



SOUTHERN NEVADA WATER AUTHORITY®

2020

MAJOR CONSTRUCTION AND CAPITAL PLAN





## **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.

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MAJOR CONSTRUCTION AND CAPITAL PLAN

**TABLE OF CONTENTS**

---

INTRODUCTION ..... 7

CHAPTER 1: SYSTEM EXPANSION..... 9

CHAPTER 2: WATER RESOURCES AND CONSERVATION ..... 13

CHAPTER 3: SYSTEM MAINTENANCE AND UPGRADES..... 15

APPENDICES ..... 19

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## MAJOR CONSTRUCTION AND CAPITAL PLAN INTRODUCTION

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The Southern Nevada Water Authority (SNWA) was formed in 1991 by a cooperative agreement among seven water and wastewater agencies. Collectively, the SNWA member agencies serve more than 2.2 million residents in the cities of Boulder City, Henderson, Las Vegas, North Las Vegas and areas of unincorporated Clark County. As their wholesale water provider, the SNWA is responsible for water treatment and delivery, as well as acquiring and managing long-term water resources for Southern Nevada.

### SNWA Member Agencies:

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

### Major Construction and Capital Plan Background

Efforts to manage Southern Nevada's water resources in a cooperative manner began in the middle of the 20th century when local municipalities, the State of Nevada, and the federal government together began exploring options to deliver Colorado River water to the Las Vegas Valley on an extensive scale. These efforts resulted in a plan for staged financing and construction of the Southern Nevada Water Project. Under the direction of the United States Bureau of Reclamation and the Colorado River Commission of Nevada, the first stage of facilities for pumping, treating and conveying up to 200 million gallons per day (mgd) of Colorado River water from

Lake Mead to the Las Vegas Valley and Boulder City was completed in 1971. An expansion of these facilities to a capacity of 400 mgd was accomplished in 1982. These facilities collectively became known as the Southern Nevada Water System (SNWS).

Ongoing growth in Southern Nevada and increasing demands on the SNWS prompted the SNWA to engage community stakeholders in developing a Capital Improvements Plan (CIP) to expand the SNWS to a regional capacity of 900 mgd. When faced with mission-critical decisions, the SNWA often relies on stakeholder advisory committees to consider community impacts and make recommendations. In 1994, the SNWA established an advisory committee that considered how the water system would need to expand to provide the redundancy and capacity the community required. One of their principal recommendations was for the community's regional water system to achieve a capacity of 900 mgd.

By 1996, all the projects initiated by the Colorado River Commission over the previous three years and all the projects identified through the SNWA's stakeholder planning process had been consolidated into a single CIP. These projects included a second water intake in Lake Mead, a new water treatment facility, and a substantial contingent of water pipeline, pumping, and power supply facilities.

As the progress of the CIP began to approach the goal of a total SNWS capacity of 900 mgd, the SNWA recognized a new capital plan was needed that would provide for accomplishment of capital endeavors which were not directly related to the capacity goal. Such endeavors could include acquiring additional water resources, major system repairs and replacements, water quality enhancements, new

facilities needed for increased reliability, and acquiring energy resources. To identify and authorize these endeavors, in 2002, the SNWA created a new capital plan called the **Major Construction and Capital Plan (MCCP)**.

Since 2002, the MCCP has been updated regularly and modified in size and scope to appropriately meet the changing water needs of the community. In 2010, given that the original purpose of the CIP had been achieved and given the MCCP's greater role as the dynamic document that defines the future major capital initiatives of the SNWA, the few remaining projects of the CIP were integrated into the MCCP and the MCCP became the single capital plan combining all authorized capital projects and initiatives into a unified document. It reports on the costs of all completed projects of the SNWA. It defines all authorized projects and initiatives for new facilities, acquisition of assets such as water and energy resources, and all other capital related activities. It also identifies estimated costs and schedules for all approved projects and initiatives.

The projects outlined within the MCCP are funded by SNWA bond proceeds and revenues generated by SNWA water bill charges, connection charges, State Sales Tax, and Southern Nevada Public Land Management Act funds.

## **INTEGRATED RESOURCE PLANNING ADVISORY COMMITTEE 2020 PROCESS**

As part of its future planning efforts, the SNWA identified a number of projects that had been deferred, facilities needed to meet new demands and projects that if constructed, would capture valuable Colorado River resources for return-flow credits that would otherwise not be returned to Lake Mead.

To ensure community input into the planning process, the SNWA Board convened an advisory committee to consider the projects and resources needed to continue serving customers into the future. Following a comprehensive education, the committee recommended a package of new infrastructure, water resources, power projects and conservation initiatives to support Southern Nevada.

## **2020 MCCP**

The amended 2020 MCCP represents a major update to the document, including its look and organization. The 2020 MCCP includes a wide variety of projects,

acquisitions, and initiatives addressing various objectives. To facilitate clarity and order, projects, acquisitions and initiatives are organized by chapters corresponding to their general purpose or other distinguishing characteristics, and are organized as follows:

**Chapter 1: System Expansion.** These projects are considered new water facilities to meet new anticipated demands within the service area or to facilitate water deliveries in areas where water systems have not yet been constructed. It also includes projects to support the SNWA's efforts to increase its renewable energy resources and maximize the sustainable use of Colorado River supplies.

**Chapter 2: Water Resources and Conservation.** Water resource projects are assets that require capital funding, but may not involve the construction of SNWA facilities. This chapter also includes the Water Smart Landscapes Program – one of the most important conservation investments the SNWA has made over time.

**Chapter 3: System Maintenance and Upgrades.** Projects, acquisitions or initiatives described in this chapter are needed to maintain the existing system or improve system reliability.

The chapters include project descriptions to outline intent and purpose, and the estimated costs to complete each project, which includes – where applicable – administration, design, construction and contingency amounts.

The appendices also include related information, including projected future cash flow and completed projects.

The MCCP is periodically revised in response to future reliability, water quality, system capacity, and water resource needs and in accordance with the SNWS Facilities and Operations Agreement.





## MAJOR CONSTRUCTION AND CAPITAL PLAN - CHAPTER 1

### SYSTEM EXPANSION

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#### PROJECTS:

- Horizon Lateral
- Garnet Valley Water System
- Garnet Valley Wastewater System
- Large Scale Solar Photovoltaic (PV) Project
- Low Lake Level Pumping Station (L3PS)

#### Overview

The SNWA continues to assess its existing regional water system needs and proposes projects necessary to meet future demands. Recently completed major projects include the Low Lake Level Pumping Station (2020) and Intake No. 3 (2015); however, those were designed and constructed to respond to drought conditions and not necessarily to meet future demands.

With economic development opportunities in Southern Nevada's horizon, the regional water system requires new, additional facilities to provide the capacity for new demands while maintaining or improving existing service levels for customers.

Projects included within the 2020 amendment include a new water transmission lateral at the southern portion of the community. In the northern area of the valley, wastewater conveyance lines are contemplated to ensure Colorado River water deliveries are efficiently used and returned to Lake Mead for use again.

Other projects include a solar project and final efforts on the Low Lake Level Pumping Station.



#### SPOTLIGHT ON: The Horizon Lateral

Approximately 40 percent of the residents and businesses in the southern portion of the Las Vegas Valley are currently served by the South Valley Lateral, which is projected to reach 95 percent capacity by 2034. The single-feed transmission lateral does not have redundant facilities to provide back-up water service to the area, highlighting the need for an additional lateral to ensure future reliability and system capacity.

To ensure system redundancy and reliability in the south part of the valley, and to support Southern Nevada's economic development, the SNWA is considering the Horizon Lateral, which will increase the transmission system capacity from the current 306 million gallons per day (MGD). A feasibility study is being prepared for the Horizon Lateral infrastructure and alignment that will define the recommended capacity, pipeline sizes, reservoir location, pumping station size and location, purveyor turnout locations, and pipeline alignments.

The Horizon Lateral project is expected to include:

- Approximately 24 miles of pipeline ranging between 72 and 120 inches in diameter
- Approximately 7 miles of tunneling
- 2 Pump Stations
- 40 Million Gallon Reservoir(s)
- Rate-of-Flow Control Stations

## Horizon Lateral

The Horizon Lateral represents the largest project proposed within this MCCP amendment in terms of both cost, timeline and magnitude. When completed, the new lateral will offer redundancy for a large portion of SNWA customers and the capacity to meet new demands in the southern portion of the water system. For more details about the Horizon Lateral project, refer to the sidebar on the previous page.

## Garnet Valley Water System

The APEX Industrial Park is one of Southern Nevada's largest industrial parks located in Garnet Valley in North Las Vegas. The 16-parcel industrial park includes more than 11,000 acres and is attracting technology- and manufacturing-based businesses.

When completed, the Garnet Valley Water System will support the water needs of the Apex Industrial Park. The Garnet Valley Water System will consist of facilities to support supplying 20 million gallons per day (MGD) at full build-out and includes:

- 18 miles of pipeline, 16 inches to 36 inches in diameter
- 1 reservoir (4 million gallons)
- 3 pumping stations with a capacity of 5 MGD
- 2 forebays
- 2 Rate-of-Flow Control Stations (20 MGD total)

## Garnet Valley Wastewater System

Southern Nevada maximizes its water resources by treating and recycling 99 percent of the water used indoors in its service area. Treating wastewater and returning it to Lake Mead extends the availability of our water resources through return-flow credits.

Construction of the Garnet Valley Wastewater System will help ensure the sustainable development of resources and reduce water demand impacts to the Colorado River. The wastewater project will support the agency's efforts to maximize our water resources by developing the infrastructure required to capture indoor wastewater from the Garnet Valley area and transport it to existing treatment facilities in accordance with SNWA's out-of-valley water use policy. The project consists of:

- 5 wastewater lift stations
- 43 miles of wastewater pipeline from 8 inches to 48 inches in diameter
- 8 miles of force main pipe from 14 inches to 30 inches in diameter

## Large Scale Solar Photovoltaic (PV) Project

A considerable amount of energy is required to pump water uphill from Lake Mead into the Las Vegas Valley, where SNWA member agencies then distribute it to homes and businesses. SNWA is one of the largest energy users in Southern Nevada, and power is a significant portion of the cost of treating and delivering water.

The Large Scale Solar Photovoltaic (PV) Project ensures a clean, cost-effective renewable energy source for the next 25 years and is essential for meeting the Nevada Renewable Portfolio Standard of 50 percent by 2030. Currently, renewable energy is approximately 21 percent of SNWA's existing power portfolio, and this project will ensure SNWA meets the state-mandated standards by securing 88 megawatts (MW) of solar energy for SNWA and 30 MW for several of its purveyor members.

As part of this project, SNWA will enter into a 25-year, fixed-rate Power Purchase Agreement (PPA) with ibV Energy Partners, which will build, operate and maintain the large-scale solar PV facility. The PPA allows SNWA to purchase power below current market cost, saving money when the facility opens in 2023 and throughout the span of the agreement. In addition to the PPA, the project consists of a 10-mile expansion to SNWA's existing power transmission system, a double-circuit 230 kV power line, 230 kV Switchyard and other infrastructure to support energy transmission.

## Low Lake Level Pumping Station (L3PS)

The Low Lake Level Pumping Station ensures Southern Nevada maintains access to its primary water supplies in Lake Mead even if water levels decline due to drought.

Development of the pumping station located in the Lake Mead National Recreation Area involves construction of a 26-foot diameter access shaft more than 500 feet deep and the excavation of a 12,500-square-foot underground forebay. The forebay connects with 34 vertical shafts—each 500 feet deep and 6 feet in diameter—to accommodate the station's submersible pumping units.

During construction, SNWA closed off an access trail to the lake to secure a large area in which to stage the construction, which began in mid-2015 and was completed in April 2020.

This capital will fund final project close-out activities that include contractor retention fees, restoring 10 miles of Lakeshore Road, re-establishing public access to the trail that has been inaccessible during

construction, removing a construction access road, and restoring the entire staging area to its pre-construction state.

## SYSTEM EXPANSION PROJECTS

| TITLE (Projected Completion Year)      | ESTIMATED COST TO COMPLETE<br>(Estimates in 2019 million dollars) |
|--|---|
| Horizon Lateral (2032)                 | \$ 1,596.7  |
| Garnet Valley Water System (2028)      | 129.8   |
| Garnet Valley Wastewater System (2027) | 120.0   |
| Solar PV Project (2022)                | 20.8  |
| Low Lake Level Pumping Station (2021)  | 16.4  |
| <b>TOTAL SYSTEM EXPANSION PROJECTS</b> | <b>\$1,883.7</b>  |

*Totals are rounded*

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## MAJOR CONSTRUCTION AND CAPITAL PLAN - CHAPTER 2

# WATER RESOURCES

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### PROJECTS:

- Future Water Resources
- Water Smart Landscape Rebate
- Water Resource Contingency
- Virgin and Muddy River Water Resource Acquisition
- Minute 323
- Interim Colorado River Supplies – Water Banking

### Overview

Water resources represent a significant and important asset for SNWA and require capital funding to acquire and maintain. While this chapter provides a brief description of resources funded within this MCCP, the SNWA Water Resource Plan provides a comprehensive overview of all SNWA water resources and how they're managed and utilized to meet demands over a 50-year planning horizon.

The estimated total spend for water resource projects over a 10-year planning horizon is \$1,068.6 million.

### Future Water Resources

SNWA is working to further diversify its water resource portfolio and has identified potential resource options, including investments in water recycling and/or desalination projects developed in partnership with other Colorado River Basin states. In these projects, SNWA would fund part of the construction of the facilities, or lease/purchase water produced by the facilities, in exchange for a portion of that partnering state's Colorado River allocation. Projects under consideration include the Metropolitan Water District of Southern California

(MET) Recycled Water Purification Center and the Yuma Desalting Plant in Arizona.

MET, in collaboration with the Los Angeles County sanitation districts, is proposing an advanced water treatment plant to treat wastewater and inject it into groundwater aquifers for future use. The project would create approximately 112,000 acre-feet of water per year. SNWA would partner with MET to help fund a portion of the project in exchange for MET using less of its Colorado River allocation, which SNWA would then utilize and access via Lake Mead.

SNWA also is considering supporting the retrofit of the Yuma Desalting Plant. Built in 1992 to treat agricultural runoff, the plant has operated only three times due to damage caused by a flood and lack of funding. SNWA may have the opportunity to participate in the plant's repair and long-term operation, which could yield up to 30,000 acre-feet of water per year.

Unlike typical construction projects, these water resource acquisitions require negotiations with willing partners. At the time of this plan's development, these were likely options, but neither have finalized opportunities for partnerships. Including these options within the MCCP and establishing a funding threshold approval ensures the SNWA is prepared to take action on valuable water resources when the opportunities arise.

### Water Smart Landscape Rebate

The Water Smart Landscape (WSL) rebate offers financial incentives to residential and commercial customers in the SNWA service area who replace water-thirsty grass with water-efficient landscaping. Since the majority of Southern Nevada's water is used outdoors on landscaping, the WSL program targets the largest consumptive use of water as a top priority.

This capital funding is capable of providing rebates for approximately 5 million square feet of non-functional turfgrass each year. To sustain results, participants in the program must grant a conservation easement that promises the project will be sustained in perpetuity. This capital funding supports the program funding and the easements associated with the property at which the grass is removed.

### Water Resource Contingency

SNWA has successfully partnered with the other Colorado River Basin states and the country of Mexico to flexibly manage Colorado River resources, which have been threatened by drought for two decades. The water resource contingency capital will provide SNWA the funding required to react to changing conditions on the Colorado River and act on developing additional water supplies when opportunities become available.

### Virgin and Muddy River Water Resource Acquisition

These costs represent the acquisition of water shares in irrigation companies on the Muddy and Virgin rivers.

### Minute 323

The United States and Mexico finalized Minute 323 to the 1944 U.S./Mexico Water Treaty in September 2017. Minute 323 helps maintain Lake Mead water levels, delay potential shortages and create additional certainty for all water users, particularly during shortages. This capital funding supports SNWA efforts to invest in conservation and infrastructure projects in Mexico in exchange for Bi-National Intentionally Created Surplus credits.

### Interim Colorado River Supplies – Water Banking

This project includes funding for temporary water supplies: Colorado River system conservation projects, interstate water banking, and SNWA activities with Colorado River basin states that alleviate impacts of the ongoing drought, and more specifically, recovery activities associated with banked resources. Colorado River system conservation and drought-related activities develop water resources to bolster Lake Mead water elevation and protect short-term water supplies, water quality, and operation of SNWA intakes.

## WATER RESOURCES

| TITLE   | ESTIMATED COST TO COMPLETE          |
|---|-------------------------------------|
|   | (Estimates in 2019 million dollars) |
| Future Colorado River Resource Acquisitions     | \$ 587.7                            |
| Water Smart Landscape Program Rebates           | 152.3                               |
| Water Resource Contingency                      | 188.3                               |
| Virgin and Muddy River Resource Acquisitions    | 98.4                                |
| Minute 323                                      | 36.4                                |
| Interim Colorado River Supplies – Water Banking | 5.5                                 |
| <b>TOTAL WATER RESOURCES COSTS</b>              | <b>1,068.6</b>                      |

*Totals are rounded*





## MAJOR CONSTRUCTION AND CAPITAL PLAN - CHAPTER 3

# SYSTEM MAINTENANCE AND UPGRADES

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### PROJECTS:

- Stage II Reliability Upgrades
- Stage II Multi-site Medium Voltage Electrical Equipment Upgrades
- Ozone Equipment Upgrade
- AMSWTF Filter Improvements
- In-Valley Maintenance Shop
- Enterprise Asset Management Software Replacement
- RMWTF Microbiology Research Lab Expansion
- Water Quality Testing Equipment
- System-wide Valve Actuator Upgrades
- SCADA System Replacement
- Joint SCADA Site

### Overview

Maintaining a world class water system requires ongoing repair, upgrade and investment. The projects outlined within this chapter represent those efforts to support existing infrastructure in a way that significantly upgrades the facilities:

### Stage II Reliability Upgrades

These improvement projects are associated primarily with SNWA water conveyance infrastructure along the Pittman Lateral which serves the central Las Vegas Valley. The upgrades will improve reliability for customers in older, more established areas of Southern Nevada.

The Stage II Reliability Upgrades consist of modifications to the Hacienda Pumping Station,

rehabilitation of portions of the Pittman Lateral, and localized improvements that would enhance the reliability of delivery along this central corridor, including upgrades to the Gowan, Simmons, Lamb and Sloan pumping stations.

The Hacienda Pumping Station has a conveyance capacity of 180 million gallons per day (MGD) and serves a critical, central area of the Las Vegas Valley. To ensure future reliability, protect against facility aging, provide redundancy in the water delivery system and prevent water loss, additional capital investments are necessary.

This project also includes construction of a new 80 MGD pumping station at the Las Vegas Valley Water District's (LVVWD) Campbell Reservoir site and approximately 1.75 miles of 66-inch diameter discharge pipeline from the new pumping station to the existing Hacienda Pumping Station discharge pipeline. This will facilitate rehabilitation work at the Hacienda Pumping Station.

Additional upgrades to facilities at Sloan, Lamb, Gowan and Simmons pumping stations will be needed to support this project. These upgrades will provide additional back-feed capacity of up to 50 MGD. This capital project includes:

- 1.75 miles of 66-inch diameter pipeline from Campbell to Hacienda Pumping Station
- 4 new pumps to existing pump barrels at Sloan Pumping Station with electrical upgrades
- 4 new pumps to existing pump barrels at Lamb Pumping Station with electrical upgrades
- 30-inch pipeline and two 16-inch pressure reducing valves with electrical upgrades at Gowan Pumping Station
- 60-inch pipeline and 60-inch bypass valve at Simmons Pumping Station

## **Stage II: Multi-site Medium Voltage Electrical Equipment Upgrades**

Pumping station switchgear that incorporates fuse clip technology has experienced failures, creating water delivery challenges and potential safety concerns for staff. The switchgear — used to control, protect and isolate large pumps — will be replaced at five pumping station sites.

### **Ozone Equipment Upgrade**

In 2002 and 2003, the SNWA implemented Ozone as a primary disinfectant at the Alfred Merritt Smith Water Treatment Facility (AMSWTF) and at the River Mountains Water Treatment Facility (RMWTF).

The systems have been operating continuously for the past 17 years. As the systems age, the potential for equipment failure increases and replacement parts become difficult to acquire. In order to maintain water quality levels, SNWA will fund an analysis of the existing system and, based on the analysis, upgrade or replace the ozone equipment at both treatment plants.

### **AMSWTF Filter Improvements**

The water treatment filters at the AMSWTF have provided reliable service to SNWA's water treatment process since the facility first opened in the 1970s. Due to age and increasing turbidity in the raw water supply due to a drop in Lake Mead's water levels, these filters and related media used to remove sediment and impurities from the water need to be upgraded and deepened. This project consists of demolishing the old filter blocks, raising the height of filter center channel walls, installing new filter blocks, and replacing 135 valves in 15 filters.

### **In-Valley Maintenance Shop**

This project included the design and construction of a maintenance building to support SNWA's water system maintenance activities, including staff, materials and related equipment. The In-Valley Maintenance Shop will provide a centralized location for SNWA to store and use specialized tools and conduct water system repair and maintenance projects. The new facility will improve work efficiencies and reduce travel time required to transport equipment and materials to various sites and locations around the valley.

## **Enterprise Asset Management Software Replacement**

Proactively maintaining, protecting and updating the infrastructure required to meet Southern Nevada's water demands requires a software management system that can track preventative maintenance required at water treatment and transmission facilities and the associated assets such as pipelines, valves, motors, electrical switchgear and pumps. This project consists of replacing outdated, inefficient technology with a software package that allows staff to more effectively manage the agency's many facilities and assets. In addition to maintaining an inventory of these assets and maintenance schedule, the system will also help manage the workflow and costs associated with SNWA's maintenance activities.

### **RMWTF Microbiology Research Lab Expansion**

The SNWA Water Quality Research & Development (R&D) Team conducts cutting-edge water quality research on contaminants of emerging concern and advanced treatment technologies. Since its inception in 2000, the R&D team has helped develop patented technology and has procured \$10 million of external research funds to study emerging water quality issues.

To date, the R&D Team has primarily focused its research on chemical contaminants such as bromate and pharmaceuticals. Emerging water quality issues that include Legionella, antimicrobial resistance and algal toxins create new challenges for the water industry, and the Microbiology Research Laboratory will allow SNWA to establish itself as an R&D leader in microbiology.

This project will facilitate building a 5,500 square-foot, state-of-the-art microbiology research facility. The new building will be located adjacent to the existing R&D laboratories at the RMWTF and include the facilities and equipment necessary to conduct leading-edge microbiology research using a combination of culture methods, molecular methods and microscopy.

### **Water Quality Testing Equipment**

Annually, SNWA's water quality scientists collect nearly 55,000 water samples and conduct nearly 300,000 analyses of those samples. Testing for more than 160 regulated and unregulated contaminants,

SNWA experts monitor water quality in real time, 24 hours a day, 365 days a year. These intensive testing process allow staff to detect contaminants at concentrations of parts per billion, and as technology improves, efficiently identifying contaminants in even smaller concentrations.

The SNWA Water Quality Compliance Laboratory and the Water Quality Research Laboratory provide the infrastructure necessary to meet federal Safe Drinking Water Act standards and support the agency's efforts to provide a clean, safe water supply. Both laboratories contain specialized, sensitive water quality testing equipment. This capital project will provide the funding necessary to replace that equipment as it becomes outdated or needs to be replaced with newer technology.

### System-wide Valve Actuator Upgrades

As the SNWA water system matures, proactively replacing aging infrastructure is essential to the reliable, cost-efficient operation of the water transmission and distribution systems. Several large valves in the SNWA water system are 50 years old or more, reaching the end of the service lifecycle. Maintaining service reliability, SNWA will update the valve actuators and continue its proactive valve maintenance programs.

### SCADA System Replacement

SNWA's water system operators use Supervisory Control and Data Acquisition system (SCADA) to monitor and control the water treatment and distribution system to ensure the safe and reliable delivery of water. This project will replace an existing SCADA with a new SCADA system that simplifies system maintenance and implements new features to help operate the water treatment and distribution system more efficiently. The Las Vegas Valley Water District and Big Bend Water District also are implementing the new SCADA system, creating operating synergies between SNWA and the two water purveyors.

### Joint SCADA Site

SNWA is evaluating the current SCADA operations to determine the feasibility of consolidating current SCADA control rooms and the operations staff from multiple locations to a single site. This capital would provide for modifying an existing space or constructing a new space for the colocation of SNWA and Las Vegas Valley Water District SCADA teams in one centralized SCADA control site.

## SYSTEM MAINTENANCE AND UPGRADE PROJECTS

| TITLE (Projected Completion Year)                                       | ESTIMATED COST TO COMPLETE<br>(Estimates in 2019 million dollars) |
|---|---|
| Stage II Reliability Upgrades (2024)                                    | \$ 61.0   |
| Stage II Multi-site Medium Voltage Electrical Equipment Upgrades (2024) | 10.5  |
| Ozone Equipment Upgrade (2025)  | 38.5  |
| AMSWTF Filter Improvements (2022)                                       | 20.7  |
| In-Valley Maintenance Shop (2024)                                       | 20.0  |
| Enterprise Asset Management Software Replacement (2027)                 | 15.5  |
| RMWTF Microbiology Research Lab Expansion (2024)                        | 16.0  |
| Water Quality Testing Equipment (2029)                                  | 11.8  |
| System-wide Valve Actuator Upgrades (2023)                              | 6.6   |
| SCADA System Replacement (2023)   | 5.0   |
| Joint SCADA Site (2026)   | 7.7   |
| <b>TOTAL SYSTEM MAINTENANCE &amp; UPGRADES</b>                          | <b>\$213.3</b>  |

Totals are rounded

## MCCP TOTAL COSTS

| PROJECT TITLE  | ESTIMATED COST TO COMPLETE              |
|--|---|
|  | <i>Estimate in 2019 million dollars</i> |
| Horizon Lateral  | \$ 1,596.7                              |
| Garnet Valley Water System                                       | 129.8                                   |
| Garnet Valley Wastewater System                                  | 120.0                                   |
| Solar PV Project   | 20.8                                    |
| Low Lake Level Pumping Station                                   | 16.4                                    |
| Water Smart Landscape Program Rebates                            | 152.3                                   |
| Future Colorado River resource acquisitions                      | 587.7                                   |
| Water Resource Contingency                                       | 188.3                                   |
| Virgin and Muddy River Resource Acquisitions                     | 98.4                                    |
| Minute 323   | 36.4                                    |
| Interim Colorado River Supplies – Water Banking                  | 5.5                                     |
| Stage II Reliability Upgrades                                    | 61.0                                    |
| Stage II Multi-site Medium Voltage Electrical Equipment Upgrades | 10.5                                    |
| Ozone Equipment Upgrade  | 38.5                                    |
| AMSWTF Filter Improvements                                       | 20.7                                    |
| In-Valley Maintenance Shop                                       | 20.0                                    |
| Enterprise Asset Management Software Replacement                 | 15.5                                    |
| RMWTF Microbiology Research Lab Expansion                        | 16.0                                    |
| Water Quality Testing Equipment                                  | 11.8                                    |
| System-wide Valve Actuator Upgrades                              | 6.6                                     |
| SCADA System Replacement   | 5.0                                     |
| Joint SCADA Site   | 7.7                                     |
| <b>TOTAL MCCP</b>  | <b>\$3,165.6</b>                        |

*Totals are rounded*



## MAJOR CONSTRUCTION AND CAPITAL PLAN **APPENDICES**

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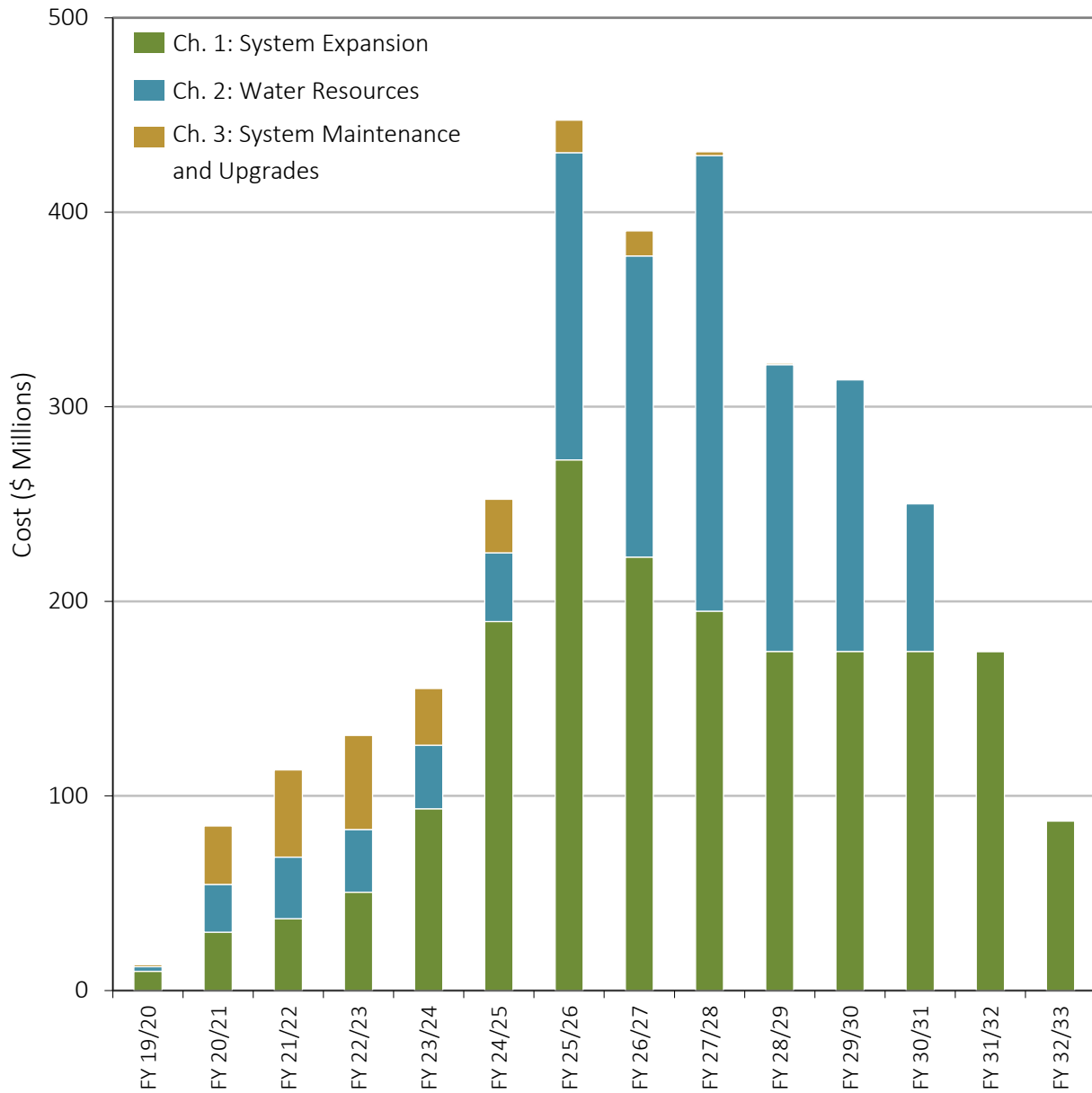
**Appendix A – Cash Flow**

**Appendix B – Completed Projects**



## APPENDIX A: Cash Flow

### MCCP Projected Cash Flow





## APPENDIX B: Completed Projects

| Project Number | Project Title  | Completion Year | Actual Cost (\$ Millions) |
|----------------|--|-----------------|---------------------------|
| .              | Planning/Environmental for 1995 CIP Administrative                                     |                 | 41.2                      |
| .              | Operational Decision Support System  | 1997            | 1.3                       |
| B01            | Batch Plant at AMSWTF  | 1997            | 1.8                       |
| C11            | Communications   | 1997            | 1.3                       |
| D01            | Scrubber Prepurchase at AMSWTF   | 1997            | 0.0                       |
| D11            | Disinfection Facilities Upgrades at AMSWTF   | 1997            | 4.1                       |
| F11            | Filter Additions at AMSWTF   | 1997            | 11.1                      |
| H01            | Hacienda Pumps Prepurchase   | 1997            | 0.0                       |
| L11            | Low Lift Pump Station  | 1997            | 0.0                       |
| M11            | Gibson Lateral (48" - 2.0 miles)   | 1997            | 5.4                       |
| P11            | Plant Improvements at AMSWTF   | 1997            | 9.2                       |
| P12            | Plant Mass Excavation at AMSWTF  | 1997            | 0.6                       |
| R11            | River Mountains Tank (46 MG)   | 1997            | 15.9                      |
| R12            | River Mountains Tank Mass Excavation   | 1997            | 1.9                       |
| S11            | Simmons Pumping Station (71 mgd)   | 1997            | 9.0                       |
| T01            | Valve Prepurchase  | 1997            | 1.0                       |
| T11            | River Mountains Tunnel (144" - 4.0 miles)  | 1997            | 20.5                      |
| T12            | River Mountains Tunnel Portal Connection   | 1997            | 13.7                      |
| T13            | River Mountains Regulating Tank Mass Excavation  | 1997            | 1.4                       |
| W11A           | West Valley Lateral (60" - 3.3 miles) - Section A                                      | 1997            | 17.4                      |
| W11B           | West Valley Lateral (60" - 2.9 miles) - Section B                                      | 1997            | 15.4                      |
| 10010C         | Substation Mass Excavation   | 1997            | 6.9                       |
| 08010K         | East C-1 Detention Basin   | 1999            | 7.7                       |
| 08010L         | Chemical Containment System at AMSWTF  | 1999            | 1.8                       |
| 10010Z         | CRC Power Development (Phase I)  | 1999            | 46.2                      |
| 11010A         | River Mountains Lateral (72" - 3.8 miles)  | 1999            | 9.6                       |
| 11010B         | South Valley Lateral - Major Crossings   | 1999            | 6.1                       |
| 11010C         | South Valley Lateral (108" - 9.8 miles)  | 1999            | 24.6                      |
| 11010D         | Foothills 2210 Pumping Station (140 mgd)   | 1999            | 20.1                      |
| 11010E         | River Mountains 2530 Pumping Station (140 mgd)   | 1999            | 24.6                      |
| 11010G         | Horizon Ridge 2375 Reservoir (10 MG), South Valley Lateral Regulating Reservoir (4 MG) | 1999            | 13.5                      |
| 11010H         | South Valley Lateral (90" - 5.0 miles, 54" - 0.2 miles)                                | 1999            | 14.6                      |
| 11010I         | South Valley Lateral - MacDonald Ranch (108" - 1.1 miles)                              | 1999            | 5.8                       |
| 11010J         | South Valley Lateral Communications  | 1999            | 2.9                       |
| 11010K         | South Valley Lateral (84" - 6.8 miles)   | 1999            | 20.9                      |
| 11010L         | Burkholder 2210 Regulating Reservoir (25 MG)   | 1999            | 14.9                      |
| 11010M         | Rate-of-Flow Control Station   | 1999            | 8.0                       |

|        |  |      |       |
|--------|--|------|-------|
| 11010P | Pipe Prepurchase (108")  | 1999 | 27.0  |
| 11010Q | Pipe Prepurchase - 11010H Phase I (90")  | 1999 | 1.8   |
| 11010R | So. Valley Lateral Regul Resv Inlet/Outlet Pipeline (90" - 0.6 miles, 54" - 0.2 miles)         | 1999 | 2.6   |
| 11010S | South Valley Lateral - MacDonald Ranch Extension (108" - 0.4 miles)                            | 1999 | 2.0   |
| 11010T | South Valley Lateral Controls  | 1999 | 1.0   |
| 11010W | South Valley Lateral - Disinfection (Complete)   | 1999 | 0.5   |
| 11010X | Black Mountain Rate-of-Flow Control Station (25 MG)  | 1999 | 3.0   |
| 11010Z | R-8 Lateral (24" - 0.8 miles)  | 1999 | 1.0   |
| 12010A | SNWS Phase II Mass Excavation  | 1999 | 2.4   |
| 12010B | SNWS Phase II System "C" (225 mgd) (27 MG)   | 1999 | 75.5  |
| 08010C | Ozone Addition to Alfred Merritt Smith Water Treatment Facility (Pre-design)                   | 2000 | 0.6   |
| 08010D | Site Preparation for Ozone Addition to AMSWTF  | 2000 | 4.2   |
| 090A   | Water Resource (Coyote Spring Valley)  | 2000 | 31.6  |
| 10010M | Nevada Power Company Connections to Sloan PS and Lamb PS                                       | 2000 | 1.4   |
| 13010A | East Valley Lateral - Hollywood/DI to Sloan PS (78" - 2.7 miles)                               | 2000 | 22.4  |
| 13010B | East Valley Lateral - Sloan Pumping Station to Las Vegas Bldg. (78" - 5.7 miles)               | 2000 | 22.8  |
| 13010C | East Valley Lateral - Las Vegas Blvd. To Lamb PS (78" - 4.5 miles)                             | 2000 | 22.7  |
| 13010D | Sloan 2160 Pumping Station (20 mgd)/Structure (175 mgd)  | 2000 | 32.2  |
| 13010E | Lamb 2350 Pumping Station (20 mgd)/Structure (175 mgd)   | 2000 | 26.4  |
| 13010F | Grand Teton 2330 Reservoir (10 MG)   | 2000 | 12.5  |
| 13010I | Disinfection Facilities: Carlton Square/Twin Lakes   | 2000 | 3.3   |
| 13010J | East Valley Lateral Communications   | 2000 | 2.4   |
| 13010T | East Valley Lateral Controls   | 2000 | 0.5   |
| 13010W | East Valley Lateral Disinfection   | 2000 | 0.3   |
| 10020A | CRC Power Development Project (Phase II)   | 2001 | 11.8  |
| 10020B | CRC Power Development Project (Phase III)  | 2001 | 14.3  |
| 07010A | Lake Mead Intake No. 2 (100 mgd)   | 2002 | 104.7 |
| 07010B | Raw Water Pumping System (108" - 2.0 miles 100 mgd)  | 2002 | 143.3 |
| 07010C | River Mountain Aqueduct (108" - 3.2 miles)   | 2002 | 18.1  |
| 07010E | Basic Water Company Pipeline Relocation  | 2002 | 0.6   |
| 08010A | RMWTF direct Filtration (150 mgd); Ozone at RMWTF (150 mgd); Clearwell Exp. 25 MG/50 MG total) | 2002 | 266.8 |
| 08010H | AMSWTF Modulating Weirs  | 2002 | 0.4   |
| 08010J | Intake System and RMWTF Communications   | 2002 | 2.6   |
| 08010M | Magic Way RMWTF Entrance Improvements  | 2002 | 3.6   |
| 08010N | RMWTF Temporary Fluoridation   | 2002 | 1.3   |
| 10510A | NPC - Leased Fiber Optic systems - Phase I   | 2002 | 0.7   |
| 13510A | Boulder City Water Delivery Improvements (30" - 7.0 miles, 10 mgd)                             | 2002 | 24.3  |
| 14010A | NVL - Washburn Rd to Decatur 2350 Res. (24" to 72" - 6.0 miles)                                | 2002 | 12.0  |
| 14010B | Carlton Sq. Lateral, Cole Ave to Washburn Rd (42" - 3.9 miles)                                 | 2002 | 10.6  |
| 14010C | Gowan 2350 Pumping Station (24 mgd)  | 2002 | 8.7   |
| 14010D | Decatur 2350 Reservoir (20 MG)   | 2002 | 12.7  |

|         |  |      |       |
|---------|--|------|-------|
| 14010E  | Deer Springs Rate-of-Flow Control Station (80 mgd)   | 2002 | 4.3   |
| 14010G  | College Rate-of-Flow Control Station (25 mgd)  | 2002 | 3.8   |
| 14010J  | North Valley Lateral - Communications  | 2002 | 2.2   |
| 14010T  | North Valley Lateral - Controls  | 2002 | 0.5   |
| 07010D  | Low Lift Pumping Station Improvements (Phase I)  | 2003 | 3.7   |
| 07210B  | Low Lift Pumping Station Improvements (Phase II)   | 2003 | 3.0   |
| 08010B  | Prepurchase Oxygen/Ozone Equipment (AMSWTF & RMWTF)  | 2003 | 19.5  |
| 08010ER | Ozone Addition to AMSWTF (600 mgd)   | 2003 | 96.0  |
| 08010T  | Intake System and RMWTF Controls   | 2003 | 4.3   |
| 08010W  | AMSWTF Ozone Controls  | 2003 | 0.6   |
| 100D    | SNWS Power System Upgrades - Equipment Prepurchase   | 2003 | 6.4   |
| 100E    | SNWS Power System Upgrades - Equipment Installation  | 2003 | 16.9  |
| 100F    | CRC Power System Upgrades  | 2003 | 5.0   |
| 100G    | SNWS Power System Upgrades - Material Prepurchase  | 2003 | 1.0   |
| 100T    | SNWS Power System Upgrades - Remote Terminal Units   | 2003 | 0.5   |
| 10510B  | NPC - Leased Fiber Optic Systems - Phase II  | 2003 | 1.7   |
| 14010F  | Foothills Pumping Station Turbine Project  | 2003 | 2.8   |
| 17010C  | North Valley Lateral - Grand Teton Drive to Beltway (60" - 2.4 miles)                                    | 2003 | 9.8   |
| 17010G  | North Valley Lateral - Beltway Crossing (60" - 0.4 miles)  | 2003 | 3.0   |
| 17010H  | North Valley Lateral - Decatur 2538/2430 PS to Grand Teton Drive (60" - 2.5 miles)                       | 2003 | 6.6   |
| 360B    | Equity Purchase of Electric Power Generation Facilities  | 2003 | 55.3  |
| 08010V  | Ozone Training and Start-up Services   | 2004 | 1.0   |
| 10010P  | NPC Connection to Decatur 2538 PS  | 2004 | 0.0   |
| 10010Q  | CRC River Mountains Pumping Station Expansion Power Supply   | 2004 | 1.9   |
| 16010A  | River Mountains Pumping Station B (175 mgd/315 mgd total), and Clearwell Expansion C (25 MG/75 MG total) | 2004 | 44.0  |
| 17010B  | North Valley Lateral - Grand Teton 2330 Res. To Valley Drive (72" - 7.0 miles)                           | 2004 | 22.4  |
| 17010D  | Sloan 2160 (91 mgd/111 mgd total) and Lamb 2350 (91 mgd/111 mgd total) Pumping Station Expansion         | 2004 | 15.1  |
| 17010F  | Decatur 2538/2430 PS (54 mgd-2538, 27 mgd-2430/Structure 105 mgd)  | 2004 | 31.1  |
| 17010J  | East Valley Lateral and North Valley Lateral Communications Improvements                                 | 2004 | 0.4   |
| 17010K  | Valley Drive Isolation Valve   | 2004 | 0.6   |
| 320C    | Disinfection By-Products Control Strategy  | 2004 | 0.2   |
| 320D    | AMSWTF Filter Media and Underdrain Improvements Study  | 2004 | 0.2   |
| 320G    | Lake Mead Intake No. 1 Modifications   | 2004 | 7.4   |
| 320H    | Pumping Plant 6 Rechlorination Station   | 2004 | 0.0   |
| 360A    | Equity Purchase of Electric Power Generation Facilities - Silverhawk Project                             | 2004 | 120.0 |
| 08210B  | RMWTF Prepurchase Ozone Equipment (150 mgd/300 mgd total)  | 2005 | 6.7   |
| 13010K  | East Valley Lateral Interconnections   | 2005 | 6.5   |
| 17010A  | East Valley Lateral - River Mtns. Res. To Desert Inn Rd. (78" - 8.2 miles)                               | 2005 | 49.8  |
| 19010A  | Horizon Ridge 2375 Reservoir Expansion (10 MG/20 MG total)   | 2005 | 11.9  |

|        |   |      |      |
|--------|---|------|------|
| 340F   | Transmission Pipeline Cathodic Protection System Repairs                                  | 2005 | 1.1  |
| 360E   | Feasibility Study of Intermountain Project Unit 3   | 2005 | 0.5  |
| 370F   | AMSWTF Utility Building Chiller Replacement   | 2005 | 0.0  |
| 07210C | Intake No. 2 to AMSWTF By-pass Pipeline   | 2006 | 17.7 |
| 08210A | RMWTF Expansion (150 mgd/300 mgd total)   | 2006 | 76.8 |
| 370H   | Flame Detection Equipment for High Pressure Hydraulic System                              | 2006 | 0.2  |
| 07210A | Raw Water Pumping System Expansion (200 mgd RMWTF + 160 mgd AMSWTF 460 mgd total)         | 2007 | 68.0 |
| 08010F | AMSWTF Process Improvements   | 2007 | 71.4 |
| 090S   | Virgin and Muddy Rivers Surface Water Development   | 2007 | 8.8  |
| 15010A | River Mountains 2530 Pumping Station Expansion - Equestrian Addition (7 mgd/14 mgd total) | 2007 | 0.9  |
| 17010L | In-Valley Isolation Valves  | 2007 | 4.4  |
| 300G   | RMWTF Operators Video Display Upgrade   | 2007 | 0.2  |
| 340G   | Transmission Pipelines Discharge Modifications Study                                      | 2007 | 0.4  |
| 370D   | Fiber-Optic Network Improvements  | 2007 | 1.3  |
| 370G   | AMSWTF Computer Room HVAC Replacement   | 2007 | 0.0  |
| 300B   | Radio Communication System Upgrades   | 2008 | 0.6  |
| 300C   | Overhead Crane Upgrades   | 2008 | 0.2  |
| 300I   | AMSWTF Asbestos Removal   | 2008 | 0.0  |
| 310C   | IPS-1 Pump and Motor Replacements   | 2008 | 28.7 |
| 320A   | RMWTF Water Quality Laboratory and Pilot Plant  | 2008 | 42.1 |
| 320E   | AMSWTF Cathodic Corrosion Protection System Repairs and Upgrades                          | 2008 | 1.5  |
| 320L   | AMSWTF Electrical Disconnect Switch Replacements  | 2008 | 0.2  |
| 320M   | Spare Filter Backwash Control Valve   | 2008 | 0.1  |
| 320R   | Water Quality Sampling and Testing Equipment  | 2008 | 1.0  |
| 340K   | Reservoir Vent Modifications  | 2008 | 0.4  |
| 340M   | Air Vacuum and Relief Valve Piping Adjustments  | 2008 | 0.1  |
| 360D   | Energy Supplier Conversion  | 2008 | 0.1  |
| 360F   | Rate of Flow Control Energy Recovery  | 2008 | 8.1  |
| 360G   | Intermountain Power Project Unit 3 - Predevelopment                                       | 2008 | 0.6  |
| 360I   | Hacienda Pumping Station Electrical Substation Upgrades                                   | 2008 | 1.8  |
| 360J   | AMSWTF & RMWTF Solar Photovoltaic Electric  | 2008 | 0.1  |
| 370J   | SNWA Office Tenant Improvements   | 2008 | 42.5 |
| 370K   | AMSWTF Warehouse Storage System Improvements  | 2008 | 0.0  |
| 370P   | Purchase SNWA Office Space  | 2008 | 36.5 |
| 07011B | Raw Water Pumping System - Warranty   | 2009 | 1.7  |
| 07012B | Flowserve Pump Replacement at BPS-1A & BPS2   | 2009 | 1.5  |
| 19010B | Duck Creek Isolation Valve  | 2009 | 4.2  |
| 19010C | Magic Rate-of-Flow Controls (15 MGD)  | 2009 | 5.9  |
| 300D   | Roofing Replacements  | 2009 | 0.9  |
| 300J   | Warm Springs Rate-of-Flow Control Station Offsite Improvements                            | 2009 | 0.0  |
| 310D   | Emergency Bypass Rate-of-flow Control Station Valve Replacements                          | 2009 | 2.6  |
| 310E   | North I-15 Treatment and Transmission Facilities Planning - Phase I                       | 2009 | 0.9  |

|          |  |              |                |
|----------|--|--------------|----------------|
| 320J     | Disinfection By-Products Studies   | 2009         | 0.3            |
| 320K     | Surface Water Treatment Pilot Studies  | 2009         | 1.9            |
| 340H     | Pumping Plant No. 7 Upgrades   | 2009         | 0.6            |
| 340I     | South Valley Facilities Expansion - Phase I                                    | 2009         | 13.4           |
| 340L     | Hemenway Rate-of-Flow Control Improvements                                     | 2009         | 0.5            |
| 340O     | Pumping Station 6 Forebay Relining   | 2009         | 0.1            |
| 340P     | Charleston Heights Lateral Repair and Valve Installation                       | 2009         | 1.9            |
| 360K     | High Concentrating Solar Photovoltaic Demonstration and Research               | 2009         | 2.3            |
| 360N     | Solar Photovoltaic Panels at AMSWTF Filters & Flocculation Basins              | 2009         | 0.1            |
| 370C     | RMWTF Fleet Maintenance & Electrical Maintenance Facility                      | 2009         | 4.0            |
| 370E     | AMSWTF Mechanic Maintenance Shop Addition                                      | 2009         | 13.0           |
| 370L     | SCADA Communications Upgrades  | 2009         | 0.4            |
| 370N     | AMSWTF Standby Generator Replacement   | 2009         | 0.3            |
| 070F05   | Lake Mead Intake No. 2 Connection and Modifications                            | 2010         | 40.4           |
| 320S     | Quagga Mussel Evaluation and Control Facilities                                | 2010         | 0.4            |
| 340A     | Coyote Spring Valley Well and Moapa Transmission System                        | 2010         | 52.6           |
| 370B     | Security System Upgrades   | 2010         | 2.0            |
| 310F     | IPS-2 Test Pump Procurement and Installation                                   | 2011         | 40.3           |
| 370O     | AMSWTF Utility Building Air Handler Replacement                                | 2011         | 0.3            |
| 370S     | Mold Abatement at River Mountains Water Treatment Facility                     | 2011         | 0.3            |
| 320N     | AMS Clearwell Slide Gates  | 2012         | 0.3            |
| 070F02C1 | Intake No. 3 Pumping Station   | 2014         | 21.9           |
| 070F02C2 | Intake No. 3 - Connector Tunnel  | 2014         | 96.9           |
| 320F     | AMSWTF Filtration System Valve Repairs   | 2014         | 0.1            |
| 340R     | Transmission Pipelines Cathodic Corrosion Protections System Repairs - Phase 2 | 2014         | 7.7            |
| 360M     | Renewable Energy Project Development   | 2015         | 3.4            |
| 070F01   | Lake Mead Intake No. 3 Shafts and Tunnel                                       | 2017         | 532.3          |
| 070F06   | Lake Mead Intake No. 3 Chemical Feed System                                    | 2017         | 2.6            |
| 320B     | Remodel Former AMSWTF Laboratory Spaces  | 2017         | 0.7            |
| 320P     | AMSWTF Chlorine Building I Rehabilitation                                      | 2017         | 0.1            |
| 340C     | Hitachi Motor Retrofit   | 2017         | 9.4            |
| 341A     | Pumping Station 6 Forebay Relining - Phase 2                                   | 2017         | 1.0            |
| 360C     | Electric Power Transmission Facilities   | 2017         | 0.3            |
| 340X     | Simmons Rate-of-Flow Control Station Pipeline Repairs and Hacienda ROFC Repair | 2018         | 0.1            |
| 070F04   | Discharge Pipeline   | 2018         | 38.2           |
| 13010H   | Disinfection Facilities - Horizon/Parkway/Bermuda                              | 2018         | 0.3            |
| 300E     | Control System Improvements  | 2018         | 30.2           |
| 340T     | Sloan Pumping Station Foundation Repairs (MEPS 6860                            | 2018         | 0.2            |
| 360H     | Pumping Station Electrical Transformer Repairs                                 | 2018         | 2.7            |
|          |  |              |                |
|          | <b>Completed Projects</b>  | <b>TOTAL</b> | <b>3,260.6</b> |

