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 2 OF 18

Great Basin Water Co.
2024 Integrated Resource Plan

Volume I: Introduction
March 01, 2024

Prepared for:

Great Basin Water Co.™

Prepared by:

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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
CRUUS	Corix Regulated Utilities (US) Inc.
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

SECTION 1.0: INTRODUCTION

1.1 Report Organization

Great Basin Water Co. ("GBWC" or "Utility") is providing a consolidated Integrated Resource Plan ("IRP") that includes specific volumes for each of the Divisions that make up GBWC. A total of five (5) volumes are associated with this document with the Introduction (Volume I) containing all of the relevant common information that is associated with each of the four Divisions. The other four (4) volumes contain information specific to each Division within the GBWC and include the following: Pahrump Division (Volume II), Spring Creek Division (Volume III), Cold Springs Division (Volume IV), and Spanish Springs Division (Volume V). Each specific Division volume has been organized as follows:

Executive Summary	The Executive Summary provides an overview of the study and the recommended capital improvement plan in each of the GBWC Divisions.
Section 1.0	Introduction. Each Division volume will provide background information for the specific Division and a discussion of the objectives of that Division volume's portion of the GBWC 2024 Consolidated IRP. The Introduction (Volume I) will provide the names and qualifications of the persons that prepared the IRP along with the references of relevant previous studies.
Section 2.0	Existing Conditions. Each Division volume will present a complete description of the service areas, existing facilities, condition of the major assets and remaining useful life, and their operation and control.
Section 3.0	Historical Data and Forecasting. Each Division volume will present an evaluation of the historical population and connections to the existing systems. This data is presented and used as a basis for the population and demand forecasting for the specific GBWC Divisions.
Section 4.0	Water Supply Needs. Each Division volume will present the analysis of the existing water system (and wastewater system if applicable) with regard 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 Emergency Response Plans for the four Divisions. The actual Emergency Response Plans for each of the Divisions will be provided in the appendices.
Section 6.0	Water Conservation Plan. This section will be provided in the Introduction (Volume I) since it has been the objective of GBWC to have one plan that spans all of the Divisions in Volume I, a summary will be provided of GBWC's efforts to conserve the water supply in each Division's service territories.
Section 7.0	Preferred Plan. Each Division will have 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. Each Division will have a summary subset of the Preferred Plan detailing the improvements, which are recommended for implementation in the 3 years following approval of the GBWC 2024 Consolidated IRP.
Section 9.0	Funding Plan. All of the Funding Plan information is provided in the Introduction (Volume I) to meet the requirements that are addressed in the Action Plans for each specific Division volumes.
Section 10.0	System Improvement Rate Request. Each Division volume will outline information required by Nevada Administrative Code (NAC) 704.63385 to support a request to designate water projects in the Action Plan as eligible for a System Improvement Rate (SIR).
Technical Appendices	The GBWC 2024 Consolidated IRP contains one comprehensive technical appendix that details the methodologies used in developing the IRP along with all of the basic appendix data used in the study.

1.2 Background

1.2.1 Ownership and Organization Chart

The GBWC water and wastewater systems are owned by GBWC, a wholly owned subsidiary of Corix Regulated Utilities (U.S.) Inc. (CRUUS) a private, investor-owned, national water and wastewater utilities owner and operator. CRUUS operates more than 750 systems in seventeen states. CRUUS acquired the GBWC Spring Creek Division (GBWC-SCD) in 1996, GBWC Cold Springs Division (GBWC-CSD) in 1998, GBWC Spanish Springs Division (GBWC-SSD) in 1999, and the GBWC Pahrump Division (GBWC-PD) in 2002.

Utilities, Inc. (UI), was purchased by CRUUS in September of 2012. In late 2013, a decision was made to restructure CRUUS to provide decision-making at the local level. The fifteen states (now seventeen states) were divided into seven business units. Each business unit has a President, Director, State Operations (both officers of the companies in their distinct business units), and finance staff. The business units are supported by Water Service Corporation, which provides support in various areas including, but not limited to, accounting, human resources, billing, customer service, internet technology, etc. GBWC is part of the Arizona/Nevada Business Unit (AZ/NV). The President resides in Fairbanks, AK and the Director reside in Reno, NV. In addition, AZ/NV has a Water Conservation Coordinator who resides in Pahrump, NV.

The four regulated Nevada utilities were reorganized in 2016 into one legal entity and named GBWC. The purpose of the Nevada reorganization was driven by the fact that water is a local resource. As such, local water companies should have local decision-making ability and responsibility as those decisions impact local residents, regulators, and communities. Additionally, there are many efficiencies in operating and managing one company as opposed to four companies, the benefit of which is passed on to the GBWC ratepayers.

GBWC is managed locally and operates all four divisions. The Arizona/Nevada Business Unit Organizational Chart is presented in Figure 1.01.

1.3 Objective

The overall objective of this resource plan is to provide guidance to the GBWC Divisions as how to provide adequate water and sanitary service to their customers in the service area over the next 20 years. This includes determining current system deficiencies and needed improvements, projecting growth over the next 20 years, and determining the facilities needed to provide adequate service for the growth. An asset management component has been integrated into the resource plan to identify and determine when existing critical assets will need to be replaced or rehabilitated in the future. Detailed Action Plans are provided in each of the Division volumes identifying needed improvements over the next 3 years, and the timing of those improvements. Additional sections in each of the volumes contain plans for funding the needed improvements and financial impact on the customers. The goal is to balance the objectives of minimizing cost, mitigating risk, and maximizing service reliability.

1.3.1 Current Level of Service Assessment

All four of the Divisions have had asset management plans developed with an assessment of the current level of service for each Division. The objective was to assess all the major service aspects of the water and sewer utilities (including regulatory, contractual, quality, reliability, customer service, and others) as well as identify the service aspects which need improvement and will have the most beneficial impact to the systems and their customers. Specifics for each of the GBWC Divisions will be discussed in more detail in their specific volumes.

Great Basin Water Organizational Chart

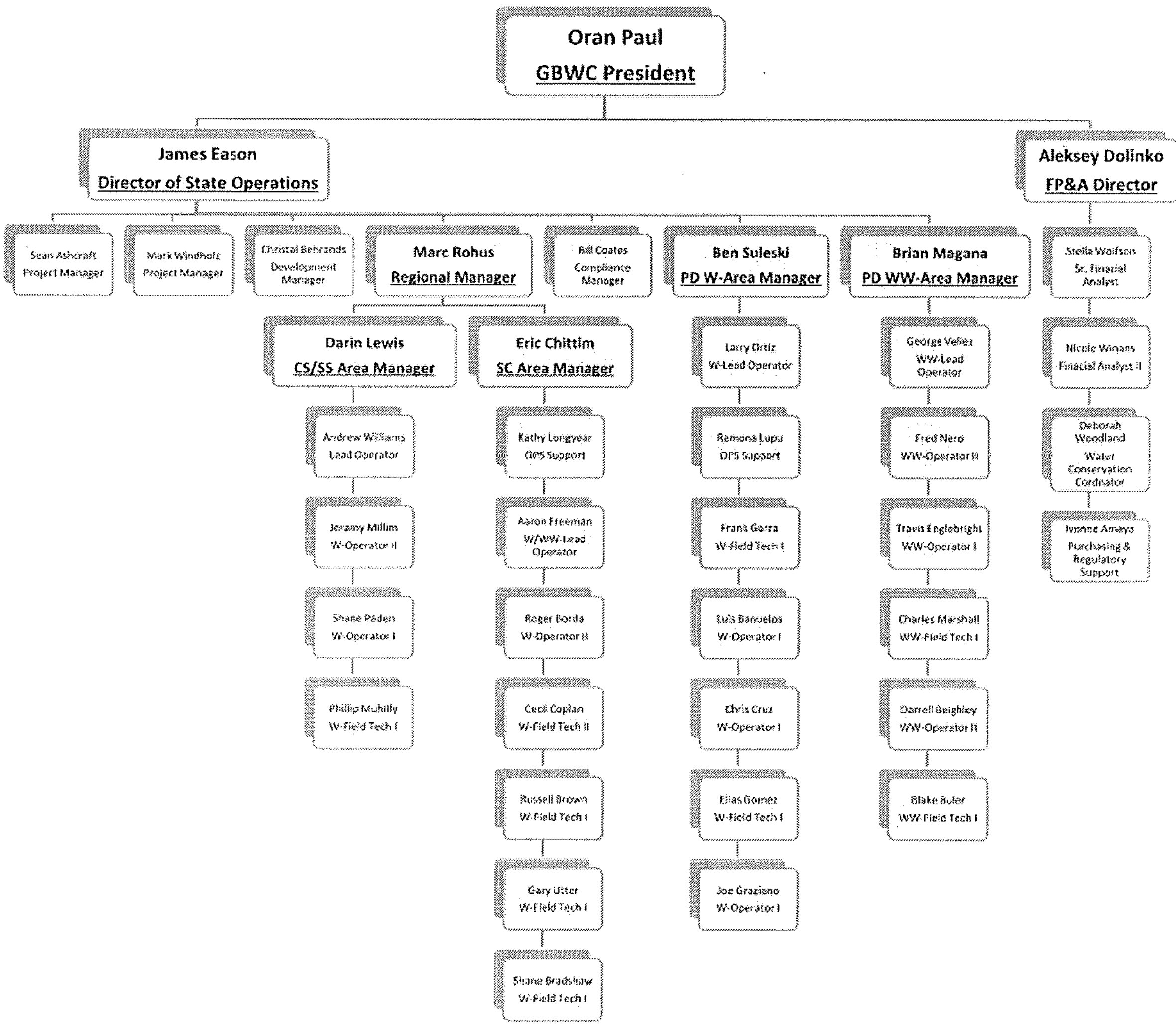


Figure 1.01: Arizona/Nevada Business Unit Organizational Chart

1.3.2 Asset Registry Condition Assessment

GBWC originally adopted and integrated the United Stations Environmental Protection Agency's Asset Management 10-Box Framework, or Asset Management Program (AMP), into all the GBWC divisions. This AMP helps establish the priorities for each of the Divisions during the IRP process. The AMP approach has been similarly deployed in each Division since the introduction of the process in December 2014 to the GBWC-SCD system. By continuing to use the foundation established by using the AMP approach, GBWC continues to develop the necessary tools to better understand its assets, implement monitoring programs, and refine established maintenance protocols.

Since the 2018 Consolidated IRP, GBWC has adopted the CentralSquare Enterprise Asset Management (CS EAM) software, formerly known as Lucity, to assist in asset management. This is a digital asset management program that tracks an asset over the entire lifecycle. The CS EAM software can assess how an asset performed during its useful life and better determine an asset's longevity (useful life) in the future by using the Replace & Rehabilitate (R&R) method, which GBWC has adopted. This is an internal approach that focuses on critical assets that have been identified in the Asset Registry. Appendix A, Vertical Asset Registry List, contains the current vertical assets for the GBWC-SCD water and wastewater systems.

1.3.3 Failure Mode and Effects Analysis

Formal Failure Mode and Effects Analysis (FMEA) workshops were held for each division between 2013 and 2017 to assess specific major assets and subsystems of the water and wastewater systems for vulnerabilities. The goal was to identify vulnerabilities so that corrective actions and better monitoring protocols could be implemented to reduce the potential failure modes. The workshops helped identify the highest-priority potential failures at the time and provided a solid starting point for GBWC staff to continue the process of asset management and FMEA during each subsequent IRP. GBWC staff continue this process through the continuous updating of asset registries to capture the conditions of assets, coupled with the analysis of the system as a whole during the IRP effort to determine assets in poor condition, consequences of failure, and recommend rehabilitation or replacement projects to address these vulnerabilities.

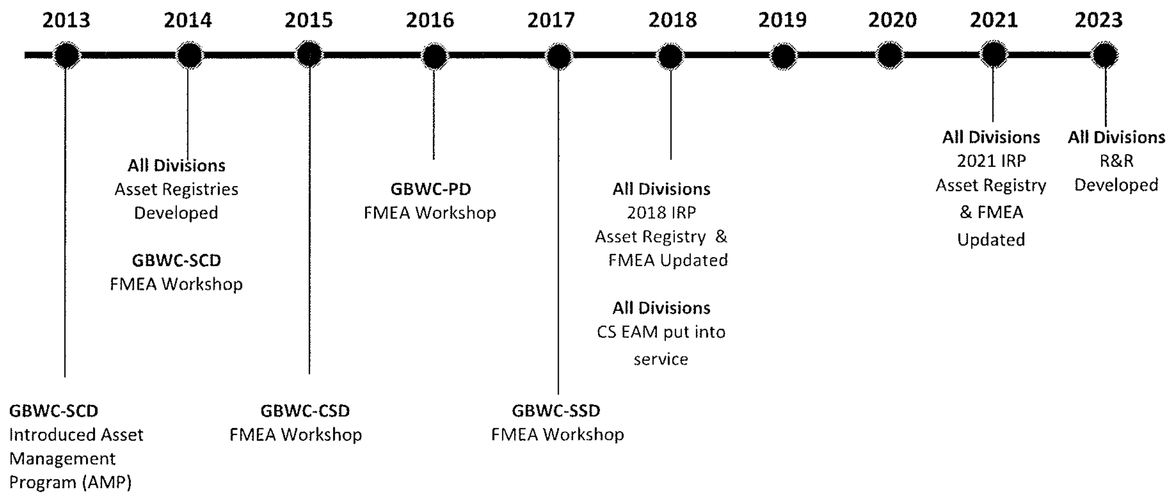


Figure 1.02 shows GBWC's history of the Asset Management and FMEA processes.

1.4 Acknowledgements

Information and review of the 2024 GBWC Consolidated IRP was provided by the following:

Western Senior Vice President, Oran Paul
Great Basin Water Co. and Bermuda Water Co.

EDUCATION: B.S in Mechanical Engineering, University of Alaska Fairbanks

EXPERIENCE:
Mr. Paul began with the company in 2007 when he was selected as Vice President of the company's Alaskan utility operations. Mr. Paul became President for Alaska in 2013 and was primarily responsible for the management of Fairbanks Sewer & Water, the second largest water and wastewater utility in Alaska. In 2021 Mr. Paul was promoted to Senior Vice President for the company's Western region which currently includes the company's utility operations in the states of Alaska, Nevada and Arizona, and the Canadian provinces of BC and Alberta. Mr. Paul is currently the acting President for Great Basin Water Co. As President, Mr. Paul is dedicated to ensuring excellent water distribution, wastewater collection, and water and wastewater treatment services across the Western Business Unit.

Director, State Operations for Nevada and Arizona, James Eason
Great Basin Water Co. and Bermuda Water Co.

EDUCATION: B.S. in Business Logistics, University of Nevada, 1995

EXPERIENCE:
Mr. Eason has been employed by the Company since September 2015 as the Vice President of Operations/Director of State Operations for the Arizona and Nevada business unit. Prior to joining the Company, Mr. Eason was the Town Manager for the Town of Tonopah where he developed, presented, and implemented the strategic plan and vision for the Town, Tonopah Public Utilities, and Library District, in conjunction with the Tonopah Town Board and staff. As the Vice President of Operations/Director of State Operations, Mr. Eason is responsible for directing the safe and efficient operations of all GBWC and Bermuda Water Company subsidiaries in assigned business units. He oversees all areas of operation, including water, wastewater, and business development. Mr. Eason provides oversight, guidance, and leadership to the business unit operations staff.

Project Manager, Sean Ashcraft
Great Basin Water Co.

EDUCATION:	High School Graduate
REGISTRATIONS:	OSHA 30 certified

EXPERIENCE:
Mr. Ashcraft has been employed by the Company since July of 2016 starting in customer service, moving over to the operational side as OPS support in July of 2018 and in April of 2020, moving into the Project Manager role so he has worked in many different facets of the utility. As Project Manager, Mr. Ashcraft is responsible for overseeing all the capital projects in the NV/AZ business units. He has assisted in providing information and insight with status of all the capital projects along with coordinating and managing schedules for the creation of the 2024 GBWC Consolidated IRP.

Project Manager, Mark Windholz
Great Basin Water Co.

EDUCATION:	High School (GED)
REGISTRATIONS:	Nevada Distribution 3 Certificate, OSHA 30 Certified.

EXPERIENCE:
Mr. Windholz has over 21 years working in the operation and maintenance of Public Water Supplies in the US. Mr. Windholz began working with CRUUS Water in 2002, starting as field operator and moving to Lead Operator in 2005. In 2014, he was moved to the Compliance side of the company. In 2020, the company promoted Mark to Project Manager, where he helps oversee the implementation of projects in NV and AZ. Mark has assisted with the oversight and management of various projects.

Regional Manager, Marc Rohus
Great Basin Water Co. – Cold Springs, Spanish Springs, Spring Creek Divisions

EDUCATION:	High School Graduate with additional CEU's and college courses in water and wastewater utilities
REGISTRATIONS:	State of Nevada, D-3 Water Operator State of Nevada, T-2 Water Operator State of Nevada, WWT-2 Wastewater Operator

EXPERIENCE:
Mr. Rohus has been employed by the Company since April 2006 with increasing levels of responsibility. As Regional Manager, Mr. Rohus is responsible for overseeing the staff and operations for all the GBWC-SCD, CSD, and SSD water and wastewater facilities. He assisted in the preparation of this IRP by providing information and insight into the overall operations of the utility.

Compliance Manager, Bill Coates
Great Basin Water Co. – Pahrump

EDUCATION:	High School Graduate, Technical Correspondence Training Courses in Water and Wastewater Treatment Operations and Maintenance.

EXPERIENCE:
Mr. Coates has been employed by the Company since August 2004 with increasing levels of responsibility. As Compliance Manager, Mr. Coates is responsible for coordinating all compliance initiatives with operations by tracking and monitoring all internal and external requirements, water and wastewater sampling and reporting, implementation of capital projects, and performs facility inspections as well as follow-ups. Mr. Coates also coordinates permits, monitors monthly DMR completion, and provides reports to senior management.

Water Conservation Coordinator, Deborah Woodland
Great Basin Water Co. – Pahrump

EDUCATION:	High School Graduate, attended community college in Las Vegas, NV, Cape Cod, MA, and Pahrump, NV.
REGISTRATIONS:	Certified MS4 Compliance & Code Enforcement Inspector, August 2019.

EXPERIENCE:
Ms. Woodland has been employed by the Company since March 2016. Prior to joining GBWC, Mrs. Woodland opened and managed/owned a drought tolerant plant nursery and water garden business in Pahrump for seven years. In 1999, Deborah was trained to and became a Master Gardener for University of Nevada Cooperative Extension. She accepted the 4-H Coordinator

position in September 2004 with the University of Nevada Cooperative Extension office in Pahrump, and in 2010 became the Master Gardener Coordinator until March 4, 2016. In 2019, Deborah became a MS4 Compliance & Code Enforcement Certified Inspector – Municipal Separate Storm Sewer System (MSS4).

Area Manager, Ben Suleski
Great Basin Water Co. – Pahrump

REGISTRATIONS:	State of California Grade 3 WDO & Grade 3 WWC. State of California Backflow Tester State of California Backflow Specialist State of Nevada Grade 3 WTO

EXPERIENCE:
Mr. Suleski has been employed by the company since March 2020. Mr. Suleski is responsible for overseeing the staff and safe operation of all water facilities in the GBWC-Pahrump Division. He has licenses in two (2) western states and has many years of experience as a Waster Distribution Operator in a T-5 water facility and with the collection of wastewater in the same area.

Area Manager, Brian Magana
Great Basin Water Co. – Pahrump

EDUCATION:	High School Graduate
REGISTRATIONS:	State of Nevada Wastewater Treatment Plant Operator I, OSHA 30

EXPERIENCE:
Mr. Magana has been employed by GBWC since July 2016. Mr. Magana worked as a Field Technician from 2016 to 2019, in 2019 Mr. Magana was moved to the position of Field Supervisor, followed by Area Manager in 2022. He oversees wastewater staff and safe operation of all wastewater facilities in the GBWC-Pahrump Division.

Area Manager, Eric Chittim
Great Basin Water Co. – Spring Creek

EDUCATION:	AAS Degree in Criminal Justice
REGISTRATIONS:	Water Distribution 2 Certificate Wastewater Operator OIT 1 Certificate

EXPERIENCE:
Mr. Chittim has been employed by the Company since November 10, 2010. Mr. Chittim started out as a Field Technician 1, worked into Lead Operator, and now is the Area Manager of the

Spring Creek Division. Mr. Chittim is responsible for overseeing the staff and operations for all water and wastewater facilities in the Spring Creek Division.

Area Manager, Darrin Lewis
Great Basin Water Co. – Cold Springs and Spanish Springs

EDUCATION:	High School Graduate with additional training courses in water distribution
REGISTRATIONS:	State of Nevada Water Distribution 2 Certification, OSHA 3

EXPERIENCE:
Mr. Lewis has been employed by the Company since January 22, 2003. Mr. Lewis started out as a Field operator and moved into Lead Operator in 2004. Mr. Lewis moved into the Area Manager role in 2017. Mr. Lewis oversees the field staff and operations in the Cold Springs and Spanish Springs Divisions.

Mike Hardy, P.E., P.G., W.R.S.
Lumos & Associates, Inc.

EDUCATION:	B.S. Geology, Bemidji State University, Bemidji, MN, 1984 Graduate Studies in Geology, Idaho State University, Pocatello, ID, 1985-1988
REGISTRATIONS:	Professional Civil Engineer – Nevada #21862 Professional Civil Engineer – Arizona #71093 Professional Geologist – California #7927 Certified State Water Right Surveyor – Nevada #1274

EXPERIENCE:
Mr. Hardy has over 34 years of experience in water resources, which include water and wastewater utility systems, ground water exploration, well field monitoring, production well drilling, well design projects and utility planning documents. He also has worked on and understands utility operational issues, which provides him with a broader perspective when evaluating alternatives. Michael has completed numerous water and sewer planning documents including preliminary engineering reports, master plans, feasibility studies, preliminary design reports, and long-range plans for water and sewer facilities. Michael has served as Project Manager on the 2018 GBWC Consolidated IRP and the 2021 GBWC Consolidated IRP. Contributions also include Water System Management Plans for Great Basin Water Co., Cold Springs, NV Project, the Spring Creek Mobile Home and Residential Home Arsenic Compliance Feasibility Studies and the Spring Creek Arsenic Treatment Plant pilot testing for Well 3, Elko County, NV Project for GBWC-SCD. Mr. Hardy is responsible for Project Management for the completion of the 2024 GBWC Consolidated IRP and development of the GBWC-SCD (Volume III).

Jonathan Lesperance, P.E.
Lumos & Associates, Inc.

EDUCATION: B.S. Civil Engineering, Arizona State University, 2009

REGISTRATIONS: Professional Civil Engineer – Nevada #22326
Professional Civil Engineer – California #84438

EXPERIENCE: Jonathan Lesperance has over 15 years of experience with a career focusing on the design of Water and Wastewater systems and infrastructure, specifically in rural areas and for a variety of municipalities and water purveyors. His water experience includes design of new water and sewer systems, system rehabilitation and pipeline replacement programs, design of water storage facilities, booster pump stations and lift stations, raw water collection and intake facilities, as well as water and wastewater treatment systems. In addition, Jonathan has extensive experience with hydraulic modeling, asset management, and water and sewer system master planning. Jonathan is the District Engineer for Gardnerville Ranchos GID and County Engineer for Eureka County, Nevada, providing extensive utility engineering services for both entities. Furthermore, Jonathan was the Project Manager for the design and construction of the recent South District Pipeline Replacement Program (SDPRP) Phases 1 and 2 that addresses two of three phases replacing old and failing water mains comprised of asbestos cement pipe (ACP) and schedule 40 PVC that are brittle and prone to costly breaks especially affecting homeowner landscaping and properties. In his role of Engineering Group Manager, Jonathan provides design oversight, technical mentoring, and leads a variety of projects that are performed by our Water/Wastewater Engineering Group. He assisted with the QA/QC and overall timely completion of the 2021 and 2024 Integrated Resource Plan.

Chelsea Cluff, P.E.
Lumos & Associates, Inc.

EDUCATION: B.S. Civil Engineering, University of Nevada, Reno, 2017

REGISTRATIONS: Professional Civil Engineer – Nevada #29939

EXPERIENCE:
Chelsea has over 5 years of experience in the planning and design of water and wastewater infrastructure. Her background includes design of earthen embankment dams, water supply and distribution, wastewater treatment and conveyance, water distribution system modeling, storm water modeling, master planning, funding acquisition, and engineering services during construction. Chelsea has played a significant role in a variety of projects include the Douglas County Water Master Plan, Incline Village General Improvement District Water and Wastewater

Master Plan, the TRI Center Effluent Reservoir Expansion project, and the Rolling A WWTF Expansion. Ms. Cluff was responsible for the development of the GBWC-CSD (Volume IV).

Mara Quiroga, P.E.
Lumos & Associates, Inc.

EDUCATION:	B.S. Civil Engineering, University of Nevada, Reno, 2015
REGISTRATIONS:	Professional Civil Engineer – Nevada #26809 Professional Civil Engineer – California #91948

EXPERIENCE:

Ms. Quiroga has 8 years of experience in civil engineering, with six of those years specializing in the design of water and wastewater infrastructure. Ms. Quiroga has experience in designing water and wastewater conveyance infrastructure, hydraulic modeling, and utility master planning. In her time at Lumos, Ms. Quiroga has been involved in a variety of projects, including nearly 20 sewer lift stations in Northern Nevada, design of a 4-mile water transmission main for the StoneGate Master Planned Community, master planning and design of on-site utilities for the StoneGate Master Planned Community, and booster pump station improvements for the Gardnerville Ranchos General Improvement District. In addition, Ms. Quiroga maintains water models for multiple municipal systems, involving both the creation of new models and analysis to prepare water system impact reports. Ms. Quiroga was responsible for the development of the GBWC-PD (Volume II).

Terry J. Redmon, CPA, CVA

EDUCATION:	Business Administration, University of Nevada, Reno, 1986
LICENSES & CREDENTIALS:	Certified Public Accountant (Nevada) Certified Valuation Analyst

EXPERIENCE:
Mr. Redmon has extensive experience with the GBWC Divisions and has been the lead revenue requirement and rate design consultant in preparing and prosecuting most of the general rate filing applications for GBWC in Nevada over the past 23 years. Additionally, Mr. Redmon has successfully prepared most of the Funding Plans for GBWC Divisions, which all have been approved by the PUCN. This experience, along with his tenure at the Attorney General's Office of the Consumer Advocate (now the Bureau of Consumer Protection), has provided him with a complete and thorough understanding of the financial and operating aspects of GBWC and the regulatory requirements of Nevada public utility law and regulations as well as those of the PUCN. Mr. Redmon assisted in the preparation of the 2024 GBWC Consolidated IRP by providing his expertise in preparation of the Funding Plan.

1.5 References

The following documents reviewed, but not limited to, during preparation of the 2024 GBWC Consolidated IRP:

- 2021 GBWC Consolidated IRP, March 1, 2021
- 2018 GBWC Consolidated IRP, March 1, 2018
- Utilities, Inc. of Nevada (UIN) 2016 IRP, March 1, 2016
- UIN 2013 IRP (Modified), March 1, 2013
- SCUC 2015 IRP, March 1, 2015
- Utilities, Inc. of Central Nevada (UICN) 2014 IRP, March 1, 2014
- GBWC – Pahrump 2017 IRP, March 1, 2017
- UIN "Draft" Level of Service Matrix, (Asset Management Plan) 2015
- UIN Asset Management Plan, February 2015
- GBWC – Cold Springs Asset Registry, 2023 update and CS EAM
- GBWC – Spring Creek Asset Registry, 2023 update and CS EAM
- GBWC – Spanish Springs Asset Registry, 2023 update and CS EAM
- GBWC – Pahrump Asset Registry, 2023 update and CS EAM
- Sky Ranch Asset Management Plan, 2015
- GBWC Consolidated Water Conservation Plan, 2021
- Meter Consumption Data, 2020, 2021, 2022 for all GBWC Divisions
- Well Production Data, 2020, 2021, 2022 for all GBWC Divisions
- Consumer Confidence Reports, 2020, 2021, 2022 for all GBWC Divisions

SECTION 2.0: EXISTING CONDITIONS

Please refer to individual Division volumes for specific data (Volume II "Pahrump Division", Volume III "Springs Creek Division", Volume IV "Cold Springs Division", and Volume V "Spanish Springs Division").

SECTION 3.0: HISTORICAL DATA AND FORECASTING

Please refer to individual Division volumes for specific data (Volume II "Pahrump Division", Volume III "Springs Creek Division", Volume IV "Cold Springs Division", and Volume V "Spanish Springs Division").

SECTION 4.0: WATER and WASTEWATER SUPPLY NEEDS

Please refer to individual Division volumes for specific data (Volume II "Pahrump Division", Volume III "Springs Creek Division", Volume IV "Cold Springs Division", and Volume V "Spanish Springs Division").

SECTION 5.0: EMERGENCY RESPONSE PLAN

Each of the GBWC Divisions has an Emergency Response Plan (ERP) and a Vulnerability Assessment (VA) on file with the State of Nevada, Department of Public Safety, and Division of Emergency Management. Copies of the ERPs for each Division can be found in Appendix J. The purpose of an ERP is to guide the GBWC Division's operational crews in a safe, timely, and effective response to incidents that threaten the utilities environment and public health, safety, or welfare. It is also intended to promote coordination among employees, supervisors, management, the public, and first responders.

The ERP is intended for personnel of utility operations and for other agencies that support the GBWC-Divisions incident response. Incidents may vary from one Division to another in type and severity. The ERPs recognize that general rules may not apply in all circumstances and seasoned judgement may be applicable in some cases. The GBWC Division ERPs are not intended to supersede any regulations or corporate initiative and shall be audited and updated as needed to reflect the corporate mandate. The latest updates were completed in December 2022.

GBWC's emergency response "Mission Statement" states that in an emergency, the mission of the Company is to protect the health and safety of their employees, customers, and our environment by being prepared to respond immediately to a variety of events that may result in reduced service of the utility. The Mission Statement has four goals:

1. Be able to quickly identify an emergency and initiate timely and effective response actions;

2. Be able to quickly notify local, regional, and federal agencies to assist in the response and provide updates of system status;

3. Protect public health and the environment by being able to quickly determine if there is a risk to the utility and being able to rapidly notify customers effectively of the situation and advise them of appropriate protective actions; and

4. Be able to quickly respond to and repair damage to minimize or prevent utility system down time.

This mission statement and its goals are accomplished through a specific chain of command. GBWC's uses this chain of command to inform managers and it is a critical step in an emergency to ensure all required individuals are properly notified to ensure a timely and effective response. The following GBWC's titles and responsibilities are activated through their chain of command:

<u>Business Unit President:</u> *Ultimately, this person is responsible for the region as well as for providing direction on key items. This person provides the communication status and updates with CRUUS/Corix Executives.*

<u>Director of Operations, NV:</u> *The Director of Operations is the lead for managing the emergency, coordinating with support agencies, and providing information to the Director of Public Relations*

for communicating with the news media. All communications to external parties are to be approved by the President. This person will provide a standard pre-scripted message to those who call with general questions. This person contacts other regions to provide additional resources so further action can be taken as required. This person also solicits assistance from Health Safety and Environment Department of Water Service Corporation (HSE) as needed. This person communicates the status and updates to HSE/President. Finally, they determine when the emergency is over and communicates next steps.

Regional Manager: *The Regional Manager is in charge of the utility operations and decision-making including determining if there is an emergency and activating the emergency plan. This person is in charge of the utility operations and providing recommendations to the Director of Operations. They are also in charge of contacting emergency contacts and regulatory contacts. Finally, they provide direction to Area Managers to move employees, contractors, customers and visitors, equipment/vehicles, and emergency supplies to a safe location.*

Area Manager: *The Area Manager is in charge of utility operations in consultation with the Regional/State Manager. This person is responsible for assigning operators to be in charge of emergencies, as well as performing inspections, maintenance, sampling, relaying critical information, and assessing facilities. Interacts with emergency responders. Additional duties include:*

- *Report emergencies immediately;*
- *Follow emergency procedures as directed by emergency personnel;*
- *If applicable, determine when to abandon or shut down the operations or task;*
- *Use a system to account for all employees after the emergency;*
- *Report missing persons to emergency personnel.*

Lead Operator: *These personnel assist the Area Manager as needed to assess the emergency to include initial inspections, assessing facilities, and sampling.*

All Staff: *The remaining staff should be familiar with the Corix weather and natural disaster emergency plan. Learn about the alarm system and any distinctive alarms used in the case of weather or natural disaster emergency. Know the location of emergency supplies, such as non-perishable food, bottled water, battery operated radios, first aid supplies, flashlights, batteries, duct tape, plastic sheeting, and plastic garbage bags. Be aware of the reliable external sources for up-to-date weather and natural disaster information. Know the difference between a weather watch and weather warning. Know steps to take to ensure public and employee safety following a security event.*

During emergency response, be aware of the potentially dangerous and unsecured work environment you are entering due to the absence of normal safety guards and protocols. Be aware of the increased safety efforts and procedures that will limit or eliminate exposure to real and potential hazards. Be ready to mobilize at any time and event requires. Receive specialized safety training for emergency response and likely scenarios. Be equipped with the appropriate vehicles, tools, and safety devices that will eliminate or reduce exposure to hazards. Shall have an emergency response card or picture ID or other means to indicate that they are an

"Emergency Responder". Deliver equipment or supplies and relieve staff after the workplace has been secured and normal work procedures re-established.

Each division ERP contains all the contact information of the designated individuals within GBWC and CRUUS, first responders for the regional areas and government agencies.

5.1 Catastrophic Interruption

In addition to the ERP being on file with the State of Nevada, Department of Public Safety, and Division of Emergency Management, GBWC updates them periodically. They are kept in the GBWC Division Offices and the area managers (with assistance from the compliance manager) are responsible for updating them as necessary to accommodate new facilities, equipment, and technologies. In addition, all available maps and schematics are kept secure at the office. Each well house contains a distribution map of the system for reference. The Emergency Response Plans, Backflow Prevention Program, Valve Maintenance Program, and well and storage site inspection procedures are designed to assure that, in the event of an emergency, an affected location can be isolated and appropriate measures can be taken to minimize the time that a customer may be left without safe drinking water.

The plans, assessments, and manuals also provide consolidated access to emergency response teams, public notification partners, County and City Officials, 24-hour response contractors, and other local support. The procedures for response are recorded for different categories of emergencies: natural and man-made.

In addition, as a subsidiary of CRUUS, the GBWC Divisions have the advantage of operator and equipment support from over 500 utility systems within the company. A satellite phone is available at the GBWC Regional Office in Pahrump, Nevada, and the President and/or Director of Operations can determine the necessity of having additional phones sent from other regions in CRUUS.

Other CRUUS subsidiaries have been successful in implementing the same or similar mechanisms in disaster-related emergencies. There have been several incidents where the CRUUS team has united to overcome the damage caused by disaster, most notably Hurricane Katrina and Hurricane Irma in Florida. In the aftermath of Hurricane Katrina, CRUUS combined skills, manpower, and emergency equipment for the communities served by CRUUS on the north shore of Lake Pontchartrain, Mandeville, Covington, and Slidell, which still had operational water and sewer facilities even after the flooding and power outages. During Hurricane Irma, CRUUS proactively sent out requests for lists of emergency equipment from all the other business Divisions in an effort to organize a list of emergency equipment to be transported to Florida to help mitigate any infrastructure damage caused by Hurricane Irma. The same resources are available for all four GBWC Divisions.

5.2 Regional Power Outages

Large-capacity storage tanks and back-up generators that provide flow to all of the systems protect the system from emergencies resulting from power outages. The GBWC Divisions have several emergency backup power generators with automatic transfer switches that will start automatically in the event that the power companies (i.e. NV Energy and Valley Electric Association) should fail. The GBWC Divisions all have SCADA systems that will notify the on-call operator to report a power failure so staff is ready to respond. For many of the GBWC Divisions, the pressure zones are interconnected, which allows the automatic transfer of water due to pressure losses. The generators are exercised and maintained in accordance with GBWC's Generator Operation and Exercising Standard Operating Procedure. Additional specific information associated with each of the GBWC Divisions (i.e. local government contacts, etc.) is provided in each of the specific Division's Emergency Action Plans.

5.3 Earthquakes or Other Natural Disaster

Earthquakes and severe storms are a possibility for all GBWC Divisions. In the event of an unforeseeable natural disaster, pre-event planning is done with all GBWC operators and other key staff to coordinate the emergency response.

The most likely damage to occur from natural disasters are main breaks and loss of power. Disruption of service due to water main breaks is lessened by having a contractor on call 24 hours a day, 7 days a week for emergency pipeline repairs for each of the GBWC Divisions. Breaks are isolated through the operation of valves and then repaired and placed back into service.

Per NAC 445A.67265 (Duties after loss of pressure in distribution system). *Except as otherwise authorized by the Division, if any part of a distribution system loses all pressure, the supplier of water shall, before placing that part of the distribution system back into service:*

1. *Inform the customers of the public water system within the affected portion of its area of service of the need to boil their water before consumption.*
2. *Collect, on 2 or more consecutive days, samples of water from that part of the distribution system which indicate that the presence of any coliform bacteria complies with primary standards.*

Should loss of storage occur from an earthquake (or any other reason) in one of the GBWC Divisions, affected tank(s) can be isolated from the distribution system and the wells and other pressure zones, depending on system capabilities, can pump or feed directly into the affected system. Should the loss of a well occur due to the well casing collapsing in an earthquake (or any other reason), the GBWC Divisions have other wells and pressure zones available to provide water to the affected area.

In the event that any of the GBWC Divisions are unable to fulfill all the system requirements with available resources, reduction of non-essential system needs is possible. Procedures for curtailment are in the Emergency Response Plans. (Please see Appendix J.)

5.4 Man-Made Disaster

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

With the rise of the 2020 Pandemic (COVID-19) in the country, GBWC has adapted their operational procedures to ensure the health and safety of their employees. Being a provider of water and sewer services, GBWC has been identified as an "Essential Business" and continued to provide these services to their customers. Social distancing and facemasks were part of the protocols to reduce the spread of the virus within the GBWC Divisions. When available, most of the employees have been remote working from home and all meetings have been converted to virtual meetings. Regarding vehicle use for travel to company owned facilities, only one employee is allowed to be in a company owned vehicle at a time. The Center for Disease Control (CDC) has provided safety protocols, which have been integrated into the GBWC Division's everyday operations of their facilities.

The most likely sources of contamination of water supplies are a result of backflow due to 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, inspections, and locks. Contamination of the water supply is protected by:

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

GBWC Tariff Rule No. 15, Sections G (effective July 2019) and 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.

GBWC has created a Cross-Connection Control Program and corresponding manual for all systems in the State of Nevada. The GBWC Divisions have State-approved Cross Connection Control Plans. Cross-connections between a potable water system and non-potable sources of contamination represent a threat to public health. The program is designed to maintain the safety and potability 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.

5.5 Conclusion

The best defense against emergencies is to avoid them through daily inspections, routine 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 is trained for emergency response in Occupational Safety and Health Administration (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. Emergency equipment and spare parts are available.

During a dire emergency, a well not contaminated or damaged will be disconnected from the distribution system and used to distribute water to the public. GBWC Divisions will provide staff personnel to work in partnership with local authorities to distribute drinking water. In a worst-case scenario, in which the GBWC Divisions have no safe drinking water, bottled water can be provided from local suppliers in the regional areas. Should a catastrophic disaster occur in any or all of the Divisions, GBWC has put the plans and resources together to respond quickly and efficiently to ensure safe drinking water.

SECTION 6.0: WATER CONSERVATION PLAN

A Consolidated Water Conservation Plan is included in this 2024 GBWC IRP for review and approval by the Commission. A full comprehensive version of the submitted Plan is included as Appendix K of the 2024 GBWC Consolidated IRP.

SECTION 7.0: PREFERRED PLAN

Please refer to individual Division volumes for specific data (Volume II "Pahrump Division", Volume III "Springs Creek Division", Volume IV "Cold Springs Division", and Volume V "Spanish Springs Division").

SECTION 8.0: ACTION PLAN

Please refer to individual Division volumes for specific data (Volume II "Pahrump Division", Volume III "Springs Creek Division", Volume IV "Cold Springs Division", and Volume V "Spanish Springs Division").

SECTION 9.0: FUNDING PLAN

Great Basin Water Co. has four operating divisions:

- Pahrump Division
- Spring Creek Division
- Cold Springs Division
- Spanish Springs Division

The complete funding plan is presented in this Volume I - Introduction, inclusive of all operating entities' action plan projects.

9.1 Description and Costs of Company's Preferred Action Plan Projects

9.1.1 Description and Costs of Pahrump Division's (Volume II) Action Plan Projects

The projects included in the Pahrump Division's three-year Action Plan are for the water and sewer operations as follows:

1. New Well in High Zone at Well 13 Property [PD Replace Well - Calvada Meadows(HZ)]
2. Pipeline via Mesquite Booster Station (Avenue of the Stars) to the Calvada Meadows [PD Pipeline Tie-In]
3. Wastewater Treatment Plant 3 - Pre-EQ Building and Tank Rehabilitation
4. Wastewater Treatment Plant 3 - Sand Filter Rehabilitation

As an alternative to Item 2, GBWC would propose the following project: Pipeline Tie-in (alternative 2) from CV North to the Calvada Meadows.

As an alternative to Item 3, GBWC explored the following project: Convert and Cover Existing Marwood Digester Tanks.

9.1.2 Description and Costs of Spring Creek Division's (Volume III) Action Plan Projects

The projects included in the Spring Creek Division's three-year Action Plan are for the water and sewer operations as follows:

1. New Production Well (Well-12 Replacement)
2. Pipe Replacement Project (All Tracts)
3. High Tank Rehabilitation
4. WWTP Reconditioning (De-Ragging & Lift Station Rehab)
5. SCADA Wastewater Upgrades

As an alternative to Item 3, GBWC would propose one of two alternative projects: (1) High Tank Replacement or (2) Booster Pump (Tract 200).

As an alternative to Item 4, GBWC would propose a more limited project for rehab of the Lift Station only.

9.1.3 Description and Costs of Cold Springs Division's (Volume IV) Action Plan Projects

The projects included in the Cold Spring's Division's three-year Action Plan are for the water operations as follows:

1. PRV Installation for fire flow between Tank 3 and Tank 4
2. Tank 1 Rehab
3. Tank 2 Factory Rehab

As an alternative to Item 3, GBWC would propose a replacement of Tank 2.

9.1.4 Description and Costs of Spanish Springs Division's (Volume V) Action Plan Projects

The projects included in the Spanish Spring's Division's three-year Action Plan are for the water operations as follows:

1. Rehabilitation of Suki Well (Well 2)
2. AMI Meter Replacement Project
3. Rehabilitation of Tank 2 – Interior & Exterior.

The Action Plan projects and their respective costs are displayed on the following tables:

- Pahrump Division Action Plan Project Costs Table 9-1.a
- Spring Creek Division Action Plan Project Costs Table 9-1.b
- Cold Springs Division Action Plan Project Costs Table 9-1.c
- Spanish Springs Division Action Plan Project Costs Table 9-1.d

Tables 9-1.a to 9-1.d detail each project, years in which expenditures would be required, and the appropriate escalation in costs due to inflation and the projects' costs with and without AFUDC computed on construction work in progress – as required under the Commission's regulations. These tables are included in Appendix L-1.

9.2 Major Assumptions Used in the Funding Plan

The major assumptions required to be disclosed under NAC 704.5679 include:

(a) The general rate of inflation;
(b) The Company's rate for the cost of capital;
(c) The discount rate used to determine present worth;
(d) The applicable income and property tax rates; and
(e) Any other assumptions used by the utility to develop the funding plan.

The escalation rate (i.e., inflation rate) each year for capital and other costs is 2.6%. This rate is the most recent average of annual inflation rate projections (CPI) for the period of 2023-2027 as published in the Fourth Quarter 2023 Survey of Professional Forecasters by the Philadelphia

Federal Reserve. While it is difficult to predict the rate of inflation over the lengthy timeline and life of these project options, the Company has determined use of this average rate best approximates what inflation will be during the Action Plan period.

The rate for the cost of capital utilized in the Present Worth Revenue Requirement ("PWRR") calculations is the rate most recently approved by the PUCN in the Company's most recent consolidated rate case filings for all of its divisions in Docket No. 21-12025, 7.127%. As a component of this rate, the Company's had a weighted cost of debt is 2.359%, which is also used in this analysis.

As agreed upon in the stipulation reached in the Company's 2021 Consolidated IRP proceeding (Docket No. 21-03003), the Company is utilizing each division's most recently approved weighted average cost of capital as the discount rate in its PWRR calculations, which is 7.127% in all divisions.

The federal tax rate in this analysis is 21%, the rate at which the Company's relative taxable income will be taxed under the new tax code revisions from HR-1 signed into law December 22, 2017, and effective for tax years after 2017.

The Company's current AFUDC rate is 7.127%. This is the rate that has been incorporated into Tables 9-1.a to 9-1.d (Appendix L-1) and is applied to the relevant present value studies during the development and construction period of each project as an addition to the overall capital cost of each Action Plan project.

The property tax and insurance expense rates are the rates computed from each operating entity's individual costs. These relative expenses are divided by the Company's gross plant in service to determine the rates used in this analysis. The bad debt rates are also determined from expense data from each individual operating division's records by taking relative bad debt expense divided by gross operating revenue for the year. The mill tax amount is based on the Commission's most recently approved rate.

For depreciation, book lives are based on the straight-line method over the useful lives of the asset components. Tax depreciation is computed using the straight-line rate based on the GDS life of 25 years for the utility plant components as is required under Internal Revenue Code Section 168. Deferred taxes due to the timing differences between book and tax depreciation recognition are accounted for in the PWRR models.

9.3 Funding Plan Description

Under NAC 704.5653, the funding plan is the plan developed by a utility that demonstrates the financial impact of an action plan on the utility and its customers. In this regard, this section shows how the Company intends to fund or finance these projects and will also show, as required by this definition, the financial impact the Company's Action Plan will have on its customers for each year in overall revenue requirements as is required under NAC 704.5679. The estimated rate impacts from these projects' revenue requirements are presented considering the most recent rate case, updated for recent financial activity and projected changes of major rate base and income statement categories.

As required by this NAC, a PWRR calculation is detailed for each project proposed in the Company's Action Plan for each operating division. The PWRR calculations are most useful when comparing the PWRRs of competing project alternatives that are designed to satisfy the same goal.

The funding plan under NAC 704.5678 must include options for defraying the expenditures identified in the plan. Each option must include one or a combination of:

1. Revenue from customer surcharges;
2. Revenue from customer hook-up fees;
3. Capital investment by the utility;
4. Debt financing by the utility; and
5. Other prudent and reasonable means of defraying the expenditures.

It is important to note that whatever the funding plan, the resultant prudently incurred costs of these projects will ultimately be borne by GBWC's ratepayers. The least cost alternative to funding is desirable; however, the Company is limited in what funding sources it has access to.

Aside from the use of internal funding from GBWC's parent company, Corix Regulated Utilities (US) Inc., ("CRUUS") which is a combination of overall parent company investment and CRUUS obtained debt financing facilities, there is a limited pool of other funding sources. The Company believes these other sources could be options where it cannot obtain internal funding, however, the Company also realizes that the other funding options can be difficult to obtain or cost-prohibitive.

The Company did not consider it as a viable option obtaining external financing at a local company level from the State of Nevada Revolving Funds program administered by the Nevada Department of Environmental Protection. The funds available under this program are targeted primarily for municipalities and their publicly owned utility systems.

The remaining types of funding traditionally used for financing plant improvements and replacements have generally not been utilized for large company projects related to the replacement or improvement of existing facilities unless they are through a surcharge levied against new growth either via individual customer charges or developer capacity fee collections. The utility system improvement requests in this case are not being proposed for new growth, but rather to replace, upgrade, and enhance existing utility infrastructure for existing customers' service.

Surcharges have been more commonly used by smaller companies that have limited or no outside financing or shareholder capital investment options. As the Commission Staff pointed out in the Spring Creek 2009 IRP filing, surcharges have the added and sometimes undesirable effect of intergenerational subsidy when current customers are paying for future plant costs. In some cases, however, this cannot be avoided where the surcharge mechanism is a viable funding option and needs to be deployed. In addition, a substantial lead-time is needed to receive approval for, implement, and begin collecting a surcharge to accumulate enough funds from ratepayers in order to begin construction of capital projects. In the case of these IRP filings, the timeline is relatively short prior to the beginning of capital expenditures, and therefore it would be difficult to file for approval of a surcharge or capacity charge and collect any meaningful monies prior to costs being expended. Therefore, these sources of funds are not optimum methods of funding for GBWC or its customers.

As noted by Staff in Spring Creek's 2009 IRP proceeding, the ratepayers are the ones who pay the ultimate bill. Therefore, the least cost approach to them should be the one selected as long as the shareholder is made whole in cost and allowed an opportunity to earn a reasonable rate of return on any investment. Where a surcharge is used, assuming the shareholders are made whole by the return of and on any outstanding investment, surcharges are collected from ratepayers just as normal service rates are collected. However, a surcharge would be in addition to the normal rates. Ratepayers as a whole would not be the group obtaining financing to fund these projects. Rather, ratepayers would be subject to their own individual cost of financing, as Staff noted, and it is difficult to calculate the cost of financing as a whole for this group. Therefore, unless these improvements are for future expansion and are being paid by growth customers, or funds from the Company's own resources were unavailable, this would likely not be the cheapest funding source to defray the proposed expenditures in this filing where cheaper and more readily accessible sources of internal or external financing exist.

As previously noted, capacity fees can be used where the costs of needed capacity increases are paid for by the cost causers. This is seen with the mechanism included in the Company's tariffs for developer contributions of plant and funds to acquire and construct plant. Or, in the instance of plant that has excess capacity over and above the normal and allowable cushions, new connecting customers coming online (i.e., the cost causer for the larger plant) might pay a hook-up surcharge for the privilege of using that expanded plant that was built for them. For example, the Pahrump Division has a capacity fee that it collects from new growth customers for treatment plant expansion. Projects included in this Action Plan are not for new growth or expanded capacity of the current plant, but for servicing the existing demands and current capacity. Therefore, a surcharge mechanism is not considered to be a viable option.

Customer hook-up fees are traditionally those amounts that are collected to pay for the actual cost of the service facilities that connect the customer premises to the collection lines in the streets. Or in some instances, as noted above, there may be a special hook-up fee related to new customers paying for the added cost of plant expansion related to that new growth, thus recovering the cost of the backbone plant.

These are the contemplated cases where a surcharge or hook-up fee can be utilized. Projects put forth by the Company in this filing are of a nature designed to improve and maintain the existing system. Such system costs may not fit the criteria for pursuing a surcharge, capacity, or hook-up fee in this instance. In those cases, the Company's only other alternative is through internal sources of funds from its parent, CRUUS, where the project may eventually benefit future customers but is needed now. Therefore, CRUUS source funds are needed to get these projects into service as soon as possible.

The Company currently anticipates that the internal funds that will be available for these projects are the least cost solution and has not considered surcharges, capacity fees, or hook-up fees as being the preferred forms of funding.

9.4 Financial Results and Risk Management

An advantage for GBWC, and consequently its ratepayers, is that if GBWC can utilize funding from CRUUS, it is generally at a reasonable cost given CRUUS's relative ability to obtain cheaper debt financing than GBWC would be able to on its own.

CRUUS, as a general matter, uses a capital budgeting process to control its cash flow requirements that meet all of its debt covenants and other requirements. The financial stability of CRUUS has to be maintained in order to ensure the continued stability of its operating entities such as GBWC. The Commission Staff agreed with this premise in Docket No. 11-03002, where it noted that allocation of resources is a management decision. The risk assessment criteria in the capital project budgeting process is determined first at the local level based on the regional President's decision for needed projects and a request to the parent company for funds to complete the needed projects. Local level risk assessment is done by the President and his team considering the needs of the local area utility, working closely with outside engineers, the Staff, BCP, local governments, and customers. The availability of the source of funds from CRUUS is generally available considering the necessary regulatory approvals have been made to assure that prudent and reasonable costs will be recovered in rates.

CRUUS does not, for funding purposes, set a fixed order of importance in GBWC's list of needed projects. Instead, project prioritization is driven by specific project factors and the needs of individual operating divisions. In addition, consideration is given to federal, state, and local mandates under law; emergency situations that may affect the health and safety of customers and company personnel; the need to provide safe and reliable service to customers; and the understanding that some projects must follow other projects for reasonable, efficient, and logical implementation. However, it is important to note that GBWC's capital resources come from CRUUS. It is not a simple process of viewing GBWC on its own as a stand-alone entity. The resources available to GBWC come from GBWC's investor for financing capital projects.

It is also important to note that the monies generated on a local level are not GBWC's funds to use at the local level. Such funds are owned by the shareholder, CRUUS. Funds generated by GBWC are used by the shareholder to service its overall company costs and expenses as well as the cost of capital. CRUUS uses a centralized cash management system to pay the debt and interest costs of the parent company as a whole. While those equity and debt funds received by GBWC to pay for these projects, over the time of many years, will be recovered from GBWC customers, the initial cash outlay was provided by the shareholder and the CRUUS-obtained debt instruments first in order to make the construction of these important and needed projects possible. While a quantitative analysis might show that GBWC has enough locally generated cash flow to provide funding for the projects in any given year of the instant plan, these earned funds cannot be specifically earmarked at the local level as they are not owned by or under the control of GBWC.

In Docket No. 11-03002, Staff discussed its desire that more information be provided in the Funding Plan including: (1) estimating any funding shortfall; (2) the overall availability of equity, debt, and internally generated funds; and (3) the ability to issue additional equity and debt.

It is not currently anticipated that the Company will have a shortfall in funding from its parent for the instant projects. However, if one does materialize, then the Company would necessarily defer the project or projects to a future capital project year and would do what was necessary to comply with any Nevada statutes and regulations in this regard. At present, the Company is committed to providing the necessary resources to fund and complete these projects. Since CRUUS is the only source of funding, the only risk is that a particular project is not funded due to a decision by CRUUS. In such a case the Company could seek to amend its resource plan, if necessary. Finally, the Company has no ability to issue additional equity or debt as that is only done at the parent level in accordance with the parent's overall corporate goals, needs, restrictions, and strategy. As already noted, the Commission's Staff agrees that resource allocation is a management decision and that the Commission's regulations provide for deviations from a company's Action Plan, if necessary.

9.5 Present Worth Revenue Requirements

Listed in Tables 9-2.a through 9-2.d are the Present Worth Revenue Requirements of each Action Plan project listed in Tables 9-1.a through 9-1.d. In addition, and in accordance with NAC 704.5679, the annual revenue requirements for each project are listed along with total rate base related to each project included in the Action Plans. These tables are seen in Appendix L-1.

The PWRR calculations consider and tabulate the costs and associated revenue requirements over their useful lives in their relative present value terms.

9.6 Additional Costs and Cost Savings

In Docket No. 11-03002, the Company's 2011 Integrated Resource Plan (Pahrump Division), the Company agreed to provide a narrative form of affirmative explanation of all significant fixed operating costs and cost savings, if any, included in its next IRP Funding Plan. The Company has been providing this discussion in its funding plans ever since that docket to better assist the parties and Commission with understanding the same. The Company considered each of the projects included in the Action Plans of the individual operating divisions and the following are the incremental costs and savings related to these projects that would be considered significant and reasonably determinable at this time. For all projects, additional costs related to property taxes, property insurance, and repairs and maintenance on the plant are factored into the PWRRs for each project. In addition, mill tax and bad debt expense based on the net increases and decreases in revenue requirement for each option has been factored in. In all cases, the applicable percentage rate applied for each of these incremental costs was developed based on historical data from each operating entity as previously discussed.

In some cases, the implementation of these projects may result in more or less operating and maintenance costs.

9.6.1 Projects with Incremental Operating and Maintenance Costs

Spring Creek Division

- If the Booster Pump alternative is selected over the preferred High Tank Rehab project, the Company would experience an estimated increase in O&M of $500 per year. This cost includes: Annual maintenance and annual electrical testing services to the pumping systems.

Spanish Springs Division

- The incremental costs of the AMI project equal to $5,000 predominantly related to cellular signal.

Cold Springs Division

- The PRV project in the Cold Springs division will result in $750 annual cost increase related to the annual maintenance of the PRV.

9.6.2 Projects with Incremental Savings

Spring Creek Division

- All proposed alternatives related to the High Tank would result in an incremental savings of $1,500 per year since the tank will no longer be required to be inspected on an annual basis.
- Approval of the de-ragging component of the WWTP Reconditioning project will result in $3,000 annual savings related to operators' time to clean the wipes out of the treatment plant.

The incremental O&M costs and cost savings are netted against each other and are reflected in the action plan projects' PWRR calculations contained in Appendix L.

In addition, as previously noted, factors for income taxes, depreciation expense, property taxes, insurance expense, mill taxes, and bad debt expense are also included in the calculations of the present worth revenue requirements for each project.

The PWRR calculations span a time horizon of up to 50 years for these projects' useful lives.

9.7 Rate Impact on Customers

In Docket No. 11-03002, the Company's 2011 Integrated Resource Plan (Pahrump Division), GBWC again agreed to provide an analysis showing the percentage increase in rates in the Action Plan period for residential customers that potentially would result from the acceptance of all the capital projects contained in the Company's Action Plan. In accordance with this agreement, the Company has prepared this funding plan analysis to assist the parties and Commission in better understanding the rate impact these proposed projects may have on customers' rates. The impact of these costs on rates is compared to the Company's currently effective tariff rates. It is important to note that these rate calculations are only estimates of what incremental impact these costs will have on the Company's current rates, taking into account certain assumptions as discussed in section 9.3. These rate estimates can and would be significantly impacted by a change in any of the assumptions used herein and also on any adjustments made by the Commission concerning all of the other costs and revenues associated with each operating entity. The rate impacts for all operating entities are detailed in Appendix L-1 of this IRP filing.

9.8 Present Worth Revenue Requirements

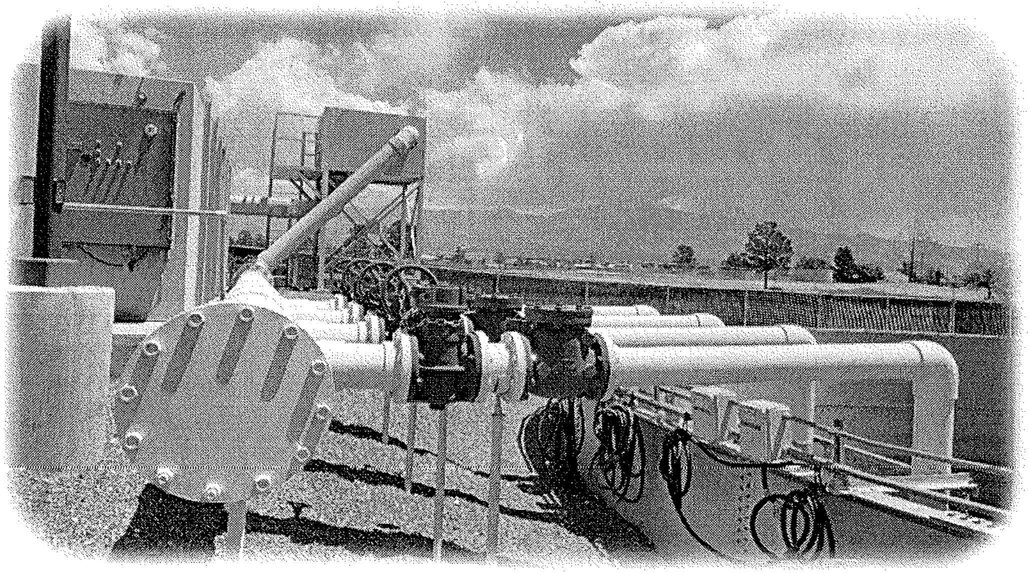
The work papers for the calculation of the PWRR's for each Action Plan project using the Company's cost of capital to derive the revenue requirements and rate base amounts for each year during the planning period and using the ratepayer discount rate to compute PWRR on each option along with the previously noted assumptions are contained in the Appendix L of this IRP.

SECTION 10.0: SYSTEM IMPROVEMENT RATE REQUEST

Please refer to individual Division volumes for specific data (Volume II "Pahrump Division", Volume III "Springs Creek Division", Volume IV "Cold Springs Division", and Volume V "Spanish Springs Division"). In addition, please see SIR impact models in Appendix L-2.

Great Basin Water Co.
2024 Integrated Resource Plan
Volume II: Pahrump Division

March 1, 2024



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ADD	Average Day Demand
ADF	Average Daily Flow
ADMM	Average Day Maximum Month
AFA	Acre Feet Annually
AFMM	Average Flow Maximum Month
AFUDC	Allowance for Funds Used During Construction
AL	Active Level
AMI	Advanced Metering Infrastructure
AMR	Automatic Meter Reading
AMS	Angle Meter Stop
amsl	Above mean sea level
ASD	Aerobic Sludge Digester
AWWA	American Water Works Association
BGL	Below Ground Level
BOD	Biological Oxygen Demand
CCA	Corrections Corporation of America
CIP	Capital Improvement Projects
CN	Cavada North
CNUC	Central Nevada Utilities Company
CV	Calvada Valley
CVE	Country View Estates
CVM	Calvada Meadows
DUI	Desert Utilities, Inc.
DWR	Division of Water Resources
EAP	Emergency Action Plan
EQ	Equalization
FMEA	Failure Mode and Effects Analysis
FOG	Fats, Oils, and Greases
GBWC	Great Basin Water Company
GIS	Geographical Information System
GPD	Gallons per Day
GPDPC	Gallons per day per connection
GPM	Gallons per Minute
GWMP	Groundwater Management Plan
GWMPAC	Groundwater Management Plan Advisory Committee
HDPE	High Density Polyethylene
HP	Horsepower
HVAC	Heating, Ventilation, and Air Conditioning

List of Abbreviations – cont.

I/I	Inflow and Infiltration
IFC	International Fire Code
IRP	Integrated Resource Plan
ISA	Interim Service Agreement
IWA	International Water Association
kW	Kilowatt
KPI	Key Performance Indicators
LF	Linear Feet
LOS	Level of Service
LS	Lift Stations
LVVWD	Las Vegas Valley Water District
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MF	Mountain Falls
MF WWTP	Mountain Falls Wastewater Treatment Plant
MFL	Million Fibers per Liter
MG	Million Gallons
MGD	Million Gallons per Day
MHz	Megahertz
MOU	Memorandum of Understanding
MSL	Mean Sea Level
NAC	Nevada Administrative Code
NCWD	Nye County Water District
ND	Non-Detect
NDEP	Nevada Division of Environmental Protection
NDMC	National Drought Mitigation Center
NDWR	Nevada Division of Water Resources
NRS	Nevada Revised Statutes
NRW	Non-Revenue Water
NSF	National Sanitation Foundation
OMS	Operation Maintenance Support
OSHA	Occupational Safety and Health Administration
PD	Pahrump Division
PEC	Preferred Equities Corporation
PF	Peaking Factor
PHD	Peak Hour Demand
PIB	Pipeline Improvement Budget
PRV	Pressure Reducing Valve

List of Abbreviations – cont.

psi	Pounds per Square Inch
PUCI	Pahrump Utilities Company, Inc.
PUCN	Public Utilities Commission of Nevada
PVC	Polyvinyl Chloride
RIB	Rapid Infiltration Basin
RIBS	Rapid Infiltration Basins
SAM	Submersible Aerator Mixer
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control and Data Acquisition
SFR	Single Family Residential
SIR	System Improvement Rate
SMMR	Spring Mountain Motorsports Ranch
SOMAR	Solids Handling Equipment
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TON	Threshold Odor Number
TSS	Total Suspended Solids
TTHM	Trihalomethane
UNK	Unknown
US	Corix Regulated Utilities, Inc.
VA	Vulnerability Assessment
VFD	Variable Frequency Drive
WWCSB	Wastewater Collection System Budget
WWTP	Wastewater Treatment Plant
WWTPB	Wastewater Treatment Plant Budget

EXECUTIVE SUMMARY

GBWC Pahrump Division Overview

The Great Basin Water Co. Pahrump Division (GBWC-PD) water and wastewater assets were acquired in 2002 from the Central Nevada Utility Company. GBWC is regulated by the Public Utility Commission of Nevada (PUCN), Nevada Division of Environmental Protection (NDEP), Nevada Division of Water Resources (NDWR), and other federal, state, and local government entities.

The Great Basin Water Co. – Pahrump Division ("GBWC-PD") service area covers approximately 43 square miles in the Pahrump Valley generally along the Highway 160 corridor as shown in Figure 1.01 (Section 1). The service area is currently comprised of five separate water systems and four wastewater collection systems. The water systems include: Calvada Valley, Calvada North/Country View Estates, Calvada Meadows, Mountain Falls, and Spring Mountain Motorsports Ranch. The wastewater systems include Plant 3 in the Calvada Valley area, Plant F in the Calvada North area, Plant MF located in Mountain Falls, SMMR Plant and three small commercial septic systems. The Spring Mountain Motorsports Ranch ("SMMR") water system and wastewater system were annexed into the service area in December 2016 and are expected to be fully dedicated in the first quarter of 2024. GBWC-PD has not accepted the new water and wastewater system as of this report but is operating the facilities under a memorandum of understanding and interim service agreement. The former Mountain View Estates water system was consolidated with the Calvada Valley system through a new pipeline completed in 2023.

The objective of the 2024 IRP is to develop a plan that will ensure that GBWC-PD's customers receive reliable water and sewer service, while minimizing costs and mitigating risks. This includes identifying any current system deficiencies and needed improvements, projecting 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.

The purpose of this IRP is to balance the needs of the 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 have exceeded their useful life expectancy and identify needs in the system in order 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, pursuant to NAC 704.5654. Historical production data presented in this IRP covers the 10-year period preceding 2023 pursuant to NAC 704.5668.

The existing water systems were evaluated for supply, storage, and distribution systems. The systems were analyzed for current operations and existing deficiencies. Following this was an analysis based on the 20-year growth projections. There are some areas with pressure concerns and some areas with marginal fire flow based on the analyses performed in this report. Infrastructure improvements to the piping system have been identified to improve the effectiveness of the existing systems.

The wastewater systems were evaluated for treatment, capacity, treatment efficiency, collection system capabilities and reclaimed water usage. There is sufficient capacity in all the wastewater systems to meet current and future needs based on the 20-year growth projections. Treatment efficiency needs to be improved at Plant 3 and will improve the overall operations of the facility.

The Plant 3 and Mountain Falls facilities produce reclaimed water that is used by local golf courses, park, and Pahrump Valley High School.

Current Service Issues

In October 2016, GBWC-PD created a "Level of Service" ("LOS") assessment. The section listed GBWC-PD's level of service elements with regard to Regulatory and Contractual Deficiencies, Quality Standards, Reliability, Customer Service, and Wastewater Standards. Some of the LOS issues that GBWC-PD are continuing to target include:

- Decreasing loss from leakage (non-revenue water).
- Fire flows: inadequacies in the dead ends of the water systems and minor issues in water system.
- Lack of potable water storage in the Calvada Meadows System.
- Redundancy improvement in the Calvada Meadows System.

Asset Registry Condition Assessment and Asset Management Analysis

GBWC-PD has an asset registry that contains the major assets in GBWC-PD's water and wastewater utilities. This asset registry included a condition assessment of the assets to ensure future fundamental replacement/rehabilitation schedules can be generated to deal with the assets once they exhaust their remaining useful life. For this Integrated Resource Plan (IRP), an updated asset registry was utilized to look at the current age and remaining useful life of the water and wastewater infrastructure. The asset registry is considered a living document, which will be updated on an as-needed basis to ensure sufficient monitoring of the assets is being conducted regularly. The asset registry only contains the major fixed assets.

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, as detailed in Volume I.

Existing Conditions

The latest existing conditions of the water supply, water distribution, wastewater collection and wastewater treatment infrastructure were documented. Descriptions of the existing conditions were based on pertinent information for this infrastructure, gathered from available information (such as inspection reports) as well as site visits that were performed.

Current and Projected Growth Requirements

Growth Projections

The "Nevada County Population Projections 2022 to 2041" report prepared by the State Demographer's Office dated October 1, 2022, was the latest data available and used to establish growth rates of the future population in the service area. The report estimates the Nye County 2022 population at 49,289 people. The latest Census was recorded in 2020. In the 2020 Census, the Nye County population was reported as 51,591 and the Pahrump population as 44,204. This is a difference of 4.4% from the State Demographer. 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. The estimated Nye County population in 2044 is 68,579. The projected Pahrump population in 2044 is estimated to be 58,759 people. The historical data and projections are presented in Table E-1.

Table E-1: GBWC-PD Population Projections

Year	Nye County Population Projections	Pahrump Population Projections
2020	*51,591*	*44,204*
2021	*52,129*	*44,665*
2022	*52,673*	*45,131*
2023	53,215	45,596
2024	53,757	46,060
2029	56,619	48,512
2034	59,852	51,282
2040	64,589	55,341
2044	68,579	58,759

Water System Forecasting

Historical water connections were tabulated and compared to historical population data to determine a reasonable assumption of growth forecasting regarding the future water connections to the GBWC-PD system. The forecasted water connections are based on a direct correlation of the projected growth rate at the historical proportional relationship between the number of connections and the overall population. This projection is summarized in Table E-2.

Table E-2: Water Connection Projections

Year	Pahrump Pop.	New Res. Service Conn.	Res. Service Conn.	Res. Users	GBWC-PD % of Pahrump Pop.	Comm. Conn.	Total GBWC-PD Conn.
2020	44,204	-	5,387	12,713	29	323	5,816
2021	44,665	137	5,524	13,037	29	320	5,973
2022	45,131	418	5,942	14,023	31	328	6,402
2023	45,596	61	6,003	14,167	31	331	6,467
2024	46,060	61	6,064	14,311	31	334	6,532
2025	46,513	60	6,124	14,453	31	337	6,596
2030	49,039	69	6,456	15,236	31	356	6,954
2035	51,869	77	6,828	16,114	31	376	7,356
2040	55,341	104	7,285	17,193	31	401	7,848
2044	58,759	115	7,735	18,255	31	425	8,332

Water Supply

There is currently enough water supply through the existing wells to meet current and forecasted future supply needs in each service area, with the exception of Calvada Meadows. Deficiencies in Calvada Meadows are addressed through proposed projects in the Action Plan. Table E-3 shows the total well capacity with all wells in service for each service area.

Table E-3: Water Demand Forecasting

Year	Calvada Valley MDD (gpm)	Calvada North/ Country View Estates MDD (gpm)	Calvada Meadows MDD (gpm)	Mountain Falls MDD (gpm)	SMMR MDD (gpm)
2022	2,536	199	6.3	943	68
2044	3,313	256	6.3	1,234	88
Adjusted Well Capacity (with largest well out of service)	3,864	485	0.0	1,531	470
Difference Between Capacity and 2044 MDD	551	229	-6.3	297	382

Many of the wells in the GBWC-PD service areas are over 40 years old, while others are showing eternal signs of potential casing failure. Since the existing condition of several wells is not known, GBWC-PD plans continue their well rehabilitation and assessment projects which evaluates the integrity of each well through camera inspections and provides vital information for well cleanings and/or replacement schedules.

System Capacity

Water storage and overall system capacity were evaluated on the basis of operational needs, emergency needs, and fire flow storage needs. Water storage and overall system capacity are regulated by NAC 445A.6674, 445A.66745, 445A.6675, 445A.6755, and 445A.66755.

For the purpose of the GBWC-PD 2024 IRP, the storage included operating storage of MDD for one day, fire flow storage (depending on the service area highest requirement), and emergency reserves of ADD in a system-wide storage assessment. Table E-4 shows the storage requirements and available storage for each service area.

The Calvada Meadows system is too small to adhere to these requirements. It is recommended that this water system be interconnected to the Calvada Valley Main System to provide greater fire flow and more reliable flows and emergency supplies.

Table E-4: Required and Available Capacity

	Calvada Valley (MG)	Calvada North/ Country View Estates (MG)	Calvada Meadows (MG)	Mountain Falls (MG)	SMMR (MG)
NAC Scenario A					
2022 Required Storage	6.14	0.70	0.25	2.20	0.38
2044 Required Storage	7.96	0.83	0.25	2.80	0.42
Available Capacity	8.28	1.45	0.36	7.06	3.28
Meets NAC for Storage?	Yes	Yes	Yes	Yes	Yes
NAC Scenario B					
2022 Required Storage	4.75	0.59	0.25	1.44	0.32
2044 Required Storage	6.13	0.69	0.25	1.80	0.34
Available Capacity	6.41	1.02	0.003	4.80	2.60
Meets NAC for Storage?	Yes	Yes	No	Yes	Yes

Transmission and Distribution Systems

The water distribution system was analyzed by hydraulically modeling the Calvada Valley, Calvada North/Country View Estates, and Mountain Falls water systems with 2021 demands, 2027 demands, and 2044 demands. The hydraulic models were analyzed on an existing demand basis for average day demand (ADD), maximum day demand (MDD), peak hour demand (PHD), and fire flow conditions. The pipeline networks were evaluated based on flow velocities and head losses as they related to pressures throughout the distribution system. Where deficiencies were noted, additional modeling was performed with potential changes to the system to determine the most technically feasible and cost-effective solution(s). The hydraulic models were compared to design criteria outlined in NAC 445A.6672.

Only a small number of 8-inch distribution pipes were observed to exceed the maximum head loss requirement (10 ft./1000 ft.). Most nodes in the system demonstrated that the system was able to meet fire flow at those nodes. The distribution piping meets the criteria for velocity, with velocities less than 8 feet per second observed.

There are several dead ends within the Calvada Valley water distribution system. Per NAC 445A.6712, the water system should be designed to the extent possible to eliminate dead ends and form a grid system or system of arterial loops. Looping and additional tie-ins in the water system will help provide better fire protection, create redundancy, and reduce customers without water in the event of a water break.

At this time, there are working hydraulic models for the Calvada Valley, Mountain Falls, Calvada North/Country View Estates, and SMMR systems. These hydraulic models were analyzed in order to model future changes to the water distribution system and ensure NAC compliance in all the GBWC-PD service areas.

Wastewater Connection Forecasting

The historical wastewater connections were tabulated and compared to the historical population data to determine a reasonable assumption of growth forecasting regarding the future wastewater connections to the GBWC-PD system. The forecasted wastewater connections are based on a direct correlation of the projected growth rate at the historical proportional relationship between the number of connections and the overall population. The projection is also correlated to the water connection forecasts to ensure that the projections do not contradict each other. The projections are summarized in Table E-5.

Table E-5: Projected Wastewater Connections

Year	Plant 3 – Calvada Valley	Plant F – Calvada North	Plant MF – Mountain Falls	Plant SMMR- Spring Mountain Motorsports Ranch	Total
2020	2,593	153	1,277	19	4,042
2021	2,649	154	1,316	23	4,142
2022	2,802	165	1,508	24	4,499
2023	2,838	167	1,519	24	4,548
2024	2,867	168	1,534	24	4,594
2025	2,895	170	1,550	25	4,639
2030	3,053	179	1,634	26	4,893
2035	3,231	190	1,729	28	5,177
2040	3,448	202	1,845	29	5,525
2044	3,662	215	1,960	31	5,868

There are no capacity-related improvements necessary in the three wastewater facilities currently in operation in the GBWC-PD. However, there are improvements that should be made to increase the efficiency of the treatment facilities. Plant 3 operates well but experiences corrosion and deterioration in the pre-EQ building and tanks. Additionally, Plant 3's existing effluent filters, which are traveling bridge sand filters, are an aging technology and require rehabilitation to improve functionality and reliability.

Table E-6: Projected Wastewater Flows

Year	Plant 3 – Calvada Valley[1]	Projected WWTP Flow ADF (MGD)[2]	Projected WWTP Flow ADMM (MGD)[3]
2017	2,452	0.648	0.678
2018	2,500	0.679	0.689
2019	2,529	0.699	0.729
2020	2,593	0.672	0.705
2021	2,649	0.709	0.749
2022	2,802	0.718	0.737
2023	2,838	0.741	0.773
2024	2,867	0.748	0.781
2025	2,895	0.756	0.788
2030	3,053	0.797	0.832
2035	3,231	0.843	0.880
2040	3,448	0.900	0.939
2044	3,662	0.956	0.997

Reclaimed Water Systems

Plant F does not produce reclaimed water. All of its effluent is disposed of through on-site spray irrigation. Plant 3 disposes of its reclaimed water to holding ponds in Discovery Park. The reclaimed water is then pumped from the receiving ponds to spray irrigation at Discovery Park, and also conveyed to the Pahrump Valley High School and local Lakeview Golf Course approximately 1 mile away for irrigation. Mountain Falls disposes of all of their reclaimed water to the Mountain Falls Golf Course.

Emergency Action Plan

The Emergency Action Plan is discussed in more detail in Volume I of this filing and is provided in Appendix J.

Water Conservation Plan

The Water Conservation Plan is referenced in Volume I of this filing and is provided in Appendix K.

Preferred Plan

The 2024 IRP Preferred Plan for GBWC-PD is intended to provide a list of necessary projects over the next 20-year planning period to continue to provide the current LOS to their customers. With the integration of the Asset Management Plan, the Preferred Plan also includes recommendations associated with monitoring, maintenance, and inspections for several of the more expensive critical assets of the water and wastewater systems. The purpose of these recommendations is to extend the useful life of the assets, prolonging the need for replacement or refurbishment.

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 IRP's. The timing of the project improvements has been assessed extensively by GBWC staff and their engineers to ensure the most cost-effective results are captured for the ratepayers, while sustaining their existing LOS. While the improvements will be presented separately for the water and wastewater systems, 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 CIP has been developed based on the best information available. CIP for the Preferred Plan include the following:

<u>Water Resources CIP</u>

- Well Replacement
- Calvada Meadows Replacement Well

<u>Water Distribution CIP</u>

- New Location for High Zone Booster Station
- Pipeline Annual Capital Improvement Budget
- AMI Installation
- New Office

<u>Water Storage CIP</u>

- Water Tank Rehabilitations

<u>Wastewater System CIP</u>

- WWTP Infrastructure Rehabilitation/Replacement
- On-Site Hypochlorite Generation Systems
- Wastewater Annual Collection System Rehabilitation/Replacement Budget

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-PD 2024 IRP (Volume II) requests the approval of four Action Plan projects, which are needed for the improvement and compliance of the GBWC-PD water and wastewater systems. The recommended Action Plan projects for GBWC-PD target the water and wastewater systems in a way that helps maintain and improve the customers' LOS, provide redundancy to the systems, and ensure compliance with NAC regulations.

The 3-year Action Plan projects are focused on immediate asset concerns that have been identified through the development of the asset management component, NAC compliance, and staff recommendations. The Action Plan Projects include:

Water Resources CIP

- New Well in High Zone at Well 13 Property

Water Distribution CIP

- Calvada Meadows System Consolidation

Wastewater System CIP

- WWTP-3 Influent Pre-EQ Building and Tanks
- WWTP-3 Sand Filter Rehabilitation

Funding Plan

Volume I (Introduction) contains the Funding Plan analysis for the recommended Action Plan projects in the GBWC-PD 2024 IRP (Volume II). Please refer to 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, Corix Regulated Utilities (US) Inc.'s debt and equity investment.

System Improvement Rate Request

GBWC-PD 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 Nevada Administrative Code (NAC) 704.6339: (i) New Well in High Zone at Well 13 Property; (ii) Calvada Meadows System Consolidation; (iii) WWTP-3 Influent Pre-EQ Building and Tanks and (iv) WWTP-3 Sand Filter 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 Co. – Pahrump Division (GBWC-PD), a description of Hydrographic Basin 162, 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 five service areas, 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 and Wastewater Treatment Plants. This section presents the analysis of the existing water and wastewater systems with regards to how it will be impacted by the demand forecasting presented in Section 3.0.
Section 5.0	Emergency Action Plan. This section provides a reference to the GBWC-PD emergency action plan discussed in Volume I.
Section 6.0	Water Conservation Plan. 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 2024 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 Nevada Administrative Code (NAC) 704.6339 to support a request to designate water and sewer 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 Pahrump Division Overview

The Great Basin Water Co. – Pahrump Division ("GBWC-PD") service area covers approximately 43 square miles in the Pahrump Valley, generally along the Highway 160 corridor as shown in Figure 1.01. The service area is currently comprised of five separate water systems and four wastewater collection systems. The water systems include: Calvada Valley, Calvada North/Country View Estates, Calvada Meadows, Mountain Falls, and Spring Mountain Motorsports Ranch ("SMMR"). The wastewater systems include Plant 3 in the Calvada Valley area, Plant F in the Calvada North area, Plant MF located in Mountain Falls In the south, SMMR Plant, and three small commercial septic systems with a total of four (4) customers. The Spring Mountain Motorsports Ranch ("SMMR") water system and wastewater system were annexed into the service area in December 2016 and are expected to be fully dedicated in the first quarter of 2024. The Mountain View Estates water system was consolidated with the Calvada Valley system through a new pipeline completed in 2023.

The GBWC-PD water systems are comprised of four (4) booster pump stations, eight (8) ground storage tanks, one (1) hydropneumatic tank, and fourteen (14) groundwater wells located in Hydrographic Basin 162 that provide potable drinking water to their service area. One (1) of these wells may be beyond its useful life (over 40 years old). The newest water system contains one (1) booster pump station, two (2) storage tanks and two (2) groundwater wells, which were recently constructed for the newly developed GBWC-PD SMMR stand-alone system.

The primary use is residential although there are several large water users on the system. A total of approximately 6,510 metered water connections are currently installed along with 4,126 sewer connections as of December 2022.

There are approximately 11,800 domestic wells within the Pahrump city limit based on the State of Nevada Division of Water Resources Open Data (as of January 2024). Within the GBWC-PD service territory, well log data suggest there are approximately 2,800 domestic wells. While some of these wells may no longer be active or serving connections, the large number of domestic wells within the service area indicates potential future connections to the system. GBWC-PD's system is currently not capable of serving many future customers without extension of their system and the installation of additional backbone infrastructure to reach these customers.

The purpose of this IRP is intended to balance the needs of the 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 insufficiencies in the system.
- Promote water system innovations that will provide efficiencies in operations and maintenance.

By working through the Action Plan, the GBWC-SCD 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 2023 pursuant to NAC 704.5668.

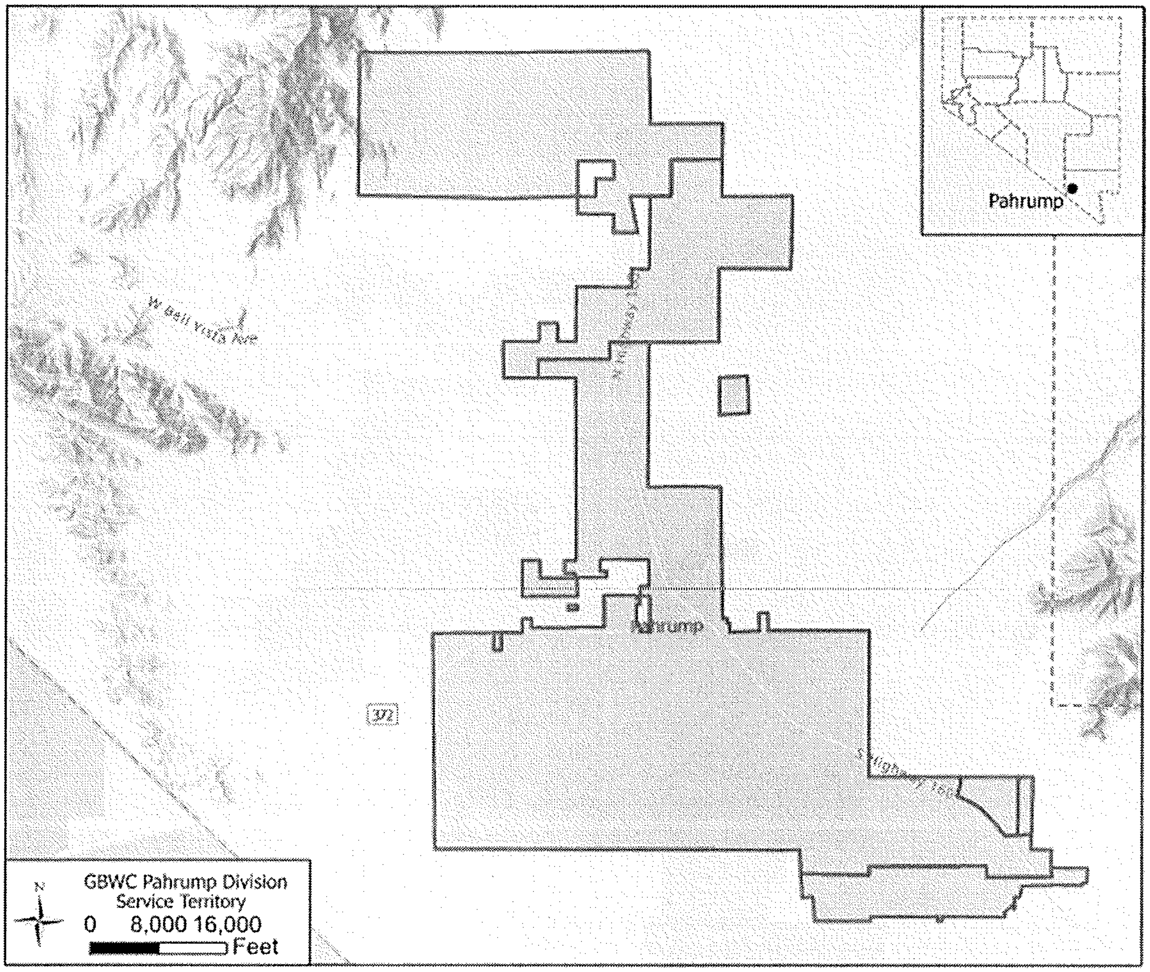


Figure 1.01: Overview of the Existing GBWC-PD Water Systems

1.2.2 Basin 162 (Pahrump Valley) Overview

Hydrographic Basin 162, known as the Pahrump Basin or "Basin 162", is the groundwater source for all of GBWC-PD's supply wells as well as the entire Pahrump Valley.

According to the Groundwater Management Plan ("GWMP"), Version February 2018, as prepared by the Nye County Water District ("NCWD") Staff and Groundwater Management Plan Advisory

Committee ("GWMPAC") members, "Basin 162 is one of the most over-appropriated basins in Nevada and has the highest density of domestic wells of any basin in the State." The perennial yield of Basin 162 has been set by the State Engineer's Office at 20,000 Acre-Feet-Annually ("AFA"). There are 59,736[1] permitted water rights in the basin. As of the GWMP in 2018[2], there were over 11,280 domestic wells with another 7,500 lots designated for domestic wells. The State Engineer's Office estimates usage at 0.5 AFA per domestic well. Note that domestic wells statutorily may be allowed to use up to 2 AFA, although no water rights are associated with a domestic well. Potential groundwater withdrawal versus perennial yield for Basin 162 is summarized in Table 1.01 to show a total over-appropriation of 49,126 AFA.

Table 1.01: Basin 162 Over-allocation

Pahrump Hydrographic Basin(2)	
Existing Permitted Rights	59,736 AFA
Existing and Future Domestic Wells	9,390 AFA
Potential Groundwater Withdrawal(1)	**69,126 AFA**
Perennial Yield	20,000 AFA
Over Appropriation	**49,126 AFA**

Notes:
(1) Potential groundwater withdrawals are the sum of:
  a. Existing water rights 59,736 (DWR website June 2023)
  b. An estimate of existing and future domestic wells at 0.5 AF per domestic well (estimated at 11,280 existing + 7,500 future)
(2) Table adapted from GWMP, Version Feb 2018, Table 2

The State Engineer is in favor of interconnecting the utilities in Basin 162. This is a challenge with three water companies spread out by miles, and even within the three utilities there are multiple separate water systems. However, both the utilities and the State Engineer's Office agree that additional means to serve the people who rely on Basin 162 through utility service serves to benefit Basin 162.

1.3 Objectives

The objective of the 2024 IRP is to develop a plan that will ensure that GBWC-PD's customers receive reliable water and sewer service, while balancing the goals of minimizing costs, mitigating risks, and increasing efficiencies. The IRP will provide guidance to GBWC in providing adequate water and sanitary sewer service to their customers in the GBWC-PD service area over the next 20 years. This includes identifying any current system deficiencies and needed improvements, projecting 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. GBWC-PD Volume 2 provides a detailed Action Plan herein, identifying the needed and

[1] Division of Water Resources ("DWR") website June 2023.

[2] Latest available information provided by Nye County.

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 October 2016, GBWC-PD created a "Level of Service" ("LOS") assessment. The section listed GBWC-PD's level of service elements with regard to Regulatory and Contractual Deficiencies, Quality Standards, Reliability, Customer Service, and Wastewater Standards, including:

- Regulatory/Contractual Deficiencies
  - Nevada Division of Environmental Protection (NDEP) Tier 1 and Tier 2 water treatment and quality parameters
  - National Sanitation Foundation (NSF) 61 compliance for lead
  - NAC standards of service (general compliance, leakage, line pressure, fire flow, storage, fire hydrant testing, backup power, redundancy, dead ends)
  - Consumer Bill of Rights
  - NDEP Backflow Prevention Program
  - Public Utilities Commission of Nevada (PUCN) Fats, Oils and Grease (FOG) Requirement
  - Nevada Division Water Resources (NDWR) water withdrawal limit
  - Emergency response
  - PUCN and NDWR water conservation requirements
  - Maintain operations and maintenance (O&M) manuals on file
  - Mountain Falls Water Supply Contractual requirements
- Water Quality Standards
- Potable Water Reliability (including outages and monthly reading of meters)
- Customer Service (flexible billing options and access to customer service)
- Wastewater Standards (effluent quality, wastewater collection system and treatment reliability) and Reclaimed Water Agreements
- Other (submitting IRP documents, site security, worker health and safety, maintaining acceptable architecture, odor and noise levels, etc.)

The LOS sections have helped GBWC-PD identify areas where improvement can be made to strengthen services and relations with their customers. Some of the targeted areas for improvement include:

- Decreasing loss from leakage (non-revenue water).
- Fire flows: inadequacies in the dead ends of the water system and minor issues in the water system.
- Limited availability of potable water storage in the Calvada Meadows System.
- Redundancy improvement in the Calvada Meadows System.

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-PD 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 Pahrump Division

2.1.1 Location

The GBWC-PD service area is located approximately 60 miles west of Las Vegas, Nevada, along U.S. Route 160. Specifically, the GBWC-PD service area is located in Township 19, 20, and 21 South, Ranges 53 and 54 East in the Pahrump Valley within Nye County, Nevada. The most recent service territory maps for each water and wastewater system can be found in Appendix D.

2.1.2 History

GBWC-PD currently covers approximately 43 square miles and consists of five individual water systems and four wastewater systems (See Appendix D). The individual water and sewer systems are: (1) Calvada Valley water and sewer systems; (2) Country View Estates/Calvada North water and sewer systems; (3) Calvada Meadows water system; (4) Mountain Falls water and sewer systems; and (5) Spring Mountain Motorsports Ranch (SMMR) water and sewer systems. The former Mountain View system was connected by a new pipeline to the main Calvada Valley system in 2023.

2.1.3 Service Territory

In late 1970, Preferred Equities Corporation ("PEC") began recording subdivision plats throughout the Pahrump Valley. The lots created through the subdivision plats recorded by PEC can be largely classified into three categories of water and sewer service. The first of the categories included lots, which were to have central water and sewer service. The second designation included lots which were to have central water service, but an individual septic disposal system. A third designation included lots which were to have a domestic well and individual septic disposal system. From 1970 to 1997 PEC platted in excess of 28,000 residential units, which were approved for service by the central water system, and about 16,400 lots were to be served by a central water and sewer system. Almost another 8,000 lots were to be served by a central water system.

In order to provide central water and sewer services, PEC established and owned Central Nevada Utilities Company (CNUC). However, PEC did not install all the infrastructure necessary to provide central water and sewer service. Instead, the majority of the expansion of the central infrastructure occurred on a piecemeal basis as individual lots were developed. As a result, today there is only infrastructure to serve about 6,400 of the original 28,000 lots.

Where PEC did install water system infrastructure, much of it was undersized. In some cases, a two-inch main would be installed for thousands of feet to serve one home. If other homes were built along the route of the two-inch main, they would be allowed to connect to the undersized main. These practices resulted in the various water systems having numerous undersized and dead-end mains, which create challenges for GBWC-PD to meet pressure and fire flow requirements for current system users.

Currently, water and sewer service in the Pahrump Valley is provided by three utility companies and numerous private wells and septic systems. GBWC-PD serves the southern, central, and northern areas of Pahrump. Desert Utilities, Inc. serves approximately 3.5 square miles in north Pahrump. Pahrump Utility Company, Inc. serves approximately 1.0 square mile in south Pahrump. Desert Utilities Inc.'s and Pahrump Utility Company's service areas are located adjacent to GBWC-PD's service area. GBWC-PD's service area constitutes about 90 percent of the total area served by the three utility companies in the Pahrump Valley.

For the GBWC 2024 IRP, it has been assumed that there are 6,532 connections throughout the existing five GBWC-PD service areas consisting primarily of residential (single family and multi-residential) clients, with a number of commercial clients and small number of public authority and irrigation connections. Growth is expected to continue in the existing service territory.

The legal description of the water service territory is contained in GBWC-PD'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.

2.1.4 Maps

The location and general map showing the GBWC-PD service territory is shown in Figure 1.01. For more detailed maps showing specific service areas and locations of major assets in each water and wastewater system, please refer to Appendix D.

2.1.5 Geography and Climate

The Pahrump Valley has elevations ranging from approximately 3,000 feet above mean sea level ("MSL") dropping to under 2,600 feet msl.

Summer in Nye County is hot and dry with highs in the low 100's and lows in the low 60's. Winter temperatures range from highs in the upper 50's and lows in upper 20's. Precipitation is low, averaging 4.7 inches per year with the wettest months occurring in the winter. Table 2.01 includes average monthly data for Pahrump, Nevada.

Table 2.01: Pahrump, Nevada Average Monthly Weather Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max. Temp. (°F)	57.4	62.5	68.0	75.5	85.2	95.2	101.6	99.8	92.6	81.5	67.3	57.8	78.7
Min. Temp. (°F)	27.0	32.1	36.9	43.2	52.2	60.0	67.3	65.7	56.8	44.8	33.8	26.6	45.5
Total Precip. (in.)	0.7	0.8	0.5	0.3	0.2	0.1	0.3	0.3	0.3	0.2	0.3	0.5	4.7
Total Snowfall (in.)	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6

Station: Pahrump, Nevada (265890)
Period of Record: 1914 to 2016
Source: Western Regional Climate Center

2.1.6 Land Use

Land use within the service territory is primarily residential with some light commercial and public facilities. Commercial facilities include mostly small stores and restaurants, with a few large retail stores and casinos. Spring Mountain Motorsports Ranch is under development with a service area composed of residential development and 20 acres of commercial development, including a planned 1,250-seat movie theater, 97-room hotel, restaurants, retail shops, racetrack facilities, and an RV park. Currently, only a small portion of the planned development has been built out.

2.1.7 Population

The U.S. Census Bureau reported a population in the town of Pahrump of 44,204 people in 2020, with an average household size of 2.36 persons per household. GBWC-PD serves approximately 26% of the town of Pahrump.

2.1.8 Water Supply and Quality

The water supply for GBWC-PD is groundwater from 13 potable wells and two non-potable wells (Wells 10 and 21). Seven wells, of which two are for irrigation, are in the Calvada Valley system; three wells are in the Country View Estates/Calvada North system; one well is in Calvada Meadows; two wells are in the Mountain Falls system; and two wells are in the Spring Mountain Motor Ranch system. The two wells used for irrigation include Well 10, which can supply irrigation water to Discovery Park, and Well 21 located on the Lake View Executive Golf Course for irrigation of the course. Well 21 has not been used for irrigation since the last 2021 Consolidated IRP submittal.

Over the 20-year projection period, the State Demographer has estimated an approximate 1.1% growth rate annually for Nye County. Based on the existing water supply well capacities, there are no anticipated water supply problems in the planning period, with the exception of replacement of wells as they reach the end of their useful life. However, GBWC-PD's wells draw from Basin 162, which is over-appropriated. Nye County has a groundwater level monitoring program in which GBWC-PD participates.

Water quality data from the 2019, 2020, 2021, and 2022 Consumer Confidence Reports for GBWC-PD specific water systems are provided in Table 2.02 through Table 2.07. Contaminants not tested in 2019 through 2022 are also included in the tables from previous reports. The reports illustrate that no regulated contaminates exceed MCLs in any of the service areas. At this time, there is no reason to assume that water quality degradation will occur during the planning period.

Table 2.02: Calvada Valley Water Quality Data (2022) Consumer Confidence Report

Parameter	Violation Y/N	Test Year	Units	MCL	Range
Microbiological					
No Detected Microbiological Contaminants Were Found in 2021 Calendar Year					
Inorganic Contaminants					
Arsenic	N	2022	ppb	10	ND
Barium	N	2022	ppm	2	0.0499 – 0.0655
Beryllium	N	2022	ppm	4	ND
Chromium	N	2016	ppb	100	5.12
Fluoride	N	2022	ppm	4	0.111 – 0.129
Iron	N	2022	ppm	0.6	ND – 0.0436
Manganese	N	2016	ppm	0.1	0.0076
Mercury	N	2022	ppb	2	ND
Nickel	N	2022	ppb	100	ND
Nitrate	N	2022	ppm	10	0.374 – 0.656
Disinfection By-Products					
Chlorine	N	2022	ppm	4	0.77 – 1.41
Lead and Copper					
Copper	N	2022	ppm	1.3 AL	0.00706 – 0.113
Lead	N	2022	ppb	15 AL	ND – 2.24
Radionuclides					
Combined Radium (-226 & -228)	N	2018	pCi/L	5	0.027 – 0.254
Uranium	N	2020	ppb	30	ND – 1.45
Gross Alpha, Incl. Radon & Uranium	N	2018	pCi/L	15	1.04 – 2.92
Gross Beta Particle Activity	N	2018	pCi/L	50	1.71
Radium 226	N	2018	pCi/L	5	ND – 0.448
Secondary Contaminants					
Aluminum	N	2022	ppm	0.2	ND – 0.00590
Chloride	N	2022	ppm	400	2.30 – 3.57
Color	N	2022	cu	15	3 – 30
Magnesium	N	2022	ppm	150	19.6 – 80.3
Odor	N	2022	ton	3	ND – 1
pH	N	2022		8.5	7.58 – 7.89
Sodium	N	2022	ppm	200	3.95 – 4.35
Sulfate	N	2022	ppm	500	25.1 – 27.6
TDS	N	2022	ppm	1000	1.68 – 234
Zinc	N	2022	ppm	5	1.66 – 226

AL = Active Level, ppb = parts per billion, ppm = parts per million, pCi/L = picocuries per liter, CU = Color Units. Contaminants are listed in order received from lab results.

Table 2.03: Calvada North/Country View Estates Water Quality Data (2021) Consumer Confidence Report

Parameter	Violation Y/N	Test Year	Units	MCL	Range
Microbiological					
No Detected Microbiological Contaminants Were Found in 2021 Calendar Year					
Inorganic Contaminants					
Aluminum	N	2016	ppm	0.2	0.002-0.003
Arsenic	N	2022	ppb	10	ND – 2.42
Asbestos	N	2016	MFL	0.2	0.002-0.003
Barium	N	2014	ppm	2	0.11-0.16
Chromium	N	2014	ppb	100	2
Fluoride	N	2022	ppm	4	ND – 0.117
Nickel	N	2022	ppb	100	ND – 1.28
Nitrates	N	2022	ppm	10	0.711 – 1.69
Selenium	N	2014	ppb	50	6
Disinfection By-Products					
TTHM	N	2019	ppb	80	6.65
Total Haloacetic Acids	N	2022	ppb	60	ND – 2.36
Chlorine	N	2022	ppm	4.0	0.89 – 1.57
Lead and Copper					
Copper	N	2018	ppm	1.3 AL	0.06 0.14
Lead	N	2018	ppb	15 AL	ND – 3
Radionuclides					
Uranium	N	2020	ppb	30	1.84 – 1.91
Gross Alpha, Incl. Radon & Uranium	N	2020	pCi/L	15	1.53
Gross Beta Particle Activity	N	2018	pCi/L	50	2.07
Radium 226	N	2020	pCi/L	5	0.047
Radium 228	N	2020	pCi/L	5	0.469
Secondary Contaminants					
Chloride	N	2022	ppm	400	6.39 – 75.8
Color	N	2022	cu	15	ND – 10.0
Iron	N	2022	ppm	0.6	ND – 0.384
Magnesium	N	2022	ppm	150	27.2 – 41.9
pH	N	2022		8.5	7.52 – 7.63
Sodium	N	2022	ppm	200	8.82 – 11.4
Sulfate	N	2022	ppm	500	17.2 – 78.7
TDS	N	2022	ppm	1000	278 – 528
Zinc	N	2022	ppm	5	6.59 – 53.4
AL = Active Level, ppb = parts per billion, ppm = parts per million, pCi/L = picocuries per liter, CU = Color Units. Contaminants are listed in order received from lab results.					

Table 2.04: Calvada Meadows Water Quality Data (2021) Consumer Confidence Report

Parameter	Violation Y/N	Test Year	Units	MCL	Range
Microbiological					
No Detected Microbiological Contaminants Were Found in 2021 Calendar Year					
Inorganic Contaminants					
Aluminum	N	2022	ppm	0.2	ND
Arsenic	N	2015	ppb	10	1
Barium	N	2015	ppm	2	0.13
Chromium	N	2015	ppb	100	4
Iron	N	2018	ppm	0.6	0.04
Fluoride	N	2015	ppm	4	0.10
Nickel	N	2015	ppm	0.1	0.003
Nitrates	N	2022	ppm	10	3.00
Selenium	N	2014	ppb	50	6
Sodium	N	2022	ppm	N/A	6.05
Disinfection By-Products					
Chlorine	N	2022	ppm	4.0	0.77 – 1.22
Total Trihalomethanes	N	2022	ppb	80	ND
Total Haloacetic Acids	N	2022	ppb	60	ND
Lead and Copper					
Copper	N	2020	ppm	1.3 AL	0.015-0.037
Lead	N	2020	ppb	15 AL	ND-1
Radionuclides					
Combined Radium (-226 & -228)	N	2018	pCi/L	5	0.255-0.962
Uranium	N	2018	ppb	30	1.11
Gross Alpha, Incl. Radon & Uranium	N	2018	pCi/L	15	2.26
Gross Beta Particle Activity	N	2018	pCi/L	50	1.05
Secondary Contaminants					
Magnesium	N	2022	ppm	150	22.6
Manganese	N	2022	ppm	0.1	ND
pH	N	2015	pH	8.5	8.17
Sulfate	N	2015	ppm	500	14
TDS	N	2015	ppm	1000	230
AL = Active Level, ppb = parts per billion, ppm = parts per million, pCi/L = picocuries per liter, CU = Color Units. Contaminants are listed in order received from lab results.					

Table 2.05: Mountain View Estates Water Quality Data (2021) Consumer Confidence Report

Parameter	Violation Y/N	Test Year	Units	MCL	Range
Microbiological					
No Detected Microbiological Contaminants Were Found in 2021 Calendar Year					
Inorganic Contaminants					
Arsenic	N	2022	ppb	10	2.06
Barium	N	2019	ppm	2	0.07
Chromium	N	2019	ppb	100	3.52
Fluoride	N	2022	ppm	2	0.293
Nickel	N	2012	ppm	0.1	0.002
Nitrate	N	2022	ppm	10	0.996
Selenium	N	2019	ppb	50	2.70
Disinfection By-Products					
Total Trihalomethanes	N	2022	ppb	80	5.29
Total Haloacetic Acids	N	2022	ppb	60	2.89
Chlorine	N	2022	ppm	4.0	0.50-1.29
Lead and Copper					
Copper	N	2019	ppm	1.3 AL	0.008-0.066
Lead	N	2019	ppb	15 AL	ND-1.00
Radionuclides					
Uranium	N	2022	pCi/L	30	3.92
Gross Alpha, Incl. Radon & Uranium	N	2022	pCi/L	15	2.85 – 6.68
Radium 226	N	2016	pCi/L	5	0.150-0.361
Radium 228	N	2016	pCi/L	5	0.0251
Radon	N	2022	pCi/L	N/A	319.9
Secondary Contaminants					
Aluminum	N	2022	ppb	200	ND
Chloride	N	2022	ppm	400	10.8
Color	N	2022	cu	15	1
Magnesium	N	2022	ppm	150	42.2
pH	N	2022		8.5	7.63
Sodium	N	2022	ppm	200	14.0
Sulfate	N	2022	ppm	500	136
TDS	N	2022	ppm	1000	488
Zinc	N	2022	ppm	5	0.00902
AL = Active Level, ppb = parts per billion, ppm = parts per million, pCi/L = picocuries per liter, CU = Color Units. Contaminants are listed in order received from lab results.					

Table 2.06: Mountain Falls Water Quality Data (2021) Consumer Confidence Report

Parameter	Violation Y/N	Test Year	Units	MCL	Range
Microbiological					
No Detected Microbiological Contaminants Were Found in 2021 Calendar Year					
Inorganic Contaminants					
Barium	N	2020	ppm	2	0.055
Chromium	N	2011	ppb	100	2
Fluoride	N	2022	ppm	2	ND
Nickel	N	2022	ppm	0.1	0.005
Nitrate	N	2022	ppm	10	0.318 – 0.361
Selenium	N	2022	ppb	50	2.44
Disinfection By-Products					
Chlorine	N	2022	ppm	4.0	0.9 – 1.29
Lead and Copper					
Copper	N	2019	ppm	1.3 AL*	0.008-0.10
Lead	N	2019	ppb	15 AL*	ND-1.34
Radionuclides					
Radium 226	N	2017	pCi/L	5	0.293 – 0.873
Radium 228	N	2017	pCi/l	5	0.320 – 0.340
Radon	N	2017	pCi/l	N/A	275.8 – 342.2
Uranium	N	2017	ppb	30	1.75-1.85
Gross Alpha	N	2017	pCi/L	15	2.02-2.57
Gross Beta Particle Activity	N	2017	pCi/L	30	0.228-0.835
Secondary Contaminants					
Aluminum	N	2022	ppm	0.2	ND
Color	N	2022	cu	15	3.0
Magnesium	N	2022	ppm	150	ND – 20.9
pH	N	2022	ppm	8.5	7.69 – 7.57
Sodium	N	2022	ppm	200	4.6 – 5.6
Sulfate	N	2022	ppm	500	30.4 – 41.7
TDS	N	2022	ppm	1000	242 – 268
Zinc	N	2022	ppm	5	0.0222 – 0.236
AL = Active Level, ppb = parts per billion, ppm = parts per million, pCi/L = picocuries per liter, CU = Color Units. Contaminants are listed in order received from lab results.					

Table 2.07: Spring Mountain Motorsports Ranch Water Quality Data (2021) Consumer Confidence Report

Parameter	Violation Y/N	Test Year	Units	MCL	Range
Microbiological					
No Detected Microbiological Contaminants Were Found in 2021 Calendar Year					
Inorganic Contaminants					
Barium	N	2022	ppm	2	0.0502
Fluoride	N	2022	ppm	2	0.121
Mercury	N	2022	ppb	2	ND
Nickel	N	2022	ppm	0.1	ND
Nitrate	N	2022	ppm	10	0.410
Disinfection By-Products					
Total Trihalomethanes	N	2022	ppb	80	ND
Total Haloacetic Acids	N	2022	ppb	60	ND
Chlorine	N	2019	ppm	4	0.8 – 2.18
Lead and Copper					
Copper	N	2022	ppm	1.3 AL	0.0182 – 0.0814
Lead	N	2022	ppb	15 AL	ND – 1.41
Radionuclides					
Radium 226	N	2021	pCi/L	5	ND-0.407
Radium 228	N	2021	pCi/L	5	0.232-0.641
Uranium, Combined	N	2020	ppb	30	ND-1.33
Gross Alpha	N	2020	pCi/L	15	0.060-3.95
Secondary Contaminants					
Aluminum	N	2022	ppm	0.2	ND
Chloride	N	2022	ppm	400	2.32
Color	N	2022	cu	15	10.0
Iron	N	2022	ppm	0.6	ND
Magnesium	N	2022	ppm	150	22.1
Manganese	N	2020	ppm	0.1	0.00321
pH	N	2022		8.5	7.61
Sodium	N	2022	ppm	200	3.74
Sulfate	N	2022	ppm	500	23.4
TDS	N	2022	ppm	1000	234
AL = Active Level, ppb = parts per billion, ppm = parts per million, pCi/L = picocuries per liter, CU = Color Units. Contaminants are listed in order received from lab results.					

2.2 Calvada Valley Water System

2.2.1 Distribution Piping (Pressure Zones)

The GBWC-PD Calvada Valley ("CV") water system consists of 2-inch, 3-inch, 4-inch, 6-inch, 8-inch, 10-inch, 12-inch, 14-inch, 16-inch, 18-inch, and 24-inch diameter piping. There are approximately 156 miles of piping within the service territory. Table 2.08 is a list of the pipe diameters and approximate total linear footage for each diameter of pipe within the service area, which is gathered from the hydraulic model.

Table 2.08: Calvada Valley Pipe Sizes and Lengths

Pipe Size	Pipe Length (ft)
2-inch	1,100
3-inch	2,300
4-inch	11,400
6-inch	62,800
8-inch	383,200
10-inch	47,200
12-inch	209,300
14-inch	20,200
16-inch	59,100
18-inch	25,600
24-inch	300
Total (rounded)	**825,400**

2.2.1.1 Distribution Piping Existing Conditions Assessment

An asset management condition assessment matrix can be developed to better categorize the condition of the existing distribution piping through the newly implemented GIS. To develop the matrix, the distribution piping would be divided into segments and a numerical value would be assigned to each segment based on the number of breaks experienced and hydraulic pressures at average day demand ("ADD"). The higher the numerical value calculated for a segment of pipe, the more severe the condition for that segment of pipe.

Because GBWC-PD acquired the system in 2002, the years segments of piping were installed are not documented and therefore not logged in GIS. Based on fire hydrant reports, the approximate age of distribution piping in Calvada Valley can be determined. The fire hydrant reports suggest a range of 40 years, with the initial piping constructed during the 1970's, where the earliest documented fire hydrant installation year is 1972. The fire hydrant installation years suggest that the majority of distribution piping was installed in the 1980's, 1990's and early 2000's. Most of the piping is polyvinyl chloride (PVC) C900 or ductile iron. On average, there are approximately three (3) main breaks and 47 service line breaks per year based on data from 2017 through 2022. Plotting the approximate addresses of main breaks and service line breaks shows that these breaks are relatively scattered throughout the Calvada Valley system. Though the breaks are scattered, a cluster of breaks have occurred on the west side of Highway 160, particularly in the area near and along Mount Charleston Drive and the area near and along Comstock Circle. Table 2.09 contains a list of the number of service line, main pipeline breaks, and other types of breaks that have occurred from 2017 through 2022.

Table 2.09: Calvada Valley Repairs to Main Pipeline, Service Lines, and Other Water Repairs

Year	Service Lines	Main Pipeline	Others
2017	40	4	1 (Hydrant)
2018	40	4	4 (Hydrant)
2019	48	3	2 (AMS)(1)
2020	14	0	0
2021	76	5	0
2022	66	2	0
Total	**284**	**18**	**7**

Notes:
(1) Angle Meter Stop (AMS)

2.2.1.2 Pressure Zone Existing Conditions Assessment

The GBWC-PD Calvada Valley water system has two distinct pressure zones known as the Low Zone and High Zone. There are two storage tanks in the Low Zone and one storage tank in the High Zone. The Low Zone is located on the west side of Highway 160. The High Zone is located on the east side of Highway 160. Section 2.2.6, System Operation and Control, provides a narrative description of how the wells and pumping station are operated within the Low and High Zones. A schematic diagram and map, included in Appendix C, show the locations of the pressure zones and other infrastructure.

The Maximum Day Demand (MDD) pressures in each pressure zone are located in Table 2.10. At the time the original water system infrastructure was installed, installation of the infrastructure was in accordance with all state and local agencies approved design requirements and construction standards. Subsequently, as GBWC-PD makes repairs or improvements, the newer infrastructure is designed and constructed to meet the most current approved design requirements and construction standards. In addition, pressure reducing valves (PRV) have been added into the system to help regulate changes in pressure. However, based on the available modeling results, pressures in certain segments still exceed the maximum allowable delivery pressure of 100 pound per square inch (psi) per NAC 445A.6711(2).

Table 2.10: Calvada Valley Pressure Zones

Pressure Zone	Supply	Hydraulic Grade Line (ft. amsl)	Hydraulic Model MDD Pressures (psi)
Low	Wells 1, 2, 9, 11, 12	2,843	48 to ~115
High		2,930	37 to ~98
Mountain View Estates		2,718	60

2.2.1.3 Pressure Reducing Valve Existing Conditions Assessment

There are nine PRVs in the GBWC-PD Calvada Valley water system, one of which is set fully open and therefore not functioning to reduce pressures. The PRVs typically prevent the lower elevations in the system from being over-pressurized as well as sustain pressures in the higher elevations. The setting and location of the PRVs can be critical to the proper balancing of the system pressures. Table 2.11 lists the existing PRVs.

Table 2.11: Calvada Valley Pressure Reducing Valves

Number	Zone	Location	Size (in)	Elevation (Feet)	Downstream Pressure Setting (psi)
1	Low	Basin Ave at Cottage Grove Estates	12	2,605	90
2	High	Winery Road and Cortina Street	16	2,732	Full open
3	Low	Calvada Blvd and Upland Ave	12	2,610	75
4	Low	Comstock Street and Red Butte Street	8	2,607	75
5	Low	Rodeo Ave and Mt. Charleston Drive	8	2,622	75
6	Low	Jaybird St and Pahrump Valley Blvd	8	2,624	75
7	High	Hwy 160 and Crawford Way	14	2,716	77
8	Low	Mesquite Booster Pump Station	12	2,672	75
9	Low	West Mesquite Avenue	6	2,618	Full open(1)
Note: (1) Set to allow 35 gpm through PRV					

Most of the PRVs were installed in 2006, with the exception of the Pahrump Nugget Casino PRV and Mesquite Booster Station PRV, both of which were installed in 2010. The 6-inch PRV on West Mesquite Avenue was installed in 2016. The fixed asset management registry, with the remaining useful life for the PRVs, is located in Appendix A. The PRVs are serviced annually under a contract with Cla-Val. A schematic diagram showing the PRV locations within the system is available in Appendix C.

2.2.2 Water Supply

All of the water that supplies the Calvada Valley system comes from five wells located in the Low Zone. Two additional wells (Well 10 and 21) are not considered potable and only supply irrigation water to Discovery Park and Lake View Golf Course. The location of the potable wells is shown in the maps located in Appendix D and detailed in Table 2.12. There is a total well capacity of 5,085 gpm or 7.322 million gallons per day (MGD). Wells 2, 11, and 12 have backup generators in place. In the event of a power outage, Wells 2, 11, and 12 can provide a pumping capacity of 3,206 gpm or 4.62 MGD.

Table 2.12: Calvada Valley Potable Water Supply Wells and Capacities

Well	Casing Diameter (in)	Capacity (GPM)	Total Dynamic Head (feet)	Backup Generator
Well 1	12"/8" liner	1,050	309	None
Well 2	12"/8" liner	1,285	350	Yes
Well 9	16"/10" liner	829	300	None
Well 11	16"	1,301	304	Yes
Well 12	14"	700	456	Yes
Total		**5,165**		

2.2.2.1 Water Supply Well Existing Conditions Assessment

Well 1

Well 1, originally drilled in 1944, was constructed with nominal 12-inch diameter steel casing to a depth of 900 feet below ground level ("BGL"). A rehabilitation of the well was completed in the second quarter of 2022. The rehabilitation involved a shock chlorination pretreatment, a 12" blank casing with an 8" liner installation, chemical treatment and swabbing, realignment of the discharge assembly, and new pump and motor installation. The well is equipped with a Grundfos submersible turbine pump (model SP1100S-3AA) with a 100-Hp Grundfos submersible motor on a variable frequency drive. The pump and motor were installed in 2022. The well is currently equipped with a portable generator that is semi-permanently located at the well site. There is chlorination equipment at the well site. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 77 years old as of 2024, but the rehabilitation has extended the useful life of the well.

Well 2

Well 2, originally drilled in 1960, was constructed with nominal 16-inch and 14-inch diameter steel casing to a depth of 783 feet bgl. A rehabilitation of this well was completed in the 4th quarter of 2020 which involved a shock chlorination/swabbing pretreatment, installation of a 12" blank casing with an 8" wire wrap liner, Arcwave main cleaning treatment, redevelopment, and design of a new pumping system (Webtrol WS11001500B submersible pump and 150-Hp Franklin submersible motor on a variable frequency drive). New well discharge piping, electrical system, and VFD were installed at the end of the 4th quarter of 2020. The well does have backup power in the form of a 300-kilowatt (kW) generator. There is chlorination equipment at the well site. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 64 years old as of 2024, but the rehabilitation has extended the useful life of the well.

Well 9

Well 9, originally drilled in 1958, was constructed with nominal 16-inch diameter steel casing with a 10-liner to a depth of 430 feet bgl and open hole to a total depth of 556 feet. The well is equipped with a Grundfos, submersible turbine pump with a 100-Hp Hitachi submersible motor on a variable frequency drive. The pump was installed in 2015 and the motor installed in 2016. The well does not have backup power. There is chlorination equipment at the well site. A partial rehabilitation of the well was conducted during the spring of 2019 including a shock chlorination pretreatment, Aqua-Freed main cleaning treatment, redevelopment, followed by the existing pumping system reinstalled in the well. A video of the well conducted in 2019 prior to the rehabilitation revealed that the well contains a 10-inch nominal casing to 432 feet and an open hole to a total depth of 556 feet. In 2015, the existing 10-inch liner was rigged up and welded to the top of the original 16-inch casing. The existing casing is completely deteriorated. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 66 years old as of 2024. For all intents and purposes, this well cannot be cleaned again and has reached the end of its useful life. GBWC-PD has elected to run this well to failure and will replace the capacity with a new well.

Well 10

Well 10, originally drilled in the 1920s, was constructed with 17-inch diameter steel casing to a depth of 344 feet bgl. The well is currently only used for irrigation production but is in the process of a complete rehabilitation to convert to a municipal well, as a project approved in the 2021 IRP. Two phases of the rehabilitation have been completed. Phase 1 consisted of excavation and removal of an artesian bypass and Phase 2 was the sanitary seal installation, both completed in 2023. The third phase to install an NSF-61 liner is anticipated to be complete in 2024. Upon completion and equipping of the well, the additional capacity will contribute to the Calvada Valley system.

Well 11

Well 11, originally drilled in 1979, was constructed with nominal 16-inch diameter steel casing to a depth of 600 feet bgl. A rehabilitation of the well was conducted during the spring of 2018. The work included pulling the existing pumping equipment, video survey, shock chlorination pre-treatment, second video survey, main treatment using acid chemicals (twice), redevelopment, new discharge assembly, and new pumping system. During the acid main treatment, the chemicals injected in the well neutralized unusually fast, not allowing for a complete cleaning. A second acid treatment was applied, which also neutralized relatively quickly, resulting in a partially cleaned casing. According to the local drilling company, the gravel pack placed in many of these old wells consisted of a limestone ($CaCO_3$) aggregate from the Spring Mtn. borrow pit, which is believed to have neutralized the acid rapidly. A sample of the Spring Mtn. aggregate was provided to Lumos, and they conducted an experiment that showed the aggregate to be predominantly limestone. A report on the experiment is available in Appendix M. The conclusion from the experiment recommended alternative treatment methods to acid-based cleaning. The well is equipped with a Franklin Model 9STS-1050-02 2-stage pump with a Hitachi 150 Hp submersible motor. The pump and motor were installed in 2018. The well does have backup power in the form of a 300-kW generator. There is chlorination equipment at the well site. Pre and post treatment video surveys were conducted in 2018 during the rehabilitation that revealed treatment was partially successful. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 45 years old as of 2024. This will probably be the last rehabilitation cleaning on the well due to the fact it is reaching the end of its useful life.

Well 12

Well 12, the replacement for the old Well 8, was drilled in early 2017 to a total depth of 970 feet bgl. The well was constructed with nominal 14-inch diameter steel casing and louvered screen intervals from 480-620 feet and 780-960 feet bgl. An exterior sounding tube was installed in the annulus that reenters the well at 755 feet. The static water level after completion is 45 feet bgl. There is chlorination equipment at the well site. In late 2018, the well was shut down due to cloudy water complaints. A video survey investigation of the well and sounding tube revealed a hole in the casing at 167 feet and a hole in the sound tube at 250-foot level. These holes allowed the gravel pack to enter the well to the 798-foot level. The gravel in the well was pumped out and the holes in the sounding tube and casing were patched. The well was brought back online in May 2019. In 2021, a backup generator was installed at the well site. The well was rehabilitated in 2022 to fix equipment failures, perform video surveys, and complete mechanical/chemical treatments. During the 2nd quarter of 2022, the well went down due to motor failure and pump repairs. The well is now equipped with a Grundfos submersible turbine pump and a 125-Hp Hitachi submersible motor on a VFD, which was resized in 2022 and replaced after the original failed. After performing a video survey, it was noted that the water was excessively cloudy, and the louver screens were plugged. The well was cleaned with a series of chemical treatments, flushing, wire brushing, swabbing/airlifting, and chlorination. A second video survey revealed nodules and scaling on the casing which was treated with ArcWave and chlorination. Before bringing the well back into production, the water tested negative for total coliform and the well was pumped until the necessary water clarity was achieved. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. As of 2024, this well is 7 years old. It is recommended to survey the well after 2 years of pumping to assess the condition of well screens via a video survey due to the aggressive nature of mineral buildup in the well.

2.2.3 Storage

The Calvada system has three storage tanks. There are two Low Zone reservoirs and one High Zone reservoir as detailed in Table 2.13 and as shown in the maps (Appendix D) and a schematic diagram (in Appendix C). All tanks are on SCADA.

Table 2.13: Calvada Valley Water Storage Tanks

Tank	Volume (MG)	Base Elevation (ft amsl)	Diameter (ft)	Height (ft)	Material
CV Low Zone Tank 1	0.75	2,812	64	32	Welded Steel
CV Mesquite Tank(1)	1.60	2,940	90	34	Welded Steel
CV High Zone Tank 1	1.20	2,965	92	24	Welded Steel
Total	**3.55**				

Notes:
(1) Also referred to as Low Zone Tank 2

2.2.3.1 Storage Tank Existing Conditions Assessment

CV Low Zone Tank 1

CV Low Zone Tank 1 is a nominal 750,000-gallon welded steel storage tank constructed in 1984 by Resource Development Co. The tank was last inspected in April 2018, where the inspection report (provided in Appendix F) states that the exterior of the tank and base of the tank were in good condition with minor surface chalking observed. The interior of the tank was also found to be in good condition with some minor surface corrosion also noted. Other than needing some epoxy repairs when time allowed, there were no major or significant recommendations made in this inspection report. Passive cathodic protection was installed on the tank in 2019. The tank is estimated to have 9 years of nominal useful life remaining as of 2024, but with cathodic protection and proper maintenance, it should extend its useful life. The estimated nominal useful life of a welded steel storage tank is usually around 45 years.

CV Mesquite Tank (Low Zone Tank 2)

CV Mesquite Tank (Low Zone Tank 2) is a nominal 1,600,000-gallon welded steel storage tank constructed in 2010 by Paso Robles Tank Inc. The most recent tank inspection report from January 2021 (provided in Appendix F), details the interior and exterior of the tank as being in good condition. There were no major recommendations made in this inspection report. The tank has cathodic protection installed by Corrpro Companies. The tank is estimated to have 31 years of nominal useful life remaining as of 2024, but with cathodic protection and proper maintenance, it should extend the useful life. This estimate of the remaining useful life is based on a welded steel storage tanks nominal life expectancy of 45 years.

CV High Zone Tank 1

CV High Zone Tank 1 is a nominal 1,200,000-gallon welded steel storage tank constructed in 1997 by Resource Development Co. In April 2018, a tank inspection found most interior/exterior components to be in good condition. The report is provided in Appendix F. The only recommendation was to continue scheduling inspections every 3-5 years. The tank had a passive cathodic protection system that was stalled in 1997 during construction. The tank is estimated to have 18 years of nominal useful life remaining as of 2024. This estimate of the remaining useful life is based on a nominal life expectancy of 45 years.

2.2.4 Booster Pumps

Water is boosted from the Lower Zone to the Upper Zone and to the High Zone Tank via the booster pumps located on Alfalfa Street near Underbrush Avenue. The booster pump station keeps the High Zone Tank filled to pressurize the High Zone. This pump station is known as the Alfalfa Booster Station.

There is a second booster pump station (Mesquite Booster Station) which fills Mesquite Tank (which can also support the high zone), near Nevada Southern Detention Center owned by CoreCivic which was formerly known as Corrections Corporation of America ("CCA") on Mesquite Ave. These booster pumps run on variable frequency drives and are designed to keep the Mesquite Tank filled to provide backup storage and pressures in the northern portion of the Low Zone. This booster station is a component of the water system, which ties the Low Zone and High Zone together. Both pumping stations are on SCADA.

The pump designs for each pump at each booster station is provided in Table 2.14 below.

Table 2.14: Calvada Valley Booster Pump Stations

Pumps	Design Flow (gpm)	Horsepower (HP)
Alfalfa Street Booster Pump Station:		
Pump 1	525	40
Pump 2	643	40
Mesquite Avenue Booster Pump Station:		
Pump 1	930	75
Pump 2	930	75

2.2.4.1 Pump and Motor Existing Conditions Assessment

Alfalfa Booster Station

The Alfalfa Booster Station has two pumps. Pumps 1 and 2 are both manufactured by Berkley/Pentair. The two Berkeley Pentair pumps are of the same model (model B3ZPLS, one with a 6" and one with an 8" impeller). Pump 1 was installed in 2018 and Pump 2 was installed in 2017. Pump 1 has a 40 HP, 3500 RPM US Motor, which was installed in 2018 and Pump 2 has a 40 Hp, 3500 RPM Baldor Motor, which was installed in 2017. Both pumps have mag starters. The pumps are assembled in a parallel configuration. The new pumps have increased the previous pumping capacity of the two pumps above 900 gpm. Together these pumps have a capacity of 1,065 gpm (due to extra friction) at approximately 280 feet total dynamic head (TDH). Pump 1 has 9 years of nominal remaining life and Pump 2 has 8 years of nominal life remaining as of 2024. The booster pumps are housed in a small building with a permanent backup generator on site. The 175-kW permanent generator is manufactured by Cummins.

Mesquite Booster Station

The Mesquite Booster Station has two Goulds pumps (Models 3410) that were installed in 2010. Both pumps have 75 HP, 1800 RPM Baldor Motors on variable frequency drives. These pumps were designed for 930 gpm at 200 feet TDH. The pumps are assembled in a parallel configuration. Together these pumps can pump 1,800 gpm at approximately 200 feet TDH. These booster pumps and motors, installed in 2010, have approximately 1 year of nominal remaining life as of 2024. The booster pumps are housed in an air-conditioned building with a permanent backup generator on site. The 250-kW generator is manufactured by Cummins. The Mesquite PRV is also located within the building.

2.2.5 Back-Up Power Supply

The Calvada Valley system has permanent back-up power at Wells 2, 11, and 12. Both booster pump stations, Alfalfa Booster Pump Station and Mesquite Booster Pump Station, also have permanent back-up power available.

2.2.6 System Operation and Control

Low Zone Tank 1 floats on the system and is fed by Wells 1, 2, 9, 11, and 12. This tank is designed to maintain a constant pressure in the low zone and controls the wells in order to maintain a minimum pressure in the tank. Mesquite Tank is located on Mesquite Road east of the Nevada Southern Detention Center on the north end of the system. This tank provides storage and pressure to the northern portion of the Calvada Valley service area. This tank has the capability to feed both the high and low zones through booster pumps at the Mesquite Booster Pump Station by alternating valves and feeds the low zone via a PRV located at the Mesquite Booster Pump Station. The new 6-inch PRV on Highway 160 and Mesquite only allows for flow direction to the low zone from the Mesquite Tank. This PRV was designed with a 1-inch bypass that allows 35-gpm continuous flow through to maintain constant water during low demands.

High Zone Tank 1 is fed by Well 12 and the Alfalfa Street Booster Pump Station. The level in the storage tank controls the operation of the Alfalfa booster pumps and Well 12. The High Zone Tank 1 maintains the minimum pressure in the high zone. In the event of a pressure drop to 43 psi or a fire flow condition, the booster station will shut down and Well 12 will be called to run (if not already running).

2.2.6.1 SCADA Existing Conditions Assessment

SCADA is installed at all tanks, wells, and at the two booster pump stations within the GBWC-PD Calvada Valley service area. The SCADA system was upgraded in 2022-2023 and monitors the following aspects: storage tank level with trends over time, well pump start/stop status, well pump run times, booster pump start/stop status, and booster pump motors run time. Pressure Reducing Valves (PRVs) are currently not monitored through SCADA but are slated to be incorporated in 2023. A Ubiquity (900 MHz) radio is used to communicate with the receiving equipment. The entire SCADA system is accessible via operator's laptops, cell phones, and tablets through the internet.

2.3 Calvada North/Country View Estates (CN/CVE) Water System

2.3.1 Distribution Piping (Pressure Zones)

The Calvada North/Country View Estates ("CN"/"CVE") system is currently one pressure zone. The maps and schematic diagram of the system are available in Appendix D and show the location and details of this system. There are approximately 18 miles of 6-inch, 8-inch, 10-inch, 12-inch, 14-inch and 16-inch diameter piping in this service area. The approximate lengths of piping for each diameter are presented in Table 2.15.

Table 2.15: Calvada North/Country View Estates Pipe Sizes and Lengths

Pipe Size	Pipe Length (ft)
6-inch	10,500
8-inch	36,400
10-inch	19,000
12-inch	20,000
14-inch	3,300
16-inch	6,300
Total (rounded)	**95,500**

2.3.1.1 Distribution Piping Existing Conditions Assessment

An asset management condition assessment matrix should be developed to better categorize the condition of the existing distribution piping. To develop the matrix, the distribution piping would be divided into segments and a numerical value would be assigned to each segment based on the number of breaks experienced and hydraulic pressures at average day demand ("ADD"). The higher the numerical value calculated for a segment of pipe, the more severe the condition for that segment of pipe. This would help GBWC-PD identify what pipe is the most problematic and help prioritize pipeline replacement in an efficient manner.

Since GBWC-PD acquired the system in 2002, the years segments of piping were installed have not been documented and are therefore not logged in GIS. Based on fire hydrant reports, the approximate age of distribution piping in Calvada North/Country View Estates can be determined. The fire hydrant reports suggest a range of 30 years where the majority of piping was installed in the mid 1980's, mid 1990's, and early 2000's. On average, there is less than 1 main break and 5 service line breaks per year based on data from 2017 through 2022. Plotting the approximate addresses of main breaks and service line breaks shows that these breaks tend to be located in the southwest (along Lucas Street and Pablo Street) within the service territory. Table 2.16 contains a list of the number of service line, main pipeline breaks and other types of breaks that have occurred from 2017 through 2022.

Since GBWC-PD does not currently have breaks or installation years logged in the GIS database system for water piping linear assets, an in-depth condition assessment of the water distribution system will have to be conducted in the future. The future condition assessment will be more comprehensive in determining areas of piping that will need repairs and replacement.

Table 2.16: Calvada North/Country View Estates Repairs to Main Pipeline, Service Lines, and Other Water Repairs

Year	Service Lines	Main Pipeline	Others
2017	6	0	0
2018	4	0	1 (AMS)(1)
2019	4	0	1 (AMS)
2020	3	0	0
2021	9	0	0
2022	4	0	0
Total	**30**	**0**	**2**
Notes: (1) Angle Meter Stop			

2.3.1.2 Pressure Zone Conditions Assessment

The GBWC-PD Calvada North/Country View Estates water system has two distinct pressure zones, the Calvada North Zone and Country View Estates Zone. Section 2.3.6, System Operation and Control, provides a narrative description of how the wells and pumping station are operated within the zones. A schematic diagram and map, included in Appendix C, show the locations of the pressure zones and other infrastructure.

The Maximum Day Demand (MDD) pressures in each pressure zone are located in Table 2.17Table 2.10. At the time the original water system infrastructure was installed, installation of the infrastructure was in accordance with all state and local agencies approved design requirements and construction standards. Subsequently, as GBWC-PD makes repairs or improvements, the newer infrastructure is designed and constructed to meet the most current approved design requirements and construction standards.

Table 2.17: Calvada North/Country View Estates Pressure Zones

Pressure Zone	Supply	Hydraulic Grade Line (ft.)	Hydraulic Model MDD Pressures (psi)
Calvada North	Well CN-1	2,782	44 to 72
Country View Estates	Well CVE 48-1 and 48-2	2,826	30 to 77

2.3.1.3 Pressure Reducing Valve Existing Conditions Assessment

There are two PRVs in the Calvada North/Country View Estates service area detailed in Table 2.18.

Table 2.18: Calvada North/Country View Estates Pressure Reducing Valves

Number	Location	Size (in)	Elevation (Feet)	Downstream Pressure Setting (psi)
2	Park Retiro	12 8-bypass	2,667	50
1	Goldpoint/Blackrock Ave.	6	2,705	Not in Use(1)
Notes: (1) Due to looping projects, the Blackrock PRV is no longer in operation				

The Park Retiro PRV and Park Retiro PRV Bypass were installed in 2015. The Goldpoint/Blackrock PRV was installed in 2006. All valves are Cla-Val valves and are serviced annually with Cla-Val.

2.3.2 Water Supply

There are three active wells in this system. There are two wells in the Country View Estates subdivision (CVE 48-1 and CVE 48-2) and one in the Calvada North area (CN 1) as detailed in Table 2.19. The system has an overall pumping capacity of 816 gpm or 1.175 MGD. The wells are on SCADA.

Table 2.19: Calvada North/Country View Estates Potable Water Supply Wells and Capacities

Well	Casing Diameter (in)	Capacity (gpm)	Total Dynamic Head (feet)	Backup Generator
CVE 48-1	8.625	189	140	Yes
CVE 48-2	10.750	296	140	Yes
CN 1	10.750	331	140	No
Total		**816**		

2.3.2.1 Water Supply Well Existing Conditions Assessment

<u>Well CVE 48-1</u>

Well CVE 48-1, originally drilled in 1984, was constructed with nominal 8.625-inch diameter steel casing to a depth of 365 feet bgl. The well is equipped with a Grundfos submersible turbine pump (model GF2305200-6) with a 25-Hp Grundfos submersible motor on a mag starter. The pump and motor were both installed in 2015. The well shares backup power at the combined well, tank, and booster pump station site in the form of a 175-kW generator. There is chlorination equipment for this well. In 2015, the pump and motor were pulled due to a check valve leaking. In 2015, a video survey was conducted revealing no deficiencies with the well casing though the pump, motor, and check valve were replaced at this time. The well is undergoing rehabilitation. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 40 years old as of 2024.

Well CVE 48-2

Well CVE 48-2, originally drilled in 1997, was constructed with nominal 10.75-inch diameter steel casing to a depth of 815 feet bgl. The well is equipped with a Wolf submersible turbine pump (model 6MM8V 6STG) with a 40-Hp Franklin submersible motor on a mag starter. The pump and motor were installed in 2013. Through the combined well, tank and booster pump station site, the well shares backup power in the form of a 175-kW generator. There is chlorination equipment for this well. A video log of the well was not available for review. The well is undergoing rehabilitation. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 27 years old as of 2024.

Well CN 1

Well CN 1, originally drilled in 1987, was constructed with nominal 10.75-inch diameter steel casing to a depth of 230 feet bgl. A rehabilitation of the well was conducted in the 1st quarter of 2023. The work included pulling the existing pumping equipment, video surveys, shock chlorination, mechanical and chemical treatment, and installing a new pumping system. After reviewing video surveys, the level of the rehabilitation scope was modified to focus on competent sections of the well due to concerns about the integrity of the pipe casing. The well is now equipped with a Grundfos submersible turbine pump with a 40-Hp Grundfos submersible motor on a mag starter. The pump and motor were installed in 2023. The well does not have backup power. There is chlorination equipment at the well site. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 37 years old as of 2024, but the useful life has been extended due to the rehabilitation. Due to poor casing condition, GBWC will operate the well until casing failure.

2.3.3 Storage

There is one storage tank located in the Country View Estates (CVE) area adjacent to the wells. This tank is filled by the three wells (CVE 48-1, CVE 48-2, and CN Well 1). Further, the tank supplies the CVE booster pumps, which maintain pressures in the system. The storage tank is a 750,000-gallon welded steel tank, 74.5 feet in diameter and 24 feet high. The tank provides water to the system as well as emergency backup water supply. This tank is on SCADA. The storage tank details are shown in Table 2.20.

Table 2.20: Calvada North/ Country View Estates Water Storage Tanks

Tank	Volume (MG)	Base Elevation (ft amsl)	Diameter (ft)	Height (ft)	Material
Tank 1	0.75	2,770	74.5	24	Welded Steel
Total	**0.75**				

2.3.3.1 Storage Tank Existing Conditions Assessment

The Country View Estates storage tank is a nominal 750,000-gallon welded steel storage tank constructed in 2005 by Resource Development Co. A tank inspection was conducted in January 2021. The inspection report (provided in Appendix F) documented the interior/exterior elements to be in good condition, with the only recommendation to install a #24 mesh screen on the exterior overflow and to continue scheduling inspections every 3-5 years. The tank had cathodic protection installed by Corrpro Companies. This tank is estimated to have 26 years of nominal useful life remaining as of 2024, but with cathodic protection and proper maintenance, it should extend its useful life. The nominal life expectancy of a storage tank is 45 years.

2.3.4 Booster Pumps

There are three booster pumps located at the CVE facility with the wells and storage tank. There is one pump in standard service with two fire pumps for emergencies. The booster pumps are controlled by system pressures operated by a VFD. The booster pump details are shown in Table 2.21.

Table 2.21: Calvada North/Country View Estates Booster Pump Station

Pumps	Design Flow (gpm)	Horsepower (HP)
Pump 1	200	10
Pump 2 (Fire Pump)	700	25
Pump 3 (Fire Pump)	700	25

2.3.4.1 Pump and Motor Existing Conditions Assessment

The Country View Estates Booster Pump Station has three pumps, which are all manufactured by Consolidated Pumps (2 model 83ZPLS & 1 model B25TPMS). All three pumps were installed in 2007. The two larger pumps have 3 phase, 3520 RPM, 25 HP Emerson Motors. The smaller pump, rated for 200 gpm at 140' TDH, has a 3 phase, 3450 RPM, 10 HP Emerson motor. The pumps are assembled in a parallel configuration. All three booster pumps were installed in 2007 and are beyond their useful life as of 2024. The booster pumps are housed in a small building with a permanent backup generator shared with all the facilities on the site. The 175-kW backup generator is manufactured by Cummins.

2.3.5 Back-Up Power Supply

The CN/CVE Booster Pump Station and Wells 48-1 and 48-2 are all located on the same site and have shared backup power in the form of a 175-kW permanent backup generator manufactured by Cummins. The GBWC-PD Calvada North/Country View Estates system does not have a permanent backup generator at CN Well #1.

2.3.6 System Operation and Control

Wells 48-1 and 48-2 fill the CVE storage tank adjacent to the wells. The tank then supplies the CVE booster pumps, which maintain pressures in the system. The CN Well 1 pumps directly into the distribution system. The CVE Booster Pump Station, CVE Well 48-1 and 48-2, and CVE Storage Tank are all on SCADA, which was installed at the site in 2008 and updated in 2023. CN Well 1 is also on SCADA.

2.3.6.1 SCADA Existing Conditions Assessment

SCADA is installed at the storage tank, three wells, and at the booster pump station within the GBWC-PD Country View Estates/Calvada North service area. The SCADA system was updated in 2023 and monitors the following aspects: storage tank level with trends over time, well pump start/stop status, well pump run times, booster pump start/stop status, and booster pump motors run times. Pressure Reducing Valves (PRVs) are currently not monitored through SCADA and were incorporated in 2023. Ubiquity (900 MHz) radios are used to communicate with the receiving equipment. The entire SCADA system is accessible via operator's laptops, cell phones, and tablets through the internet.

2.4 Calvada Meadows Water System

The Calvada Meadows ("CVM") system is located south of the Calvada North/Country View Estates system. The service area is adjacent to and south of the Country View Estates subdivision. There are currently only 41 customers in this service area and only the one pressure zone, which can be seen in the schematic diagram and maps available in Appendix D.

2.4.1 Distribution Piping (Pressure Zones)

The distribution piping in the Calvada Meadows water system serves 41 connections. The piping is composed of 3-inch, 4-inch, 8-inch, and 10-inch pipes. There is less than 1 mile of piping in the Calvada Meadows service area. Table 2.22 below details the lengths of pipe for each diameter.

Table 2.22: Calvada Meadows Pipe Sizes and Lengths

Pipe Size	Pipe Length (ft)
3-inch	1,200
4-inch	500
8-inch	1,900
10-inch	600
Total (rounded)	**4,200**

2.4.1.1 Distribution Piping Existing Conditions Assessment

An asset management condition assessment matrix should be developed to better categorize the condition of the existing distribution piping in Calvada Meadows. To develop the matrix, the distribution piping would be divided into segments and a numerical value would be assigned to each segment based on the number of breaks experienced and hydraulic pressures at average day demand (ADD). The higher the numerical value calculated for a segment of pipe, the more severe the condition for that segment of pipe. This would help GBWC-PD to identify what pipe is the most problematic and help to prioritize pipeline replacement in an efficient manner.

Since GBWC-PD acquired the system in 2002, the years segments of piping were installed have not been documented and therefore not logged in GIS. There are also no fire hydrant reports to indicate the approximate age of the distribution piping in Calvada Meadows. There were no recorded water main or service breaks in the area in the past four years as shown in Table 2.23.

Table 2.23: Calvada Meadows Repairs to Main Pipeline, Service Lines, and Other Water Repairs

Year	Service Lines	Main Pipeline	Others
2017	0	0	0
2018	1	0	0
2019	0	0	0
2020	0	0	0
2021	0	0	0
2022	0	0	0
Total	**1**	**0**	**0**

2.4.1.2 Pressure Zone Conditions Assessment

Currently, a WaterCAD model of the Calvada Meadows service area does not exist. The effort to develop and calibrate a WaterCAD model is beyond the scope of the 2024 IRP document preparation. The small size of the system and the proposed Action Plan project to consolidate the Calvada Meadows system with Calvada Valley or CN/CVE system render an analysis excessive at this point. Upon design of a consolidation project, it is recommended that the existing Calvada Meadows system be incorporated into the existing water model for the consolidated system.

2.4.2 Water Supply

There is one active well in this system, Calvada Meadows Well 1. The well has a 250 gpm, or approximately 360,000 gpd, capacity, as detailed in Table 2.24. This well is on SCADA.

Table 2.24: Calvada Meadows Water Supply Wells and Capacities

Well	Casing Diameter	Capacity (GPM)	Total Dynamic Head (feet)	Backup Generator
CVM 1	10.75	250	-	No
Total		**250**		

2.4.2.1 Water Supply Well Existing Conditions Assessment

The Calvada Meadows Well 1, originally drilled in 1989, was constructed with nominal 10.75-inch diameter steel casing to a depth of 500 feet bgl. The static water level in the well is approximately 94 feet bgl. The well is equipped with a Grundfos, submersible turbine pump (model unknown) with a 25-Hp Franklin submersible motor on a mag starter. The pump and motor were installed in 2013. The well does not have backup power. There is chlorination equipment at the well site. A de-sander device was installed on the well discharge line at the site due to the well pumping significant quantities of sand that has been increasing yearly. A video log of the well was not available for review. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. Although this well is only 35 years old as of 2024, the increasing sand production is concerning and could suggest this well is close to failing.

2.4.3 Storage

There is one 3,000-gallon hydropneumatic tank located at the Calvada Meadows well site used to control the well and maintain steady pressures within the service area. GBWC-PD is proposing to connect the Calvada Meadows system to the main as described in the Action Plan. If the proposal is not adopted, GBWC-PD will either be required to replace or convert the existing hydropneumatic tank into a ground storage tank with a booster pumping system. The storage tank details are summarized in Table 2.25.

Table 2.25: Calvada Meadows Water Storage Tanks

Tank	Volume (MG)	Base Elevation (ft amsl)	Diameter (ft)	Length (ft)	Material
Tank 1	0.003	2,690	5.5	18.3	Steel
Total	**0.003**				

2.4.3.1 Storage Tank Existing Conditions Assessment

The existing 3,000-gallon hydropneumatic storage tank was installed in 2013. The hydropneumatic tank was purchased from RECO Tanks South Carolina. This hydropneumatic tank does not meet requirements for fire flow or significant supply storage in the event that the single well in the GBWC-PD Calvada Meadows system is out of service. The tank is estimated to have 9 years of nominal useful life remaining as of 2024. The remaining useful life is based on a storage tank's nominal life expectancy of 20 years. However, the walls of the tank are thinning, and the small manway does not allow access for inspection.

2.4.4 Booster Pumps

Currently, there are no booster pumps in the Calvada Meadows water system.

2.4.5 Back-Up Power Supply

The Calvada Meadows system currently does not have any back-up power supply. The system has a manual transfer switch and can use one of the two (2) 100 kW portable generators in the event of significant power failure.

2.4.6 System Operation and Control

The Calvada Meadows well site was added to SCADA in 2008 and upgraded in 2023. The existing system monitors chlorine residual, well on/off, tank pressure, well turbidity, and low/high pressure status alarm.

2.4.6.1 SCADA Existing Conditions Assessment

SCADA is installed at the Calvada Meadows well. The SCADA system was upgraded in 2023 and monitors well pump start/stop status and well pump run times. The hydropneumatic tank is also monitored through SCADA. Ubiquity (900 MHz) radio is used to communicate with the receiving equipment. The entire SCADA system is accessible via operator's laptops, cell phones, and tablets through the internet.

2.5 Mountain View Estates Water System

The Mountain View Estates system is located at the western end of the Calvada Valley system. In 2023, a pipeline was constructed to connect and consolidate Mountain View Estates with the Calvada Valley system. The hydropneumatic tank in the Mountain View Estates system was retired as part of this project. Historical data on the system is provided within this report for informational purposes where appropriate, but for future projections all connections are included in the Calvada Valley system data.

2.6 Mountain Falls Water System

The Mountain Falls ("MF") system is located on the southern end of the Calvada Valley system. The system is located wholly on the southwestern side of Highway 160. The service area elevations drop to the west, but not enough to divide the system into separate pressure zones. This system can be seen in the maps and schematic diagram provided in Appendix D.

2.6.1 Distribution Piping (Pressure Zones)

The distribution piping in Mountain Falls is composed of primarily of 8-inch and 12-inch distribution piping, though there is also 2-inch, 4-inch, 6-inch, 10-inch and 18-inch piping in the system. There are approximately 22 miles of piping in the Mountain Falls service area. Table 2.26 below details the approximate lengths of pipe for each diameter.

Table 2.26: Mountain Falls Pipe Sizes and Lengths

Pipe Size	Pipe Length (ft)
2-inch	300
4-inch	600
6-inch	4,600
8-inch	72,200
10-inch	1,200
12-inch	27,400
18-inch	9,700
Total (rounded)	**116,000**

2.6.1.1 Distribution Piping Existing Conditions Assessment

An asset management condition assessment matrix should be developed to better categorize the condition of the existing distribution piping in Mountain Falls. To develop the matrix, the distribution piping would be divided into segments and a numerical value would be assigned to each segment based on the number of breaks experienced and hydraulic pressures at average day demand ("ADD"). The higher the numerical value calculated for a segment of pipe, the more severe the condition for that segment of pipe. This would help GBWC-PD to identify what pipe is the most problematic and help to prioritize pipeline replacement in an efficient manner.

Because GBWC-PD acquired the system in 2004, the years segments of piping were installed are not documented and therefore not logged in GIS. Fire hydrant reports suggest a range of approximately 20 years where the majority of piping was installed in the mid 2000's (2005-2007), with the earliest fire hydrant installation dating back to 1999. On average, there were 0 main breaks and approximately 13 service line breaks per year based on data from 2017 through 2022. Table 2.27 contains a list of the number of service line, main pipeline breaks and other types of breaks that have occurred from 2017 through 2022.

Since GBWC-PD does not currently have breaks or installation years logged in the GIS database system for water piping linear assets, an in-depth condition assessment of the distribution system will have to be conducted in a future IRP. This future condition assessment will be more comprehensive in determining areas of piping that will need repairs and replacement.

Table 2.27: Mountain Falls Repairs to Main Pipeline, Service Lines, and Other Water Repairs

Year	Service Lines	Main Pipeline	Others
2017	8	0	0
2018	17	0	6 (AMS)[(1)]
2019	16	0	0
2020	0	0	0
2021	18	0	0
2022	19	0	0
Total	**78**	**0**	**6**

Notes:
(1) Angle Meter Stop (AMS)

2.6.1.2 Pressure Zone Conditions Assessment

The GBWC-PD Mountain Falls water system has two distinct pressure zones. One zone ("supply zone") contains two wells and two storage tanks with no service connections. Water is conveyed through a pressure reducing valve into the Mountain Falls zone, where all the system's connections are located. For the system analysis, only the Mountain Falls zone is analyzed, as no users are located in the supply zone. Section 2.6.6, System Operation and Control, provides a narrative description of how the wells are operated. A schematic diagram and map, included in Appendix C, show the locations of the pressure zones and other infrastructure.

The Maximum Day Demand (MDD) pressures are located in Table 2.28. At the time the original water system infrastructure was installed, installation of the infrastructure was in accordance with all state and local agencies approved design requirements and construction standards. Subsequently, as GBWC-PD makes repairs or improvements, the newer infrastructure is designed and constructed to meet the most current approved design requirements and construction standards. Based on the available modeling results, pressures in certain segments still exceed the maximum allowable delivery pressure of 100 pound per square inch (psi) per NAC 445A.6711(2) which requires the installation of individual pressure reducing valves for connections in locations exceeding 100 psi.

Table 2.28: Mountain Falls Pressure Zone

Pressure Zone	Supply	Hydraulic Grade Line (ft. amsl)	Hydraulic Model MDD Pressures (psi)
Mountain Falls	Wells MF 1 and MF 2	2,923	57 to 107

2.6.1.3 Pressure Reducing Valve Existing Conditions Assessment

There is one pressure reducing valve in the Mountain Falls service area. The PRV is a 12-inch valve located on Mountain Falls Parkway and set to open at 75 psi. The PRV is serviced annually.

2.6.2 Water Supply

There are two active wells in this system. The two wells are identical in design and can pump approximately 1,550 gpm each. The system has an overall pumping capacity of 3,100 gpm or 4.46 MGD, as detailed in Table 2.29. The wells are both on SCADA.

Table 2.29: Mountain Falls Water Supply Wells and Capacities

Well	Casing Diameter (in)	Capacity (GPM)(1)	Total Dynamic Head (feet)	Backup Generator
Well MF 1	14	1,531	227	Yes
Well MF 2	16	1,569	197	Yes
Total		**3,100**		

Notes:
(1) Capacities based on the most review conducted in 2020.

2.6.2.1 Water Supply Well Existing Conditions Assessment

Well MF 1

Mountain Falls Well 1, originally drilled in 1946, was constructed with nominal 14-inch diameter steel casing to a depth of 704 feet bgl. Sometime later, a 10-inch liner was installed from 20 feet to 704 feet bgl. The screen intervals are 419-439 feet; 455-475 feet; 490-510 feet; 526-546 feet; 562-602 feet; 638-706 feet bgl. The current static water level in the well is approximately 22 feet bgl. The well is equipped with a Goulds submersible turbine pump (model 9THC, 2-stage) with a 125-Hp Hitachi submersible motor with a variable frequency drive (VFD). The pump and motor were installed in 2019 after completing a rehabilitation of the well. In 2018, the damaged 230 kW backup generator was repaired and brought back into service. There is chlorination equipment at the well site. The well and discharge piping are housed within a small building. There is a pump to waste for this well, controlled by a Cla-Val valve, to waste for a period of time before discharging into the distribution system. Several video surveys were conducted during the rehabilitation in 2019, which identified that the 10-inch liner consists of low carbon steel blank casing and stainless-steel wire wrap screen intervals. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 78 years old as of 2024, but the new 10-inch liner has extended the useful life of the well.

Well MF 2

Mountain Falls Well 2, originally drilled in 1972, was constructed with nominal 16-inch diameter steel casing to a depth of 707 feet bgl. The well drillers report was not available for review to obtain screen intervals. This well appears to have had a liner installed in the well sometime around 2000, but no record of the work exists. The liner appears to be 12-inch in diameter with two screen zones based on a video survey conducted during the 2020 rehabilitation of the well. The screen intervals are located from 499-519 feet and 593-726 feet of wire wrap screen. The video survey also revealed that the blank casing is composed of low carbon steel and the wire wrap screen is stainless steel. Currently, the static water level in the well is 9.5 feet bgl. The well is equipped with a Goulds submersible turbine pump (Model 9THC, two stages) with a 125-Hp Hitachi submersible motor with a soft start. The pump and motor were installed in 2020 after completing a rehabilitation of the well. In 2019, the damaged 230 kW backup generator was replaced with a new 230 kW generator. There is chlorination equipment at the well site. The well and discharge piping are housed within a small building. There is a pump to waste for this well, controlled by a Cla-Val valve, to waste for a period of time before discharging into the distribution system. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 52 years old as of 2024, but the new 12-inch liner has extended the useful life of the well.

2.6.3 Storage

There are two storage tanks located in the Mountain Falls area. The tanks are filled by the two wells. One storage tank is 1,200,000-gallon welded steel tank 92 feet in diameter and 24 feet high and the other tank is 1,400,000-gallon welded steel tank with a diameter of 102 feet and 24 feet high. The tanks provide pressure to the lower elevations in the service area and control the operation of the wells. The tanks are on SCADA. The storage tank details are summarized in Table 2.30.

Table 2.30: Mountain Falls Water Storage Tanks

Tank	Volume (MG)	Base Elevation (ft amsl)	Diameter (ft)	Height (ft)	Material
Tank 1	1.2	2,960	92	24	Welded Steel
Tank 2	1.4	2,960	102	24	Welded Steel
Total	**2.6**				

2.6.3.1 Storage Tank Existing Conditions Assessment

MF Tank 1

MF storage tank 1 was constructed in 2000 by Resource Development Co. The most recent tank inspection was conducted in April 2018, where the exterior components were found to be in good/excellent condition. The inspection of the interior noted that the interior walls were in good condition with moderate oxidation. The only recommendation was to schedule time to make epoxy repairs to the interior of the floor, which shows blistering in the coating. In 2015, the tank floor and walls were sand blasted and recoated. During sand blasting, the contractor began noticing holes appearing in the bear metal floor. All the holes identified were patched. Prior to recoating the floor of the tank, a specialized tank inspection of the tank floor was conducted and found that the floor was heavily deteriorating due to corrosion occurring underneath the floor. The exterior corrosion to the floor is why the diver conducting the 2018 inspection only observed blistering on the floor. The tank floor was rehabilitated in 2023. The two inspection reports are provided in Appendix F. Passive cathodic protection was installed to the tank in 2019. The tank is estimated to have 21 years of nominal useful life remaining as of 2024. The remaining useful life is based on a storage tank's nominal life expectancy of 45 years.

MF Tank 2

MF storage tank 2 is a nominal 1,400,000-gallon tank and is anticipated to be placed in service in the 2nd quarter of 2024. . The first inspection for the new tank will not be scheduled until 2029, five years after construction. Passive cathodic protection was installed underneath the tank the same year it was built with galvanic anode cathodic protection installed in the interior of the tank. With cathodic protection and proper maintenance, the storage tank should have an extended useful life. The tank is estimated to have 44 years of nominal useful life remaining as of 2024. The remaining useful life is based on a storage tank's nominal life expectancy of 45 years.

2.6.4 Booster Pumps

There are no booster pumps within the Mountain Falls water system.

2.6.5 Back-Up Power Supply

The two Mountain Falls wells have permanent backup generators at each location.

2.6.6 System Operation and Control

SCADA was added to the Mountain Falls Tank in 2008 and upgraded in 2023.

2.6.6.1 SCADA Existing Conditions Assessment

SCADA is installed at the storage tank and two wells within the GBWC-PD Mountain Falls service area. The SCADA system was updated in 2023 and monitors storage tank level with trends over time, well pump start/stop status, and well pump run times. The Pressure Reducing Valve (PRV) is currently monitored through SCADA. Ubiquity (900 MHz) radio is used to communicate with the receiving equipment. The entire SCADA system is accessible via operator's laptops, cell phones, and tablets through the internet.

2.7 Spring Mountain Motorsports Ranch Water System

The Spring Mountain Motorsports Ranch ("SMMR") development was annexed into GBWC-PD service area on December 1st, 2016. Currently, GBWC-PD has not accepted the new water and sewer infrastructure and is instead working under a memorandum of understanding (MOU) and Interim Service Agreement (ISA). Full dedication of the system is expected to occur in 2024. In general, a payment from the Developer to GBWC will be made for any deficits between revenues and expenses. Copies of the MOU and ISA can be found in Appendix M. GBWC-PD started collecting meter data in January 2020. Since this is a new water system, no capital improvements are being identified in the Preferred (Section 7) or Action (Section 8) Plans of this document.

The service area is bound on the west side of the property by Nevada State Route 160 and is located northeast of the Mountain Falls service area. The Spring Mountain Motor Ranch water system includes water pipe distribution, two wells, two storage tanks, and a booster pump station. The service area includes residential and commercial development on property surrounding the SMMR racetrack facilities in Pahrump, Nevada. Currently, only a small portion of the anticipated development is constructed. A design report titled "Water System Design Spring Mountain Motorsports Ranch" (April 29, 2016) was prepared by Golder Associates Inc. This design report is included in Appendix M. A map and schematic diagram of the service area's water system components are included in Appendix D. pictures of the major assets are available in Appendix E.

2.7.1 Distribution Piping (Pressure Zones)

The main artery of the distribution piping has been constructed with a map showing the piping sizes and location available in Appendix D. Fire hydrants, isolation valves, and air/vacuum valves haven been installed along the pipelines as shown in the drawing. From the booster pump station, the pipeline transitions from a 12-inch ductile iron pipe to a 12-inch PVC pipe. This pipe then splits into two directions. The north 10-inch distribution line is directed east around the north edge of the facility. The 12-inch south distribution line goes around the south end of the site. These distribution lines are connected to the residential water mains. Overall, the distribution piping in Spring Mountain is composed of 2-inch, 6-inch, 8-inch, 10-inch, and 12-inch distribution piping in the system. There are approximately 4 miles of piping in the Spring Mountain service area. Table 2.31 below details the approximate lengths of pipe for each diameter.

Table 2.31: Spring Mountain Pipe Sizes and Lengths

Pipe Size	Pipe Length (ft)
2-inch	100
6-inch	200
8-inch	1,400
10-inch	13,200
12-inch	7,000
Total (rounded)	**21,900**

2.7.1.1 Distribution Piping Existing Conditions Assessment

Because the main artery of the distribution piping was recently constructed in 2018, a conditions assessment is not necessary at this time. New pipeline installation standards and oversight were approved by Nye County, NDEP, and GBWC-PD to ensure that the piping was properly installed.

2.7.1.2 Pressure Zone Conditions Assessment

The SMMR system is comprised of one pressure zone served by two storage tanks through a booster pump station. A hydraulic water model of the distribution piping was developed by Golder Associates, Inc. To ensure proper pressures in the system in accordance with NAC requirements. The water model was updated as part of the 2024 IRP effort and analyzed for conformance with NAC pressure requirements. Section 2.7.6, System Operation and Control, provides a narrative description of how the wells and pumping station are operated. A schematic diagram and map, included in Appendix C, show the locations of the pressure zones and other infrastructure.

The Maximum Day Demand (MDD) pressures are located in Table 2.32Table 2.10.

Table 2.32: SMMR Pressure Zone

Pressure Zone	Supply	Hydraulic Grade Line (ft. amsl)	Hydraulic Model MDD Pressures (psi)
SMMR	SMMR Well 1 and 2	2,994	59 to 96

2.7.2 Water Supply

There are two wells that operate in the Spring Mountain Motorsports Ranch that deliver water to the two storage tanks. The wells are located in the northwest corner of the site. Both wells have been drilled and completed with discharge piping and well houses. The wells have sodium hypochlorite disinfection. Table 2.33 details the information for the wells.

Table 2.33: Spring Mountain Motorsports Ranch Potable Water Supply Wells and Capacities

Well	Casing Diameter (in)	Capacity (gpm)	Total Dynamic Head (feet)	Backup Generator
1	12	470	309	None
2	12	470	309	Yes
Total		**940**		

2.7.2.1 Water Supply Well Existing Conditions Assessment

SMMR Well 1

SMMR Well 1, originally drilled in 2015, was constructed with nominal 12-inch diameter low carbon steel casing to a total depth of 700 feet bgl. The well is screen from 400-700 feet bgl. The original static water level is 129 feet bgl. The well is equipped with a Webtrol, submersible turbine pump (unknown model) with a 50 Hp Franklin submersible motor operated with a soft start. The pump and motor were installed in 2019. The well does not have backup power. There is chlorination equipment housed at the well site. A video survey of the well was unavailable for review. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 9 years old as of 2024 and has approximately 31 years of useful life remaining.

SMMR Well 2

SMMR Well 2, originally drilled in 2018, was constructed with nominal 12-inch diameter low carbon steel casing to a depth of 720 feet bgl. The well is screened from 400- 700 feet bgl. The original static water level is 127 feet bgl. The well is equipped with a Webtrol, submersible turbine pump (unknown model) with a 50 Hp Hitachi submersible motor operated with a soft start. The pump and motor were installed in 2019. The well shares a 450 kW Cummins backup generator with the booster station facility located at the same site. There is chlorination equipment housed at the well site. A video survey of the well was unavailable for review. The standard nominal useful life of a well with good quality construction is roughly 40 (±5) years. This well is 5 years old as of 2024 and has approximately 35 years of useful life remaining.

2.7.3 Storage

Two storage tanks have been constructed at the same site as Well 1 and the booster station within the Spring Mountain Motor Raceway. Each storage tank has a capacity of 550,000 gallons. The details for each storage tank are provided in Table 2.34. The tanks are equipped with level transducers that will control the well pumps and monitor tank levels in the SCADA system.

Table 2.34: Spring Mountain Motorsports Ranch Water Storage Tanks

Tank	Volume (MG)	Base Elevation (ft amsl)	Diameter (ft)	Height (ft)	Material
1	0.55	2,831	60	28	Welded Steel
2	0.55	2,831	60	28	Welded Steel
Total	**1.10**				

2.7.3.1 Storage Tank Existing Conditions Assessment

SMMR Tank 1

SMMR Tank 1 is a nominal 550,000-gallon welded steel storage tank constructed in 2019 by Resource Development Co. The most recent tank inspection was conducted in April 2022, where the exterior components were found to be in good condition. The inspection of the interior found the components to be in good condition as well. The only recommendation was to continue to schedule a cleaning and inspection every 3-5 years. Passive cathodic protection was installed on the tank the same year it was built. This tank is estimated to have 38 years of nominal useful life remaining as of 2024, but with cathodic protection and proper maintenance, it should extend its useful life. The remaining useful life is based on a storage tanks nominal life expectancy of 45 years.

SMMR Tank 2

SMMR Tank 2 is a nominal 550,000-gallon welded steel storage tank constructed in 2019 by Resource Development Co. The most recent tank inspection was conducted in April 2022, where the exterior and interior components were found to be in good condition. It is recommended to continue to schedule a cleaning and inspection every 3-5 years. Passive cathodic protection was installed on the tank the same year it was built. This tank is estimated to have 38 years of nominal useful life remaining as of 2024, but with cathodic protection and proper maintenance, it should extend its useful life. The remaining useful life is based on a storage tanks nominal life expectancy of 45 years.

2.7.4 Booster Pumps

The booster station pumps water from the storage tanks to the distribution system. The pumps are designed to meet supply demands as well as required fire flow. There are currently six pumps assembled in parallel, each with a capacity of 544 gpm, providing up to 3,264 gpm. One of these pumps was added to provide redundancy to the system. These pumps are operated with variable speed drives and capable of meeting very low flows.

The pumps operate with a bypass loop to re-circulate water which allows the pump(s) to operate at all times. The booster pumps are located inside a building to protect from flood, fire, and other hazards and include a discharge flowmeter to measure flow to the distribution system. This building is located at the same site as Well 2 and the two storage tanks. Two (2) 180-gallon expansion tanks were included to support the system in low-to-zero flow conditions. The pump designs for each pump at each booster station is provided in Table 2.35 below.

Table 2.35: Spring Mountain Motorsports Ranch Mountain Booster Pump Station

Pumps	Design Flow (gpm)	Horsepower (HP)
Pump 1	3,264	25
Pump 2	3,264	25
Pump 3	3,264	25
Pump 4	3,264	25
Pump 5	3,264	25
Pump 6	3,264	25

2.7.4.1 Pump and Motor Existing Conditions Assessment

The SMMR booster pumps consist of PACO (Model 10N6-30707-14000X-1871P) pumps with 25 Hp Baldor motors, each with a variable frequency drive. The package system consists of six pumps/motors in parallel. The pumps, which were all installed in 2019, have at least 10 years of nominal useful life. The pumps are housed in a brick building that is located in a block wall with a shared backup generator with Well 2.

2.7.5 Back-Up Power Supply

The SMMR system has a 450 kW Cummins permanent backup generator located at the Well 2, booster station, and tank site. The backup generator was sized to support both Well 2 and the booster station facilities.

2.7.6 System Operation and Control

The system is set to operate with the two wells providing supply to the two storage tanks. Following the storage tanks, the booster station pumps water into the distribution system.

2.7.6.1 SCADA Existing Conditions Assessment

SCADA is installed at the two storage tanks, two wells, and the booster pump facility allowing GBWC-PD to monitor and remotely control the water system. Currently, the SCADA system monitors storage tank level with trends over time, well pump start/stop status, well pump run times, booster station pumps on/off, and run times in the SMMR water system. A Ubiquity (900 MHz) radio is used to communicate with the receiving equipment. The entire SCADA system is accessible via operator's laptops, cell phones, and tablets through the internet.

2.8 Wastewater Collection, Treatment and Disposal

Within the GBWC-PD service area there are four active wastewater service areas: the central system in the Calvada Valley area; the northern system in the Calvada North area; the southern system in the Mountain Falls area; and the Spring Mountain Motor Ranch system northern east of Hwy 160. There are three septic systems serving a total of four customers owned and maintained by GBWC-PD. The three septic systems are located on 121 West Calvada Blvd. (serving one customer), a system on 2650 East Feather Street (serving two customers), and a system on 2900 S. Blagg Road (serving one customer). These are all located within the Calvada Valley system. No additional connections will be allowed to these three septic systems. If the sewer line is extended past any of these customers, they will be connected to the collection sewer extension. The remainder of the water service area is served by individual septic systems, which are owned and maintained by the property owners. The four GBWC-PD wastewater systems are shown in the wastewater collection system maps located in Appendix D with Appendix C containing flow schematics for each of the wastewater treatment facilities.

The north-south slope of the terrain throughout the service area is very shallow and therefore incurs the need for pumping. The east-west slope on the east side of Highway 160 is relatively steep and easily accommodates gravity flow. The east-west sloping terrain west of Highway 160 is relatively shallow and requires pumping if gravity pipe runs are longer than 1 to 2 miles. This geography results in ten lift stations in the Calvada Valley system and one lift station in the smaller Calvada North system.

2.8.1 Northern Area – Calvada North (Plant F Facilities)

The Calvada North (Plant F Facilities) is located in the northwestern-most portion of the GBWC-PD service area. It is located in the narrower, northern portion of Pahrump Valley and is generally at a higher elevation than the southern and larger part of the town of Pahrump. Development is on both the west and east side of Highway 160.

The service area of Calvada North (Plant F Facilities) is relatively flat, falling only 50 feet from the east to the west. The area east of Highway 160 has much greater slope.

This area has developed somewhat slowly. While some parcels are relatively large, being small ranchettes or horse properties, most are less than ½ acre. There are nearly 5,400 parcels in the Plant F service area.

2.8.1.1 Collection Piping Existing Conditions Assessment

The collection system is relatively small and only contains one lift station. The collection system is comprised of approximately 51,073 linear feet (LF) (approximately 10 miles) of 8-inch PVC material gravity main as shown in Table 2.36. The collection system was installed starting approximately mid 1980's to mid-1990's. A portion of the service area collects in the sole collection system lift station (Lift Station 4 North), which pumps north via a segment of force main, discharges to a manhole, then gravity feeds to the Plant F onsite lift station. The segment of force main from Lift Station 4 North to the manhole is the only force main in the system. No major blockages have been observed in the sewer collection system and there are no areas in the collection system that require frequent preventative maintenance. As in the other wastewater collection systems, inflow and infiltration (I/I) is observed at the Plant F Wastewater Treatment

Plant. GBWC plants to continue to reevaluate past video inspection and areas performed in the mid-2000's to assess if any needed replacement of sewer main is required.

Table 2.36: Calvada North Existing Pipe Sizes and Lengths

Pipe Diameter (in)	Length (ft)
8"	51,073
Total	**51,073**

2.8.1.2 Lift Stations Existing Conditions Assessment

Table 2.37 details each lift station in the GBWC-PD Calvada North service area.

Table 2.37: Calvada North Lift Stations

Lift Station	Year Built	Discharges	Approx. Capacity (gpm)
LS 4 North	1996	Manhole	85
Plant F LS	1996	Plant F	90 – 120

Lift Station 4 North

There is only one lift station located in the Calvada North wastewater collection system designated as Lift Station 4 North. The lift station is a duplex system with two Hydromatic (Model S4LRC750M46) pumps with 7.5 Hp, 3-phase motors. The lift station does not have odor control or any standby power; however, it is equipped with a manual transfer switch in the event of a power outage. GBWC-PD owns a portable generator that can be setup at the lift station in the event of a power outage. The lift station structure was installed in 1996 and is approximately 28 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 22 years of remaining useful life.

Plant F Lift Station

The Plant F lift station, which is located at the Plant F wastewater treatment plant, feeds the plant. The lift station is a duplex system with two Hydromatic (Model S4LRC1500M4-4) pumps with 7.5 Hp, 3-phase motors. The lift station does not have odor control. This lift station does share a 100-kW backup generator with the Plant F treatment facility. The lift station structure was installed in 1996 and is approximately 28 years old as of 2024. This type of wet well lift station structure is estimated to have 50 years of nominal useful life. It is estimated that this lift station has approximately 22 years of remaining useful life.

2.8.1.3 Treatment Facility

The Calvada North service area has one treatment facility known as Plant F. Plant F is a 50,000 gallon per day (gpd) package treatment plant manufactured by ECOfluid System, Inc. Treatment includes a bar rack screen that discharges influent into an Anoxic tank. The Anoxic tank then splits the flow into two Aeration Tanks, which then flows into separate clarifiers. From the clarifiers, solids are manually wasted into a digester and the clear effluent is then chlorinated and conveyed into a final effluent tank. The solids are treated in the aerobic digester and stored for hauling off-site. Existing flows to the facility are approximately 27,400 gpd (based on average monthly 2022 influent flow). The treatment facility has a permanent 100 kW backup generator in support of the treatment plant and lift station feeding the plant.

2.8.1.4 Effluent Disposal Methods

The Plant F facility has two separate methods for the disposal of effluent. The first method involves three rapid infiltration basins (RIB) adjacent to Plant F. According to GBWC, they can discharge for approximately 1 week into the three RIBs before they fill up. Once full, it takes up to 3 weeks for the effluent to completely percolate back into the ground. The second, and more effective method, is through on-site spray irrigation. Effluent is pumped to four separate zones of irrigation spray heads that apply the effluent over approximately a 2-acre area on the Plant F property. In 2022, GBWC disposed of approximately 1 million gallons of effluent into the RIB's and 8.3 million gallons through spray irrigation.

2.8.2 Central Area – Calvada Valley (Plant 3 Facilities)

Plant 3 ("WWTP-3") is designated to serve the Calvada Valley development, which lies to the south of Nevada Route 372, east of Blagg Road, west of Highway 160, and north of Jaybird Road. The service area of Plant 3 slopes east to west falling 240 feet from east to west.

There are approximately 11,500 parcels within the reasonable service area of Plant 3. Of the 11,500 serviceable parcels, approximately 6,600 are currently designated as parcels to receive central sewer service. These 6,600 service connections would generate an estimated average daily flow of 11.65 MGD.

2.8.2.1 Collection Piping Existing Conditions Assessment

The collection system in the Calvada Valley area is comprised of approximately 319,240 LF (approximately 61 miles) of 6-inch, 8-inch, 10-inch, 12-inch, 15-inch, and 20-inch Polyvinyl Chloride ("PVC") material gravity mains and force mains as shown in Table 2.38. No major blockages have been observed in the sewer collection system, though there is one area on Dandelion Street that requires preventative maintenance (through jetting) every 3 months due to dips in the line. As in the other wastewater collection systems, I/I is observed at the Plant 3 Wastewater Treatment Plant.

Table 2.38: Calvada Valley Existing Pipe Size and Lengths

Pipe Diameter (in)	Length (ft)
4″	40
6″	7,000
8″	240,500
10″	29,700
12″	37,500
15″	3,700
20″	800
Total (rounded)	**319,240**

2.8.2.2 Lift Stations Existing Conditions Assessment

The collection system includes 10 lift stations (LS). Lift Stations 1, 2, and 3 pump directly to Plant 3. The remaining lift stations are re-pumped by one or more of these stations. A schematic diagram of the flows is available in Appendix D. Table 2.39 details each lift station in the GBWC-PD Calvada Valley service area.

Table 2.39: Calvada Valley Wastewater Collection System Lift Stations

Lift Station	Install Year of Lift Station Structure	Discharges To	Capacity (gpm)
1	1993	Plant 3	650
2	1995	Plant 3	250
3	2010	Plant 3	550
4	2010	LS 3	500
5	1999	LS 1	TBD
6	2002	LS 2	TBD
7	2001	LS 4	130
8	1992	LS 3	TBD
10	2010	LS 4	500
11	2010	LS 10	500
Note: (1) Lift Station Capacities could not be verified for lift station 5, 6, and 8			

The locations of the lift stations are shown in the service area maps in Appendix D. Each lift station is a duplex lift station containing two pumps. For more information regarding each pump/motor and major piece of equipment as well as an assessment of remaining useful life, refer to the asset registry in Appendix A.

Lift Station 1

Lift Station 1 is a duplex wet well with a vault box that feeds directly to Plant 3 Treatment Facility. The lift station is equipped with two Hydromatic (model S4LRC15003-4) pumps with 15 Hp, 3-phase motors. The lift station does not have odor control. The lift station is equipped with SCADA for monitoring levels, flows, and run time. The lift station received a power service upgrade in 2024, increasing the voltage from 270V to 480V, with the addition of variable frequency drives (VFDs). The lift station is also slated to receive permanent backup generator in 2024. The lift station is equipped with an overflow line that flows into Lift Station 2 in the event of a high influent level. The lift station structure was installed in 1993 and is approximately 31 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 19 years of remaining useful life.

Lift Station 2

Lift Station 2 is a duplex wet well equipped with two Hydromatic (Model S4LRC3000M-4) pumps with 30 Hp, 3-phase motors. The lift station does not have odor control or a backup generator at the site. It does have a manual transfer switch for setting up a portable generator in the event of a power outage. It is slated to receive a backup generator and VFDs in 2024. The lift station is equipped with SCADA for monitoring levels, flows, and run time. There is a hardwired high level alarm connection to Lift Station 3 notifying that Lift Station 2 is having a high influent level. The lift station structure was installed in 1995 and is approximately 29 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 21 years of remaining useful life.

Lift Station 3

Lift Station 3 is a duplex wet well equipped with two Hydromatic (model S4LRC3000M-4) pumps with 30 Hp, 3-phase motors. The lift station has a diatomaceous earth odor control system with an experimental fragrant deodorant system. The lift station is equipped with a permanent 100 kW backup generator. The lift station is also equipped with SCADA for monitoring levels, flows, and run time. The lift station structure was installed in 2010 and is approximately 14 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 36 years of remaining useful life.

Lift Station 4

Lift Station 4 is a duplex wet well equipped with two EBARA (model 150DLFU6184) pumps with 25 Hp, 3-phase motors. The pumping systems are operated on VFD's with flow rates fluctuating between 500 and 835 gpm. The lift station has two force mains, and the meter box is located in a vault just outside the security fencing. Odor control for the site consists of a diatomaceous earth and an ozone injection system. The lift station is equipped with a permanent 60 kW backup generator. The lift station is also equipped with SCADA for monitoring levels, flows, and run time. There is a transducer in the wet well for monitoring influent levels and controlling the pumping rate. The lift station structure was installed in 2010 and is approximately 14 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 36 years of remaining useful life.

Lift Station 5

Lift Station 5 is a duplex wet well equipped with two Hydromatic (model S4LRC1500M4-4) pumps with 15 Hp, 3-phase motors. The lift station does not have odor control or a backup generator at the site. It does have a manual transfer switch for setting up a portable generator in the event of a power outage. The lift station is equipped with SCADA for monitoring levels, flows, and run time. The lift station structure was installed in 1999 and is approximately 25 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 25 years of remaining useful life.

Lift Station 6

Lift Station 6 is a duplex wet well equipped with two Hydromatic (model S4MRC500M) pumps with 5 Hp, 3-phase motors. The lift station does not have odor control or a backup generator at the site. It does have a manual transfer switch for setting up a portable generator in the event of a power outage. The lift station is also equipped with SCADA for monitoring levels, flows, and run time. Currently, there are only two customers that feed into this lift station. The lift station structure was installed in 2002 and is approximately 22 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 28 years of remaining useful life.

Lift Station 7

Lift Station 7 is a duplex wet well equipped with two Flygt (model 3217.095) pumps with 10 Hp, 3-phase motors. The lift station does not have odor control or a backup generator at the site. It does have a quick connect system in a vault outside the security fencing for setting up a portable generator in the event of a power outage. The lift station is also equipped with SCADA for monitoring levels, flows, and run time. The lift station structure was installed in 2001 and is approximately 22 years old. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 28 years of remaining useful life.

Lift Station 8

Lift Station 8 is a duplex wet well equipped with two Hydromatic (model SPGF300M6-4) grinder pumps with 3 Hp, 3-phase motors. The lift station services the Community Christian Academy School and Pahrump Community Church. The lift station does not have odor control or a backup generator at the site. It does not have a manual transfer switch for setting up a portable generator in the event of a power outage. The lift station is equipped with SCADA for monitoring levels, flows, and run time. The lift station structure was installed in 1992 and is approximately 32 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 18 years of remaining useful life.

Lift Station 10

Lift Station 10 is an elevated site (due to flooding issues) with a duplex wet well equipped with EBARA (model 100DLFU65.5) pumps with 7.5 Hp, 3-phase motors. Odor control for the site consists of a diatomaceous earth scrubber. The site is equipped with a Cummins 35 kW backup generator. Lift Station 9 (LS 9) is also located at this site. LS 9 was constructed for a development that was never built, and therefore the lift station was never used and is abandoned. A second generator is located onsite but not used. According to GBWC, the original contractor for LS 9 never purchased the 30 kW Kohler generator from the vendor and the vendor put a lien on the equipment. Lift station 10 is also equipped with SCADA for monitoring influent levels, flows, and run time. The lift station structure was installed in 2010 and is approximately 13 years old. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 37 years of remaining useful life.

Lift Station 11

Lift Station 11 is an elevated site (due to flooding issues) with a duplex wet well equipped with EBARA (model 100DLFU65.5) pumps with a 7.5 and 10 Hp, 3-phase motors. Odor control for the site consists of a diatomaceous earth scrubber. The site is equipped with a Cummins 35 kW backup generator. The lift station receives influent flow from the Nevada Southern Detention Center. The lift station is also equipped with SCADA for monitoring influent levels, flows, and run time. The lift station structure was installed in 2010 and is approximately 14 years old as of 2024. This type of lift station structure is estimated to have 50 years of nominal useful life, indicating that this lift station structure will not need replacement at this time. It is estimated that this lift station has approximately 36 years of remaining useful life.

2.8.2.3 Backup Generators

Lift Stations 1, 2, 3, 4, 10, and 11 will all have permanent backup power as of 2024. Lift Stations, 5, 6, and 7 all have manual transfer switches to accept connection to a portable generator. Lift Station 8 is the only lift station that does not have the capability to connect to a portable generator upon power failure. With GBWC-PD only possessing two portable generators, there are multiple facilities at risk in case of a major power outage. However, there are several features to prevent overflows in the case of power outage at Lift Stations 1 and 2. Lift Station 1 can overflow to Lift Station 2, which can then overflow to Lift Station 3. In addition, the high-level alarm at Lift Station 2 is wired into the SCADA at Lift Station 3.

2.8.2.4 Central Area – Plant 3 Treatment Facility

Plant 3 is the wastewater facility for the Central Valley service area. Plant 3 is a 1.5 MGD sequencing batch reactor (SBR) facility. The facility includes a surge tank, biological treatment, traveling bridge tertiary filters, and an ultraviolet and chorine disinfection system. Solids are treated by aerobic digestion and dewatering prior to hauling off-site for ultimate disposal. The facility currently treats approximately 720,000 gpd (based on the average monthly 2022 influent flow).

The influent is pumped through the head works, which contains a screen brush auger, grit concentrator and odor scrubber. From the head works, influent is conveyed to a pre-equalization tank (the old Marwood concrete tanks) and then pumped into SBRs. Currently SBR 3 is not in day-to-day rotation and is used for overfall capacity during flooding events or when mechanical issues occur. Each SBR contains a submersible/aerator/mixer (SAM) system for treatment. From the SBRs, the effluent is decanted to a post equalization tank, then pumped to the splitter box where gravity feeds equally into the existing 3 travelling bridge (sand) filters. Sludge in the SBRs is automatically wasted to aerobic digesters (old Marwood Tanks). From the sand filters, the effluent goes through a pre- and post-chlorine contact chamber and then is finally conveyed to the receiving lagoons (Lined Ponds) at the Discovery Park.

2.8.2.5 Plant 3 Treatment System Existing Conditions Assessment

The Plant 3 WWTP equipment was evaluated in the asset registry provided in Appendix A. This asset registry details each piece of major equipment with information including the year the equipment was procured/installed and remaining useful life. The majority of the equipment is in "good" to "fair" age-based condition. However, the sand filters and pre-EQ building are in poor condition based on site observations and operator feedback. The pre-EQ building has substantial corrosion to both the concrete structure and the metal building due to the corrosive environment inside the building. The travelling bridge sand filter backwashing pumps require frequent replacement. In addition, the filter housing will need to be rehabilitated and the sand media will need to be replaced.

2.8.2.6 Central Area – Effluent Disposal Methods

Plant 3 effluent is pumped to two Discovery Park lagoons (synthetically lined ponds) for storage and final disposal. The Plant 3 facility currently has two separate methods for the disposal of its effluent. The first method involves conveying treated effluent, via pumps, 2.5 miles to the local Lakeview Executive Golf Course (Lakeview) for irrigation use. This only occurs during the warm months of the year when Lakeview needs to irrigate their fairways and greens. During the winter months, treated effluent from the two lined ponds is pumped to two rapid infiltration basins (RIB) constructed in 2019. The two ponds were designed to accept up to 625,000 gpd each allowing for sufficient effluent disposal during the winter months. A third effluent reuse/disposal option was recently constructed to provide effluent for irrigation of the Pahrump High School sports complex fields. The pipeline that currently conveys treated effluent to Lakeview runs past the Pahrump High School (School). The 4-inch effluent pipeline was tapped into the existing effluent pipeline to convey effluent to irrigate the baseball and soccer fields.

2.8.3 Southern Area – Mountain Falls

The Mountain Falls Wastewater Treatment Plant ("MF WWTP") is designated to serve the Mountain Falls development, which lies generally to the south of Gamebird Road, east of Homestead Road, west of Highway 160, and north of Manse Road. The service area of the MF WWTP is relatively flat, falling only 70 feet from the east to the west. There will be approximately 3,290 parcels within the anticipated service area of MF WWTP.

2.8.3.1 Collection Piping Existing Conditions Assessment

The area is comprised of 99,100 LF (approximately 19 miles) of 8-inch, 10-inch, 12-inch and 15-inch PVC gravity mains, which convey the wastewater directly to Mountain Falls Wastewater Plant for treatment. There are no force mains in the Mountain Falls wastewater collection system. No major blockages have been observed in the sewer collection system and there are no areas in the collection system that require frequent maintenance. As in the other wastewater collection systems, I/I is observed at the Mountain Falls Wastewater Treatment Plant.

Table 2.40: Mountain Falls Existing Pipe Sizes and Lengths

Pipe Diameter (in)	Length (ft)
8″	67,700
10″	18,400
12″	9,700
15″	3,300
Total (rounded)	**99,100**

2.8.3.2 Lift Stations Existing Conditions Assessment

There are no lift stations in the Mountain Falls wastewater collection system. The wastewater flows by gravity to the treatment plant.

2.8.3.3 Mountain Falls – Treatment Facility

Mountain Falls is the wastewater facility in the southern service area. This is a facility similar in treatment to Plant 3. The treatment facility includes a lift station, SBR for biological treatment, filtration, and disinfection. Solids are treated by aerobic digestion and dewatered prior to hauling off-site for ultimate disposal. The facility currently treats approximately 125,000 gpd (based on the average monthly 2022 effluent flow) and has a rate capacity of 750,000 gpm. This facility has onsite backup power.

The influent gravity feeds into the treatment head works, which consist of a ladder screen as well as grit concentrator and removal system, which then flows into the treatment systems lift station. The lift station pumps influent to two SBRs (currently SBR-2 is not needed due to demands), which contain a SAM unit similar to the SBRs in Plant 3. From the SBR, sludge is automatically wasted to an Aerobic Sludge Digester (ASD) tank. The clear effluent in the SBR is decanted and pumped into a Post-Equalization Tank before being pumped through a splitter box and gravity fed through two sand filters. From the sand filters, the effluent is gravity fed to a post chlorine contact chamber before being conveyed to the Mountain Falls Golf Course receiving ponds for irrigation.

2.8.3.4 Treatment System Existing Conditions Assessment

The Mountain Falls WWTP equipment was evaluated in the asset registry in Appendix A. The asset registry details each piece of equipment with information including the year the equipment was procured/installed and remaining useful life. The majority of the equipment is in "good" to "fair" age-based condition.

2.8.3.5 Effluent Disposal Methods

All the effluent that is conveyed to the Mountain Falls Golf Course receiving ponds is used to irrigate the golf course and open space.

2.8.4 Spring Mountain Motorsports Ranch

Similar to the water system, GBWC-PD has not yet accepted the new wastewater infrastructure and instead is working under a memorandum of understanding (MOU) and Interim Service Agreement (ISA). The system is expected to be fully dedicated in the first quarter of 2024. The SMMR wastewater collection system consists of a gravity sewer collection system and a force main. The following sections provide a description of the collection system design as provided in the "Wastewater Lift Station and Force Main SMMR Pahrump, Nevada" design report prepared by Golder Associates Inc (April 29, 2016). The design report is included in Appendix M. The design report states that the force main and lift station were designed and constructed in accordance with regulations set by NDEP and in accordance with relevant NRS and NAC provisions. According to the design report in Appendix M, the collection system design flow is based on Las Vegas Valley Water District ("LVVWD") design code. Similar to the water system, customer meter data began being collected in January 2020.

2.8.4.1 Collection Piping Existing Conditions Assessment

The collection system includes both gravity pipe and force main. All the gravity sewers are conveyed into a manhole upstream of the wet well. The gravity sewer comprises of 11,421 LF of 8-inch mains, or approximately 2.5 mile as shown in Table 2.41.

The design of the collection system includes approximately 0.5 mile of 6-inch diameter HDPE force main to convey sewage from the lift station to the package wastewater treatment plant. The force main crosses beneath the racetrack near the WWTP, which contains a sleeved casing pipe that was bored and jacked under the track.

Table 2.41: Spring Mountain Ranch Existing Pipe Sizes and Lengths

Pipe Diameter (in)	Length (ft)
6"	2,650
8"	11,420
Total	**14,070**

2.8.4.2 Lift Stations Existing Conditions Assessment

The sewage lift station is located at the low point of the development, which is the southwest corner of the SMMR project as shown in the map in Appendix D. The lift station pumps sewage to the package wastewater treatment plant.

The lift station is a duplex wet well equipped with two 15-hp Flygt (Model NP3153HT3~464) submersible pumps operating in lead-lag that are capable of passing 3-inch solids with each rated for estimated peak flow of 287 gpm. The 5-ft diameter wet well includes level transducers and three-float system. The lift station discharge pipeline is equipped with all necessary valves and appurtenances. The facility has odor control in the form of a diatomaceous earth system. The lift station is also equipped with a 100-kW standby generator in the event of power loss. A control building is located inside the security fencing with instrumentation.

2.8.4.3 Spring Mountain Motorsports Ranch Wastewater Treatment Plant

The SMMR WWTP is a pre-manufactured (packaged) plant. The design report prepared by Golder Associates Inc., entitled "Wastewater Treatment Plant Spring Mountain Motorsports Ranch" (May 4, 2016), details the design. This design report is provided in Appendix M.

The WWTP is sized for approximately 108,000 GPD influent flow at full buildout. Currently the WWTP is rated for 58,000 GPD until "Train 2" is added at the plant. Wastewater loading is detailed in the design report in Appendix M. The packaged treatment plant was manufactured by Smith & Loveless, Inc. and utilizes both suspended and fixed growth processes with anoxic denitrification. A clarifier is provided for settling. Sludge is pumped to an aerobic digester/holding tank and hauled to an offsite facility operated by GBWC-PD that has capacity for sludge dewatering and disposal. The plant also includes an equalization (EQ) basin and an influent flowmeter. The WWTP has a Cummins 150 kW standby generator for backup power located at the control building with the blowers. A schematic flow diagram is provided in Appendix D.

2.8.4.4 Treatment System Existing Conditions Assessment

The SMMR plant equipment was evaluated in the asset registry in Appendix A. The asset registry details each piece of equipment with information including the year the equipment was procured/installed and remaining useful life. The majority of the equipment is in "good" age-based condition.

2.8.4.5 Effluent Disposal Methods

Effluent is disposed of through Rapid Infiltration Basins (RIBs) with the required design criteria provided in the design report located in Appendix M.

SECTION 3.0: HISTORICAL DATA AND FORECASTING

3.1 Planning Period

The planning period for this 2024 IRP is from 2025-2044 with an emphasis on the full three years of data compiled from 2020, 2021, and 2022. Demand projections and buildout estimates will extend to 2044.

3.2 Existing Service Area

The GBWC-PD service area is largely residential with light commercial and industrial areas. The commercial area is primarily in downtown Pahrump south of Basin Street along Highways 160 and 372. The commercial base is a mix of retail stores, restaurants, casinos, and hotels. Most of the Pahrump Valley has been platted for residential development, with the majority of the lots now owned by individual lot owners as opposed to a single developer. While a number of developer driven subdivisions and annexations are in planning or construction phases in the area, Pahrump also has many areas that will develop on a piecemeal basis as an individual lot owner decides to construct a home on his or her parcel.

Prospective homeowners, in order to connect to the system, must first comply with GBWC-PD's Tariff Rule 9 ("Rule 9"), which governs the extension or modification of the existing system to serve a new customer. The provisions of Rule 9 are driven by the historical public policy in Nevada that requires new growth to pay for itself. Accordingly, under Rule 9, an applicant for new service from GBWC-PD is responsible for the cost of constructing and installing any new water (except the first fire hydrant) or sewer infrastructure (except the first manhole) needed to serve the proposed development. An applicant is also responsible for capacity and connection fees under the tariff (also referred to as "tap fees"). At this time, approximately 31% of the people who live in Pahrump are connected to the GBWC-PD water system even though the service area comprises approximately 90% of the Pahrump area. As the population increases, the percentage of residents connected to the GBWC-PD water system is anticipated to increase due to the expanding infrastructure and increased proximity of new backbone infrastructure to future development. However, as previously noted, the extent of the existing infrastructure is limited, and many parcels are located long distances from GBWC-PD's water and sewer lines. In such cases, the costs for a new applicant can be substantial.

3.3 Population Projections

The "Nevada County Population Projections 2022 to 2041" report prepared by the State Demographer's Office dated October 1, 2022, was the latest data available and used to establish growth rates of the future population in the service area. The report estimates the Nye County 2022 population at 49,289 people. The latest Census was recorded in 2020. In the 2020 Census, the Nye County population was reported as 51,591 and the Pahrump population as 44,204. This is a difference of 4.4% from the State Demographer. 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. The estimated Nye County population in 2044 is 68,579. The projected Pahrump population in 2044 is estimated to be 58,759 people. The historical data and projections are presented in Table 3.01.

Table 3.01: GBWC-PD Population Projections

Year	Percentage Change(1)	Nye County Population Projections(2)	Pahrump Population Projections(3)
2020		*51,591*	*44,204*
2021	1.0%	*52,129*	*44,665*
2022	1.0%	*52,673*	*45,131*
2023	1.0%	53,215	45,596
2024	1.0%	53,757	46,060
2025	1.0%	54,285	46,513
2026	1.0%	54,845	46,992
2027	1.1%	55,440	47,502
2028	1.1%	56,052	48,026
2029	1.0%	56,619	48,512
2030	1.1%	57,234	49,039
2031	1.1%	57,862	49,577
2032	1.1%	58,510	50,132
2033	1.1%	59,175	50,702
2034	1.1%	59,852	51,282
2035	1.1%	60,537	51,869
2036	1.1%	61,229	52,462
2037	1.2%	61,975	53,102
2038	1.3%	62,788	53,798
2039	1.4%	63,666	54,550
2040	1.5%	64,589	55,341
2041	1.5%	65,564	56,176
2042	1.5%	66,554	57,024
2043	1.5%	67,559	57,885
2044	1.5%	68,579	58,759

Notes:

(1) Nye County Population Projections are based on the "Nevada County Population Projections 2022 to 2041" prepared by the Nevada State Demographer's Office, October 1, 2022, for the year 2023 forward. The percent change from 2041 was extended through 2044 to estimate populations through the planning period.

(2) The 2020 U.S. Census population data was used for an initial population value.

(3) Pahrump population projections for years 2023 forward are based on percent change of the Nye County projected population.

GBWC-PD currently serves approximately 31% of the people in Pahrump based on an occupancy rate of 2.36 persons per unit. The occupancy rate of 2.36 persons per unit is based on 2020-2021 US Census Bureau Quick Census data and provides a reasonable assumption to relate population growth to new residential connections. Since the projected population growth rate is low, the percentage of GBWC-PD customers to Pahrump population is assumed to be constant during the planning period. It is anticipated that as the growth continues this percentage will gradually increase. However, due to the low 20-year projection at this time no appreciable difference is anticipated.

Table 3.02 displays the 2020 through 2044 projected connections as well as the residential users per year, which is based on the occupancy rate of 2.36 persons per unit. The percentage of the GBWC-PD residential users was compared to the historical and projected Pahrump population for each year.

Table 3.02: GBWC-PD Connection Projections

Year	Pahrump Pop.(1)	% Change in Pop.(2)	Comm Conn. (3)	Other Conn. (4)	New Res. Service Conn.(5)	Res. Service Conn.(6)	Res. Users(7)	GBWC-PD % of Pahrump Pop.(8)	Total GBWC-PD Conn.(9)
2020	44,204	-	323	106	-	5,387	12,713	29%	5,816
2021	44,665	-	320	129	137	5,524	13,037	29%	5,973
2022	45,131	1.0%	328	132	418	5,942	14,023	31%	6,402
2023	45,596	1.0%	331	133	61	6,003	14,167	31%	6,467
2024	46,060	1.0%	334	134	61	6,064	14,311	31%	6,532
2025	46,513	1.0%	337	135	60	6,124	14,453	31%	6,596
2026	46,992	1.0%	340	136	63	6,187	14,601	31%	6,663
2027	47,502	1.1%	344	137	67	6,254	14,759	31%	6,735
2028	48,026	1.1%	348	139	69	6,323	14,922	31%	6,810
2029	48,512	1.0%	352	140	64	6,387	15,073	31%	6,879
2030	49,039	1.1%	356	142	69	6,456	15,236	31%	6,954
2031	49,577	1.1%	360	144	71	6,527	15,404	31%	7,031
2032	50,132	1.1%	364	146	73	6,600	15,576	31%	7,110
2033	50,702	1.1%	368	148	75	6,675	15,753	31%	7,191
2034	51,282	1.1%	372	150	76	6,751	15,932	31%	7,273
2035	51,869	1.1%	376	152	77	6,828	16,114	31%	7,356
2036	52,462	1.1%	380	154	78	6,906	16,298	31%	7,440
2037	53,102	1.2%	385	156	84	6,990	16,496	31%	7,531
2038	53,798	1.3%	390	158	92	7,082	16,714	31%	7,630
2039	54,550	1.4%	395	160	99	7,181	16,947	31%	7,736
2040	55,341	1.5%	401	162	104	7,285	17,193	31%	7,848
2041	56,176	1.5%	407	164	110	7,395	17,452	31%	7,966
2042	57,024	1.5%	413	166	112	7,507	17,717	31%	8,086
2043	57,885	1.5%	419	169	113	7,620	17,983	31%	8,208
2044	58,759	1.5%	425	172	115	7,735	18,255	31%	8,332

Notes:

(1) Pahrump population projections for years 2020 forward are based on the percent change of Nye County projected population (calculated in Table 3.01).

(2) The % change in population is based on the "Nevada County Population Projections 2022 to 2041."

(3) The GBWC-PD commercial connections for 2020 through 2022 are based on actual data and is the total number of commercial meters in the service territory. The GBWC-PD commercial connections projected for the year 2023 forward is based upon multiplying by the % Change in Population. Note 2 above defines how the % Change in Population was determined.

(4) The GBWC-PD "other" connections for 2020 through 2022 are based on actual data. The connection count includes public authority, irrigation, and temporary connections and is the total number of other meters in the service territory. The GBWC-PD residential connections from years 2023 forward are based on multiplying by the % Change in Population. Note 2 above defines how the % Change in Population was determined.

(5) The new residential service connections are calculated by subtracting the previous year's residential service connections from the current year's residential service connections, where the residential service connections for each year are calculated based on the % Change in Population as discussed in Note 4 above.

(6) The GBWC-PD residential connections for 2020 through 2022 are based on actual data. The connection count includes residential and multi-residential connections and is the total number of residential meters in the service territory. The GBWC-PD residential connections from the years 2020 forward are based on multiplying by the % Change in Population. Note 2 above defines how the % Change in Population was determined.

(7) The GBWC-PD residential users were determined by taking the residential connections for each year and multiplying by the average number of people per household. The 2020-2021 US Census Quickfacts for Pahrump were utilized to determine the 2.36 persons per household factor.

(8) The percentage of the Pahrump population served by GBWC-PD each year is based on the GBWC-PD residential users divided by the Pahrump population.

(9) The GBWC-PD total connections for 2020 through 2022 are based on actual data and is the sum of all actual connections. The GBWC-PD total connections projected for years 2023 forward is based upon summing the projected connections for each year.

3.3.1 Future Development

The GBWC-PD service territory includes the Spring Mountain Motorsports Ranch ("SMMR"), which was annexed in January 2016. The development is designed for 80 single-family residential lots and 62 acres of commercial development that will include a movie theater, SMMR Silverton hotel, restaurants, retail shops, racetrack facilities and an RV Park. The rate of development in the SMMR system is unknown at this time, so growth has been estimated at the same rate as the other GBWC-PD systems.

In addition, there are several other developments with lots that have been permitted by NDEP and are expected to be connected within the 20-year forecast. There are several developments within the Calvada Valley System as well as continued development in the Mountain Falls service area that are estimated to be completed within the next few years.

A historical development Ishani Ridge that went bankrupt during the Great Recession was recently ruled upon by the district court to disperse the bond money collected for infrastructure upgrades to the project. It is anticipated to be completed in the next 3 years. At build-out, this development will bring an additional 250 residential homes into the Calvada Valley System. The following are annexations into the Calvada Valley System:

- Wilson Road development (Binion Ranch) mixed use commercial/residential projected 910 SFRs in the next 3-5 years
- Two Medicine Man RV Park, annexation approved, in planning stage 120 pads
- Alka Glove Manufacturing, seeking annexation

America West is looking to annex into the Mountain Falls development and bring an additional 44 (total build-out 2000 residential homes) residential homes over the next 3 years.

The Mountain Falls development phases that are anticipated to be completed over the next 3-5 years include the following:

- Area-6: 224 lots, currently building
- Area-7: 166 lots, currently building
- Area-4C: 105 lots, currently building
- Area 5A: 138 lots, final map approved
- Area 8: 145 lots, submitted to NDEP
- Area 2: 90 lots, plans approved
- Area 9: 119 lots planned

With the information provided, it would not be possible to project the exact annual growth rate of the development, though the new developments suggest significantly higher population growth rates than the State Demographer's population projections.

3.4 Water System Forecasting

3.4.1 Water System Connections Projections

GBWC-PD served 6,402 total water connections as of December 2022. The connections comprised of 328 commercial, 5,942 residential, 9 public, 94 irrigation, and 29 miscellaneous users. In the three-year planning period, by 2027, the total residential and commercial connections are estimated to increase to 6,598. By 2044, the total residential and commercial connections are estimated to increase to 8,160, a net increase of 1,562 connections from 2027 to 2044. The residential connection growth rate was developed in Table 3.02 to mirror the annual County population growth rate from 2022-2044. See Table 3.01 and associated notes.

The commercial connection growth rate was projected to match the annual County population growth rate from 2022-2044. This showed an overall growth of 88 commercial connections over 20 years (from 2025 to 2044) to a total of 425. Table 3.02 shows the 20-year projection and a three-year history.

Table 3.03 displays the historical and projected connections in each service area within GBWC-PD. For each service area, the percentage of the total connection counts was determined for 2022. Due to the large growth in Mountain Falls in 2022 compared to previous years, using the 2022 percent of the total was more accurate to the current conditions than an average of the last three years. The percentage for each service area was applied to the total count for the projected years (from Table 3.02) for each of the four service areas, excluding the Calvada Meadows system (due to infrastructure limitations, the system cannot currently sustain future connections).

Table 3.03: GBWC-PD Water Connection Projections Per Service Area

Year(1)	Calvada Valley(2)	Calvada North/Country View Estates(2)	Calvada Meadows(2)	Mountain View Estates(2)	Mountain Falls(2)	Spring Mountain Motorsports Ranch(2)	Total
2020	4,018	385	38	27	1,329	19	5,816
2021	4,120	395	39	25	1,371	23	5,973
2022	4,328	419	41	26	1,564	24	6,402
2023	4,398	423	41(4)	-(3)	1,580	24	6,467
2024	4,443	428	41	-	1,596	24	6,532
2025	4,487	432	41	-	1,612	25	6,596
2026	4,533	436	41	-	1,628	25	6,663
2027	4,582	441	41	-	1,646	25	6,735
2028	4,633	446	41	-	1,664	26	6,810
2029	4,680	450	41	-	1,681	26	6,879
2030	4,732	455	41	-	1,700	26	6,954
2031	4,785	460	41	-	1,719	26	7,031
2032	4,839	466	41	-	1,738	27	7,110
2033	4,894	471	41	-	1,758	27	7,191
2034	4,950	476	41	-	1,778	27	7,273
2035	5,007	482	41	-	1,799	28	7,356
2036	5,064	487	41	-	1,819	28	7,440
2037	5,127	493	41	-	1,842	28	7,531
2038	5,195	500	41	-	1,866	29	7,630
2039	5,267	507	41	-	1,892	29	7,736
2040	5,344	514	41	-	1,920	29	7,848
2041	5,425	522	41	-	1,949	30	7,966
2042	5,507	530	41	-	1,978	30	8,086
2043	5,590	538	41	-	2,008	31	8,208
2044	5,675	546	41	-	2,039	31	8,332

Notes:
(1) 2020 through 2022 data is provided based on historical total meter count data in each service area.
(2) Total GBWC-PD water connections are per Table 3.02 projections for 2020 forward. The average percentage of the total based on the historical 2020, 2021, and 2022 data for each service area was applied to the projected total connections for the year in order to estimate connections in each service area.
(3) Mountain View Estates was consolidated into the Calvada Valley System in 2023.
(4) The projected connection count from 2023-2044 for Calvada Meadows utilize the 2022 count since the service area is determined to be at or near build out.

3.4.2 Water Usage

3.4.2.1 Recorded Water Production

Table 3.04 summarizes the historical water production for the five individual water systems as part of the GBWC-PD, based on the detailed information provided in Appendix G. The Mountain View Estates system was consolidated into Calvada Valley in 2023 but data is included in the table for reference. The water production listed in the table is the sum of the historical water production for the wells in each service area from monthly production reports. See Section 2.0 for the description of wells in each service area.

Total annual water production during the three-year analysis period of 2020 through 2022 ranged from 3.265 MGD in 2022 to a high of 3.419 MGD in 2021.

Table 3.04: Historical Water Production for GBWC-PD

Year	Calvada Valley(1) (MGD)	Calvada North/ Country View Estates (2) (MGD)	Calvada Meadows(3) (MGD)	Mountain View Estates(4) (MGD)	Mountain Falls(5) (MGD)	Spring Mountain Motorsports Ranch(6) (MGD)	Total (MGD)
2013	1.814	0.162	0.004	0.005	1.098	-	3.083
2014	1.967	0.135	0.004	0.006	0.738	-	2.850
2015	1.920	0.128	0.006	0.004	0.787	-	2.845
2016	2.070	0.131	0.007	0.003	1.063	-	3.274
2017	1.968	0.132	0.007	0.004	0.729	-	2.840
2018	2.016	0.151	0.008	0.004	0.843	-	3.022
2019	1.995	0.145	0.007	0.005	0.656	-	2.808
2020	2.225	0.174	0.005	0.004	0.695	0.031	3.134
2021	2.255	0.177	0.004	0.005	0.671	0.067	3.179
2022	2.189	0.187	0.005	0.006	0.820	0.058	3.264

Notes:
(1) Calvada Valley Wells 1, 2, 9, 11 and 12
(2) Calvada North Well 1, Country View Estates Wells 48-1 and 48-2.
(3) Calvada Meadows Well 1
(4) Mountain View Estates Well. The Mountain View Estates well was disconnected from the distribution system after consolidation into the Calvada Valley system in 2023.
(5) Mountain Falls Well 1 and Well 2
(6) Spring Mountain Motorsports Ranch Well 1 and Well 2. The SMMR wells came online in 2019. Therefore, 2020 is the first available full year of data.

In order to determine maximum daily demand ("MDD"), monthly production data was analyzed. Using the maximum month production, the average day of the maximum month ("ADMM") was calculated (2020–2022). 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 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) equates to 1.72 for all the service areas combined, which is within the typical range. Maximum months observed were generally June, July, or August. A peaking factor of 1.75 was also applied to the MDD to calculate the system's peaking hourly demand (PHD). Table 3.05 show the ADD, ADMM, MDD, PF, and PHD values for 2020-2022. Table 3.05a through 3.05e show ADD, ADMM, MDD, PF, and PHD values for each of the service areas for 2020-2022.

Table 3.05: GBWC-PD Historical Maximum Daily Production and Peaking Factors

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	3.01	4.51	1.50	1.25	5.64	1.87	1.75	9.87	6,854
2021	3.09	4.14	1.30	1.25	5.17	1.63	1.75	9.05	6,285
2022	3.18	4.20	1.32	1.25	5.25	1.65	1.75	9.19	6,382
MDD/ADD Average for 2020, 2021 & 2022						**1.72**			

Table 3.05a: Calvada Valley Historical Maximum Daily Production and Peaking Factors

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	2.10	3.00	1.43	1.25	3.75	1.78	1.75	6.56	4,556
2021	2.17	2.88	1.33	1.25	3.60	1.66	1.75	6.30	4,375
2022	2.11	2.80	1.33	1.25	3.50	1.66	1.75	6.13	4,257
MDD/ADD Average for 2020, 2021 & 2022						**1.70**			

Notes:

(2) Mountain View Estates was consolidated into Calvada Valley in 2023. For the purpose of calculating an accurate peaking factor for the consolidated system moving forward, these values include historical data for Mountain View Estates.

Table 3.05b: Country View Estates/Calvada North Historical Maximum Daily Production and Peaking Factors

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	0.17	0.23	1.30	1.25	0.28	1.60	1.75	0.49	340
2021	0.18	0.23	1.29	1.25	0.29	1.64	1.75	0.51	354
2022	0.19	0.26	1.38	1.25	0.32	1.71	1.75	0.56	389
MDD/ADD Average for 2020, 2021 & 2022						**1.65**			

Table 3.05c: Calvada Meadows Historical Maximum Daily Production and Peaking Factors

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	0.00	0.01	1.66	1.25	0.01	1.99	1.75	0.02	11
2021	0.00	0.01	1.41	1.25	0.01	1.85	1.75	0.01	10
2022	0.00	0.01	1.55	1.25	0.01	1.97	1.75	0.02	11
MDD/ADD Average for 2020, 2021 & 2022						**1.94**			

Table 3.05d: Mountain Falls Historical Maximum Daily Production and Peaking Factors

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	0.69	1.33	1.91	1.25	1.66	2.39	1.75	2.91	2,021
2021	0.67	1.17	1.74	1.25	1.46	2.18	1.75	2.56	1,778
2022	0.82	1.47	1.79	1.25	1.84	2.24	1.75	3.22	2,236
MDD/ADD Average for 2020, 2021 & 2022						**2.27**			

Table 3.05e: Spring Mountain Motorsports Ranch Historical Maximum Daily Production and Peaking Factors

Year	ADD (MGD)	ADMM (MGD)	ADMM/ ADD	MDD/ ADMM	MDD (MGD)	MDD/ ADD	PHD/ MDD	PHD (MGD)	PHD (gpm)
2020	0.03	0.05	1.53	1.25	0.06	1.91	1.75	0.11	76
2021	0.07	0.17	2.50	1.25	0.21	3.13	1.75	0.37	257
2022	0.06	0.10	1.78	1.25	0.13	2.26	1.75	0.23	160
MDD/ADD Average for 2020, 2021 & 2022						**2.43**			

These maximum daily flows are also related to the seasonal changes in the system. As previously stated, the maximum flows all occurred in the summer when usage is the highest. The higher flows typically occur between May and October. When averaged over the three-year period, the flow for the summer months is approximately 1.5 times the winter flow (sum of production during all other months). This GBWC-PD seasonal data for years 2013 through 2022 is summarized in Table 3.06. In addition, the table presents the seasonal peaking factor and monthly peaking factor based on the peak month and average annual month. For the whole GBWC-PD service territory, the average seasonal peaking factor for 2020-2022 is 1.31 and the monthly average peaking factor is 1.33. Years 2020 through 2022 (with historical data from 2013 through 2019) were also analyzed based on data provided for each service area (Table 3.06a through 3.06f). Note that the Mountain View Estates Well data is provided for reference only as it was disconnected from the distribution system in 2023 after consolidation with the Calvada Valley system. These values for the remaining systems are used later in this report to determine projected seasonal peaks.

Table 3.06: 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)	Monthly Peaking Factor (Peak Month/Average Annual Month)
2013	1,164.06	750.19	413.86	1.81	146.29	1.51
2014	1,040.25	661.47	378.78	1.75	131.11	1.51
2015	1,038.31	657.16	381.15	1.72	131.69	1.52
2016	1,195.40	758.94	436.46	1.74	148.17	1.49
2017	1,036.69	639.23	397.46	1.61	133.98	1.55
2018	1,102.70	700.03	402.67	1.74	134.58	1.46
2019	1,025.03	637.71	387.32	1.65	135.53	1.59
2020	1,098.47	682.91	415.56	1.39	129.32	1.41
2021	1,127.18	681.43	445.75	1.29	124.38	1.32
2022	1,158.96	696.04	462.92	1.25	125.29	1.30

Table 3.06a: Calvada Valley Historical Seasonal 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)	Monthly Peaking Factor (Peak Month/Average Annual Month)
2013	662.11	420.38	285.75	1.47	79.96	1.45
2014	717.98	424.27	293.71	1.44	78.78	1.32
2015	700.87	420.68	280.19	1.50	77.93	1.33
2016	755.73	446.34	309.38	1.44	82.83	1.32
2017	718.45	419.41	299.04	1.40	80.60	1.35
2018	735.77	435.95	299.83	1.45	80.60	1.31
2019	728.03	434.85	293.19	1.48	87.57	1.44
2020	812.21	466.08	335.87	1.39	93.06	1.37
2021	823.16	455.85	353.20	1.29	89.28	1.30
2022	798.92	435.29	348.15	1.25	86.77	1.30

Table 3.06b: Country View Estates/Calvada North Historical Seasonal 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)	Monthly Peaking Factor (Peak Month/Average Annual Month)
2013	59.13	29.19	32.85	0.89	5.94	1.21
2014	49.22	30.07	19.15	1.57	5.67	1.38
2015	46.54	26.96	19.58	1.38	5.12	1.32
2016	47.66	27.64	20.02	1.38	5.28	1.33
2017	48.32	28.15	20.17	1.40	5.2	1.29
2018	55.00	31.14	23.86	1.31	5.72	1.25
2019	53.10	31.07	22.04	1.41	5.75	1.30
2020	63.69	37.22	26.47	1.41	7.00	1.32
2021	64.58	37.36	27.22	1.37	7.06	1.31
2022	68.19	40.02	28.17	1.42	7.96	1.40

Table 3.06c: Calvada Meadows Historical Seasonal 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)	Monthly Peaking Factor (Peak Month/Average Annual Month)
2013	1.46	0.81	0.79	1.03	0.18	1.48
2014	1.62	0.89	0.73	1.22	0.19	1.41
2015	2.23	1.20	1.02	1.18	0.29	1.56
2016	2.71	1.44	1.27	1.13	0.26	1.15
2017	2.41	1.21	1.20	1.01	0.22	1.10
2018	2.76	1.41	1.36	1.04	0.26	1.13
2019	2.38	1.35	1.04	1.30	0.25	1.26
2020	1.65	0.88	0.77	1.14	0.23	1.64
2021	1.58	0.88	0.70	1.25	0.19	1.44
2022	1.67	0.99	0.68	1.45	0.22	1.58

Table 3.06d: Mountain View Estates Historical Seasonal 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)	Monthly Peaking Factor (Peak Month/Average Annual Month)
2013	1.83	1.03	0.77	1.34	0.20	1.31
2014	2.08	1.20	0.89	1.35	0.24	1.38
2015	1.56	0.83	0.73	1.14	0.19	1.46
2016	1.20	0.61	0.59	1.03	0.14	1.40
2017	1.36	0.77	0.59	1.31	0.16	1.41
2018	1.57	0.91	0.66	1.38	0.16	1.22
2019	1.95	1.21	0.74	1.64	0.16	0.98
2020	1.61	0.95	0.66	1.45	0.18	1.35
2021	1.82	1.05	0.77	1.36	0.22	1.46
2022	2.24	1.15	1.09	1.06	0.34	1.82

Note:
Data is provided for reference only as the well was disconnected from the distribution system in 2023 after consolidation with the Calvada Valley system.

Table 3.06e: Mountain Falls Historical Seasonal 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)	Monthly Peaking Factor (Peak Month/Average Annual Month)
2013	400.77	298.78	106.67	2.80	65.55	1.96
2014	269.36	205.04	64.31	3.19	46.24	2.06
2015	287.12	207.49	79.62	2.61	48.15	2.01
2016	388.11	282.91	105.20	2.69	59.67	1.84
2017	266.16	189.69	76.47	2.48	47.81	2.16
2018	307.59	230.63	76.97	3.00	51.42	2.01
2019	239.56	169.24	70.32	2.41	41.89	2.10
2020	253.67	188.89	64.78	2.92	41.15	1.95
2021	244.73	170.77	73.96	2.31	36.35	1.78
2022	299.17	213.90	85.27	2.51	45.50	1.83

Table 3.06f: Spring Mountain Motorsports Ranch Historical Seasonal 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)	Monthly Peaking Factor (Peak Month/Average Annual Month)
2020	11.49	7.01	4.47	1.57	1.49	1.55
2021	24.49	19.02	5.47	3.48	5.19	2.54
2022	21.00	11.28	9.72	1.16	3.19	1.82

Note:
The SMMR wells came online in 2019. Therefore, 2020 is the first available full year of data.

3.4.2.2 Recorded Consumption

Table 3.07 summarizes the historical metered water use data for the years 2020 through 2022. Total annual water use supplied by GBWC-PD during the analysis period ranged from 2.61 MGD metered in 2020 to 2.96 MGD metered in 2022. The data presented in Table 3.07 is a summary of the consumption class data presented in Table 3.08 and Table 3.09.

Table 3.07: GBWC-PD Historical Metered Water in MGD

Year	Billed Municipal Usage(1)	Utility Usage(2)	Total Metered(3)
2013	1.73	0.017	1.74
2014	2.39	0.018	2.41
2015	2.35	0.101	2.45
2016	2.81	0.016	2.83
2017	2.84	0.092	2.93
2018	3.02	0.365	3.39
2019	2.81	0.411	3.22
2020	2.34	0.275	2.61
2021	2.51	0.146	2.66
2022	2.68	0.283	2.96

Notes:
(1) Billed Municipal Usage is the total residential, commercial, public authority, temporary connections, and multi-residential metered flow from meter consumption data.
(2) Utility usage for the years 2020 through 2022 is from accounts for WWTP water meters as well as estimated amounts for other utility usage, such as water quality testing and irrigation of company property. The unbilled utility usage is considered authorized consumption.
(3) Total metered is the sum of billed municipal usage and unbilled utility usage.

The metered data can be broken down further to show the historical metered water use by class of service. Table 3.08 summarizes the consumption data by class of service for the period from 2020 through 2022. Table 3.08a through Table 3.08f summarize the historical consumption data by class of service for each of the six service areas. The five classes of service were identified as residential, commercial, irrigation, public authority, and miscellaneous. Commercial data includes connections from businesses, churches, and the prison. Public authority data includes schools and government buildings. Miscellaneous data includes temporary connections from construction.

Table 3.08: GBWC-PD Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Irrigation	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	445,431,942	53.1%	239,513,811	28.6%	153,950,082	18.4%
2021	478,434,962	53.5%	279,018,629	31.2%	136,622,893	15.3%
2022	481,278,912	50.4%	285,686,867	29.9%	188,517,762	19.7%
Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.						

Table 3.08(cont.): GBWC-PD Historical Metered Water Use by Class of Service

Year	Public Authority		Miscellaneous	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	9,877,564	1.2%	3,688,850	0.4%
2021	9,224,482	1.0%	13,452,170	1.5%
2022	8,136,013	0.8%	14,929,702	1.5%
Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.				

Table 3.08a: Calvada Valley Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Irrigation	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	329,605,174	58.3%	216,103,940	38.2%	19,825,737	3.5%
2021	345,945,728	56.0%	254,233,282	41.1%	17,950,418	2.9%
2022	343,893,075	56.0%	255,143,434	41.7%	14,302,820	2.3%
Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.						

Table 3.08a (cont.): Calvada Valley Historical Metered Water Use by Class of Service

Year	Public Authority		Miscellaneous	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	9,877,564	1.7%	3,229,350	0.6%
2021	9,224,482	1.4%	13,215,770	2.1%
2022	8,136,013	1.3%	14,929,702	2.3%
Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.				

Table 3.08b: Country View Estates/Calvada North Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Irrigation	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	30,745,378	80.1%	7,654,030	19.9%	0	0.0%
2021	34,185,640	68.6%	15,645,930	31.4%	0	0.0%
2022	35,721,714	66.7%	17,859,410	33.3%	0	0.0%

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.

Table 3.08b (cont.): Country View Estates/Calvada North Historical Metered Water Use by Class of Service

Year	Public Authority		Miscellaneous	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.

Table 3.08c: Calvada Meadows Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Irrigation	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	1,226,790	98.7%	16,030	1.3%	0	0.0%
2021	1,520,370	98.8%	17,850	1.2%	0	0.0%
2022	1,241,210	91.5%	115,090	8.5%	0	0.0%

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.

Table 3.08c (cont.): Calvada Meadows Historical Metered Water Use by Class of Service

Year	Public Authority		Miscellaneous	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.

Table 3.08d: Mountain View Estates Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Irrigation	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	1,228,340	99.6%	4,430	0.4%	0	0.0%
2021	1,326,030	100.0%	90	0.0%	0	0.0%
2022	1,296,078	99.8%	3,120	0.2%	0	0.0%

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.
Data is provided for reference only as Mountain View Estates was consolidated with the Calvada Valley system in 2023.

Table 3.08d (cont.): Mountain View Estates Historical Metered Water Use by Class of Service

Year	Public Authority		Miscellaneous	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.
Data is provided for reference only as Mountain View Estates was consolidated with the Calvada Valley system in 2023.

Table 3.08e: Mountain Falls Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Irrigation	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	80,776,708	35.7%	11,678,621	5.2%	134,124,345	59.2%
2021	90,502,676	42.8%	2,211,920	1.0%	118,672,475	56.1%
2022	95,646,483	35.1%	2,306,050	0.8%	174,214,942	64.0%

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.

Table 3.08e (cont.): Mountain Falls Historical Metered Water Use by Class of Service

Year	Public Authority		Miscellaneous	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	0	0.0%	459,500	0.2%
2021	0	0.0%	236,400	0.1%
2022	0	0.0%	0	0.0%

Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.

Table 3.08f: Spring Mountain Motorsports Ranch Historical Metered Water Use by Class of Service

Year	Residential		Commercial		Irrigation	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	1,849,552	31.3%	4,056,760	68.7%	0	0.0%
2021	4,954,518	41.8%	6,909,257	58.2%	0	0.0%
2022	4,480,352	30.4%	10,259,763	69.6%	0	0.0%
Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.						

Table 3.08f (cont.): Spring Mountain Motorsports Ranch Historical Metered Water Use by Class of Service

Year	Public Authority		Miscellaneous	
	Annual (Gallons)	% of Total	Annual (Gallons)	% of Total
2020	0	0.0%	0	0.0%
2021	0	0.0%	0	0.0%
2022	0	0.0%	0	0.0%
Notes: Years 2020, 2021 and 2022 are the annual consumption by category from meter consumption data.				

The Calvada Valley System has an average of 56.7% of metered water use as residential, an average of 40.3% commercial metered water use, an average 2.9% irrigation metered water use, an average of 1.5% public authority metered water use, and an average of 1.7% miscellaneous water use. The Country View Estates/Calvada North service has an average of 71.8% of metered water use as residential and 28.2% of metered water use as commercial. Calvada Meadows has an average residential metered water use of 96.4%, while the average commercial metered water use was 3.6%. The average residential metered water use in Mountain View Estates was 99.8% and the commercial metered water use was 0.2%. In the Mountain Falls service area, the average residential metered water use is 37.9%, average commercial metered water use is 2.3%, average irrigation metered water use was 59.8%, and an average of 0.1% miscellaneous water use. The Spring Mountain Motorsports Ranch service area has an average of 34.5% of metered water use as residential and 65.5% of metered water use as commercial.

3.4.2.3 Non-Revenue Water

Non-revenue water ("NRW") is a term used to reflect the distributed volume of water, which is not reflected in customer billings. 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 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 3.09 shows the difference (water loss) between historical water production and known usage over a ten-year period in the GBWC-PD service area. This compares the production data summarized in Table 3.04 (and other data) with the metered uses summarized in Table 3.07 and includes some authorized water use (water used that is not billed). For example, firefighting would be considered authorized water use. Over the last three complete years of data (2020–2022), the system non-revenue water (NRW) for GBWC-PD averaged approximately 11.3%.

Table 3.09: GBWC-PD Historical Non-Revenue Quantities

Year	Water Produced (MG)(1)	Water Metered (MG) (2)	Water Lost (MG) (3)	% Gross Non-Revenue Water (4)
2013	1,177.02	630.10	546.92	46.5%
2014	1,036.29	871.50	164.79	15.9%
2015	1,031.81	856.08	175.73	17.0%
2016	1,195.40	1,026.26	169.14	14.1%
2017	1,036.69	911.05	125.64	12.1%
2018	1,102.70	944.29	158.41	14.4%
2019	1,025.03	826.73	198.30	19.3%
2020	1,098.47	952.80	145.67	13.3%
2021	1,127.18	969.89	157.29	14.0%
2022	1,158.96	1,081.94	77.02	6.6%

Notes:
(1) Water produced is total well production in the service area.
(2) Average water metered is total meter consumption from provided consumption data and includes authorized utility water use.
(3) Water lost is the difference between water produced and water metered.
(4) The water percentage lost is the difference between water produced and water metered divided by the water produced.

Table 3.09a through Table 3.09f provide a summary of non-revenue quantities in each service area for the last nine years (2014-2022). Prior to 2014 metered consumption data was not separated by service area.

Table 3.09a: Calvada Valley Historical Non-Revenue Quantities

Year	Water Produced (MG)(1)	Water Metered (MG) (2)	Water Lost (MG) (3)	% Gross Non-Revenue Water (4)
2014	717.96	567.94	150.02	20.9%
2015	700.80	578.53	122.27	17.4%
2016	755.55	585.83	169.72	22.5%
2017	718.45	586.10	132.35	18.4%
2018	735.77	600.11	135.66	18.4%
2019	728.03	570.64	157.39	21.6%
2020	812.21	675.24	136.97	16.9%
2021	823.16	688.33	134.83	16.4%
2022	798.92	667.24	131.68	16.5%

Notes:
(1) Water produced is total well production in the service area.
(2) Average water metered is total meter consumption from provided consumption data and includes authorized utility water use.
(3) Water lost is the difference between water produced and water metered.
(4) Water percentage lost is the difference between water produced and water metered divided by the water produced.

Table 3.09b: Country View Estates/Calvada North Historical Non-Revenue Quantities

Year	Water Produced (MG)(1)	Water Metered (MG) (2)	Water Lost (MG) (3)	% Gross Non-Revenue Water (4)
2014	49.28	42.34	6.94	14.1%
2015	46.72	36.87	9.85	21.1%
2016	47.82	39.79	8.03	16.8%
2017	48.32	35.10	13.22	27.4%
2018	55.00	37.46	17.54	31.9%
2019	53.10	33.56	19.54	36.8%
2020	63.69	38.98	24.71	38.8%
2021	64.58	51.45	13.13	20.3%
2022	68.19	59.08	9.11	13.4%

Notes:
(1) Water produced is total well production in the service area.
(2) Average water metered is total meter consumption from provided consumption data and includes authorized utility water use.
(3) Water lost is the difference between water produced and water metered.
(4) Water percentage lost is the difference between water produced and water metered divided by the water produced.

Table 3.09c: Calvada Meadows Historical Non-Revenue Quantities

Year	Water Produced (MG)(1)	Water Metered (MG) (2)	Water Lost (MG) (3)	% Gross Non-Revenue Water (4)
2014	1.61	0.95	0.66	41.0%
2015	2.23	1.21	1.02	45.7%
2016	2.70	1.50	1.20	44.4%
2017	2.41	1.02	1.39	57.7%
2018	2.76	1.24	1.52	55.1%
2019	2.38	1.07	1.31	55.0%
2020	1.65	1.52	0.13	7.9%
2021	1.58	1.81	-0.23	-14.6%(5)
2022	1.67	1.63	0.04	2.4%

Notes:
(1) Water produced is total well production in the service area.
(2) Average water metered is total meter consumption from provided consumption data and includes authorized utility water use.
(3) Water lost is the difference between water produced and water metered.
(4) The water percentage lost is the difference between water produced and water metered divided by the water produced.
(5) A negative water loss value suggests irregularities in metering data and is not representative of actual conditions. The negative value was excluded from the analysis as an outlier.

Table 3.09d: Mountain View Estates Historical Non-Revenue Quantities

Year	Water Produced (MG)(1)	Water Metered (MG) (2)	Water Lost (MG) (3)	% Gross Non-Revenue Water (4)
2014	2.08	1.75	0.33	15.9%
2015	1.57	1.50	0.07	4.5%
2016	1.21	1.10	0.11	9.1%
2017	1.36	0.95	0.41	30.1%
2018	1.57	1.15	0.42	26.8%
2019	1.95	1.34	0.61	31.3%
2020	1.61	1.50	0.11	6.8%
2021	1.82	1.59	0.23	12.6%
2022	2.24	1.57	0.67	29.9%

Notes:
(1) Water produced is total well production in the service area.
(2) Average water metered is total meter consumption from provided consumption data and includes authorized utility water use.
(3) Water lost is the difference between water produced and water metered.
(4) The water percentage lost is the difference between water produced and water metered divided by the water produced.
(5) Data is provided for reference only as Mountain View Estates was consolidated with the Calvada Valley system in 2023.

Table 3.09e: Mountain Falls Historical Non-Revenue Quantities

Year	Water Produced (MG)(1)	Water Metered (MG) (2)	Water Lost (MG) (3)	% Gross Non-Revenue Water (4)
2014	269.37	265.36	4.01	1.5%
2015	287.26	274.85	12.41	4.3%
2016	388.00	403.69	-15.69	-4.0%
2017	266.16	285.60	-19.44	-7.3%
2018	307.59	303.50	4.09	1.3%
2019	239.56	200.12	39.44	16.5%
2020	253.67	227.93	25.74	10.1%
2021	244.73	213.94	30.79	12.6%
2022	299.17	333.60	-34.43	-11.5%(5)

Notes:
(1) Water produced is total well production in the service area.
(2) Average water metered is total meter consumption from provided consumption data and includes authorized utility water use.
(3) Water lost is the difference between water produced and water metered.
(4) The water percentage lost is the difference between water produced and water metered divided by the water produced.
(5) A negative water loss value suggests irregularities in metering data and is not representative of actual conditions. The negative value was excluded from the analysis as an outlier.

Table 3.09f: Spring Mountain Motorsports Ranch Historical Non-Revenue Quantities

Year	Water Produced (MG)(1)	Water Metered (MG) (2)	Water Lost (MG) (3)	% Gross Non-Revenue Water (4)
2020	11.49	7.63	3.85	33.5%
2021	24.49	12.76	11.73	47.9%
2022	21.00	14.74	6.26	29.8%

Notes:
(1) Water produced is total well production in the service area.
(2) Average water metered is total meter consumption from provided consumption data and includes authorized utility water use.
(3) Water lost is the difference between water produced and water metered.
(4) Water percentage lost is the difference between water produced and water metered divided by the water produced.

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 704.5667 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. For most of the GBWC-PD systems, the NRW exceeds the previously indicated 10% industry standard. The following measures can be conducted by GBWC-PD 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-PD'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 pressure zones. The installation of flow meters at the existing and future PRVs will allow for better delineation of NRW between pressure zones.

The Calvada Valley system has seen an improvement in water loss since the 2021 IRP, with an average of 16.6% over the last three years of data.

The Country View Estates/Calvada North system has seen improvement in water loss since the 2021 IRP, with an average of 24.2% over the last three years of data. Water loss has continued to decrease in each subsequent year.

There has been a significant decrease in water loss in Calvada Meadows since 2020 when two leaks in the system were repaired, down to an average of 5.2% (excluding the negative year in 2021). In addition, fire hydrants were secured with locks in 2020 to combat water theft.

The Spring Mountain Motorsports Ranch system was newly constructed in 2020. The years 2020, 2021, and 2022 indicate very large water loss percentages. This is attributed to meter malfunctions, main flushing during construction, and irregularities in metering and production during construction. Due to the newness of the system and the decrease of water loss in 2022, GBWC-PD should continue monitoring SMMR for a more accurate analysis of water loss in the coming years.

The Mountain View Estates system was consolidated with Calvada Valley in 2023, but the water loss data is included herein to illustrate the decrease in water loss after a leak in the well column pipe check valve was repaired, to an average of 16.4%. The increase in water loss in 2022 indicates further exploration may be required in the former Mountain View Estates service area to reduce water loss moving forward. With the retirement of the Mountain View Estates Well as part of the 2023 consolidation, issues with aging well infrastructure and metering may resolve some of the water loss issues.

The Mountain Falls system has seen a slight increase in water loss since the 2021 IRP, to an average of 11.4% (excluding the negative value in 2022). The water lost is attributable to apparent losses (meter inaccuracies, unauthorized consumption, systematic data handling errors, etc.) and real losses (system leakage and tank overflows, etc.).

Based on the analysis per service area in Table 3.09a through Table 3.09f, it is recommended that the conservation practices described above be continued and that investigations are performed to determine the cause of high NRW, particularly for the Country View Estates/Calvada North and SMMR service areas.

3.4.3 Water Usage Forecasting

The existing service area is largely platted but development proceeds sporadically throughout the service area. This is due to the fact that there are few planned subdivisions. As such, it is difficult to identify specific areas of future development. In addition, infrastructure was haphazardly installed throughout the systems prior to GBWC-PD ownership. Zoning and boundary lines change over time as well. These factors, among others, cause due diligence in the valley to be difficult for the average single-family homeowner and even commercial enterprises. It also makes GBWC-PD's duty to support these developers often challenging and time consuming.

Development will likely continue to occur in a dispersed, random manner. Therefore, future development is assumed to be spread out proportionally throughout four service areas (Calvada Meadows cannot currently sustain additional development due to water infrastructure limitations). This is illustrated in Section 3.4.1 and the projected service connections in Table 3.03. Table 3.10 summarizes the 5-year projections over the 20-year planning period.

Table 3.10: GBWC-PD Water Connection Projection Summary Per Service Area

Year	Calvada Valley	Calvada North/Country View Estates	Calvada Meadows	Mtn. View Estates(1)	Mtn. Falls	Spring Mountain Motorsports Ranch	Total
Historical							
2020	4,018	385	38	27	1,329	19	5,816
2021	4,120	395	39	25	1,371	23	5,973
2022	4,328	419	41	26	1,564	24	6,402
Projected							
2024	4,443	428	41	-	1,596	24	6,532
2029	4,680	450	41	-	1,681	26	6,879
2034	4,950	476	41	-	1,778	27	7,273
2039	5,267	507	41	-	1,892	29	7,736
2044	5,675	546	41	-	2,039	31	8,332

Notes:
(1) Mountain View Estates was consolidated into the Calvada Valley system in 2023.

The historical daily residential water demands for GBWC-PD are summarized in Table 3.11, which is based on the active number of connections (active for 10 or more months of the year) for each service area and the total flows for the active connections. Table 3.11a through 3.11e provide the historical daily water demands in each service area.

Table 3.11: GBWC-PD Historical Daily Residential Water Demands

Year	Annual Metered Water Use(1) (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2020	433,889,907	4,916	242
2021	448,864,601	4,947	249
2022	449,902,953	5,080	243
		Average	**245**

Notes:
(1) Total metered water use for all residential connections that had 10 months or more of observed metered water.
(2) Total number of residential connections with 10 months or more of observed metered water.

Table 3.11a: Calvada Valley Historical Daily Residential Water Demands

Year	Annual Metered Water Use(1) (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2020	323,571,692	3,392	261
2021	328,739,020	3,389	266
2022	319,152,817	3,387	258
		Average	**262**

Notes:
(1) Total metered water use for all residential connections that had 10 months or more of observed metered water.
(2) Total number of residential connections with 10 months or more of observed metered water.
(3) Mountain View Estates was consolidated into Calvada Valley in 2023. For the purpose of calculating an accurate demand for the consolidated system moving forward, this table includes the historical data for Mountain View Estates.

Table 3.11b: Country View Estates/Calvada North Historical Daily Residential Water Demands

Year	Annual Metered Water Use(1) (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2020	30,225,457	354	234
2021	28,885,335	342	231
2022	34,230,175	368	255
		Average	**240**

Notes:
(1) Total metered water use for all residential connections that had 10 months or more of observed metered water.
(2) Total number of residential connections with 10 months or more of observed metered water.

Table 3.11c: Calvada Meadows Historical Daily Residential Water Demands

Year	Annual Metered Water Use(1) (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2020	1,209,180	29	114
2021	1,216,460	28	119
2022	1,205,780	31	107
		Average	**113**

Notes:
(1) Total metered water use for all residential connections that had 10 months or more of observed metered water.
(2) Total number of residential connections with 10 months or more of observed metered water.

Table 3.11d: Mountain Falls Historical Daily Residential Water Demands

Year	Annual Metered Water Use(1) (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2020	78,544,288	1,138	189
2021	85,324,669	1,173	199
2022	90,941,431	1,275	195
		Average	**194**

Notes:
(1) Total metered water use for all residential connections that had 10 months or more of observed metered water.
(2) Total number of residential connections with 10 months or more of observed metered water.

Table 3.11e: Spring Mountain Motorsports Ranch Historical Daily Residential Water

Year	Annual Metered Water Use(1) (Gallons)	Number of Active Connections(2)	Average GPD/Connection
2020	339,290	3	310
2021	4,699,117	15	858
2022	4,372,750	19	631
		Average	**600**

Notes:
(1) Total metered water use for all residential connections that had 10 months or more of observed metered water.
(2) Total number of residential connections with 10 months or more of observed metered water.

Within the whole GBWC-PD service territory, the average residential gallons per day per connection ("gpdpc") is 244 gpdpc. Calvada Valley has an average residential water usage of 262 gpdpc, Country View Estates/Calvada North has an average water usage of 240 gpdpc, Calvada Meadows has an average water usage of 113 gpdpc, Mountain Falls has an average water usage of 195 gpdpc, and Spring Mountain Motorsports Ranch has an average water usage of 600 gpdpc.

Table 3.12, 3.13, and 3.14 summarize the average daily demand per connection for commercial connections, irrigation, and public authority connections.

Table 3.12: GBWC-PD Historical Daily Commercial Water Demands

Year	Metered Water Use(1) (Gallons)	Average Number of Connections(2)	Average GPD/Connection
2020	230,506,996	271	2,330
2021	242,095,499	250	2,653
2022	238,495,838	267	2,447
		Average	**2,447**

Notes:
(1) Total metered water use for all commercial connections that had 10 months or more of observed metered water.
(2) Total number of commercial connections with 10 months or more of observed metered water.

Table 3.13: GBWC-PD Historical Daily Irrigation Water Demands

Year	Metered Water Use(1) (Gallons)	Average Number of Connections(2)	Average GPD/Connection
2020	83,859,355	51	4,505
2021	38,699,438	50	2,121
2022	86,334,125	59	4,009
		Average	**3,545**

Notes:
(1) Total metered water use for all irrigation connections that had 10 months or more of observed metered water.
(2) Total number of irrigation connections with 10 months or more of observed metered water.

Table 3.14: GBWC-PD Historical Daily Public Authority Water Demands

Year	Metered Water Use(1) (Gallons)	Average Number of Connections(2)	Average GPD/Connection
2020	9,797,450	7	3,835
2021	8,992,540	6	4,106
2022	8,097,943	7	3,169
		Average	**3,703**

Notes:
(1) Total metered water use for all public connections that had 10 months or more of observed metered water.
(2) Total number of public connections with 10 months or more of observed metered water.

Table 3.15 provides both average day and maximum day projected future water demand for the GBWC-PD Service Territory and for each service area. The demands for the base year (2022) were calculated from historical well production data and was used as the starting value for the projections from 2023 through 2044. The percentage change from the Nevada State Demographer's population projections for Nye County were used to project future ADD production required for GBWC-PD (see Table 3.01 for details). The projected ADD production was then multiplied by the Peaking Factors (MDD/ADD) derived in Table 3.05a through Table 3.05e to determine MDD production for 2023 through 2044.

The projected future water demands do not account for system-wide losses, or continued savings associated with the Water Conservation Plan. Future water system demands should be reduced as the system NRW is reduced.

Table 3.15: GBWC-PD Projected Peak Water Demand

	GBWC-PD Total Required Water Production (MGD) [MDD=ADDx1.68]		Total ADD Production Required	Calvada Valley (MGD) [MDD=ADDx1.62]		Country View Estates/Calvada North (MGD) [MDD=ADDx1.65]		Calvada Meadows (MGD) [MDD=ADDx1.94]		Mountain Falls (MGD) [MDD=ADDx2.27]		Spring Mountain Motorsports Ranch [MDD=ADDx2.43]		Percent Change
Year	ADD	MDD	AFA	ADD	MDD	ADD	MDD	ADD	MDD	ADD	MDD	ADD	MDD	%
2017	2.84	5.40	3,181	1.97	3.25	0.13	0.21	0.007	0.009	0.73	1.93	-	-	
2018	3.02	5.43	3,383	2.02	3.25	0.15	0.24	0.008	0.011	0.84	2.14	-	-	
2019	2.81	5.48	3,148	2.00	3.54	0.15	0.24	0.007	0.010	0.66	1.69	-	-	
2020	3.01	5.17	3,371	2.23	3.79	0.17	0.28	0.005	0.010	0.70	1.59	0.20	0.49	
2021	3.09	5.30	3,459	2.26	3.84	0.18	0.30	0.004	0.008	0.67	1.52	0.31	0.75	1.0%
2022	3.18	5.45	3,557	2.19	3.72	0.19	0.31	0.005	0.010	0.82	1.86	0.06	0.15	1.0%
2023	3.21	5.51	3,593	2.21	3.76	0.19	0.32	0.005	0.010	0.83	1.88	0.06	0.15	1.0%
2024	3.24	5.56	3,630	2.24	3.80	0.19	0.32	0.005	0.010	0.84	1.90	0.06	0.15	1.0%
2025	3.27	5.62	3,666	2.26	3.84	0.20	0.32	0.005	0.010	0.85	1.92	0.06	0.15	1.0%
2026	3.31	5.68	3,703	2.28	3.88	0.20	0.33	0.005	0.010	0.85	1.94	0.06	0.15	1.0%
2027	3.34	5.74	3,744	2.31	3.92	0.20	0.33	0.005	0.010	0.86	1.96	0.06	0.15	1.1%
2028	3.38	5.80	3,785	2.33	3.96	0.20	0.33	0.005	0.010	0.87	1.98	0.06	0.16	1.1%
2029	3.41	5.86	3,823	2.35	4.00	0.20	0.34	0.005	0.010	0.88	2.00	0.06	0.16	1.0%
2030	3.45	5.92	3,865	2.38	4.05	0.21	0.34	0.005	0.010	0.89	2.02	0.07	0.16	1.1%
2031	3.49	5.99	3,907	2.41	4.09	0.21	0.34	0.005	0.010	0.90	2.04	0.07	0.16	1.1%
2032	3.53	6.05	3,951	2.43	4.14	0.21	0.35	0.005	0.010	0.91	2.07	0.07	0.16	1.1%
2033	3.57	6.12	3,996	2.46	4.18	0.21	0.35	0.005	0.010	0.92	2.09	0.07	0.16	1.1%
2034	3.61	6.19	4,042	2.49	4.23	0.22	0.36	0.005	0.010	0.93	2.12	0.07	0.17	1.1%
2035	3.65	6.26	4,088	2.52	4.28	0.22	0.36	0.005	0.010	0.94	2.14	0.07	0.17	1.1%
2036	3.69	6.34	4,134	2.55	4.33	0.22	0.36	0.005	0.010	0.95	2.16	0.07	0.17	1.1%
2037	3.74	6.41	4,185	2.58	4.38	0.22	0.37	0.005	0.010	0.96	2.19	0.07	0.17	1.2%
2038	3.79	6.50	4,240	2.61	4.44	0.23	0.37	0.005	0.010	0.98	2.22	0.07	0.17	1.3%
2039	3.84	6.59	4,299	2.65	4.50	0.23	0.38	0.005	0.010	0.99	2.25	0.07	0.18	1.4%
2040	3.89	6.68	4,361	2.69	4.57	0.23	0.38	0.005	0.010	1.01	2.28	0.07	0.18	1.5%
2041	3.95	6.78	4,427	2.73	4.63	0.24	0.39	0.005	0.010	1.02	2.32	0.07	0.18	1.5%
2042	4.01	6.89	4,494	2.77	4.70	0.24	0.40	0.005	0.010	1.04	2.35	0.08	0.18	1.5%
2043	4.07	6.99	4,562	2.81	4.78	0.24	0.40	0.005	0.010	1.05	2.39	0.08	0.19	1.5%
2044	4.13	7.10	4,631	2.85	4.85	0.25	0.41	0.005	0.010	1.07	2.42	0.08	0.19	1.5%

Table 3.16 shows the existing well capacity available for each of the service areas based on current well production. When comparing Table 3.16 (current well production for each service area) to Table 3.15 (existing and future projected demands for each service area), the well production in all service areas meet the current ADD and MDD, as well as the projected ADD and MDD in 2044.

Table 3.16: GBWC-PD Existing Well Capacity

Calvada Valley		**Country View Estates/ Calvada North**		**Calvada Meadows**		**Mountain Falls**		**SMMR**		**GBWC-PD Total**
Well	Capacity (gpm)	Well	Capacity (gpm)	Well	Capacity (gpm)	Well	Capacity (gpm)	Well	Capacity (gpm)	
1	1,050	48-1	189	1	250	1	1,531	1	470	
2	1,285	48-2	296			2	1,569	2	470	
9	829	CN 1	331							
11	1,301									
12	700									
Total (gpm)	**5,165**		**816**		**250**		**3,100**		**940**	**10,271**
Total (MGD)	**7.44**		**1.18**		**0.36**		**4.46**		**1.35**	**14.79**

Notes:
(1) The well that supplied Mountain View Estates was retired during the consolidation of Mountain View Estates with Calvada Valley and has been removed from the existing well capacity analysis

Since the systems experience NRW water losses (both from real water losses and apparent losses) as established in Table 3.09, GBWC-PD's water production must be able to accommodate for these losses in order to ensure the system averages 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 in order to compensate for both consumption and NRW. The well production required was inflated by the NRW percentages stated above for each system.

Both the existing and future water demand (averages) were provided/projected based on the calculated water demand factors for residential, commercial, irrigation, and public authority service class for each pressure zone. Table 3.17a identifies existing demands as provided by meter data. Table 3.17b identifies the grossed-up well production required to provide anticipated service and accommodations for NRW losses.

Table 3.18a and 3.18b include the minimum well production required in order to accommodate for the NRW. Note that water demand in Table 3.18a and 3.18b for the service areas are higher than shown in the projected future water demand shown in Table 3.15, in order to accommodate for NRW. The projected future water demand and production well capacity required in Table 3.18a and Table 3.18b demonstrate that there will be sufficient production well capacity in all service areas, except Calvada Valley, for the anticipated growth. Calvada Valley shows a deficiency of approximately 920 gpm for PHD. A new production well, Well 10, is being constructed in Calvada Valley and is anticipated to be completed in 2024. This well will provide additional capacity to the system and upon completion of the well and determination of final flow rates, the 2044 production capacity can be reevaluated.

Table 3.17a: Existing Demand (2022) **Table 3.17b: Well Production Required (2022)**

Calvada Valley – Existing Demands (1)					Calvada Valley – Well Production Required (1) (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) with NRW (16.6% system losses)	System MDD Required (gpm) (ADD x 1.70)	System PHD Required (gpm) (MDD x 1.75)
Residential	3,945	262	1,032,275	717	836	1,421	2,487
Commercial	341	2,358	805,101	559	652	1,108	1,939
Irrigation	59	1,083	63,897	44	51	87	152
Public	9	3,703	33,330	23	27	46	81
Total	**4,354**	**7,406**	**1,934,603**	**1,343**	**1,566**	**2,662**	**4,659**
Country View Estates/Calvada North (CVE/CN) – Existing Demands					CVE/CN – Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (24.2% system losses)	System MDD Required (gpm) (ADD x 1.65)	System PHD Required (gpm) (MDD x 1.75)
Residential	415	240	99,600	69	86	141	247
Commercial	4	10,220	40,881	28	35	57	100
Irrigation	0	0	0	0	0	0	0
Public	0	0	0	0	0	0	0
Total	**419**	**10,460**	**140,481**	**97**	**120**	**199**	**348**
Calvada Meadows – Existing Demands					Calvada Meadows – Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (5.2% system losses)	System MDD Required (gpm) (ADD x 1.94)	System PHD Required (gpm) (MDD x 1.75)
Residential	40	113	4,533	3.00	3.15	6.11	10.69
Commercial	1	136	136	0.09	0.09	0.17	0.30
Irrigation	0	0	0	0	0	0	0
Public	0	0	0	0	0	0	0
Total	**41**	**249**	**4,669**	**3.09**	**3.24**	**6.28**	**10.99**
Mountain Falls – Existing Demand					Mountain Falls – Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (11.4% system losses)	System MDD Required (gpm) (ADD x 2.27)	System PHD Required (gpm) (MDD x 1.75)
Residential	1,521	194	295,581	205	228	518	907
Commercial	7	1,496	10,472	7	8	18	32
Irrigation	35	6,596	230,860	160	178	404	707
Public	0	0	0	0	0	0	0
Total	**1,563**	**8,286**	**536,913**	**372**	**414**	**940**	**1,645**
Spring Mountain Motorsports Ranch (SMMR) – Existing Demand					SMMR – Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (33.4% system losses)	System MDD Required (gpm) (ADD x 2.43)	System PHD Required (gpm) (MDD x 1.75)
Residential	21	600	12,591	9	12	29	51
Commercial	3	5,912	17,735	12	16	39	68
Irrigation	0	0	0	0	0	0	0
Public	0	0	0	0	0	0	0
Total	**24**	**6,511**	**30,326**	**21**	**28**	**68**	**119**

Notes:
(1) Mountain View Estates was consolidated into Calvada Valley in 2023. For the purpose of calculating an accurate peaking factor for the consolidated system moving forward, these values include historical data for Mountain View Estates.
(2) Accommodates for demands and anticipated system-wide losses

Table 3.18a: Future Water Demand (2044) Table 3.18b: Future Well Production (2044)

Calvada Valley – Projected Future Demands (1)					Calvada Valley – Projected Well Production Required (1) (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) with NRW (16.6% system losses)	System MDD Required (gpm) (ADD x 1.70)	System PHD Required (gpm) (MDD x 1.75)
Residential	5,138	262	1,344,443	934	1,089	1,851	3,239
Commercial	446	2,361	1,053,006	731	852	1,448	2,534
Irrigation	79	1,083	85,557	59	69	117	205
Public	12	3,703	44,440	31	36	61	107
Total	**5,675**	**7,409**	**2,527,446**	**1,755**	**2,046**	**3,477**	**6,085**
Country View Estates/Calvada North (CVE/CN) –Future Demands					CVE/CN – Projected Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (24.2% system losses)	System MDD Required (gpm) (ADD x 1.65)	System PHD Required (gpm) (MDD x 1.75)
Residential	541	240	129,840	90	112	184	323
Commercial	5	10,220	51,102	35	43	72	125
Irrigation	0	0	0	0	0	0	0
Public	0	0	0	0	0	0	0
Total	**546**	**10,460**	**180,942**	**125**	**155**	**256**	**448**
Calvada Meadows – Projected Future Demands					Calvada Meadows – Projected Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (5.2% system losses)	System MDD Required (gpm) (ADD x 1.94)	System PHD Required (gpm) (MDD x 1.75)
Residential	40	113	4,533	3.00	3.16	6.13	10.73
Commercial	1	136	136	0.09	0.09	0.17	0.30
Irrigation	0	0	0	0	0	0	0
Public	0	0	0	0	0	0	0
Total	**41**	**249**	**4,669**	**3.09**	**3.25**	**6.30**	**11.03**
Mountain Falls – Projected Future Demand					Mountain Falls – Projected Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (11.4% system losses)	System MDD Required (gpm) (ADD x 2.27)	System PHD Required (gpm) (MDD x 1.75)
Residential	1,979	194	384,586	267	297	675	1,181
Commercial	14	1,496	20,944	15	17	38	67
Irrigation	45	6,596	296,820	206	229	521	912
Public	0	0	0	0	0	0	0
Total	**2,038**	**8,286**	**702,350**	**488**	**544**	**1,234**	**2,160**
Spring Mountain Motorsports Ranch (SMMR) – Projected Demands					SMMR – Projected Well Production Required (2)		
Customer Class	Total No. of Customers	ADD (gpdpc)	System ADD (GPD)	System ADD (GPM)	ADD Required (GPM) including NRW (33.4% system losses)	System MDD Required (gpm) (ADD x 2.43)	System PHD Required (gpm) (MDD x 1.75)
Residential	27	600	16,188	11	15	36	63
Commercial	4	5,912	23,647	16	21	52	91
Irrigation	0	0	0	0	0	0	0
Public	0	0	0	0	0	0	0
Total	**31**	**6,511**	**39,835**	**27**	**36**	**88**	**154**

Notes:
(1) Mountain View Estates was consolidated into Calvada Valley in 2023. For the purpose of calculating an accurate peaking factor for the consolidated system moving forward, these values include historical data for Mountain View Estates.
(2) Accommodates for demands and anticipated system-wide losses

3.5 Wastewater System Forecasting

While currently there are five GBWC-PD water systems with meter data, only four of the water systems also provide centralized sewer service. Sewer service exists in the Calvada Valley area, the Calvada North area (excluding the Country View Estates section), the Mountain Falls area, and the Spring Mountain Motorsports Ranch area.

Currently, based on 2022 connection counts, approximately 75% of the water customers have sewer service. Table 3.19 displays the historical and projected wastewater connections in each of the four service areas with sewer service. Connection counts were determined by applying the average ratio of wastewater to water connections for each service area to the projected water connections determined in Table 3.03. This brings the total connections up by 1,826 connections, from 4,042 sewer connections in 2020 to a projected number of 5,868 sewer connections in 2044.

Table 3.19: GBWC-PD Wastewater Connection Projections

Year(1)	Plant 3 – Calvada Valley(2)	Plant F – Calvada North(2)	Plant MF – Mountain Falls(2)	Plant SMMR- Spring Mountain Motorsports Ranch(2)	Total(3)
2020	2,593	153	1,277	19	4,042
2021	2,649	154	1,316	23	4,142
2022	2,802	165	1,508	24	4,499
2023	2,838	167	1,519	24	4,548
2024	2,867	168	1,534	24	4,594
2025	2,895	170	1,550	25	4,639
2026	2,925	172	1,565	25	4,687
2027	2,956	174	1,582	25	4,738
2028	2,990	176	1,600	26	4,791
2029	3,020	177	1,616	26	4,840
2030	3,053	179	1,634	26	4,893
2031	3,087	181	1,652	26	4,947
2032	3,122	183	1,671	27	5,003
2033	3,158	185	1,690	27	5,060
2034	3,194	188	1,710	27	5,118
2035	3,231	190	1,729	28	5,177
2036	3,268	192	1,749	28	5,237
2037	3,308	194	1,771	28	5,301
2038	3,352	197	1,794	29	5,371
2039	3,399	200	1,819	29	5,446
2040	3,448	202	1,845	29	5,525
2041	3,500	206	1,873	30	5,609
2042	3,553	209	1,902	30	5,694
2043	3,607	212	1,931	31	5,780
2044	3,662	215	1,960	31	5,868

Notes:

(1) 2020, 2021, and 2022 are provided based on historical total meter count data in each service area. Data provided for 2020 through 2022 broke out wastewater connections for each of the four service areas.

(2) Total residential GBWC-PD water connections for years 2023 forward are based on the average 2020, 2021, and 2022 ratio of wastewater connections to total water and wastewater connections in Calvada Valley (65% of water connections have sewer service), Calvada North (39% of water connections have sewer service), Mountain Falls (96% of water connections have sewer service), and Spring Mountain Motorsports Ranch (100% of water connections have sewer service). The average percentage based on the historical 2020, 2021 and 2022 data for each service area was applied to the applicable service area projected total water connections for the year listed in Table 3.03 in order to estimate connections in each wastewater service area.

(3) The total wastewater connections are the sum of the wastewater connections in Calvada Valley, Calvada North, Mountain Falls, and Spring Mountain Motorsports Ranch wastewater service areas.

3.5.1 Recorded Wastewater Flows and Disposal

GBWC-PD has four wastewater treatment facilities: Plant F in the Calvada North service area, Plant 3 in the Calvada Valley service area, Mountain Falls in the Mountain Falls service area, and the SMMR Plant in the Spring Mountain Motorsports Ranch service area. Table 3.20 shows recorded flows in the wastewater service areas. The total GBWC-PD average wastewater daily flow between the three wastewater treatment facilities for the past three full years of data was 0.817 MGD in 2020, 0.855 MGD in 2021 and 0.877 MGD in 2022.

Plant 3 has a rated capacity of 1.5 MGD and currently treats approximately 700,000 gallons per day (0.7 MGD). Plant F has a rated capacity of 50,000 gpd and currently treats approximately 26,000 gpd. Mountain Falls has a rated capacity of 750,000 gpd and is currently treating about 120,000 gpd. SMMR Plant has a rated capacity of 54,340 gpd and is currently treating approximately 7,000 gpd. The overall rated capacity of 2.3 MGD is only utilized up to approximately 871,000 gpd.

Table 3.20: GBWC-PD Recorded Wastewater Flows

Treatment Facility	Average Daily Flow, ADF (MGD)				Average Flow Maximum Month, AFMM (MGD)			
	Plant 3 – Calvada Valley (1.5 MGD)	Plant F – Calvada North (0.05 MGD)	Plant MF – Mountain Falls (0.75 MGD)	SMMR Plant (0.05 MGD)(4)	Plant 3 – Calvada Valley	Plant F – Calvada North	Plant MF – Mountain Falls	SMMR Plant (0.05 MGD)(4)
Year								
2013	0.567	0.022	0.069	-	0.584	0.023	0.089	-
2014	0.581	0.022	0.068	-	0.607	0.023	0.089	-
2015	0.607	0.023	0.062	-	0.656	0.028	0.063	-
2016	0.638	0.021	0.063	-	0.653	0.024	0.078	-
2017	0.648	0.023	0.082	-	0.678	0.030	0.093	-
2018	0.679	0.023	0.087	-	0.689	0.029	0.097	-
2019	0.699	0.024	0.097	-	0.729	0.028	0.112	-
2020	0.672	0.027	0.113(2)	0.005(3)	0.705	0.041(1)	0.123	0.005(3)
2021	0.709	0.025	0.115	0.006	0.749	0.029	0.149	0.008
2022	0.718	0.026	0.125	0.008	0.737	0.031	0.130	0.018
3 Year Average (2020-2022)	**0.700**	**0.026**	**0.118**	**0.006**	**0.730**	**0.034**	**0.134**	**0.010**

Notes:
(1) Increased influent flows due to Treasures RV Park water leak, fixed in November 2020.
(2) The Mountain Falls plant experienced influent flow meter failures in April 2020, October 2020-June 2021. Flow data was estimated off post equalization flow meter.
(3) The Spring Mountain Motorsports Ranch Plant experienced flow meter malfunctions from January 2020-July 2020. The recorded flow only represents data from August 2020-December 2020.
(4) The Spring Mountain Motorsports Ranch plant came online in 2020.

When the 30-day average daily influent flow rate equals or exceeds 85% of design treatment capacity, GBWC must prepare a letter that describes how the utility will increase the capacity of the treatment plant and provide a schedule for construction that will ensure that the improvements are made before the existing plant reaches design capacity. The four existing facilities are sufficiently below their rated capacity and are not expected to reach 85% of design capacity within the 20-year planning period.

Table 3.21a through 3.21d show the projected wastewater flow at the four wastewater facilities. The projected wastewater flows are based on the growth projections summarized in Table 3.19. The growth projections provided in Table 3.19 are based on the average percentage of total connections that also include wastewater service from 2020 through 2022. This projection is based on the growth projections established by the State Demographer's office and as summarized in Table 3.19.

Table 3.21a provides projected wastewater connections and flows through 2044 for Calvada Valley Plant 3. The projected connections were estimated using the same methodology as used in Section 3.4.1 – Water System Connection Projections using the Nevada State Demographer's Office growth rates. For Calvada Valley Plant 3, an average daily flow ("ADF") per connection of 261 gpdpc and an average daily maximum month per average daily flow ("ADMM/ADF") peaking factor of 1.04 was used to estimate projected flows based on 2020-2022 wastewater flow data (see Section 2.4).

In the 2021 IRP, the anticipated average day maximum month flow was compared to 85% of the design capacity to evaluate whether sufficient capacity was available to accommodate projected growth. In the 2024 IRP, the anticipated average daily flow, rather than the average day maximum month flow, was compared to 85% of design capacity to evaluate whether sufficient capacity was available to accommodate projected growth. This change was made to bring the analysis in line with industry standards. The Calvada Valley Plant 3 anticipated average daily flow of 0.956 MGD (956,000 GPD) in 2044 equates to 64% of the treatment system design capacity. The anticipated flows will likely not be close to exceeding the design flow of 1.5 MGD within the planning period or exceed 85% of the design capacity, which is approximately 1.28 MGD.

Table 3.21a: Calvada Valley Plant 3 Wastewater Flow Projections

Year	Plant 3 – Calvada Valley(1)	Projected WWTP Flow ADF (MGD)(2)	Projected WWTP Flow ADMM (MGD)(3)
2017	2,452	0.648	0.678
2018	2,500	0.679	0.689
2019	2,529	0.699	0.729
2020	2,593	0.672	0.705
2021	2,649	0.709	0.749
2022	2,802	0.718	0.737
2023	2,838	0.741	0.773
2024	2,867	0.748	0.781
2025	2,895	0.756	0.789
2026	2,925	0.764	0.797
2027	2,956	0.772	0.805
2028	2,989	0.780	0.814
2029	3,020	0.788	0.822
2030	3,053	0.797	0.832
2031	3,087	0.806	0.841
2032	3,122	0.815	0.850
2033	3,158	0.824	0.860
2034	3,194	0.834	0.870
2035	3,231	0.843	0.880
2036	3,267	0.853	0.890
2037	3,308	0.864	0.901
2038	3,352	0.875	0.913
2039	3,398	0.887	0.926
2040	3,448	0.900	0.939
2041	3,500	0.914	0.953
2042	3,553	0.928	0.968
2043	3,607	0.942	0.982
2044	3,662	0.956	0.997

Notes:
(1) 2020, 2021, and 2022 data are provided based on historical total meter count data. Projected connections were determined from Table 3.19.
(2) Projected wastewater flow is based on multiplying the number of connections by the average historical (2020, 2021, and 2022) average daily flow (ADF) gallons per day per connection (gpdpc) determined from Tables 3.19 and 3.20. The ADF for Plant 3 is 261 gpdpc.
(3) The projected average daily maximum month (ADMM) flows were determined by multiplying the average daily flow (ADF) by the average historical (2020, 2021, and 2022) peaking factor (ADMM/ADF). The average Plant 3 peaking factor is 1.04.

Table 3.21b provides projected wastewater connections and flows through 2044 for Plant F. The projected connections were estimated using the same methodology as used in Section 3.4.1 –

Water System Connection Projections using the Nevada State Demographer's Office growth rates. An ADF per connection of 165 gpdpc and an ADMM/ADF peaking factor of 1.30 was used to estimate projected flows based on 2020-2022 wastewater flow data.

The Calvada North Plant F anticipated average daily flow of 0.036 MGD (36,000 GPD) in 2044 which equates to 71% of the treatment system design capacity. In the 2024 IRP, the anticipated average daily flow, rather than the average day maximum month flow, was compared to 85% of design capacity to evaluate whether sufficient capacity was available to accommodate projected growth. This change was made to bring the analysis in line with industry standards. The anticipated flows will likely not exceed the design flow of 0.05 MGD (50,000 GPD) or exceed 85% of the design capacity, which is approximately 0.0425 MGD (42,500 GPD).

Table 3.21b: Calvada North Plant F Wastewater Flow Projections

Year	Plant F – Calvada North Connections(1)	Projected WWTP Flow ADF (MGD)(2)	Projected WWTP Flow ADMM (MGD)(3)
2017	141	0.023	0.030
2018	144	0.023	0.029
2019	146	0.024	0.028
2020	153	0.027	0.041
2021	154	0.025	0.029
2022	165	0.026	0.031
2023	167	0.028	0.036
2024	168	0.028	0.036
2025	170	0.028	0.036
2026	172	0.028	0.037
2027	174	0.029	0.037
2028	176	0.029	0.038
2029	177	0.029	0.038
2030	179	0.030	0.038
2031	181	0.030	0.039
2032	183	0.030	0.039
2033	185	0.031	0.040
2034	187	0.031	0.040
2035	190	0.031	0.041
2036	192	0.032	0.041
2037	194	0.032	0.042
2038	197	0.033	0.042
2039	200	0.033	0.043
2040	202	0.033	0.043
2041	206	0.034	0.044
2042	209	0.034	0.045
2043	212	0.035	0.045
2044	215	0.036	0.046

Notes:

(1) 2020, 2021, and 2022 data are provided based on historical total meter count data. Projected connections were determined from Table 3.19.

(2) Projected wastewater flow is based on multiplying the number of connections by the average historical (2020, 2021, and 2022) average daily flow (ADF) gallons per day per connection (gpdpc) determined from Tables 3.19 and 3.20. The ADF for Plant F is 165 gpdpc.

(3) The projected average daily maximum month (ADMM) flows were determined by multiplying the average daily flow (ADF) by the average historical (2020, 2021, and 2022) peaking factor (ADMM/ADF). The average for Plant F peaking factor is 1.30.

Table 3.21c provides projected wastewater connections and flows through 2044 for Mountain Falls Plant MF. The projected connections were estimated using the same methodology as used in Section 3.4.1- Water System Connection Projections using the Nevada State Demographer's Office growth rates. An ADF per connection of 86 gpdpc and an ADMM/ADF peaking factor of 1.14 were used to estimate projected flows based on 2020-2022 wastewater flow data.

The Mountain Falls Plant MF anticipated average daily flow of 0.169 MGD (169,000 GPD) in 2044 equates to 22% of the treatment system design capacity. In the 2024 IRP, the anticipated average daily flow, rather than the average day maximum month flow, was compared to 85% of design capacity to evaluate whether sufficient capacity was available to accommodate projected growth. This change was made to bring the analysis in line with industry standards. The anticipated flows will likely not be close to exceeding the design flow of 0.75 MGD (750,000 GPD) within the planning period or exceed 85% of the design capacity, which is approximately 0.638 MGD (638,000 GPD).

Table 3.21c: Mountain Falls Plant MF Wastewater Flow Projections

Year	Plant MF – Mountain Falls(1)	Projected WWTP Flow ADF (MGD)(2)	Projected WWTP Flow ADMM (MGD)(3)
2017	932	0.082	0.093
2018	1,038	0.087	0.097
2019	1,218	0.097	0.112
2020	1,277	0.113	0.123
2021	1,316	0.115	0.149
2022	1,508	0.125	0.130
2023	1,524	0.131	0.149
2024	1,539	0.132	0.151
2025	1,554	0.134	0.152
2026	1,570	0.135	0.154
2027	1,587	0.137	0.156
2028	1,605	0.138	0.157
2029	1,621	0.140	0.159
2030	1,639	0.141	0.161
2031	1,657	0.143	0.162
2032	1,675	0.144	0.164
2033	1,694	0.146	0.166
2034	1,714	0.147	0.168
2035	1,733	0.149	0.170
2036	1,753	0.151	0.172
2037	1,774	0.153	0.174
2038	1,798	0.155	0.176
2039	1,823	0.157	0.179
2040	1,849	0.159	0.181
2041	1,877	0.162	0.184
2042	1,905	0.164	0.187
2043	1,934	0.166	0.190
2044	1,963	0.169	0.192

Notes:

(1) 2020, 2021, and 2022 data are provided based on historical total meter count data. Projected connections were determined from Table 3.19.

(2) Projected wastewater flow is based on multiplying the number of connections by the average historical (2020, 2021, and 2022) average daily flow (ADF) gallons per day per connection (gpdpc) determined from Tables 3.19 and 3.20. The ADF for Plant MF is 86 gpdpc.

(3) The projected average daily maximum month (ADMM) flows were determined by multiplying the average daily flow (ADF) by the average historical (2020, 2021, and 2022) peaking factor (ADMM/ADF). The average for Plant MF peaking factor is 1.14.

Table 3.21d provides projected wastewater connections and flows through 2044 for the Spring Mountain Motorsports Ranch Plant. The projected connections were estimated using the same methodology as used in Section 3.4.1- Water System Connection Projections using the Nevada State Demographer's Office growth rates. An ADF per connection of 288 gpdpc and an ADMM/ADF peaking factor of 1.63 were used to estimate projected flows based on 2020-2022 wastewater flow data.

The Spring Mountain Motorsports Ranch Plant anticipated average daily flow of 0.009 MGD (9,000 GPD) in 2044 equates to 17% of the treatment system design capacity. In the 2024 IRP, the anticipated average daily flow, rather than the average day maximum month, was compared to 85% of design capacity to evaluate whether sufficient capacity was available to accommodate projected growth. This change was made to bring the analysis in line with industry standards. The anticipated flows will likely not be close to exceeding the design flow of 0.054 MGD (54,350 GPD) within the planning period or exceed 85% of the design capacity, which is approximately 0.046 MGD (46,198 GPD).

Table 3.21d: Spring Mountain Motorsports Ranch Plant SMMR Wastewater Flow Projections

Year	Plant SMMR – Spring Mountain Motorsports Ranch(1)	Projected WWTP Flow ADF (MGD)(2)	Projected WWTP Flow ADMM (MGD)(3)
2020	19	0.005	0.005
2021	23	0.006	0.008
2022	24	0.008	0.018
2023	24	0.007	0.011
2024	24	0.007	0.012
2025	25	0.007	0.012
2026	25	0.007	0.012
2027	25	0.007	0.012
2028	26	0.007	0.012
2029	26	0.007	0.012
2030	26	0.008	0.012
2031	26	0.008	0.012
2032	27	0.008	0.013
2033	27	0.008	0.013
2034	27	0.008	0.013
2035	28	0.008	0.013
2036	28	0.008	0.013
2037	28	0.008	0.013
2038	29	0.008	0.013
2039	29	0.008	0.014
2040	29	0.008	0.014
2041	30	0.009	0.014
2042	30	0.009	0.014
2043	31	0.009	0.014
2044	31	0.009	0.015

Notes:

(1) 2020, 2021, and 2022 data are provided based on historical total meter count data. Note that due to an influent flow meter failure, the full year 2020 data is not available. Projected connections were determined from Table 3.19.

(2) Projected wastewater flow is based on multiplying the number of connections by the average historical (2020, 2021, and 2022) average daily flow (ADF) gallons per day per connection (gpdpc) determined from Tables 3.19 and 3.20. The ADF for Plant SMMR is 288 gpdpc.

(3) The projected average daily maximum month (ADMM) flows were determined by multiplying the average daily flow (ADF) by the average historical (2020, 2021, and 2022) peaking factor (ADMM/ADF). The average for Plant SMMR peaking factor is 1.63.

3.5.2 Reclaimed Water Sold or Used

Calvada North Plant F, which produces Class-B effluent, does not generate reclaimed water due to the small size of Plant F. All of its effluent is disposed of either through on-site rapid infiltration basins or on-site spray irrigation.

Calvada Valley Plant 3, which also produces Class-B effluent, disposes of its reclaimed water to a holding pond at Discovery Park. From the holding pond at Discovery Park, effluent is either used to irrigate the park, sent to two rapid infiltration basins (RIBs), or pumped to irrigate the Pahrump High School athletic fields or the Lake View Executive Golf Course.

Over the last three total years of data (2020- 2022), Discovery Park has been irrigated with an average volume of 187.6 MG per year of effluent, the golf course has received an average volume of 99.5 MG per year of effluent and the Pahrump High School has received an average of 1.4 MG per year. The RIBS have received an average volume of 73.1 MG (200,000 gpd) per year over the last three years (2020- 2022). Each RIB is capable of accepting 625,000 gallons per day.

Table 3.22: Plant 3 Effluent Reuse

Year	Total Plant Effluent(1) (Gallons)	Discovery Park (2) (Gallons)	Lake View (2) (Gallons)
2020	239,137,000	235,260,000	99,030,000
2021	255,962,000	255,962,000	98,640,000
2022	290,918,000	290,919,000	102,300,000
Average	**262,005,667**	**260,713,667**	**99,990,000**

Notes:
(1) Values represent metered flow from Plant 3 Effluent Contact Chamber, Discovery Park Pump House, and Lake View Pump House. Total volumes received and exited from the east and west receiving ponds are not metered. Discrepancies between total effluent and Discovery Park and Lake View use is a result of water stored in the receiving ponds.
(2) Tabulated data does not include water pumped from Wells 9, 10, and 21. See Appendix M for schematic flow diagram of effluent reuse.

Table 3.22a: Plant 3 Effluent Reuse from Discovery Park

Year	Discovery Park Irrigation (Gallons)	RIBs (1) (Gallons)	Total Water from Discovery Park (Gallons)
2020	178,995,900	56,264,100	235,260,000
2021	159,358,000	96,604,000	255,962,000
2022	224,401,000	66,518,000	290,919,000
Average	**187,584,967**	**73,128,700**	**260,713,667**

Notes:
(1) Total volume between the East and West RIBs at Discovery Park.

Table 3.22b: Plant 3 Effluent Reuse from Lake View

Year	Lake View Golf Course (Gallons)	Pahrump High School (1) (Gallons)	Total Water from Lake View (Gallons)
2020	99,030,000	N/A	99,030,000
2021	98,640,000	N/A	98,640,000
2022	100,947,482	1,352,518	102,300,000
Average	**99,539,161**	**1,352,518**	**99,990,000**

Notes:
(1) Pahrump High School was incorporated into the effluent reuse system in 2022.

The effluent from Plant 3 is not sold to the Lake View Executive Golf Course or Pahrump High School and is instead provided free of charge.

The Mountain Falls Treatment Plant, which produces Class-A effluent, conveys all effluent to ponds at the Mountain Falls Golf Course for irrigation of the course.

SECTION 4.0: Water Supply and Wastewater Treatment

4.1 Water Supply

The water supply was evaluated based on the GBWC-PD well and storage tank capacity versus the projected water demands. This analysis provides a timeline of when the existing capacity of the wells will be exceeded and a projection to determine when new wells will need to be developed. Projected water demands are presented in Table 3.18a. 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

The water in Nevada on the surface and below the ground's surface 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 watercourse acquired a priority right to the use and to the extent of its use.

GBWC-PD currently holds interests in water rights in excess of 200 permits. As of this 2024 IRP filing, the following is an overview of current GBWC-PD permitted water rights:

- Total decreed and permitted spring water rights = 3,098.92 AFA
- Total permitted groundwater water rights = 27,586.25 AFA
- Total Combined Duty (TCD) water rights = 24,403.54 AFA
    - Excludes several Ready-For-Action permits totaling 31.62 AFA
- Total permitted effluent rights = 1,680.22 AFA

A review of the water rights held by GBWC-PD indicates that sufficient water rights exist for the foreseeable future; however, as discussed in Section 1.2.2, Basin 162 is significantly over-appropriated. At this time, GBWC-PD is actively working cooperatively with the State Engineer's Office and the NCWD to further catalogue water rights held by the company and find solutions for the long-term health of Basin 162.

4.1.2 Water Supply Evaluation

Each system was evaluated for the available well capacity as compared to the current and projected system demands. As the five existing water systems in GBWC-PD are currently not interconnected, they were all evaluated separately. The criteria for evaluating adequate supply capacity are based on NAC 445A.6672, which requires a system that 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. This provides a higher level of reliability should a well be undergoing a major rehabilitation or have a failure for any reason.

This analysis does not consider the remaining useful life of the wells. Should any well(s) require replacement within the planning period, the replacement well(s) will need to meet or exceed the capacity of the well(s) which are being replaced. Over half of the wells (7 out of 12 wells) in the GBWC-PD service areas are over 40 years old. Over the past three years, several of the wells have been rehabilitated to help return well capacity and extend their useful life with the goal of putting off the cost of replacing many of these wells.

4.1.2.1 Calvada Valley Water Supply

The Calvada Valley water system has five active potable wells with a total pumping capacity of 5,085 gallons per minute (gpm). This equates to a daily production volume of 7.32 million gallons per day (MGD). The largest well is Well 11 with a capacity of 1,301 gpm or 1.87 MGD. Therefore, the total well capacity with Well 11 out of service is 3,864 gpm or 5.45 MGD.

An analysis of the Calvada Valley well capacity versus existing and projected demands is presented in Table 4.01. To accommodate for system losses (NRW), the water supply demand was grossed up by 16.6%, which results in a total ADD of 1,565 gpm for existing conditions and an anticipated 2,045 gpm by 2044. Refer to Table 3.17b and Table 3.18b for the well production requirement figures. The MDD is estimated at 1.62 times the ADD for the Calvada Valley system, which equates to 2,536 gpm for existing MDD and an anticipated 3,313 gpm MDD by 2044. As Table 4.01 shows, the water system can meet existing and future (2044) demands for ADD and MDD.

Unfortunately, the useful life has been exceeded in many of the existing wells in the Calvada Valley system. If a well past its useful life were to go out of service, capacity for the entire system would be reduced. For this reason, it is recommended that GBWC-PD continue performing well assessments/rehabilitations in this service area to continue determining their integrity and estimated remaining useful life.

Table 4.01: Calvada Valley Well Capacity

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
1	NO		1,050
2	YES		1,285
9	NO		829
11	YES		1,301
12	YES		700
		Total, All Wells in Service	**5,165**
		Total, Well 11 Out of Service	**3,864**
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	1,566	2,662	YES
2044	2,046	3,477	YES

Notes:
(1) Capacities are based on the most recent review conducted in 2023 by Lumos Staff.
(2) System demand (determined in previous sections) was grossed up to accommodate for 16.6% losses, as shown in Table 3.17 and Table 3.18
(3) Total well supply must be able to accommodate MDD.

4.1.2.2 Country View Estates/Calvada North (CVE/CN) Water Supply

CVE/CN has three active wells with a total pumping capacity of 816 gpm. This equates to a daily capacity of 1.18 MGD. Well CN 1 is the largest well with a capacity of 331 gpm or 0.48 MGD. Therefore, the total capacity with the largest well out of service is 485 gpm or 0.70 MGD.

An analysis of the CVE/CN well capacity versus existing and projected demands is presented in Table 4.02. To accommodate for system losses (NRW), the water supply demand was grossed up by 24.2%, which results in a total ADD of 120 gpm for existing conditions and an anticipated 155 gpm by 2044. Refer to Table 3.17b and Table 3.18b for the well production requirement figures. MDD is estimated at 1.65 times the ADD for the water system and is 199 gpm for existing conditions and an anticipated 256 gpm by 2044. As Table 4.02 shows, the Country View Estates/Calvada North water system can meet existing and future (2044) demands.

Unfortunately, the useful life has been exceeded in many of the existing wells in the Country View Estates/Calvada North system. If a well past its useful life were to go out of service, capacity for the entire system would be reduced. For this reason, it is recommended that GBWC-PD continue performing well assessments/rehabilitations in this service area to continue determining their integrity and estimated remaining useful life.

Table 4.02: Country View Estates/Calvada North Well Capacity

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
CVE 48-1	YES		189
CVE 48-2	YES		296
CN 1	NO		331
		Total, All Wells in Service	**816**
		Total, CN 1 Out of Service	**485**
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	120	199	YES
2044	155	256	YES

Notes:
(3) Capacities are based on the most recent review conducted in 2023 by Lumos Staff.
(4) System demand (determined in previous sections) was grossed up to accommodate for 24.2% losses.
(5) Total well supply must be able to accommodate MDD.

4.1.2.3 Calvada Meadows Water Supply

Calvada Meadows has one active potable well with a pumping capacity of 250 gpm. This equates to a daily capacity of 0.36 MGD (360,000 gpd). The Calvada Meadows well currently has an annual average production rate of 4,575 gpd (3.2 gpm), which is significantly below the well pumping capacity. The low growth rate over the planning period yields no additional connections in this area over the next 20 years. The low growth rate can be attributed to the lack of backbone infrastructure to support growth. Calvada Meadows lots are referred to as "unbuildable lots" as the price to provide water to these lots is cost prohibitive for individual lot owners under the policy that growth pays for itself.

To accommodate for system losses (NRW), the water supply demand was grossed up by 5.2%, which results in a total ADD of 3.24 gpm for existing conditions and an anticipated 3.24 gpm by 2044. Refer to Table 3.17b and Table 3.18b for the well production requirement figures. MDD is estimated at 1.94 times the ADD for the water system and is 6.28 gpm for existing conditions and an anticipated 6.28 gpm by 2044.

The remaining useful life of the only well in Calvada Meadows may be very limited. The well has been pumping significant volumes of sand, which usually is an indicator of a structurally damaged well casing. Since there is only one well in the water system, the loss of the well could be very detrimental to the ability of GBWC-PD to serve potable water to their customers. For this reason, it is recommended that GBWC-PD perform an assessment of the well in this service area to determine its integrity and estimated remaining useful life. It is also important to note that the existing well cannot supply an adequate fire flow of 1,500 gpm.

Table 4.03: Calvada Meadows Well Capacity

System Well Capacity			
Wells	**Backup Power**		**Capacity[1] (gpm)**
CVM 1	NO		250
		Total, All Wells in Service	**250**
		Total, CVM 1 Well Out of Service	**0**
System Demand			
Year	**ADD[2] (gpm)**	**MDD (gpm)**	**Can Well Supply[3] Meet MDD?**
2022	3.24	6.28	YES
2044	3.24	6.28	YES

Notes:
(1) Capacities are based on the most recent review conducted in 2023 by Lumos Staff.
(2) System demand (determined in previous sections) was grossed up to accommodate for 5.2% losses.
(3) Total well supply must be able to accommodate MDD.

4.1.2.4 Mountain Falls Water Supply

Mountain Falls has two active wells, MF Wells 1 and 2, with a total pumping capacity of 3,100 gpm. This equates to a daily capacity of 4.46 MGD. MF Well 2 has a slightly higher pumping capacity of 1,569 gpm as compared to MF Well 1, which has a pumping capacity of 1,531 gpm. With MF Well 2 out of service, MF Well 1 has a daily capacity of 2.20 MGD.

An analysis of the Mountain Falls well capacity versus existing and projected demands is presented in Table 4.04. To accommodate for system losses (NRW), the water supply demand was grossed up by 11.4%, which results in a total ADD of 415 gpm for existing conditions and an anticipated 543 gpm by 2044. Refer to Table 3.17b and Table 3.18b for the well production requirement figures. MDD is estimated at 2.27 times the ADD for the water system and is 943 gpm for existing conditions and an anticipated 1,234 gpm by 2044. As shown in Table 4.04, the water system can meet existing and future (2044) demands.

The Mountain Falls wells were rehabilitated in 2019 and 2020. These rehabilitations extended the remaining useful life and rehabilitated liners that were previously installed in unknown years.

Table 4.04: Mountain Falls Well Capacity

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
MF 1	YES		1,531
MF 2	YES		1,569
		Total, All Wells in Service	**3,100**
		Total, MF 2 Out of Service	**1,531**
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	415	943	YES
2044	543	1,234	YES

Notes:
(1) Capacities are based on the most recent review conducted in 2023 by Lumos Staff.
(2) System demand (determined in previous sections) was grossed up to accommodate for 11.4% losses.
(3) Total well supply must be able to accommodate MDD.

4.1.2.5 Spring Mountain Motorsports Ranch Water Supply

Spring Mountain Motorsports Ranch has two active wells with a total pumping capacity of 940 gpm. This equates to a daily capacity of 1.35 MGD. Both wells have the same pumping capacity of 470 gallons per minute. With one well out of service, the system has a daily capacity of 0.68 MGD.

An analysis of the Spring Mountain Motorsports Ranch well capacity versus existing and projected demands is presented in Table 4.05. To accommodate for system losses (NRW), the water supply demand was grossed up by 33.4%, which results in a total ADD of 28 gpm for existing conditions and an anticipated 36 gpm by 2044. Refer to Table 3.17b and Table 3.18b for the well production requirements. The MDD is estimated at 2.43 times the ADD for the SMMR water system and is calculated as 68 gpm for existing conditions and 88 gpm by 2044. The SMMR water system can meeting existing and future (2044) demands, as shown in Table 4.05.

Table 4.05: Spring Mountain Motorsports Ranch Well Capacity

System Well Capacity			
Wells	**Backup Power**		**Capacity(1) (gpm)**
SMMR 1	NO		470
SMMR 2	YES		470
		Total, All Wells in Service	**940**
		Total, SMMR 1 Out of Service	**470**
System Demand			
Year	**ADD(2) (gpm)**	**MDD (gpm)**	**Can Well Supply(3) Meet MDD?**
2022	28	68	YES
2044	36	88	YES

Notes:
(1) Capacities are based on the most recent review conducted in 2023 by Lumos Staff.
(2) System demand (determined in previous sections) was grossed up to accommodate for 33.4% 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.66725, 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-PD 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-PD uses 1,500 gpm for 2 hours for residential and 2,000 gpm for 2 hours for 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-PD 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.

4.1.3.1 Calvada Valley System Capacity

There are three storage tanks (Low Zone Tank, Mesquite Tank, and High Zone Tank) in the Calvada Valley system for a total nominal storage capacity of 3.55 million gallons (MG). The Calvada Valley system also houses five wells (Well 1, 2, 9, 11, and 12), three of which have backup power (Well 2, 11, and 12). The three wells that have backup power, which are considered "Alternative Pumping Capacity" and count towards storage capacity per NAC 445A.66725 and NAC 445A.6554) supply a total of 4.73 MGD to the system. The Calvada Valley system has a required fire flow capacity of 2,000 gpm for 2 hours due to commercial connections. Table 4.06 and Table 4.07 summarize the system capacity analysis for Calvada Valley in 2022 and 2044, respectively. The system capacity analysis is based on the storage provided by the existing tanks, as well as the additional alternative pumping capacity from the wells with backup power. Based on the analysis, the Calvada Valley water system meets the existing (2022) and future (2044) storage requirements.

Table 4.06: GBWC-PD Calvada Valley 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)	3,288,825	Operating Storage for ADD(3) (gal)	1,934,603
Emergency Reserve(4) (gal)	1,934,603	Emergency Reserve(4) (gal)	1,934,603
Fire Flow (gal) 2,000 gpm for 2 hours	240,000	Fire Flow (gal) 2,000 gpm for 2 hours	240,000
Required Storage (gal)	**5,463,428**	**Required Storage (gal)**	**4,109,206**
System Storage Capacity(6)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
CV Low Zone Tank 1 (gal)	750,000	CV Low Zone Tank 1 (gal)	750,000
CV Mesquite Tank (gal)	1,600,000	CV Mesquite Tank (gal)	1,600,000
CV High Zone Tank 1 (gal)	1,200,000	CV High Zone Tank 1 (gal)	1,200,000
Well #2 (gal)	1,850,400	Well #2 (gal)	1,850,400
Well #11 (gal)	1,873,440	Well #11 (gal)	1,873,440
Well #12 (gal)	1,008,000	Well #12 (gal)	1,008,000
Total Capacity (gal) All Wells in Service	**8,281,840**	**Total Capacity (gal) Largest Producer Out of Service**	**6,408,400**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	5,463,428	Required Storage (gal)	4,109,206
Total Capacity (gal)	8,281,840	Total Capacity (gal)	6,408,400
Difference (gal)	**2,818,412**	**Difference (gal)**	**2,299,194**
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 16.6% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 1.62 (determined in previous sections).

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

(5) Mountain View Estates was consolidated into Calvada Valley in 2023. For the purpose of calculating an accurate peaking factor for the consolidated system moving forward, these values include historical data for Mountain View Estates

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

Table 4.07: GBWC-PD Calvada Valley Future (2044) System Capacity Analysis

System Storage Requirements(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Operating Storage for MDD(3) (gal)	4,296,658	Operating Storage for ADD(3) (gal)	2,527,446
Emergency Reserve(4) (gal)	2,527,446	Emergency Reserve(4) (gal)	2,527,446
Fire Flow (gal) 2,000 gpm for 2 hours	240,000	Fire Flow (gal) 2,000 gpm for 2 hours	240,000
Required Storage (gal)	**7,064,104**	**Required Storage (gal)**	**5,294,892**
System Storage Capacity(6)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
CV Low Zone Tank 1 (gal)	750,000	CV Low Zone Tank 1 (gal)	750,000
CV Mesquite Tank (gal)	1,600,000	CV Mesquite Tank (gal)	1,600,000
CV High Zone Tank 1 (gal)	1,200,000	CV High Zone Tank 1 (gal)	1,200,000
Well #2 (gal)	1,850,400	Well #2 (gal)	1,850,400
Well #11 (gal)	1,873,440	Well #11 (gal)	1,873,440
Well #12 (gal)	1,008,000	Well #12 (gal)	1,008,000
Total Capacity (gal) All Wells in Service	**8,281,840**	**Total Capacity (gal) Largest Producer Out of Service**	**6,408,400**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	7,064,104	Required Storage (gal)	5,294,892
Total Capacity (gal)	8,281,840	Total Capacity (gal)	6,408,400
Difference (gal)	**1,217,736**	**Difference (gal)**	**1,113,508**
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 16.6% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 1.62 (determined in previous sections).

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

(5) Mountain View Estates was consolidated into Calvada Valley in 2023. For the purpose of calculating an accurate peaking factor for the consolidated system moving forward, these values include historical data for Mountain View Estates.

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

4.1.3.2 Country View Estates/Calvada North System Capacity

There is one storage tank in the CVE/CN system for a storage capacity of 0.75 MG. Additionally, there are three wells in the system (CVE 48-1, CVE 48-2, and CN 1), two of which have backup power (CVE 48-1, CVE 48-2) The two wells that have backup power which are considered "Alternative Pumping Capacity" and counts towards storage capacity per NAC 445A.66725 and NAC 445A.6554) supply a total of 0.698 MGD to the system. The Country View Estates/Calvada North system has a required fire flow capacity of 2,000 gpm for 2 hours due to commercial connections.

Table 4.08 and Table 4.09 summarize the system capacity analysis for the CVE/CN system in 2022 and 2044, respectively. The system capacity analysis is based on the storage provided by the existing tanks, as well as the additional alternative pumping capacity from the wells with backup power. Based on the analysis, the CVE/CN water system meets the existing (2022) and future (2044) storage requirements.

Should the only storage tank in this service area be out of service, there will be no emergency storage for fire flow. It is recommended that the operations team devise an emergency storage plan for this area that could include a temporary bladder tank or use of other large private water storage facilities in the area.

Table 4.08: GBWC-PD CVE/CN 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)	231,794	Operating Storage for ADD(3) (gal)	140,481
Emergency Reserve(4) (gal)	140,481	Emergency Reserve(4) (gal)	140,481
Fire Flow (gal) 2,000 gpm for 2 hours	240,000	Fire Flow (gal) 2,000 gpm for 2 hours	240,000
Required Storage (gal)	**612,275**	**Required Storage (gal)**	**520,962**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Tank 1 (gal)	750,000	Tank 1 (gal)	750,000
CVE 48-1 (gal)	272,160	CVE 48-1 (gal)	272,160
CVE 48-2 (gal)	426,240	CVE 48-2 (gal)	426,240
Total Capacity (gal) All Wells in Service	**1,448,400**	**Total Capacity (gal) Largest Producer Out of Service**	**1,022,160**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	612,275	Required Storage (gal)	520,962
Total Capacity (gal)	1,448,400	Total Capacity (gal)	1,022,160
Difference (gal)	**836,125**	**Difference (gal)**	**501,198**
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 24.2% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 1.65 (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 4.09: GBWC-PD CVE/CN Future (2044) 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)	298,554	Operating Storage for ADD (3) (gal)	180,942
Emergency Reserve (4) (gal)	180,942	Emergency Reserve (4) (gal)	180,942
Fire Flow (gal) 2,000 gpm for 2 hours	240,000	Fire Flow (gal) 2,000 gpm for 2 hours	240,000
Required Storage (gal)	**719,496**	**Required Storage (gal)**	**601,884**
System Storage Capacity (5)			
Scenario A (1) = MDD + FF		Scenario B (2) = ADD + FF – Well (Largest Producer)	
Tank 1 (gal)	750,000	Tank 1 (gal)	750,000
CVE 48-1 (gal)	272,160	CVE 48-1 (gal)	272,160
CVE 48-2 (gal)	426,240	CVE 48-2 (gal)	426,240
Total Capacity (gal) All Wells in Service	**1,448,400**	**Total Capacity (gal) Largest Producer Out of Service**	**1,022,160**
System Storage Requirement/Capacity Comparison			
Scenario A (1) = MDD + FF		Scenario B (2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	719,496	Required Storage (gal)	601,884
Total Capacity (gal)	1,448,400	Total Capacity (gal)	1,022,160
Difference (gal)	**728,904**	**Difference (gal)**	**420,276**
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 24.2% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 1.65 (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.

4.1.3.3 Calvada Meadows System Capacity

There is one 3,000-gallon hydropneumatic tank and one well (CVM 1) that supplies 0.36 MGD in the Calvada Meadows system. The CVM 1 well has a backup power supply, which is considered

"Alternative Pumping Capacity" and counts towards storage capacity per NAC 445A.66725 and NAC 445A.6554. The Calvada Meadows system has a required fire flow capacity of 2,000 gpm for 2 hours due to commercial connections.

Table 4.10 summarizes the system capacity analysis for Calvada Meadows in both 2022 and 2044, since Calvada Meadows is at buildout and will not have any additional water connections in the future (as discussed in previous sections). The system capacity analysis is based on the storage provided by the existing hydropneumatic tank, as well as the additional alternative pumping capacity from the well with backup power. Based on the analysis, the Calvada Meadows water system meets the existing (2022) and future (2044) storage requirements under Scenario A, but does not meet existing (2022) and future (2044) storage requirements under Scenario B.

Due to the small size of this service area, the standard requirements for storage are excessive. The well and hydro tank are capable of meeting the daily demands of the system but cannot provide fire protection. Should there be a well failure, the customers would be without water.

Table 4.10: GBWC-PD Calvada Meadows Existing (2022) and Future (2044) 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)	9,042	Operating Storage for ADD(3) (gal)	4,669
Emergency Reserve(4) (gal)	4,669	Emergency Reserve(4) (gal)	4,669
Fire Flow (gal) 2,000 gpm for 2 hours	240,000	Fire Flow (gal) 2,000 gpm for 2 hours	240,000
Required Storage (gal)	**253,711**	**Required Storage (gal)**	**249,338**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Hydropneumatic Tank (gal)	3,000	Hydropneumatic Tank (gal)	3,000
CVM 1	360,000	CVM 1	360,000
Total Capacity (gal) All Wells in Service	**363,000**	**Total Capacity (gal) Largest Producer Out of Service**	**3,000**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	253,711	Required Storage (gal)	249,338
Total Capacity (gal)	363,000	Total Capacity (gal)	3,000
Difference (gal)	**109,289**	**Difference (gal)**	**-246,338**
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 5.2% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 1.94 (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.

4.1.3.4 Mountain Falls System Capacity

There are currently two storage tanks (Tank 1 and Tank 2) in the Mountain Falls system for a total storage capacity of 2.60 MG. The Mountain Falls system also houses two wells (Well MF 1 and Well MF 2), which supply a total of 4.64 MGD to the system. Both wells have a backup power supply, which is considered "Alternative Pumping Capacity" and counts towards storage capacity per NAC 445A.66725 and NAC 445A.6554. The Mountain Falls system has a required fire flow capacity of 2,000 gpm for 2 hours due to commercial connections.

Table 4.11 and Table 4.12 summarize the system capacity analysis for Mountain Falls in 2022 and 2044, respectively. The system capacity analysis is based on the storage provided by the existing tanks, as well as the additional alternative pumping capacity from the wells with backup power. Based on the analysis, the Mountain Falls water system meets the existing (2022) and future (2044) storage requirements.

Table 4.11: GBWC-PD Mountain Falls 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)	1,218,793	Operating Storage for ADD(3) (gal)	536,913
Emergency Reserve(4) (gal)	536,913	Emergency Reserve(4) (gal)	536,913
Fire Flow (gal) 2,000 gpm for 2 hours	240,000	Fire Flow (gal) 2,000 gpm for 2 hours	240,000
Required Storage (gal)	**1,995,706**	**Required Storage (gal)**	**1,313,826**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Tank 1 (gal)	1,200,000	Tank 1 (gal)	1,200,000
Tank 2 (gal)	1,400,000	Tank 2 (gal)	1,400,000
Well MF 1 (gal)	2,204,640	Well MF 1 (gal)	2,204,640
Well MF 2 (gal)	2,259,360	Well MF 2 (gal)	2,259,360
Total Capacity (gal) All Wells in Service	**7,064,000**	**Total Capacity (gal) Largest Producer Out of Service**	**4,804,640**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	1,995,706	Required Storage (gal)	1,313,826
Total Capacity (gal)	7,064,000	Total Capacity (gal)	4,804,640
Difference (gal)	**5,068,294**	**Difference (gal)**	**3,490,814**
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 11.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.27 (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 4.12: GBWC-PD Mountain Falls Future (2044) 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)	1,594,335	Operating Storage for ADD(3) (gal)	702,350
Emergency Reserve(4) (gal)	702,350	Emergency Reserve(4) (gal)	702,350
Fire Flow (gal) 2,000 gpm for 2 hours	240,000	Fire Flow (gal) 2,000 gpm for 2 hours	240,000
Required Storage (gal)	**2,536,685**	**Required Storage (gal)**	**1,644,700**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Tank 1 (gal)	1,200,000	Tank 1 (gal)	1,200,000
Tank 2 (gal)	1,400,000	Tank 2 (gal)	1,400,000
Well MF 1 (gal)	2,204,640	Well MF 1 (gal)	2,204,640
Well MF 2 (gal)	2,259,360	Well MF 2 (gal)	2,259,360
Total Capacity (gal) All Wells in Service	**7,064,000**	**Total Capacity (gal) Largest Producer Out of Service**	**4,804,640**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	2,536,685	Required Storage (gal)	1,644,700
Total Capacity (gal)	7,064,000	Total Capacity (gal)	4,804,640
Difference (gal)	**4,527,316**	**Difference (gal)**	**3,159,940**
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 11.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.27 (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.

4.1.3.5 Spring Mountain Motorsports Ranch System Capacity

There are currently two storage tanks (Tank 1 and Tank 2) in the SMMR system for a total storage capacity of 1.1 MG. The SMMR system also houses two wells (SMMR 1 and SMMR 2), of which only SMMR 2 has backup power. The SMMR 2 well supplies 0.68 MGD of water to the system and is considered as "Alternative Pumping Capacity", therefore, also counts towards storage capacity per NAC 445A.66725 and NAC 445A.6554. The SMMR system has a required fire flow capacity of 2,375 gpm for 4 hours based on the Water System Design Report provided in Appendix M.

Table 4.13 and Table 4.14 summarize the system capacity analysis for SMMR in 2022 and 2044, respectively. The system capacity analysis is based on the storage provided by the existing tanks, as well as the additional alternative pumping capacity from the well with backup power. Based on the analysis, the SMMR water system meets the existing (2022) and future (2044) storage requirements.

Table 4.13: GBWC-PD SMMR 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)	73,793	Operating Storage for ADD(3) (gal)	30,326
Emergency Reserve(4) (gal)	30,326	Emergency Reserve(4) (gal)	30,326
Fire Flow (gal) 2,375 gpm for 4 hours(6)	570,000	Fire Flow (gal) 2,375 gpm for 4 hours(6)	570,000
Required Storage (gal)	**674,119**	**Required Storage (gal)**	**630,652**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Tank 1 (gal)	550,000	Tank 1 (gal)	550,000
Tank 2 (gal)	550,000	Tank 2 (gal)	550,000
SMMR 2 (gal)	676,800	SMMR 2 (gal)	676,800
Total Capacity (gal) All Wells in Service	**1,776,800**	**Total Capacity (gal) Largest Producer Out of Service**	**1,100,000**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	674,119	Required Storage (gal)	630,652
Total Capacity (gal)	1,776,800	Total Capacity (gal)	1,100,000
Difference (gal)	**1,102,681**	**Difference (gal)**	**469,348**
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 33.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.43 (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.

(6) Fire flow estimate per Water System Design Report for Spring Mountain Motorsports Ranch by Golder Associates (see Appendix M)

Table 4.14: GBWC-PD SMMR Future (2044) 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)	96,932	Operating Storage for ADD(3) (gal)	39,835
Emergency Reserve(4) (gal)	39,835	Emergency Reserve(4) (gal)	39,835
Fire Flow (gal) 2,375 gpm for 4 hours(6)	570,000	Fire Flow (gal) 2,375 gpm for 4 hours(6)	570,000
Required Storage (gal)	**706,767**	**Required Storage (gal)**	**649,670**
System Storage Capacity(5)			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Tank 1 (gal)	550,000	Tank 1 (gal)	550,000
Tank 2 (gal)	550,000	Tank 2 (gal)	550,000
SMMR 2 (gal)	676,800	SMMR 2 (gal)	676,800
Total Capacity (gal) All Wells in Service	**1,776,800**	**Total Capacity (gal) Largest Producer Out of Service**	**1,100,000**
System Storage Requirement/Capacity Comparison			
Scenario A(1) = MDD + FF		Scenario B(2) = ADD + FF – Well (Largest Producer)	
Required Storage (gal)	706,767	Required Storage (gal)	649,670
Total Capacity (gal)	1,776,800	Total Capacity (gal)	1,100,000
Difference (gal)	**1,070,033**	**Difference (gal)**	**450,330**
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 33.4% to account for system losses (determined in previous sections). MDD was determined by applied the MDD/ADD factor of 2.43 (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.

(6) Fire flow estimate per Water System Design Report for Spring Mountain Motorsports Ranch by Golder Associates (see Appendix M)

4.2 Water Distribution System

The water distribution system was analyzed by hydraulically modeling the Calvada Valley, Calvada North/Country View Estates, Mountain Falls, and SMMR water systems. The hydraulic model was analyzed on an existing demand basis for average day demand (ADD), maximum day demand (MDD), peak hour demand (PHD), and fire flow conditions. The pipeline network was also evaluated based on flow velocities and head losses as they relate to pressures throughout the distribution system. Where deficiencies were noted, additional modeling was performed with potential changes to the system to determine the most technically feasible, cost-effective solutions.

The goal for developing solutions to problematic areas of the distribution network was to improve efficiency by making the most cost-effective changes necessary to correct each deficiency. Consideration was also given to the most pressing problems and those that affect the greatest number of customers. The overall objective was to produce a fully functional and compliant system at the lowest cost to ratepayers.

Design criteria are outlined in NAC 445A.6672 and are summarized in Table 4.15.

Table 4.15: Design Criteria

Parameter	Criteria
Pressure/Flow Requirements	
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 Requirements	
Minimum Residual Pressure	20 psi
Minimum Residential Fire Flow	1,000 gpm
Minimum Commercial Fire Flow	1,500 gpm
Design Commercial Fire Flow	2,000 gpm

Notes:
(1) Provision of NAC 445A.6672.
(2) American Water Works Association (AWWA) standard.
(3) From the Southern Nevada Consensus Fire Code Amendments, the minimum required fire flow for one- and two-family dwellings is 1,000gpm and the minimum required fire flow for buildings other than one- and two-family dwellings is 1,500 gpm.
(4) In accordance with IFC 2018 and based on commercial building square footage within the service area, the minimum commercial fire flow used for design of the system is 2,000 gpm.

Model Selection and Development

The GBWC-PD hydraulic water models were analyzed using the Bentley WaterCAD v8i modeling software. The existing model for the GBWC-PD Calvada Valley water system was selected to begin the process from the previously submitted 2021 IRP. The Calvada North/Country View Estates, Mountain Falls, and SMMR models were obtained from consultants who created the models for

GBWC-PD. The existing models were updated with all additional connections that have occurred since the last updates. The models were updated to fit current conditions, including updating all system demands based on 2020 to 2022 water usage analysis and updating the status of open and closed valves to reflect current operational strategy.

Existing Demands Update

Based on available information, the method used in updating the model demands was a multi-step process. The following summary outlines how the model was updated.

- System ADD were analyzed based on meter data from 2020 to 2022. The new demands were evenly adjusted across all nodes in the hydraulic models to match the system ADD presented in the previous section of this report. Since growth in the service area is well distributed and not centralized to any location, a global adjustment was justified.

- The Mountain View system connection to the Calvada system was completed in 2023 and incorporated in the hydraulic model update. Demands from the Mountain View system were applied based on the ADD determined for that system from 2020 to 2022 meter data analysis completed in previous sections.

- The updated average day demands developed in the previous step were globally adjusted to the existing MDD for the water system. This was done by applying the MDD/ADD peaking factor based on 2020-2022 well production data. PHD was incorporated into the model by multiplying the MDD by 1.75.

- To adjust the model for the 3-Year Action Plan (2027) and projected 20-year Preferred Plan (2044), the water systems were globally adjusted based on the estimated ADD for each scenario. The ADD was then globally adjusted to the estimated MDD using the MDD/ADD peaking factors.

- The 20-year Preferred Plan (2044) model also involved the addition of any piping, nodes, or demand that is assumed to be installed by that time.

Table 4.16 through Table 4.19 present the existing and anticipated demands used in the hydraulic models.

Table 4.16: Calvada Valley Hydraulic Model Loading

Area	ADD (gpm)	MDD (gpm)	PHD (gpm)
Existing Conditions	1,343	2,283	3,995
Action Plan (2027)	1,410	2,397	4,195
Preferred Plan (2044)	2,243	3,813	6,673
Note: (1) Hydraulic model loading excludes system losses			

Table 4.17: Calvada North/Country View Estates Hydraulic Model Loading

Area	ADD (gpm)	MDD (gpm)	PHD (gpm)
Existing Conditions	97	160	280
Action Plan (2027)	102	168	294
Preferred Plan (2044)	125	206	361
Note: (1) Hydraulic model loading excludes system losses			

Table 4.18: Mountain Falls Hydraulic Model Loading

Area	ADD (gpm)	MDD (gpm)	PHD (gpm)
Existing Conditions	373	847	1,482
Action Plan (2027)	393	891	1,560
Preferred Plan (2044)	488	1,108	1,939
Note: (1) Hydraulic model loading excludes system losses			

Table 4.19: SMMR Hydraulic Model Loading

Area	ADD (gpm)	MDD (gpm)	PHD (gpm)
Existing Conditions	21	51	89
Action Plan (2027)	22	54	94
Preferred Plan (2044)	27	66	115
Note: (1) Hydraulic model loading excludes system losses			

The hydraulic modeling scenarios performed include:

- Existing Static
- Existing MDD
- Existing MDD + Fire
- Existing PHD
- 3-Year Action Plan (2027) Static
- 3-Year Action Plan (2027) MDD
- 3-Year Action Plan (2027) MDD + Fire
- 3-Year Action Plan (2027) PHD
- 20-Year Preferred Plan (2044) Static
- 20-Year Preferred Plan (2044) MDD
- 20-Year Preferred Plan (2044) MDD + Fire
- 20-Year Preferred Plan (2044) PHD

The GBWC-PD water systems were evaluated using Bentley WaterCAD v10i modeling software and carefully applied data, assumptions, and operating conditions. The goal of the analysis was to identify weaknesses in the distribution networks that would lead to unacceptable pressure conditions, reduced fire-flow capacity, and energy waste through high head losses.

4.2.1 Distribution System Evaluation

4.2.1.1 Calvada Valley Distribution System

Several areas within Calvada Valley were found to have high pressures (>100 psi). High pressures are known to increase the rate of main breaks and leaks in a water distribution system and the associated water losses. Two nodes were identified in the High Zone to be borderline for required MDD pressure; however, this is within the margin of error for modeling discrepancies and is not considered an issue until the model can be further calibrated. No regional distribution areas were observed with low distribution pressures. Detailed model results can be found in Appendix H.

The Calvada Valley System is currently divided into three pressure zones – the High Zone, the Low Zone, and the Mountain View Zone. The majority of the high pressures in the system were observed in the Low Zone.

Only a small amount of distribution pipes was observed to exceed the maximum head loss requirement (10 ft./1,000 ft.). With the exception of one pipe, the distribution piping meets the criteria for velocity, with velocities less than 8 feet per second observed at peak demands.

Existing Conditions
The hydraulic distribution model for existing conditions meets the majority of the design criteria described in Table 4.15 with the exception of nodes that appear to be active distribution nodes with pressures higher than 100 psi. Most of the high-pressure nodes were in the Low Pressure Zone.

Action Plan (2027)
Similar to existing conditions scenario, the 3-year Action Plan (2027) hydraulic model appears to satisfy most of the criteria described in Table 4.15, with the exception of nodes that appear to be active distribution nodes with pressures higher than 100 psi. Again, the majority of the high-pressure nodes were in the Low Pressure Zone.

Preferred Plan (2044)
The Preferred Plan (2044) hydraulic model appears to satisfy most of the criteria described in Table 4.15, with the exception of nodes that appear to be active distribution node with pressures higher than 100 psi.

4.2.1.2 Calvada North/Country View Estates Distribution System

Two nodes within Calvada North/Country View Estates were found to have low pressures (<40 psi) at maximum day demand (MDD). One node is borderline to meet MDD required pressure and is within the margin of error for modeling discrepancies and is not considered an issue until the model can be further calibrated. Several areas were identified as deficient for fire flow requirements. The deficient areas are served by a single radial main without a secondary source;

looped pipeline would improve fire flow conditions to these areas. No regional distribution areas were observed with high distribution pressures. Detailed model results can be found in Appendix H.

The Calvada North/Country View Estates System is currently divided into two pressure zones, referred to herein as the Calvada North Zone and the Country View Estates Zone.

Only two distribution pipes were observed to exceed the maximum head loss requirement (10 ft./1,000 ft.). The distribution piping meets the criteria for velocity, with velocities less than 8 feet per second observed at peak demands.

Existing Conditions

The hydraulic distribution model for existing conditions meets the majority of the design criteria described in Table 4.15 with the exception of two nodes with nodes less than 40 psi at MDD, and radial areas that do not meet fire flow requirements.

Action Plan (2027)

Similar to existing conditions scenario, the 3-year Action Plan (2027) hydraulic model appears to satisfy the majority of the design criteria described in Table 4.15 with the exception of two nodes with nodes less than 40 psi at MDD, and radial areas that do not meet fire flow requirements.

Preferred Plan (2044)

The Preferred Plan (2044) hydraulic model appears to satisfy the majority of the design criteria described in Table 4.15 with the exception of two nodes with nodes less than 40 psi at MDD, and radial areas that do not meet fire flow requirements.

4.2.1.3 Mountain Falls Distribution System

All distribution nodes within the Mountain Falls system were found to meet minimum pressure requirements. Detailed model results can be found in Appendix H.

The Mountain Falls System is divided into two pressure zones, an upper zone that contains the wells and tanks, and a lower zone that contains all distribution nodes. For the purpose of evaluations, only the distribution zone was considered.

A number of distribution pipes were observed to exceed the maximum velocity (8 feet per second). These mains are the primary transmission mains that convey all water supply into the distribution system. The remaining distribution piping meets the criteria for velocity, with velocities less than 8 feet per second observed at peak demands, and maximum head loss below the requirement (10 ft./1,000 ft.).

Existing Conditions

The hydraulic distribution model for existing conditions meets the majority of the design criteria described in Table 4.15 with the exception of several pipelines that exceed maximum velocity.

Action Plan (2027)
Similar to existing conditions scenario, the 3-year Action Plan (2027) hydraulic model appears to satisfy the majority of the design criteria described in Table 4.15 with the exception of several pipelines that exceed maximum velocity.

Preferred Plan (2044)
The Preferred Plan (2044) hydraulic model appears to satisfy the majority of the design criteria described in Table 4.15 with the exception of several pipelines that exceed maximum velocity.

4.2.2 System Deficiencies and Alternatives for Improvements

4.2.2.1a Calvada Valley System Issues

Distribution Pressure:
There are currently three pressures zones in the Calvada Valley System (Low Zone, High Zone, and Mountain View Zone). One issue identified in the Low Zone is pressures exceeding 100 psi. These high pressures can cause increases in breaks and leaks in the pipe as well as increases in the volume of water lost.

Distribution Piping:
There does not appear to be any serious distribution piping issues.

Storage:
With the addition of alternative pumping capacity from Wells 2, 11, and 12 (in 2021) containing backup generators, the Calvada Valley system storage capacity can meet existing and the projected 2044 storage capacity requirements. All three storage tanks are equipped with cathodic protection which should add longevity to the tanks with proper maintenance. No immediate issues with storage were identified for the Calvada Valley Water System.

Wells and Production
Currently, the production from the wells in the Calvada Valley Water System can meet existing and projected (2044) demands. One major concern with the existing wells is the age of many of the wells. The average age of four of the existing wells, (Wells 1, 2, 9, and 11) is approximately 63 years old. With the standard nominal useful life of a well with good quality construction being roughly 40 (±5) years, many of these wells are at or very near the end of their useful life expectancy. Wells 1 and 12 were rehabilitated in 2022, Well 2 was rehabilitated in 2020, and Well 11 was rehabilitated in 2018, which should extend the useful life of these wells. However, replacement of several of these wells will be required in the near future to continue meeting capacity requirements.

Non-Revenue Water
The non-revenue water over the past three years (2020-2022) averaged 16.6%, which is considered high although it represents an improvement from previous years.

4.2.2.1b Calvada Valley System Recommended Solutions

Distribution Pressure
A complete calibration of the WaterCAD model should be conducted to validate the results of the model, which will help to ensure the integrity of the model results over time.

Distribution Piping
There does not appear to be any serious distribution piping issues.

Storage
The storage tank inspections should continue to be conducted on a 3–5-year schedule to ensure their integrity.

Wells and Production
Complete the construction of a new production well to replace Well 9 within the Preferred Plan (2028). Annual wire-to-water efficiency testing.

Non-Revenue Water
The following measures are and should continue being taken by GBWC-PD as an ongoing effort to limit water losses from the water production process to the water delivery point:

- Reservoirs are thoroughly inspected at regular intervals to assure integrity against leakage.
- All pipeline leaks are fixed as soon as possible with water losses estimated.
- Customer meters are reviewed and monitored for consumption anomalies.
- Asset Management programs should be continued to help identify and replace old infrastructure and portions of infrastructure susceptible to leaks.
- Reinitiate the well production meters calibrations and testing annually for accuracy.
- Continue annual monitoring of the NRW to help identify problematic areas and continue upgrading customer meters to AMR.

4.2.2.2a Calvada North/Country View Estates Issues

Distribution Pressure
Several areas are deficient for fire flow requirements at the required residual pressure. Two nodes are deficient for MDD scenarios.

Distribution Piping
Pipeline looping projects should be explored to bring radial areas into compliance with fire flow requirements.

Storage
The Calvada North/Country View Estates storage tank (750,000 gallons) meets existing and projected (2044) requirements for storage in the water system. The existing storage tank is equipped with cathodic protection, which should extend its useful life beyond the estimated

remaining life of 26 years (based on a nominal life expectancy of 45 years). No issues at this time were identified.

Wells and Production
Based on the existing well capacity analysis of Wells CVE 48-1, CVE 48-2, and CN 1, there is plenty of capacity to meet existing and future projected (2044) demands for the Calvada North/Country View Estates Water System. Wells CV 48-1 and CV 48-2 are scheduled for rehabilitation in late 2023 and Well CN 1 was partially rehabilitated in early 2023.

Non-Revenue Water
For the past three years (2020-2022), the non-revenue water has averaged 24.2%. There appears to be a downward trend in the percentage of non-revenue water in the past three years.

4.2.2.2b Calvada North/Country View Estates Recommended Solutions

Distribution Pressure
A complete calibration of the WaterCAD model should be conducted to validate the results of the model, which will help to ensure the integrity of the model results over time. Pipeline looping projects should be explored to bring radial areas into compliance with fire flow requirements.

Distribution Piping
No recommendations.

Storage
The storage tank inspections should continue to be conducted on a 3–5-year schedule to ensure its integrity.

Wells and Production
Wells CV 48-1 and CV 48-2 are scheduled to be rehabilitated in the near future. Each well should continue to be routinely inspected for any new issues after rehabilitation and annual wire-to-water efficiency testing performed.

Non-Revenue Water
The following measures are and should continue being taken by GBWC-PD as an ongoing effort to reduce water losses from the water production process to the water delivery point:

- Reservoirs are thoroughly inspected at regular intervals to assure integrity against leakage.
- All pipeline leaks are fixed as soon as possible with water losses estimated.
- Customer meters are reviewed and monitored for consumption anomalies.
- Asset management programs should be continued to help identify and replace old infrastructure and portions of infrastructure susceptible to leaks.
- Reinitiate the well production meters calibrations and testing annually for accuracy.

- Continue annual monitoring of the NRW to help identify problematic areas and continue upgrading customer meters to AMR.

4.2.2.3a Mountain Falls Issues

Storage
Between the existing storage tank and alternative pumping capacity in the two wells, the Mountain Falls Water System meets existing and projected future (2044) storage requirements. The existing storage tank also contains cathodic protection, which will help extend the useful life of the storage tank once the floor of the tank is replaced.

Wells and Production
There is plenty of capacity to meet existing and future projected (2044) demands for the Mountain Falls Water System. No issues currently exist with the wells or production capacity.

Non-Revenue Water
The non-revenue water over the past three years (2020-2022) averaged 16.4%. There appears to be an upward trend in the percentage of non-revenue water in the past three years.

4.2.2.3b Mountain Falls Recommended Solutions

Storage
Continue to conduct storage tank inspections on a 3-to-5-year schedule to ensure integrity of the tanks.

Wells and Production
Continue to monitor water levels and document production and water levels on a monthly basis. Annual wire-to-water efficiency testing.

Non-Revenue Water
The following measures should continue to be taken by GBWC-PD as an ongoing effort to track and reduce water losses from the water production process to the water delivery point:

- Reservoirs are thoroughly inspected at regular intervals to assure integrity against leakage.
- All pipeline leaks are fixed as soon as possible with water losses estimated.
- Customer meters are reviewed and monitored for consumption anomalies.
- Asset Management programs should be continued to help identify and replace old infrastructure and portions of infrastructure susceptible to leaks.
- Reinitiate the well production meters calibrations and testing annually for accuracy.
- Continue annual monitoring of the NRW to help identify problematic areas.

4.3 Water Transfer Possibilities

There are two other utilities operating in the Pahrump Valley: Pahrump Utilities Company, Inc. ("PUCI") and Desert Utilities, Inc. ("DUI"). GBWC-PD maintains an existing interconnect with PUCI at Manse and Hafen Ranch Road. The interconnect is setup for manual operation only and historically has never been used.

4.4 Water Reliability

The GBWC-PD service area relies entirely on groundwater. Several factors that would affect the reliability of GBWC-PD's groundwater are limited source water through over-pumping or drought, water quality, infrastructure problems, legal issues such as forfeiture of sufficient water rights to serve, and catastrophic interruptions. There are currently no existing or projected water quality problems in the service area. The existing infrastructure is adequate to meet current needs.

4.4.1 Historic Effects of Drought

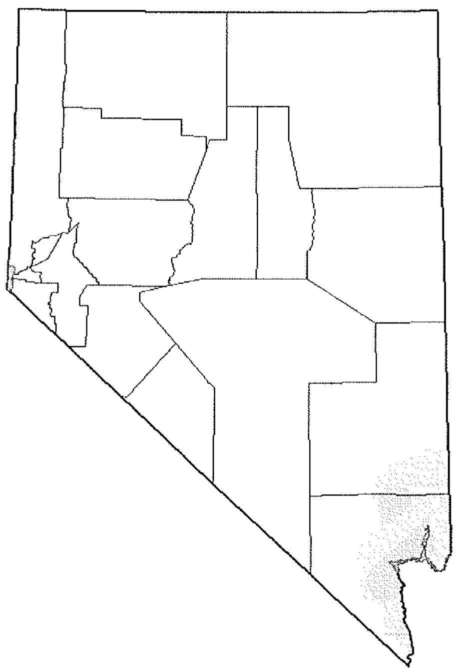
The groundwater source in the Pahrump Valley has been relatively drought resistant. However, over-pumping of portions of the basin where there is a high density of domestic wells has occurred, causing private wells to fail. It is highly recommended that GBWC-PD take steps to protect the health and sustainability of the basin for future reliable service.

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: https://drought.unl.edu/

Figure 4.01 is an example of the data provided on the website. Over the past year, the drought circumstances have significantly decreased due to the very wet conditions during the 2022/2023 winter months.

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
(Source: http://droughtmonitor.unl.edu/Maps/MapArchive.aspx)

4.4.2 Maintenance Program

The third factor affecting reliability is equipment availability. GBWC-PD has an active preventative maintenance program. Outages due to equipment breakdowns have not been frequent enough to affect the water supply. Long-term maintenance practices are being implemented, such as reservoir inspections and assessments, well casing inspection/cleaning, and replacement of equipment that is beyond its serviceable life. An asset management framework has been established and identifies that many wells in the GBWC-PD system are beyond their useful life. Rehabilitations of multiple wells have been performed in recent years to extend the useful life.

4.4.3 Catastrophic Interruption

GBWC-PD has an Emergency Action Plan ("EAP") discussed in Volume I and provided in Appendix J, and a Vulnerability Assessment ("VA") on file with the State of Nevada Department of Public Safety and Division of Emergency Management. In addition, GBWC-PD also has an Emergency Response Manual. All three of these documents are updated annually. They are kept in the GBWC-PD office and the Area Manager is responsible for updating them as necessary to accommodate new facilities, equipment, and technologies. In addition, all maps and schematics are kept secured at the office. The Emergency Response Manual, backflow program, valve maintenance program, and well and storage site inspection procedures are designed to assure that, in the event of an emergency, an affected location can be isolated and appropriate measures can be taken to minimize the time that a customer may be left without safe drinking water.

The plan, assessment, and manuals also provide consolidated access to emergency response teams, public notification partners, county and city officials, 24-hour response contractors, and other local support. The procedures for response are recorded for different categories of emergencies, be it natural and man-made.

4.4.3.1 Regional Power Outage

Large-capacity storage tanks and back-up generators protect the system from emergencies resulting from power outages. GBWC-PD has permanent emergency generators on Wells 2, 11 and 12 in the Calvada Valley system, on Wells 48-1 and 48-2 in Country View Estates/Calvada North, on both Wells 1 and 2 in Mountain Falls, and on Well 2 in Spring Mountain Motorsports Ranch. The utility owns two portable generators. The portable generators cannot operate any of the wells or lift stations over 75 HP unless they have VFDs as the 100 kW generators will not handle the inrush current on start-up of larger motors.

Wells 2 and 11 in the Calvada Valley system are the two largest producing wells in the system. There are also storage tanks, which will help keep the system pressurized in the event of a power outage. The Alfalfa Booster Station is equipped with a permanent generator. In addition, the Alfalfa Booster Station, in conjunction with Well 12 and SCADA, provides fire protection to a portion of the Calvada Valley system. In the event of a significant power outage, Wells 2, 11, and 12 will be operational.

The Calvada North/Country View Estates system has three wells, a storage tank, and a booster pumping facility. The two Country View Estates wells are the primary water supply, and they fill the storage tank on the same site. The booster pumping facility and wells have a shared permanent generator. No emergency generation improvements are necessary for this service area.

The Mountain Falls wells recently had their emergency backup generators repaired and replaced providing sufficient well capacity in the event of an emergency. In addition, there is a 1.2 MG and a 1.4 MG storage tank to help maintain water reliability and pressures during an emergency.

The Calvada Meadows Well is not equipped with an emergency generator. The portable generator for the water system can be connected to Calvada Meadows to provide emergency power. The Calvada Meadows system is a larger service area but still has few connections. If the well remains in service and continues to be the singular source for the service area, there will be a need for a permanent generator in the future. Until it is economically feasible with contributions from future developments, the portable generator should be sufficient for the 20-year projected customer base of 41 homes in a localized power outage scenario.

The wastewater treatment plants all have permanent emergency generators; however, not all the lift stations have permanent standby power. All lift stations without permanent standby power are equipped with generator receptacles (manual transfer switches) with the exception of Lift Station 8. A portable generator may be used with all lift stations equipped with generator receptacles. The two most critical lift stations are Lift Station 1 and Lift Station 2, which pump directly to Plant 3. These lift stations are slated to receive backup generators in 2024

All generators are exercised and maintained according to the GBWC-PD Generator Operation and Exercising Standard Operating Procedure, which is a part of the Emergency Response Manual. Should a sustained regional power outage occur, generators from other Corix companies could be brought to GBWC-PD to supplement power needs. However, the closest Corix affiliate outside of the Arizona/Nevada business unit is in the Austin, Texas area. Additionally, one portable generator is available within approximately 3 hours and another within approximately 8 hours of GBWC-PD. The plan, assessment, and manual also provide consolidated access to emergency response teams, public notification partners, county and city officials, 24-hour response contractors, and other local support. The procedures for response are recorded for different categories of emergencies, be it natural or man-made.

4.4.3.3 Man-Made Disasters

Man-made disasters can come in many forms. Fortunately, GBWC-PD 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.

The most likely source of contamination of water supplies is 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, Section G (effective July 2019) and Section 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.

4.4.3.4 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-PD will provide staff personnel to work in partnership with the local fire department to distribute drinking water. In the worst-case scenario, where GBWC-PD's wells and tanks cannot supply safe drinking water, bottled water must be provided. Should a catastrophic disaster occur in Pahrump, GBWC-PD has put the plans and resources together to respond quickly and efficiently to ensure safe drinking water.

4.5 Wastewater Collection

The wastewater collection system in the GBWC-PD service area primarily consists of gravity sewer mains with thirteen lift stations due to the general topography of the service area. The system was analyzed based on four factors:

1. The capacity and integrity of the gravity collection system.
2. The impact of fats, oils, and greases or industrial wastes to the system.
3. The impact of infiltration and inflow on the system.
4. The condition and capacity of the existing lift stations.

4.5.1 Gravity Collection System

The collection system has largely been sufficient to handle the wastewater flows of the service area.

4.5.2 Fats, Oils and Greases (FOG)

GBWC-PD continues the FOG Control Plan on a routine basis. Both the GBWC-PD and GBWC-SCD provide wastewater service and require a FOG Control Plan, which has been approved by NDEP and incorporated into the GBWC Tariff 1-S with Commission approval. The GBWC consolidated FOG Control Plan is attached in Appendix M.

4.5.3 Infiltration and Inflow

GBWC-PD monitors the infiltration and inflow through a routine maintenance program to inspect and retrofit the manhole covers with Inflow Rainstoppers inserts. The vactor truck and video van are valuable tools in assessing needed manhole repairs.

4.5.4 Lift Stations

All lift stations in the Pahrump Division have sufficient capacity to accommodate the 20-year projected flows. All lift stations are in good condition and no deficiencies were noted. Lift station pump capacities and pump run times were used to calculate influent flow into each lift station as shown in Table 4.20. Influent flows are well below pump capacities and demonstrate viable detention times (allotted time wastewater sits before pumped upstream). Pump run times for all of the lift stations suggest adequate pump cycle times and a minimal amount of starts within each hour, which lead to the longevity of pumps.

Table 4.20: GBWC-PD Wastewater Lift Stations Capacity

Lift Station	Pump 1 Flow Rate	Pump 2 Flow Rate	Pump 1 Average Run Time	Pump 2 Average Run Time	2022 Existing Influent Flow	2044 Projected Influent Flow
	(gpm)	(gpm)	(hrs/day)	(hrs/day)	(gpm)	(gpm)
1	650	650	4.5	4.7	249	325
2	250	250	2.2	2.3	47	61
3	550	550	5.3	6.7	275	359
4	500	500	5.4	6.7	252	329
5	--	--	1.7	5.2	--	--
6	--	--	0.1	0.1	--	--
7	130	130	1.8	2.2	22	28
8	--	--	0.75	0.45	--	--
10	500	500	2.7	3.1	121	158
11	500	500	2.5	2.8	110	144
LS 4 North	--	--	0.1	0.1	--	--
Plant F LS	105	105	1.7	2	16	21
SMMR	300	300	1.8	2	48	62

Note:
Pump capacities for Lift Stations 5, 6, 8, and 4 North could not be verified without taking the stations offline and removing the pumps to determine model and capacity.
Influent flow rates are based on pump capacity and average daily runtime, and therefore are not available for stations with unknown pump capacity.

4.6 Wastewater Treatment and Disposal

4.6.1 Wastewater Treatment System Design Criteria

GBWC-PD has four wastewater service areas as previously described. Each wastewater service area has one wastewater treatment facility located within the service area. Each facility was evaluated based on its capacity, operations, condition, and effluent disposal. The available capacity is based on the amount of wastewater generated per connection. Future available capacity was determined by extrapolating wastewater generated per connection the growth projections. This provides a timeline for when additional facilities will be needed.

The facility's effluent disposal systems were evaluated for their effectiveness and compliance with State regulatory requirements. Per NAC 445A.275 regulations, the minimum effluent quality required for reuse is secondary treatment defined as meeting 30 mg/L TSS, 30 mg/L CBOD,10 mg/L Nitrogen, pH ranging between 6-9, and a varying bacteriological quality based on intended use.

Each facility's effluent disposal was evaluated based on the applicable criteria to determine the long-term feasibility of meeting the regulatory requirements. Unreliable treatment or historical problems were investigated to determine their cause and potential solutions were evaluated based on technical and financial feasibility.

4.6.1.1 Plant 3

Based on average influent plant flows from 2020-2022, Plant 3 is operating at approximately 48% capacity and consistently meets effluent discharge requirements. Plant 3 has been in service since 1992, with upgrades and expansions completed in March of 2006 and 2020. A majority of the equipment is in "good" to "fair" condition, however there are also components that are in "poor" condition.

In the past ten years, a few upgrades have made the plant's operations more efficient. The solids handling equipment, which was undersized for the volume of solids being treated (especially in the winter), was upgraded in 2020 to a screw press system. In approximately 2014, a backup SBR submersible aerator mixer (SAM) unit was added. In the event that the working SAM unit fails and needs to be sent to the manufacturer to be rebuilt, the backup unit allows for a smooth transition/replacement of the SAM unit to keep the SBRs treatment process operating at full capacity.

Required upgrades are discussed below.

Sand Filters Rehabilitation:
While the previously discussed upgrades have helped to make the Plant 3 treatment process more efficient, the sand filters are aging and in need of rehabilitation to extend their useful life. The sand filter tanks are corroded and require cleaning, blasting, and coating. The sand media needs to be removed and replaced in order to inspect the underdrain, replenish media lost during periods of excess backwash, and replace degraded media to improve filter effectiveness. Replacement parts for the gearbox that operates the traveling bridge are no longer manufactured and would require custom machining to replace.

Emergency Storage:
Additional emergency storage would also help support operations at the facility. As mentioned above, the filters can become overloaded with suspended solids when the SBRs are not operating properly. This typically happens twice per year as temperature changes and the biology in the basins is adjusting. Once the filters become overloaded, the backwash volumes increase significantly and further negatively impact the SBRs. It can take up to two weeks to recover from these types of process issues. It is also recommended that some type of emergency storage or diversion of the filters be installed in the future to alleviate this process issue and potential impact to meeting permit limits.

4.6.1.2 Plant F

The facility is currently running at approximately 52% capacity. No capacity-related improvements are projected to be necessary to accommodate the 20-year flow projection.

4.6.1.3 Mountain Falls

The facility is currently running at approximately 16% capacity. The existing SBR facility at Mountain Falls is operating within its capacity and is not projected to need expansion in order to accommodate the 20-year flow projection. The facility is reported to be operating well with no necessary repairs or improvements required. A minor upgrade was completed in 2020 when the old Plant 3 solids handling equipment (SOMAR) was relocated to the Mountain Falls WWTP to increase sludge treatment capacity, provide improved redundancy, and improve efficiency at the WWTP. The influent bar screen was replaced in 2023.

4.6.1.4 Spring Mountain Motorsports Ranch

The facility is currently running at approximately 12% capacity and is not projected to require expansion to accommodate the 20-year flow projection.

4.7 Reclaimed Water

Both Plant 3 and the Mountain Falls WWTP produce reclaimed water, which has historically been used for golf courses and park irrigation. At this time, Plant F is too small to produce reclaimed water in a cost-effective manner. When the facility gets larger, there will be sufficient land for expansion to dispose of reclaimed water. Mountain Falls sends all of its reclaimed water to the Mountain Falls golf course; the golf course can take all of the reclaimed water the WWTP can deliver.

Plant 3
Plant 3 sends its reclaimed water to receiving ponds at the Discovery Park property. From the Discovery Park receiving ponds, there is a pump station that distributes irrigation water throughout the park and a second pump station, which sends some of the flow to the Lakeview Executive Golf Course (Lakeview) or to the Pahrump High School sports fields. Two rapid infiltration basins (RIBs) were created at the Discovery Park in 2019, each having a capacity of 625,000 gpd. They are mostly used during the winter months when the Lakeview Executive Golf Course stops taking effluent.

As the system grows, the reclaimed and disposal system should be expanded to make the most efficient use of this resource possible. Based on the current growth projections, there should be no need for additional expansion during the projected planning period.

SECTION 5.0: EMERGENCY ACTION PLAN

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-PD is provided in Appendix J.

SECTION 6.0: WATER CONVERSATION 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-PD 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 water demand for the term of the resource plan." NAC 704.5674. 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. Note that the improvements, later called out in the Utility Action Plan, are for recommended improvements to be implemented within the next three years and are not reviewed in this section. This Plan is a planning level guideline based on current growth projections and should be reviewed periodically and updated.

The 2024 IRP Preferred Plan for GBWC-PD 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 into the 2024 IRP, the Preferred Plan also includes recommendations associated with monitoring, maintenance, and inspections for several critical assets of the water and wastewater systems. 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-PD staff believes are prudent. The asset maintenance, monitoring, and smaller capital project 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-PD water and wastewater systems.

7.1 CIP Organization and Description

The Capital Improvement Projects (CIP) sections describe capital improvements, maintenance, and monitoring recommendations to the systems 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-PD 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 customers. The 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 which 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 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).

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

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-PD 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
5. Provide looping/waterline tie-ins of the distribution systems to reduce dead-ends and provide fire protection.

The 2024 IRP preferred plan includes projects that focus on the GBWC-PD systems which are described below.

7.2 Water Resources CIP

7.2.1 Well Replacement (Well 9, Calvada North Well, CVE Well 48-1, or Other Wells)

There are several wells in the GBWC-PD system that have exceeded (or will soon exceed) their useful service life and need replacement. Well replacements will need to be scheduled on an on-going basis to address aging infrastructure and to maintain production capacity. The existing Well 41 site has been identified as a potential location for a future replacement well. The site contains Well 41, an existing well that is not connected to the GBWC-PD system. A new municipal supply well would be drilled at the site. The location has the benefit of water rights associated with it in addition to a GBWC-PD pipeline in close proximity for connection to a new well. Beyond Well 41, the specific wells to be replaced will be identified in future IRP action plans based on well inspections and ongoing monitoring of production capacities and performance with consideration for added service life resulting from successful well rehabilitations. To address the aging assets, a well replacement project has been scheduled and budgeted for every 4 years in the Preferred Plan with the assumption that each project will span two (2) project years. Budgetary capital costs for ongoing well replacement projects are as follows:

- <u>Well Replacement (every four years)</u>
  Estimated Cost: $1,600,000 per project
  Project Years: 2028-2029, 2032-2033, 2036-2037, 2040-2041, 2043-2044

7.2.2 Calvada Meadows Replacement Well Project (Alternative to Calvada Meadows System Consolidation)

The Calvada Meadows Water System is a stand-alone water system with only one municipal supply well (Well 1). The well was originally drilled in 1989 with a 10-inch nominal steel casing to a depth of 500 feet. Starting in 2016, the well has seen an increase in sand production that has resulted in GBWC-PD installing a de-sander device on the surface of the well to help reduce the sand content from plugging and fouling valves in the system. According to GBWC-PD, the amount of sand has been steadily increasing, which is usually an indication that the well casing (or screen interval) is structurally failing. Since this is the only water source for the water system and the system's only storage is a 3,000-gallon hydropneumatic tank, it would be very difficult to take the well offline and conduct an inspection of the casing. In addition, sometimes when wells are taken offline and the casing is in poor condition, the pulling of the pumping equipment causes a full failure of the well.

This Preferred Plan project is considered to be an alternative to either of the pipeline tie-in and system consolidation projects that are being proposed in the Action Plan, both of which are preferred over this approach. This alternative would involve the replacement of the existing Well 1 and discharge piping. While this project would replace the water source, it does not provide a redundant water supply or increase fire flow for the stand-alone water system. The cost to replace the existing well and discharge piping followed by abandonment of the old well is provided below along with the target year. If either of the tie-in projects in the Action Plan are approved, then there will be no need to move forward with this replacement project.

- <u>Calvada Meadows Replacement Well Project</u>
  Estimated Cost: $2,000,000
  Project Year: 2030

Regardless of whether the well replacement project is completed in the Preferred Plan, the existing hydropneumatic tank will also require replacement in approximately 2033 at the end of its useful life. Consolidation through a pipeline tie-in would remove the need to replace the hydropneumatic tank by providing storage capacity from the consolidated system.

7.3 Water Distribution CIP

7.3.1 New Location for High Zone Booster Station

The Calvada Valley system conveys water from the Low Zone (which contains all production wells) to the High Zone through the existing Alfalfa Booster Station. GBWC-PD has received complaints of low pressure in the area upstream of the booster station, especially when Well 12 is offline for rehabilitation. In addition, there is no supply redundancy to the High Zone. This project would relocate the existing booster station to a location that does not result in low pressures upstream, while also providing a new more robust booster station to serve the High Zone.

This project is an alternative to the New Well in High Zone project in the Action Plan. The well project is the preferred alternative, to provide a supply source within the High Zone that can supplement the capacity of the existing booster station and reduce the flow required, thereby increasing pressures upstream.

- New Location for High Zone Booster Station
  Estimated Cost: $2,000,000
  Project Year: 2028-2030

7.3.2 Pipeline Annual Capital Improvement Budget (Looping/Tie-ins)

Many of the GBWC-PD water systems contain incomplete waterline distribution looping and tie-ins that leave the systems vulnerable to a single waterline break affecting numerous customers. If a pipe breaks in an isolated location in the pipeline distribution systems, large numbers of customers will be left without water service until the break is repaired. By having an annual budget for looping or dead-end tie-ins for the distribution system, GBWC-PD can start to reduce these vulnerabilities and provide a better level of service to their water customers. GBWC-PD plans to set an annual budget of $1,000,000 per year to reduce these types of vulnerabilities, though the actual cost will be dependent on the project selected.

- Pipeline Annual Capital Improvement Budget
  Estimated Cost: $1,000,000 per year
  Project Year: 2028 – 2044

GBWC-PD has identified multiple weaknesses in their system's distribution waterlines. Below is a list of several areas that could benefit by looping/tie-in projects. Pipeline looping project descriptions and cost estimates have been provided to give the reader a relative cost for each project. Once again, the objective is to identify weaknesses within the existing distribution piping that can benefit the customers' level of service through looping/tie-in pipeline projects.

7.3.2a Dandelion to SMMR Project

Installation of approximately 4,550 linear feet of 12-inch pipe to connect the existing 6-inch pipes on East Dandelion St and Wheeler Pass Road This pipeline project would increase the resiliency of the GBWC-PD system by interconnecting the independent Calvada Valley and SMMR water systems. By consolidating these systems, redundancy is improved with supply provided from either system, allowing for more dependable operation of the overall system and eventually reduces the reporting requirements for the one system. GBWC-PD aims to eventually consolidate all independent systems under its purview. The total estimated cost of this project is $1,508,296. The projected design and construction of this project, if it is selected as part of the annual pipeline looping budget, would be planned for 2028.

Dandelion to SMMR Project
Estimated Cost: $1,508,296
Project Year: 2028-2030

7.3.2b Connect SMMR to Mountain Falls

Installation of approximately 5,075 linear feet of 12-inch pipe to connect the existing 12-inch pipes on East Spring Mountain Boulevard and Mountain Falls Boulevard. This pipeline project would increase the resiliency of the GBWC-PD system by interconnecting the independent SMMR and Mountain Falls water systems. By consolidating these systems, redundancy is improved with supply provided from either system, allowing for more dependable operation of the overall system and eventually reduces the reporting requirements for the two systems. GBWC-PD aims to eventually consolidate all independent systems under its purview. The total estimated cost of this project is $1,663,524. The projected design and construction of this project, if it is selected as part of the annual pipeline looping budget, would be planned for 2031.

Connect SMMR to Mountain Falls
Estimated Cost: $1,663,524
Project Year: 2031-2034

7.3.2c Gamebird and Malibu to Mountain Falls

Installation of approximately 3,600 linear feet of 12-inch pipe to connect the existing 12-inch pipe on East Gamebird Avenue to a future developer-built pipeline on Mountain Falls Parkway. This pipeline project would increase the resiliency of the GBWC-PD system by interconnecting the independent Calvada Valley and Mountain Falls water systems. By consolidating these systems, redundancy is improved with supply provided from either system, allowing for more dependable operation of the overall system and eventually reduces the reporting requirements for the one system. GBWC-PD aims to eventually consolidate all independent systems under its purview. The total estimated cost of this project is $1,193,149. The projected design and construction of this project, if it is selected as part of the annual pipeline looping budget, would be planned for 2035.

Gamebird and Malibu to Mountain Falls
Estimated Cost: $1,193,149
Project Year: 2035-2038

7.3.2d Dandelion Looping Project

Installation of approximately 4,010 linear feet of 12-inch pipe to connect to an existing 10-inch pipeline at the intersection of Dandelion and Unicorn Avenue to the existing 12-inch pipeline that services the Courtyard Apartments. The main serving the Courtyard Apartments is a dead-end line, which carries risk of service interruption in the event of a pipeline break, or water quality concerns with stagnant water at the dead end. This looping project will provide more reliable water service and fire protection to the Courtyard Apartments and surrounding parcels. The total estimated cost of this project is $1,286,198. The projected design and construction of this project, if it is selected as part of the annual pipeline looping budget, would be planned for 2039.

Dandelion and Unicorn Looping Project.
Estimated Cost: $1,286,198
Project Year: 2039 – 2042

7.3.2e Pahrump Valley Blvd Looping Project

Installation of approximately 500 linear feet of 12-inch pipe and connect the existing 12-inch pipe on Pahrump Valley Boulevard to the 8-inch pipe currently serving the area around the Terribles Roadhouse Casino. This looping project will provide a redundant water service to the current customers and provide reliable fire protection to the surrounding area. The total estimated cost of this project is $318,684. The projected design and construction of this project, if it is selected as part of the annual pipeline looping budget, would be planned for 2041.

Pahrump Valley Blvd Looping Project
Estimated Cost: $318,684
Project Year: 2041-2043

7.3.2f Kaibab to Tiawah and Iroquois Loop

Installation of approximately 910 linear feet of 8-inch pipe and 950 linear feet of 16-inch pipe to connect the existing 16-inch pipe on Kaibab to the 8-inch pipes on Tiawah and Iroquois. The Calvada Valley High Pressure Zone is like one long straw without any real looping in the distribution piping. Installing this looping system would help prevent water service loss to a large portion of customers if a waterline break occurs close to the High Zone Tank portion of the waterline. The area will also receive an increase in redundancy and fire protection in the area. The total estimated cost of this project is $973,182. The projected design and construction of this project, if it is selected as part of the annual pipeline looping budget, would be planned for 2041.

- Kaibab to Tiawah and Iroquois Loop
  Estimated Cost: $973,182
  Project Year: 2041-2043

7.3.3 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 water system at a time. Based on current meter replacement costs, we have provided a budgetary estimate of the following:

- AMI Installation
  Estimated Cost: $384,120 per year for five years, $2,020,600 total cost over five years ($100,000 added to first year for initial equipment and software cost)
  Project Year: 2029-2033

7.3.4 New Office

GBWC-PD is planning to construct a new office in Pahrump to provide a 5,000-SF office building and fenced storage yard. The offices of GBWC-PD are currently being rented, and in an effort to stop renting the space, the new office would be constructed on a parcel owned by GBWC-PD in Pahrump. In addition, the utility is lacking in storage facilities that are fenced and covered. This project would provide secure storage for GBWC-PD vehicles and equipment. Budgetary capital costs for the new office are as follows:

- New Office
  Estimated Cost: $1,500,000 over two years
  Project Year: 2028-2029

7.4 Water Storage CIP

7.4.1 Water Tank Rehabilitations

Based on useful life estimates for water tanks in the system, it is likely that rehabilitation will be required to extend the life of the water tanks. An estimated cost of $500,000 is applied 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 are 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 Wastewater System CIP

7.5.1 WWTP Infrastructure Rehabilitation/Replacement

GBWC-PD is proposing an annual CIP budget for their wastewater treatment facilities to address fixed assets that may need refurbishing or replacements at any of their wastewater treatment plants. By having this annual budget, GBWC-PD will be able to assess the condition of existing assets and address capital projects sooner, which may reduce the costs for rehabilitation. GBWC-PD is proposing an annual budget of $500,000 for the CIP at the wastewater treatment plants.

- <u>WWTP Annual Rehabilitation/Replacement Budget</u>
  Estimated Cost: $500,000 Annually
  Project Year: 2028 – 2044

7.5.2 On-Site Hypochlorite Generation Systems

GBWC-PD currently uses chemical delivery services to supply sodium hypochlorite drums for chlorination systems at each of their wastewater treatment facilities for disinfection treatment. In order to potentially save on chemical delivery costs, GBWC-PD would like to invest in an on-site hypochlorite generation system that would be located at WWTP-3 and would ultimately produce hypochlorite for use at all GBWC-PD water and wastewater facilities. 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
  - Three (3) Clortec CT3000 or approved equal
  - Capable of producing 300 lbs/day as required by flow data of treatment plants and well water treatment
  - 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
- Chemical Room
- Distribution piping (or trucking) to other treatment plants and well sites

The estimated cost to furnish and install all required components for an on-site hypochlorite generation system is $1,611,132. 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: $1,611,132
  Project Years: 2028-2030

7.5.3 Wastewater Annual Collection System Rehabilitation/Replacement Budget

Similar to the water system, GBWC-PD is proposing an annual capital budget for their wastewater collection systems to address linear and fixed assets that may need rehabilitation or replacement. By having this annual budget, GBWC-PD will be able to assess the condition of existing assets and address capital projects sooner, which may reduce the costs by rehabilitation earlier. GBWC-PD is proposing an annual rehabilitation and replacement budget of $500,000 for the CIP for their wastewater collection systems.

- Wastewater Annual Collection System Rehabilitation/Replacement Budget
  Estimated Cost: $500,000 per year
  Project Year: 2028 – 2044

7.6 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. Although many of these assets are less than $50,000 to replace or refurbish and can be completed under GBWC-PD's general ledger, it is important to show how substantial the asset list is. In Table 7.02, well replacements have been added starting in 2028 and every four years after, which is based on the nominal age of existing wells in all the systems. Many of the monitoring, maintenance, and inspection recommendations have been designed to help extend their useful lives.

Table 7.01: Future Potential Asset Replacement Projects

Asset	Year	Cost	Comments
Mesquite Booster Pump Station Pumps 1 and 2	2026	$31,000	Replacement
Country View Estates Pumps 1, 2 and 3	2026	$32,000	Replacement
Lift Station 1 Pumps 1 and 2	2039	$15,000	Replacement
Lift Station 2 Pumps 1 and 2	2025	$19,000	Replacement
Lift Station 3 Pump 1	2038	$9,500	Replacement
Lift Station 3 Pump 2	2025	$9,500	Replacement
Lift Station 4 Pumps 1 and 2	2026	$19,000	Replacement
Lift Station 5 Pumps 1 and 2	2025	$10,000	Replacement
Lift Station 6 Pumps 1 and 2	2025	$6,000	Replacement
Lift Station 7 Pumps 1 and 2	2030	$14,000	Replacement
Lift Station 8 Pump 1	2032	$7,000	Replacement
Lift Station 8 Pump 2	2025	$7,000	Replacement
Lift Station 10 Pumps 1 and 2	2025	$15,000	Replacement
Lift Station 11 Pumps 1 and 2	2025	$15,000	Replacement
Plant F Lift Station Pumps 1 and 2	2025	$15,000	Replacement
Plant F Calvada North 4 Lift Station	2025	$8,000	Replacement
Plant 3 WWTP Equipment	Varies between 2025 and 2041	$7,136,500	Replacement
Plant F WWTP Equipment	Varies between 2025 and 2041	$932,000	Replacement
Plant MF WWTP Equipment	Varies between 2025 and 2041	$6,351,000	Replacement
Total Asset Cost		**$14,651,500**	

7.7 Preferred Plan Project Timeline

Table 7.02 provides an estimated project schedule timeline for the recommended implementation of the Preferred Plan. The scheduled timeline for replacement of assets beyond 2044 should be determined based on the ongoing monitoring, maintenance, and inspection protocols.

Table 7.02: GBWC-PD Scheduled Timeline for Preferred Plan CIPs

Year	Projects	Total Annual CIP Cost
2025	See Action Plan Timeline	$1,436,785
2026	See Action Plan Timeline	$4,549,099
2027	See Action Plan Timeline	$2,535,857
2028	Well Replacement; High Zone Booster Station; Pipeline Improvement Budget (PIB); New Office; WWTP Budget (WWTPB); On-Site Hypochlorite Generation System; WW Collection System Budget (WWCSB)	$4,466,667
2029	Well Replacement; High Zone Booster Station; PIB; AMI Installation; New Office; WWTPB; On-Site Hypochlorite Generation System; WWCSB	$4,950,787
2030	Calvada Meadows Well Replacement; High Zone Booster; AMI Installation; Water Tank Rehabilitation; WWTPB; On-Site Hypochlorite Generation System; WWCSB	$6,050,787
2031	PIB; AMI Installation; WWTPB; WWCSB	$2,384,120
2032	Well Replacement; PIB; AMI Installation; WWTPB; WWCSB;	$3,184,120
2033	Well Replacement; PIB; AMI Installation; Water Tank Rehab; WWTPB; WWCSB	$3,684,120
2034	PIB; WWTPB; WWCSB	$2,000,000
2035	PIB; WWCSB WWTPB	$2,000,000
2036	Well Replacement; PIB; Water Tank Rehab; WWTPB; WWCSB	$3,300,000
2037	Well Replacement; PIB; WWTPB; WWCSB	$2,800,000
2038	PIB; WWTPB; WWCSB	$2,000,000
2039	PIB; Water Tank Rehab; WWTPB; WWCSB;	$2,500,000
2040	Well Replacement; PIB; WWTPB; WWCSB	$2,800,000
2041	Well Replacement; PIB; WWTPB; WWCSB	$2,800,000
2042	PIB; Water Tank Rehab; WWTPB; WWCSB	$2,500,000
2043	Well Replacement; PIB; WWTPB; WWCSB	$2,800,000
2044	Well Replacement; PIB; WWTPB; WWCSB	$2,800,000
Preferred/Action Plan Total		**$59,521,741**

SECTION 8.0: ACTION PLAN

GBWC-PD will focus the next three years on those projects determined to be most critical for mitigating risk and maximizing reliability. GBWC-PD will limit other capital improvements during this time to minimize customer "rate shock". The Action Plan is to address all the systems, compliance, environmental, and conservation needs at a capital-spending schedule, which can be tolerated and accepted by their customers. GBWC-PD has scaled its Action Plan to reflect projects that it can reasonably complete within the 3-year Action Plan period. Each of the capital projects intended to address concerns outside of the immediate three-year Action Plan is addressed in the 2024 IRP Preferred Plan.

The recommended Action Plan projects for GBWC-PD target the water and wastewater systems in a way that helps maintain and improve the customers' current level of service, provide redundancy to the system, free up staff time for added recommended 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.

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-PD, Volume II) 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 staff recommendations. There are several projects that are being considered for the overall GBWC-PD Service Territory. These projects are described below.

1. New Well in High Zone at Well 13 Property (PD Replace Well – Calvada Meadows (HZ))
2. Calvada Meadows System Consolidation
3. Influent Pre EQ-Building and Tanks
4. Sand Filter Rehabilitation Project

8.2 Water Resources CIP

8.2.1 New Well in High Zone at Well 13 Property (PD Replace Well – Calvada Valley (HZ))

The Calvada Valley system contains two zones – High Zone and Low Zone. All production wells for Calvada Valley are located in the Low Zone, and water is pumped to the High Zone Tank through an existing booster pump station. In the event of a failure at the booster pump station there is no redundancy to get additional supply to the High Zone. In addition, Wells 9 and 11 are nearing the end of life and cannot be further cleaned or rehabilitated. Installation of a new well would increase the available capacity in the system, supplement wells that will be retired from service in the future and provide redundancy in the High Zone. An alternative to this project is presented in the Preferred Plan, which entails relocating the existing booster pump station to address pressure issues and provide redundancy. The new well project is the preferred alternative over the new booster station location, as the well provides a second source to the zone to supplement the booster station flows. This project has been identified as a Medium Priority project.

- <u>New Well in High Zone at Well 13 Property Project</u>
  Estimated Cost: $2,552,598
  Project Years: 2025 – 2026
  Tier: Medium Priority

<u>Anticipated Timeline:</u>

Tasks	Est. Time
Bid Document Prep, Bidding, and Review	8 weeks
Capital Project Team Review	2 weeks
Contract Negotiations	4 weeks
Survey	3 weeks
Geotechnical Investigation	4 weeks
Engineering Design Bid Projects	21 weeks
Project Bidding and Award	4 weeks
Construction	28 weeks
Closeout of Project	4 weeks
Total Estimated Project Time	78 weeks

8.3 Water Distribution CIP

8.3.1 Calvada Meadows System Consolidation

The system capacity analysis in Section 4.1.3.3 determined the Calvada Meadows system to have insufficient capacity for Scenario B. Scenario B describes the "worst-case" scenario with the largest producer offline while meeting ADD and fire demands. The Calvada Meadows system currently only has one active well and one storage tank. Installing a new pipeline between the

Mesquite Booster Station and the Calvada Meadows system (serving the area surrounding the airport) will tie the system into the Calvada Valley system and provide redundancy for the Calvada Meadows area. In addition, this would allow the Calvada Meadows well to be removed from service and thereby reduce sand in the system from this well. The alternative is replacing the existing well that is sanding and potentially close to failure (included as an alternative project in the Preferred Plan). Replacing the existing well would still not provide sufficient storage to the system, and NDEP would likely require a second well (~$1,600,000), storage tank (~$900,000), and booster pump station (~$700,000) to meet storage, pressure, and fire flow requirements to meet NAC requirements. The system would be better served interconnecting with the Calvada Valley system to provide the best operational flexibility and redundancy.

By consolidating these systems, redundancy is improved with supply provided from either system, allowing for more dependable operation of the overall system and eventually reduces the reporting requirements for the one system. GBWC-PD aims to eventually consolidate all independent systems under its purview.

8.3.1a Pipeline via Mesquite Booster Station (Avenue of the Stars) to Calvada Meadows [PD Pipeline Tie-In]

The preferred pipeline tie-in project to consolidate the Calvada Meadows system is a pipeline to interconnect with the Calvada Valley system. The Calvada Valley system is the largest in the GBWC-PD system and would provide redundancy and supply to Calvada Meadows. The pipeline project will consist of 6,500 linear feet of 12-inch C900 PVC and will follow Avenue of the Stars. The pipeline will connect to the upstream side of the Mesquite Booster Pump Station, which is a high-pressure area (over 100 psi). Due to the connection point, a PRV will be required prior to the first connection in the Calvada Meadows system. For cost estimating, 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 set to ensure sufficient operational pressures and fire flow is available to the Calvada Meadows system. Additional modeling will be required to establish the design of the PRV station.

The pipeline to the Calvada Meadows system is significantly less expensive than the Calvada North/Country View Estates pipeline tie-in alternative discussed below, and would connect Calvada Meadows to the larger Calvada Valley system, thereby increasing redundancy and resilience. It is recommended that this project be pursued over the alternative presented below.

- <u>System Consolidation Calvada Meadows to Main System</u>
  Estimated Cost: $2,697,720
  Project Years: 2026 – 2027
  Tier: High Priority (Preferred Alternative)

Anticipated Timeline:

Tasks	Est. Time
Bid Document Prep, Bidding, and Review	8 weeks
Capital Project Team Review	2 weeks
Contract Negotiations	4 weeks
Survey	3 weeks
Geotechnical Investigation	4 weeks
Engineering Design Bid Projects	21 weeks
Project Bidding and Award	4 weeks
Construction	28 weeks
Closeout of Project	4 weeks
Total Estimated Project Time	**78 weeks**

8.3.1b Pipeline from Country View Estates to Calvada Meadows [PD Pipeline Tie-In Alternative]

The alternative to consolidate the Calvada Meadows system is a pipeline to interconnect with the Calvada North/Country View Estate system. This project would consist of the installation of approximately 14,450 linear feet of 12-inch pipe to connect the existing pipes on Bell Vista Avenue and Black Rock Avenue (existing 6-inch). Due to the varying hydraulic grade lines of the systems, a PRV will likely be required prior to the first connection in the Calvada Meadows system. For cost estimating, 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 set to ensure sufficient operational pressures and fire flow is available to the Calvada Meadows system. Additional modeling will be required to establish the design of the PRV station.

This pipeline project would increase the resiliency of the GBWC-PD system by interconnecting the independent Calvada Meadows (at the Airport) and Country View Estates water systems. If this project is not completed under the Action Plan, it will be put in the Preferred Plan to be completed at a future time in order to continue GBWC-PD's goal of interconnecting all its independent systems. The project is established as a high priority project, if the preferred project recommended above is not selected.

- Airport to Country View Estates
  Estimated Cost: $4,077,552
  Project Year: 2026-2027
  Tier: High Priority

8.4 Wastewater System CIP

8.4.1 WWTP-3 Influent Pre-EQ Building and Tanks

WWTP-3 is located in the Calvada Valley system. Based on a site visit conducted in May of 2023 and discussions with GBWC-PD staff, the Pre EQ-Building is experiencing corrosion and ventilation issues. From the information available, it appears that the hydrogen sulfide gases from the wastewater are causing corrosion and deterioration issues above the tank water level. Current conditions below the water level are unknown, due to the fact that the isolation valves are so corroded that they cannot be operated to isolate and drain the tanks for inspections. Corrosion seems to be limited to the lower half of the building but there are locations in the rafters that cannot be observed from the ground and require additional inspection for structural damage. Additionally, multiple concrete walkway areas at the top of the tanks have deteriorated. The handrails along the concrete tanks, as well as other structure supports, were rehabilitated in approximately 2016 due to the corrosive environment. It is recommended that rehabilitation or replacement should be considered as soon as possible to address the ongoing corrosion and deterioration issues. The Pre EQ-Building is integral to controlling the amount of flow entering the plant and not overloading the biological processes that occur in the SBRs that follow. A preferred project to address these issues (tank repair) along with an alternative (conversion of existing sludge tanks) are considered below.

8.4.1a Repair Existing Pre-EQ Tanks and Building

This project would focus on rehabilitating the existing tanks within the Pre EQ-Building. Rehabilitation would extend the useful life of the tanks. The recommended rehabilitation includes the following items:

- Structural assessment of existing building foundation, walls, and support beams to determine scope of section replacement and recommend rehabilitation methods.
- Rehabilitation of existing Pre-EQ concrete tanks through coating. The coating product is recommended to be a solvent-free 100% solids, epoxy coating. The coating would be applied to the entirety of the tanks (interior and exterior) to help prevent hydrogen sulfide from corroding concrete infrastructure.
- Replacement or rehabilitation, as recommended by structural engineer assessment report, of building (walls, supports, doors, hardware), concrete walkways, and miscellaneous metal (pipe supports, process pipe, valves, etc.).
- Installation of robust ventilation/odor scrubber system to reduce future corrosion.

This project has been identified as a High Priority due to the severity of the corrosion and deterioration. The rehabilitation effort is significantly less expensive than replacing the tanks (see discussion below) and can still provide an extension of the useful life of the building and tanks. It is recommended that this project be pursued over the alternative.

- Influent Pre EQ-Building and Repair Tanks
  Estimated Cost: $2,184,671
  Project Year: 2026
  Tier: High Priority (Preferred Alternative)

Anticipated Timeline:

Tasks	Est. Time
Bid Document Prep, Bidding, and Review	8 weeks
Capital Project Team Review	2 weeks
Contract Negotiations	4 weeks
Survey	2 weeks
Engineering Design Bid Projects	12 weeks
Project Bidding and Award	3 weeks
Construction	18 weeks
Closeout of Project	3 weeks
Total Estimated Project Time	**52 weeks**

8.4.1b Replace Tanks

This alternative to the repair of the existing Pre-EQ tanks would replace the tanks by converting the existing aerobic digesters (Old Marwood Tanks) currently equipped to process sludge. Not all digesters are in use at one time, so it is assumed digester capacity is not an issue if digester tanks were repurposed. The existing Pre-EQ tank volume is approximately 180,000 gallons total and it is likely that two (2) digester tanks would need to be converted to match current plant operations.

This project would entail abandonment of the existing Pre-EQ tanks, lining the existing digesters to be converted, reconfiguring progress piping to flow from headworks to the new Pre-EQ tanks and back to the SBRs, a new metal building to cover the new Pre-EQ tanks, HVAC and plumbing systems, and electrical and control improvements.

The Calvada Valley lift stations currently pump to the existing, elevated headworks. From there water enters the existing Pre-EQ basin via gravity and flows to the existing pump station which delivers wastewater to the top of the SBRs. The proposed, converted Pre-EQ tanks are at ground level. It is assumed that a gravity line from the existing, elevated headworks to the new Pre-EQ tanks (existing digester tanks) is possible; however, it is recommended a new pump station be constructed to deliver water from the new Pre-EQ tanks to the top of the SBRs to replace the pump station within the existing Pre-EQ building. GBWC may elect for equipment from the existing pump station to be reused, if it is in good condition; however, for budgeting purposes, no reused items were considered in the cost estimate.

Like the tank repair, this alternative has been identified as a High Priority project due to the severity of the corrosion and deterioration. This option would provide a long-term solution as the tanks would remain in use for another 40 years. However, this alternative would cost $4,373,750 more than the rehabilitation option. Due to the significant difference in cost and current condition of the existing Pre-EQ tank and building, it is not recommended that this option be pursued, and no funding analysis will be completed for it.

- Convert and Cover Existing Marwood Digester Tanks
  Estimated Cost: $6,558,421
  Project Years: 2026
  Tier: High Priority

  Anticipated Timeline:

Tasks	Est. Time
Bid Document Prep, Bidding, and Review	4 weeks
Capital Project Team Review	2 weeks
Contract Negotiations	4 weeks
Survey & Geotechnical Investigation	2 weeks
Engineering Design Bid Projects	12 weeks
Project Bidding and Award	3 weeks
Construction	22 weeks
Closeout of Project	3 weeks
Total Estimated Project Time	52 weeks

8.4.2 WWTP-3 Sand Filter Rehabilitation

It is recommended that a rehabilitation of the existing sand filter system be performed on the splitter box, three sand filter media tanks and associated parts and equipment. The sand filter tanks must be taken offline independently to be cleaned, blasted, coated, and repaired. The splitter box supplies chlorinated effluent to the existing three separate traveling bridge sand filters, which the equipment and media has not been removed or replaced since installation of the system. Replacement parts for the existing gear boxes are no longer manufactured and will need to be custom fabricated in the future for replacements. Typically, these parts must be replaced at least every 15 years, due to normal wear associated with daily operations of the sand filters. In 2020, GBWC was able to procure two replacement gear boxes, replaced and installed one of the gearboxes and has one spare remaining for a future replacement.

The sand media needs to be removed and replaced. Filter media should be replaced approximately every 10 to 20 years to ensure optimal performance. According to interviews with operations staff, the media has not been replaced since installation. Solids can build up in the media, and properties like roughness, depth, and size distribution can change over time which all impact filter effectiveness. This reduction in performance can result in excessive contaminants in effluent from the treatment plant. There is a possibility that when the media is removed, issues could be found with the underdrains that would require repair as well.

Rehabilitation of the sand filters has been proposed as a less expensive alternative to a full replacement.

This project has been identified as a Medium Priority project.

- <u>WWTP-3 Sand Filter Replacement</u>
  Estimated Cost: $1,086,752
  Project Years: 2025-2026
  Tier: Medium Priority

8.5 Action Plan Project Timeline

Table 8.01 is a schedule of the project timeline for the preferred alternatives of the water and wastewater projects proposed for the three-year Action Plan.

Table 8.01: GBWC-PD Scheduled Timeline for Action Plan CIPs

Year	Projects	Total Annual CIP Cost
2025	New Well in High Zone at Well 13 Property	$893,409
	WWTP-3 Sand Filter Rehabilitation	$543,376
	2025 CIP Total Cost	**$1,436,785**
2026	New Well in High Zone at Well 13 Property	$1,659,189
	System Consolidation Calvada Meadows to Main System	$161,863
	WWTP-3 Influent Pre-EQ Building and Tanks	$2,184,671
	WWTP-3 Sand Filter Rehabilitation	$543,376
	2026 CIP Total Cost	**$4,49,099**
2027	System Consolidation Calvada Meadows to Main System	$2,535,857
	2027 CIP Total Cost	**$2,535,857**
3-Year Action Plan Total		**$8,521,741**

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-PD 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) New Well in High Zone at Well 13 Property; (ii) Calvada Meadows System Consolidation; (iii) WWTP-3 Influent Pre-EQ Building and Tanks and (iv) WWTP-3 Sand Filter Rehabilitation.

NAC 704.6339 specifies that SIR requests should 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

10.1.1 Water Resources CIP

New Well in High Zone at Well 13 Property
This project involves drilling a new well in the Calvada Valley water system. This well would provide redundancy to the High Zone and additional well capacity in the Calvada Valley water system in the event Well 9 or 11 fails. See Sections 2.2.2.1, 4.1.2.1, and 8.2.1 (Water Resources CIP).

10.1.2 Water Distribution CIP

Calvada Meadows System Consolidation
This project consists of two alternatives for pipelines that will interconnect the Calvada Meadows system with a larger system (Calvada Valley or Calvada North/Country View Estates, depending

on the alternative). The consolidation of the Calvada Meadows system will improve redundancy, supply, storage, and fire flow to the system. See Sections 2.4, 4.1.3.3, and 8.3.1 (Water Distribution CIP).

10.1.3 Wastewater System CIP

WWTP-3 Influent Pre-EQ Building and Tanks
This project consists of two alternatives to address the poor conditions of the pre-EQ building and tanks at Plant 3. The preferred version of the project would rehabilitate the existing concrete tanks and metal building. The alternative version of the project would convert existing sludge digester tanks into new pre-EQ tanks. See Sections 2.8.2.5 and 8.4.1 (Wastewater System CIP).

WWTP-3 Sand Filter Rehabilitation
This project would rehabilitate the existing traveling bridge sand filters at Plant 3. This involves replacement of media, rehabilitation of the tanks, and custom manufactured gearboxes. See Sections 2.8.2.5 and 8.4.2 (Wastewater System CIP).

10.2 Need for Each SIR Project

10.2.1 Water Resources CIP

New Well in High Zone at Well 13 Property
This project will upgrade the production system and improve reliability by providing redundancy to the High Zone and additional well capacity in the Calvada Valley water system. This project may also serve as a partial replacement for aging infrastructure at Well 9 and Well 11. See Sections 2.2.2.1, 4.1.2.1, and 8.2.1 (Water Resources CIP).

10.2.2 Water Distribution CIP

Calvada Meadows System Consolidation
The Calvada Meadows system is served by one well and one storage tank, resulting in no redundancy in the event of equipment failure. The storage tank also does not provide sufficient storage to meet fire flow requirements. The consolidation of the Calvada Meadows system will improve redundancy, supply, storage, and fire flow to the system by providing supply from a larger adjacent system. See Sections 2.4, 4.1.3.3, and 8.3.1 (Water Distribution CIP).

10.2.3 Wastewater System CIP

WWTP-3 Influent Pre-EQ Building and Tanks
The pre-EQ building is critical for controlling flow entering the plant and failure or inability to maintain it will cause challenges in the operation of the downstream SBRs. The valves to isolate the tanks are corroded and unable to operate, resulting in the inability to isolate the tanks for inspection, cleaning, and maintenance. Without the ability to isolate and drain the tanks, the condition of the tanks below the water level cannot be investigated for structural issues. The metal structure and concrete tanks are showing signs of corrosion and degradation with the

extent of damage unknown without further investigation. See Sections 2.8.2.5 and 8.4.1 (Wastewater System CIP).

WWTP-3 Sand Filter Rehabilitation

The aging sand filters require rehabilitation to increase reliability and efficacy of the filters. The media in the filters is regularly lost due to upset events and increased backwashing frequency. The filters use a specialized sand media that must be transported from out of the area. Traveling bridge gearbox motors and filter pumps are becoming increasingly difficult to acquire and expensive to replace. The tanks are showing signs of corrosion and should be sandblast and coated to increase the useful life See Sections 2.8.2.5 and 8.4.2 (Wastewater System CIP).

10.3 Benefits of Each SIR Project

10.3.1 Water Resources CIP

New Well in High Zone at Well 13 Property

This project provides redundancy in the High Zone, where the only supply source currently is the booster pump station from the Low Zone. The new well will also provide replacement capacity for Well 9 and 11 once they fail. See Sections 2.2.2.1, 4.1.2.1, and 8.2.1 (Water Resources CIP).

10.3.2 Water Distribution CIP

Calvada Meadows System Consolidation

The consolidation of the Calvada Meadows system will increase redundancy, thereby reducing water loss to customers during breaks or failures. The project will also improve fire flow to the system. See Sections 2.4, 4.1.3.3, and 8.3.1 (Water Distribution CIP).

10.3.3 Wastewater System CIP

WWTP-3 Influent Pre-EQ Building and Tanks

This project will extend the useful life of the pre-EQ structure. By replacing the isolation valves, operators gain the ability to drain the tanks to clean out debris, maintain the structure, and inspect for structural deficiencies. The concrete walkways and metal structure are showing signs of corrosion and rehabilitating the structures based on results of a structural inspection will extend their useful life. See Sections 2.8.2.5 and 8.4.1 (Wastewater System CIP).

WWTP-3 Sand Filter Rehabilitation

The aging sand filters require rehabilitation to increase reliability and efficacy of the filters. Rehabilitating the tanks will reduce the risk of structural failure and extend their useful life. Parts for the traveling bridge filter are no longer available and need to be custom manufacturer. Replacing the media and inspecting the underdrain system will improve the performance of the filters. See Sections 2.8.2.5 and 8.4.2 (Wastewater System CIP).

10.4 Project Supports Current Customers

The water and wastewater projects are not designed to increase revenues by connecting an improvement to a distribution system or wastewater system to new customers.

10.4.1 Water Resources CIP

New Well in High Zone at Well 13 Property
This project provides redundancy to existing customers in the High Zone and replacement capacity for Well 9 and 11 once they fail. See Sections 2.2.2.1, 4.1.2.1, and 8.2.1 (Water Resources CIP).

10.4.2 Water Distribution CIP

Calvada Meadows System Consolidation
This project provides redundancy to existing customers in the Calvada Meadows system and increases available fire flow in the system. See Sections 2.4, 4.1.3.3, and 8.3.1 (Water Distribution CIP).

10.4.3 Wastewater System CIP

WWTP-3 Influent Pre-EQ Building and Tanks
This project increases reliable treatment for existing customers in Calvada Valley through dependable operations of the pre-EQ process, and by extension the entire treatment process. See Sections 2.8.2.5 and 8.4.1 (Wastewater System CIP).

WWTP-3 Sand Filter Rehabilitation
This project increases reliable treatment for existing customers in Calvada Valley by rehabilitating aging infrastructure and ensuring dependable operation of the filtration system. See Sections 2.8.2.5 and 8.4.2 (Wastewater System CIP).

10.5 Statement that Each Project is not Included in Rate Base

The projects listed in Section 10.1 *et seq.* were 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 projects listed in Section 10.1 *et seq.* will be funded through traditional funding sources using Great Basin Water Company debt and equity investment. See Section 9 (Funding Plan).

10.7 Construction Schedule for Each Project

10.7.1 Water Resources CIP

New Well in High Zone at Well 13 Property

This project is scheduled for the years 2025 and 2026. See Section 8.2.1 (Water Resources CIP).

10.7.2 Water Distribution CIP

Calvada Meadows System Consolidation

This project is scheduled for the years 2026 and 2027. See Section 8.3.1 (Water Distribution CIP).

10.7.3 Wastewater System CIP

WWTP-3 Influent Pre-EQ Building and Tanks
This project is scheduled for the year 2026. See Section 8.4.1 (Wastewater System CIP).

WWTP-3 Sand Filter Rehabilitation
This project is scheduled for the years 2025 and 2026. See Section 8.4.2 (Wastewater System CIP).

10.8 Project Budget for Each Project

10.8.1 Water Resources CIP

New Well in High Zone at Well 13 Property
Project Cost: $2,552,598. See Section 8.2.1 (Water Resources CIP).

10.8.2 Water Distribution CIP

Calvada Meadows System Consolidation
Preferred Project (Pipeline via Mesquite Booster Station) Project Cost: $2,627,720.
Alternative (Pipeline from Country View Estates) Project Cost: $4,077,552.
See Section 8.3.1 (Water Distribution CIP).

10.8.3 Wastewater System CIP

WWTP-3 Influent Pre-EQ Building and Tanks
Preferred Project (Repair Existing Pre-EQ Tanks and Building) Project Cost: $2,184,671.
Alternative (Replace Tanks) Project Cost: $6,558,421.
See Section 8.4.1 (Wastewater System CIP).

WWTP-3 Sand Filter Rehabilitation
Project Cost: $1,086,752. See Section 8.4.2 (Wastewater System CIP).