Front/Back Cover Photo: Longview Overlook at Lake Mead

2024 – 2029 JOINT WATER CONSERVATION PLAN

SOUTHERN NEVADA WATER AUTHORITY™

City of Henderson | City of Las Vegas | City of North Las Vegas

City of Boulder City | Clark County Water Reclamation District

Big Bend Water District | Las Vegas Valley Water District

Photo: Las Vegas Skyline

SOUTHERN NEVADA WATER AUTHORITY

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John J. Entsminger
General Manager

Photo: Summit Club landscape conversion

MISSION

Our mission is to provide world-class water service in a sustainable, adaptive and responsible manner to our customers through reliable, cost-effective systems.

GOALS

Assure quality water through reliable and highly efficient systems.

Deliver an outstanding customer service experience.

Anticipate and adapt to changing climatic conditions while demonstrating stewardship of our environment.

Develop innovative and sustainable solutions through research and technology.

Ensure organizational efficiency and manage financial resources to provide maximum customer value.

Strengthen and uphold a culture of service, excellence and accountability.

The Southern Nevada Water Authority (SNWA) is a cooperative, not-for-profit agency formed in 1991 to address Southern Nevada's unique water needs on a regional basis.

Photo: Lake Mead scenic overlook

TABLE OF CONTENTS

Photo: Las Vegas skyline from the Las Vegas Wash

A Message from the General Manager

Communities across the Colorado River Basin face an unprecedented challenge: balancing water needs with the realities of a warmer and drier future. Over the past two decades, evolving hydrologic conditions have led to diminished inflows into the Colorado River system and Lake Mead, which serves as Southern Nevada's primary water supply source. Today, crucial storage reserves hover at historically low levels, posing a serious threat to water supply security for much of the West.

Regionally, the Colorado River Basin states are working with the Federal government, Tribes, the Republic of Mexico and other water users to implement rules and agreements aimed at preventing water levels at Lake Mead and Lake Powell from reaching critically low elevations. Despite these efforts, further actions are needed to safeguard Southern Nevada and diverse interests throughout the basin. The SNWA continues to collaborate with our partners on the river to identify and enact strategies for sustainably managing this fragile river system.

At the local level, we have made significant strides in water efficiency, focusing on consumptive water use reductions that help to stretch our limited supplies. As further detailed in this Joint Conservation Plan, these efforts have enabled us to reduce demands and bolster temporary supplies to offset the impacts of shortage. They have also helped keep more water in Lake Mead for later use and overall system benefit. Additionally, we have implemented new policies to reduce the impact of new development and deployed new resources to support the community in its water conservation journey. Our efforts and achievements have inspired countless communities as they pursue their own water conservation journey and have left a lasting ripple within the basin and around the world.

Even as we celebrate these tremendous successes, I encourage continued resolve as our community pursues the actions necessary to achieve our water conservation goal. This work is not easy, but it is essential. Our success will go far in addressing the realities of an increasingly water-scarce future.

John J. Entsminger
General Manager

Photo: Mojave Desert, Southern Nevada

CHAPTER 1: PLAN INTRODUCTION

This chapter provides an overview of SNWA responsibilities and details how the organization works with its member agencies to implement conservation initiatives that help protect and extend the community's limited water supplies.

The Southern Nevada Water Authority (SNWA) is a regional, not-for-profit agency formed in 1991 by a cooperative agreement among the following water and wastewater agencies:

- City of Las Vegas
- City of North Las Vegas
- City of Boulder City
- City of Henderson
- Big Bend Water District
- Las Vegas Valley Water District
- Clark County Water Reclamation District

The SNWA member agencies collectively serve more than 2.3 million residents in Boulder City, Henderson, Las Vegas, North Las Vegas, Laughlin and areas of unincorporated Clark County.

AUTHORITIES

As the region's wholesale water provider, the SNWA is responsible for managing all water supplies available to Southern Nevada through an approved water resource plan and water budget, managing regional conservation programs, ensuring regional water quality meets or exceeds state and federal standards, and building and operating regional facilities to provide a reliable drinking water delivery system to its member agencies.

Although the SNWA plays a critical role in managing water, it has no responsibility for establishing customer rates and limited authority to regulate water use by end-users. Such policies, codes and regulations are typically implemented through its member agencies. In terms of regulatory issues, the SNWA plays an important role in facilitating information sharing and collaboration. Past efforts have resulted in the creation of successful community-wide water-efficiency policies, such as permanent mandatory watering restrictions and limitations on new turf installation.

Water conservation education, outreach and incentive programs detailed in this plan are primarily developed and managed by the SNWA with committed involvement from its member agencies.

STATE AND FEDERAL REQUIREMENTS

Nevada Revised Statutes (NRS) and the Reclamation Reform Act (RRA) require the SNWA to develop and maintain a 5-year water conservation plan.[1,2] This 2024-2029 Joint Conservation Plan (Plan) meets these state and federal conservation plan requirements, addressing the regional conservation initiatives of the SNWA and its member agencies for five years, effective from the date of SNWA Board adoption. The SNWA's next Conservation Plan update is due in mid-2029.

ABOUT US

The SNWA is responsible for water **RESOURCE PLANNING** and management in Southern Nevada, ensuring regional **WATER QUALITY** meets or exceeds state and federal standards and building and operating regional **FACILITIES**. The SNWA also manages regional **CONSERVATION** efforts.

7 Member Agencies

2.3 million Residents

~40 million Annual Visitors

As required, the Plan includes detailed information on the following:

- A drought contingency plan
- Water management measures
- Standards for efficiency in new development
- Conservation water rates
- Conservation measures
- Plans to achieve water loss reduction goals
- Public education initiatives
- A schedule for carrying out the plan
- Water conservation savings estimates
- Measures for evaluating plan effectiveness

PLANNING GUIDANCE

The SNWA reviewed other guidance to support the development of its 2024-2029 Plan, including the U.S. Environmental Protection Agency's (EPA) Advance Guidelines for Preparing Water Conservation Plans (for systems serving greater than 100,000 customers), the American Water Works Association's (AWWA) G480-20 Water Conservation Program Operation and Management Standards and AWWA's M52 Manual of Water Supply Practices, A Planning Manual.[3,4,5] These tools assist water suppliers in developing effective water conservation plans. While compliance with EPA and AWWA guidance is voluntary, the SNWA has informed its Plan with these valuable tools.

Although the plan includes summary information on facilities and resource planning as required, it does not address all aspects of water resource management and development. Instead, it serves as a companion to the other SNWA planning documents described in Chapter 2.

CONSERVATION PHILOSOPHY

For many communities, including ours, conservation is a sensible approach that can extend the availability and use of limited water supplies. Implementation of the conservation planning goals and strategies detailed within this Plan will help to:

- Prolong the life and improve the utilization of existing facilities, reduce variable operating costs and delay new source water development costs.
- Improve operational flexibility, extend permanent resources and help to grow temporary supplies for use when needed.
- Reduce the magnitude and impact of Colorado River curtailments associated with shortage declarations.
- Build and maintain strong relationships with the public, other stakeholders and the river community with whom we share resources.
- Protect Southern Nevada's economy and jobs by ensuring the community's short- and long-term water demands can be sustainably met.
- Demonstrate our deep understanding of the value of water and model responsible, innovative approaches for the stewardship of Southern Nevada's limited water supplies.

INTEGRATED RESOURCE PLANNING

The SNWA has steadily reduced per capita water use since 2000 as shown in Figures 1.1 and 1.2. However, conservation and efficiency gains began to level out and remained relatively flat between 2015 and 2018. Recognizing that additional work was needed to reinvigorate and sustain progress, the SNWA launched major planning efforts in 2019 to identify the steps necessary to get the community back on track. At the same time, the organization considered how climate change and system age might affect the community's long-term conservation progress. As further detailed below, efforts focused on opportunities and next steps to improve water efficiency among all customer classes, emphasizing consumptive water use reductions.

Public Involvement in Goal Setting

The SNWA consistently relies on public input to inform management actions. Citizen advisory committees convened by the SNWA Board of Directors over the past three decades have explored and deliberated various issues—from water quality, environmental initiatives and conservation goals to developing water sources and infrastructure for Southern Nevada's future.

The SNWA convened its 2020 Integrated Resource Planning Advisory Committee (IRPAC 2020) in 2019. The

Photo: 2020 IRPAC meeting

committee met nine times between 2019 and 2020. Among other topics, the committee reviewed Southern Nevada's water conservation initiatives and progress toward the SNWA's then-regional conservation goal of 105 gallons per capita per day (GPCD) by 2035.

The committee recognized that more stringent regulations and community-wide participation in conservation were needed, particularly due to waning progress and upward pressure due to climate change. The committee considered and recommended a wide range of opportunities that, if implemented, could help Southern Nevada reach higher levels of water efficiency (Appendix 1). As further detailed in this Plan, many of IRPAC's recommendations are currently being implemented by the SNWA and its member agencies.

Concurrent with the IRPAC process, SNWA staff worked to identify specific strategies and tactics to advance the committee's recommendations and identify other conservation opportunities. The SNWA also began quantifying potential water savings associated with the proposed program and policy changes.

Water Conservation Goal

Based on the outcome of internal and public planning processes, the SNWA Board of Directors in 2021 adopted a new water conservation goal of 86 GPCD by 2035. The SNWA's Water Resource Plan provides an illustrative look at how achieving the goal might impact the community's near and long-term resource needs.

Many communities use GPCD as an effective metric to measure water use and efficiency improvements over time. However, GPCD varies across communities due to differences in climate, demographics, water-use accounting and economic conditions. As such, it is difficult to use the GPCD metrics for different communities to compare water efficiency.

The SNWA monitors and reports actual and per capita water use figures in consumptive use terms to more accurately reflect water resource implications associated with conservation progress. Consumptive water use is the difference between water withdrawals (or diversions) and returns to the Colorado River. These returns are also known as return-flow credits. SNWA GPCD is calculated by dividing all SNWA water sources diverted (excluding off-stream storage) less corresponding Colorado River return-flow credits by the total SNWA resident population served per day.

Not all water diverted in the SNWA service area is consumed. That is because nearly all water used indoors is recycled for direct or indirect reuse. Direct reuse involves collecting, treating and utilizing reclaimed wastewater flows for non-potable uses such as golf course or park irrigation. Indirect reuse consists of recycling water by way of treatment and release to the Colorado River for return-

flow credits. This approach extends local water supplies by more than 70 percent.

Southern Nevada has made significant progress toward its water conservation goals. As detailed in Chapters 4-6, efforts range from new policies and programs to targeted education and outreach initiatives. The onset of drought prompted many of these efforts, but they have since become a permanent way of life for area residents.

Between 2002 and 2023, per capita and Colorado River water use decreased by about 58 percent and 42 percent, respectively. Meanwhile, the population increased by about 52 percent. Worldwide, few—if any—communities have done as much as fast to improve water efficiency and reduce water waste. As detailed in Chapter 2, these actions were necessary to respond to rapidly declining Lake Mead water levels, a condition brought about by changing hydrology within the Colorado River Basin.

CONSERVATION STRATEGIES

The SNWA and its member agencies use several demand management tools to promote conservation and reduce overall water use, including water pricing, incentives, regulations and education. These measures work in conjunction with one another to encourage water efficiency. For example, water pricing (including water rates and water waste fees) provides a financial signal for customers to reduce water use, which may lead customers to improve efficiency.

Through passive and active education, customers learn about regulations (such as day-of-week watering restrictions and incentive programs), which, when acted upon, help the customer save water and reduce the impact of rates. Ideally, these measures yield higher levels of efficiency. Appendix 2 includes a table of estimated water savings by specific conservation measures over the planning horizon. However, their complex and inter-related nature makes it impracticable to attribute specific water savings to any single measure.

The SNWA maintains a suite of conservation programs for indoor and outdoor water uses, while deliberately focusing its staff and financial resources on programs and efforts designed to reduce consumptive water use associated with water waste, landscape irrigation and evaporative cooling. This strategy builds upon the community's strong and growing conservation ethic and results.

Other conservation strategies include:

- Engaging our community with information and programs that help individuals and organizations change their water use (retrofit).
- Building in future conservation savings by ensuring new development is water efficient.
- Transforming demand through new products and technologies that reduce water use.
- Curtailing waste and losses by minimizing water loss in utility and customer applications.
- Advancing knowledge through investments that increase our understanding of new opportunities and the influence of existing programs.
- Valuing water appropriately by ensuring rates and fees are sufficient to fund operations and incorporate conservation pricing.

A CALL TO ACTION

Many of the conservation measures described in Chapter 5 are voluntary, making the public an essential partner in our community efforts to improve water efficiency and reduce water waste.

While this Plan describes many ways to improve water efficiency, the SNWA specifically calls on residents and businesses to take three key actions that have a high impact on reducing water use:

- Remove non-functional turf—replace water-thirsty grass with water-efficient landscapes.
- Change your watering clock—follow mandatory time-of-day and day-of-week watering restrictions.
- Report water waste—help local water agencies identify and address unnecessary losses in our community by reporting water waste.

OUR WATER CONSERVATION JOURNEY AND RESULTS (2002 – 2023)

Southern Nevada has made significant water use reductions and continues efforts to achieve the community's new water conservation goal of 86 GPCD. In 2023, the community's consumptive Colorado River water use reached its lowest point since the early 1990s. As shown in Figure 1.1 and 1.2, the community used 89 gallons per capita per day, representing a 58 percent decline in the community's per capita water use since 2002.

Figure 1.1: SNWA per capita water use and water conservation goal

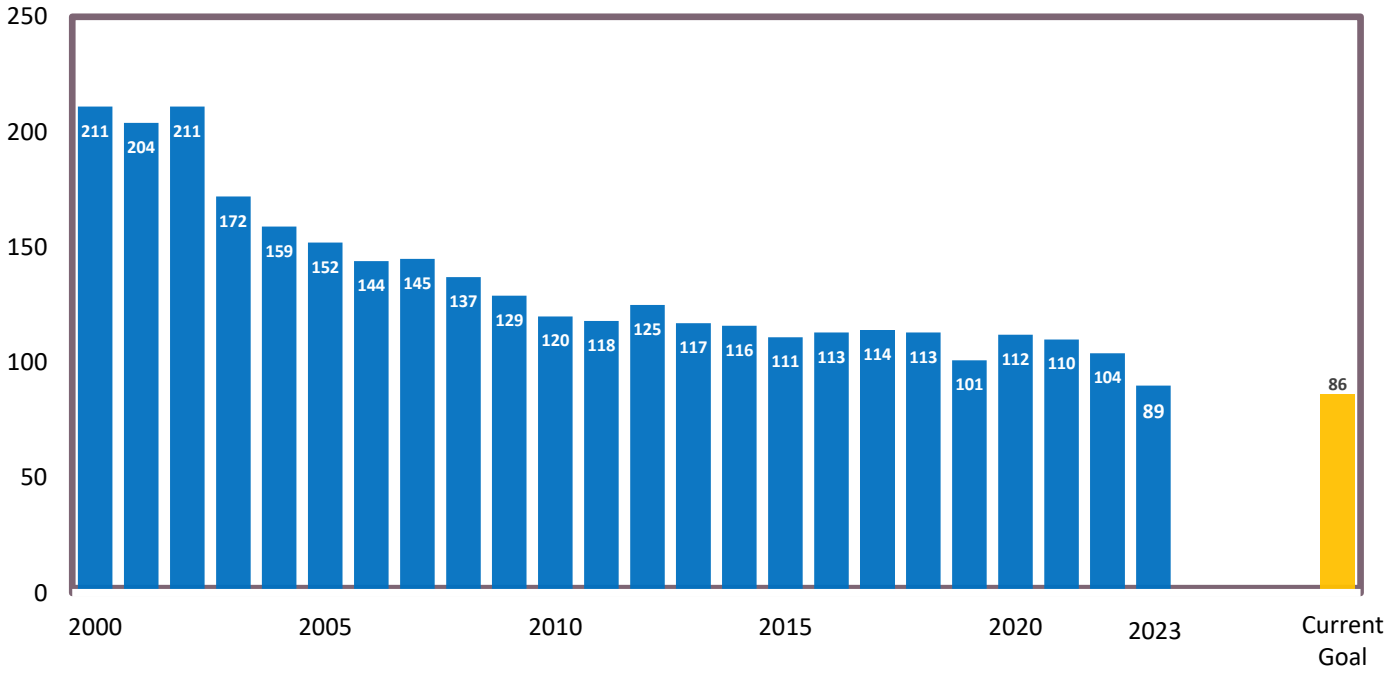


Figure 1.2: Summary results

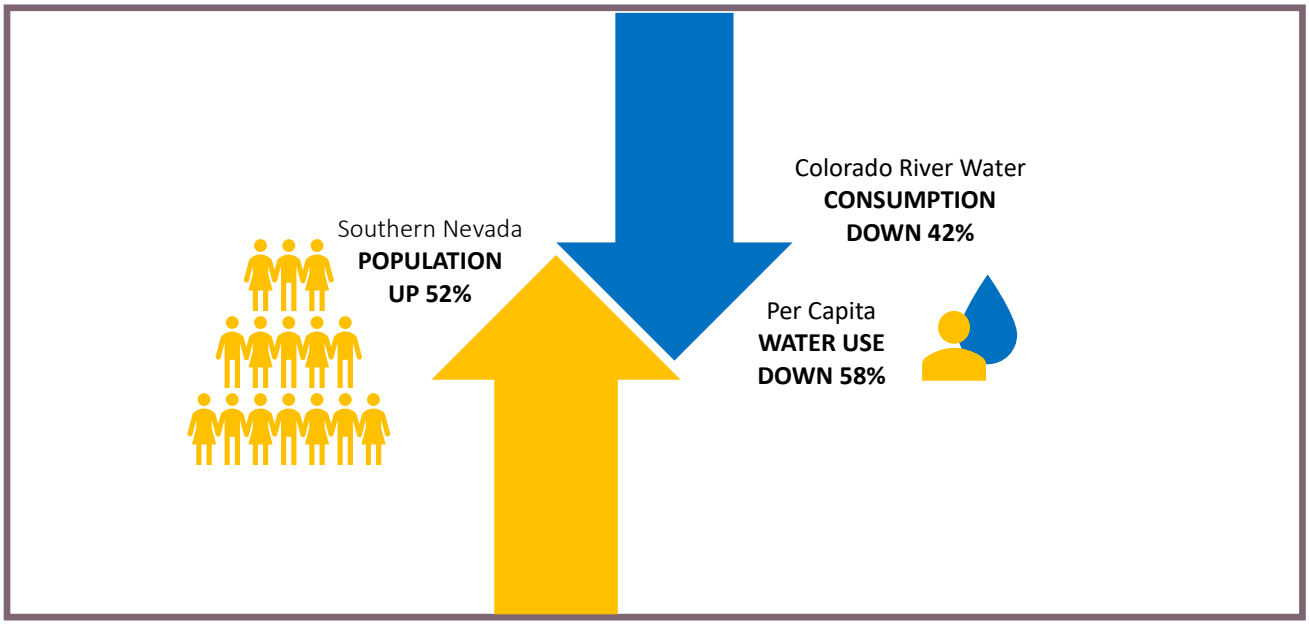


Photo: SNWA Low Lake Level Pumping Station

CHAPTER 2: WATER SYSTEM OVERVIEW

This chapter provides an overview of the SNWA service area, significant planning efforts and a summary of the SNWA's Water Resource Portfolio.

SOUTHERN NEVADA WATER AUTHORITY

As the region's wholesale water supplier, the SNWA is responsible for constructing and operating regional water facilities with a combined capacity of 900 million gallons per day. The SNWA operates and maintains three raw water intakes and three raw water pumping stations that deliver SNWA's contracted Colorado River supplies from Lake Mead. Other SNWA facilities include two water treatment plants, approximately 30 pumping stations, more than 160 miles of large-diameter pipelines, and 39 regulating tanks, reservoirs and surge towers.

As further described below, the SNWA's water purveyors (*) are responsible for municipal water service to residents and businesses in their respective service areas (Figure 2.1).

Las Vegas Valley Water District (*)

The Las Vegas Valley Water District (LVVWD) is the region's largest municipal water purveyor, providing municipal water service to nearly 423,000 customer accounts in Las Vegas and portions of unincorporated Clark County. The system includes more than 7,000 miles of pipelines, 53 pumping stations and 78 water storage reservoirs.

City of Henderson (*)

The City of Henderson provides water, wastewater and reclaimed water services to more than 112,000 customer accounts within the city's jurisdiction. The system includes more than 1,300 miles of distribution pipelines, 33 pumping stations, and 51 water storage reservoirs.

City of North Las Vegas (*)

The City of North Las Vegas provides municipal water and wastewater service to more than 103,000 customer accounts in North Las Vegas and adjacent portions of Las Vegas and unincorporated Clark County. The system includes more than 1,100 miles of distribution pipelines, 10 pumping stations and nine water storage reservoirs. The city also operates direct and indirect reuse facilities.

City of Boulder City (*)

The City of Boulder City provides water service to approximately 6,000 customer accounts in Boulder City. The system includes more than 145 miles of distribution pipelines and six water storage reservoirs. In coordination with SNWA, Boulder City is evaluating new facility options for wastewater treatment and reuse.

City of Las Vegas

The City of Las Vegas provides wastewater service to customers within its service area. LVVWD provides municipal water supplies for the City of Las Vegas.

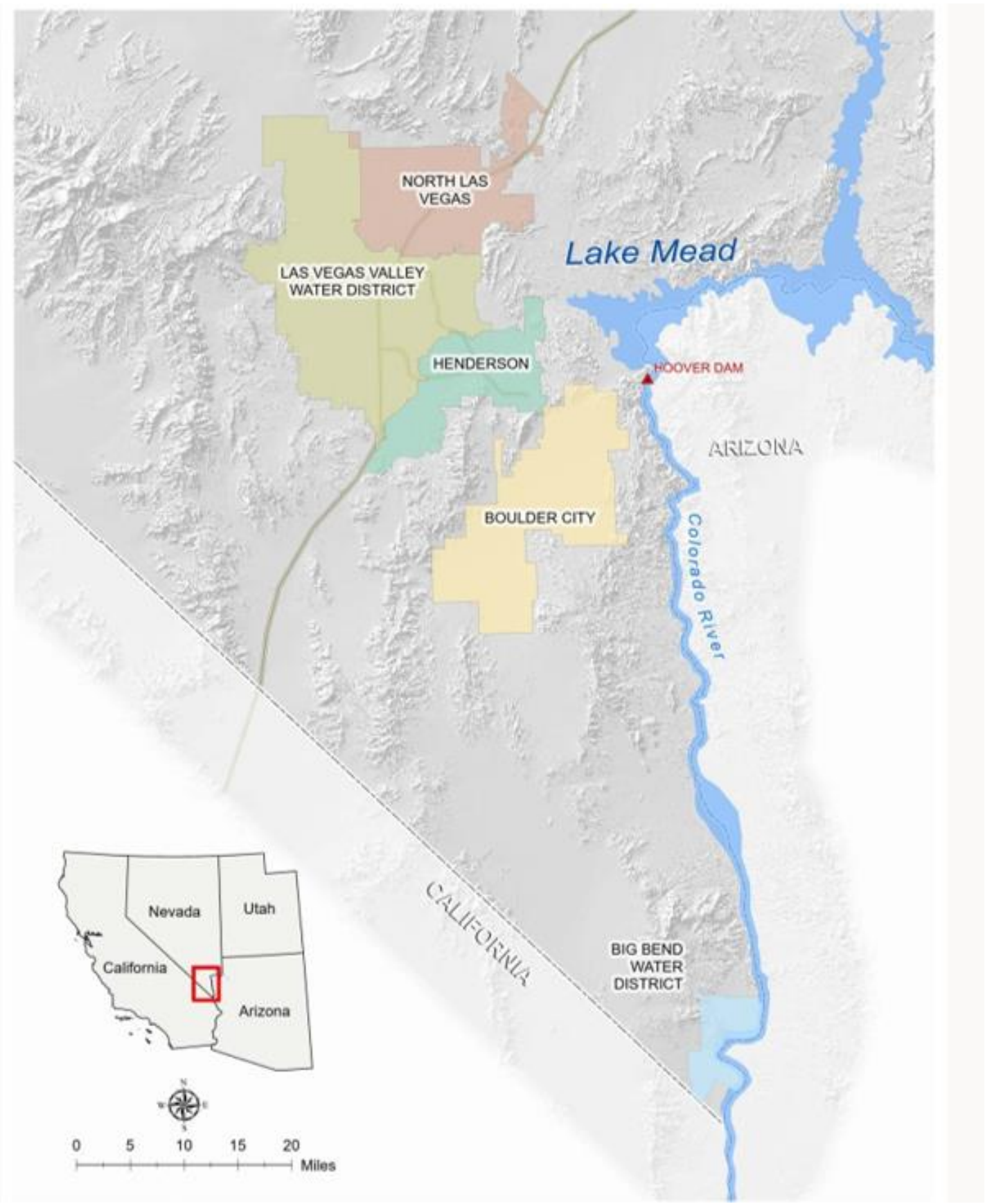
Big Bend Water District (*)

The Big Bend Water District provides municipal water service to approximately 2,400 customer accounts in Laughlin, Nevada. The water system is operated and maintained by the LVVWD under a cooperative agreement. The system includes more than 60 miles of distribution pipelines, six pumping stations, five water storage reservoirs and a water treatment plant.

Clark County Water Reclamation District

The Clark County Water Reclamation District is the wastewater agency responsible for unincorporated Clark County. The agency collects, treats and produces more than 105 million gallons of wastewater daily. Treated wastewater is primarily returned to Lake Mead via the Las Vegas Wash and to the Colorado River at Laughlin for indirect reuse. The agency also provides a small portion of reclaimed water for irrigation and industrial applications.

Figure 2.1: SNWA and purveyor service areas



MAJOR PLANNING EFFORTS

The SNWA conducts short- and long-range planning to ensure high-quality water supplies and reliable service to its customers. As noted in Chapter 1, the SNWA consistently relies on input from citizen committees to support planning efforts. As described in the following sections, integrated resource planning initiatives have helped inform and advance many SNWA planning processes.

Water Resource Plan and Water Budget

The SNWA conducts an annual review and updates its Water Resource Plan and Water Budget. The Water Resource Plan includes a summary of projected water demands in Southern Nevada over a 50-year planning horizon and describes water resources available to meet those demands over time. The plan also details how the SNWA plans to meet future water demands under variable supply and demand conditions. The Water Budget presents a detailed forecast of water demands by SNWA purveyor members over a 4-year planning horizon.

Conservation Plan

The SNWA develops and implements a water conservation plan that provides a comprehensive overview of SNWA conservation goals and achievements and discusses efforts planned or underway to reduce water waste and promote water efficiency. While the Plan is updated on a five-year schedule as required, the SNWA regularly reviews its programs and strategies, adjusting as needed to help keep the community on track to meet its water conservation goals.

Drought Plan

The SNWA adopted a Drought Plan in 2002 that identified staged conservation measures for implementation based on the severity of drought conditions. Drought response actions identified in the plan and subsequent amendments have since become permanent conservation measures, as discussed in Chapter 4. Chapter 3 details the SNWA's current drought response actions.

Major Construction and Capital Plan

The SNWA implements a Major Construction and Capital Plan that reports the costs of completed projects and defines authorized projects and initiatives for new regional facilities, including acquiring assets and other capital-related activities. The plan further identifies estimated costs and schedules for approved projects.

Water Quality Plan

The Regional Water Quality Plan for the Las Vegas Valley details implementation efforts to protect, preserve and enhance the quality and quantity of water resources in the Las Vegas Valley Watershed, sustain economic well-being, and protect the environment for present and future generations.

Financial Plan

The SNWA's Annual Comprehensive Financial Report is updated annually to provide a comprehensive overview of SNWA financial statements, accomplishments and financial forecasts.

WATER SUPPLY DESCRIPTION

The SNWA works to develop and manage a flexible portfolio of diverse water resource options; many of these resources have resulted from years of in-state, interstate and international collaborations. The portfolio includes permanent, temporary and future resources, described in detail in the SNWA's Water Resource Plan. The following provides a general overview of water supplies that are available or are expected to be available over the SNWA's 50-year planning horizon. Snwa.com maintains plan updates and more detailed discussions.

Permanent Resources

Colorado River Water: Nevada's 300,000 acre-feet per year (AFY) Colorado River apportionment continues to be Southern Nevada's largest and most critical permanent resource. Nevada's right to this water was established under the 1922 Colorado River Compact and the 1928 Boulder Canyon Project Act (BCPA), which together set forth where and how Colorado River water is used.

The SNWA has contracts with the U.S. Secretary of the Interior for 276,205 AFY of Nevada's 300,000 AFY allocation. As detailed in the SNWA's Water Resource Plan, the SNWA may also utilize the unused apportionment of other Nevada Colorado River contract holders, and surplus Colorado River water as available.

Intentionally Created Surplus: Under the 2007 Record of Decision for the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (Interim Guidelines), the SNWA can develop some of its surface water rights in Nevada by allowing them to flow into Lake Mead in exchange for Intentionally Created Surplus (ICS) credits. The credits can be withdrawn through SNWA facilities when needed and returned to the system for return-flow credits.

Return-Flow Credits and Water Reuse: The BCPA defines Colorado River apportionments in "consumptive use" terms. Consumptive use is the difference between diversions and flows returned to the Colorado River. With these returns, also known as "return-flow credits," Nevada can divert more than 300,000 AFY, so long as sufficient flows are returned to the river to ensure the consumptive, or "net use" is no greater than 300,000 AFY.

Southern Nevada recycles nearly all water used indoors through direct or indirect reuse. Direct reuse involves collecting, treating and utilizing reclaimed water flows for non-potable uses such as golf course or park irrigation. Indirect reuse involves recycling water through treatment and releases to the Colorado River for return-flow credits. In 2023, Nevada's total consumptive Colorado River water use was 187,000 AFY.

Las Vegas Valley Groundwater: LVVWD and North Las Vegas have permanent groundwater rights totaling 40,760 and 6,201 AFY, respectively. These rights are among the most senior groundwater rights in the Las Vegas Valley and remain a critical component of the SNWA's water resource portfolio.

Temporary Resources

The SNWA reserves water in years when Nevada's Colorado River allocation exceeds community water demands. These resources are "banked" as temporary supplies for future use and serve as an important management tool; they can be used to meet potential short-term gaps between supply and demand and serve as a bridge to meet demands while other future resources are being developed. Some banked resources can help offset future reductions in permanent supplies due to federally imposed shortages (see Chapter 3).

The SNWA also banks water in Lake Mead in the form of ICS as allowed under the Interim Guidelines. The primary purpose of ICS is to encourage efficient Colorado River water use, increase storage in major system reservoirs, improve surface water elevations in Lake Mead, avoid the potential for a declared shortage and minimize shortage impacts.

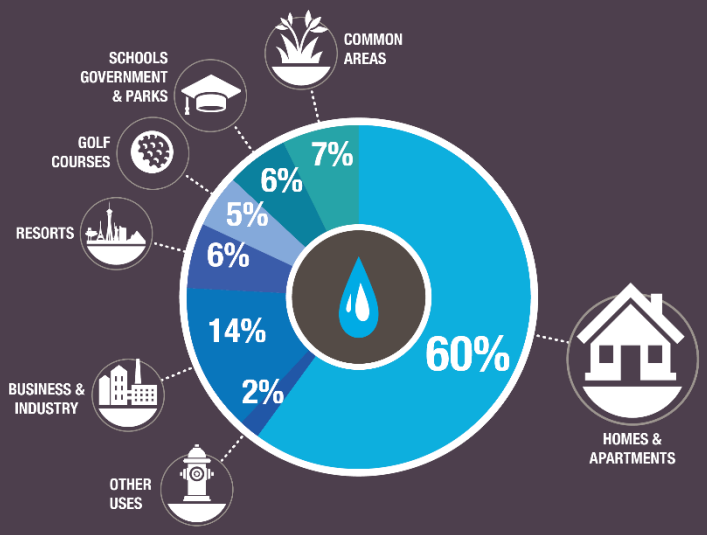
Water Banking: SNWA water purveyors began storing or "banking" unused Colorado River resources in the Las

Figure 2.2: Municipal metered water use

COMMUNITY WATER USE

Homes and apartments make up about 60 percent of the community's water use. Most of that water is used outdoors for landscape irrigation.

The SNWA works with all sectors of our community to reduce water use, focusing on consumptive water use reductions like turf conversions and cooling efficiency.



Vegas Valley through direct injection beginning in the late 1980s. Banking programs were expanded to include in-lieu storage in the Las Vegas Valley and interstate banking agreements for storage in Arizona and California.

The SNWA accrues credits by conveying some of its surface and groundwater rights located in Nevada to Lake Mead in exchange for ICS credits. The SNWA also accrues credits by participating in Colorado River conservation and efficiency programs that save Colorado River water that would otherwise have been banked or lost from the system. As shown in Figure 2.3, the SNWA has banked approximately 2.2 million acre-feet of water through 2023. This amount is twelve times Nevada's 2023 consumptive Colorado River water use.

The 2019 Lower Basin Drought Contingency Plan Agreement (DCP) expanded Lake Mead water banking opportunities for Southern Nevada by authorizing a new ICS project. The project allows SNWA to leverage its past and future conservation savings to obtain ICS credits. Ongoing accruals will be based on conservation achievements since 2002.

Future Resources

Water resource conditions have changed significantly in many Western states, including Nevada. As a result, the SNWA has worked to implement strategies that conserve and maximize the use of Colorado River and groundwater supplies, helping to establish temporary resources that can be used flexibly to meet evolving supply and demand conditions. These strategies improve overall efficiency, provide operational flexibility, buffer the potential impacts of drought conditions and help delay the development of costly facilities that may not be needed in the future.

To prepare for the future, the SNWA has identified resources that are expected to be available at some point during the long-term planning horizon. These include desalination, local groundwater, Virgin River/Colorado River augmentation, and transfers and exchanges. In some instances, future resources are quantified and subject to water rights permitting, while the availability and development of others require further research and analysis. The SNWA Water Resource Plan further details future resource options.

Water Conservation

Water conservation is a resource that differs from other water supplies. Unlike other "wet" resources acquired and conveyed to meet demands, conservation reduces demands and extends the availability of existing, temporary and future water supplies.

The SNWA's most current Water Resource Plan (available at snwa.com) provides an illustrative look at how projected conservation achievements impact short- and long-term water demands.

Figure 2.3: SNWA banked supplies through 2023

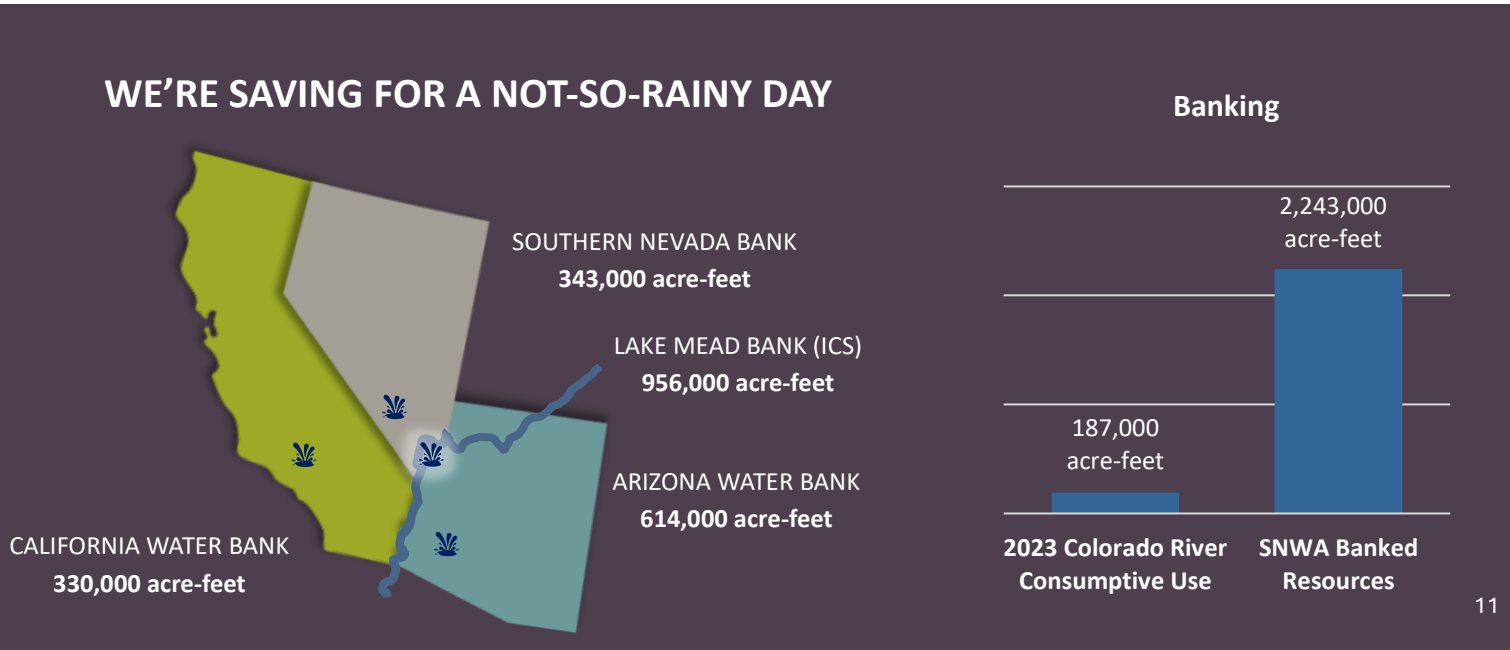


Photo: Lake Mead

CHAPTER 3: DROUGHT RESPONSE

Water resource managers face increased uncertainty and risk due to rapidly changing climate conditions. This chapter details current and anticipated challenges associated with Colorado River water supplies, as well as local and regional adaptation and response efforts.

CLIMATE OVERVIEW

Las Vegas ranks among the warmest and driest cities in the United States. On average, the greater Las Vegas Valley receives 4.18 inches of precipitation annually, although yearly rainfall totals can vary significantly. The summer months (June – August) are extremely hot, with average temperatures between 87.6°F and 93.2°F. Daytime summer temperatures often exceed 110.0 °F. High temperatures are moderated by dry air/low humidity conditions, typically below 40 percent year-round. Normal average temperatures range between 48.2°F and 53.5°F during winter, while the spring and fall are generally mild. Normal average temperatures during these shoulder seasons range between 60.8°F and 83.6°F.[6]

Las Vegas is also one of the fastest-warming cities in the U.S.[7] In recent years, local temperatures have warmed sooner in the spring, lingered longer into fall and reached record-breaking highs more often. Between 2003 and 2023, the region experienced its top ten warmest years on record. Consistent with global trends, annual temperatures in the Las Vegas area are expected to rise between 2.0°F and 3.0°F by 2035, and precipitation may become more varied. These conditions could worsen. Temperatures are projected to warm between 5.0 and 10.0°F by the end of the century.[8]

Based on a 2020 heat impacts study, the number of days between 90.0 °F and 120.0°F in the SNWA's service area will grow in the future from a 1990-2010 baseline of 130 days to 168 days or more by 2070.[9]

Southern Nevada's Urban Heat Island

Many communities experience higher temperatures at their urban core than outlying areas, a phenomenon known as the urban heat island (UHI) effect. This condition is primarily due to development, including the addition of thermal mass and hardscapes, which changes natural landscapes and vegetation. Air pollution, including vehicle and building emissions, contributes to UHI by producing greenhouse gas emissions. Buildings, roads and parking lots absorb and re-emit the sun's heat, creating an island of higher temperatures. According to a 2017 Climate Central study, Las Vegas' summer urban heat island is 7.3°F hotter than surrounding areas.[10]

Temperature and precipitation can significantly affect water use patterns in Southern Nevada, particularly for outdoor irrigation and large-scale evaporatively cooled facilities. Landscapes consume more water during high temperatures due to evaporation, evapotranspiration and plant water needs. Likewise, water used for air cooling increases when conditions are hot.

THE COLORADO RIVER AND CLIMATE CHANGE

The persistence of drought and rising temperatures in the Southwest have resulted in changes to precipitation patterns; reduced snowpack and runoff to rivers, lakes and streams; drastic decreases to critical storage reserves; dry soil conditions and increased wildfire occurrence; and the encroachment of non-native species.

As detailed in the water supply description, Southern Nevada's principal water supply is derived from precipitation and snowmelt that originates primarily in the Rocky Mountains of the Upper Colorado River Basin and flows into the Colorado River. Beginning in 2000 and continuing today, the Colorado River Basin has experienced drought conditions that quickly developed into the worst drought in the basin's recorded history.

According to the Fifth National Climate Assessment, released in 2023, temperature changes have significantly altered the water cycle in the Southwest region. With

continued greenhouse emissions, higher temperatures could cause more frequent and severe droughts in the Southwest, leading to drier future conditions.[11]

The best available scientific projections suggest that Colorado River conditions will continue to worsen. Leading climate scientists warn of a permanent shift to a drier future, known as "aridification." In simple terms, aridification refers to the process of a region becoming increasingly dry.[12] From a timescale perspective, aridification represents a long-term change rather than seasonal variation. Changes in air temperature and precipitation are likely to translate into diminished streamflow, drier soil conditions, increased water evaporation and evapotranspiration, and higher water demands for agricultural irrigation and landscaping uses.[13]

Water Supply Conditions

As shown in Figure 3.1, snowfall and runoff within the Colorado River Basin were well below normal between 2000 and 2023, representing one of the lowest 24-year averages on record. These conditions have resulted in significant water level declines at major system reservoirs.

As of late 2023, the combined water storage in the Colorado River's two primary reservoirs (Lake Mead and Lake Powell) was less than 35 percent of capacity. [14] Lake Mead water levels have declined approximately 148 feet since 2000, and further water-level declines are expected (Figure 3.3). While Colorado River stakeholders have worked effectively since the onset of drought to develop and implement shortage sharing, contingency and other plans to bolster Lake Mead water levels, resource challenges reached a tipping point in 2022.

Modeling by the U.S. Bureau of Reclamation in 2022 determined that additional, urgent and extraordinary actions are needed to prevent water and power supply disruptions associated with operations at Lake Mead and Lake Powell, the Colorado River's two primary reservoirs.[15]

DROUGHT RESPONSE

The following section outlines key policy initiatives currently being implemented or authorized. It also details the status of policy discussions to protect water and power operations in the Colorado River Basin.

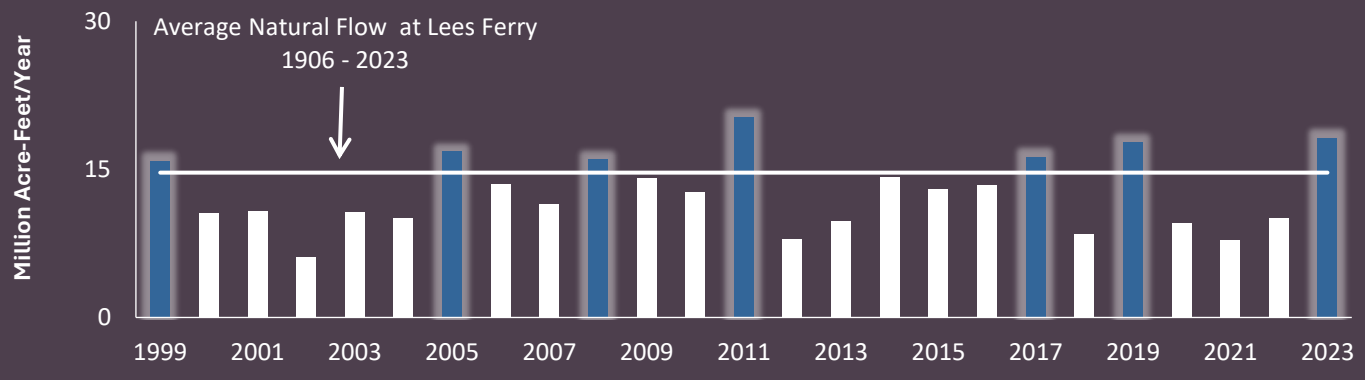
Colorado River Interim Guidelines

The SNWA worked with federal, state and municipal water providers in the Colorado River Basin to develop and implement a shortage sharing agreement. In 2007, the Secretary of the Interior issued a Record of Decision for The Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (Interim Guidelines), which established rules for implementing shortages in the Lower Basin. [16]

Figure 3.1 Colorado River natural flow (1999 – 2023)

THE COLORADO RIVER HAS ENDURED DECADES OF DROUGHT

Severe and sustained drought conditions continue to persist in the Colorado River Basin. Changing hydrology and streamflow trends create uncertainty for water users.



According to the Interim Guidelines, the Secretary of the Interior will declare a shortage based on projected Lake Mead water levels as determined by U.S. Bureau of Reclamation Colorado River modeling efforts. The forecast is reviewed annually in August; a shortage declaration will be made if Lake Mead is forecasted to be at or below 1,075 feet on January 1 of the following year.

Colorado River Drought Contingency Plan

In addition to the mandatory reductions defined by the Interim Guidelines, the SNWA and other Lower Colorado River Basin water users in Arizona and California will make contributions as defined by the Lower Basin Drought Contingency Plan Agreement (DCP).[17] The DCP was approved in 2019 to help mitigate drought impacts. Like the Interim Guidelines, thresholds for DCP contributions are based on the U.S. Bureau of Reclamation's August projection of Lake Mead elevation on January 1 of the succeeding year.

DCP contributions and shortage reductions increase as Lake Mead water levels decline. As shown in Figure 3.2, Nevada's obligation under these agreements ranges from 8,000 AFY to a combined maximum of 30,000 AFY. The maximum total obligation under the Interim Guidelines and DCP for all parties, including Mexico, is 1.375 million AFY through 2026.

Lake Mead Water Level (FT)	Shortage Amount (AFY)	DCP Contribution (AFY)	Total (AFY)
Above 1,090	0	0	0
At or below 1,090	0	8,000	8,000
At or below 1,075	13,000	8,000	21,000
At or below 1,050	17,000	8,000	25,000
At or below 1,045	17,000	10,000	27,000
Below 1,025	20,000	10,000	30,000

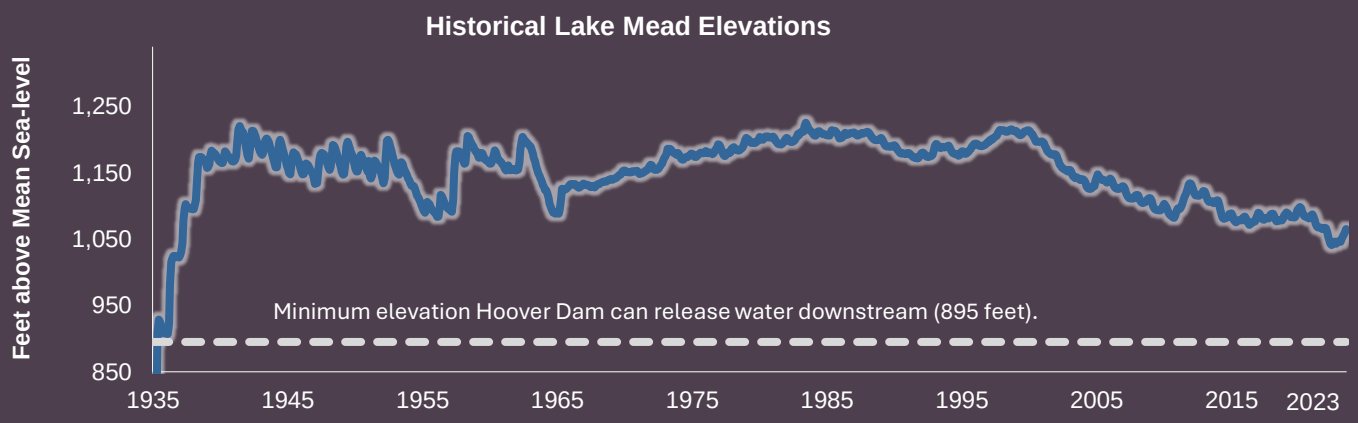
Figure 3.2 Nevada shortage/DCP contributions

If at any time the U.S. Bureau of Reclamation's minimum probable forecast for Lake Mead elevation is projected to be at or below an elevation of 1,030 feet, the Secretary of the Interior will consult with Lower Basin stakeholders to determine if additional actions are needed to protect Lake Mead's elevation from declining below 1,020 feet.[18]

The Interim Guidelines and DCP guide Colorado River operations through 2026. At the time of the 2024-2029

Figure 3.3 Historical Lake Mead elevation (1935 – 2023)

Lake Mead water levels have dropped approximately 148 feet since the onset of drought and further water-level declines are expected.



Plan publication, discussions regarding post-2026 system operations are ongoing. The states are contemplating additional conservation to reduce water use.

Colorado River Near-Term Actions

In response to actual and projected water level declines at lakes Mead and Powell, the Bureau of Reclamation in 2023 published a Notice of Intent in the Federal Register and initiated an environmental review process under the National Environmental Policy Act (1970) to develop and analyze alternatives to supplement the Interim Guidelines. The Bureau of Reclamation solicited input from the Seven Basin States, Tribal and local governments, and the public as part of this process.

The Bureau of Reclamation considered various alternatives, including a "Lower Basin Alternative" presented by Arizona, California and Nevada. In May 2023, anticipating additional conservation requirements, the Seven Basin States announced that Arizona, California and Nevada had reached an understanding to conserve 3.0 million acre-feet of Colorado River water by the end of calendar year 2026, with at least 1.5 million acre-feet conserved by the end of 2024.

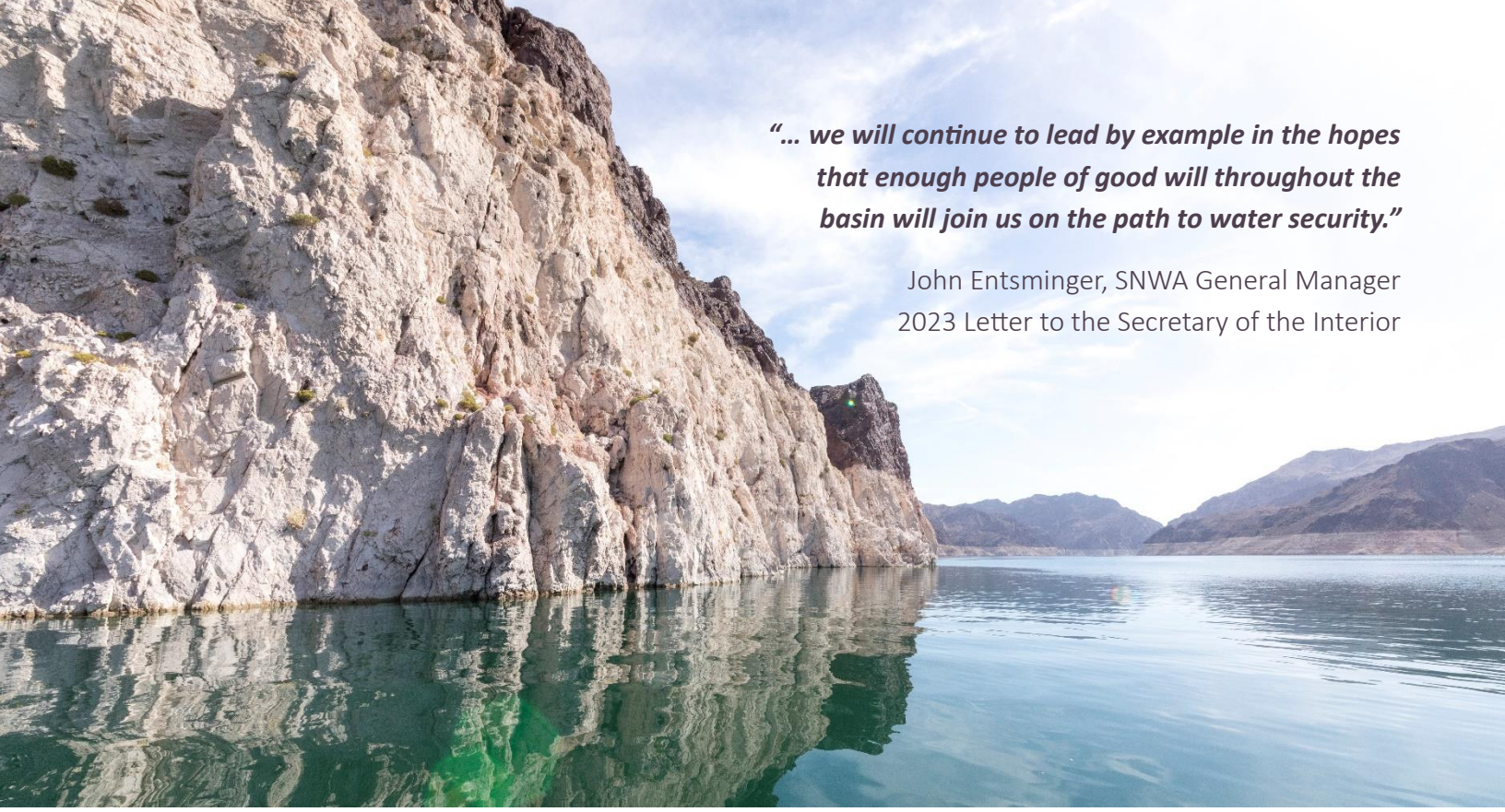
The Bureau of Reclamation released its final Supplemental Environmental Impact Statement for Near-term Colorado River Operations in 2024. The preferred alternative reflects measures to conserve at least 3.0 million acre-feet of system water through the end of 2026. Implementing this action will substantially reduce the risk of Lake Powell and Lake Mead reaching critical elevations through the end of 2026, coinciding with the expiration of the current Interim Guidelines. The parties continue to focus on solutions as part of post-2026 negotiations.

Other Actions

In 2023, the Nevada State Legislature also recognized that additional actions may be needed to ensure the SNWA has sufficient water resources available to meet community water resource needs during a federally declared shortage or other emergency condition limiting the agency's ability to provide reliable water service.

To this end, the Legislature approved Assembly Bill 220 (AB220), which, among other things, allows the SNWA to limit single-family residential water use to not more than 0.5 acre-feet if/or when the federal government reduces Nevada's allocation of Colorado River water to 270,000 acre-feet or less. The legislation also gives the SNWA

Photos: Lake Mead at Hoover Dam in 1983, 2003 and 2023



"… we will continue to lead by example in the hopes that enough people of good will throughout the basin will join us on the path to water security."

John Entsminger, SNWA General Manager
2023 Letter to the Secretary of the Interior

Photo: Lake Mead showing calcium bathtub ring (high water line)

General Manager the authority to further restrict water use during a declared shortage or other emergency condition, including a delivery system outage, subject to ratification by the SNWA Board.[19]

ONGOING PRIORITIES

Southern Nevada has prepared for and responded to drought and climate change impacts for over two decades. When the drought took hold in 2000, Southern Nevada was among the first communities to respond with advanced conservation measures, which have since become a permanent way of life for our community.

Through its adaptive management and response efforts, Southern Nevada has reduced its consumptive use of Colorado River water by approximately 42 percent since 2002. Nevada's 2023 consumptive Colorado River water use was 187,000 AFY, the lowest point since the early 1990s. This level of use is well below the maximum reductions prescribed under existing rules described in the preceding sections.

The SNWA is prepared to manage community water supplies and demands to the extent required and will work with the federal government, Colorado River Basin states and SNWA member agencies to implement the following actions, as appropriate:

- Implement existing policies and programs to manage Colorado River water use in accordance with federal shortage declarations and DCP commitments.
- Work with the federal government and other Colorado River water users to determine what additional actions are needed to protect system operations.
- Implement potential changes to policy, pricing, education and incentive programs discussed in this plan and authorized under AB220 to elicit an increased water conservation response.
- Access temporary water supplies as needed to meet short-term gaps between supply and demand; accelerate future resources development and/or use.

Photo: Acoustic Listening Device, Leak Investigation

CHAPTER 4: WATER MANAGEMENT MEASURES

This chapter examines water management and operational strategies deployed by the SNWA and its member agencies to manage the community's limited water resources effectively and sustainably.

The SNWA and its member agencies implement water management measures designed to promote water conservation and improve water use efficiency. The following sections describe these measures and detail new initiatives and strategies developed by the organization for implementation under the 2024-2029 Plan. New additions build upon the community's prior conservation success and address new opportunities to enhance results.

N *Look for this symbol (on left) to learn more about new strategies being implemented by SNWA under the 2024—2029 Plan.*

BEST MANAGEMENT PRACTICES

The SNWA Board of Directors and SNWA member agencies approved a Memorandum of Understanding (MOU) in 1994 regarding water conservation and efficiency programs. Amended in 1999, the MOU included 14 Best Management Practices (BMPs) for increased water efficiency in the SNWA service area.

As noted below, BMPs ranged from regulation and pricing to education and incentives:

- Water measurement/accounting system
- Incentive pricing and billing
- Water conservation/efficiency coordination
- Information/education program
- Distribution system audit program
- Customer audit/incentive program
- Commercial/industrial audit/incentive program
- Landscape audit program
- Landscape ordinances
- Landscape retrofit incentive program
- Wastewater management/recycling program
- Fixture replacement program
- Plumbing regulations
- Water shortage contingency plan

The MOU gave SNWA member agencies the flexibility to prioritize and implement the BMPs individually, or to participate in joint programs covering some or all SNWA member agencies. It also served as a foundation for subsequent water management, conservation, education and outreach initiatives, as described below and in Chapters 5 and 6.

MUNICIPAL WATER MANAGEMENT

Progress towards the SNWA's water conservation goal depends, in part, on the water management and business practices of SNWA's member agencies. Consistent with the BMPs detailed on the left, water management efforts include universal metering, non-revenue water management, tiered rates and water reuse. As described briefly below, the SNWA and its member agencies continue to use these best water management practices.

Universal Metering

SNWA member agencies fully meter all customer connections. Metering efforts include source-water metering, service-connection metering and reading, fixed-interval meter reading and meter-accuracy analysis.

The LVVWD upgraded its small water meter test bench in 2022. The meter test bench simulates field and flow conditions to assess water meter accuracy. With precise testing capabilities, LVVWD can promptly identify and remedy meter inaccuracies. The LVVWD is also phasing in ultrasonic water meters at all residential properties over the next 15 to 20 years. The meters use sound waves to measure fluid velocity and calculate water flow rates and are more accurate at very low flow rates.

Meter Reading and Monitoring: Water purveyors read meters monthly. Information is classified and retrievable based on customer class, meter size, land use and other relevant variables. The purveyors monitor customer meters for consumption anomalies—such as spikes in

consumption due to leaks—and use this information to notify customers of unusual account activity.

Most SNWA purveyors (including LVVWD, North Las Vegas and BBWD) also implement Advanced Metering Infrastructure (AMI). This technology improves meter reading efficiency, provides higher-resolution data for research and analysis and improves the customer billing process. AMI data is available in near real-time, allowing for faster customer leak notification and repair. Henderson is in the process of installing AMI and Boulder City is seeking grants to support system upgrades.

N Leverage Meter Technology

The increased availability of water usage data and the enhanced ability to share that information with customers faster will yield additional awareness of and response to on-site water use issues and conservation opportunities. For example, LVVWD uses its new metering technology to identify potential leaks and customer compliance issues. The LVVWD's system automatically reviews all available single-family residential meter data to identify violations of time-of-day and day-of-week watering restriction. The LVVWD has begun issuing customer notifications for Sunday watering and may scale up outreach in future years.

The City of North Las Vegas utilizes two enhanced meter data portals that customers can access depending on their meter type. The City also utilizes this data for leak investigations and water use compliance activities related to irrigation restrictions. North Las Vegas is working to provide enhanced, real-time courtesy violation detections for customers to alert them to continuous use, intermittent leaks and watering restriction violations. Efforts will encourage customers to promptly remedy any violations to avoid formal water waste notices and fees.

The City of Henderson also leverages meter data to enforce irrigation compliance for dedicated irrigation services. Henderson will explore additional functionalities as it brings AMI online over the next few years.

Incentive Pricing and Billing

While the SNWA's member agencies set water rates independently, they use similar conservation rate principles to manage water demand. Over the years, SNWA water purveyors have compressed tier thresholds and significantly increased upper-tier water rates for high water users. To maintain a strong pricing signal, the SNWA adopted the recommendation of a citizens' committee in 2015 to promote water rates that sustain and advance conservation achievements by ensuring rates keep pace with inflation.

Conservation Rates: The SNWA's purveyor members use incentive pricing to promote water conservation. Under an increasing block rate model, the unit price of water in each succeeding block or "tier" is charged at a higher price. In simple terms, as a customer's water use increases, so does the price they pay for that water. This pricing provides a financial incentive for customers to improve efficiency and eliminate water waste. The SNWA also implements a commodity charge, which pays for SNWA water system enhancements. The flat fee is assessed per thousand gallons. Customers are billed monthly based on metered use, and bills include consumption information (gallons of water used/billed under each tier).

N Implement Rate Changes

While rates are an effective conservation measure, public water agencies also have an obligation to the well-being and vitality of the communities they serve. As such, the SNWA's member agencies will consider further rate adjustments when warranted to achieve conservation goals or operational requirements and work to ensure water pricing appropriately balances the need for conservation with economic factors.

Tier Compression: Several purveyors, including LVVWD, Henderson and Boulder City, adjusted rates during the prior plan period to compress tiers and/or increase rates at the higher thresholds to strengthen conservation pricing signals.

Water Budget Surcharges: All golf courses in the SNWA service area are on an approved water budget. Golf courses pay a surcharge when they use more water than their budgeted amount. These surcharges are assessed annually in addition to the price paid for water.

Water Waste Fees: Customers are subject to fees if water waste issues are not resolved within a prescribed time limit or for recurring violations. The fee assessment doubles with subsequent violations.

Enforce Water Theft Rules

Water Theft Fees: Water theft occurs when individuals tap water pipelines and fire hydrants to obtain water without payment. LVVWD and the City of Las Vegas have implemented policy changes in recent years to target water theft. The LVVWD policies include escalating fees, ranging from $5,000 for the first violation to $10,000 for subsequent violations within 18 months. Other potential consequences include civil action, criminal penalties and termination of service.

The City of North Las Vegas has established Service Rules to pursue citing individuals and commercial companies for water theft. The City of Henderson also pursues mitigation and enforcement of water theft, including fees for violations.

Development Codes and Policies

As detailed below, the SNWA's member agencies have adopted landscape and development codes that are among the most stringent in the U.S. Recent changes include stricter restrictions on turf installations, prohibitions on new golf courses and reductions to golf course water budgets, limitations on the size of pools in new development and new cooling efficiency standards.

Landscape Watering Restrictions: All jurisdictions implement assigned watering groups that limit watering to one day/week in winter, three days/week in spring and fall, and six days/week in summer. Spray irrigation is prohibited from 11 a.m. to 7 p.m. from May 1- August 31.

Vehicle Washing: A positive shutoff nozzle is required for residential vehicle washing. Commercial vehicle washing is prohibited unless water is captured in the sanitary sewer, where it can be treated and reused.

Update Development Codes and Policies

Grass Provisions: Grass is prohibited in new development, except for parks, schools and cemeteries.[20]

Mist Systems: Commercial use of mist systems is limited to May through August from 12 p.m. to 12 a.m.

Golf Courses: The development of new golf courses is prohibited; existing courses are subject to reduced water budgets.

Man-Made Lakes: The development of new man-made lakes is prohibited.

Septic Systems: Properties connected to municipal water are prohibited from installing new septic tanks.[21]

Irrigation Controller, Spray Sprinkler Body: WaterSense-certified devices are required for new development effective January 2024 or when final product specifications are approved.[22]

Pools: New residential pools are limited to a maximum surface area of 600 square feet.

Water Waste: As detailed below and in Appendix 3, the SNWA works with its member agencies to implement code, ordinances and service rule changes that prohibit water waste, which includes:

- Allowing water to spray or flow off a property.
- Watering outside of assigned day(s).
- Failure to comply with misting system and vehicle/equipment washing restrictions.
- Using sprinklers from 11 a.m. to 7 p.m. between May 1 and August 31.
- Failure to repair a malfunctioning irrigation system or supply line within 48 hours.
- Failure to discharge swimming pool/spa drainage water into a public sanitary sewer, if available.

Water Waste Enforcement

The SNWA's member agencies implement compliance activities associated with water waste rules. Upon observance, customers are given notice and allowed time to correct problems; citations and fees may be issued if violations are not resolved within the prescribed timeframe or for recurring violations.

LVVWD, Henderson and Boulder City maintain mobile and/or web-based technologies that allow users to pinpoint the address of water waste, upload photos and input other valuable information such as time, date and type of waste observed. The forms prompt investigations by the water service providers.

N Increase Water Waste Enforcement

The SNWA continues collaborating with its member agencies to increase water waste enforcement within the members' respective service areas. In 2021, the SNWA developed and executed interlocal agreements for a regional water waste program to include Henderson and North Las Vegas. As part of this effort, the SNWA worked to onboard additional water use compliance staff, including four Conservation Aides, to provide water waste investigations in member agency service areas. The LVVWD also secured additional staff and vehicles to perform investigations and branded collateral, including vehicle wraps and water patrol logos for field vehicles.

The LVVWD, the City of Henderson and the City of North Las Vegas also began pooling resources for joint patrol events within specific service areas for higher visibility and impact. These members also perform data investigations, which involves analyzing usage data to identify irrigation trends and notifying customers who water outside the mandatory irrigation schedule.

Between 2021 and 2023, the LVVWD, City of Henderson and City of North Las Vegas conducted more than 134,000 water waste investigations and issued more than 14,000 fines. Agency staff patrol for water waste around the clock, seven days a week.

The City of North Las Vegas also requires customer backflow devices to be tested and free from leaks. The agency uses existing enforcement mechanisms to provide administrative oversight and enforcement.

N Increase Water Efficiency Standards

The Nevada State Legislature approved legislation in 2019 to require new residential, commercial and industrial structures completed after 2020 to meet any WaterSense final product specifications for toilets, urinals, showerheads and faucets developed by the United States Environmental Protection Agency. Further amended in 2023, the legislation requires residential, commercial and

Photo: Water waste investigation

WE'RE ON PATROL FOR WATER WASTE.

Since 2021, LVVWD, Henderson and North Las Vegas have completed more than 134,000 water use compliance investigations in their respective service areas.

Compliance staff serve as ambassadors in the community, helping to inform and educate the public about the importance of protecting our limited water supply.

industrial structures completed after 2024 to meet WaterSense product specifications for irrigation controllers.[23]

Figure 4.1 compares current and prior standards for residential, commercial and industrial toilets, urinals, showerheads, faucets and irrigation controllers. Water efficiency standards are presented in terms of gallons per minute (gpm) and/or gallons per flush (gpf).

Water Reuse

Nearly all water used indoors within the SNWA service area is recycled, either as direct or indirect reuse. Direct reuse involves capturing, treating and reusing wastewater flows for non-potable uses such as golf course and park irrigation. Indirect reuse consists of recycling water through treatment and release to the Colorado River for return-flow credits (see Chapter 2). Approximately 40 percent of water deliveries in the SNWA service area result in highly treated wastewater. Of that, 99 percent is treated and recycled for water reuse.

As shown in Figure 4.2, nearly all highly treated wastewater is recycled for direct and/or indirect reuse. This reuse extends SNWA resources because water can be recovered and used again until fully consumed. Southern Nevada's two largest consumptive water uses include irrigation and evaporative cooling.

Although the SNWA supports and promotes all forms of water conservation, the organization specifically focuses on consumptive water uses, which have the greatest impact on the community's overall water supply.

N Maximize Reuse Outside the Las Vegas Valley

In 2017, the SNWA adopted a policy to address water use outside the Las Vegas Valley. The policy prioritizes returning treated wastewater to Lake Mead for return-flow credits, and implementing reuse to achieve full beneficial use of SNWA water resources when returning treated wastewater to Lake Mead is not feasible. Few communities implement water reuse as aggressively or effectively as Southern Nevada.

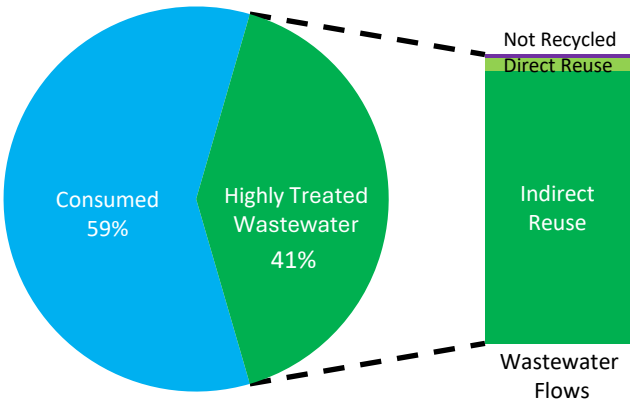
Since adopting its Out-of-Valley Water Use Policy, the SNWA has worked with its member agencies to develop water infrastructure plans to expand water reuse potential in new and existing development areas. For example, the SNWA amended its Major Capital Construction Plan in 2022 to include new facilities to transport wastewater from a developing industrial area known as the APEX in Garnet Valley to existing wastewater treatment facilities.

The SNWA also engaged the City of Boulder City to discuss options to capture, treat and recover Boulder City's Colorado River wastewater flows. The SNWA is conducting a feasibility study to consider three water reuse options.

Figure 4.1 Water efficiency standards

Fixture/Appliance	Prior Standard	Current Standard
Toilet	1.6 gpf	1.28 gpf
Urinal	1 gpf	0.5 gpf
Showerhead	2.5 gpm	2.0 gpm
Faucets	2.2 gpm	1.5 gpm
Irrigation Controller	N/A	WaterSense Certified

Figure 4.2 Wastewater reuse



These options include the construction of a recharge well that would return wastewater to Lake Mead via in-ground filtration and, alternatively, wastewater treatment plant upgrades to improve wastewater quality and make it suitable for irrigation use. A third option includes using the existing multi-agency infrastructure to return water to Lake Mead. The federal government announced a $1.0 million grant to SNWA in 2023 to support a water reuse study and recovery efforts.

N Optimize Return-Flow Credits

There are approximately 14,500 commercial and residential septic systems in the greater Las Vegas Valley. Many associated properties rely on Colorado River water, delivered by municipal water providers. Unlike properties connected to municipal wastewater, the community cannot recover water discharged to septic systems.

The SNWA launched a Septic Conversion Pilot Program in 2023 that offers grant funding for septic users to abandon their systems and connect to the municipal wastewater system. Water discharged to the municipal wastewater system is collected, treated and released to the Las Vegas Wash for return-flow credit.

WATER LOSS REDUCTION PLAN

All water delivery systems experience losses, known as non-revenue water (NRW) or unaccounted water. Non-revenue water losses are typically associated with leaks (real losses) and variations in meter accuracy (apparent losses, unbilled authorized consumption and water theft). The SNWA's current water loss rate is approximately one percent and the combined SNWA water purveyor's system water loss rate is approximately five percent, well below industry norms.

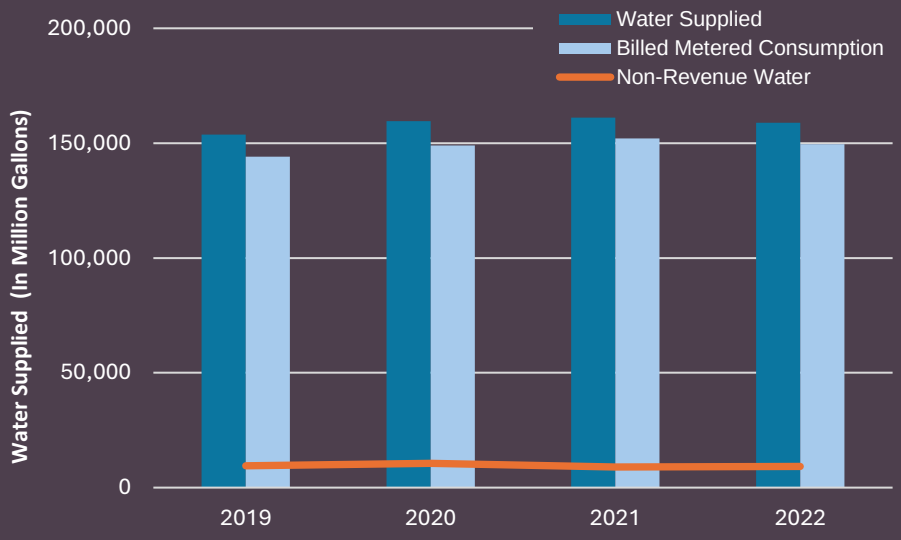
The SNWA initiated work with a consultant in 2022 to conduct a non-revenue water analysis for each purveyor member, including the LVVWD, City of North Las Vegas, City of Henderson, City of Boulder City and the BBWD. Among other efforts, the consultant performed the meter verification procedures and advanced validation of water delivery volumes to the utilities. [24]

The consultant conducted the non-revenue water analysis using the AWWA's methodology and software for water loss auditing. The contractor also performed a "gap" analysis to guide the development of a Non-Revenue Water Management Program designed to set and achieve water loss reduction goals within the SNWA member agency service area. As required by NRS 540.145(1)(a),

Figure 4.3 SNWA non-revenue water volumes (2019 – 2022)

WE'RE LOOKING OUT FOR LEAKS

The SNWA and its members track non-revenue water losses. These losses are typically associated leaks in the distribution system, variations in meter accuracy and water theft.



this Plan includes water audits (See Appendix 5) and specific measures that target water loss reductions.

Subsequent Plan revisions will include a comparison of non-revenue water loss calculations and an analysis of progress toward water loss reduction goals.

NRW Reduction Goal

As further described in this chapter, the SNWA and its purveyor members considered existing non-revenue water losses and the potential for improvement when establishing water loss reduction goals.

The process included:

- Identifying existing non-revenue water loss
- Evaluating the technical minimum achievable water loss amount
- Developing an interim GPCD target and quantifying contributions by agency

As shown in Figure 4.3, the SNWA's current NRW rate is the difference between the amount of water supplied by SNWA Purveyors to customers (2019 through 2022) and water billed during those same years. The difference between these two volumes is approximately 9.0 billion gallons of non-revenue water or 23,600 acre-feet.

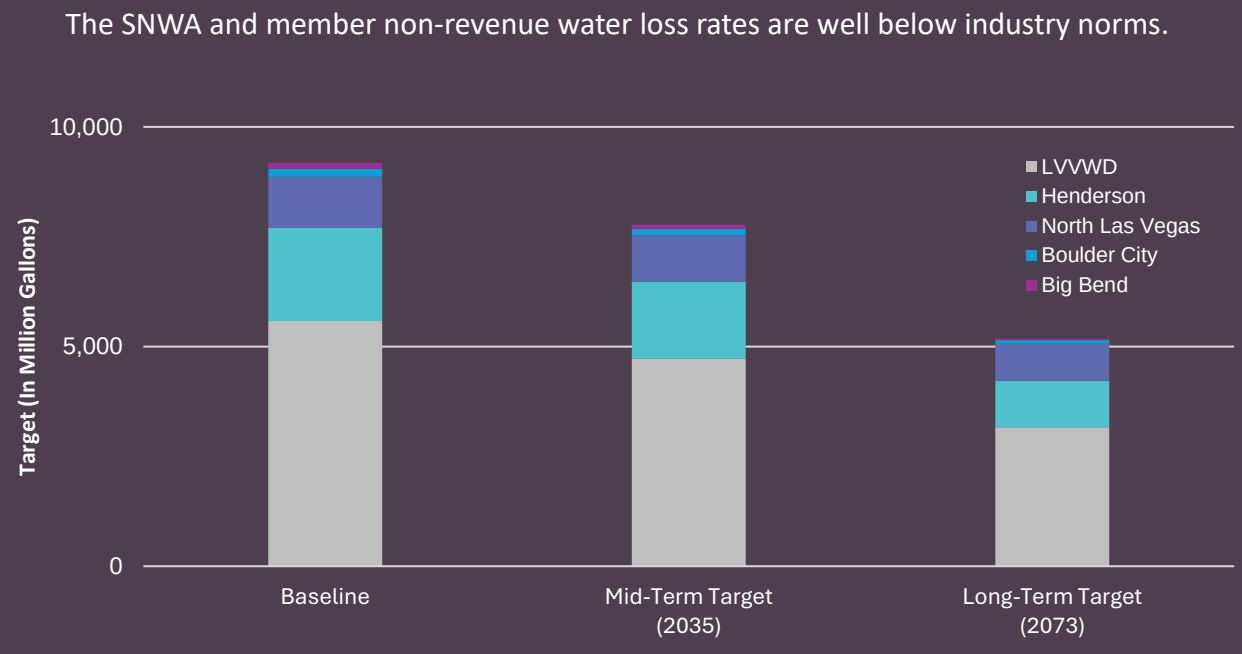
The SNWA considered mid and long-term NRW target reductions as part of this planning effort. Figure 4.4 considers a long-term reduction to approximately 5.0 billion gallons. Achieving this non-revenue water target will save the community approximately 12,000 AFY. This target is the technical minimum for non-revenue water losses, meaning this is the lowest reasonable amount of non-revenue water loss the agencies can achieve through water loss management and prevention measures. For this Plan, the SNWA and its purveyor members set an interim target of 7.7 billion gallons (a reduction of 1.4 billion gallons from the current baseline). This reduction represents an approximate 2,500 AFY water savings.

Achieving this goal will reduce demands by approximately 1.7 GPCD by 2035 and 4.8 GPCD over the long-term planning horizon (2073). Expected reductions in SNWA member agencies' NRW is proportionate to the population of their respective service areas. The SNWA will report progress toward the mid-term target in the next Plan update.

Water Loss Reduction Strategies

The SNWA and its purveyor members are working to address water losses through strategic initiatives and collaborative efforts that focus on maintaining beneficial practices, enhancing program management, reducing

Figure 4.4 SNWA NRW Baseline and Target Reductions (Gallons)



apparent losses through metering improvements and minimizing real losses associated with leaks. Annual auditing is a cornerstone, bolstering data reliability and accuracy across operations. As further described below, the respective agency staff will support these activities by monitoring trends, overseeing interventions, and developing maintenance strategies informed by regular assessment.

- Implement Uniform Design and Construction Standards: The SNWA's member agencies have created and adopted Uniform Design and Construction Standards for Potable Water Distribution Systems. These detailed construction standards ensure that water delivery systems meet or exceed industry standards. [25]
- Conduct Soil Testing/Identify Threats: Water purveyors conduct soil testing before facility installations to identify potential distribution system threats. For example, they use plastic sleeves to prevent corrosion in areas where testing indicates soil chemistry will be destructive to copper pipes.
- Conduct Condition Assessments: Crews inspect reservoirs and pipelines thoroughly and regularly, using special monitoring devices to detect and report water leakage.
- Speed Leak Repairs: Interagency collaboration speeds leak repairs through fast-tracking line location ("call-before-you-dig") and prompt repair. Agencies track the estimated system loss for each leak repaired.

Expand Program Management Efforts

Conduct Annual Auditing: Water purveyors will conduct annual water audits, focusing on improved data reliability to enhance the accuracy and dependability of data across operations.

Track and Report NRW: Water purveyors will establish and maintain dedicated Water Loss Control Teams that monitor progress, analyze data trends and support intervention projects that reduce non-revenue water losses. Teams will convene to review data tracking and project status. The purveyors will also summarize their efforts and progress in reducing non-revenue water in comprehensive annual Water Loss Control Reports. Some SNWA member agencies also plan to participate in monthly tracking through the development and use of the SNWA's NRW dashboard, which is currently in development.

Reduce Apparent Losses / Improve Revenue Recovery

Small Meter Testing/Replacement Programs: All SNWA purveyor members actively seek ways to enhance the accuracy of small meters to reduce apparent losses. Current and future strategies include:

- Repairing or replacing small meters as needed
- Engaging consultants to analyze small meter testing
- Implementing automated internal operations to identify inactive meters
- Updating operational policies

Some agencies are also planning proactive meter replacements. Concerted efforts across multiple jurisdictions underscore a shared commitment to improve customer metering inaccuracies and optimize metering systems for greater efficiency.

Large Meter Testing and Replacement Programs: All SNWA purveyor members have large meter testing and replacement programs in place and will maintain existing efforts and/or consider enhancements for improved results. Along with data analysis, meter testing and replacement activities will help to ensure meters function properly, improving resource management across jurisdictions.

Improve Metering Systems: LVVWD, BBWD and City of North Las Vegas have converted to Automated Metering Infrastructure (AMI). North Las Vegas replaced all water meters in its service area with new smart meters. LVVWD finalized a customer portal that will allow customers to view daily water consumption through MyAccount. Henderson will migrate to an AMI Read System on all meters with network infrastructure planned for installation in 2025 and SmartPoint/EndPoints installed by

2029. Boulder City is seeking grants and will transition to AMI once Automatic Meter Reading (AMR) meter replacements in its service area are complete (at 43 percent in 2024).

N Reduce Real Losses / Improve Leak Management

Conduct Main Repairs/Replacements: All SNWA purveyor members repair mains as needed to avoid water losses. Some agencies also implement proactive measures to prevent future water loss and infrastructure failures. For example, Boulder City utilizes satellite leak detection and conducts a comprehensive data analysis to identify potential leaks before they become significant problems. Similarly, LVVWD uses predictive tools like VODA.ai to help pinpoint high-risk pipelines for condition assessment and replacement, proactively addressing potential failures before they occur. Henderson and North Las Vegas conduct regular assessments and track historical trends to inform their maintenance strategies.

Implement Service Line Replacement Program: All SNWA purveyor members conduct service line replacements, prioritizing and performing work based on information such as leak detection results, pipeline age, material type, inspection data and failure rates. When possible, agencies work with internal and external partners to minimize disruptions and resolve other facility issues (for example, coordinating service line replacements with street and sidewalk repairs). The LVVWD has also expanded its use of predictive tools like VODA.ai to include service lines in its pipeline failure prediction model.

Expand Leak Detection Efforts: LVVWD, North Las Vegas and Boulder City plan to expand leak detection efforts. The agencies are pursuing several proactive methods, including satellite leak detection, large-diameter leak detection programs and artificial intelligence to identify leaks and prioritize replacements based on data analysis. Boulder City entered into an agreement with Asterra in 2024 to support satellite leak detection efforts. Asterra technology provides intelligence and insights to detect sub-surface leaks within the distribution system. The technology will help Boulder City identify the largest potential leaks within its service area and prioritize staff and financial resources for repairs.

Henderson conducted a similar satellite assessment with Asterra, which continues to inform their system maintenance efforts. In 2024, the city entered into a subsequent agreement with ArcadisGen to lead the implementation of enterprise decision analytics for digital asset management. The project will help the city to analyze its assets throughout their lifecycle, calculate the probability of risk and failure, and inform proactive maintenance effort so that the right assets are replaced at the right time.

LVVWD and North Las Vegas are also pursuing a partnership under Water, United to conduct leak detection using FIDO Tech's artificial intelligence. Planned work efforts include installing sensors to monitor approximately 300 miles of pipe. Upon notification, LVVWD and North Las Vegas will deploy distribution crews to fix leaks within their respective monitoring areas.

Other: LVVWD and Boulder City are exploring other opportunities and actions to reduce real losses, including investigations and/or implementations of District Meter Areas (DMAs), pressure monitoring strategies and potential increases to staff resources for faster leak repairs (subject to funding and approvals).

Photo: Commercial landscape conversion

CHAPTER 5: SPECIFIC WATER CONSERVATION MEASURES

This chapter describes specific water conservation measures planned or underway to help the community achieve its water conservation goal.

This chapter describes specific water conservation measures that bolster the water management measures and education/outreach efforts described in Chapter 4. These include policies, pricing and programs for residential and commercial water use in Southern Nevada, including indoor and outdoor water uses. See Appendix 2 for an estimate of water savings by each specific water conservation measure.

N *Reminder: Look for this symbol to learn more about new strategies being implemented by SNWA under the 2024-2029 Conservation Plan.*

As further described in this chapter, the SNWA and its member agencies have implemented new policy, pricing and program changes to support conservation goal achievement. Some actions are based on recommendations from the SNWA's Integrated Resource Planning Advisory Committee, while others are part of ongoing strategic planning efforts.

Together, these actions will help the SNWA to achieve its current conservation goal while countering upward pressures associated with climate change and system age. Implementing these measures requires ongoing support from the community and SNWA member agencies.

Information on policies, pricing and programs is current at the time of Plan publication. However, the SNWA regularly evaluates conservation progress, Colorado River conditions and other factors and may add, discontinue, or materially change its approach as conditions warrant. For the latest information on specific water conservation measures, visit snwa.com.

POLICY CHANGES

As described below, the SNWA works with its members to implement policy changes that reduce or restrict consumptive water use throughout Southern Nevada. Other municipal water providers in the SNWA service area are implementing measures that apply exclusively to their service area, such as landscaping codes and standards.

Photo: Pollinators like the Costa's hummingbird below find food and shelter in desert-adapted landscapes.

Photo: Narrow strips of grass next to parking lots and roadways are non-functional and must be removed to comply with AB356.

N Prohibit New Golf Course Development

The LVVWD and the City of Henderson approved rule changes in 2021 that restrict the use of Colorado River water to irrigate new golf course developments. Other jurisdictions followed suit with rule and code changes in 2022, including Clark County, Boulder City and North Las Vegas. Restricting new course development will help to reduce per-capita consumptive water use.

N Reduce Golf Course Water Budgets

The SNWA approved a resolution in 2022 supporting the reduction of golf course water budgets from 6.3 to 4.0 acre-feet of water annually per irrigated acre. The local jurisdictions adopted rule and code changes to implement these reductions, which became effective in January 2024.

Not all golf courses will be affected. Many golf courses have participated in SNWA incentive programs to replace grass with water-efficient landscaping and are already using less water than allowed under the revised budget amount.

N Limit New Turf Installations

Southern Nevada has some of the most progressive development standards for new grass installation. In December 2021, the SNWA adopted a resolution supporting a prohibition on the installation of new irrigated turfgrass and use of spray irrigation systems in new development, excluding parks, schools and cemeteries. This measure includes prohibitions on grass in new single-family and multi-family developments. The LVVWD and local jurisdictions—including Clark County

and the cities of Henderson, North Las Vegas, Boulder City and Las Vegas—considered and adopted rule and code changes to implement turf restrictions in 2022 and 2023.

AB220 further codifies grass limitations for those customers that use or will use Colorado River water distributed by the SNWA or one of its member agencies.

N Implement AB356 (Non-Functional Turf)

The Nevada Legislature passed Assembly Bill 356 (AB356) in 2021, restricting the use of Colorado River water to irrigate non-functional turf (decorative grass) in non-single-family residential applications by the end of 2026. The new law targets grass in streetscapes, medians, parking lots, traffic circles and other areas that are not used for recreation and play.

The SNWA convened an advisory committee to define functional and non-functional turf as required. The committee advanced its recommendations to the SNWA Board of Directors in early 2022. The Board subsequently adopted definitions for functional and non-functional turf (see Appendix 5) and the SNWA Nonfunctional Turf Removal Plan.

The SNWA supports non-functional grass removal efforts with financial incentives, as detailed later in this chapter (see Incentive Programs). Chapter 6 details other tools and resources to help customers plan and implement grass conversions.

N Coordinate on New Development (Large Users)

Meaningful opportunities for efficiency gains exist within the commercial and industrial sectors, especially for new development. The SNWA is collaborating with the Las Vegas Global Economic Alliance and the Governor's Office of Economic Development to prioritize businesses development efforts on companies and industries that have a minimal water footprint.

Photo: A turf conversion along a residential streetscape.

N Implement Pool Development Standards

Some private pools exceed 3,000 square feet and evaporate more than 145,000 gallons of water annually. The SNWA approved a resolution in 2022 that supports a 600-square-foot surface area limit on new residential pools. Each square foot of the pool surface area avoided saves an estimated 48.6 gallons of water annually. The LVVWD and other local jurisdictions implemented this change with rule and code changes.

This measure will help reduce consumptive water use associated with evaporative water loss, targeting savings from the largest 25 percent of new pools constructed. While the average swimming pool in Southern Nevada is about 475 square feet, the new pool size limits will prevent the development of large-scale, water-intensive residential swimming pools.

N Implement Cooling Efficiency Standards

Evaporative cooling is Southern Nevada's second largest consumptive water use, predominantly used to cool commercial and industrial buildings. The deployment of alternative cooling technology represents a significant water savings opportunity. Water consumption primarily occurs through evaporation and drift loss, which comprises about 70 percent of cooling water demand.

In 2021, the SNWA approved a resolution for a moratorium on cooling and heating mechanisms that consumptively use water. This action is supported by the 2020 IRPAC, which recommended the SNWA evaluate changes necessary to reduce current and future consumptive water losses associated with evaporative cooling technology.

PRICING

While the SNWA's member agencies set water rates independently, they use similar conservation rate principles to manage water demand. Over the years, SNWA water purveyors have compressed tier thresholds

Photo: A typical residential pool surrounded by lush water smart landscaping.

and significantly increased upper-tier water rates for high water users. To help maintain a pricing signal, the SNWA adopted the recommendation of a citizens committee in 2015 to promote water rates that sustain and advance conservation achievements by ensuring rates keep pace with inflation.

N Implement Pricing Changes

LVVWD, City of Henderson and City of Boulder City advanced various rate changes in recent years, including tier compression, increasing pricing at top tiers and/or tier equalization to incentivize water conservation and/or standardize the amount SFR customers pay for water, regardless of meter size.

INCENTIVE PROGRAMS

The SNWA has developed an extensive suite of tools to help customers in its service area improve water efficiency and reduce water waste. This chapter includes a description of incentive programs the SNWA plans to offer under the current Plan timeframe.

Water Smart Landscapes Rebate Program

The SNWA launched its Water Smart Landscapes (WSL) program as a pilot in 1999. Since then, the program has supported more than 83,000 turf conversion projects, saving more than 12.5 billion gallons of water for the community annually. The program provides participants a financial incentive to replace water-thirsty lawns with water-efficient landscaping that uses about 55 gallons less water per square foot per year than traditional grass.

The SNWA targets grass removal as a top priority because it is Southern Nevada's largest consumptive water use. The WSL program remains a major demand reduction tool as the community works to achieve its conservation goal.

To sustain results, participants must grant a conservation easement that commits to sustaining the project in perpetuity. In addition to the financial incentives, the SNWA offers free planning tools and resources to help residents and businesses prepare for their conversion. These include:

- An online plant list with more than 500 trees, shrubs, groundcovers and other desert-adapted plants suitable for desert environments.
- An online plant search database that includes plant photos and characteristics (such as water requirements and maintenance needs).
- Tools for landscape design, including a needs assessment, step-by-step design worksheet and design planning tips.
- Sample landscaping designs with suggested plant selections, layouts and tips for success.
- Free landscaping and irrigation design classes offered by SNWA experts.
- Online and print resources for qualified landscape contractors, installing and maintaining drip irrigation, managing pests and setting irrigation controllers.
- Additional rebates for trees to increase canopy cover within the conversion area and informational resources to protect mature trees during conversions.

Photo: Members of the public participate in free landscape offerings led by SNWA conservation experts.

N Expedite Non-functional Turf Removal

The SNWA expects WSL program enrollment among non-single family residential customers to ramp up exponentially over the next few years to support the implementation of AB356. To increase the efficiency of fieldwork and project closeouts, the SNWA augmented staff with contract labor and deployed new technologies to expedite nonfunctional turf mapping.

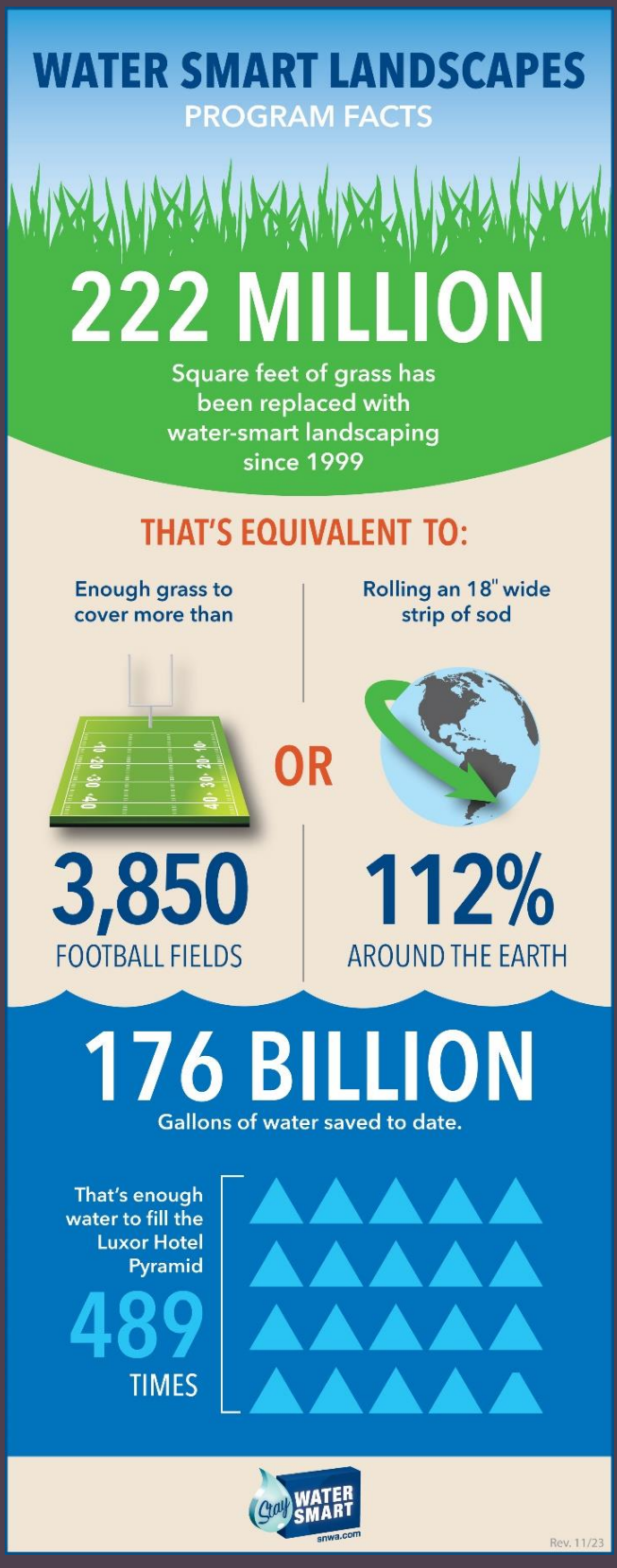
To accelerate large projects, streamline program administration and manage total program costs, the SNWA approved new program conditions in 2021 that remove the annual per-project cap for WSL projects ($500,000). The SNWA made changes to its WSL rebate amount in 2023 for non-single family residential customers to encourage properties to act now rather than later. Effective January 1, 2025, the incentive will decrease from $3 to $2 per square foot for the first 10,000 square feet of turf converted and to $1 per square foot thereafter. The SNWA will continue to evaluate the community's progress in removing non-functional turf and may make further WSL program changes to ensure compliance with AB356.

N Boost Residential WSL Participation

Increase Incentive Amount. The SNWA monitors and adjusts its incentive programs to maintain public interest and participation over time. In 2024, the SNWA authorized a temporary increase to the program rebate for single-family residential properties from $3 to $5 per square foot for the first 10,000 square feet of grass converted and $1.50 to $3.50 for every square foot thereafter for projects completed during calendar year 2024. This limited-time offering was possible through the State of Nevada's Water Conservation and Infrastructure Initiative grant, which is expected to be fully utilized by the end of 2024 or early 2025.

The City of Henderson offered a WSL supplemental incentive program that provided an additional $1.50 in rebates for turf conversion projects between 10,000 – 40,000 square feet. In FY23, Henderson distributed $953000 supplemental rebates, supporting the conversion of more than 1.3 million square feet of grass.

Infographic: WSL program facts



At the time of Plan publication, the City of Henderson is offering a $575 WSL topper for participating Henderson residents. MGM Resorts International (MGM) is also offering an additional $1 per square foot rebate to MGM employees. The City of North Las Vegas is pursuing a grant to support additional turf removal incentives for residential customers in its service area.

Conduct Targeted Outreach: In 2024, the SNWA sent a mailer to more than 50,000 area residents with at least 300 square feet of turf to promote the limited-time $5 WSL incentive. The SNWA will monitor the effectiveness of its targeted outreach efforts and continue to employ these or similar outreach strategies if they are effective in drawing WSL program enrollment and project completion.

Water Efficient Technologies Rebate Program

The SNWA's Water Efficient Technologies (WET) program offers incentives to commercial and multi-family property owners who install water-efficient devices. Businesses can work directly with the SNWA to implement custom technology that meets their needs or select pre-approved water-savings technologies with predictable savings and a defined monetary incentive for technology improvements.

Pre-approved technologies include:

- High-efficiency showerhead, toilet and urinal retrofits
- Sports field conversions to artificial surfaces
- Retrofits of standard cooling towers with qualifying high-efficiency drift elimination technologies

Nonconsumptive-use technologies earn a one-time incentive of $15 per 1,000 gallons conserved annually or up to 50 percent of the product purchase price (excluding labor and installation), whichever is less.

Consumptive-use technologies earn a one-time payment of $45 per 1,000 gallons conserved annually or up to 50 percent of the product or project cost for select technologies, whichever is less. Evaporative cooling conversions that reduce consumptive use but do not convert to 100 percent air-cooled technologies can earn a one-time payment of $70 per 1,000 gallons conserved annually or up to 50 percent of the project cost, whichever is less.

N Boost Participation in WET Program

Increase Program Incentives for Cooling Efficiency: In 2023, the SNWA Board approved WSL program changes, increasing the rebate for evaporative cooling conversions from $45 to $70 per 1,000 gallons of water saved annually, permanently increasing the incentive for wet-to-dry-cooling conversions from $950 to $1,500 per ton converted and removing the $500,000 annual cap for evaporative cooling projects under the WET program.

Photo: A cooling conversion project at the Charleston Library.

WATER SAVING SOLUTIONS ABOUND

Evaporative cooling is the second largest consumptive use of water in Southern Nevada. From high-efficiency waterless systems to hybrid options, the SNWA's WET program helps customers cash in on savings for cooling upgrades.

In 2024, the SNWA Board established a $475 per ton incentive to support the conversion to hybrid cooling systems and approved an additional temporary incentive of $550 per ton converted, for a total incentive of $1,025 per ton. The additional temporary incentive is available to customers until funding is exhausted via a $15 million Clark County Recovery grant that supports incentives to reduce consumptive water use from evaporative cooling. The rebate pays up to 50 percent of the total project cost and is only available for retrofitting existing systems.

Convert Athletic Field Turf: The SNWA entered into an interlocal agreement with the Clark County School District (CCSD) in 2021 to support converting up to 24 grass football fields to artificial turf. A typical field includes 94,000 square feet of play area, and a single field conversion saves an estimated 7.0 million gallons of water annually. The SNWA entered into a subsequent agreement in 2024 to support converting baseball, softball and soccer fields at 46 area schools. The SNWA will continue to work with CCSD to identify candidate schools, implement conversions and monitor results.

Convert Cool-Season Turf: The SNWA's WET program includes rebates to encourage more water-efficient grasses and groundcover at properties with "functional turfgrass." Conversion projects must use warm season grass species and may not overseed with cool-season grasses after the conversion.

In 2023, the SNWA Board removed the maximum annual incentive for cool-to-warm season turf conversions. Qualifying participants receive $0.50 per square foot for the first 100,000 square feet of turf converted and $0.25 per square foot thereafter. The City of Henderson provided additional funding for conversions in its jurisdiction with support from a $150,000 grant from Google. Henderson fully expended funds in 2024 but is pursuing additional grants to support progress and results.

Limiting future installations of cool-season turf and expediting warm-season turf conversions at existing public facilities will help reduce consumptive use associated with turf irrigation while preserving functional turf in recreational spaces. Future efforts to limit new cool-season turf installations may include changes to service rules, codes and ordinances. The estimated annual water savings is 21 gallons per square foot of turf converted.

Convert Turf to Alternative Sporting Surfaces: The SNWA works with local jurisdictions to convert underutilized park turf to more water-efficient surfaces such as sports court hardscapes and skate parks, splash pads with recovery and reuse systems, and playground and picnic areas.

Photo: Sierra Vista High School football field

The Clark County School District replaced 2.4 million square feet of grass with artificial turf at two dozen high school athletic fields in 2019 and 2020 with funding support from the WET program. The project will save about 135 million gallons of water annually. Additional conversions are underway.

Benefits include improved quality of life, higher utilization of play areas and cost and water savings. The SNWA pays 50 percent of the real project costs or $3.30 per square foot, whichever is less.

Partner to Test New Technologies: Through collaborations with WaterStart (see Chapter 7), the SNWA is evaluating the effectiveness of new water-saving technologies. Based on the results of pilot programs, the SNWA may add technology options to its list of pre-approved technologies or share program results with the business community as an opportunity under the WET program.

Implement Park Efficiency Improvements

Parks provide significant recreational value for our community's residents, offering active and programmed turf areas for various uses. While grass is the predominant feature in most parks, other amenities may include playgrounds, sewer-connected splash pads, sports courts and group-use facilities. Water use per irrigated acre varies markedly with this sector, and many parks appear to be using significantly more water than needed. High water use could be the result of unaddressed leaks, inefficient irrigation practices or other factors.

The SNWA offers incentives to public parks to convert cool-season turf, install sewer-connected splash pads and develop alternate amenities (such as basketball courts, tennis courts and other turfless areas). Future efforts may include creating awareness and tools for parks to manage water use consistent with their property features.

Leak Rebates and Resources

Customers are responsible for repairing leaks occurring on their property and the customer side of the utility's water meter. Residential leaks are typically due to damaged irrigation systems, cracked supply lines or faulty fixtures (such as faucets, toilets, appliances and water heaters). Slow leaks are not always visible and can generate significant water loss.

As described below, the SNWA and local water purveyors have deployed new tools and resources to help customers find and fix leaks faster. Some utilities also use new metering technology to analyze water use to identify and alert customers about possible leaks, which helps speed resolution.

Smart Leak Detector Rebate: The SNWA offers a rebate for one of five qualifying smart leak detectors that send information to customers about potential leaks via a smartphone application. The SNWA pays 50 percent of the purchase price up to $200. Some devices involve tapping into the existing plumbing system and may require a licensed plumber for installation, while others attach to the water meter.

Enhance Leak Resolution

Water Smart Plumber: The SNWA launched its Water Smart Plumber program in 2023. With a list of 27 participating contractors and growing, customers can have greater confidence in their ability to find and fix leaks on their property. Among other requirements, contractors must complete at least six hours of SNWA water efficiency training and two hours of annual refresher training. They must also communicate with customers within 24 hours of an inquiry, provide a written bid for work based on an hourly rate (not a flat project rate) and agree not to upsell a customer beyond the service requested from the initial inquiry.

Leak Detection Assistance Program: The SNWA Board approved a Leak Detection Assistance program in 2024. The program involves issuing customers with excessive leaks a $250 voucher for the initial leak detection service or the first two hours of service work to fix the identified leak. Program participants must use a SNWA Water Smart Plumber for this service. This program is available to single-family residential customers who receive notice about excessive or ongoing leaks.

Several of the SNWA member agencies maintain leak adjustment programs to help speed customer leak repairs.

Service Line Warranty Program: Service line repairs can be very costly, averaging $3,300 to repair. The City of North Las Vegas endorses Service Line Warranties of America and sends information to its customers about optional third-party coverage for water and sewer service lines.

The LVVWD is also evaluating a discounted water service line protection plan and would like to engage a third-party to provide customer insurance. This program is still under development, with an expected rollout in 2024.

Other Coupons and Rebates

The SNWA offers a variety of instant coupons and rebates for single-family residential property owners. The programs contribute to water use reductions within the community and offer customers easy access to water efficiency tools while minimizing the SNWA's program time and management costs.

Water Smart Car Wash Coupons: As of 2024, coupons are available from 15 partners for use at dozens of valley-wide locations. The SNWA's Water Smart Car Wash partners recycle water used on-site or send it to a water treatment facility where water is treated and returned to Lake Mead for reuse.

Smart Irrigation Controller Rebates: As of 2024, SNWA rebates are available for the purchase of 25 qualifying products. Smart controllers can improve water efficiency by helping homeowners automatically adjust their watering schedule according to weather and plant demands. Customers can save up to 50 percent off the purchase price up to $100, whichever is less. For commercial properties and HOAs, the SNWA's rebate pays up to $40 per valve or 50 percent off the product cost for smart controllers. In addition to the SNWA incentive, the City of Boulder City rebates its customer an additional 50 percent of the purchase price up to $75.

N Leverage Technology to Improve Compliance

Compliance Smart Controller Incentive: The SNWA is investigating a new incentive program to reduce consumptive water uses associated with landscape irrigation, particularly avoidable water use related to seasonal changes to the landscape watering schedule. To this end, the SNWA is contracting with a smart controller manufacturer to develop and deploy a new rebate program for specialized smart controllers that automatically adjust for seasonal restrictions based on a customer's property address and assigned schedule. As envisioned, the customer will retain control to set and edit landscape watering station cycle times, frequency and duration, but they cannot schedule watering for a non-assigned day.

The voluntary program will help customers avoid water waste violations by aligning irrigation to the mandatory seasonal schedule. It will also help them to reduce landscape water use and associated costs during watering schedule transitions throughout the year.

Other Coupons and Rebates

The SNWA offers resources to help residential water users become more efficient, inside and outside the home.

Stock Photo: faucet.

FIND AND FIX LEAKS FASTER, WE'LL HELP.

The SNWA and local water purveyors have new tools and resources to help customers resolve water leaks faster than ever.

- Get a Smart Leak Detector rebate.
- Find a Water Smart Plumber.
- Participate in the Leak Detection Assistance Program to help resolve excessive or ongoing leaks.

The Springs Preserve Botanical Gardens feature thousands of desert and desert-adapted trees, plants and shrubs. Find inspiration for a stunning, dynamic and water-efficient landscapes.

Photo: Springs Preserve Botanical Gardens

From how-to leak detection videos to water-saving tips, online resources provide customers with information on new high-efficiency products to maximize water savings. Other offerings include:

Indoor Water Audit Kits: The SNWA provides free indoor kits for residential customers located within the SNWA's member agency service area. The kits include a kitchen faucet fixture, bathroom sink aerators, a water flow testing bag, leak detection tablets, thread-sealing Teflon tape and a water-efficient shower head.

Water Use Estimator: This free online tool helps customers calculate their water footprint based on the size of their home, the number of occupants, existing appliances and outdoor landscaping. The water use estimator projects monthly water usage and provides customized tips for reducing water use.

Demonstration Gardens: The SNWA and its member agencies operate, support and/or promote desert demonstration gardens throughout the Las Vegas Valley and support smaller demonstration projects.

irrigation system maintenance and drip irrigation basics in English and Spanish. The Springs Preserve also provides free and paid offerings in its demonstration gardens, conducted by Master Gardeners and horticulture experts.

N Offer Site Appraisals

The SNWA launched a residential site evaluation program in 2019 but put the program on hold for staff and customer safety during the pandemic. Site evaluations resumed in late 2023.

High water-use customers are invited to participate in an on-site evaluation, based on their water use history. The review includes an audit of outdoor water use. The program aims to help single-family residential customers with unusually high-water use identify conservation opportunities and implement solutions. SNWA staff provide information on irrigation controller management, incentives and other programs designed to help customers save time, water and money.

NEVER WATER ON SUNDAY

OR **ANY DAY** 11 AM TO 7 PM **MAY – AUG**

IT'S THE LAW!

DON'T SPRINKLE AWAY OUR FUTURE.

IT'S TIME TO GET REAL.

Stay WATER SMART

LAKE MEAD IS AT HISTORIC LOWS.

Just because you can water more doesn't mean you need to.
Change your watering clock now. Find SUMMER watering tips at **SNWA.COM**

SNWA IS A NOT-FOR-PROFIT WATER AGENCY

CHAPTER 6: EDUCATION AND OUTREACH

This chapter describes SNWA education and outreach offerings to keep the community's residents and businesses informed and engaged as we work toward our water conservation goal.

The SNWA continues to develop and maintain a comprehensive public education and outreach program to keep residents and businesses informed of current conditions and engaged in ongoing conservation efforts. From direct mail and social media to billboards and business engagement, the SNWA has diverse tools to reach all corners of our community. Education and outreach efforts focus on programs, policies and actions to protect Southern Nevada's limited water supplies.

ADVERTISING, PUBLICATIONS & MEDIA

The SNWA's education and outreach campaign conveys the urgency of conservation efforts, provides information on and related context for policy changes and directs customers to program offerings. The SNWA disseminates crucial information through diverse channels while fostering a sense of shared responsibility that helps to safeguard local water supplies.

Television, Print and Radio Advertising: The SNWA launched new watering restriction (Get Real) and water waste (Law & Water) public education and outreach campaigns in 2022, featuring ads in both English and Spanish. These campaigns achieved several hundred million impressions, with thousands of ads running annually to promote water conservation initiatives. The SNWA also produced in-house campaigns focused on evaporative cooling, irrigation education and a "Thank You" campaign highlighting the success of the previous year's community conservation efforts while reminding the public to keep conserving water.

The SNWA's 2024 ethics campaign focuses on the value of water, promoting the use of water-efficient landscaping reflective of the reality and resource limitations of our desert environment. Likewise, the SNWA's new public education campaign focuses on mandatory seasonal watering restrictions, featuring collaborations with local sports teams throughout the Las Vegas Valley. The SNWA refreshes its compliance campaign every few years to keep its messaging fresh and to evolve as conditions change. For example, recognizing a significant transition from grass to desert-adapted landscaping over the last decade, the SNWA has developed new advertising that focuses on the nuances between drip and spray irrigation and significant differences related to the amount and

Image: SNWA Water Smart Landscapes advertisement

frequency of water needed for grass and other landscape vegetation like trees and shrubs (Drip It, Don't Drown It).

The SNWA also continues to promote its incentive programs on an ongoing basis and released new ads related to AB356, non-functional turf removal. The SNWA distributes campaign materials through various outlets, including paid advertising (television, print and radio) and web and social media channels.

Direct Mail: The SNWA's purveyor members distribute bill inserts that contain useful program information and water conservation tips to customers. Bills provide easy-to-read details about assigned watering days and comparative water use information that helps customers identify possible problems. The SNWA Public Services staff coordinates with member agencies to share conservation assets (including graphics and campaign collateral) via an online file-sharing portal.

The SNWA also distributes conservation collateral, which includes the following:

- Seasonal watering schedule. Issued quarterly to approximately 550,000 single-family residential properties (print).
- Lake Mead Water Supply Update. Issued two to three times annually to 860,000 residential properties, including townhomes and apartments (print).
- Business Newsletter. Issued two to three times per year by email to nearly 4,000 subscribers.


SOUTHERN NEVADA WATER AUTHORITY

LAKE MEAD

WATER SUPPLY UPDATE

OCT 2022

New conservation actions approved

The federal government declared additional water cuts for Nevada in response to declining water levels at Lake Mead. This action will remove 8.1 billion gallons from our community's water supply next year.

In addition, the federal government gave the states that share the Colorado River until mid-August to develop a plan to significantly cut total water use on the river. However, the states failed to develop a plan.

In response, the SNWA sent a letter to the federal government outlining 12 recommendations to cut water use from every state and every sector and asked for federal intervention if the states are unable to achieve an agreement. Water officials in Arizona, Colorado and many environmental groups have since endorsed the proposals.

"Southern Nevada has been ahead of the curve when it comes to water (conservation) for decades," said SNWA General Manager John Entsminger. "We desperately need the rest of the states that rely on the Colorado River to do what we're doing."

Southern Nevada is uniquely prepared for drought—we have invested $1.4 billion building infrastructure to secure our access to water even at very low lake levels, and our community has embraced water conservation, but we need to do even more.

Southern Nevada has been moving forward on multiple water conservation initiatives to reach a new community conservation goal of 86 gallons per person per day and to prepare for a hotter, drier future:

Golf Courses & Strip Water Features - New golf courses are prohibited and new water features are banned on the Las Vegas Strip.

Water Rates - The City of Henderson and the Las Vegas Valley Water District have adjusted their water rates so that all residential water customers get the same amount of water at each water rate tier. Previously, properties with larger meters could use more water in the lowest tiers. Additionally, the Water District is implementing an excessive use charge, which will encourage the largest residential water users to conserve or pay significantly more for their excessive water use.

Nonfunctional Turf Removal - Across Southern Nevada, nonfunctional turf is being removed to comply with a state law that prohibits irrigation of nonfunctional grass by Jan. 1, 2027.

Pool Size Limitations - The Las Vegas Valley Water District, Boulder City, Henderson and North Las Vegas approved limitations on new pool sizes to a maximum surface area of 600 square feet.

Lake Mead, the primary source of our community water supply, has dropped more than 170 feet

Mailer: Lake Mead Water Supply Update

Interactive Website: The award-winning snwa.com website features videos, infographics, multimedia demonstrations and other features to help residents and businesses save water. Customers can find their watering

Image: SNWA compliance advertisement with drip watering tips

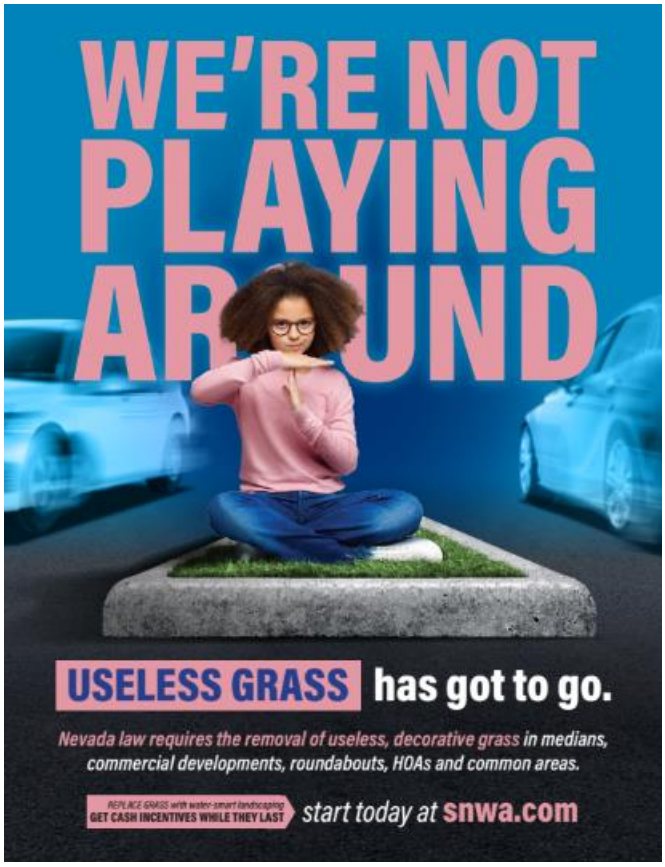


Image: AB356, non-functional turf ad

group, submit a water waste report via appropriate links, sign up for rebate programs, print coupons and calculate potential water savings associated with converting grass to water-smart landscaping. A plant list, sample landscape designs and other landscape resources are also available.

The website prominently features information on local and regional water supply challenges, incentives and rebates for homeowners and businesses, and a strong call to action for customer participation in water conservation offerings.

Vegas Valley H2O: The SNWA works with the LVVWD and Springs Preserve to produce Vegas Valley H2O, a quarterly television program that aligns with seasonal landscape watering schedule changes. The program features current water supply conditions, water conservation topics and landscaping tips. Vegas Valley H2O airs daily on local stations (CCTV, KCLV and BCTV) and is also available on YouTube and social media.

Videos and Multimedia: Instructional videos are available free of charge at snwa.com and youtube.com. They feature how-to multimedia demonstrations that aid customers with finding and fixing leaks, converting grass to water-efficient landscaping, setting irrigation clocks and other conservation topics.

Social Media: The SNWA has an active online presence, engaging customers daily through Facebook, X, Instagram and other social media platforms. Posts include conservation tips, landscaping information and how-to photos and videos. Visitors can also follow links to management interviews and other stories for a deeper dive into current Colorado River challenges and how Southern Nevada's conservation response is helping to ensure a sustainable future for our community.

Newsletters: SNWA Board members distribute a wide range of information to residents and businesses in their jurisdiction. The SNWA provides information for use and distribution. Article topics, including conservation policy or program changes, typically coincide with the latest water news. The SNWA also produces an e-newsletter and distributes it to about 4,000 subscribers.

As part of its H2One campaign, the City of Henderson also produces a monthly newsletter for distribution within its service area.

EDUCATION, ENGAGEMENT AND SUPPORT

N Enhance Educational Offerings

Landscape Classes: The SNWA offers free in-person and online classes in English and Spanish to help customers build knowledge and confidence to reduce landscape water use and address other challenges. SNWA staff experts lead classes at the Springs Preserve.

Class offerings for 2024 include:

- Basics of Water Smart Landscape
- Drip Irrigation
- Basics of Performing a Home Water Audit

Photo: Members of the SNWA Youth Conservation Council engage the public at the Springs Preserve's Earth Day event.

Youth Education: The SNWA has partnered with the Springs Preserve to create youth education offerings that educate and inspire young learners to protect and conserve our community's limited water resources. The Springboard Virtual Education Program offers students virtual, real-time interaction with conservation and water resource experts. Topics align with state standards. Teachers can select a video topic and request an expert at springspreserve.org.

The City of Henderson also offers youth programs within its service area. In collaboration with CCSD and area charter schools, Water Smart Students provides water conservation education for K-5th grade. The hands-on learning experience is led by staff experts, engaging youth to help them build smart habits that will last a lifetime and extend the community's water resources.

Youth Conservation Council: The SNWA's Youth Conservation Council (formerly Youth Advisory Council) allows high school students to earn community service hours and gain valuable experience while learning about real-world water issues. The program explores how biology, chemistry, engineering, education, law and public relations experts work with the community to manage Southern Nevada's water resources.

Participants examine water-related issues facing our community and develop outreach strategies for environmental stewardship, including planning and implementing the Earth Day event at the Springs Preserve.

N Leverage Technology to Increase Outreach

Water Smarts Podcast: The SNWA launched its Water Smarts Podcast in 2021, featuring engaging discussions on dozens of water resource and conservation-related topics of interest to the community. Program hosts guide thoughtful conversations with staff experts and community leaders, digging into issues, challenges and opportunities to stretch our community's limited water supply. New episodes air monthly on more than a dozen podcast providers.

N Provide Conservation Resources for Businesses

Business Resources: Businesses can create or expand their sustainability practices by educating employees and customers on the importance of conservation and how they can save water and money. The SNWA offers a myriad of free opportunities, including:

- Participation at employee expos and events to answer questions and provide outreach materials.
- Speakers to conduct educational presentations to employees.
- Conservation Toolkit, including content and visuals for employee newsletters and other communications.

- Access to conservation experts who can assist with incentives for upgrading businesses with water-efficient devices, technologies and landscaping.
- Water conservation collateral such as posters, flyers, banners and more.

Media Interviews: SNWA management and staff participate in interviews with local, national and international media outlets focused on water resources, shortage declarations, conservation, water waste, seasonal watering restrictions and other topics. In 2023, the SNWA participated in more than 100 interviews.

Event Participation: The SNWA engages in community outreach events to provide the public with conservation-focused messaging and information. The organization attended 100 special events in 2023. The SNWA's purveyors also participate in local events. The City of Henderson participated in 67 events activations throughout the city, which had a combined attendance of over 145,000 residents.

Conservation Helpline: The Conservation Helpline (702-258-SAVE) serves as a point of contact for residents interested in available incentive programs and to request various education and literature resources.

Speakers Bureau: The SNWA has an active speakers bureau program. Upon request, SNWA management and staff participate in presentations and engaging discussions with community businesses and groups. The SNWA participated in more than 60 presentations in 2023.

The SNWA's member agencies also participate in a wide range of speaking engagements, from Chamber of Commerce events to community-level meetings with Homeowner Associations. Discussion topics range in nature but generally focus on water conservation, underscoring the importance of contributions from all community sectors and linking listeners with conservation program resources to support water efficiency improvements.

N Enhance Targeted Outreach Efforts

The SNWA began ramping up its targeted outreach efforts in 2018 to promote conservation programs with the greatest water saving potential for various customer classes. With the implementation of new policies and programs and program changes, the SNWA continues to conduct and enhance targeted outreach to those most affected or with the greatest potential to save water.

Recent efforts include:

- Issued ~51,000 letters to residents with landscape suitable for conversion to promote the WSL program.
- Participated in meetings with HOAs and issued letters to customers affected by AB356.
- Issuing watering schedule reminders to customers based on meter usage data (LVVWD, ongoing).
- Issuing leak reimbursement letters to customers with suspected leaks (LVVWD, ongoing).
- Issued ~86,000 letters in 2023 to inform septic system owners about a new conversion program.
- Used phone messaging system and text reminders (text CONSERVE to 85357) to inform customers about federally declared shortages and seasonal watering restrictions.
- Conducted outreach via meetings and/or mailers to landscape professionals, pool owners, pool industry representatives and realtors/developers.
- Distributed nearly 10,000 letters annually to newly constructed homes to promote conservation policies and programs, including information on turf limitations, spray irrigation prohibitions and other conservation opportunities (SNWA, ongoing).
- Distributed more than 800 Conservation Toolkits to area businesses per quarter, (SNWA, ongoing).
- Sent nearly 600 letters to non-residential properties with non-functional grass in 2024 and about 10,000 letters over the recent years.

PARTNERSHIPS & COLLABORATIONS

Water Upon Request: Water Upon Request partners agree to serve water only when patrons request it. Every glass not served saves up to three gallons of water. More than 200 restaurants have participated in the program, created in partnership with the Nevada Restaurant Association and other collaborators.

Water Smart Contractors Program

Water Smart Landscaper: The SNWA offers a Water Smart Landscaper program. Companies participating in the program ensure their employees are trained in water-efficiency practices through free, SNWA-sponsored workshops. In turn, the SNWA features these companies in its Find a Landscaper section on snwa.com.

Contractors must complete at least six hours of SNWA water-efficiency training, comply with business standards, maintain good standing with the Nevada State Contractors Board, and be licensed and insured. Training includes a detailed overview of SNWA's programs, xeriscape principles, efficient irrigation design and scheduling. Annual refresher training is required. As of 2024, more than 125 companies are participating in the program.

N Enhance Targeted Outreach Efforts

Water Smart Plumber: The SNWA launched its new Water Smart Plumber Program in 2024 to help customers identify residential leaks and expedite repairs for water-saving benefits. Local plumbing contractors can join the program at no cost.

Like the Water Smart Landscaper program, Water Smart Plumbers must complete at least six hours of SNWA water-efficiency training and two hours of annual refresher training, maintain good standing with the Nevada State Contractors Board, and be licensed and insured. The SNWA features these companies on snwa.com. More than 25 plumbing companies have enrolled since the program's launch in 2024.

Homebuilder Outreach: The SNWA partners with local homebuilders to provide water efficiency materials to new homeowners. Materials include information about seasonal watering restrictions, preventing water waste, grass prohibitions, and other important conservation to help new homeowners understand water-use policies in Southern Nevada.

The SNWA distributes more than 3,000 packets annually.

Community Partnerships

WaterStart: Formed in 2013 as a partnership between public and private sectors to foster economic growth in the water industry, WaterStart accelerates the adoption of innovative water technologies. This Nevada non-profit recruits novel technologies and co-funds trials with members to help offset costs and risks associated with proving new technologies. This approach incentivizes innovation, opens doors to companies looking to validate solutions and helps to scale effective solutions faster.

The SNWA is a WaterStart partner and has participated in WaterStart pilot projects designed to improve leak monitoring and notifications, pressure surge monitoring and flow meter/pump efficiency. After successful testing, new technologies have been adopted/deployed within the SNWA service area and/or within member agency distribution systems.

N Recognize Industry Contributions

Water Smart Business: The SNWA's new Water Smart Business program is planned for launch in 2024 to recognize large- and small-scale businesses for their water conservation contributions to the community. It also serves as a peer-to-peer challenge to influence and promote participation in SNWA conservation programs within the business community.

Photo: Henderson's H2One conservation campaign.

"When we all come together to do our part, we can make a difference. From city staff to business leaders and homeowners, we all share the responsibility of conserving this limited and precious resource."

Henderson Mayor Michelle Romero

A CITY'S CALL TO CONSERVE

The City of Henderson unveiled its H2One campaign during the mayor's 2023 State of the City address, calling on all sectors of the Henderson community to conserve and focusing on steps residents and businesses can take for a big impact. The campaign features electronic and print media, including social media videos, billboards and a monthly e-newsletter distributed to area residents and businesses.

Photo: Henderson Mayor Michelle Romero signs the H2One conservation pledge.

Most businesses will join at the Partner Level, recognizing contributions associated with smaller-scale conservation projects. The SNWA may invite businesses that execute major conservation projects or that demonstrate a significant effort to participate at the Executive Level. Program benefits are commensurate with conservation efforts, ranging from Water Smart Partner marketing materials and on-property recognition to more substantial member recognition materials.

Each year, the City of Henderson honors one Henderson resident or business for their significant conservation contributions—from a water efficient-landscape design or renewable water policy to employee education, process optimization and more. The recipient is presented with the award at a Henderson City Council meeting and receives recognition through social media and other outreach tools.

Other Partnerships

Isle, North America: The LVVWD and SNWA also partner with Isle, North America (Isle). Formed in 2012, the organization guides members through innovation programs and works to help scale up solutions faster. Isle connects utilities to share expertise and find tailored solutions to address challenges like rising costs, regulatory pressure and aging infrastructure.

Water, United: Microsoft, PepsiCo, FiDO Tech and Oldcastle Infrastructure launched "Water, United" in 2024, This new initiative is working to unite public and private sectors to accelerate innovative water solutions in the Colorado River Basin. As described in Chapter 4, the LVVWD and City of North Las Vegas are in the process of deploying FiDO technology, which uses artificial intelligence to help utilities locate leaks for faster resolution.

Photo: Hybrid cooling tower at the Forum Shops

CHAPTER 7: RESEARCH INITIATIVES

The SNWA has a long history of research and collaboration, working inside and outside the organization to advance knowledge, technology and water efficiency innovations.

The SNWA's Water Resources division provides full-time support for research and analysis. In addition to supporting and tracking Plan implementation and conducting customer use analyses, the team helps evaluate new techniques and promising technologies for water savings and efficiency, particularly related to consumptive water uses.

Past research efforts focused on irrigation efficiency. For example, the SNWA's best-known research initiative was the Xeriscape Conversion Study. To date, the study represents the largest and most comprehensive study on the influence of landscape style on water demand. As detailed below, the division's research focus has expanded as various SNWA conservation programs and initiatives have matured.

TECHNOLOGY RESEARCH

New and expanding technologies represent a growing tool for conservation and water efficiency enhancements. The SNWA's current areas of exploration are detailed below.

Cooling Research Initiatives

Evaporative Cooling Analysis: The SNWA conducted target sector identification for evaporative cooling facilities in the Las Vegas Valley. According to the Southern Nevada Health District database, there are approximately 820 regulated cooling towers within the SNWA member agency service area with a collective cooling capacity of more than one million tons; there are also hundreds of additional smaller towers below the size requiring a permit. The SNWA estimates there are an additional 30,000 commercial-scale swamp coolers (20,000 full-scale industrial units and 10,000 half-scale units), and a large, albeit unknown, number of evaporative condensers.

The SNWA established an evaporative cooling submetering program in 2022 to help quantify consumptive water uses associated with large-scale evaporative cooling facilities in the Las Vegas Valley and refine water savings estimates associated with retrofit options. As part of this effort, the SNWA installed submeters at target properties (schools, resorts, and other large properties), including 57 submeters at 22 sites. The SNWA continues to gather and analyze data and monitor meters. Data collection is ongoing through 2024.

Alternative Cooling Technology Research: The SNWA is conducting active and passive research to evaluate the conservation potential for various improvements to traditional cooling technologies and potential water savings associated with alternative cooling technologies. This research includes touring technology installations, meeting with industry experts and deploying pilot studies.

- The SNWA collaborated with WaterStart, Formula 1(F1) and MGM to deploy an atmospheric water generator to capture water vapor exhaust from MGM's evaporative cooling tower to offset F1's water footprint for the 2023 Las Vegas Grand Prix.
- The pilot program produced the required water volume to support race operations while providing valuable information on the effectiveness of the technology when paired with evaporative cooling infrastructure. The project represents a first-of-its-type installation of recapture technology in the U.S.
- The SNWA helped incentivize the installation of an innovative radiant cooling technology array called SkyCool at a customer's property. The array is showing promising results in reducing the load on their evaporative condenser. It reflects heat from the array panels and radiates heat at a frequency that allows it to pass through the cold sky into space.

- The SNWA contributed to the Alliance for Water Efficiency's summary research on cooling towers. The study involved creating a model to assist utilities in identifying cooling towers in their service areas, developing practices for estimating use, determining the conservation potential of technologies intended to save water in a tower, enumerating evaporative cooling alternatives and developing recommendations for incentive and outreach initiatives that utilities can use to address cooling tower use in their area.

Smart Leak Detection

Smart leak detectors continuously monitor water use and provide real-time information to property owners via smartphones. The SNWA is evaluating the technology as part of a Smart Leak Detector incentive program. The program aims to quantify water savings and reduce water demand in residential households by helping to avert major leak events and modify consumer water use behaviors through engagement.

Remote Sensing

The SNWA has conducted vegetation analyses for the greater Las Vegas Valley since the mid-2000s. Initial studies focused on mapping turf coverage across the region using aerial imagery, which remains an agency priority. In 2022, the SNWA partnered with the USGS to acquire LiDAR (Light Detection and Ranging) digital elevation data of Southern Nevada. This three-dimensional data was crucial in mapping turf, trees, and shrubs and achieving accurate results.

The results showed 8,349 acres of grass in the study area. The analysis also showed that turf coverage is highest on commercial properties, with non-profit facilities and single-family residential properties also having large areas of turf. Tree canopy coverage totaled 21,800 acres, while shrub coverage totaled 4,848 acres, with single-family residential properties having the highest overall coverage. As part of this effort, the SNWA also estimated the total acreage of non-visible turf (2,500 acres), which includes turf obscured on the imagery from trees, buildings, and other artifacts.

Photo: 2022 aerial imagery showing vegetation

Process data allows the SNWA to monitor progress in non-functional turf removal efforts. It also allows the SNWA to target marketing and outreach to property owners with a significant amount of turf.

RELEVANT CLIMATE CHANGE RESEARCH

Research helps the SNWA to anticipate and adapt to changing conditions. The following studies detail the SNWA findings related to vegetation and water demands.

Heat Impact Study: Based on the SNWA's 2020 heat impact study, the SNWA service area will see an additional six and a half weeks of temperatures over 105°F by 2070[26] Heat impacts don't just affect people; they affect plant health, too. As described below, climate change conditions affect local tree and plant populations.

Landscape Study: The SNWA used heat tolerance data from the American Horticultural Society to identify

common trees and plant varieties currently at or near their heat tolerance range. Four of the 20 most commonly planted WSL tree species evaluated likely have or will fall outside their heat tolerance zones by 2025 (including Italian Cypress, Raywood Ash, Purple Leaf Plum and Lacebark Elm). The SNWA anticipates 10 additional tree species evaluated will fall outside their heat tolerance zones by 2055. The latter includes Ash varieties (Arizona, Modesto and Fan-Tex) and Pine (Mondell/Afghan and Aleppo). Other at-risk tree species include Olive, Chaste Tree, African Sumac and Privet. Some varieties are already showing signs of decline in our community.

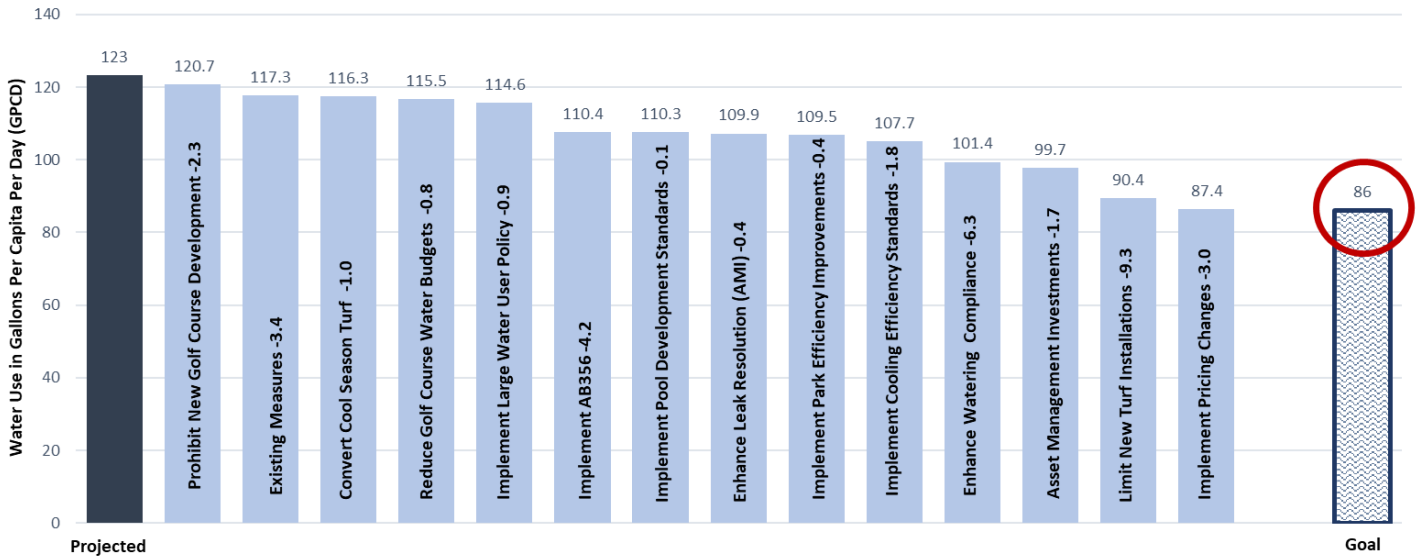
The SNWA tree study considered the heat tolerance of one hundred common landscape plants. It is likely other tree species will fall within the at-risk category upon further research and analysis, and some trees may outperform expectations. In any case, declining or dying tree populations could significantly impact current and future tree canopy coverage totals in Southern Nevada.

Current tree studies do not quantify the number of trees in the community by species, making it difficult to quantify the potential impact of tree die-offs. However, at-risk tree populations are significant in older and newer developed areas alike. The SNWA used this research to update the Southern Nevada Water Authority/Southern Nevada Regional Planning Coalition's Regional Plant List and notified stakeholders, including local nurseries.

Water Demand Analysis: As noted in Chapter 3, the SNWA anticipates potential increases in water use to compensate for warmer and drier conditions, particularly water uses associated with landscape irrigation and evaporative cooling systems. Trees, grass and other landscape plants require more water more frequently as temperatures warm. Likewise, demands on existing evaporative cooling systems are anticipated to increase as these systems work harder and longer to achieve target comfort settings for more days each year and during temperature extremes.

Research indicates that local water demands could increase by more than 10 GPCD between 2018 and 2035 due to upward pressure associated with climate change and system age.[27] The SNWA used this as a starting point for research and planning efforts, considering what actions are needed to achieve 86 GPCD by 2035. As illustrated in Figure 7.1 and described in this Plan, identified measures address immediate challenges associated with climate change and represents a realistic path to achieve the community's conservation goal.[28]

Figure 7.1: Southern Nevada's conservation strategy, a path to 86 GPCD




WATER
PATROL
LAS VEGAS VALLEY
WATER DISTRICT
WATER PATROL
TO PROTECT AND CONSERVE
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CHAPTER 8: PLAN IMPLEMENTATION AND SCHEDULE

The SNWA has a knowledgeable, committed and effective team that works with the community to achieve our regional water conservation goal.

PROGRAM STAFFING

The SNWA reorganized management and staffing resources in 2022 to provide enhanced water conservation support to community residents and businesses. As further described in this chapter, the Residential and Water Use Compliance Conservation Division (SFR/WUC Division) and a newly established Enterprise Conservation Division administer regional water conservation activities for the SNWA and its member agencies. Both divisions fall under the Water Resources Department, responsible for managing the SNWA's water, land and natural resources. Among other efforts, the department conducts long-range planning for the sustainable use of current and future resources, manages the SNWA's water resources portfolio, oversees environmental restoration and compliance efforts and administers regional water conservation programs.

The SNWA also formed an internal Conservation Cross-Departmental Team (Conservation CDT) to activate, engage and leverage management and staff talents from across the organization to support conservation initiatives. From Asset Management and Customer Care to Public Services and Information Technology, participants work to develop strategies and lead initiatives that are helping to drive down regional water use.

The conservation divisions work with the Conservation CDT to implement the SNWA's Water Conservation Plan, including many of the new initiatives previously described. They also work to develop and administer programs, track and evaluate progress and recommend program changes based on performance.

The SNWA coordinates regional conservation issues and programs, providing technical assistance to its member agencies and working with their dedicated conservation coordinators. Management and technical workgroups meet monthly to discuss and coordinate efforts.

Discussions include ongoing implementation and maintenance of water efficiency programs and standards across jurisdictions.

Single-Family Residential/Water Use Compliance Conservation Division

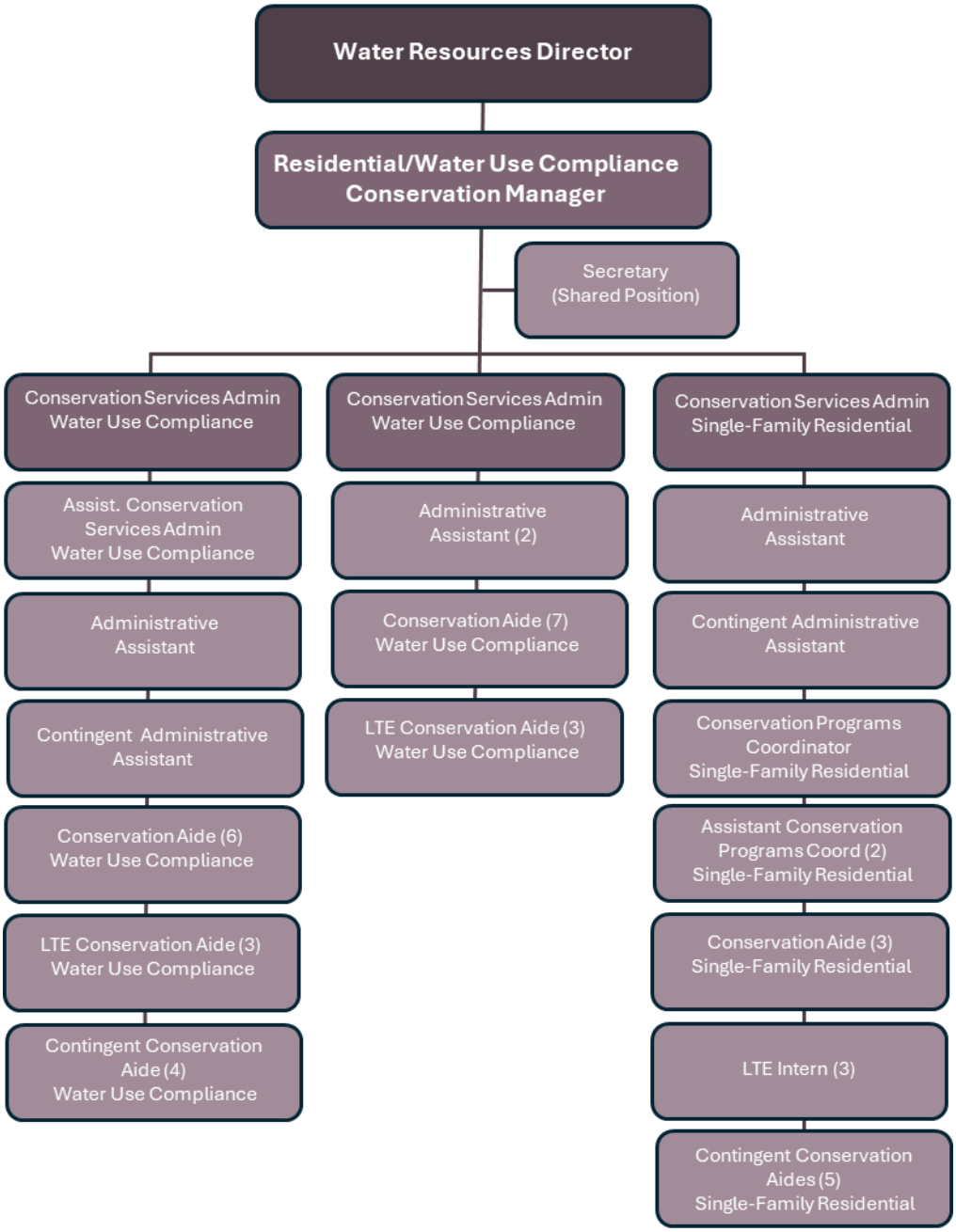
The SFR/WUC Division delivers water conservation programming to nearly 600,000 single-family residential properties in the SNWA service area, supporting landscape conversions, leak management and irrigation efficiency programs. The team also works on behalf of the LVVWD and SNWA to implement the nation's largest water use enforcement program. Through patrol and enforcement efforts, the team ensures water users follow the mandatory watering schedules and make irrigation system repairs to prevent water waste.

Photo: Conservation CDT

As of late 2024, the division consists of 27 full-time employees, including a division manager and three supervisors (Figure 8.1). Interns and limited-term employees augment core staffing. The division includes two teams supporting water use compliance activities (including water waste and water theft enforcement) and one team that supports incentive and service programs (including WSL administration and site evaluations).

As noted in Chapter 4, the SNWA has worked to onboard additional water use compliance staff to support regional water waste enforcement efforts. As part of a 2021 interlocal agreement, the SNWA dedicated staff for water waste patrol in Henderson and North Las Vegas. On occasion, the teams also pool resources for joint patrol events within specific service areas to increase visibility and impact. Agency staff patrol for water waste around the clock, seven days a week.

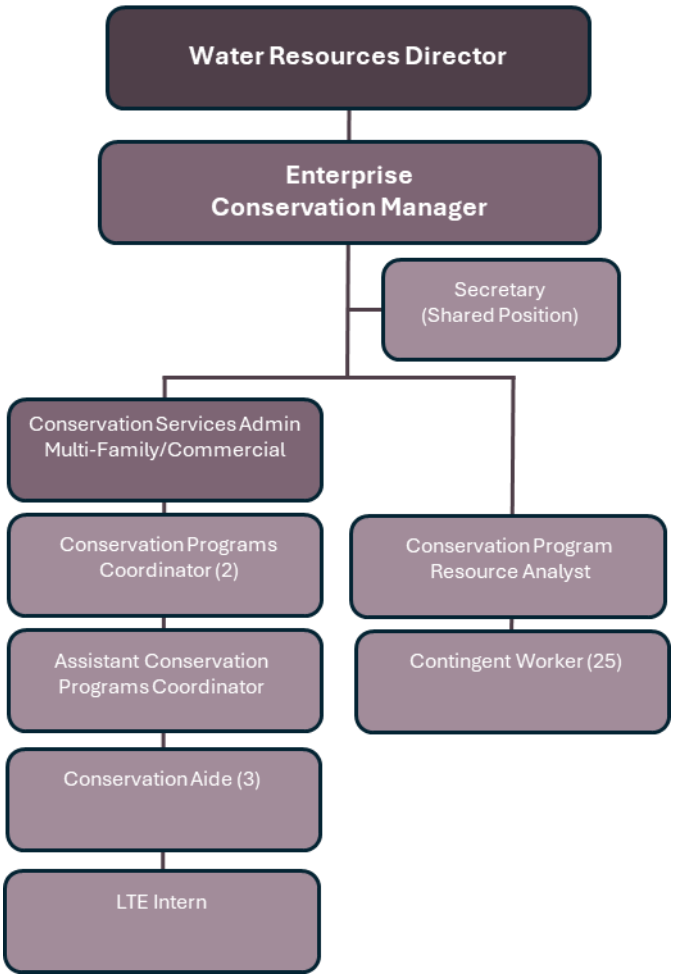
Figure 8.1: SFR/WUC Conservation Division organizational chart



The Enterprise Conservation division supports organizational initiatives targeting all other user classes (commercial, industrial and institutional water users). The team's primary focus areas include incentive program administration, stakeholder engagement, research and policy development. The team is principally focused on supporting non-functional turf conversions associated with AB356, including pre-emptive mapping efforts to expedite the processing of WSL applications.

As of late 2024, the division consists of nine full-time employees, including a division manager, a supervisor, a Resource Analyst and coordination staff (Figure 8.2). Core staffing is augmented by contract, which provides the SNWA with the flexibility to ramp up and down labor as needed to support non-functional turf conversion efforts associated with AB356 implementation.

Figure 8.2: Enterprise Conservation Division organizational chart



IMPLEMENTATION SCHEDULE

The SNWA offers conservation programs to residential and non-residential customers, targeting consumptive and non-consumptive water uses. Consumptive water uses are typically associated with outdoor landscaping and evaporative cooling. In contrast, non-consumptive uses relate to indoor uses where water is captured, treated and recycled for return-flow-credits.

Figure 8.3 details policies and programs planned for implementation over the 5-year planning horizon. The SNWA will make decisions about continued implementation, modifications or other changes based on ongoing assessments of community participation conservation gains, implementation costs and other factors.

Figure 8.3 Plan implementation schedule

POLICIES AND PROGRAMS	CUSTOMER TYPE		WATER USE TYPE		SCHEDULE (2024-2028)
	SFR	Enterprise	Indoor	Outdoor	24 25 26 27 28 29
INCENTIVES					
Water Smart Landscapes	x	x		x	
SFR participants	x			x	
Non-SFR participants		x		x	..
Water Efficient Technologies		x	x	x	
Leak Incentives	x	x	x	x	
REBATES AND SERVICES					
Car wash coupons	x	x		x	
Smart Controller rebate	x	x		x	
Water Leak Detector rebate (device)	x	x	x	x	..
Indoor retrofit kit	x		x		
Targeted audits	x			x	..
WATER MANGEMENT MEASURES					
Development Codes and Policies	x	x	x	x	
Golf course moratorium					
Golf course water budgets					
Turf limitations (new development)					
Turf limitations (exiting development, AB356)					
Pool size limitations					
Evaporative cooling moratorium (new development)					**Permanent**
Landscape watering restrictions					
Mist systems restrictions					
Fountains/ornamental water feature restrictions					
Man made lakes restrictions					
Water waste ordinances					
Seasonal watering restrictions					
Water efficiency standards (new development)					

.. Based on performance monitoring, subject to further review

Figure 8.3 Plan implementation schedule (Continued)

POLICIES AND PROGRAMS	CUSTOMER TYPE		WATER USE TYPE		SCHEDULE (2024-2028)
	SFR	Enterprise	Indoor	Outdoor	24 25 26 27 28 29
WATER MANAGEMENT MEASURES (Continued)					
Universal Metering	x	x	x	x	Permanent
Incentive Pricing and Billing	x	x	x	x	
Water Waste Enforcement	x	x		x	
Water Reuse and Recycling	x	x	x	x	
EDUCATION AND OUTREACH					
Advertising, Publications and Media	x	x	x	x	
Education , Engagement and Support	x	x	x	x	Permanent
Landscape classes					
Youth Conservation Council					
WaterSmarts Podcast					
Conservation helpline					
Partnerships and Collaborations	x	x	x	x	Permanent
Water Upon Request					
Water Smart Landscaper					
Water Smart Plumber					
Water Smart Business (2024 launch)					

PLAN MAINTENANCE AND EVALUATION

The SNWA updates its water conservation plan every five years as required and assesses its program offerings on an ongoing basis. This evaluation helps to inform the organization's staff and financial investments. The SNWA tracks incentive/rebate enrollment on a weekly, monthly and annual basis and evaluates program success based on participation, investment and water savings.

Performance trends help the SNWA identify which programs meet expected water use reductions and/or draw the highest level of public interest and participation. This evaluation informs SNWA's public education and outreach efforts. It also helps to identify needs for potential changes to program incentive amounts, staffing needs and program funding. In recent years, these metrics identified areas of diminishing returns. As a result, the SNWA has made program changes (most notably to WSL and WET) to help maintain and boost participation levels and associated water savings.

The SNWA reports information on conservation achievements to its Board of Directors and proposes program funding as part of its annual budget process. A summary of past performance and program benchmarks for 2024-2029 is also provided in Appendix 3. The programs, strategies and results detailed in the Plan provide strong evidence of the SNWA's ongoing commitment to helping Southern Nevada improve water efficiency and achieve its water conservation goals.

The next Plan update is scheduled for November 2029.

Photo: Las Vegas Wash

APPENDIX 1: IRPAC 2020 RECOMMENDATIONS

The SNWA Board of Directors established the 11-member Integrated Resource Planning Advisory Committee (IRPAC 2020) in 2019 to evaluate and develop recommendations on various issues critical to the SNWA's mission. As detailed below, the committee's deliberations resulted in 22 recommendations that were accepted by the SNWA Board of Directors in September 2020. Major topics include water resources, water conservation, facilities and rates.

GENERAL RECOMMENDATIONS

1. Work with community stakeholders to implement IRPAC recommendations.

MCCP AND FACILITIES

2. Maintain current asset management funding levels and practices to ensure reliable water treatment and transmission in Southern Nevada.
3. Pursue projects to meet Nevada's Renewable Portfolio Standard.
4. Include the candidate projects presented to IRPAC 2020, totaling $3.166 billion, in the SNWA's Major Construction and Capital Plan (MCCP).

WATER RESOURCES

5. Pursue emerging water resource opportunities with Colorado River partners to increase Nevada's water supplies, as presented to IRPAC on December 18, 2019.
6. Require out-of-valley development to return wastewater to Lake Mead and embed the principles of the SNWA's Out-of-Valley Water Use Policy within municipal codes and Las Vegas Valley Water District (LVVWD) Service Rules.

CONSERVATION

7. Pursue changes necessary to achieve the SNWA's current water conservation goal of a minimum of 105 GPCD by 2035 and further efforts to achieve additional conservation thereafter.
8. Reduce existing non-functional turf acreage by 50 percent by 2035.
9. Embed the principles of the SNWA's Non-Functional Turf Resolution in municipal codes and LVVWD Service Rules.
10. Limit future installations of cool-season turf in public spaces and expedite the conversion of cool-season turf to warm-season turf at existing public facilities.
11. Implement smart controller technology to automate landscape watering compliance and increase outreach and enforcement efforts.
12. Pursue implementation of advanced metering infrastructure and develop partnerships and programs to improve the speed of customer leak repairs.
13. Evaluate changes necessary to reduce current and future consumptive water losses associated with evaporative cooling technology.
14. Establish an efficiency review policy and process for new large water users to encourage efficient development and disincentivize consumptive use.

15. Continue to make investments that will maintain or improve the existing water loss rates among wholesale and retail water purveyors.

16. Continue outreach efforts to engage the public and effectuate the changes needed to meet the community's regional conservation goal.

FUNDING

17. Fund the MCCP with a combination of debt capital and pay-go to manage unrestricted reserve balances at adequate levels consistent with the Reserve Policy.

18. Implement a six-year annual increase to SNWA charges effective January 2022 to: 1) Phase-in an inflationary catch up, and 2) Adjust for subsequent annual inflation within the six-year period:
    – Increase the Connection Charge by 9.5% annually or six years effective Mar. 2022
    – Increase the Infrastructure Charge by 4.6% annually or six years effective Jan. 2022
    – Increase the Commodity Charge by 4.8% annually or six years effective Jan. 2022

19. Implement an indexed rate component to the SNWA Infrastructure and Commodity charges annually, effective January 2028, and limit future increases to a floor of 1.5% and a ceiling of 4.5% each Year.
    – Infrastructure Charge in accordance with Engineering News Record (ENR) index
    – Commodity Charge in accordance with the Consumer Price Index (CPI). Do not implement inflationary increases in a year in which the five-year forecast unrestricted reserve balance is projected to be greater than 150% of targeted reserve balances.

20. Implement an indexed rate component to the SNWA Connection Charge annually in accordance with the ENR index, effective March 2028.

21. Eliminate the $16.1 million Connection Charge threshold, require SNWA Connection Charge revenues to fund the pay-go portion of capital expenditures and related debt service, and exclude from funding recurring operating expenses.

22. Provide IRPAC 2020 with an annual update of the funding model and convene the committee as necessary.

APPENDIX 2: WATER SAVINGS

This section includes a summary of past performance and estimates water savings/program benchmarks for the 2024-2029 Plan.

Figures A1 through A10 compare water savings estimates in the 2019 Conservation Plan against actual performance results over the 5-year implementation period and provides additional performance detail (for example, projects completed, water savings, dollars rebated, etc.). The shaded area in each table correlates to the SNWA's 2019 Conservation Plan and provides a basis for the water savings estimates provided in this current Plan.

Figures A11 and A12, respectively, estimate the annual and cumulative water savings associated with implementation of specific water conservation measures detailed in this Plan. As noted, water savings do not accumulate in all instances. While these estimates play an important role for tracking progress and setting performance targets, there are significant outside factors that can influence participation and results. For example, Covid-19 had significant impacts on the SNWA's Residential Site Evaluation Program, which was suspended in 2020 through 2022. Economic conditions are another factor that can influence participation, particularly since many of the SNWA's conservation incentive programs pay only a portion of the cost to purchase tools and technologies, or upgrade landscapes.

It is also important to note that the SNWA has reached many of the community's most willing participants through its incentive programs and other offerings over the years. It follows that the well of opportunity has diminished through the success of prior efforts. While future gains are anticipated, the SNWA recognizes that these may come slower than in prior years, and potential participants may be harder to compel towards change.

In addition to the specific conservation measures detailed in plan, the SNWA and its member agencies will continue to maintain or enhance current service levels associated with the following water management measures:

- Meter new service connections and conduct ongoing meter repair and replacement.
- Conduct incentive pricing and billing.
- Implement existing development codes and policies that restrict landscape watering, grass installation, use of mist systems, fountains/ornamental water features and water waste.
- Conduct water waste enforcement.
- Implement water reuse.
- Implement leak detection programs as described and seek opportunities to further reduce water loss within the SNWA service area.
- Track GPCD progress and make program adjustments as needed.
- Maintain education, engagement and support programs.

Figure A-1: Water Smart Landscapes program, projected vs. actual performance 2019 - 2023

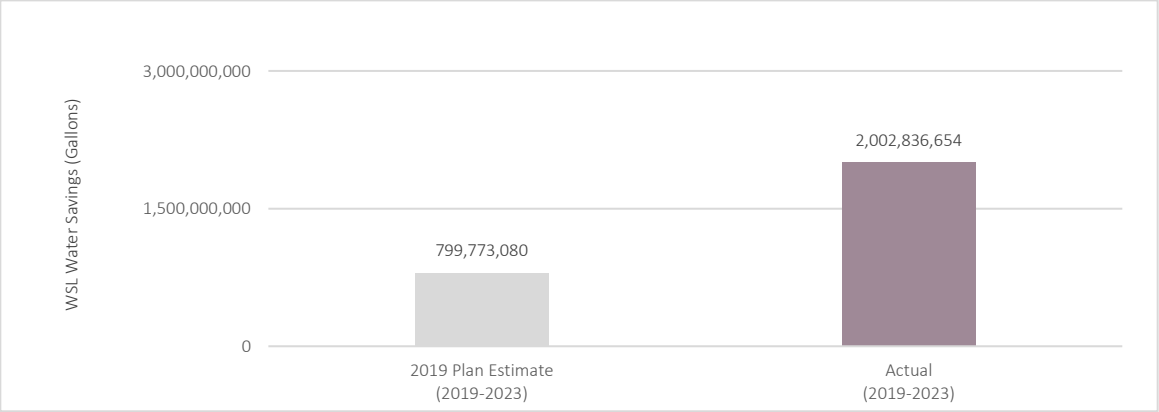


Figure A-2: Water Smart Landscapes program performance summary, 1999-2023

Year	Projects Completed	Annual Savings (Gallons)	Cumulative Savings (Gallons)	Annual Savings (AFY)	Cumulative Savings (AFY)	Dollars Rebated	Turf Converted (SF)
1999*	308	N/A	N/A	N/A	N/A	$308,961	N/A
2000	340	26,039,070	26,039,070	80	80	$386,822	466,650
2001	509	152,435,277	178,474,347	468	548	$951,725	2,731,815
2002	615	187,529,125	366,003,472	576	1,123	$1,413,047	3,360,737
2003	2,375	638,107,317	1,004,110,789	1,958	3,082	$10,297,729	11,435,615
2004	8,714	1,912,335,923	2,916,446,712	5,869	8,950	$28,819,765	34,271,253
2005	5,749	873,642,381	3,790,089,093	2,681	11,631	$14,407,768	15,656,674
2006	3,468	598,157,140	4,388,246,232	1,836	13,467	$10,973,873	10,719,662
2007	5,862	1,031,129,662	5,419,375,894	3,164	16,631	$23,961,354	18,479,026
2008	5,172	1,572,958,593	6,992,334,488	4,827	21,459	$43,429,127	28,189,222
2009	7,293	954,021,695	7,946,356,183	2,928	24,386	$22,876,432	17,097,163
2010	3,180	482,660,123	8,429,016,306	1,481	25,868	$10,742,984	8,649,823
2011	2,712	362,741,627	8,791,757,933	1,113	26,981	$8,289,927	6,500,746
2012	2,436	303,992,541	9,095,750,474	933	27,914	$6,991,166	5,447,895
2013	2,275	269,549,991	9,365,300,465	827	28,741	$6,213,367	4,830,645
2014	2,188	245,048,881	9,610,349,346	752	29,493	$5,722,132	4,391,557
2015	2,105	245,755,699	9,856,105,045	754	30,247	$6,071,928	4,404,224
2016	2,269	243,026,131	10,099,131,176	746	30,993	$7,037,221	4,355,307
2017	2,016	197,415,880	10,296,547,056	606	31,599	$5,952,132	3,537,919
2018	2,326	198,632,041	10,495,179,097	610	32,209	$8,525,761	3,559,714
2019	3,127	266,218,898	10,761,397,995	817	33,026	$13,004,369	4,770,948
2020	2,842	252,254,000	11,013,651,995	774	33,800	$12,011,829	4,520,681
2021	3,256	238,550,301	11,252,202,296	732	34,532	$11,834,647	4,275,095
2022	5,777	531,068,186	11,783,270,482	1,630	36,162	$24,552,746	9,517,351
2023	6,145	714,745,269	12,498,015,751	2,193	38,355	$31,826,962	12,809,055
Totals	**83,059**	**12,498,015,751**	**176,375,151,697**	**38,355**	**541,275**	**$316,603,771**	**223,978,777**

** The SNWA began tracking grass removed/gallons saved under the program in 2000.*

Figure A-3: Water Efficient Technologies program, projected vs. actual performance 2019 - 2023

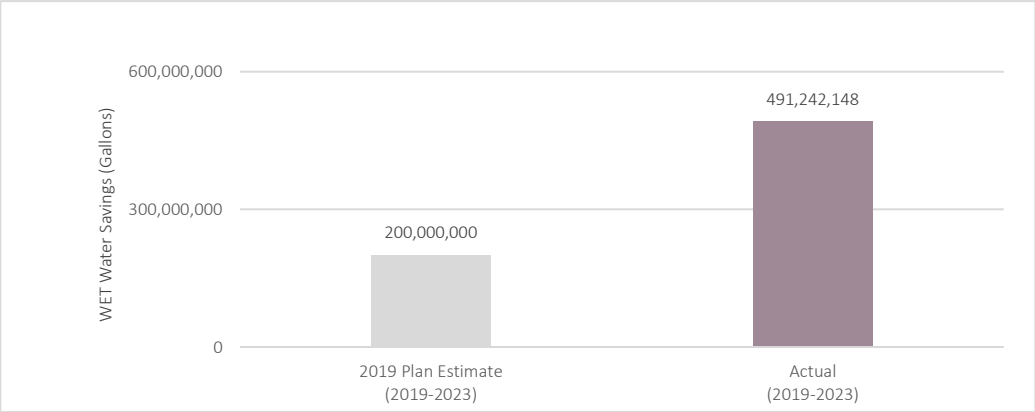


Figure A-4: Water Efficient Technologies program performance summary, 2001-2023

Year	Projects Completed	Annual Savings (Gallons)	Cumulative Savings (Gallons)	Annual Savings (AFY)	Cumulative Savings (AFY)	Dollars Rebated
2001	2	8,293,107	8,293,107	25	25	$24,277
2002	1	19,600,000	27,893,107	60	86	$20,783
2003	2	41,968,592	69,861,699	129	214	$161,796
2004	9	73,857,342	143,719,041	227	441	$251,676
2005	5	67,648,935	211,367,976	208	649	$113,283
2006	9	79,193,774	290,561,750	243	892	$132,671
2007	17	107,441,724	398,003,474	330	1,221	$490,837
2008	4	114,851,967	512,855,441	352	1,574	$243,836
2009	9	14,604,974	527,460,415	45	1,619	$159,520
2010	33	261,594,823	789,055,238	803	2,422	$459,998
2011	22	257,135,835	1,046,191,073	789	3,211	$212,264
2012	25	116,866,780	1,163,057,853	359	3,569	$295,097
2013	24	44,133,533	1,207,191,386	135	3,705	$186,665
2014	27	108,763,954	1,315,955,340	334	4,039	$237,966
2015	33	102,154,169	1,418,109,509	313	4,352	$295,167
2016	31	58,249,926	1,476,359,435	179	4,531	$432,237
2017	46	36,198,761	1,512,558,196	111	4,642	$283,762
2018	10	37,111,937	1,549,670,133	114	4,756	$246,702
2019	13	66,458,344	1,616,128,477	204	4,960	$460,105
2020	15	23,191,774	1,639,320,251	71	5,031	$143,089
2021	52	197,447,989	1,836,768,240	606	5,637	$7,974,357
2022	45	115,732,137	1,952,500,377	355	5,992	$1,516,639
2023	52	88,411,904	2,040,912,281	271	6,263	$1,839,358
Totals	**486**	**2,040,912,281**	**22,753,793,792**	**6,263**	**69,828**	**$16,182,084**

Figure A-5: Smart Controller Incentive program, projected vs. actual performance 2019 - 2023

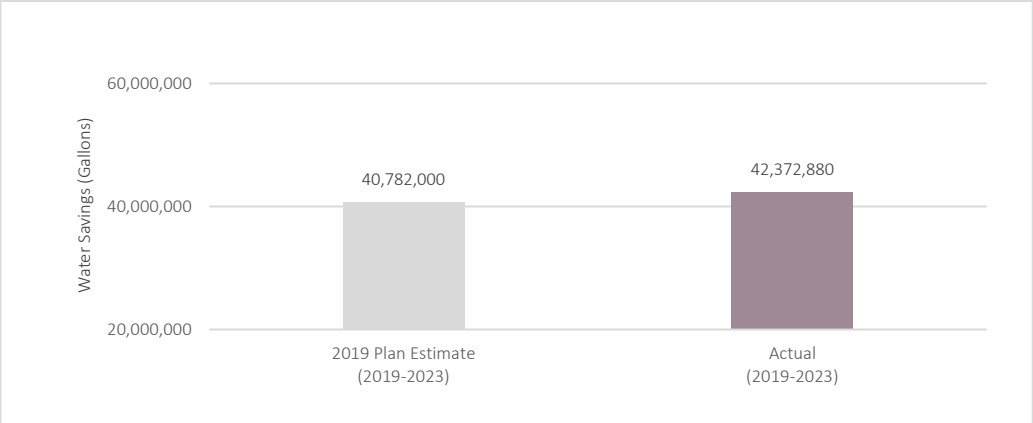


Figure A-6: Smart Controller incentive program performance summary, 2006-2023

Year	Clocks Rebated	Annual Savings (Gallons)	Cumulative Savings (Gallons)	Annual Savings (AFY)	Cumulative Savings (AFY)	Dollars Rebated
2006	11	97,100	97,100	0.30	0.30	$26,228
2007	41	359,270	456,370	1.10	1.40	$25,119
2008	14	106,810	563,180	0.33	1.73	$27,925
2009	10	48,550	611,730	0.15	1.88	$18,974
2010	21	116,520	728,250	0.36	2.23	$75,628
2011	30	213,620	941,870	0.66	2.89	$9,168
2012	42	339,850	1,281,720	1.04	3.93	$22,097
2013	26	184,490	1,466,210	0.57	4.50	$21,903
2014	75	495,210	1,961,420	1.52	6.02	$57,398
2015	228	1,767,220	3,728,640	5.42	11.44	$120,991
2016	836	7,855,390	11,584,030	24.11	35.55	$152,008
2017	941	8,952,620	20,536,650	27.47	63.02	$168,278
2018	907	8,651,610	29,188,260	26.55	89.58	$168,329
2019	778	7,437,860	36,626,120	22.83	112.40	$128,754
2020	666	6,350,340	42,976,460	19.49	131.89	$116,008
2021	771	7,389,310	50,365,770	22.68	154.57	$134,812
2022	605	5,767,740	56,133,510	17.70	172.27	$81,271
2023	658	15,427,630	71,561,140	47.35	219.61	$90,202
Totals	**6,660**	**71,561,140**	**330,808,430**	**220**	**1,015**	**1,445,090**

Figure A-7: Pool Cover Rebate program, projected vs. actual performance, 2005 - 2020

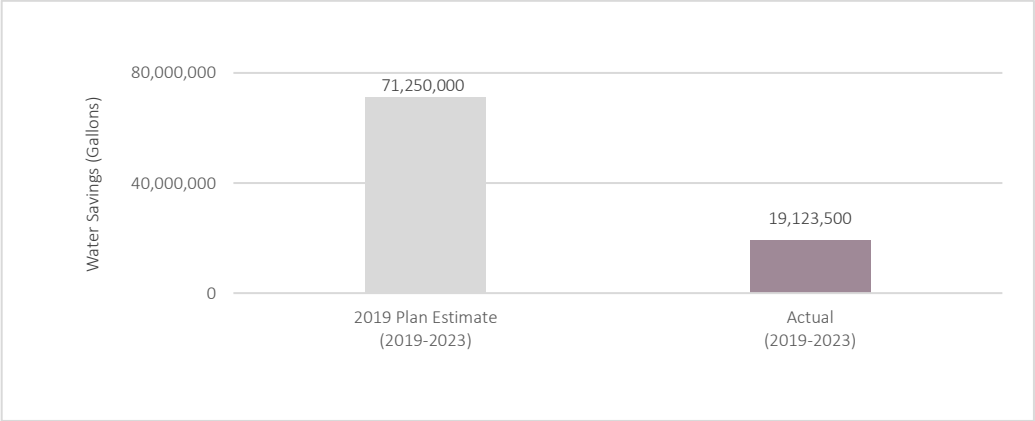


Figure A-8: Pool Cover rebate program performance summary, 2005-2020

Year	Coupons Received	Annual Savings (Gallons)	Cumulative Savings (Gallons)	Annual Savings (AFY)	Cumulative Savings (AFY)	Dollars Rebated
2005	3,552	45,288,000	45,288,000	139	139	$168,414
2006	3,979	50,732,250	96,020,250	156	295	$193,995
2007	3,366	42,916,500	138,936,750	132	426	$163,239
2008	3,450	43,987,500	182,924,250	135	561	$173,353
2009	3,982	50,770,500	233,694,750	156	717	$204,835
2010	4,147	52,874,250	286,569,000	162	879	$214,730
2011	3,740	47,685,000	334,254,000	146	1,026	$193,439
2012	3,262	41,590,500	375,844,500	128	1,153	$172,343
2013	2,952	37,638,000	413,482,500	116	1,269	$154,867
2014	2,903	27,578,500	441,061,000	85	1,354	$153,353
2015	3,002	28,519,000	469,580,000	88	1,441	$159,978
2016	1,873	17,793,500	487,373,500	55	1,496	$103,831
2017	2,060	19,570,000	506,943,500	60	1,556	$116,078
2018	1,493	14,183,500	521,127,000	44	1,599	$90,550
2019	1,221	11,599,500	532,726,500	36	1,635	$77,237
2020*	792	7,524,000	540,250,500	23	1,658	$46,222
Totals	**45,774**	**540,250,500**	**5,606,076,000**	**1,658**	**17,204**	**$2,386,465**

** The SNWA discontinued this incentive in 2020 upon program maturity.*

Figure A-9: Residential Site Evaluation projected vs. actual performance, 2005 - 2020

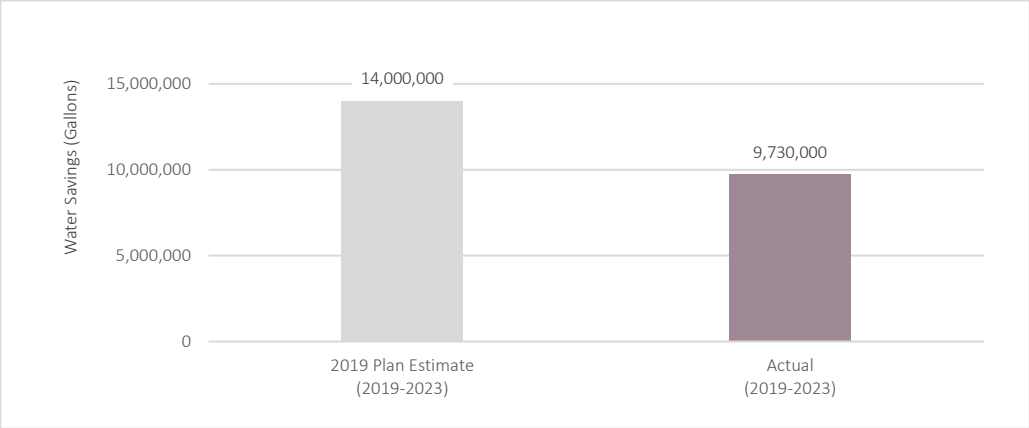


Figure A-10: Residential Site Evaluation performance summary, 2019-2023

Year	Evaluations Performed	Annual Savings (Gallons)	Annual Savings (AFY)
2019	199	6,965,000	22.83
2020	15	525,000	1.61
2021	0	0	0.00
2022	0	0	0.00
2023	64	2,240,000	6.87
Totals	**278**	**9,730,000**	**31**

** The SNWA suspended this program during the pandemic and resumed efforts in 2023.*

Figure A-11: Estimated annual water savings, 2024 - 2028

Program/Initiative	2024 Projected Annual Savings (Gallons)	2025 Projected Annual Savings (Gallons)	2026 Projected Annual Savings (Gallons)	2027 Projected Annual Savings (Gallons)	2028 Projected Annual Savings (Gallons)
Prohibit New Golf Course Development	5,700,000	5,800,000	5,900,000	6,000,000	6,100,000
Reduce Golf Course Water Budgets	844,400,000	844,400,000	844,400,000	844,400,000	844,400,000
Convert Cool Season Turf to Warm Season (WET)	80,500,000	80,500,000	80,500,000	80,500,000	80,500,000
Implement Large Water User Policy	64,000,000	64,000,000	64,000,000	64,000,000	64,000,000
Implement Pool Development Standards	3,100,000	3,100,000	3,100,000	3,100,000	3,100,000
Implement AB 356 (WSL)	625,000,000	1,037,900,000	1,874,900,000	0	0
Enhance Leak Resolution	333,400,000	337,700,000	345,500,000	365,700,000	372,200,000
Implement Park Efficiency Improvements	0	223,700,000	223,700,000	284,700,000	284,700,000
Enhance Cooling Efficiency (WET)	10,040,000	11,000,000	15,000,000	20,000,000	25,000,000
Other Water Efficiency (WET)	113,000,000	113,000,000	113,000,000	100,000,000	95,000,000
Evaporative Cooling Moratorium	1,500,000	4,500,000	7,500,000	10,500,000	15,000,000
Enhance Watering Compliance	5,580,000,000	5,703,000,000	5,822,000,000	5,937,000,000	6,042,000,000
Make Asset Management Investments	4,200,000	4,300,000	4,400,000	4,500,000	4,500,000
Smart Controller Retrofits	16,900,000	16,900,000	16,900,000	16,900,000	16,900,000
Residential Water Smart Landscapes	315,270,000	217,600,000	212,000,000	212,000,000	212,000,000
Residential Site Evaluations Reactivation	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
Limit New Turf Installations	930,100,000	930,100,000	930,100,000	930,100,000	930,100,000
Totals	**8,930,610,000**	**9,601,000,000**	**10,566,400,000**	**8,882,900,000**	**8,999,000,000**

Figure A-12: Estimated cumulative water savings, 2024 - 2028

Program/Initiative	2024 Projected Cumulative Savings (Gallons)	2025 Projected Cumulative Savings (Gallons)	2026 Projected Cumulative Savings (Gallons)	2027 Projected Cumulative Savings (Gallons)	2028 Projected Cumulative Savings (Gallons)
Prohibit New Golf Course Development	5,700,000	11,500,000	17,400,000	23,400,000	29,500,000
*Reduce Golf Course Water Budgets	844,400,000	844,400,000	844,400,000	844,400,000	844,400,000
Convert Cool Season Turf (WET)	80,500,000	161,000,000	241,500,000	322,000,000	402,500,000
Implement Large Water User Policy	64,000,000	128,000,000	192,000,000	256,000,000	320,000,000
Implement Pool Development Standards	3,100,000	6,200,000	9,300,000	12,400,000	15,500,000
Implement AB 356 (WSL)	625,000,000	1,662,900,000	3,537,800,000	3,537,800,000	3,537,800,000
*Enhance Leak Resolution	333,400,000	337,700,000	345,500,000	365,700,000	372,200,000
*Implement Park Efficiency Improvements	0	273,714,840	312,816,960	351,919,080	351,919,080
Enhance Cooling Efficiency (WET)	10,040,000	21,040,000	36,040,000	56,040,000	81,040,000
Other Water Efficiency (WET)	113,000,000	226,000,000	339,000,000	439,000,000	534,000,000
Water Efficiency Code Enhancements	1,500,000	6,000,000	13,500,000	24,000,000	39,000,000
*Enhance Watering Compliance	5,580,000,000	5,703,000,000	5,822,000,000	5,937,000,000	6,042,000,000
Make Asset Management Investments	4,200,000	8,500,000	12,900,000	17,400,000	21,900,000
Smart Controller Retrofits	16,900,000	33,800,000	50,700,000	67,600,000	84,500,000
Residential Water Smart Landscapes	315,270,000	532,870,000	744,870,000	956,870,000	1,168,870,000
*Residential Site Evaluations Reactivation	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
Limit New Turf Installations	930,100,000	1,860,200,000	2,790,300,000	3,720,400,000	4,650,500,000
Totals	**8,930,610,000**	**11,820,324,840**	**15,313,526,960**	**16,935,429,080**	**18,499,129,080**

** Water savings for this measure do not accumulate.*

APPENDIX 3: MUNICIPAL WATER WASTE ORDINANCES

Water waste ordinance, building codes and other water management measures described in this Plan are implemented by the SNWA's member agencies.

Boulder City

- Section 9-8
- Section 9-14

Clark County

- Chapter 24.30
- Chapter 24.34
- Title 30
- Las Vegas Valley Water District Service Rules

City of Henderson

- Section 14.14.020
- Chapter 14.14

City of Las Vegas

- Section 14.08
- Section 14.08.040
- Section 14.11
- Las Vegas Valley Water District Service Rules

City of North Las Vegas

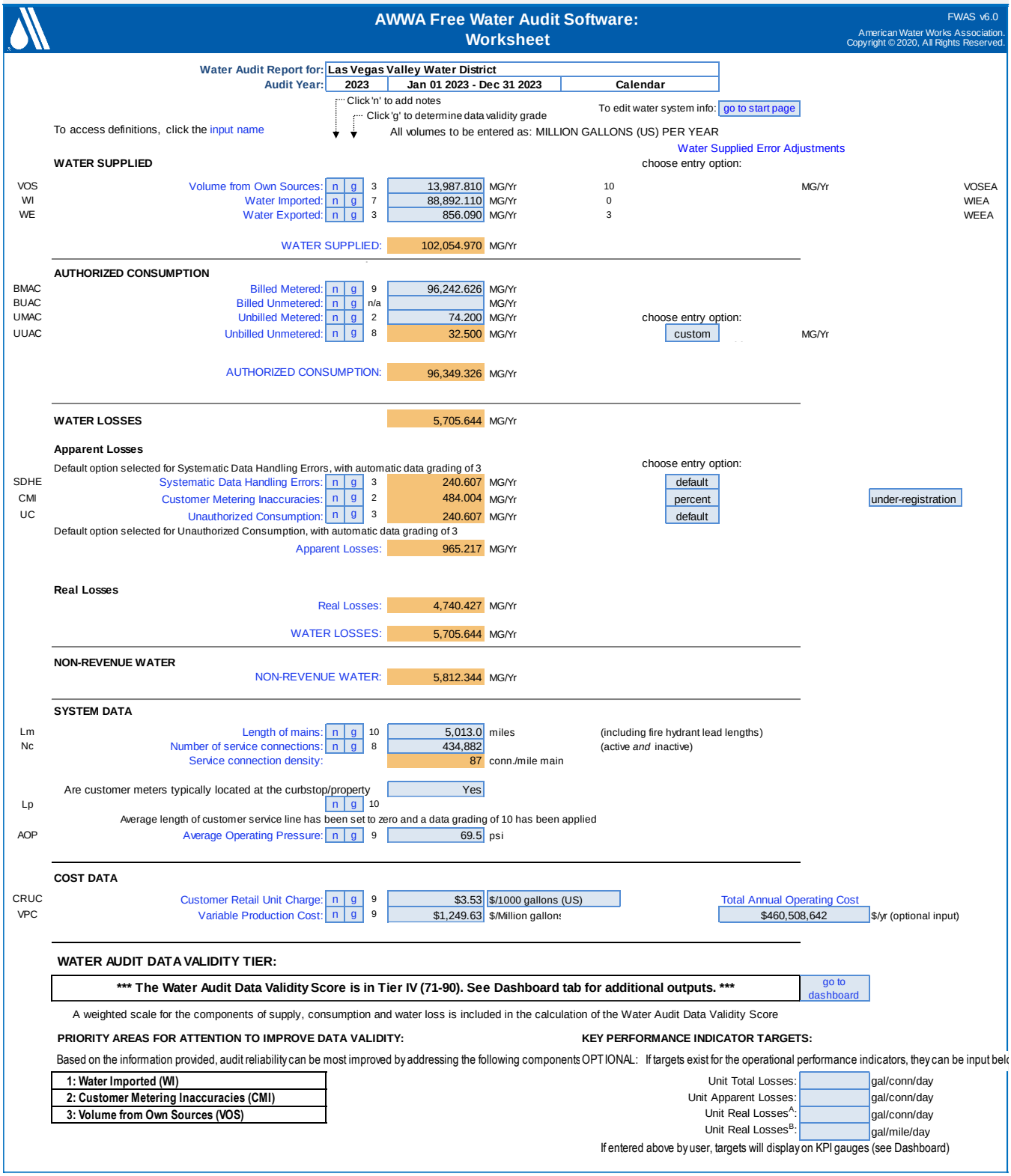
- Section 13.08.040
- Section 13.08.030
- Section 13.08
- City of North Las Vegas Utility Service Rules

APPENDIX 4: WATER AUDITS

The following section contains the 2023 water audits for the following agencies:

- Las Vegas Valley Water District
- City of North Las Vegas
- City of Henderson
- City of Boulder City
- Big Bend Water District

Figure A-5.1: Las Vegas Valley Water District water audit



AWWA Free Water Audit Software: Worksheet

FWAS v6.0

Water Audit Report for: Las Vegas Valley Water District
Audit Year: 2023 | Jan 01 2023 - Dec 31 2023 | Calendar

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED — choose entry option:

		n	g							
VOS	Volume from Own Sources:	n	g	3	13,987.810	MG/Yr	10	MG/Yr		VOSEA
WI	Water Imported:	n	g	7	88,892.110	MG/Yr	0			WIEA
WE	Water Exported:	n	g	3	856.090	MG/Yr	3			WEEA
	WATER SUPPLIED:				102,054.970	MG/Yr				

AUTHORIZED CONSUMPTION — choose entry option:

BMAC	Billed Metered:	n	g	9	96,242.626	MG/Yr				
BUAC	Billed Unmetered:	n	g	n/a		MG/Yr				
UMAC	Unbilled Metered:	n	g	2	74.200	MG/Yr				
UUAC	Unbilled Unmetered:	n	g	8	32.500	MG/Yr	custom	MG/Yr		
	AUTHORIZED CONSUMPTION:				96,349.326	MG/Yr				

WATER LOSSES 5,705.644 MG/Yr

Apparent Losses — choose entry option:

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

SDHE	Systematic Data Handling Errors:	n	g	3	240.607	MG/Yr	default			
CMI	Customer Metering Inaccuracies:	n	g	2	484.004	MG/Yr	percent			under-registration
UC	Unauthorized Consumption:	n	g	3	240.607	MG/Yr	default			

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 965.217 MG/Yr

Real Losses

Real Losses: 4,740.427 MG/Yr

WATER LOSSES: 5,705.644 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 5,812.344 MG/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	10	5,013.0	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	8	434,882		(active *and* inactive)
	Service connection density:				87	conn./mile main	

Are customer meters typically located at the curbstop/property: Yes

Lp: n g 10

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n	g	9	69.5	psi	

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$3.53	$/1000 gallons (US)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n	g	9	$1,249.63	$/Million gallons	$460,508,642	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *****

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components

1: Water Imported (WI)
2: Customer Metering Inaccuracies (CMI)
3: Volume from Own Sources (VOS)

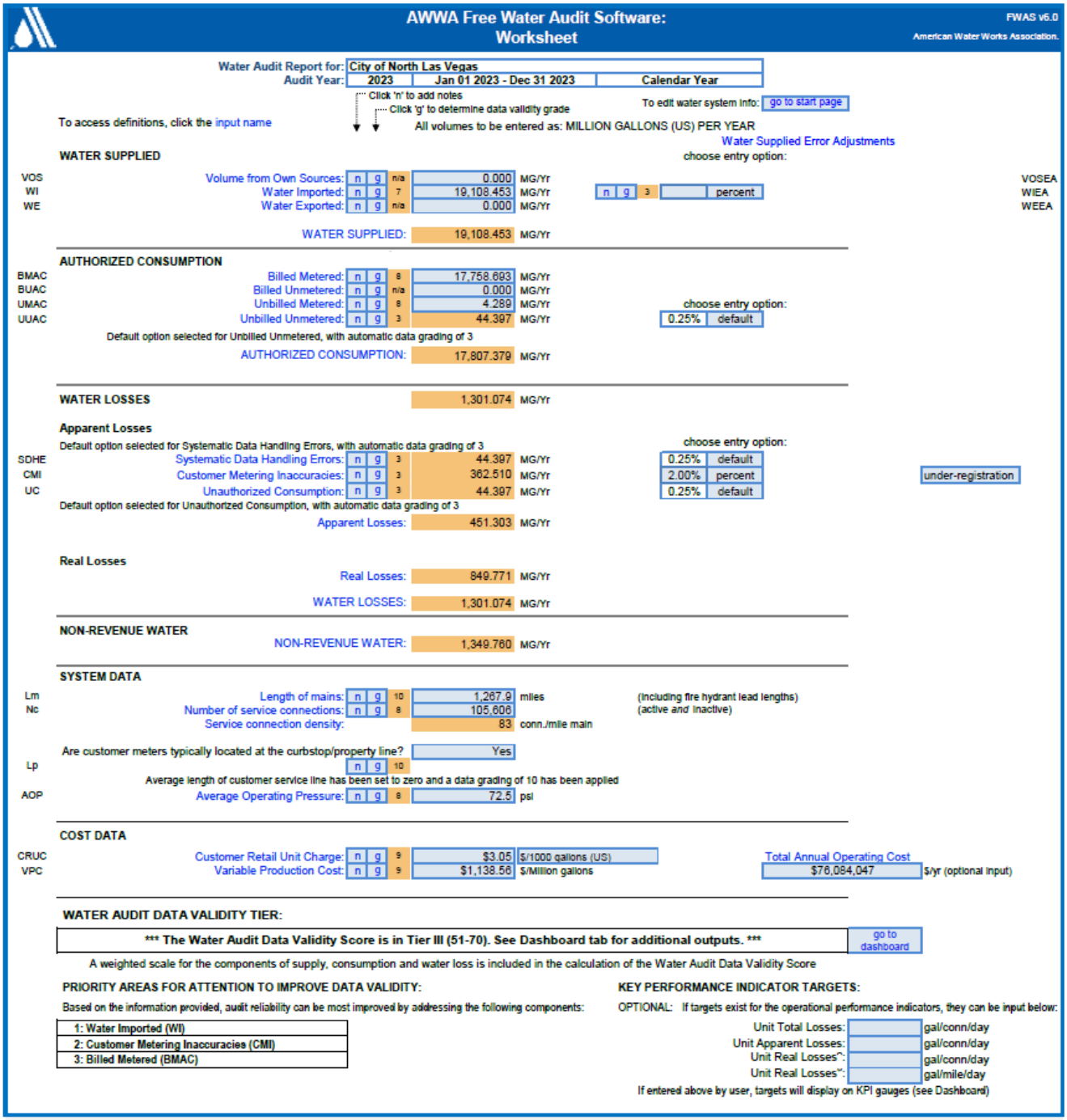
KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input belo

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[A]:		gal/conn/day
Unit Real Losses[B]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Figure A-5.3: City of North Las Vegas water audit



AWWA Free Water Audit Software: Worksheet

FWAS v6.0 — American Water Works Association.

Water Audit Report for: City of North Las Vegas
Audit Year: 2023 | Jan 01 2023 - Dec 31 2023 | Calendar Year

Click 'n' to add notes. Click 'g' to determine data validity grade.
To edit water system info: go to start page
To access definitions, click the input name
All volumes to be entered as: MILLION GALLONS (US) PER YEAR
Water Supplied Error Adjustments — choose entry option:

WATER SUPPLIED

VOS	Volume from Own Sources:	n	g	n/a	0.000	MG/Yr		VOSEA
WI	Water Imported:	n	g	7	19,108.453	MG/Yr	n g 3 — percent	WIEA
WE	Water Exported:	n	g	n/a	0.000	MG/Yr		WEEA

WATER SUPPLIED: 19,108.453 MG/Yr

AUTHORIZED CONSUMPTION

							choose entry option:	
BMAC	Billed Metered:	n	g	8	17,758.693	MG/Yr		
BUAC	Billed Unmetered:	n	g	n/a	0.000	MG/Yr		
UMAC	Unbilled Metered:	n	g	8	4.289	MG/Yr		
UUAC	Unbilled Unmetered:	n	g	3	44.397	MG/Yr	0.25% default	

Default option selected for Unbilled Unmetered, with automatic data grading of 3

AUTHORIZED CONSUMPTION: 17,807.379 MG/Yr

WATER LOSSES 1,301.074 MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

							choose entry option:	
SDHE	Systematic Data Handling Errors:	n	g	3	44.397	MG/Yr	0.25% default	
CMI	Customer Metering Inaccuracies:	n	g	3	362.510	MG/Yr	2.00% percent	under-registration
UC	Unauthorized Consumption:	n	g	3	44.397	MG/Yr	0.25% default	

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 451.303 MG/Yr

Real Losses

Real Losses: 849.771 MG/Yr

WATER LOSSES: 1,301.074 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 1,349.760 MG/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	10	1,267.9	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	8	105,606		(active and inactive)
	Service connection density:				83	conn./mile main	

Are customer meters typically located at the curbstop/property line? Yes

Lp: n g 10

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP: Average Operating Pressure: n g 8 — 72.5 psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$3.05	$/1000 gallons (US)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n	g	9	$1,138.56	$/Million gallons	$76,084,047	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. *** — go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Water Imported (WI)
2: Customer Metering Inaccuracies (CMI)
3: Billed Metered (BMAC)

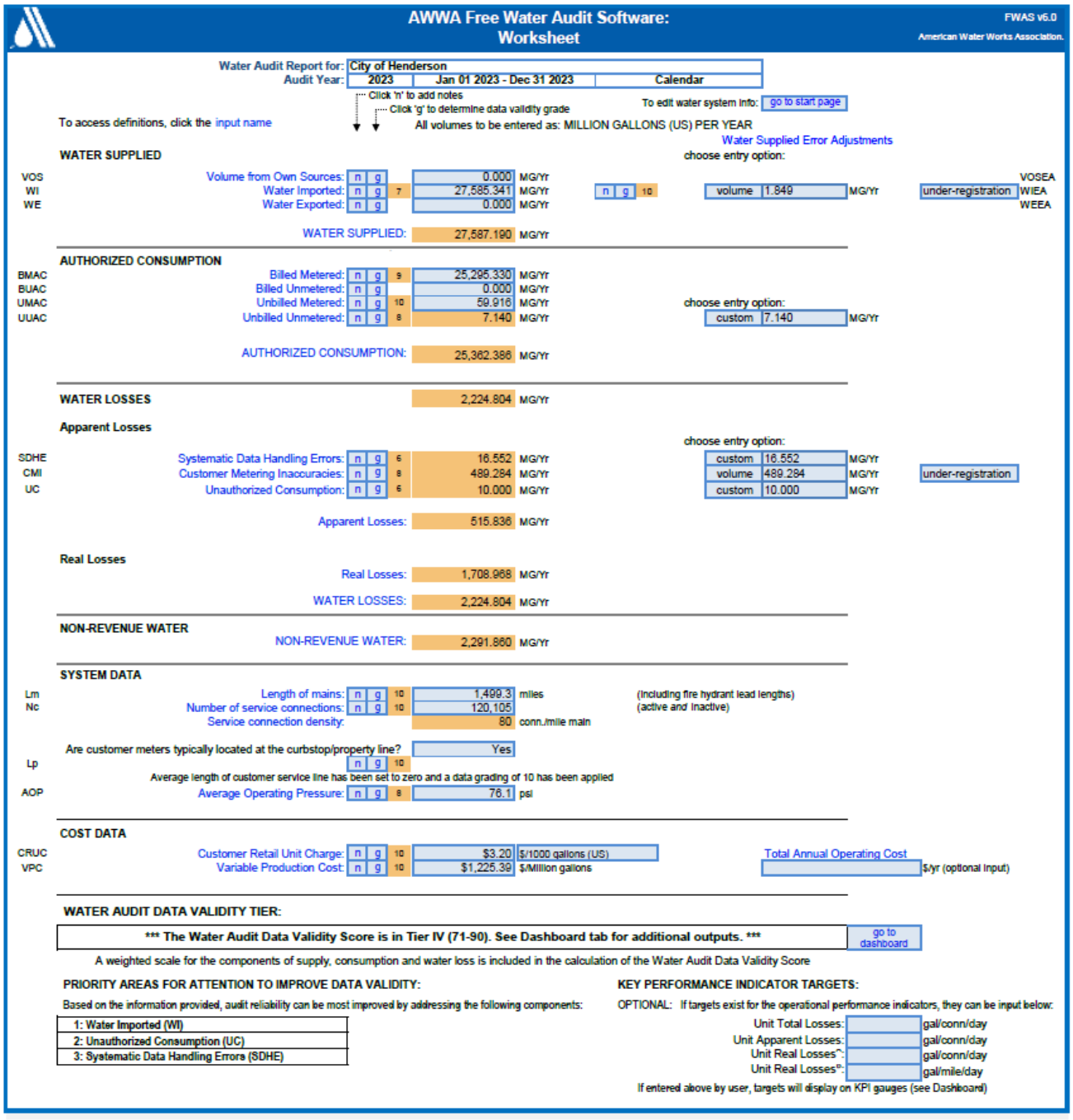
KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:	gal/conn/day
Unit Apparent Losses:	gal/conn/day
Unit Real Losses^:	gal/conn/day
Unit Real Losses*:	gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Figure A-5.4: City Henderson water audit



AWWA Free Water Audit Software: Worksheet

FWAS v6.0 — American Water Works Association.

Water Audit Report for: City of Henderson
Audit Year: 2023 | Jan 01 2023 - Dec 31 2023 | Calendar

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	n g		0.000	MG/Yr					VOSEA
WI	Water Imported:	n g	7	27,585.341	MG/Yr	n g 10	volume	1.849	MG/Yr	under-registration WIEA
WE	Water Exported:	n g		0.000	MG/Yr					WEEA
	WATER SUPPLIED:			27,587.190	MG/Yr					

AUTHORIZED CONSUMPTION

choose entry option:

BMAC	Billed Metered:	n g	9	25,295.330	MG/Yr			
BUAC	Billed Unmetered:	n g		0.000	MG/Yr			
UMAC	Unbilled Metered:	n g	10	59.916	MG/Yr			
UUAC	Unbilled Unmetered:	n g	8	7.140	MG/Yr	custom	7.140	MG/Yr
	AUTHORIZED CONSUMPTION:			25,362.386	MG/Yr			

WATER LOSSES 2,224.804 MG/Yr

Apparent Losses

choose entry option:

SDHE	Systematic Data Handling Errors:	n g	6	16.552	MG/Yr	custom	16.552	MG/Yr	
CMI	Customer Metering Inaccuracies:	n g	8	489.284	MG/Yr	volume	489.284	MG/Yr	under-registration
UC	Unauthorized Consumption:	n g	6	10.000	MG/Yr	custom	10.000	MG/Yr	
	Apparent Losses:			515.836	MG/Yr				

Real Losses

	Real Losses:		1,708.968	MG/Yr
	WATER LOSSES:		2,224.804	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 2,291.860 MG/Yr

SYSTEM DATA

Lm	Length of mains:	n g	10	1,499.3	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n g	10	120,105		(active and inactive)
	Service connection density:			80	conn./mile main	
	Are customer meters typically located at the curbstop/property line?			Yes		
Lp		n g	10			
	Average length of customer service line has been set to zero and a data grading of 10 has been applied					
AOP	Average Operating Pressure:	n g	8	76.1	psi	

COST DATA

CRUC	Customer Retail Unit Charge:	n g	10	$3.20	$/1000 gallons (US)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n g	10	$1,225.39	$/Million gallons		$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *** go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Water Imported (WI)
2: Unauthorized Consumption (UC)
3: Systematic Data Handling Errors (SDHE)

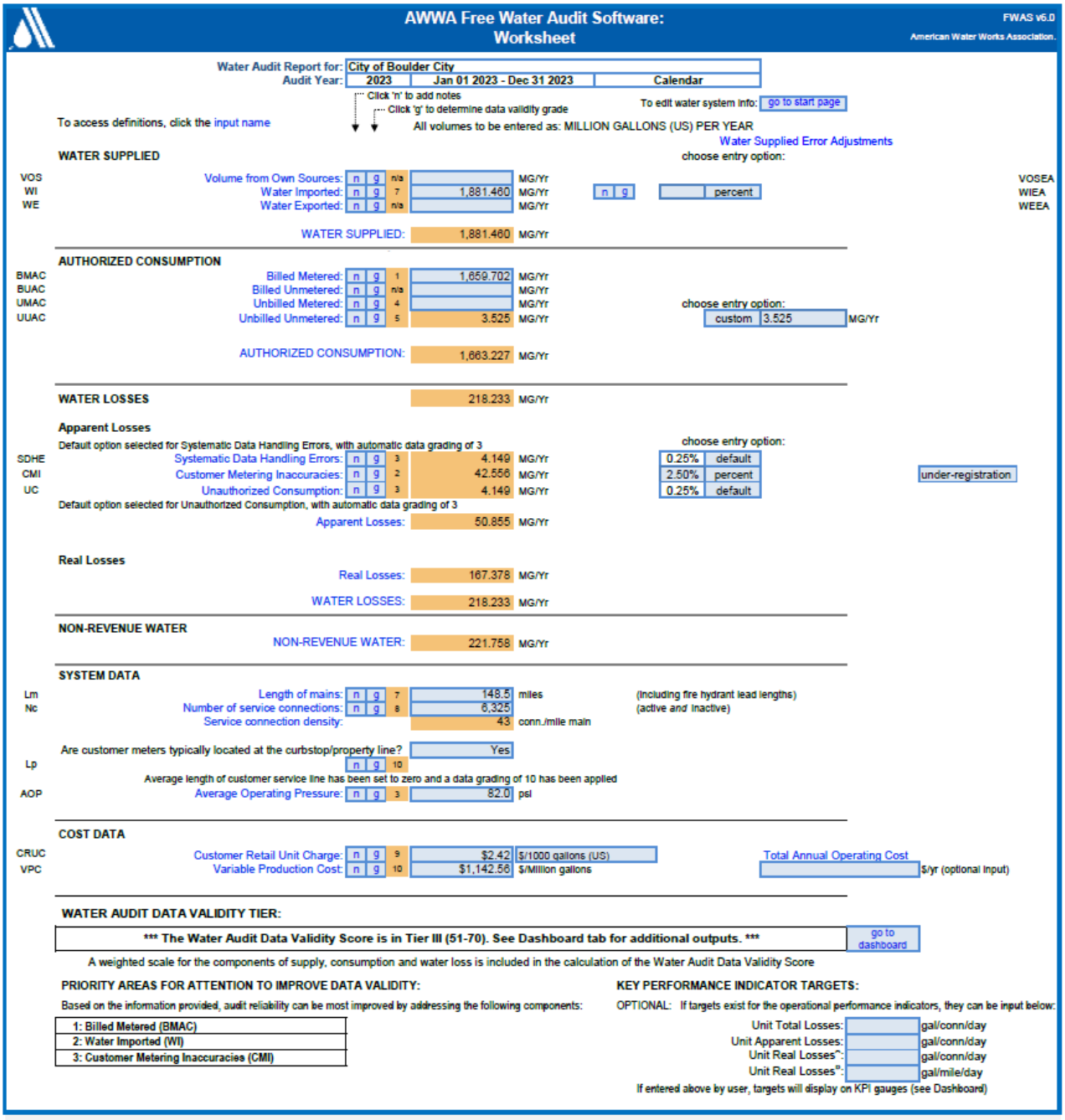
KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses^:		gal/conn/day
Unit Real Losses^:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Figure A-5.5: City of Boulder City water audit



AWWA Free Water Audit Software: Worksheet

FWAS v6.0

American Water Works Association.

Water Audit Report for: City of Boulder City

Audit Year: 2023 | Jan 01 2023 - Dec 31 2023 | Calendar

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	n	g	n/a		MG/Yr			VOSEA
WI	Water Imported:	n	g	7	1,881.460	MG/Yr	n g	percent	WIEA
WE	Water Exported:	n	g	n/a		MG/Yr			WEEA
	WATER SUPPLIED:				1,881.460	MG/Yr			

AUTHORIZED CONSUMPTION

choose entry option:

BMAC	Billed Metered:	n	g	1	1,659.702	MG/Yr			
BUAC	Billed Unmetered:	n	g	n/a		MG/Yr			
UMAC	Unbilled Metered:	n	g	4		MG/Yr			
UUAC	Unbilled Unmetered:	n	g	5	3.525	MG/Yr		custom 3.525	MG/Yr
	AUTHORIZED CONSUMPTION:				1,663.227	MG/Yr			

WATER LOSSES 218.233 MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g	3	4.149	MG/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n	g	2	42.556	MG/Yr	2.50%	percent	under-registration
UC	Unauthorized Consumption:	n	g	3	4.149	MG/Yr	0.25%	default	

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 50.855 MG/Yr

Real Losses

Real Losses: 167.378 MG/Yr

WATER LOSSES: 218.233 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 221.758 MG/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	7	148.5	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	8	6,325		(active *and* inactive)
	Service connection density:				43	conn./mile main	
	Are customer meters typically located at the curbstop/property line?				Yes		
Lp		n	g	10			

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n	g	3	82.0	psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$2.42	$/1000 gallons (US)	Total Annual Operating Cost
VPC	Variable Production Cost:	n	g	10	$1,142.56	$/Million gallons	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. ***

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Billed Metered (BMAC)
2: Water Imported (WI)
3: Customer Metering Inaccuracies (CMI)

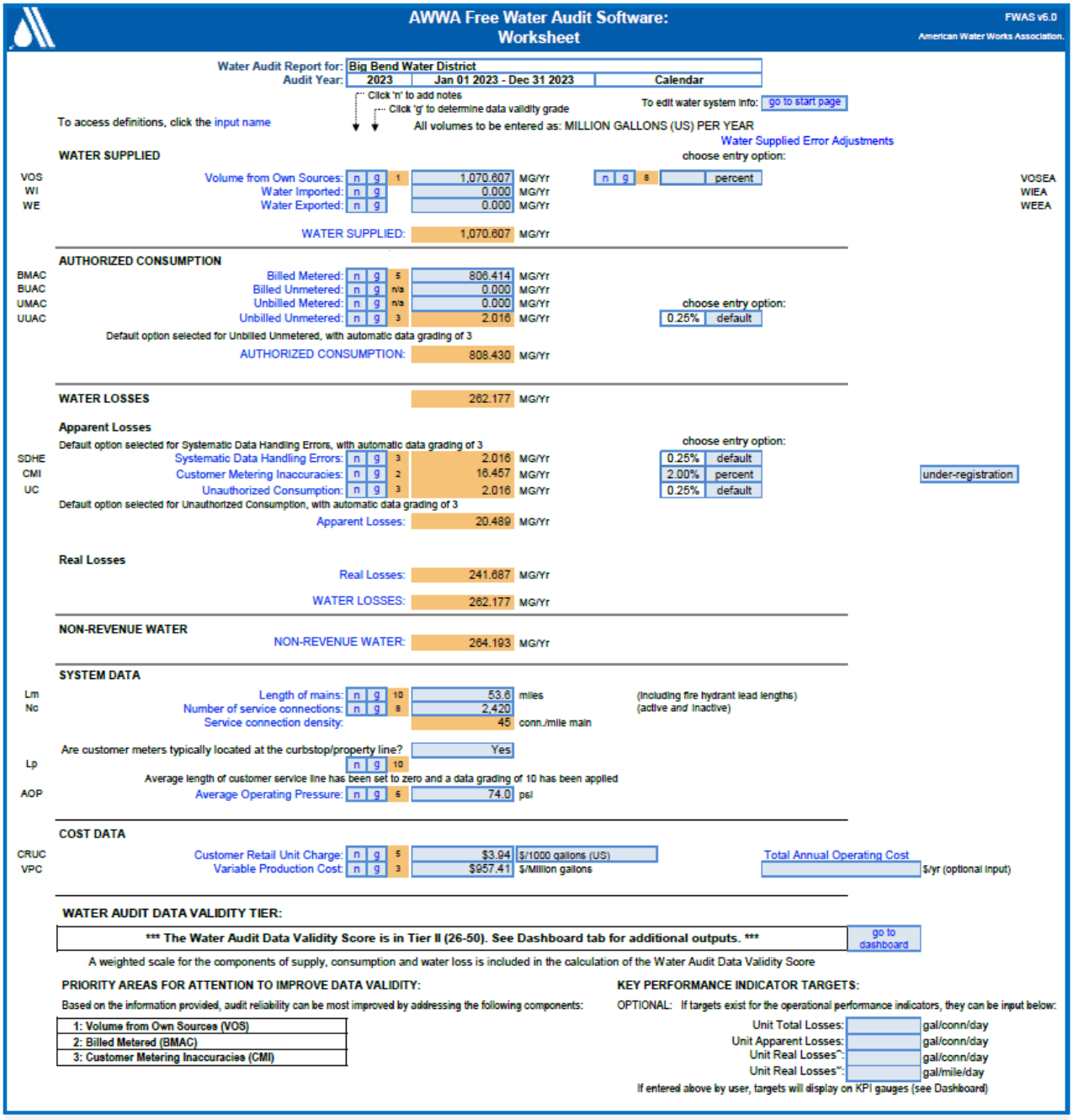
KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses^:		gal/conn/day
Unit Real Losses":		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Figure A-5.6: Big Bend Water District water audit



AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association.

Water Audit Report for: Big Bend Water District
Audit Year: 2023 | Jan 01 2023 - Dec 31 2023 | Calendar

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	n g	1	1,070.607	MG/Yr	n g 8		percent
WI	Water Imported:	n g		0.000	MG/Yr			
WE	Water Exported:	n g		0.000	MG/Yr			
	WATER SUPPLIED:			1,070.607	MG/Yr			

AUTHORIZED CONSUMPTION

choose entry option:

BMAC	Billed Metered:	n g	5	806.414	MG/Yr		
BUAC	Billed Unmetered:	n g	n/a	0.000	MG/Yr		
UMAC	Unbilled Metered:	n g	n/a	0.000	MG/Yr		
UUAC	Unbilled Unmetered:	n g	3	2.016	MG/Yr	0.25%	default

Default option selected for Unbilled Unmetered, with automatic data grading of 3

AUTHORIZED CONSUMPTION: 808.430 MG/Yr

WATER LOSSES 262.177 MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	n g	3	2.016	MG/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n g	2	16.457	MG/Yr	2.00%	percent	under-registration
UC	Unauthorized Consumption:	n g	3	2.016	MG/Yr	0.25%	default	

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 20.489 MG/Yr

Real Losses

Real Losses: 241.687 MG/Yr

WATER LOSSES: 262.177 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 264.193 MG/Yr

SYSTEM DATA

Lm	Length of mains:	n g	10	53.6	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n g	8	2,420		(active and inactive)
	Service connection density:			45	conn./mile main	
	Are customer meters typically located at the curbstop/property line?			Yes		
Lp		n g	10			

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n g	6	74.0	psi

COST DATA

CRUC	Customer Retail Unit Charge:	n g	5	$3.94	$/1000 gallons (US)	Total Annual Operating Cost
VPC	Variable Production Cost:	n g	3	$957.41	$/Million gallons	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier II (26-50). See Dashboard tab for additional outputs. ***

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Volume from Own Sources (VOS)
2: Billed Metered (BMAC)
3: Customer Metering Inaccuracies (CMI)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses*:		gal/conn/day
Unit Real Losses**:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

APPENDIX 5: TURF DEFINITIONS

NON-FUNCTIONAL TURF

An irrigated grass area not providing functional use. Areas of nonfunctional turf include, but are not limited to:

Streetscape turf

Grass located along public or private streets, streetscape sidewalks, driveways and parking lots, including turf within a community, park and business streetscape frontage areas, medians, and roundabouts.

Frontage, courtyard, interior and building-adjacent turf

Grass in front of, between, behind or otherwise adjacent to a building or buildings located on a property not zoned exclusively for single-family residence, including maintenance and common areas.

Certain HOA-managed landscape areas

Turf managed by a homeowner association that does not provide a recreational benefit to the community or that otherwise does not qualify as functional turf, regardless of property zoning.

FUNCTIONAL TURF

An irrigated grass area that provides a recreational benefit to the community and is:

- Located at least 10 feet from a street, installed on slopes less than 25 percent and not installed within street medians, along streetscapes or at the front of entryways to parks, commercial sites, neighborhoods, or subdivisions.
- Active/programmed recreation turf, athletic fields, designated-use-area turf, golf course play areas, some pet relief turf, playground turf or resident area turf.

Active/programmed recreation turf

Grass used for recreation that is 1,500 contiguous square feet or greater; co-located with facilities; and located at least 10 feet from a street or interior-facing parking lot unless the turf area is at least 30 feet in all dimensions or immediately adjacent to an athletic field.

Athletic field turf

Grass used for sports or physical education that is 1,500 contiguous square feet or greater; not less than 30 feet in any dimension; and located at a school, daycare, religious institution, recreation center, senior center, park or water park. Athletic field turf may be located less than 10 feet from a street or interior-facing parking lot if the contiguous turf area is at least 30 feet in all dimensions.

Designated use area

Grass designated for special use at cemeteries and mortuaries.

Golf course play area

Grass in driving ranges, chipping and putting greens, tee boxes, greens, fairways and rough. Pet relief area Grass at a property providing commercial and retail services for pets, such as veterinarian and boarding facilities. The area must not exceed 200 square feet.

Pet relief area

Grass at a property providing commercial and retail services for pets, such as veterinarian and boarding facilities. The area must not exceed 200 square feet.

Playground turf

Grass in designated play areas with playground amenities, including but not limited to slides, swings and climbing structures on homeowner association owned/managed property or at a public park, water park, school, daycare, recreation center, senior center or religious institution. Playground turf may be located less than 10 feet from a street if fenced.

Resident area turf

Grass up to 150 square feet per dwelling unit at multi-family residential properties, multi-family mixed use properties, or assisted living and rehabilitation centers used by tenants for recreation or leisure. May not be located in parking lots, streetscapes or other non-accessible areas.

Plan References

[1] Nevada Revised Statutes (NRS) 540.121–151.

[2] Reclamation Reform Act, Pub. L. No. 97-293,96 Stat. 1263 (1982).

[3] United States Environmental Protection Agency Water Conservation Plan Guidelines, Advanced Guidelines for water systems serving over 100,000 people. www.epa.gov, updated June 8, 2023.

[4] "AWWA G480-20 Water Conservation Program Operation and Management." American Water Works Association, 2021.

[5] AWWA M52 Manual of Water Supply Practices, Water Conservation Programs, A Planning Manual, 2017.

[6] NOAS NCEI, (2024). U.S. Monthly Climate Normals [dataset]. National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), US. Las Vegas, Nevada 1997 – 2020.

[7] Climate Central, U.S. Warming Rankings, April 20, 2022. According to the report, Las Vegas ranks 3rd as the fastest warming cities (+5.9°F).

[8] Kalansky, J., Sheffield, A., Cayan, D., and Pierce, D. 2018 Climate conditions in Clark County, NV. Southern Nevada Water Authority.

[9] Its Hot, and Getting Hotter: Implications of extreme heat on water utility staffing and infrastructure, and ideas for adaptation, 2020. Resilient Analytics report for Water Utility Climate Alliance and Metropolitan Water agencies.

[10] Climate Central, 2014. "Hot and Getting Hotter: Heat Islands Cooking U.S. Cities."

[11] White, D.D., E.H. Elias, K.A. Thomas, C.E. Bradatan, M.W. Brunson, A.M. Chischilly, C.A.F. Enquist, L.R.
Fisher, H.E. Froehlich, E.A. Koebele, M. Méndez, S.M. Ostoja, C. Steele, and J.K. Vanos, 2023: Ch. 28. Southwest. In: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. https://doi.org/10.7930/NCA5.2023.CH28

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[14] "Lower Colorado Water Supply Report," May 13, 2024, U.S. Bureau of Reclamation.

[15] U.S. Bureau of Reclamation, Notice of Intent to prepare a Supplemental Environmental Impact Statement, Public Informational Webinars per 87 FR 69042, November and December 2022.

[16] "Record of Decision Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead, December 2007," signed December 13, 2007, by Dirk Kempthorne, Secretary of the Department of Interior.

[17] "Agreement Concerning Colorado River Drought Contingency Management and Operations," 2019.

[18] Exhibit 1 to the Lower Basin Drought Contingency Plan Agreement, Lower Basin Drought Contingency Operations," 2019.

[19] Assembly Bill 356 (AB356), 2021.

[20] Assembly Bill 220 (AB220), 2023

[21] Ibid

[22] Ibid

[23] Ibid

[24] International Water Association/American Water Works Association Water Audit Method, M36 Manual for Water Audits & Loss Control Program and Water Research Foundation Level 1 Water Audit Validation Guidance Manual.

[25] Uniform Design and Construction Standards for Potable Water Systems, 3rd Edition – 2010. Las Vegas Valley Water District, City of Henderson, City of North Las Vegas and City of Boulder City. www.lvvwd.com/assets/pdf/udacs-2010,pdf.

[26] Southern Nevada Water Authority, "Heat Impacts on Infrastructure & Personnel: A SNWA Case Study,"2020. https://www.wucaonline.org/assets/pdf/heat-impact-case-study-snwa.pdf. Retrieved 8/11/2021.

[27] "Changes in Water Use Under Regional Climate Change Scenarios," 2013, Water Research Foundation (Project #4263) prepared by Jack C. Kiefer, John M. Clayton, Benedykt Dziegielewski and James Henderson.

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