of the tank. Additionally, the roof will be re-caulked. Exterior coating includes sandblasting, a priming epoxy coat, and a finishing polyurethane coat. Exterior repairs included in this project are recommended based on OSHA requirements and listed below:

- Installation of self-closing gate at roof access for OSHA compliance.
- Installation of new gaskets on the manways and roof hatch.
- Installation of flex cable safety climb on exterior ladder
- Install three (3) bolts on roof anchor points.
- Install new FRP interior ladder.
- Install new roof vent and screen.
- Install new decals on the LLI gauge board.

The estimated pricing and schedule for this project is as follows:

- Storage Tank 1 Rehabilitation
  Estimated Cost: $575,547
  Project Year: 2025-2026
  Tier: High Priority

Table 8.02: Anticipated Timeline for Storage Tank 1 Rehabilitation

Tasks	Est. Time
ITB Documents & Engineer Proposal Submittals	8 weeks
Capital Project Team Review & Engineer Award	2 weeks
Contract Negotiations	4 weeks
Survey	2 weeks
Geotechnical Investigation	-
Engineering Design	16 weeks
Bidding and Project Award	4 weeks
Construction	22 weeks
Closeout of Project	3 weeks
Total Estimated Project Time	**56 weeks**

8.3.2 Storage Tank 2 Factory Rehabilitation or Replacement

Storage Tank 2 is located in Pressure Zone 2. Tank 2 was relocated to its current location in 1975 (49 years ago) from another site and the actual age of the tank is unknown. The nominal useful life expectancy for a bolted steel tank is 45 years, meaning the tank is past its useful life. Tank 2 was last inspected in 2021 and was given poor ratings for most of its internal condition assessments including the internal sidewall plates, internal floor plate, common inlet/outlet, and manways.

The fire marshal having jurisdiction has the sole authority to determine, on a case-by-case basis, if fire flow storage can be conveyed from a high-pressure zone in a system or must be stored in the specific pressure zone. In discussions with TMFPD's Fire Marshal on January 8, 2019 and December 22, 2023, the Fire Marshal advised that TMFPD is not amenable to removing Tank 2 in any scenario because Cold Springs Division System is a stand-alone (isolated) water system.

TMFPD's focus is on the minimum requirements for fire flow of the adopted fire code, and it was advised that they are not apt to give consideration to removing and/or reducing an existing water supply in any way, especially in an isolated water system. For documentation of all correspondence with TMFPD related to Tank 2 and the required fire storage within the Cold Springs system, see Appendix M.

When a water storage tank fails, it typically fails along a welded seam. This failure is commonly called "unzipping" of a storage tank due to the rapid failure. If a tank of this size and volume were to fail in this manner, it would result in a significant release of water all at once. Due to the high seismic activity in the area of Tank 2, even a small earthquake could trigger a welded seam failure. Tank 2 is a liability in its current state and in the event of failure, the pressure zone would not have sufficient storage for a fire event. This project has been identified as a high priority project because allowing tanks to deteriorate into poor condition increases the risk of a failure which would compromise the entire water system.

Two alternatives, a full replacement and factory rehabilitation, were considered for this project and are described below.

8.3.2.1 Tank 2 Factory Rehabilitation

Tank 2 is past its useful life and in very poor condition. A factory rehabilitation of Tank 2 will result in an asset that is as close to a new tank as possible. When compared to a full replacement of Tank 2 as an alternative, the factory rehabilitation offers a better solution and lower cost than a full replacement cost.

The recommended factory rehabilitation project is a complete tear down of the original tank parts. The parts are then transported back to the contractor's shop and either reconditioned or completely remanufactured replacement parts. Once all the parts of the tank haven assessed and either reconditioned or replaced, the parts are transported back to the site and the tank is reassembled in the exact same location and way. Additionally, a cathodic protection system would be installed to prevent further corrosion and is included in the cost estimate. External repairs included in this project are recommended based on OSHA requirements and listed below:

- Installation of self-closing gate at roof access for OSHA compliance.
- Installation of new gaskets on the manways and roof hatch.
- Installation of flex cable safety climb on exterior ladder
- Install three (3) bolts on roof anchor points.
- Install new FRP interior ladder.
- Install new roof vent and screen.
- Install new decals on the LLI gauge board.

The estimated pricing and schedule for this project is as follows:

- <u>Storage Tank 2 Factory Rehabilitation</u>
  Estimated Cost: $749,548
  Project Year: 2026-2027
  Tier: High Priority (Preferred Alternative)

Table 8.03: Anticipated Timeline for Storage Tank 2 Factory Rehabilitation

Tasks	Est. Time
ITB Documents & Engineer Proposal Submittals	8 weeks
Capital Project Team Review & Engineer Award	2 weeks
Contract Negotiations	4 weeks
Survey	-
Geotechnical Investigation	-
Engineering design bid projects	16 weeks
Bidding and Project Award	4 weeks
Construction	22 weeks
Closeout of Project	3 weeks
Total Estimated Project Time	**54 weeks**

8.3.2.2 Tank 2 Replacement

If the current Tank 2 is decommissioned and replaced with a new 420,000-gallon storage tank, Pressure Zone 2 will continue to have dedicated storage (Tank 2) and supply (Van Dyke Well) for the zone. A full replacement would prolong the life of Tank 2 by another 45 years but comes at higher price than the factory rehabilitation. Factory rehabilitation or replacement is the preferred alternative due to the possible structural degradation of Tank 2. As stated in a letter signed by the Deputy Fire Chief of TMFPD, the fire authority is not amenable to Tank 2 being removed from the GBWC-CSD water system (see Appendix M). Rehabilitation will extend the life of Tank 2 in the short-term, but since Tank 2 is required by the fire authority, the most cost-effective solution to fixing Tank 2's deficiencies and extending its life before another project is required, is to replace it.

The estimated pricing and schedule for this project is as follows:

- Storage Tank 2 Replacement
  Estimated Cost: $1,062,747
  Project Year: 2026-2027
  Tier: High Priority

Table 8.04: Anticipated Timeline for Storage Tank 2 Replacement

Tasks	Est. Time
ITB Documents & Engineer Proposal Submittals	4 weeks
Capital Project Team Review & Engineer Award	2 weeks
Contract Negotiations	4 weeks
Survey	2 weeks
Geotechnical Investigation	3 weeks
Engineering design bid projects	12 weeks
Bidding and Project Award	4 weeks
Construction	26 weeks
Closeout of Project	4 weeks
Total Estimated Project Time	**61 weeks**

8.4 Action Plan Project Timeline

Table 8.05 is a schedule of the project timeline for the water projects proposed for the 3-year Action Plan.

Table 8.05 Scheduled Timeline for Action Plan Water Projects

YEAR	PROJECTS	TOTAL CIP COST (1)	TOTAL CIP COST (2)
2025	PRV Installation to Assist with Fire Flows (PZ 3 to PZ 4)	**$454,221**	**$454,221**
	Rehabilitation of Tank 1	**$575,547**	**$575,547**
	2025 CIP Total Cost	**$1,029,768**	**$1,029,768**
2026	Rehabilitation of Tank 2	**$749,548**	**$0**
	Replacement of Tank 2	**$0**	**$1,062,747**
	2026 CIP Total Cost	**$749,548**	**$1,062,747**
2027	-	-	-
	2027 CIP Total Cost	**$0**	**$0**
3-Year Action Plan Total		**$1,779,316**	**$2,092,515**

Notes:
(1) Total CIP Cost includes Storage Tank 2 Factory Rehabilitation.
(2) Total CIP Cost includes Storage Tank 2 Replacement.

SECTION 9.0: FUNDING PLAN

The Funding Plan is detailed in Volume I, Section 9 of this 2024 IRP filing.

SECTION 10.0: SYSTEM IMPROVEMENT RATE REQUEST

GBWC-CSD is requesting that the following projects described in the Action Plan be designated as eligible for a System Improvement Rate ("SIR") under NRS 704.663(3) and NAC 704.6339: Storage Tank 2 Replacement and Storage Tank 2 Factory Rehabilitation.

NAC 704.6339 states that SIR requests must include the following information:

(1) A description of the project.
(2) A statement explaining the necessity of the project.
(3) The resulting benefits of the project to the utility and the customers of the utility upon the completion of the project.
(4) A statement supported by written testimony that the project is not designed to increase revenues by connecting an improvement to a distribution system or wastewater system to new customers.
(5) A statement that the project was not included in the rate base of the utility in its most recent general rate case.
(6) A statement that the project costs for which recovery will be sought represent an investment to be made by the utility and which will not be paid by another funding source, including, without limitation, a grant, developer contribution or other form of reimbursement.
(7) If submittal to the Commission is not otherwise required by law or regulation, the utility's plan for construction and the proposed schedule for construction. A plan for construction and a proposed schedule for construction submitted pursuant to this paragraph must comply with the provisions of paragraph (a) of subsection 4 of NAC 704.568.
(8) If submittal to the Commission is not otherwise required by law or regulation, a budget of planned expenditures, which complies with the provisions of NAC 704.5681.

10.1 Description of each SIR Project

Storage Tank 2 Replacement
This project would involve demolition of the existing Tank 2 (due to the poor tank conditions) and construction of a new 420,000-gallon welded steel tank in its place. For in-depth discussion about Tank 2, see Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section (Tank 2 Replacement).

Storage Tank 2 Factory Rehabilitation
This project would involve the complete tear down of the existing Tank 2 parts, shipping the parts to the contractor's shop and either reconditioning or refabricating replacement parts. The parts would then be transported back to the Tank 2 site and reassemble at the site creating a relatively new Tank 2. For in-depth discussion about Tank 2, see Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section 8.3.2.1 (Tank 2 Factory Rehabilitation).

10.2 Need for Each SIR Project

Storage Tank 2 Replacement

This project replaces aging infrastructure, which is in very poor condition. The project materially improves service and reliability in Pressure Zone 2 by ensuring adequate fire flow storage for the zone. Per Truckee Meadows Fire Protection District requirements, each pressure zone must have sufficient storage to meet fire flow requirements (see Appendix M). Tank 2 is required to meet this storage requirement in Pressure Zone 2, and is at risk of failing in the near future, as discussed in Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section 8.3.2.2 (Tank 2 Replacement).

Storage Tank 2 Factory Rehabilitation

_This project replaces aging infrastructure, which is in very poor condition. The project materially improves service and reliability in Pressure Zone 2 by ensuring adequate fire flow storage for the zone. Per Truckee Meadows Fire Protection District requirements, each pressure zone must have sufficient storage to meet fire flow requirements (see Appendix M). Tank 2 is required to meet this storage requirement in Pressure Zone 2, and is at risk of failing in the near future, as discussed in Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section 8.3.2.1 (Tank 2 Factory Rehabilitation).

10.3 Benefits of Each SIR Project

Storage Tank 2 Replacement

Replacing Tank 2 will reduce the liability of a potential tank failure in the near future and the possible release of a large volume of water. In addition, this project will ensure fire flow is reliably provided to Pressure Zone 2 during the extended lifespan of the new tank. Replacing Tank 2 will bring the GBWC-CSD system Pressure Zone 2 in conformance with the requirements of the Truckee Meadows Fire Department for fire flow storage (see Appendix M). in-depth discussion about Tank 2, see Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section 8.3.2.2 (Tank 2 Replacement).

Storage Tank 2 Factory Rehabilitation

The factory rehabilitation of Tank 2 will reduce the liability of a potential tank failure in the near future and the possible release of a large volume of water. In addition, this project will ensure fire flow is reliably provided to Pressure Zone 2 during the extended lifespan of the new tank. Replacing Tank 2 will bring the GBWC-CSD system Pressure Zone 2 in conformance with the requirements of the Truckee Meadows Fire Department for fire flow storage (see Appendix M). in-depth discussion about Tank 2, see Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section 8.3.2.1 (Tank 2 Factory Rehabilitation).

10.4 Project Supports Current Customers

Storage Tank 2 Replacement
This project will allow GBWC-CSD to continue to provide necessary fire flow storage to benefit current customers in Pressure Zone 2. For in-depth discussion about Tank 2, see Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section 8.3.2.2 (Tank 2 Replacement).

Storage Tank 2 Factory Rehabilitation
This project will allow GBWC-CSD to continue to provide necessary fire flow storage to benefit current customers in Pressure Zone 2. For in-depth discussion about Tank 2, see Section 2.2.3.1 (Storage Tank Existing Condition Assessment, Tank 2), Section 4.1.3 (System Capacity Analysis, Pressure Zone 2 Storage) and Section 8.3.2.1 (Tank 2 Factory Rehabilitation).

10.5 Statement that each Project is not included in Rate Base

The projects shown in Section 10.1 *et seq.* are not included in the Company's rate base in its most recent general rate case. See Testimony by Terry J. Redmon.

10.6 Funded by Utility Investment

The projects list in Section 10.1 *et seq.* will be funded through traditional funding sources using GBWC's parent company's (Corix Regulated Utilities (US) Inc.) debt and equity investment, and will not be paid by another funding source, including, without limitation, a grant, developer contribution, or other form of reimbursement. See Section 9.0 (Funding Plan).

10.7 Construction Schedule for Each Project

Storage Tank 2 Replacement
This project is scheduled for construction in 2026-2027. See Section 8.3.2.2 (Tank 2 Replacement).

Storage Tank 2 Factory Rehabilitation
This project is scheduled for construction in 2026-2027. See Section 8.3.2.1 (Tank 2 Factory Rehabilitation).

10.8 Project Budget for Each Project

Storage Tank 2 Replacement
Project Cost: $1,062,747. See Section 8.3.2.2 (Tank 2 Replacement).

Storage Tank 2 Factory Rehabilitation
Project Cost: $749,548. See Section 8.3.2.1 (Tank 2 Factory Rehabilitation).

Appendix A: Fixed Asset Registry

LEAVE THIS IN THIS DOCUMENT, IT'S A PLACEHOLDER FOR ALL SMART REFERENCES TO THIS APPENDIX. IF THIS IS DELETED, ALL REFERENCED LINKS WILL BE BROKEN.

Appendix B: NDWR Hydrographic Basin Data & Water Rights

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Appendix C: Flow Schematics

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Appendix D: Service Territory Maps

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Appendix E: Photos of Major Assets

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Appendix F: Tank Inspection Reports

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Appendix G: Monthly Well Production

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Appendix H: WaterCAD Modeling Scenarios

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Appendix I: Capital Improvement Projects

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Appendix J: Emergency Response Plans

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Appendix K: Water Conservation Plan

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Appendix L: Funding Plan Analysis (PWRR Models)

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Appendix M: Miscellaneous Data

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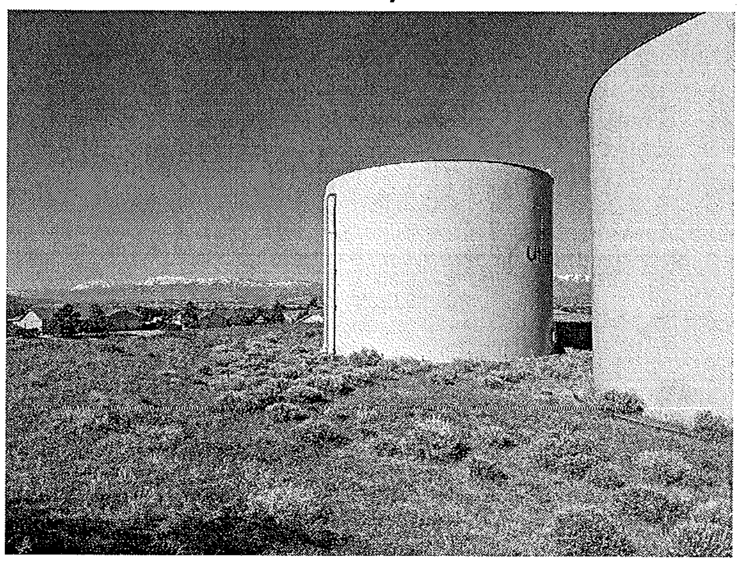
Great Basin Water Co.
2024 Integrated Resource Plan
Volume V: Spanish Springs Division

March 1, 2024



Prepared for:

Great Basin Water Co.™

Prepared by:

Lumos & Associates, Inc.
950 Sandhill Road, Suite 100
Reno, Nevada 89521
775-827-6111

LUMOS & ASSOCIATES

PROFESSIONAL ENGINEER-STATE OF NEVADA
MICHAEL W. HARDY
Exp: 06-30-25
CIVIL
No. 21862

2-29-24

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List of Abbreviations

ADD	Average Day Demand
ADMM	Average Day Maximum Month
AFA	Acre Feet Annually
AFUDC	Allowance for Funds Used During Construction
AL	Active Level
AMP	Asset Management Plan
AMR	Automatic Meter Reading
amsl	Above Mean Sea Level
AWWA	American Water Works Association
bgl	Below Ground Level
CDP	Census Designated Place
CIP	Capital Improvement Project
CPC	Certificate of Public Convenience and Necessity
FF	Fire Flow
fps	Feet per Second
FMEA	Failure Mode and Effects Analysis
ft	Feet or Foot
GBWC	Great Basin Water Co.
GBWC-PD	Great Basin Water Co. – Pahrump Division
GBWC-SCD	Great Basin Water Co. – Spring Creek Division
GBWC-CSD	Great Basin Water Co. – Cold Springs Division
GBWC-SSD	Great Basin Water Co. – Spanish Springs Division
gpd	Gallons per day
gpdpc	Gallons per day per Connection
gpm	Gallons per Minute
GIS	Geographical Information System
GPS	Global Positioning System
HAA5	Haloacetic acids
HGL	Hydraulic Grade Line
HP	Horsepower
IRP	Integrated Resource Plan
LF	Linear Feet
LOS	Level of Service
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MG	Million Gallons
MGA	Million Gallons Annually
MGD	Million Gallons per Day

List of Abbreviations – cont.

mg/L	Milligrams per Liter
MG/Y	Million Gallons per Year
NAC	Nevada Administrative Code
ND	Non-Detect
NDEP	Nevada Division of Environmental Protection
NDMC	National Drought Mitigation Center
NRS	Nevada Revised Statutes
NRW	Non-Revenue Water
O&M	Operation and Maintenance
pCi/L	Picocurie per Liter
PER	Preliminary Engineering Report
PF	Peaking Factor
pH	Potential of Hydrogen
PHD	Peak Hour Demand
ppb	Parts per Billion
ppm	Parts per Million
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
psig	Pounds per Square Inch Gauge
PUCN	Public Utilities Commission of Nevada
PVC	Polyvinyl Chloride
PWRR	Present Worth Revenue Requirement
RPN	Risk Priority Number
RTC	Regional Transportation Commission
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SIR	System Improvement Rate
SRUC	Sky Ranch Utility Company
SSD	Spanish Springs Division
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TMWA	Truckee Meadows Water Authority
TMWRF	Truckee Meadows Water Reclamation Facility
TTHM	Trihalomethane
µg/L	Micrograms per Liter
UI	Utilities, Inc.
UIN	Utilities, Inc. of Nevada
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

GBWC Spanish Springs Division Overview

The water system in Spanish Springs, Nevada is owned by Great Basin Water Co. (GBWC), a wholly owned subsidiary of Corix Regulated Utilities (US) Inc. (CRUUS), a private, investor-owned, national water and wastewater utilities owner and operator. The GBWC-Spanish Springs Division (SSD) water system encompasses an area within Washoe County approximately 7.5 miles north of Interstate 80 off Pyramid Highway (State Highway 445) at the intersection of Pyramid Highway (NV 445) and La Posada Drive in Sparks, Nevada (Figure E-1). More specifically, the area extends east from Pyramid Highway along La Posada Drive to Cordoba Boulevard, north to Tranquil Drive, west to Pyramid Highway, and south to La Posada Drive (Figure E-1). The service area spans an area approximately 1.75 miles north to south and 1.25 miles east to west covering an area of approximately 1.5 square miles. The GBWC-SSD service area is surrounded by the Truckee Meadows Water Authority (TMWA) water service area. Approximately 582 customers are currently being served.

The GBWC-SSD water system is made up of two pressure zones served by two wells, three ground level water storage tanks, and one booster pump station located in the Spanish Springs Hydrographic Basin (Basin 85).

The overall objective of this Integrated Resource Plan (IRP) is to provide guidance to GBWC-SSD as to how to provide safe and reliable water to their customers in the service area over the next 20 years by balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. The strategy is to identify current needs in the system and integrate an asset management approach into the document for future use. This strategy will allow the IRP to help with the improvement needed to meet current and future demands. This resource plan is intended to balance the needs of the water system, environment, and customers over the next 20 years. The Action Plan is a 3-year plan. The purpose of the Action Plan is to:

- Identify current major assets that may have exceeded or are near to their useful life.
- Identify needed improvements in the water system; and
- Promote water system innovations that will provide efficiency in operations and maintenance.

By working through the Action Plan, GBWC-SSD will be able to develop a plan for the next three years balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. The planning horizon for the IRP is 20 years, from 2024 to 2044.

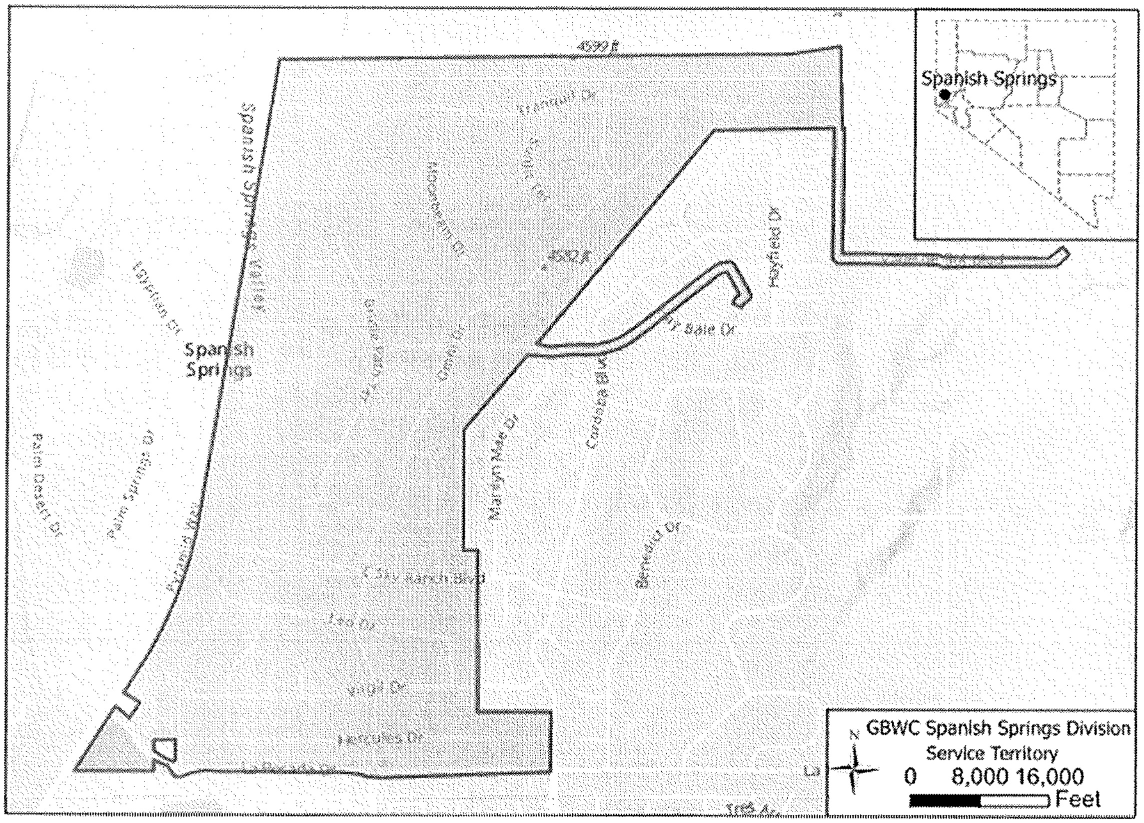


Figure E-1: Overview of the Existing Water Service Boundaries

Current Level of Service

In February 2015, the GBWC-SSD management team initiated the development of an Asset Management Plan which included a section on the current "Level of Service" (LOS) assessment. The section listed the LOS elements for the water system with regards to Regulatory and Contractual Quality, Reliability, and Customer Service. The LOS sections have helped GBWC-SSD identify areas where improvement will help to strengthen services and relations with their customers. For the most part, the GBWC-SSD water system met their LOS objectives such as:

- Water Esthetics: All minor air entrainment complaints have been resolved. With the rehabilitation of Wells 1 & 2, the air entrainment complaints have ceased.
- Monthly Reading of Meters: Occasional winter weather and buried frozen meter pits makes readings difficult to acquire. All the automatic meter readers (AMR) have been installed, making readings easily acquired, in all seasons.

The only minor improvements still needed include:

- GIS: Implementation of a Geographic Information System to maintain linear assets. Historically, GBWC utilized an employee to obtain GPS locations for Kimley Horn to add to a GIS map of the Spanish Springs assets. Currently, GBWC is utilizing internal employees to both gather and input GPS coordinates of assets. It is estimated that less than 50% of the assets are in the GIS map.

The Staff that operate and manage the GBWC-SSD water system also operate and manage the GBWC–Cold Springs Division (GBWC-CSD) water system. Since identifying these service needs for improvement, the GBWC-SSD Staff are targeting solutions to improve the LOS aspects as well as recommended improvements in the Preferred Plan section of this IRP (Section 7).

Current Project Requirements

Growth Projections

The GBWC-SSD service territory is completely subdivided. The service territory is surrounded by TMWA service territory. The likelihood that additional developments may be annexed into the service territory is low. Therefore, all future development is anticipated to be infill.

The *Nevada County Population Projections 2022 – 2041* dated October 1, 2022, prepared by the Nevada State Demographer's Office, was the most current data available and used to develop the future population and connection projections in the GBWC-SSD Service Area. Two sets of population projections were developed by the State Demographer's Office for this time period. One population projection was developed based on additional factors including the Tesla Gigafactory Project and price of housing increases among other factors. The second population projection does not take these factors into consideration and is considered a more baseline projection model. The future population and connection projections for the GBWC-SSD used the population projection model with the additional factors including the Tesla Gigafactory Project and housing price increases. The U.S. Census Bureau American Factfinder was also evaluated to provide past and current population information for the Spanish Springs Census Designated Place (CDP). The GBWC-SSD Service Area is contained within the Spanish Springs CDP.

The report *Nevada County Population Projections 2022–2041* shows a 2022 population for Washoe County of 486,337 people and an increase to 590,280 by the year 2040. The most recent Spanish Springs CDP (2020) reported a population in the Spanish Springs area of 17,314 and an occupancy density of 2.71 people per household.

At the projected growth rate for the area, it appears that the GBWC-SSD service territory will be completely built out by 2025 as shown in Table E-1. Table E-1 is a projection in population growth and service connections for the 20-year planning period. Projections have been calculated and are based on the Nevada Demographer's information.

Table E-1: Population and Service Connection Projections

Year	Washoe County Population (1)	County % Change(1)	Spanish Springs Population(2)	Estimated GBWC-SSD Service Area Population(3)	Additional GBWC-SSD Connections	Total GBWC-SSD Service Connections (4)
2020	473,606	-	17,314	1,556	-	581
2021	479,882	1.90%	17,643	1,550	0	581
2022	486,337	2.30%	18,049	1,553	1	582
2023	494,175	2.00%	18,410	1,584	12	594
2024	503,050	1.70%	18,723	1,611	10	604
2025	511,348	1.40%	18,985	1,629	6	610
2026	519,337	1.30%	19,232	1,629	0	610
2027	526,985	1.20%	19,462	1,629	0	610
2028	534,036	0.90%	19,638	1,629	0	610
2029	540,605	0.90%	19,814	1,629	0	610
2030	546,868	0.70%	19,953	1,629	0	610
2031	882,804	0.70%	20,093	1,629	0	610
2032	558,419	0.60%	20,213	1,629	0	610
2033	563,691	0.60%	20,335	1,629	0	610
2034	568,629	0.60%	20,457	1,629	0	610
2035	573,186	0.50%	20,559	1,629	0	610
2036	577,348	0.50%	20,662	1,629	0	610
2037	581,142	0.50%	20,765	1,629	0	610
2038	584,571	0.40%	20,848	1,629	0	610
2039	587,604	0.40%	20,931	1,629	0	610
2040	590,280	0.40%	21,015	1,629	0	610
2041	592,641	0.40%	21,099	1,629	0	610
2042	595,012	0.40%	21,184	1,629	0	610
2043	597,392	0.40%	21,268	1,629	0	610
2044	599,781	0.40%	21,353	1,629	0	610

Notes:

(1) Washoe County population data for 2022-2041 are provided as reported in the report *Nevada County Population Projections 2022 to 2041* dated October 1, 2022, prepared by the Nevada State Demographer's Office. https://tax.nv.gov/uploadedFiles/taxnvgov/Content/TaxLibrary/Nevada%20County%20Population%20Projections%202022%20to%202041.pdf

(2) The 2017-2019 Spanish Springs populations were based on U.S Census Bureau data. Population projections from 2020-2038 were estimated based on 2.71 persons/household for the estimated total number of expected meter connections in place. Population projections from 2020 to 2038 were estimated using % change for Washoe County per Nevada State Demographer's Office. The % change from 2038 was extended for 2039 through 2041 to estimate populations through the planning period.

(3) Estimated Service Area Populations were calculated using the 2017-2019 actual connections meter counts multiplied by the U.S Census Bureau's household density of 2.71. Estimated Service Area Populations for 2020-2041 were calculated by multiplying the number of estimated connection counts by U.S Census Bureau's household density of 2.71.

(4) Total existing service connections for 2017-2019 are based on GBWC meter counts and includes commercial. Total existing service connections for 2020-2038 are based on the Nevada State Demographer's Office County % change. The % change from 2038 was extended through 2039- 2041 to estimate service connections through the planning period.

Water System Forecasting

The projection for infill development of the GBWC-SSD service area was based on the Demographer's Office percentage estimates for population growth for the planning period. GBWC-SSD had a total of 582 water connections at the end of 2022. Based on the 20-year Demographer's Office estimates, the total number of connections will reach the potential buildout of 610 customers by the year 2025. Table E-2 also shows the water system connection projections for the service territory.

Table E-2: Growth Projections

Year	GBWC-SSD Connections
2020	581
2021	581
2022	582
2023	594
2024	604
2025	610
2026	610
2027	610
2028	610
2029	610
2030	610
2031	610
2031	610
2032	610
2033	610
2034	610
2035	610
2036	610
2037	610
2038	610
2039	610
2040	610
2041	610
2042	610
2043	610
2044	610

Water System Analysis

Water Rights

The GBWC-SSD owns and leases seven (7) water right permits/certificates in the Spanish Springs Hydrographic Groundwater Basin with a total combined duty of 719.66 AFA. What this means is that GBWC-SSD has the right to pump up to 719.66 AFA from its two potable supply wells in support of customer demand. All the water rights are in good standing with the State Engineer's Office.

Water System Capacity Analysis

The GBWC-SSD water system was evaluated based on available well capacity as compared to the current and projected future water demand. The criteria for evaluating adequate supply capacity is based on NAC 445A.6672, which requires a system that relies exclusively on wells to provide a total system capacity sufficient to meet the maximum data demand (MDD) when all wells are operational, or the average day demand (ADD) with the most productive well out of service.

Since water is conveyed from the Lower Pressure Zone to the Upper Pressure Zone via booster pumps and no PRVs exist to allow water to move back to the Lower Pressure Zone, the water system was evaluated for well capacity as a whole. The water system has two active wells with a total pumping capacity of 875 gpm. Tables E-3 and E-4 summaries the existing and projected water demands with total available well capacity.

In a true NAC 445A.6672 regulatory sense, the existing well capacity is not in compliance. Over the past few years, the wells have shown a decline in well capacity along with structural issues reducing flow rates. The existing well infrastructure is reaching the end of its useful life and replacement capacity will be needed in the years to come. Also, the existing wells and booster station have recently installed backup power, thus providing better reliability in the system in the event of an extended power outage.

Table E-3: Well Capacity

Wells	Capacity (gpm)(1)	Backup Power
Well #1	450	YES
Well #2	425	YES
Total, All Wells in Service	875	
Total, Well #1 Out of Service	425	

Table E-4: Future Requirements

Year	Well Supply req'd for ADD (gpm)(2)	MDD (gpm)	Can Well Supply(3) Meet MDD?
2022	350	866	YES
2044	367	908	NO

(1) Capacities are based on the most recent review conducted in 2022 by Lumos Staff.
(2) Well supply values were grossed up to accommodate for 3.4% losses.
(3) Total well supply must be able to accommodate MDD.

Water Storage Analysis

Water storage was evaluated on the basis of operational, emergency, and fire flow storage needs using Nevada Administrative Code (NAC) 445A requirements. The GBWC-SSD system analysis was based on total system storage which includes both available, above ground storage and alternative pumping capacity as defined by NAC. Available pumping capacity includes the wells and booster stations, which are equipped with an emergency backup power supply and add to the effective storage of the system.

Table E-5: Storage Capacity Requirements (Million Gallons)

Pressure Zone	Current Storage Tank Capacity (MG)	Current Alternative Storage Capacity (MG)	Total Capacity (MG)	Required Existing Capacity (MG)	Required 20-Year Projected (MG)
Lower	0.55	1.26	**1.81**	1.06	1.11
Upper	0.35	1.26	**1.61**	0.85	0.89

Table E-5 indicates that the Lower and Upper Pressure Zones meet existing and future storage capacity requirements through the use of alternative capacity from backup generators installed on the existing wells and the booster station.

Transmission and Distribution System

The piping systems were analyzed using Bentley's WaterCAD hydraulic modeling program. The hydraulic model was evaluated at peak demand conditions and fire flow demand conditions to determine the fire flow capabilities. The objective of the analysis was to identify weaknesses in the distribution network that would lead to unacceptable pressure conditions, reduced fire-flow capacity, and energy waste through high head losses. The GBWC-SSD hydraulic model was analyzed for Existing Conditions, Three (3) Year Action Plan (2027), and Preferred Plan (2044). No significant issues or unacceptable conditions were identified in any of the model runs.

Emergency Action Plan

Volume I (Introduction) contains information related to the Emergency Action Plan. Please refer to Section 5 of Volume I. Appendix J contains the Emergency Action Plan for GBWC-SSD.

Water Conservation Plan

Section 6 of Volume I (Introduction) provides a generalized explanation of the Water Conservation Plan for the four divisions. Appendix K contains the Water Conservation Plan.

Preferred Plan

The GBWC 2024 IRP Preferred Plan for the GBWC-SSD is intended to provide a list of necessary projects over the next 20-year planning period in order for GBWC-SSD to continue to provide the current level of service to their customers. With the integration of an asset management plan into the GBWC 2024 IRP, the Preferred Plan also makes recommendations associated with monitoring, maintenance, and inspections for several of the more expensive critical assets of the water system. The purpose of these recommendations is to extend the useful life of the assets, prolonging the need for replacement or refurbishment. A condition assessment of several assets over the past year has identified some of the larger assets which are reaching the end of their useful lives and will need to be replaced and/or refurbished. The capital projects provided in this Preferred Plan are at a planning level guideline based on current demand and growth projections and should be reviewed periodically and updated in future IRPs.

The Preferred Plan addresses the system, compliance, environmental, and conservation needs at a capital spending and monitoring schedule, which GBWC-SSD staff believes are prudent. The asset maintenance, monitoring, and smaller capital recommendations are provided in the plan with the goal of extending the assets' useful lives beyond their nominal life expectancies. This will help to push out some of the larger capital projects for replacement or refurbishing of specific assets. With this strategy in mind, the objective of this Preferred Plan is to make the necessary investments to maintain the customer's existing level of service while ensuring NAC compliance of the GBWC-SSD water system.

The timing for the project improvements has been assessed extensively by GBWC staff and their engineer to ensure the most cost-effective results are captured for the rate payers. The scheduling for the capital improvements is primarily based on the fixed asset registry and designed in a manner that brings about the least cost with the highest benefit to the company and ratepayers. The following CIP's have been developed based on the best information available. They include:

- Reconditioning of Tank 1A (Interior and Exterior)
- Pipeline and Meter Pit Replacement Annually (2028-2041)
- Replacement of Water Main on Sunset Springs Lane
- Bridle Path (Well 1) Replacement Well
- Arsenic/Nitrate Treatment Pilot Testing and PER
- Arsenic/Nitrate Treatment Plant
- Secondary Transmission Main Inter-tie with TWMWA (Alternative to Treatment Plant)
- PRV Between Upper and Lower Pressure Zones

Action Plan

The GBWC-SSD (Volume-V) portion of the 2024 Consolidated IRP requests the approval of two (2) Action Plan Projects which are needed for the improvement and compliance of the GBWC-SSD water system. The recommended Action Plan projects for GBWC-SSD target the water system in a way that helps maintain (and improve) the customers' current level of service, provide regulatory compliance to the system, extend the useful life of existing major assets. In addition to the recommended capital projects, additional monitoring, testing, maintenance, and inspection recommendations are being proposed with the goal of even greater oversight of assets to further extend the nominal life expectancy for many of the larger assets.

The three (3) year Action Plan projects focused on asset concerns that have been identified through the development of the asset management component, the new Lucity OMS Software System, NAC regulatory compliance, and GBWC-SSD staff recommendations. The Action Plan Projects are:

- Rehabilitation of Suki Well (Well 2)
- AMI Installation
- Rehabilitation of Tank 2 – Interior and Exterior

All of these recommended Action Plan Projects are considered critical to ensure that the existing GBWC-SSD customer's level of service is maintained and ensure compliance with NAC 445A "Water Works" regulations.

Funding Plan

Section 9 of Volume I (Introduction) contain the funding plan analysis for the recommended Action Plan projects in Volume V. Please refer to Section 9 in Volume I for information related to the Action Plan project funding plan. The project list in Section 10.1 *et seq.* will be funded through traditional funding sources using GBWC's parent company's Corix Regulated Utilities (US) Inc. debt and equity investment.

System Improvement Rate Request

GBWC-SSD is requesting that the following projects described in the Action Plan be designated as eligible for a System Improvement Rate (SIR) under Nevada Revised Statutes (NRS) 704.663(3) and NAC 704.6339: (i) Rehabilitation of Well 2 (Suki).

SECTION 1.0: INTRODUCTION

1.1 Report Organization

Summary	The Executive Summary provides an overview of the study and the recommended capital improvement plan.
Section 1.0	Introduction. This section provides background information on the Great Basin Water Co. – Spanish Springs Division (GBWC-SSD), a description of Hydrographic Basin 85, and discussion of the objectives of the Integrated Resource Plan (IRP).
Section 2.0	Existing Conditions. This section presents a complete description of the service area, existing facilities, condition of the major assets and remaining useful life, and their operation and control.
Section 3.0	Historical Data and Forecasting. This section presents an evaluation of the historical population and connections to the existing system. This data is used and presented as a basis for the population and demand forecasting for the utility.
Section 4.0	Water Supply Needs. This section presents the analysis of the existing water system with regards to how it will be impacted by the demand forecasting presented in Section 3.0.
Section 5.0	Emergency Response Plan. This section provides a reference to GBWC's Emergency Response Plan discussed in Volume I (Introduction). The actual Emergency Response Plan is provided in Appendix J.
Section 6.0	Water Conservation Plan. This section provides a reference to GBWC's Water Conservation Plan discussed in Volume I (Introduction). The actual Water Conservation Plan is provided in Appendix K.
Section 7.0	Preferred Plan. This is a 20-year projected evaluation which includes a preferred plan for the necessary improvements over the 20-year planning period. This preferred plan is a planning level guideline based on current demands, growth projections, and useful remaining life of major assets.
Section 8.0	Action Plan. This section is a summary subset of the Preferred Plan detailing the improvements which are recommended for implementation in the 3 years following approval of the 2024 GBWC Consolidated IRP.
Section 9.0	Funding Plan. This section details the financing impacts and strategies for meeting the needs addressed in the GBWC-SSD Action Plan.
Section 10.0	System Improvement Rate Request. This section outlines the information required by Nevada Administrative Code (NAC) 704.6339 to support a request to designate water projects in the Action Plan as eligible for a System Improvement Rate.
Technical Appendices	This section is part of the comprehensive technical appendix that will support all of the specific resource plan volumes which will contain the complete details of the methodologies used in developing the resource plan along with all of the basic data used in the study.

1.2 Background

1.2.1 Spanish Springs Division Overview

The GBWC-SSD water system encompasses an area within Washoe County approximately 7.5 miles north of Interstate 80 off Pyramid Highway (State Highway 445) at the intersection of Pyramid Highway (NV 445) and La Posada Drive in Sparks, Nevada as shown in Figure 1.1. More specifically, the area extends east from Pyramid Highway along La Posada Drive to Cordoba Drive, north to Tranquil Drive, west to Pyramid Highway, and south to La Posada Drive (Figure 1.1). The service area spans an area approximately 1.75 miles north to south and 1.25 miles east to west covering an area of approximately 1.5 square miles. The GBWC-SSD service area is surrounded by the Truckee Meadows Water Authority (TMWA) water service area. Approximately 582 customers are currently being served.

GBWC-SSD de-annexed a portion of their territory due to GBWC's inability to provide adequate and reliable water service in a timely manner to the developer that needed to develop the project within a specific time frame. The de-annexed area is approximately 0.12 square miles and was taken over by TMWA. Please refer to the new legal description of the service area in Appendix D.

The GBWC-SSD water system is made up of two pressure zones served by two wells, three ground level water storage tanks, and one booster pump station located in the Spanish Springs Hydrographic Basin (Basin 85).

The purpose of this IRP is intended to balance the needs of the water system, environment, and customers over the next 20 years. The Action Plan is a 3-year plan. The purpose of the Action Plan is to:

- Identify current major assets that may have exceeded or are near the end of their useful life.
- Identify needed improvements in the water system; and
- Promote water system innovations that will provide efficiency in operations and maintenance.

By working through the Action Plan, GBWC-SSD will be able to develop a plan for the next three years balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. The planning horizon for the IRP is 20 years, from 2025 to 2044 (NAC 704.5654). Historical production data presented in this IRP covers the 10-year period preceding 2022 pursuant to NAC 704.5668.

1.2.2 Basin 85 (Spanish Springs Valley) Overview

The GBWC-SSD water system is located in the Spanish Springs Hydrographic Basin (Basin 85). Basin 85 contains a diverse appropriation of water rights including "Manner of Use" for commercial, construction, domestic, irrigation, municipal, quasi-municipal, recreational, and stock water. The largest volume of water right appropriations is for municipal and quasi-municipal use. In 1975 (Order 533), the State Engineer elevated Basin 85 to a "designated basin" status. A basin is usually elevated to a designated status when the water rights in the basin have reached or exceeded its perennial yield. A designated basin allowed the State Engineer additional authority in the administration of the water resources in the form of restricting specific uses and/or subdividing a basin for better management of the water resources. Currently, there are approximately 6,224.75-acre feet annually (AFA) of water rights appropriated in Basin 85 with a perennial yield of 1,000 AFA. Basin 85 is currently over appropriated.

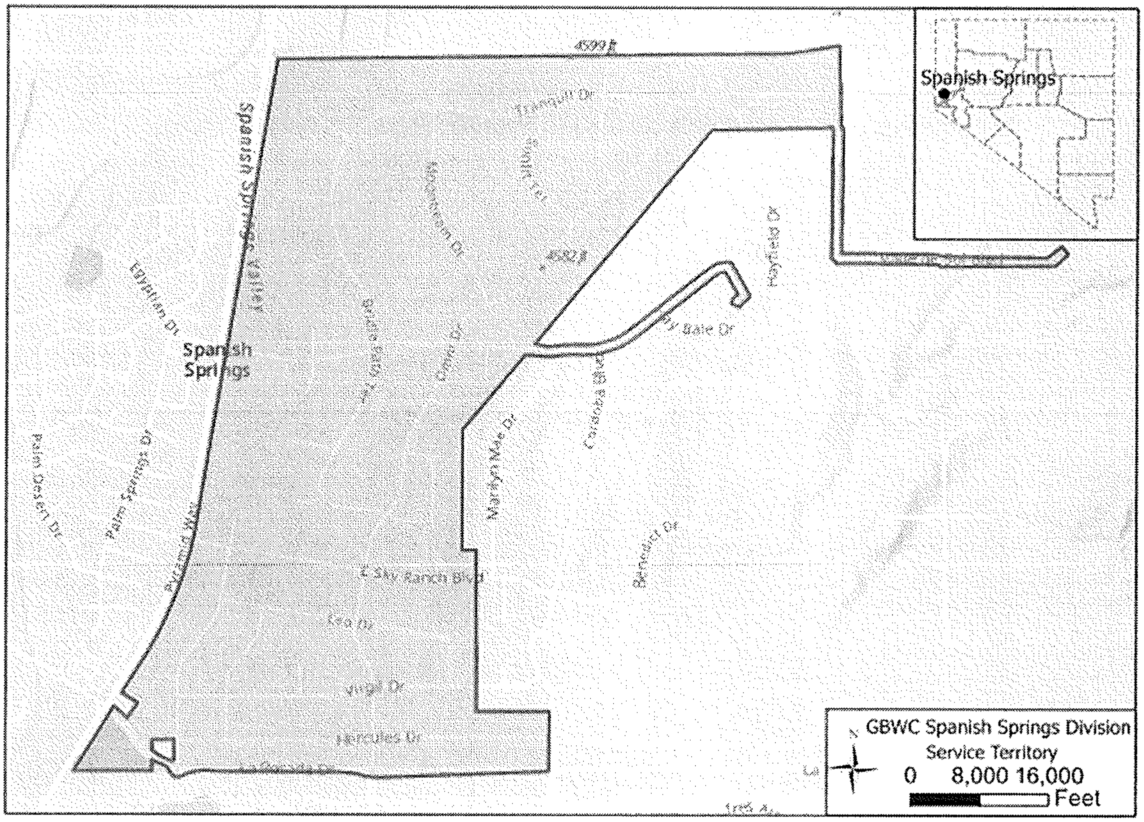


Figure 1.1: Overview of the Existing GBWC-SSD Water System

1.3 Objective

The overall objective of this IRP is to provide guidance to GBWC as to how to provide adequate water service to their customers in the GBWC-SSD service area over the next 20 years by balancing the objectives of minimizing cost, mitigating risk, and maximizing service reliability. This includes identifying needed improvements for the current system and needed improvements for projected growth over the next 20 years, identifying innovative tools and systems for improving operation and maintenance efficiencies, and determining the facilities needed to provide adequate service for growth. An asset management framework has been integrated into the IRP to identify and determine when existing critical assets will need to be replaced or rehabilitated in the future. A detailed Action Plan is provided identifying the needed and recommended improvements over the next three (3) years, and the timing of those improvements. Additional sections address water conservation as a means to limit water demand

and protect the groundwater resource, a funding plan for each of the proposed improvements, and estimated financial impacts of the proposed Action Plan on the customers.

1.3.1 Current Level of Service

In February 2015, the GBWC-SSD management team initiated the development of an Asset Management Plan which included a section on the current "Level of Service" (LOS) assessment. The section listed the LOS elements for the water system with regards to Regulatory and Contractual Quality, Reliability, and Customer Service. The LOS sections have helped GBWC-SSD identify areas where improvement will help to strengthen services and relations with their customers. For the most part, the GBWC-SSD water system met their LOS objectives such as:

- Water Esthetics: All minor air entrainment complaints have been resolved. With the rehabilitation of Wells 1 & 2, the air entrainment complaints have ceased.
- Monthly Reading of Meters: Occasional winter weather and buried frozen meter pits makes readings difficult to acquire. All the automatic meter readers (AMR) have been installed, making readings easily acquired, in all seasons.

The only minor improvements still needed include:

- GIS: Implementation of a Geographic Information System to maintain linear assets. Historically, GBWC utilized an employee to obtain GPS locations for Kimley Horn to add to a GIS map of the Spanish Springs assets. Currently, GBWC is utilizing internal employees to both gather and input GPS coordinates of assets. It is estimated that less than 50% of the assets are in the GIS map.

The Staff that operate and manage the GBWC-SSD water system also operate and manage the GBWC – Cold Springs Division (GBWC-CSD) water system. Since identifying these service needs for improvement, the GBWC-SSD Staff are targeting solutions to improve the LOS aspects as well as recommended improvements in the Preferred Plan section of this IRP (Section 7).

1.3.2 Asset Registry Condition Assessment

Prior to the 2021 Consolidated IRP, all GBWC Divisions performed an asset registry condition assessment independently. Since then, a more streamlined approach has been taken across all divisions. Please see Volume I for further details.

Appendix A, Vertical asset Registry List, contains the current vertical assets for the GBWC water and wastewater systems.

1.3.3 Failure Mode and Effects Analysis

Historically, each GBWC Division identified vulnerabilities differently. It has since been streamlined and the same process is used across all divisions. Please reference Volume I for further details.

SECTION 2.0: EXISTING CONDITIONS

2.1 Spanish Springs Division

2.1.1 Location

The GBWC-SSD service area is located approximately 7.5 miles north of the intersection of Interstate I-80 and Pyramid Highway. Specifically, the GBWC-SSD service area is located in portions of sections 25, 26, 35, and 36 of Township 21 North, Range 20 East of the Mount Diablo Meridian and within Washoe County, Nevada. The most recent service territory map can be found in Appendix D.

2.1.2 History

The Sky Ranch Utility Company (SRUC) was formed by the Spanish Springs Partnership to serve the Sky Ranch Subdivision in the Spanish Springs Valley. The Commission issued the Certificate of Public Convenience and Necessity (CPC) Number 860 to the Utility on November 14, 1983 (Docket No. 83-293). In July 1999, the SRUC transferred its CPC 860 to GBWC-SSD (Formally known as Sky Ranch Water Service Corporation) in the Commission Order under Docket No. 99-3028. On June 28, 2001, the Public Utilities Commission of Nevada (PUCN) approved the de-annexation of 34 lots in Sky Ranch North, Unit 1A, served by TMWA and formerly Washoe County Utility Division, and ordered GBWC-SSD to transfer 38.08 AFA of water rights to TMWA which were required to serve this lots in Docket No. 01-2023.

2.1.3 Service Territory

The GBWC-SSD water service area covers approximately 1.5 square miles and consists of two (2) pressure zones. For the GBWC-SSD 2024 IRP Volume V portion, there are 582 connections consisting primarily of single-family residences with a small number of public and commercial connections. The total number of lots available in the service territory is 610 and ranges from approximately 1 to 5 acres in size. The GBWC-SSD service territory is completely surrounded by the TMWA water service area and domestic well owners.

GBWC-SSD does not provide sewer services for their service area. Customers are on either private septic systems or are served by the City of Sparks, Truckee Meadows Water Reclamation Facility (TMWRF) sewer system. The residential customers on private septic systems are owned and maintained by the individual property owners. A small portion of commercial and public customers are served by collection, treatment, and disposal systems owned by City of Sparks and TMWRF.

In 2022 GBWC-SSD de-annexed the northern most portion of their service territory, giving control to TMWA. The de-annexed areas include all areas of Section 23 and a portion of Section 26. Please refer to appendix D for a full legal description.

The legal description of the water service territory for GBWC-SSD is contained in GBWC's Tariff Rule No. 17 which is maintained on file in the office of the PUCN and at the GBWC offices in Reno and Pahrump, as well as on the GBWC website at www.GreatBasinWaterCo.com. Refer to Appendix D for the legal descriptions of the service area.

2.1.4 Maps

Figure 1.1 shows the general overview of the GBWC-SSD water service territory. A more detailed map of the service territory with infrastructure is available in Appendix D.

2.1.5 Geography and Climate

The service territory terrain is generally level with slight slopes. The surrounding hills allow for placement of large water tanks sufficient for proper distribution pressures. One hundred ninety feet of topographic relief exists between the two pressure zones, ranging from 4,500 feet above mean sea level (amsl) to 4,690 amsl. The lower pressure zone is relatively level and only has 60 feet of topographic relief, ranging from 4,500 amsl to 4,560 amsl.

Summers in Spanish Springs are characterized by hot, dry afternoons with temperatures in the 90s to low 100s, cooling to lows in the 50s by morning. Average winter temperatures range from highs in the mid-40s and low 50s to lows in the mid-20s, frequently falling below freezing. Snowfall averages 21.5 inches per year and generally melts quickly. Annual precipitation averages around 8.1 inches per year throughout the region. Sunny or partly cloudy skies are predominant. Average monthly data for the region is summarized in Table 2.01.

Table 2.01: Spanish Springs Average Monthly Weather Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max. Temp. (°F)	47.7	51.5	59.5	64.8	73.2	82.7	91.6	90.0	83.4	71.4	56.7	46.9	68.3
Min. Temp. (°F)	23.5	25.7	31.0	35.1	41.5	47.6	53.5	51.4	44.6	35.5	28.1	22.6	36.7
Total Precip. (in.)	1.3	0.3	0.6	0.7	0.6	0.0	0.0	0.0	0.1	2.48	0.23	1.8	8.1
Total Snowfall (in.)	5.6	5.1	2.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	3.1	4.9	21.5

Station: Sparks, Nevada (267697)
Period of Record: 1999 to 2016 (Most recent climate data available)
Source: Western Regional Climate Center

2.1.6 Land Use

Land use within the service territory is primarily residential with some light commercial facilities. Commercial uses include a convenience store, car wash, storage facility, fire station, and church in the southwestern corner of the service territory.

2.1.7 Population

The residents that are served by the GBWC-SSD service territory represent a very small portion of the Spanish Springs community at large. The U.S. Census Bureau (https://www.census.gov/quickfacts/spanishspringscdpnevada) reported a population in Spanish Springs 2020 (most recent) Census Designated Place (CDP) of 17,314 people with an average household size of 2.71 persons per household. Census data specifically for the GBWC-SSD service area is not available. The GBWC-SSD service territory has been completely subdivided into 610 large lots ranging in size from 1 to 5 acres. Growth to the service area is limited to the minimal number of undeveloped lots that remain.

2.1.8 Water Supply and Quality

The water supply for GBWC-SSD is groundwater from two (2) wells located in the lower pressure zone. Water quality data from the 2022 Consumer Confidence Report for GBWC-SSD is provided in Table 2.02. This report illustrates that no regulated contaminates exceed maximum contaminant levels (MCLs) for compliance. The Consumer Confidence Reports can be found on www.GreatBasinWaterCo.com.

Table 2.02: Water Quality Data (2022) GBWC-SSD Consumer Confidence Report

Parameter	Violation Y/N	Test Year	UNITS	MCL	Range
Microbiological					
Inorganic Contaminants					
Arsenic*	N	2022	ppb	10	5.9-11
Barium	N	2022	ppm	2	0.058-0.15
Chromium	N	2022	ppm	0.1	0.002-0.006
Selenium	N	2022	ppm	0.05	<0.012-0.021
Fluoride	N	2022	ppm	2	<0.01
Nitrate	N	2022	ppm	10	0.58-9.9
Mercury	N	2022	ppb	2	0.6 – 0.7
Nickel	N	2022	ppm	0.1	0.003-0.005
Disinfection By-Products					
HAA5	N	2022	ppb	60	<1.0
TTHM	N	2022	ppb	80	<1.0
Chlorine	N	2022	ppm	4	0.23-1.09
Lead and Copper					
Copper, Free	N	2020	ppm	1.3 AL	0.002-0.170
Lead	N	2020	ppb	15 AL	<1.0-1.0
Radionuclides					
Combined Radium (-226 & -228)	N	2015	pCi/L	5	0.214-0.248
Uranium	N	2017	µg/L	30	3 - 10
Gross Alpha, Incl. Radon & U	N	2017	pCi/L	15	3.38-11.00
Gross Beta Particle Activity	N	2017	pCi/L	50	4.39-4.74
Radium 226	N	2015	pCi/L	5	0.0565-0.172
Radium 228	N	2015	pCi/L	5	0.0762-0.157
Radon	N	2017	pCi/L	N/A	640-756
Secondary Contaminants					
Chloride	N	2022	mg/L	400	51-99
Magnesium	N	2022	mg/L	150	15-32
Manganese	N	2022	mg/L	0.1	<0.001
pH	N	2022	pH	8.5	8.02-8.15
Sodium	N	2021	mg/L	200	26-54
Sulfate	N	2022	mg/L	500	41-82
Zinc	N	2022	mg/L	5	<0.01
TDS	N	2022	mg/L	1,000	350-630

* Means at or above the maximum contamination level periodically.

2.2 Existing System

Photos of the existing water system facilities major assets are contained in Appendix E and described in the sections to follow.

2.2.1 Distribution Piping (Pressure Zones)

The GBWC-SSD distribution piping consists of 6-, 8-, 10-, and 12-inch piping. The hydraulic model indicates that pipe sizing and conditions are adequate for maximum day demand (MDD) and fire flow. The development of the distribution pipe network was conducted over an extensive period of time with the older sections of the pipe network made of Schedule 40 polyvinyl chloride (PVC) and the newer pipe network made of C900 PVC. Generally, the older schedule 40 pipe is located south of and includes Sky Ranch Blvd while the newer C900 pipe is located north of Sky Ranch Blvd. Linear footages for all the different pipe diameters are listed in Table 2.03.

Table 2.03: GBWC-SSD Pipe Sizes and Total Length

Pipe Size	Pipe Length (ft.) (Schedule 40)	Pipe Length (ft.) (C900)
6-inch	17,300	5,700
8-inch	1,700	8,300
10-inch	4,300	25,700
12-inch	-	12,000
Total	**23,300**	**51,700**

2.2.1.1 Distribution Piping Existing Condition Assessment

The service lines and meter pit coils have caused the largest concentration of repairs in the system. The various portions of service lines and meter pits were installed starting in the late 1970s, through the 1980s and 1990s, and ending in the early 2000s. Generally, these repairs are located in the older sections of the GBWC-SSD service area. In 2018, GBWC started replacing a limited number of service connections, which experienced service line and meter pit coil issues. The replacement of service lines, meter pit coils, and meter pits are located in the upper pressure zone and on the following streets of Hercules, Virgil, Leo, and Rockwell. Some of the meter pits and service lines have been replaced with new updated meter pits and service lines. Typically, the saddles attached to the water service lines have been the area of failure due to the rusting of the clamps. Two main pipeline leaks were repaired on Sunset Springs in 2017. Table 2.04 contains a list of the number of service line, meter pit coils, and main pipeline leaks that have occurred from 2019 to 2022.

Table 2.04: Repairs to Distribution Piping, Water Service Lines, and Meter Pit Coils

Year	Meter Pit Repairs	Service Line Repairs	Main Pipeline Repairs	Valves, Sample Stations and Hydrant Repairs
2019	11	4	0	12
2020	5	0	0	0
2021	10	0	0	0
2022	3	2	0	1

2.2.1.2 Pressure Zone Condition Assessment

The GBWC-SSD water system has two distinct pressure zones known as the Lower Pressure Zone and the Upper Pressure Zone. A schematic diagram and map, included in Appendix C, show the locations of the pressure zones and other infrastructure. Each pressure zone contains its own storage tank(s). The Lower Pressure Zone is located on the south side of the service territory. The Lower Pressure Zone is served by two storage tanks known as Tanks 1A and 1B. The Lower Pressure Zone is fed by Wells 1 (Bridal/Bridle Path) and 2 (Suki). In the event of a loss in production from one of the wells, GBWC-SSD has an agreement with TMWA to convey emergency water through an existing metered 10-inch connection located on the west end of Hercules Drive. In 2020, a new backflow preventer and flow meter were installed on the west end of Hercules Drive, both of which are owned by TMWA.

The Upper Pressure Zone is located on the north side of the service territory and is served by one storage tank known as Tank 2. There are no wells feeding the Upper Pressure Zone. A booster station conveys water from the Lower Pressure Zone to the Upper Pressure Zone. The MDD pressures in each pressure zone are located in Table 2.05. Based on the available hydraulic modeling results, the pressure zones all meet minimum and maximum allowable delivery pressures per NAC 445A.6711(1)(b).

Table 2.05: GBWC-SSD Pressure Zones

Pressure Zone	Supply	Hydraulic Grade Lines	Hydraulic Model MDD Pressures (PSI)
Lower	Wells 1 & 2 to Tanks 1A & 1B	4,668	46.3 to ~81.8 psi
Upper	Booster Station in Lower Pressure Zone to Tank 2	4,771	46.4 to ~98.2 psi
Notes: PSI = pounds per square inch.			

2.2.2 Water Supply

All the water which supplies the water system comes from two wells: Well 1 (Bridle Path Well) and Well 2 (Suki Well). Both wells are located in the Lower Pressure Zone. Appendix D contains a map showing the locations of the two wells that feed the Lower Pressure Zone. Table 2.06

contains the wells and general information for each. The total water production capacity for the two wells is 875 gallons per minute (gpm).

Table 2.06: GBWC-SSD Potable Water Supply Wells and Capacities

Well	Casing Diameter (in)	Capacity (gpm)	Total Dynamic Head (ft)	Backup Power
Well 1 (Bridal/Bridle Path)	12	450	230	Yes
Well 2 (Suki)	12	425	260	Yes
Total Production		**875**		

2.2.2.1 Water Supply Well Existing Condition Assessment

Well 1 (Bridle Path Well)

Well 1 (also known as the Bridle Path Well) was originally drilled in 1989 and is constructed with a nominal 12-inch diameter steel casing to a total depth of 800 feet below ground level (bgl). The screen intervals consist of louver (shutter) screen from 199-395 feet; 475-575 feet bgl; and wire wrap screen from 395-475 feet; 575-795 feet bgl. The original static water level was 66 feet bgl. Currently the static water level is 68 feet bgl. The well is equipped with a Goulds 7TLC 6 stage submersible turbine pump with a 75-horsepower (HP) Franklin submersible motor. A rehabilitation of the well was conducted in June 2017. During the cleaning procedure, a hole was identified at approximately 445 feet bgl, allowing the gravel pack to flow into the well casing. The decision was made to abandon the lower portion of the well and install a plug up to the 430-foot interval to prevent any additional loss of gravel pack. An additional 40 feet of nominal 10-inch perforated casing was then installed on top of the plug in the event that additional weak areas in the screen interval might fail, allowing gravel pack inside the casing. Any future rehabilitations will not be possible due to the poor integrity of the screen intervals. The well was equipped with a 150 kW MTU Onsite Energy 6R0120 DS150 Model: 431CL6202 backup generator, in 2020. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. Currently, this well is 34 years old.

Well 2 (Suki Well)

Well 2 (also known as the Suki Well) was originally drilled in 1977 and is constructed with a nominal 12-inch diameter steel casing to a depth of 193 feet bgl. The screen intervals consist of factory mill slot from 70-108 feet; 128-178 feet; and wire wrap screen from 108-128 feet; 178-193 feet bgl. The original static water level was 29.5 feet bgl. Currently the static water level is 67 feet bgl, with a pumping water level of 112 feet bgl. The well is equipped with a Goulds 8RJLC, 4 stage submersible turbine pump with a 50-HP Hitachi submersible motor. A rehabilitation on the well in May 2016 helped clean the screen intervals and return some lost well capacity, but the condition of the casing suggests that this well is nearing the end of its useful life. The well was equipped with a 150 kW MTU Onsite Energy 6R0120 DS150 Model: 431CSL6202 backup generator in 2020. Any additional rehabilitations could result in a total failure of the integrity of the screen intervals. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. Currently, this well is 46 years old.

2.2.3 Storage

There are three (3) water tanks used for water storage in the GBWC-SSD area with a total capacity of 0.90 million gallons (MG) as listed in Table 2.07. Two (2) storage tanks (Tanks 1A and 1B) serve the Lower Pressure Zone and one (1) storage tank (Tank 2) serves the Upper Pressure Zone.

Table 2.07: GBWC-SSD Water Storage Tanks

Tank	Year Built	Volume (MG)	Base Elevation (ft amsl)	Diameter (ft)	Height (ft)	Material
1A	1980	0.25	4,636	38	30	Welded Steel
1B	1992	0.30	4,636	42	30	Welded Steel
2	1993	0.35	4,746	50	24	Welded Steel
Total		**0.90**				

2.2.3.1 Storage Tank Existing Condition Assessment

Washoe County Health District performed an inspection of the 3 tanks in the GBWC-SSD area on May 24, 2023. Three significant deficiencies and three minor deficiencies were identified. The three major deficiencies declared were due to the tanks' overflow pipes not having an adequate air gap. The area needs to be cleared around the overflow terminus to ensure there is an air gap to prevent contamination of finished water. The three minor deficiencies found at all 3 tanks were due to Northern Nevada Public Health District personnel not being able to get access to the top of the tank, due to GBWC-SSD policy. GBWC-SSD must take labeled pictures of the un-inspected items consisting of:

1. Tank vent with screening
2. Tank hatch open
3. Tank hatch closed
4. Interior of tank and sediment levels
5. Tops of the tanks

GBWC-SSD was to consult with Northern Nevada Public Health District by June 29, 2023 and they were to provide a written response by July 14, 2023. On July 11, 2023, GBWC-SSD provided a response letter to Northern Nevada Public Health District with the information requested.

Tank 1A

Storage Tank 1A is a nominal 250,000-gallon welded steel storage tank with an unknown construction date. The water system received a CPC in 1983 so the assumption is the tank was probably built sometime around 1983. This assumption is being made because no name plate exists on the tank. The tank was last inspected in 2019 by Inland Potable Services, Inc. out of Centennial, Colorado. The exterior of the tank was given a good to fair rating for all components. The interior of the tank received mainly fair to poor ratings for the floor, walls, and center column. Approximately 1/16th-inch of sediment was removed from the floor. The main recommendation from the inspection was to blast and coat the interior of the tank. The tank inspection report for Tank 1A is available in Appendix F.

This tank contains cathodic protection, which was installed in 2019. The water level indicator is broken, but since this tank is hydraulically connected to Tank 1B, one water level indicator is capable of measuring water levels in both tanks. Tank 1B has an operational water level indicator connected to the SCADA system. However, a Washoe County Health District sanitary survey, conducted on June 16, 2020, required the monitoring system be revised to show each tank separately in the SCADA system. GBWC-SSD is expecting to conduct upgrades to the SCADA system in 2023 and anticipates completion by the end of the year. The age of the tank is approximately 40+ years old. The tank is estimated to have 5± years of nominal useful life based on a storage tank nominal life expectancy of 45 years.

Tank 1B

Storage Tank 1B is a nominal 300,000-gallon welded steel storage tank constructed in 1992. The tank was last inspected in 2019 by Inland Potable Services, Inc out of Centennial, Colorado. The exterior and interior of the tank was given a good to fair rating for all components. Approximately 1/16th -inch of sediment was removed from the floor. The tank inspection report for Tank 1B is available in Appendix F. This tank contains cathodic protection, which was installed in 2019. The water level indicator in this tank was connected to GBWC-SSD's SCADA system so that level readings can be recorded and documented. The tank is estimated to have 14± years of nominal useful life based on a storage tank nominal life expectancy of 45 years.

Tank 2

Storage Tank 2 is a nominal 350,000-gallon welded steel storage tank constructed in 1993. The tank was last inspected in 2019 by Inland Potable Services, Inc. The exterior of the tank was given a good to fair rating for all components. The exterior of the roof did show signs of deterioration of the paint coat with corrosion noted. The interior of the tank was also given good to fair ratings for all components. The interior of the roof did show signs of deterioration. Approximately 1/8th -inch of sediment was removed from the floor. The tank inspection report for Tank 2 is available in Appendix F. This tank contains cathodic protection, which was installed in 2019. The water level indicator in this tank was connected to the SCADA system so that level readings can be recorded and documented. The tank is estimated to have 15± years of nominal useful life based on a storage tank nominal life expectancy of 45 years.

2.2.4 Booster Pumps

Water is pumped through a booster pump station located on Sunset Springs Lane from the Lower Pressure Zone into the Upper Pressure Zone. This is the only way that water can be conveyed into the Upper Pressure Zone. The booster station is located on Sky Ranch Drive in a very tight vault that often fills with water. After the Area Manager had an electrical inspection conducted, which found most all of the electrical contacts, conduit, and wiring were heavily corroded, all corroded electrical components were replaced in 2019. A flow meter is connected to the discharge piping running to the Upper Pressure Zone. Currently, the only way to read the flow meter for the booster station is manually. A plan to put into place to integrate the flow meter into the SCADA system, but due to the flow meter location to the wall of the vault, it couldn't be accomplished without removal of a portion of the vault wall. Currently, the staff is working on other alternatives so it can be connected to SCADA.

The larger booster pump has a Cla-Val installed to prevent water hammer when utilizing the larger pump. The Cla-Val was last inspected on August 9, 2022, and found to be in acceptable condition. The next scheduled inspection is recommended to be done in late 2024.

2.2.4.1 Pump and Motor Existing Condition Assessment

Booster Pump Station 1

The booster station vault is equipped with two (2) different size pumping systems. The larger of the two is a Paco Pump (unknown model) with a 75-HP Marathon motor with a capacity of 950 gpm with 235 feet of total dynamic head (TDH). The second pump is a Paco Pump (unknown model) with a 40-HP Baldor motor with the capacity of 475 gpm with 225 feet of TDH. The two pumps are located in parallel, in a very tight vault, making replacement of the pumps and motors very difficult. The 475-gpm booster pump is equipped with an inline CLA VAL system to prevent water hammer on startup. The 950-gpm booster pump and motor were both installed in 1996, making their age 24 years old. It is estimated that the 950-gpm booster pump and motor has reached the end of its useful life and may fail at any time.

The 475-gpm booster pump was installed in 2002 and the 40-HP motor was installed in 2007, making the pump 18 years old and the motor 13 years old. The booster station was equipped with a 150 kW MTU Onsite Energy 6R0120 DS150 Model: 431CSL6202 backup diesel generator in 2020. If a loss of power occurs to the system, the booster station can still convey water to the Upper Pressure Zone.

2.2.5 Backup Power Supply

Backup power supply is provided in the event that a power outage occurs and allows GBWC-SSD to continue to provide water services during emergency situations or shutdowns. Well 1, Well 2 and the Booster Station, have backup generators and automatic transfer switches to ensure instantaneous power to the motors when a power outage occurs.

2.2.6 System Operation and Control

The wells and booster pumping station are controlled by a SCADA system through the water levels in the tanks. When the water level drops to a preset level (see below), the pumps turn on and begin filling the tanks. The operations for each tank are discussed below and presented in Table 2.08.

Lower Pressure Zone (Tanks 1A & 1B)

The lower level in Storage Tanks 1A and 1B triggers both Well 1 and Well 2 to start when the water level is at 25.5 feet. When the tanks are filled, SCADA shuts down the wells at 28.0 feet.

Upper Pressure Zone (Tank 2)

The lower level in Storage Tank 2 triggers the booster station pump to start when the water level is at 17 feet. During the lower demand months, the 475-gpm booster pump operates, and during high demand months, the 950-gpm booster pump operates. When the tank is filled, SCADA shuts down the booster station at 20.0 feet. If the lower level in Storage Tanks 1A and 1B reaches 14 feet, SCADA shuts down the booster station.

Table 2.08: Storage Tank Control Points

Tank	Low Water Level (ft)	Main Filling Source at Low Water Level	Backup Supply Water Level (ft)	Backup Supply Source if Main Source Cannot Maintain Water Level	High Water Level - All Sources Off (ft)
Tank 1A	25.5	Well 1/Well 2	16.0	TMWA/Interconnect	28.0
Tank 1B	25.5	Well1/Well 2	16.0	TMWA/Interconnect	28.0
Tank 2	17.0	475 gpm Booster	13.0	TMWA/Interconnect	20.0

2.2.6.1 SCADA Existing Conditions Assessment

The GBWC-SSD current SCADA system was installed in 2012 and monitors the following aspects: Storage tank level with trends over time, well pump start/stop status, well pump run times, static and pumping water levels, booster pumps start/stop status, and run time for each booster pump motor. In addition, the SCADA system monitors "Out of Parameter" conditions and will trigger an alarm call-out to the on-call operator's cell phone. The "Out of Parameter" condition includes high tank levels, low tank levels, well pump/motor failure, and electrical power failure. All the monitoring equipment uses FM radio frequency to communicate with the receiving equipment located in Well House 2. The entire SCADA system is accessible through the operators' laptop, cell phones, and tablets through the internet. In 2021 the firewall was upgraded for the SCADA system.

GBWC-SSD is currently in the process of upgrading the SCADA system. The SCADA upgrade project was initiated in May 2023, with expected completion of December 31, 2023. The new SCADA system is called VTSCADA and the contractor installing the system has reported that all items for the upgrade are available, but there are supply chain delays for the materials, which may affect the completion date of this project.

SECTION 3.0: HISTORICAL DATA AND FORECASTING

3.1 Planning Period

The planning period for the 2024 GBWC Consolidated IRP is from 2025- 2044 with an emphasis on the full three years of data compiled for 2020, 2021 and 2022. Demand projections and buildout estimates will extend through 2044. The existing GBWC-SSD service territory currently contains a total of 610 permitted lots. As of 2023, GBWC-SSD has installed 582 meters on lots, leaving 28 lots still available for development. This equates to the existing service territory permitted residential lots currently at 95% of buildout.

3.2 Existing Service Area

The GBWC-SSD service area is primarily residential, with limited light commercial areas. The commercial development is limited to the southwest corner of the GBWC-SSD service area; businesses in this area include a gas station, grocery store, restaurants, and hair salon. The service area is located along the east side of Pyramid Way (Nevada State Route 445) and to the north of La Posada Drive in Spanish Springs, Nevada. The vast majority of the GBWC-SSD residential parcels have already been built out; therefore, future development within the service area is anticipated to be very limited. The greater Spanish Springs area is also primarily residential.

3.3 Population Projections

The *Nevada County Population Projections 2022– 2041* dated October 01, 2022, prepared by the Nevada State Demographer's Office, were used to project the future population and connections in the existing GBWC-SSD service area. The U.S. Census Bureau American Factfinder was also utilized to review past and current population information for the Spanish Springs Census Designated Place (CDP). The GBWC-SSD Service Area is contained within the Spanish Springs CDP.

The reported *Nevada County Population Projections 2022 – 2041* specifies a 2022 population for Washoe County of 485,113 people. From 2023 to 2028, the population is expected to increase to 539,931 people, equating to an average annual growth rate of 1.42%. From 2029 to 2037, growth rates are anticipated to continue increasing, but at a lower rate, with an average rate of 0.62%; this would result in a Washoe County population of 570,936 people by the end of 2037. The growth rate for 2038 through 2041 was listed at 0.4% annually, according to the Nevada State Demographer's Office population projections; this growth rate was extended through 2042, 2043, and 2044 to estimate populations through the planning period.

The Spanish Springs CDP (July 1, 2019) reported a population in the Spanish Springs area of 16,241 with an estimated population increase of 1.38% average annual growth projected to occur between 2019 and 2028. This population increase is slightly less than the Nevada State Demographer Office's projections. With either population projection, the limiting factor for growth in the GBWC-SSD service area is the number of lots available for development. There are currently 610 total lots, with 582 of the lots currently developed.

To estimate population growth for the GBWC-SSD service area specifically, an occupancy density of 2.78 people per household was used. This occupancy density is based on the July 1, 2018 census data for the Spanish Springs CDP boundary, which extends beyond the GBWC-SSD Service Area.

Table 3.01: Population and Service Connection Projections

Year	Washoe County Population(1)	% Change(1)	Spanish Springs Population(2)	Estimated GBWC-SSD Service Area Population(2)	Additional GBWC-SSD Service Connections(3)	Total GBWC-SSD Service Connections(4)
2020	475,896	-	17,314	1,556	-	581
2021	485,113	1.90%	17,643	1,550	0	581
2022	496,124	2.30%	18,049	1,553	1	582
2023	505,821	2.00%	18,410	1,584	12	594
2024	514,300	1.70%	18,723	1,611	10	604
2025	521,603	1.40%	18,985	1,629	6	610
2026	528,479	1.30%	19,232	1,629	0	610
2027	535,016	1.20%	19,462	1,629	0	610
2028	539,931	0.90%	19,638	1,629	0	610
2029	544,545	0.90%	19,814	1,629	0	610
2030	548,538	0.70%	19,953	1,629	0	610
2031	552,272	0.70%	20,093	1,629	0	610
2032	555,810	0.60%	20,213	1,629	0	610
2033	559,169	0.60%	20,335	1,629	0	610
2034	562,372	0.60%	20,457	1,629	0	610
2035	565,418	0.50%	20,559	1,629	0	610
2036	568,253	0.50%	20,662	1,629	0	610
2037	570,936	0.50%	20,765	1,629	0	610
2038	573,490	0.40%	20,848	1,629	0	610
2039	575,864	0.40%	20,931	1,629	0	610
2040	578,105	0.40%	21,015	1,629	0	610
2041	580,230	0.40%	21,099	1,629	0	610
2042	582,551	0.40%	21,184	1,629	0	610
2043	584,881	0.40%	21,268	1,629	0	610
2044	587,221	0.40%	21,353	1,629	0	610

Notes:
(1) Washoe County populations for 2020 are based on U.S Census Bureau data. Washoe County population projections for 2021-2044 are estimated using the % change based on Nevada County Population Projections 2022 to 2041 dated October 1, 2022, prepared by the Nevada State Demographer's Office. The % change from 2041 was extended for 2042, 2043, and 2044 to estimate populations through the planning period.
(2) The 2020 Spanish Springs populations are based on U.S Census Bureau data. Population projections from 2021 to 2025 were estimated using % change for Washoe County per Nevada State Demographer's Office. After the service connection count reached the estimated buildout of 610, the population was assumed to remain the same.

(3) Estimated Service Area Populations were calculated using the 2020-2022 actual connections meter counts multiplied by the U.S Census Bureau's household density of 2.71. Estimated Service Area Populations for 2023-2044 were calculated by multiplying the number of estimated Connection counts by U.S Census Bureau's household density of 2.71.

(4) Existing residential service connections for 2020-2022 are based on GBWC meter counts. Total existing service connections for 2020-2022 are based on GBWC meter counts and includes commercial. Due to the system being near build-out, it is assumed no additional connections will be made after the year 2025.

3.3.1 Future Development

The GBWC-SSD service area is surrounded by the TMWA service territory and domestic well owners. Due to the lack of areas for expansion of the existing service area, the potential for growth outside the existing service area appears to be quite limited. Once all remaining vacant lots have been developed, the GBWC-SSD service area will be fully built-out.

3.4 Water System Forecasting

3.4.1 Water System Connection Projections

The GBWC-SSD service territory is completely subdivided. The service territory is surrounded by the TMWA service territory. It is very unlikely that additional developments will be annexed into the service territory. Therefore, all future developments will likely be infill. At the projected growth rate for the area, it is anticipated that the GBWC-SSD service territory will be completely built out by 2025 as shown in Table 3.02.

Table 3.02: Projected Water Connections

Year	GBWC-SSD Total Connections
2020	581
2021	581
2022	582
2023	594
2024	604
2025	**610**
2026	610
2027	610
2028	610
2029	610
2030	610
2031	610
2032	610
2033	610
2034	610
2035	610
2036	610
2037	610
2038	610
2039	610
2040	610
2041	610
2042	610
2043	610
2044	610

3.4.2 Water Usage

3.4.2.1 Recorded Water Production GBWC-SSD

Table 3.03 summarizes historical water production from the two wells for years 2013 through 2022 based on the detailed information provided in Appendix G. There is a meter installed on the booster station which records how much water flows from the Lower Pressure Zone to the Upper Pressure Zone. However, the meter is in an underground vault that requires confined space procedures to enter. This requires that two people are present to check the meter, so a complete meter record is not available. The 2021 Spanish Springs IRP referred to a plan for GBWC-SSD to install a replacement meter (referred to as an AMR) on the booster station to rectify this situation.

Due to the narrow location of the underground vault, it would require significant work to replace the meter, including breaking concrete adjacent to the meter pit. Due to the difficulty of replacing the meter, GBWC-SSD has not completed this project and has no current plans to initiate a meter replacement, until other work is required in the booster station underground vault. The new meter will be compatible with the SCADA system that GBWC-SSD utilizes. The well production data can only be summarized for the water system as a whole in million gallons per day (MGD) and million gallons per year (MG/Y), rather than by each pressure zone.

The total annual water production during the 10-year period ranged from a high of 198.05 MG in 2014 to a low of 155.35 MG in 2017. This is a 21.6% deviation (42.7 MG/Y difference) in water production over the analyzed period. It is important to note that the 2017 meter data could be considered partially erroneous because Well 1 was down for structural repairs and the emergency interconnect between TMWA and GBWC-SSD had to be opened to meet demand.

Table 3.03: Historical Water Production for GBWC-SSD by Wells

	Lower Pressure Zone				Total	
	Well 1		Well 2			
Year	MG/Y	MGD	MG/Y	MGD	MG/Y	MGD
2013	82.33	0.23	112.57	0.31	194.90	0.53
2014	96.62	0.26	101.43	0.28	198.05	0.54
2015	69.41	0.19	99.54	0.27	168.95	0.46
2016	76.77	0.21	106.76	0.29	183.53	0.50
2017	48.45	0.13	106.91	0.29	155.35	0.43
2018	78.86	0.22	102.80	0.28	181.67	0.50
2019	63.18	0.17	101.28	0.28	164.46	0.45
2020	90.49	0.25	104.38	0.29	194.87	0.53
2021	78.24	0.21	98.96	0.27	177.20	0.49
2022	75.80	0.21	104.70	0.29	180.49	0.49

Monthly meter data was utilized to determine MDD. Using the maximum month production, the average day of the maximum month (ADMM) was calculated. The ADMM calculation relates to the estimated MDD value. MDD was calculated by multiplying the ADMM by 1.25 (a standard of the American Water Works Association [AWWA]). The ratio of the MDD to the average day demand (ADD) is typically referred to as the Peaking Factor (PF). According to the AWWA criteria, the peaking factor typically ranges from 1.2 to 3.0. The three-year average PF derived from the data (2020-2022) equates to 2.47, which is within the typical range. Maximum months observed were generally July or August. A peaking factor was also applied to the MDD to calculate the system's peak hour demand (PHD), which was used in the hydraulic model system analysis. Table 3.04 show the ADD, ADMM, MDD, PF and PHD values for 2020-2022.

Table 3.04: GBWC-SSD Historical Maximum Daily Production, Peaking Factors and Maximum Day Demand/PHD

Year	ADD (MGD)	ADMM (MGD)	ADMM/ADD	MDD/ ADMM	MDD (MGD)	MDD/ADD	PHD/MDD	PHD (MGD)	PHD (gpm)
2020	0.53	1.05	1.97	1.25	1.32	2.46	1.75	2.30	1599
2021	0.49	0.93	1.92	1.25	1.17	2.40	1.75	2.04	1419
2022	0.49	1.01	2.04	1.25	1.26	2.55	1.75	2.21	1533
MDD/ADD Average for 2020, 2021 & 2022						**2.47**			

As previously stated, peak production months have historically occurred in July or August. The maximum demands are also related to the seasonal changes in the system. The maximum demands always occur in the summer months when the weather is warmest and outdoor water demands are at their peak. Based on a review of production data, the peak season can be defined as May to October. Winter production includes months outside of this period. The seasonal peaking factor is the peak season production divided by the winter production. Approximately 76% of water used during the year occurs during the peak season months as shown in Table 3.05.

Table 3.05: Total Historical Seasonal Average Well Production

Year	Annual Production (12 months total) MG	Peak Seasonal Production (May-October) MG	Winter Production (November-April) MG	Seasonal Peaking Factor (Seasonal Peak/Winter Production)	Peak Month Production, MG	Peaking Factor (Peak Month/Average Annual Month)
2013	194.90	139.93	54.97	2.55	35.61	2.19
2014	198.05	138.02	60.03	2.30	32.16	1.95
2015	168.95	117.04	51.91	2.25	27.90	1.98
2016	183.53	138.96	44.57	3.12	35.09	2.29
2017	155.35	112.73	42.62	2.64	30.24	2.34
2018	181.67	137.38	44.29	3.10	33.93	2.24
2019	164.46	130.10	34.36	3.79	33.27	2.43
2020	194.87	161.64	33.23	4.86	32.63	2.01
2021	177.20	141.99	35.21	4.03	28.64	1.94
2022	180.49	146.79	33.70	4.36	31.28	2.08

3.4.2.2 Recorded Consumption

Table 3.06 summarizes the historical water meter use data for the years 2020, 2021 and 2022. The total annual water use supplied by GBWC-SSD during this time period decreased from 186.9 MG in 2020 to approximately 172.0 MG in 2021. This is an 8% decrease from 2020 to 2021. The following year (2022) historical meter use increased to 174.9 MG, which is a 1.7% increase from 2021.

Table 3.06: Summary of Historical Meter Water Use Data for 2013 – 2022

Year	Total (gal)	Total (AFA)
2013	174,667,900	536.04
2014	175,323,200	538.05
2015	147,266,860	451.95
2016	169,494,570	520.16
2017	165,817,210	508.87
2018	172,133,406	528.26
2019	159,062,100	488.14
2020	186,921,150	573.64
2021	171,955,950	527.71
2022	174,877,320	536.68
3-Yr. Average	**177,918,140**	**546.01**

The meter data can be broken down further to show the historical metered water use by class of service. Table 3.07 presents the metered data by class of service for the GBWC-SSD. As is evident, the residential class of service is by far the predominant service class for GBWC-SSD. Commercial use increased in 2022 due to demand from the operation of the Emigrant Storage and car wash on La Posada Drive, which is served by GBWC-SSD in the southwestern extent of their service territory.

Table 3.07: Historical Metered Water Use by Class of Service

Year	Residential		Commercial	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2013	N/A[1]	N/A[1]	N/A[1]	N/A[1]
2014	172,777,480	99.57	754,700	0.43%
2015	143,719,900	99.67	479,210	0.33%
2016	159,514,950	99.66	536,550	0.34%
2017	164,836,670	99.41	980,540	0.59%
2018	171,436,426	99.60	696,980	0.40%
2019	158,410,090	99.59	652,010	0.41%
2020	186,235,470	99.63%	685,680	0.37%
2021	171,296,230	99.62%	659,720	0.38%
2022	169,917,780	97.16%	4,959,540	2.84%
[1] Data collected in 2013 was not separated by class of service.				

3.4.2.3 Non-Revenue Water

The International Water Association (IWA) and the American Water Works Association (AWWA) define non-revenue water as equal to the total amount of water flowing into the potable water supply network from the source (Wells) minus the total amount of water that industrial and domestic consumers are authorized to use (metered/billed and authorized unbilled consumption). There are two broad types of losses that occur in drinking water utilities, which include Apparent losses and Real losses.

Apparent Losses: are the non-physical losses that occur in utility operations due to customer meter inaccuracies, systematic data handling errors in customer billing systems, and unauthorized consumption. In other words, this is water that is consumed, but is not properly measured, accounted, or paid for.

Real Losses: are the physical losses of water from the distribution system, including leakage and storage overflows.

Table 3.08 presents the differences between historical water production and actual usage during the 2020-2022 time period. This compares the production data from Table 3.05 to the metered water use from Table 3.06. The system non-revenue water (NRW) for GBWC-SSD averaged 3.43% over the last 3 years. As mentioned earlier, NRW is a combination of real losses such as leaks, and apparent losses such as variation in meter accuracy, un-metered accounts, and theft.

Table 3.08: GBWC-SSD Historical Non-Revenue Water Quantities

Year	Water Produced (MG/Y)(1)	Water Consumption (MG/Y) (2)	Gross Non-Revenue Water(3)(4) (MG/Y)	% Gross Non-Revenue Water(3)(4)
2013	194.90	174.67	20.23	0.10
2014	198.05	175.32	22.73	0.11
2015	168.95	147.27	21.68	0.13
2016	183.53	169.50	14.03	0.08
2017	155.35	165.82	-10.47	-6.7%
2018	181.67	172.13	9.54	5.3%
2019	164.46	159.06	5.4	3.3%
2020	194.87	186.92	7.95	4.1%
2021	177.20	171.96	5.24	3.0%
2022	180.49	174.88	5.62	3.1%
Three Year Average NRW				**3.4%**

Notes:
(1) Historical water production data from Table 3.03.
(2) Historical metered water usage data from Table 3.07.
(3) Non-revenue water is the difference between water production and water consumption.
(4) Production data for 2017 is less than metered use, resulting in a negative percentage of gross non-revenue water. This was due to an emergency failure in the integrity of Well 1's casing in July 2017. An unmetered intertie with TMWA was used to provide water to customers during this period, and no record of the water volumes provided by TMWA is available.

AWWA has been working over the past two decades to change the perception of what is considered an acceptable industry water loss percentage standard for NRW. Publications on water loss that refer to the "AWWA" Standard have ranged from 5% to 20% NRW. These misrepresentations, often derived anecdotally, come from technology and service providers, regulatory agencies, environmental groups, and water utilities. Since 2003, AWWA has recommended that it is in the best interest of utilities to set system-specific loss targets and not use the prescribed "one size fits all" mentality. While in past IRP documents, NRW has always been presented as a percentage loss with a goal of targeting 10% or less, it would be best to refrain from this type of objective and instead transition to the AWWA "Key Performance Indicators" (KPI) as provided in the "Non-Revenue Water AWWA Loss Control Committee Report" (AWWA Report) dated November 2019. A copy of the AWWA Report can be found in Appendix M. In order to meet the NAC 704.567 regulation, percentages for NRW are provided similar to previous IRP documents. However, for future analyses, it is recommended that GBWC works with the PUCN and other regulators to develop their own NRW targets by implementing the AWWA KPI as provided in the AWWA Report. The following measures can be conducted by GBWC-SSD as an ongoing effort to reduce real water losses from the water production process to the water delivery point and apparent losses in the utility operations as outlined in the AWWA Report:

- Annual water audits should be performed using the AWWA Free Water Audit Software.
- Well production meters should be regularly tested, monitored, and maintained.
- Storage tanks should be inspected at regular intervals to assure integrity against leakage.
- High system pressures should be reduced by implementation of system improvement projects including, but not limited to, the addition of VFDs on wells and booster pumps, more pressure reducing stations, and pipeline improvements.
- GBWC-SSD's continued diligence in repairing all pipeline leaks and breaks in a timely manner.
- Ensure that automatic meter reading/advanced metering infrastructure (AMR/AMI) are working properly.
- Continue tracking waterline breaks and leaks as a tool to prioritize and target pipeline system improvements.
- Install water meters at PRVs to monitor water flowing between Tracts. The installation of flow meters at the existing and future PRVs will allow for better delineation of NRW between Tracts and pressure zones.

3.4.3 Water Usage Forecasting

The GBWC-SSD service territory has been fully subdivided. Therefore, unless additional areas are annexed into the service territory, all future development will be infill from the remaining permitted lots. Projections for future population and connections in the GBWC-SSD service territory are detailed in Table 3.01 and 3.02. In addition, it is anticipated that all future infill connections will consist primarily of residential connections. Based on this assumption, GBWC-SSD would reach its potential buildout of a possible 610 connections by 2025, which is within the 20-years growth projection (refer to Table 3.02).

Table 3.09A and Table 3.09B summarize the average water demand data for 2020-2022 as provided by GBWC-SSD. In order to get a more accurate water demand for the three years used, only meter connections with 10 months of meter data or more were used to determine the average gallons per day per connection (gpdpc) for the residential and commercial users.

Table 3.09A: Average Daily Water Demand for GBWC-SSD Connections – Residential

Year	Annual Metered Water Use (Gallons)	Number of Active Connections(1)	Average GPD/Connection
2020	184,847,780	566	895
2021	171,203,970	570	823
2022	169,907,480	572	814
Average Use (Latest 3 years)			**844**

Notes:
(1) Total number of connections with 10 months or more of observed metered water. This results in slightly fewer connections and metered use than is presented previously in Table 3.07.

Table 3.09B: Average Daily Water Demand for GBWC-SSD Connections – Commercial

Year	Annual Metered Water Use (Gallons)	Number of Active Connections(1)	Average GPD/Connection
2020	520,680	3	476
2021	354,090	3	323
2022	180,800	1	496
Average Use (Latest 3 years)			**431**

Notes:
(1) Total number of connections with 10 months or more of observed metered water. This results in slightly fewer connections and metered use than is presented previously in Table 3.07.

The GBWC-SSD has an average residential water usage of 844 gpdpc, and an average commercial water usage of 431.

Table 3.10 provides both an average day and maximum day projected future water demand for GBWC-SSD. Actual demands were used for the years 2020-2022, while the Nevada Demographer's population projections were utilized for forecasting. The average peaking factor (MDD/ADD) calculated for the water demand was used in the forecasting. The factor was derived from actual consumption figures and ADD in the maximum months. Refer to Table 3.04 and 3.05 for historical maximum daily consumption and peaking factors used.

Table 3.10: Projected Future Water Demand (MGD)

Year	GBWC-SSD Total Required Water Production (MGD) MDD/ADD = 2.47		Total ADD Production Required	Service Area % Population Change
	ADD	MDD	AFA	
2020	0.53	1.32	598	-
2021	0.49	1.20	544	1.90%
2022	0.49	1.22	554	2.30%
2023	0.50	1.25	565	2.00%
2024	0.51	1.27	576	1.70%
2025	0.52	1.29	586	1.40%
2026	0.53	1.31	594	1.30%
2027	0.54	1.33	602	0.00%
2028	0.54	1.33	602	0.00%
2029	0.54	1.33	602	0.00%
2030	0.54	1.33	602	0.00%
2031	0.54	1.33	602	0.00%
2032	0.54	1.33	602	0.00%
2033	0.54	1.33	602	0.00%
2034	0.54	1.33	602	0.00%
2035	0.54	1.33	602	0.00%
2036	0.54	1.33	602	0.00%
2037	0.54	1.33	602	0.00%
2038	0.54	1.33	602	0.00%
2039	0.54	1.33	602	0.00%
2040	0.54	1.33	602	0.00%
2041	0.54	1.33	602	0.00%
2042	0.54	1.33	602	0.00%
2043	0.54	1.33	602	0.00%
2044	0.54	1.33	602	0.00%

Table 3.11 shows the existing well capacity available for the GBWC-SSD water system based on current well production. When comparing Table 3.11 (Existing Well Capacity) to Table 3.10

(existing and future projected demands), the well production meets ADD and MDD and will meet the required future demand at buildout for the existing GBWC-SSD service territory.

Table 3.11: Existing Well Capacity

Wells	Capacity (gpm)	Capacity (MGD)
Well #1 (Bridal/Bridle Path)	450	0.65
Well #2 (Suki)	425	0.61
Totals	**875**	**1.26**

The projected future demands do not account for system-wide losses or continued savings associated with the GBWC Water Conservation Plan. Since the NRW system losses averaged 3.4% for the past three years, GBWC-SSD water production must be able to accommodate for these apparent and real losses in order to ensure the system demands are met. The amount of realized NRW is a product of the amount of water delivered. In order to calculate the total amount of water that needs to be delivered, an adjustment to recognize NRW is needed. This "gross-up" adjustment is intended to provide the total amount of production water required to be delivered to compensate for both consumption and NRW. The well production required was inflated by a factor of 3.4% to account for losses.

Both the existing and future water demand (averages) were provided/projected based on the calculated water demand factors for residential and commercial service classes. Table 3.12A identified existing demand as provided by meter data. Table 3.12B identified the gross-up well production required to provide anticipated service and accommodate for NRW losses.

Tables 3.13A and 3.13B show future demands as of 2044. These tables present the minimum well production required to accommodate for these unaccounted-for losses. It should be noted that using this same demand-average throughout the system and projected into the future, water demands in 3.13A and 3.13B are higher than demands noted in Table 3.10; this difference results from accounting for system losses.

Table 3.12A: Existing Demand / **Table 3.12B Existing Well Production Required**

GBWC-SSD Existing Demand					Existing Well Production Required To Accommodate for Demand and Anticipated System Wide Losses		
Customer Class	**No. of Customers**	**Average Daily Demand (gpdpc)**	**Total Average Demand per Day (gpd)**	**Average Daily Demand TOTAL SYSTEM (gpm)**	**ADD required (gpm) including NRW (3.4% system losses)**	**SYSTEM MDD Required (gpm) (ADD X 2.47**	**SYSTEM PHD Required (gpm) (MDD X 1.75)**
Residential	573	844	483,612	336	347	858	1,502
Commercial	9	431	3,879	3	3	8	14
TOTALS	**582**	**1,275**	**487,491**	**339**	**350**	**866**	**1,516**

Table 3.13A: Future Demand (2044) / **Table 3.13B: Future Well Production Required (2044)**

GBWC-SSD Future Demand					Future Well Production Required To Accommodate for Demand and Anticipated System Wide Losses		
Customer Class	**No. of Customers**	**Average Daily Demand (gpdpc)**	**Total Average Demand per Day (gpd)**	**Average Daily Demand TOTAL SYSTEM (gpm)**	**ADD required (gpm) including NRW (3.4% system losses)**	**SYSTEM MDD Required (gpm) (ADD X 2.47)**	**SYSTEM PHD Required (gpm) (MDD X 1.75)**
Residential	601	844	507,244	352	364	900	1,574
Commercial	9	431	3,879	3	3	8	14
TOTALS	**610**	**1,275**	**511,123**	**355**	**367**	**908**	**1,588**

Based on the limited growth potential available in the existing service territory, GBWC-SSD can meet MDD now. The well capacity of 875 gpm is just below the future demand of 908 gpm for meeting the MDD. Based on population projections, buildout should occur around 2025 in the Action Plan period.

SECTION 4.0: WATER SUPPLY NEEDS

4.1 Water Supply

The water system was evaluated based on the GBWC-SSD total system capacity, which includes wells and storage, compared to projected water demands. Projected water demands are presented in Table 3.12B and 3.13B of Section 3.3.3. The water supply plan is based on the production and storage facilities defined previously in Section 2 of this report.

4.1.1 Water Rights

The water in Nevada on the surface and underground belongs to the people of the State. Entities within the State can apply for the right to use that water. Nevada Water Law is founded on the doctrine of prior appropriation – "first in time, first in right". Under the appropriation doctrine, the first user of water from a source acquired a priority right to the use and to the extent of its use.

The GBWC-SSD owns and leases seven (7) water right permits/certificates in the Spanish Springs Hydrographic Groundwater Basin with a total combined duty of 719.66 AFA. As a result, GBWC-SSD has the right to pump up to 719.66 AFA from its two potable supply wells to support customer demand. All the water rights are in good standing with the State Engineer's Office. Roughly 18.0 AFA of these water rights are allocated for commercial use. Based on the dedication criteria and existing service territory, there appears to be sufficient water rights to serve the remainder of the undeveloped residential lots. Appendix B contains a hydrographic summary of the water rights manner of uses for the Spanish Springs Basin.

4.1.2 Water Supply Evaluation

The GBWC-SSD water system capacity was evaluated by comparing existing, available well capacity to the current and projected future water demands. The criteria for evaluating adequate supply capacity is based on NAC 445A.6672, which requires a system which relies exclusively on wells to provide a total well capacity sufficient to meet the MDD when all the wells are operational, or the ADD with the most productive well out of service.

Because water is conveyed from the Lower Pressure Zone to the Upper Pressure Zone via booster pumps, and since no PRVs exist to allow flow back into to the Lower Pressure Zone, the water system was evaluated for well capacity as a whole. The water system has two active wells with a total pumping capacity of 875 gpm. Table 4.01 shows a total available pumping capacity of 875 gpm with both wells in service. With Well 1 (the largest producer) out of service, the available pumping capacity is 425 gpm. To accommodate for the 3.4% system losses, the water supply demand was grossed up by the 3.4%, which requires 350 gpm to meet ADD for existing conditions and an anticipated 367 gpm by 2044 to meet ADD. Refer to Table 3.12B and 3.13B for the well production requirement figures. MDD is 2.47 multiplied by the ADD for the water system and 837 gpm is required to meet MDD for existing conditions and is anticipated to need 908 gpm to meet MDD by 2044. As Table 4.01 shows the water system can meet existing demand, but not future demands.

In a true NACA.6672 regulatory sense, the existing well capacity is in compliance. However, it should be noted that the existing well infrastructure is reaching the end of its remaining useful life and replacement capacity will be needed in the years to come. Any disruptions or significant capacity losses in the two wells would cause the Spanish Springs system to go out of compliance and the existing capacity will not be large enough for the future demand.

Table 4.01: Well Capacity and Future Requirements

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
Well #1	YES		450
Well #2	YES		425
		Total, All Wells in Service	**875**
		Total, Well #1 Out of Service	**425**
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	350	866	YES
2044	367	908	NO

Notes:
(1) Capacities are based on the most recent review conducted in 2022 by Lumos Staff.
(2) System demand (determined in previous sections) was grossed up to accommodate for 3.4% losses.
(3) Total well supply must be able to accommodate MDD.

4.1.3 Water Storage Evaluation

Water storage and overall system capacity is regulated by the Nevada Administrative Code (NAC), Sections 445A.6672, 445A.6674, 445A.66745, 445A.6675 and 445A.66755. Key definitions used for the Water Storage Evaluation are listed, below:

- Total Storage Capacity – Includes operating storage, emergency storage, and fire flow storage.
- Operating Storage – Operating storage is provided as MDD. The MDD for each of the pressure zones in the GBWC-CSD Water System were calculated by applying a peaking factor to the ADD. The ADD was calculated from meter data provided for the years 2020, 2021, and 2022.
- Emergency Storage – The NAC states that emergency storage can either be determined by the engineer or is 75% of the amount of operating storage. Lumos has provided emergency storage equivalent to ADD.
- Fire Flow Storage – For Fire Flow Storage, GBWC-SSD uses 1,000 gpm for 2 hours for residential and small commercial areas.

As of the 2024 IRP, the System Capacity Analysis will include an additional scenario to check the total capacity of the GBWC-SSD water system, as defined by NAC 445A.6672. Since this system relies exclusively on groundwater wells as its source of water, it was determined that incorporating a more robust analysis would be the most conservative approach to ensure the system could successfully provide capacity for the following two scenarios:

- Scenario A: Total system capacity requirements for one day of MDD, emergency reserves, and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
- Scenario B: Total system capacity requirements for one day of ADD, emergency reserves, and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

It is important to note that the System Capacity Analysis performed in the previous versions of the GBWC IRP is still being performed in the 2024 IRP under Scenario A. The only modification to this analysis was to add Scenario B (per NAC 445A.6672) to provide additional insight into possible system vulnerabilities. Explanations of how ADD, MDD, and emergency reserves were calculated are listed in each storage capacity table in the following sub-sections. Each pressure zone's storage capacity was analyzed separately.

Lower Pressure Zone, Storage

The Lower Pressure Zone has two storage tanks, designated as Tanks 1A and 1B. Tank 1A has a storage capacity of 250,000 gallons and Tank 1B has a storage capacity of 300,000 gallons. This provides a total storage capacity for the Lower Pressure Zone of 550,000 gallons. The Lower Pressure Zone currently has 323 connections. The Lower Pressure Zone is approximately 96% built out with an estimated total connection count of 338.

The Lower Pressure Zone has a minimum fire flow requirement of 1,000 gpm for 2 hours for the residential and small commercial properties. There is one larger commercial property, the Spring Lutheran Church which opened in 2017, with a fire flow requirement of 1,500 gpm for 2 hours. The GBWC-SSD existing hydraulic distribution system would not meet the flow requirement. The new church is located close to a shopping center that has a fire flow requirement of 4,000 gpm and is served by TMWA. One of the fire hydrants for the shopping center is located within the required proximity of the church and does meet the fire flow required. The church received approval from the fire hydrant owner, TMWA, to use it for fire suppression so the Fire Marshal gave the church approval as well. The church's fire flow requirement is serviced by TMWA's fire hydrant and not GBWC-SSD.

Table 4.02 identifies the Lower Pressure Zone as meeting the storage capacity requirement with its existing storage tanks and when the alternative storage capacity from the two wells is included. Well sites 1 and 2 have backup generators added, which will add an additional 1,260,000 gallons of storage capacity to the lower pressure zone. With this alternative pumping capacity, the Lower Pressure Zone meets the existing and future storage capacity requirements (see Table 4.03).

Table 4.02: GBWC-SSD Lower Pressure Zone Existing System Capacity Analysis

System Requirements			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
MDD(3) (gal)	673,352	ADD(3) (gal)	272,612
Emergency Reserve(4) (gal)	272,612	Emergency Reserve(4) (gal)	272,612
Fire Flow (gal) 1,000 gpm for 2 hours	120,000	Fire Flow (gal) 1,000 gpm for 2 hours	120,000
Required Storage (gal)	**1,065,964**	**Required Storage (gal)**	**665,224**
System Storage Capacity(5)			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Tanks 1A & 1B (gal)	550,000	Tanks 1A & 1B (gal)	550,000
Well 1 (gal)	648,000	Well 1 (gal)	648,000
Well 2 (gal)	612,000	Well 2 (gal)	612,000
Total Capacity (gal) All Wells in Service	**1,810,000**	**Total Capacity (gal) Largest Producer Out of Service**	**1,162,000**
Storage/Capacity Comparison			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Required Storage (gal)	1,065,964	Required Storage (gal)	665,224
Total Capacity (gal)	1,810,000	Total Capacity (gal)	1,162,000
Difference (gal)	**744,036**	**Difference (gal)**	**496,776**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**YES**

Notes:
(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.
(3) Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 3.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.47 (determined in previous sections).
(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675.
(5) Tank volumes represent nominal (nameplate) volumes.

Table 4.03: GBWC-SSD Lower Pressure Zone Future System Capacity Analysis

System Requirements			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
MDD(3) (gal)	704,622	ADD(3) (gal)	285,272
Emergency Reserve(4) (gal)	285,272	Emergency Reserve(4) (gal)	285,272
Fire Flow (gal) 1,000 gpm for 2 hours	120,000	Fire Flow (gal) 1,000 gpm for 2 hours	120,000
Required Storage (gal)	1,109,894	Required Storage (gal)	690,544
System Storage Capacity(5)			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Tanks 1A & 1B (gal)	550,000	Tanks 1A & 1B (gal)	550,000
Well 1 (gal)	648,000	Well 1 (gal)	648,000
Well 2 (gal)	612,000	Well 2 (gal)	612,000
Total Capacity (gal) All Wells in Service	1,810,000	Total Capacity (gal) Largest Producer Out of Service	1,162,000
Storage/Capacity Comparison			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Required Storage (gal)	1,109,894	Required Storage (gal)	690,544
Total Capacity (gal)	1,802,800	Total Capacity (gal)	1,154,800
Difference (gal)	700,106	Difference (gal)	471,456
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.

(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.

(3) Projected ADD was determined through analysis of 2022 meter data provided by GBWC and population projections (determined in previous sections). The ADD was increased by 3.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.47 (determined in previous sections).

(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675

(5) Tank volumes represent nominal (nameplate) volumes.

Upper Pressure Zone, Storage

The Upper Pressure Zone has one storage tank known as the Tank 2. The total storage capacity of Tank 2 is 350,000 gallons. The Upper Pressure Zone currently has 250 connections consisting of residential homes. The Upper Pressure Zone is approximately 95% built out with an estimated total connection count of 263.

The Upper Pressure Zone has a required fire flow capacity of 1,000 gpm for 2 hours. All the connections in the Upper Pressure Zone are residential.

Table 4.04 identifies the Upper Pressure Zone as not meeting storage capacity requirements with its existing storage tank capacity alone. Similar to the Lower Pressure Zone, the Upper Pressure Zone has a very high ADD. The addition of backup power to Well 1, Well 2 and the booster station allows alternative pumping capacity in the for the Upper Pressure Zone, utilizing the booster station to convey the alternative water from the Lower Pressure Zone into the Upper Pressure Zone. Table 4.05 shows that utilizing the alternative pumping capacity with the existing storage tank meets the anticipated future capacity required.

Table 4.04: GBWC-SSD Upper Pressure Zone Existing System Capacity Analysis

Upper Pressure Zone Existing Conditions (as of 2022)			
System Requirements			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
MDD(3) (gal)	521,170	ADD(3) (gal)	211,000
Emergency Reserve(4) (gal)	211,000	Emergency Reserve(4) (gal)	211,000
Fire Flow (gal) 1,000 gpm for 2 hours	120,000	Fire Flow (gal) 1,000 gpm for 2 hours	120,000
Required Storage (gal)	**852,170**	**Required Storage (gal)**	**542,000**
System Storage Capacity(5)			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Tank 2 (gal)	350,000	Tank 2 (gal)	350,000
Well 1 (gal)	648,000	Well 1 (gal)	648,000
Well 2 (gal)	612,000	Well 2 (gal)	612,000
Total Capacity (gal) All Wells in Service	**1,610,000**	**Total Capacity (gal) Largest Producer Out of Service**	**962,000**
Storage/Capacity Comparison			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Required Storage (gal)	852,170	Required Storage (gal)	542,000
Total Capacity (gal)	1,610,000	Total Capacity (gal)	962,000
Difference (gal)	**757,830**	**Difference (gal)**	**420,000**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**YES**

Notes:

(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.
(3) Existing ADD was determined through analysis of 2022 meter data provided by GBWC (determined in previous sections). The ADD was increased by 3.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.47 (determined in previous sections).
(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675
(5) Tank volumes represent nominal (nameplate) volumes.

Table 4.05: GBWC-SSD Upper Pressure Zone Future System Capacity Analysis

Upper Pressure Zone Projected Conditions (as of 2044)			
System Requirements			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
MDD(3) (gal)	548,984	ADD(3) (gal)	221,972
Emergency Reserve(4) (gal)	221,972	Emergency Reserve(4) (gal)	221,972
Fire Flow (gal) 1,000 gpm for 2 hours	120,000	Fire Flow (gal) 1,000 gpm for 2 hours	120,000
Required Storage (gal)	**890,956**	**Required Storage (gal)**	**563,944**
System Storage Capacity(5)			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Tank 2 (gal)	350,000	Tank 2 (gal)	350,000
Well 1 (gal)	648,000	Well 1 (gal)	648,000
Well 2 (gal)	612,000	Well 2 (gal)	612,000
Total Capacity (gal) All Wells in Service	**1,610,000**	**Total Capacity (gal) Largest Producer Out of Service**	**962,000**
Storage/Capacity Comparison			
Scenario A(1) = MDD + ADD + FF		Scenario B(2) = ADD + ADD + FF - Well (Largest Producer)	
Required Storage (gal)	890,956	Required Storage (gal)	563,944
Total Capacity (gal)	1,610,000	Total Capacity (gal)	962,000
Difference (gal)	**719,044**	**Difference (gal)**	**398,056**
Meets NAC Requirements?	**YES**	**Meets NAC Requirements?**	**YES**

Notes:
(1) Scenario A is described in NAC 445A.6672.3.(a) and is a required storage analysis for well-reliant systems. In Scenario A, required storage is defined as one day of MDD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service.
(2) Scenario B is described in NAC 445A.6672.3.(b) and is a required storage analysis for well-reliant systems. In Scenario B, required storage is defined as one day of ADD (see note 3), emergency reserve (see note 4), and the most extreme fire flow/demand required in the system area. The system capacity includes any storage tanks and all wells in service except for the largest producing well.
(3) Projected ADD was determined through analysis of 2022 meter data provided by GBWC and population projections (determined in previous sections). The ADD was increased by 3.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.47 (determined in previous sections).
(4) Emergency reserve is defined as one day of ADD as allowed by NAC 445A.6675
(5) Tank volumes represent nominal (nameplate) volumes.

4.2 Water Distribution System Criteria

The water distribution system was analyzed by hydraulically modeling the GBWC-SSD water system. The hydraulic model was analyzed on an existing demand basis for ADD, MDD, PHD, and fire flow conditions. The pipeline network was evaluated based on flow velocities and head losses as they related to pressures throughout the distribution system.

The goal for developing any needed solution to problematic areas of the distribution network was to improve efficiency by making the minimum changes necessary to correct the deficiency. The overall objective was to produce a fully functional and compliant system at the lowest cost to rate payers.

Design criteria are outlined in NAC 445A.6672 and are summarized in Table 4.06.

Table 4.06: Design Criteria

Parameter	Criteria
Minimum Pressure at Peak Hour Demand*	30 psi
Minimum Pressure at Maximum Day Demand*	40 psi
Maximum Pressure*	100 psi
Maximum Flow Velocity in Pipe*	< 8 feet per second (fps)
Maximum Head Loss**	10 feet per 1,000 feet
Fire Flow	
Minimum Residual Pressure	20 psi
Minimum Residual Fire Flow	1,000 gpm
Minimum Commercial Fire Flow	1,000 gpm

Notes:
*Provisions of the Nevada Administrative Code.
**American Water Works Association (AWWA).

Model Selection and Development

The GBWC-SSD hydraulic water model was analyzed using the Bentley WaterCAD v8i modeling software. The existing model for the GBWC-SSD water system was selected to begin the process from the model as prepared and calibrated by Brown & Caldwell in 2010 per GBWC-SSD's request. The existing model was updated with all additional connections that have occurred since 2010. The model was updated to fit current conditions, including updating all system demands and the addition of new demands due to growth since the last model update.

Demands Update

Based on available information, the following method was used to update the model demands, which included multiple steps:

- Lumos distributed new demands to account for growth since the model was last analyzed. This process included identification of new service connections between 2020 and 2022. Once identified, these demands were distributed to nodes adjacent to the new service connections, incorporating 2020-2022 water meter billing data.
- Updated average day system demands developed in the previous step were then globally adjusted to the existing MDD for the two pressure zones. This was done by applying the

MDD/ADD peaking factor for each pressure zone. PHD was provided by multiplying 1.75 to MDD for each of the pressure zones.

- To adjust the model for the 3-Year Action Plan and 2044 Future Demands, the pressure zones were regionally adjusted based on the estimated ADD for both scenarios. The ADD was then globally adjusted to the estimated MDD-scenario based on the peaking factor presented above. Table 4.07 presents the existing and anticipated demands used in the hydraulic model.

Table 4.07: Hydraulic Model Loading

GBWC-SSD PRESSURE ZONES	ADD (gpm)	MDD (gpm)	PHD (gpm)
Existing (2022) Upper Pressure Zone	150	371	649
Existing (2022) Lower Pressure Zone	189	466	816
Totals	**339**	**837**	**1465**
Action Plan (2027) Upper Pressure Zone	165	406	711
Action Plan (2027) Lower Pressure Zone	203	501	876
Totals	**367**	**908**	**1535**
Future (2044) Upper Pressure Zone	165	406	711
Future (2044) Lower Pressure Zone	203	501	876
Totals	**367**	**908**	**1535**

The hydraulic modeling scenarios performed include:

- Existing MDD
- Existing MDD with fire flow
- Existing PHD
- 3-Year Action Plan (2027) MDD
- 3-Year Action Plan (2027) MDD with fire flow
- 3-Year Action Plan (2027) PHD
- Future (2044) MDD
- Future (2044) MDD with fire flow
- Future (2044) PHD

4.2.1 Distribution System Evaluation

The GBWC-SSD water system was evaluated using Bentley WaterCAD v8i software and carefully applied data, assumptions, and operating conditions. The objective of the analysis was to identify weaknesses in the distribution network that would lead to unacceptable pressure conditions, reduced fire-flow capacity, and energy waste through high head losses.

4.2.2 System Deficiencies and Alternatives for Improvements

The GBWC-SSD distribution model was analyzed for Existing Conditions, the 3-Year Action Plan (2027), and the Preferred Plan (2044). Since buildout for the water system is anticipated to occur within the 3-Year Action Plan period, the analysis for the 3-Year Action Plan and Preferred Plan (2044) have the same results. No significant deficiencies were identified in any of the model runs. Model results are presented in Appendix H.

Existing Conditions

With the exception of a few model junctions, the hydraulic distribution model for the existing conditions meets all the design criteria. The MDD + Fire Flow (FF) hydraulic model run had one junction that didn't meet the required fire flow of 1,000 gpm with 20 psi residual pressure. The location had a fire flow of 985.9 with a residual pressure at 20 psi. The location included:

1. The east dead end of Geraldine Ct (node J-60), which has 6" pipe.

However, the nodes at the fire hydrants nearest these nodes meet all design criteria. All the rest of the hydraulic distribution model runs for the existing conditions meet all the design criteria.

Action Plan (2027)

Similar to the existing conditions scenario, the hydraulic distribution model meets all the design criteria for the 3-year Action Plan scenario (2027) with only minor exceptions. The MDD + FF hydraulic model run had a couple junctions that didn't meet the required 1,000 gpm fire flow rate with 20 psi residual pressures. The two locations had fire flows ranging from 946.8 – 990.7 gpm with residual pressures at 20 psi. The two locations include:

1. The east end of Sky Ranch Blvd (node J-79), which has 6" pipe.
2. The east end of Geraldine Ct (node J-60), which has 6" pipe.

All the rest of the hydraulic distribution model runs for the Action Plan scenario (2027) meet all the design criteria.

Preferred Plan (2044)

Because buildout is projected to occur by the end of the 3-Year Action Plan period, the hydraulic model run results for the Preferred Plan scenario in 2044 are the same as the Action Plan hydraulic modeling run results.

4.3 Water Transfer Possibilities

TMWA is the only regional water purveyor adjacent to the GBWC-SSD service territory. A manual interconnect exists at the intersection of Hercules/Cordoba through a valve in the street. In 2020, a new backflow preventer and flow meter were installed on the west end of Hercules Drive, both of which are owned by TMWA. Currently GBWC-SSD and TMWA have a written agreement to allow for an emergency transfer of water from TMWA into the GBWC-SSD service area. Because the differential pressure between the two systems only allowed for a transfer of water into GBWC-SSD but not in the other direction, TMWA has inter-tied into the system with a PRV and water meter. In 2018, GBWC-SSD authorized TMWA to conduct a high-level engineering analysis to determine the least cost necessary to provide wholesale water to the service area. TMWA estimated the cost to provide 600 gpm to the service area is approximately $9,722,416, while a maximum day capacity of 1,100 gpm would be approximately $17,589,436. Due to the large cost for a water supply by TMWA, no contract has been developed for the purchase of water from TMWA. The final discovery for these cost estimates can be found in Appendix M.

4.4 Water Reliability

4.4.1 Overview

The GBWC-SSD water system relies entirely on groundwater. Several factors which could affect the reliability of GBWC-SSD groundwater, which include well failures (both wells are reaching the end of their useful life), droughts (which can affect water quality and water quantity), and catastrophic interruptions.

4.4.2 Well Failure

As mentioned in Section 2 of this Volume, the two existing GBWC-SSD wells were rehabilitated in 2017 to help increase the production capacity of the wells. With the completion of these rehabilitations, it has become evident that both Well 1 and Well 2 have very poor well casing integrity and could fail within the next 5 years. As mentioned in Section 2, the well screen in Well 1 became compromised in at least one location and a blank section of liner casing was installed to hold back the gravel behind the original screen.

4.4.3 Historical Effects of Drought

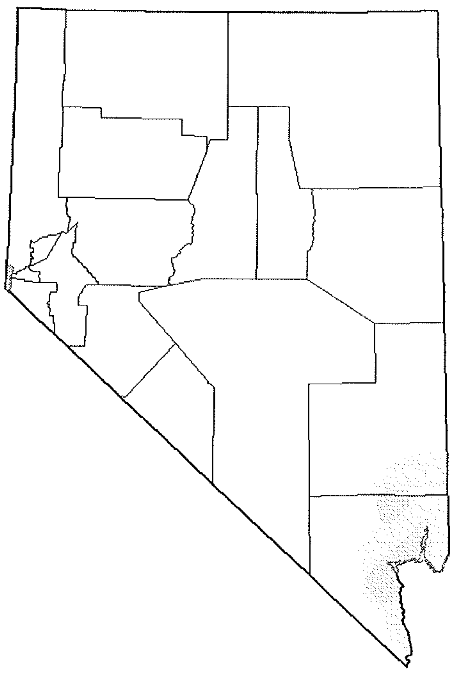
One factor affecting reliability of the groundwater supply is the trend in pumping water levels. From 2000 through 2023, the Spanish Springs Area has had 17 years out of 23 years of "Moderate to exceptional Drought" conditions. The National Drought Mitigation Center (NDMC) monitors drought conditions throughout the United States and classifies drought conditions based on intensity and percent of an area affected by the drought. The NDMC has a website that records drought conditions several times per month every month of the year. The website is:

Reference: http://droughtmonitor.unl.edu/Maps/MapArchive.aspx

Figure 4.01 is an example of the data provided on the website. Due to the substantial precipitation in the 2023 water year, starting October 1, 2022, the drought circumstances have been pushed back, however, additional precipitation periods are needed to remain out of this prolonged drought cycle.

U.S. Drought Monitor

Nevada



December 26, 2023

(Released Thursday, Dec. 28, 2023)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	94.41	5.59	1.60	0.00	0.00	0.00
Last Week 12-19-2023	94.40	5.60	1.60	0.00	0.00	0.00
3 Months Ago 09-26-2023	94.28	5.72	1.60	0.00	0.00	0.00
Start of Calendar Year 01-03-2023	0.00	100.00	100.00	78.45	24.45	0.00
Start of Water Year 09-26-2023	94.28	5.72	1.60	0.00	0.00	0.00
One Year Ago 12-27-2022	0.00	100.00	100.00	99.51	24.45	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Rocky Bilotta
NCEI/NOAA

USDA

droughtmonitor.unl.edu

Figure 4.01: Drought Conditions Map for Nevada as of December 2023
(Source: http://droughtmonitor.unl.edu/Maps/MapArchive.aspx)

4.4.4 Catastrophic Interruption

The catastrophic interruptions including regional power outages, earthquakes or other national disaster and man-made disasters have been addressed in Volume I of the Consolidated 2024 IRP.

4.4.5 Man-Made Disasters

Man-made disasters can come in many forms. Fortunately, GBWC-SSD has never experienced civil riots or acts of terrorism. Minor acts of vandalism have occurred, such as graffiti and theft. Should a man-made disaster affect the infrastructure, the same procedures are followed with local law enforcement being notified.

With the rise of the 2020 Pandemic (COVID-19) in the country, GBWC-SSD has had to adapt their operational procedures to ensure the health and safety of their employees. GBWC-SSD was identified as an "Essential Business" and continued to provide services to their customers. Social distancing and facemasks were introduced as new protocols to reduce the spread of the virus within the GBWC-SSD. When available, most of the employees were working remotely and all meetings were converted to virtual meetings. When utilizing vehicles for travel to company-owned facilities, only one employee was allowed to be in a company-owned vehicle at a time. The Center for Disease Control (CDC) provided safety protocols, which were integrated into GBWC-SSD's everyday operations of their facilities. As of 2023 we are out of the pandemic phase of COVID-19; however, GBWC-SSD is prepared with experience and protocols to continue providing services to customers in the event of another pandemic level event.

The most likely sources of contamination of water supplies are because of backflow from loss of pressure in the system, through unprotected cross connections or after a break in a main.

Purposeful intrusion into the system is guarded through fences, lighting, inspections, and locks. Contamination of the water supply is protected by:

- Frequent monitoring and testing of water for bacterial contamination.
- Recording customer complaints regarding water quality.
- Working chlorinators at the well sites.
- Active backflow prevention requiring routine monitoring of all new customer service applications and backflow prevention assemblies for potential cross connections.
- Ability to isolate segments of the water distribution system through use of valves.

GBWC has created a Cross-Connection Control program and corresponding manual for all systems in the State of Nevada. Cross-connections between a potable water system and non-potable sources of contamination represent a threat to public health. This program is designed to maintain the safety and quality of the water in the supply and distribution system by preventing the introduction, by backflow, of any foreign liquids, gases, or other substances into the supply system. Cross connection control is addressed in GBWC's tariff and the GBWC Standards and Specifications for Water Distribution System Construction for new development.

GBWC Tariff Rule No. 15, Sections G (effective July 2019) and H (effective July 2019) provide for Cross-Connection Control and penalties for violation. Per Section G:

- "Where any water pipe on a Customer's premises is cross-connected to another source or water supply, the Utility may refuse or discontinue service until there shall be installed at the expense of the Customer a suitable protective device, approved by the Utility, to protect against back-flow into the Utility's system, as required by the governmental authorities having jurisdiction. Customer or Applicant will own and maintain said cross-connection protective device(s) and provide to Utility each year the annual inspection report by a licensed cross-connection inspector and follow the Utility's State approved Cross Connection Control Plan and this Section G can cause the imposition of penalties set forth in the following Section H."

In accordance with Section H, penalties are assessed for violations of the Cross-Connection Plan, with the penalties increasing with each offense. The addition of violation fees and a structure for notifying customers in violation with the Cross-Connection Control Program are greatly assisting in protecting the potable water system.

4.4.6 Conclusion

The best defense against emergencies is to avoid them through daily inspections, routine equipment maintenance, long-term equipment maintenance, comprehensive sampling plans, security, usage checks and communication.

In all cases of disaster, natural or man-made, the best response to a catastrophic interruption of service is to be prepared. Staff are trained for emergency response in OSHA safety, Electrical Safety, Lock Out / Tag Out, Generator Operation, and recognizing chemicals in an uncontrolled environment.

Public notification procedures are established with contact numbers. Communication procedures and equipment are in place. Primary and secondary emergency responders are designated.

During a dire emergency, an uncontaminated and undamaged well will be disconnected from the distribution system and used to distribute water to the public. GBWC-SSD will provide staff personnel to work in partnership with the local fire department to distribute drinking water. In the worst-case scenario, where GBWC-SSD wells and storage tanks cannot supply safe drinking water, bottled water must be provided. Should a catastrophic disaster occur in Spanish Springs, GBWC-SSD has put the plans and resources together to respond quickly and efficiently to ensure safe drinking water.

SECTION 5.0: EMERGENCY RESPONSE PLAN

Section 5 of Volume I of this IRP provides a generalized explanation of the Emergency Action Plan for the four divisions, and the Emergency Action Plan for GBWC-SSD is provided in Appendix J.

SECTION 6.0: WATER CONSERVATION PLAN

The conservation plan is discussed in Section 6 in Volume I of this IRP, and the full conservation plan is included as Appendix K. GBWC-SSD has no deviations from the conservation plan provided in Volume I.

SECTION 7.0: PREFERRED PLAN

The purpose of a utility's Preferred Plan is to set forth the "utility's selection of its preferred options for meeting the demand for water for the term of the resource plan." The preferred plan must "include an explanation of the criteria that the utility used to select its preferred options" in "sufficient detail to enable the Commission to determine whether the utility's selection is justified." NAC 704.5674.

The 2024 IRP Preferred Plan for GBWC-SSD is intended to provide a list of necessary projects over the next 20-year planning period to continue providing the current LOS to their customers. With the integration of an asset management plan to this volume of the 2024 Consolidated IRP, the Preferred Plan also makes recommendations associated with monitoring, maintenance, and inspections for several critical assets of the water system. The purpose of these recommendations is to extend the useful life of the assets and to prolong the need for replacement or refurbishment. A condition assessment of several assets over the past year identified some of the larger assets which have reached the end of their useful lives and will need to be replaced and/or refurbished. The capital projects provided in this preferred plan are at a planning level guideline based on current demand and growth projections and should be reviewed periodically and updated in future IRPs.

The preferred plan addresses the system, compliance, environmental, and conservation needs at a capital spending and monitoring schedule, which GBWC-SSD staff believes are prudent. The asset maintenance, monitoring, and smaller capital recommendations are provided in the plan with the goal of extending the assets' useful lives beyond their nominal life expectancies. This will help to push out some of the larger capital projects for replacement or refurbishing of specific assets.

With this strategy in mind, the objective of this Preferred Plan is to make the necessary investments to at least maintain the customer's existing LOS while ensuring NAC compliance of the GBWC-SSD water system.

7.1 CIP Organization and Description

The Capital Improvement Projects (CIPs) sections describe capital improvements, maintenance, and monitoring recommendations to the system to maintain the customer's existing LOS while ensuring NAC 445A compliance. The timing for the project improvements has been assessed extensively by GBWC-SSD staff and their engineers to ensure the most cost-effective results are captured for the ratepayers, while sustaining their existing LOS. The scheduling for the capital improvements were designed in a manner that brings about the least cost with the highest benefit to the company and its ratepayers. The following CIPs have been developed based on the best information available.

It should be noted that the CIPs are conceptual plans, and no survey routes, site inspections or other field investigations have been conducted at this time. It should also be noted that no easements or sites have been obtained for facilities that are planned outside the public right of way. It is possible that when such investigations are conducted at the time of design, changes in pipe alignments, lengths, facility siting or other changes may be required. All estimated costs in this Volume (GBWC-SSD, Volume V) of the 2024 IRP were developed from actual costs from third parties and do not include items such as allowance for funds used during construction (AFUDC) and capitalized time as requested by Commission Staff.

The following sections describe the CIPs, monitoring, maintenance, and inspection recommendations necessary to maintain the customer's LOS for the GBWC-SSD water system, while ensuring NAC 445A compliance. All the recommendations are provided to:

1. Replace assets that are at the end of their useful lives.
2. Extend the useful life of an asset.
3. Improve the monitoring of major assets.
4. Reduce operators time associated with meter reading so maintenance and monitoring can take precedence; and
5. Ensure that a reliable supply of water is conveyed to the customers.

A detailed breakdown of the construction and non-construction costs for each of the CIPs can be found in Appendix I.

7.2 Preferred Plan Water Projects

Reconditioning of Tank 1A (Interior and Exterior)

Storage Tank 1A is a nominal 250,000-gallon welded steel storage tank with an unknown construction date. The water system received a CPC in 1983 so the assumption is the tank was probably built sometime around 1983. This assumption is being made because no name plate exists on the tank. The tank was inspected in 2019 and 2023 by Inland Potable Services, Inc out of Centennial, Colorado. The exterior of the tank was given a good to fair rating for all components. The interior of the tank received mainly poor ratings for the floor, walls, and center column. A recommendation is being made that the interior and exterior of the tank be pressure washed and recoated to recondition the tank and help ensure an extended useful life. The estimated cost and schedule for this project is as follows:

- <u>Reconditioning of Tank 1A (Interior and Exterior)</u>
  Estimated Cost: $521,326
  CIP Year: 2028

Pipeline and Meter Pit Replacement

Several times a year, TMWA, the Regional Transportation Commission (RTC), City of Reno, and Washoe County meet to plan out CIPs to take advantage of cost savings by scheduling street repairs, water main replacements, storm water replacements, sewer collection pipe replacements, associated laterals and meter pit replacements, and sidewalk and electrical power upgrades all at the same time. By coordinating these projects, significant savings are created and budgeted dollars can stretch out for more projects. GBWC-SSD would like to conduct similar coordinated efforts on water improvement projects with Washoe County Roads with the hope that it will reduce the cost of replacing water mains in paved streets. With some of the water mains in GBWC-SSD showing signs of breaking in recent years, GBWC-SSD is planning to allocate a budgetary dollar amount annually to focus on future water main replacement projects. Since it appears that many of the water system service lines may be leaking where they are saddled into the water mains, this is a good opportunity to address these leaks and potentially reduce NRW in the system, which appears to be declining in the apparent losses. Check valves could also be installed as a means of backflow prevention during the same time as any meter pit replacement work. Due to uncertainty in the costs associated with coordinating with Washoe County Roads, GBWC-SSD is estimating a budgetary dollar amount. These budgeted amounts may or may not be used every year. The actual costs will be based on Washoe County Roads schedule and if they have not planned any road rehabilitations in GBWC-SSD service territory, then the money budgeted may not be used. Other years may utilize previous unused budgets if the County has a project that is advantageous in benefiting overall cost. The budgetary cost and project schedule for the water main replacement projects are as follows:

- Pipeline and Meter Pit Replacement Project
  Budgetary Cost Estimate: $250,000 (each year)
  CIP Year: 2028-2044

Replacement of Water Main on Sunset Springs Lane

In 2017, two sections of the 12-inch water main on Sunset Springs Lane were identified as in need of repair. Age and poor installation practices by the contractor for this section of pipeline are resulting in water main leaks. GBWC-SSD plans to replace approximately 3,300 linear feet (LF) of this water main. The estimated cost currently includes the road repairs; however, GBWC-SSD plans to coordinate the schedule with Washoe County Road Department to potentially shift road repair costs to Washoe County. Currently, the timing of the pipeline replacement is determined based on the condition of the road and when Washoe County will likely schedule the road for maintenance upgrades. The replacement line is anticipated to extend approximately 6 feet into the roadway. An existing TMWA transmission line appears to be located approximately 3 to 4 feet from the proposed replacement line location. The proximity of the nearby line and requirement to work in the road will create additional safety, cost, and work area restriction considerations for the project. The estimated cost and schedule for this project is as follows:

- Replacement of Water Main on Sunset Springs Lane
  Estimated Cost: $1,200,000
  CIP Year: 2029

Replacement of Bridle Path (Well 1)

The Bridle Path Well (Well 1) was rehabilitated in the spring of 2017. During the cleaning and video inspection of the well, a sizable hole was observed in the screen interval at around 435 feet below ground level (bgl). The hole was allowing the filter pack behind the screen interval to flow into the well. If this was allowed to continue, the well would have lost all the gravel from this depth upward resulting in a complete loss of the filter pack. The loss of the filter pack would result in the well pumping large quantities of sand making the well inoperable. The only option to immediately fix was to install a liner into this portion of the well to hold back the remaining gravel pack. This resulted in sealing off the lower portion of the well from 400 feet to a total depth of 800 feet bgl. Currently, only the upper portion of the well is still usable, but other intervals of screen in the remaining zones are also showing signs of failure. GBWC-SSD is hoping to get at least 7 additional years out of this well before it completely fails. GBWC-SSD plans to drill a test hole and replacement well within the same parcel of land as the existing Bridle Path Well. The anticipated size and depth of the well has been preliminarily designed similar to the existing well (14-inch casing to 800 feet). The well replacement process is anticipated to take approximately two (2) years. The estimated cost and schedule for this project is as follows:

- Bridle Path Replacement Well
  Estimated Cost: $1,600,000
  CIP Year: 2030

Arsenic/Nitrate Treatment Pilot Testing and Preliminary Design Report

Although the two production wells currently meet the MCL for arsenic concentration through an Alternative Monitoring Plan using a running annual average, the Bridle Path Well has been showing a trend in increasing arsenic levels. In 2019, arsenic values ranged from 4-12 ug/l, and it was only through the running annual average for arsenic that levels were below the MCL of 10 ug/L, and therefore not a violation. GBWC-SSD believes that over time, this increasing trend could result in requiring a mitigation measure for arsenic. GBWC-SSD plans to conduct an arsenic treatment pilot testing and develop a Preliminary Engineering Report to determine the best method to mitigate the future anticipated arsenic issue. GBWC-SSD observed a nitrate concentration at the MCL of 10 mg/L in a municipal well on September 1, 2023. This resulted in an email from Northern Nevada Public Health stating their concerns regarding a potential increasing trend in nitrate concentrations. In response, GBWC-SSD drafted a memorandum to NNPH detailing different strategies being evaluated to promote water quality. The three potential options consisted of: 1) securing a new groundwater source location, if feasible; 2) connecting to a future water treatment facility owned and operated by TMWA, or; 3) construct localized treatment infrastructure within the GBWC-SSD territory. It should be noted that GBWC-SSD contributed financially and participated in a recent pilot treatment study with TMWA. A draft memorandum summarizing the pilot project was completed by Carollo in early 2024. A copy of GBWC-SSD's memorandum response to NNPH is included in Appendix M.

The estimated cost and schedule for this project is as follows:

- Arsenic Treatment Pilot Testing and PER
  Estimated Cost: $160,000
  CIP Year: 2030

Arsenic/Nitrate Treatment Plant

Following the results of the Arsenic Treatment Preliminary Design Report described above, the next step will be to implement the design and construction of an arsenic treatment plant, pending further assessment. The treatment plant will be tied into the replacement Bridle Path Well (Well

1) to bring the concentration into compliance. Even though this preferred project is still speculative, it needs to be addressed due to the threat of increasing arsenic levels in the existing wells. The plant could potentially be located near the Bridle Path well location. The estimated cost and schedule for this project is as follows:

- Arsenic Treatment Plant
  Estimated Cost: $2,500,000
  CIP Year: 2031

Secondary Transmission Main Inter-tie with TMWA (Alternative to As Treatment Plant)

Creating an inter-tie connection with the other neighboring water utility, TMWA, presents an additional strategy for increasing the system's water supply. TMWA completed a discovery effort in 2018 to estimate costs for the inter-tie to SSD for flow rates of 600 and 1,100 gpm. This would allow GBWC to purchase additional water from TMWA to meet the system demand rather than expanding water sources directly within the SSD service area. TMWA has a much larger relative service area and can more easily access water resources with lower arsenic concentrations. The proposed point of connection would be a 12-inch main along Cordoba Boulevard. This strategy may be considered as an alternative to the arsenic treatment plant; it is unlikely that both the treatment plant and inter-tie would be implemented. Estimated costs for this project are as follows:

- Secondary Transmission Main Intertie
  Estimated Cost: $9,722,416 (for 600 gpm), $17,589,436 (for 1,100 gpm)
  CIP Year: 2031

Pressure Reducing Valve between Upper and Lower Pressure Zones

This is a conditional project, if GBWC-SSD is able to locate a feasible location for a New Well in the Upper Pressure Zone. GBWC-SSD would need to install a PRV between the Upper and Lower Pressure Zones to provide more flexibility between the two zones. If this happens, having the ability to move water to the lower pressure zone will become a necessity in the event that a well is taken offline or goes down. The tentative schedule will in part be dependent on the location of the new production well in the Upper Pressure Zone. The estimated cost and schedule for this project is as follows:

- PRV Between Upper and Lower Pressure Zones
  Estimated Cost: $250,000
  CIP Year: 2032

7.3 Other Fixed Assets – Future Potential Replacement Needs

Table 7.01 is a list of additional assets that may need replacement or refurbishing based on their age and expected nominal useful lives. The goal for many of these assets, through proper monitoring and maintenance, is to extend their useful lives beyond the nominal useful life expectancy for replacement. Many of the recommended monitoring, maintenance, and inspection recommendations have been designed for this reason.

Table 7.01: Major Assets Expected Replacement/Refurbish Years

Asset	Year	Comments
Booster Pump/Motor 1	2038	Replacement
Booster Pump/Motor 2	2038	Replacement

7.4 Preferred Plan Project Timeline

Table 7.02 provides an estimated project schedule timeline for the recommended implementation of the Preferred Plan. This project schedule timeline only recommends implementation of projects through 2044 with a recommended budgetary cost estimate for the yearly replacement of future linear and fixed assets. As previously mentioned, the schedule timeline for replacement of assets should be determined based on the monitoring, maintenance, and inspection protocols recommended in the 2024 IRP and future IRPs.

Table 7.02: Scheduled Timeline for Preferred Plan Water CIPs

Year	Projects	Total Annual CIP Cost
2025	See Action Plan Timeline	$282,005
2026	See Action Plan Timeline	$880,012
2027	See Action Plan Timeline	$91,500
2028	Tank 1A Reconditioning Pipeline and Meter Pit Replacement	$771,326
2029	Pipeline and Meter Pit Replacement Main Replacement (Sunset Springs Lane)	$1,450,000
2030	Pipeline and Meter Pit Replacement Bridle Path Replacement Well Arsenic Treatment Pilot Testing and PER	$2,010,000
2031	Pipeline and Meter Pit Replacement Arsenic Treatment Plant TMWA Intertie (not included in costs)*	$2,750,000
2032	Pipeline Meter Pit Replacement PRV Between Upper/Lower Pressure Zones	$500,000
2033	Pipeline Meter Pit Replacement	$250,000
2034	Pipeline Meter Pit Replacement	$250,000
2035	Pipeline Meter Pit Replacement	$250,000
2036	Pipeline Meter Pit Replacement	$250,000
2037	Pipeline Meter Pit Replacement	$250,000
2038	Pipeline Meter Pit Replacement Booster Pump/Motor Replacement	$500,000
2039	Pipeline Meter Pit Replacement	$250,000
2040	Pipeline Meter Pit Replacement	$250,000
2041	Pipeline Meter Pit Replacement	$250,000
2042	Pipeline Meter Pit Replacement	$250,000
2043	Pipeline Meter Pit Replacement	$250,000
2044	Pipeline Meter Pit Replacement	$250,000
20-Year Preferred/Action Plan Total*		**$11,984,843**

*Note: Total cost above reflects the implementation of the arsenic treatment plant and excludes the TMWA intertie project. The treatment plant and TMWA intertie are mutually exclusive alternatives. If the TMWA intertie is implemented rather than the treatment plant, the total 20-year cost estimate could be up to an approximate $27,054,378.

SECTION 8.0: ACTION PLAN

The recommended Action Plan projects for GBWC-SSD targets the water system in a way that helps maintain (and improve) the customers' current LOS, provide redundancy to the system, free up staff time for added recommended monitoring and maintenance, and ensures compliance with NAC 445A "water works" regulations. In addition to the recommended capital projects, several additional monitoring, maintenance, and inspection recommendations are being proposed with the goal of even greater oversight of assets to further extend the nominal life expectancy for many of the larger assets. Where this Action Plan provides only a single option for a project, this represents the sole viable option for the project. For every Action Plan item related to a forecasted demand deficiency, we have considered all relevant and required factors in reaching our determination. Consistent with the Commission's guidance for the IRP, GBWC-SSD has scaled its Action Plan to reflect projects that it can reasonably complete within the 3-year Action Plan period.

It should be noted that the CIPs are conceptual plans, and no survey routes, site inspections or other field investigations have been conducted at this time. It should also be noted that no easements or sites have been obtained for facilities that are planned outside the public right of way. It is possible that when such investigations are conducted at the time of design, changes in pipe alignments, lengths, facility siting or other changes may be required. All estimated costs in this Volume (GBWC-SSD, Volume V) of the consolidated 2024 IRP were developed from actual costs from third parties and do not include items such as allowance for funds used during construction (AFUDC). The AFUDC is included in the Funding Plan (Appendix L).

A detailed breakdown of the construction and non-construction costs for each action plan project can be found in Appendix I.

8.1 Action Plan Projects

The three-year Action Plan projects are focused on asset concerns that have been identified through the development of the asset management component, NAC compliance, and GBWC-SSD operations staff recommendations. The Action Plan projects are as follows:

- Rehabilitation of Suki Well (Well 2)
- AMI Installation
- Rehabilitation of Tank 2 – Interior and Exterior

8.2 Water System Projects

Rehabilitation of Suki Well (Well 2)

Well 2 was originally drilled and constructed in 1977. Well rehabilitation is proposed due to the condition of the well casing, which is nearing the end of its service life. Redrilling the well is not an option due to limited space on the associated parcel and the proximity of nearby septic systems. Based on its age and observed condition, it is unlikely that the existing well screen can withstand another cleaning without becoming compromised. The first step of the rehabilitation is to pull all pumping equipment and appurtenances from the existing well. A video survey should be completed for the entire well after it is flushed with clean water; this will help to document the pre-rehabilitation condition of the well. A nominal 10-inch diameter liner composed of stainless steel should then be installed in the original casing. Installation of filter pack between the new liner and existing well casing is not interpreted as practical and is not recommended due to limited annulus space. The well should then be acid treated and cleaned via swabbing. The well can also be pump tested to design the pumping equipment for the rehabilitated well. If necessary, GBWC may purchase water from TMWA while Well 2 is out of service. The rehabilitation work should be completed during the winter when system water demands are at their lowest. This project has been established as a high priority project because it is critical in order to extend the life of the well and maintain the current service area production capacity and meet customer demand.

- Rehabilitation of Suki Well (Well 2)
  Estimated Cost: $516,192
  Project Year: 2025 – 2026
  Tier: High Priority

Anticipated Timeline for Rehabilitation of Well 2

Tasks	Est. Time
Mobilization	1 week
Rehabilitation Work	12 weeks
Installation of Liner	12 weeks
Reinstall Pumping Equipment	4 weeks
Water Neutralization and Disposal	12 weeks
Design/Water Project Submittal	11 weeks
Total Estimated Project Time	**52 weeks**

AMI Installation

GBWC is planning to upgrade their current Automatic Meter Reading (AMR) System to Advanced Metering Infrastructure (AMI) System. An AMR System is the communication technology water utilities use to automatically collect water consumption and status data from water meters. AMR systems can be either walk-by or drive-by. An endpoint is connected to the meter's encoder register. The endpoint captures water flow and alarm data which is collected by utility personnel by walking or driving by with a data receiver in proximity to the device. After collection, the meter data is transferred to a database where utilities can monitor and analyze usage, troubleshoot issues, and bill customers based on actual consumption.

An AMI System is an integrated system of water meters, communication networks and data management systems that enables two-way communication between meter endpoints and utilities. Unlike AMR, AMI doesn't require utility personnel to collect the data. Instead, the system automatically transmits the data directly to the utility at predetermined intervals freeing up valuable time for operators to be proactive in conducting other critical activities. Meter data is sent to utilities via a fixed network. The utility can use the data to improve operational efficiencies and sustainability by effectively monitoring water usage and system efficiency, detecting malfunctions and recognizing irregularities quicker. In today's world, the existing cellular networks designed to minimize downtime, can be used to make sure meter data is collected securely and without interruption.

GBWC is planning to conduct the upgrade using existing staff to cut down on costs. The upgrade will require the addition of a few strategically located towers and some software modifications. The preliminary plan is to conduct the transition over a 3-year period starting in January 2025; a tentative objective is to complete approximately one-third of the AMI installations during each of these years. This project has been established as a medium priority project. Based on current meter replacement costs, we have provided a budgetary estimate of the following:

- AMI Installation
  Estimated Cost: $283,000
  Project Year: 2025 – 2027
  Tier: Medium Priority

Anticipated Timeline for AMI Installation

Tasks	Est. Time
Year 2025 Installations	52 weeks
Year 2026 Installations	52 weeks
Year 2027 Installations	52 weeks
Total Estimated Project Time	**156 weeks**

Rehabilitation of Tank 2 – Interior and Exterior
Storage Tank 2 is a nominal 350,000-gallon welded steel storage tank, originally constructed in 1993. The most recent inspections of the tank occurred in 2019 and 2023. Some corrosion was observed on the tank's roof and paint coat. Based on the age and condition of the tank, both interior and exterior reconditioning is recommended to help preserve and extend the tank integrity. It is anticipated that the following reconditioning work will be conducted on Tank 2, reconditioning of the exterior tank piping, sand blast and recoating of the tank interior, install cathodic protection, sand blast the tank exterior, and recoat the tank exterior. This project has been established as a high priority project because it is critical for maintaining the tank integrity and upholding the necessary storage capacity for SSD.

- Rehabilitation of Tank 2 – Interior and Exterior
  Estimated Cost: $442,664
  Project Year: 2026
  Tier: High Priority

Anticipated Timeline for Rehabilitation of Tank 2

Tasks	Est. Time
Mobilization	1 week
Rehabilitation of Exterior Tank Piping	7 weeks
Cathodic Protection/OSHA Requirements	4 weeks
Sand Blast and Coat Tank Exterior	4 weeks
Sand Blast and Coat Tank Interior	4 weeks
Design/Water Project Submittal	8 weeks
Testing and Inspection	4 weeks
Total Estimated Project Time	**32 weeks**

Maintenance/Monitoring/Inspections

Transducer Documentation of SWL and PWL

Since the water system is entirely dependent on groundwater, it is critical that GBWC-SSD collects water level data from the two wells. At a minimum, GBWC-SSD should be documenting one (1) Static Water Level (SWL) and Pumping Water Level (PWL) per month for each of the wells. The data would provide valuable information on the groundwater aquifers and characteristic changes in the well hydraulics. This will give GBWC-SSD a direct look at how the aquifers respond to multiple droughts and/or wet years as well as seasonal trends. The data will also help the GBWC-SSD staff anticipate seasonal well production rates and be more proactive during the times of highest water demand. A project cost is not being provided for this data collection recommendation due to the nominal expense associated.

Wire-Water Efficiency Testing:

Due to the critical nature and dependency of groundwater, the wells should have a wire to water efficiency test conducted annually to determine the overall electrical efficiency of the pumping systems in the wells. Well hydraulic parameters are constantly changing and these tests better determine when a well needs cleaning (rehabilitation) due to plugging of the screens or a redesign of the pumping system to reduce annual electrical costs. A project cost is not being provided for this monitoring recommendation due to the nominal expense associated with an outside testing company.

Storage Tank Inspections and Cleanings

To help ensure that the storage tanks remain in good condition, ongoing third-party tank inspections should be scheduled every 5 years along with routine maintenance for all storage tanks. For the cathodic protection systems, this includes annual potential tests by a certified contractor to determine if the anodes are working properly and monthly rectifier readings. Regularly scheduled inspections and maintenance will help extend the useful lives of the tanks. The costs for the tank inspections and smaller-scale maintenance activities are not included in the CIP because it is budgeted for separately as ongoing inspection and maintenance.

8.3 Action Plan Project Timeline

Table 8.01 is a schedule of the project timeline for the water projects proposed for the 3-year action plan.

Table 8.01: Scheduled Timeline for Action Plan Water Projects

Year	Project	Total Annual CIP Cost
2025	Rehabilitation of Suki Well (Well #2)	$170,344
	AMI Installation	$100,000
	2025 CIP Total Cost	**$270,344**
2026	Rehabilitation of Suki Well (Well #2)	$345,848
	Rehabilitation of Tank 2 – Interior and Exterior	$442,664
	AMI Installation	$91,500
	2026 CIP Total Cost	**$880,012**
2027	AMI Installation	$91,500
	2027 CIP Total Cost	**$91,500**
3-Year Action Plan Total		**$1,241,856**

SECTION 9.0: FUNDING PLAN

The Funding Plan is detailed in Volume I (Introduction) of this 2024 Consolidated IRP filing.

SECTION 10.0: SYSTEM IMPROVEMENT RATE REQUEST

GBWC-SSD is requesting that the following projects described in the Action Plan be designated as eligible for a System Improvement Rate (SIR) under NRS 704.663(3) and NAC 704.6339: (i) Rehabilitation of Suki Well.

NAC 704.6339 states that for purposes of reviewing a request included in a plan or amendment to a plan submitted pursuant to NRS 704.661, the Commission will consider the following information:

(1) A description of the project.
(2) A statement explaining the necessity of the project.
(3) The resulting benefits of the project to the utility and the customers of the utility upon the completion of the project.
(4) A statement supported by written testimony that the project is not designed to increase revenues by connecting an improvement to a distribution system or wastewater system to new customers.
(5) A statement that the project was not included in the rate base of the utility in its most recent general rate case.
(6) A statement that the project costs for which recovery will be sought represent an investment to be made by the utility and which will not be paid by another funding source, including, without limitation, a grant, developer contribution or other form of reimbursement.
(7) If submittal to the Commission is not otherwise required by law or regulation, the utility's plan for construction and the proposed schedule for construction. A plan for construction and a proposed schedule for construction submitted pursuant to this paragraph must comply with the provisions of paragraph (a) of subsection 4 of NAC 704.568.
(8) If submittal to the Commission is not otherwise required by law or regulation, a budget of planned expenditures complies with the provisions of NAC 704.5681.

10.1 Description of Each SIR Project

Rehabilitation of Suki Well

The objective of this project is to perform rehabilitation and maintenance work to extend the service life of Suki Well. This project was proposed due to the poor condition of the original well casing. The proposed rehabilitation involves a nominal 10-inch diameter stainless steel liner to be installed in the well casing; placement of filter pack is not recommended due to limited annular space. The liner installation should be followed by acid treatment and brushing. This work should be completed during the winter months, while system demand is at its lowest. See Section 2.2.2.1 (Water Supply Existing Condition Assessment). See Section 8.2 (Rehabilitation of Suki Well).

10.2 Need for Each SIR Project

Rehabilitation of Suki Well

This project is needed to ensure that a reliable water supply continues for the water system. The primary objective is to extend the useful life of the Suki Well. See Section 2.2.2.1 (Water Supply Existing Condition Assessment). See Section 8.2 (Rehabilitation of Suki Well).

10.3 Benefits of Each SIR Project

Rehabilitation of Suki Well

This project is necessary to ensure a reliable water source is always available to the customers. The objective is that the rehabilitation will extend the service life of Suki Well. See Section 2.2.2.1 (Water Supply Existing Condition Assessment). See Section 8.2 (Rehabilitation of Suki Well).

10.4 Project Supports Current Customers

Rehabilitation of Suki Well

This project is provided to ensure customers have a reliable water source in the future and extend the service life of Suki Well. See Section 2.2.2.1 (Water Supply Existing Condition Assessment). See Section 8.2 (Rehabilitation of Suki Well).

10.5 Statement that Each Project is not included in Rate Base

The project listed in Section 10.1 *et seq.* was not included in the Company's rate base in its most recent general rate case. See Testimony by Terry J. Redmon.

10.6 Funding by Utility Investment

The project list in Section 10.1 *et seq.* will be funded through traditional funding sources using GBWC's parent company's Corix debt and equity investment, and will not be paid by another funding source, including, without limitation, a grant, developer contribution or other form of reimbursement. See Section 9.0 (Funding Plan).

10.7 Construction Schedule for Each Project

Rehabilitation of Suki Well

This project is scheduled for construction in 2025. See Section 8.2 (Rehabilitation of Suki Well).

10.8 Project Budget for Each Project

Rehabilitation of Suki Well

Estimated Cost: $527,853. See Section 8.2 (Rehabilitation of Suki Well), Appendix I and Appendix L.